Cúram 8.2.1

Universal Access Responsive Web Application Guide 8.2.0

Note

Before using this information and the product it supports, read the information in Notices on page 369

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Edition

This edition applies to Cúram 8.2.1.

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1 Universal Access

Cúram Citizen Engagement provides a configurable citizen-facing application that enables agencies to offer a web self-service solution to their citizens. It uses the Merative ™ Cúram Universal Access Responsive Web Application, a citizen-facing web application to provide citizens with online facilities. The Universal Access client uses modern technologies, such as React JavaScript, and the Cúram Design System to enable citizens to better access services in a browser from desktop, tablet, and mobile devices.

Cúram Citizen Engagement also supports authorized representatives, users who assist citizens in applying for benefits by extending the authorization beyond the citizen.

Cúram Platform and the application module provide the configurable business processes on the Cúram server.

The Merative ™ Cúram Universal Access Responsive Web Application client asset is updated at more regular intervals than Cúram Platform and the Merative ™ Cúram Universal Access application module and has its own version number scheme.

Note: Online documentation for Universal Access is provided for the most recent version only. To read the documentation for older versions of the Cúram Universal Access Responsive Web Application asset, or Merative ™ Cúram Universal Access with the classic client application, see the Cúram PDF library.

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2 What's new and release notes for Universal Access

Read about what's new and the release notes for recent versions of Merative ™ Cúram Universal Access.

2.1 What's new in Universal Access

Read about the enhancements and improvements in Merative ™ Cúram Universal Access with the Merative ™ Cúram Universal Access Responsive Web Application.

8.1.1 (23 April 2026)

No what's new updates in Merative™ Cúram Universal Access for this release.

2.2 Release notes

Read about enhancements and defect fixes in Merative ™ Cúram Universal Access with the Cúram Universal Access Responsive Web Application.

For more information about changes that depend on server-side updates, see the release notes for your specific version of Cúram at Merative Social Program Management.

For more information about compatibility with Cúram versions, see 4.1 Prerequisites and supported software on page 59.

We also provide migration guidelines that we recommend you follow to upgrade from your current version of CE. See 2.3 V8.0.0 Migration Guide on page 18.

8.2.0 (21 May 2026)

Decorative pictogram images announced by screen readers (SPM-138313)

Previously, decorative pictogram images on the profile notices page were announced by screen readers due to embedded title elements in the SVG files, causing unnecessary noise for users relying on assistive technology. The title tags have now been removed from pictograms, ensuring screen readers correctly skip these decorative elements and improving the accessibility experience. (DT037142)

Read-only fields not visually distinctive in High Contrast mode (SPM-138909)

Previously, read-only fields were not visually distinguishable from editable fields when Windows High Contrast mode was enabled, making it difficult for users with low vision to identify which fields could not be edited. The read-only icon now acts as a tooltip trigger that displays a localized "read-only" label on `TextInput`, `DateAdapter`, and `DropdownAdapter` components, improving field distinction in both normal and High Contrast modes. (DT037189)

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2.3 V8.0.0 Migration Guide

This migration guide should be followed if upgrading an application built using V7 of the Universal Access Responsive Web Application to V8. If upgrading from versions lower than V7, you must complete the migration steps in the associated migration guides in order.

This guide outlines the migration steps required to upgrade the reference application provided with the Universal Access Responsive Web Application asset. Customized versions of the application may require additional work and further analysis should be carried out to identify that work. It is recommended that a file comparison is carried out between all files received in the extracted `universal-access-starter-pack.tgz` file in the V8 asset and the equivalent file in your project. Differences will need to be reviewed and applied manually. The following section will highlight many of these differences.

1. **Update the following in "package.json"**

   Update the scripts section

   - The following scripts must be added (or updated) in your package.json

   ```
   "build-css": "sass --quiet-deps --load-path ./src --load-path ./node_modules --
   load-path ../../node_modules src/sass/styles.scss:src/css/styles.css && npm run
    post-css",

   "watch-css": "npm run build-css && sass --quiet-deps --load-path ./src --load-
   path ../../node_modules --load-path ./node_modules src/sass/styles.scss:src/
   css/styles.css --watch",
   ```

   Update the versions of following packages in dependencies

   - The following scripts must be added (or updated) in your package.json

   ```
   "react": "^18.3.1",
   "react-dom": "^18.3.1",
   "eslint": "^9.34.0",
   ```

   Remove WDS Core in dependencies

   - Remove `@govhhs/govhhs-design-system-core` from the dependencies section in package.json.

2. **Design System Core Package Removal**

   The direct dependency on `@govhhs/govhhs-design-system-core` has been removed from the codebase. All assets and styles are now accessed through `@govhhs/govhhs-design-system-react/core/`.

   Applications using direct imports from the core package must update their import paths.

   Specific Path Updates Required

   In files like `src/sass/styles.scss` and `src/sass/custom-variables.scss`, update all references from:

   ```
   @govhhs/govhhs-design-system-core/dist/
   ```

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to

```
@govhhs/govhhs-design-system-react/core/dist/
```

Example: custom-variables.scss

```
$icon-path: "@govhhs/govhhs-design-system-react/core/dist/icons";
$image-path: "@govhhs/govhhs-design-system-react/core/dist/img";
```

Example: styles.scss

```
@use '@govhhs/govhhs-design-system-react/core/src/stylesheets/govhhs-wds' as *
 with (
  $icon-path: "@govhhs/govhhs-design-system-react/core/dist/icons",
  $image-path: "@govhhs/govhhs-design-system-react/core/dist/img",
  $css--theming-enabled: true,
);
```

Example: JS import update

```
// Before
import rect from '@govhhs/govhhs-design-system-core/dist/img/round-rec-60.svg';
// After
import rect from '@govhhs/govhhs-design-system-react/core/dist/img/round-
rec-60.svg';
```

Impact and Migration

This change streamlines the package structure by consolidating design system assets within the React package, reducing dependency complexity. Applications using the previous design system core package directly will need to:

- Update all import statements to use the new paths
- Update SCSS variables that reference design system paths
- Rebuild applications to ensure proper resolution of the new asset paths
- Check for any styling inconsistencies that may arise from this change

3. **Jest Update and Configuration Changes**:

This release updates Jest to version 29. To run tests npm run jest in universal access with the package test-framework lower then 7.9.0, you'll need to update the Jest configuration in the following files:

File: `./tests/config/snapshot.config.js`

Replace the line:

```
unitTestConfig.transformIgnorePatterns = ['/node_modules/(?!@spm|intl-
messageformat|intl-messageformat-parser|chroma-js).+\.js$',];
```

with:

```
unitTestConfig.transformIgnorePatterns = ['/node_modules/(?!@spm|intl-
messageformat|intl-messageformat-parser|chroma-js|nanoid).+\.js$',];
```

File: `./tests/config/unit.config.js`

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Replace the line:

```
unitTestConfig.transformIgnorePatterns = ['/node_modules/(?!@spm|intl-
messageformat|intl-messageformat-parser|chroma-js).+\.js$',];
```

with:

```
unitTestConfig.transformIgnorePatterns = ['/node_modules/(?!@spm|intl-
messageformat|intl-messageformat-parser|chroma-js|uuid|accessibility-checker|
exceljs|nanoid|testcafe|testcafe-hammerhead).+\.js$',];
```

4. **Prevent Navigation Flicker on Page Refresh**

   To prevent the "Login" and "Sign-Up" buttons from appearing briefly when refreshing the citizen home page, update `./src/App.js`:

   - Add the `isNavigationHidden` prop to the `ApplicationHeaderComponent` within the SSOVerifier placeholder
   - Remove all `isEmpty={false}` props from every instance of `ApplicationHeaderComponent`

   ```
   ...
   <CookiesHandler
       footer={<ApplicationFooter />}
       header={
           <ApplicationHeaderComponent
           isALinkedUser={() => false}
           isAppealsEnabled={false}
           />
       }
   >
   <ConnectivityHandler>
       <SSOVerifier
           placeholder={
               <>
                   <ApplicationHeaderComponent
                       isALinkedUser={() => false}
                       isAppealsEnabled={false}
                       isNavigationHidden
                   />
                   <Main className='wds-u-bg--page' id='maincontent' pushFooter>
                       {routes}
                   </Main>
               </>
           }
       >
           <ApplicationHeader />
           <ErrorBoundary>
               <SessionTimeout />
               <Toaster />
               {routes}
           </ErrorBoundary>
           <ApplicationFooter />
       </SSOVerifier>
   </ConnectivityHandler>
   ...
   ```

5. **To hide React 19 Deprecation Warnings**

   Add the following lines in `./src/index.js`:

   ```
   import { hideReact19DeprecationWarningsInBrowser } from '@spm/core-ui';
   ```

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Place this after imports

```
hideReact19DeprecationWarningsInBrowser();
```

Add the following import in `./tests/config/setup-tests.js`:

```
import { shouldProcessConsoleMessage } from '@spm/test-framework';
```

Add the following code at the end of the file:

```
const shouldPrint = shouldProcessConsoleMessage;
// Store original console methods
const originalConsoleError = global.console.error;
const originalConsoleWarn = global.console.warn;
const originalConsoleLog = global.console.log;
// Ensure React 19 deprecation warnings aren't printed out to the console
global.console.error = (error, ...args) => {
 let errorMessage = typeof error === 'string' ? error : error.message;
 args.forEach(argument => {
 errorMessage = errorMessage.replace(/%([Odios])/, argument);
 });
 try {
 throw new Error(errorMessage);
 } catch (error_) {
 if (shouldPrint(error_)) {
 originalConsoleError(error, ...args);
 }
 }
};
global.console.warn = (error, ...args) => {
 let errorMessage = typeof error === 'string' ? error : error.message;
 args.forEach(argument => {
 errorMessage = errorMessage.replace(/%([Odios])/, argument);
 });
 try {
 throw new Error(errorMessage);
 } catch (error_) {
 if (shouldPrint(error_)) {
 originalConsoleWarn(error, ...args);
 }
 }
};
global.console.log = (error, ...args) => {
 let errorMessage = typeof error === 'string' ? error : error.message;
 args.forEach(argument => {
 errorMessage = errorMessage.replace(/%([Odios])/, argument);
 });
 try {
 throw new Error(errorMessage);
 } catch (error_) {
 if (shouldPrint(error_)) {
 originalConsoleLog(error, ...args);
 }
 }
};
```

6. **ESLint upgrade from v7 to v9**

Remove the Old ESLint Configuration (delete the following files):

- `.eslintignore`
- `.eslintrc.js`

Add the New ESLint Configuration

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- Create `eslint.config.js` with the following configuration:

```
/*
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*/
const baseConfig = require('@spm/eslint-config');
module.exports = [
 {
 ignores: ['node_modules/**', 'src/**/generated/**', 'src/serviceWorker.js'],
 },
 ...baseConfig,
];
```

7. **Update Vite Configuration Filter Pattern**

   In `./vite.config.js`, locate the `build.onLoad()` call and update the `filter` argument to use the cross-platform path separator pattern.

   Replace:

```
build.onLoad({ filter: /src\/.*\.js$/ }, async args => ({
```

   with:

```
build.onLoad({ filter: /src[/\\].*\.js$/ }, async args => ({
```

   This change ensures the filter pattern works correctly on both Unix-based systems (using `/`) and Windows (using `\`).

8. **Vite manualChunks — object-based manualChunks**

   V8 replaces the previous dynamic/chunk-per-dependency approach with an explicit object-based `manualChunks` mapping to prevent circular chunk dependencies introduced by core dependency updates.

   The old config used helpers that spread package dependencies into `manualChunks` (for example `...filterForChunkSplitting(dependencies)`). Changes in dependency graphs caused circular chunk references in Rollup. The new approach groups related libraries into named chunks (for example `react-redux`, `design-system`, `vendor-utils`, `formatjs`, `lodash`) using an explicit object so Rollup produces deterministic bundles without circular dependencies.

   1. Remove dynamic chunk-splitting code

      Open `vite.config.js` and remove any of the following lines if present:

      - `import { dependencies } from './package.json';`
      - The `filterForChunkSplitting` helper function (or similar) and any `...filterForChunkSplitting(dependencies)` spread inside `manualChunks`.

   2. Replace `manualChunks` with the object mapping

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Locate in your vite.config.js, `manualChunks` property (it will be inside `rollupOptions.output`) and replace its contents with the object below (use this as the baseline — add app-specific modules as needed):

```
manualChunks: {
 'react-redux': ['react','react-dom','react-router-dom','redux','react-
redux','@reduxjs/toolkit','prop-types'],
 'design-system': ['@govhhs/govhhs-design-system-react'],
 'vendor-utils': ['@rjsf/core','flatpickr','cleave.js','date-
fns','dompurify','superagent','bowser'],
 formatjs: ['@formatjs/intl','@formatjs/icu-messageformat-parser','@formatjs/fast-
memoize','@formatjs/intl-utils','@formatjs/intl-getcanonicallocales','@formatjs/
intl-locale','@formatjs/intl-numberformat','@formatjs/intl-
pluralrules','@formatjs/intl-relativetimeformat','react-intl','intl-
messageformat'],
 lodash:
 ['lodash','lodash.invoke','lodash.get','lodash.differencewith','lodash.words',
'lodash.find','lodash.clonedeep','lodash.dropright','lodash.head','lodash.omit'],
}
```

Note: See the vite.config.js inside "UA_Web_App_8.x.x > packages > spm-universal-access-starter-pack-8.x.x.tgz" for reference.

9. **Install new v8 dependencies following the standard process (manual or automated step)**

    1. Download the Merative ™ Cúram Universal Access Responsive Web Application and Cúram Design System Node packages. Open Cúram Support, under Software Downloads, select Go to Downloads, and follow the instructions to download the `SPM_DS_<version>.zip` and `UA_Web_App_<version>.zip` archive files.
    2. Extract SPM_DS_<version>.zip and UA_Web_App_<version>.zip archive files to any directory. For example:

        ```
        ```
        /Install_Dir/SPM_DS_V7.0.0/govhhs-govhhs-design-system-react-2.0.0
        /Install_Dir/UA_WebApp_V7.0.0/spm-universal-access-8.0.0.tgz
        ```
        ```

    3. Install Dependencies

        - **Installing Dependencies (Manual)** *(Not the recommended option)*

            Note: This step even though has always been the default, can be time-consuming. In addition to the manual option, there is an alternative automated version for this step, which is recommended.

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Firstly, from your custom application directory, install the Cúram Design System and the Merative ™ Cúram Universal Access dependencies by entering the following command:

```
npm i --legacy-peer-deps \
<SPM_DS_version_path>/govhhs-govhhs-design-system-core-<version>.tgz \
<SPM_DS_version_path>/govhhs-govhhs-design-system-react-<version>.tgz \
<SPM_DS_version_path>/spm-core-<version>.tgz \
<SPM_DS_version_path>/spm-core-ui-<version>.tgz \
<SPM_DS_version_path>/spm-core-ui-locales-<version>.tgz \
<SPM_DS_version_path>/spm-intelligent-evidence-gathering-<version>.tgz \
<SPM_DS_version_path>/spm-intelligent-evidence-gathering-locales-
<version>.tgz \
<SPM_DS_version_path>/spm-eslint-config-<version>.tgz \
<SPM_DS_version_path>/spm-test-framework-<version>.tgz \
<SPM_DS_version_path>/spm-web-dev-accelerator-<version>.tgz \
<SPM_DS_version_path>/spm-web-dev-accelerator-scripts-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-ui-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-ui-locales-<version>.tgz \
<UA_Web_App_version_path>/spm-mock-server-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-mocks-<version>.tgz
```

Where `<SPM_DS_version_path>` is the path to the extracted SPM_DS_<version> folder and `<UA_Web_App_version_path>` is the path to the extracted UA_Web_App_<version> folder. And <version> matches the version of the .tgz files in the folder.

For example:

```
/Install_Dir/SPM_DS_V7.0.0/govhhs-govhhs-design-system-react-2.0.0
/Install_Dir/UA_WebApp_V7.0.0/spm-universal-access-8.0.0.tgz
```

Secondly, then run the following command to install the 3rd party package dependencies, such as react and redux

```
npm install --legacy-peer-deps
```

Note: The Cúram Universal Access Responsive Web Application is using the legacypeer-deps option as a temporary fix while we work to remove this constraint. For more information about legacy-peer-deps, see npm Docs.

Note: You need to install all the dependencies as part of the same command because of the npm idealtree feature, which predicts how your dependency tree specified in your package.json file will look after installing all packages. If one of the required dependencies specified above is missing in the command during installation, idealtree will fail with an error.

Note: Ignore any Node package dependency warnings for now. If needed, you can resolve them later.

- **Installing Dependencies (Automated)** (*recommended option*)

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Firstly, move the extracted packages (`UA_Web_App_<version>` and `SPM_DS_<version>`) in 8.1 and 8.2 to the same directory level as `<universal-access-custom-app>`. After this, your folder structure should look as follows:

```
.
├── UA_Web_App_<version>
├── SPM_DS_<version>
└── universal-access-custom-app
  ├── babel.config.js
  ├── bundle.stats.html
  ├── index.html
  ├── installCEDeps.sh
  ├── mock/
  ├── package.json
  ├── public/
  ├── src/
  ├── tests/
  └── vite.config.js
```

For Mac OS users when downloading the zip files, a quarantine flag will be automatically added to the `./installCEDeps.sh` script preventing it from executing. The quarantine flag can be removed and the script can be made executable by running the following commands:

```
> xattr -d com.apple.quarantine ./installCEDeps.sh
> chmod +x installCEDeps.sh
```

For Windows OS users, please ensure you can run shell scripts from your commandline tool of choice. We recommend installing Git for Windows so that Git and optional Unix tools such as Bash are added to your PATH.

Next, from your custom application directory, install the Cúram Design System and the Merative ™ Cúram Universal Access Node packages by entering the following commands:

```
> npm run install-ce-deps
```

This will automatically install the Cúram Design System and the Merative ™ Cúram Universal Access dependencies followed by installing the 3rd party dependencies such as react and redux.

10. Build the app and ensure that key scripts still work

After completing the migration steps above, you need to verify that your project still works correctly by performing the following tasks.

```
npm install --legacy-peer-deps
npm run build
npm run jest
npm run lint
```

11. Lint remediation (if needed)

If `npm run lint` reports new lint errors after the ESLint upgrade, remediate the reported issues before proceeding. You can attempt automatic fixes with:

```
npm run lint -- --fix
```

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Manually fix any remaining lint errors reported by the command.

12. **Start your app**

    Ensure that all commands in previous steps are successful before proceeding to start your application.

```
npm start
```

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3 Business overview of the Cúram Universal Access Responsive Web Application

Citizen Engagement uses the Merative ™ Cúram Universal Access Responsive Web Application, a citizen-facing web application to provide citizens with online facilities. Citizen Engagement provides domain-specific predefined business processes that you can configure to meet your organization's needs.

Cúram Platform and the Merative ™ Cúram Universal Access application module provide the configurable predefined business processes on the server.

3.1 Screen

Citizens can self-check their eligibility for benefits and services before they submit an application. Checking for eligibility is implemented by using the Screening feature.

Screening has many advantages for both citizens and agencies:

- Citizens can check their eligibility for the benefits that the agency offers before they apply, and without having to go through the whole application process.
- Screening reduces the need for citizens to interact with the agency.
- Screening reduces the time and effort that caseworkers need to spend on screening tasks, freeing them up to concentrate on their core duties.
- Screening can quickly determine whether citizens are potentially eligible for one or more benefits based on a short set of guided questions and eligibility rules. Based on this determination, citizens can then decide whether to apply for the benefits.

Related concepts

Configuring screenings on page 230
Define the different types of screenings that citizens can complete to identify programs that they might be eligible to receive.

Filtered and eligibility screening types

To balance the need for quick screening results against the need to gather detailed citizen information, Merative ™ Cúram Universal Access supports two types of screening. Screening results indicate the programs for which citizens might be eligible.

Filtered screening

Filtered screening allows citizens to quickly see whether they are eligible for benefits before they go through the more detailed eligibility screening process. Asking questions about their marriage or pregnancy status can quickly identify and eliminate programs for which citizens are unlikely to be eligible.

Filtered screening is defined by specifying a simple filter script and rules. Typically, a filtered screening script is not longer than two pages. If filtered screening is defined, the system

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immediately displays the filtered screening script when citizens select the screening. The system does not prompt citizens to select programs. Instead, the system runs the rules for all programs that are defined in the filtered screening rule set.

You can easily and quickly customize a filtered screening. For each screening, you configure the available programs and eligibility requirements. You then configure the script, rules, and data schema to collect and process citizen information, and define what information is displayed to citizens. When defined, citizens can screen themselves to identify programs that they might be eligible to receive. For more information, see 7.5 Configuring screenings on page 230.

Program selection takes precedence over filtered screening. For more information about program selection, see 3.1 Screen on page 27.

Eligibility screening

Eligibility screening determines citizens' potential eligibility to receive a program or programs. To gather the more detailed information that is needed to determine whether citizens qualify for benefits, eligibility screening uses a longer and more detailed IEG script. Typical questions can relate to the citizen's income, or resources, for example, savings, stocks, or bonds.

Eligibility screening consists of a script to collect data and a rule set to determine the citizen's potential eligibility for one or more programs.

Eligibility screening rules are run upon completion of the screening script and the results are displayed for citizens on the **Here's what you might get** page.

The eligibility screening rules are run only for programs that are associated with the screening.

The relationship between filtered and eligibility screening

Some points to note regarding the two screening types:

- Filtered screening is a precursor to eligibility screening.
- Filtered screening is optional. Citizens can screen for eligibility without doing a filtered screening.
- After they complete a filtered screening, citizens must then complete an eligibility screening before they can apply for benefits.

For more information about the flow of an IEG script configuration, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

Related concepts

The screening auto-save property on page 233
Use the screening curam.citizenworkspace.auto.save.screening property to set whether screenings are automatically saved for authenticated citizens.

Configuring screenings on page 230
Define the different types of screenings that citizens can complete to identify programs that they might be eligible to receive.

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Anonymous or authenticated screening

Merative ™ Cúram Universal Access supports both anonymous and authenticated screening. Citizens who are not logged in, and want to retain a degree of anonymity, can screen themselves for benefit eligibility while unauthenticated. Citizens who are logged in can complete an authenticated screening.

Anonymous screening

Unauthenticated citizens can screen themselves for benefits without logging in but they cannot save their screening until they log in. Administrators can use an IEG script configuration to set if citizens have an option to save their progress. If an administrator sets the option to save progress on a particular script, unauthenticated citizens are taken to the **Log in** page when they select to save. When logged in or signed up, citizens' screening progress is saved and they are taken to the **Dashboard**.

For more information about IEG script configuration, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

Authenticated screening

Citizens who are logged in to Universal Access can complete an authenticated screening.

Pre-populating citizen data

Citizens might want the convenience of having their data pre-populated when they start screening. Use the curam.citizenaccount.prepopulate.screening system property to pre-populate citizen data into a screening form for linked users:

- If enabled, basic details for citizens are populated in the script.
- If disabled, citizens must complete their details.

For more information, see Prepopulating the screening script on page 234.

Saving screenings for authenticated citizens

Authenticated citizens can save a screening and resume it later. As citizens progress through the script, information that is entered on the previous page is automatically saved each time that citizens click **Next** in the IEG script. If there is a timeout or the browser is closed accidentally, automatically saving the information prevents the loss of the screening information. Use the curam.citizenworkspace.auto.save.screening system property to set whether screenings are automatically saved in the citizen account. For more information, see The screening auto-save property on page 233.

In-progress screenings

When citizens save an in-progress screening, or it is automatically saved by the system, an in-progress screening message is displayed in the citizens' dashboard as a reminder. Citizens can complete an in-progress screening or they can delete it. When citizens complete a screening, the **Here's what you might get** page is displayed and the in-progress message is removed. The screening also appears on the **Benefits checker** page on the **Dashboard**.

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The Benefits you might get pane

Citizens can view completed screenings on the **Benefits you might get** pane in the citizen **Dashboard**. To ensure that the most recent results of a screening are kept relevant for the citizen, one screening of the same type can be in the complete state at a time. Citizens can use the **Benefits you might get** pane to view the results of the screening or delete the screening from the pane.

Configuring rescreening

Citizens might need to change a screening if they forget to provide some information or their circumstances change. In the administration application, you can set whether to allow citizens to change and resubmit their screening.

- If the setting is set to **Yes**, citizens can rescreen from the **Benefits you might get** pane or from the **Screening results** page.
- If the setting is **No**, citizens do not see these links, in this case if the citizen wants to rescreen, they must delete their screening and start again.

For more information, see Configuring rescreening on page 233.

Related concepts

Prepopulating the screening script on page 234
When citizens screen from a citizen account, you can prepopulate information that is already known about the citizen who is screening.

The screening auto-save property on page 233
Use the screening curam.citizenworkspace.auto.save.screening property to set whether screenings are automatically saved for authenticated citizens.

Related tasks

Configuring rescreening on page 233
Configure whether citizens can change and resubmit their screenings.

The Check what you might get page

Screening starts when citizens select **Check what you might get** on the organization **Home** page.

When citizens select to create a new account, an account creation screen is displayed. After the citizen successfully creates the account, the citizen is automatically logged in to the system and the screening process proceeds.

If citizens are logged in and they click **Check** on any screening where they have a previously completed or in-progress screening of that type, they are alerted to the existence of that previous screening. Citizens can then either view the current progress of that screening or they can start screening again.

If citizens start screening again, any in progress screenings are overwritten. Any completed screening is only overwritten when citizens get to the screening results page.

The **Check what you might get** page lists and describes each of the screenings that are available.

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Note: The **Check what you might get** page is laid out as follows:

- Page description - a banner indicating to citizens that they can screen themselves.
- A list of screenings with a description of what each screening is.
- A list of benefits with a description of what each benefit offers.

A screening might allow citizens to screen for one or more programs. Citizens are prompted to select the programs for which they want to be screened. However, there are three situations when citizens are not prompted to select programs:

- If filtered screening is defined for the screening. In this instance, citizens are prompted to select the programs for which they want to be screened when filtered screening is complete.
- If a single program is defined for the screening.
- If a screening has been configured to disable program selection by citizens. The Program Selection indicator determines whether citizens can select specific programs to screen for or whether they are brought directly into a screening script where they are screened for all programs associated with the screening. For more information, see *Defining Program Selection*.

  Note: Program selection takes precedence over filtered screening. Also, if filtered screening is enabled but only one program configured, citizens are brought directly to eligibility screening for that single program.

Citizens select the screening and the programs for which they want to be screened and then click **Check**. The system then starts the associated IEG script so that screening can start.

Related concepts

Configuring screenings on page 230
Define the different types of screenings that citizens can complete to identify programs that they might be eligible to receive.

The Here's what you might get screening results page

When a screening is submitted, the eligibility rules run and the list of programs is displayed with the results on **Here's what you might get** page.

- Programs that the citizens might be eligible for are marked with the Eligible

  icon. Citizens can click **Apply** to apply for these programs online through the **Apply for benefits** flow.
- Programs for which eligibility cannot be determined are listed with a suitable message, which can be configured in the administration application. For example:

  ```
  Based on what you have told us, we are unable to make a
   determination for Child Care Assistance.
  ```

Administrators can use Cúram Express® Rules (CER) to provide detailed explanatory text to help citizens understand the decisions that are made about potential eligibility.

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If citizens' circumstances change, they can screen again at any time by clicking **Check again for what you might get**.

How to apply

For each screening type, you can configure helpful, informative text to display on the **Here's what you might get** page header. For example, "You can apply online using the **Apply** button, print the application and mail it to the office, or visit our office and speak to a caseworker."

You can configure this text in the **How to apply** rich text editor in the administration application. For more information, see Configuring screening display information on page 232.

The **How to apply** editor can include links. This is useful if the agency wants citizens to visit their local office. For example, the agency might choose to use Google Maps, or any maps provider of their choice, to show citizens where their local office is.

Applying for benefits offline

The **Here's what you might get** page also indicates whether benefits can be applied for offline. Benefits that can be applied for offline typically have a **Download application** link to download the application form, see Specifying a PDF application form for screening results on page 224.

Transferring data from screening to application

You can configure the application so that citizens' screening data can be reused when they apply directly from the **Here's what you might get** page. When configured, some details based on the schema that is applied are transferred into the application. This existing information saves the citizen time when they are completing their application.

Related concepts

Configuring screening display information on page 232
You can configure the screening information display fields for each screening.

Screening from a citizen account

Citizens can screen themselves for programs while logged in to their citizen account.

By using a short set of guided questions and eligibility rules, citizens can determine whether they might be eligible for one or more programs. Based on this determination, the citizen can decide whether to apply for the programs identified.

To perform a screening, citizens take the following steps:

1. Select **Check what you might get** on the organization **Home** page.
2. Select **Check** on the eligibility category.
3. Select the benefits they think they might get on the **Include benefits** page
4. Select **Continue** to start the check eligibility process.
5. Citizens then answer the questions on the screening script.
6. Select **Next** to navigate through the pages in the script.
7. When the process is complete, citizens are shown the benefits they might be eligible for on the **Here's what you might get** page.

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8. Citizens can then **Apply** for benefits.

Related concepts

Prepopulating the screening script on page 234
When citizens screen from a citizen account, you can prepopulate information that is already known about the citizen who is screening.

3.2 Apply

Citizens can apply for benefits online by submitting an application form that includes personal details like income, expenses, employment, and education. This information becomes evidence on the citizen's case that agencies can use to determine their eligibility for benefits. Citizens can also apply offline by downloading the application form to send to the agency or to bring to their local agency office.

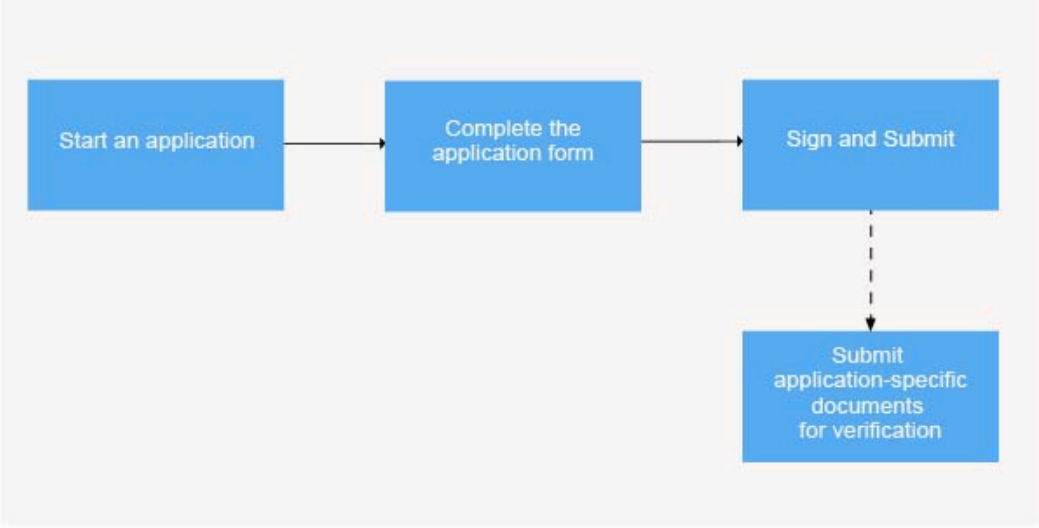

Figure 1: Key business flow for Apply

Related concepts

Configuring applications on page 236

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Use Cúram administration and system administration applications to define the applications that are available for citizens. For each application, you can configure the available programs and an application script and data schema. You must also configure the remaining applications details, such as application withdrawal reasons.

Start an application

Citizens can browse the available benefits and apply for the benefits that they need. Benefit applications can include single or multiple benefits.

> **Note:** The term *benefit* in Merative ™ Cúram Universal Access Responsive Web Application is synonymous with *program* in Cúram.

If configured, citizens can apply for multiple benefits with a single application. For example, citizens might use the **Income Support** application to apply for the **Food Assistance** and **Cash Assistance** benefits.

Applications for benefits can be grouped into categories, for example **Unemployment services**. A customizable icon can be displayed for each benefit type along with the benefit name and a description of the benefit.

Citizens can also click **Learn more** to learn more about each application or can click **Download application** to print the application form, complete it by hand and mail it or bring it to the agency.

What can I configure or customize?

- Administrators can define the applications, benefits, and categories in the Universal Access section of the Administration Application. The application and benefit descriptions and benefit icons are configurable. Benefits are displayed in alphabetical order by default, but you can override this order when you configure the online categories.
- The configuration property **Multiple application** is available at the program level. If this property is set to **No** and there is a pending decision for the program, the **Apply** option is disabled.

  The multiple applications configuration property to allow multiple applications for the same benefit is available at the benefit level. The **Apply** button is conditionally displayed if it is set to Yes or if multiple applications set to No and the citizen has no pending applications.
- If the More Info URL setting is configured for the application, **Learn more** is displayed.
- If the PDF Application Form setting is configured for the application, **Download application** is displayed, see Specifying a PDF application form for program applications on page 223.

Complete the application form

Application forms in the Cúram Universal Access Responsive Web Application are created with IEG scripts and rendered by IEG. When citizens click **Start application** to complete the form,

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they are starting an IEG script, which is known as an intake script. Citizens complete the form to be ready to submit the application.

Depending on how authentication is configured, applications are managed in one of the following ways:

- Citizens must log in to their account to apply. They are prompted to log in or sign up from the application overview page, or at the end of the application form.
- Citizens can submit an application without an account.

Typically, an application form consists of an overview page, a form divided into sections, and a summary page. If the application can be used for multiple benefits, a page where citizens are prompted to select the benefits that they want to apply for can be shown.

By default, applications are automatically saved for logged-in citizens each time that they click **Continue** in the application form. Citizens can also manually save in-progress applications. Applications are not saved for citizens who are not logged in.

When citizens quit a benefit application, three options are available depending on how the intake application is configured.

- Save the application.

  If citizens try to save the application without being logged in, the login screen opens so they can log in or create an account. If citizens create an account, they are automatically logged in to the system and the intake process starts. The system also checks whether they have any existing applications.
- Leave the application without saving.

  If citizens try to quit the application without saving it, the application displays a warning dialog box to prevent accidental loss of information.

  > **Note:** Citizens must click the application name on the page to see the **Leave this application** dialog box. The application name is also conditionally enabled depending on whether the **quit and delete** option is enabled in the IEG script.
- Cancel the application.

  Clicking **Cancel** returns citizens to the point at which they left the application script with the previously entered data available. Citizens can cancel an application without saving at any point before they submit. Citizens can cancel only when the application is in progress, if they **Save and Exit**, they can then only **Delete** the application.

What can I configure or customize?

- The curam.citizenaccount.prepopulate.screening system property sets whether the IEG script is pre-populated with any available citizen information.
- Where the system is configured to allow multiple benefits for an application, citizens are prompted to select benefits, with the following exceptions.
  - If a single benefit is defined for the application.
  - Each application is configured so that the citizen can select a benefit or automatically select all of the programs that are associated with the application.

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The program selection configuration property is available at the application level:

- If set to Yes, an **Include benefits** page is displayed that allows a citizen to select some or all of the benefits. If an application contains a single benefit, the **Include benefits** page is not displayed.
- If set to **No** and the application contains multiple programs, all the benefits are automatically applied for and the **Include benefits** page is not displayed.

- A system property specifies whether applications are automatically saved.
- You can configure the application to require citizens to log in to apply for benefits:
  - Typically, citizens can start an application without logging in, but to save an application they must log in or sign up for an account. Citizens who are logged in can save an application for a benefit before they submit it and then return later to complete the application.

    The agency can configure the system to specify whether citizens need to be authenticated before they apply for benefits:

    - If authentication is enabled, citizens must either create a new user account or log in to an account before they start the application process.
    - If authentication is disabled, citizens can proceed with the application without authentication.

    The curam.citizenworkspace.authenticated.intake configuration property specifies whether citizens must log in to apply for benefits. If the property is set to **NO**, citizens do not have to log in to apply for benefits. If the property is set to **YES**, citizens must create an account or log in to an existing account to apply for benefits.

Sign and submit

Depending on the configuration, the application can be submitted when citizens complete the form or when they exit a form before it completes. After citizens submit an application for a benefit, the way the intake script is processed depends on how the benefit is configured.

An intake application can be configured so that it can be submitted before it is complete or only when complete. If the property is enabled, citizens must log in to an existing account or create a new account before the application can be sent to the agency.

When citizens send an application to the agency, either by exiting or completing a script, the screen that is displayed depends on:

- Whether citizens are logged in.
- Whether citizens must either create or log in to an account before the application is submitted.

If citizens are not logged in, they are prompted to log in or create a new account. For more information, see Manage existing applications on page 39.

Log-in requirements

The system can be configured as follows:

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- Citizens are not required to identify themselves to the system and can send an application to the agency without logging in or creating an account.
- Citizens must log in or create an account.

In-progress and submitted applications

If citizens log in before they submit the application, the system can determine whether they have:

- In-progress application of the same type. Citizens can choose to submit the new application or discard it and keep the saved application. The options available are to **Start again** or **Resume** the in-progress application.
- Previously submitted applications for the same programs that are still pending disposition, that is, awaiting a decision by the agency. If citizens submit applications for the same programs, the system determines whether they can still submit any of the programs to the agency for processing.
- Benefits can be configured so that multiple applications can be submitted for the program at any time. For example, submitting a new application for cash assistance for a different household unit than a previously submitted application that the agency is processing. This screen indicates that the application cannot be submitted for all of the programs for which the citizen wants to apply. However, the application might still be sent to the agency. There are three options:
  - Continue to submit the application for the programs for which the citizen can apply.
  - Save the application.
  - Delete the application.

Partial submissions

You can configure the application so citizens can submit a partial application without logging in.

If the **Submit on Completion Only** administration setting is selected, citizens can submit a partially completed application. Citizens see the option to submit a partially completed application on the Save and Exit modal when they save and exit an IEG script. If the **Submit on Completion Only** administration setting is not selected, citizens cannot submit a partially completed application. Citizens don't need to be logged in to submit the partial application.

Specify a submission script

To allow citizens to submit an application to the agency, you must specify a submission script for the application in the administration system. The submission script is required because applications require additional information, which does not form part of the application, to be captured before the applications can be submitted.

For example, a Cash Assistance application requires information that relates to the citizen's ability to attend an interview. This information would not be appropriate for another type of application that does not require an interview to be conducted, for example, unemployment insurance. Electronic signatures are another example of the type of information that would typically be captured by using a submission script.

This data might not be captured as part of the script, as citizens can submit the application before they complete the script.

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Processing a submitted script

The processing that happens on completion of the submission script depends upon the configuration of the programs for which citizens are applying. Program eligibility can be configured such that it might be determined by using Cúram or a remote system.

If Cúram is specified as the eligibility system, an application case creation process is started. The application case creation process includes a search and match capability, which attempts to match citizens on a new application to registered persons on the system based on configured search criteria. When search and match finishes, one or more application cases are created. If the programs that are applied for are configured for different application case types, multiple application cases are created. If the application was submitted within the business hours of the root location for the organization, the application date on the application case is set to today's date. If the application is submitted outside of the business hours of the organization, the application date is set to the next business date.

Mapping application data to case evidence tables

The data that is entered for the application might be mapped to case evidence tables. The mappings are configured for a particular program by using the Cúram Data Mapping Editor. A mapping configuration is needed for a program so that evidence entities can be created and populated in response to an online application submission for that program.

Association of requested programs with application cases

When the application case is created, the programs that are requested by the citizen are associated with the relevant application case. Some organizations might impose time limits within which an application for a program must be processed. A number of timer configuration options are available for a particular program. These timers are set when a program is associated with an application case.

If the eligibility is determined by a remote system, configurations are provided to allow a web service to be started on a remote system.

Display submission confirmation

A submission confirmation is displayed upon successful submission of an application, which displays the reference number that is associated with the submitted application. Citizens can use this reference number in any further correspondence about the application with the agency.

Submission confirmation

When citizens successfully sign and submit an application, they see an overview of their application. The stages specific to the application process are now updated with a confirmation message to indicate that the application was successfully submitted. The message can contain:

- A customizable icon.
- An application reference number.
- Informational message for the citizen.

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- A **Save submitted application PDF** link that allows citizens to download a PDF summary of information that is entered as part of the application, see 7.3 Configuring PDFs on page 222.

Manage existing applications

When a citizen logs in, their existing applications are listed and the citizen has different options that depend on the state of the application.

Existing applications are in one of the following categories:

- **Application in progress**. The application is in progress but is not yet submitted. Citizens can either continue or delete applications in this category.
- **Pending decision**. The application is awaiting a decision from the caseworker. Citizens can either download or withdraw applications in this category.
- **Active**. The caseworker authorized the application.
- **Denied** The caseworker rejected the application.
- **Authorization failed**. Citizens can download applications in this state.
- **Withdrawn**. Citizens can withdraw an application if it is in **Pending decision** or **Denied** status.

The application lists are displayed only if there are items in the list, that is, if there are no saved applications.

Citizens can resume or delete an incomplete application, withdraw a submitted application, or start a new application. Citizens can apply for benefits that they previously applied for.

Citizens can:

- Resume an application from where it was last saved by selecting the **Continue** link on the **Your benefits** page, or by selecting **Continue** on an in-progress application alert in the **Dashboard**. The application is resumed from where it was last saved.
- Withdraw an application. If available, the withdraw option is displayed for the pending decision application on the **Your benefits** page.
- Delete an application. Citizens can delete in-progress applications only that were not yet submitted to the agency.

Withdrawing an application

Citizens can withdraw a successfully submitted application or they can also withdraw applications for all or any one of the programs.

Citizens can withdraw each program individually. The reasons for withdrawing the program application can be configured for the intake application in the administration system.

The **Reason** field contains a list of configurable code table values that are defined by the administrator. The list of values is configured at application level.

The **First name**, **Last name**, and **Reason** fields are mandatory.

The submit action on the page withdraws the application. The system automatically updates the status of the programs that are associated with the application case to **Withdrawn** and sends a notification to the application caseworker.

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Deleting an application

Citizens can delete applications before they are submitted to the agency. Deleting an application physically deletes the application record.

Submit application-specific documents

Citizens with linked accounts can upload the required supporting documents for their application. After a citizen signs and submits their application, they are shown the information that they need to verify and the documents that they can upload to prove that information.

Citizens can add and submit one or more documents. If previously submitted documentation is suitable, citizens can select and submit that documentation, or choose to submit new documentation.

When they add a document, they must specify the type of document from the list of eligible document types. For phones or tablets, the file picker uses the native functionality of the device so they can take a photo, select a picture, or select a file.

By default, the allowed file formats are JPG, JPEG, PNG, TIFF, and PDF and the file size limit is 5 MB. The allowed file formats and file size limit can be customized by the organization. On desktop devices, they select only valid file formats. On mobile devices, an error is shown if they select an unsupported file type.

Citizens can view or change their uploaded documents to check them before they submit them to the agency.

When citizens successfully submit documents, the caseworker is notified that documents are ready to verify. A task is generated for the caseworker in the Cúram caseworker application.

3.3 Verify

If your organization includes the online submission of documents in their business process, citizens are notified in the Cúram Universal Access Responsive Web Application when some of their information needs to be verified with supporting documentation. They can then provide that supporting documentation online. Both citizens and caseworkers receive notifications, alerting them to any steps to take. Case workers control the verification of evidence, ensuring adherence to agency standards.

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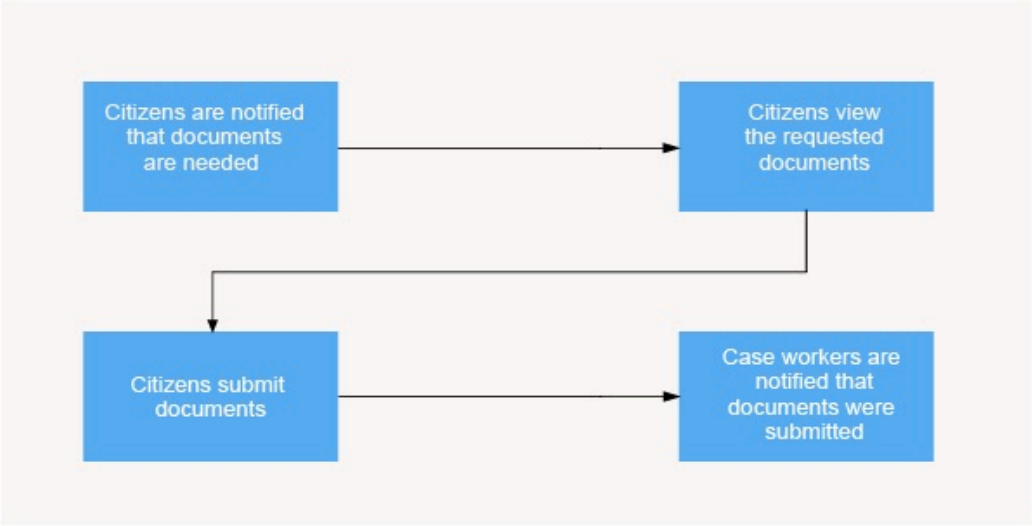

Figure 2: Key business flow for Verifications

Related concepts

Customizing verifications on page 291
If your organization includes the online submission of documents in their business process, citizens can upload and submit documents from the Merative ™ Cúram Universal Access Responsive Web Application to prove information that they provided in their benefit applications. You can customize a number of aspects of the verifications functionality in the application.

Citizen alerts and to-do messages

When citizens must provide documentation to the agency, they see an alert in their dashboard, and a to-do message for each application or benefit case where documents are needed. Only linked users see the verification alert and to-do messages.

The alert is removed when there is at least one document submitted for each verification.

To-dos are grouped by case, so a citizen can have multiple to-dos if they have multiple applications or cases. The to-do messages for a case are removed when all documents are provided for that case.

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Viewing verifications

Citizens who are linked users can upload and submit documents to prove information that they provide. For example, they can submit a birth certificate to prove a date of birth and a caseworker can then verify the evidence with the submitted document.

Verifications are displayed whenever they are generated for that user, either by online or in-person interactions with the organization. For example, verifications can be generated during an online benefit application process, or on receipt of a postal application form, or when a caseworker meets with a client in the office.

Verifications that are raised for any case members on a case or application for which the citizen is the primary client are displayed to the citizen. If there are verifications raised on behalf of an entire family, the verification is raised against the primary client and are displayed as such to the citizen.

Where there are multiple people on an application or case, you can see and can submit documentation for each person's outstanding verification requirements.

Verified and non-verified verifications are displayed, but canceled verifications are not displayed. When the information is verified, the verification's status is updated. If a verification item utilization expires, the verification is shown here again and a message indicates that more recent documentation is needed.

Related concepts

The 'Your documents' page on page 49
When a citizen who is a linked user is logged in, they see a **Your documents** page that provides a consolidated view of their verifications and submitted documents. Citizens can see what information they need to provide documentation for, information for which they have submitted documentation, and verifications that were done in the past.

Submitting documents

Citizens can add and submit one or more documents. For phones or tablets, the file picker uses the native functionality of the device so they can take a photo, select a picture or select a file. When they submit a document, they must specify the type of document from the list of eligible document types. The caseworker is notified that documents are ready to verify.

To prevent unnecessary submissions, citizens cannot submit further documents when the verification status is **Verified**.

A verification is displayed for each item of information for which caseworkers need documentation to verify. Citizens can see a list of the information to be verified and the eligible documents that a caseworker can use to verify that information.

When submitting documents on desktop devices, Citizens can select only files in valid file formats. If you are using a phone or tablet, the file picker uses the native functionality of the device so you can take a photo, select a picture or select a file. On mobile devices, an error is shown if you select an unsupported file format. By default, the allowed file formats are JPG, JPEG, PNG, TIFF, and PDF and the file size limit is 5 MB. You can customize the allowed file formats and file size limit.

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Citizens specify the type of document from the list of eligible document types such as a passport. The eligible document types are based on the verification item utilization.

Citizens can check a document before they submit by clicking the thumbnail image to see the document. They can delete a document before they submit.

On submission, the verification status is updated and a task is generated for the caseworker in the Cúram caseworker application.

Sharing and reusing documents

You can configure whether documents of a certain type can be shared and reused across verifications that require the same document type.

- If you choose that a document can only be used against that verification, and must be unique, then the document is not shared across any other verifications that might use the same document type. A citizen might need to resubmit the document multiple times if they have multiple cases with the same information.
- If you chose that a document can be shared and reused, the submitted documents can be associated with other relevant verification items. If previously submitted documentation is suitable, citizens can select that documentation to reuse for the verification.

Administrators can configure a verification item utilization by setting the **Usage Type** to `Shared` or `Unique`.

For more information, see the *Verification Guide*.

Caseworker tasks

When documents are submitted for verification by a citizen, a task is generated for the caseworker that is assigned to the citizen’s case.

The task indicates that evidence on the case or for the person is now ready for verification, based on the documents submitted.

A system configuration is available to determine whether the task is generated when all documents for an evidence record are received, or when all documents for all evidence records on the case are received.

When the caseworker opens the task, details of the evidence, it’s related documentation and whether it’s ready for verification are visible to the caseworker for review.

Related tasks

Customizing caseworker tasks on page 295
When a citizen submits a document for a verification, a task is generated for the caseworker. Tasks are displayed to the caseworker that is assigned to the citizen's case when they log in to the caseworker application. System administrators can configure the system to display a task each time a citizen provides all documents for an individual evidence record on a case, or to display the task only when a citizen has provided all documents for every evidence record on a case.

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3.4 Track

When citizens create a secure citizen account, they can access a range of relevant information. Citizens can also use the citizen account to track and manage their interactions with the agency.

Related concepts

Configuring the citizen account on page 244
Although customization is required to modify some citizen account information, you can configure information on the citizen account and the **Contact Information** tab.

Customizing the citizen account on page 316
Users can use the citizen account to log in to a secure area where users can screen and apply for programs.

Creating a citizen account and logging in

Citizens can create a citizen account at any time, including during the check eligibility and application processes.

Creating an account

Citizens can select **Sign up** on the organization **Home** page to create an account. Citizens then enter their first and last names, an optional email address, and an account password. If citizens select **I don't have an email address**, they can specify a user name instead.

Administration configurations

- Number of login attempts before the account is locked out: 5
- Number of remaining login attempts before a user warning is displayed: 3
- Number of break-in attempts before an account is locked: 3
- Maximum and minimum characters in a user name
- Maximum and minimum characters in a password

For more information about user name and password length, see the *Security Guide*.

Logging in

To log in to the citizen account, citizens select **Log in** on the organization **Home** page. Depending on how they created their account, citizens enter either an email or user name. They then enter their `password` and click **Next**. You can configure the number of log-in attempts citizens have before their account is locked out. For example, if you set the number of login attempts to three, the account is locked for citizens who make more than three unsuccessful login attempts.

On a successful login, the **Citizen account** dashboard is displayed.

System messages

Agencies use system messages to broadcast messages to either all public citizens who are not logged into an account, or specifically to clients who have a citizen account. System messages that are broadcast to all public citizens are displayed on the organization **Home** page. For example, agencies can use system messages to provide information and help line numbers

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to clients for a natural disaster, such as a flood. You can configure system messages in the Administration application by using the **New System Message** page. For more information about system messages, see Citizen account messages on page 47.

Related concepts

Screen on page 27
Citizens can self-check their eligibility for benefits and services before they submit an application. Checking for eligibility is implemented by using the Screening feature.

Account management configurations on page 219
Use the following configuration properties to define the behavior of password validations for citizen accounts. For the Cúram Universal Access Responsive Web Application, you must implement these validations in the application before you enable them.

The Dashboard page

When a citizen is logged in, their **Dashboard** shows an overview of their account.

If your organization uses Appeals, and a citizen has applied for at least one benefit, they also see an **Appeals** page. For more information, see Requesting an appeal from the citizen account on page 57.

If your organization uses Verifications, and a citizen is a linked user with at least one verification that needs documentation, they also see a **Your documents** page. For more information, see The '**Your documents**' page on page 49.

- **System messages**
  System messages are broadcast to all logged-in citizens and are displayed at the top of the dashboard. For example, system messages can inform citizens about planned system outages.

  Citizens who are linked users can see system messages about their verifications.
- **In-progress applications messages**
  Messages about current in-progress applications are displayed at the top of the screen. Citizens can either continue or delete their in-progress applications.
- **The 'Check what you might get' card**
  Citizens can click **Check what you might get** to check their own eligibility for benefits. For more information, see The **Check what you might get** page on page 30.
- **The 'Apply for benefits' card**
  Citizens can click **Apply for benefits** to apply for a benefit. For more information, see Start an application on page 34.
- **The 'Review your profile' card**
  Citizens can click **Review your profile** to update their profile with a change in circumstances. For more information, see Enter a life event on page 53.
- **The Payments pane**
  Lists a summary of the most recent payments to the citizen. Citizens can click **All payments** to view the payment details or see their payment history. For more information, see The **All payments** page on page 46

  - **Expected and previous payments**
    Citizens can view their expected and previous benefit payments in their account, and see how the payments were calculated. The payment dates, benefit type, and payment amount

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are always displayed. The adjustment indicator displays whether the entitlement amount has changed.

> **Note:**
>
> By default, the display of additional payment information is disabled. For information about how to enable the display of additional payment information, see Configuring payments on page 256.

- **The 'Benefits you might get' pane**
  Lists a summary of any in-progress eligibility checks. Citizens can click recheck or delete individual eligibility checks.
- **The To-Dos pane**
  Lists actions that citizens must take to complete an application, including action messages that the caseworker creates for the citizen. For example, a citizen might need to provide supplementary information to support a benefit application.

  Citizens who are linked users can see messages about their verifications.
- **The Meetings pane**
  Lists a summary of meetings that citizens were invited to including the dates of the meetings. The most recent meeting is shown first.
- **The Notifications pane**
  Lists acknowledgments for all of the applications that citizens make. A date is included for most notifications. The most recent notification is shown first. Example notifications include application acknowledgment, appeal request messages, or service request messages.

Related concepts

Customizing specific message types on page 321
Organizations can customize the default message to create a referral message or a service delivery message.

The All payments page

The **All payments** page shows more details about payments to the citizen. The messages that are associated with these payments can be retrieved from Cúram or another remote system. Canceled or expired payments are also displayed.

The **All payments** page has the same expected and previous payments sections as the user's dashboard. Citizens can view their expected and previous benefit payments in their account, and see how the payments were calculated. The payment dates, benefit type, and payment amount are always displayed. The adjustment indicator displays whether the entitlement amount has changed.

If a payment consists of more than one benefit, all benefits and case numbers are included in the title. The improved layout of the breakdown shows each payment, and any deductions or components that make up the overall payment amount for that benefit. If a benefit has been adjusted, the adjustment increase or decrease amount is displayed.

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Note:

By default, the display of additional payment information is disabled. For information about how to enable the display of additional payment information, see Configuring payments on page 256.

Payment type

Payments can be by check, electronic funds transfer (EFT), cash, or voucher. Depending on the payment type, the following details can be displayed for each payment:

- **Check**
  Payee address and check number
- **EFT**
  Bank sort code and bank account number
- **Cash**
  Payee address
- **Voucher**
  Payee address and voucher number

Citizen account messages

In addition to system messages and in-progress application messages, the **Payments**, **To-Dos**, **Meetings**, and **Notifications** panes on the **Dashboard** display citizen account messages. Messages from remote systems can also be displayed by using web services. For example, messages can be about meetings for the citizen, or activities that are scheduled for the citizen.

Displaying a message

Each message has a title and an icon. In addition, the **To-Dos** and **Notifications** messages have an effective date and time that specifies when the message is displayed. Usually the effective date of a message is set to the current date, but you can set the effective date by configuration settings.

For example, you might not want to display a message immediately if a service is scheduled in the future. You can configure the message to display a specified number of days before the start date of the service. The system uses the number of days to populate the effective date.

Messages from remote systems are displayed based on the effective date that is specified in the web service.

Prioritization and ordering

You can assign a priority to a message so that it is displayed at the top of the **Meeting** listing.

You can also configure the order of messages types in the administration system. For example, you can configure payment messages to be displayed first and meeting messages to be displayed second.

Message duration

The message type determines the length of time that the message is displayed. You can set the message duration by start and end dates or by replacing one message with another.

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Where items have start and end dates, you can use them to specify the duration that message is displayed. For example, service messages are displayed until the start date of the service.

In other cases, you can replace a message with another message. Use a configuration setting to determine whether to:

- Specify the duration for when a message is replaced.
- Specify the number of days after which the message is removed.

The duration of messages from remote systems is based on the expiry date that is defined in the web service.

System messages

Agencies use system messages to broadcast messages to either all public citizens who are not logged into an account, or specifically to clients who have a citizen account. For example, agencies can use system messages to provide information and help line numbers to clients for a natural disaster, such as a flood. You can configure system messages in the Administration application by using the **New System Message** page.

The **Title** and **Message** fields define the title of the message and the message body that is displayed to a client in the citizen application.

The **Visibility** field defines the user group that a message is visible to, for example, either only logged-in users, only public users, or only public and logged-in users.

The **Effective Date and Time** field defines an effective date for the message, such as when the message is displayed in the dashboard page. The **Expiry Date and Time** field defines an expiry date for the message, for instance, when the message no longer is to be displayed in the dashboard.

Messages are saved with a status of **In-Edit**. Messages must be published before they display in the citizen account. After it is published, the message is active and is displayed either to public citizens or in the Citizen Account, based on the visibility, effective date and expiry dates that you have defined.

Predictive Response Manager

The Predictive Response Manager (PRM) is the infrastructure that is used to build and then generate and display messages on the Citizen Account home page.

A number of default messages are provided and are described in this information along with their associated configurations

For more information about configuring messages, see Customizing specific message types on page 321.

Verifications messages

Verifications messages are displayed on the **To-Dos** pane. The messages are removed from the list when documents for all verifiable data items are supplied.

Verifications are grouped by person or case, either application case or integrated case, rather than as individual notifications. A case reference number is provided where appropriate. The verifiable data items are displayed in a list.

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The Your benefits page

When a citizen is logged in, they can see all of their benefits applications and the application status on the **Your benefits** page.

The **Your benefits** page displays applications that can be in one of the following states:

- **Application in progress**. The application is in progress but is not yet submitted. Citizens can either continue or delete applications in this category.
- **Pending decision**. The application is awaiting a decision from the caseworker. Citizens can either download or withdraw applications in this category.
- **Active**. The caseworker authorized the application.
- **Denied** The caseworker rejected the application.
- **Authorization failed**. Citizens can download applications in this state.
- **Withdrawn**. Citizens can withdraw an application if it is in **Pending decision** or **Denied** status.

If a submitted application is approved by the caseworker and a product delivery case is created for that application, the application is also displayed on the **Your benefits** page.

If enhanced benefit and payment information is enabled, the **Your benefits** page also displays a message about the expected next payment for active benefits.

The 'Your documents' page

When a citizen who is a linked user is logged in, they see a **Your documents** page that provides a consolidated view of their verifications and submitted documents. Citizens can see what information they need to provide documentation for, information for which they have submitted documentation, and verifications that were done in the past.

The verification items are organized based on their status:

- **Documents required**
  Verifications that require citizens to submit documentation so that their information can be verified by a caseworker.
- **Documents received**
  Verifications for which citizens submitted documents for information to be verified by a caseworker.
- **Documents accepted**
  Verifications for which a citizen submitted documents, and their information was verified by a caseworker.

Verifications

Each item of information for verification is shown. If needed, you can customize how information is presented for individual verifications, see Customizing how verification information is presented on page 293.

Verifications show the following summary information:

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- The information to be verified, which can be a single verifiable data item, or a group of verifiable data items related to an evidence record.
- The status of the verification:
  - **Not yet submitted**. One or more documents are required to verify this information but were not yet submitted.
  - **Documentation submitted**. The caseworker is reviewing the submitted documents or has verified some of the required documents for multiple verifiable data items.
  - **Verified** A caseworker has successfully verified this item of information with the submitted documents.
- The person for which information needs to be verified, that is, the case participant. For example **For James Smith**.
- The due date, that is, the date by which the documents are to be submitted by the citizen. For example, **Due 26 Sept**. By default, this is the same date as the date that the information needs to be verified by the caseworker. If needed, your organization can configure a lead time to the due date so that document are submitted earlier to give caseworkers enough time to verify the evidence and process the application.
- The names of any programs that are associated with an application case, or product deliveries that are associated with an integrated case, depending on whether a citizen is applying for or receiving benefits. **Application for ... <program>** is shown for application cases, for example, **Application for Rent Assistance**. The program name is shown for product delivery cases, for example **Food Assistance**.

Verification details

The following verification details are shown:

- **Provide documents that show**

  The details of the information that needs to be verified, which consists of the verifiable data items, and a description of the evidence provided and what the verification was raised against.
- **Eligible documents**

  A list of the documents that can be provided to prove the information. For example:

  - Paid Medical Invoice
  - Prescription Receipts
  - Doctor's Letter
- **Add or reuse documents**

  To prove information is correct, you can add documents or reuse documents that you have already submitted.
- **Your submitted documents**

  If documents were previously submitted for the validation, the documents are listed here. You can download your previously submitted documents to see them in detail. A message indicates any documents that are no longer valid.

Related concepts

Viewing verifications on page 42

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Citizens who are linked users can upload and submit documents to prove information that they provide. For example, they can submit a birth certificate to prove a date of birth and a caseworker can then verify the evidence with the submitted document.

The Notices page

When a citizen is logged in, they can see all communications that are relevant to them on the **Notices** page, with sent, received, or normal status indicated. Notices are typically formal written communications that are issued to meet legal, regulatory, or state requirements, which are created by using letterhead templates.

For example, online appeal requests are shown on the **Notices** page.

By default, communications are listed where the logged-in citizen is the concern or is a correspondent on the communication, in other words, for linked users.

Citizens can see the communication description and any attachment in the expanded view. They can view or save attachments by clicking the **View attachment** link.

Citizens can request that notices are sent to them by mail. The system logs the request to send the communication to the citizen. The request includes communication (ID), date, time, and status. After a citizen requests a notice by mail, the **Request this notice by mail** link is disabled.

What can you configure or customize?

You can configure the number of communications that are listed. You can also create a custom implementation to change what communications are shown, such as showing communications for other family members.

The processing of requests for communications by mail is customizable, so customers can add their own logic to deal with these requests.

Related concepts

Customizing the Notices page on page 324
By default, the notices relevant to the linked user are listed on the **Notices** page. You can replace the default CitizenCommunicationsStrategy implementation with your own custom implementation.

Related tasks

Configuring communications on the Notices page on page 256
You can configure the maximum number of communications that are displayed on the **Notices** page. By default, up to 20 communications are displayed.

The Profile page

When a citizen is logged in, they can see their information, including contact information, on their **Profile** page.

Citizen information

Citizens can see profile information, such as their contact information. Their contact information can include information like their address, phone number, and

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email address. A configuration setting determines whether the citizen's contact information is displayed on the citizen account. For example, an agency can set the `curam.citizenaccount.contactinformation.show.client.details` property to `false` to disable citizen contact information. For more information, see Configuring contact information on page 253.

Tell us what has changed

Citizens can submit updates to their profile information and contact details. For more information, see 3.5 Update on page 52.

Related concepts

Configuring contact information on page 253
Configure contact information for citizens and caseworkers.

Selecting a language

Citizens can select a preferred language from the **language** drop-down in the footer of the application. When citizens select a preferred language, the application is displayed in that language. The application retains the preferred language setting based on a cached value in the browser.

Note: The **language** drop-down only appears when more than one language is configured for the application.

Note: A citizen's language preference is not saved if the browser is configured to block access to its local storage, the application reverts to the default language (English) when the page is reloaded.

3.5 Update

Citizens can update their details by submitting a change in their circumstances to the agency, which is implemented by using the Life Events feature. Examples of changes in circumstances include a change of address, a birth, or marriage. These significant events in citizens' lives might affect the benefits or services that they are receiving or are due to receive.

Key business flow scenario

James Smith is in receipt of child benefit and is also working full time. However, he just lost his job as the company that he works for is closing. James needs to tell the agency about losing his job so that he can get his benefit reviewed. Life Events allows James to communicate this change to the agency without visiting the office. This reduces the amount of interaction with the agency and saves valuable caseworker time.

Related concepts

Configuring life events on page 241

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For each life event, you must define how information is collected, stored, and displayed. You can configure life event information categories, mappings to dynamic evidence, and information sharing with internal and external sources.

Enter a life event

Citizens who are logged in can review their existing profile information on the **Profile page** and make any required changes. They can submit a change in their circumstances by selecting either **Review your profile** on their dashboard or selecting **Profile** to open the **Profile** page.

The 'Tell us if anything has changed' pane

The **Tell us if anything has changed** pane displays the available life events, for example, **Change of Address** or **Change in Employment Status**. Each configured life event is a card, with a description that is configurable by an administrator in Universal Access life event administration.

The administrator can categorize life events in Universal Access life event administration. For example, you can categorize changing jobs, income changes, and change of address life events under **Employment**. If a life event is not categorized, it appears in the **All** category tab. If citizens cannot immediately see the life event that they want, they can select **See more** to see the life events across all categories.

The life event Overview page

When citizens select a life event, the **Overview** page outlines the update process.

The steps list any information or documentation that they must provide, and approximately how long the submission takes to complete. The steps can also include how the agency might inform them of the change when the change of circumstance is complete.

When citizens read and understand the information that is presented, they can select **Start** to enter the submission form.

When citizens begin a submission form, they are presented with a guided set of questions that use Intelligent Evidence Gathering (IEG) to gather information. The IEG script for the form is defined in Universal Access life event administration.

The life event Summary page

After they enter information, a **Summary** page displays so they can review their changes before submission.

The life event Confirmation page

On successful submission of the life event, the **Confirmation** page is displayed.

The confirmation page can display information that is useful and relevant to the submitted life event. This information can be defined in Universal Access life event administration.

- Text can be added. For example, agencies can say that a change might take some time as a caseworker review is needed.

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- The **Next steps** pane can display information such as actions that citizens might need to take after they submit the change. For example, citizens might need to update their rent if they move into a new home. The **Next steps** pane can also include links to external websites.

Citizens don't need to have a case on the system to submit a life event. If they don’t, the submitted information isn’t transmitted to a case owner. Instead, the submitted information is stored internally and the agency must decide what to do with the information.

The life event Consent page

An optional **Consent** page can be displayed so that citizens can consent to having their details sent to selected other agencies or third parties. Administrators can configure the **Consent** page to display for a life event in Universal Access life event administration. This action constitutes the citizens' consent to send information to the selected agencies. The information can be transmitted to a remote system through a web service or to the relevant case owners on an Cúram system through the evidence broker.

The life events change history

Citizens can access their previously submitted life events from the dashboard by clicking **Review your profile** > **Previous changes**. The list of life events is sorted by the submission date. They can select a life event record from the history list to view a summary of the information that they submitted to the agency.

Submit documents for verification

If your organization includes the online submission of documents in their business process, citizens can upload and submit supporting documentation for information that they provide, so caseworkers can verify their changes. For more information, see Submitting documents on page 42.

Related concepts

Configuring a life event on page 241
You can configure a life event in the administration application on the **New Life Event** page.

3.6 Appeal

If your organization includes appeals in their business process, citizens can appeal decisions on their benefits online from their citizen accounts on their own devices. If your organization uses the Cúram Appeals application module, your organization can process appeals through the full appeals life cycle that is provided by that solution.

Figure 3: Key business flow for Appeals

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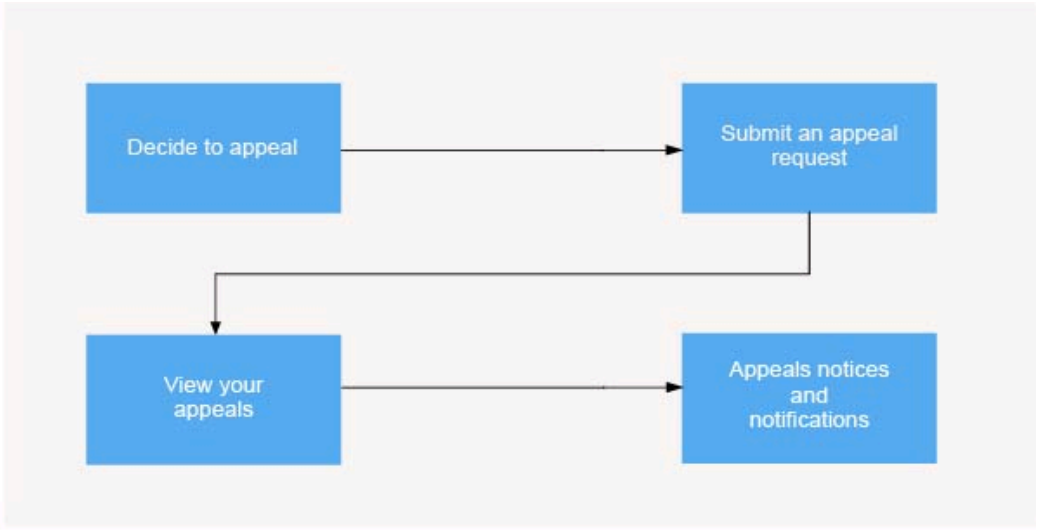

1. Decide to appeal on page 55
2. Submit an appeal request on page 56
3. View your appeals on page 56
4. Appeals notices and notifications on page 57

Related tasks

Customizing appeals on page 315
You can customize appeals to suit your organization. You can integrate with an appeals system of your choice. If you are licensed for the Cúram Appeals application module, the Cúram appeals functionality is available on installation.

Decide to appeal

If citizens don't agree with a decision on their benefits, they can appeal the decision. They can appeal for themselves or a family member, and can appeal online regardless of how they originally applied. A citizen must have applied for at least one benefit in order to appeal.

By default, they can appeal:

- An eligibility determination.

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- A change to their eligibility.
- Their calculated benefit.

Citizens are informed of their rights of appeal, and an overview page explains anything that citizens need to know before they request an appeal.

Submit an appeal request

After they read their appeal rights and understand the appeals process, citizens complete a form with all of the relevant information. This information can range from details of the benefit itself to supplemental information needed to establish informal reviews and hearings such as interpreters or emergency needs.

You can configure the form to ask for the specific information that is needed by your organization. The Cúram Design System accommodates a wide range of question formats to enable the citizen to easily complete this form. You can use a summary page to provide further information in the form to help the citizen and to alleviate specific concerns.

After they enter and review their appeal request details, citizens sign and submit the request for appeal and get a confirmation of the submission. The confirmation page outlines the next steps and sets out the time frames for the organization to respond, and any communications to be expected.

Appeals processing

A caseworker or hearing official can receive notification of that appeal and begin processing.

- When the Cúram Appeals application module is installed, the full appeals lifecycle and statuses in that solution are supported. A task is created and assigned to an appeal request work queue when the citizen submits the request. The appeal request is recorded against the citizen's person record. A PDF file is generated from the IEG script and is stored for caseworker reference as a communication against the appellant in the caseworker application.

  A caseworker can then act on the request and either acknowledge the request and continue with the appeal process or reject the request. An acknowledgment or rejection message is displayed in the citizen's account. A list of submitted appeal requests is provided in the citizen's account and provides a view of the request's status.
- When the Cúram Appeals application module is not installed, a citizen can request an appeal. They can receive an appeal request submitted status, and the organization must implement an appeals solution to handle the submitted appeal requests and other appeal lifecycle processing.
- Alternatively, an organization can implement a solution to have a third-party appeals system process the appeal and to generate the appropriate appeal lifecycle processing, statuses, and messaging.

View your appeals

Citizens can see their appeals on the **Appeals** page. All appeals that citizens submit are displayed and are updated with the appropriate color-coded statuses as they move through the Appeals

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lifecycle of hearings and decisions. At any stage, citizens can log in and understand what is happening with their appeal.

The **Appeals** page displays each appeal in a card, with copy of the original appeal details if needed. Typically, the details that are provided in the earlier form are added to a PDF, both the citizen and the caseworker receive a copy.

The statuses of appeals are updated as the appeal moves through the appeals lifecycle, as pre-configured for the Cúram Appeals application module, or as configured for your organization's custom appeals process.

Appeals notices and notifications

Citizens receive both formal notices and informal notifications at specific milestones in the appeals process. These updates provide them with instant status updates, while they wait for formal notice of a decision or next steps.

- **Notices**
  Citizens can see communications in the **Notices** page, which are typically formal written communications about the appeal or hearing, typically issued to meet legal, regulatory, or state requirements. Notices are often created by using letterhead templates.
- **Notifications**
  Citizens can see messages in the **Notifications** pane on their dashboard, which are typically informal messages that inform the citizen of any significant point in a process. For example, for appeals, notification can inform citizens of any progression on their appeal request, such as when their appeal request was first acknowledged, or if their appeal was accepted or denied.

Requesting an appeal from the citizen account

When logged into their citizen account, a citizen can review their rights of appeal. They can request an appeal on a benefit decision if they are a participant on a Cúram application or case.

Before you begin

For example, a citizen might be deemed ineligible on application, or have their benefit payments reduced. If they don't agree with the decision or the circumstances of the decision, they can appeal the decision.

Procedure

1. Go to the **Appeals** page.
2. Click **Request an appeal**. The appeals process overview page is displayed.
3. Review the overview of the appeals process, and when you are ready, click **Start**. The appeal request form opens.
4. Complete the appeal request form.
5. Sign and submit the form.
6. Your appeal request is complete. Review the **Confirmation and next steps** information.

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4 Installing the application development environment and web server

The Merative ™ Cúram Universal Access Responsive Web Application requires a React JavaScript development environment in addition to the Cúram Java development environment. You can deploy your web application on a web server in a production-like environment as part of your development process. Deployment in a production environment is outside the scope of this documentation, but you can refer to the instructions for guidance.

Note: The Merative ™ Cúram Universal Access Responsive Web Application installation includes the Cúram Design System so you don't need to install the design system separately.

4.1 Prerequisites and supported software

Before you install or upgrade, review the prerequisites and supported software to ensure compatibility.

Cúram Platform and the Merative ™ Cúram Universal Access application module

Cúram Platform and the Merative ™ Cúram Universal Access application module installed on the server are prerequisites for the Merative ™ Cúram Universal Access Responsive Web Application client asset that is needed for Cúram Citizen Engagement.

Merative ™ Cúram Universal Access Responsive Web Application is released at more frequent intervals and requires specific Cúram and Merative ™ Cúram Universal Access application module versions to benefit from server-side enhancements, security updates, and defect fixes.

Note:

- From Merative ™ Cúram Universal Access Responsive Web Application 5.0.0 onwards, new features, server-side enhancements, and defect fixes are supported only in the most recent Cúram version lines. Security fixes and defect fixes are supported on Cúram 7.0.10-7.0.11.
- The Merative ™ Cúram Universal Access Responsive Web Application 3.x.x version line continues to be supported for security updates and critical defect fixes only on the older compatible version lines of Cúram, 7.0.10-7.0.11.
- The Merative ™ Cúram Universal Access Responsive Web Application 2.6 version line continues to be supported for security updates and critical defect fixes only on the older compatible version lines of Cúram, 7.0.4 -7.0.9.

For more information about the support strategy, see 11.4 Citizen Engagement support strategy on page 367.

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Table 1: Compatibility with Cúram

A list of the asset versions and their compatible Cúram versions.

Asset versions	Compatible Cúram versions
8.2.0 8.1.1 8.1.0 8.0.0 7.11.2	• 8.2.1 for all new features, enhancements, and defect fixes. • 7.0.10-7.0.11 for security fixes and defect fixes.
7.11.1 7.11.0 7.10.1 7.10.0 7.9.0	• 8.2.0 for all new features, enhancements, and defect fixes. • 7.0.10-7.0.11 for security fixes and defect fixes.
7.8.0 7.7.1 7.7.0 7.6.2 7.6.1 7.6.0 7.5.0 7.4.0	• 8.1.3 for all new features, enhancements, and defect fixes. • 7.0.10-7.0.11 for security fixes and defect fixes.
7.3.1 7.3.0 7.2.0 7.1.0 7.0.2 7.0.1 7.0.0	• 8.1.2 for all new features, enhancements, and defect fixes. • 7.0.10-7.0.11 for security fixes and defect fixes.
6.3.1 6.3.0 6.2.3 6.2.2	• 8.1.1 for all new features, enhancements, and defect fixes. • 7.0.10-7.0.11 for security fixes and defect fixes.
6.2.1 6.2.0 6.1.4	• 8.1.0 for all new features, enhancements, and defect fixes. • 7.0.10-7.0.11 for security fixes and defect fixes.

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Asset versions	Compatible Cúram versions
6.1.3 6.1.2 6.1.1 6.1.0	• 8.0.3 for all new features, enhancements, and defect fixes. • 7.0.10-7.0.11 for security fixes and defect fixes.
6.0.2 6.0.1 6.0.0 5.3.2 5.3.1 5.3.0 5.2.2 5.2.1 5.2.0 5.1.0	• 8.0.2 for all new features, enhancements, and defect fixes. • 7.0.10-7.0.11 for security fixes and defect fixes.
5.0.0	• 8.0.1 for all new features, enhancements, and defect fixes. • 7.0.10-7.0.11 for security fixes and defect fixes.
4.1.4 4.1.3 4.1.2 4.1.1 4.1.0	• 8.0.1 for all new features, enhancements, and defect fixes.
4.0.3 4.0.2 4.0.1 4.0.0	• 8.0.0 for all new features, enhancements, and defect fixes.
3.0.10 3.0.9 3.0.8 3.0.7 3.0.6	• 7.0.11 iFix 5 for essential maintenance, security updates and critical defect fixes. • 7.0.10 iFix 8 for essential maintenance, security updates and critical defect fixes.
3.0.5 3.0.4	• 7.0.11 iFix 3 for all new features, enhancements, and defect fixes. • 7.0.10 iFix 7 for essential maintenance, security updates and critical defect fixes.

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Asset versions	Compatible Cúram versions
3.0.3	• 7.0.11 iFix 3 for all new features, enhancements, and defect fixes. • 7.0.10 iFix 6 for essential maintenance, security updates and critical defect fixes.
3.0.2	• 7.0.11 iFix 2 for all new features, enhancements, and defect fixes. • 7.0.10 iFix 5 for essential maintenance, security updates and critical defect fixes.
3.0.1 3.0.0	• 7.0.11 iFix 1 for all new features, enhancements, and defect fixes. • 7.0.10 iFix 4 essential maintenance, for security updates and critical defect fixes.
2.9.1 2.9.0	• 7.0.11 for all new features, enhancements, and defect fixes. • 7.0.10 iFix 3 for essential maintenance, security updates and critical defect fixes.
2.8.6 2.8.5 (Including the 2.8.4 internal release) 2.8.3 2.8.2 2.8.1 2.8.0 2.7.0	• 7.0.10 iFix 3 for all new features, enhancements, and defect fixes.

Note: Universal Access does not support the dual deployment of the classic client application and the Merative ™ Cúram Universal Access Responsive Web Application client against the same instance of the Cúram server. You can build and deploy your server without the classic client application as described in Alternative Targets for IBM® WebSphere® Application Server or Multiple EAR files for Oracle WebLogic Server. Alternatively, you must use another strategy to block access to the classic client application URLs to ensure that users cannot concurrently access both clients.

Node.js

Node.js is a prerequisite for installing the React application and for developing and deploying your web application.

Compatible Node.js versions.

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Supported software	Version	Prerequisite minimum	Operating system restrictions
Node.js	22 LTS (latest) 20 LTS (latest)	20 LTS (latest)	No

Note: By default, Node 16 uses Node Package Manager (npm) 8 and Node 18 uses npm 9. To use either of these configurations, you must specify the npm option `legacy-peer-deps` in your project. The way that npm treats peer dependencies changed. The Cúram Universal Access Responsive Web Application is using the `legacy-peer-deps` option as a temporary fix while we work to remove this constraint. For more information about `legacy-peer-deps`, see npm Docs. The following steps outline how to configure the `legacy-peer-deps` option:

1. Create a *`.npmrc`* file at the root of your project.
2. Add the `legacy-peer-deps=true` content to the file.

Platforms

There is no dependency on specific hardware platforms, but some minimum hardware requirements apply:

- Desktop devices that meet Microsoft™ Windows™ 10 specifications.

Interactive Development Environment (IDE)

The Cúram Universal Access Responsive Web Application does not depend on a specific IDE, you can choose your own. There are many IDEs that you can choose, for example Microsoft™ Visual Studio Code, Atom, and Sublime. However, Merative™ uses Microsoft™ Visual Studio Code to develop the reference application, it supports many plugins that make development faster and easier, for example it supports the following tools:

- Linting tools (ESLint)
- Code formatters (Prettier)
- Debugging tools (Debugger for Chrome)
- Documentation tools (JSDoc)

Merative ™ does not own, develop, or support these tools.

Application server, web server, and database

Deploying the web application requires a web server in the Cúram topology. The following application server, web server, and database combinations are supported for developing and deploying your custom application.

- IBM® WebSphere® Application Server, IBM® HTTP Server or Apache HTTP Server, and IBM® Db2®
- IBM® WebSphere® Application Server, IBM® HTTP Server or Apache HTTP Server, and Oracle Database
- Oracle WebLogic Server, Oracle HTTP Server or Apache HTTP Server, and Oracle Database

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For more information about installing an application server or database for Cúram, see the *Server Developer's Guide*.

HTTP servers

These HTTP servers are supported for deployment.

Compatible HTTP server versions

Supported software	Version	Prerequisite minimum	Operating system restrictions
IBM® HTTP Server	9.0	9.0.0.5	No
	8.5.5	8.5.5.9	No
Oracle HTTP Server	12.2.1.3.0 and future fix packs	12.2.1.3.190808	No
Apache HTTP Server	2.4 and future patches	2.4	No

Web browsers

Merative ™ Cúram Universal Access with the Cúram Universal Access Responsive Web Application is developed for public-facing applications. Every effort was made to ensure that the application pages use standard web technologies and formats to be compatible with all browsers that are listed. However, the browsers that are listed in the following table are the only browsers that are officially supported.

Note: The browser **Back** and **Forward** buttons, and browser refresh, are now supported on IEG pages in the Cúram Universal Access Responsive Web Application. Information that is entered in IEG forms is now retained when the citizen clicks **Next** or goes back or forward through a form.

Chrome, Firefox, Edge, and Safari release new versions more frequently than Internet Explorer, and they install updates automatically by default. Cúram Universal Access Responsive Web Application releases are tested on the latest browser versions that are available at the start of the Merative™ development cycle.

Note: Only stable Chrome releases are tested.

If no issues result from the tests, Merative™ certifies the browser version.

For each new product release, the prerequisites list the version that is certified. If Merative™ cannot certify that version for any reason, you might need to revert to a previous version that is fully certified. While Merative™ supports customers who use newer versions of these browsers than the last certified version, customers must understand that the versions are not fully tested.

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Supported software	Version	Operating system restrictions
Apple Safari	14 and future fix packs	No
Google Chrome	91 and future fix packs	No
Microsoft™ Edge	91 and future fix packs	No
Mozilla Firefox	89 and future fix packs	No

Accessibility

This accessibility software is certified.

Supported software	Version	Prerequisite minimum	Operating system restrictions	Browser
Freedom Scientific JAWS screen reader	2023 and future fix packs	2023	No	Microsoft Edge
Apple VoiceOver	Any version and future fix packs	Any version	Any version	Safari

Note: The combination of Microsoft Edge and JAWS 2023 is the only certified screen reader and browser combination.

Previous versions

To see the prerequisites and supported software for previous versions, see the Cúram PDF library.

4.2 Installing the Merative ™ Cúram Universal Access development environment

You can install a lightweight or a full development environment. The Cúram Design System is installed as part of the Merative ™ Cúram Universal Access installation and doesn't need a separate installation.

Before you begin

- **Lightweight development environment**

  The lightweight development environment replaces the Cúram application with a Node.js hosted mock server. This accelerates set up and development, but can't fully replicate integration testing with the Cúram application. Use this environment to get started quickly.

  1. Install the Merative ™ Cúram Universal Access React development environment.
  2. Configure the Merative ™ Cúram Universal Access to connect to the mock server, see The mock server API service on page 116.

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- **Full development environment**
  In the full development environment, you install the Cúram Java™ development environment to develop and test your APIs instead of using mock APIs. For more information about installing the Cúram Java™ development environment, see the *Server Developer's Guide.*

  Note: If you are working with a non-English version, you must ensure that the appropriate language is installed on Cúram.

  1. Install the Merative ™ Cúram Universal Access React development environment.
  2. Install the Cúram Platform.
  3. Install the Merative ™ Cúram Universal Access Application Module.
  4. Install any additional Cúram components that you need:
     - To use Cúram Appeals, install Cúram Appeals Application Module.
     - To use Cúram Verifications, Cúram Verification Engine Application Module.
  5. Configure the REST APIs, see 5.12 Connecting to Universal Access REST APIs on page 115.

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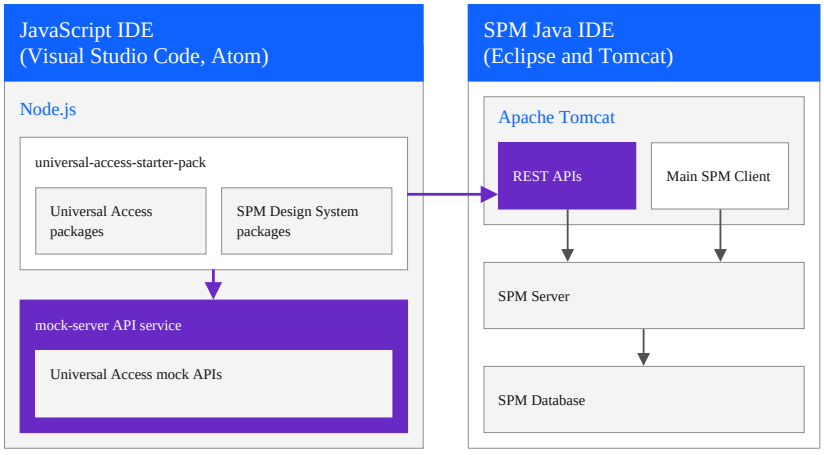

Figure 4: Universal Access React and Java™ application development environments

- **Troubleshooting environment**
  For troubleshooting, it can sometimes be useful to connect your lightweight or full development environment directly to an Cúram server. For more information, see 11.2 Connect a React development environment to an Cúram server on page 366.

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About this task

To install the Merative ™ Cúram Universal Access, first extract the *spm-universal-access-starter-pack* React starter application. Then, install all of the Cúram Design System and Merative ™ Cúram Universal Access Node packages into the starter application.

Attention: When you work with npm packages, it is important that you familiarize yourself with the npm ecosystem and how package dependencies work so you can adopt a suitable security strategy for your project.

Procedure

1. Download the Merative ™ Cúram Universal Access and Cúram Design System Node packages. Open the Cúram Support, under **Software Downloads**, select **Go to Downloads**, and follow the instructions to download the *SPM_DS_<version>.zip* and *UA_Web_App_<version>.zip* archive files.
2. Extract *SPM_DS_<version>.zip* and *UA_Web_App_<version>.zip* archive files to any directory.
3. Extract the *spm-universal-access-starter-pack_<version>.tgz* file into *UA_Web_App_<version>/packages*. The extracted *package* directory forms the React starter application. Now, you need to install all the other packages into this directory.
4. Rename the extracted *package* directory to reflect your project. For example, *universal-access-custom-app*.
5. **Note:** Step 5 can be time-consuming. In addition to the manual option, there is an alternative automated version for this step.

   (Manual option) Installing dependencies. Follow these two steps:

   - First, from your custom application directory, install the Cúram Design System and the Merative ™ Cúram Universal Access dependencies by entering the following command:

```
npm i --legacy-peer-deps \
<SPM_DS_version_path>/govhhs-govhhs-design-system-core-<version>.tgz \
<SPM_DS_version_path>/govhhs-govhhs-design-system-react-<version>.tgz \
<SPM_DS_version_path>/spm-core-<version>.tgz \
<SPM_DS_version_path>/spm-core-ui-<version>.tgz \
<SPM_DS_version_path>/spm-core-ui-locales-<version>.tgz \
<SPM_DS_version_path>/spm-intelligent-evidence-gathering-<version>.tgz \
<SPM_DS_version_path>/spm-intelligent-evidence-gathering-locales-<version>.tgz \
<SPM_DS_version_path>/spm-eslint-config-<version>.tgz \
<SPM_DS_version_path>/spm-test-framework-<version>.tgz \
<SPM_DS_version_path>/spm-web-dev-accelerator-<version>.tgz \
<SPM_DS_version_path>/spm-web-dev-accelerator-scripts-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-ui-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-ui-locales-<version>.tgz \
<UA_Web_App_version_path>/spm-mock-server-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-mocks-<version>.tgz
```

   Where <*SPM_DS_version_path*> is the path to the extracted *SPM_DS_<version>* folder and <*UA_Web_App_version_path*> is the path to the extracted

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`UA_Web_App_<version>` folder. And `<version>` matches the version of the `.tgz` files in the folder. For example:

```
/Install_Dir/SPM_DS_V7.0.0/govhhs-govhhs-design-system-core-1.42.0
/Install_Dir/UA_WebApp_V7.0.0/spm-universal-access-7.0.0.tgz
```

- Second, run the following command to install the 3rd party package dependencies, such as react and redux.

```
npm install --legacy-peer-deps
```

Note: The Cúram Universal Access Responsive Web Application is using the legacy-peer-deps option as a temporary fix while we work to remove this constraint. For more information about legacy-peer-deps, see npm Docs.

Note: You must install all the dependencies as part of the same command because of the npm idealtree feature, which predicts how your dependency tree specified in your package.json file will look after installing all packages. If one of the required dependencies specified above is missing in the command during installation, idealtree will fail with an error.

Note: Ignore any Node package dependency warnings for now. If needed, you can resolve them later.

(Automated option) Installing dependencies. Follow these two steps:

- First, move the extracted package used in steps 3 and 4 (e.g. universal-access-custom-app) to the same directory level as SPM_DS_<version> and UA_Web_App_<version>". After this, your folder structure should look as follows:

```
.
├── UA_Web_App_<version>
├── SPM_DS_<version>
└── universal-access-custom-app
    ├── babel.config.js
    ├── bundle.stats.html
    ├── index.html
    ├── installCEDeps.sh
    ├── mock/
    ├── package.json
    ├── public/
    ├── src/
    ├── tests/
    └── vite.config.js
```

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Note: For Mac OS users when downloading the zip files, a quarantine flag will be automatically added to the ./installCEDeps.sh script preventing it from executing. The quarantine flag can be removed and the script can be made executable by running the following commands:

```
xattr -d com.apple.quarantine ./installCEDeps.sh

chmod +x installCEDeps.sh
```

Note: For Windows OS users, please ensure you can run shell scripts from your command-line tool of choice. We recommend installing Git for Windows so that Git and optional Unix tools such as Bash are added to your PATH.

- Second, from your custom application directory, install the Cúram Design System and the Merative ™ Cúram Universal Access Node packages by entering the following commands:

```
npm run install-ce-deps
```

This command will automatically install the Cúram Design System and the Merative ™ Cúram Universal Access dependencies followed by installing the 3rd party dependencies such as react and redux.

6. Build your application with Vite

```
npm run build
```

7. You can run the Universal Access starter application by entering the following command from your application directory.

```
npm start
```

If the local host does not start automatically, browse to http://localhost:3000/ to see the running application.

4.3 Upgrading the Merative ™ Cúram Universal Access Responsive Web Application

You can upgrade your custom React application with the latest versions of the Merative ™ Cúram Universal Access Responsive Web Application and Cúram Design System Node packages to benefit from the most recent updates.

Before you begin

Before you upgrade, ensure that you review your custom application for any potential upgrade impacts. For more information, see 5.3 Developing compliantly on page 87.

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Note: If you are migrating Merative ™ Cúram Universal Access Responsive Web Application from version 7 to version 8, please refer to the Migration Guidelines from CE Version 7 to CE Version 8.

Note: When upgrading to newer 8.X.X versions, it is advised to use the migration guide for CE Version 8 as a starting point followed by a manual process guided by the release notes of newer versions and a file comparison of the package that is being installed.

Procedure

1. Download the Merative ™ Cúram Universal Access Responsive Web Application and Cúram Design System Node packages. Open Cúram Support, under **Software Downloads**, select **Go to Downloads**, and follow the instructions to download the *SPM_DS_<version>.zip* and *UA_Web_App_<version>.zip* archive files.
2. Extract *SPM_DS_<version>.zip* and *UA_Web_App_<version>.zip* archive files to any directory.

Note: The next step 3 can be time-consuming. In addition to the manual option, there is an alternative automated version for this step.

3. (Manual option) Installing dependencies. Follow these two steps:
   - First, from your custom application directory, install the Cúram Design System and the Merative ™ Cúram Universal Access dependencies by entering the following command:

```
npm i --legacy-peer-deps \
<SPM_DS_version_path>/govhhs-govhhs-design-system-core-<version>.tgz \
<SPM_DS_version_path>/govhhs-govhhs-design-system-react-<version>.tgz \
<SPM_DS_version_path>/spm-core-<version>.tgz \
<SPM_DS_version_path>/spm-core-ui-<version>.tgz \
<SPM_DS_version_path>/spm-core-ui-locales-<version>.tgz \
<SPM_DS_version_path>/spm-intelligent-evidence-gathering-<version>.tgz \
<SPM_DS_version_path>/spm-intelligent-evidence-gathering-locales-<version>.tgz \
<SPM_DS_version_path>/spm-eslint-config-<version>.tgz \
<SPM_DS_version_path>/spm-test-framework-<version>.tgz \
<SPM_DS_version_path>/spm-web-dev-accelerator-<version>.tgz \
<SPM_DS_version_path>/spm-web-dev-accelerator-scripts-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-ui-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-ui-locales-<version>.tgz \
<UA_Web_App_version_path>/spm-mock-server-<version>.tgz \
<UA_Web_App_version_path>/spm-universal-access-mocks-<version>.tgz
```

   Where *<SPM_DS_version_path>* is the path to the extracted *SPM_DS_<version>* folder and *<UA_Web_App_version_path>* is the path to the extracted `UA_Web_App_<version>` folder. And `<version>` matches the version of the `.tgz` files in the folder. For example:

```
/Install_Dir/SPM_DS_V7.0.0/govhhs-govhhs-design-system-react-2.0.0
/Install_Dir/UA_WebApp_V7.0.0/spm-universal-access-8.0.0.tgz
```

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- Second, run the following command to install the 3rd party package dependencies, such as react and redux.

```
npm install --legacy-peer-deps
```

Note: The Cúram Universal Access Responsive Web Application is using the legacy-peer-deps option as a temporary fix while we work to remove this constraint. For more information about legacy-peer-deps, see npm Docs.

Note: You need to install all the dependencies as part of the same command because of the npm idealtree feature, which predicts how your dependency tree specified in your package.json file will look after installing all packages. If one of the required dependencies specified above is missing in the command during installation, idealtree will fail with an error.

Note: Ignore any Node package dependency warnings for now. If needed, you can resolve them later.

(Automated option) Installing dependencies. Follow these two steps:

- First, move the extracted package used in steps 3 and 4 (e.g. universal-access-custom-app) to the same directory level as SPM_DS_<version> and UA_Web_App_<version>". After this, your folder structure should look as follows:

```
.
├── UA_Web_App_<version>
├── SPM_DS_<version>
└── universal-access-custom-app
    ├── babel.config.js
    ├── bundle.stats.html
    ├── index.html
    ├── installCEDeps.sh
    ├── mock/
    ├── package.json
    ├── public/
    ├── src/
    ├── tests/
    └── vite.config.js
```

Note: For Mac OS users when downloading the zip files, a quarantine flag will be automatically added to the ./installCEDeps.sh script preventing it from executing. The quarantine flag can be removed and the script can be made executable by running the following commands:

```
xattr -d com.apple.quarantine ./installCEDeps.sh

chmod +x installCEDeps.sh
```

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Note: For Windows OS users, please ensure you can run shell scripts from your command-line tool of choice. We recommend installing Git for Windows so that Git and optional Unix tools such as Bash are added to your PATH.

- Second, from your custom application directory, install the Cúram Design System and the Merative ™ Cúram Universal Access Node packages by entering the following commands:

```
npm run install-ce-deps
```

This command will automatically install the Cúram Design System and the Merative ™ Cúram Universal Access dependencies followed by installing the 3rd party dependencies such as react and redux.

4. Build your application with Vite

```
npm run build
```

5. You can run the Universal Access starter application by entering the following command from your application directory

```
npm start
```

Related tasks

Installing the Merative Cúram Universal Access development environment on page 65
You can install a lightweight or a full development environment. The Cúram Design System is installed as part of the Merative ™ Cúram Universal Access installation and doesn't need a separate installation.

4.4 Install and configure IBM® HTTP Server with WebSphere® Application Server

Install and configure IBM® HTTP Server either on the same server as WebSphere® Application Server or on a remote server. To enable cross-origin resource sharing (CORS), you can set the curam.rest.allowedOrigins property for the REST application on your application server, or install the IBM® HTTP Server plug-in for WebSphere® Application Server.

Before you begin

WebSphere® Application Server must be installed and configured.

You must install IBM® Installation Manager. For more information, see the IBM® Installation Manager documentation. You can download IBM® Installation Manager from Installation Manager and Packaging Utility download documents.

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Note:

When the React application and the Cúram server are deployed in different hosts that don't share the same top-level domain+1, and the web server where the React app is hosted doesn't run a proxy plug-in towards the Cúram application servers, you must change the Cross-Site Request Forgery (CSRF) and session cookies for cross-origin requests, from the default `Samesite=Lax` to `Samesite=None`.

An alternative solution is to deploy a gateway web server in front of Cúram to modify the cookie by using this directive:

```
Header edit Set-Cookie ^(.*)$ $1;SameSite=None;Secure
```

For Cúram clusters, place this directive in the web servers where Cúram applications are mapped.

About this task

To enable cross-origin resource sharing (CORS), choose one of the following options:

- Set the curam.rest.allowedOrigins property for the REST application that is deployed on the application server. For more information about setting the curam.rest.allowedOrigins property, see the *Cúram™ REST API Guide*.
- Install and configure the IBM® HTTP Server plug-in for WebSphere® Application Server to enable IBM® HTTP Server to communicate with WebSphere® Application Server. WebSphere® Customization Toolbox is needed to configure the plug-in.

Procedure

1. Install IBM® HTTP Server. For more information, see Migrating and installing IBM HTTP Server.
2. Optional: If you don't set the curam.rest.allowedOrigins property, you must install the following software:
   a) Install the IBM® HTTP Server plug-in for WebSphere® Application Server.
      For more information, see Installing and configuring web server plug-ins.
   b) Install the WebSphere® Customization Toolbox.
      For more information, see Installing and using the WebSphere Customization Toolbox.
3. Start IBM® HTTP Server. For more information, see Starting and stopping the IBM HTTP Server administration server.
4. To secure IBM® HTTP Server, see Securing IBM® HTTP Server.

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Generating an IBM® HTTP Server plug-in configuration

This task is needed only if you install the IBM® HTTP Server plug-in for WebSphere® Application Server. Use WebSphere® Customization Toolbox to generate a plug-in configuration.

Before you begin

Start WebSphere® Application Server. For more information, see Starting a WebSphere® Application Server traditional server.

Procedure

To generate the IBM® HTTP Server plug-in configuration, complete the steps at the WebSphere® Application Server Network Deployment plug-ins configuration topic.

Configuring the IBM® HTTP Server plug-in

Configure the IBM® HTTP Server plug-in for WebSphere® Application Server and WebSphere® Customization Toolbox. This task is necessary only if you have chosen to install the IBM® HTTP Server plug-in, instead of setting the curam.rest.allowedOrigins property for the REST application that is deployed on the application server. Also, for information about how to configure the web server's HTTP verb permissions to mitigate verb tampering, see the *Security Guide*.

About this task

You can run the `configurewebserverplugin` target to complete the following tasks:

- Add the web server virtual hosts to the client hosts configuration in WebSphere® Application Server.
- Propagate the plug-in key ring for the web server.
- Map the modules of any deployed applications to the web server.

Procedure

1. Start IBM® HTTP Server.

   For more information, see Starting and stopping the IBM® HTTP Server administration server.
2. On the remote WebSphere® Application Server, run the following command.

   ```
   build configurewebserverplugin -Dserver.name=server_name
   ```

   The `configurewebserverplugin` target requires a mandatory `server.name` argument that specifies the name of the server when the target is invoked. For more information about the `configurewebserverplugin` target, see Configuring a web server plug-in in WebSphere® Application Server.
3. Consider adding extra aliases to the *client_host*, as shown in the following examples:

   - For WebSphere® Application Server, add port number `9044`.
   - For the default HTTP port, add port number `80`.

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- For HTTPS ports, add port number `433`.

For more information about client host setup, see step 19 in the WebSphere® Application Server port access setup topic.

4. To avoid port mapping issues from web applications, restart WebSphere® Application Server and IBM® HTTP Server.

   For more information, see Starting and stopping the IBM® HTTP Server administration server.

4.5 Install and configure Oracle HTTP Server with Oracle WebLogic Server

Install and configure Oracle HTTP Server on either the same server as Oracle WebLogic Server or on a remote server.

Before you begin

Oracle WebLogic Server must be installed and configured. For more information, see Installing and Configuring Oracle WebLogic Server and Coherence for Oracle HTTP Server 12.1.3, and Installing and Configuring Oracle HTTP Server for Oracle HTTP Server 12.2.1.3.

Note:

When the React application and the Cúram server are deployed in different hosts that don't share the same top-level domain+1, and the web server where the React application is hosted doesn't run a proxy plug-in towards the Cúram application servers, you must change the Cross-Site Request Forgery (CSRF) and session cookies for cross-origin requests, from the default `Samesite=Lax` to `Samesite=None`.

An alternative solution is to deploy a gateway web server in front of Cúram to modify the cookie by using this directive:

```
Header edit Set-Cookie ^(.*)$ $1;SameSite=None;Secure
```

For Cúram clusters, place this directive in the web servers where Cúram applications are mapped.

Installing Oracle HTTP Server and its components

Install and configure Oracle HTTP Server in either a stand-alone domain, or in an Oracle WebLogic Server domain. You must install and configure an Oracle web server plug-in for proxying requests.

About this task

The Oracle web server plug-in allows requests to be proxied from Oracle HTTP Server to Oracle WebLogic Server. If you install and configure the Oracle web server plug-in, requests that are

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delegated to Oracle WebLogic Server still appear to originate from the Oracle HTTP Server, even if Oracle HTTP Server and Oracle WebLogic Server are hosted on two different servers.

Because of the web browser same-origin policy, cross-origin resource sharing (CORS) is restricted in many browsers by default. The web server plug-in enables CORS where Oracle HTTP Server and Oracle WebLogic Server are installed on different computers.

CORS enables an instance of your web application that is deployed on Oracle HTTP Server in one domain to request the REST services that are deployed on Oracle WebLogic Server in another domain.

Procedure

1. Install Oracle HTTP Server for Oracle WebLogic Server. For more information, see Installing and Configuring Oracle HTTP Server for Oracle HTTP Server 12.1.3, and Installing and Configuring Oracle HTTP Server for Oracle HTTP Server 12.2.1.3.
2. To configure Oracle HTTP Server, choose one of the following options:
   - To configure Oracle HTTP Server in a stand-alone domain, follow the instructions at Configuring Oracle HTTP Server in a Standalone Domain for Oracle HTTP Server 12.1.3, or Configuring Oracle HTTP Server in a Standalone Domain for Oracle HTTP Server 12.2.1.3.
   - To configure Oracle HTTP Server in an Oracle WebLogic Server domain, follow the instructions at Configuring Oracle HTTP Server in a WebLogic Server Domain for Oracle HTTP Server 12.1.3, or Configuring Oracle HTTP Server in a WebLogic Server Domain for Oracle HTTP Server 12.2.1.3.
3. If Oracle HTTP Server and Oracle WebLogic Server are installed in different domains, to enable CORS, install a web server plug-in.

   For more information about configuring an Oracle WebLogic Server proxy plug-in, see Configuring the Plug-In for Oracle HTTP Server for Oracle HTTP Server 12.1.3, or Configuring the Plug-In for Oracle HTTP Server for Oracle HTTP Server 12.2.1.3.
4. To secure Oracle HTTP Server, follow the procedure at Managing Application Security 12.1.3, or Managing Application Security for Oracle HTTP Server 12.2.1.3.

Results

The Oracle HTTP Server instance is now ready to for you to deploy the application. The default location for deploying the application is *`OHS_INSTANCE/config/fmwconfig/components/${COMPONENT_TYPE}/instances/${COMPONENT_NAME}/htdocs`*. However, you can configure the default location value to a different location.

What to do next

Start Oracle HTTP Server. For more information, see Next Steps After Configuring an Oracle HTTP Server Domain for Oracle HTTP Server 12.1.3, and Next Steps After Configuring the Domain for Oracle HTTP Server 12.2.1.3.

Configuring the Oracle HTTP Server plug-in

If a web server such as Oracle HTTP Server is configured in the topology, you must configure a web server plug-in in Oracle WebLogic Server. The web server plug-in enables Oracle WebLogic

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Server to communicate with Oracle HTTP Server. Also, for information about how to configure the web server's HTTP verb permissions to mitigate verb tampering, see the *Security Guide*.

About this task

To enable an Oracle HTTP Server web server plug-in in Oracle WebLogic Server, you can run the `configurewebserverplugin` target.

Procedure

1. Ensure the remote Oracle WebLogic Server Oracle WebLogic Server is running.

   For more information, see Deploying the application (Oracle WebLogic Server).
2. On the remote Oracle WebLogic Server, run the following command.

   The `configurewebserverplugin` target requires a mandatory `server.name` argument that specifies the name of the server when the target is invoked.

   ```
   build configurewebserverplugin -Dserver.name=server_name
   ```

   For more information about the `configurewebserverplugin` target, see Deploying the application (Oracle WebLogic Server).
3. Restart the remote Oracle WebLogic Server.

   For more information, see Deploying the application (Oracle WebLogic Server).

4.6 Installing and configuring Apache HTTP Server

Install and configure Apache HTTP Server on either the same server as the application server or on a remote server. To enable cross-origin resource sharing (CORS), you can set the curam.rest.allowedOrigins property for the REST application on your application server, or install the appropriate plug-in for your web server. Also, for information about how to configure the web server's HTTP verb permissions to mitigate verb tampering, see the *Security Guide*.

Before you begin

An application server must be installed and configured.

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Note:

When the React application and the Cúram server are deployed in different hosts that don't share the same top-level domain+1, and the web server where the React application is hosted doesn't run a proxy plug-in towards the Cúram application servers, you must change the Cross-Site Request Forgery (CSRF) and session cookies for cross-origin requests, from the default `Samesite=Lax` to `Samesite=None`.

An alternative solution is to deploy a gateway web server in front of Cúram to modify the cookie by using this directive:

```
Header edit Set-Cookie ^(.*)$ $1;SameSite=None;Secure
```

For Cúram clusters, place this directive in the web servers where Cúram applications are mapped.

About this task

To enable cross-origin resource sharing (CORS), choose one of the following options:

- Set the curam.rest.allowedOrigins property for the REST application that is deployed on the application server. For more information about setting the curam.rest.allowedOrigins property, see the *Developing Outbound REST APIs Guide*.
- Install and configure the plug-in for your server.

Procedure

1. Install Apache HTTP Server. For more information, see Compiling and Installing in the Apache HTTP Server documentation.
2. Optional: If you don't set the curam.rest.allowedOrigins property, you must choose one of the following options:
   - WebSphere® Application Server

     Install the plug-in for WebSphere® Application Server, see Installing and configuring web server plug-ins.

     Install the WebSphere® Customization Toolbox, see Installing and using the WebSphere Customization Toolbox.

     To configure Apache HTTP Server with WebSphere® Application Server, see Configuring Apache HTTP Server.
   - Oracle WebLogic Server 12cR1 (12.1.3):

     For more information about configuring an Oracle WebLogic Server proxy plug-in, see Configuring the Plug-In for Oracle HTTP Server.

     To configure Apache HTTP Server with Oracle WebLogic Server, see Configuring the Plug-In for Apache HTTP Server.
   - Oracle WebLogic Server 12cR2 (12.2.1.3):

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For more information about configuring an Oracle WebLogic Server proxy plug-in, see Configuring the Plug-In for Oracle HTTP Server.

To configure Apache HTTP Server with Oracle WebLogic Server, see Configuring the Plug-In for Apache HTTP Server.

3. Start Apache HTTP Server. For more information, see Starting Apache in the Apache HTTP Server documentation.
4. To secure Apache HTTP Server server, see Security Tips and Apache SSL/TLS Encryption in the Apache HTTP Server documentation.

4.7 Building the Cúram Universal Access Responsive Web Application for deployment

Build the Cúram Universal Access Responsive Web Application for deployment on an HTTP server. To quickly configure the *`universal-access-starter-pack`* application for deployment, follow these basic steps.

Before you begin

For the relative URL, assuming that you want to deploy the application in `https://yourhostname.com/universal`, set the environmental variable `PUBLIC_URL=/universal` for the application build, or set the `package.json homepage` attribute to `"/universal"`. Otherwise, set your own specific value. For more information about build location options, see Building for Relative Paths in the Create React App documentation.

For production builds, review all of the environment variables in your *`.env`* files, and check the order of the environment variables where you have multiple *`.env`* files. For more information about the priority of different *`.env`* files, see What other .env files can be used? in the Create React App documentation.

Procedure

1. Edit the *`.env`* configuration file in the root of your app, and update the `REACT_APP_REST_URL` environment variable with the hostname and port of the server where the REST services are deployed, for example:

```
# Where the Curam Rest API application is hosted/mapped
# in the same server or domain as the Cúram Universal Access Responsive Web
                                        Application:
REACT_APP_REST_URL=/Rest

# Where the Curam Rest API application is hosted/mapped in a different server or
 domain:
REACT_APP_REST_URL=https://restapplication.com/Rest
```

2. Enter the following command to install dependent packages:

```
npm install
```

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3. Enter the following command to build the application into a *build* folder in the *universal-access-starter-pack*:

```
npm run build
```

4. Copy the *build* folder to the HTTP Server and deploy, see 4.8 Deploying your web application to a web server on page 81.

4.8 Deploying your web application to a web server

To test your web application against an existing Cúram application that is deployed on an enterprise application server, you can deploy the web application on one of the supported web servers. The supported web servers are all based on Apache HTTP server so the deployment procedure is similar.

Before you begin

You must have built your application for deployment.

About this task

The `universal-access-starter-pack` package includes a preconfigured *.htaccess* file under the public folder that gets added to the built application. This file contains comments to explain the web server configuration requirements for React Router `BrowserRouter` enablement.

For more information about how to configure *.htaccess* files in a web server, see the *Apache HTTP Server Tutorial: .htaccess files* related link.

For more information about React Router `BrowserRouter`, see Serving Apps with Client-Side Routing.

Procedure

1. Copy the contents of the *build* directory to the appropriate directory for your HTTP server.

   For more information about the `<directory>` directive, see the related links.
2. Configure the web server.
   - If you use *.htaccess*, enable the directives in *.htaccess* by editing *httpd.conf* and setting an appropriate value for the `AllowOverride` directive in the Directory section for the HTTP server's `DocumentRoot`, or the corresponding directory where the resources are being deployed.

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In addition, you must load the `mod_rewrite` module for the React Router `BrowserRouter`.

```
# Enables mod_rewrite for React Router's BrowserRouter directives
<IfModule !mod_rewrite.c>
    LoadModule rewrite_module modules/mod_rewrite.so
</IfModule>
# "/opt/IBM/HTTPServer/htdocs/universal" is the location
# where the web application is deployed under the DocumentRoot.
# Alternatively you can specify the DocumentRoot "/opt/IBM/HTTPServer/htdocs"
<Directory "/opt/IBM/HTTPServer/htdocs/universal">
    AllowOverride FileInfo Options=MultiViews
</Directory>
```

- If you do not use `.htaccess`, you can copy the directives in *`.htaccess`* and put them in a `LocationMatch` section for your application in *`httpd.conf`*.

```
# Enables mod_rewrite for React Router's BrowserRouter directives
<IfModule !mod_rewrite.c>
    LoadModule rewrite_module modules/mod_rewrite.so
</IfModule>
# Below LocationMatch is set to "/universal" because the application
# will be served from https://youhostname.com/universal
<LocationMatch /universal>
    #
    # place here your .htaccess directives
    #
</LocationMatch>
```

3. Tune your HTTP server for improved performance, see the Performance Tuning guide.

Related information

GitHub documentation: npm run build
Content Security Policy Quick Reference Guide
Apache core features V2.0: <Directory> Directive
Apache core features V2.4: <Directory> Directive
Apache HTTP Server Tutorial: .htaccess files

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5 Developing with the Cúram Universal Access Responsive Web Application

Find out how to use the provided development resources to customize the Merative ™ Cúram Universal Access Responsive Web Application reference application and build your custom application.

5.1 Starter pack and packages

Using the Merative ™ Cúram Universal Access Responsive Web Application starter pack and packages, and Social Program Management Design System packages, as your starting point, you can customize Universal Access for your organization.

Each package includes a `package-lock.json.sample` file, which lists the packages and versions that the release was built with. This file is for reference only and is not to be used directly for building.

universal-access-starter-pack

This package contains a development environment and a fully functional and deployable reference application. The starter application uses the other provided modules to provide an external web application for Universal Access.

The starter pack demonstrates how a modern and responsive Universal Access client can be built by using React, Redux, and the Cúram Design System. It includes a sample feature that demonstrates coding conventions and the correct usage of the Web Development Accelerator tool to help you to get started with developing your own custom features, see 5.6 The `sampleApplication` feature on page 92. You can rename, modify, and extend the starter application to suit the needs of your organization.

universal-access-sample-app-auth-rep

This package contains a development environment and a sample application. The sample application is for illustrative purposes only and is not ready to deploy like the universal-access-starter-pack.

This application illustrates how a web application aimed at a user acting as an authorized representative might look. When you run the application you will notice that it is themed differently to the universal-access-starter-pack application to differentiate it. A different home page is presented to the user.

You can use this sample application to explore building applications that support authorized representatives. For more on authorized representative support, see the *Universal Access for Authorized Representatives* chapter in the *Cúram Universal Access Responsive Web Application* guide.

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universal-access

This package contains a module that connects the Cúram Universal Access Responsive Web Application to the Cúram server. `universal-access` makes HTTP requests to the server to allow the web application to interact with the Merative ™ Cúram Universal Access installation. Redux is the storage mechanism for requests and responses. For more information, see 5.8 Redux in Universal Access on page 96 and Universal Access Redux modules on page 98. This module does not render content, it depends on `universal-access-ui` to render the content.

universal-access-ui

This package contains a set of Cúram Universal Access Responsive Web Application features that presents views to the user, it depends on `universal-access` to provide the data that it needs for those views.

universal-access-ui-locales

This package contains translated UI artifacts for the `universal-access-ui` package.

universal-access-mocks

This package contains a module that provides mock data specific to Universal Access business scenarios for testing purposes. It is used by the mock server to provide mock APIs in the development environment so you don't need to host an Cúram server during development.

mock-server

This package contains a lightweight server that can serve HTTP requests and return mock data as a response. You can use `mock-server` during client development as a substitute for a real server to test features.

core

This package provides JavaScript™ utilities to help you develop your application. For example, use the *RESTService* utility to connect to a Cúram server-side REST API. Use `IntlUtils` to format numbers and dates for globalization.

For more information about the *core* package utilities, see the JSDoc API documentation in *spm/core/doc*.

core-ui

This package provides common React UI components to help you develop your application. For example, use the AppSpinner component to display a spinning animation while a page loads, or use the Toaster component to display notifications to the user.

For more information about the *core-ui* components, see the JSDoc API documentation in *spm/core-ui/doc*.

core-ui-locales

This package provides translated artifacts for the *core-ui* components.

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intelligent-evidence-gathering

This package enables IEG scripts that are configured in the Cúram application to run in your application. An API is provided to call the IEG scripts.

For more information, see the API documentation in *spm/intelligent-evidence-gathering/doc*.

intelligent-evidence-gathering-locales

This package contains translated artifacts for the *intelligent-evidence-gathering* package.

spm-web-dev-accelerator

This package contains the Web Development Accelerator rapid feature development tool, which generates Redux modules to handle the communication between your application and Cúram REST APIs.

spm-web-dev-accelerator-scripts

This package contains a Swagger parser to retrieve information from Cúram REST APIs, and scripts to generate the features and modules code from configuration information in the `spm-web-dev-accelerator` package.

spm-test-framework

This package contains a number of reusable files to help you to set up a test environment for testing with Test Cafe, Jest, and Enzyme. You can use the provided helper files to help you to develop and write end-to-end tests, unit tests, or snapshot tests for your project.

spm-eslint-config

This package contains an ESLint configuration with predefined coding style rules and an EditorConfig configuration file.

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5.2 Sample application project structure

The project structure is based on the Facebook `create-react-app`.

For more information about `create-react-app`, see create-react-app.

```
.
├── mock
├── node_modules
├── package.json
├── public
├── src
|   └── App.js
|   └── Config
|   └── css
|   └── Features
|   |   └── sampleApplication
|   |   |   └── confirmation
|   |   |   |   └── SampleApplicationConfirmation.js
|   |   |   └── form
|   |   |   |   └── SampleApplicationForm.js
|   |   |   └── overview
|   |   |   |   └── SampleApplicationOverview.js
|   └── index.js
|   └── intl
|   └── modules
|   └── paths.js
|   └── redux
|   └── routes.js
|   └── routesMessages.js
|   └── /sass
|   └── serviceWorker.js
├── tests
├── .env
├── .env.development
```

The main files in the project are as follows:

package.json

The *package.json* file is customized to support the Universal Access starter application. For more information on standard *package.json*, see package.json.

/mock

/mock contains the wiring that is needed to interact with the *mock-server* module. The mock server replicates the Cúram APIs, providing the mocked end points that are used by the sample application.

For more information about the mock server, see The mock server API service on page 116.

/public

/public is part of the *create-react-app* boilerplate. For more information, see create-react-app.

/src

/src is your working folder. The starter pack provides the basic infrastructure that interacts with the universal-access modules that are the platform for your development effort. */src* contains the following components:

- */src/index.js* Initiates the application and adds the following capabilities:

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  - Connection to a Redux store by using the `react-redux` module Provider component.
  - Globalization is added by using `react-intl` and the `LanguageProvider` component.
  - The universal-access module has a limited set of configurations that can be modified by using the `AppConfig` component.
- *`src/App.js`* is launched from the *`index.js`* file and wraps the main application in the `react-router`.
- *`src/css`* contains the compiled CSS styles.
- *`src/config`* contains the`intl` configuration files.
- *`src/features`* contains a sample feature to demonstrate how to implement a simple version of the **Apply for benefits** feature, see 5.6 The `sampleApplication` feature on page 92.
- *`src/redux`* contains the configuration for Redux reducers and the store.
- *`src/intl`* handles React-Intl Initialization.
- *`src/routes.js`* provides a point of customization for adding, replacing, or removing routes in your application.
- *`src/paths.js`* provides access the URLs that are mapped to each page by the route configuration.
- *`src/routesMessages.js`* contains the text Routes to be displayed on the window's title.
- *`src/appconfig.sample.json`* allows parts of `universal-access` to be customized, for example, specifying the default and other supported languages.
- *`src/sass/styles.scss`* contains the SCSS style definitions.
- *`src/sass/custom_variables.css`* provides a configuration point for CSS variables.

`.env` and *`.env.development`*

The *`.env`* file contains the environment variables for production. The *`.env.development`* file supersedes the environment variables in *`.env`* and sets specific environment variables for development. For more information about environment variables, see the 5.18 React environment variable reference on page 186.

5.3 Developing compliantly

Follow these guidelines to protect your project from making customization changes that are incompatible with the base product, or have the potential to incur upgrade impacts.

Never use undocumented APIs

JavaScript does not have access modifiers such as public, private. or protected. It is possible to call functions in Cúram modules that are not intended for public use. Calling these functions is not supported as those APIs can change in a future release and break your code.

The only JavaScript APIs that are intended for public use are documented in the *`docs`* folder of the Cúram *`node_modules`*. For example, `node_modules/@spm/core/docs/index.html`.

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Observe the Redux reducer namespace

If you use Redux, your Reducer names must not infringe on the namespace for Universal Access reducers. All Universal Access reducers are prefixed with UA, for example. *`UABenefitSelection`*. When Universal Access and custom reducers are combined, clashing names override the Universal Access reducers. Customizing `universal-access` reducers is not supported.

Don't modify the starter application files

While you can modify the starter application files in place, it is better to copy the files and change the copy. Your upgrades will then be easier as you can compare files between the current and previous version of the product without the added complexity of your customization changes. Where upgrade changes are needed, manually apply the changes to your custom version.

Don't modify or source control any code that is generated

The Web Development Accelerator tool generates code from the metadata in the `modules_config.json` file, which is the only file that you need to source control. The code is generated each time that you click **Generate** in the tool, or run the *`npm install`*, *`npm run build`*, or *`npm run wda-generate`* commands.

5.4 Enforce good code style with ESLint and EditorConfig

To help you to run static code analysis on your code, the *`spm-eslint-config`* package contains an ESLint configuration with predefined coding style rules and an EditorConfig configuration file.

ESLint

Most code editors support plug-ins for linting. ESLint plugin is a useful plug-in for Microsoft Visual Studio Code. Code editor plug-ins highlight errors in the editor so they can be seen and fixed during development. When all the developers in a team use a plug-in, it helps to maintain a consistent code style.

If you use Microsoft™ Visual Studio Code, the provided configuration files prompt you to install the recommended ESLint plug-in for code styling. If you use a different editor, you can manually configure the plug-in. For example, for Atom you can configure the Atom ESLint plug-in.

The first time that you run a static code analyzer on your code, particularly if coding style was not previously enforced, you might see numerous errors. Don't get discouraged, while it might take some time to fix all of the violations, ensuring that your team uses a consistent coding style has significant long-term benefits.

The ESLint configuration is in the `./node_modules/@spm/eslint-config/index.js` file.

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- **Running ESLint**

  To check the code for ESLint violations, run the following command in the application root directory. Errors are listed in the console.

  ```
  npm run lint
  ```

- **Fixing ESLint violations**

  Run the following command for ESLint to fix syntactic problems automatically:

  ```
  npm run lint -- --fix
  ```

  You must manually fix any violations that can't be resolved automatically.

Overriding ESLint config rules in the sample config

The sample `.eslintrc.js` file in the `universal-access-sample-app` is used for linting by default when you run ESLint through an npm script or by using an editor ESLint plug-in. The sample extends the configuration file in the `spm-eslint-config` package, which contains a set of predefined coding style rules. You can override rules that are inherited from this configuration file by using the instructions at https://eslint.org/docs/user-guide/configuring/configuration-files#configuration-based-on-glob-patterns.

An example of overriding a rule is shown.

```
module.exports = {
  extends: ["./node_modules/@spm/eslint-config/index.js"],
  overrides: [
    {
      files: ['src/**/*.js'],
      rules: {
        // 0 is off / 1 is warn / 2 is error
        'react-hooks/exhaustive-deps': 2,
      },
    },
  ],
};
```

EditorConfig

EditorConfig helps maintain consistent coding styles for multiple developers who work on the same project. The `.editorconfig` EditorConfig setup file is in the root directory of the sample application.

The included EditorConfig configuration file ensures consistent coding style when it comes to indentation, spacing, and quotation types. For more information about available Editor Config plug-ins, see the EditorConfig downloads.

Automation

If you have a CD/CI pipeline, you can include linting as part of the testing phase. It is a good idea to correct code with linting issues before you merge it into the codebase.

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5.5 Universal Access UI coding conventions

The `universal-access-ui` package is responsible for the presentation of the UI in the application. Coding conventions ensure that the UI code is separated by responsibilities, which gives benefits such as easier maintenance. Features, Components, and Messages are coded to render each page of the application.

Each page represents a business process function along a specific URL route. It is presented by using individual Cúram Design System components, embedded with localizable messages, and connected to the Redux store, in the `universal-access` package, to access and manage data in the application state (where applicable).

Features

A *feature* is an intangible concept of individual business functionality that is translated into a view navigable by a route.

A feature maps a particular business process or functionality, such as showing a user their payments, and makes it visible to the user in a collection of files that work together and are navigable by a URL route. For example `/payments`.

Multiple features can be used to implement a larger or more encompassing business process, such as Life Events, depending on how many separate views or business process functions are required.

Features are mainly defined through a path, a Routes.js entry, and a directory that references the feature's top-level React component.

- **`Paths.js`**

  A simple JavaScript file that exports a JSON object that contains the properties with each navigable path a user might traverse to in the application.

  For a feature, the first step is to declare the appropriate navigable route here, for example:

  ```
  const PATHS = {
    ...
    USER_ENROLMENT: '/user_enrolment'
    ...
  }
  ```

- **`Routes.js` entry**

  At a high-level, the `Routes.js` file in `universal-access-ui` (not the customizable `Routes.js` file in the sample application) renders the feature's top-level React component (which is exported from the feature's `index.js` file) depending on the current URL route.

  react-loadable is used for component-centric code splitting. The feature's top-level React component is dynamically imported.

  ```
  // UserEnrolmentContainer exported by /features/UserEnrolment/index.js
  const UserEnrolment = Loadable({
    loader: () =>
      import(/* webpackChunkName: "SomeFeature" */ "../features/UserEnrolment"),
    loading: LoadingPage
  });
  ```

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Declare the route within the `render()` function, either as a `TitledRoute` or an `AuthenticatedRoute`. Those familiar with React-Router might recognize some of the props.

```
...
render() {
  return (

      ...
      <TitledRoute
        component={UserEnrolment}
        exact
        path={PATHS.USER_ENROLMENT}
        title={localisableRoutesMessageFile.userEnrolmentTitle}
      />
      ...
  )
}
```

This effectively wires up the feature's route to the feature's React components in the internal `Routes.js` file.

Adding features, or customizing existing features, for example overriding the FAQs, require some implementation in your `sample-app/src/routes.js` file. You must add the new feature or redirect a route of an existing feature to your custom feature. For information about implementing similar routing in your custom application, see the *Universal Access Responsive Web Application Guide*.

- **Directory reference**

  The location of the feature in the file system. Each feature in `universal-access-ui` is a directory within `/universal-access-ui/src/features`. The directory is named after the business process function. It contains the files responsible for rendering the actual view to the user. A single React component , typically the Container, is exported by the feature's `index.js` to represent the feature at higher levels, for example `Routes.js`.

  The `universal-access-ui` package does contain other high-level directories that are responsible for other functionality, but these are separate or complementary to the base feature concept.

Components

A *component* is a React component whose responsibility is to manage the data concerns for the piece of business functionality and render the user's view of the business functionality by using the data passed as props, text defined in Messages, and components from the Cúram Design System.

Components are typically the highest-level React component that are exported from a feature (and act as the starting renderable component) as generally every business process function requires some type of data to retrieve, manipulate, and display. There are a few exceptions to this rule when the feature is only an informational or static text view.

Components render the view of the business process function to the user.

By default, layouts, HTML elements, and more complex UI widgets (like buttons, cards, badges, panels, sections, headers, etc.) are taken from the Cúram Design System. This provides a standardized theme to the look-and-feel of all our features and benefit from common concerns,

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such as accessibility and differing screen size layouts. We reference text defined in a separate Messages file to render any text content.

Messages

Messages files define a JSON object that contains individual properties for each portion of text that is used by a component and exported as a parameter to an API of the `react-intl` library.

Typically, every component renders text as part of it's view. Each portion of text must be translatable depending on the user's language. Universal Access uses the react-intl library to help manage the text content for translation.

For each component, there is a similarly created messages file, which contains the text that is wrapped in the react-intl defineMessages() API. For example, `UserEnrolmentComponentMessages.js`.

```
import { defineMessages } from 'react-intl';

export default defineMessages({
  userEnrolmentTitle: {
    id: 'UserEnrolment_Title',
    defaultMessage: 'User Enrolment',
  },
  userEnrolmentDescription: {
    id: 'UserEnrolment_Description',
    defaultMessage: "You can enrol in our user's program.",
  },
  userEnrolmentButtonLabel: {
    id: 'UserEnrolment_Button',
    defaultMessage: 'Continue',
  },
  ...
});
```

5.6 The `sampleApplication` feature

The sample feature illustrates the principles, tools, and technologies for developing features in the application. It implements a simple **Apply for Benefits** workflow that complies with the coding conventions.

The Web Development Accelerator tool significantly speeds up the development of the Redux modules that connect the application to the REST APIs. The `BaseFormContainer` component is used to implement IEG forms. The test framework speeds up the development of tests with less code. Where possible, replacing React containers with standard and custom React hooks can reduce complexity and further speeds up development.

Apply for Benefits workflow

- **Landing page**
  The `/sample-application` page shows a list of application types, which were obtained by using an API call. The code for that API call was generated with the Web Development Accelerator tool. Select an application type to go the **Overview** page. When you select the application type, the type is stored in a custom Redux store object that was also configured with the tool.

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- **Overview page**
  The `/sample-application/overview` page describes the benefit and provides the option to start the application. Applying for the benefit starts an IEG script with a script ID that is obtained from an API call. This API call is configured by using the Web Development Accelerator.
- **The Apply for Benefits form**
  The form is rendered from the IEG script by using the `BaseFormContainer` component. Enter any needed values to complete the form. When the form is complete, the confirmation page opens.
- **Confirmation page**
  The `/sample-application/confirmation` page summarizes the information that you entered.

Looking at the SampleModule module

To review the Redux module for the sample feature in Web Development Accelerator, start the tool by running `npm run wda`. From the home page, select **View Modules** and then **Edit** on *`SampleModule`* module. On the **APIs** tab, you can see the two APIs for the Apply for Benefits workflow.

- The `v1/ua/online_categories` API returns a list of online categories where each online category includes details of applications that a user can apply for. This API is used on the landing page.
- The `v1/ua/application_form` API is used to start a new application form for the logged in user. The *`selectedApplicationType`* value is defined when you click an application type on the landing page and is then used on subsequent pages.

On the **Store** tab, you can see the selector and action for the `selectedApplicationType`.

Overview of the sample application code

- **`SampleApplicationComponent.js`**

  Displays a list of benefit application types. This component shows you how to do the following tasks:

  - To generate a temporary user if the current user is not logged-in by using the `useGeneratedUserIfNotLoggedIn` React hook.
  - To retrieve information from the API and Redux store state by using the `SampleModuleHooks.useFetchOnlineCategories` hook.
  - To verify whether the Rest API is still fetching information by using the `SampleModuleHooks.useFetchOnlineCategories` hook.
  - To wrap the complete component with a React Higher Order Component (HOC). In this case, the `withErrorBoundary` error boundary HOC.
- **`SampleApplicationConfirmation.js`**
  A confirmation page with the identifier of the application submitted.

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- **`SampleApplicationFormComponent.js`**
  This component handles the application IEG scripts. General rendering and handling for IEG is delegated to the `BaseFormContainer` component.
- **`SampleApplicationOverviewComponent.js`**
  This component gives an end-to-end view of the application process to the user, along with a summary of the application type and program types that they are applying for. This component shows how to dispatch an action and create an application form by calling the `useCallback` hook that is associated with a button `onClick` handler.

Related concepts

Generating custom hooks on page 103
To abstract the complexity of working with Redux, the Web Development Accelerator automatically generates React Hooks to be imported directly into React components. You don't need to know about Redux to use these hooks for state management in the application.

5.7 Manage state with React Hooks

React Hooks enable you to use state, execute effects, and other React features without writing a class. You can use hooks to subscribe to the Redux store and dispatch actions, without having to wrap your components in `connect()`.

For more information about React Hooks, see Introducing Hooks in the React documentationIntroducing Hooks in the React documentation at https://reactjs.org/docs/hooks-intro.html.

If you use containers, you need to:

- Use a React Class Component.
- Implement `mapDispatchToProps` to have access to the `dispatch` object to call actions.
- Implement `mapStateToProps` to have access to the `state` object to call selectors.
- Use the `connect` higher-order component when you export the component to wire it with Redux.

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For example:

```
class SampleContainer extends Component {

    componentDidMount() {
        //Initializations
        //Calling Action
        this.props.sampleAction();
    }

    ...

    render() {
        //Calling selector
        const selectorValue = this.props.sampleSelector();

        return <>Component body</>;
    }

    ...

}

// We need to implement this function to have access to the `dispatch` object
const mapDispatchToprops = dispatch => ({
    // Call actions using the dispatch object
    sampleAction: () => SampleModuleActions.actionName(dispatch);
})

// We need to implement this function to have access to the `state` object
const mapStateToProps = state => ({
    // Call selectors using the state object
    sampleSelector : () => SampleModuleSelectors.selectorName(state);
})

// To do the wiring with redux, we need to  use the `connect` HOC passing the two
 functions: `mapStateToProps` and `mapDispatchToProps`
export connect(mapStateToProps, mapDispatchToProps)(SampleContainer);
```

To do the same with hooks:

- You don't use class components.
- You don't need to use `connect`, `mapStateToProps` or `mapDispatchToProps`.
- Use `useDispatch` to get the `dispatch` objects and call the actions.
- Use `useSelector` to get the `state` object and call the selectors.
- Use `useEffect` to simulate the life cycle events, for example `componentDidMount`

For example:

```
const SampleComponent  = props => {
    //Get the dispatch object to call actions
    const dispatch = useDispatch();

    // Initializations - Calls on initial render (like componentDidMount) and only if
 dispatch function ever changes
    useEffect(() => {
        //Calling action
        SampleActions.actionName(dispatch);
    } , [dispatch])


    //To call the selectors you do:
    const selectorValue = useSelector(state => SampleSelectors.selectorName(state));

    return (<>Component body</>);

}
```

In addition to the reduced code, you can create custom hooks to further reduce the amount of code.

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Custom hooks

The following custom login hooks are provided.

- `useGeneratedUserIfNotLoggedIn`: On mounting a component, checks whether the user is logged in. If not, calls REST APIs to create a temporary user and automatically authenticate the user. This is useful for anonymous IEG forms.
- `usePublicCitizenIfNotLoggedIn`: On mounting a component, checks whether the user is logged in. If not, automatically authenticates the user as a `publicCitizen`. For example, this is useful for landing pages that need to call REST APIs to populate lists.

If you don't want to log out the existing generated user, you can set the `keepExistingGeneratedUser` argument for these login hooks to `true`. By default, it is set to `false`.

It is not possible to implement these two custom functions without hooks, as a utility JavaScript™ file for example, because they need to modify the React component state.

5.8 Redux in Universal Access

Redux is used as a client-side store to store data that is retrieved by Cúram APIs and data that is used to present a consistent user experience.

What is Redux?

Redux is a client-side store that provides a mechanism for holding data in the browser.

- The store is typically used to manage state in the client application. State can include the following types of data:
  - System data that is returned from an API request.
  - User input data that is collected before it is posted to APIs.
  - Application data that is not sent from or to the server, but is created and maintained to control how the application works. For example, transient user selections like hiding or showing a side pane.
- Redux uses a unidirectional architecture, which simplifies the process of managing state.
- Redux can be used as a caching mechanism to avoid unnecessary network round-trips, although consider this usage carefully to ensure the data that is presented is always current.
- Redux proves to be beneficial as your application grows and becomes more complex. By centralizing state management and offering tools that give a holistic view of the application state, development can scale more easily.

Note: This topic assumes that you are familiar with Redux and using Redux with React components. If you are not familiar with these technologies and how they work together, you should complete tutorials from the official sources for these technologies.

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How is Redux used in Universal Access?

Merative ™ Cúram Universal Access uses Redux to store the data that is retrieved by the Cúram APIs.

Each GET API used by Universal Access has an associated 'store slice' where the response of the API is stored. React components can monitor the store for updates relevant to them and automatically update as data changes. The store is also used for collecting user input, such as user information that is requested while users sign up. This data can then be retrieved from the store and posted to the Cúram server.

Other parts of the store are not tied to Cúram APIs, and track data that is used to present a consistent user experience.

Creating a Redux store

By default, the Universal Access starter pack is configured to use a Redux store. This configuration is needed to allow it to use the *`universal-access`* and *`universal-access-ui`* packages. The store configuration is initiated from the *`src/redux/ReduxInit.js`* file in the starter pack.

```
...

import store from './store';

...

// ===================================
// 1. Create the store and initialize the universal-access module.
// ===================================

// Create the app Redux store
this.appStore = store;

// Configure the Core package
CoreReduxStore.createStore(this.appStore);
}

...
```

For more information on Redux, see https://redux.js.org/.

Configuring the store

Configure the store in the *`src/redux/store.js`* file, which exports the `configureStore` function that can be called to create a new Redux store. The configure store function can be modified to:

- Add Redux 'middleware'.
- Provide a custom set of reducers.

> **Note:** To work with the `universal-access` packages, the store must use the reducers that are exported from the *`universal-access`* package.

Clearing Redux store data

The Redux store is a JavaScript object that is stored in the global object for the browser window. The content of the store is visible through inspection, either programmatically or by browser

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plug-in tools, such as the developer tools. It is critical that the store is cleared for the current user when they log out to ensure that no sensitive user data is left on the device for malicious actors. The log-out feature that is provided by the starter app triggers a Redux action that clears the store.

Adding reducers

If you decide to use Redux with your custom React components, you must create custom reducers and add them to the store. All Universal Access reducers are prefixed with **UA**, for example `UAPaymentsReducer`. The *`intelligent-evidence-gathering`* package also exposes IEGReduxReducers reducers, prefixed with **IEG**. When adding custom reducers, you can combine your custom reducers with existing reducers. Do not use the UA or IEG prefixes in custom reducers to avoid overriding existing reducers. Overriding reducers is not supported, see 5.3 Developing compliantly on page 87.

The *`src/redux/rootReducer.js`* file defines the set of reducers for the store, and combines them into a single *root reducer* that can be passed to the `configureStore` function in the *`src/redux/store.js`* file.

For convenience, the file defines an `AppReducers` object where you can add custom reducers. The custom reducers that are defined in the `AppReducers` object are combined with the `UAReducers` imported from the *`universal-access`* package, and the superset of reducers is returned.

The following code excerpt shows the `rootReducer` function that returns the combination of Universal Access reducers and custom reducers.

```
const AppReducers = {
  // Add custom reducers here...
  // customReducer: (state, action) => state,
};

/**
 * Combines the App reducers with those provided by the universal-access package
 */
const appReducer = combineReducers({
  ...AppReducers,
  ...UAReduxReducers,
});



/**
 * Returns the rootReducer for the Redux store.
 * @param {*} state
 * @param {*} action
 */
const rootReducer = (state, action = { type: 'unknown' }) => {
  ...
  return appReducer(state, action);
};
```

Universal Access Redux modules

Modules in the Cúram Universal Access Responsive Web Application communicate between the application and the Cúram REST APIs and manage data for the API in the Redux store.

This design allows the React components to focus on presentation and reduces the complexity of the code in the presentation layer. Modules manage the communication between the

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client application and the Cúram REST APIs, including authentication, locale management, asynchronous communication, error handling, Redux store management and more.

Modules typically follow the re-ducks pattern for scaling with Redux

Modules and APIs

Modules consist of collection of artifacts that work together to communicate withCúram REST APIs and manage the storage and retrieval of the response in the application state. For example, the Payments module is responsible for communicating with the `/v1/ua/payments` API. For more information about Cúram APIs, see the *Cúram™ REST API Guide*.

- **Models**

  The `models.js` file is your data representation of the response from the API. It must map the JSON response properties to an object that can be referenced within your web application.

```
class UserProfile {
  constructor(json = null) {
    if (json) {
      this.personFirstName = json.personFirstName;
      this.personMiddleName = json.personMiddleName;
      this.personSurname = json.personSurname;
      this.personDOB = json.personDOB
      this.userName = json.userName;
      this.userType = json.userType;
      ...
    }
  }
}

export default UserProfile;
```

- **Utils**

  The `utils.js` file is responsible for the actual communication to the required API. On successful contact with the API, it constructs the model with the response. For simple GET calls, you can use `RESTService.get` to handle the API call. For more information, see the RESTService utility.

```
import { RESTService } from "@spm/core";
import UserProfile from "./models";

const fetchUserProfileUtil = callback => {
  const url = `${process.env.REACT_APP_REST_URL}/user_profile`;
  RESTService.get(url, (success, response) => {
    const modelledResponse = new UserProfile(response);
    callback(success, modelledResponse);
  });
};

export { fetchUserProfileUtil };
```

- **ActionTypes and Actions**

  Module actions are used to modify the Redux store, like inserting, modifying, or deleting data from the store. For example, the `PaymentsActions` action modifies the payments slice of the store.

  Some actions include calls to APIs. For example, `PaymentsActions.getData` action calls the *`v1/ua/payments`* API and dispatches the result to the payments slice of the store, or sets an error if the API call fails.

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The `actionTypes.js` file represents the type of action that is being performed. At its core, they are simple string types. For more information, see the Redux Glossary.

```
const FETCH_USER_PROFILE = "UA-CUSTOM/USER_PROFILE/FETCH_USER_PROFILE";

export { FETCH_USER_PROFILE };
```

The `actions.js` file contains the Redux actions, which are objects that represent an intention to change the application state. They are exported to be accessible to call from a Container component.

The following example is a representation of the action that calls the API and attaches the response to the dispatch, but you might further improve by adding fallback behavior.

```
import { FETCH_USER_PROFILE } from "./actionTypes";
import { fetchUserProfileUtil } from "./utils";

export default class actions {
  static fetchUserProfile = dispatch => {
    fetchUserProfileUtil((success, payload) => {
      if (success) {
        dispatch({
          type: FETCH_USER_PROFILE,
          payload: payload
        });
      }
    });
  };
}
```

- **Reducer**

  The `reducers.js` file contains the Redux Reducers. Redux Reducers are just functions that take the existing state and current actions and calculate a new state, thus updating the application state.

  The following example represents a data reducer that updates the state based on the API result. You can implement more complex reducers based on the action to represent API errors or failures or if the API is awaiting a response, like an `isFetchingUserProfile` reducer.

  Reducers aren't called from Container components.

```
import { combineReducers } from "redux";
import { FETCH_USER_PROFILE } from "./actionTypes";

const fetchUserProfileReducer = (state = {}, action) => {
  if (action.type === FETCH_USER_PROFILE) {
    return { ...state, payload: action.payload };
  } else {
    return state;
  }
};

const reducers = combineReducers({
  fetchUserProfile: fetchUserProfileReducer
  // room for more reducers!
});

export default { reducers };
```

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- **Selectors**

  Module selectors are used to query the Redux store. They provide the response to predefined store queries. For example, the `PaymentsSelector.selectData` selector returns the */payments/data* slice from the store, and the `PaymentsSelector.selectError` selector returns the value of the */payments/error* slice of the store.

  The `selectors.js` file is responsible for retrieving the data from the application state for use in the Container component (and likely passed as props to the Presentational component). It selects information from the state by using the state's 'slice' identifier.

```
export default class selectors {
  static moduleIdentifier = "UACustomUserProfile";

  static fetchUserProfile = state =>
    state[selectors.moduleIdentifier].fetchUserProfile.payload;
}
```

- **Index**

  You must export the parts of a module that must be accessible. Instead of creating an `index.js` per module, create one in the module directory that exports the Actions, Model, and Selectors of each custom module. These classes or functions are the only ones that need to be accessed from the container components.

```
// Modules
export { default as UserProfileActions } from "./UserProfile/actions";
export { default as UserProfileSelectors } from "./UserProfile/selectors";
export { default as UserProfileModels } from "./UserProfile/models";
```

Blackbox

Modules are blackbox so are not open to customization or extension. The modules expose actions and selectors to interact with the module. The actions and selectors are APIs that are documented in the *<your-project-root>/node_modules/@spm/universal-access/docs/index.html* file.

Reusing Universal Access modules in your custom components

You can use the actions and selectors from the universal-access package to connect your custom components to existing Cúram APIs and the Redux store. You can use the *react-redux* module to connect your components. Examples of this technique can be found in the *universal-access-ui* features.

For example, the following code is from the *PaymentsContainer* file in the Payments feature. The code shows how the actions and selectors from the Payments module are connected to the properties of the Payments component.

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This pattern is documented extensively in the official Redux documentation.

```
import { connect } from 'react-redux';
import React, { Component } from 'react';

...

/**
 * Retrieves data from the Redux store.
 *
 * @param state  the redux store state
 * @memberof PaymentsContainer
 */
const mapStateToProps = state => ({
  payments: PaymentsSelectors.selectData(state),
  isFetchingPayments: PaymentsSelectors.isProcessing(state),
  paymentsError: PaymentsSelectors.selectError(state),
});
/**
 * Retrieve data from related rest APIs and updates the Redux store.
 *
 * @export
 * @param {*} dispatch the dispatch function
 * @returns {Object} the mappings.
 * @memberof PaymentsContainer
 */
export const mapDispatchToProps = dispatch => ({
  loadPayments: () => PaymentsActions.getData(dispatch),
  resetError: () => PaymentsActions.resetError(dispatch),
});
/**
 * PaymentsContainer initiates the rendering the payments list.
 * This component holds the user's payment details list.
 * @export
 * @namespace
 * @memberof PaymentsContainer
 */
export default connect(
  mapStateToProps,
  mapDispatchToProps
)(PaymentsContainer);
```

Web Development Accelerator

The Web Development Accelerator is a tool that automatically generates code for application state, such as custom hooks and Redux modules. Select and configure Cúram REST APIs and automatically generate all of the hook or module code.

How it works

1. Add a module and provide a module name and description.
2. Click **Add API** and select and configure the Cúram REST APIs that are required for the module.
3. Select the **Store the API response in Redux?** checkbox if you want to store the API response in the Redux store. If you select this option, hooks cache the responses of APIs.
4. Save the module. Your configuration is saved as metadata in a JSON file, which is the only code that you need to source control.
5. Generate the code. The module and hooks code is generated from the metadata and placed into a specified directory in the project.
6. Review the generated code in the Code preview tab. The tab contain the following sub-tabs, Hooks, Actions, ActionTypes, Utils, Models, Reducers, and Selectors.
7. Import the module or hook into your React components.

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Note: You don't need to source control the generated code. The code is generated each time that you click **Generate** in the tool, or when you run *npm install*, *npm run build* or *npm run wda-generate*.

Generating custom hooks

To abstract the complexity of working with Redux, the Web Development Accelerator automatically generates React Hooks to be imported directly into React components. You don't need to know about Redux to use these hooks for state management in the application.

The generated hooks are responsible for the integration with the Redux modules, and handle all the caching that is needed to avoid unnecessary HTTP calls to REST APIs.

React Hooks are generated for each API and store objects that are added to the modules by using the Web Development Accelerator. The hooks provide all data and functions that are needed by the React components. There is no need to interact directly with the Redux files, that is, Actions or Selectors.

For each API, a hook is generated with the following structure:

GET APIs:

```
const { data, isFetching, error, reFetchData, resetData } = useActionName([params],
 deps
       = []);
```

For DELETE, POST, PUT APIs:

```
const { actionName, data, isFetching, error } = useActionName();
```

Hooks are also generated for custom store objects that are defined in the **Store** tab of the Web Development Accelerator:

```
const { object, setObject } = useSetObject();
```

For more information about how to interact with the React Hooks, see the Sample Application Feature at: */src/features/sampleApplication*

Related concepts

The sampleApplication feature on page 92

The sample feature illustrates the principles, tools, and technologies for developing features in the application. It implements a simple **Apply for Benefits** workflow that complies with the coding conventions.

Generating Universal Access Redux modules

In the Web Development Accelerator, you can create a module, select and configure your REST APIs, and generate all of the code that is needed to handle the API requests and manage your application state with Redux.

Before you begin

Check that the Web Development Accelerator environment variables are set correctly, see 5.18 React environment variable reference on page 186.

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Procedure

1. In the root directory of the *universal-access-starter-app*, run the command:

   ```
   npm run wda
   ```

   The Web Development Accelerator opens locally at *http://localhost:3000/*.
2. On the home page, click **View modules**.
3. Click **Add module** or click an existing module to edit the module.
4. To add APIs, select the **APIs** tab and click **Add API**.
5. From the list of available APIs that is defined by the Swagger specification in the WDA_SPM_SWAGGER environment variable, select the APIs that you need.
   The APIs are added to the model metadata JSON file that is specified in the WDA_MODULES_CONFIG environmental variable.
6. You can customize the default Action functions, Selectors, and Reducers for an API by changing their names, or by specifying whether the API response is stored in Redux.
   a) By default, function names are defined by a convention based on the API URI and verb. Click a function name to rename the function.
   b) By default, each REST API response is cached in the Redux store. If you don't want to store the API response, clear the **Store the API response in Redux?** check box. The corresponding functions are removed from the model.

   The APIs are defined in the model.
7. To create a custom store object to cache JavaScript objects, select the **Store** tab, click **Add Store**, enter a name for the store object, and click **Confirm**.
8. You can preview the code to be generated from the modules metadata by selecting the **Code Preview** tab.
9. You can generate the code as follows:
   a) From the **Modules** page, click **Generate**
   b) By using *npm*, run the command:

      ```
      npm run wda-generate
      ```

      The code is also generated each time that the project is installed or built by running `npm run start` or `npm run build`.

   The modules and the generated code are written directly to the directory that is defined in the `WDA_MODULES_OUTPUT` environment variable.

5.9 Error handling with a React higher-order component (HOC)

You can use the `withErrorBoundary` function as a higher-order component (HOC) to handle API errors on features. You can then focus on implementing components and delegate the error

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handling to the function. Additionally, this approach reduces the amount of code that is needed to implement the component and its tests.

The `withErrorBoundary` function is provided in the *`@spm/core-ui`* package and provides the following functions:

- Retrieves the list of all errors from the Redux Store by calling the `ReduxUtils.generateGlobalErrorSelector` selector, or you can provide a single selector that is generated by the Web Development Accelerator.
- For any errors that are stored on the Redux store, the `withErrorBoundary` function throws a JavaScript exception that is caught by the nearest `ErrorBoundary`.
- Wraps a component in an `ErrorBoundary`.
- Clears the errors from the Redux Store when the component is unmounted.

Table 2: The `withErrorBoundary` parameters

Parameter	Mandatory	Details
wrappedComponent	Yes	The component or container to wrap.
errorSelector	No	The selector to get the errors. If you don't provide an error selector, `ReduxUtils.generateGlobalErrorSelector` is used.
resetErrorAction	No	The action to reset the errors.

Examples

Exporting a component with the `withErrorBoundary` function.

- **Default values**

```
import withErrorBoundary from '@spm/core-ui';

class Container extends Component {
    ...
    ...
    ...
}

export default withErrorBoundary(Container)
);
```

- **With parameters**

```
import withErrorBoundary from '@spm/core-ui';
import { SampleModuleSelectors, SampleModuleActions} from '../../modules/generated';

class Container extends Component {
    ...
    ...
    ...
}

export default
 withErrorBoundary(Container,SampleModuleSelectors.fetchCustomAPIError ,
 SampleModuleActions.resetFetchCustomAPIError)
);
```

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This example handles errors that are related only to the specified API error selector, rather than listening for errors in the data store.

5.10 Connectivity handling

By default, a connectivity handler prevents data loss in IEG forms and provides offline detection for the rest of the application. You see a warning message when you are disconnected, giving you a chance to check your internet connectivity. You see a success message when you recover connectivity. You can choose to prevent data loss in pages outside IEG forms by implementing the connectivity handler for other pages in the application.

If internet connectivity is lost or the service becomes unavailable when you are in the application, a warning message is displayed.

```
You're disconnected. Check your internet connection or wait while
 we try to reconnect.
```

By default, connectivity is tested by pinging the server but you can customize this behavior with a custom function. For example, to change the server URL or to ping a static file.

While connectivity is not strictly required for every page in the application, the connectivity polling ping is used to detect if users are online. You can enable or disable connectivity handling for all pages, but not for specific pages. The ping continues after session expiry. If the server can respond with an error then there is still connectivity. If there is no response from the server, then the application is set offline.

Preventing data loss in IEG

To prevent you from losing information that you enter in IEG forms, you are now prevented from leaving IEG pages with unsubmitted changes when you are disconnected. An error message is displayed and you remain on the page where you entered the information. You must check your internet and get online or wait for the service to become available before you can continue. If internet connectivity or the service remains unavailable, the error message persists.

```
You're still disconnected. Check your internet connection or try
 again later.
```

When you recover connectivity or the service becomes available, a success message is displayed and you can save your changes.

```
You are now connected.
```

Implementing a connectivity handler

You can implement loss-of-connectivity handling to improve the resilience of the application. Users are notified when they lose or recover internet connectivity or access to the service. In addition, you can prevent user actions when they are offline to avoid errors or data loss. By default, user actions are prevented in IEG forms to prevent information loss if users go offline when in IEG forms.

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Before you begin

The implementation consists of two components.

- **The `ConnectivityHandler` component**

  Use the `ConnectivityHandler` React component in *`packages/core-ui/src/Connectivity/ConnectivityHandler`* to detect offline and online events and to notify the user. The `ConnectivityHandler` component wraps the application with the logic to call the appropriate messages.

  The `ConnectivityHandler` component provides the following functions:

  - Registers browser offline and online events and runs the corresponding callback functions. Internet connectivity is checked by making a periodic request to the server, by default every 5 seconds.
    - If the server request fails, it triggers the offline event callback. A dismissable warning message is displayed:

      ```
      You are offline, check your internet connection and try again.
      ```
    - After connection is lost, a successful server request triggers the online event callback. A dismissable success message that expires after 7 seconds is displayed:

      ```
      You are back online.
      ```
  - Reads the `preventActionOnOffline` Redux global state variable that is managed by the `Connectivity` Redux module. When this state is `true` and a user tries to interact with a page when they are offline, an error message is displayed:

    ```
    You are still offline, check your internet connection and try again.
    ```
- **The `Connectivity` Redux module**

  Use the `Connectivity` Redux module in *`packages/core/src/modules/Connectivity`* to manage the connectivity global state of the application, and to provide an option to prevent unwanted actions.

  The **`Connectivity`** module has two selectors and two actions:

  - The `setOnline` action sets the connectivity state of the application. Set to `true` for online and `false` for offline.
  - The `getOnline` selector returns the connectivity state of the application.
  - The `setPreventActionOnOffline` action sets the prevent action state of the application. Set `true` to prevent user actions while offline and `false` to allow user actions.
  - The `getPreventActionOnOffline` selector returns the prevent action state of the application.

Procedure

1. Wrap your application in the `ConnectivityHandler` component.

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Place the`ConnectivityHandler` component between the `ErrorBoundary` and `SSOVerifier` components in the application tree as follows:

```
```
    <ReduxInit>
      <IntlInit>
        <Router basename={process.env.PUBLIC_URL}>
          <ScrollToTop>
            <ErrorBoundary
              footer={<ApplicationFooter />}
              header={<ApplicationHeaderComponent hasErrorBeenCaught />}
              isHeaderBoundary
            >
              <ConnectivityHandler>
                <SSOVerifier
                  placeholder={
                    <ApplicationHeaderComponent
                      isALinkedUser={() => false}
                      isAppealsEnabled={false}
                      isEmpty
                    />
                  }
                >
                  {/* Rest of the application tree */}
                </SSOVerifier>
              </ConnectivityHandler>
            </ErrorBoundary>
          </ScrollToTop>
        </Router>
      </IntlInit>
    </ReduxInit>
```
```

The application now notifies users of online and offline events.

2. Optional: Configure connectivity polling, which pings the server at intervals to check connectivity. You can change the ping behavior and the interval for connectivity polling.
   a) You can create a custom function to override the default polling behavior. For example, to ping a static file, to use a different URL, or even to generate a URL for every instance that includes a timestamp. To implement this, import the `registerConnectivityPollingFunction` function in your `App.js` file, which receives your custom function as a parameter.

```
import { registerConnectivityPollingFunction } from '@spm/core-ui';
```

   Refer to the following three examples for how to use this function:

   - Example 1: Use the same application server but ping a different URL

```
import { registerConnectivityPollingFunction } from '@spm/core-ui';
import { RESTService } from '@spm/core';

const customPollingFunction = pingCallback => {
  const url = `${process.env.REACT_APP_REST_URL}/v1/ua/<NEW_API_ROUTE>`;
  RESTService.get(url, pingCallback);
};
registerConnectivityPollingFunction(customPollingFunction)
```

     In the URL constant, replace `<NEW_API_ROUTE>` with the new route. The polling function is called with the `pingCallback` function, which is responsible for notifying users about online or offline events and must be used in this function as part of the `RESTService` function parameters.

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Make the REST request by using the `RESTService.get(url,pingCallback)` function. This function receives the new URL and the `pingCallback` for online or offline notifications as parameters.

- Example 2: Use a static file such as the fav icon

```
import { registerConnectivityPollingFunction } from '@spm/core-ui';
import { RESTService } from '@spm/core';

const customPollingFunction = pingCallback => {
  const url = ${window.location.origin}/fav.ico?_="${new Date().getTime()}";
  RESTService.getWithoutCredentials(url, pingCallback);
};
registerConnectivityPollingFunction(customPollingFunction)
```

Set the URL constant with the corresponding URL origin to access the public folder resources where *`fav.ico`* is typically located.

You don't need to pass the application credentials for this request so you can use `RESTService.getWithoutCredentials(url, pingCallback)`. This function receives the generated URL and the `pingCallback` for online or offline notifications as parameters.

- Example 3: Use a different server

```
import { registerConnectivityPollingFunction } from '@spm/core-ui';
import { RESTService } from '@spm/core';

const customPollingFunction = pingCallback => {
  const url = `${new_server_origin}/${api_route}`;
  RESTService.getWithoutCredentials(url, pingCallback);
};
registerConnectivityPollingFunction(customPollingFunction)
```

In the URL constant, replace `<NEW_API_ROUTE>` with the new route. The polling function is called with the `pingCallback` function, which is responsible for notifying users about online or offline events and must be used in this function as part of the `RESTService` function parameters.

On your server, you must address any CORS issues and include a status parameter in the API response, for example `status:200`. The `pingCallback` function reads this value and sets the application to offline mode only when the value doesn't exist.

b) By default, the `system_configuration` API is pinged at a sensible interval of 5 seconds. If your testing indicates that an interval of 5 seconds is not suitable for your application, you can change the interval by setting the REACT_APP_CONNECTIVITY_INTERVAL environment variable, for example:

```
REACT_APP_CONNECTIVITY_INTERVAL=7000
```

For more information about environment variables, see 5.18 React environment variable reference on page 186.

3. Optional: You can prevent user actions when they are offline with the `Connectivity` Redux module. You can display a danger message to tell users that they are offline and that they need to check their internet connection.

a) Use the `getOnline` selector to read the connectivity global state of the application.

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b) Use the `setPreventActionOnOffline` action to notify `ConnectivityHandler` to display the prevent action message.

For example:

```
preventOffline = callback => {
    const { isOnline, preventActionOnOffline } = this.props;
    return isOnline === false ? preventActionOnOffline() : callback;
  };
```

The example function uses `{ connect } from 'react-redux'`. Its implementation helps you to inject the selectors and actions from the connectivity global state of the application as props. `isOnline` is the value that is returned by `getOnline`, and `preventActionOnOffline()` calls `getPreventActionOnOffline(true)`.

The `preventOffline` function receives the function to run or prevent when online or offline as a callback.

The online status is received from props and the `preventActionOnOffline` function displays the message.

When `isOnline` is `false`, call the function to display the message, otherwise call the callback function.

5.11 Developing with routes

Routes define the valid endpoints for navigation in your application. Your application consists of a network of routes that can be traversed by your users to access the application's pages.

Merative ™ Cúram Universal Access uses the *react-router* and *react-router-dom* packages to manage navigation. React Router defines and works with routes. For more information, see the React Router documentation at https://reacttraining.com/react-router/web/guides/philosophy.

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The Routes component

The module for Universal Access exports the *Routes* component, which exposes the routes defined by the module. The defined routes are the suite of pages that are prebuilt and available for reuse in Universal Access.

Routes component

You can import and reuse the Routes component in your application. The code example shows how import and reuse the Routes component in a sample application.

```
import React from 'react';
import { injectIntl, intlShape } from 'react-intl';
import { BrowserRouter } from 'react-router-dom';
import '@spm/web-design-system/js/govhhs-design-system-core.min';
import { Routes } from '@spm/universal-access';

const App = (props) => {
  return (
    {/** You must define your routes controller (Hash vs Browser) */}
    <BrowserRouter>
      <div className="app">
        <div className="my-header-navigation">
          <a href="/">Home</a> | <a href="/faq">Faq</a>
        </div>
        <Routes />
      </div>
    </BrowserRouter>
  );
};

App.propTypes = {
  intl: intlShape.isRequired,
};

export default injectIntl(App);
```

Adding routes

You can add a route by including a new route anywhere inside your Router component.

The following code example adds a route to `MyNewPageComponent` into the router component:

```
import { BrowserRouter, Route } from 'react-router-dom';
…
<BrowserRouter>
 <div className="app">
  <div className="my-header-navigation">
   <a href="/">Home</a> | <a href="/my-new-page">New Page</a>
  </div>
  <UARoutes />
  <Route path="/my-new-page" component={MyNewPageComponent} />
 </div>
</BrowserRouter>
```

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Replacing routes

You can replace existing paths from the Universal Access module's Routes component with your preferred component.

Wrap your routes in a *<Switch>* component

You can replace existing paths from the Routes component with your preferred component. To achieve this, you must first wrap your routes in a *<Switch>* component from react-router. This action ensures that the first match of the requested path that is found in your application is used to resolve the path. For more information on Switch, see https://reacttraining.com/react-router/web/guides/philosophy.

Add a route with the same path

When you have wrapped in *Switch*, you add a route with the same path as the page you are overriding.

Note: This route must come before the *<Routes/>* component to ensure it is matched first.

The following code example shows a replacement route to *MyHomePageComponent* enclosed in a *<Switch>*:

```
import { BrowserRouter, Route, Switch } from 'react-router-dom';
…
<BrowserRouter>
 <div className="app">
  <div className="my-header-navigation">
   <a href="/">Home</a> | <a href="/my-new-page">New Page</a>
  </div>
  <Switch>
   <Route path="/" component={MyHomePageComponent} />
   <Routes />
   <Route path="/my-new-page" component={MyNewPageComponent} />
  </Switch>
 </div>
</BrowserRouter>
```

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Redirecting routes

You can redirect existing paths by using the *react-router* *Redirect* component.

Redirecting a route

The following code example imports the `Redirect` component and redirects the path `'/bring-me-home'` to `"/"`.

```
import { BrowserRouter, Route, Switch, Redirect } from 'react-router-dom';
…
<BrowserRouter>
 <div className="app">
  <div className="my-header-navigation">
   <a href="/">Home</a> | <a href="/my-new-page">New Page</a>
  </div>
  <Switch>
   <Route path="/" component={MyHomePageComponent} />
   <Redirect from="/bring-me-home" to="/" />
   <Routes />
   <Route path="/my-new-page" component={MyNewPageComponent} />
  </Switch>
 </div>
</BrowserRouter>
```

Removing routes

You can remove unwanted routes from Merative ™ Cúram Universal Access.

You might want to reuse some but not all of the Universal Access <Routes/>. For those routes that you want to remove instead of replacing, use the react-router <Redirect> component to send users to a ‘404’ style page, or some other valid end point.

You must declare the redirect before the <Routes/> component. You must also wrap the redirect in a *<Switch>* component. The following code example removes the route to "FAQ" by redirecting to a 404 page:

```
<BrowserRouter>
 <div className="app">
  <div className="my-header-navigation">
   <a href="/">Home</a> | <a href="/faq">FAQ</a>
  </div>
  <Switch>
   <Redirect path="/faq" to="/404page" />
   <Routes />
  </Switch>
 </div>
</BrowserRouter>
```

Advanced routing

Merative ™ Cúram Universal Access is now code-split based on routes.

Code splitting

Code-split based on routes is achieved using *react-loadable* and the *@spm/universal-access-ui* package that is in the default *LoadingPage* component. For more information, see

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https://create-react-app.dev/docs/code-splitting and https://github.com/jamiebuilds/react-loadable. The following example shows how to achieve the same split with the routes that you added:

```
import { LoadingPage } from '@spm/universal-access-ui';
…
const MyNewPageComponent = Loadable({
 loader: () => import(/* webpackChunkName: "MyNewPageComponent" */ '../features/
MyNewPageComponent'),
 loading: LoadingPage,
});
…
   <Route
    component={MyNewPageComponent}
    exact
    path='/my-new-page'
    />
```

Titled routes

Accessibility rules require that a web page should have a descriptive title. You can implement a descriptive title using the *TitledRoute* component of the *@spm/universal-access-ui* package. To localize the title, *TitledRoute* exposes a title prop that accepts a *react-intl message ()* and can be used with or without code-split routes as shown in the following example:

```
import { TitledRoute } from '@spm/universal-access-ui';
import { defineMessages } from 'react-intl';
…
const titles = defineMessages({
 myNewPage: {
   id: 'app.titles.myNewPage',
   defaultMessage: 'My New Page',
 },
});
…
   <TitledRoute
    component={MyNewPageComponent}
    exact
    path='/my-new-page'
    title={titles.myNewPage}
  />
```

Authenticated routes

You can protect parts of the application in two ways:

1. On access, handle authentication failures to a REST API and redirect to a login page.
2. Block access to specific routes to avoid any cost in running the REST API.

The following example shows how to block access to specific routes. The *@spm/universal-access-ui* package provides an *AuthenticatedRoute* component that accepts an *authUserTypes* array prop of the allowed user types to access this route. *AuthenticatedRoute* also wraps

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TitledRoute and therefore offers a title prop. The following is an example of using *AuthenticatedRoute*:

```
import { AuthenticatedRoute } from '@spm/universal-access-ui';
import { Authentication } from '@spm/universal-access';
import { defineMessages } from 'react-intl';
…
const titles = defineMessages({
 myNewPage: {
   id: 'app.titles.myNewPage',
   defaultMessage: 'My New Page',
 },
});
…
   <AuthenticatedRoute
    authUserTypes={[Authentication.USER_TYPES.STANDARD,
 Authentication.USER_TYPES.LINKED]}
    component={MyNewPageComponent}
    exact
    path='/my-new-page'
    title={titles.myNewPage}
   />
```

The example blocks access to the */my-new-page* routes for all users who are not of type STANDARD or LINKED, these users are redirected to the */login* route.

5.12 Connecting to Universal Access REST APIs

You must connect your web application to Cúram Universal Access REST APIs. You can use the `RESTService` utility, and the mock server API service or Cúram APIs to help you to develop and test your REST API connections.

For information about securing your Universal Access REST APIs, see 6.2 Securing access to Universal Access REST APIs on page 203.

Configuring the Universal Access API end point

Use the `REACT_APP_REST_URL` environment variable in the `.env` or `.env.development` file to nominate the host for the Cúram APIs.

For example, in a development environment where the Cúram Universal Access Responsive Web Application is running on Node.js on a developer's local machine, and Cúram is running on port 9080 in Eclipse/Tomcat on the local machine, add the following to the `.env.development` file in the React application.

```
REACT_APP_REST_URL=http://localhost:9080/Rest
```

And in a *"deployed environment"*, such as IBM® HTTP Server hosting the Cúram Universal Access Responsive Web Application and IBM® WebSphere® Application Server hosting the Cúram application on port `9044` with hostname `citizenportal.myorg.com`, add the following:

```
REACT_APP_REST_URL=https://citizenportal.myorg.com:9044/Rest
```

For more information about environment variables, see 5.18 React environment variable reference on page 186.

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The mock server API service

The mock server is a mock API service that is provided to aid rapid development. The mock server serves APIs that simulate calling real web APIs. When you are developing your application, the mock server provides a lightweight environment against which the React components can be tested communicating with the services that provide their data.

Configuring the mock server

Configure the mock server location through the following properties in the `.env.development` file. You can change these values to suit your needs.

- `REACT_APP_REST_URL=http://localhost:3080`
- `MOCK_SERVER_PORT=3080`

Running the mock server

Run the mock server by using the following command from the root directory of your project:

```
npm run start:mock-server
```

However, when you are developing locally, you can use the following command that starts both the mock server and the client:

```
npm run start
```

See the `package.json` file in your project for the full list of commands.

Adding mock APIs

The universal-access project includes a number of mock APIs that simulate calling the Cúram Universal Access APIs. These mock APIs support running some basic scenarios in development mode for the existing set of features.

As you develop your application, you typically create new APIs that you also want to mock. When the mock server starts, it looks to import the `/mock/apis/mockapis` file relative to the folder the command was started from. In this file, the mock-server expects to find three objects, GET, POST, and DELETE, that it can query to serve API requests for those HTTP methods.

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The format of the mock definition is a relative URL that is assigned a JavaScript object. For example, the following code assigns the object *user* to the URL */user*, and the object *payments.json*, which is read from a file, to the */payments* URL.

```
const user = {

  'firstname': 'James',

  'surname': 'Smith',

  'gender': 'male',

   ...

}

const mockAPIsGET = {
  // ADD YOUR GET MOCKS HERE

  // Example of providing mock data in response to an API request in
  // the format uri:mockobject
  '/user': user,

  '/payments': readFile('./payments/payments.json)
};
```

If you use mocking extensively, it is better to use separate files and folders to structure your mocks.

Using universal-access mock APIs

The *mockapis.js* file is preconfigured to import and use mock APIs defined and exported by the universal-access package. This allows your project to reuse and extend the set of universal-access mock APIs.

```
const mockAPIs = require('@spm/universal-access-mocks');

// Extract the existing universal access GET,POST and DELETE mocks for merging.
const UAMockAPIsGET = mockAPIs.GET;
const UAMockAPIsPOST = mockAPIs.POST;
const UAMockAPIsDELETE = mockAPIs.DELETE;

...

//create custom mocks

...

// Merge UA mocks with custom mocks
const GET = Object.assign({}, UAMockAPIsGET, mockAPIsGET);
const POST = Object.assign({}, UAMockAPIsPOST, mockAPIsPOST);
const DELETE = Object.assign({}, UAMockAPIsDELETE, mockAPIsDELETE);

module.exports = { GET, POST, DELETE };
```

Where the same URL is used by a custom mock that was previously assigned to a universal-access package mock, the custom mock replaces the universal access version.

The RESTService utility

The *@spm/core* package provides the `RESTService` utility, which you can use to connect your application to a REST API. The `RESTService` utility provides important functions for securing and connecting to Cúram REST APIs, such as CSRF protection and SSO support. You can fetch resources with alternatives such as Fetch API, SuperAgent, or Axis, but you must consider

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implementing functionality that is handled by the `RESTService` utility, like CSRF protection and SSO support.

The `RESTService` utility supports the GET, POST, and DELETE HTTP methods through the following JavaScript methods:

- `RESTService.get(url, callback, params)`
- `RESTService.post(url, data, callback)`
- `RESTService.del(url, callback)`

See the full `RESTService` class documentation in the *`doc`* folder in the *`@spm/core`* package.

The `RESTService` utility hides details of calls, such as passing credentials, language, and errors. The callback that is passed to the GET, POST, or DELETE methods is started after the API calls return. API calls are asynchronous, so write your code to expect and handle a delay in receiving a response.

The `RESTService` utility provides functions during communications for authentication, handling responses, and user language.

Authentication

Authentication of the user is handled transparently by the `RESTService` utility. After a user is authenticated, the REST APIs automatically send the needed 'credentials', that is, the authentication cookies, with each request. For information about how authentication is handled for REST, see the *Universal Access Responsive Web Application Guide*.

If a user's session is invalidated before a new request is made to a REST API, then the '401 unauthorized' response is returned by the server. The `RESTService` utility relays the response to the callback function passed by the caller.

Handling responses

The `RESTService` utility formats the response from the server to ensure that callbacks receive the response in a consistent manner.

Each GET, POST, and DELETE method accepts a callback function from the caller. When called by the `RESTService` utility, the callback function receives a Boolean value that indicates the success or failure of the API call and the response. The callback function can then deal with the result. For example, a failure can be used to trigger your code to throw an error with the response data that can be used to trigger an error boundary. For more information about the callback function parameters, see the API documentation for the `RESTService` utility.

User Language

The 'Accept-Language' HTTP header is automatically set by the `RESTService` utility based on the user's selected language, which the user can select with the language picker in the application. This approach lets the server respond in the correct locale where locale sensitive information is being handled on the server.

The locale that is passed in the header is set in the transaction that is initiated by that REST request, and is used for the duration of that transaction. For more on transactions, see the *Server Developer's Guide*.

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Cross-Site Request Forgery (CSRF)

The `RESTService` utility manages REST API CSRF protection for Universal Access that includes:

- Managing conditions on when to fetch a CSRF token.
- Pausing requests to fetch the CSRF token from the SPM server when needed.
- Storing the CSRF token in the application.
- Appending the CSRF token to the HTTP request header when appropriate.

Handling timeouts

The `RESTService` utility can manage unresponsive calls to the server. You can set environment variables in the *`.env`* files to set thresholds for timeouts.

- `REACT_APP_RESPONSE_TIMEOUT=10` Wait 10 seconds for the server to start sending.
- `REACT_APP_RESPONSE_DEADLINE=60` but allow 1 minute for the file to finish loading.

Simulating slow responses

During development, it is important to test that your application continues to operate in an acceptable way even when network responses are slow. You can simulate a slow network connection by setting a property in the *`.env.development`* file in the root of your project.

For example, set `REACT_APP_DELAY_REST_API=2` to delay the response from all GET requests for 2 seconds. The value can be set to any positive integer to adjust the delay.

Related concepts

Universal Access authentication on page 204
The `universal-access` package exports the `Authentication` module, which can be used to log in and out of the application and to inspect the details of the current user. The login service is passed a username and password, and optionally a `callback` function that is called when the authentication request is completed.

Related reference

React environment variable reference on page 186
A full list of Universal Access React environment variables categorized by function. You can set environmental variables in *`.env`* files in the root directory of your application. If you omit environment variables, either they are not set or the default values apply.

Adding metadata to file uploads

You can add metadata to files that you upload with the Document Service APIs by using the `X-IBM-Curam-File-MetaData` attribute. That metadata can then be used, for example, as search criteria in a content management system.

When a user wants to upload a file by using the Document Service API, a request is made to the following API endpoint:

```
POST /v1/dbs/files
```

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The body of the request is the file that you want to upload in `binary` format. The `Content-Type` of the request is set to `application/octet-stream`.

```
// file data JSON object
const fileData = {
      caseReference,
      loggedInUserName,
      loggedInUserId,
      relatedPersonId,
      relatedPersonName,
      filename,
      classification,
      dateOfUpload: new Date(),
    }
// Stringify the file data
const metadata = JSON.stringify(fileData);
// Set headers
const headers = {
  'X-IBM-Curam-File-MetaData': encodeURIComponent(metadata),
};
```

To add metadata that relates to the file being uploaded, the `X-IBM-Curam-File-MetaData` header is set to a URI encoded JSON string. The URI encoded JSON string is decoded on the server so it is expected to be URI encoded before sending the request.

```
// POST request
RESTService.post(
    '/v1/dbs/files',
    // File being uploaded
    data,
    (success, body, header) => {
      callback(success, body, header);
    },
    // Set request body format
    'application/octet-stream',
    null,
    // Headers including metadata string
    headers
  );
```

The `headers` are then included in the `POST` request to `/v1/dbs/files`. These headers are not parsed or used in the default `POST /v1/dbs/files` API endpoint.

For more information, see encodeURIComponent().

Universal Access REST API reference

The following Cúram REST APIs are relevant to the key business functions of Merative ™ Cúram Universal Access Responsive Web Application.

For the full list of supported Cúram APIs, see the Swagger specification, which is available from a running Cúram instance at *`http://<hostname>:<port>/Rest/api/definitions/v1`*.

Appeals

```
POST /v1/ua/appeals_form
```

Starts a new IEG execution for an appeal.

```
POST /v1/ua/appeals_form/exit
```

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Exits the Appeals IEG Form.

```
GET /v1/ua/appeals
```

Returns the list of appeals for the logged in user.

```
GET /v1/ua/appeals/{online_appeal_request_id}/attachment
```

Returns the attachment document for an appeal request.

Applications

```
GET /ua/online_categories
```

Returns a list of Online Categories. Each category includes details of the applications that a user can apply for.

```
GET /ua/submitted_applications
```

Returns a list of applications that were previously submitted by the logged in user.

```
POST /ua/submitted_applications/{application_id}/application_programs/
{application_program_id}/withdrawal_request
```

Creates a withdrawal request for the specified program in a submitted application. The application can be withdrawn only if it has a status of pending, and if there is not already a pending withdrawal request for this application. For each program associated with the submitted application, a separate withdrawal request must be created. Either a *`withdrawalReason`* or *`reasonText`* value must be supplied, but not both. See */`withdrawal_request_reasons`* for the list of possible withdrawal reasons that were configured for the associated application type.

```
GET /ua/submitted_applications/{application_id}/application_programs/
{application_program_id}/withdrawal_request_reasons
```

Returns a list of possible withdrawal reasons that a user can choose when they withdraw an application.

```
GET /ua/application_types
```

Returns details of the application type definition of the specified draft or submitted intake application.

```
GET /ua/application_types/{application_type_id}
```

Returns details of the specified application type.

```
GET /ua/application_submission_message
```

Returns details of an application submission message.

```
GET /ua/application_confirmation_message
```

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Returns details of an application confirmation message. The details are configurable by an administrator, by updating the details for the associated application type definition.

```
GET /ua/draft_applications
```

Returns a list of draft applications that are currently in-progress for the logged in user.

```
GET /ua/submitted_applications/{application_id}/attachment
```

Returns the attachment for the specified submitted application.

```
GET /ua/form_details/{application_form_id}
```

Gets details of a form instance.

```
POST /ua/application_form
```

Starts a new intake application form for the logged in user. Under the hood, a new datastore is created to store the data provided in the application form, for later use for when the user is ready to submit their intake application.

```
DELETE /ua/application_form/{application_form_id}
```

Cancels the specified intake application form without saving the details, which means the application form cannot be retrieved or resumed at a later stage.

```
POST /ua/submission_form
```

Starts a submission form for the logged in user, which is used in association with the specified intake application form.

```
GET /ua/submission_form/{submission_form_id}
```

Gets details of a submission form instance.

```
GET /ua/submission_form/{submission_form_id}/page_details
```

Returns details of questions for a single page of the specified form. If the page query parameter value is `next`, or is empty, then questions are returned for the next unanswered page, or for the first page if no answers were yet submitted. If the page query parameter value is `previous`, questions are returned for the page before the last answered page. In this way, you can navigate through the pages of a form. However, you cannot jump directly to a specific page.

```
POST /ua/applications
```

Creates an intake application based on the data that was previously supplied in the specified intake application and submission forms.

Document service

```
POST /v1/dbs/files
```

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Uploads a file and returns the URL for the file.

This API is disabled by default for security purposes, so you must ensure that you have implemented the appropriate file security and validations for document uploads and enabled the API before you can upload files to your system for verification, see the *Server Developer's Guide*.

```
GET /v1/dbs/files/{file_id}
```

Retrieves a specified file.

```
DELETE /v1/dbs/files/{fileId}
```

Deletes a specified file. The DELETE method is not currently used by the Cúram Universal Access Responsive Web Application.

Life events

```
GET /ua/life_event_categories
```

Gets the list of life event categories and the life event contexts (of type *`Citizen/Online`*) that are contained inside those categories, and the life event contexts that are not associated with any category.

```
POST /ua/life_events_form
```

Get the *`formId`* given the *`lifeEventsContextId`*.

```
GET /ua/life_events_form/{formId}
```

Gets the Life Event Context record based on the IEG form.

```
POST /ua/life_events_form/exit
```

Submits the Life Event IEG form.

```
GET /ua/life_events_history
```

Get the life event history.

```
GET /ua/life_event_remote_systems/{formId}
```

Gets the list of Remote Systems that are associated with the Life Event Context of the specified Life Event Form.

```
POST /ua/life_event_remote_systems/{formId}
```

Sends the Life Event data to the selected Remote Systems.

Messages

```
GET /ua/messages
```

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Returns a list of messages that are applicable to logged-in users. The list includes account messages and system messages whose visibility value is either `Logged-in users`, `Public and logged-in users`, or an empty `null` value.

```
GET /ua/public_messages
```

Returns a list of public messages that are applicable to public users. The list includes system messages whose visibility values are either `Public users`, or `Public and logged-in users`.

Notices

```
POST /v1/ua/communications/{communication_id}/mark_send_by_post
```

Mark a communication to be sent by mail. An attribute on the return of the API indicates whether a send by mail request exists for the communication.

```
GET /v1/ua/communications/
```

Returns the list of communications for the logged in user.

```
GET /v1/ua/communications/{communication_id}
```

Returns a communication.

```
GET /v1/ua/communications/{communication_id}/attachments/{attachment_id}
```

Returns the communication attachment details.

Organization

```
GET /ua/organisation
```

Returns the details of the organization.

```
GET /ua/local_offices
```

Returns a list of local offices. The list can be filtered either by county or by ZIP/postal code.

Payments

```
GET /ua/payments
```

Returns a list of payments for the logged in user. The returned list is ordered by payment date, with the most recent payment listed first. The list can be filtered to return a single payment by supplying both query parameters of *`payment_id`* and *`isPaymentByExternalParty`*.

```
GET /ua/payment_messages
```

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Returns details of the user's next payment.

```
/ua/payments/{payment_id}
```

Returns payment-specific details by payment ID. For an external payment identification, append the suffix `\"E\"` to *payment_id*.

```
/ua/payments_summaries
```

Returns a list of payment summaries for the logged-in user.

```
/ua/next_payments_summaries
```

Returns a list of next payment summaries for the logged-in user. Includes an adjustment indicator to highlight where payments differ from the previous payment.

```
/ua/payments/simulate_payments
```

Generates the projected next payments based on current circumstances. Use this API to get detailed information about next payments. You must supply a list of benefit IDs for simulation to be performed for each benefit. Payment simulation is an expensive instruction, so use this API judiciously.

System

```
GET /ua/system_configurations
```

Returns a list of system properties. The list can be filtered to return a single system property by supplying the property ID.

```
GET /ua/app_image_resource
```

Returns the requested image resource.

```
GET /ua/icons/{icon_id}
```

Returns the requested icon.

User

```
GET /v1/ua/user
```

Returns information that is related to the current user, such as user permissions.

```
GET /ua/profile
```

Returns details of the logged in user.

```
GET /ua/profile_image/{image_id}
```

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Returns the requested profile photo. This photo must belong to the logged in user. See `/profile` for retrieving the details for the value to use for `{image_id}`.

```
POST /ua/user_account
```

Resets the user's password, with the new password specified. The specified existing password must be valid, in order for the password to be successfully reset.

```
POST /ua/generated_user_accounts
```

Generates a temporary user account to be used to log in to thCúram system under the hood, when the citizen user has not logged in or created their own user account. This account temporarily stores the details of the citizen user, for example any intake applications or benefits they start, and transfers these details to a permanent user account if the user signs up or logs in with their own account at a later stage.

```
POST /ua/application_form_ownership
```

Changes the ownership of the specified intake application form to the currently logged in user. This action can be completed only if the previous owner of the intake application form is a system-generated user, it is not permissible to use this API to change the ownership from one citizen account user to another.

```
GET /ua/user_account_login
```

Retrieve the users last successful login date time.

```
GET /ua/case_contacts
```

Returns a list of contact information for the caseworkers that are related to the logged in user's cases.

Screening

```
GET /ua/screening_form
```

List all screening forms for the current user.

```
POST /ua/screening_form
```

Starts a new IEG execution based on the Screening Type.

```
GET /ua/screening_form/{formId}
```

Gets the Screening Type and Program selection for a specified Screening Form.

```
POST /ua/screening_form/{formId}
```

Updates the Program selection for specified Screening Form.

```
DELETE /ua/screening_form/{formId}
```

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Delete a screening form.

```
POST /ua/filter_screening_form
```

Starts a new Filter Screening IEG execution based on the Screening Type.

```
POST /ua/screening_form/exit
```

Exits the Screening IEG Form.

```
GET /ua/screening_form/{formId}/results
```

Get the Screening Results.

Verifications

```
POST /v1/ua/verifications/link_file
```

Links an existing file on the system to a specified verification. A link record is created to link the file and the verification.

```
GET /v1/ua/verifications
```

Returns details for all verifications for a specified person or case.

Universal Access passes in the `ConcernRoleID` for the primary participant, which returns verifications for all case participants on all active cases where the person is the primary participant.

```
GET /v1/ua/verifications/{verificationId}
```

Returns details for a specified verification.

```
DELETE /v1/ua/verifications/{verificationId}/file_links/{link_id}
```

Removes a link between a file and a verification without deleting the file. The link record is deleted. You can delete the file by using the document service *`DELETE /v1/dbs/files/{fileId}`*
API.

5.13 Developing toast notifications

A toast as a computing term refers to a graphical control element that communicates certain events to the user without forcing them to react to the notification immediately. In the Cúram Universal Access Responsive Web Application, we use the design system `Alert` component as a base to represent our toast notifications and allow capability to display these notifications independent of the main display content in any function within the application.

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The <Toaster> component

The exposed `<Toaster>` component is used in *`App.js`* and is responsible for rendering toast notifications retrieved directly from the Redux store. These notifications are displayed independent of page content. This means that a deeply nested function can be used to display a notification without regard to the current component render and/or functionality that is used to navigate to different pages.

The `<Toaster>` component handles the retrieving of toast slice within the store, and in passing functionality to remove toast notifications after they are dismissed.

The <Toast> component

The exposed `<Toast>` is the preferred component to display toast notifications. It accepts properties as defined by the web design system Alert component, without requiring the need to specify the component as an `Alert` and the `banner`, `center`, and `toast` properties. It also requires a `text` property to be defined.

The Toaster module

Any component that intends to display a toast notification within it's processing must use the `Toaster` module action `fillToaster` function. This can be either passed to the component as a property, or connected to the Redux store and defining the action as a property. For more information, see Universal Access Redux modules on page 98.

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An example of a page that implements the `Toaster` module action `fillToaster` and a service unavailable toast notification is shown.

```
import React from 'react';
import { connect } from 'react-redux';
import { ToasterActions } from '@spm/universal-access';
import { Toast } from '@spm/universal-access-ui';

...

/**
 * Updates the Toast slice of Redux store
 * @param {*} dispatch the dispatch function
 */
export function mapDispatchToProps(dispatch) {
  return {
    fillToaster: data => {
      ToasterActions.fillToaster(dispatch, data);
    },
  };
}

class MyComponent extends React.Component {

  ...

  doSomething({ success }) {
    if (success) {
     ...
    }
    else {
      this.props.fillToaster(
        <Toast
          dismissable={false}
          expireAfter={5}
          text="This service is currently unavailable"
          type="danger"
        />
      );
    }
  }

 ...

export default connect(
  null,
  mapDispatchToProps
)(MyComponent);
```

5.14 Localization

You can add languages to the application, and apply regional settings for calendar and date formats, and for currencies.

Configuring languages in the application

You can add languages to the application or change the default language. You must create a *`src/config/intl.config.js`* file to be read by the *`src/intl/IntlInit.js`* component, which handles storage of the configuration and creates the `react-intl IntlProvider`.

About this task

Review the *`src/config/intl.config.js.sample.md`* file, which contains the `intl.config.js` object schema and an example *`src/config/intl.config.js`* file.

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Translated messages for the default supported languages are provided in the following locations:

- For `universal-access-ui` components, in the `universal-access-ui-locales` package at */node_modules/@spm/universal-access-ui-locales*.
- For the `core-ui` components, in the `core-ui-locales` package at */node_modules/@spm/core-ui-locales*.
- For the `intelligent-evidence-gathering` components, in the `intelligent-evidence-gathering-locales` package at */node_modules/@spm/intelligent-evidence-gathering-locales*.

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Procedure

Create a *src/config/intl.config.js* file with reference to the following example from the *src/config/intl.config.js.sample.md* file.

```
export default {
  defaultLocale: 'en',
  locales: [
    {
      locale: 'en',
      displayName: 'English',
      localeData: () => {
        require('@formatjs/intl-pluralrules/locale-data/en');
        require('@formatjs/intl-numberformat/locale-data/en');
        require('@formatjs/intl-relativetimeformat/locale-data/en');
      }
    },
    {
      locale: 'de',
      displayName: 'German',
      localeData: () => {
        require('@formatjs/intl-pluralrules/locale-data/de');
        require('@formatjs/intl-numberformat/locale-data/de');
        require('@formatjs/intl-relativetimeformat/locale-data/de');
      },
      messages: {
        ...require('@spm/core-ui-locales/data/messages_de'),
        ...require('@spm/intelligent-evidence-gathering-locales/data/messages_de'),
        ...require('@spm/universal-access-ui-locales/data/messages_de')
      }
    },
    {
      locale: 'ar',
      displayName: 'Arabic',
      direction: 'rtl',
      localeData: () => {
        require('@formatjs/intl-pluralrules/locale-data/ar');
        require('@formatjs/intl-numberformat/locale-data/ar');
        require('@formatjs/intl-relativetimeformat/locale-data/ar');
      },
      messages: {
        ...require('@spm/core-ui-locales/data/messages_ar'),
        ...require('@spm/intelligent-evidence-gathering-locales/data/messages_ar'),
        ...require('@spm/universal-access-ui-locales/data/messages_ar')
      }
    },
    {
      locale: 'ht',
      displayName: 'Haitian',
      /*
        Custom locale data
        Where the locale you need to support is not found in the react-intl locale data
 you can create your own locale data to handle this. Simply create an object with the
 locale property. You must include at a minimum the pluralRuleFunction
        See https://github.com/yahoo/react-intl/issues/1050
      */
      localeData: () => {
        return {
          locale: 'ht',
          pluralRuleFunction(arg1, arg2) {
            return arg1 && arg2 === 1 ? 'one' : 'other';
          }
        };
      },
      messages: require('../locale/messages_ht')
    }
  ]
};
```

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Translating your application

Use *react-intl* and *babel-plugin-react-intl* to extract text from your application. You can then translate the text into another language and include that translation in the application.

Extracting translatable content

You can follow the same method that Merative ™ uses during development to extract the translatable content from your application.

About this task

`react-intl` (https://github.com/formatjs/babel-plugin-react-intl) and `babel-plugin-react-intl` (https://github.com/yahoo/babel-plugin-react-intl) are used to globalize the application during development.

Note: `react-intl` provides React components and an API to format dates, numbers, and strings, including pluralization and handling translations. `babel-plugin-react-intl` extracts string messages from React components that use `react-intl`.

Procedure

1. Use the `react-intl` `defineMessages` API to define the default message string entry within the application.
2. Add `babel-plugin-react-intl` version ^5.0.0 and its dependencies `babel-cli` version ^7.0.0 and `babel-preset-react-app` version ^7.0.0 to the application's `devDependencies`.

```
npm install --save-dev @babel/cli@^7.0.0  @babel/core@^7.0.0 babel-plugin-react-intl@^5.0.0
```

3. Add a *`.babelrc`* file in the root of your project. Use *`.babelrc`* to configure the settings for the `babel-plugin-react-intl` as shown in the following example *`.babelrc`* file:

```
{
  "presets": ["react-app"],
  "plugins": [
    [
      "react-intl", {
        "messagesDir": "translations/messages",
      }
    ]
  ]
}
```

4. Add the following line to your *`package.json`* "scripts":

Linux

```
“extractTranslations”: "NODE_ENV=production babel ./src >/dev/null"
```

Windows

```
"extractTranslations": "set NODE_ENV=production&&babel ./src > NUL"
```

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5. Run the following extraction command to extract all translations to the *translations/messages* directory, as specified in the *.babelrc* configuration:

```
npm run extractTranslations
```

Including translated content in your application

Merative ™ Cúram Universal Access exposes a `src/intl/IntlInit` component. This component reads the configuration provided in the custom `src/config/intl.config.js` to seed your application with messages for all the languages that you want your application to support.

Procedure

1. Ensure that translations are returned for use in your product in the format of a single JSON file per locale. The JSON file must be in the format that is expected by `react-intl`, which is `{[id: string]: string}`, as shown in the following example:

```
{
“label1”: “Translated text1“,
“label2”: "Translated text2”,
}
```

   Where *id* is the ID that is used in your `defineMessages` entry and subsequent extracted message ID.

   Note: The id in this file format `{[id: string]: string}` must match the ID that you define in your code as in the `defineMessages` structure. For more information, see https://formatjs.io/docs/react-intl/api/#formatmessag.

   This file and its location in the application forms the entry to the messages value with the *intl.config.js* for your configured locale, for example:

```
{
      locale: "de",
      displayName: "German",
      localeData: () => {
        require('@formatjs/intl-pluralrules/locale-data/de');
        require('@formatjs/intl-relativetimeformat/locale-data/de');
      },
      messages: require("../locale/messages_de")
},
```

2. `react-intl` also requires that its own locale configuration is provided to support some of its internal functions. For more information, see https://formatjs.io/docs/react-intl and https://formatjs.io/docs/polyfills/.

Results

When you have configured it correctly with the *src/config/intl.config.js* file, the `ApplicationFooter` language selection drop-down should expose your new locale selection, it should also load and apply the configured translation messages to the application.

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Note: If your application does not find messages for the currently selected language at run time, `react-intl` defaults to the text of the `defaultMessage` entry that was used when the message was defined in the source code.

Translating the multilingual messages for when JavaScript is disabled

The translation process is different for the multilingual messages that are displayed when JavaScript is disabled in the browser. Because JavaScript is not available, the messages are implemented in the static `index.html` file. You must customize this file to include translated messages for each of your supported languages.

Procedure

1. Open the `universal-access-sample-app/public/index.html` file and review the message and the provided languages.
2. Update the message if required and translate the message into all of your supported languages.
3. Edit the `universal-access-sample-app/public/index.html` file, and follow the provided format to add messages.

```
<noscript>
  <div lang="en">
    <h1>
        <svg" focusable="false" aria-hidden="true"><use xlink:href="../../dist/
icons/icon-sprite-sheet.svg#info-16"></use></svg>
        JavaScript is switched off in your browser</h1>
    <p>To use this service, you must enable JavaScript in your browser setting and
 try again.
        For instructions to enable JavaScript, check your browser support website.</
p>
  </div>   ...
  </noscript>
```

Screen readers that switch language profiles use the `lang` attribute to provide the correct accent and pronunciation. Most language tags consist of a two- or three-letter language subtab, often followed by a two-letter or three-digit region subtag. For information about choosing a language tag, see Choosing a Language Tag.

4. To change the style of the messages, update the `noscript.css` file that is referenced in the header.

   For more information about styling the application, see Customizing the color and typography of the application on page 138.

Regional settings

The universal-access module and its components respect the regional settings that are defined in Cúram to ensure your application is synchronized with the Cúram instance on which it depends.

Regional settings for currencies, and for calendar and date formats in the user interface, are defined inCúram.

For more information about regional settings, see the *Regionalization Guide*.

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5.15 Customizing the application

As a developer, use these simple scenarios to learn how customize the Merative ™ Cúram Universal Access Responsive Web Application.

The first scenario shows how to change default text on the **My Details** page. Each subsequent scenario adds to the previous one to build out new content in your application.

Note: Follow the scenarios in sequence. If you start in the middle of the scenario list, you might have to go back through previous scenarios.

Changing text in the application

You can change the default text, images, colors, or typography in the application. In this scenario, an English language message is changed. Text is changed by providing custom text that overrides the default text for any language.

Before you begin

You can find text in the application components and in IEG forms.

- Text in IEG scripts. For more information, see the *Working with Intelligent Evidence Gathering (IEG) Guide*.
- Text in IEG configuration settings. For more information, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

About this task

Message or text strings in the application use the `react-intl` package, which supports globalization of React applications. `react-intl` allows the messages to be extracted and translated to other supported languages, it can also add placeholders for data.

To change the existing text of any of the languages that are provided by Merative ™, you must provide a custom version of the message that is mapped to the same `message id`.

Procedure

1. To change an English language message, find the ID of the message you want to replace. In your project, go to */node_modules/@spm/universal-access-ui/locale*.
   a) The *locale* folder contains message files for each supported locale. For your chosen language, search the appropriate *message_xx.json* for the text string that you want to replace. For example, to change the English text **Apply for a benefit**, search *messages_en.json* for that string as shown in the following example. If there is more than one instance of the string, you must find the correct message ID for the text you want

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to change. The simplest way to find the correct instance is to try replacing each ID one by one, reloading the page each time to see whether the new string is displayed.

```
"System_Messages_Alert_Description": "System messages alert description",

"Payments_NoPaymentMessages": "No payment messages",

"Payments_ApplyForABenefitLink": "Apply for a benefit",

"TODO_NoTODOMessages": "No to-dos",

"TODO_CaseworkerMessage": "Your caseworkers can create to-dos for you.",

"Meetings_NoMessages": "No meetings",
```

b) For the **Apply for a benefit** string, use the associated ID `"Payments_ApplyForABenefitLink"` to override the message in your custom *`messages_en.json`*.

2. Create a custom message file by creating a *`messages_en.json`* file in the *`src/locale`* folder. Custom messages are injected into the application at application start. For more information, see 5.14 Localization on page 129. By default, the starter application provides a locale folder from where custom messages files are automatically loaded. You can add your custom file to this folder: *`src/locale`*.
3. To replace the message, create a new `id:message` mapping in your custom message file by using the same ID value as shown in the following example.

```
"Payments_ApplyForABenefitLink": "Click here to apply for a benefit",
```

4. Update the `src/config/intl.config.js` file in the English locale to point to the custom messages file.

```
// [...]
    {
      locale: 'en',
      displayName: 'English',
      localeData: () => {
        require('@formatjs/intl-pluralrules/locale-data/en');
        require('@formatjs/intl-relativetimeformat/locale-data/en');
      },
      messages: require('../locale/messages_en'),
    },
// [...]
```

Related concepts

Localization on page 129
You can add languages to the application, and apply regional settings for calendar and date formats, and for currencies.

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Customizing images, fonts, and files

As the Cúram Universal Access Responsive Web Application is based on `create-react-app`, you can follow one of their standard approaches for adding images, fonts, fonts and files, depending on whether you are adding images for IEG scripts.

For the application in general, you can co-locate the image or file with the component that requires the resource, then import this resource within the component as follows:

```
import React from 'react';
import image from './image.png';

const Component = () => {
  return <img src={logo} alt="Logo" />;
};

export default Component;
```

For more information, see Adding Images, Fonts, and Files in the `create-react-app` documentation.

Adding images for IEG scripts

Some IEG `<Text>` elements support rich text content that might include HTML tags. If you need to add an image as part of the text, the URL of the image must target to a resource in the `public` folder of the application, for example:

- Create an `img` folder in the public directory of your application. The relative path should look like this `universal-access-sample-app/public/img`.
- Store the image in the `img` folder, for example `universal-access-sample-app/public/img/image.png`.
- Define an IEG text element in the script, for example `<display-text id="DisplayText.Image"/>`.
- Define the content of the property as an HTML image tag in the property file :

  ```
  DisplayText.Image=<img src="img/image.png "/>
  ```

  Where the `src` path points to the folder created on the `public` folder.

Images added in this way are not sized to device screen sizes, therefore take a mobile-first approach when adding images to IEG Scripts.

For more information about adding resources to the `public` folder, see Using the Public Folder in the `create-react-app` documentation.

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Customizing the color and typography of the application

You can customize the color scheme and typography of your application to help users recognize and trust that they are interacting with the correct agency or organization. This can be achieved in several ways, as explained in the next sections. Do not modify `CSS` files directly.

> **Note:** The styling process is different for the multilingual messages that are displayed when JavaScript is disabled in the browser. Because JavaScript is not available, the messages are implemented in the static `index.html` file. To change the style of those messages, update the `noscript.css` file that is referenced in the header. See Translating the multilingual messages for when JavaScript is disabled on page 134.

Sass

The design system uses the Sass `CSS` preprocessor. The Sass files are compiled into `CSS` at build time and your application uses the transpiled `CSS`.

The file structure of the starter pack

The starter pack is configured to use Sass. The relevant files are in a `/css` and `/sass` folders under the `/src` folder in the file structure.

```
.
├── src
|   └── css
|   |   └── styles.css // transpiled output, do not modify
|   └── sass
|   |   └── customVariables.scss
|   |   └── styles.scss
```

> **Note:** The contents of the `/css` folder are generated at build time. Don't directly edit any files inside the `/css` folder.

You must edit the Sass files to make style changes. You can write `CSS` into these files if you don’t want to use Sass features or are more familiar with `CSS`. By default, the Sass folder contains two files:

- **styles.scss** - Use this file to import the design system stylesheets and all other styles that the app might use.
- **custom-variables.scss** - Customize the file by overriding the design system variables values with your intended values.

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Customization can be achieved by adjusting the Sass variables directly. While this technique is supported, customization of color schemes should be implemented using the ThemeBuilder provided in the Design System Storybook tool.

```
// sass/custom-variables.scss
// Sass Variables - Previous method
@use '@govhhs/govhhs-design-system-core/src/stylesheets/govhhs-wds' as * with (
  $color-primary: your-custom-color-hex1,
  ...
);
// Design Token theming - Recommended method
[data-wds-theme='default'] {
  --cds-background: your-generated-color-hex1;
  --cds-background-brand: your-generated-color-hex2;
  ...
}
-
```

Design Tokens

Design tokens are a series of `CSS`, not Sass variables that are re-used throughout the Design System to give consistent styling across components.

Each token represents a design decision, has a specific role, and has a relationship with other design tokens. The design tokens are implemented using `CSS` Custom Properties. The tokens can be customized to change the color scheme of the Design System. The full list of tokens can be seen in the ThemeBuilder discussed below.

ThemeBuilder

The Design System ThemeBuilder tool comes with the Design System Storybook documentation. The Storybook documentation can be located in the `/docs` folder of the `Universal Access Responsive Web Application` asset.

The ThemeBuilder applies selected colors to a custom theme configuration but still maintains the relationships between the underlying Design Tokens. As a result, the ThemeBuilder maintains the accessibility of the UI.

The relationship between the underlying Design Tokens is consistent as the selected colors are derived to respect the luminance stops of the colors being replaced. Controlling the relative brightness and luminance enforces color contrasts between the design tokens ensuring color schemes meet accessibility guidelines.

Themes used in the Design System are used to globally modify existing components or sections of a page to fit a specific visual style.

If changing the color scheme of your application it is strongly recommended that you use the ThemeBuilder to achieve this.

ThemeProvider

The Theme Provider tool comes with the Design System Storybook documentation. The Storybook documentation can be located in the `/docs` folder of the `Universal Access Responsive Web Application` asset.

The ThemeProvider is used in conjunction with the ThemeBuilder to implement inline theming where a page or a section of a page is styled with a particular theme that differs from the base

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theme. You might apply a scheme when your branding needs require different patterns of color application, for example a light theme with a dark header.

Sass variables

As discussed above, the ThemeBuilder is the recommended approach for customizing the color scheme in your application. However, using Sass variables to customize the application is also supported.

You can use Sass to declare variables in `CSS`. Variables can be defined for colors, spacing, and typography in a single place and reused throughout the Design System stylesheets. The complete set of predefined variables can be viewed in the file

```
node_modules/@govhhs/govhhs-design-system-core/src/stylesheets/core/_variables.scss
```

If changing the color scheme for your application using the Sass variables technique, you should ensure that color contrast values meet guidelines for accessibility. For users with low vision, low-contrast text is difficult or impossible to read. For more information about color contrast and testing your color scheme, see the Text elements must have sufficient color contrast against the background in the WCAG guidelines and consider the user of color contrast analysis tools.

Changing the color pallet with Sass variables

Define the –darker, the -darkest, the light, and the lightest variants by using the lighten or the darken Sass utilities.

```
$color-primary-darker: darken($color-primary, 10%);
$color-primary-darkest: darken($color-primary, 20%);
$color-primary-light: lighten($color-primary, 10%);
$color-primary-lightest: lighten($color-primary, 50%);
```

Or by hard-coding your new values.

```
$color-link: #2b4380;
$color-link-hover: #0535d2;
$color-visited: #7834bc;
```

Changing typography with Sass variables

Typography can be changed using the maps for the associated variables.

```
// Body font map
$body-font: (
'font-size': 20px,
'line-height': 33px,
'font-weight': 400
);
//Small font map
$small-font: (
'font-size': 16px,
'line-height': 26px,
'font-weight': 400
);
```

Custom styles

Custom styling outside of Design Tokens is not recommended. However, it can be achieved by creating a custom file in the Sass folder. For example, my-custom-styles.scss. This file can be

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imported into the `styles.scss` file. The order of the style import matters, import the new file after the design system styles in the following order:

Adding content to the application

Build on the text change scenario from *Changing application text* to add a route. You also add content that is displayed when the route is loaded.

Before you begin

If you are not familiar with React and React Router, you must take a basic course in building a web application with React and React Router.

The term "feature" refers to the content that is displayed when a route is loaded, this content is what citizens see on the user interface. A feature is an abstraction that includes all the content that comes together to create the user experience. A feature can be a collection of JavaScript™ files, JSON files, and APIs that work together to generate the user experience. The term "feature" can be referred to as a page, view, or component in other application environments.

This scenario adds a feature that presents a logged-in person's details in the main content area when a */person* URL is loaded. This scenario is built on in later scenarios by calling APIs, by using client-side stores, error handling, or globalization.

About this task

When you extend the Merative ™ Cúram Universal Access reference application, you might want to introduce new content that is displayed when citizens click a link.

Procedure

1. Create the content for the feature, take the following steps:
   a) Create a folder called *features* under the */src* folder in your project
   b) Create a *person* subfolder and create *PersonComponent.js* in the folder.

   ```
   src/features/Person/PersonComponent.js
   ```

   c) Add some HTML to display when the component is loaded. The following example displays some data that is returned by an API:

   ```
   import React from 'react';

   const Person = () => { return (
       <div>
         <h1>James Smith</h1>
         <h2>Gender: Male</h2>
         <h2>Born: April 1st 1996</h2>
       </div>
   )};
   export default Person;
   ```

2. Add a route to link to your feature, take the following steps:
   a) Declare an associated URI for each feature in the application. The URI allows React to present the feature when the URI is requested in the browser. This technique is standard `'React Routing'` for displaying features. For more information about routes, see 5.11

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Developing with routes on page 110. Add a simple component that displays when the route is loaded:

1. Open *routes.js* in your project.
2. Import a Person component from the folder *features/person*.
3. Add a *"/person"* route that loads the Person component as shown in the following example:

```
import React from 'react';
import { Route, Switch } from 'react-router-dom';
import { Routes as UARoutes } from '@spm/universal-access-ui';
import Person from './features/PersonComponent'

export default (
  <Switch>
    <Route path="/person" component={Person} />
    <UARoutes />
  </Switch>
);
```

3. Load the new feature by using the route, take the following steps:
   a) Run your application, enter the following command:

```
npm run start
```

   b) Start a browser and enter the full URL for the feature, for example: http://localhost:8888/person

Results

When the application loads, the person details are displayed in the main content area.

Related concepts

Developing with routes on page 110
Routes define the valid endpoints for navigation in your application. Your application consists of a network of routes that can be traversed by your users to access the application's pages.

Styling content with the Social Program Management Design System

Build on the route and person content scenario that you added in *Adding content to the application* by styling the content of a person's details.

Before you begin

The Cúram Design System is a design framework that helps you to build a cohesive and consistent application. By selecting components from a design catalog and applying design principles, design and development is faster and user experience is improved.

About this task

The full catalog of Social Program Management Design System components, including descriptions of when and where to use them, is documented in the *govhhs-design-system-react* package. You can access these packages through *index.html* file in */node_modules/@govhhs/govhhs-design-system-react/docs*. This scenario uses a number of Social Program Management Design System components to improve the person feature.

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Procedure

1. Import contents from the Social Program Management Design System. Enter the following command to import the *Avatar* and *MediaObject* components from the package `@govhhs/govhhs-design-system-react`:

```
import {Avatar, MediaObject} from '@govhhs/govhhs-design-system-react'
```

2. Update `PersonComponent.js` to use the Grid, Column, Card, MediaObject, Avatar, and List components to display the person's details. You can also include an address in a separate card.

   Use the following code to replace the previous `PersonComponent.js`:

```
import React from 'react';
import {Grid, Column, Card,CardBody,CardHeader, List, ListItem, Avatar,
 MediaObject } from '@govhhs/govhhs-design-system-react'

const avatarMediaJames = <Avatar initials="JS" size="medium" tooltip="profile
 photo" />;
const Person = () => {
    return (
        <Grid className="wds-u-p--medium">
            <Column width="1/2">
             <Card>
                <MediaObject media={avatarMediaJames} title="James Smith">
                <List>
                    <ListItem>Gender: Male</ListItem>
                    <ListItem>Born: April 1st 1996</ListItem>
                </List>
            </MediaObject>
            </Card>
            </Column>
            <Column width="1/2">
             <Card title="Address">
                 <CardHeader title="Address"/>
                 <CardBody>
                    <List>
                        <ListItem>1074, Park Terrace</ListItem>
                        <ListItem>Fairfield</ListItem>
                        <ListItem>Midway</ListItem>
                        <ListItem>Utah 12345</ListItem>
                    </List>
                </CardBody>
            </Card>
            </Column>
        </Grid>
)};
export default Person;
```

3. Save `PersonComponent.js`.

Results

When you reload the application, you see the updated application style.

Changing the application header or footer

Build on the styling scenario from *Using the Social Program Management Design System to style content* by adding a link to the application header or footer.

Before you begin

For more information about the application header and footer, see the *Universal Access Responsive Web Application Guide*.

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To customize the header, you must create your own custom version. To keep this scenario brief, work on the header only and copy the existing header from `universal-access-ui`. Make some small changes to the header to show how it can be customized. Alternatively, completely replace the header or footer with your own version.

About this task

Change the application header to include a new link that to take you to the **My Details** page.

Procedure

1. Copy the Universal Access header by copying the *`node_modules/@spm/universal-access-ui/src/features/ApplicationHeader`* folder to *`src/features`*.
2. Fix any broken imports. Take the following steps:
   a) Use ESLint or a similar linting tool to find any errors where imports are not found.

   > **Note:** If you do not use a linting tool, you get build errors.

   b) Errors are generated because the `universal-access-ui` uses relative paths when it imports dependencies from its own project. For imports that are within the `universal-access-ui` module, but outside the *`features/ApplicationHeader`* folder, you must change the imports to reference the official exported version of those dependencies from the `universal-access-ui` node module.
   c) For each import that is not resolved, find the equivalent export in the `universal-access-ui` package. Inspect *`node_modules/@spm/universal-access-ui/src/index.js`* to find the list of exported artifacts and their exported names.

      The `Paths` module is referenced in the `ApplicationHeader` by using the default import from a relative path as shown in the following example: `import PATHS from '../../router/Paths'` Amend module as shown in the following example: `import { Paths } from 'universal-access-ui'`
   d) Repeat this procedure for all the files in the *`ApplicationHeader`* folder, some of the imports of `'Paths'`, and for some other references such as `'ErrorBoundary'` and `'AppSpinner'`.
3. Replace the existing header with your custom version, take the following steps:
   a) Open *`src/App.js file`* and remove the imported `ApplicationHeader` from `universal-access-ui`.
   b) Import your cloned version from *`./features/ApplicationHeader`* as shown in the following example:

      ```
      import ApplicationHeader from './features/ApplicationHeader';
      ```

      Import `ApplicationHeader` as a default import, without curly brackets, rather than a named import. Alternatively, you can add a named export to your `ApplicationHeader` feature.
4. Update the header feature to include a tab that loads the `/person` page take the following steps:
   a) Open *`constants.js`* in *`src/features/ApplicationHeader/components`*. *`constants.js`* defines an object that represents a navigation item for the header.

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b) Add and entry for the new page **My Details** as shown in the following example:

```
/**
 * Application navigation header tabs.
 */
const NAVIGATION_HEADER_TABS = {
    ...

  PROFILE: { NAME: 'PROFILE', ID: 'navigation-profile' },
  CHANGE_PASSWORD: { NAME: 'CHANGE_PASSWORD', ID: 'navigation-change-password' },
  MYDETAILS: { NAME: 'MYDETAILS', ID: 'my-details' },

};
```

c) Open *ApplicationHeaderLogic.js*. *ApplicationHeaderLogic.js.* contains the logic that tracks which tabs are selected so they can be highlighted as active.

d) Update the `isTabActiveForUrlPathname` function to include the new **My Details** page in the **Your Account** section. For brevity, the value is hardcoded in the following example. However, you can replicate the pattern that is used by the `universal-access` code to add it to `Paths`.

```
const isTabActiveForUrlPathname = (urlPathname, navigationTabName) => {

  ...
  switch (navigationTabName) {
    case FIND_HELP.NAME:
      return (
        urlPathname === Paths.HOME ||
        urlPathname === Paths.APPLY ||
        urlPathname === Paths.BENEFIT_SELECTION ||
        urlPathname === Paths.APPLICATION_OVERVIEW
      );
    case YOUR_ACCOUNT.NAME:
      return (
        urlPathname === Paths.ACCOUNT ||
        urlPathname === Paths.BENEFITS ||
        urlPathname === Paths.PAYMENTS.ROOT ||
        urlPathname === Paths.PAYMENTS.DETAILS ||
        urlPathname === '/person'
      );
```

Open *ApplicationHeaderComponent.js*, which renders the header, and find the `PrimaryNavigation` component.

e) Add a tab called **'My Details'** with a link to the person feature inside *ApplicationHeaderComponent.js*. For brevity, the example is hardcoded values,

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but you can replace these values with variables. If you want, you can also globalize the tab.

```
..

<PrimaryNavigation>
  <Tabs>
    ...

    <Tab
      id={NAVIGATION_HEADER_TABS.YOUR_BENEFITS.ID}
      href={HASH_SYMBOL + LOCATIONS.BENEFITS}
      label={formatMessage(translations.headerYourBenefitsLabel)}
    />
    <Tab
      id="person_tab"
      href="/person"
      label="My Details"
    />
  </Tabs>
  ...
</PrimaryNavigation>

...
```

5. Save your file and restart the application.
6. You can modify the application footer in the same way by replacing the `universal-access-ui` version in *`src/App.js`* with your own custom version.

Results

Go to the home page. A new tab that is called **My Details** is in the primary navigation area. When you select **My Details**, the person feature is loaded in the main content area.

Related reference

Customizing headers and footers on page 146
Merative ™ Cúram Universal Access contains a predefined header and footer. You can customize your application headers and footers by replacing the sample components with your own custom versions.

Customizing headers and footers

Merative ™ Cúram Universal Access contains a predefined header and footer. You can customize your application headers and footers by replacing the sample components with your own custom versions.

Headers and footers

The header and footer contain content such as links, **Log in**, and **Sign up** buttons, and menus for logged-in users.

The *`App.js`* file in the *universal-access-sample-app* module, reuses the sample *ApplicationHeader* and *ApplicationFooter* components that are provided by the universal-access module by placing them above and below the main content of the application:

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App.js

```
<BrowserRouter>
  <ScrollToTop>
    <div className="app">
      <a className="wds-c-skipnav" href="main-content">
        {formatMessage(translations.appSkipLink)}
      </a>

      <Route path="/" component={ApplicationHeader} />
      <main id="main-content" className="main-content">
        <Content>{routes}</Content>
      </main>

      <ApplicationFooter />
    </div>
  </ScrollToTop>
</BrowserRouter>
```

Header

Typically, an application header has two views. One view has items relevant to users who are not logged in or signed up, for example a **Sign Up** button. The second view shows items that are relevant to users who are signed up and logged in, for example an **Update your profile** button.

To facilitate the separate views, use a react-router-dom *Route* component. The `App.js` sample demonstrates wrapping the *ApplicationHeader* component in a Route component and passing Route information to the *ApplicationHeader*. This allows the *ApplicationHeader* to query the Route properties and decide what to display based on the current location in the application. For example, you might want to show a different view for the login page route (‘*my-app-domain*/login’) from the application home page route (‘*my-app-domain*/’).

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The following code sample shows how the *ApplicationHeader* queries its location property to find out what page the application is displaying. The sample code then uses this information to decide what to show in the header.

```
get isOnLoginPage() {
  return this.props.location.pathname === '/login';
}

render() {
 return (
  <Header
    title={this.pageTitle}
    type="scrollable"
    logo={<img src={logo}
    alt="agency"
    id={this.props.loggedInUser} />}>
    <PrimaryNavigation type="scrollable">
      <TabList scrollable>
        <Tab
         id="tab1"
         href="/"
         text={
           this.props.intl.formatMessage(translations.headerHomeLabel)}/>
            <Tab
              id="tab2"
              href="/my-applications"
              text={this.props.intl.formatMessage(
                 translations.headerBenefitsLabel)}/>
         </TabList>
       </PrimaryNavigation>
       <SecondaryNavigation type="Scrollable"/>

        {/* Show signed out menu */}
        {!this.isOnLoginPage &&
         this.props.loggedInUser === null &&
         !this.isUserProfileLoaded &&
         this.signInMenu}

        {/* Show signed in menu */}
        {this.props.loggedInUser &&
         this.isUserProfileLoaded &&
         this.profileMenu}
       </SecondaryNavigation>
     </Header>
    );
  }
```

Login and sign up in the header

If you are building your own customer header, you must identify which page you are currently displaying the Header on, you must also differentiate between logged in and logged out users. Whether a user is logged in or out can be determined by using the authentication API provided by the universal-access module. The Authentication API provides functions to allow you to log in and out of the application, and also allows you to query if a user is logged in and who that user is. For more information, see 5.12 Connecting to Universal Access REST APIs on page 115.

The following code sample shows how the *ApplicationHeader* uses the Authentication API. In this function, a check is made to see whether a user is logged in before it loads that user's profile. The user's profile is needed to display the user's full name in the header.

```
fetchProfile() {
  if (Authentication.isLoggedIn() && !this.isUserProfileLoaded) {
     this.props.loadProfile();
  }
}
```

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Footer

You can add a footer to the bottom of the application page in the same way as you add the header to the top of the page. The universal-access module provides a sample application footer that is used in the universal-access-sample-app, see the `App.js` sample. The sample footer is static and does not change based on the location or the authentication state, however the footer can be made dynamic by following the example from the header.

Creating an Cúram REST API

Build on the scenario from *Changing the application header or footer*, use a REST API to get data to your application.

About this task

The most common way to get data to your application is to use a REST API to receive the requested data as a JSON string that your application then parses and renders. Cúram provides development tools and the runtime infrastructure that you can use to build and deploy a REST API with your Cúram server. The REST API can be called by using standard HTTP verbs such as GET, POST, and DELETE. The REST API returns data as a JSON string in the response body. For more information about REST APIs, see the *Cúram™ REST API Guide*.

Connecting to REST APIs from the application

Build on the Cúram REST API that you created in the scenario *Creating an Cúram REST API* by calling it from your application.

About this task

Features in your application rely on passing data to and from the Cúram server or another service. The reference application already consumes a number of Universal Access APIs to support business features.

This scenario updates the person feature to read the data from an API instead of just displaying hardcoded values. The scenario shows you how to create and use the following items:

- Use the RESTService utility to helps you call APIs.
- Use the mock server to show you how to create a mock API so you can quickly develop your feature without spending time building and deploying the real API that it eventually uses.
- Connect your application to a Cúram development environment that hosts the APIs by using Tomcat to enable real integration testing in the development environment.

Procedure

1. Create a mock API by completing the following steps:
   a) In your project, open `/mock/apis/mockAPIs.js`.

      The mock server consumes `mockAPIs.js`, it contains the mappings from APIs to the mock data. The mock server uses this information to provide the correct data when an API call is made in development mode. `mockAPIs.js` also contains an import from the

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`universal-access-ui` package and assignments for GET, POST, and DELETE APIs as shown in the following example:

```
const mockAPIs = require('@spm/universal-access-mocks');

// Extract the existing universal access GET,POST and DELETE mocks for merging.
const UAMockAPIsGET = mockAPIs.GET;
const UAMockAPIsPOST = mockAPIs.POST;
const UAMockAPIsDELETE = mockAPIs.DELETE;
```

Use these APIs to test the Universal Access application. For more information, see The mock server API service on page 116.

b) To add more mock data, add your mocks to the placeholders provided. This scenario adds the person data for a person `James Smith` that is returned when the *`'/person'`* path is loaded.

c) Add an object in *`mockAPIs.js`* to represent James Smith. For simplicity, do not normalize the dates, or use code tables, later scenarios show you how to globalize and handle code tables.

```
const user = {
 firstname: 'James',
 surname: 'Smith',
 dob: 'April 1st 1996',
 gender: 'male',
 address: {
   addr1:'1074, Park Terrace',
   addr2:'Fairfield',
   addr3:'Midway',
   addr4:'Utah 12345',
 }
}
```

d) Include a value for the URI `'/user'` in the `mockAPIsGET` object to return the mock object as shown in the following example:

```
const mockAPIsGET = {
  '/user': user,
}
```

The new `'/user'` mock API is merged with the mocks from `universal-access-ui` and is deployed by the mock server on port 3080.

e) Test that the new API is working, start the application by using `npm start`.

f) Using the browser, load the `/person` URL: http://localhost:3080/person. If successful, the browser displays the response.

2. Use the RESTService utility from the core package to make an Ajax call to the API.

You can use many agents to make Ajax calls. The RESTService utility uses Superagent. The RESTService utility handles the following functions:

- Authentication credentials are automatically handled for each call, and users are redirect to log in when appropriate.
- The user's locale is passed to ensure that the response is in the correct locale.
- Timeouts are managed with environment variables in the *`.env`* file.
- Errors are captured and thrown in a standard fashion so that the error handling infrastructure is invoked.

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For more information about the RESTService utility, see The RESTService utility on page 117.

3. Open *PersonComponent.js* file. Make the following changes, checking that your application still displays the page after each step:
   a) To enable lifecycle methods that are required to manage the API calls, convert the old stateless component to a stateful `React.Component` class:

   `Old stateless Person component`

   ```
   const Person = () => {
      return (
       <JSX code here>
      );
   }
   ```

   `Updated stateful Person component`

   ```
   class Person extends Component {
       render(){
         return (
           <JSX code here>
        )};
   }
   ```

   b) Create local state to hold the API data.

   The local state stores the values returned by the API that drive the render function. Whenever the state is updated, the component re-renders to reflect the state change. For this scenario, hardcode the values for the state in your class constructor so that something is displayed on the page. To differentiate between this temporary default data and the API data, change the `firstName` to `'Roger'`. Later, when you introduce the API, the data for `'James'` is returned from the API and not the default state as shown in the following example:

   ```
   constructor(props) {
     super(props);
       this.state= {
         user : {
           firstName:'Roger',
           surname:'Smith',
           dob:'April 1st 1996',
           gender: 'Male',
           address: {
             addr1:'1074, Park Terrace',
             addr2:'Fairfield',
             addr3:'Midway',
             addr4:'Utah 12345',
           }
        }
     }
   }
   ```

   c) Convert all hardcoded references to use the values from the state.

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Now that you have a state object, replace all hardcoded values with references to the state. Replace each hardcoded piece of data with a state reference `{this.state.user.X}`. Examples are as follows:

```
...
class Person extends Component {
    render(){
      return (
        ...
            <Card>
               <MediaObject media={avatarMedia}
 title={this.state.user.firstName}>
               <List>
                   <ListItem>Gender: {this.state.user.gender}</ListItem>
                   <ListItem>{this.state.user.gender}</ListItem>
               </List>
            </MediaObject>
    )};
        ...
}
...
```

d) Import the `RESTService` utility.

   To call an API, you must invoke one of the methods of the RESTService utility. First you must import it from the core package:`import { RESTService } from '@spm/core'`

e) Create a `componentDidMount` method to invoke the API call.

   When your component is mounted by React, the `componentDidMount` function is invoked. In `componentDidMount` the API call can be made to populate the component state. Update your constructor to set the user values to blank when initializing, this setting ensure that your data is being loaded from the API. Then, add the following code to your Person component. The root location of the API is taken from the values set in your *`.env.development`* file when in development mode. In production mode, it is taken from the *`.env`* file.

   The *`.env.development`* file specifies the mock server URL as REACT_APP_REST_URL, which has the value http://localhost:3080/ where the mock server is deployed. You can use this environment variable to prepend the `/user` API.

   The RESTService API accepts a URL and a callback function as parameters. In the following code, the callback function is passed as an anonymous function in the second parameter. The 'success' is checked, before the state is updated with the response.

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Note: Error scenarios are not handled in this code. The Handling failures in the application on page 155 scenario contains details about failure responses, 'Error Boundaries', and failure handling.

```
componentDidMount() {

    const url = ${process.env.REACT_APP_REST_URL}/v1/user;
    const user = RESTService.get(url, (success, response) => {
      if (success) {
        this.setState((user: response));
      }
    });

  }
```

Results

Start your application, log in and select the **My Details** tab. The tab loads using data that is pulled from the `/user` API.

The `REACT_APP_REST_URL` environment variable that is defined in the `.env` and `.env.development` files determines where the API is served. In development mode, the API calls the mock server. In production mode, the API calls the Cúram server that hosts the application REST APIs. You can seamlessly switch between development and production, assuming the contract remains the same between your mock and real APIs. That is, that the JSON structure matches in both.

Related reference

Handling failures in the application on page 155
Handle any failures that you find when you did integration testing in the *Developing with Cúram APIs by using Tomcat* scenario.

Testing REST API connections with Tomcat

Build on the scenario in *Calling an API from the application*. Do your integration testing with the real Cúram APIs instead of the mock APIs in your Universal Access client.

Before you begin

You must be familiar with the Cúram development environment, the development of REST APIs, and the Merative ™ Cúram Universal Access development environment.

This scenario uses IP address 192.1.1.1 to represent the development computer for the Cúram server, and 192.9.9.9 for the computer that hosts the Universal Access client. However, you can use the same computer with the same IP address. Replace this address with the IP address of your development computer.

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About this task

The mock server is hosted on the same domain as the application during development http://localhost. However, when your APIs are served from a different domain, you might encounter Cross Origin Resource Sharing (CORS) issues. You can use Tomcat to configure your Universal Access client and Merative ™ Cúram Universal Access server to allow Cross Origin requests. To overcome the CORS issues, the REST toolkit uses a filter that provides the required HTTP headers to allow browsers to accept responses from a different domain. In this scenario, the domain is where the REST application is deployed.

Procedure

1. Configure the Cúram server, take the following steps:
   a) In your development environment, add the following properties to `Bootstrap.properties` and set the `hostname/ipaddress` of the computer where the Universal Access client is to be deployed:
      - `curam.rest.refererDomains = 192.9.9.9`
      - `curam.rest.allowedOrigins = 192.9.9.9`

      Note: If you develop the server and client on the same computer, you can use `"localhost"`.

      The property `curam.rest.allowedOrigins` is the `Origin` value in the CORS headers. Both properties can have comma-delimited domain names, for example, `curam.rest.allowedOrigins = 192.9.9.9, 192.9.9.8, mymachine.mycorp.com` to allow multiple domains to access the Cúram application.
   b) Set the `CATALINA_HOME` environment variable to the location of your Tomcat installation. For example, on Windows™ set the following variable: `'set CATALINA_HOME=C:\DevEnv\7.0.1\tomcat'`
   c) Build Cúram by using the appbuild server, database, client, and other components.
   d) Run an extra target **`appbuild rest`** to create the REST project in your *`EJBServer\build\RestProject\devApp`* directory.
   e) Copy *`Rest.xml`* into your Tomcat *`conf/localhost`* folder. For more information about building Cúram APIs, see the *Cúram™ REST API Guide*.
   f) Start the server, RMILoginClient, and Tomcat in the normal way for Cúram.

      The REST client starts automatically. When the client is running, the APIs are accessible in the */Rest* base path, for example: *`http://192.1.1.1:9080/Rest/<myapi>`*.
2. Configure the Universal Access client by completing the following steps:
   a) Modify the following environment variable in the *`.env.development`* file in the root of the application to point to the REST URL on *`Eclipse/Tomcat`* as shown in the following example:

```
REACT_APP_REST_URL=http://192.1.1.1:9080/Rest
```

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> **Note:** If you develop the server and client on the same computer, you can use `"localhost"`.
>
> If you want to connect to an application on WebSphere® Application Server, you must change `"http"` to `"https"` and update to the correct port. 9044 is the default port.

b) Build the application, enter the following command: **`npm run build`**.

c) Start the application, enter the following command: **`npm run start`**.

Results

Your Universal Access client application now communicates with the REST API that is deployed on Eclipse with Tomcat.

> **Note:** Run the application in debug mode so it stops at breakpoints in the application code.

Handling failures in the application

Handle any failures that you find when you did integration testing in the *Developing with Cúram APIs by using Tomcat* scenario.

Before you begin

You should build fault-tolerant web applications because, for example, web services such as a REST API are never fully reliable. When handling the expected response, the application must also allow for failures, such as network outages, timed out responses, internal server errors, or software bugs.

Universal Access ErrorBoundary component

According to React, "Error boundaries are React components that catch JavaScript™ errors anywhere in their child component tree, log those errors, and display a fallback UI instead of the component tree that crashed."

An error boundary component is a React component that implements the `componentDidCatch` lifecycle method. For more information about error boundaries, see https://reactjs.org/

The `@spm/core-ui` package exports a reusable `ErrorBoundary` component. The default behavior of the component is to handle error scenarios by replacing the failing component with a generic message.

> **Note:** Authentication errors have a specific handler in the `ErrorBoundary` component. If the error object that is received by the `componentDidCatch` method contains a status attribute with a value of '401' (Unauthorized error), then the client forces a log-out in the client application. Citizens are automatically redirected to the **Log in** page, so they can revalidate and return to the page they were previously on. This situation typically happens if the session times out or is invalidated on the server. The source code for the `ErrorBoundary` component is available in the `@spm/core-ui` package.

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This scenario shows API error handling in the **My Details** page where the API call fails. This scenario also shows how to use the `ErrorBoundary` component to provide a better user experience when failures occur.

Error boundaries in the Universal Access application

The Universal Access starter pack contains the following two error boundaries:

- The first wraps the entire application to capture errors that might occur when loading the header or footer.
- The second wraps the main content to capture errors that are raised from components that are loaded in the main content section.

The error boundaries are shown in the following example:

```
/**
 * App component entry point.
 */
const App = () => (
  <BrowserRouter>
    <ScrollToTop>
            <ErrorBoundary
                footer={<ApplicationFooter />}
                header={<ApplicationHeaderComponent hasErrorBeenCaught />}
                isHeaderBoundary
              >
        <ApplicationHeader />
         <ErrorBoundary>
          <Main pushFooter className="wds-u-bg--page">
            {routes}
          </Main>
         </ErrorBoundary>
        <ApplicationFooter />
       </ErrorBoundary>
    </ScrollToTop>
  </BrowserRouter>
);
```

The error boundary on the main section allows the application context to be retained. That is, the header and footer continue to be displayed when the error is raised from the main section. This continuity provides a better user experience.

You can replace these error boundaries with your own error boundaries.

Faking an API error

This API failure scenario uses a 404 response as the error, you trigger this failure by temporarily changing the API call to a non-existent API.

Take the following steps:

1. Open *`src/modules/generated/SampleModule/utils.js`*.

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2. Update the `fetchOnlineCategoriesUtil` function to call a non-existent API `v1/ua/online_categories1` as shown in the following example:

```
 const fetchOnlineCategoriesUtil = callback => {
  ReduxUtils.getModelDataFromRestAPI(
    callback,
    `v1/ua/online_categories1`,
    models.UAOnlineCategoryList
  );
};
```

3. Save your code and wait for the application to reload.

The `SampleApplicationComponent` component cannot call the API and an error page is displayed.

Catching an API failure

Using the *Faking an API error* failure scenario, you can modify the code to cater for this failure. The API call is asynchronous, and the callback runs outside the context of the Component tree. This execution mode means that the error that is thrown in the call-back function is not caught by the `componentDidCatch` method of the `ErrorBoundary`. Therefore, instead of exposing the component with the `withErrorBoundary` HOC, which throws an error, you can update the state of the component. You can then retrieve the `error` state from the WDA hook and handle it as you need. The failure branch sets the `error` value that is returned by the API call as shown in the following example.

```
 export const SampleApplicationComponent = props => {

  const { data, isFetching, error } = SampleModuleHooks.useFetchOnlineCategories();

console.log(`state -> ${error}`);
  if (isFetching) {
    return <AppSpinner />;
  }
  if (error) {
    throw new Error('An error occurred when calling API ');
  }
....

export default withRouter(SampleApplicationComponent);
```

The render method should print the following error in the console:

```
state -> Error: cannot GET http://localhost:3080/`v1/ua/online_categories1` (404)
```

Throwing an error

Now that you have control of the failure, throw an error with an appropriate value for the `ErrorBoundary` component to catch. You can place the throw in the render function, which executes when the state updates.

The error object that you throw can be anything that you choose so that the error is useful to the citizen. In this instance, you can throw the string object that is returned by the response because it describes the issue.

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Implementing a loading mask

Building on the previous scenarios, use a loading mask to indicate that the application is working on rendering a page.

About this task

Response times vary for REST APIs over a network. In a many cases, the time it takes to receive the response is longer than the time it takes for React to render for the first time. This delay leads to a poor user experience when the page draws the components, but the data is missing.

To avoid poor user experience, use a loading mask to tell users that the application is working on rendering their page.

This scenario uses the `AppSpinner` component from the `universal-access-ui package` to include a loading mask for the **My Details** page to demonstrate how your components can handle slow response times.

API response delay

During development, you must often replicate real world response times for APIs. You can configure the `RestService` to set a delay by using the *`env.development`* file in your environment. By default this value is set to 2 seconds. Note this delay in the application when you are in development mode, where you see spinners while components wait for the data to be returned from the mock server by way of the `RestService` module. You can increase or decrease this value to meet your application's needs.

The `AppSpinner` component

The `universal-access-ui` package includes the `AppSpinner` component, which you can reuse in your project. The `AppSpinner` component wraps the `Spinner` component from the *`govhhs-design-system-react`* package and includes a label for accessibility purposes. You can also create your own loading mask in the same manner. You can view the source code for `AppSpinner` in the `universal-access-ui` package.

Procedure

1. Waiting for the API.

   The `AppSpinner` is displayed while the application waits for the API to respond, so you need a mechanism to notify you when the data is, and is not loaded. Use the state to indicate when data is loaded and when it is not. Take the following steps:

   a) Open the *`PersonComponent.js`* file.

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b) In the constructor, add an attribute called `loading` to the state, with a value of true.

```
...
 constructor(props) {
   super(props);
   this.state = {
     user: {
       firstName: "",
       surname: "",
       dob: "",
       gender: "",
       address: {
         addr1: "",
         addr2: "",
         addr3: "",
         addr4: ""
       }
     },
     loading: true,
   };
 }
 ...
```

2. Display the loading mask.

   Now you have a value that indicates whether the data is loading, take the following steps to display the loading mask based on the value:

   a) Import the AppSpinner loading mask from `universal-access-ui`:

   ```
   import {AppSpinner} from '@spm/universal-access-ui';
   ```

   b) In the render function, add a check that renders the AppSpinner if the loading value is true:

   ```
   render() {
       if (this.state.loading){
         return <AppSpinner/>
       }
       return (
         <Grid className="wds-u-p--medium">
           <Column width="1/2">

           ...

        )

     }
   ```

   When you save and reload the application, you see the spinner in the main section area. However, the spinner continues to display after the data is returned.

3. Remove the loading mask.

   When the data is returned from the API, remove the mask by updating the state to indicate that loading is finished. Take the following steps:

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a) In the `componentDidMount` function, update the state to set the loading value to false when a successful response is returned as shown in the following example:

```
componentDidMount() {
    const url = ${process.env.REACT_APP_REST_URL}/v1/user1;
    RESTService.get(url, (success, response) => {
      this.setState({loading: false})
      if (success) {
        this.setState({user: response});
      } else {
        this.setState({apiCallFailed: response})
      }
    });
  }
```

b) Save and reload the application. Now, when the API response is received, the loading mask is removed and the user's data is displayed.

Reusing existing features

The reference application that is available when you install Merative ™ Cúram Universal Access satisfies a number of general business scenarios such as creating an account, logging in, and applying for benefits. The scenarios are provided both as working software and as examples of how to construct the product. You can clone and modify existing features in the application.

Before you begin

The *`universal-access-ui`* package is structured by feature. Typically, each feature is mapped to a single route. For example, when the *`/profile`* route is loaded, the Profile feature is displayed. The feature folder is a collection of files that work together to present that feature. An example from the Profile feature is shown.

```
/universal-access-ui

--/src

----/Feature

------/Profile

--------/components

----------/ContactInformationComponent.js

----------/PersonalInformationComponent.js

----------/ProfileComponent.js

----------/ProfileComponentMessages.js

--------/index.js

--------/ProfileContainer.js
```

The feature uses a commonly used pattern to move the data retrieval and management into a container component, and the rendering logic into stateless presentation components. This pattern is widely documented and used extensively when you work with React and Redux. The pattern is not covered in detail here, but you can see how features are structured.

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About this task

You can copy the entire code base for a feature into your custom project and replace the route that served that feature with your version. You can then modify the code base to create your own custom feature.

Note: After you reuse a feature, you now have full ownership of the custom feature. On upgrade of the *universal-access-ui* package, you do not receive any changes to the product version of the feature and must manually apply any updates that you need.

Note: Most features in the *universal-access-ui* package depend on the modules in the *universal-access* package for their data. On upgrade, you must validate that your feature was not affected by any changes to modules that the feature depends on. See Universal Access Redux modules on page 98.

Procedure

1. Find the feature that you want to replace in the *universal-access-ui* package.
   a) Inspect the URL end point that you want to change and note the path.
   For example, the path to the `faqs` feature is */myapp/faqs* so the path is *faqs*.
   b) Open the */node_modules/@spm/universal-access-ui/src/router/Path.js* file. Search for the path string literal, in this case `'/faqs'` is assigned to the `Paths.FAQS` variable.

```
const Paths = {
  HOME: '/',
  ...
  FAQS: '/faqs',
  ...
  SIGNUP: '/signup',
  ...
};
export default Paths;
```

   c) Open the */node_modules/@spm/universal-access-ui/src/router/Routes.js* file. Search for `Paths.FAQS` to find the route that the variable is being used in. Use the component value of the route to find the associated feature.
   For example, the `FAQ` route component is imported from `'../features/FAQ'`.

```
...
import FAQ from '../features/FAQ';
...
export default () => (
  <Switch>
    ...
    <Route component={FAQ} exact path={PATHS.FAQS} />
    ...
  </Switch>
);
```

2. Copy the entire feature folder into your custom application.
   For example, copy the */node_modules/@spm/universal-access-ui/src/features/FAQ* directory to *<myapp>/src/features/FAQ*.
3. Replace the route with your custom version.
   a) In your project, open the *src/routes.js* file.

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b) Add a route at any point before the `UARoutes` entry to ensure that your path supersedes the same path in `UARoutes`.

```
import React from 'react';
import { Switch, Route } from 'react-router-dom';
import { Routes as UARoutes } from '@spm/universal-access-ui';
import FAQ from './features/FAQ';

export default (
  <Switch>
    <Route component={FAQ} exact path='/faqs' />
    <UARoutes />
  </Switch>
);
```

4. You can now verify whether your custom version of the feature is being used. Make an obvious change to the feature and reload the application to see whether the change is picked up and displayed.
5. Change the code to customize the feature.

5.16 Implementing page view analytics

You can implement page view analytics in your application to collect citizen page views for analysis. Using the included page view JavaScript functions, you can start tracking page views by implementing a callback to send tracking data to a library of your choice for analysis. In this example, the data is sent to the Google global site tag (gtag.js) JavaScript tagging framework.

Before you begin

The `registerPageViewCallback` and `pageView` functions are available for you to implement tracking in your custom application.

- **`registerPageViewCallback`**
  This function takes a callback, which you must define, as an argument. You must call the `registerPageViewCallback` function before the application is rendered.
- **`pageView`**
  This function calls the registered page view callback where present. If the page view callback is not registered, it is not called.

  For IEG pages, `pageView` passes an object with the following properties as a parameter to the callback:

  - `pageType` ('IEG')
  - `pageID` (the current IEG page ID)
  - `scriptID` (the IEG script ID)

  For non-IEG pages, `pageView` passes an object with the following properties as a parameter to the callback:

  - `title`
  - `location`
  - `path`

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About this task

To track page views, you must initialize the tracking library, register the callback, and implement the callback to send tracking data to a library for analysis.

When you define your own custom routes, you must use the `TitledRoute` component so that the pages can be tracked. If the route corresponds to an IEG script, you must set the `isIEG` property for the `TitledRoute` component.

Procedure

1. The *`index.html`* file is a good place to initialize the library. Insert this snippet, which is as provided by Google except for the tracking call.

```
<!-- Global site tag (gtag.js) - Google Analytics -->
<script async src="https://www.googletagmanager.com/gtag/js?id=UA-TRACKINGID"></
script>
<script>
  window.dataLayer = window.dataLayer || [];
  function gtag(){dataLayer.push(arguments);}
  gtag('js', new Date());
</script>
```

2. Also in the *`index.html`* file, you must update the Content Security Policy to allow the Google script to run:

```
<meta http-equiv="Content-Security-Policy" content="script-src 'self' 'unsafe-
eval' 'unsafe-inline' https://www.googletagmanager.com/ http://www.google-
analytics.com/" />
```

3. Implement the callback function.

   The callback handles both IEG and non-IEG pages based on the `pageType` prop.

```
export default function customCallback(props) {
  const gtagProps = {};
  if (props.pageType && props.pageType === 'IEG') {
    // IEG pages
    gtagProps.page_title = `${props.scriptID} ${props.pageID}`;
    gtagProps.page_path = `/apply/${props.pageID}`;
  } else {
    // Non-IEG pages
    gtagProps.page_title = props.title;
    gtagProps.page_location = props.location;
    gtagProps.page_path = props.path;
  }
  window.gtag('config', 'UA-TRACKINGID', gtagProps);
}
```

4. In *`index.js`*, register the callback before the application renders.

```
registerPageViewCallback(customCallback);
ReactDOM.render(<App />, document.getElementById('root'));
```

5. For your own custom routes, you must use the `TitledRoute` component so that the pages can be tracked. If the route corresponds to an IEG script, you must set the `isIEG` property for the `TitledRoute` component. For more information, see Advanced routing on page 113.

5.17 Implementing a test environment

Use the *`test-framework`* package to set up your Merative ™ Cúram Universal Access Responsive Web Application test environment for testing with Test Cafe, Jest, and Enzyme.

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Then, use this guidance and the provided helper files to write end-to-end tests, unit tests, or snapshot tests for your project. You can configure the default test environment to suit your project requirements as needed.

End-to-end test environment

The `test-framework` package contains reusable files to help you set up a test environment with TestCafe, and to help you to develop end-to-end test scripts.

End-to-end test helper files

The end-to-end test helper files in `test-framework` are designed to operate best within a page object framework structure for your end-to-end automation suite.

Browser.js

The *`Browser.js`* module simulates interactions a user can have with their browser during an automated test, such as:

- Retrieving the current URL for the current page displayed in the remote browser.
- Clicking the browsers back button to navigate to the previous page.
- Clicking the browsers forward button to advance to the next page.

Page.js

The *`Page.js`* module simulates common interactions that a user can have with a web page in an application. A large variety of prebuilt methods are provided in this file, which help you to execute many user interactions, such as:

- Clearing text and typing new text into an input field.
- Clicking an element.
- Clicking an element only if it is displayed.
- Retrieving the value of an input field.
- Retrieving the text content of an element.
- Waiting for an element to be displayed.
- Plus many more as described in the JS documentation for this package.

In addition, the Page module contains two methods to help you with developing and debugging your end-to-end test scripts:

- The `wait` method pauses a test for a specified time (in milliseconds).
- The `debug` method physically stops the currently executing test script. You can then interact with the page that is displayed in the remote browser in its current state. You can resume the test script again at any time.

PageObject.js

The *`PageObject.js`* file acts as a base class from which you can build your own custom page objects for use with end-to-end tests for any application. This class provides a lot of built-in functionality to help you with your page object development tasks. For more information, see the JS documentation for this package and the `PageObject` class documentation.

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Verify.js

The *`Verify.js`* module provides a number of assertion methods for verifying the results from your automated test scripts. This module allows you to execute verifications such as:

- Verifying whether an element is displayed in the UI.
- Verifying whether two values are equal (or not).
- Verifying whether a specified value is true or false.

End-to-end test initial setup and configuration

Create your directory structure and *`index.js`* file.

Project directory structure

Using the suggested directory structure for your end-to-end test framework helps you to get the best out of the `test-framework` package during test development. It also helps you to keep things clean and maintainable as your test framework scales in size.

```
.
├── tests
|   └── e2e
|   |   └── config
|   |   └── data
|   |   └── page-objects
|   |   └── scripts
```

- The `config` directory contains a single `index.js` file that serves as the configuration file for all of the modules and page objects that are going to be used by your test scripts.
- The `data` directory contains any additional data that is used by the test scripts such as user data or routes data for your application.
- The `page-objects` directory is where you build the page objects that are required to test each individual page of your application.
- The `scripts` directory is where you place the test scripts to be ran by `testcafe`.

Initial `config` directory setup

The first step in building your end to end framework is to create an `index.js` file in the `config` directory as shown:

```
.
├── tests
|   └── e2e
|   |   └── config
|   |   |   └── index.js
```

This file is where you are import all of the modules from the `test-framework` package that you want to reuse in your test scripts. You also configure and export your page objects from this configuration file. This approach improves your framework's long-term maintainability as everything that is used by your test scripts is located in and exported from this single file. If something does change, the configuration file is all that needs to be updated and your scripts automatically inherit all of the changes without the need to refactor them.

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Import the `test-framework` helper files and export them for use in your test scripts. Initially your `index.js` file contains the following code:

```
import { Browser, Page, Verify } from'@spm/test-framework';

export { Browser, Page, Verify };
```

If you set up your test directory structure as suggested, then importing each of these modules into your test scripts follows this pattern:

```
import { Browser, Page, Verify } from'../config';
```

Page object development and best practices

The page object model design pattern for building UI automation frameworks is our recommended practice. A page object is an object-oriented class that is built to represent the individual pages in the application under test. These representations offer an interface from which your test scripts can interact with any UI element that is associated with that page similarly to how a user would interact with them.

For example, the page object for the `LoginPage` in your application might include a `login()` method where you specify the user name and password credentials as parameters. This method then provides the automated steps that are required for logging a user in to your application. This page object can then be reused by any test script that requires a logged in user, with each test suite calling that `login()` method without needing to copy and paste the individual steps each time.

The benefits to the page object model extend far beyond simply reducing code duplication. Further benefits include:

- The API of your chosen automation framework is completely abstracted away from your test scripts. This makes tests easier to read, write and review.
- Element selectors are isolated in the page object that requires them.
- Since you are referencing page objects in your test scripts, the scenarios executed by the scripts document themselves as you write them. Managers and new team members alike will find these test scripts much clearer and easier to understand. For example: it is much easier to read and instantly know the meaning of `loginPage.goto();` followed by `loginPage.login();` as opposed to trying to make sense of a group of API calls.
- Suppose that an update completely changes the behavior for something that previously exists in one of your page objects. You need to update only the affected individual page object function to work with the new behavior and all of your test scripts automatically inherit the changes. You won't need to go back and change anything in any of your scripts.

Best practices

Best practices for the development of page objects in your automation framework.

- **Use CSS selectors to locate your UI elements**

  Use CSS selectors when trying to locate your UI elements. While you can use XPaths for this purpose, CSS selectors are the highly recommended practice due to their sheer simplicity, not to mention the overall speed and performance advantages they have over their XPath equivalents. To get the best out of CSS selectors, assign some attribute to your UI elements

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to make them unique from all other elements. For example, set the `id`, `name`, or perhaps a custom `data-testid` attribute with some unique identifier for that element.

- **Keep assertions out of page objects**

  One of the golden rules for building end-to-end test scripts is that you should aim to include just one main assertion or set of assertions per test script. It is therefore equally important that you do not place assertions in any of the functions provided by your page objects. It can be very tempting to add assertions to a page object function because it always provides an assertion for you every time that method is invoked.

  For example, suppose that a message is briefly displayed to the user to confirm that they have successfully logged in. You also have a scenario to automate that verifies that this message is displayed after a user has logged in. You might add the assertions for this as the final steps of the `login()` method in your `LoginPage` page object so that this verification is always made every time any page object invokes that `login()` function.

  While it can look like a good idea to do this and also promotes the idea that you are getting something of a free verification for your login behavior in all of your other scripts, this is not a recommended practice because:

  - First, you are losing a lot of clarity in your test scripts by adding verifications to your page object functions. Seeing `loginPage.login()` in your script does not clearly imply that this method also includes a verification therefore the intention of the test script will also be unclear as a result.
  - Adding assertions to page objects adds too much ambiguity to your test suites. Your scripts will automatically inherit multiple assertions, any of which can fail, which may result in the conclusion of your scripts never being reached and their intended main verification(s) never taking place. Going back to our `login()` example, suppose a bug is introduced whereby the login message is not displayed to the user after successful login. Now all of your test scripts which invoke that `login()` method will fail since you added the verifications to confirm the presence of the message even though only one test in your entire suite should realistically be verifying this.
  - Developers that may have to debug a failing test will be forced to dig deep into your page object framework in order to find what verifications have actually taken place during the test execution. This will be even more complex a task if you are importing and reusing page objects that have been developed in a separate framework.
  - Verifications aren't as free as you might think. In fact, they can be very expensive for time. Having multiple verifications taking place throughout your page object functions can slow your test script execution times down by a significant amount.

The pageObject class

The `PageObject.js` file in the `test-framework` package provides an interface from which you can easily create page objects for use in your end-to-end framework. When you create page

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objects, you can use `PageObject constructor` parameters to automatically generate methods that are commonly used by page objects during automation.

Import this class into your page object file directly and extend from it to inherit all of its behavior, for example:

```
import { PageObject } from'@spm/test-framework';

export default class MyPageObject extends PageObject {
  // ...
}
```

You can use the `PageObject` class to set a URL for the web page that is represented by your page object. It also has a number of parameters to automatically generate methods that are commonly used by page objects during automation. Alternatively, you can call the `super` method in the `constructor` to extend from this class without setting any of the parameters.

The PageObject constructor parameters

The `PageObject` class provides a number of `constructor` parameters that you can use to build your page objects. The sample code shows how to invoke the `PageObject constructor` and lists all of the parameters that are accepted:

```
export default class MyPageObject extends PageObject {
  /* Invokes the PageObject constructor - the following is the complete list of
 parameters supported in their correct order */
  constructor() {
      super(
        url,
        clickList,
        clickIfDisplayedList,
        clearAndTypeTextList,
        typeTextList,
        selectList,
        getValueList,
        getIsSelectedList,
        getDropdownSelectionList,
        getTextContentList
        getIsReadOnlyList
      );
    }
  }
```

@param {JSON} clickList parameter

The `clickList` parameter specifies a list of CSS selectors in JSON, all of which correspond to elements in the UI to be clicked during your test execution. For example, these two CSS selectors correspond to two different buttons in your UI:

```
const submitButton ='input[id="submit"]';
const exitButton ='button[id="exit"]';
```

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Instead of declaring them as the individual variables as shown, declare them as the `clickList` parameter as follows:

```
const clickList= {
  exitButton: 'button[id="exit"]',
  submitButton: 'input[id="submit"]'
};

export default class MyPageObject extends PageObject {
  /* For this example we are only setting the URL and clickList parameters - all other
 parameters are left undefined */
  constructor() {
      super('http://www.ibm.com', clickList);
    }
  }
```

By specifying your UI elements that are to be clicked in this way, you now have access to `click` methods for each of the selectors in the `clickList` after you create an instance of your page object. These `click` methods are automatically generated when your page object is created. So for the previous example, the following code sample demonstrates exactly what methods become available when you create an instance of the `MyPageObject` class:

```
/* First create an instance of your page object */
const myPageObject = newMyPageObject();

/* After creating the page object instance, you will have access to both of these click
 methods */
await myPageObject.clickExitButton();
await myPageObject.clickSubmitButton();
```

The `click` method name is derived from the word `click` followed by the title of the key that you assigned to your selector. Therefore, if you declared a `myCustomSelector` key in the JSON that provided to the `clickList` parameter, the `click` method for that selector is `clickMyCustomSelector()`.

Note: As all of these method names are derived from keys, be careful with your spelling. Any spelling mistakes in keys are reproduced in the subsequent `click` method name.

@param {JSON} clickIfDisplayedList parameter

Specifying CSS selectors in the `clickIfDisplayedList` parameter automatically generates a method for each selector when the page object instance is created.

Each of the generated methods attempts to click the UI element corresponding to your specified selector only if that selector is displayed in the UI. If the UI element is not displayed, the method exits cleanly and allows your test script to continue running.

The naming convention for this method follows the format `click_XXX_IfDisplayed` where `_XXX_` is the title that you assigned to each of your keys.

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The methods that are generated in this instance are as follows:

```
const clickIfDisplayedList= {
  exitButton: 'button[id="exit"]',
  submitButton: 'input[id="submit"]'
};

class MyPageObject extends PageObject {
  /* For this example we are only setting the URL and clickIfDisplayedList parameters -
 all other parameters are left undefined */
  constructor() {
      super('http://www.ibm.com', undefined, clickIfDisplayed);
    }
  }

/* Now create an instance of your page object */
const myPageObject = newMyPageObject();

/* After creating the page object instance, you will have access to both of these
 clickIfDisplayed methods */
await myPageObject.clickExitButtonIfDisplayed();
await myPageObject.clickSubmitButtonIfDisplayed();
```

@param {JSON} clearAndTypeTextList parameter and @param {JSON} typeTextList parameter

Both of these parameters automatically generate `type` methods. However, the functionality of the methods that are generated for each of the element selectors that are specified in either list is slightly different:

- If you add selectors to the `clearAndTypeTextList` parameter, then the methods clear all previous text that was entered into the corresponding UI element before you type new text into that element.
- Any selectors added to the `typeTextList` parameter generate methods that type text into the UI element. No previous text is cleared, so the text is appended to the existing text.

While the functionality varies depending on which list that you add your selectors to, the actual method names that are generated follow the very same naming convention. In both cases the method name follows the format `type_XXX`, where `_XXX` is the title that you assigned to each of your keys. This `type_XXX` method also accepts a `string` parameter where you can specify the exact text that you want to type into that element.

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The methods that are generated in this instance are as follows:

```
const clearAndTypeTextList = {
  firstName: 'input[id="first_name"]',
  lastName: 'input[id="last_name"]'
};
const typeTextList = {
  addressLine1: 'input[id="address_line_1"]',
  addressLine2: 'input[id="address_line_2"]'
};

class MyPageObject extends PageObject {
  /* For this example we are only setting the URL and both type text parameters - all
 other parameters are left undefined */
  constructor() {
      super(
        'http://www.ibm.com',
        undefined,
        undefined,
        clearAndTypeTextList,
        typeTextList
      );
    }
  }

/* Now create an instance of your page object */
const myPageObject = newMyPageObject();

/* After creating the page object instance, you will have access to all of these type
 methods */
await myPageObject.typeFirstName('Michael');
await myPageObject.typeLastName('Myers');
await myPageObject.typeAddressLine1('Haddonfield');
await myPageObject.typeAddressLine2('Illinois');
```

@param {JSON} selectList parameter

You can use the `selectList` parameter to specify a list of element selectors that correspond to `<select>` elements in your UI. Any element selector that specified in this parameter has a method automatically generated for it when the page object instance is created. The naming convention for the generated methods follows the format `select_XXX`, where `_XXX` is the title that you assigned to each of your keys. This `select_XXX` method also accepts a `string` parameter where you can specify the exact option that is to be chosen from the list of options in that `<select>` element.

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The following example shows the methods that are generated for element selectors that are specified in the `selectList` parameter:

```
const selectList= {
  company: 'select[id="company"]',
  county: 'select[id="county"]'
};

class MyPageObject extends PageObject {
  /* For this example we are only setting the URL and the selectList parameter - all
 other parameters are left undefined */
  constructor() {
      super(
        'http://www.ibm.com',
        undefined,
        undefined,
        undefined,
        undefined,
       selectList
      );
    }
  }

/* Now create an instance of your page object */
const myPageObject = newMyPageObject();

/* After creating the page object instance, you will have access to these select
 methods */
await myPageObject.selectCompany('IBM');
await myPageObject.selectCounty('Dublin');
```

@param {JSON} getValueList parameter

For verification purposes in your test scripts, you can retrieve the text value of an `<input>` field by adding element selectors to the `getValueList` parameter.

The naming convention for the methods follows the format `get_XXX_Value`, where `_XXX_` is the title that you assigned to each of your keys. When you invoke this method in your test script, it retrieves the current `string` value of the `<input>` element corresponding to the CSS selector you specified.

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The following example shows how you might combine a `type_XXX` method action with a `get_XXX_Value` method action to enter text into an `<input>` field and then retrieve its value again:

```
const clearAndTypeTextList = {
  firstName: 'input[id="first_name"]',
  lastName: 'input[id="last_name"]'
};
/* We can re-use both of the existing selectors for the purpose of this list - there's
 no need to declare them again */
const getValueList= {
  firstName: clearAndTypeTextList.firstName,
  lastName: clearAndTypeTextList.lastName
};

class MyPageObject extends PageObject {
  /* For this example we are only setting the URL, the clearAndTypeTextList parameter
 and the getValueList parameter - all other parameters are left undefined */
  constructor() {
      super(
        'http://www.ibm.com',
        undefined,
        undefined,
        clearAndTypeTextList,
        undefined,
        undefined,
        getValueList
      );
    }
  }

/* Now create an instance of your page object */
const myPageObject = newMyPageObject();

/* After creating the page object instance, you will have access to all of these
 methods */
await myPageObject.typeFirstName('Jack');
await myPageObject.typeLastName('Bauer');
const firstName = awaitmyPageObject.getFirstNameValue();
const lastName = awaitmyPageObject.getLastNameValue();
```

@param {JSON} getIsSelectedList parameter

During test execution, you can verify whether a specific checkbox or set of checkboxes were selected or cleared with the `getIsSelectedList` parameter. The naming convention for the generated methods follows the format `is_XXX_Selected`, where `_XXX_` is the title that you assigned to each of your keys. When you invoke this method in your test script, it returns a Boolean `true` or `false` value that depends on whether the checkbox element corresponding to the CSS selector that you specified is checked or not.

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The following example shows how you might combine a `click_XXX` method action with an `is_XXX_Selected` method action to select a checkbox and then determine whether it was checked:

```
const clickList= {
  agreeTermsAndConditions: 'input[type="checkbox"][id="terms_and_conditions"]'
};
/* We can re-use this existing selector for the purpose of this list - there's no need
 to declare it again */
const isSelectedList= {
  agreeTermsAndConditions: clickList.agreeTermsAndConditions
};

class MyPageObject extends PageObject {
  /* For this example we are only setting the URL, the clickList parameter and the
 isSelectedList parameter - all other parameters are left undefined */
  constructor() {
      super(
        'http://www.ibm.com',
        clickList,
        undefined,
        clearAndTypeTextList,
        undefined,
        undefined,
        undefined,
        isSelectedList
      );
    }
  }

/* Now create an instance of your page object */
const myPageObject = newMyPageObject();

/* The first check for whether the checkbox is selected or not will return false */
let isChecked = awaitmyPageObject.isAgreeTermsAndConditionsSelected();

/* Now lets click on the checkbox and re-run our previous method - this time it will
 return true */
await myPageObject.clickAgreeTermsAndConditions();
isChecked = await myPageObject.isAgreeTermsAndConditionsSelected();
```

@param {JSON} getDropdownSelectionList parameter

You can retrieve the selected option from a `<select>` element during test execution by adding selectors to the `getDropdownSelectionList` parameter. For example, if your test script already has a value for a `<select>` element in your UI and you want to verify whether the value is correct and retained after some other actions are executed.

The naming convention for the generated methods follows the format `get_XXX_Selection`, where `_XXX_` is the title that you assigned to each of your keys. When you invoke this method in your test script, it retrieves the `string` value of the currently selected option in the `<select>` element corresponding to the CSS selector you specified.

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The following example shows how you might combine a `select_XXX` method action with an `get_XXX_Selection` method action to select an option in a `<select>` element and then retrieve the currently selected option from that `<select>` element again:

```
const selectList= {
  company: 'select[id="company"]',
  county: 'select[id="county"]'
};
/* We can re-use these existing selectors for the purpose of this list - there's no
 need to declare them again */
const getDropdownSelectionList= {
  company: selectList.company,
  county: selectList.county
};

class MyPageObject extends PageObject {
  /* For this example we are only setting the URL, the selectList parameter and the
 getDropdownSelectionList parameter - all other parameters are left undefined */
  constructor() {
      super(
        'http://www.ibm.com',
        undefined,
        undefined,
        undefined,
        undefined,
        selectList,
        undefined,
        undefined,
        getDropdownSelectionList
      );
    }
  }

/* Now create an instance of your page object */
const myPageObject = newMyPageObject();

/* After creating the page object instance, you will have access to these all of these
 methods */
await myPageObject.selectCompany('IBM');
await myPageObject.selectCounty('Dublin');
const companySelection = awaitmyPageObject.getCompanySelection();
const countySelection = awaitmyPageObject.getCountySelection();
```

@param {JSON} getTextContentList parameter

You can use the `getTextContentList` parameter to specify a list of selectors from which you want to retrieve text content.

The naming convention for the generated methods follows the format `get_XXX_TextContent` where `_XXX_` is the title that you assigned to each of your keys. When you invoke this method in your test script, it retrieves the `string` value of the text content for the UI element corresponding to the CSS selector that you specified.

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The following example shows the methods that are generated for element selectors that are specified in the `getTextContentList` parameter:

```
const getTextContentList= {
  title: 'h1[id="main_heading"]'
};

class MyPageObject extends PageObject {
  /* For this example we are only setting the URL and the getTextContentList parameter
 - all other parameters are left undefined */
  constructor() {
      super(
        'http://www.ibm.com',
        undefined,
        undefined,
        undefined,
        undefined,
        undefined,
        undefined,
        undefined,
        undefined,
        getTextContentList
      );
    }
  }

/* Now create an instance of your page object */
const myPageObject = newMyPageObject();

/* After creating the page object instance, you will have access to these methods */
const titleText = await myPageObject.getTitleTextContent();
```

@param {JSON} getIsReadOnlyList parameter

During test execution, you can verify whether a specific input field or set of input elements are marked as read only with the `getIsReadOnlyList` parameter.

The naming convention for the generated methods follows the format `is_XXX_ReadOnly`, where `_XXX_` is the title that you assigned to each of your keys. When you invoke this method in your test script, it returns a Boolean `true` or `false` value that depends on whether the input element corresponding to the CSS selector you specified is a read-only input field or not.

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The following example shows the methods that are generated for the element selectors that are specified in the `getIsReadOnlyList` parameter:

```
const getIsReadOnlyList = {
  firstName: input[id="first-name"]
};

class MyPageObject extends PageObject {
  /* For this example we are only setting the URL and the getIsReadOnlyList parameter -
 all other parameters are left undefined */
  constructor() {
    super(
      'http://www.ibm.com',
      undefined,
      undefined,
      undefined,
      undefined,
      undefined,
      undefined,
      undefined,
      undefined,
      undefined,
      getIsReadOnlyList
    );
  }
}

/* Now create an instance of your page object */
const myPageObject = new MyPageObject();

/* After creating the page object instance, you will have access to these methods */
const isReadOnly = await myPageObject.isFirstNameReadOnly();
```

Adding custom behavior to your page objects

You can add custom behavior to your page objects. For example, a specific click action, or a specific series of instructions to run for an automated task in your end-to-end test scripts.

As a further example, a web page might render some dynamic content and you need to wait for a specific element to be visible in the UI before you continue.

The `test-framework` package provides a `PageObject` class from which you can take advantage of the automatically generated methods that are provided. You can add your own custom behavior to your page objects too.

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Sample page object with custom behavior

In this example, you add a simple `waitForPageLoad()` method to your page object. It is assumed that your application is rendering some dynamic content, such as a timeline, and that a `See More` button is rendered at the foot of the dynamic content.

```
import { Page, PageObject } from'@spm/test-framework';

consturl='http://www.ibm.com';

/* Now lets define some other selectors that we are going to use to define our custom
 behaviour */constseeMoreButton='input[type="button"][id="see_more"]';

exportdefaultclassMyPageObjectextendsPageObject {
  constructor() {
    /* For this example we will only define the URL - we don't need to define the other
 lists */super(url);
  }

  /* Now lets add our custom behaviour to our page object */asyncwaitForPageLoad() {
    awaitPage.waitForElementToBeDisplayed(seeMoreButton);
  }
}

/* Now create an instance of your page object */constmyPageObject=newMyPageObject();

/* Lets navigate to the URL defined in our page object and then wait for the page to
 load */awaitmyPageObject.goto();
awaitmyPageObject.waitForPageLoad();
```

Building, exporting and configuring your page objects

Build, export, and configure your page objects so you can import and use them in your end-to-end test scripts.

Building your page objects

It is best to build each of your page objects by extending from the `PageObject` class in the `test-framework` package. Then, save each of your page object files in the `page-objects` folder in your test framework directory structure. The naming convention for page objects is to use the title of the application web page that the page object represents, for example `HomePage.js` or `LoginPage.js`.

```
.
├── tests
|   └── e2e
|   |   └── page-objects
|   |   |   └── HomePage.js
|   |   |   └── LoginPage.js
```

Exporting your page objects from `page-objects/index.js`

After you create your page objects, you must export them from the `page-objects` directory to import them into your test scripts. Create an `index.js` file in the `page-objects` folder to

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enable all of your page object files to be exported from this single location. As you scale your page object framework, you can have many page objects to export from this folder.

```
.
├── tests
|   └── e2e
|   |   └── page-objects
|   |   |   └── HomePage.js
|   |   |   └── LoginPage.js
|   |   |   └── index.js
```

With the `index.js` file in place, export your page objects by using this file as shown in the example:

```
export { defaultasHomePage } from'./HomePage';
export { defaultasLoginPage } from'./LoginPage';
```

Configuring your page objects

You can now import page objects into your project's `config/index.js` file for reuse with your end-to-end test scripts. Before you continue, ensure that your test directory structure looks like this structure:

```
.
├── tests
|   └── e2e
|   |   └── config
|   |   |   └── index.js
|   |   └── page-objects
|   |   |   └── HomePage.js
|   |   |   └── LoginPage.js
|   |   |   └── index.js
```

The following sample code shows your `config/index.js` file after you add your page object configuration to the file. In the sample code, you are importing each of your custom page objects from your `page-objects` folder, instantiating each page object and then exporting each instantiated page object from the file:

```
import { Browser, Page, Verify } from'@spm/test-framework';
import {
  HomePage,
  LoginPage// ... also import any other page objects that you require ...
} from'../page-objects';

/* Instantiate all of the page objects to be used during the e2e tests */
consthomePage=newHomePage();
constloginPage=newLoginPage();
// ... also instantiate any other page objects that you imported ...export {
  Browser,
  Page,
  Verify,
  homePage,
  loginPage// ... export all other instantiated page objects ...
};
```

With your page objects configured, you can now easily import and use your page objects in your end-to-end test scripts.

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Writing end-to-end scripts

Now that your page objects are developed and your end-to-end framework is configured to use the `test-framework` package, you are ready to start writing test scripts that bring everything together. The code samples are developed with `testcafe` as the leading framework.

The sample code assumes that your framework directory structure is as shown.

```
.
├── tests
|   └── e2e
|   |   └── config
|   |   |   └── index.js
|   |   └── page-objects
|   |   |   └── HomePage.js
|   |   |   └── LoginPage.js
|   |   |   └── index.js
|   |   └── scripts
|   |   |   └── *.e2e.test.js
```

Scenario 1: Logging in redirects the user to the home page

You can write a test script for the following sample scenario based on the provided directory structure:

1. Open the application and go to the log-in page.
2. Enter the credentials of a valid user into the username and password fields and click **Log in**.
3. After you log in, verify that you were redirected to the user's account page.

Now to look at a test script for this scenario that incorporates your page objects and is driven by `testcafe`. Comments with each line of code further describe exactly what's happening at each step.

```
/* Firstly import all relevant page objects and test helper files by importing them
 from the config/index.js file */
import { Browser, homePage, loginPage, Verify } from '../config';

fixture('Login e2e').page(loginPage.getUrl()); // Set the initial page to be opened as
 the login page

test('Verify that the user is redirected to the home page on successful login', async
 () => {
  /* Log in as a valid user by re-using the page objects login method */
  await loginPage.login();

  // Re-use the Browser test helper file to get the current URL from the remote browser
 */
  const currentUrl = await Browser.getCurrentUrl();

  // Finally verify that the current URL in the remote browser matches the expected URL
 for the home page
  // It should be noted that every page object has a `getUrl()` method which allows you
 to easily retrieve the expected URL for the page it represents
  // Also note that this test is re-using the Verify test helper file to do its
 verifications
  await Verify.equal(
    currentUrl,
    homePage.getUrl(),
    'User was not redirected to the home page after successfully logging in'
  );
});
```

Save this test into your `scripts` directory as `LoginPage.e2e.test.js`. Ensure that you save all other test scripts for your end-to-end framework in this directory.

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Running end-to-end tests

It is straightforward to run your tests with `testcafe` by using a single `npm` script and a number of custom-set options.

For example, this `npm` script runs the specified test scripts by using `testcafe`. The tests run in Google Chrome with headless mode enabled and in incognito mode:

```
"testcafe": "testcafe \"chrome:headless -incognito\" tests/e2e/scripts/*.e2e.test.js",
```

To add this script to your project, copy and paste the `npm` script into the `package.json` file of the project that contains your end-to-end test framework. From the root of the project, run the script from the command line as follows:

```
npm run testcafe
```

You can watch your test suites run in headless mode from your command line.

You can disable headless mode by removing the `:headless` section of the script:

```
"testcafe": "testcafe \"chrome -incognito\" tests/e2e/scripts/*.e2e.test.js",
```

Now, when you run your test suites, you can see a physical remote browser open on the desktop of your local computer and you can watch the test execution as it happens.

For more information about the full list of supported browsers and all of the command line switches available for running scripts, see the TestCafe documentation.

Jest and Enzyme test environment

The `test-framework` package contains reusable files to help you set up a test environment with Jest and Enzyme, and to help you to develop unit and snapshot test scripts.

Unit and snapshot test initial setup and configuration

Use the provided files to easily configure a default Jest and Enzyme test environment that you can use to start writing your unit and snapshot tests.

Project directory structure

By default, the Jest files expect a certain folder structure for your unit and snapshot test framework. Create the following folder structure in your environment.

```
.
├── tests
|   └── config
|   |   └── setup-tests.js
|   |   └── snapshot.config.js
|   |   └── test-mapper.js
|   |   └── unit.config.js
|   └── snapshots
|   |   └── *.snap.test.js
|   └── unit
|   |   └── *.unit.test.js
```

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Configuring the *setup-tests.js* file

Add the following code to the *setup-tests.js* file to configure Jest to work with `enzyme-adapter-react-16` and to configure the snapshot serializer for use with the snapshot tests:

```
import Enzyme from 'enzyme';
import { createSerializer } from 'enzyme-to-json';
import Adapter from 'enzyme-adapter-react-16';

Enzyme.configure({ adapter: newAdapter() });

/* Setup snapshot serializer */
expect.addSnapshotSerializer(createSerializer({ noKey:true, mode:'deep' }));
```

- **Mocking the Redux store**

  Some Jest tests mount components that access a Redux store by using the `getState` method. You can configure a mock store with the relevant Redux methods by adding this code to the *setup-tests.js* file.

  ```
  global.mockStore = {
    getState: jest.fn(),
    dispatch: jest.fn(),
    subscribe: jest.fn()
  };
  ```

  You can then call the mock store from any component in a Jest test script with the following code:

  ```
  const myComponent = IntlEnzymeTestHelper.mountWithIntlWithStore(
    <MyComponent />,
    global.mockStore
  );
  ```

- **Mocking the Redux store with custom mock state**

  Some unit tests might need access to a mock Redux store with a specific mock state and with custom data.

  - Add the mock state to the *setup-tests.js* file as follows:

    ```
    const mockState = {
      // Add all of your mock data keys and values here
    };
    ```

  - Set the mock `getState` function to return the mock state when it is called during unit tests:

    ```
    global.mockStore = {
      getState: jest.fn(() => mockState)
    };
    ```

Configuring the `test-mapper.js` file

Jest cannot process data from CSS or image files and throws an error to the console if these files are referenced by any React component. Jest is designed to test the behavior of the component code and distances itself from any styling or images that are applied to that component.

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To cleanly bypass any of these imports, add the following code to the `test-mapper.js` file.

```
module.exports= {};
```

Configuring the `unit.config.js` and `snap.config.js` files

These files are designed to configure the unit tests and snapshot tests for a project. You can use the default Jest configuration by adding the following content to both files:

```
// unit.config.js
const { getUnitTestConfig } = require('@spm/test-framework');

module.exports = getUnitTestConfig();
```

```
// snapshot.config.js
const { getSnapshotTestConfig } = require('@spm/test-framework');

module.exports = getSnapshotTestConfig();
```

- **Setting custom `jest` configurations**

  You can customize the default Jest configuration.

  For example, you can set more project-specific folders to be ignored by the Jest coverage collection statistics as follows:

  ```
  const { getUnitTestConfig } = require('@spm/test-framework');

  const unitTestConfig = getUnitTestConfig();
  unitTestConfig.coveragePathIgnorePatterns.push('<rootDir>/path/to/my/folder1');
  unitTestConfig.coveragePathIgnorePatterns.push('<rootDir>/path/to/my/folder2');

  module.exports = unitTestConfig;
  ```

Unit and snapshot test helper files

The `test-framework` provides the `IntlEnzymeTestHelper.js` and `TestUtils.js` helper files to help you to write unit and snapshot tests.

`IntlEnzymeTestHelper.js`

React components that use the `react-intl` module need access to the `intl` context, which is not available when you mount single components with Enzyme. You can use the `IntlEnzymeTestHelper.js` class to wrap a valid English-locale `intl` context around a component under test.

`TestUtils.js`

The `TestUtils.js` class is a utility class for testing React components with Redux modules.

To use the helper files in your Jest tests

Import any of the Jest helper files directly from the `test-framework` package as follows:

```
import { IntlEnzymeTestHelper, TestUtils } from '@spm/test-framework';
```

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You can then call any of the class functions from your Jest test scripts as shown in the following examples:

```
describe('Test suite', () => {
  it('verifies something', () => {
    // ...
    const wrapper = IntlEnzymeTestHelper.mountWithIntl(
      <MyComponentUnderTest />
    );
    // ...
  });

  it('verifies something else', () => {
    const mockData = {
      // mock JSON data
    };
    const mockUtilFunction = TestUtils.mockActionsCallbackFxn([true, mockData]);
    // ...
  });
});
```

Guidelines for writing unit test scripts

The following guidance might be useful when you write Jest tests for both unit and snapshot testing.

To unit test or to snapshot test?

The first question that you must answer is whether to write a unit test or snapshot test.

- **Unit tests**
  Unit tests act as documentation for the project code or React component that you are testing. They include individual verifications for every piece of behavior in the code. Anyone must be able to read the verifications in the unit test suite and fully understand which behavior is being triggered and under which circumstances. Unit tests must be clear and concise and are a perfect indicator of code coverage within the overall project. These tests are the primary form of testing for the project code so you must write unit tests for all code in the project.
- **Snapshot tests**
  Snapshot tests can verify only that the DOM output for a React component in the provided state is correct. Don't use snapshot tests to test React component functionality, but use them as a complement to your unit tests to verify that the DOM output for a React component is correct. After unit tests verify the code behavior, snapshot tests can verify that everything is correct from an HTML markup perspective when the component is output to the DOM. Snapshot test verifications are far too vague to offer any form of clear documentation for a component that is being tested. Because of the vague nature of their verifications, snapshot tests are also a poor indicator of code coverage so don't use them to collect code coverage statistics. It is much more beneficial for the project to collect code coverage statistics solely for behavioral based verifications, such as unit tests.

  Collecting code coverage statistics for snapshot tests can provide a number of false positives. Code coverage might increase due to the presence of snapshot tests. However, the functionality of the code is not tested and verified as correct. You might read a high code coverage percentage in the coverage report and incorrectly assume that all of the component behavior is tested.

It can be beneficial to write both unit test and snapshot test suites for a project. However, unit tests must always be your priority given that they directly test the functionality of all of the code.

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A project can manage without snapshot tests. However, it can never survive without a thorough suite of unit tests.

Decide what must be tested

For each a new function or React component, you must decide what to test. Read through the code for the function or component and highlight the key behaviors and when they occur.

Create the unit test suite to test all of the identified functionality. After all of the behaviors are captured and tested in the unit test suite, then you can write snapshot tests to capture the DOM output for any new `React` components.

Your goal is to test all of the available functionality and cover 100% of the code. If there is code that is unreachable for any reason, then that code must be highlighted by the unit tests and refactored.

Ensure that all tests can be ran independently

All tests must be able to run independently of one another. A test that depends on the completion of another test is difficult to maintain and can be a direct cause of many avoidable consistency and reliability problems with your test suites.

- If the first test fails, the dependency can trigger a false negative by causing a dependent test to fail. Jest tests run concurrently by default so avoid creating tests that depend on each other.
- If a test is finishing work that started in another test, the dependency can significantly reduce the clarity of what each test is doing.
- If a test fails, the dependency significantly hinders debugging. You need to be able to isolate failing tests so you can rerun the failing test only. Test preconditions must be automatically included when you run the failed test independently on your local computer. If a failing test depends on another test, you must find and run the other test before you can run the failing test. If several tests are chained in a sequence, you must find and run all preceding tests.

If you need reusable piece of test code for use in multiple test scripts, put the code inside one of the Jest test hooks, such as `beforeAll`, `beforeEach`, `afterAll`, or `afterEach`.

Use clear test descriptions

Each unit test in a project verifies some behavior of the code. Therefore, the description of the unit test must clearly indicate exactly what is being tested and under what circumstances.

There are essentially two ways to declare a unit test description:

- You can use a behavior-driven development (BDD) style description. For example:

```
it('given MyComponent, when the submit button is clicked, then the dialog is
 rendered', () => {
  // ...
});
```

- You can use a plain English sentence beginning with `verifies that...` to state exactly what is being verified. For example:

```
it('verifies that the dialog is rendered when the submit button is clicked', () => {
  // ...
});
```

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Minimize the number of assertions for each test

Ideally each test script has one main assertion or `expect` statement that verifies the behavior that is being tested. It can be tempting to place multiple `expect` statements into a single test script, but avoid this practice. If any of the preceding `expect` statements in the script fail, then none of the subsequent `expect` statements will run.

If multiple `expect` statements are required, you can create a test suite that triggers the behavior to be tested in a `beforeAll` or `beforeEach` test hook. You can then write multiple test scripts that capture and verify each expected behavior individually. For example:

```
describe('MyComponent onClick() method behaviour', () => {
  let myComponent;
  let onClick;

  beforeAll(() => {
    onClick = jest.fn();
    myComponent =mount(<MyComponent onClick={onClick} />);
    /* Click the submit button to fire the onClick behaviour */
    myComponent.find('button').prop('onClick')();
  });

  it('verifies that the wds-u-hidden class of the dialog has been removed', () => {
    expect(myComponent.find('Dialog').hasClass('wds-u-hidden')).toBeFalsy();
  });

  it('verifies that the onClick functionality was invoked', () => {
    expect(onClick.mock.calls).toHaveLength(1);
  });
});
```

Running Jest and Enzyme tests

If you are using the default Jest configuration, you can run the Jest and Enzyme tests by adding scripts to the *`package.json`* file.

Procedure

- Add the following scripts to the *`package.json`* file.

```
"test-snapshots": "jest --config ./tests/config/snapshot.config.js",
"test-snapshots-update": "npm run test-snapshots -- -u",
"test-unit": "jest --config ./tests/config/unit.config.js",
"test-unit-coverage": "npm run test-unit -- --collectCoverage",
```

5.18 React environment variable reference

A full list of Universal Access React environment variables categorized by function. You can set environmental variables in *`.env`* files in the root directory of your application. If you omit environment variables, either they are not set or the default values apply.

The starter pack provides the *`.env`* and the *`.env.development`* files to get you started. For more information about using *`.env`* files, see *Adding Development Environment Variables In .env* in the Create React App documentation.

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REST API

- **REACT_APP_REST_URL**

  Specifies the path to REST services. You must set this variable as it is needed by the Authentication service. When you specify a path, it can be a URL to a server, or a relative path in the local deployment server if you are using a proxy. For the Universal Access application, it is *`http{s}://<ServerHostName>:<Port>/Rest`*. For example:

  ```
  REACT_APP_REST_URL=https://192.0.2.4:9044/Rest
  ```

  Where *<ServerHostName>* and *<Port>* are the hostname and port number of the server where the REST services are deployed.

  This variable is also used by the default Redux modules and modules that are generated by Web Development Accelerator to call REST APIs. For example:

  ```
  RestService.get(${REACT_APP_REST_URL}/v1/users)
  ```

  For development with the mock server, you can use local host without */Rest*. For example:

  ```
  REACT_APP_REST_URL=http://localhost:3080
  ```

  For more information, see The mock server API service on page 116.

- **MOCK_SERVER_PORT**

  Specifies the port to serve mock APIs. For example:

  ```
  MOCK_SERVER_PORT=3080
  ```

  For more information, see The mock server API service on page 116.

- **REACT_APP_RESPONSE_TIMEOUT**

  Specifies the maximum time in seconds to wait for the first byte to arrive from the server, by default 10, but does not limit how long the entire download can take. Set the response timeout

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to be a few seconds longer than the actual time it takes the server to respond. The lengthened response allows for time to make DNS lookups, TCP/IP, and TLS connections. For example:

```
REACT_APP_RESPONSE_TIMEOUT=10
```

For more information, see The RESTService utility on page 117.

- **REACT_APP_RESPONSE_DEADLINE**

  Specifies the maximum time in seconds for the entire request, including all redirects, to complete. If the response is not fully downloaded within REACT_APP_RESPONSE_DEADLINE, the request is canceled. The default value is 60. For example:

  ```
  REACT_APP_RESPONSE_DEADLINE=60
  ```

  For more information, see The RESTService utility on page 117.

- **REACT_APP_DELAY_REST_API**

  (Development only) Specifies a time in seconds to simulate a delay in the response from the API. For example:

  ```
  REACT_APP_DELAY_REST_API=2
  ```

  The value can be set to any positive integer to adjust the delay. For more information, see The RESTService utility on page 117.

User session

- **REACT_APP_LOGOUT_END_POINT**

  Specifies the logout endpoint for the application. By default, `/logout`.

  The strategy for user session logout changed to align with using the Cúram REST infrastructure APIs. Now when logging out, the `/logout` endpoint is called instead of the old `logout.jsp` endpoint.

  ```
  REACT_APP_LOGOUT_END_POINT=/logout
  ```

  If your version of Cúram does not support the new `/logout` endpoint, you must set the old `logout.jsp` endpoint. The `/logout` endpoint is supported in 7.0.10.0 iFix 4 and 7.0.11.0 iFix 1 or later.

  ```
  REACT_APP_LOGOUT_END_POINT=logout.jsp
  ```

- **REACT_APP_SESSION_INACTIVITY_TIMEOUT**

  Specifies the time in seconds before a user session expires. The value must match the session timeout that is configured on the server, by default, 30 minutes, or 1800 seconds.

  ```
  REACT_APP_SESSION_INACTIVITY_TIMEOUT=1800
  ```

  For more information, see Configuring user session timeout on page 254.

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- **REACT_APP_SESSION_PING_INTERVAL**

  Specifies the time in seconds between each time that the user's current session is checked for security purposes to see whether they are actively using the application or not. By default, the value is 60. For example:

```
REACT_APP_SESSION_PING_INTERVAL=60
```

- **REACT_APP_SESSION_TIMEOUT_REDIRECT_URL**

  Specifies the URL that the application redirects to when a user session times out. By default, `/login`. For example:

```
REACT_APP_SESSION_TIMEOUT_REDIRECT_URL=/login
```

Security

You can specify Cross-Site Request Forgery (CSRF) protection settings and the logout endpoint for your application. For more information, see Enabling Cross-Site Request Forgery (CSRF) protection for Universal Access on page 204.

- **REACT_APP_REQUIRE_CSRF_TOKEN**
  Specifies whether a CSRF token is needed before the application can make API requests. If enabled, and if no CSRF token is stored, the application attempts to get a CSRF token before making a request. It takes a Boolean value, and defaults to false if not present. For example, to enable CSRF protection:

```
REACT_APP_REQUIRE_CSRF_TOKEN=true
```

- **REACT_APP_CSRF_ALLOWLIST**
  Specifies a comma-separated list of URL suffixes to allow, typically where enabling CSRF protection might cause an infinite loop. The default value is empty. For example:

```
REACT_APP_CSRF_ALLOWLIST=/logon.jsp,/logout.jsp,/j_security_check
```

Locale

- **REACT_APP_INTL_LOCALE**
  Specifies a locale to set the correct regional format for dates and numbers in the application. The value must align with the *`curam.environment.default.locale`* value that is set in your regional settings on the server, see The Application.prx file.

  The format of the locale is *`xx-XX`*, for example. en-US, rather than *`en_US`*, which is the format on the server. For example, to set the US locale:

```
REACT_APP_INTL_LOCALE=en-US
```

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Unauthorized redirect

- **REACT_APP_UNAUTHORIZED_REDIRECT_URL**

  Specifies the URL that the application redirects to when an unauthorized redirect occurs. By default, `/login`.

```
REACT_APP_UNAUTHORIZED_REDIRECT_URL=/login
```

Feature toggles

You can enable the display of specific features in the application.

- **REACT_APP_FEATURE_LIFE_EVENTS_ENABLED**

  Specifies whether to display the Life Events feature in the application with a Boolean value. It is enabled by default. For example, to enable Life Events:

```
REACT_APP_FEATURE_LIFE_EVENTS_ENABLED=true
```

  For more information, see Enabling and disabling life events on page 271.

- **REACT_APP_FEATURE_APPEALS_ENABLED**

  Specifies whether to display the Appeals feature in the application with a Boolean value. It is disabled by default. For example:

```
REACT_APP_FEATURE_APPEALS_ENABLED=false
```

  For more information, see Enabling and disabling appeals on page 316.

- **REACT_APP_FEATURE_VERIFICATIONS_ENABLED**

  Specifies whether to display the Citizen Verifications feature in the application with a Boolean value. It is disabled by default. For example, to enable Citizen Verifications:

```
REACT_APP_FEATURE_VERIFICATIONS_ENABLED=true
```

  For more information, see Enabling or disabling verifications on page 291.

- **REACT_APP_FEATURE_PAYMENT_DETAILS_ENABLED**

  Specifies whether to display additional payment information in the application with a Boolean value. It is disabled by default. For example, to enable the enhanced display of benefit and payment information:

```
REACT_APP_FEATURE_PAYMENT_DETAILS_ENABLED=true
```

  For more information, see Configuring payments on page 256.

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- **REACT_APP_CITIZEN_DASHBOARD_PAYMENT_COUNT_MAX**

  Specifies the maximum number of payments for the expected payments list and previous payments list on the dashboard, by default 3. This setting applies only when the enhanced display of benefit and payment information is enabled.

```
REACT_APP_CITIZEN_DASHBOARD_PAYMENT_COUNT_MAX=3
```

Connectivity handler

- **REACT_APP_CONNECTIVITY_INTERVAL**

  Specifies the interval in milliseconds between polling calls to check internet connectivity. By default, the `system_configuration` API is pinged every 5 seconds.

```
REACT_APP_CONNECTIVITY_INTERVAL=5000
```

- **REACT_APP_CONNECTIVITY_POLLING_ENABLED**

  (Development only) Specifies whether to poll to check internet connectivity. For development purposes, you can disable polling by setting the value to `false`.

```
REACT_APP_CONNECTIVITY_POLLING_ENABLED=true
```

You can customizing connectivity handling, for more information, see Implementing a connectivity handler on page 106.

User account status polling

To check whether a user has a standard or linked account when they submit an application, you can poll the user's account type to check for updates to their account status. This feature can be useful when an application is set up to automatically create linked accounts, such as in test or demonstration environments.

- **REACT_APP_USER_ACCOUNT_POLLING**

  For example:

```
REACT_APP_USER_ACCOUNT_POLLING={“api”: “/v1/ua/user_account_login”, “timeout”: “0”,
 “interval”: “1000"}
```

  Where:

  - `api`

    Specifies a URL to call to check the user account type. By default, `/v1/ua/user_account_login`.
  - `timeout`

    Specifies the timeout in milliseconds for the user account type polling to stop. By default, the timeout is set to 0, which disables user account type polling. Five seconds is a sensible period to allow for asynchronous processing to finish while not polling indefinitely.
  - `interval`

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Specifies the interval in milliseconds between polling calls to check the user account type. By default, 1 second.

Application-specific verification polling

When a citizen submits an application, there is a delay while verifications are generated for that application. You can enable verification polling to handle this delay, allowing the page to wait and present the verifications when they become available. You can set the polling on (default) or off, and adjust the interval and duration. You can also specify the URL to query to check for the application verifications. For more information about verification settings, see 8.4 Customizing verifications on page 291.

- **REACT_APP_VERIFICATION_POLLING**

  For example:

  ```
  REACT_APP_VERIFICATION_POLLING={"api": "/v1/ua/submitted_applications", "timeout":
   "10000", "interval": "1000"}
  ```

  Where:

  - `api`

    Specifies a URL to call to check the submitted applications for verifications. By default, `/v1/ua/submitted_applications`.
  - `timeout`

    Specifies the timeout in milliseconds for the polling calls to stop. By default, 10 second.
  - `interval`

    Specifies the interval in milliseconds between polling calls. By default, 1 second.

- **REACT_APP_VERIFICATION_URL**

  Specifies the URL to query to check for the application verifications. For example:

  ```
  REACT_APP_VERIFICATION_URL=<REACT_APP_REST_URL>/v1/ua/verifications
  ```

Document uploads

You can specify the allowed file formats and maximum size for the documents that users can upload.

- **REACT_APP_DOC_UPLOAD_FILE_FORMATS**

  Specifies the file name extension, including the dot separator, of the allowed file types for document uploads in a comma-separated list. By default, if you do not set this environment variable, the allowed file types are JPG, JPEG, PNG, TIFF, and PDF. To change the default file types, set this environment variable. For example:

  ```
  REACT_APP_DOC_UPLOAD_FILE_FORMATS=".png,.jpg,.pdf"
  ```

  If you specify an invalid file extension string, all file types are denied.

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For more information, see Customizing file formats and size limits for file uploads on page 292.

- **REACT_APP_DOC_UPLOAD_SIZE_LIMIT**

  Specifies the maximum size limit for uploaded documents. By default, the maximum file size is 5 MB. To change the default file size, set this environment variable. For example:

  ```
  REACT_APP_DOC_UPLOAD_SIZE_LIMIT=6
  ```

  For more information, see Customizing file formats and size limits for file uploads on page 292.

- **REACT_APP_DOC_UPLOAD_LEAD_DAYS**

  Specifies a lead time in days to subtract from due dates to give caseworkers time to process applications before the actual due dates. This earlier date is then displayed to citizens in the application.

  The default value of `REACT_APP_DOC_UPLOAD_LEAD_DAYS` is 0 days. The value that you set is converted to its absolute value and subtracted from the verification due date. For example, -1 and 1 have the same effect.

  For example:

  ```
  REACT_APP_DOC_UPLOAD_LEAD_DAYS=-7
  ```

  For more information, see Customizing a file upload lead time for verifications on page 293.

Cúram Web Development Accelerator

For more information, see Generating Universal Access Redux modules on page 103.

- **WDA_MODULES_OUTPUT**

  (Development only) Specifies the directory to place module files generated by the Web Development Accelerator, by default *`src/modules/generated`*. For example:

  ```
  WDA_MODULES_OUTPUT=src/modules/generated
  ```

- **WDA_MODULES_CONFIG**

  (Development only) Specifies a JSON file in which to save the module configuration that you define, by default *`modules_config.json`*. This file contains the metadata that is used to generate the code. For example:

  ```
  WDA_MODULES_CONFIG=src/modules/modules_config.json
  ```

  It is recommended that you add only this file to source control.

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- **WDA_SPM_SWAGGER**

  (Development only) Specifies the location of a copy of the Cúram Swagger specification that defines which REST APIs are available to the Web Development Accelerator. For example:

  ```
  WDA_SPM_SWAGGER=spm_swagger.json
  ```

  You can copy this file from a running Cúram instance at *`http://hostname:port/Rest/api/definitions/v1`*.

Application authentication

The default implementation for authentication is a Java™ Authentication and Authorization Service (JAAS) authentication method. If the JAAS authentication method does not suit, you can change to another authentication method, such as Single sign-on (SSO). Ensure that you set any related environmental variables where needed. For more information, see 6.3 Universal Access authentication on page 204.

The following authentication methods are provided:

- **REACT_APP_AUTH_METHOD**
  - `JAASAuthentication`

    (Default) No further environmental variables needed.
  - `DevAuthentication`

    (Development only) Specifies simple authentication during development that bypasses proper authentication (JAAS or SSO) and accepts the username *`dev`* without any password. The login process can run and allows access to the 'user account' password protected pages. If you specify simple authentication, you can set the optional user type environmental variable in Simple authentication for development on page 194.
  - `SSOSPAuthentication` or `SSOIDPAuthentication`

    Specifies service-provider (SP)-initiated or identity provider (IdP)-initiated SAML 2.0 web SSO. If you set SSO authentication, you must set the related SSO environmental variables in Single sign-on (SSO) authentication on page 195.

    For example:

    ```
    REACT_APP_AUTH_METHOD=SSOIDPAuthentication
    ```

Simple authentication for development

(Development only) If you are using simple authentication for development, you can set the following environmental variable. For more information, see Customizing the authentication method on page 206.

- **REACT_APP_SIMPLE_AUTH_USER_TYPE**

  (Development only) Specifies a user type during development so you can test functionality for those users.

  - PUBLIC, a public citizen account user.

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- GENERATED, an anonymous generated account user.
- STANDARD, a standard registered account user.
- LINKED, a linked account user.
- null, no user type.

For more information about user types, see 6.5 User account types on page 214.

For example, to test the application for a linked user:

```
REACT_APP_SIMPLE_AUTH_USER_TYPE=LINKED
```

Single sign-on (SSO) authentication

If you use SSO authentication, you must set the following environmental variables. For more information, see the *Security Guide*.

- The `<IdP_URL>` consists of three parts: the HTTPS protocol, the IdP hostname or IP address, and the listener port number. For example, `https://192.168.0.1:12443`.
- The `<ACS_URL>` consists of three parts: the HTTPS protocol, the Assertion Consumer Service (ACS) hostname or IP address, and the listener port number. For example, `https://192.168.0.2:443`.
- **REACT_APP_SAMLSSO_ENABLED**

  Specifies whether SSO authentication is used in the application. By default, the IdP-initiated flow of the SAML SSO browser profile is used. A Boolean value is accepted. For example, to handle the SAML SSO browser profile in the application:

  ```
  REACT_APP_SAMLSSO_ENABLED=true
  ```

- **REACT_APP_SAMLSSO_SP_MODE**

  (SP-initiated flow only) Specifies whether to use the SP-initiated flow of the SAML SSO Browser profile. By default, the default IdP-initiated flow of the SAML SSO Browser profile and this setting overrides it. A Boolean value is accepted. For example:

  ```
  REACT_APP_SAMLSSO_SP_MODE=true
  ```

- **REACT_APP_SAMLSSO_USERLOGIN_URL**

  Specifies the IdP login page URL, that is, the URL where the application sends the user login credentials. For example:

  ```
  REACT_APP_SAMLSSO_USERLOGIN_URL=<IdP_URL>/pkmslogin.form
  ```

- **REACT_APP_SAMLSSO_SP_ACS_URL**

  Specifies the ACS application server URL, that is, the service provider URL where the application sends the SAML response. For example:

  ```
  REACT_APP_SAMLSSO_SP_ACS_URL=<ACS_URL>/samlsps/acs
  ```

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- **REACT_APP_SAMLSSO_USERLOGOUT_URL**

  Specifies the IdP logout page URL, that is, the URL where the application sends the user logout request. For example:

```
REACT_APP_SAMLSSO_USERLOGOUT_URL=<IdP_URL>/pkmslogout
```

- **REACT_APP_SAMLSSO_IDP_LOGININITIAL_URL**

  (IdP-initiated flow only) Specifies the initial URL to which the application sends the initial login request to the identity provider. Refer to the identity provider documentation for the correct URL and values. For example:

```
REACT_APP_SAMLSSO_IDP_LOGININITIAL_URL=<IdP_URL>/isam/sps/saml20idp/saml20/
logininitial?RequestBinding=
HTTPPost&PartnerId=<ACS_URL>/samlsps/acs&NameIdFormat=Email
```

- **REACT_APP_SAMLSSO_IDP_SSOLOGIN_URL**

  (SP-initiated flow only) Specifies the identity provider URL where the application sends the SAML request. Refer to the identity provider documentation for the URL. For example

```
REACT_APP_SAMLSSO_IDP_SSOLOGIN_URL=<IdP_URL>/isam/sps/saml20idp/saml20/login
```

Intelligent Evidence Gathering (IEG)

For more information, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

- **REACT_APP_DISPLAY_REQUIRED_LABEL**

  Specifies whether to indicate the required form fields or the optional form fields. As most questions in a typical form are required, indicating the optional questions rather than the required questions typically results in a less cluttered form. By default, optional fields are highlighted in IEG forms. For example, to display labels for required fields only:

```
REACT_APP_DISPLAY_REQUIRED_LABEL=true
```

- **REACT_APP_DATE_FORMAT**

  Specifies the date format for form fields, by default, MM/DD/YYYY. The valid values are dd-mm-yyyy and mm-dd-yyyy. If you omit the environment variable or set an invalid value, the default date format is used. For example, to change the date format to DD/MM/YYYY:

```
REACT_APP_DATE_FORMAT=dd-mm-yyyy
```

  Note: Specific globalization considerations apply to the date format when it is used in hint text and messages. Ensure that you have the same date format in the `REACT_APP_DATE_FORMAT` environment variable, and in the`DateAdapter_DateFormat` and `Errors_date` messages in the `intelligent-evidence-gathering-locales` package.

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- **REACT_APP_PHONE_MASK_FORMAT**

  Specifies a phone number mask for a form field in a question. The value must be in ISO 3166-1 alpha-2 code format, for example, `US | CA | GB | DE`. In your IEG script, you must add the `wds-js-input-mask-phone` class name to the question.

  ```
  REACT_APP_PHONE_MASK_FORMAT=US
  ```

  Where country is the locale that you want to use.

- **REACT_APP_PHONE_MASK_DELIMITER**

  Specifies a custom delimiter for phone numbers. For example, to convert 1 636 5600 5600 to 1-636-5600-5600:

  ```
  REACT_APP_PHONE_MASK_DELIMITER=-
  ```

- **REACT_APP_PHONE_MASK_LEFT_ADDON**

  Specifies a fixed country code for phone number fields. For example, to convert 1-636-5600-5600 to +1-636-5600-5600:

  ```
  REACT_APP_PHONE_MASK_LEFT_ADDON=+
  ```

- **REACT_APP_CURRENCY_MASK_ADDON**

  Specifies a currency symbol to display before or after the amount, where the alignment of the currency symbol is based on the locale. For more information, see the developer.mozilla.org documentation. For example, to specify Canadian Dollars, where in a French locale the dollar is aligned on the right, and in an English locale the dollar is aligned on the left:

  ```
  REACT_APP_CURRENCY_MASK_ADDON=$
  ```

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6 Security for the Cúram Universal Access Responsive Web Application

Merative ™ Cúram Universal Access gives citizens access to their most sensitive personal data over the internet. Security must be a primary concern in the development of citizen account customizations. All projects that are built on the Cúram Universal Access Responsive Web Application must focus on delivering security from beginning to end.

It is recommended that all projects take at least the following steps to ensure the security of the project delivery:

- Ensure that the project team are familiar with the principles of secure application development, and common vulnerabilities such as the OWASP Top Ten.
- Develop and apply a threat model.
- Employ security experts to test everything from requirements to the finished deployment.
- Plan for how the application is used in public spaces like libraries and kiosks.

Customers must contact Merative™ support to discuss any unusual customization that might have specific security issues.

6.1 Build secure web apps with the Social Program Management Design System

When you develop with the Cúram Design System and npm, you must consider your security attack plane, and take the appropriate steps to prevent or reduce the threat to your runtime application from malicious actors. npm is an impressive resource of open source software, but you must understand the threats that exist with this software stack and act responsibly to mitigate risk.

Merative ™ Cúram Universal Access goes through rigorous security threat monitoring during development and before release. However, after the software is released there is an ongoing threat to your business:

- From your customization of the software.
- From new vulnerabilities that are discovered after release.

npm, which is the backbone of the Social Program Management Design System software development lifecycle strategy, promotes the reuse of third-party packages. Each of your packages uses other packages, which in turn use other packages, and so on. This generates a large tree of dependencies on software packages, many of which you might have little or no knowledge of. It is important to understand the NPM threat vectors and take the appropriate steps.

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Protect yourself during development

You can use a number of strategies to reduce the possibility that you might release vulnerable software.

- **Review Dependencies**

  If you introduce new third-party dependencies in your custom code, try to choose packages that are established, well-maintained, and used widely. This strategy increases the chances that vulnerabilities are discovered quickly and resolved immediately by the package owners.
- **Audit Packages**

  Monitor the results of the `npm audit` command that is run after each installation. To reduce possible vulnerabilities, fix issues in your direct dependencies as they arise to ensure that your development environment is using the latest versions of packages in your dependency tree. While not all packages that are used during development get deployed in production, it is still good practice to minimize warnings as much as possible.
- **Lint in development**

  Use linting tools in your development environment to highlight security issues in your custom code and resolve or mitigate any reported issues before your release the code. For more information about configuring linting, see 5.4 Enforce good code style with ESLint and EditorConfig on page 88.
- **Lint in the continuous integration pipeline**

  Introduce linting to your integration pipeline to ensure that failures for security rules block the integration of new code.
- **Review code**

  Include security as a critical aspect of a code review, and educate your developers on how to spot scenarios where security is a concern, and how to identify coding errors.
- **Consider your authentication strategy**

  The reference application provides basic sign-up and log-in pages to demonstrate how the Merative ™ Cúram Universal Access Responsive Web Application can be integrated with a Cúram deployment. These features are provided as references, but are not intended to be directly deployed into production.

  You must consider your authentication strategy and ensure it meets your organization's requirements. For example, you might need to integrate with an Identity Provider in your authentication flow, or use a captcha for your sign-up or log-in pages.
- **Secure your REST APIs**
  Ensure that you secure your REST APIs before deployment, see 6.2 Securing access to Universal Access REST APIs on page 203.

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Protect your production environment

You must understand how your production code is created, and use **`npm audit`** to identify security issues.

How is your deployed code created?

- **`npm install`**

  When you run `npm install` for your development environment, it typically installs packages that:

  - Are used at run time and need to be included in the build for deployment.
  - Are only required for development purposes or to create the deployment.

  By convention, runtime or development-only packages are separated by the `dependencies` and `devDependencies` lists in the `package.json` file. However, you can have the packages in either list or mixed any way that you want. After an installation runs successfully you have all the code that is required to go to the next stage, which is to build your deployment and run your app. Adding packages to the `devDependencies` list does not ensure that they are not in your deployed code.
- **`npm run build`**

  When you run `npm run build`, the `dependencies` list in the *`package.json`* file is ignored as it is only relevant to the development environment. Instead, the *`src/index.js`* file that represents the root of the App is used to initiate a process of including only the files that are required to create a working deployment. It is possible that code from packages that are listed in your `devDependencies` ends up in your deployment bundle, if code from those packages is called from code in your runtime application.

Use `npm audit` to identify security issues

When you run `npm audit`, all packages that are listed in *`package-lock.json`* are analyzed for vulnerabilities. The audit is not sophisticated enough to know what is part of the deployment. That is, the contents of the build folder, and the packages from which they were included.
For this reason, an `npm audit` is an *indicative* security check that helps to identify potential vulnerabilities with the packages that you are using. However, it is not an accurate picture of how vulnerable your running application is because:

- Code from packages with known vulnerabilities might not be included in your deployed code. Either because it is only used for development, or because the bundling algorithm calculates that the code is not required and doesn't add it to the deployment bundle.
- Vulnerabilities might not be discovered yet. So the code that you successfully audited yesterday might not pass an audit check today. No code did not change, but a new vulnerability was discovered and reported to NPM https://www.npmjs.com/advisories.

Therefore, `npm audit` is a good smoke test for vulnerabilities, but needs further analysis before action is taken.

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When to run `npm audit`?

`npm audit` runs on each installation. In a development environment, it is obvious to the team when vulnerabilities arise as each time a developer installs the app, they are notified of vulnerabilities.

For a deployed environment, you can run `npm audit` daily against your deployed code to highlight any new vulnerabilities that were discovered since you deployed your application. You might be tempted to run it against your development codebase, but this code is not the same as your deployed code. The packages that are in a deployment might have been removed from your development repository since you last deployed and therefore not show up in an audit on your development codebase.

To monitor the code that is running in your deployed environment, you must run ***`npm audit`*** against the packages that were used to build that deployment. You need the `package.json` and `package-lock.json` from the codebase from which the deployment was built. You can create a simple automated job to run `npm audit` against a folder that contains these files and to report any failures. For example, you can run **`npm audit --audit-level=high`** from a folder that contains these files:

```
/my-current-deployment-packages
 + package.json
 + package-lock.json
```

Review content security policy settings

"The HTTP Content-Security-Policy response header allows website administrators to control resources the user agent is allowed to load for a given page. With a few exceptions, policies mostly involve specifying server origins and script endpoints. This helps guard against cross-site scripting attacks." (From mdn web docs https://developer.mozilla.org/en-US/docs/Web/HTTP/Reference/Headers/Content-Security-Policy)

The CSP can be defined in the root index.html file from which your site is deployed. Alternatively, where the meta tag does not support the CSP `policy-directive`, e.g. "frame-ancestors", you can add headers using a reverse proxy such as Nginx or Apache HTTP Server. E.g. The code below could be used to add the frame-ancestors policy to any response from the / universal endpoint

```
location ~ ^/universal {
  add_header Content-Security-Policy "frame-ancestors 'none'";
}
```

It is recommended that your security team reviews the content security policy to ensure it meets your internal security policies.

Review your build files for secrets

When you deploy your application, you publish the contents of the /build folder to the public via the browser. This set of files should be reviewed to ensure it does not contain any sensitive information that malicious actors could extract. For example, environment variables used by the React application are written into the JavaScript files as part of the build process. It is possible through misconfiguration that environment variables that are not required and include sensitive information are included.

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The build files can be reviewed manually by searching for a value from your .env file. E.g. `REACT_APP_REST_URL`. Adjacent to this reference you will see the list of other environment variables. Ensure the list only includes environment variables required by the application, and do not include sensitive information.

Consider using security scanning tools to automate the review process.

Consider penetration testing

Penetration testing is an activity that is carried out on running software to find security holes. Penetration testing can be done with automated tools, such as IBM Security AppScan. To add a further strength test to your development process, you can hire third-party services that specialize in the penetration testing of apps, which includes both automated and manual testing. Typically, penetration testing is carried out periodically to provide an external health check on your applications security.

How to address security vulnerabilities

If you find that you are using a vulnerable package, you must analyze the threat to decide how to mitigate the risk.

Sometimes, an `npm audit` scan might report packages that are used in development but are not in your deployed application bundle and therefore not in your runtime application. The urgency of fixing issues with these packages is reduced.

For vulnerabilities that you discover through `npm audit` that are **High** or **Critical**, you must address them as soon as possible. For most, the fix is already available or to be provided within hours or days of registration of the vulnerability. You must redeploy your production code from a repository that was updated to the patched version of the vulnerable package. Typically, `npm audit` advises you what you need to do.

In some cases, the fix might require upgrading a package to a major version, which requires a manual upgrade as it might be a breaking change for your code. Where the package was included through your own custom code, you can do this upgrade yourself. In other cases, the fix is outside your control. For example, where the vulnerable package is a dependency of a package that you depend on, you need the owner of that package to fix their code. If Merative™ owns the package, you can open a support case for the issue.

For more information about how deal with security audits, see this npm article.

6.2 Securing access to Universal Access REST APIs

You must ensure that you secure access to REST APIs that are used by Universal Access.

If you are enabling verifications, you must ensure that you have implemented the appropriate file security and validations for document uploads, and enabled the Files API so you can upload files to Cúram.

For more information, see the *Cúram™ REST API Guide*.

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Cúram delivers many REST APIs that are not all used by client applications like Merative ™ Cúram Universal Access. Ensure that you remove Security IDentifiers (SIDs) from the database for any unused REST API functions to greater secure what is available to be accessed by users, see 6.6 User account authorization on page 215.

Enabling Cross-Site Request Forgery (CSRF) protection for Universal Access

You can enable token-based Cross-Site Request Forgery (CSRF) protection in Universal Access to secure the Cúram REST APIs from CSRF attacks.

About this task

For more information about CSRF protection in Cúram, see the *Cúram™ REST API Guide*.

For more information about how the REST APIs integrate token-based CSRF protection, see the *Cúram™ REST API Guide*.

Procedure

1. Enable CSRF protection on the Cúram server, see the *Cúram™ REST API Guide*.
2. Ensure that any subdomains are included in the `curam.rest.refererDomains` Cúram system property.
3. Set the Universal Access security environment variables for CSRF in Universal Access application. See 5.18 React environment variable reference on page 186.
4. Ensure that any images in the application that are stored in Cúram and requested from the Cúram server use the `UAImage` component from the `core-ui` package. The `UAImage` component is a wrapper for the `Image` component that adds the CSRF token to image requests from the Cúram server.

   Note: If you are upgrading, you must ensure that you replace the `Image` component with the `UAImage` component for all images that are stored in Cúram. Otherwise, images that are stored in Cúram cannot be retrieved and displayed.

6.3 Universal Access authentication

The `universal-access` package exports the `Authentication` module, which can be used to log in and out of the application and to inspect the details of the current user. The login service is passed a username and password, and optionally a `callback` function that is called when the authentication request is completed.

Authentication services

The Authentication API supports the following modes:

- JAAS Authentication (Default)
- Simple Authentication (Development mode)

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- Single Sign-on (SSO) Authentication
- Custom authentication

JAAS authentication

By default, the login process uses the standard JAAS login module.

The JAAS login module is exposed through the Cúram Universal Access API at the `/j_security_check` end point, and authenticates the user against the Cúram database of users. For more information about JAAS login in Cúram, see the *Security Guide*.

Simple authentication (Development Mode)

During development, you can use a simple authentication that does not require an Cúram server. This simple authentication bypasses proper authentication (JAAS or SSO) and instead accepts the username `dev` without any password. The login process runs and allows access to the 'user account' password protected pages.

This simple authentication is sufficient to do most client development work and avoids the need to configure your client application to communicate with an Cúram server.

SSO authentication

The application supports single sign-on (SSO), which is a typical use case for many enterprises that serve multiple applications with a single username and password for their clients.

For more information about configuring your application to use SSO, see the *Security Guide*.

- **Automatically logging in to your SSO**

  The default `SSOVerifier` component wraps the whole application and checks for SSO status when the application is loaded for the first time. The `SSOVerifier` component verifies whether the user is already logged in with SSO and can be logged directly into the application. If the user is not yet authenticated, then they must authenticate as a public citizen so that they can access the system configuration.

  The `SSOVerifier` does the entire precheck within the component, by making all the required calls to determine with the IdP whether the current user is authenticated. `SSOVerifier` is helped to make these calls by using functions exposed by `SSOAuthentication`.

  If you need custom verification, you must create your own verifier component to replace the current `SSOVerifier` component. Then, add your custom verifier component to the call stack in your entry JavaScript file, for example `App.js`.

Custom authentication

You can implement your own custom authentication to suit your specific environment.

User account types

The Universal Access client supports three different user account types, Public, Generated, and Citizen. For more on user accounts and security, see 6.5 User account types on page 214. If you want to customize the log in and sign up process that is provided with the Universal Access

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starter pack, the `Authentication` module provides log-in functions to support each of these three user account types.

```
Authentication.loginAsPublicCitizen

Authentication.loginWithGeneratedUser

Authentication.login
```

Tracking the logged in user

The Cúram Universal Access Responsive Web Application uses 'session storage' in the browser to store some basic details of the currently logged-in user after they are authenticated with the server. This session storage is typically used to inform the client application what views to present. For example, if no user is logged in, then the login and sign-up page buttons are displayed on the home page.

The `Authentication` module provides functions that query the current logged-in user and their account details, according to the session storage in the browser.

```
Authentication.getLoggedInUser

Authentication.getUserAccount
```

Logged in on the client or the server

Citizens can seem to be logged in on the client when they are not logged in on the server. This situation does not compromise the security of the application. The Cúram server APIs use session tokens that are stored in cookies to determine whether the current user is authenticated. The cookies are transmitted with each API call, and only a valid token results in a successful response.

For example, if a user's session times out on the server, the next API request to the server results in a 401 unauthorized response, even if the user seems to be logged in to the client application. This behavior ensures that no matter what the client application says about the currently logged-in user, the server responds only to valid session tokens.

For more information, see Configuring user session timeout on page 254.

Related concepts

The RESTService utility on page 117
The *@spm/core* package provides the `RESTService` utility, which you can use to connect your application to a REST API. The `RESTService` utility provides important functions for securing and connecting to Cúram REST APIs, such as CSRF protection and SSO support. You can fetch resources with alternatives such as Fetch API, SuperAgent, or Axis, but you must consider implementing functionality that is handled by the `RESTService` utility, like CSRF protection and SSO support.

Customizing the authentication method

The default implementation for authentication is a Java™ Authentication and Authorization Service (JAAS) authentication method. If the JAAS authentication method does not suit, you

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can change to one of the other provided authentication methods, or implement your own custom authentication method.

About this task

The following authentication methods are available in the application. For more information, see 6.3 Universal Access authentication on page 204. To use any of the provided authentication methods, set the REACT_APP_AUTH_METHOD environmental variable in the appropriate `.env` file to one of the following options and set any related environmental variables. For example:

```
REACT_APP_AUTH_METHOD=SSOIDPAuthentication
```

- `JAASAuthentication`

  (Default for production environments. That is, **`npm start`** with *`.env.development`*.)

  No further environmental variables needed.
- `DevAuthentication`

  (Default for development environments.)

  Set the Simple authentication for development on page 194 environmental variables.
- `SSOSPAuthentication`

  Service-provider (SP)-initiated SAML 2.0 web SSO.
- `SSOIDPAuthentication`

  Identity provider (IdP)-initiated SAML 2.0 web SSO.

If you set SSO authentication, you must set the Single sign-on (SSO) authentication on page 195 environmental variables.

For more information about environmental variables, see the 5.18 React environment variable reference on page 186.

If you want to use custom authentication, you must create a custom authentication method and register the new authentication method as follows:

Procedure

1. Create a custom authentication method, which consists of a normal class file that contains two static methods as follows:

   - `static login = input => {}`

     Where `input` is an object that contains one or more of these authentication properties: `username`, `password`, `callback`, `ssoPreCheck`, `ssoLogin`.

     Implement the logic to authenticate the user in this method.
   - `static logout = (callback, reportLogoutError) => {}`

     Where:

     - `callback` is a function that is called when logout completes.
     - `reportLogoutError` can be used to define whether a message is shown.

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Implement the logic to log out the user in this method.

2. Register your new authentication method in an entry point file such as `App.js` by using the `AuthenticationRegistry` component as shown in the following example:

   a) Import the `AuthenticationRegistry` component and the authentication class:

   ```
   import { AuthenticationRegistry } from '@spm/core';
   import CustomAuthentication from '<path_to_custom_method>';
   ```

   b) Use `AuthenticationRegistry.registerAuthenticationType` to register the functions from the authentication class:

   ```
   AuthenticationRegistry.registerAuthenticationType(CustomAuthentication);
   ```

6.4 Authenticating with external security systems

By default, Merative ™ Cúram Universal Access uses its own authentication system that is backed up by a database of registered users. However, Universal Access can also be configured to authenticate with external security systems.

Configuring SAML SSO for Universal Access

You can configure SAML Single Sign-On (SSO) for Universal Access. For more information, see the *Security Guide*.

Identity Only authentication

You can deploy Universal Access in *Identity Only* mode for registered users so that creating accounts occurs externally and user accounts are authenticated externally. For more information, see the *Security Guide*.

Integrating with IdPs for multifactor authentication

To integrate multifactor authentication into your application, use single sign-on through SAML with an identity provider (IdP) that supports multifactor authentication.

In the associated single sign-on flow, the entire authentication process, including the login screen, is delegated to the IdP. You can customize the application to support the flow.

For more information, see the example in the Github open source repository.

External security authentication example for Universal Access

You can ensure that citizens can be authenticated for any of your services by using a single set of credentials. This approach provides the benefits of a streamlined authorization process for both governments and citizens. The example outlines the implementation of a set of customization requirements for a team that is deploying Universal Access.

Any analysis of requirements for external security integration must consider the following questions:

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- Does your deployment support anonymous screening, anonymous intake, or both?
- Is account management supported in Merative ™ Cúram Universal Access or in the external security system?
- Is single sign-on (SSO) needed?

Example customization requirements

The external security authentication example describes the configuration and development tasks to implement the following set of customization requirements, and refers to these requirements where appropriate.

1. Users can access Universal Access and do anonymous screening or intake.
2. Users who want to access their saved screening or intake information must first create an account on a system called `CentralID`.
3. Users who log in to Universal Access can use their CentralID username and password to authenticate.
4. Users do all of their account management with an external system called Central ID. For example, resetting a password, creating a new account, or changing account details.
5. CentralID stores all user records in a secure LDAP server.
6. Because all account management is now done in CentralID, the account creation screens and password reset screens are to be removed from Universal Access.
7. Users can log in as soon as they register with CentralID, and experience no delay while an ID propagates to Universal Access.

Configuring an alternative login ID

By default, you cannot change user names after they are created. However, you can configure an alternative login ID that can be updated.

If you configure an alternative login ID for a user name that is case-sensitive, then the alternative login ID is also case-sensitive.

For information about configuring alternative login IDs, see the *Security Guide*.

Deploying in identity-only mode for registered users

You must configure the application server to use LDAP for authentication if a user is in `Identity-Only` mode. Also, configure the necessary properties to deploy in identity-only mode for registered users.

Configuring the application server to use LDAP for authentication in `Identity-Only` mode

If a user is in `Identity-Only` mode, it is necessary to match the login IDs that are stored in LDAP with the login IDs that are stored in the `ExtendedUsersInfo` table.

For information about how to configure your application server to use LDAP for authentication, see the relevant application server documentation.

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Configuring properties to deploy in identity-only mode for registered users

Add the following properties to the *AppServer.properties* file:

```
curam.security.check.identity.only=true
curam.security.user.registry.disabled.types=EXT_AUTO,EXT_GEN
curam.citizenworkspace.enable.usertypes.for.temporary.users=true
public.user.type=EXT_AUTO
```

To reconfigure the application server, run the following command:

```
appbuild configure
```

The *curam.security.check.identity.only* property ensures that application security is set to work in Identity Only mode. For more information about Identity Only authentication mode, see either *Deployment Guide for WebSphere®* or *Deployment Guide for WLS*. In Identity Only mode, authentication uses only the internal user table to check for the existence of the user. The validation of the password is left to a subsequent module, either a JAAS module (Oracle® WebLogic) or the User Registry (IBM® WebSphere®).

Take the example of a user, "johnsmith", who has been registered with the CentralID LDAP server. For John Smith to be able to use Universal Access, there must also be a "johnsmith" entry in the ExternalUser table. When John Smith logs in, his authentication request is passed to the Cúram JAAS Login Module. The Cúram JAAS Login Module checks that the user `johnsmith` exists in the Cúram ExternalUser table but does not check the password. The authentication then proceeds to the User Registry (WebSphere®) or LDAP JAAS Module (WebLogic) where the user name and password are checked against the contents of the CentralID LDAP server. For the authentication to work correctly, it is necessary to configure the application server with the connection details for the secure LDAP server.

The Identity Only configuration allows the application to defer to an external security system such as an LDAP-based directory service for the authentication of user credentials. However, when an anonymous user accesses the organization **Home** page for the first time, the user is automatically logged in as a `publiccitizen` user. Subsequently, if the user chooses to screen themselves or to perform an intake, Universal Access creates a new "generated" anonymous user. Each generated user is unique, which ensures that the data that belongs to that user is kept confidential. Public citizen users and generated users are not inserted into the LDAP directory, so they cannot be authenticated by using the Identity Only mechanism. The following line ensures that users with the user type EXT_AUTO (public citizen users) and EXT_GEN (generated users) are authenticated against the External User table:

```
curam.security.user.registry.disabled.types=EXT_AUTO,EXT_GEN
```

After the previous configuration has been applied to the server and the server has been started, perform the following configuration steps:

1. Log in as sysadmin.
2. **Select Application Data** > **Property Administration**.
3. Select category **Citizen Account - Configuration**.
4. Set the property **curam.citizenaccount.public.included.user** to EXT_AUTO.

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5. Set the property **curam.citizenaccount.anonymous.included.user** to EXT_GEN.
6. Set the property **curam.citizenworkspace.enable.usertypes.for.temporary.users** to TRUE.
7. **Publish** the property changes.

   You need another configuration entry so that Universal Access operates correctly with respect to authentication as shown in the following steps:
8. Select **Select Application Data** > **Property Administration**.
9. Select category **Infrastructure – Security parameters**.
10. Set **curam.custom.externalaccess.implementation** to **curam.citizenworkspace.security.impl.CitizenWorkspacePublicAccessSecurity**.
11. **Publish** the property changes.
12. Log out and restart the server.

Disabling the Create Account screens

Configure the necessary properties to disable the screens for creating an account that Universal Access provides by default. Requirement 4 in the example requirements indicates that all account management functions are handled by the external system, CentralID, including the creation of a new account and performing a password reset.

Configure Universal Access to disable the screens that are related to account management:

1. Log in as sysadmin.
2. Select **Application Data** > **Property Administration**.
3. Select Category **Citizen Portal - Configuration**.
4. Set the property *curam.citizenworkspace.enable.account.creation* to **NO**.
5. **Publish** the property changes.

The previous steps remove references to **Account Creation** pages from Universal Access. The Login screen still contains a link to a page for changing passwords. In this example, the implementation team can use the following steps to retain the link but change it to open a new browser window on the CentralID password reset page:

1. Log in as sysadmin.
2. Select **Application Data** > **Property Administration**.
3. Select Category **Citizen Portal - Configuration**.
4. Set the property *curam.citizenworkspace.forgot.password.url* to , for example **http://www.centralid.gov/resetpassword**
5. **Publish** the property changes.

To completely remove the reset password link, use the following steps:

1. Log in as sysadmin.
2. Select **Application Data** > **Property Administration**.
3. Select Category **Citizen Portal - Configuration**.
4. Set the property *curam.citizenworkspace.display.forgot.password.link* to **NO**.
5. **Publish** the property changes.

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Redirecting users to register with an external system

Replace the message that is displayed in the log in page so that non-registered users are directed to the CentralID page for registration.

Universal Access invites users to log in with a log in message. You can replace the message so that the log in page displays a message that is similar to the following example:

```
"<p>If you are registered with CentralID enter your user name
   and password to log in. To register, go to
   <a href="http://www.centralid.gov/register"> The CentralID
   registration page.</a></p>"
```

The properties for controlling the login page message are in the *<CURAM_DIR>/EJBServer/components/Data_Manager/Initial_Data/blob/prop/Logon.properties* file.

Enabling users to log on immediately after registration with CentralID

Users should be able to log in as soon as they have registered with CentralID. Some configuration is required to prevent a delay in the propagation of a user's ID to other systems.

To function correctly, each user must have an entry in the ExternalUser table. The customer could build a batch process to import users from the LDAP directory into the ExternalUser table. However, requirement 7 in the example requirements would not be satisfied, which states that users must be able to register with CentralID, and then immediately use Universal Access. Another option would be to build a web service or similar mechanism that would be launched when a new user registers with CentralID. The implementation of the web service would create the appropriate entry in the ExternalUser table.

A simpler option is to override the default log-in behavior to create new accounts as needed, after the completion of checks to ensure that the relevant entry exists in the LDAP server. You can override the default log-in behavior in Universal Access by extending the `curam.citizenworkspace.security.impl.AuthenticateWithPasswordStrategy` class and overriding the `authenticate()` method. The following code outlines how to use

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the `AuthenticateWithPasswordStrategy` and other security APIs to meet the previous requirements:

```
public class CustomSecurityStrategy extends AuthenticateWithPasswordStrategy {
  @Inject
  private CitizenWorkspaceAccountManager cwAccountManager;
  ...
  @Override
  public String authenticate(final String username,
      final String password)
      throws AppException, InformationalException {
    final String retval = null;
    if (username.equals(PUBLIC_CITIZEN)) {
      return super.authenticate(username, password);
    }
    // Authenticate generated accounts as normal
    if (cwAccountManager.isGeneratedAccount(username)) {
      return super.authenticate(username, password);
    }
    // Check that the user exists in LDAP
    // This prevents hackers from registering many bogus
    // accounts that exist in Curam but not in LDAP
    if (!isUserInLDAP(username)) {
      return SECURITYSTATUS.BADUSER;
    }
    // If there's no account for this user
    if (!cwAccountManager.hasAccount(username)) {
      createUserAccount(username);
    }
    return SECURITYSTATUS.LOGIN;
  }
  private void createUserAccount(final String username)
      throws AppException, InformationalException {
    final CreateAccountDetails newAcctDetails;
    ...
    cwAccountManager.createStandardAccount(newAcctDetails);
  }
}
```

This code checks to see whether the user is logging in is a public citizen user or a generated account. In both cases, authentication logic is delegated to the default `AuthenticateWithPasswordStrategy` API. In the case of a registered user, the Strategy checks the LDAP directory to ensure that the user exists in the LDAP directory. If the user exists in the LDAP directory and does not exist yet in Universal Access, then a new user account is created. Note, the custom code does not need to authenticate the user against LDAP since the authentication is handled by the User Registry in WebSphere® or the LDAP JAAS Module in WebSphere®. It is important to note that the password parameter of the `authenticate()` method is passed in clear text.

To install the `CustomSecurityStrategy` class, it must be bound in place of the Default Security Strategy class. Use a Guice Module to bind the implementation:

```
public class CustomModule extends AbstractModule {
  @Override
  protected void configure() {
    binder().bind(SecurityStrategy.class).to(
      CustomSecurityStrategy.class);
  }
}
```

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You must configure the CustomModule at startup by adding a DMX file to the custom component as shown in the following example:

```
<CURAM_DIR>/EJBServer/custom/data/initial/MODULECLASSNAME.dmx

<?xml version="1.0" encoding="UTF-8"?>
<table name="MODULECLASSNAME">
    <column name="moduleClassName" type="text" />
    <row>
      <attribute name="moduleClassName">
        <value>gov.myorg.CustomModule</value>
      </attribute>
    </row>
</table>
```

6.5 User account types

Merative ™ Cúram Universal Access has different account types to support both anonymous and registered citizens. As citizens use Universal Access, their account type can change.

Merative ™ Cúram Universal Access has the following user types:

Public citizen account

When citizens view the organization **Home** page, they are automatically logged in under the *publiccitizen* account. This account has access only to the home page and the pages that allow citizens to enter or reset passwords.

Anonymous account

When the user clicks a link to start screening or applying for benefits, they are logged out as *publiccitizen* and logged back as an *anonymous* account with a random username. A principle of Universal Access is that users cannot access the data of other users. If all intakes and screenings used the same *publiccitizen* user account, a citizen might see data that was entered by another citizen.

Registered accounts

Registered accounts are standard accounts that are created by citizens. Citizens can create accounts when they first use the application, or during processes like applying for benefits. These accounts are different from anonymous accounts in that they allow citizens to continue previously saved applications, restart applications that were previously unfinished, and review or withdraw previously submitted applications.

Linked accounts

Linked accounts are accounts that are linked to a Concern Role ID for a Person entity. Organizations must implement their own linking functions. Universal Access APIs that allow a username to be linked to a Concern Role ID are available to support linking.

Citizens with linked accounts have access to detailed information about their benefits and cases by using their citizen account. Citizens with a linked account can submit life events such as getting married or losing their job. They also have access to information about benefit payments.

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Because of the sensitivity of this information, customers must ensure that they have a robust process for creating linked user accounts.

The following scenarios are examples. The actual processes for linking are unique to each organization.

- A citizen creates a user account in Universal Access and submits an intake application:
  - An organization can implement an online mechanism to link a registered account. Citizens can be asked in the online application if they want to upgrade their account for access to more services. If they consent, their registered account is automatically linked.
  - Citizens are contacted by their caseworker who asks them if they want access to more services. The citizen agrees and presents themselves at their local office with personal identification, such as a passport. The caseworker can then link the registered account that they used to submit their intake application.
- A citizen requests a citizen account and is asked to present themselves at their local Social Welfare office with personal identification, such as drivers license. After they verify the citizen's identity, the caseworker uses custom functions to enter details for the new linked account.

In none of these scenarios does a caseworker have access to a citizen's password. The linking process can automatically upgrade their account, or can trigger a batch job that sends the password by letter to the citizen's home address.

6.6 User account authorization

Whenever a request is made to a Universal Access API authorization controls are applied to ensure the citizen's data is secure. The authorization checks are invoked at 2 levels.

1. Role-based access control (RBAC)
2. API authorization checks

Role-based access control

RBAC as discussed in the section *Authorization Overview* in the *Cúram Security Guide*, ensures that users only call APIs that their role permits. When an RBAC check fails the API code is never executed.

Note: Due to the public availability of Universal Access web applications attempts to breach security will be more common. Before deploying to production a full review of all external users and user roles should be carried out to ensure that the roles assigned and the permissions they grant are correct. Redundant users and user roles should be removed and the remaining users, roles, and security groups should be tightly regulated.

API authorization checks

After the RBAC check for the API has been completed successfully the user request will be processed by the API. APIs must enforce a second-level authorization check. At this level, the individual user's permissions are checked (as opposed to their role permissions). By default, all product Web APIs have an authorization check. The typical check will ensure the data requested

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is associated with the currently logged-in user. Without this check a malicious user with the same security role could manipulate API parameters to return another user's data.

Customizing Web API authorization checks

The product APIs can be customized to change the authorization checks performed. If custom checks are introduced, responsibility for the security of the API passes from the product to the customizer.

Authorization for the citizen account

The product provides a Service Provider Interface that can be used to customize the product authorization checks. The interface is simple, allowing the implementor to provide an authorization check of any complexity.

The code is listed below (with Javadoc removed for brevity).

```
public interface AuthorisationStrategy {
  public void doAuthorisationCheck()
    throws AppException, InformationalException;
  public void doAuthorisationCheck(Object paramObj)
    throws AppException, InformationalException;
  public boolean disableDefaultAuthorisationChecks();
}
```

The authorization strategy interface allows the developer to define 3 actions:

1. Apply an authorization check to an API that received no parameters
2. Apply an authorization check to an API that received parameters
3. Disable the default product authorization checks. This is required if your custom authorization checks conflict with the default product checks

The custom strategy class is configured using Guice. For more information on working with Guice modules see the *Creating a Guice* module in the *Developing with Persistence Infrastructure Guice guide*.

Two configuration options are available.

1. **Application level**, where all APIs will implement the authorization check based on the application code. All external users are assigned an application code when their account is created. For example, a citizen is assigned the code CITWSAPP (citizen workspace app).
2. **API level**, where authorization checks are specific to an API. The configuration uses the fully qualified API *class.method* as the identifier. This value can be retrieved via the `TransactionInfo.getProgramName` API.

The configuration options described above give the developer full control over the authorization strategy. For example, where an authorized representative is logged in and representing another user, the authorization check can use the application code for the current user (representative) to look up a strategy that will check if they are assigned to the user (being represented) whose resources they are trying to access. If the `doAuthorisationCheck` call completes without throwing an exception, then the check has passed.

If parameters are passed to an API and are part of the authorization check, the parameterized version of `doAuthorisationCheck(Object paramObj)` must be used. The implementation

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can cast the object back to the correct type for the API that is being invoked. When this situation arises you must use the API level configuration described above.

Finally, custom checks will likely conflict with the default product checks. If this is the case implementing `disableDefaultAuthorisationChecks` to return true will turn off the default product checks. Depending on the configuration, this will turn off the check for a specific API or all APIs for users with the configured application code.

Warning: When API authorization is customized, particularly when the default authorization checks are disabled, it is strongly advised that penetration testing is performed on the application to ensure no vulnerabilities have been introduced. Customization of the authorization process transfers responsibility for the API security from the product to the customizer.

Example configuration of authorization strategy

The code listing below shows the configuration of the custom checks via the conventional "Module.java" file. Note the use of `AuthorisationStrategyByApplication` and `AuthorisationStrategyByFID`. Your service provider implementations must extend these interfaces.

```
class Module {
  @Override
  protected void configure() {
    ...
    bindAuthorisationImplementation();
    ...
  }
  /**
   * Bind custom authorization implementations
   */
  private void bindAuthorisationImplementation() {
    // Define a strategy that works based on the current users
    // application code.
    final MapBinder<String, AuthorisationStrategyByApplication>
      authorizationStrategyByApplicationBinder =
      MapBinder.newMapBinder(binder(), String.class,
        AuthorisationStrategyByApplication.class);

    authorizationStrategyByApplicationBinder
      .addBinding(APPLICATION_CODE.CITWSAPP)
      .to(MyCustomApplicationLevelAuthorisationCheckImpl.class);

    // Define a strategy that works based on the API that is curently
    // being invoked. FID refers to Function Identifier, which is the fully
    // qualified class.method string.
    final MapBinder<String, AuthorisationStrategyByFID>
      authorizationStrategyByFIDBinder =
        MapBinder.newMapBinder(binder(), String.class,
          AuthorisationStrategyByFID.class);

    authorizationStrategyByFIDBinder.addBinding(
     "curam.citizenworkspace.rest.facade.intf.PaymentMessageAPI.readPaymentMessages")
     .to(MyCustomAPILevelAuthorisationCheckImpl.class);
  }
```

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The code listing below shows an example implementation of an API-level authorization check

```
package curam.citizenworkspace.security.impl;
public class MyCustomAPILevelAuthorisationCheckImpl
  implements AuthorisationStrategyByFID {
  @Override
  public void doAuthorisationCheck(Object paramObj)
    throws AppException, InformationalException {

    UAPaymentMessageType pmtMsgType = (UAPaymentMessageType)paramObj;
    ExternalUserDetails externalUserDetails = null;

    try {
      final ExternalUserKey externalUserKey = new ExternalUserKey();
      externalUserKey.userKey.userName = TransactionInfo.getProgramUser();
      final ExternalUser externalUser =
        curam.core.sl.fact.ExternalUserFactory.newInstance();
      externalUserDetails = externalUser.read(externalUserKey);
    } catch (final Exception e) {
      // Handle exception
    }

    if (doCheck(externalUserDetails, pmtMsgType)) {
      // Authorised
      return;
    }

    throw RESTAPIERRORMESSAGESExceptionCreator.HTTP_403_FORBIDDEN();
  }

  @Override
  public boolean disableDefaultAuthorisationChecks() {
    return true;
  }

  private doCheck(ExternalUserDetails eud, UAPaymentMessageType pmtMsgType){
    // add whatever checks you need here.
  }
}
```

The code listing below shows an example of how the strategy is called from a product API.

```
public UAPaymentMessageList
  readPaymentMessages(final UAPaymentMessageType messageType)
  throws AppException, InformationalException {

  // Call to your custom strategy, if implemented.
  // Here the API has passed a param that will be relayed
  // to the custom check.
  authorisationController.doAuthorisation(messageType);

  // Disables the default checks if requested.
  if (!authorisationController.disableDefaultAuthorizationChecks()) {
    // perform security checks
    citizenAccountSecurity.performDefaultSecurityChecks();
  }

  // complete the API request.
  ...
}
```

Related concepts

Customizing the citizen account on page 316

Users can use the citizen account to log in to a secure area where users can screen and apply for programs.

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6.7 Customizing account creation and management

You can customize account creation and management.

Account management configurations

Use the following configuration properties to define the behavior of password validations for citizen accounts. For the Cúram Universal Access Responsive Web Application, you must implement these validations in the application before you enable them.

Table 3: Account configurations

Property	Description
`curam.citizenworkspace.username.min.length`	Minimum number of characters in the username.
`curam.citizenworkspace.username.max.length`	Maximum number of characters in the username.
`curam.citizenworkspace.password.min.length`	Minimum number of characters in the password.
`curam.citizenworkspace.password.max.length`	Maximum number of characters in the password.
`curam.citizenworkspace.password.min.special.chars`	Minimum number of special characters and/or numbers in the password.

To update these properties, log in as a System Administrator (sysadmin), select **Application Data** > **Property Administration**, and search for the property.

Account management events

Events are raised at key points during account processing. You can use these events to add custom validations to the account management process.

For more information about adding custom validations to the account management process, see the *Server Developer's Guide*.

The table shows the events in the `curam.citizenworkspace.security.impl.CitizenWorkspaceAccountEvents` class. For more information about the events, see the related Javadoc™ information in the WorkspaceServices component.

Table 4: Account events

Event Interface	Description
`CitizenWorkspaceCreateAccountEvents`	Events raised around account creation.
`CitizenWorkspacePasswordChangedEvent`	Event raised when a user is changing their password.
`CitizenWorkspaceAccountAssociations`	Events raised when a user is linked or unlinked from an associated Person Participant.

CitizenWorkspaceAccountManager API

Use the `curam.citizenworkspace.security.impl.CitizenWorkspaceAccountManager` API

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to create and link citizen accounts. You can use the API to build custom functionality to support caseworkers who want to create and link accounts on behalf of citizens.

The API offers the following methods:

- Creating standard accounts.
- Creating linked accounts.
- Removing links between participants and accounts.
- Retrieving account information.

For more information, see the API Javadoc™.

6.8 Data caching

Minimize the risk of citizens accessing each others' data from browser and server data caches. Cached data can be accessed when citizens use the browser back button or browser history to retrieve data entered by other users, or when PDF files are cached locally on the computer that was used to make the application.

Server caching

HTTP servers like Apache can set cache-control response headers to not store a cache. Use this approach to prevent access to data using the browser back button or history.

Browser caching

Browsers can be configured not to cache content. If citizens can access the web portal in a "kiosk", then the browser should be configured never to cache content.

Advise citizens to clear their cache and close all browser windows they have used when they are finished using the web portal. Also tell citizens to remove PDF documents that they download from the browser's temporary internet files.

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7 Configuring the Cúram Universal Access Responsive Web Application

System administrators can use the following configuration options to configure and maintain Universal Access with the Cúram Universal Access Responsive Web Application features such as screening, applications, updates with life events, appeals, and verifications.

7.1 Configuring the browser

Users are notified when cookies or JavaScript™ are disabled in their browser. To use the application, they must enable both cookies and JavaScript™ in their browser by configuring the appropriate browser preferences.

Cookies and JavaScript

The following information messages are displayed if cookies or JavaScript™ are disabled:

- **Cookies are disabled in your browser**
  To use this service, you must enable cookies in your browser settings and try again. For instructions to enable cookies, check your browser support website.
- **JavaScript™ is disabled in your browser**
  To use this service, you must enable cookies in your browser settings and try again. For instructions to enable JavaScript™, check your browser support website.

Because JavaScript™ is not available, the JavaScript™ messages are implemented in a static file, instead of the standard message implementation. Updating the text or styling of these messages is different than the standard process.

- For more information about translating these messages, see Translating the multilingual messages for when JavaScript is disabled on page 134.
- For more information about styling these messages, see Customizing the color and typography of the application on page 138.

7.2 Configuring service areas

You can define a service area by configuring the counties or ZIP codes that are associated with the service area.

Configuring service areas

You define service areas in the **Service Areas** section of the administration application. You must specify a name for a service area. You can associate counties and ZIP codes of the areas that are covered with the service area. Service areas can be associated with a local office, which identifies where citizens can apply in person for a program or where they can send an application. For more

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information about associating service areas with local offices, see Defining local offices for a program on page 229.

Enabling citizens to search for a local office

A search page allows citizens to search for a local office. Citizens can either search by county or by ZIP code. The curam.citizenworkspace.page.location.search.type system property determines how the search works.

- If you set the property to **Zip**, citizens can search for a local office using a ZIP code.
- If you set the property to **County**, citizens can select from a list of counties to get a list of local offices.

7.3 Configuring PDFs

PDF format is supported for three use cases in the Merative ™ Cúram Universal Access Responsive Web Application. Citizens can download PDF application forms for offline applications, a PDF summary of information that a citizen enters is automatically generated when citizens submit an application, and a PDF can be created to capture an appeal request.

PDF forms for offline applications

Citizens can download PDF application forms to view or apply offline. You can configure a PDF application form to be available from specific program applications. You can also configure application forms to be available from the screening results page when citizens are found to be eligible for a program. To configure a PDF application form, you must:

- Define a PDF application form, see Defining PDF forms on page 223.
- To specify a PDF application form for program application, see Specifying a PDF application form for program applications on page 223.
- To specify a PDF application form to be available for programs from screening results, see Specifying a PDF application form for screening results on page 224.

PDF summary

By default, a generic PDF summary is generated for all Cúram intake applications. Citizens can download the PDF to see a summary of the information that they entered in their application. The PDF summary is generated from a generic XSL template by using the Cúram XML infrastructure.

Customizing the generic XSL template for the PDF summary

You can configure your system to use an improved XSL template that is based on the summary page in IEG scripts. If needed, you can customize the XSL template for the PDF summary. For more information about customizing the generic PDF summary form, see Customizing the generic PDF summary form for processed applications on page 266.

Configuring a PDF application form template for the PDF summary

You can configure a PDF application form to be used as a template for the summary PDF form instead of the generic XSL template. The application form is populated with information that

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is entered by the citizen. That is, the citizen's information is copied from the data store to the PDF application form according to the data mapping. To configure the PDF application form as a template, you must:

- Define a PDF application form, see Defining PDF forms on page 223.
- Specify a PDF application form for an application, see Specifying a PDF application form for program applications on page 223.
- Define PDF summary mappings for a program, Defining PDF summary mappings for a program on page 224.

PDF forms for appeal requests

Typically, the details that citizens provide in an appeal request are added to a PDF, both the citizen and the caseworker receive a copy. For more information about configuring a PDF for appeal requests, see Configuring appeal requests on page 255.

Related concepts

Defining local offices for a program on page 229
Citizens might be able to apply for a program in person at a local office. You can configure local offices where an application for a program can be sent.

Defining PDF forms

You can define PDF application forms that you can then associate with applications or programs.

Define a PDF form by selecting **Administration Workspace** > **Shortcuts** > **Universal Access** > **PDF Forms**.

You must specify a name and language for each PDF form. You can also add a version of the form for each language that is configured in your application.

You can associate a local office with a PDF form, which enables administrators to define the local office and associated service areas where citizens can send their completed application.

Specifying a PDF application form for program applications

You can specify a PDF application form that citizens can download to view or apply for a program offline.

You must define PDF application forms before you can associate them with a program application, see Defining PDF forms on page 223.

Specify a PDF form for an online application by selecting the PDF form from the list at **Administration Workspace** > **Shortcuts** > **Universal Access** > **Applications** > **Online Application** > **Edit** > **PDF Application Form**

Citizens can then see a **Download application** link for the application, see Start an application on page 34.

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Specifying a PDF application form for screening results

You can configure PDF application forms to be available for citizens to download from their screening results to view or apply offline. They can post it to the agency or bring it to a local office.

You must define PDF forms before you can associate them with a program, see Defining PDF forms on page 223.

When **PDF Application Form** is specified for a program, a **Download application** link is displayed for eligible programs on the **Here's what you might get** page when citizens complete a screening, see The **Here's what you might get** screening results page on page 31.

Defining PDF summary mappings for a program

Information that citizens enter during all online intake applications is mapped to a PDF summary form that citizens can print. By default, this PDF summary is based on an XSL template, but you can configure a PDF application form to be used as a template for the PDF summary instead.

To generate the PDF summary based on the PDF application form, you must configure a mapping configuration of type **PDF Form Creation** for that program. The data is mapped to the application form that is specified for the online application that the program is associated with.

If a PDF mapping configuration is not associated with a program, the default generic XSL template is used.

Complete the following steps as an administrator:

1. Select **Administration Workspace** > **Shortcuts** > **Universal Access** > **Programs**.
2. Select a program then select **Mappings** > **New Mapping**.
3. Add the configuration XML and a mapping configuration of type **PDF Form Creation**.
4. Define a PDF form, see Defining PDF forms on page 223.
5. Specify a PDF form for an online application, see Specifying a PDF application form for program applications on page 223.

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7.4 Configuring programs

You can configure different types of programs, with settings for display and system processing information, local offices, mappings to PDFs, and evidence types. You can associate programs with screenings and benefit applications.

Configuring a program

You can configure program details and associated display and system processing information on the **New Program** page in the administration application.

Defining a name and reference

The name that you define is displayed in the administration application.

Define a name and reference when creating a new program. The name that is defined is displayed both to the citizen and in the internal application. The reference is used to reference the program in code.

Defining an intake processing system

Define an intake processing system for each program.

Two options are available:

- **Cúram**
- Select from the list of preconfigured remote systems.

If intake is managed by Cúram, select **Cúram**. If intake is managed by an external system, the program application is sent to the remote system by using the `ProcessApplicationService` web service, select a remote system.

If **Cúram** is specified as the intake system, an application case type must be selected. An application case of the specified type is created in response to a submission of an application for the program. An indicator is provided which dictates whether a **Reopen** action is enabled on the programs list on an application case for denied and withdrawn programs of a particular type. A workflow can be specified that is initiated when the program is reopened.

For more information about configuring application cases, see the *Intake Guide*.

When an application case type is selected, the program can be added manually to that type of application case by a worker in the internal application as part of intake processing. A configuration setting specifies whether the program is a coverage type. Coverage types are automatically evaluated by program group rules in the context of healthcare reform applications, such as insurance affordability. Coverage types cannot be applied for directly by a citizen or manually added to an application case by a worker and authorized. If the program is a coverage type, select **Yes**. The program is filtered out of the list of programs available to be added to online and internal applications in administration and the list of programs available to be manually added to an application case by a worker. If the program is not a coverage type, select **No**. The program will be available to be manually added to online and internal applications in administration and to an application case by a worker.

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A remote system must be configured in the administration application before it can be selected as the case processing system.

For more information about remote systems, see *Configuring Remote Systems.*

Defining case processing details

Define a case processing system for each program.

Two options are available:

- **Cúram**
- Select from remote systems.

If the program eligibility is determined and managed by using a Cúram-based system, select **Cúram**. If eligibility is determined and managed by an external system, select a remote system.

If you select **Cúram** as the case processing system, more options are available to allow you to configure program level authorization. Program level authorization means that if an application case contains multiple programs, each program can be authorized individually, and a separate case is used to manage the citizens on an ongoing basis.

Defining the integrated case strategy

Define the integrated case strategy so that the system can identify whether a new or existing integrated case is used when program authorization is successful.

The integrated case strategy identifies whether a new or existing integrated case is used when program authorization is successful. The integrated case hosts any product deliveries created as a result of the authorization. If a new integrated case is created, all of the application case clients are added as case participants to the integrated case. If an existing integrated case is used, any additional clients on the application case are added as case participants to the integrated case. Any evidence captured on the application case that is also required on the integrated case is copied to the integrated case upon successful authorization. The configuration options for the integrated case strategy are as follows:

- **New**
  A new integrated case of the specified type is always created when authorization of the program is successful.
- **Existing (Exact Client Match)**
  If an integrated case of the specified type exists with the same citizens as those cases present on the application case, the existing case is used automatically. If multiple integrated cases that meet these criteria exist, the caseworker is presented with a list of the cases and must select one to proceed with the authorization. If no existing cases match the criteria, a new integrated case is created.
- **Existing (Exact Client Match) or New**
  If one or more integrated cases of the specified type exist with the same citizens as those cases present on the application case, the caseworker is presented with the option to select an existing case to use as the ongoing case, or to create a new integrated case. If no existing cases match the criteria, a new integrated case is created.
- **Existing (Any Client Match) or New**
  If one or more integrated cases of the specified type exist, where any of the clients of the application case are case participants, the caseworker is presented with the option to select

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one of the existing cases to use as the ongoing case, or to create a new integrated case. If no existing cases match the criteria, a new integrated case is created.

- **Specifying the Integrated Case Type**
  The administrator must specify the type of integrated case to be created or used upon successful program authorization as defined by the Integrated Case strategy listed.

Specifying a client selection strategy

Specify a client selection strategy to define how clients are added from the application case to the product delivery.

The client selection strategy defines how clients are added from the application case to the product delivery created as a result of authorization of a program. If a product delivery type is specified, a client selection strategy must be selected. The configuration options are as follows:

- **All Clients**
  All of the application clients are added to the product delivery case. The application case primary client is set as the product delivery primary client. All other clients are added to the product delivery as members of the case members group.
- **Rules**
  A rule set determines the clients to be added to the product delivery if a product delivery is configured. At least one client must be determined by the rules for authorization to proceed.
- **User Selection**
  The user selects the clients who are added to the product delivery. The caseworker must select both the primary client and any other clients to be added to the case member group on the product delivery.
- **Specifying a Client Selection Ruleset**
  A Client Selection Ruleset must be selected when the Client Selection Strategy is **Rules**.

Specifying a product delivery type

Specify a product delivery type.

The **Product Delivery Type** drop-down specifies the product delivery that is used to make a payment to citizens in respect of a program. **Product Delivery Type** displays all active products configured on the system.

> **Note:** This field applies to both program and application authorization processing. That is, program and application authorization can result in the creation of the product delivery type that is specified.

Submitting a product delivery automatically

The **Submit Product Delivery** indicator specifies if the product delivery created as a result of program authorization should be submitted automatically for approval. If selected, the product delivery created as a result of authorization of this program is submitted automatically to a supervisor for approval.

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Note: This field applies to both program and application authorization processing. That is, program and application authorization can result in the automatic submission of a product delivery.

Configuring timers

Agencies can impose time limits within which an application for a program must be processed. You can configure application timers for each of these programs.

For example, an agency might want to specify that food assistance applications are authorized within 30 business days of the date of application.

The following configuration options are available, including the duration of the timer, whether the timer is based on business or calendar days, a warning period, and timer extension and approval.

- **Duration**
  The length of the timer in days. This value, along with the fields **Start Date** and **Use Business Days** (and the configured business hours for the organization) calculate the expiry date for the timer. This value is used as a number of business days if **Use Business Days** is set. If **Use Business Days** is not set, this value is used as calendar days.
- **Start Date**
  Specifies whether the timer starts on the application date or the program addition date. The options available are **Application Date** and **Program Addition Date**.

  Note: In most cases, these dates are the same. That is, the programs are added at the same time as the application is made. However, when a program is added later to the application, after initial submission, the dates differ.
- **Warning Days**
  Specifies a number of warning days to warn citizens that the timer deadline is approaching. If configured, the **Warning Reached** workflow is enabled when the warning date is reached and the timer is still running (for example, the program is not completed).
- **End Date Extension Allowed**
  Specifies whether citizens can extend the timer by a number of days.
- **Extension Approval Required**
  Specifies whether a timer extension requires approval from a supervisor. If approval is required, the supervisor either approves or rejects the extension. After the extension is approved, or if approval is not required, the timer expiry date is updated to reflect the extension.
- **Use Business Days**
  Specifies if the timer should not decrement on non-working days. If this indicator is set, the system uses the **Working Pattern Hours** for the organization to determine the non-working days when it is calculating the expiry date for the timer.
- **Resume Timer**
  Specifies whether the program timer must be resumed when the program is reopened.
- **Resume From**
  If a timer is resumed, the **Resume From** field specifies the dates from which a program can be resumed. The values include the date that the program was completed, denied, or withdrawn, and the date that the program was reopened.

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- **Timer Start**
  Specifies a workflow that is started when the timer starts.
- **Warning Reached**
  Specifies a workflow that is started when the warning period is reached.
- **Deadline Not Achieved**
  Specifies a workflow that is enacted if the timer deadline is not achieved; that is, the program is not being withdrawn, denied, or approved by the timer expiry date.

Configuring multiple applications

Configure multiple applications so that citizens can apply for a program while they have a previous application pending.

The **Multiple Applications** indicator dictates if citizens can apply for a program while they have a previous application pending. If set to true, citizens can have multiple pending applications for the given program. That is, citizens can submit an application for this program while they already have a pending application in the system. If it is set to false, this program is not offered if logged in citizens have pending applications for this program.

This configuration is not applicable to Health Care Reform Applications.

Defining a URL

If a URL is defined, a **More Info** link is displayed with the program name so that citizens can find out more information about the selected program.

Defining description and summary information

When a program is displayed on the **Select Programs** page, a description can be displayed which gives a description of the program. The **Online Program Description** field defines this description.

A description summary of the program can also be defined using the **Online Program Summary** field. The field is a high-level description of the program displayed on the **Here's what you might get** page that is displayed when citizens complete a screening.

Defining local office application details

Citizens can apply for programs at a local office. If this is the case, the **Citizen Can Apply At Local Office** indicator indicates that local office information is displayed for a program.

Additional information can also be defined, for example, citizens might need to bring proof of identity if they want to apply at the local office. An administrator can define this information in the **Local Office Application Information** field.

Defining local offices for a program

Citizens might be able to apply for a program in person at a local office. You can configure local offices where an application for a program can be sent.

Associating a local office with a program allows an administrator to define the local offices and their associated service areas where a particular program can be applied for in person. This information is displayed on the **Here's what you might get** page that is displayed to citizens when they complete a screening.

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A local office must be first be defined in the *LocalOffice* code table in system administration. Service areas must be defined before they can be associated with a local office.

Defining program evidence types

You can configure selected evidence types to allow the expedited authorization of programs before other programs in a multi-program application. You can then associate these evidence types with a program.

Evidence types can support applications for multiple programs. You might need a program to be authorized more quickly than other programs for which a citizen applied. You can specify that the evidence that is needed for a specific program to be authorized only is used and copied to the ongoing cases. Benefits for the authorized program can be delivered to citizens, while the caseworker continues to gather the evidence that is needed for the other programs.

7.5 Configuring screenings

Define the different types of screenings that citizens can complete to identify programs that they might be eligible to receive.

For each screening, you can configure the available programs and eligibility requirements. You can then configure the script, rules, and data schema to collect and process citizen information, and define what information is displayed to citizens.

Once defined, citizens can self screen to identify programs that they may be eligible to receive. There are four main aspects to configuring a screening:

- Configuring the information about a screening to be displayed to citizens.
- Configuring the script, rules and schema used to collect and process the information specified by citizens to identify their eligibility.
- Configuring the programs for which citizens can screen themselves for eligibility.
- Configuring additional screening system properties.

Related concepts

Screen on page 27
Citizens can self-check their eligibility for benefits and services before they submit an application. Checking for eligibility is implemented by using the Screening feature.

Customizing screenings on page 259
Use the supported classes and APIs to customize the events that are started for screenings and the screening results page.

Configuring a new screening

Screenings are configured on the **New Screening** page.

The screening configurations are as follows.

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Defining a name

You must define a name must be defined when creating a screening. The name defined is the name of the screening displayed to citizens in the Merative ™ Cúram Universal Access portal.

Defining program selection

The **Program Selection** indicator defines whether citizens can select specific programs that they want to screen for, or whether they are brought directly into a screening script. If citizens are brought to a script, they are screened for all programs associated with the screening.

Defining a More Info URL

If a More Info URL is defined, a **More Info** link is displayed.

Allowing re-screening

The **Allow Rescreening** indicator defines whether citizens can re-screen when they have completed a screening.

Defining an icon for a screening

If you want an icon displayed with a screening, select an icon from the **Icon** selection box.

Note: Alternatively, you could modify the `img src` attribute of the icon directly on the screening HTML page, for example

```
<img src="camera.gif" alt="Camera">
```

Configuring eligibility and screening details

Configure details for eligibility screening or filtered screening

Two types of screening are supported - filtered screening and eligibility screening. Eligibility screening collects answers to a set of questions, stores this information and processes it to identify eligibility. Filtered screening reduces the number of programs that a citizen might screen for by asking a short set of questions and using the answers to filter out the programs that they would not be eligible for.

Configuring eligibility screening details

Specify an IEG script for the screening to collect the answers to a set of questions. You must also specify a data store schema to store the data entered in the script. On saving the screening, the system creates an empty template for both the script and schema based on the Question Script and schema that you specified. You can update these templates from the **Screening** tab by selecting hyperlinks provided on the page. Clicking the **Question Script** link starts the IEG editor that allows you to edit the question script. Click the schema link to start the Datastore Editor, you can then edit the schema.

You must specify a CER rule set to process the data in the data store and to produce an eligibility result. When specified on creation of the screening, the system creates an empty rules template.

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You can then update the ruleset from the **Screenings** tab by selecting the hyperlink provided on the page. Clicking the link starts the CER Editor, which allows you to edit the ruleset. For more information about writing screening rule sets, see Writing Rule Sets For Screening on page 234

Configuring filtered screening details

Specify filtered screening details for a screening so that filtered screening is available before citizens perform eligibility screening. As with eligibility screening, you must define a Filter Script (IEG) and associated data store schema to collect and store the answers to questions. You must also specify a Filter Rules (CER rule set) to process the data and produce a filtered screening result. When specified on the **New Online Screening** page, the system automatically creates an empty template for the scripts and ruleset that can be subsequently updated by selecting the associated hyperlinks on the **Screening** page.

Reusing rule sets across screenings

Use the system property *curam.citizenworkspace.screening.ruleset.reuse.enabled* to specify:

- Whether CER rule sets can be reused across different screenings.
- Whether the same rule set can be used for eligibility and filtered screening.

If *curam.citizenworkspace.screening.ruleset.reuse.enabled* is enabled, you cannot reuse rule sets, if it is disabled you can reuse rule sets. You cannot use the *ScreeningRulesLinkDAO.readActiveByRuleSet* method when *curam.citizenworkspace.screening.ruleset.reuse.enabled* property is enabled.

Configuring screening display information

You can configure the screening information display fields for each screening.

Summary information

Define a high-level description of the screening.

Here's what you might get text

Define the text to be displayed on the **Here's what you might get** page, which is displayed to show citizens the results of a completed screening.

Description

Define a description of the screening to be displayed.

How to apply text

Allows an administrator to define the text displayed on the **Here's what you might get** page.

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Defining programs for a screening

You must associate programs with a screening so that citizens can screen for those programs.

You can associate any program that is described in *Configuring Programs* with a screening. When associating programs with a screening, you can assign an order that sets the display order of the selected program relative to other programs associated with the screening.

Related concepts

Configuring programs on page 225
You can configure different types of programs, with settings for display and system processing information, local offices, mappings to PDFs, and evidence types. You can associate programs with screenings and benefit applications.

The screening auto-save property

Use the screening curam.citizenworkspace.auto.save.screening property to set whether screenings are automatically saved for authenticated citizens.

By default, curam.citizenworkspace.auto.save.screening is set to true. All screenings, irrespective of type, are automatically saved for authenticated citizens. Each screening is automatically saved when citizens click **Next** to progress through an IEG script. If curam.citizenworkspace.auto.save.screening is set to false, screenings are not automatically saved.

Configuring rescreening

Configure whether citizens can change and resubmit their screenings.

About this task

In the administration application, you can configure whether to allow citizens to change and re-submit their screening. If so, citizens can rescreen from the **Check what you might get** page or from the **Here's what you might get** page. If not, citizens who want to rescreen must delete their screenings and start again.

Procedure

1. Log in to Cúram as an administrator.
2. Select **Administration Workspace** > **Shortcuts**.
3. Select **Universal Access** > **Screenings**.
4. Select the screening that you want to change.
5. Select **...** > **Edit**.
6. Select the **Allow Rescreening** checkbox to enable rescreening and click **Save**.

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Prepopulating the screening script

When citizens screen from a citizen account, you can prepopulate information that is already known about the citizen who is screening.

You must configure prepopulation for screening. For more information, see how this configuration is done for life events, Pre-populating a life event on page 275 and Driving updates from life events on page 281.

Use the system property curam.citizenaccount.prepopulate.screening to set whether the IEG script is prepopulated. The default value of this property is true, which means that the script is prepopulated with information that is already known about the citizen.

Related concepts

Authenticated screening on page 29
Citizens who are logged in to Universal Access can complete an authenticated screening.

Resetting data captured from a previous screening

Determine whether starting an intake application resets data captured by a previously completed screening.

Determines whether starting an intake application resets datastore data captured by a previously completed screening

Use the system property curam.citizenworkspace.intake.resets.screening.results to determine whether starting an intake application resets datastore data that was captured by a previously completed screening.

Setting curam.citizenworkspace.intake.resets.screening.results to true means that starting an intake application resets datastore data captured by a previously completed screening.

Setting curam.citizenworkspace.intake.resets.screening.results to false means that starting an intake application does not reset datastore data captured by a previously completed screening.

Writing Rule Sets For Screening

Develop screening rule sets.

Addin a data store schema

Create a new data store schema for use with screening and intake intelligent evidence gathering (IEG) scripts. However, some constraints exist on the format of these schemas. In some cases, requirements dictate that citizens can screen for a program and then follow that screening by applying for benefits.

In many cases, applications are processed by Cúram and are mapped to Cúram cases and evidence by using the Cúram Data Mapping Engine (CDME). In these circumstances, use `CitizenPortal.xsd` as a basis for the schema for screening. This process is used because the same data store schema also needs to be used for intake. In particular, the CDME features do not work correctly if a schema is used that removes or changes the data type of any of the attributes or entities in the `CitizenPortal.xsd` schema.

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All schema that follows the pattern of the *CitizenPortal.xsd* schema are safe for later releases. This assurance means that upgrades do not add any new mandatory attributes or entities. Upgrades do not change any existing attributes or entities that currently are required to support existing Cúram data mapping engine functions.

The screening rules interface

All screening rule sets must use the screening rules interface so that they can be executed within Merative ™ Cúram Universal Access.

The ruleset interface is detailed in the following XML example:

```
<?xml version="1.0" encoding="UTF-8"?>

<RuleSet xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
   xsi:noNamespaceSchemaLocation="http://www.curamsoftware.com/
   CreoleRulesSchema.xsd"
   name="ScreeningInterfaceRuleSet">

   <!-- This class must be extended by all rule sets invoked by
     the Citizen Portal screening results processing. -->
  <Class name="AbstractScreeningResult" abstract="true">

    <Initialization>
      <Attribute name="calculationDate">
        <type>
          <javaclass name="curam.util.type.Date"/>
        </type>
      </Attribute>
    </Initialization>

    <!-- The programs supported by this Screening Ruleset. -->
    <Attribute name="programs">
      <type>
        <javaclass name="List">
          <ruleclass name="AbstractProgram"/>
        </javaclass>
      </type>

      <derivation>
        <!-- Subclasses of AbstractScreeningResult must override
          this attribute to create a list of the Programs
          supported by the rule set. -->
        <abstract/>
      </derivation>
    </Attribute>

  </Class>

  <!-- This class must be extended by all programs supported
    in the rule set. -->
  <Class name="AbstractProgram" abstract="true">

    <!-- Identifies the program as configured in the Citizen
      Portal administration application. -->
    <Attribute name="programTypeReference">
      <type>
        <javaclass name="String"/>
```

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```
      </type>
      <derivation>
        <abstract/>
      </derivation>
    </Attribute>

    <!-- Whether the claimant is eligible for this program. -->
    <Attribute name="eligible">
      <type>
        <javaclass name="Boolean"/>
      </type>
      <derivation>
        <abstract/>
      </derivation>
    </Attribute>

    <!-- The localizable explanation as to why the claimant is
        or is not eligible for this program.  May contain HTML
        formatting/hyperlinks/etc. -->
    <Attribute name="explanation">
      <type>
        <javaclass name="curam.creole.value.Message"/>
      </type>
      <derivation>
        <abstract/>
      </derivation>
    </Attribute>
  </Class>

</RuleSet>
```

Screening rule sets must include a class that extends the `AbstractScreeningResult` rule class outlined .

Using the `AbstractScreeningResult` rule class guarantees that the required attributes are available when the rules are executed.

7.6 Configuring applications

Use Cúram administration and system administration applications to define the applications that are available for citizens. For each application, you can configure the available programs and an application script and data schema. You must also configure the remaining applications details, such as application withdrawal reasons.

Related concepts

Apply on page 33

Citizens can apply for benefits online by submitting an application form that includes personal details like income, expenses, employment, and education. This information becomes evidence on the citizen's case that agencies can use to determine their eligibility for benefits. Citizens can also apply offline by downloading the application form to send to the agency or to bring to their local agency office.

Customizing applications on page 260

You can customize the application flow to link directly to an application script, or to provide separate overview pages or submission confirmation pages for each application type. You

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can also use customization points, for example, customizing the generic PDF for processed applications, to customize the application intake process when an intake application is submitted.

Configuring applications in the administration application

Use the Cúram administration application to configure an online application.

Procedure

1. Log in to Cúram as an administrator.
2. Select **Administration Workspace** > **Shortcuts** > **Universal Access** > **Applications**.
3. Click **New**. The **New Online Application** page opens.
4. Enter the required information. For more information, see Configuring application information and display information on page 237, Configuring scripts on page 238, , and Defining PDF forms on page 223.

Configuring application information and display information

Configure the following information on the **New Online Application** page.

- **Name**
  The name of the application that is displayed in the online portal.
- **Program selection**
  Indicates whether citizens can select specific programs to apply for or whether they are brought directly into an application script. That is, citizens can apply for all programs associated with the application.
- **More Info URL**
  If a URL is defined, a **More Info** link is displayed with the application name so that citizens can find out more information about the selected application.
- **Client registration**
  Determines whether citizens are registered as prospect persons or persons.

  To determine whether to register citizens as prospect persons or persons, the system checks the client registration configuration in the following two scenarios:

  - If **Person Search and Match** is configured, and no match can be found for the citizen.
  - If **Person Search and Match** is not configured, that is, citizens on an application are always registered without the system automatically searching and matching them.

  If **Client Registration** is not set, the system checks the system property curam.intake.registerAsProspect to identify whether citizens are registered as a prospect person or a person.
- **Submit on Completion Only**

  Determines whether citizens can submit the application to the agency before completing the intake script.
- **Defining an icon for an application**
  If you want an icon displayed with an application, select an icon from the **Icon** selection box.

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Note: Alternatively, you could modify the `img src` attribute of the icon directly on the application HTML page, for example

```
<img src="camera.gif" alt="Camera">
```

- **Summary**
  A high-level description of the application.
- **Description**
  An overview description of the application.
- **Submission Confirmation Page Details**
  A more detailed description of the application. Use the **Title** and **Text** fields to define a title and text to be displayed on the **Submission Confirmation** page.

Configuring scripts

Configure an IEG application script to collect the answers to the application questions and configure a submission script for an application so that citizens can submit applications.

- **Application scripts**
  Specify a script name in the **Question Script** field. Specify a data store schema in the **Schema** field to store the data entered in the script. On saving the application, an empty template for both the script and schema is created by the system based on the question script and schema specified. You can update these templates from the **Application** tab by selecting the hyperlinks provided on the page. Click the **Question Script** link to start the IEG editor so you can edit the question script. Click the **Schema** link to start the Datastore Editor and edit the schema.
- **Submission scripts**
  Configure an IEG submission script in the **Submission Script**. The script defines additional information that does not form part of the application script to be captured, for example, a TANF typically requires information regarding the citizen's ability to attend an interview.

  On saving the application, an empty template for the submission script is created by the system based on the Submission Script that you specify. You can update this from the **Application** tab by selecting the hyperlink on the page. Clicking the link starts the IEG editor that you use to edit the question script.

Configuring application properties

Use the system administration application to configure Cúram application properties for online applications.

About this task

You can configure the following properties for your organization.

- Mandate citizen authentication before they can apply.

  If you set the curam.citizenworkspace.authenticated.intake property to **YES**, citizens must create an account or log in before they start an application. Citizens are brought to the following components:

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- The **Apply for benefits** page.
- The login page when citizens select **Apply**.

If set to **NO**, citizens go directly to the application selection page.

- Set optional authenticated application.

  If you set the curam.citizenworkspace.intake.allow.login property, citizens can choose to log in before they submit an application. If not, citizens go directly to the application submission script.
- Display a confirmation page to citizens when they quit the application.

  If you set the curam.citizenworkspace.display.confirm.quit.intake property to **YES**, a confirmation page is displayed when citizens quit during the application process. If set to **NO**, a confirmation page is not displayed.

  Use this property only when the curam.citizenworkspace.intake.allow.login property is set to **NO**.
- Allow citizens to start an application from the organization **Home** page.

  If you set the curam.citizenworkspace.intake.enabled property to **YES**, the **Apply For Benefits** link is displayed on the organization **Home** page. If set to **NO**, the link is not displayed.
- Preepopulate scripts with known information about authenticated citizens. You must configure prepopulation for intake. For more information, see how this configuration is done for life events, Pre-populating a life event on page 275 and Driving updates from life events on page 281.

  If you set the curam.citizenaccount.prepopulate.intake property property to TRUE, the application is prepopulated with information that is already known about authenticated citizens. By default, this property is set to true so scripts are prepopulated. If not, the script is not prepopulated.
- Automatically save applications in the citizen account.

  If you set the `Auto-save intake` property to true, applications are automatically saved in the citizen account. Each application is auto-saved when citizens click Next as they progress through the IEG script. By default, this property is set to true. If set to false, applications are not automatically saved.

Procedure

1. Log in to Cúram as a system administrator.
2. Select **System Configurations** > **Shortcuts** > **Application Data**.
3. Enter the name of the application property that you want to configure in the **Name** field and select **Search**.
4. Select **...** > **Edit Value**.
5. Change the property setting, for example change **YES** to **NO** and **Save** your changes.

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Configuring other application settings

You can associate programs with an application, define mappings for an application, and configure withdrawal reasons.

- **Associating programs with applications**
  Programs can be associated with an application. You can set the display order of the selected program relative to other programs that are associated with the application. For more information, see 7.4 Configuring programs on page 225.
- **Defining evidence mappings for an application**
  Applications can be processed by Cúram or a remote system.

  If the application is processed by Cúram, the entered information is mapped to the evidence tables that are associated with the application case that is defined for the programs that are associated with the application. The mappings are configured for an application by creating a mapping with the Data Mapping Editor. A mapping configuration must be specified in order for the appropriate evidence entities to be created and populated in response to an online application submission.

  For more information about the Data Mapping Editor, see the *Data Mapping Editor Guide*.
- **Configuring withdrawal reasons**
  Citizens can withdraw the application for all or any one of the programs for which they applied.

  When they withdraw an application, citizens must specify a withdrawal reason. You can define withdrawal reasons for an application in the **Intake Application** section of the administration application. Before you associate a withdrawal reason with an application, you must define withdrawal reasons in the WithdrawalRequestReason code table.

  For more information, see the *Intake Configuration Guide*.

Related concepts

Configuring programs on page 225
You can configure different types of programs, with settings for display and system processing information, local offices, mappings to PDFs, and evidence types. You can associate programs with screenings and benefit applications.

7.7 Configuring online categories

Online categories group different types of applications or screenings together to make it easier for citizens to find the ones that they need. You must define online categories for screenings and applications to be displayed. After you define online categories, you must associate each screening and application to a category.

Defining online categories

When defining an online category a name and URL must be defined. If a URL is defined a **More Info** link is displayed with the name of the online category allowing citizens to find out more information about the selected category. An order can be assigned to a category which dictates the display order of the selected category relative to other categories.

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Associating screenings and applications

Applications and screenings must be associated with an online category so they can be displayed in the application. When associating a screening with an online category, an order can be applied which dictates the display order of the screening relative to other screenings within the same category. When associating an application with an online category an order can be applied which dictates the display order of the application relative to other applications within the same category.

7.8 Configuring life events

For each life event, you must define how information is collected, stored, and displayed. You can configure life event information categories, mappings to dynamic evidence, and information sharing with internal and external sources.

Life events are displayed in the citizen account to allow citizens to submit information to the agency. Life events can also provide citizens with useful information and resources. Life events can be made available in other channels. For example, they can be submitted online by an agency worker in the internal application. Configuration settings allow different information to be displayed depending on where the life event is initiated from. For example, the **Having a Baby** life event question script that is displayed to citizens can be different from the **Having a Baby** life event question script that is displayed to an agency worker.

Related concepts

Update on page 52
Citizens can update their details by submitting a change in their circumstances to the agency, which is implemented by using the Life Events feature. Examples of changes in circumstances include a change of address, a birth, or marriage. These significant events in citizens' lives might affect the benefits or services that they are receiving or are due to receive.

Customizing life events on page 271
A description of the high-level architecture of life events and how to perform the analysis and development tasks in building a life event.

Configuring a life event

You can configure a life event in the administration application on the **New Life Event** page.

Defining a name

Specify a name that uniquely identifies the life event. This name is only displayed in the administration application. You must specify a schema if the life event enables citizens to submit information to the agency. The schema defines where the information submitted by a citizen or user in the life event script is stored.

For more information, see the *Working with Intelligent Evidence Gathering (IEG) Guide*.

Defining a channel type

The channel type defines the channel in which a life event is used, for example, 'Online' or 'Internal'.

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Defining a display name

The display name represents the name of the life event that appears citizens or agency workers. For example, a change of job life event might be displayed as **Lost My Job** to citizens but **Client Loses Job** to caseworkers.

Displaying question and answer scripts

Question script is the name of the life event script. Answer script gathers answers to life event questions.

Defining a schema

The name of the data store schema used by the life event script to capture data. Select a schema from the **Schema** menu.

Defining the display ruleset

Define the ruleset that determines which recommendations are displayed to citizens when a life event is submitted.

Enabling citizen consent

For certain life events, a citizen's consent might be needed before information is sent to a remote system or agency. The **Citizen Consent Enabled** selection box allows an administrator to specify whether a citizen's consent is needed. This provision means that citizens can select the agencies that they would like to send their life event information to.

If this indicator is specified, a list of remote systems is displayed on completion of the life event script. If this indicator is not specified, the citizen is not presented with the list. If only one remote system is associated with the life event, the **Citizen Consent If One Choice Only** field is provided to determine whether the citizen is presented with the remote systems list. The citizen must specify their consent to send information to this remote system by selecting it on completion of the question script.

Defining the channel

The channel that this life event applies to, either online or internal.

Defining a display description

A description of the life event. This description is displayed on the cards on the citizen's profile page. Rich text is supported.

Defining additional information

Additional information related to the life event can be specified. For example, you can display links to useful websites or information that the agency deems relevant to a particular life event.

Defining the submission text

Configure the text to be displayed to a citizen after they submit a life event. If a rule set was defined, the following default text is displayed:

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Your information has been submitted. Based on the information you have given us, we have identified services and programs that may be of use to you. View your results.

Defining an icon

You cannot define an icon when first configuring a life event. Instead, you must save the life event and then take the following steps:

1. Select the ellipsis **...** icon for the new life event and then select **New Image**.
2. Select **Browse**, and select an image file from your local drive.

   Note: Only `.png` or `.gif` images are supported. Image files must not be animated.
3. Specify an image name and alt text and select **Save**.

Mapping life event information to evidence entities

Information that is gathered in the life event script is stored in the data store schema that is defined for the life event.

To pass information gathered in the life event script into Cúram, it must be mapped to dynamic evidence entities. Dynamic evidence entities must first be defined in the **Rules and Evidence** section of the administration application. When defined, you must specify these entities as **Social Record Evidence Types** in the administration application. An indicator is also provided to set if a particular evidence type is visible to citizens. When the social record evidence entities are defined, use the Data Mapping Editor to map the data from the data store to the appropriate evidence entities. You can access the Data Mapping Editor from the **Mappings** tab on the life event.

When citizens submit a life event, the information that is gathered is mapped to evidence entities that are associated with a new case type called a social record case. The evidence broker can then be used to pass the information from this case to the appropriate ongoing cases.

For more information about data mapping, see the *Data Mapping Editor Guide*.

For more information about sharing evidence, see the *Evidence Broker Guide*.

Defining a question script, answer script, and schema

You must define an IEG script for the life event if the life event allows citizens or users to submit information to the agency.

The IEG script that you define collects the answers to a set of questions related to the life event. Specify a script name in the **Question Script** field. You must also specify a schema if the life event allows citizens or users to submit information to the agency. The schema defines where the information submitted in the life event script is stored. Specify a schema in the **Schema** field. You must specify an answer script to allow citizens to review the answers they have provided to the questions during submission of the life event. Specify an answer script in the **Answer Script** field.

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When you save the life event, empty template scripts and a schema are created by the system based on the Question Script, Answer Script and Schema specified. You can then update these from the **Life Event** tab by selecting the hyperlinks provided on the page. Clicking on the **Question Script** and **Answer Script** links launch the IEG Editor. Clicking on the **Schema** link starts the Datastore Editor. Existing schema, question scripts and answer scripts can be used by selecting them on the **Edit Life Event** page.

Note: If a life event has been configured to send information to remote systems, set the **Finish Page** field in the script properties (accessed by selecting **Edit** > **Configure Script Properties** in the IEG Editor) to `cw/DisplayRemoteSystems.jspx`.

For more information on defining IEG scripts and schema, see *Working with Intelligent Evidence Gathering*.

Categorizing life events

Life event administration allows you to categorize or group together similar life events, for example, changing jobs, changing address and changing income life events could be categorized within an employment category.

Categorizing life events makes it easier for citizens or users to find the life event they need. You define categories in life event administration and then associate them with a life event. When defining a category, you must specify a name and description . Life events can then be associated with that category.

Defining Remote Systems

Life event information can be submitted to remote or external systems. You must associate a remote system with a life event so that life event information can be sent to that system.

The remote system must have the `Life Event Service` web service associated with it. This is used to transmit life event information to the remote system. Remote Systems can be configured in the Remote Systems section of the administration application.

7.9 Configuring the citizen account

Although customization is required to modify some citizen account information, you can configure information on the citizen account and the **Contact Information** tab.

Messages can originate as a result of transactions in Cúram or a remote system. Most of the configuration options apply to all messages but there are a some configuration options that do not apply to messages originating from a remote system.

Related concepts

Track on page 44
When citizens create a secure citizen account, they can access a range of relevant information. Citizens can also use the citizen account to track and manage their interactions with the agency.

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Configuring messages

The **Messages** pane on the organization **Home** page displays messages to logged-in citizens. For example, a message that informs citizens when their next benefit payment is due or the amount of the last payment. You can configure a number of items in the **Messages** plane.

Messages can be displayed which relate to meetings, activities, and application acknowledgments. Messages can be displayed as a result of transactions in Cúram or they can originate from remote systems through a web service.

Account messages

Adding an account message or changing a dynamic element of an account message requires customization. You can update the text in the default account messages by using a set of properties for each type of message.

The following properties are available:

- `CitizenMessageMyPayments` - messages about payments.
- `CitizenMessageApplicationAcknowledgement` - messages about application acknowledgments.
- `CitizenMessageVerificationMessages` - messages about verification messages.
- `CitizenMessageMeetingMessages` - messages about meetings.
- `CitizenMessagesReferral.properties` - messages about referrals.
- `CitizenMessagesServiceDelivery` - messages about service deliveries.
- `OnlineAppealRequestMessage` - messages about appeal requests.

The properties are in the **Application Resources** section of the administration application. To update the message, each file needs to be downloaded, updated, and uploaded again. The icons that are displayed in the citizen account for each type of message can be configured in the **Account Messages** section of the **administration** application.

Adding a message that originates from a remote system requires that a code table entry is added to the `ParticipantMessageType` code table and an associated entry in the **Account Messages** listing in the administration application. Messages can then be sent by the `ExternalCitizenMessageWS` web service.

Creating appeal request acknowledgment or appeal rejection messages

Create messages to acknowledge an appeal request or to reject an appeal request.

Table 5: Appeal request acknowledgment

Message Area	Description
Title	Appeal Request Acknowledgment
Message	`We have received your [Appeal Request - hyperlink to the appeal request on the My Appeals page] and it is currently under review. We will contact you shortly to confirm the next steps.`
Effective Date	Current Date.

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Message Area	Description
Duration	This value is defined in the `Num.Days.To.Expiry=7` property in the `OnlineAppealRequestMessage` properties file and used in the implementation to set the attribute expiry date time. The default value is 7.
Notes	None.

Table 6: Appeal rejection

Message Area	Description
Title	Appeal Request Disallowed
Message	`We have reviewed your appeal request and determined it to be an invalid appeal. We will send you written notice of this, including further details.`
Effective Date	Current Date.
Duration	This value is defined in the `Num.Days.To.Expiry=7` property in the `OnlineAppealRequestMessage` properties file and used in the implementation to set the attribute expiry date time. The default value is 7.
Notes	None.

Creating application acknowledgments

Create messages to acknowledge an application.

Table 7: Application acknowledgment

Message Area	Description
Title	<Icon> TANF Application Acknowledgment
Message	`We have received your TANF Application form. The status of this application is pending. We will contact you when the application has been processed.`
Effective Date	Current® date
Duration	An administrator can use a configuration setting to define the number of days (from the effective date) that the message is displayed.
Notes	None.

Creating meeting messages

Create messages for a meeting invitation, a meeting cancellation, and a meeting update. An administrator can use a configuration setting to set the number of days (from the effective date) that the meeting messages are displayed.

Table 8: Meeting invite

Message Area	Description
Title	<Icon> Meeting Invitation - Meeting with Case Worker

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Message Area	Description
Message 1 (Not an all day meeting and the meeting start and end date are on the same day)	`You are invited to attend a meeting from 9.00AM until 5.00PM on 12/04/2010 in Meeting Room 1, Block C. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 2 (All day meeting for one day only)	`You are invited to attend an all day meeting on 12/04/2010 in Meeting Room 1, Block C. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 3 (All day meeting for multiple days)	`You are invited to attend an all day meeting each day from 12/04/2010 until 15/04/2010 in Meeting Room 1, Block C. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 4 (Non-all day meeting for multiple days)	`You are invited to attend a meeting from 9.00AM until 5.00PM from 12/04/2010 to the 13/04/2010 in Meeting Room 1, Block C. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Notes	`When the case worker is setting up a meeting, the location is an optional field. Therefore, if a meeting location is not specified, the preceding messages are displayed without a location. Also, the meeting organizer's contact details are optional. Therefore, if no contact details are found, the preceding message is displayed without the organizer's contact details.`

Table 9: Meeting cancellation

Message Area	Description
Title	<Icon> Cancellation - Meeting with Case Worker
Message 1 (Not an all day meeting and the meeting start and end date are on the same day)	`The meeting that you were scheduled to attend from 2.00PM until 6.00 PM on 12/04/2010 is canceled. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information.`
Message 2 (All day meeting for one day only)	`The all day meeting that you were scheduled to attend on 12/04/2010 is canceled. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information.`

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Message Area	Description
Message 3 (All day meeting for multiple days)	`The all day meeting that you were scheduled to attend from 12/04/2010 until 15/04/2010 is canceled. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information.`
Effective Date	Current Date.
Notes	The meeting organizer's contact details link opens a page that shows the organizer's contact details.

Table 10: Meeting update

Message Area	Description
Title	<Icon> Cancellation - Meeting with Case Worker
Message 1 (Date and Time change of a non-all-day meeting)	`The meeting that you were scheduled to attend from 2.00PM until 6.00 PM on 12/04/2010 is rescheduled to 3.00PM until 7.00 PM on 13/04/2010 in Meeting Room 1, Block C. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 2 (Location change of a non-all-day meeting)	`The location of the meeting you are scheduled to attend from 2.00PM until 6.00 PM on 12/04/2010 is changed. This meeting is now scheduled for Meeting Room 1, Block D. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 3 (Date, time, and location change of non-all-day meeting)	`The meeting that you were scheduled to attend from 2.00PM until 6.00 PM on 12/04/2010 is rescheduled to 3.00PM until 7.00 PM on 13/04/2010. It is rescheduled for Meeting Room 2, Block C. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 4 (Date change of all day meetings for multiple days)	`The all day meeting that you are scheduled to attend from 12/04/2010 until 15/04/2010 is rescheduled. This meeting will now take place from 13/04/2010 until 16/04/2010. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 5 (Location change for all day meeting for multiple days)	`The location of the all day meeting you are scheduled to attend from 12/04/2010 until 15/04/2010 is changed. This meeting is rescheduled for Meeting Room 1, Block D. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`

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Message Area	Description
Message 6 (Date and location change for all-day meeting for multiple days)	`The all day meeting that you are scheduled to attend from 12/04/2010 until 15/04/2010 is rescheduled. This meeting will now take place from 13/04/2010 until 16/04/2010 in Meeting Room 1, Block D. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 7 (Date change for an all-day meeting)	`The all day meeting that you are scheduled to attend on 12/04/2010 is rescheduled. This meeting will now take place on 13/04/2010. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 8 (Location change for an all-day meeting)	`The location of the all day meeting you are scheduled to attend on 12/04/2010 is changed. This meeting is rescheduled for Meeting Room 1, Block D. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 9 (Date and location change for an all-day meeting)	`The all day meeting that you are scheduled to attend on 12/04/2010 is rescheduled. This meeting is rescheduled for 13/04/2010 in Meeting Room 1, Block D. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 10 (Date and time change of a non-all-day meeting for multiple days)	`The meeting that you are scheduled to attend from 2.00PM until 6.00 PM on 12/04/2010 until 15/04/2010 is rescheduled. This meeting is rescheduled for 2.00PM until 6.00 PM on 13/04/2010 until 16/04/2010. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Message 11 (Location change of a non-all-day meeting for multiple days)	`The location of the meeting you are scheduled to attend from 2.00PM until 6.00 PM on 12/04/2010 until 15/04/2010 is changed. This meeting is rescheduled for Meeting Room 1, Block D. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`

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Message Area	Description
Message 12 (Date, time, and, location change of non-all-day meeting for multiple days)	`The meeting that you are scheduled to attend from 2.00PM until 6.00 PM on 12/04/2010 until 15/04/2010 is rescheduled. This meeting is rescheduled for 2.00PM until 6.00 PM on 13/04/2010 until 16/04/2010 in Meeting Room 1, Block D. Please contact Joe Bloggs at 014567832 or joe@SemAgency.com if you need more information or cannot attend.`
Notes	When the case worker is setting up a meeting, the location is an optional field. Therefore, if a meeting location is not specified, the preceding messages are displayed without a location. Also, the meeting organizer's contact details are optional. Therefore, if no contact details are found, the preceding message is displayed without the organizer's contact details.

Creating payment messages

Create messages for an issued payment, a canceled payment, a due payment, a stopped payment, an unsuspended payment, an issued overpayment, and an issued underpayment. An administrator can use a configuration setting to set the number of days (from the effective date) that the payment messages are displayed.

Table 11: Payment issued

Message Area	Description
Title	<Icon> Latest Payment
Message 1	`Your latest payment of $22.00 was due on 22/07/2009. Click here to view the payment details. Your next payment is due on 29/07/2009. Click My Payments to view your payment history.`
Message 2 (Payment previously canceled)	`Your latest payment of $22.00 was due on 22/07/2009. Click here to view the payment details. This payment was originally canceled on 23/07/2009. Click here to view details of the canceled payment. Your next payment is due on 29/07/2009. Click My Payments to view your payment history.`
Effective Date	Current Date.
Notes	A payment can be issued, then canceled, and then reissued. The **here** hyper link opens a page that shows payment details. The **My Payments** link opens the **My Payments** page in the Citizen Account. **Note:** If no more payments are due, the `Your next payment is due on 29/07/2009` part of the messages is not displayed.

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Table 12: Payment canceled

Message Area	Description
Title	<Icon> Payment Canceled
Message	`Your payment of $22.00, due on 22/07/2009, has been canceled. Click here to view the details. Click Contact Information to contact your caseworker if you need more information. Your next payment is due on 29/07/2009. Click My Payments to view your payment history.`
Effective Date	Current Date.
Notes	If no more payments are due, the `Your next payment is due on 29/07/2009` part of the message is not displayed. The **Contact Information** link opens the **Contact Information** tab in the citizen account. The **My Payments** link opens the **My Payments** page in the Citizen Account.

Table 13: Payment due

Message Area	Description
Title	<Icon> Next Payment Due
Message	`Your next Cash Assistance payment is due on 29/07/2011.`
Effective Date	Current Date.
Notes	This message is appropriate when it is the first payment that a citizen receives.

Table 14: Case suspended

Message Area	Description
Title	<Icon> Payments Stopped
Message	`Your Cash Assistance payments have been stopped from 29/07/2009. Click Contact Information to contact your caseworker if you need more information.`
Effective Date	Current Date.
Notes	The **Contact Information** link opens the **Contact Information** tab in the Citizen Account.

Table 15: Case unsuspended

Message Area	Description
Title	<Icon> Payments Unsuspended
Message	`Your Cash Assistance payment suspension has been lifted from 29/07/2009. Your next payment is due on 31/07/2009.`

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Message Area	Description
Effective Date	Current Date.
Notes	None.

System messages

Agencies use system messages to send messages to either all public citizens, or specifically to clients who have a citizen account. For example, an agency might want to provide information and helpline numbers to citizens who are affected by a natural disaster. You can configure system messages in the administration application on the **New System Message** page.

Use the **Title** and **Message** fields to define the title of the message and the message body that is displayed in the citizen application.

The **Visibility** field defines the user group that a message is visible to, for example, either **Logged-in users**, **Public users**, or **Public and logged-in users**.

Use the **Effective Date and Time** to define an effective date for the message, such as when the message is displayed in the citizen account. Use the **Expiry Date and Time** field to define an expiry date for the message, for example, when to remove the message from the Citizen Account.

The message is saved with a status of **In-Edit**. Before the message is displayed in the Citizen Account, it must be published. After it is published, the message is active and is displayed either to public citizens or in the Citizen Account, based on the visibility, effective date and expiry dates that you have defined.

Configuring message duration

System properties set the length of time a type of message is displayed in the citizen account. For example, a payment message can be configured to be displayed for 10 days. These configuration options apply only to messages that originate as a result of transactions on Cúram.

The following system properties are provided:

- `curam.citizenaccount.payment.message.expiry.days` - sets the number of days from the effective date that a payment message is displayed in the citizen account. A payment message is displayed for this duration unless another payment message is created which replaces it. The default value is 10.
- `curam.citizenaccount.intake.application.acknowledgement.message.expiry.days` - sets the number of days from the effective date that an application acknowledgment message is displayed in the citizen account. An acknowledgment message is displayed for this duration unless another acknowledgment message is created which replaces it. The default value is 10.
- `curam.citizenaccount.meeting.message.effective.days` -sets the number of days from the effective date that a meeting message is displayed. A meeting message is displayed for this duration unless another meeting message is created which replaces it. The default value is 10.

Switching off messages

An agency might not want to display messages in the Citizen Account. To cater for this choice, the system property `curam.citizenaccount.generate.messages` enables an agency to switch all messages *on* or *off*. The default value is `true`, which means that messages are generated and displayed in the Citizen Account.

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Configuring last logged in information

The text displayed in the welcome message and last logged on information can be updated using the properties that are stored in the `CitizenAccountHome` properties file stored in the **Application Resource** section of the Administration Application.

The following properties are provided:

- *citizenaccount.welcome.caption* - updates the welcome message.
- *citizenaccount.lastloggedon.caption* - updates the last logged on message.
- *citizenaccount.lastloggedon.date.time.text* - updates the date and time message.

Configuring contact information

Configure contact information for citizens and caseworkers.

Contact information displayed in the citizen account displays contact details (phone numbers, addresses and email addresses) stored for the logged in citizen and also caseworker contact details (business phone number, mobile phone number, pager, fax and email) of the case owners of cases associated with the logged in citizen in Cúram and on remote systems.

Citizen contact information

The following system property is provided that sets whether contact information is displayed to a citizen.

- **`curam.citizenaccount.contactinformation.show.client.details`**
  If the property is set to `true`, citizens' address, phone number, and email address are displayed. If this property is set to `false`, contact information is not displayed. The default value for this property is true.

Caseworker

The following system properties are provided to set whether agency worker contact information is displayed to a citizen, and if displayed, additional system properties are provided to dictate the type of contact information displayed:

- ***curam.citizenaccount.contactinformation.show.caseworker.details***
  Sets whether worker contact details are displayed in the citizen account. If this property is set to true, worker contact details of cases associated with the logged in citizen are displayed. If this property is set to false, worker contact information is not displayed. The default value for this property is true.
- ***curam.citizenaccount.contactinformation.show.businessphone***
  Sets whether the worker's business phone number is displayed. The default value of this property is true.
- ***curam.citizenaccount.contactinformation.show.mobilephone***
  Sets whether the worker's mobile number is displayed. The default value of this property is true.
- ***curam.citizenaccount.contactinformation.show.emailaddress***
  Sets whether the worker's email address is displayed. The default value of this property is true.

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- ***curam.citizenaccount.contactinformation.show.faxnumber***
  Sets whether the worker's fax number is displayed. The default value of this property is true.
- ***curam.citizenaccount.contactinformation.show.pagernumber***
  Sets whether the worker's pager is displayed. The default value of this property is true.
- ***curam.citizenaccount.contactinformation.show.casemember.cases***
  Sets whether the worker's contact information is displayed for cases where the citizen is a case member. If this property is set to true, cases where the citizen is a case member are displayed. If this property is set to false, then only cases where the citizen is the primary client are displayed. Note: this property only applies to cases originating from Cúram. The types of product deliveries and integrated cases to be displayed can be configured in the Product section of the Administration Application. For more information on administering this see the *Cúram Integrated Case Management Configuration Guide*.

Configuring user session timeout

Configure the user session timeout modal in the System Administration application and the Cúram Universal Access Responsive Web Application so that citizens know when their session is about to expire.

If a user session is inactive for a while, citizens can continue their current session by clicking **Stay logged in** so that they don't lose information that they entered on the current page. Citizens can also continue the current session by navigating away from the **Stay logged in** button.

If citizens do not continue their session, they are logged out automatically after a configurable period of time to secure their personal information.

Note:

The Social Program Management Design System is a React application that communicates through REST APIs that are hosted by the Cúram application. The Cúram application and the application server on which it is deployed on manage a user's session, including the session timeout value that is used to terminate the user's session after a period of inactivity.

You can deploy the REST APIs as a separate enterprise application to the caseworker application which allows the session timeout value to differ between the two applications. For example, a caseworker session timeout value of 30 minutes might be too long for a citizen whose timeout value might be more appropriately set to less than 10 minutes.

For more information about how to deploy the REST application, see the Cúram Clustered IBM WebSphere Application Server Deployment Guide.

Use the following properties to configure the session timeout:

- **curam.environment.enable.timeout.warning.modal**
  You can enable or disable the session timeout feature. For more information, see the *Web Client Reference Manual*.
- **curam.environment.timeout.warning.modal.time**
  You can configure the maximum time that the **Stay logged in** dialog is displayed to citizens. For more information, see the *Web Client Reference Manual*.

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- **REACT_APP_SESSION_INACTIVITY_TIMEOUT**

  In the Cúram Universal Access Responsive Web Application, use the REACT_APP_SESSION_INACTIVITY_TIMEOUT environment variable to configure the time in seconds before a user session expires. You can set the environment variable in the `.env` or `.env.development` files in the root of your application. The value must match the session timeout that is configured on the server, by default, 30 minutes or 1800 seconds.
- **Configuring the dialog box text**
  To configure the dialog box title, informational text, or button text for the Cúram Universal Access Responsive Web Application, use the `SessionTimeoutDialogComponentMessages.js` file that accompanies the source files. For more information about customizing, see 5.15 Customizing the application on page 135.
- **Configuring the login page to notify citizens when their session times out**

  Use the sessionCountdownTimerEnd property on the router location state to update a customized login page with a message to notify citizens when their session times out. For more information about routing, see 5.11 Developing with routes on page 110.

  An example of the sessionCountdownTimerEnd is shown:

```
if (location.state.sessionCountdownTimerEnd) {
<Alert .../>

}
```

  This notification message is configured by default when a citizen's session times out.

Related tasks

Customizing the Cúram Universal Access Responsive Web Application on page 259
Use this information to customize Universal Access for your organization.

Configuring appeal requests

Complete the following steps to enable a citizen to request an appeal from their citizen account.

Procedure

1. Create a custom IEG script and data store schema to capture the appeal information.
2. Set the values of the `curam.citizenworkspace.appeals.datastore.schema` and the `curam.citizenworkspace.appeals.datastore.script.id` properties to the values of the script and data store schema that you created.
3. Create an XSL template to generate a PDF of the appeal information.

Related tasks

Customizing appeals on page 315
You can customize appeals to suit your organization. You can integrate with an appeals system of your choice. If you are licensed for the Cúram Appeals application module, the Cúram appeals functionality is available on installation.

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Configuring communications on the Notices page

You can configure the maximum number of communications that are displayed on the **Notices** page. By default, up to 20 communications are displayed.

Procedure

Edit the *curam.citizenaccount.max.communication* system property and specify the maximum number of communications to display.

What to do next

You can further customize the underlying communications implementation if needed. For more information, see Customizing the Notices page on page 324.

Related concepts

The Notices page on page 51
When a citizen is logged in, they can see all communications that are relevant to them on the **Notices** page, with sent, received, or normal status indicated. Notices are typically formal written communications that are issued to meet legal, regulatory, or state requirements, which are created by using letterhead templates.

Configuring payments

You can enable the display of enhanced benefit and payment information in the application. The enhanced payment information is shown everywhere that payment information is displayed, such as the dashboard and all payments pages. Messages about expected benefits are displayed on the benefits page. By default, REACT_APP_FEATURE_PAYMENT_DETAILS_ENABLED is set to `false` and the additional benefit and payment information is not displayed.

Before you begin

To avail of the enhanced benefit and payments information display feature, ensure that your version of Cúram includes the "/ua/payments/{payment_id}", "/ua/payments_summaries", "/ua/next_payments_summaries", "/ua/submitted_applications/next_payments_summaries", "/ua/payments/simulate_payments" REST APIs.

About this task

When the additional benefit and payment information is displayed, expected and previous payments, a detailed payment breakdown, and information about any adjustments that were made since the last payment, become available in the citizen account. The information is displayed in the dashboard, the all payments page, and the payment detail page.

You can configure how the maximum number of payments that are displayed on the dashboard, by default 3 rows are displayed.

Procedure

1. To enable the display of enhanced benefit and payment information, set the value of the REACT_APP_FEATURE_PAYMENT_DETAILS_ENABLED environment variable to `true`.

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2. To specify the maximum number of payments for the expected payments list and previous payments list on the dashboard, you can modify the REACT_APP_CITIZEN_DASHBOARD_PAYMENT_COUNT_MAX=3 environmental variable.

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8 Customizing the Cúram Universal Access Responsive Web Application

Use this information to customize Universal Access for your organization.

8.1 Customizing screenings

Use the supported classes and APIs to customize the events that are started for screenings and the screening results page.

Related concepts

Configuring screenings on page 230

Define the different types of screenings that citizens can complete to identify programs that they might be eligible to receive.

Track the volume, quality, and results of screenings

Use the *curam.citizenworkspace.impl.CWScreeningEvents* class to access the events that are started for screening events.

You can use *curam.citizenworkspace.impl.CWScreeningEvents* to track the volume or results of screening for reporting purposes. For more information, see to the API Javadoc™ for *CWScreeningEvents* in `<CURAM_DIR>/EJBServer/components/CitizenWorkspace/doc`

Populating a custom screening results page

Use the *performScreening* that is contained in the `curam.citizenworkspace.security.impl.UserSession` API to populate a custom **Screening Results** page.

The **Screening Results** page is displayed when an IEG screening script is run. The operation runs the configured rule set for the selected screening type. The results of the screening, that is, the list of eligible and undecided programs, are stored against the user's session.

The *screeningResultsForDisplay* return type of the operation allows access to three objects. These objects contain the information that is required to populate either the default or custom **Screening Results** page:

- **ScreeningType**
  The screening type that the user selected.
- **List<Program>**
  A list of the programs that the user was screened for. The *ScreeningResultsOrderingStrategy* sets the order of the programs listed.
- **Map<String, ProgramType>**
  A *join.util.map* that contains a mapping of strings to *ProgramTypes* where the string contains the unique reference for that *ProgramType*.

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The following is a sample usage:

```
UserSession userSession = userSessionDAO.get(sessionID);
ScreeningResultsForDisplay screeningResultsForDisplay =
    userSession.performScreening();
```

The following is a sample interface definition:

```
/**
   * Executes the Screening rule set associated with the current screening IEG
   * script data. The return object, {@link ScreeningResultsForDisplay},
   * contains all of the information required to be displayed on the
   * Screening Results page.
   *
   * @return object containing the ordered screening results, the selected
   *         {@link ScreeningType} and a map of {@link ProgramType} records.
   *
   * @throws InformationalException
   *           Generic exception signature.
   * @throws AppException
   *           Generic exception signature.
   */
  ScreeningResultsForDisplay performScreening() throws InformationalException,
      AppException;
```

For more information, see the API Javadoc for the *curam.citizenworkspace.security.impl.UserSession* in *<CURAM_DIR>/EJBServer/components/CitizenWorkspace/doc*.

8.2 Customizing applications

You can customize the application flow to link directly to an application script, or to provide separate overview pages or submission confirmation pages for each application type. You can also use customization points, for example, customizing the generic PDF for processed applications, to customize the application intake process when an intake application is submitted.

Related concepts

Configuring applications on page 236

Use Cúram administration and system administration applications to define the applications that are available for citizens. For each application, you can configure the available programs and an application script and data schema. You must also configure the remaining applications details, such as application withdrawal reasons.

Linking directly to an application

You can link directly to the overview page of an application from a custom URL. For example, you can customize the application flow to skip the **Apply For Benefits** page and the **Benefit Selection** page if you prefer.

You can do this by using the IDs from the INTAKEAPPLICATIONTYPE and PROGRAMTYPE database tables.

Creating a direct link by using a custom URL

For example, you might want to create a URL, such as `/food-stamps`, that links directly to your food stamps application.

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1. Create a wrapper component to pass in the data about the application. For example, create a `FoodStampsComponent` as shown.

```
const FoodStampsComponent = () => (
  <ApplicationOverviewContainer
    intakeApplicationTypeId="91001"
    programIds="1010,1015"
  >
    <FoodStampsDescriptionComponent />
  </ApplicationOverviewContainer>
);
```

2. Add a new `/food-stamps` route that loads the `FoodStampsComponent` component.

Creating a direct link by using a generic URL

Rather than hardcoded values, you can pass in the data for an application by using a generic URL of the form `/application-overview/:intakeApplicationTypeId/:programIds`, where `:intakeApplicationTypeId` is the intake application type ID and `:programIds` is a comma-separated list of program IDs. For example:

```
/application-overview/91001/1010,1015
```

Customizing application overview pages

You can create separate application overview pages for each application type so you can display specific information about the type of benefit that a citizen is applying for.

These examples use the `ApplicationOverviewContainer` and the `StartApplicationButton` components, and demonstrate how to customize the page while using the existing application functionality.

Customizing an application overview page accessed by a custom URL

When you access an application by using a custom URL, such as `/food-stamps`, you can use a wrapper component to pass in a child component, in which you can display information about a specific application type.

For example, for a food stamps application, you can create a `FoodStampsDescriptionComponent` component as a child of your `FoodStampsComponent`.

```
const FoodStampsComponent = () => (
  <ApplicationOverviewContainer
    intakeApplicationTypeId="91001"
    programIds="2010,2015"
  >
    <FoodStampsDescriptionComponent />
  </ApplicationOverviewContainer>
);
```

Customizing an application overview page accessed by a generic URL

When accessing an application by using generic URLs, such as `/application-overview/91001/1010,1015`, complete the following steps to customize the overview page for an application.

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1. Write a component that checks the IDs, for example, `NewOverviewComponent`.

```
const NewOverviewComponent = props => {
  let child = null;
  const id = props.match.params.intakeApplicationTypeId;
  if (id === '91001') {
    child = <FoodStampsDetailsComponent />;
  } else if (id === '50000') {
    child = <ChildWelfareDetailsComponent />;
  } else {
    // throw error
  }
  return (
    <ApplicationOverviewContainer
      intakeApplicationTypeId={props.match.params.intakeApplicationTypeId}
      programIds={props.match.params.programIds}
    >
      {child}
    </ApplicationOverviewContainer>
  );
};
```

2. Overwrite the existing route. For example:

```
<TitledRoute
  component={NewOverviewComponent}
  exact
  path={`${PATHS.APPLICATION_OVERVIEW}/:intakeApplicationTypeId/:programIds`}
  title={applicationOverviewTranslations.overviewTitle}
/>
```

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Customizing the intake application workflow

Review a summary of the intake application workflow in a flowchart.

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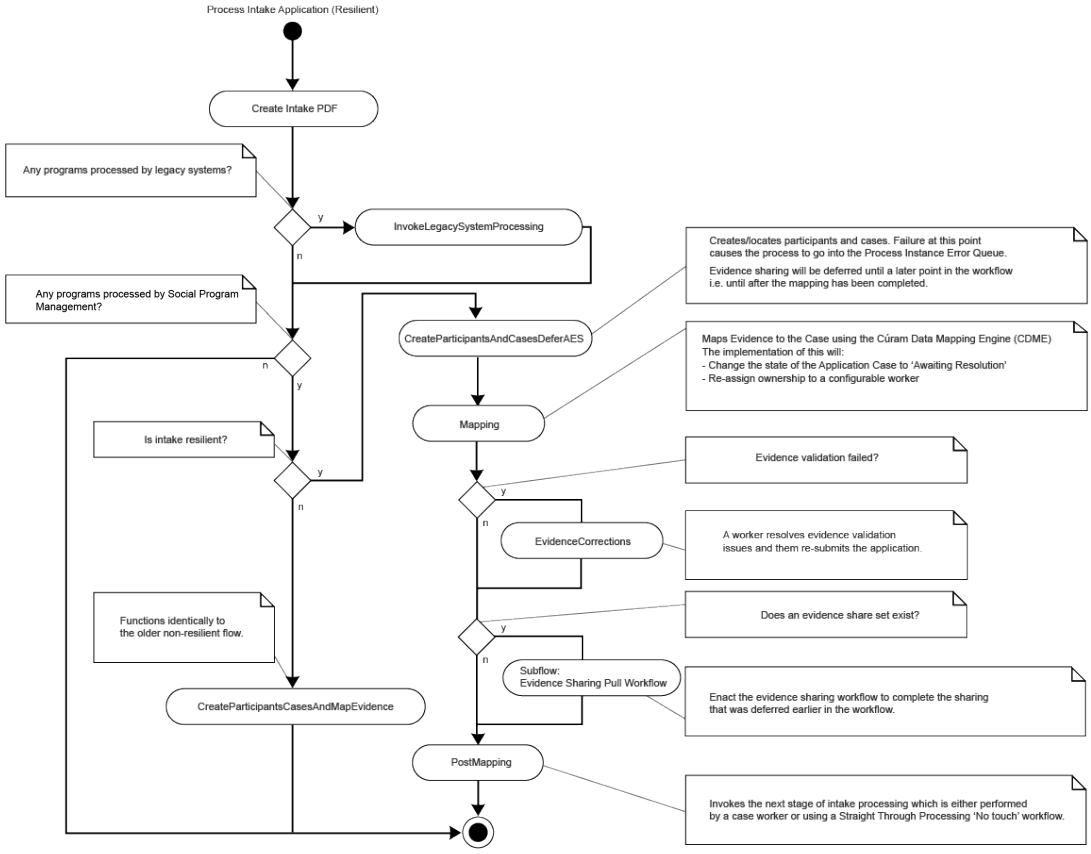

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- **Create intake PDF**
  This automatic activity creates a PDF document based on the content of the application. For more information, see Customizing the generic PDF summary form for processed applications on page 266.
- **InvokeLegacySystemProcessing**
  This automatic activity sends applications to legacy systems by using web services. This path is taken only if there are legacy systems that are associated with at least one of the programs on the application.
- **CreateParticipantsAndCasesDeferAES**
  This automatic activity creates participants for the submitted application and then creates one or more cases for the programs that are associated with the application. In most cases, application cases are created.
  This path is taken only if the configuration property *curam.intake.use.resilience* is set to `true`. For compatibility with previous versions, this property is `false` by default. However, it is recommended that all production systems set this value to true. For more information about the implications of setting this value to true, see Using events to extend intake application processing on page 269.

  This activity also defers the evidence sharing that occurs when case members are added to an application case to a later point in the workflow.

  Note: For customizations to this workflow or for custom intake workflows, evidence sharing can be deferred by using the `curam.aes.sl.observe.impl.AESShareSetPullManualEnactment.process()` API. For more information, see the associated Javadoc.
- **Mapping**
  This automatic activity uses the Cúram Data Mapping Engine (CDME) to map data collected in the application script into Case Evidence. If a validation issue occurs with the mapped evidence, this activity is automatically retried. During the retry, if there is a single Application Case, the validations are disabled and a WDO flag *IntakeCaseDetails.mappingValidInd* set to `false`.
- **EvidenceCorrections**
  This manual task is called if the Mapping activity fails due to a validation error. That is, the `IntakeCaseDetails.mappingValidInd` set to `false`. The assignment of this task is configurable.

  For more information about the ownership strategy, see the *Intake Developer's Guide*.
  The caseworker or operator must resolve the evidence validation issues and resubmit the application.
- **Subflow: Evidence Sharing Pull Workflow**
  If there is evidence to share, the evidence sharing pull workflow is enacted to trigger any sharing activities that were deferred in `CreateParticipantsAndCasesDeferAES`.
  If there is no evidence to share, the workflow bypasses this step.
- **PostMapping**
  This automatic activity starts the next stage of application processing by calling the `IntakeApplication.IntakeApplicationEvents.postMapDataToCuram()` event.

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- **CreateParticipantsCasesAndMapEvidence**
  This path is followed when the configuration property `curam.intake.use.resilience` is set to false. This automatic activity behaves identically to the older non-resilient workflow. It creates cases and participants and completes all evidence mapping in a single transaction, which results in a less resilient process if a failure occurs.

Customers can customize the workflow compliantly as described in the *Universal Access Responsive Web Application Guide* and the *Web Client Reference Manual*. Customers must not change the enactment structs that are used by these workflows.

Related concepts

Customizing the generic PDF summary form for processed applications on page 266
By default, the PDF summary is automatically generated from an XSL template for all intake applications.

Using events to extend intake application processing on page 269
The interface `IntakeApplication.IntakeApplicationEvents` contains events that are invoked when citizens submit an intake application for processing.

Customizing the generic PDF summary form for processed applications

By default, the PDF summary is automatically generated from an XSL template for all intake applications.

The PDFs are rendered by the XML server. For more information about XSL templates, see the *Communications Overview Guide*.

Configuring the generic PDF summary template

Complete the following steps to change or update the generic PDF summary template for intake applications. If needed you can upload your own custom template. Customers can choose between an improved template or the default earlier template.

About this task

- ***WSXSLTEMPLATEINST001.xsl***

  The */EJBServer/components/WorkspaceServices/data/initial/blob/WSXSLTEMPLATEINST001.xsl* template is configured by default and provides compatibility for existing scripts.
- ***IntakeApplicationPDFTemplate.xsl***

  Customers can use the more recent */EJBServer/components/WorkspaceServices/data/initial/blob/IntakeApplicationPDFTemplate.xsl* template to generate an improved summary that is based on the final summary page of the IEG application script.

  The PDF summary template does not support some IEG scripts. To define a list of scripts to be excluded from summary PDF template generation, if a summary PDF template is configured, use the `curam.intake.pdftemplate.iegsummarypagelayout.scriptexcludelist` environment variable. For the excluded IEG scripts, the default data store PDF template is used instead to generate PDF documents.

  The PDF summary template does not support the following IEG scripts:

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- Scripts with no summary pages.
- Scripts with one or more summary pages, but where a summary page isn't at the end of the script.
- Scripts with a summary page that is nested in a condition.
- Scripts where the last summary page contains no cluster.

For a summary PDF to be generated from an IEG script by using the `IntakeApplicationPDFTemplate.xsl` template, a summary page must be at the end of the script. If your IEG scripts don't have a summary page, you must either add a summary page or use the default *`WSXSLTEMPLATEINST001.xsl`* template, which doesn't need a summary page in the IEG script.

You can configure the text and logo in the header, and further customize the template to define the information that you want to include in the PDF summary form.

Procedure

1. Log in as a system administrator, go to **Communications** > **XSL Templates**.
2. Search for the **Intake Application** template with the following details:
   - Description: Intake Application
   - Relates To: Intake Application
   - Category: Intake Application
   - Subcategory: Intake Application
   - Template Type: Letter
   - Template ID: Intake Application
3. Select the template and check it out.

   The existing template version is saved in case you need it later.
4. Locate the template that you want to upload.
   This can be your own custom template, or the improved template. For example, to use the improved *`IntakeApplicationPDFTemplate.xsl`* template, download it from */EJBServer/components/WorkspaceServices/data/initial/blob/IntakeApplicationPDFTemplate.xsl* so you can upload it here.
5. Click **Check in template**, and upload the new or updated template.

Customizing generic PDF summary forms based on the `IntakeApplicationPDFTemplate.xsl` template

You can customize the generic PDF summary form of an online application that is based on the most recent *`IntakeApplicationPDFTemplate.xsl`* template. You can customize the text and logo in the header, and customize the XSL template to define the information that you want to include in the generic PDF summary form.

Before you begin

The *`IntakeApplicationPDFTemplate.xsl`* template uses information from the summary page in IEG scripts to generate the PDF summary form, see the *Universal Access Configuration Guide*.

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Where an IEG script contains multiple conditional summary pages, the last visible summary page is used to generate the PDF. If your IEG scripts don't have a summary page, you must either add a summary page, or use the earlier *WSXSLTEMPLATEINST001.xsl* template, which doesn't need a summary page.

Procedure

1. To customize the PDF header, edit the `intake-application-pdf-props` app resource, which is located in the `EJBServer/components/WorkspaceServices/data/initial/blob/prop/IntakeApplicationPDFProps.properties` file.

   You can customize the following information:

   ```
   # START NON-TRANSLATABLE
     pdf.logo=logo-pdf
     # END NON-TRANSLATABLE
     pdf.logo.altText=logo
     pdf.application.reference=Application number:
     pdf.submitted.date=Submitted on
   ```

   a) Update the text as needed.

   b) To customize the PDF logo, add an image resource that matches the name on the `pdf.logo` property and locale. The default name of the image resource is *logo-pdf*.

2. To update the template, search for an XSL resource that is called `Intake Application`, which is located at:

   ```
   EJBServer/components/WorkspaceServices/data/initial/blob/
   IntakeApplicationPDFTemplate.xsl
   ```

   This XSL uses XSL-FO 1.0 technology to generate the PDF. For more information about XSL, see https://www.w3.org/TR/xsl11.

3. Update the system to use your custom template, see Configuring the generic PDF summary template on page 266.

Customizing generic PDF summary forms based on the WSXSLTEMPLATEINST001.xsl template

Complete the following step to customize a PDF summary form that is based on the default *WSXSLTEMPLATEINST001.xsl* template. You can customize the XSL template to define the information that you want to include in the generic PDF summary form.

About this task

The data passed to the XSL template reads from the data store. For more information, see the *Communications Overview Guide*.

Procedure

1. Instead of displaying the data store labels in the PDF, you can define a property file to specify alternative names for entities and attributes and to hide entities and attributes that you do not want to display in the PDF.

   Define a property file with the naming convention *<application schema name>PDFProps*, and edit the contents of the property file as follows:

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- **Name an entity**
  <Entity Name=<Name To Be Displayed in the PDF>, for example, *Application=Intake Application*
- **Hide an entity**
  <Entity Name.hidden=true, for example, *ScreeningType.hidden=true*
- **Hide an attribute**
  <Entity Name.Attribute Name.hidden=true, for example, *Application.user Name.hidden=true*
- **Specify a label for an attribute**
  <Entity Name.Attribute Name=PDF Label, for example, *Submission.dig FirstName=First Name*

Upload the property file to **Application Resources** in the **Intelligent Evidence Gathering** section of the administration application. For more information about IEG, see the *Working with Intelligent Evidence Gathering (IEG) Guide*.

2. To update the template, search for an XSL resource that is called `Intake Application`, which is located at:

```
/EJBServer/components/WorkspaceServices/data/initial/blob/WSXSLTEMPLATEINST001.xsl
```

Update the template as needed. This XSL uses XSL-FO 1.0 technology to generate the PDF. For more information about XSL, see https://www.w3.org/TR/xsl11.

Using events to extend intake application processing

The interface `IntakeApplication.IntakeApplicationEvents` contains events that are invoked when citizens submit an intake application for processing.

Use these events to change the way that intake applications are handled, for example supplement or replace the standard CDME mapping or perform an action after an application has been sent to a remote system using web services. For more information, see the API Javadoc information for `IntakeApplication.IntakeApplicationEvents` in *<CURAM_DIR>/EJBServer/components/WorkspaceServices/doc*.

The interface `IntakeProgramApplication.IntakeProgramApplicationEvents` contains events that are invoked at key stages during the processing of an application for a particular program. For information, see the API Javadoc information for `IntakeProgramApplication.IntakeProgramApplicationEvents` in *<CURAM_DIR>/EJBServer/components/WorkspaceServices/doc*.

Customizing the concern role mapping process

The *curam.workspaceservices.applicationprocessing.impl* package contains a ConcernRoleMappingStrategy API that provides a customization point into the online application process.

Use the ConcernRoleMappingStrategy API to implement custom behavior following the creation of each new concern role that is added to an application. For example, customers who have

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customized the prospect person entity might want to store information on that entity that cannot be mapped using the default CDME processing.

Enable the ConcernRoleMappingStrategy API

In the Cúram system administration application, enable the ConcernRoleMappingStrategy API by setting the Enable Custom Concern Role Mapping property to true.

Procedure

1. Log in to the Cúram application as system administrator.
2. Click **System Configurations** > **Application Data** > **Property Administration**.
3. In the **Application - Intake Settings** category, search for the property *curam.intake.enableCustomConcernRoleMapping*.
4. Edit the property to set its value to `true`.
5. Save the property.
6. Select **Publish**.

Use the ConcernRoleMappingStrategy API

Use the enabled ConcernRoleMappingStrategy API to implement a strategy for mapping information to a custom concern role.

About this task

The `curam.workspaceservices.applicationprocessing.impl` package contains the ConcernRoleMappingStrategy API.

Procedure

1. Provide an implementation of the customization point.
2. Bind your custom implementation by creating or extending your custom mapping module as follows:

```
package com.myorg.custom;
class MyModule extends AbstractModule {
  @Override
  protected void configure() {

      bind(ConcernRoleMappingStrategy.class).to(
           MyCustomConcernRoleMapping.class);
```

3. If you did not already add your MyModule class to the ModuleClassName table by using an appropriate DMX file, add your MyModule class.

How to send applications to remote systems for processing

Use the Citizen Workspace to send applications to remote systems that use web services for processing.

An event `ReceiveApplicationEvents.receiveApplication` is raised before the application is sent to the remote system. The event can be used to edit the contents of the data store that is used to gather application data before transmission. For more information, refer to the

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API Javadoc for `ReceiveApplicationEvents`, which is in *<CURAM_DIR>/EJBServer/components/WorkspaceServices/doc*.

8.3 Customizing life events

A description of the high-level architecture of life events and how to perform the analysis and development tasks in building a life event.

Many types of life events can be built by analysts, some require input from developers. This information will help analysts to understand how to perform the analysis for a new life event and how to determine whether input is needed from developers.

Related concepts

Configuring life events on page 241
For each life event, you must define how information is collected, stored, and displayed. You can configure life event information categories, mappings to dynamic evidence, and information sharing with internal and external sources.

Enabling and disabling life events

The life events feature is enabled by default. When it is enabled, the life event feature is available for linked users only. You can use the REACT_APP_FEATURE_LIFE_EVENTS_ENABLED environment variable to enable or disable life events.

About this task

For more information about linked users, see 6.5 User account types on page 214.

The following life events functionality can be enabled or disabled:

- The **View your account** card on the **Home** page is updated to say **See your next payment, tell us of any changes in your circumstances, and more**.
- **Review your profile** card on the **Dashboard** page.
- **Tell us if any anything has changed** pane on the **Profile** page.
- Live event-related URLs, for example `/life-events/history`.

Procedure

1. Edit the *.env* file in the root of your application.
2. Set REACT_APP_FEATURE_LIFE_EVENTS_ENABLED to *true* or *false*. If you don't define the environment variable, the life event feature defaults to enabled.

How to build a life event

To design a life event for Merative ™ Cúram Universal Access, you must undertake an analysis.

You can build life events for caseworkers, or use the life event infrastructure to drive other processes like certification, but that is outside the scope of this information. Java coding skills are not a prerequisite for developing all life events. Depending on requirements, many and

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in some cases all of the artifacts required can be developed by a Business Analyst. Business Analysts can use this information to determine whether Java developers are needed to complete the implementation of a life event.

Generally, there are two types of life events for citizens:

- Standard life events
- Round tripping life events

Standard life events allow citizens to enter new life event information and submit it to the agency. For example, a citizen logs in and submits a "Having a Baby" life event, which is new information on the system. If they submit incorrect information, such as the name of the obstetrician, they can start a new life event, reenter the information, and submit.

Round-tripping life events are more complex. The distinction between round-tripping or standard life events is whether the data that is pre-populated in the life event can be changed by the user. If a citizen is expected to update pre-populated information in addition to adding new information, the life event is considered a round-tripping life event. It’s considerably harder to design scripts for this type of life event.

The primary artifacts that constitute a simple life event are:

- An IEG script and its associated data store schema
- An IEG script to review answers in a previously submitted life event (optional)
- A Cúram Data Mapping Engine specification that describes how to map data from the IEG script into evidence on the citizen's cases

All of these artifacts can be configured in the administrator application. For more information about configuring Simple life events, see 7.8 Configuring life events on page 241.

Information that is entered is processed by the life events system as follows:

1. If the user is linked to the local Cúram case processing system, then the life events system can update related evidence in their cases.
2. If the user is linked to remote systems, then the life events system can send updates to the remote system by using web services.

If the life event is a round-tripping life event, or it is required to update the person's evidence in Cúram, then some development work is needed. See the life events APIs needed to meet these requirements or indeed to supplement the standard life event behavior with more custom functionality.

Customizing advanced life events

To develop advanced life events, you must understand the difference between a simple life event and advanced life event.

When to use advanced life events

Advanced life events enable fully automated round-tripping of data. This means that evidence is read into the datastore for an IEG script. It is then updated by the citizen. When the life event is submitted, the original evidence that was read into the IEG script is updated. Advanced life

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events are only required when this level of automated round tripping of data is required. Under all other circumstances Simple life events are the recommended approach. Project Architects should consider carefully whether round tripping is required or whether the data entered can be treated as new evidence to be integrated into the citizen's cases.

Advanced life events cannot be configured through the administration user interface, they must be created by developers.

How to build a life event

Analysis

The distinction between standard life events and round-tripping life events is whether citizens can change the data that is prepopulated in the life event. If citizens can update prepopulated information, rather than just adding new information, then use a round-tripping life event. It's more difficult to develop this type of life event. The advanced life events subsystem is designed to cater for round-tripping life events.

The following information describes how to develop an advanced life event that supports round-tripping.

The following primary artifacts constitute an advanced life event:

- An IEG script and its associated data store schema.
- An IEG script to review answers in a previously submitted life event (optional).
- A Recommendations Ruleset that produces the set of recommendations based on the information that is entered in the IEG script (optional).

The life events system can take information that is entered by the user and update related evidence in any cases they have.

The life events system can do one of the following processes:

1. If the user is linked to the local Cúram case processing system, then the life events system can update related evidence in any of their cases.
2. If the user is linked to remote systems, then the life events system can send updates to related remote systems through web services.

You can configure the life events system to ask a citizen's permission before life event information is sent to remote systems. A standard life event that just sends information to remote systems can be configured through the administration application. For more information, see Defining Remote Systems on page 244.

If the life event is a round-tripping life event or is needed to update evidence in the local case processing system, then some development work is needed to configure the life event. Round-tripping life events must be pre-populated. Pre-population of life events is only supported for users that are linked to the local Cúram case processing system by using a concern role. To read information from cases and update those cases, the life events system relies on the Citizen Data Hub subsystem. The following work is needed to configure the Citizen Data Hub.

The life event broker uses the Data Hub to get the data it needs to populate the life event, so you must configure the Data Hub to extract this data. The life event broker also sends the updated

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data back through the Data Hub. The Data Hub must be configured to tell it what to do with this updated data.

You can use some of these artifacts to configure the Citizen Data Hub for reading information:

- Transform - converts data from the Holding Case into data store XML.
- Filter Evidence Links - When you read Citizen Data, these links filter out only the evidence entities of interest that are read from the Holding Case.
- View processors - Java™ classes for extracting non-evidence data into the data store XML.

You can use these artifacts, among others, to configure the Citizen Data Hub for updating information:

- Transforms - Convert a data store XML Difference Description back into Holding Case Evidence.
- Update processors - Do other update tasks or update non-evidence data that relates to citizens.

Considerations for life events analysis

The considerations that affect the complexity of developing a particular life event that must read from, or write to, an evidence or participant-related data store in Cúram. These considerations inform any analysis of life events development and any resulting estimates.

1. Is the life event a standard life event or a round tripping life event
2. What information needs to be pre-populated into the IEG script?
3. What evidence data is read by the life event?
4. What evidence data is updated by the life event?
5. What non-evidence data is read/updated by the life event
6. How many programs or case types are affected by the life event
7. If a life event shares to multiple cases, will those case types also share evidence with each other using Evidence Broker?
8. Does a life event have associated recommendations? If so, do they relate to Community Services, Government Programs or both?

Of these items that deal with Non-Evidence Entities presents the greatest challenge. Any life event that updates non-evidence entities require developers with Java skills.

Building the components of a life event

How you build the component parts of a life event that uses the Citizen Data Hub. This information does not require any knowledge of Java™.

Writing life event IEG Scripts

Writing a life event IEG script is similar to writing any other IEG script, but with some special considerations. These considerations depend on whether the life event is a round-tripping life event or a standard life event.

For a round-tripping life event, citizen data is read into the data store that is used by the IEG script. This data can be modified by citizens as they progress from page to page in the life event script. For example, a citizen can modify income data that is read into the life event script before submission. The life event broker ensures that when the citizen changes the income data the changes are detected and propagated correctly back to the income entity from which the data was read. The life event broker needs a way to track data from its origin in the income entity, through

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the life event script, and back to the same income entity. To facilitate this process, the IEG script designer needs to place a marker into the data store schema.

The following code block is an example of the definition of an income data store:

```
<xsd:element name="Income">
      <xsd:complexType>
         <xsd:attribute name="incomeType" type="INCOME_TYPE"
            default=""/>
        <xsd:attribute name="cgissIncomeType"
             type="CGISS_INCOME_TYPE"/>
        <xsd:attribute name="incomeFrequency"
             type="INCOME_FREQUENCY" default=""/>
       <xsd:attribute name="incomeAmount" type="IEG_MONEY"
            default="0"/>
        <xsd:attribute name="localID" type="IEG_STRING"/>
      <xsd:complexType>
    </xsd:element>
```

The life event broker uses the `localID` attribute to track the unique identity of the entity from which the income data was drawn. When this entity is changed and submitted, the life event broker can use the value of `localID` to locate the correct entity to update with the changes in the life event. Other special markers exist that can be placed in the schema to aid with providing automatic updates to evidence entities.

When you design a script for a round-tripping life event, you must account for the effects that pre-population of data can have on the flow of the script. One example of this situation is conditional clusters. Life event scripts need to avoid conditional clusters that are associated with pre-populated data. These clusters are common in intake scripts but don't work well when the data store was pre-populated. For example, for a life event that involves a job loss, a Boolean flag on the `Person` entity, `hasJob` is used to indicate that person has a job. The IEG script presents the user with a question: `Does anyone in your household have a job?`. This question is used to drive the display of a conditional cluster that identifies which household members who have jobs.

However, if the data in the data store is repopulated, it's likely one or more `Person` entities with `hasJob` already be set to true. In the current implementation of IEG, it isn't possible to get the `Does anyone in your household have a job?` control question to default to true even when `hasJob` is true for one or more household members. For this reason, the rule needs to be to avoid control questions for conditional clusters such as when the fields they control are pre-populated.

Pre-populating a life event

A description of the artifacts that you must develop to pre-populate a life event script:

How the Data Hub works for reading

You can use the Data Hub to collect data about Citizens from different locations and return the data as an XML document in a datastore. You can use the Data Hub to hide the complexities of where data comes from and how it is represented in its original locations. For example, to drive a "Lost my Job" life event, you might need to gather information about a person's Income, Address, and Employment. These three pieces of information might be represented differently on the underlying system, they might be on one or more different systems. The caller doesn't need to know this detail. The Citizen Data Hub can get these pieces of information in one single operation. Operations of this type are named uniquely, each is called a "Data Hub Context". To

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animate the "Lost my Job" example, define a Data Hub Read Context called "CitizenLostJob" that enables the collection of Income, Address and Employment information in a single query.

One of the sources that the Data Hub can draw on is Evidence on Cases. In particular, Evidence on the Citizen's Holding Case. The Holding Case can use the Evidence Broker to gather data from many disparate Integrated Cases or even from other systems through web services. The Holding Case is a little different from other Cases. There is only one Holding Case per Citizen on a given Cúram system. The Holding Case has an interface that allows all of the Evidence it contains to be extracted in XML format. This XML format is optimized for the description of Evidence in particular. Because it is optimized for the description of Evidence, it isn't necessarily in a format that is suitable for insertion into a data store. Fortunately it is relatively easy to translate data in one XML format into another format with XSLT. For more information about XSLT, see www.w3.org/TR/xslt.

Authoring Read Transforms

You can write XSLT Transforms for use in the Data Hub. To write Citizen Data Hub Transforms, you must understand the structure of the Holding Evidence XML that is the source data and the Data Store schema that is the target.

For example, a simple life event for Citizens who have bought a new car is associated with the Data Hub Context "CitizenBoughtCar". Look at the following fragment of Holding Evidence XML that is used to describe a Vehicle:

```
<?xml version="1.0" encoding="UTF-8"?>
  <client-data
  xmlns="http://www.curamsoftware.com/schemas/ClientEvidence">
    <client localID="101" isPrimaryParticipant="true">
      <evidence>
        <entity localID="-416020015578349568" type="ET10081">
          <attribute name="vehicleMake">VM2</attribute>
          <attribute name="versionNo">2</attribute>
          <attribute name="startDate">20110301</attribute>
          <attribute name="usageCode">VU1</attribute>
          <attribute name="amountOwed">3,200.00</attribute>
          <attribute name="numberOfDoors">0</attribute>
          <attribute name="evidenceID">
            -5315936410157449216
          </attribute>
          <attribute name="monthlyPayment">0.00</attribute>
          <attribute name="vehicleModel">159</attribute>
          <attribute name="year">2008</attribute>
          <attribute name="equityValue">0.00</attribute>
          <attribute name="endDate">10101</attribute>
          <attribute name="fairMarketValue">17,000.00</attribute>
          <attribute name="curamEffectiveDate">20110301
           </attribute>
        </entity>
      </evidence>
    </client>
  </client-data>
```

The *client* element represents data that belongs to the participant with concern role id 101. In Cúram demo data this is James Smith. The client contains a single evidence entity of type *ET10081*. In the Cúram Common Evidence layer, *ET10081* is the Evidence Type identifier for Vehicle Evidence. The *localID* attribute plus the evidence type uniquely identifies the underlying evidence object for the Vehicle. This data must be mapped to data store XML so that it

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can be used to populate an IEG Script. Consider how the previous data is represented in data store XML:

```
<?xml version="1.0" encoding="UTF-8"?>
<Application>
    <Person localID="101" isPrimaryParticipant="true"
      hasVehicle="true">
        <Resource resourcePageCategory="RPC4001"
          localID="-4160200155783495 68" vehicleMake="VM2"
          versionNo="2" amountOwed="3,200.00" vehicleModel="159"
          year="2008" fairMarketValue="17,000.00"
          curamEffectiveDate="20110301">
            <Descriptor/>
        </Resource>
    </Person>
</Application>
```

This XML data must conform to the schema that is used to build the IEG script. Notice that the data store XML conforms to a schema that is a superset of the *CitizenPortal.xsd* schema. You can use the *CitizenPortal.xsd* schema as a starting point for the schemas used in Customer life events and add "marker" attributes that are needed for life events. These marker attributes include the use of *localID*. Datastore schemata for entities can also include the following special markers that are specialized for representing Evidence in the Holding Case:

- curamEffectiveDate - This maps to the effective date of a piece of Cúram Evidence

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The following XSLT fragment shows how to transform Vehicle Holding Evidence into a corresponding Data Store Entity:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- This script plucks out and copies all resource-related entities from output built
 by the XMLApplicationBuilder -->
<xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
    xmlns:x="http://www.curamsoftware.com/schemas/DifferenceCommand"
    xmlns:fn="http://www.w3.org/2006/xpath-functions" version="2.0">
    <xsl:output indent="yes"/>
    <xsl:strip-space elements="*"/>
    <xsl:template match="update">
        <xsl:for-each select="./diff[@entityType='Application']">
            <xsl:element name="client-data">
                <xsl:apply-templates/>
            </xsl:element>
        </xsl:for-each>
    </xsl:template>
    <xsl:template match="diff[@entityType='Person']">
        <xsl:element name="client">
            <xsl:attribute name="localID">
                <xsl:value-of select="./@identifier"/>
            </xsl:attribute>
            <xsl:element name="evidence">
                <xsl:apply-templates/>
            </xsl:element>
        </xsl:element>
    </xsl:template>
    <xsl:template match="diff[@entityType='Resource']">
        <xsl:element name="entity">
            <xsl:attribute name="type">ET10081</xsl:attribute>
            <xsl:attribute name="action">
                <xsl:value-of select="./@diffType"/>
            </xsl:attribute>
            <xsl:attribute name="localID">
                <xsl:value-of select="./@identifier"/>
            </xsl:attribute>
            <xsl:for-each select="./attribute">
             <xsl:choose>
               <xsl:when test="./@name='vehicleUsage'">
   <attribute name="usageCode"><xsl:value-of select="."/></attribute>
               </xsl:when>
               <xsl:otherwise>
                 <xsl:copy-of select="."/>
               </xsl:otherwise>
             </xsl:choose>
            </xsl:for-each>
      <xsl:apply-templates/>
        </xsl:element>
    </xsl:template>
    <xsl:template match="diff[@entityType='Ownership']">
    <xsl:element name="entity">
      <xsl:attribute name="type">ET10073</xsl:attribute>
      <xsl:attribute name="action">
        <xsl:value-of select="./@diffType"/>
      </xsl:attribute>
      <xsl:attribute name="localID">
        <xsl:value-of select="./@identifier"/>
      </xsl:attribute>
      <xsl:for-each select="./attribute">
        <xsl:copy-of select="."/>
      </xsl:for-each>
       <xsl:element name="entity-data">
                <xsl:attribute name="entity-data-type">role</xsl:attribute>
                <xsl:element name="attribute">
                    <xsl:attribute name="type">PRI</xsl:attribute>
                </xsl:element>
                <xsl:element name="attribute">
                    <xsl:attribute name="roleParticipantID">
                        <xsl:value-of select="./@identifier"/>
                    </xsl:attribute>
                </xsl:element>
                <xsl:element name="attribute">
                    <xsl:attribute name="entityRoleIDFieldName">caseParticipantRoleID</
xsl:attribute>
                </xsl:element>
            </xsl:element>
    </xsl:element>
  </xsl:template>
    <xsl:template match="*">
        <!-- do nothing -->
    </xsl:template>
</xsl:stylesheet>
```

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Adding this transform to your life event can turn Vehicle Evidence recorded on any Integrated Case into a Data Store format that can be displayed in an IEG script with all the information pre-populated from the Evidence Record.

Defining Filters for Evidence

When the Holding Case is called to return an XML representation of its evidence, by default it returns all evidence for the citizen concerned. This can be a very large query that returns more information than is required. For each Data Hub Context, use a Filter Evidence Link to define, which Evidence Types you need. Define a Filter Evidence Link by adding entries to a Filter Evidence Link *dmx* file. The following example shows a Filter Evidence Link *dmx* file that defines the information that to be returned for the "CitizenBoughtCar" life event:

```
<?xml version="1.0" encoding="UTF-8"?>
<table name="FILTEREVIDENCELINK">
    <column name="FILTEREVLINKID" type="id" />
    <column name="FILTERNAME" type="text" />
    <column name="EVIDENCETYPECODE" type="text" />
   <row>
        <attribute name="FILTEREVLINKID">
            <value>175</value>
        </attribute>
        <attribute name="FILTERNAME">
            <value>CitizenBoughtCar</value>
        </attribute>
        <attribute name="EVIDENCETYPECODE">
            <value>ET10081</value>
        </attribute>
    </row>
</table>
```

Using Pre-Packaged View Processors

You now know how Transforms can be used to turn Evidence data into Data store XML for use in a life event Script. However, other important pieces of information are not represented as Evidence. In general, you must develop custom Java code to populate any information that is not represented as evidence. With Java, you can develop *View Processors* that can be used to extract non-evidence data and translate this data into data store XML. By associating these View Processors with the right Data Hub Context, they can add their information into the data store in addition to the data put there by the transforms. The Life Events Broker ships with some pre-packaged View Processors that are capable of inserting certain frequently used non-evidence Data.

- Household View Processor
- The Person Address View Processor

The Household View Processor finds all Persons that are related to the currently logged-in user and pulls them into the data store with information on how they are related to the logged-in Citizen. This information is based on the Cúram Platform `ConcernRoleRelationship` entity.

The Person Address View Processor populates the most important details of the logged-in Citizen, such as name and Social Security Number. It also pulls in the Residential and Mailing addresses of the logged-in Citizen. Both the Household View processor and the Person Address View Processor can be used together in the same life event Context but the Person Address View

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Processor must be run after the Household View Processor. The following example shows how to configure these two View Processors to execute for the "CitizenBoughtCar" life event.

```
<?xml version="1.0" encoding="UTF-8"?>
  <table name="VIEWPROCESSOR">
    <column name="VIEWPROCESSORID" type="id"/>
    <column name="LOGICALNAME" type="text" />
    <column name="CONTEXT" type="text" />
    <column name="VIEWPROCESSORFACTORY" type="text" />
    <column name="RECORDSTATUS" type="text"/>
    <column name="VERSIONNO" type="number"/>
    <row>
      <attribute name="VIEWPROCESSORID">
        <value>4</value>
      </attribute>
      <attribute name="LOGICALNAME">
        <value>CitizenLostJob0</value>
      </attribute>
      <attribute name="CONTEXT">
        <value>CitizenBoughtCar</value>
      </attribute>
      <attribute name="VIEWPROCESSORFACTORY">
        <value>
        curam.citizen.datahub.internal.impl.
        +HouseholdCustomViewProcessorFactory
        </value>
      </attribute>
      <attribute name="RECORDSTATUS">
        <value>RST1</value>
      </attribute>
      <attribute name="VERSIONNO">
        <value>1</value>
      </attribute>
    </row>
    <row>
       <attribute name="VIEWPROCESSORID">
         <value>5</value>
       </attribute>
       <attribute name="LOGICALNAME">
         <value>CitizenLostJob1</value>
       </attribute>
       <attribute name="CONTEXT">
         <value>CitizenBoughtCar</value>
       </attribute>
       <attribute name="VIEWPROCESSORFACTORY">
          <value>
          curam.citizen.datahub.internal.impl.
          +CustomPersonAddressViewProcessorFactory
          </value>
       </attribute>
       <attribute name="RECORDSTATUS">
         <value>RST1</value>
       </attribute>
       <attribute name="VERSIONNO">
         <value>1</value>
       </attribute>
     </row>
   </table>
```

The *CONTEXT* field links the *ViewProcessor* to the "CitizenBoughtCar" life event Context. This ensures that this *ViewProcessor* is called whenever the "CitizenBoughtCar" Data Hub Context is called. The use of a *logicalName* uniquely distinguishes each View Processor. View Processors for a Data Hub Context are executed in lexical order. A View Processor name with a *logicalName* of "AAA" for the Data Hub Context "CitizenBoughtCar" is executed before one with a *logicalName* of "AAB".

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Driving updates from life events
A description of the artifacts that you must develop to process data that is submitted from a life event script.

How the Data Hub works for updating

The citizen Data Hub also has Data Hub contexts for updating. Life events typically use the same Data Hub context name for the read and updates that are associated with the same life event. The example `CitizenBoughtCar` context describes a set of artifacts for prepopulating a `CitizenBoughtCar` life event script and also a set of artifacts for handling updates to the Citizen's data when the `CitizenBoughtCar` life event script is complete.

An update operation for a Citizen Data Hub context can update multiple individual entities in a single transaction. The following artifacts are provided to a Data Hub following a script submission:

- A Data Store root entity, which is the root of the data store that was updated by the life events IEG script.
- A Difference command, which is an entity that describes how this data store is different from the one that was passed to the IEG script before it was started. In other words, it describes how the user changed the data by running the life event script. These differences are broken down into three basic types:
  - Creations - The user creates a data store entity as a result of running the IEG script.
  - Updates - The user updates an entity as a result of running the IEG script.
  - Removals - The user removes an entity as a result of running the IEG script.

  Creations and Updates are the most common. Allowing users to remove items in life events scripts is generally considered bad practice. Standard life events tend to be characterized by a number of Creations whereas Round Tripping life events tend to be a mixture of Creations and Updates. The Difference Command is generated automatically by the life event broker after a life event is submitted.
- A Data Hub Context Name.

To turn a Data Hub Update Operation into automatic updates to evidence entities on the Holding Case, specify a Data Hub Update Transform. For requirements to update non-evidence entities, you must develop an Update Processor. These Update Processors involve Java™ code development.

Writing transforms for updating

Update Transforms, like Read Transforms are specified by using a simple XSLT syntax. To write Update Transforms, the author must understand both the input XML, and the output Evidence XML format. The following examples are built around a `CitizenHavingABaby` life event. This life event allows the user to report that they are due to have a baby. They can enter a number of unborn children to indicate, for example, that they are expecting twins. The user can also enter a due date and they can nominate a father for the unborn child. The father can be an existing case participant or someone else entirely. In the latter case, they must enter information like their name, address, or Social Security Number. This life event is not a round-tripping life event, as it creates evidence rather than updates evidence. The input to an Update Transform is an XML-

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based description of the Data Store Difference Command. An example difference command XML for the `CitizenHavingABaby` is shown:

```
<update>
  <diff diffType="NONE" entityType="Application">
    <diff diffType="NONE" entityType="Person" identifier="102">
      <diff diffType="CREATE" entityType="Pregnancy">
        <attribute name="numChildren">1</attribute>
        <attribute name="dueDate">20110528</attribute>
        <attribute name="curamDataStoreUniqueID">385</attribute>
      </diff>
    </diff>
    <diff diffType="UPDATE" entityType="Person" identifier="101">
      <attribute name="isFatherToUnbornChild">true</attribute>
      <attribute name="curamDataStoreUniqueID">399</attribute>
    </diff>
  </diff>
</update>
```

The difference command XML corresponds node-for-node with the data store XML. Each `diff` node describes how the corresponding data store entity was modified by running the IEG script. The *`curamDataStoreUniqueID`* attribute identifies the changed data store entity. The *`diffType`* attribute identifies the nature of the change, for example *`CREATE`*, *`UPDATE`*, *`NONE`*, or *`REMOVE`*. Attributes that changed or were added to each data store entity are listed. In the previous example, the user registered a pregnancy for Linda Smith (concern role ID 102) with one unborn child, due on 28 May 2011. The father is listed as being James Smith (concern role ID 101). For more information about the difference command XML, see the schema in the Difference Command XML schema. You can use some other attributes and elements when you update the XML, as shown:

```
<?xml version="1.0" encoding="UTF-8"?>
  <client-data>
    <client localID="102">
      <evidence>
        <entity type="ET10074" action="CREATE" localID="">
          <attribute name="numChildren">1</attribute>
          <attribute name="dueDate">20110528</attribute>
          <entity-data entity-data-type="role">
            <attribute type="LG"/>
            <attribute roleParticipantID="102"/>
            <attribute
              entityRoleIDFieldName="caseParticipantRoleID"/>
          </entity-data>
          <entity-data entity-data-type="role">
            <attribute type="FAT"/>
              <attribute roleParticipantID="101"/>
              <attribute participantType="RL7"/>
              <attribute
                entityRoleIDFieldName="fahCaseParticipantRoleID"/>
            </entity-data>
          <entity type="ET10125" action="CREATE">
            <attribute name="comments"> Unborn child 1</attribute>
            <entity-data entity-data-type="role">
              <attribute type="UNB"/>
              <attribute roleParticipantID="102"/>
              <attribute
                entityRoleIDFieldName="caseParticipantRoleID"/>
            </entity-data>
          </entity>
        </entity>
      </evidence>
    </client>
  </client-data>
```

Note the use of the *`action`* attribute, which describes the action to be taken on the underlying evidence. For example, to create the evidence or to update existing evidence.

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The next section discusses the meaning of the *<entity-data>* element. The following example shows the XSLT used to transform the previous difference XML into the previous evidence XML:

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- This script plucks out and copies all resource-related -->
<!-- entities from output built by the XMLApplicationBuilder -->
<xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
    xmlns:x="http://www.curamsoftware.com/
      schemas/DifferenceCommand"
    xmlns:fn="http://www.w3.org/2006/xpath-functions"
    version="2.0">
    <xsl:output indent="yes"/>
    <xsl:strip-space elements="*"/>
    <xsl:template match="update">
        <xsl:for-each select="./diff[@entityType='Application']">
            <xsl:element name="client-data">
                <xsl:apply-templates/>
            </xsl:element>
        </xsl:for-each>
    </xsl:template>
    <xsl:template match="diff[@entityType='Person']">
        <xsl:element name="client">
            <xsl:attribute name="localID">
                <xsl:value-of select="./@identifier"/>
            </xsl:attribute>
            <xsl:element name="evidence">
                <xsl:apply-templates/>
            </xsl:element>
        </xsl:element>
    </xsl:template>
    <xsl:template match="diff[@entityType='Pregnancy']">
        <xsl:element name="entity">
            <xsl:attribute name="type">ET10074</xsl:attribute>
            <xsl:attribute name="action">
                <xsl:value-of select="./@diffType"/>
            </xsl:attribute>
            <xsl:attribute name="localID">
                <xsl:value-of select="./@identifier"/>
            </xsl:attribute>
            <xsl:for-each select="./attribute">
                <xsl:copy-of select="."/>
            </xsl:for-each>
            <xsl:element name="entity-data">
                <xsl:attribute name="entity-data-type">
                  role
                </xsl:attribute>
                <xsl:element name="attribute">
                    <xsl:attribute name="type">LG</xsl:attribute>
                </xsl:element>
                <xsl:element name="attribute">
                    <xsl:attribute name="roleParticipantID">
                        <xsl:value-of select="../@identifier"/>
                    </xsl:attribute>
                </xsl:element>
                <xsl:element name="attribute">
                    <xsl:attribute name="entityRoleIDFieldName">
                      caseParticipantRoleID
                    </xsl:attribute>
                </xsl:element>
            </xsl:element>
            <xsl:element name="entity-data">
                <xsl:attribute name="entity-data-type">
                  role
                </xsl:attribute>
                <xsl:element name="attribute">
                    <xsl:attribute name="type">FAT</xsl:attribute>
                </xsl:element>
                <xsl:for-each select=
                "../../diff[@entityType='Person']/attribute[
                  @name='isFatherToUnbornChild'
                  and ./text()='true']">
                    <!-- Copy the participant id if a family -->
                    <!-- member is the father -->
                    <xsl:element name="attribute">
                      <xsl:attribute name="roleParticipantID">
                          <xsl:value-of select="
                            ../@identifier"/>
                        </xsl:attribute>
                    </xsl:element>
                </xsl:for-each>
                <!-- Copy details of absent parent -->
                <xsl:call-template name="absentFather"/>
                <xsl:element name="attribute">
```

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Writing transforms that create new case participants

Evidence Entities frequently refer to third parties. For example, Pregnancy evidence refers to the father through a Case Participant Role. The associated father can be a Person or a Prospect Person. Other evidence types, such as *Student*, can refer to a School that is entered as a Representative Case Participant Role.

The Evidence XML schema provides a generic element that is called <*entity-data*>, which can be used to provide special handling instructions to the Citizen Data Hub. The type of handling depends on the <*entity-data-type*> specified. Cúram provides a special processor for the entity-data-type *role*. This role entity data processor can be used to create new Case Participant Roles or to reference existing Case Participant Roles for existing Case Participants. In the Evidence XML output listed previously, the attribute that is denoted by *type* is used to denote the Case Participant Role Type. For example, FAT for Father or UNB for Unborn Child. This value must be a code-table value from the *CaseParticipantRoleType* code table. The *roleParticipantID* denotes the `ConcernRoleID` of an existing participant on the system. If the *roleParticipantID* is supplied, the system does not attempt to create a new Case Participant, but reuses a case participant with this ID. The *entityRoleIDFieldName* is the field name in the corresponding Evidence Entity. For example, for the *Pregnancy* evidence entity, it is *fahCaseParticipantRoleID*. Where a new participant needs to be created, the following fields are supported by the Role Entity Data Processor.

- `participantType` - A code table entry from the *ConcernRoleType* code table. For example, use RL7 to create a new Prospect Person.
- `firstName`
- `middleInitial`
- `lastName`
- `SSN`
- `dateOfBirth`
- `lastName`
- `lastName`
- `street1`
- `city`
- `state`
- `zipCode`

Updating Non-Evidence entities

You can configure life events to automatically map updates through to Evidence Entities on multiple integrated cases. Sometimes life events must update non-Evidence entities such as a Residential Address, Employment, or other customer-specific non-evidence entities. Typically, these entities are shared across multiple cases. It is also typical that these entities do not follow the same controlled Life Cycle as evidence entities. Evidence has many advantages:

- It is temporal.
- It is case-specific, with sharing of updates between cases controlled through the Evidence Broker.

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- Caseworkers can veto acceptance of updates that come from external sources like Merative ™ Cúram Universal Access.
- It has an in-edit and approval cycle.
- It has support for verifications.

Non-evidence entities have none of these advantages and safeguards. A decision to update non-evidence entities based on life events must be made with due care, especially if the changes can be applied simultaneously across multiple cases. You can update non-evidence entities but this approach always involves custom code. These approaches must include safeguards to ensure that at least one agency worker manually approves changes before they are applied to the system.

Configuring the evidence broker for use with the holding case

The Holding Case is only a holding area for Evidence before it is sent somewhere else. Typically, after data is updated on the Holding Case, the goal is to broker these updates to Integrated Cases so that caseworkers can evaluate the changes and apply them to the relevant cases.

For example, after the data is accepted on Integrated Cases, a user can see the positive impact of submitting a life event because the updated data has an impact on the user's benefits. The bridge between the Holding Case and the Integrated Cases is crossed only if the appropriate configuration is defined. For more information, see the *Evidence Broker* guide.

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Configuring sharing from the Holding Case

An evidence configuration for sharing of Pregnancy evidence from the Holding Case to an Integrated Case is shown in the following example:

```
<?xml version="1.0" encoding="UTF-8"?>
  <table name="EVIDENCEBROKERCONFIG">
    <column name="EVIDENCEBROKERCONFIGID" type="id"/>
    <column name="SOURCETYPE" type="text" />
    <column name="SOURCEID" type="id" />
    <column name="TARGETTYPE" type="text" />
    <column name="TARGETID" type="id"/>
    <column name="SOURCEEVIDENCETYPE" type="text"/>
    <column name="TARGETEVIDENCETYPE" type="text"/>
    <column name="AUTOACCEPTIND" type="bool"/>
    <column name="WEBSERVICESIND" type="bool"/>
    <column name="SHAREDTYPE" type="text"/>
    <column name="RECORDSTATUS" type="text"/>
    <column name="VERSIONNO" type="number"/>
    <row>
      <attribute name="EVIDENCEBROKERCONFIGID">
        <value>10003</value>
      </attribute>
      <attribute name="SOURCETYPE">
        <value>CT10301</value>
      </attribute>
      <attribute name="SOURCEID">
        <value>10330</value>
      </attribute>
      <attribute name="TARGETTYPE">
        <value>CT5</value>
      </attribute>
      <attribute name="TARGETID">
        <value>4</value>
      </attribute>
      <attribute name="SOURCEEVIDENCETYPE">
        <value>ET10000</value>
      </attribute>
      <attribute name="TARGETEVIDENCETYPE">
        <value>ET10074</value>
      </attribute>
      <attribute name="AUTOACCEPTIND">
        <value>0</value>
      </attribute>
      <attribute name="WEBSERVICESIND">
        <value>0</value>
      </attribute>
      <attribute name="SHAREDTYPE">
        <value>SET2004</value>
      </attribute>
      <attribute name="RECORDSTATUS">
        <value>RST1</value>
      </attribute>
      <attribute name="VERSIONNO">
        <value>1</value>
      </attribute>
    </row>
  </table>
```

When evidence is shared from the Holding Case to another Integrated Case, the source type needs to be `CT10301` and the source ID needs to be set to `10330`. The source evidence type needs to be set to `ET10000`, which is the code for all Evidence that is stored in Holding Cases. Evidence of this type is known as `Holding Evidence`. The target evidence type in this case is `ET10074`. In Cúram Common Evidence, this particular designation identifies Pregnancy Evidence. The evidence sharing type needs to be set to `SET2004`, which is the code for Non-Identical Sharing.

Note: The `AUTOACCEPTIND` is set to `0`. Always set this value to `0` when it is shared from a Holding Case to an Integrated Case. This setting means that a caseworker always sees any changes that come from the citizen's Holding Case.

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If the caseworker agrees with the changes, the **Incoming Evidence** link of the **Integrated Case Evidence** page can be used to synchronize the data from the Holding Case in the normal way.

To establish an Evidence Broker Configuration for a custom component, a DMX file must be created that contains the configuration that follows the previous example, for example, *%SERVER_DIR%\components\Custom\data\initial\EBROKER_CONFIG.dmx*

In sharing Holding Evidence to a Standard Evidence Entity like a Pregnancy, the Evidence Broker copies the Holding Evidence that contains the Pregnancy data into a new Pregnancy Evidence Record in the target Integrated Case. Holding Evidence is not standard Evidence. Holding Evidence is stored in an XML representation, so while the Holding Evidence is copied to the Target Evidence type, the Evidence Broker converts the XML data into standard Evidence data. To assist with this conversion process, it is necessary to supply metadata. See the following example of this metadata:

```
<?xml version="1.0" encoding="UTF-8"?>
<data-hub-config>
  <evidence-config package="curam.holdingcase.evidence">
    <entity name="HoldingEvidence" ev-type-code="ET10000">
      <attribute name="entityStruct">
        curam.citizen.datahub.holdingcase.holdingevidence.struct.
        +HoldingEvidenceDtls
      </attribute>
    </entity>
    <entity name="Pregnancy" ev-type-code="ET10074">
      <attribute name="entityStruct">
        curam.evidence.entity.struct.PregnancyDtls
      </attribute>
      <related-entity>
        <case-participant-role>
          <attribute name="linkAttribute">
            fahCaseParticipantRoleID
          </attribute>
        </case-participant-role>
        <case-participant-role>
          <attribute name="linkAttribute">
            caseParticipantRoleID
          </attribute>
        </case-participant-role>
      </related-entity>
    </entity>
  </evidence-config>
</data-hub-config>
```

The metadata describes each of the entities that can be copied to and from the Holding Case and an Integrated Case. The metadata describes the `dtls` structs that are used to build the target evidence. It also describes which of the attributes in Case Evidence refer to case participant roles. This information ensures that when the Holding Evidence is copied, it does not blindly copy case participant role identifiers from Holding Evidence. Instead, it looks for the equivalent case participant role ID on the target case and, if it does not exist, creates one.

This metadata is stored in an `AppResource` resource store key.
The resource store key is identified by the Environment Property *curam.workspaceservices.datahub.metadata*. The initially configured value for this variable defaults to the value *curam.workspaceservices.datahub.metadata*. This variable points to default Holding Evidence Data Hub metadata. You can use the following steps to replace the default Holding Evidence Data Hub metadata with a custom version to support all Evidence Types that need to be brokered from the Holding Case to all Integrated Cases:

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- Copy the contents of *%SERVER_DIR%\components\WorkspaceServices\data\initial\clob\DataHubMetaData.xml* to *%SERVER_DIR%\components\Custom\data\initial\clob\CustomDataHubMetaData.xml*
- Edit the contents of *CustomDataHubMetaData.xml* to describe all the Evidence Entities that need to be updated by the Data Hub.
- Create a file *%SERVER_DIR%\components\Custom\data\initial\APP_RESOURCES.dmx*. Add an entry to this file as shown:

```
<?xml version="1.0" encoding="UTF-8"?>
<table name="APPRESOURCE">
<column name="resourceid" type="id" />
<column name="localeIdentifier" type="text"/>
<column name="name" type="text"/>
<column name="contentType" type="text"/>
<column name="contentDisposition" type="text"/>
<column name="content" type="blob"/>
<column name="internal" type="bool"/>
<column name="lastWritten" type="timestamp"/>
<column name="versionNo" type="number"/>
<row>
  <attribute name="resourceID">
    <value>10700</value>
  </attribute>
  <attribute name="localeIdentifier"> <value/>
  </attribute>
  <attribute name="name">
    <value>custom.datahub.metadata</value>
  </attribute>
  <attribute name="contentType">
    <value>text/plain</value>
  </attribute>
  <attribute name="contentDisposition"> <value>inline</value>
  </attribute> <
  attribute name="content"> <value> ./Custom/data/initial/clob/
CustomDataHubMetaData.xml </value>
  </attribute> <attribute name="internal"> <value>0</value> </attribute>
  <attribute name="lastWritten"> <value>SYSTIME</value>
  </attribute> <attribute name="versionNo"> <value>1</value>
  </attribute>
</row>
</table>
```

- Create or append to the file *%SERVER_DIR%\components\Custom\properties\Environment.xml* adding an entry along the following lines:

```
<environment>
   <type name="dynamic_properties">
     <section code="WSSVCS"
       name="Workspace Services - Configuration">
       <variable name="curam.workspaceservices.datahub.metadata"
         value="custom.datahub.metadata" onlyin="all"
         type="STRING">
         <comment>
           Identifies an AppResource used to configure DataHub
           meta-data.
         </comment>
       </variable>
     </section>
   </type>
 </environment>
```

Round-tripping and configuring sharing to the Holding Case

Analysts also might want to consider whether evidence needs to be transferred in the opposite direction. That is, from the Integrated Cases to the Holding Case. When sharing is configured from the Integrated Case to the Holding Case, changes made by the caseworker to selected evidence can be propagated back to the Holding Case. This process is essential for life events that

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need to prepopulate data from Evidence Entities in existing Integrated Cases. This example shows how to configure Pregnancy Evidence for Sharing to the Holding Case.

```
<?xml version="1.0" encoding="UTF-8"?>
<table name="EVIDENCEBROKERCONFIG">
  <column name="EVIDENCEBROKERCONFIGID" type="id"/>
  <column name="SOURCETYPE" type="text" />
  <column name="SOURCEID" type="id" />
  <column name="TARGETTYPE" type="text" />
  <column name="TARGETID" type="id"/>
  <column name="SOURCEEVIDENCETYPE" type="text"/>
  <column name="TARGETEVIDENCETYPE" type="text"/>
  <column name="AUTOACCEPTIND" type="bool"/>
  <column name="WEBSERVICESIND" type="bool"/>
  <column name="SHAREDTYPE" type="text"/>
  <column name="RECORDSTATUS" type="text"/>
  <column name="VERSIONNO" type="number"/>
  <row>
    <attribute name="EVIDENCEBROKERCONFIGID">
      <value>2</value>
    </attribute>
    <attribute name="SOURCETYPE">
      <value>CT5</value>
    </attribute>
    <attribute name="SOURCEID">
      <value>4</value>
    </attribute>
    <attribute name="TARGETTYPE">
      <value>CT10301</value>
    </attribute>
    <attribute name="TARGETID">
      <value>10330</value>
    </attribute>
    <attribute name="SOURCEEVIDENCETYPE">
      <value>ET10074</value>
    </attribute>
    <attribute name="TARGETEVIDENCETYPE">
      <value>ET10000</value>
    </attribute>
    <attribute name="AUTOACCEPTIND">
      <value>1</value>
    </attribute>
    <attribute name="WEBSERVICESIND">
      <value>0</value>
    </attribute>
    <attribute name="SHAREDTYPE">
      <value>SET2004</value>
    </attribute>
    <attribute name="RECORDSTATUS">
      <value>RST1</value>
    </attribute>
    <attribute name="VERSIONNO">
      <value>1</value>
    </attribute>
  </row>
</table>
```

Note: Unlike Sharing from Holding Case to Integrated Case, the `AUTOACCEPTIND` is set to `1`. This designation is because the target case is a Holding Case and Holding Cases are designed to operate unattended. It is not expected that caseworkers need to review items that are being shared onto the Holding Case as they come from an authoritative source, for instance, the Integrated Case.

Issues for consideration

With suitable configuration, you can share data from the Holding Case to multiple Integrated Cases. For example, Integrated Cases A and B are configured to share information with a citizen's Holding Case. A and B both separately recorded an Income Evidence record for the citizen.

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In the citizen's Holding Case, this evidence record shows up as two separate Income Records. For cases A and B, the income records are two separate records that hold a view of the citizen's income. However, to the citizen, this breakdown might not make much sense. The citizen has only one Income and is using one portal to communicate with the agency or agencies concerned. Why does the citizen see two records for the same Income? In cases where there is sharing to multiple Integrated Cases from a single Holding Case, consider creating another set of sharing relationships to be established from A to B and B to A. This issue requires proper consideration early on in the project lifecycle.

Putting it all together

You saw how to create the parts of a life event, now join all these pieces together to make a complete life event.

New life events can be configured in the administration application. You can create new life event types and life event channels, add rich text descriptions, and associate life events with IEG scripts and recommendation rule sets. When all of the needed entities are created, the data can be extracted into a set of DMX files that can be used as a basis for ongoing development. Use the following set of commands to extract the relevant *DMX* files:

```
build extractdata -Dtablename=LifeEventType
build extractdata -Dtablename=LifeEventContext
build extractdata -Dtablename=LifeEventCategory
build extractdata -Dtablename=LifeEventCategoryLink
build extractdata -Dtablename=LocalizableText
build extractdata -Dtablename=TextTranslation
```

The `LocalizableText` and `TextTranslation` tables contain all of the life event descriptions, but they also contain text translations that don't relate to life events. Developers must audit these *DMX* files and remove any entries that don't correspond to the relevant life event descriptions before they copy the *DMX* files to *%SERVER_DIR%\components\Custom\data\initial*.

Event APIs for life events

The life event broker is instrumented with guice events. Developers can write listeners that can be bound to these events. The available events are:

- *PreCreateLifeEvent* - Invoked before launching a life event
- *PostCreateLifeEvent* - Invoked after the life event has been initialized. That is after the Data Hub Transform and View Processors have been executed.
- *PreSubmitLifeEvent* - Invoked after the life event has been submitted but before the Update Processors have been run.
- *PostSubmitLifeEvent* - Invoked after the life event has been submitted.

Note that both the Pre and Post SubmitLifeEvent events are executed from within a Deferred Process so the current user is expected to be *SYSTEM*. Life events should never attempt to change the contents of the life event. The code extract below shows how a Listener class, *MyPreCreateListener* can be bound to one of these life events:

```
Multibinder<LifeEventEvents.PreCreateLifeEvent>
   preCreateBinder =
    Multibinder.newSetBinder(binder(),
```

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```
      new TypeLiteral<LifeEventEvents.PreCreateLifeEvent>() { /
**/
    });

  preCreateBinder.addBinding().to(MyPreCreateListener.class);
```

8.4 Customizing verifications

If your organization includes the online submission of documents in their business process, citizens can upload and submit documents from the Merative ™ Cúram Universal Access Responsive Web Application to prove information that they provided in their benefit applications. You can customize a number of aspects of the verifications functionality in the application.

Your organization can integrate a verifications system of your choice. If you use the Cúram Verification Engine application module, the verifications functionality is available in the Cúram Universal Access Responsive Web Application after you set up your Cúram verifications.

Related concepts

Verify on page 40

If your organization includes the online submission of documents in their business process, citizens are notified in the Cúram Universal Access Responsive Web Application when some of their information needs to be verified with supporting documentation. They can then provide that supporting documentation online. Both citizens and caseworkers receive notifications, alerting them to any steps to take. Case workers control the verification of evidence, ensuring adherence to agency standards.

Enabling or disabling verifications

The verifications feature is disabled by default. Set the REACT_APP_FEATURE_VERIFICATIONS_ENABLED environment variable to enable or disable the **Your documents** page and options in your application. Set the curam.rest.docservice.fileupload.enabled property to enable the files API so you can upload files to your system. Verifications are available only to linked users.

About this task

For more information about linked users, see 6.5 User account types on page 214.

The following verifications functions are enabled or disabled:

- The verifications-related URLs, the **Your documents** page at `/verifications` and the verification details page at `/verifications/details`.
- The verification Alert on the **Dashboard** page.
- Verifications messages in the **To-dos** pane on the dashboard.

For more information about environment variables, see the 5.18 React environment variable reference on page 186.

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Procedure

1. **Note:** Before you enable the files API, ensure that you implement the appropriate file security and validations for document uploads.

   Set the curam.rest.docservice.fileupload.enabled property to enable the files API so you can upload files to your system. For more information, see the *Cúram™ REST API Guide*.
2. Edit the `.env` file in the root of your application and set REACT_APP_FEATURE_VERIFICATIONS_ENABLED to `true`. If you don't define the environment variable, the verifications feature defaults to disabled.

Enabling the submitted document review feature for citizen verifications

If you use the Cúram Verification Engine application module and you want to enable caseworkers to see submitted documents in Cúram, you must enable the submitted document review feature for citizen verifications.

About this task

For more information about the submitted document review feature, see the *Verification Guide*.

Procedure

To enable caseworker to see the submitted documents, set the curam.verification.submittedDocuments.display.enabled property to display documents that are submitted to verify evidence with the associated verification.

Customizing file formats and size limits for file uploads

You can specify which file formats to allow users to upload and a size limit for uploaded files by setting environment variables. By default, the allowed file formats are JPG, JPEG, PNG, TIFF, and PDF and the file size limit is 5 MB.

Before you begin

You must ensure that you have implemented the appropriate file security and validations for document uploads and enabled the file upload API.

If you do not set the *REACT_APP_DOC_UPLOAD_FILE_FORMATS* environment variable, the default file formats are allowed. If you specify an invalid file extension string, all file types are denied.

If you do not set the `REACT_APP_DOC_UPLOAD_SIZE_LIMIT`, the default value applies.

Procedure

1. To change the allowed file formats for file uploads, set the *REACT_APP_DOC_UPLOAD_FILE_FORMATS* environment variable in your `.env` file. Specify the file name extension, including the dot separator, for each allowed file type in a comma-separated list.

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For example:

```
REACT_APP_DOC_UPLOAD_FILE_FORMATS=".png,.jpg,.pdf"
```

2. To change the allowed file sizes for file uploads, set the `REACT_APP_DOC_UPLOAD_SIZE_LIMIT` environment variable in your *.env* file. Enter the maximum size in megabytes (MB).

   For example:

```
REACT_APP_DOC_UPLOAD_SIZE_LIMIT=6
```

Customizing a file upload lead time for verifications

If needed, your organization can configure a lead time to the due date so that document are submitted earlier to give caseworkers enough time to verify the evidence. Use the `REACT_APP_DOC_UPLOAD_LEAD_DAYS` environment variable to set how many days you want to subtract from the actual date. This earlier date is then displayed to citizens in the application.

About this task

By default, the due date is the date when the information needs to be verified by the caseworker. The default value of `REACT_APP_DOC_UPLOAD_LEAD_DAYS` is 0 days. The value you set is converted to its absolute value and subtracted from the verification due date. For example, -1 and 1 have the same affect.

Procedure

To set a lead time, set the `REACT_APP_DOC_UPLOAD_LEAD_DAYS` environment variable in your *.env* file.

For example:

```
REACT_APP_DOC_UPLOAD_LEAD_DAYS=-7
```

If the actual due date is 31 August, then 24 August is displayed in the application.

Customizing how verification information is presented

The information for the majority of verifications that are presented to the citizen is processed and grouped by evidence records to present meaningful and consumable information in the UI. However, you might have a number of evidence types that contain disparate information that would be more meaningfully displayed in separate verifications. You can customize how information from evidence records is grouped and displayed in the application.

To understand how information is grouped by default, take an evidence record called Medical Expenses, which is an instance of a Medical expenses evidence type. An evidence record can consist of one or more verifiable data items. For example, the amount entered for a medical expense and it's frequency. If a citizen had multiple expenses, it might look like this:

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- **Medical Expense:**
  - For Diabetes
    - Amount: $100
    - Frequency: Weekly
  - For Asthma
    - Amount: $125
    - Frequency: Monthly

To show related expenses that need documentation, verifiable data items are grouped into bigger verifications. By default, information is grouped by the following five criteria in order of importance:

- Evidence type
- Evidence record
- Case
- Person
- Due date

Anything different in the list results in a separate verification.

The text that is displayed on the verification is taken from the evidence descriptor of the evidence record for which the verification was raised, for example **Paid $100 for Diabetes**.

Customizing verifiable data item grouping

You can customize how verifiable data items on an evidence record are grouped for display in verifications. For example, to separate out disparate items that are on the same evidence record but that are not suitable to show on the same verification.

About this task

To customize the grouping, you must override the method with your own custom implementation and import your custom implementation. You can use the following example as a reference.

Procedure

1. Create a custom module that implements your custom grouping.

   For example:

   ```
   src/features/Verification/CustomVerificationsConfig.js
   ```

2. Create a `config` function that adds a custom mapping verification.

   ```
   import { CustomVerificationsSelectors } from '@spm/universal-access';

   function config() {

      // Custom function to group by evidence type and due date
       const customGroupFunction = verification => {
         return `${verification.relatedEvidence.value}-${dueDate}`;
       };

      CustomVerificationsSelectors.addCustomGroupId(customGroupFunction);
   }
   export default { config };
   ```

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3. Update your `App.js` file or equivalent as follows:

```
import CustomVerificationsConfig from './features/Verification/
CustomVerificationsConfig';
CustomVerificationsConfig.config();
```

Customizing verification names

You can customize the name of a verification if the name from the evidence type is not suitable.

Procedure

1. Create a custom module that implements your custom naming.

   For example:

```
src/features/Verification/CustomVerificationsConfig.js
```

2. Create a `config` function that adds a custom mapping verification.

```
import { CustomVerificationsSelectors } from '@spm/universal-access';

function config() {

    // Custom function to change the description to "Health Custom"
    const customNameCallback =  (group) => {
        const { relatedEvidenceType } = group;
        // if the code of the name is "DET106"  change the description to "Health
 expenses"
        if (relatedEvidenceType && relatedEvidenceType.value === 'DET106') {
          // add description  to "Health expenses"
          const newRelatedEvidenceType = { ...relatedEvidenceType, description:
 'Health Custom' };
          // return a group with the name modified
          return { ...group, relatedEvidenceType: newRelatedEvidenceType };
        }
        return group;
      })
   CustomVerificationsSelectors.addMapVerificationGroup(groupByVerificationId);
}
export default { config };
```

3. Update your `App.js` file or equivalent as follows:

```
import CustomVerificationsConfig from './features/Verification/
CustomVerificationsConfig';
CustomVerificationsConfig.config();
```

Customizing caseworker tasks

When a citizen submits a document for a verification, a task is generated for the caseworker. Tasks are displayed to the caseworker that is assigned to the citizen's case when they log in to the caseworker application. System administrators can configure the system to display a task each time a citizen provides all documents for an individual evidence record on a case, or to display the task only when a citizen has provided all documents for every evidence record on a case.

About this task

By default, the task is displayed only when all documents are uploaded for all evidence records on the case.

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Procedure

1. Log on to the Cúram application as a system administrator, and click **System Configurations**.
2. In the **Shortcuts** pane, click **Application Data** > **Property Administration**.
3. Configure the curam.citizenworkspace.task.notifications.on.all.evidence.uploads property.

Related concepts

Caseworker tasks on page 43
When documents are submitted for verification by a citizen, a task is generated for the caseworker that is assigned to the citizen's case.

Customizing application-specific verification polling

When a citizen submits an application, there is a delay while verifications are generated for that application. You can enable verification polling to handle this delay, allowing the page to wait and present the verifications when they become available. You can set the polling on (default) or off, and adjust the interval and duration.

About this task

For more information about environment variables, see the 5.18 React environment variable reference on page 186.

Procedure

Edit the *.env* file in the root of your application and update values for REACT_APP_VERIFICATION_POLLING.

For example:

```
REACT_APP_VERIFICATION_POLLING={"api": "/v1/ua/submitted_applications", "timeout":
 "10000", "interval": "1000"}
```

Where:

- `api`

  Specifies a URL to call to check the submitted applications for verifications. By default, `/v1/ua/submitted_applications`.
- `timeout`

  Specifies the timeout in milliseconds before the polling stops. By default, 10 second.
- `interval`

  Specifies the interval in milliseconds between polling calls. By default, 1 second.

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8.5 Customizing with web services

In some scenarios, agencies handle interactions with citizens over the internet, but use an existing legacy system for case processing. To cater for these scenarios, Universal Access can be configured to communicate with various remote systems using web services.

Inbound and outbound web services

Universal Access supports specific outbound and inbound web services.

The following outbound web services are supported:

- Submit an application for benefits.
- Withdraw an application for benefits.
- Send a life event.

The following inbound web services are supported:

- Create a citizen account on Universal Access.
- Link a user to a remote system (gives them the right to send information to those systems and receive information from them in turn).
- Unlink a user from a remote system.
- Receive an update to the status of a submitted application.
- Receive an update to the status of a request to withdraw an application.
- Receive a citizen message (for display on a citizen account).
- Receive payment information.
- Receive case contact information.

Web services security

Connections to remote systems can be configured through the remote systems configuration page in the administrator application.

Remote systems can invoke web services on Universal Access and must supply user name and password credentials as part of the SOAP header, details of how to do this are described using sample web service requests. It is strongly recommended that a different username and password be assigned to each remote system. The username associated with a remote system is set in the Source User Name field of the remote system configuration page. Having a different user name for each remote system allows Universal Access to perform proper data-based security checks on the incoming service requests. This prevents one remote system sending requests to update data that is properly the concern of a different remote system.

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Process application service

The process application web services consists of receive application and receive withdrawal request.

Receive application

When the *Receive application* outbound web service is started on remote systems, it communicates an application for benefits for one or more social programs. The Web Service Description Language (WSDL) describing this service can be found in *<CURAM_DIR>\EJBServer\components\WorkspaceServices\axis\ProcessApplicationService\ProcessApplicationService.wsdl*.

A web service request of this type contains the following information:

- `intakeApplicationType` - An ID that uniquely identifies an Intake Application Type.
- `applicationReference` – A unique reference for a particular application. This reference is a human-readable ID that is displayed to citizens after they complete an application; for example, `512` or `756`. The application reference is used as an argument to other web services and needs to be stored by the receiver.
- `applicationLocale` – Denotes the preferred locale of the user who entered the application, for example `en_US`. This information needs to be stored by the receiver. Remote systems can send various information back to the citizen's account. Some of this information must be localized by the sender to the preferred locale of the citizen.
- `submittedDateTime` – The date and time at which the application was submitted. This information is in XML schema `dateTime` format, for example, 2012-05-29T15:34:49.000+01:00.
- `programsAppliedFor` – This field contains a list of the programs that were applied for as part of this application. Each program is referred to by a unique reference. This information corresponds to the value of the Reference field configured in the Programs section of Universal Access configuration. For example:

```
<ns1:programsAppliedFor>
    <ns1:programTypeReference>CashAssistance</ns1:programTypeReference>
    <ns1:programTypeReference>SNAP</ns1:programTypeReference>
</ns1:programsAppliedFor>
```

- `applicationData` – Contains a base64 encoded representation of the intake data. This intake data is the XML representation of the XML data store associated with an application.
- `applicationSchemaName` – The name of the schema that is used to create the data store for the application.
- `senderIdentification` – Identifies the sender of the request. The sender identification contains two parts, 1) the identifier of the system from which the request originates, 2) The Citizen Workspace Account ID of the user that created the request. The second part is optional, applications submitted anonymously do not contain part two but applications that are submitted by a logged in user do.
- `supplementaryInformation` – optional, reserved for future use.

The receiver of this information is expected to record the details of the application keyed against sender identification and intake application reference.

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On success, the implementation of this web service must return the Boolean value `true` to indicate that the request was processed successfully. In the case that a problem occurs in processing the request, a fault must be returned containing a string to indicate the nature of the problem. The String needs to be localized to the locale of Universal Access server since it appears in the server log files.

Note: The receiver can receive multiple applications with the same Intake Application reference but the intake application reference is always unique for a particular sender. For example, Systems A and B send a `receiveApplication()` request to system X. Both requests have the `applicationReference` 256.

Note: The receiver never should receive two applications from A with an application reference of 256.

Receive withdrawal request

Merative ™ Cúram Universal Access invokes this outbound web service on remote systems. It is used by citizens to withdraw an application that they have previously submitted using the Receive Application Service. WSDL describing this service can be found in *<CURAM_DIR>\EJBServer\components\WorkspaceServices\axis\ProcessApplicationService\ProcessApplicationService.wsdl*.

A web service request of this type contains the following information:

- applicationReference – A unique reference for the application to be withdrawn. This refers to the id transmitted with the Receive Application service request.
- programTypeReference – A reference that identifies the program being withdrawn. Each program type is referred to by a unique reference. This corresponds to the value of the Reference field configured in the Programs section of Merative ™ Cúram Universal Access configuration. For example "CashAssistance".
- requestSubmittedDateTime – A timestamp indicating when the request was submitted in XML Schema dateTime format. For example, 2012-05-29T15:34:49.000+01:00
- withdrawalRequestReason – The value is taken from the code table WithdrawalRequestReason. Values for this code table are
  - WRES1001 – Attained employment
  - WRES1002 – Change of circumstances
  - WRES1003 – Filed in error
- withdrawalRequestID – An id that uniquely identifies this withdrawal request from the sending instance of Universal Access.
- senderIdentification – Identifies the sender of the request. The sender identification contains two parts, 1) the identifier of the system from which the request originates, 2) The Citizen Workspace Account ID of the user that created the request.
- supplementaryInformation – optional, reserved for future use.

The expected result following successful processing is a receiveWithdrawalRequestResponse as follows:

```
<receiveWithdrawalRequestResponse>
```

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```
  <result>true</result>
</receiveWithdrawalRequestResponse>
```

The service implementation should return a fault if there is an error processing the request. The fault string should be globalized to the locale of the Merative ™ Cúram Universal Access server since it will appear in the server log files. Some problems that may arise include:

- A withdrawal request with the given ID has already been sent by the given instance of Universal Access.
- The application reference referred to is not recognized as an application previously transmitted in a Receive Application service invocation from the same Universal Access instance.

The withdrawal request application is processed by the receiving agency after which a response should be sent in the form of a withdrawal request update. See the sample SOAP request for this web service.

Update Application Service

The Update Application web services consists of the Intake Program Application Update and the Withdrawal Request Update.

Intake Program Application Update

The Intake Program Application Update is an inbound web service invoked by remote systems on Merative ™ Cúram Universal Access.

The Intake Program Application Update is used to inform Universal Access of changes to the status of an application for benefits that was previously received via the Receive Application web service. The status of an application can transition to Approved, Denied or Withdrawn. Where an application is denied a reason can be included in the web service message. The schema for the payload of web service requests of this type can be found in <CURAM_DIR>\EJBServer \components\WorkspaceServices\webservices\UpdateApplication.xsd. See the sample SOAP request for this web service.

A web service request of this type contains the following information:

- curamReferenceID – This must match the applicationReference element for the corresponding Receive Application request.
- programApplicationStatus – This can take the following values:
  - IPAS1002 – Withdrawn
  - IPAS1003 – Approved
  - IPAS1004 – Denied
- programApplicationDisposedDateTime – This is a formatted date time string in the standard Cúram ISO8601 format – "YYYYMMDD HH:MM:SS".
- programApplicationDenialReason – Optional, if the status sent is IPAS1004, this contains free text describing the reason for denial. The denial reason should be taken from the code table IntakeProgApplDenyReason.

The web service request needs to be sent with a Cúram security credential (see a sample SOAP message for details). The user name placed within the credential must match the Source User

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Name entered into the Remote System entry corresponding to the peer system sending the request.

Withdrawal Request Update

The Withdrawal Request Update is an inbound web service invoked by remote systems on Merative ™ Cúram Universal Access.

The Withdrawal Request Update is used to inform Universal Access of changes to the status of a Withdrawal Request that was previously submitted using the Receive Withdrawal Request web service. You can find the schema for the payload of web service requests of this type in *<CURAM_DIR>*`\EJBServer\components\WorkspaceServices\webservices\UpdateApplication.xsd`. See the sample SOAP request for this web service.

A web service request of this type contains the following information:

- curamReferenceID – This must match the withdrawalRequestID in the corresponding Receive Withdrawal Request message.
- withdrawalRequestStatus – This an enumeration taking the following values:
  - WREQ1002 – Approved
  - WREQ1003 – Denied
- resolvedDateTime – A time stamp in the standard Social Program Management ISO8601 format – "YYYYMMDD HH:MM:SS".
- withdrawalRequestDenialReason – Optional. In the case there the withdrawal request was denied, a textual explanation for the denial. The sender must localize this to the locale of the citizen who originally submitted the application.

See the sample SOAP request for the Withdrawal Request Update operation.

On success this operation returns a document indicating that the request has succeeded. On failure, a fault is raised. Reasons for failure include:

- The withdrawal request id does not match a known withdrawal request id.
- The withdrawal request state transition is invalid.

life event service

The life event service is an outbound web service is invoked by Merative ™ Cúram Universal Access on remote systems. WSDL describing this service can be found in <CURAM_DIR>\EJBServer\components\WorkspaceServices\axis\LifeEventService\LifeEvent.wsdl.

A request for this web service contains the following fields:

- lifeEventReference – Describes the type of the life event, for example "Change of Address"
- senderIdentification – Identifies the sender of the request. The sender identification contains two parts, 1) the identifier of the system from which the request originates, 2) The Citizen Workspace Account ID of the user that created the request.
- lifeEventData - Contains a base64 encoded representation of the life event data. This life event data is the XML representation of the XML datastore associated with an life event.
- lifeEventSchemaName – The name of the schema used to create the data store for the life event.

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- submittedDateTime – The date and time when the life event was submitted. An XML Schema dateTime. For example, 2012-05-29T15:34:49.000+01:00
- supplementaryInformation – optional, reserved for future use.

The implementation should return a response of type lifeEventResponse with the content "true" when the life event is successfully processed. If there is an error processing the life event then the system should return a fault in accordance with the WSDL specification.

Create account service

The create account service is an inbound web service invoked by remote systems on Merative ™ Cúram Universal Access. The service creates a Citizen Workspace Account for users who previously submitted an Intake Application anonymously.

The create account service performs two functions:

- Create an account for a previously anonymous user.
- Link that account to the remote system that is invoking the Create Account Web Service.

If a Citizen Workspace user is "linked" to a remote system, it means that user is registered on the remote system and the remote system will recognize requests from that Citizen Workspace user as relating to a particular case, cases or an individual on the remote system. This has serious security implications on the remote system – The remote system sending a request to link a user or create an account for a user must be convinced of the identity of the individual who owns the account. The schema for the payload of web service requests of this type can be found in *<CURAM_DIR>*`\EJBServer\components\WorkspaceServices\webservices\ExternalAccountCreate.xsd`. See the sample SOAP request for this web service.

A create account request contains the following information:

- firstName – The first name.
- middleName – The middle name. Optional.
- surname – The last name.
- username – The username for the newly created account.
- password – The password for the newly created account.
- confirmPassword – Confirmation of the password. Must match password.
- secretQuestionType – The type of secret question selected to unlock the user's account. Values should correspond to entries from the SecretQuestionType code table. For example, SQT1 – Mother's maiden name.
- answer – An answer to the secret question. Non empty.
- termsAndConditionsAccepted – Boolean indication that the citizen has accepted the terms and conditions on which the account is created.
- intakeApplicationReference – Refers to the unique applicationReference passed in as part of the receive application request. If this is specified, a link will be created between the application and the newly created account.
- clientIDOnRemoteSystem – This is a unique identifier that can be used to identify the user of this account on the remote system. There is no prescribed form for this id, it could be a Social Security Number for example. It must be capable of uniquely identifying the citizen on the remote system.

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- sourceSystem – Identifies the remote system that sent this request. This must match the name of a remote system configured in the administration application. For more information about configuring remote systems, see Configuring life events.

If successful this returns the id of the created citizen workspace account. Problems that occur during the processing of the request are flagged by a fault response. Possible issues include:

- An account has already been associated with the intake application reference.
- The username already exists.
- The user name or password do not meet minimum mandatory criteria such as password strength, user name length.

Link service

The link service is an inbound web service invoked by remote systems on Merative ™ Cúram Universal Access. The link service is used to link a Citizen Workspace account to a remote system.

See the section on Create Account Service for a general discussion of the implications of linking a user. The schema for the payload of web service requests of this type can be found in *<CURAM_DIR>\EJBServer\components\WorkspaceServices\webservices\ExternalAccountLink.xsd*. See the sample SOAP request for this web service.

This web service request contains the following information:

- sourceSystem – The name of the remote system sending the request. Must match the name of a remote system configured in the system.
- citizenWorkspaceAccountID – The unique citizen workspace account id.
- clientIDOnRemoteSystem - This is a unique identifier that can be used to identify the user of this account on the remote system. There is no prescribed form for this id, it could be a Social Security Number for example. It must be capable of uniquely identifying the client on the remote system.
- createdByUsername – The username on the remote system responsible for this request.

On success this operation returns a document indicating that the request has succeeded. On failure, a fault is raised. Reasons for failure include:

- The citizen workspace account id is invalid, does not exist or is associated with a de-activated account.
- The citizen workspace account in question is already linked to this remote system.

Unlink service

The unlink service is an inbound web service invoked by remote systems on Merative ™ Cúram Universal Access. The unlink service is used to unlink a Citizen Workspace Account from a remote system.

After executing this service it will not be possible for the user of the unlinked account to submit life events to this remote system, for example. The schema for the payload of web service requests of this type can be found in *<CURAM_DIR>\EJBServer\components*

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\WorkspaceServices\webservices\ExternalAccountUnlink.xsd. See the sample SOAP request for this web service.

This web service request contains the following information:

- sourceSystem – The name of the remote system sending the request.
- citizenWorkspaceAccountID – The unique ID of the Citizen Workspace Account being unlinked.

On success this operation returns a document indicating that the request has succeeded. On failure, a fault is raised. Reasons for failure include:

- The indicated account does not exist or is not active.
- The indicated account is not linked to the remote system sending the request.

Citizen message

The citizen message is an inbound web service invoked by remote systems on Merative ™ Cúram Universal Access. The citizen message is used to send Citizen Messages that are displayed on a user's Home Page when they log in to the Citizen Account.

The schema for the payload of web service requests of this type can be found in *<CURAM_DIR>\EJBServer\components\WorkspaceServices\webservices \ExternalCitizenMessage.xsd*. See the sample SOAP request for this web service.

This web service request contains the following information:

- sourceSystem – The name of the remote system sending the request.
- citizenWorkspaceAccountID – The unique citizen workspace account id.
- cityIndustryType – Denotes the type of industry associated with the message. The values for this element must match codes from the CityIndustry code table.
- relatedID – Refers to the id of an underlying entity in the remote system to which the message refers. For example, if the message concerns a payment then the related ID identifies the ID of the payment within the remote system.
- externalCitizenMessageType – The external citizen message type, taken from the ExternalCitizenMessageType codetable.
- messageTitle – The title of the message. It is the responsibility of the remote system to localize this to the locale of the end user.
- messageBody – The body of the message. It is the responsibility of the remote system to localize this to the locale of the end user.
- effectiveDate – Optional. The date from which the message is effective. It will only be displayed from this date onwards. The date must be in the format – "YYYY-MM-DD". If an effective date is not provided then the current date is taken as the effective date.
- expiryDate – The date that the message is set to expire. Following this date, the message will not be displayed to the user. The date must be in the format – "YYYY-MM-DD".
- priority – A boolean value to indicate whether this message is a high priority.

Some messages are designed such that a newer message can replace an older one. For example, a message is sent concerning a meeting. The time of the meeting changes and a new message is sent with the updated time for the meeting. The citizen does not see both messages, rather the

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second message replaces the first and only the second message is seen. One external message will automatically replace another external message if the following fields match those of an existing message: sourceSystem, externalCitizenMessageType and relatedID.

Payment service

The payment service is an inbound web service invoked by remote systems on Merative ™ Cúram Universal Access. The payment service is used to transmit information about one or more payments.

The schema for the payload of web service requests of this type can be found in *<CURAM_DIR>*`\EJBServer\components\WorkspaceServices\webservices\ExternalPayment.xsd`. See the sample SOAP request for this web service.

This web service request can contain one or more Payments. This allows the remote system to batch up payments and send them as a single request for performance reasons. Each payment can relate to an entirely separate citizen account. A single payment may contain a payment breakdown. A payment breakdown may contain one or more payment line items.

A single payment contains the following information:

- paymentID – Together with the source system, this uniquely identifies a payment.
- sourceSystem – The name of the remote system sending the request. Must match the name of a remote system configured in the system.
- citizenWorkspaceAccountID – The unique citizen workspace account id.
- cityIndustryType – Denotes the type of industry associated with the payment. The values for this element must match codes from the CityIndustry code table. Optional.
- paymentAmount – The headline value for the payment as a whole. This payment may optionally be further broken into a number of line items.
- currency – The currency in which the payment was made, contains values from the Currency code table. Optional.
- paymentMethod – The method by which the payment was made, contains values from the MethodOfDelivery code table.
- paymentStatus – The status of the payment, for example cancelled, processed, suspended etc. Contains values from PmtReconciliationStatus code table.
- effectiveDate – The effective date of the payment in the format "YYYY-MM-DD".
- coverPeriodFrom – The start date of the period covered by this payment. In the format "YYYY-MM-DD".
- coverPeriodTo – The end date of the period covered by this payment. In the format "YYYY-MM-DD".
- dueDate – The date that the payment was due to be paid. In the format "YYYY-MM-DD".
- payeeName – The name of the payee for this payment.
- payeeAddress – The address that the payment was sent to (in the case of a cheque). Optional.
- paymentReferenceNo – Uniquely identifies a payment within a given remote system.
- bankSortCode - The sort code of the bank account to which this payment is delivered.
- bankAccountNo – The bank account number to which payment is made.
- A payment may contain a Payment Breakdown (optional).

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A Payment Breakdown contains one or more Payment Line Items. A Payment Line Item contains the following information:

- caseName – The human readable name of the case on the remote system with which this payment is associated.
- The case name must be localised to the locale of the citizen. This case name must match the case name displayed on the Contact Information page.
- caseReference – This uniquely identifies the case on a given remote system.
- componentType – This contains a code from the FinComponentType code table.
- debitAmount – The amount debited if this payment was a debit.
- creditAmount – The amount credited if this payment was a credit.
- coverPeriodFrom - The start date of the period covered by this payment. In the format "YYYY-MM-DD".
- coverPeriodTo – The end date of the period covered by this payment. In the format "YYYY-MM-DD".

It is important to note that payments can supersede previously submitted payments. For example, a payment is submitted from TestSystem with paymentID 1234. Subsequently another payment arrives from TestSystem with the same paymentID, 1234. This payment replaces the previous payment. The previous payment is physically removed along with all its related payment line items. A typical example of where this might occur is when a previously issued payment is cancelled.

Contact service

The contact service is an inbound web service invoked by remote systems on Merative ™ Cúram Universal Access. The contact service is used to update a register of caseworker contact details relating to a remote system.

The schema for the payload of web service requests of this type can be found in *<CURAM_DIR>*`\EJBServer\components\WorkspaceServices\webservices\ExternalContact.xsd`. See the sample SOAP request for this web service.

A contact web service request contains the following information:

- sourceSystem – The name of the remote system sending the request. Must match the name of a remote system configured in the system.
- contactReference – A reference for the contact, unique within the source remote system.
- fullName – The full name of the caseworker.
- phoneNumber – The phone number of the caseworker. Optional.
- mobilePhoneNumber – The mobile/cell phone number of the caseworker. Optional.
- faxNumber – The fax number for the caseworker. Optional.
- email – The email address of the caseworker. Optional.

If a request is received with the same source system and contact reference as a preexisting entry then the information in the newer request supersedes the preexisting information.

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Case service

The case service is an inbound web service invoked by remote systems on Merative ™ Cúram Universal Access. The case service is used to update details of cases associated with a particular Citizen Account.

The schema for the payload of web service requests of this type can be found in *<CURAM_DIR>*`\EJBServer\components\WorkspaceServices\webservices\ExternalCase.xsd`. See the sample SOAP request for this web service.

A web service request of this type contains the following information:

- sourceSystem – The name of the remote system sending the request. Must match the name of a remote system configured in the system.
- contactReference – A reference for the contact, unique within the source remote system, this must match a contact reference previously transmitted via a Contact Service request.
- caseReference – This is a case reference and must be unique within the remote system that is the source of this request.
- caseName - The human readable name of the case on the remote system. The case name must be localized to the locale of the client. Case names used in the Payment web service should match case names provided in this request.
- citizenWorkspaceAccountID – The unique citizen workspace account id.

If a request is received with the same source system and case reference as a preexisting entry then the information in the newer request supersedes the preexisting information.

Sample SOAP requests

Use the sample SOAP requests to help you develop real SOAP requests.

Intake program application update

Sample intake program application update SOAP request.

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/
envelope/" xmlns:rem="http://
remote.externalservices.workspaceservices
.curam" xmlns:xsd="http://dom.w3c.org/xsd">
   <soapenv:Header>
     <curam:Credentials xmlns:curam="http://
www.curamsoftware.com">
     <Username>userforpeersystem</Username>
     <Password>password</Password>
   </curam:Credentials>
   </soapenv:Header>
   <soapenv:Body>
      <rem:updateIntakeProgramApplication>
      <rem:xmlMessage>
      <intakeProgramApplicationUpdate>
        <applicationReference>256</applicationReference>
        <applicationProgramReference>joannesprogram
</applicationProgramReference>
        <programApplicationStatus>IPAS1004</
programApplicationStatus>
```

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```
        <programApplicationDisposedDateTime>
          20120528 17:19:47
        </programApplicationDisposedDateTime>
        <programApplicationDenialReason>IPADR1001
</programApplicationDenialReason>
      </intakeProgramApplicationUpdate>
         </rem:xmlMessage>
      </rem:updateIntakeProgramApplication>
   </soapenv:Body>
</soapenv:Envelope>
```

Withdrawal request update

Sample withdrawal request update SOAP request.

```
      <?xml version="1.0" encoding="UTF-8"?>
<table name="SEARCHSERVICEFIELD">

  <column name="
      searchServiceFieldId
      " type="text" />
  <column name="
      searchServiceId
      " type="text" />
  <column name="
      name
      " type="text" />
  <column name="
      indexed
      " type="bool" />
  <column name="
      type
      " type="text" />
  <column name="
      stored
      " type="bool" />
  <column name="
      entityName
      " type="text" />
  <column name="
      analyzerName
      " type="text" />
  <column name="
      untokenized
      " type="bool" />

  <row>
    <attribute name="searchServiceFieldId">
      <value>
      field0
      </value>
    </attribute>
    <attribute name="searchServiceId">
      <value>
      PersonSearch
      </value>
    </attribute><attribute name="name">
      <value>
```

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```
      primaryAlternateID
      </value>
    </attribute><attribute name="indexed"> <soapenv:Envelope
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:rem="http://
remote.externalservices.workspaceservices.curam"
xmlns:xsd="http://dom.w3c.org/xsd">
   <soapenv:Header>
     <curam:Credentials xmlns:curam="http://
www.curamsoftware.com">
     <Username>userforpeersystem</Username>
     <Password>password</Password>
   </curam:Credentials>
   </soapenv:Header>
   <soapenv:Body>
      <rem:updateWithdrawalRequest>
         <rem:xmlMessage>
    <withdrawalRequestUpdate>
      <curamReferenceID>-6897262829317914624</curamReferenceID>

      <withdrawalRequestStatus>WREQ1002</withdrawalRequestStatus>
      <resolvedDateTime>20120525 11:30:50</resolvedDateTime>
    </withdrawalRequestUpdate>
         </rem:xmlMessage>
      </rem:updateWithdrawalRequest>
   </soapenv:Body>
</soapenv:Envelope>
```

Create account

Sample create account SOAP request.

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/
envelope/" xmlns:rem="http://
remote.externalservices.workspaceservices.
curam" xmlns:xsd="http://dom.w3c.org/xsd">
   <soapenv:Header>
     <curam:Credentials xmlns:curam="http://
www.curamsoftware.com">
     <Username>admin</Username>
     <Password>password</Password>
   </curam:Credentials>
   </soapenv:Header>
   <soapenv:Body>
      <rem:createAccount>
         <!--Optional:-->
         <rem:xmlMessage>
            <!--Optional:-->
     <cre:AccountCreate xmlns:cre="http://www.curamsoftware.com/
WorkspaceServices/ExternalAccountCreate">
        <firstName>John</firstName>
        <middleName>M</middleName>
        <surname>Doe</surname>
        <username>johnmdoe</username>
        <password>password1</password>
        <confirmPassword>password1</confirmPassword>
        <secretQuestionType>SQT1</secretQuestionType>
        <answer>mypassword1</answer>
```

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```
        <termsAndConditionsAccepted>true</
termsAndConditionsAccepted>
        <intakeApplicationReference>256</
intakeApplicationReference>
        <clientIDOnRemoteSystem>112233445566</
clientIDOnRemoteSystem>
        <sourceSystem>TestSystem</sourceSystem>
    </cre:AccountCreate>
         </rem:xmlMessage>
      </rem:createAccount>
   </soapenv:Body>
</soapenv:Envelope>
```

Account link

Sample account link SOAP request.

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/
envelope/" xmlns:rem="http://
remote.externalservices.workspaceservices.
curam" xmlns:xsd="http://dom.w3c.org/xsd">
   <soapenv:Header>
     <curam:Credentials xmlns:curam="http://
www.curamsoftware.com">
     <Username>admin</Username>
     <Password>password</Password>
   </curam:Credentials>
   </soapenv:Header>
   <soapenv:Body>
      <rem:linkTargetSystemToAccount>
         <rem:xmlMessage>
          <lnk:AccountLink xmlns:lnk="http://
www.curamsoftware.com/
WorkspaceServices/ExternalAccountLink">
           <sourceSystem>TestSystem</sourceSystem>
           <citizenWorkspaceAccountID>7081910414040104960
</citizenWorkspaceAccountID>
           <clientIDOnRemoteSystem>112233445566</
clientIDOnRemoteSystem>
          <createdByUsername>testuser</createdByUsername>
         </lnk:AccountLink>
         </rem:xmlMessage>
      </rem:linkTargetSystemToAccount>
   </soapenv:Body>
</soapenv:Envelope>
```

Account unlink

Sample account unlink SOAP request.

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/
envelope/" xmlns:rem="http://
remote.externalservices.workspaceservices.
curam" xmlns:xsd="http://dom.w3c.org/xsd">
   <soapenv:Header>
     <curam:Credentials xmlns:curam="http://
www.curamsoftware.com">
     <Username>admin</Username>
     <Password>password</Password>
   </curam:Credentials>
```

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```
   </soapenv:Header>
   <soapenv:Body>
      <rem:unlinkTargetSystemFromAccount>
         <!--Optional:-->
         <rem:xmlMessage>
         <unl:AccountUnlink xmlns:unl="http://
www.curamsoftware.com/
WorkspaceServices/ExternalAccountUnlink">
           <sourceSystem>TestSystem</sourceSystem>
           <citizenWorkspaceAccountID>7081910414040104960
</citizenWorkspaceAccountID>
         </unl:AccountUnlink>
         </rem:xmlMessage>
      </rem:unlinkTargetSystemFromAccount>
   </soapenv:Body>
</soapenv:Envelope>
```

Citizen message

Sample citizen message SOAP request.

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/
envelope/" xmlns:rem="http://
remote.externalservices.workspaceservices.
curam" xmlns:xsd="http://dom.w3c.org/xsd">
    <soapenv:Header>
  <curam:Credentials xmlns:curam="http://www.curamsoftware.com">
     <Username>admin</Username>
     <Password>password</Password>
   </curam:Credentials>
   </soapenv:Header>
   <soapenv:Body>
      <rem:createMessage>
         <rem:xmlMessage>
<cm:CitizenMessage xmlns:cm="http://www.curamsoftware.com/
WorkspaceServices/ExternalCitizenMessage">
  <sourceSystem>TestSystem</sourceSystem>
  <cityIndustryType>CMI9001</cityIndustryType>
  <citizenWorkspaceAccountID>7081910414040104960
</citizenWorkspaceAccountID>
  <relatedID>6060</relatedID>
  <externalCitizenMessageType>PMT2004</
externalCitizenMessageType>
  <messageTitle>Hello, World!</messageTitle>
  <messageBody>This is the body of the message.</messageBody>
  <effectiveDate>2000-01-01</effectiveDate>
  <expiryDate>2020-01-01</expiryDate>
  <priority>false</priority>

</cm:CitizenMessage>
         </rem:xmlMessage>
      </rem:createMessage>
   </soapenv:Body>
</soapenv:Envelope>
```

Payment (simple)

Sample payment (simple) SOAP request.

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/
```

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```
envelope/" xmlns:rem="http://
remote.externalservices.workspaceservices.
curam" xmlns:xsd="http://dom.w3c.org/xsd">
   <soapenv:Header>
     <curam:Credentials xmlns:curam="http://
www.curamsoftware.com">
     <Username>admin</Username>
     <Password>password</Password>
   </curam:Credentials>
   </soapenv:Header>
   <soapenv:Body>
      <rem:create>
         <rem:xmlMessage>
     <tns:Payment xmlns:tns="http://www.curamsoftware.com/
WorkspaceServices/ExternalPayment">
        <paymentID>1554</paymentID>
        <sourceSystem>TestSystem</sourceSystem>
        <cityIndustryType>CMI9001</cityIndustryType>
        <citizenWorkspaceAccountID>7081910414040104960
</citizenWorkspaceAccountID>
        <paymentAmount>50.00</paymentAmount>
        <currency>EUR</currency>
        <paymentMethod>CHQ</paymentMethod>
        <paymentStatus>PRO</paymentStatus>
        <effectiveDate>2012-01-01</effectiveDate>
        <coverPeriodFrom>2012-01-01</coverPeriodFrom>
        <coverPeriodTo>2012-01-01</coverPeriodTo>
        <dueDate>2012-01-01</dueDate>
        <payeeName>Dorothy</payeeName>
        <payeeAddress>12 Gloster St., WA 6008</payeeAddress>
        <paymentReferenceNo>F</paymentReferenceNo>
        <bankSortCode>933384</bankSortCode>
        <bankAccountNo>88776655</bankAccountNo>
        <PaymentBreakdown>
           <PaymentLineItem>
                <caseName>I</caseName>
                <caseReferenceNo>J</caseReferenceNo>
                <componentType>C10</componentType>
                <debitAmount>22.45</debitAmount>
                <creditAmount>50.76</creditAmount>
                <coverPeriodFrom>2012-01-01</coverPeriodFrom>
                <coverPeriodTo>2012-01-01</coverPeriodTo>

            </PaymentLineItem>
        </PaymentBreakdown>
    </tns:Payment>
  </rem:xmlMessage>
</rem:create>
</soapenv:Body>
</soapenv:Envelope>
```

Payment (batched)

Sample payment (batched) SOAP request.

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/
envelope/" xmlns:rem="http://
remote.externalservices.workspaceservices.
curam" xmlns:xsd="http://dom.w3c.org/xsd">
```

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```
   <soapenv:Header>
     <curam:Credentials xmlns:curam="http://
www.curamsoftware.com">
     <Username>admin</Username>
     <Password>password</Password>
   </curam:Credentials>
   </soapenv:Header>
   <soapenv:Body>
      <rem:create>
         <rem:xmlMessage>
     <tns:Payments xmlns:tns="http://www.curamsoftware.com/
WorkspaceServices/ExternalPayment">
        <Payment>
            <paymentID>2346</paymentID>
            <sourceSystem>TestSystem</sourceSystem>
            <cityIndustryType>CMI9001</cityIndustryType>
            <citizenWorkspaceAccountID>8306889512684879872
</citizenWorkspaceAccountID>
            <paymentAmount>48.00</paymentAmount>
            <currency>EUR</currency>
            <paymentMethod>CHQ</paymentMethod>
            <paymentStatus>PRO</paymentStatus>
            <effectiveDate>2012-01-01</effectiveDate>
            <coverPeriodFrom>2012-01-01</coverPeriodFrom>
            <coverPeriodTo>2012-01-01</coverPeriodTo>
            <dueDate>2012-01-01</dueDate>
            <payeeName>D</payeeName>
            <payeeAddress>E</payeeAddress>
            <paymentReferenceNo>F</paymentReferenceNo>
            <bankSortCode>G</bankSortCode>
            <bankAccountNo>H</bankAccountNo>
            <PaymentBreakdown>
                <PaymentLineItem>
                    <caseName>I</caseName>
                    <caseReferenceNo>J</caseReferenceNo>
                    <componentType>C24000</componentType>
                    <debitAmount>22.45</debitAmount>
                    <creditAmount>49.76</creditAmount>
                    <coverPeriodFrom>2012-01-01</coverPeriodFrom>
                    <coverPeriodTo>2012-01-01</coverPeriodTo>
                </PaymentLineItem>
                <PaymentLineItem>
                    <caseName>I</caseName>
                    <caseReferenceNo>J</caseReferenceNo>
                    <componentType>C24000</componentType>
                    <debitAmount>22.45</debitAmount>
                    <creditAmount>49.76</creditAmount>
                    <coverPeriodFrom>2012-01-01</coverPeriodFrom>
                    <coverPeriodTo>2012-01-01</coverPeriodTo>
                </PaymentLineItem>
            </PaymentBreakdown>
        </Payment>
    </tns:Payments>
         </rem:xmlMessage>
      </rem:create>
   </soapenv:Body>
</soapenv:Envelope>
```

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Contact

Sample contact SOAP request.

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/
envelope/" xmlns:rem="http://
remote.externalservices.workspaceservices.
curam" xmlns:xsd="http://dom.w3c.org/xsd">
   <soapenv:Header>
  <curam:Credentials xmlns:curam="http://www.curamsoftware.com">
     <Username>admin</Username>
     <Password>password</Password>
   </curam:Credentials>
   </soapenv:Header>
   <soapenv:Body>
      <rem:updateExternalContact>
         <rem:xmlMessage>
     <con:ContactInfo xmlns:con="http://www.curamsoftware.com/
WorkspaceServices/ExternalContact">
        <sourceSystem>TestSystem</sourceSystem>
        <contactReference>CON_100</contactReference>
         <fullName>Harry Neilan</fullName>
        <phoneNumber>1-800-CALL-ME</phoneNumber>
        <mobilePhoneNumber>1-800-CALL-MOB</mobilePhoneNumber>
        <faxNumber>1-800-CALL-FAX</faxNumber>
        <email>harry@x.org</email>
    </con:ContactInfo>
         </rem:xmlMessage>
      </rem:updateExternalContact>
   </soapenv:Body>
</soapenv:Envelope>
```

Cases

Sample cases SOAP request.

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/
envelope/" xmlns:rem="http://
remote.externalservices.workspaceservices.
curam" xmlns:xsd="http://dom.w3c.org/xsd">
<soapenv:Header>
     <curam:Credentials xmlns:curam="http://
www.curamsoftware.com">
     <Username>admin</Username>
     <Password>password</Password>
   </curam:Credentials>
   </soapenv:Header>
   <soapenv:Body>
      <rem:updateExternalCase>
         <rem:xmlMessage>
    <cas:CaseInfo xmlns:cas="http://www.curamsoftware.com/
WorkspaceServices/ExternalCase">
        <sourceSystem>TestSystem</sourceSystem>
        <contactReference>CON_100</contactReference>
        <caseReference>CAS_109</caseReference>
        <caseName>My Benefit Case - 103</caseName>
        <citizenWorkspaceAccountID>8306889512684879872
</citizenWorkspaceAccountID>
    </cas:CaseInfo>
         </rem:xmlMessage>
```

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```
      </rem:updateExternalCase>
   </soapenv:Body>
</soapenv:Envelope>
```

8.6 Customizing appeals

You can customize appeals to suit your organization. You can integrate with an appeals system of your choice. If you are licensed for the Cúram Appeals application module, the Cúram appeals functionality is available on installation.

About this task

You can customize the following aspect of appeals:

- The **Your rights to appeal content** text on the dashboard.
- The **Your appeals** page. The **Appeals** page is shown only when a citizen has a case to appeal, otherwise it is not displayed.
- The Request an Appeal **Overview** page, from which you can start the **Request an Appeal** form.
- The **Request an Appeal** IEG script, in which you specify the contents of the form.
- The **Confirmation and next steps** page.
- The **Appeal** cards on the **Appeals** home page, which contain information about each appeal request that a user creates. Each card shows the status of the appeal request in a colored badge, with text such as **Appeal Request Submitted** or **Appeal Request Pending**. The color depends on the status. For example, **Appeal Request Submitted** is blue. You can customize the label text.

Procedure

1. The Appeals feature is unavailable by default. Enable Appeals in the application, see Enabling and disabling appeals on page 316.
2. Review the text on application pages. For more information about modifying text on pages, see Changing text in the application on page 135.
3. Review the **Request an Appeal** form. For more information, see Configuring appeal requests on page 255.
4. Review the **Appeal Request** cards on the **Your appeals** page, which show the appeals status. For more information about customizing the appeals statuses, see Customizing appeal request statuses on page 325.

Related concepts

Appeal on page 54
If your organization includes appeals in their business process, citizens can appeal decisions on their benefits online from their citizen accounts on their own devices. If your organization uses the Cúram Appeals application module, your organization can process appeals through the full appeals life cycle that is provided by that solution.

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Enabling and disabling appeals

The Appeals feature is disabled by default. Use the REACT_APP_FEATURE_APPEALS_ENABLED environment variable to enable or disable the Appeals pages and options in your application. When you enable Appeals, it is available only to linked users with an existing case that they can appeal.

About this task

For more information about linked users, see 6.5 User account types on page 214.

The following Appeals functionality can be enabled or disabled:

- The **Appeals** tab on the home page.
- The **Appeals Request** page.
- **Your rights of appeal** message on the home page.
- Appeals-related URLs, for example `/appeals`.

Procedure

1. Edit the *`.env`* file in the root of your application.
2. Set REACT_APP_FEATURE_APPEALS_ENABLED to *`true`* or *`false`*. If you don't define the environment variable, the appeals feature defaults to enabled.

8.7 Customizing the citizen account

Users can use the citizen account to log in to a secure area where users can screen and apply for programs.

Users also use the citizen account to view information relevant to them, including individually tailored messages, system-wide announcements, updates on their payments, contact information for agency staff and outreach campaigns that might be relevant to them. The citizen account also provides a framework for customers to build their own pages or override the existing pages.

Related concepts

Track on page 44
When citizens create a secure citizen account, they can access a range of relevant information. Citizens can also use the citizen account to track and manage their interactions with the agency.

Messages

When a linked citizen logs in, messages are gathered from the system and from remote systems for display.

The `curam.citizenmessages.impl.CitizenMessageController` API gathers and displays messages. The API reads persisted messages by participant from the `ParticipantMessage` database table. The API also raises the `CitizenMessagesEvent.userRequestsMessages` event, inviting listeners to add messages to a list that is passed as part of the event parameter. The messages that are gathered from each source are sorted, turned into XML, and returned to the citizen for display.

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Configuring citizen messages

Global configurations are included that can be specified for **Citizen Messages**, such as enabling certain types and configuring their display order. The different types of messages also include their own configuration points. Specific information about how to customize the various message types is provided later.

The textual content of a message type also can be configured. Each message type has a related properties file that includes the localizable text entries for the various messages displayed for that type. These properties also include placeholders that are substituted for real values related to the citizen at run time.

The wording of this text can be customized, by inserting a different version of the properties file into the resource store. The following table defines which properties file need to be changed for each type of message:

Table 16: Message properties files

Message type	Property file name
Payments	*CitizenMessageMyPayments.properties*
Application Acknowledgment	*CitizenMessageApplicationAcknowledgement.properties*
Verifications	*CitizenMessageVerificationMessages.properties*
Meetings	*CitizenMessageMeetingMessages.properties*
Referral	*CitizenMessagesReferral.properties*
Service Delivery	*CitizenMessagesServiceDelivery.properties*

You can also remove placeholders (which are populated with live data at run time) from the properties. However, there is currently no means to add further placeholders to existing messages. A custom type of message must be implemented in this situation.

Adding a new type of citizen message

Messages are gathered by the controller in two ways: the controller reads messages that were persisted to the database by using the *curam.citizenmessages.persistence.impl.ParticipantMessage* API, and also gathers them by raising the *curam.participantmessages.events.impl.CitizenMessagesEvent*

A decision needs to be made regarding whether to 'push' the messages to the database, or else have them generated dynamically by a listener that listens for the event that is raised when the citizen logs in. The specific requirements of the message type need to be considered, along with the benefits and drawbacks of each option.

Persisted messages

In this scenario, when something takes place in the system that might be of interest to the citizen, a message is persisted to the database. For example, when a meeting invitation is created, an event is fired. The initially configured meeting messages function listens for this event. If the meeting invitee is a participant with a linked account, a message is written to the `ParticipantMessage` table that informs the citizen that they are invited to the meeting.

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One benefit of this approach is that little processing is done when the citizen logs in to see this message: the message is read from the database and displayed, as opposed to calculation that takes place that would determine whether the message was required. However, the implementation also needs to handle any changes to the underlying data that might invalidate or change the message, and take appropriate action.

For example, the meeting message function also listens for changes to meetings to ensure the meeting time, location, and similar, are up to date, and to send a new message to the citizen to inform the citizen that the location or time was changed.

Dynamic messages

These messages are generated when the citizen logs in, by event listeners that listen for the `curam.participantmessages.events.impl.CitizenMessagesEvent.userRequestsMessages` event.

Because the message is generated at runtime, code is not required to manage change over time. The message is generated based on the data within the system each time the citizen logs in. If some underlying data changes, the next time the citizen logs in, they will get the correct message.

A drawback to this approach is that significant processing might be required at run time to generate the message. Care must be taken to ensure that this processing does not adversely affect the load time of the **Citizen Account** dashboard.

Performance considerations must be evaluated against the requirements of the specific message type and the effort that is required to manage change to the data that the message is related to over time. For example, the initially configured verification message is dynamic. When a citizen logs in, it checks to see whether any outstanding verifications exist for that citizen. This process is a relatively simple database read, whereas it would be complicated to listen for various events in the Verification Engine and ensure that an up-to-date message was stored in the database related to the participants' outstanding verifications. Alternatively, the meeting messages need to inform the citizen of changes to their meetings, so functionality had to be written to manage changes to the meeting record and its related message over time.

Implementing a new message type

Organizations can implement a dynamic message or a persisted message.

To implement a new message type, regardless of whether the message is persisted or is generated dynamically, complete the following steps.

Common tasks

- In the administration system, add an entry to the `CT_ParticipantMessageType` code table to represent the new message type.
- Add a DMX entry for the ParticipantMessageConfig database table. This entry stores the type and sort order of the new message type and is used for administration. For example:

```
<row>
   <attribute name="PARTICIPANTMESSAGECONFIGID">
     <value>2110</value>
   </attribute>
   <attribute name="PARTICIPANTMESSAGETYPE">
     <value>PMT2001</value>
```

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```
    </attribute>
    <attribute name="ENABLEDIND">
      <value>1</value>
    </attribute>
    <attribute name="SORTORDER">
      <value>5</value>
    </attribute>
    <attribute name="VERSIONNO">
      <value>1</value>
    </attribute>
  </row>
```

- Add a properties file to the App Resource store that contains the text properties and image reference for the message.
- Add an image for this message type to the resource store.

Implementing a dynamic message

To implement a dynamic style message, an event listener must be implemented to listen for the *`CitzenMessagesEvent.userRequestsMessages`* event. This event argument contains a reference to the Participant and a list, to which the listener adds *`curam.participantmessages.impl.ParticipantMessage`* Java™ objects.

For more information, see the Javadoc™ API for *`CitzenMessagesEvent`* in the *`<CURAM_DIR>/EJBServer/components/core/doc`* directory. For a full explanation, see the Javadoc™ API for *`curam.participantmessages.impl.ParticipantMessage`* and *`curam.participantmessages.impl.ParticipantMessages`*.

The message text is stored in a properties file in the resource store. A dynamic listener retrieves the relevant properties from the resource store, and creates the ParticipantMessage object. The message text for a message can include placeholders. Values for placeholders are added to ParticipantMessage objects as parameters. The CitizenMessagesController resolves these placeholders, replacing them with the real values for the participant.

For example, look at this entry from the *`CitizenMessageMyPayment.properties`* file:

```
Message.First.Payment=
  Your next payment is due on {Payment.Due.Date}
```

The actual payment due date of the payment is added to the ParticipantMessage object as a parameter. The CitizenMessagesController then resolves the placeholders, populating the text with real values, and then turns the message into XML that is rendered on the citizen account. A public CitizenMessageController method also exists, which returns all messages for a citizen as a list, see the Javadoc™.

From the *`curam.participantmessages.impl.ParticipantMessage`* API:

```
/**
 * Adds a parameter to the map. The paramReference
 * should be present in the message title or body so
 * it can be replaced by the paramValue before the message
 * is displayed.
 *
 * @param paramReference
```

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```
 * a string place holder that is present in either the
 * message title or body. Used to indicate where the value
 * parameter should be positioned in a message.

 * @param paramValue
 * the value to be substituted in place of the place holder
 */
 public void addParameter(final String paramReference,
   final String paramValue) {

   parameters.put(paramReference, paramValue);
 }
```

The call to the method would look like this:

```
participantMessage.addParameter("Payment.Due.Date", "1/1/2011");
```

Messages can also include links, which are also resolved at run time. Links can use placeholder values for the link text. A link is defined in a properties file as shown.

```
Click {link:here:paymentDetails} to view the payment details.
```

In this example, `here` is the text to display, and `paymentDetails` is the name of the link to be inserted at that point in the text.

For more information, see the *Advisor Configuration Guide*.

For a dynamic listener to populate this link with a target, it creates a *`curam.participantmessages.impl.ParticipantMessageLink`* object, specifying a target and a name for the link. The code would look like this example:

```
ParicipantMessageLink participantMessageLink =
     new ParticipantMessageLink(false,
       "CitizenAccount_listPayments", "paymentDetails");

   participantMessage.addLink(participantMessageLink);
```

Before the dynamic listener composes the message, it must check to ensure that the message type in question is enabled. The `curam.participantmessages.configuration.impl.ParticipantMessageConfiguration` record for that message type is read, and the `isEnabled` method is used to determine whether this message type is enabled. If not, processing stops.

Note: You can separate the code that listens for the event and the code that composes a specific message to adhere to the philosophy of “doing one thing and doing it well”.

Implementing a persisted message

To display a persisted message to the citizen, it must be written to the database with the *`curam.citizenmessages.persistence.impl.ParticipantMessage`* API. Message arguments are handled by persisting a *`curam.advisor.impl.Parameter`* record and associating it with the ParticipantMessage record. Links are handled by the *`curam.advisor.impl.Link`* API. Parameter names map to placeholders in the message text. Link names relate to the names of links that are specified in the message text. For more information, see the Javadoc™ for

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curam.citizenmessages.persistence.impl.ParticipantMessage, *curam.advisor.impl.Parameter*, and *curam.advisor.impl.Link*.

An expiry date time must be specified for each ParticipantMessage. After this date time, the message is no longer be displayed.

Messages can be removed from the database. If a message needs to be replaced with a modified version, or removed for another reason, use the *curam.citizenmessages.persistence. impl.ParticipantMessage* API.

Each message has a related ID and type that is used to track the record that the message is related to. For example, meeting messages store the Activity ID and a type of `Meeting`. Messages can be read by participant, related ID, and type by the `ParticipantMessageDAO`.

Before it persists the message, the dynamic listener checks to ensure that the message type in question is enabled. The `curam.participantmessages.configuration.impl.ParticipantMessageConfiguration` record for that message type is read, and the `isEnabled` method is used to determine whether this message type is enabled. If not, no further processing occurs.

Customizing specific message types

Organizations can customize the default message to create a referral message or a service delivery message.

Referral message

This message type creates messages related to referrals. This is a dynamic message. When the citizen logs in, a message will be created for each referral that exists for the citizen in the system, provided that referral has a referral date of today or in the future, and provided that a related Service Offering has been specified for this referral. The properties file *EJBServer\components\CitizenWorkspace\data\initial\blob\prop\CitizenMessageReferral.properties* contains the properties for the referral message text, message parameters, links and images. This properties file is stored in the resource store. This resource is registered under the resource name *CitizenMessageReferral*. To change the message text of the message, or to remove placeholders or change links, a new version of this file must be uploaded into the resource store.

Service delivery message

This message type creates messages related to service deliveries. This is a dynamic message. When the citizen logs in, a message will be created for each service delivery that exists for the citizen in the system, provided that service delivery has a status of 'In Progress' or 'Not Started'. The properties file *EJBServer\components\CitizenWorkspace\data\initial\blob\prop\CitizenMessageServiceDelivery.properties* contains the properties for the service delivery message text, message parameters, links and images. This properties file is stored in the resource store. This resource is registered under the resource name *CitizenMessageServiceDelivery*. To change the message text of the message, or to remove placeholders or change links, a new version of this file must be uploaded into the resource store.

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Payment messages

The payment message type creates messages based on the payments that are issued or canceled for a citizen.

The payment messages are persisted to the database. They replace each other, for example, if a payment is issued and then canceled, the payment issued message is replaced with a payment canceled message. The properties file *EJBServer\components\CitizenWorkspace \data\initial\blob\prop\CitizenMessageMyPayments.properties* contains the properties for financial message text, message parameters, links, and images. This properties file is stored in the resource store. This resource is registered in the resource name *CitizenMessageMyPayments*. To change the message text of financial messages, or to remove placeholders or change links, upload a new version of this file to the resource store. The following table lists the messages that are created when events that are related to payments occur in the system, and the related property in *CitizenMessageMyPayments.properties*.

Table 17: Payment messages and related properties

Payment event	Message Property
First payment issued on a case	Message.First.Payment
Latest payment issued	Message.Payment.Latest
Last payment issued	Message.Last.Payment
Payment canceled	Message.Cancelled.Payment
Payment reissued	Message.Reissue.Payment
Payment stopped (case suspended)	Message.Stopped.Payment
Payment / Case unsuspended	Message.Unsuspended.Payment

Customization of the payment messages expiry date

You can set the number of days that the payment message is displayed to the citizen with a system property. By default the property value is set to 10 days, but you can override this default from property administration.

Table 18: Payment message expiry property

Name	Description
curam.citizenaccount.payment.message.expiry.days	The number of days that the payment message is displayed to the participant.

Meeting messages

The meeting message type creates messages based on meetings that citizens are invited to, provided that they are created by using the `curam.meetings.sl.impl.Meeting` API.

The API raises events that the meeting messages functionality consumes. There are other ways of creating Activity records without this API, but meetings created in these ways do not have related messages created as the events are not raised. These messages are persisted to the database. They replace each other, for example, if a meeting is scheduled and then the location is changed, the initial invitation message is replaced with one informing the citizen of the location change. The properties file *EJBServer\components\CitizenWorkspace \data\initial\blob\prop\CitizenMessageMeetingMessages.properties* contains the properties for the meeting messages text, message parameters, links and

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images. This properties file is stored in the resource store. This resource is registered in the resource name *CitizenMessageMeetingMessages*. To change the message text of meeting messages, or to remove placeholders or change links, a new version of this file must be uploaded into the resource store. Table 1 describes the messages created when various events related to meetings occur in the system, and the properties in *CitizenMessageMeetingMessages.properties* that relates to each message created. Different versions of the message text are displayed depending on whether the meeting is an all day meeting, whether a location has been specified, and whether the meeting organizer has contact details registered in the system. Accordingly, the property values in this table are approximations that relate to a range of properties within the properties file. Refer to the properties file for a full list of the message properties.

Table 19: Meeting messages

Meeting event	Message Properties
Meeting invitation	Non.Allday.Meeting.Invitation.*, Allday.Meeting.Invitation.*
Meeting update	Non.Allday.Meeting.Update.*, Allday.Meeting.Update.*
Meeting canceled	Allday.Meeting.Update.*, Allday.Meeting.Cancellation.*

Customization of the meeting messages display date

The number of days before the meeting start date that the message should be displayed to the citizen can be configured using a system property. By default the property value is set to 10 days, however, this can be overridden from property administration.

The meeting message expires (it is no longer displayed to the citizen) at the end of the meeting, that is, the date time at which the meeting is scheduled to end.

Table 20: Meeting message display date property

Name	Description
curam.citizenaccount.meeting.message.effective.days	The number of days before the meeting start date that the message should be displayed to the citizen.

Application acknowledgment message

The application acknowledgment message type creates a message when an application is submitted by a citizen.

The message is persisted to the database. The properties file *EJBServer\components\CitizenWorkspace\data\initial\blob\prop\CitizenMessageApplicationAcknowledgment.properties* contains the properties for the messages text, message parameters, links and images. This properties file is stored in the resource store. This resource is registered under the resource name *CitizenMessageApplicationAcknowledgment*. To change the message text of the message, or to remove placeholders or change links, a new version of this file must be uploaded into the resource store.

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Customization of application acknowledgment message expiry date

The number of days the Application Acknowledgment message will be displayed to the citizen can be configured using a system property. By default the property value is set to 10 days, however, this can be overridden from property administration.

Table 21: Application acknowledgment message expiry property

Name	Description
curam.citizenaccount. intake.application.acknowledgement.message.expiry.days	The number of days the application acknowledgment message will be displayed to the participant.

Customizing the Notices page

By default, the notices relevant to the linked user are listed on the **Notices** page. You can replace the default CitizenCommunicationsStrategy implementation with your own custom implementation.

For example, you can create a custom implementation to retrieve the communications of all of the household members of the logged-in citizen, instead of just the citizen.

Create an alternative implementation of the `curam.citizenaccount.impl.CitizenCommunicationsStrategy.listCitizenCommunications(` method for listing the citizen communication records.

In addition, a number of default hooks are available for custom implementations to customize the behavior of the communication processing module.

Related concepts

The Notices page on page 51
When a citizen is logged in, they can see all communications that are relevant to them on the **Notices** page, with sent, received, or normal status indicated. Notices are typically formal written communications that are issued to meet legal, regulatory, or state requirements, which are created by using letterhead templates.

Communication processing hooks and events

How electronic notices are managed and supported in the Citizen Portal affects the communication processing module.

While the default implementation doesn't address or implement any of the impacts, the following default hooks are available for the custom implementation to customize the communication processing module.

curam.core.hook.impl.PreCreateCommunicationHook - can be used in customized scenarios for any kind of pre creation processing for communication records.

curam.core.hook.impl.PreModifyCommunicationHook - can be used in customized scenarios for any kind of pre modify processing for communication records.

For e.g.; in situations where create or modify operation is not applicable, this hook points can be used to redirect the user with customized messages before the creation or modification of communication records using custom exception handling.

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curam.core.hook.impl.CommunicationInvocationStrategyHook - can be used as a toggle the above hooks i.e., PreModifyCommunicationHook and PreCreateCommunicationHook should be invoked or not.

The following communication processing methods have been updated by the pre creation and pre modification hooks that are mentioned above to enable further customization.

- curam.core.facade.impl.Communication.modifyWordDocument(ModifyWordDocumentDetails)
- curam.core.facade.impl.Communication.modifyEmail(ModifyEmailCommDetails, ModifyEmailCommKey)
- curam.core.facade.impl.Communication.modifyRecordedCommunication1(ModifyRecordedCommKey, ModifyRecordedCommDetails1)
- curam.core.facade.impl.Communication.modifyProForma1(ModifyProFormaCommDetails1)
- curam.core.facade.impl.Communication.createEmailCommunication(CreateEmailCommDetails)
- curam.core.facade.impl.Communication.createEmail(CreateEmailCommDetails)
- curam.core.facade.impl.Communication.createMSWordCommunication1(CreateMSWordCommunicationD
- curam.core.facade.impl.Communication.createCaseMSWordCommunication1(CreateMSWordCommunicati
- curam.core.facade.impl.Communication.createRecordedCommunication1(RecordedCommDetails1)
- curam.core.facade.impl.Communication.createProForma1(CreateProFormaCommDetails1)
- curam.core.facade.impl.Communication.createProFormaCommunication1(CreateProFormaCommDetails1)

Communication events

curam.core.events.CONCERNROLEACOMMUNICATION.INSERT_CONCERN_ROLE_COMMUNI

curam.core.events.CONCERNROLEACOMMUNICATION.MODIFY_CONCERN_ROLE_COMMUN

These are the events that are raised post-creation or post-modification of a communication record. Custom implementations can listen to these events for any kind of post processing requirements.

Customizing appeal request statuses

You can create an implementation to enable the display of appeal request status from an external appeals system in the citizen account by using the provided API.

About this task

The *curam.core.onlineappealrequest.impl.OnlineAppealRequestStatus* interface takes an appeal request as an input and passes back a code-table value. You can modify code-table entries as required.

- The appeal status text that you see in the application is hardcoded as `<description>` tags in two `CT_CitizenAppealRequestStatus.ctx` files.
  - The `EJBServer\components\core\codetable \CT_CitizenAppealRequestStatus.ctx` file contains the code table value for the **Appeal Request Submitted** status. This is so you can submit an appeal even if Cúram Appeals is not installed and the `Appeals.jar` file is not present. You can modify the description for the **Appeal Request Submitted** status in this file.
  - When Cúram Appeals is installed and the `Appeals.jar` is present, more appeal status values are available. You can modify the descriptions for the other code

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table status values in the *EJBServer\components\Appeal\codetable\CT_CitizenAppealRequestStatus.ctx* file.

For information about editing code tables, see the *Server Developer's Guide*.

- The color of each appeal status is set by the Badge component in the Social Program Management Design System. The *AppealRequestsComponent.js* file contains a `getBadgeDataByCodetable` function. The `getBadgeDataByCodetable` function is a map of code tables to badge type. For example, the CARS1001 code table is mapped to the `warning` badge type so it is displayed in red. In your Web app development environment, you can see the badge colors by opening the design system Storybook documentation at *@govhhs/govhhs-design-system-react/doc/index.html* and expanding to **Components** > **Badge**.

Procedure

1. Identify the appeal request ID from the caseworker application.
2. Use the appeal request ID to associate the appeal request status from the external system with the appeal request status in Merative ™ Cúram Universal Access.
3. Implement the *curam.core.onlineappealrequest.impl.OnlineAppealRequestStatus* interface to return the appropriate code table value based on the OnlineAppealRequest.
   For example, a custom implementation of this class might call a remote system and map the return value to an appropriate code table value.
4. Customize an appeal status message to display in the **Citizen Account**.
5. If you create a new status, you must map it to a badge type to specify a color to display.

Related tasks

Customizing appeals on page 315
You can customize appeals to suit your organization. You can integrate with an appeals system of your choice. If you are licensed for the Cúram Appeals application module, the Cúram appeals functionality is available on installation.

Error logging in the citizen account

When a citizen submits an application, when a citizen clicks **Submit** a deferred process starts. If a mapping failure occurs, an error is logged.

Application property

The application property *curam.workspaceservices.application.processing.logging.on* increases the level of detail of error messages.

When *curam.workspaceservices.application.processing.logging.on* is set to *true*, detailed error messages are written to the application log files if the submission process fails.

Error codes

Each error message is prepended with an error code. These error codes help to automatically scan application logs so that unexpected failures can be identified. The error codes that are returned by the application is defined in the code table file *CT_ApplicationProcessingError.ctx*.

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The range of codes that are reserved for internal processing is **APROCER001 – APROCER500**. Customers can use the range **APROCER501 – APROCER999** to log errors in custom processing, for example error codes for extension-mapping handler class.

The list of error codes that are returned by the application, and a brief description of the problem, is listed in Table 1.

Table 22: Application error codes

Code	Description
APROCER001	An error occurred creating a person.
APROCER002	An error occurred creating a prospect person.
APROCER003	A relationship error occurred creating a person.
APROCER004	An error occurred creating a case.
APROCER005	An error occurred while performing a "map-attribute" mapping.
APROCER006	An error occurred while performing a "set-attribute" mapping.
APROCER007	An error occurred while performing a "map-address" mapping.
APROCER008	General mapping failure.
APROCER009	Error creating evidence.
APROCER010	More than one PDF form is registered against the program type.
APROCER011	Error setting the alternate id type for a Prospect Person.
APROCER012	Invalid alternate ID value.
APROCER013	Error the Evidence Application Builder has not been correctly configured.
APROCER014	Evidence type not listed in the Mapping Configuration.
APROCER015	No parent evidence entity found.
APROCER016	An error occurred when trying to unmarshal the application XML.
APROCER017	An error occurred when trying to set a field value.
APROCER018	An error occurred when trying to create the PDF document.
APROCER019	An error occurred when trying to create the PDF document. A form code could not be mapped to a codetable description.
APROCER020	An error occurred when trying a WorkspaceServices mapping extension handler.
APROCER021	Missing source attribute in datastore entity.
APROCER022	An attribute in an expression is not valid.
APROCER023	Application builder configuration error.
APROCER024	Failed creating *DataStoreMappingConfig*, no name specified.
APROCER025	Failed creating *DataStoreMappingConfig*, the name is not unique.
APROCER026	The mapping to datastore had to be abandoned because the schema is not registered.
APROCER027	There was a problem parsing the Mapping Specification.
APROCER028	General mapping error. Mapping XML included.
APROCER029	Cannot have multiple primary participants.

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Code	Description
APROCER030	No programs have been applied for.
APROCER031	An error occurred while attempting to map to Person data.
APROCER032	An error occurred while attempting to map to Relationship data.
APROCER033	An error occurred while creating Cases.
APROCER034	An error occurred while creating evidence.
APROCER035	No programs have been applied for.
APROCER036	An error occurred reading data from the datastore.
APROCER037	Specified integrated case type does not exist.
APROCER038	Specified case type does not exist
APROCER039	Duplicate SSN entered for prospect person.
APROCER040	Duplicate SSN entered.
APROCER041	There was a problem with the workflow process.
APROCER042	No primary participant has been identified as part of the intake process.

8.8 Artifacts with limited customization scope

A description of Merative ™ Cúram Universal Access artifacts that have restrictions on their use. Customers that want to change these artifacts should consider alternatives or request an enhancement to Universal Access.

Model

Customers are not supported in making changes to any part of the Universal Access model. Changes in the model such as changing the data types of domains can cause failure of the Universal Access system and upgrade issues. This applies to the model files in the following packages:

- WorkspaceServices
- CitizenWorkspace
- CitizenWorkspaceAdmin

Code tables

For more information about a list of restricted code tables, see the *Development Compliancy Guide*.

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9 IEG in the Universal Access Responsive Web Applications

9.1 IEG in the Cúram Universal Access Responsive Web Application

Universal Access uses forms to gather information about citizens, such as when they apply for benefits. Merative ™ Cúram Universal Access Responsive Web Application forms that gather data as evidence are implemented in IEG, as in the classic Universal Access citizen application. However, forms are now rendered in the browser by the IEG React Player, rather than the IEG Java™ player, and in some cases, the IEG behavior is different.

Script designers can find information describing form design and user experience best practices with proven patterns for forms in the IEG Form Design Guidance PDF located in the docs folder of the *Universal Access Responsive Web Application* asset zip file.

Due to the technology and user interface changes, your existing IEG scripts must be tested before use, and in most cases, at least some minor changes are needed for existing scripts to work in the new application.

The default connectivity handling in the Cúram Universal Access Responsive Web Application helps to prevent citizens losing data in IEG forms by preventing them from leaving pages with unsaved changes. For more information about data loss prevention in IEG, see the *Universal Access Responsive Web Application Guide*.

9.2 IEG elements and attributes specific to the design system and Cúram Universal Access Responsive Web Application

The following IEG elements and attributes apply to the design system and Cúram Universal Access Responsive Web Application only.

- **Display elements and attributes**
  - The `combo-box` element, which is a child element of the `question` element.
  - The `explainer` element, which is a child element of the `cluster`, `question-page`, and `relationship-page` elements.
  - The `hint-text` element, which is a child element of the `container`, `list-question`, and `question` elements.
  - The `next-button-label` element, which is a child element of the `question-page`, `relationship-page`, and `summary-page` elements.
  - The `relationship-detail-header` element, which is a child element of the `relationship-summary-list` element.
  - The `quick-add-list` element, which is a child element of the `relationship-page` element.

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- **Display element attributes**
  - The `grouping-id` attribute of the `cluster` element.
- **Flow-control element attribute**
  - The value 'hidden' for the loop-type attribute of the loop element.
- **Meta-display elements**
  - The `class-names` element, which is a child element of the `layout` element.
  - The `date-picker` value for the `type` child element of the `layout` element.

For more information about IEG elements, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

9.3 IEG configuration not currently supported for the Cúram Universal Access Responsive Web Application

The following IEG configuration is not currently supported by the Cúram Design System or the Universal Access Cúram Universal Access Responsive Web Application.

- **Question matrices**
  Question matrices display a list of questions that are based on a code table and, for each of the code table values and each entity, a check box is displayed for you to select the values that apply to a particular entity.
- **Three-field date picker**
  The three-field date picker is no longer supported. Dates either default to a single-field date input field or can be configured with a date picker component by using the `layout` element.
- **Grouping individual question help at cluster level**
  Cluster-level help is supported, however, the `compile.cluster.help` property, which groups the help text for each of the questions in a cluster into the cluster help panel is not supported.
- **Display elements and attributes**
  - The `custom-output` element, which renders custom HTML on summary pages only.
  - The `show-page-elements` attribute on the `edit-link` element for editing specific clusters.
  - The `footer-field` element, which displays values that are calculated from expressions in the `footer-row` element of a list.
  - The `footer-row` element, which adds an extra row at the end of a list to display total or summary information.
  - The `help-text` element, which displays help text, is not supported for pages.
  - The `icon` element, which is used to add images to either the title area of a page or the sections panel.
  - The `label-alignment` element, which is used in the `layout` element for a cluster to control the text alignment of the labels in the cluster.

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    - The `label-width` element, which is used in the `layout` element for a cluster to control the width of the labels in the cluster.
    - The `num-cols` element, which is used in the `layout` element for a cluster to control the number of columns in the cluster.
    - The `type` element, which is used in the `layout` element for a cluster to control the layout of labels in relation to input controls.
    - The `width` element, which is used in the `layout` element for a cluster to control the width of the cluster on the page.
    - The `legislation` element, which creates legislation links at page and question level to point to relevant legislative information.
    - The `policy` element, which creates policy links at page and question level to point to relevant policy information
    - The `skip-field` element, which enables a more flexible layout of elements within clusters or footer rows in lists where no visible display element is needed.
    - The `row-help` element, which specifies help for rows in a list.
    - The `set-focus` attribute of the `question-page` element, which sets focus for a page.
- **Meta-display elements**
    - The `codetable-hierarchy-layout` element, which is used in questions with a code table hierarchy type to control different aspects of the layout.
- **Structural, administrative, and other elements and attributes**
    - The `hide-for-control-question` attribute on the `ieg-script` element, which hides the label and value of control questions for loops when the loop is entered.
    - The `highlight-validation` attribute on the `ieg-script` element. Validations are now always displayed with the failing input field.
    - The `show-progress-bar` attribute on the `ieg-script` element. Progress through sections is now indicated by text and the section title. For example, **STEP 2 OF 4 · HOUSEHOLD**.

For more information about IEG elements, see the the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

9.4 Customizing the Back button in IEG forms

You can customize the behavior of the Back button in IEG forms to suit your applications.

For the best user experience, set the behavior of the **Back** button in IEG according to whether you have a single form or multiple forms in your application. Where you have multiple forms, you typically want to navigate back to the previous form.

- Where you have a single form, always disable the **Back** button on the first page of the IEG form. The **Back** button goes back one page in the form, not in the application, so you don't

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need one on the first page. For more information about the `show-back-button` element, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

- Typically, an application has multiple forms. By default, a feature with two forms, Apply and Submit is provided in the `universal-access-ui` package. The default feature has two instances of `BaseFormContainer`, `ApplicationFormContainer` and `SubmissionFormContainer`.

  By default, the Apply form has the **Back** button disabled on its first page.

  In Cúram Universal Access Responsive Web Application 3.0.4 or later, the **Back** button of the Submit form goes to the Apply form in the `SubmissionFormContainer` component by default.

  If you are customizing or overriding `SubmissionFormContainer` component, or using an earlier version, you must add some code to the `SubmissionFormContainer` component to ensure that the **Back** button goes to a previous form.

  - Add a function to the component logic, for example:

    ```
    handleBackForFirstPage = () => {
      const { history, submissionFormDetails } = this.props;
      const { applicationFormId } = submissionFormDetails;
      history.push({
        pathname: `${PATHS.APPLY}/${applicationFormId}`,
      });
    };
    ```

  - Then, inside the render function, pass the function to the `BaseFormContainer` component by using the `onBackForFirstPage` prop, for example:

    ```
    render() {
      const { submissionFormDetails, match } = this.props;


    RESTService.handleAPIFailure(this.props.createApplicationUsingFormDetailsError);
      RESTService.handleAPIFailure(this.props.createSubmissionFormError);
      RESTService.handleAPIFailure(this.props.deleteApplicationFormError);
      RESTService.handleAPIFailure(this.props.getSubmissionFormDetailsError);

      if (match.params.submissionFormId && submissionFormDetails) {
        return (
          <BaseFormContainer
            iegFormId={match.params.submissionFormId}
            iegHookBindingKey={HookBindings.SUBMISSION}
            onBackForFirstPage={this.handleBackForFirstPage}
            onExit={this.handleExit}
            onFinish={this.handleFinishScript}
            onSaveAndExit={this.handleSaveAndExit}
            title={(submissionFormDetails &&
    submissionFormDetails.applicationTitle) || ''}
          />
        );
      }

      return <AppSpinner />;
    }
    }
    ```

  For more information about the `onBackForFirstPage` property, see 9.16 Customizing script behavior with BaseFormContainer on page 351.

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9.5 Configuring section navigation for forms

If you are developing scripts in IEG, you can enable section navigation to guide people through forms.

About this task

You can use section navigation on any forms, but it is particularly useful for longer forms. If you enable section navigation, it is a good idea to use section summary pages so that users can review their changes regularly.

Procedure

In your IEG script, add the `show-section` element to the `ieg-script` element.

9.6 Configuring progress information for forms

If you are developing pages in IEG, you can show progress text and the section title so citizens can see where they are in the script, for example, **STEP 2 OF 4 · HOUSEHOLD**.

Add the following IEG configuration property to the *`ieg-config.properties`* file to configure the text. The section title is added automatically.

```
# Text progress bar indicator
progress.bar.indicator.text=Step %1s of %2s
```

Where *`%1s`* is the current step number and the *`%2s`* is the total number of steps on the script. The message is calculated based on the total number of sections and the current section.

The IEGPageMetadata(JSON); component contains all of the metadata for each IEG form. The text progress indicator is displayed if IEGPageMetadata finds the `metadata['ieg-config']['progress-indicator']` element in the JSON.

9.7 Configuring dynamic titles on forms

If you are developing pages in IEG, you can configure the relationship pages with more relevant titles that are based on the user's responses.

The relationship page title accepts an International Components for Unicode (ICU) message template. Page titles and subtitles accept a specific formatting syntax based on ICU. It should be used in loops and will give more context to the users.

These six keywords are defined:

- `index`
- `innerIndex`
- `outerIndex`
- `ordinal`
- `innerOrdinal`

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- `outerOrdinal`

You can use `index` and `ordinal` in simple non-nested loops. If they are used in a nested loop, it is synonymous to `outerIndex` and `outerOrdinal`.

Refer to these examples.

`"Add {ordinal} member"` displays **Add first member**, **Add second member**, ...

`"Add the {innerOrdinal} income for the {outerOrdinal} member"` displays **Add the first income for the first member** ...

`"{index, select, 0 {Add your {innerOrdinal} income} other {Add %1s's {innerOrdinal} income}}"` displays **Add your first income** or **Add Jane's first income** depending on the value of index (this is equal to ordinal - 1).

`"Ajouter la {ordinal}#feminine# personne"` displays **Ajouter la première personne**.

`"Ajouter la {innerOrdinal}#feminine# recette du {outerOrdinal}# %spellout-ordinal-masculine# membre"` displays **Ajouter la première recette du premier membre**.

You can define the title as follows:

```
{index, select, 0 {Your relationships} other {{personName}'s relationships}}
```

The outcome of this message template on the first relationship question page is **Your relationships**. On the following relationship question pages, it shows **[personName]'s relationships**. The reserved word `personName` displays the person's first name on the title of the page.

9.8 Configuring rich text on forms

You can configure rich text to display with a number of IEG display elements in IEG forms. You can also configure external links in rich text to open in a new tab or window.

About this task

Rich text is supported in the following IEG display elements that support text:

- `cluster` title, help, and description
- `container` title, help, and description
- `display-text`
- `divider`
- `list` title, help, and description
- `question` label and help
- `subtitle`

For more information about IEG elements, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

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Configuring external links to open in a new tab or window

You can configure external links to open in a new tab or window in IEG forms. By default, links open in the current tab.

About this task

For security reasons, HTML in rich text is sanitized to remove certain attributes before display, including the HTML target attribute. You must configure the rich text to leave the target attribute in the sanitized content so that the link opens in a new tab or window.

For example, the `<a href="myurl">my link</a>` link in rich text opens in the current tab as intended. The `<a href="myurl" target="_blank">my link</a>` link is intended to open in a separate tab or window. However, because the rich text is sanitized with DOMPurify before display, the target attribute is removed and the link opens in the current tab by default.

To configure DOMPurify to leave specific attributes, you must add `dompurify` to the dependencies and specify a DOMPurify persistent configuration in any JavaScript or JSX code that runs when the app is loaded. For example, *`App.js`*. For more information about DOMPurify, see https://github.com/cure53/DOMPurify#persistent-configuration.

Only one active configuration at a time is allowed. After you set the configuration, any extra configuration parameters that are passed to `DOMPurify.sanitize` are ignored. The DOMPurify configuration persists until the next call to `DOMPurify.setConfig`, or until `DOMPurify.clearConfig` is called to reset it.

Procedure

1. Add `dompurify` to the dependencies in the *`package.json`* file.

```
npm install dompurify
```

2. To configure DOMPurify to leave the target attribute, specify the following DOMPurify persistent configuration in any JavaScript or JSX code that runs when the app is loaded.

```
import DOMPurify from 'dompurify';
DOMPurify.setConfig({ ADD_ATTR: ['target'] });
```

9.9 Configuring hint text for forms

You can use short sentences of hint text to explain the expected input format or content in IEG forms. For example, you can explain the expected format for a telephone number.

About this task

Hint text is suitable for short sentences and does not support HTML tags. If you want to add more text or format text with HTML tags, use the `help-text` or `explainer` elements instead. For more information, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

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Note: Specific globalization considerations apply to the date format when it is used in hint text and messages. Ensure that you have the same date format in the `REACT_APP_DATE_FORMAT` environment variable, and in the`DateAdapter_DateFormat` and `Errors_date` messages in the `intelligent-evidence-gathering-locales` package.

Procedure

In your IEG script, you can add the `hint-text` element to any `container`, `question` or `list-question` element.

For example:

- Container

```
<container show-container-help="true">
        <title id="primaryPhoneNumber">primaryPhoneNumber</title>
    <hint-text id="PhoneNumber.Hint">PhoneNumber.Hint</hint-text>
    <help-text id="PhoneNumber.Help">Telephone number must only contain numbers,
 parentheses, or dashes and be 10 digits. For example, (212) 555-0010 or
 2125550010.</help-text>
    <question id="primaryPhoneType" mandatory="true">
                <help-text id="PhoneNumber.Help">Telephone number must only contain
 numbers, parentheses, or dashes and be 10 digits. For example, (212) 555-0010 or
 2125550010.</help-text>
        <label id="PrimaryPhoneType.Label">Primary Phone Type</label>
    </question>
</container>
```

- Question

```
<question id="firstName" mandatory="true">
        <hint-text id="FirstName.Hint">FirstName.Hint</hint-text>
    <label id="FirstName.Label">First Name</label>
</question>
```

- List question

```
<list-question entity="Person" id="currentlyWorking" mandatory="false">
    <label id="CurrentlyWorking.Label">Please select the people that have a job:</
label>
    <hint-text id="CurrentlyWorking.Hint">CurrentlyWorking.Hint</hint-text>
    <item-label>
        <label-element attribute-id="firstName" />
    </item-label>
</list-question>
```

9.10 Configuring explainer text for forms

You can use the `explainer` element to provide extra text in IEG forms that is initially hidden and that can be expanded to show further explanation. For example, you can provide background information that a user can choose to expand only if needed.

About this task

You can use the `explainer` element to provide a large amount of text without cluttering up the form. For more information, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

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Procedure

In your IEG script, add the `explainer` element to any `cluster`, `question-page`, or `relationship-page` element.

For example:

- `cluster`

```
<cluster>
        <explainer>
          <title id="ExplainerCluster.Title">Why do we ask for your Social Security
 Number?</title>
          <description id="Explainer.Description">Your Social Security Number
 ensures that your application is unique to you and reduces processing time.</
description>
        </explainer>
        <question control-question="false" id="isSSN" mandatory="true" multi-
select="false" show-field-help="false">
          <label id="IsSSN.Label">What is your Social Security Number?</label>
        </question>
      </cluster>
```

- `question-page`

```
<question-page>
<explainer>
 <title id="ExplainerSSN.Title">Why do we ask for your Social Security Number?</
title>
 <description id="ExplainerSSN.Description">Your Social Security Number ensures that
 your application is unique to you and reduces processing time.</description>
 </explainer>
</question-page>
```

- `relationship-page`

```
<relationship-page>
<explainer>
 <title id="ExplainerSSN.Title">Why do we ask for your Social Security Number?</
title>
 <description id="ExplainerSSN.Description">Your Social Security Number ensures that
 your application is unique to you and reduces processing time.</description>
 </explainer>
</relationship-page>
```

9.11 Configuring the 'Help' label for forms

You can change or remove the 'Help' label from the help icon for input controls in the application by overriding the default text. To remove the label, override the default text with a single space character in a custom messages file.

Procedure

1. Create a `src/locale/messages_en.json` messages file with a single space character as the value for the help label message ID, `WidgetHelp_helpToggleText`.

```
{
  "WidgetHelp_helpToggleText": " "
}
```

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2. Update the `src/config/intl.config.js` file in the English locale to point to the custom messages file.

```
// [...]    {
      locale: 'en',
      displayName: 'English',
      localeData: () => {
        require('@formatjs/intl-pluralrules/locale-data/en');
        require('@formatjs/intl-relativetimeformat/locale-data/en');
      },
      messages: require('../locale/messages_en'),
    },// [...]
```

3. Rebuild and deploy the application to see your changes.

Related tasks

Changing text in the application on page 135
You can change the default text, images, colors, or typography in the application. In this scenario, an English language message is changed. Text is changed by providing custom text that overrides the default text for any language.

9.12 Configuring required or optional labels for form fields

You can choose whether to indicate the required fields or the optional fields in IEG forms. As the majority of questions in a typical form should be required, indicating the optional questions rather than the required questions typically results in a less cluttered form. By default, optional fields are highlighted in IEG forms.

About this task

By default, fields that are not configured as required in the IEG script are labeled as **Optional** and required fields are not labeled. If you choose to indicate required fields instead, fields that are configured as required in the script are labeled **Required** and optional fields are not labeled.

Procedure

Show labels for required questions only by adding the `REACT_APP_DISPLAY_REQUIRED_LABEL` environment variable to your *`.env`* file with a value of `true`.
For example:

```
REACT_APP_DISPLAY_REQUIRED_LABEL=true
```

9.13 Configuring input formats and constraints for form fields

You can customize field inputs and constraints on IEG forms, such as phone numbers, social security numbers (SSN), dates, currencies, and percentages. You can adjust the width of form fields to match the length of the expected input, and choose to use a date picker for dates where appropriate.

About this task

Where users need to type confidential information, you can obscure the input values to ensure privacy. This configuration is done in the data store schema by setting a new data type and cannot

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be used with masks. Instead of using a mask, you can also implement any extra constraints, such as the number of characters, in the data store schema by creating a custom domain, see Configuring inputs to be obscured for privacy on page 343.

Masked input fields increase input field readability by formatting or constraining typed data. You can apply input masks with the IEG `class-names` element, which is a child element of the `layout` element. The `class-names` element adds the content of the element to the HTML that is generated for the component, this element accepts multiple values that are separated by a space. For more information about the IEG `layout` element, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

You might need a custom mask that is not supported by the `class-names` element, such as variants of the Social Security Number (SSN) or Social Insurance Number (SIN). To create a custom mask, use the `mask-format` element, which is a child element of the `layout` element, to set custom masks with Cleave.js format.

- **Input field masks**

  If the class name matches any of the reserved input mask class names, that class name is applied to the HTML control input. If the class name does not match a reserved input mask class name, the class name is applied to the `<div>` element that contains the HTML element (`cluster`, `question`, or `list-question`). You can use the following design system CSS classes as input masks to format and constrain input values for questions:

  - `wds-js-input-mask-currency`

    Masks input for currencies. The character limit is 21 characters. You can also set optional environmental variables for currency symbols, see Configuring currency symbols on page 342.
  - `wds-js-input-mask-numeral`

    Masks input for numerical input.
  - `wds-js-input-mask-yyyy-mm-dd`

    Masks input for the YYYY-MM-DD date format.
  - `wds-js-input-mask-percentage`

    Masks input for percentage characters.
  - `wds-js-input-mask-phone`

    Masks input for phone number fields according to the defined locale for the application. Configuring the phone number input mask requires some additional steps and you can also set optional environmental variables for delimiters and country codes, see Configuring phone numbers on page 341.
  - `wds-js-input-mask-postal-code`

    Masks input for 2 groups of 3 characters that are separated by a space, XXX XXX, such as a Canadian postal code. Alphabetic characters are converted to uppercase.
  - `wds-js-input-mask-sin`

    Masks input for 3 groups of 3 characters that are separated by spaces, XXX XXX XXX, such as a Canadian Social Insurance Number (SIN).
  - `wds-js-input-mask-ssn`

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Masks input for digits that are separated by dashes and grouped as follows, XXX-XX-XXXX, such as a US social security number (SSN).

- `wds-js-input-layout-size--field_size`

  Adjusts the width of form fields to match the length of the expected input. Where *field_size* is one of the following sizes:

  - **x-small**
    Use for 2 - 3 characters, such as DD, MM, or title.
  - **small**
    Use for 4 - 6 characters, such as ZIP code, postal code, or CVV number.
  - **medium**
    Use for around 8 characters, such as SSN or DD/MM/YYYY.
  - **large**
    Use for around 16 characters, such as credit card numbers.
  - **x-large**
    Use for around 24 characters, such as email addresses.

- **Form field width**

  To avoid confusion about expected inputs, always match the width of form fields to the expected input. For example, use a form field that matches the length of the SSN.

- **Date picker**

  For date questions, in addition to the masked input, you can choose to add a date picker for dates by setting the value of the `type` child element of the `layout` element to `date-picker`. For those questions, you can then use the calendar or type the date. By default, date questions are displayed with the masked input field if no layout `type` is specified.

Procedure

1. In your IEG script, add the appropriate CSS classes to the `layout` element for the question. For example:

```
<question id="ssn" mandatory="true">
 <label id="SSN.Label">SSN</label>
 <layout>
  <class-names>custom-css-class1 wds-js-input-mask-ssn wds-js-input-layout-size--
medium
            </class-names>
 </layout>
</question>
```

2. If you want to add a custom mask, use a `mask-format` element in the `layout` element. Define the `mask-format` text value by using an XML CDATA section with a JSON object with reference to the Cleave.js documentation,
   For example,

```
<layout><mask-format><![CDATA[{ "delimiter": " ",  "blocks": [2, 2, 2],
      "numericOnly": true  }]]></mask-format><layout>
```

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Configuring phone numbers

You can configure an input mask class name to format phone number fields in IEG forms according to the defined locale for the application. You can also configure a phone number delimiter or a country prefix if needed.

Procedure

1. Add `cleave.js` as a dependency in your `package.json` file.

   ```
   "cleave.js": "<version>"
   ```

   Where *version* is the version that you want to use.
2. Import the region-specific `.js` file in your initializing `.js` file.

   For example:

   ```
   import 'cleave.js/dist/addons/cleave-phone.[country]';
   ```

   Where *country* is the locale that you want to use.
3. Add a REACT_APP_PHONE_MASK_FORMAT environment variable to your `.env` file.

   ```
   REACT_APP_PHONE_MASK_FORMAT=[country]
   ```

   Where *country* is the locale that you want to use.
4. In your IEG script, add the `wds-js-input-mask-phone` class name to the question. For example:

   ```
   <question id="primaryPhoneNumber" mandatory="true" show-field-help="true">
    <layout>
      <class-names>wds-js-input-mask-phone</class-names>
    </layout> <label id="PrimaryPhoneNumber.Label">Primary Phone Number</label>
   </question>
   ```
5. Optional: You can set a custom delimiter for phone numbers by adding the `REACT_APP_PHONE_MASK_DELIMITER` environment variable to your `.env` file.
   For example, to convert 1 636 5600 5600 to 1-636-5600-5600, set the environment variable as follows:

   ```
   REACT_APP_PHONE_MASK_DELIMITER=-
   ```
6. Optional: You can set a fixed country code for phone numbers by adding the `REACT_APP_PHONE_MASK_LEFT_ADDON` environment variable to your `.env` file.
   For example, to convert 1-636-5600-5600 to +1-636-5600-5600, set the environment variable as follows:

   ```
   REACT_APP_PHONE_MASK_LEFT_ADDON=+
   ```

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Configuring date formats

You can configure the date format in IEG forms by setting the `REACT_APP_DATE_FORMAT` environment variable.

About this task

By default, the date format is MM/DD/YYYY if you do not set a value for the `REACT_APP_DATE_FORMAT` environment variable. If you set an invalid value, the default date format is used.

The valid values are:

```
dd-mm-yyyy
mm-dd-yyyy
yyyy-mm-dd
```

Note: Specific globalization considerations apply to the date format when it is used in hint text and messages. Ensure that you have the same date format in the `REACT_APP_DATE_FORMAT` environment variable, and in the `DateAdapter_DateFormat` and `Errors_date` messages in the `intelligent-evidence-gathering-locales` package.

Procedure

Change the date format by adding the `REACT_APP_DATE_FORMAT` environment variable to your *`.env`* file.
For example, to change the date format to DD/MM/YYYY, set the environment variable as follows:

```
REACT_APP_DATE_FORMAT=dd-mm-yyyy
```

Note: The date display format supports the forward slash (/) date separator character only. However, when you specify the date configuration you must use the dash (-) character. For example, yyyy-mm-dd. The use of a custom date separator character is not supported.

Configuring currency symbols

You can configure the currency symbol that is displayed for currency fields in IEG forms. Configure the `REACT_APP_CURRENCY_MASK_ADDON` environment variable to specify a currency symbol to display either before or after the currency amount. The alignment of the currency symbol is based on the locale.

About this task

For more information about how the currency symbol is aligned based on locale, see the developer.mozilla.org documentation.

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The value of the REACT_APP_CURRENCY_MASK_ADDON environment variable takes precedence over the deprecated REACT_APP_CURRENCY_MASK_LEFT_ADDON and REACT_APP_CURRENCY_MASK_RIGHT_ADDON environment variables.

Procedure

Use the following option to configure and align the currency symbol based on the locale by configuring the REACT_APP_CURRENCY_MASK_ADDON environment variable.

- Add the REACT_APP_CURRENCY_MASK_ADDON environment variable to your *.env* file. For example, to set the currency symbol to US dollars, enter the following command:

```
REACT_APP_CURRENCY_MASK_ADDON=$
```

Use the following deprecated option to explicitly align the currency symbol on either the left side or the right side.

-

  Add a currency symbol for currency fields by adding the REACT_APP_CURRENCY_MASK_LEFT_ADDON or REACT_APP_CURRENCY_MASK_RIGHT_ADDON environment variables to your *.env* file. For example, to set the currency symbol for US dollars, enter the following command to set the environment variable:

  ```
  REACT_APP_CURRENCY_MASK_LEFT_ADDON=$
  ```

  If both environment variables are set, REACT_APP_CURRENCY_MASK_LEFT_ADDON takes precedence.

Configuring inputs to be obscured for privacy

Where users need to type confidential information, you can obscure the input values to ensure privacy. Users can show or hide the text as they type. The user input is obscured when they type the confidential information, such as their Social Security Number (SSN). By default no constraints are applied, but you can create a custom domain to apply custom constraints where needed. For example, you can restrict the number of characters.

About this task

You can obscure inputs by setting the data type for a specified attribute of an entity to IEG_OBSCURED in the data store schema. This configuration cannot be used with masks. Instead of using a mask, you can also implement any extra constraints, such as the number of characters, in the data store schema by creating a custom domain.

For more information about data types and IEG domains, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

For more information about data store schemas, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

Procedure

1. In the entity, identify the attributes for which you want to obscure the input.

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For example, the `ssn` attribute for the social security number.

2. Edit the data store schema *`.xsd`* file for the IEG script and in the entity, change the type of the attribute to *`IEG_OBSCURED`*.
   For example,

```
<xsd:attribute name="ssn" type="IEG_OBSCURED"/>
```

3. Optional: To apply further input constraints to the field, create a custom domain.
   For example, to constrain the user from typing more than 9 characters in the input field for an SSN, you can create a custom domain called `SSN_OBSCURED`.
   a) Create a custom domain like the following domain.

```
....
    <xsd:include schemaLocation="IEGDomains"/>
<!-- NEW  TYPE  BEGIN-->
 <xsd:simpleType name="SSN_OBSCURED">
        <xsd:restriction base="IEG_OBSCURED">
   <xsd:minLength value="8"/>
   <xsd:maxLength value="9"/>
  </xsd:restriction>
    </xsd:simpleType>

<!-- NEW  TYPE  END-->
 <xsd:element name="Application">
.....
```

   b) Edit the data store schema *`.xsd`* file for the IEG script and change the type of the `ssn` attribute to *`SSN_OBSCURED`*.
   For example,

```
<xsd:attribute name="ssn" type="SSN_OBSCURED"/>
```

9.14 Configuring code-table hierarchies for form fields

You can use code-table hierarchies to add two related questions in IEG forms. When you answer the first question, the second question is enabled.

About this task

Any question where the data type is defined as a code table hierarchy is displayed as two separate questions in vertically aligned drop-down menus. The first question menu corresponds to the root code table in the hierarchy, and displays the label that is specified for the question. The second question menu corresponds to the second-level code table in the hierarchy, and displays a label that corresponds to the code table display name. The second menu is disabled until a selection is made in the first menu. Summary pages display both questions.

Displaying a code-table hierarchy value in a list, or the `codetable-hierarchy-layout` options, are not supported.

Procedure

To ensure that the label is displayed correctly for the second question, you must ensure that, for each code table `name` element, there is a corresponding `locale` element within the `displaynames` element in your code-table definition.

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For example, see the following code-table definition.

```
<codetables package="curam.codetable" hierarchy_name="CountyCityHierarchy">
    <!-- Parent codetable - County -->
    <codetable java_identifier="COUNTYCODE" name="CountyCode">
        <displaynames>
            <name language="en">County</name>
            <locale language="en">County</name>
        </displaynames>
        <!-- code items... -->
    </codetable>
    <!-- Child codetable - City -->
    <codetable java_identifier="CITYCODE" name="CityCode"
 parent_codetable="CountyCode">
        <displaynames>
            <name language="en">City</name>
            <locale language="en">City</name>
        </displaynames>
        <!-- code items... -->
    </codetable>
</codetables>
```

9.15 Implementing a combo box for form fields

You can implement a combo box question with an auto-complete search function to help you to complete form fields in IEG forms as you type. For example, known address fields can be automatically selected when you enter an address. You can implement the option to add new items if they are not found, for example, add an address.

About this task

You must implement a search function in the Cúram Universal Access Responsive Web Application and register the search function with `IEGRegistry`. The search function can point to an internal or external search service to provide the information. Then, update the datastore schema definition and your IEG script.

Implementing search functions for `ComboBox` components

You can implement the `ComboBox` component to search external data sources as you type in a form field, with a built-in filter function. Implement a search function and associated error handling, and make that search function available to the IEG form. If needed, you can implement an **Add New** option so that users can add an item if it is not found.

Procedure

1. Implement the search function. A search function is a JavaScript™ function that receives one parameter that contains the value of the `ComboBox`, and returns an array of items to be displayed by the `ComboBox`.

   The response of `search-function` is an array of items, `{items}`. Each item is an object with the following structure:

```
{
  id:"key"
  value:"value"
  item: { "attribute1": "value1", "attribute2": "value2" },
}
```

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Where:

- `id` is a mandatory attribute to store the ID in the data store.
- `value` is the value of the question to store in the data store and to render in the list of options of the `ComboBox`.
- `item` is an optional complex object with the structure of the `formData` to be populated if that element is selected in the `ComboBox` component.

The structure of the item object must match the `formData` of the target entity. The following simple example populates the `ResidentialAddress` entity:

```
{
  'street1': 'street1',
  'street2': 'street2',
  'city': 'city',
  'zipCode':' zipCode',
  'state': 'state',
}
```

2. Register the search function with the `IEGRegistry` object. `IEGForm` has access to `IEGRegistry` and all registered functions. `IEGForm` reads the custom functions from `IEGRegistry` and stores them on its `formContext` so `IEGForm` can call custom functions.
   1. Implement the JavaScript™ function in any `.js` file.
   2. Import `IEGRegistry` in a JavaScript™ initial file, such as `App.js`, and add the custom function to the registry. For example:

```
 import { IEGRegistry } from '@spm/core';
 import { searchCity, customFunction } from './examples/playground/
customFunctions';
...

const App = () => {
  IEGRegistry.registerComboBoxSearchFunctions({ searchCity, customFunction });
   ....
};
```

Add New option

If you want to render an **Add New** option in the menu that is displayed by the `ComboBox`, the response of the JavaScript™ function must follow the structure:

```
{
   newItem: { id: '-1', label: 'Add New', value: ' ', position: 'top' },
   items,
 }
```

Where:

- `newItem` is a complex object with the definition of the **Add New** option.
- `id` is the ID of the new option.
- `label` is the label of the new option.
- `value` is the value of the new option.
- `position` is the position where the new option renders. The possible values are `bottom` and `top`.

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Error messages

The search function must implement its own logic to handle errors if an error needs to be displayed on the UI, the response of the search function must be:

```
{errorMessage: 'Controlled Error Message'}
```

The error message is displayed underneath the `ComboBox`.

Customizing Screen Reader Announcements for ComboBox search results

Aside from the default behavior where the Screen Reader announces the number of results found as the user types in the ComboBox, you can use this feature to announce messages that are more tailored to your needs.

Procedure

1. Implement a function to generate custom messages. This is a JavaScript™ function that receives and object that contains the following properties:

   Source: https://github.com/downshift-js/downshift?tab=readme-ov-file#geta11ystatusmessage

Property	Type	Description
highlightedIndex	number/null	The currently highlighted index
highlightedItem	any	The value of the highlighted item
inputValue	string	The current input value
isOpen	boolean	The isOpen state
itemToString	function(any)	The function for getting the string value from one of the options
previousResultCount	number	The total items showing in the dropdown the last time the status was updated
resultCount	number	The total items showing in the dropdown
selectedItem	any	The value of the currently selected item

   You can use a combination of these properties which are updated with each keystroke from the user to generate a string that will be read aloud by the AT tool of your choosing.

   Note: Please note that if an empty string is returned, the Screen Reader won't announce anything.

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The following is an example of a customization function that slightly changes the default behavior by not announcing anything if the user didn't input at least 3 characters, and then depending on the number of results found shows a different message:

```
const screenReaderResultAnnouncement = downshiftObject => {
  const { inputValue, resultCount } = downshiftObject;
  if (inputValue.length < 3) {
    return '';
  }

  if (resultCount === 0) {
    return 'No results found';
  }
  if (resultCount === 1) {
    return `1 result found for ${inputValue}`;
  }
  return `${resultCount} results found for ${inputValue}`;
};
```

You can implement this JavaScript™ function in any .js file as long as you export it.

2. **Register your custom functions with IEGRegistry**

   Like registering the search function, we can use IEGRegistry to register the custom function that was created. However, it is necessary to register your custom Screen Reader announcements function under **screenReaderResultAnnouncement** property name and using the **registerComboBoxCustomFunctions** method of the IEGRegistry. This is achieved by:

   - Naming the function screenReaderResultAnnouncement (like shown in the example) when you define it and using JavaScript™'s Shorthand Property Assignment as follows:

```
import { IEGRegistry } from '@spm/core';
import { screenReaderResultAnnouncement } from './path/to/custom/functions'

IEGRegistry.registerComboBoxCustomFunctions({ screenReaderResultAnnouncement });

/**
 * App component entry point.
 */
const App = () => {…}
```

   - Giving the function any custom name, and assigning it to the screenReaderResultAnnouncement property of the object we pass to the registerComboBoxCustomFunctions method as follows:

```
import { IEGRegistry } from '@spm/core';
import { customFunctionName } from './path/to/custom/functions'

IEGRegistry.registerComboBoxCustomFunctions({
  screenReaderResultAnnouncement: customFunctionName
});

/**
 * App component entry point.
 */
const App = () => {…}
```

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Configuring combo box scripts and schemas

Add the `combo-box` element to a question in your IEG script and configure the `combo-box` element attributes. Add a cluster after the question to display the information to the user when they select a menu item. Update the schema definition with the appropriate elements.

About this task

The `question` schema type must be a string. You cannot use a `question` with a `combo-box` child element as a control question.

You can review the design system usage guidance for the `ComboBox` component. In your development environment, open the Social Program Management Design System Storybook documentation at *`<path>@govhhs/govhhs-design-system-react/doc/index.html`* and search for `ComboBox`.

For more information about the IEG `combo-box` element, see the *Authoring Scripts using Intelligent Evidence Gathering Guide*.

Procedure

1. Add the `combo-box` child element to the `question` element. For example:

```
<question-page id="AboutTheApplicant_GB"  read-only="false" set-focus="false" show-
back-button="false" show-exit-button="true" show-next-button="true" show-person-
tabs="false" show-save-exit-button="true" entity="Person" >

<!-- ComboBox -->
<cluster entity="SearchAddress">
  <title id="SearchAddress.Title">Your address</title>
  <question id="fullAddress" mandatory="true" show-field-help="false">
  <label id="FullAddress.Label">Search for your address</label>
  <combo-box  key="id" search-function="searchAddress" target-
entity="ResidentialAddress" filter-items="true" />
</question>
</cluster>
 </question-page>
```

   Where:

   - `key` is the id to be stored in the data store and renders as a hidden widget on the front end. It is mandatory and the entity must define this property in the schema definition. The `key` schema type must be a string.
   - `search-function` is the name of the JavaScript™ search function to be called on each keydown event.
   - `target-entity` is an optional attribute to show information to the user when they select a combo box menu item. In `target-entity`, specify the cluster entity to be populated with the value of the `search-function` result item attribute. Update the script to display the cluster entity on the page, the target entity must be shown on the same page as the combo box. If more than one cluster on the page is related to the same entity name, the first cluster that matches the entity attribute value with the `target-entity` value is populated.
   - `filter-items` is an optional attribute that, if true, filters the items as you type with the built-in filter. By default, it is false.

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2. Add a cluster to display the target-entity information when a user selects a menu item.

```
<question-page id="AboutTheApplicant_GB"  read-only="false" set-focus="false" show-
back-button="false" show-exit-button="true" show-next-button="true" show-person-
tabs="false" show-save-exit-button="true" entity="Person" >

<!-- ComboBox -->
<cluster entity="SearchAddress">
  <title id="SearchAddress.Title">Your address</title>
  <question id="fullAddress" mandatory="true" show-field-help="false">
  <label id="FullAddress.Label">Search for your address</label>
  <combo-box  key="id" search-function="searchAddress" target-
entity="ResidentialAddress" filter-items="true" />
</question>
</cluster>

<!-- ComboBox -->
<cluster entity="ResidentialAddress">
        <title id="Address.Title">Enter address</title>
        <help-text id="ADHelp">You must enter the address in which you physically
 reside (residential address).</help-text>
        <question control-question="false" id="street1" mandatory="true" multi-
select="false" show-field-help="false">
          <label id="Street1.Label">Street 1</label>
        </question>
        <question control-question="false" id="street2" mandatory="false" multi-
select="false" show-field-help="false">
          <label id="Street2.Label">Street 2</label>
        </question>
        <question control-question="false" id="city" mandatory="false" multi-
select="false" show-field-help="false">
          <label id="City.Label">City</label>
        </question>
        <question control-question="false" id="zipCode" mandatory="false" multi-
select="false" show-field-help="false">
          <label id="Zipcode.Label">ZIP code</label>
        </question>
</cluster>
 </question-page>
```

3. Edit the schema definition and add an element for the combo box and the target entity, for example:

```
<!-- ComboBox -->
<xs:element name="SearchAddress">
      <xs:complexType>
          <xs:attribute name="id" type="IEG_STRING" />
          <xs:attribute name="fullAddress" type="IEG_STRING"/>
      </xs:complexType>
</xs:element>
<!-- Target Entity -->
 <xs:element name="ResidentialAddress">
  <xs:complexType>
   <xs:attribute name="street1" type="IEG_STRING"/>
   <xs:attribute name="street2" type="IEG_STRING"/>
   <xs:attribute name="city" type="IEG_STRING"/>
   <xs:attribute name="zipCode" type="IEG_STRING"/>
  </xs:complexType>
 </xs:element>
2. Associate that new element to a Person entity.
<xs:element name="Person">
 <xs:complexType>
  <xs:sequence minOccurs="0">
   <xs:element ref="SearchAddress" minOccurs="0" maxOccurs="1"/>
   <xs:element ref="ResidentialAddress" minOccurs="0" maxOccurs="unbounded"/>
   ....
  </xs:element>
</xs:complexType>
```

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9.16 Customizing script behavior with BaseFormContainer

The behavior of scripts in the application is controlled by the *BaseFormContainer.js* container component. Each form calls this container component, which controls script behavior such as whether partial submission is allowed, or where to go on exiting the script. You can customize the behavior for individual scripts by modifying `BaseFormContainer` properties.

About this task

The following `BaseFormContainer` properties are available:

- `iegFormId`. (Mandatory) This property corresponds to the IEG execution ID that is obtained from one of the following options:
  - An API that starts the script, by creating the execution with the necessary script ID and data store schema.
  - Existing executions that can be resumed.

  Note: Later, the ID is used on the server to ensure that the current user matches the user who is associated with the execution in the `CitizenScriptInfo` table. The ID also ensures that the execution is not completed.
- `title`. (Mandatory) The title to be displayed in the header. You can convert the property by using the `formatMessage` for `react-intl`.
- `isLoginOrSignupAllowed`. If the property is `true` when **Save and exit** is clicked and the user is not logged in, the log-in screen is displayed. The default value is **True**.
- `isPartialSubmissionAllowed`. Specifies that partially completed scripts can be submitted. The corresponding option must be added to the header. The default value is **False**.
- `onExit`. Specifies what happens when a user exits the script without saving. By default, it goes to the home page.
- `onFinish`. Specifies what happens when the last page of the script is submitted. By default, it goes to the home page.
- `onPartialSubmission`. Specifies what happens when a partial script is submitted. By default, it saves the current page and then starts the `OnFinish` handler.
- `onSaveAndExit`. Specifies what happens when a user saves and exits the script. By default, it saves the current page and determines what page to go to. If the user is not logged in, the log-in page is displayed. If the user is logged in, the dashboard is displayed.
- `onRef`. A function that receives the instance of the current `BaseFormContainer` to provide access to its defined functions and props. You can use this function to customize the default `BaseFormContainer` functions. For an example of using the `onRef` function to customize the behavior of **Save and exit**, see the `SampleApplicationFormComponent` in the `sampleApplication`.
- `onBackForFirstPage`. A function that is called on the back-button click event of the first page of a form to redirect back to another form. The function contains the code responsible for the redirection. For example, you might want to go back to an application script from a submission script to change something before you submit an application.

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Procedure

To modify the behavior for an existing form feature, follow the standard steps in Reusing existing features. For example, to customize the form that is loaded from the */eligiblity/form* URL, do the following steps:

1. Find the path variable in the *node_modules/@spm/universal-access-ui/routes/Paths.js* file.
   For example, search for */eligibilty/form* to locate `PATHS.ELIGIBILITY.FORM`.
2. Search the *Routes* file for the path variable to find the location of the feature that it loads.
   For example, in the *node_modules/@spm/universal-access-ui/src/routes/Routes.js* file search for the `PATHS.ELIGIBILITY.FORM` path variable that you located in the previous step. The path variable maps to the *feature/Forms/Eligibility* location.
3. Copy the source code from the feature folder that you identified in the previous step to your custom folder.
   For example, copy *node_modules/@spm/universal-access-ui/src/features/Forms/Eligibility* to the *your-custom-app/src/features/Forms/Eligibility* folder.
4. Add a route in the *your-custom-app/src/routes.js* file with the same path as the original `PATHS.ELIGIBILITY.FORM` feature.
   a) Map the new route to your custom version of the form feature.
5. Update the properties of the form container according to your requirements.
   For example, use custom functions to change the behavior of the on-exit and on-finish flows, as shown in the following code sample:

```
<BaseFormContainer
          iegFormId={formId}
          iegHookBindingKey={HookBindings.SCREENING}
          onExit={this.myCustomHandleExitForm}
          onFinish={this.myCustomHandleFinishForm}
          title={myCustomTitle || ''}
        />
```

9.17 Merging clusters with the `cluster` element `grouping-id` attribute

If you are developing pages in IEG, you can merge several clusters on summary pages by using the **`cluster`** element **`grouping-id`** attribute. The **`grouping-id`** attribute is not supported for standard Cúram web applications.

Related data fields can be defined within different clusters under the following conditions. You can use the **`grouping-id`** attribute to merge these related data fields into a single cluster on IEG pages.

- Data is defined within different schema entities but a single cluster can be defined for a single entity only.
- Data is defined within a conditional cluster but it must be included in a non-conditional cluster when the condition is met.

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All clusters with a specific **grouping-id** attribute are merged into the first cluster with that **grouping-id** attribute. Aside from the questions, the cluster elements are shown as defined by the first cluster. Ensure that the other cluster elements in the first cluster, such as the title or buttons, are suitable for the merged cluster.

Where possible, do not have a conditional cluster as the first cluster if you are merging conditional and non-conditional clusters. If the first cluster is conditional and the condition is not met, then the merged cluster is not displayed. If a conditional cluster must be positioned before non-conditional clusters in a merged cluster, then add a non-conditional cluster with no questions as the first cluster with the **grouping-id**.

This sample XML snippet merges three clusters into a single cluster with the **grouping-id** attribute. The three clusters have data fields from three different entities and the last cluster is conditional.

```
<cluster entity="ResidentialAddress" grouping-id="100">
  <title id="Address.Title">Address</title>
  <edit-link
    skip-to-summary="false"
    start-page="AboutTheApplicant_GB"
  />
  <layout>
    <type>flow</type>
    <num-cols>2</num-cols>
    <label-alignment>left</label-alignment>
  </layout>
  <question
    id="street1"
  >
    <label id="Street1.Label">Street 1:</label>
  </question>
...
</cluster>
<cluster entity="Person" grouping-id="100">
  <question
    id="applyToMailingAddress"
  >
    <label id="ApplyToMailingAddress.Label">Mail to Same Address?</label>
  </question>
</cluster>
<condition expression="Person.applyToMailingAddress==&quot;N2OITYN2&quot;">
  <cluster entity="MailingAddress" grouping-id="100">
    <question
      id="street1"
    >
      <label id="Street1.Label">Street 1:</label>
    </question>
    ...
</cluster>
```

9.18 Configuring relationship pages questions

If you are developing pages in IEG, you can configure the text of the relationship questions on relationship pages.

By default, the question label is dynamic, in the first relationship question page, it renders as “What is [Name and Age of the Person related] to you?”. On the following relationship question pages, it renders “What is [Name and Age of the Person related] to [Name and Age of the Person]?

The attribute name for the start date must be `startDate`.

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To show age in the relationship question label, you must populate the date of birth, which is defined as the `dateOfBirth` attribute of the `Person` entity.

You can use the following IEG configuration property to configure the default text.

```
# relationship question label on relationship page
relationship.question.label={index, select, 0 {What is %2s to you?} other {What is %2s
 to %1s?}}
```

The example ICU template does the following:

In the first iteration:

```
What is %2s to you?
```

Where *%2s* is the related person in the first iteration.

From the second iteration until the end:

```
What is %2s to %1s?
```

Where *%1s* is the new main person in the iteration and *%2s* is the related person in the iteration.

9.19 Configuring relationship starting dates on relationship summary pages

If you are developing pages in IEG, you can configure the start date of relationships for relationship summary pages. For example, Married since Jun 12, 2014.

You can use the following IEG configuration property to configure the default text.

```
# relationship type and start date label.
relationship.type.date.label=%1s since %2s
```

Where *%1s* is the relationship type and *%2s* is the relationship start date.

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9.20 Configuring `quick-add-list`

The `quick-add-list` feature is enabled at the IEG script level. The `quick-add-list` component receives two parameters, `entity` with the Entity object is managed by the component and `criteria` with any specific criteria that the component might need to meet.

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Common pattern

The code that follows is an example of a fully functional implementation of the `quick-add-list` component in a section of an IEG script:

```
<section>
    <question-page id="AnyMemberPage" show-back-button="true"  show-exit-button="false"
 show-save-exit-button="true" show-person-tabs="false">
        <title id="AnyMemberPage.Title">Household</title>
 <description id="AnyMemberPage.Description">Please enter details about the other
 people besides yourself who live in your home including those who are not related to
 you. Once you're finished please check the box to confirm the number of other people
 living in your home (not including yourself).
         </description>
         <condition expression="false">
     <cluster entity="Application">
  <question id="dummy" default-value-expression="householdCount()"/>
     </cluster>
        </condition>
        <quick-add-list entity="Person" criteria="isPrimaryParticipant==false">
            <title id="HouseholdList.Title">Household members</title>
     <quick-edit-link >
         <page-title id="Edit.PageTitle">Edit %1s (%2s)<argument id="Person.firstName"/
><argument id="Person.age"/>
                </page-title>
     </quick-edit-link>
     <quick-delete-link>
         <page-title id="Delete.PageTitle">Remove %1s %2s (%3s) from the household?
<argument id="Person.firstName"/><argument id="Person.lastName"/><argument
 id="Person.age"/></page-title>
         <confirm-message id="Delete.Message">Are you sure you want to remove %1s?
<argument id="Person.firstName"/></confirm-message>
         <confirm-button id="Delete.Button">Remove %1s<argument id="Person.firstName"/
></confirm-button>
     </quick-delete-link>
            <quick-add-link>
               <page-title id="Add.PageTitle">Add new person to household</page-title>
               <title id="Add.Title">Add new member</title>
            </quick-add-link>
            <page-content id="HouseholdMember"/>
        </quick-add-list>
        <condition expression="Application.householdCount != 0">
            <cluster>
                <question id="doneEditingHousehold" mandatory="true" control-
question="true" control-question-type="IEG_BOOLEAN">
                <label id="HasOtherMembers.Label">There are %1s other people in your
 home not including yourself<argument id="Application.householdCount"/></label>
                </question>
            </cluster>
        </condition>
        <condition expression="Application.householdCount == 0">
            <cluster>
                <question id="doneEditingHousehold" mandatory="true" control-
question="true" control-question-type="IEG_BOOLEAN">
                <label id="HasOtherMembers.Label">There are no other people in your
 household, just yourself</label>
                </question>
            </cluster>
        </condition>
    </question-page>
    <loop loop-type="hidden" entity="Person" criteria="isPrimaryParticipant==false">
        <question-page id="HouseholdMember">
            <title id="HouseholdMember.Title">Household</title>
            <cluster>
                <title id="HouseholdMember.Cluster.Title">Personal details</title>
                <question id="firstName" mandatory="true">
                    <label id="FirstName.Label">First Name</label>
                </question>
                <question id="lastName" mandatory="true">
                    <label id="lastName.Label">Last Name</label>
                </question>
                <question id="dateOfBirth" mandatory="true">
                    <label id="DateOfBirth.Label">Date of birth</label>
                </question>
            </cluster>
        </question-page>
    </loop>
</section>
```

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The `quick-add-list` component uses a custom function `householdCount` that updates the number of household members. The logic for that custom function can be written as follows:

```
public Adaptor getAdaptorValue(final RulesParameters rulesParameters)
   throws AppException, InformationalException {

   final IEG2Context ieg2Context = (IEG2Context) rulesParameters;
   final long executionID = ieg2Context.getExecutionID();
   final long rootEntityID = ieg2Context.getRootEntityID();

   final IEGScriptExecution scriptExecution = IEGScriptExecutionFactory
     .getInstance().getScriptExecutionObject(executionID);
   Datastore ds = null;
   try {
     ds = DatastoreFactory.newInstance()
       .openDatastore(scriptExecution.getSchemaName());
   } catch (final NoSuchSchemaException e) {
     throw new AppException(IEG.ID_SCHEMA_NOT_FOUND);
   }

   final Entity rootEntity = ds.readEntity(rootEntityID);

   final Entity[] personEntities =
     rootEntity.getChildEntities(ds.getEntityType("Person"));

   rootEntity.setTypedAttribute("householdCount", personEntities.length - 1);
   rootEntity.update();

   return AdaptorFactory.getBooleanAdaptor(true);
 }
```

9.21 Configuring how and when server-side validations are displayed

In Citizen Engagement, there are two phases of validation in IEG forms. They are client-side validations and server-side validations. Client-side validations occur first. They are displayed at the top of the page in the error section, with a link to the field with the error, and the message is repeated inline beneath the field. Examples are typically mandatory field validations. For example, Complete the field "Date of Birth". Server-side validations occur when a call is made to the backend to check the information provided by the user. Examples are where a person's date of birth can't be in the future, or where an SSN/SIN needs to be in a certain format and have a specific number of characters.

About this task

By default server-side error messages are displayed at the top of the page in the error section once all client-side errors have been corrected. Unlike client-side error messages, there is no link to the field with the error and the error is not repeated inline. You can choose whether client-side and server-side validations should operate the same way and display simultaneously with links to the field with the error.

Procedure

Set the environment variable `REACT_APP_ACCESSIBLE_SERVER_SIDE_VALIDATIONS_ENABLED` in your *`.env`* file with a value of `true` to display *all* error messages at the same time whether they are as a result of client-side or server-side validations. When this is set to true, all error messages including server-side

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error messages are displayed with a link to the field where the error occurred. The field with the error is highlighted to the user and the error message is repeated inline.

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10 Universal Access for Authorized Representatives

Reaching citizens in need

Many benefits go unclaimed by citizens, and often by citizens who desperately require them. This is because a citizen may not know what they are entitled to, or don’t know how to find that information. For some citizens, working with online technology can be challenging for many reasons. They may not have the cognitive or physical abilities or the skills to work with technology or read and complete forms. Or they may not have a device that they can use to access the service in the first place. Finding ways to ensure these citizens receive the appropriate support available can significantly impact positive outcomes.

Authorized Representatives

Authorized representatives can play an important role in connecting vulnerable citizens with the help they are entitled to.

Authorized representatives may be family members, legal representatives, carers, community-based organizations, or other approved third parties. Tasks such as creating an online account, applying for benefits, and managing associated tasks can be carried out from an approved account linked to the citizen.

Support for Authorized Representatives

Cúram Citizen Engagement (CE) provides a citizen-facing responsive web application, a ready-to-deploy reference application enabling agencies to offer a web self-service solution to their citizens to apply for benefits and track & manage their interactions with the agency. With CE, the citizen can view and make changes to their account, once they have been authenticated with the Cúram system. Support for authorized representatives requires extending the authorization beyond the citizen. As part of this extension, the citizen's data privacy and control of who has access to their data must not be lost. The Cúram Web APIs support customization of the authorization strategy to support this business function.

10.1 Authorized Representative Sample App

For reference purposes, the Authorized Representative Sample App is provided. It illustrates how a dashboard home page for an authorized representative might be presented. It illustrates “Theming” to differentiate this portal from the citizen portal. It also presents a simple workflow that allows an authorized representative to complete a citizen's application, demonstrating customized authorization.

Installing the Authorized Representative Sample App

The sample application comes with the `Universal Access Responsive Web Application` asset, and the same process can be used to install it as described in section *4.2 Installing the Merative ™ Cúram Universal Access development environment.* However, for the Authorized

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Representative Sample App, there are two small differences to notice when using the 4.2 Installation steps:

– In step number 3 of the Procedure section. Replace `spm-universal-access-starter-pack-.tgz` with `spm-universal-accesssample-app-auth-rep-.tgz` as the package that is extracted as your project root.

– In step number 5 (Automated option), locate the steps described in the note for Mac OS users. Replace file name `./installCEDeps.sh` with `installCEDepsForAuthRepApp`

– All other steps remain the same.

Customizing the Sample Application

The instructions for customizing the authorized representative sample application are the same as provided for the universal access starter pack; the same documentation can be used. See *Developing with the Cúram Universal Access* in the *Universal Access* guide.

Screen Design

The application provides sample screens as conceptual designs for the user experience, such as a dashboard that presents the list of clients with actions that can be taken. These are intended as helpful guides but require further design and development to meet individual project requirements and be production-ready.

Theming

The application is themed using the Theme Builder and Design System tokens. See the section on ThemeBuilder in *Customizing the color and typography of the application*.

Authorization Testing

The application also provides a modal for testing the execution of an IEG script on behalf of another user. This basic implementation is not intended to be the user experience in production, it is to help developers explore and test the authorization controls that they will need to develop to allow authorized representatives to act on behalf of their clients. The following sections delve deeper into customizing the authorization process.

APIs, data security, and authorization

Any application that connects to Cúram using the Cúram Web APIs must ensure that a user's data can not be viewed or edited by anyone not authorized. By default, this is achieved by authenticating who the user is, for example, via a username and password, and then carrying out an authorization check. The default authorization check is a 2 phase process.

1. Is the current user, based on their role, allowed to access this API? (Role Based Access Security)
2. Is the current user the owner of this data and therefore allowed to access or update it? (Policy Based Access Control)

The second check is critical, as it is possible for another user to a) authenticate successfully and b) have a role that allows them to call an API to retrieve the data. However, they will fail on the final check, because the system will know which user they are through the authentication process, and compare their user id against the user id of the data owner.

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This check prevents unauthorized access through URL manipulation. For example, a malicious user could attempt to view another person's data by resending an API request generated from their account, replacing an identifier with one that belongs to another user.

In the context of authorized representatives, the checks described above could prevent the representative from helping the citizen. The next section describes how the Cúram Web APIs can be customized to support authorized representatives.

10.2 Customizing Cúram Web APIs to allow authorized representatives to assist citizens

When a citizen operates on their online account, using the product Web APIs, the system makes 2 assumptions.

1. The operation is *on behalf of* the currently logged-in user. For example, when the user 'johnsmith' is logged in and submits an application, the application will be created for that John Smith.
2. Authorization checks are carried out *against* the currently logged-in user. For example, if 'johnsmith' tries to resume a form that he had started the system will validate that *johnsmith,* the current user, is the owner of the form being resumed, otherwise the request will be rejected.

When an authorized representative assists a client the 2 assumptions above will be incorrect. The current logged-in user is not the intended applicant, and they are not the data owner.

AuthorizedRepresentativeProvider Interface

To facilitate a representative acting on behalf of a citizen a service provider class can be used to nominate the citizen being represented. The system will use the value returned by the Service Provider Interface class implementation to carry out authorization checks and retrieve and update data. For example, submitting an application form when acting as an authorized representative will create an application for the citizen being assisted, not for the representative.

The `AuthorisedRepresentativeProvider` class is a simple Service Provider Interface(SPI) that allows the provider to define their strategy for how the APIs decide who the operation is on behalf of and how to check authorization for the current user.

The `getCitizenUserName` method is used to return the name of the citizen that the representative is currently assisting. How the citizen's username is decided is the responsibility of the provider.

Example implementation

The implementation is a 2 step process

1. Configure the implementation of the AuthorisedRepresentativeProvider interface

Implementations of the AuthorisedRepresentativeProvider interface class are configured via a Guice Module. Create a MapBinding using the user's Application Code as the key and the

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implementation class as the value. The Application Code is assigned to the user when their account is created. This value is found on the ExternalUser database table.

Note: Note: To learn more about Guice Modules and how to use them see the section 'Creating a Guice Module' in the *Developing with Persistence Infrastructure* guide.

```
final MapBinder<String, AuthorisedRepresentativeProvider>
  mapBinderAuthorisedRepresentativeProvider =
    MapBinder.newMapBinder(binder(),
      String.class, AuthorisedRepresentativeProvider.class);
mapBinderAuthorisedRepresentativeProvider
  .addBinding(APPLICATION_CODE.AUTHREPAPP)
  .to(AuthorisedRepresentativeProviderSample.class);
```

Using MapBinder allows multiple strategies to be employed, one per application code. This provides flexibility for different authorized representative strategies, one per end-user application. For example, if the user type 'AuthorizedRepresentative' has their own application, and therefore their own application code of `AUTHREPAPP`, then the binding should use this value as the key so that the same strategy is employed for all users of type 'AuthorizedRepresentative'.

2. Implement the Service Provider Interface class

The code example below is simplistic but illustrates how the `AuthorisedRepresentativeProvider` interface class could be implemented. Realistically, the resolution of the citizen's name will involve implementing a more sophisticated solution that maps citizens to authorized representatives, perhaps involving database tables. It may also facilitate switching representatives or revoking permission from representatives, etc...

The code shows how 3 authorized representatives are mapped to 3 citizens. The `TransactionInfo.getProgramUser` public API returns the currently logged-in user, and this value is used to look up the mapping. The citizen's username is returned by the mapping and used by the system to determine which user the action is on behalf of. If there is no mapping the current user's name will be returned as it would have been if no implementation of the `AuthorisedRepresentativeProvider` had been configured.

```
public class AuthorisedRepresentativeProviderSample
  implements AuthorisedRepresentativeProvider {

  @Override
  public String getCitizenUserName() {

    final Map<String, String> isHelping = new HashMap<>();
    isHelping.put("authrep1", "jamessmith");
    isHelping.put("authrep2", "lindasmith");
    isHelping.put("authrep3", "robsmith");

    if (isHelping.containsKey(TransactionInfo.getProgramUser())) {
      // return the citizen the logged in user is helping
      return isHelping.get(TransactionInfo.getProgramUser());
    }

    return TransactionInfo.getProgramUser();
  }
}
```

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The result of the code above will be that the representative `authrep1` will act as `jamessmith` whenever they invoke a product API that supports authorized representatives. Similarly, authrep2 will be lindasmith anytime they invoke a product API that supports authorized representatives, etc... If the mapping fails the current user's name will be returned. The default authorization checks will be applied as they would have been without this implementation being provided.

10.3 Customizing the authorization strategy

In the previous section, the AuthorisedRepresentativeProvider class changed the default processing for supported Cúram Web APIs. While this solves the problem of granting permission to authorized representatives to act on behalf of the Citizen, it also grants the representative the same rights as the data owner. This may be considered too permissive.

When providing authorization to 3rd parties to act on a user's data, the authorization often comes with limitations that would not be applied to the data's owner. This type of authorization control is known as Policy Based Access Control.

Cúram provides customization points that support customers plugging in their policies for authorization. The customization is via a Service Provider interface that will be invoked by the system every time an API is called. If required, the service provider can optionally add their authorization checks on top of the default product checks, or override the default checks.

For example, imagine that an authorized representative was granted permission to help a citizen using the AuthorisedRepresentativeProvider class. While there are many tasks that a citizen would like help with, they may not be comfortable with the representative viewing their financial information. Access to the API that provides the financial information can be restricted using the `AuthorisationStrategy` class.

This Service Provider Interface exposes 2 methods that can be implemented to control access.

doAuthorisationCheck(Object...)

The first method `doAuthorisationCheck` will either return without failure (succeed) or throw an authorization exception (fail). The optional parameter of type 'Object' is the parameter received by the API from which the doAuthorisation method was called if the API received a parameter object. This parameter may be required to carry out the authorization check, such as reading an entity using an ID(s) passed to the API. The generic parameter can be cast back to the correct Java type in the implementation class.

disableDefaultAuthorizationChecks()

The second method allows the default product authorization checks to be disabled. This may be required if they conflict with the custom authorization checks implemented by doAuthorizationCheck.For more on custom authorisation checks please see the section 'Customizing Web API Authorization' checks in the *Universal Access Responsive Web Application* guide.

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11 Troubleshooting and support

Use this information to help you to troubleshoot issues with the Merative ™ Cúram Universal Access Responsive Web Application or Cúram Design System.

The Cúram supported assets can be installed, customized, and deployed separately from Cúram, before being integrated into the system.

When troubleshooting web applications that are integrated with Cúram, use this troubleshooting information in conjunction with the troubleshooting information for Cúram.

For more information about troubleshooting, see the *Troubleshooting Guide* guide.

Related information

11.1 Examining log files

Log files are a useful resource for troubleshooting problems.

Examining the browser console logs

For JavaScript applications, you can examine the browser console logs for errors that might be relevant to investigating problems. For the exact details about how to locate the console logs within the browser, see your browser documentation.

Note: When you are developing applications with the Cúram Design System, console logging information might also be displayed in the console that runs the start process for the application.

Examining the HTTP Server log files

When you deploy a built application on an HTTP Server, the built application introduces a new point with which logging is captured in your system topology. The IBM® HTTP Server, Oracle HTTP Server, and the Apache HTTP Server include comprehensive logging system and related information.

For more information about troubleshooting the IBM® HTTP Server, see Troubleshooting IBM HTTP Server.

For more information about troubleshooting the Oracle HTTP Server, see Managing Oracle HTTP Server Logs.

For more information about troubleshooting the Apache HTTP Server, see Log Files.

Examining the IEG log files

System administrators can enable improved logging by setting the curam.trace system administration property to `trace_on` or higher, and you can then check the server logs after you call the datastore prepopulation feature. You can view detailed logs that are generated during

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the population of data during screening, application intake, and life events to better explain what interactions have taken place. Information is output to the server logs during datastore prepopulation to describe which code path was taken and why.

The following information is written to the server logs during datastore prepopulation:

- Information about which code path was taken and why.
- The values of the relevant system administration properties.
- The schema names of the relevant IEG scripts.
- The number of records in the ViewProcessor table.

11.2 Connect a React development environment to an Cúram server

A common troubleshooting technique is to connect your React development environment on `localhost:3000` to an Cúram deployment, typically a test system deployment. In this environment, you must complete some extra configuration steps to handle browser CORS security features.

With this environment, you can debug issues in the React application without having to rebuild an Cúram development environment, which can save time in many scenarios. For example, where replicating the problem scenario in the development environment is onerous, but you can troubleshoot it on the test server.

Due to CORS security features built into browsers, you must change the Cross-Site Request Forgery (CSRF) and session cookies that the React application uses, from the default `Samesite=Lax` to `Samesite=None`. Otherwise, browsers report CORS errors and the React application cannot communicate with the Cúram server.

You can deploy a gateway web server in front of Cúram to modify the cookie by using this directive:

```
Header edit Set-Cookie ^(.*)$ $1;SameSite=None;Secure
```

For Cúram clusters, place this directive in the web servers where Cúram applications are mapped.

11.3 Citizen Engagement components and licensing

You can use and customize the Merative ™ Cúram Universal Access Responsive Web Application for your organization, or develop your own custom web applications in addition to the standard Cúram application. Use this information to understand the Cúram components, supported assets, and licenses that you need.

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Installable components

- **Cúram Design System supported asset**
  The design system provides foundational packages for building accessible and responsive web applications. It consists of a React UI component library, React development resources, and a style guide for creating web applications.
- **Merative ™ Cúram Universal Access Responsive Web Application supported asset**
  The Merative ™ Cúram Universal Access Responsive Web Application provides a reference web application, which you can use and customize for your organization. The Merative ™ Cúram Universal Access Responsive Web Application requires the Cúram Design System and the Universal Access application module.
- **Universal Access application module**
  The Universal Access (UA) application module provides the Universal Access administrator application and the Universal Access REST APIs that expose interfaces to Universal Access functions for consumption by the Merative ™ Cúram Universal Access Responsive Web Application. Universal Access requires the Cúram Platform.

Licensing Universal Access

You can buy the Universal Access application module, which entitles the Merative ™ Cúram Universal Access Responsive Web Application asset, and Cúram Platform, which entitles the Cúram Design System asset.

Alternatively, you can buy Citizen Engagement, which includes the Universal Access application module, the Cúram Platform, and both assets.

Licensing the Cúram Design System

To develop custom web applications to complement the Cúram Platform, you can buy the Cúram Platform, which entitles the Cúram Design System asset.

11.4 Citizen Engagement support strategy

The Citizen Engagement assets are typically released monthly, and they can be upgraded independently of Cúram . Each release is a full release and not a delta release.

The assets are supported for the lifetime of the latest supported Cúram version available at the time of the asset release.

- The main asset line is released monthly and contains new features, enhancements, security updates, defects, and support for the latest Cúram version.
- Merative ™ Cúram Universal Access Responsive Web Application 2.6 continues to be supported with security updates and critical defect fixes for older compatible Cúram versions.

Although new features can be delivered in any asset release, they are typically delivered at the same time as the Universal Access application module release that contains the new APIs for those features. Where possible, Universal Access REST API changes are delivered in refresh pack or other impact-free releases that impose no forced upgrade impact.

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Semantic versioning

The assets use semantic versioning. As a general guideline, this means:

- MAJOR version for incompatible API changes
- MINOR version for adding functionality in a backwards-compatible manner
- PATCH version for backwards-compatible bug fixes

11.5 Known limitations

Review the known limitations for the Cúram Universal Access Responsive Web Application, and, where available, workaround information.

Landing page error caused by the public messages environment variable not being correctly disabled

Cúram Universal Access Responsive Web Application 5.0.0 fails to load the application landing page when it is used with either Cúram 7.0.10 or 7.0.11. Cúram 8.0.0 provides a `/ua/public_messages` API that displays public messages on the landing page.

The `/ua/public_messages` API is not available in Cúram 7.0.10 or 7.0.11. If you are using the Cúram Universal Access Responsive Web Application 5.0.0 with either Cúram 7.0.10 or 7.0.11, you can resolve the issue by disabling the public messages feature. To disable the public messages feature, configure the following environment variable in your *.env* file:

```
REACT_APP_DISABLE_PUBLIC_MESSAGES =true
```

Navigation section breaks when you edit household members from the Summary page without saving your changes

When you edit household members from the **Summary** page but you don't save your changes, clicking the section that contains the **Quick Add** list in the **Go to section** menu brings you to the **Summary** page.

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