

# React Code Style and Architecture

- [Future Articles](#)
- [Official React Documentation](#)
- [File and Folder Structure](#)
- [Code Ordering Style](#)
- [Custom Hooks Style Guide](#)
- [Conditional Rendering](#)
- [App Wide State](#)
- [Events and Listeners](#)
- [Loading Indicator](#)
- [Localization](#)
- [Routing](#)
- [Permission and Feature Validation](#)
- [Virtualization and Infinite Scrolling](#)
- [Modals](#)

# Future Articles

The following are items that we would like to have documented in the future. Most have not been documented because they are awaiting design.

- ADA Compliance
- Uniform Exception Handling
- Infinite Scrolling
- Standardized Loading Indicator / State
- Localization
- UseForm

# Official React Documentation

- <https://beta.reactjs.org/learn>
- beta.reactjs.org has much more modern docs. Most all of the examples on reactjs.org use class components rather than function components.

It is recommended to read most of articles in the **Learn** section of <https://beta.reactjs.org>

# File and Folder Structure

File and Folder Structure should match the UI as closely as possible.

There are cases where hooks, interfaces, enums, or components need to be shared in multiple places and they should be placed in the following folders.

- api
  - hooks to send requests to the backend
- hooks
  - other custom hooks (like useForm)
- types
  - files for interfaces and enums

# Code Ordering Style

Import Ordering:

1. React
2. Packages
3. EFC packages
4. Internal references
5. CSS

- 
1. Expanding of Props
    - `const { recentNodes, maxRowsToDisplay } = props;`
  2. React Hooks (except `useEffect`)
    - `useState`, `useContext`, etc
  3. Custom Hooks
    - `useSomeApi`, `useForm`, etc
  4. Other Variables and Methods
    - can be intermixed
  5. Effects (`useEffect`)
  6. return statement

The following is an example of how properties are ordered in a component function

```
export const RecycleBin = (props: RecycleBinProps) => {
```

```
  const { active } = props;
```

```
  const [showConfirmation, setShowConfirmation] = useState(false);
```

```
  const [recycleBinItems, setRecycleBinItems] = useState<RecycleBinItem[]>([]);
```

```
  const [selectedItems, setSelectedItems] = useState<RecycleBinItem[]>([]);
```

```
  const { getItemIcon, restoreRecycleBinIcon, recycleBinIcon } = useIcons();
```

```
  const { getRecycleBinFiltered, purgeFromRecycleBin, restoreFromRecycleBin } = useRecycleBinApi();
```

```
  const { t } = useTranslation('RecycleBin');
```

```
  const openPurgeConfirmation = () => setShowConfirmation(true);
```

```
  const closePurgeConfirmation = () => setShowConfirmation(false);
```

```
  const getRecycleBinItems = () => {
```

```
    getRecycleBinFiltered(initFilterProps).then((items: RecycleBinItem[]) => {
```

```
      setRecycleBinItems(items);
```

```
});
```

```
};
```

```
const onSelectItems = (items: RecycleBinItem[]) => {
```

```
  setSelectedItems(items);
```

```
};
```

```
const getIcon = (item: RecycleBinItem): EfcIconProps => {
```

```
  const fileExt = item.node.name.slice(item.node.name.lastIndexOf('.'));
```

```
  return getItemIcon(item.node.systemType, fileExt);
```

```
};
```

```
const purgeSelectedItems = () => {
```

```
  openPurgeConfirmation();
```

```
};
```

```
const purgeItem = (item: RecycleBinItem) => {
```

```
  if (!!item) {
```

```
    setSelectedItems([item]);
```

```
    openPurgeConfirmation();
```

```
  }
```

```
};
```

```
const confirmPurge = (confirmed: boolean) => {
```

```
  closePurgeConfirmation();
```

```
  if (!!confirmed) {
```

```
    purgeFromRecycleBin(selectedItems.map((item) => item.node)).then(refreshList);
```

```
  }
```

```
};
```

```
const restoreSelectedItems = () => {
```

```
  restoreFromRecycleBin(selectedItems.map((item) => item.node)).then(refreshList);
```

```
};
```

```
const restoreItem = (item: RecycleBinItem) => {
```

```
  restoreFromRecycleBin([item.node]).then(refreshList);
```

```
};
```

```
const refreshList = () => {
```

```
  getRecycleBinItems();
```

```
  setSelectedItems([]);
```

```
};
```

```
const columns: (string | EfcTableColumnInfo)[] = [
```

```
  { name: 'node.name', searchBy: true, displayName: t(RecycleBinKeys.Name), useIcon: getIcon },
```

```
  { name: 'dateDeleted', searchBy: true, displayName: t(RecycleBinKeys.DateDeleted), isDate: true },
```

```
  { name: 'path', searchBy: true, displayName: t(RecycleBinKeys.Path) },
```

```
];
```

```
const bulkActions: EfcCallToActionInfo[] = [
```

```
  { text: t(RecycleBinKeys.Purge), icon: recycleBinIcon, onClick: purgeSelectedItems },
```

```
  { text: t(RecycleBinKeys.Restore), color: 'primary', icon: restoreRecycleBinIcon, onClick: restoreSelectedItems },
```

```
];
```

```
const contextActions: EfcCallToActionInfo[] = [
```

```
  { text: t(RecycleBinKeys.Restore), icon: restoreRecycleBinIcon, onClick: restoreItem },
```

```
  { text: t(RecycleBinKeys.PurgeForever, 'Purge Forever'), icon: recycleBinIcon, onClick: purgeItem },
```

```
];
```

```
const confirmationCTAs: EfcCallToActionInfo[] = [
```

```
  { text: t(RecycleBinKeys.Cancel), color: 'primary', emphasis: 'med', onClick: () => confirmPurge(false) },
```

```
  { text: t(RecycleBinKeys.Purge), color: 'primary', emphasis: 'high', onClick: () => confirmPurge(true) },
```

```
];
```

```
useEffect(() => {
```

```
  if (!!active) {
```

```
    getRecycleBinItems();
```

```
  }
```

```
}, [active]);
```

```
return (
```

```
  <div className='my-2'>
```

```
    <Suspense>
```

```
      <FullTable data={recycleBinItems} columns={columns} bulkActions={bulkActions}
```

```
contextActions={contextActions} onSelect={onSelectItems} />
```

```
      {recycleBinItems.length == 0 &&
```

```
        <Text>
```

```
          {t(RecycleBinKeys.EmptyMsg)}
```

```
        </Text>
```

```
      }
```

```
    <Modal toggle={closePurgeConfirmation} title={t(RecycleBinKeys.AreYouSure)}
```

```
isOpen={showConfirmation} ctas={confirmationCTAs}>
```

```
      <Modal.Body>
```

```
        <Trans t={t} count={selectedItems.length} i18nKey={RecycleBinKeys.PurgeConfirmMsg}>
```

```
          {{ count: selectedItems.length }} files will be permanently removed from your account and will
```

```
not be able to be recovered.
```

```
        </Trans>
```

```
      </Modal.Body>
```

```
    </Modal>
```

```
  </Suspense>
```

```
</div>
```

```
);
```

```
};
```

# Custom Hooks Style Guide

When writing custom hooks follow guidelines as described in [Code Ordering Style](#).

On top of code ordering, the following guidelines should also be followed

- return object should not have any inline functions. Functions on the return object should be declared above the return statement like in the following example.

```
export const useFileUploadApi = () => {  
  const deleteAllFailedFileUploadsAsync = async () => {  
    const resp: AxiosResponse = await Api.delete('api/FileUpload/Failed/All');  
    return resp.data as UtopiaUploadFileResponse[];  
  };  
  const deleteFailedFileUploadAsync = async (nodeId: string, uploadIdentifier: string) => {  
    const resp: AxiosResponse = await  
    Api.delete(`api/FileUpload/Failed?nodeId=${nodeId}&uploadIdentifier=${uploadIdentifier}`);  
    return resp.data as UtopiaUploadFileResponse[];  
  };  
  const queryFailedFileUploadsAsync = async (start: number, count: number) => {  
    const resp: AxiosResponse = await  
    Api.get(`api/FileUpload/Failed?start=${start}&count=${count}`);  
    return resp.data as UtopiaUploadFileResponse[];  
  };  
  return {  
    deleteAllFailedFileUploadsAsync,  
    deleteFailedFileUploadAsync,  
    queryFailedFileUploadsAsync  
  };  
};
```



# Conditional Rendering

React has a tutorial on different ways to conditionally render JSX and can be found [here](#).

## Conditionally Including JSX

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Doing it this way is discouraged

## Conditional (ternary) operator (? :)

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This is how you do 'if else' statements

Avoid having nested ternary operators

Nested ternary operators may indicate you need create more components

It is okay to have multiple components to the same file (so don't hesitate to add more if improves maintainability)

## Logical AND operator (&&)

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Equivalent to ngIf in angularjs

## Style

Ternary Operators can get messy quick, so it's important to style it appropriately.

The following is example of how one might use a ternary on two larger pieces of JSX.

Notice how the **':**' is the only thing on the line to really help differentiate what is the ***if*** block and what is in the ***else*** block.

Notice also the use the **&&** operator throughout the JSX.

```

return (
  <>
    <Card.Title tag={Link} to={RoutePath.Portfolios} className='no-decoration' size='lg' bold icon={{
...icons.favoritesIcon, pull: 'left', color: colors.utopiaHeart, size: 'md' }}>
      { !!favoritesPortfolio ? favoritesPortfolio.name : 'Favorites' }
    </Card.Title>

    {{{!!isLoading || !!errorLoading || !user}} ?
      <>
        { (!!isLoading || !user) &&
          <SkeletonTheme enableAnimation height='24px' width='85%'>
            <Skeleton count={NUM_NODES/2} className='mb-3 ms-4 me-4' />
          </SkeletonTheme>
        }

        { !!errorLoading &&
          <Card.Text>There was an issue when loading your favorite nodes.</Card.Text>
        }
      </>
    :
    <>
      { (!!favoritesPortfolio) &&
        <Card.Text>No portfolio has been set as the Favorites portfolio. Right-click a portfolio in the My
Portfolios page to set a Favorites portfolio.</Card.Text>
      }

      { (favoritesPortfolio?.nodes.length == 0) &&
        <Card.Text>No favorites selected yet. Right-click files or folders and choose “Add To Portfolio” to
add to Favorites.</Card.Text>
      }

      { favoritesPortfolio?.nodes.slice(0, NUM_NODES).map((node) => (
        <Card.Link key={node.id} tag={Link} to={` ${RoutePath.GoToNode}/${node.id}`}
className='ms-4 my-3' icon={{ ...icons.getItemIcon(node.systemType, node.fileInfo?.fileExtension), size: 'md'
}}>
          <TooltipItem innerClassName='truncated-text' id={node.id} message={node.name}>
            {node.name}
          </TooltipItem>
        </Card.Link>
      ) ) }
    )}

```

```
        { (!!favoritesPortfolio && favoritesPortfolio.nodes.length >= NUM_NODES) &&
          <div className='d-flex justify-content-center'>
            <Button color='primary' emphasis='low' onClick={() => navigate(RoutePath.Portfolios)}>See
all</Button>
          </div>
        }
      </>
    }
  </>
);
```

# App Wide State

We implement app wide state by using **Context**.

## Context

reactjs.org has a [tutorial](#) for **Context** and the official documentation can be found [here](#).

## In Atlantis

We currently use **Context** in Atlantis. One example of this is [AuthContext](#). It currently stores user info that can be used across the app.

# Events and Listeners

Events are typically handled using React's ***useEffect*** hook.

## useEffect

React has a [tutorial](#) as well as documentation that can be found [here](#).

Use effect allows you to run a function every time a state or context property changes.

The following example will run a function every time the ***user*** object is updated,

```
useEffect(() => {  
  if (!!user) {  
    // do something here  
  }  
}, [user]);
```

## Lifting Up State

In some cases, you may not even need to use ***useEffect***.

You can lift up state as described in [this](#) article.

When a parent component is controlling state, and passing in handler functions as props to children components, may eliminate the need for an event altogether.

## Window Event Listeners

We use ***window.addEventListener*** is several places. For example, listening for posted messages from the Utopia iframe or listening for resize events to know when we the screen size has reached a new bootstrap breakpoint. Functions that run as callbacks for these event listeners cache state variables, so you can do a couple things to account for this.

1. Re-setup the event listener every time a state variable changes

```
useEffect(() => {  
  window.addEventListener('resize', onScreenResized);  
  return () => {  
    return window.removeEventListener('resize', onScreenResized);  
  };  
});
```

```
}, [screenSize]));
```

2. Use the functional version of the setter to get the current value of the state variable

```
setScreenSize(currentScreenSize => {  
  if (currentScreenSize !== newScreenSize) {  
    return newScreenSize;  
  }  
  else {  
    return currentScreenSize;  
  }  
});
```

The top answer to [this](#) stack overflow question describes some the different ways you can account for this.

# Loading Indicator

We found a cool react component from react-loading-skeleton called ***Skeleton***.

In its props, it lets you tell it how many blurry placeholder items you want it to display.

We use it when waiting for items in a list to load from the back end.

```
<SkeletonTheme enableAnimation height='24px' width='85%'>
```

```
  <Skeleton count={someConfigurableNumber} className='mb-3 ms-4 me-4' />
```

```
</SkeletonTheme>
```

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# Localization

- useSafeTranslation hook
  - Pass in the "filename / namespace" as the parameter\_
    - `const { t } = useSafeTranslation(TranslationFiles.RecycleBin)`
    - All "filenames / namespaces" are stored in the enum TranslationFiles (which currently can be found in the same file as the useSafeTranslation hook)
- Define string lookup keys as enums
  - ```
export enum RecycleBinTKeys {  
  Name = 'name',  
  DateDeleted = 'dateDeleted',  
  Path = 'path',  
  Purge = 'purge',  
  PurgeForever = 'purgeForever',  
  Restore = 'restore',  
  Cancel = 'cancel',  
  ForceCheckIn = 'forceCheckIn',  
  PurgeConfirmMsg = 'purgeConfirmMsg',  
  AreYouSure = 'areYouSure',  
  EmptyMsg = 'emptyMsg',  
  PageTitle = 'pageTitle',  
}
```
  - Need to be single strings with no spaces.
  - enum name should be match the name of the namespace it will be used for, and have TKeys appended to the end.
  - All TKey enums are in currently in the same file as the useSafeTranslation hook.
- Use the "t" method
  - `t(RecycleBinTKeys.Name)`
  - If the key doesn't exist it will be added
  - Must run the code and navigate to location
- locales folder contains all the string translations
  - Namespace matches the name of the json file

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- ~~If rendering of page needs to wait for the json file to be loaded in use the ready value from useSafeTranslation, around the return value. (May need if page doesn't load and you get~~



~~white-screen)-~~

- `const {t, ready } = useSafeTranslation(TranslationFiles.RecycleBin);`
- `return !ready ? null : ( /* all your jsx here */)`
- This is striked out becuse we have not needed to do this. We're not sure what fixed the original issue but it's not needed anymore, but I've left this here just in case we run into it again in the future.

## Plurals

see i18n documentation [here](#). Plurals are useful when the copy needs to change slightly when you have multiple items, for example, when you are deleting 2 items instead of one, you want to add an 's' to the end of a word to make it plural.

- recycle bin area has a purge modal that does this.

## Nesting

see i18n documentation [here](#). Nesting is useful when you need pass multiple values into the copy, for example, when you the copy indicates how many file uploads and form fills are in a document request that is assigned to you.

# Routing

There is a specific url route for every page and tab within a page in Atlantis. Each has a specific url route. When needed, we also have routes for specific states of a view or tab.

For example, when viewing a document request you are taken to the document request page, with the Inbox tab selected, but the content that is shown is not the inbox but instead, the document request to be completed. There is also a third state of the inbox tab creating a new document request.

The url routes for each of these states in this example are as follows:

- /docrequests
- /docrequests/inbox
- /docrequests/new
- /docrequests/inbox/:id

## Where is routing setup?

In the app.tsx file there is a LayoutRoutes function component. In it, all the different routes in the app are defined.

You will notice that we verify the logged in user has permission to go to the route before we actually add it. This ensures that they will be taken to a not found page in the case they are accidentally routed somewhere they shouldn't have permission to.

In the LayoutRoutes component routes have been grouped by the page they are on.

In the app component (also in app.tsx) you will also notice that we do not render the layout route components until the logged in users account settings and system permissions have been loaded to ensure routes are not rendered until we can validate if they have permission to navigate to a specific route.

## RoutePaths.ts

In the RoutePaths.ts file there are many enums (and types) related to routing.

## RoutePath type

The RoutePath type represents each and every route that can be navigated to in Atlantis. The RoutePath type is actually not an enum, though in usage it operates as one. It is a defined type and is actually a concatenation of many enum types. RoutePath is composed of an enum that represents the route of each page, unless the page doesn't have tabs in which case the route is

part of an enum name `SingleRoute`. For example, we have a `DocumentRequestRoutePath` that currently looks like the following.

```
export enum DocumentRequestRoutePath {  
  DocumentRequestIndex = '/docrequests',  
  DocumentRequestInbox = '/docrequests/inbox',  
  DocumentRequestNew = '/docrequests/new',  
  DocumentRequestView = '/docrequests/inbox/:id',  
  DocumentRequestTemplates = '/docrequests/templates',  
  DocumentRequestTemplateNew = '/docrequests/newTemplate',  
  DocumentRequestSent = '/docrequests/sent',  
  DocumentRequestAccountRequests = '/docrequests/all',  
}
```

You can see there is a route path for the page itself, others for each tab, and even others for states within these tabs.

Why is this helpful?

This allows us to constrain route paths when needed. For example, I can have a function that can accept `RoutePaths` of a specific page (like document requests). I don't have to worry about handling the other 50+ route paths that exist, only the document request route paths.

## RouteParams

In the `RoutePaths.ts` file there are enums that end with `RouteParams`. These represent the variables in route paths that have them. For example, for the path `'/docrequests/inbox/:id'` there is a variable name `':id'`. You can use `DocumentRequestRouteParams.Id` enum whenever you need to, so you don't have to have magic strings anywhere. This is especially important when routing (see [How do I route to a specific location?](#)).

## Other enums

At the time of this writing, there is only one other type of enum. It is called `SelectedDetail`. Its purpose is to be used in conjunction with the `DocumentRoutePath.GoToNodeDetail` (`/documents/node/:nodeId/:selectedDetail`). The values of this enum are all the valid values that can be used for the `:selectedDetail` variable.

There will likely be other enums that serve a similar purpose (and maybe even other purposes) and feel free to add other enums and types to this file to make routing as clean as it can be.

## How do I route to a specific location?

### useRouting Hook

The main way to route to a specific location is with the `useRouting` hook. In a similar way to the `RoutePath` type being composed of other enums, it is a hook that is composed of other hooks. Most

areas of the app have their own hook with all the logic for routing contained there. When actually using the hook though, you don't have to worry about that and can just import `useRouting` and use what you need from it.

There are currently two ways to use the `useRouting` hook:

#### 1. `routeTo...` functions

- Use these functions when you need to route directly to a specific area
  - Example:

```
routeToDocuments();
```
- Some of these functions take parameters, like `ids`

#### 2. `getLinkTo...` functions

- Use these functions when you need to grab a link to an area, maybe for use with Component Library components
  - Example:

```
<Card.Link tag={Link}
to={getLinkToMySettings()}>{t(NavMenuKeys.MySettings)}</Card.Link>
```
- You need to specify that the `tag` property is `'Link'`, and the `to` is where you call the `getLinkTo` function.

## useNavigate Hook

The majority of cases should be covered by the `useRouting` hook, but if you come across a case where that won't work, you can still use the `useNavigate` hook:

- `navigate(RoutePath.RouteWithoutVariable)` - route that does not have a variable
- `navigate(RoutePath.RouteWithSingleVariable.replace(SomeRouteRouteParams.paramName, valueToReplaceVariableWith));`
- `navigate(
 RoutePath.RouteWithMultipleVariable
 .replace(SomeRouteRouteParams.paramName1, param1Value)
 .replace(SomeRouteRouteParams.paramName1, param1Value)
);`

## How do I add a route?

- Add a new enum to the `RoutePath` type.
- In the `canGoToRoute` function in the `useRouteValidator` hook, add a case to the switch statement to validate the logged in user's permissions and features appropriately to make sure they can navigate to this route.
- In the `LayoutRoutes` component, add a `Route` component for this specific route. Make sure you only render the route if the logged in user has permission. For example:

```
{canGoToRoute(RoutePath.AuditLogs) && <Route path={RoutePath.AuditLogs} element={ <AuditLogs /> } />}
```
- If needed (like on a page with tabs), make sure the component that you've chosen to render when this route is navigated to, has been updated to handle this route.
  - For examples of this, look at the code for any component that has tabs.

- Add a `getLinkTo` and `routeTo` function for the route you added
  - If the route you added is its own new area, consider making a new hook for it within the Routing folder and then make sure to add it to the general `useRouting` hook in the return statement

# Permission and Feature Validation

## useRouteValidator Hook

Any logic related to validating if a user can view a specific route (for example a page or even a tab on a page) lives in this hook.

Most account feature and system permission checking happens in this hook.

This hook is used to validate if a specific route should even be rendered, if tabs on a page should be show, if navbar or sidenav options should be show or hidden, and which features show up in the account features flyout (to name some of the most common).

There a couple of functions in the hook to validate routes.

- `canGoToRoute`: checks to see if the logged in user can go to a specific route.
- `canGoToSomeRoute`: checks to see if the logged in user can go to at least one route in a set of routes.

## useAccountFeatureValidator Hook

Any logic related to validating if an account has certain features lives in this hook.

There are several functions to validate features on the logged in users accounts.

- `accountFeaturesHaveLoaded`: checks if account features have been loaded from the back end and cached for quick lookup.
- `hasFeatureOnAccount`: checks to see if a specific account has a specific feature (or set of features)
- `hasFeatureOnSomeAccount`: checks to see if any account has a specific feature (or set of features)
- `isESignatureFeatureAvailable`: checks if a specific account has the eSignature account feature or if the user is authenticated to docusign (either indicates that the eSignature feature can be used).

## useSystemPermissionsValidator Hook

Any logic related to validating if a user has certain system permissions lives in this hook.

There are several functions to validate system permissions the logged in users accounts.

- `hasPermissionOnAccount`: checks to see if the logged in user has specific system permission(s) on a specific account.
- `hasSomePermissionOnAccount`: checks to see if the logged in user has any one of a set of system permissions on a specific account.
- `hasPermissionOnSomeAccount`: checks to see if the logged in user has system permission(s) on any of their accounts.
- `systemPermissionsHaveLoaded`: checks if the logged in users system permissions have been loaded from the back end and cached for quick lookup.

# Virtualization and Infinite Scrolling

## Virtuoso Library

We use a library called **Virtuoso** to do both virtualization and infinite scrolling of flat lists. I say '**flat lists**' because we tried to use virtuoso in in our node tree component, but it had issues rendering nested lists that used virtuoso, so we ended up not doing any virtualization in the node tree and rolling our own infinite scrolling solution for it. However, we feel this use case is fairly uncommon and recommend using Virtuoso whenever possible because it's a pretty simple API and does both virtualization and infinite scrolling.

Official Documentation can be found [here](#).

Places using **Virtuoso** in our code include the **FullTable** component in the component library and **FailedUploads** component in AtlantisFrontEnd.

Please note that you must supply a height for Virtuoso, or any virtualized list, to work because it needs some kind of container to do its calculations.



# Modals

There is currently a hook called `useModal` that we use to open modals in many places. This hook has been deprecated. There is also a function named `openModal` in `LayerConext` that has been deprecated. Please don't continue to use either of these approaches. Instead, use the `Modal` component in the Nautilus Component Library and described in this article.

Storybook Docs can be found [here](#)

Bootstrap Docs can be found [here](#)

## Introduction

We have a `Modal` component in the Nautilus Component Library that is built on top of the Bootstrap `Modal` component. You can reference the Bootstrap documentation on Modals for any details on how the modal works and the options available, as well as our Nautilus Storybook documentation for the `Modal` component.

## Toggling Modal Display

The **`isHiddenState`** prop is used to control whether or not the modal is hidden or not. You can pass in a react state that is returned directly from the `useState` hook.

## Modal Content

There are three props that are used to set the content of the Modal, **`Header`**, **`Body`**, and **`Footer`**. The props for each of these are union types. One type in the union allows you to pass in custom JSX to display whatever you want in that section of the modal. The other is a simple type that has a small number of properties to support common usage.

When custom JSX is passed to any section, it will be wrapped in a **`div`** with that section's corresponding bootstrap class (i.e: **`modal-header`**, **`modal-body`**, **`modal-footer`**) to enforce modal styling.

## Toggle between modals

Bootstrap only supports displaying one modal at a time so you cannot stack them. You can see bootstrap docs [here](#) for details on a clever way for toggling between modals when needed by setting the **`data-bs-toggle`** and **`data-bs-toggle`** attributes on buttons in each modal.

In the Nautilus UI modal, footer buttons have a prop named ***altModalToShowOnClickElementId*** that will set both data attributes accordingly and open the modal with the specified modal element id when the button is clicked.