Oracle® Application Express

Tutorial: Building an Application

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Preface

Oracle Application Express Tutorial: Building an Application demonstrates how to build a working application for managing projects and tasks using some of the latest features of Oracle Application Express.

Audience

Oracle Application Express Tutorial: Building an Application is intended for workspace administrators who want to set up an Oracle Application Express development environment and application developers who want to learn how to build database-centric web applications using Oracle Application Express.

To use this guide, you must have a general understanding of relational database concepts and the operating system environment under which Oracle Application Express is running.

Documentation Accessibility

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Related Documents

For more information, see these Oracle resources:

- *Oracle Application Express Release Notes*
- *Oracle Application Express Installation Guide*
- *Oracle Application Express End User's Guide*
- *Oracle Application Express App Builder User's Guide*
- *Oracle Application Express Administration Guide*
- *Oracle Application Express SQL Workshop Guide*
- *Oracle Application Express API Reference*
- *Oracle Application Express Application Migration Guide*

Conventions

The following text conventions are used in this document:

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action, or terms defined in text or the glossary.
italic	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
`monospace`	Monospace type indicates commands within a paragraph, URLs, code in examples, text that appears on the screen, or text that you enter.

1

About Oracle Application Express

Oracle Application Express is an environment designed for rapid application development and deployment.

You can develop professional applications that are both fast and secure using only a web browser and limited programming experience. Oracle Application Express accelerates the application development process with features such as user interface themes, navigational controls, form handlers, and flexible reports. The deployed applications require only a browser and access to an Oracle database running Application Express.

This tutorial is intended to guide you through almost every step of creating an app with a focused amount of context. For more in-depth information about Oracle Application Express, see the "Quick Start" section of the *Oracle Application Express App Builder User's Guide*.

About This Tutorial

In *Oracle Application Express Tutorial: Building an Application*, you create a simple project management application for the fictitious AnyCo Corp. The application manages IT project information stored in database tables. This tutorial shows you how to build, modify, and run the application. Each chapter is a further lesson that advances the work of previous one so that the concepts build on one another.

Oracle Application Express Tutorial: Building an Application is intended to be followed in the order it is written.

2 Before You Begin

For this tutorial, you must have access to an Oracle Application Express environment and an account with development privileges.

Accessing an Oracle Application Express Environment

You must have access to an Oracle Application Express release 19.2 or later. You can access Oracle Application Express in one of the following ways:

- Request an account on apex.oracle.com.
- Subscribe to an account on the Oracle Database Cloud Service which includes Oracle Application Express.
- Install a local installation of Oracle Database which includes Oracle Application Express release 19.2 or later.

Oracle Application Express Development User Account

If you are accessing Oracle Application Express in a hosted environment, requesting an account creates a workspace and an account. If you are managing Oracle Application Express locally, you will create a workspace and account manually. In either scenario, your Oracle Application Express account must have developer privileges.

3

Populating Your Workspace

To build an Oracle Application Express app, you need a complete set of tables and data.

About This Lesson

In this lesson, you install **Sample Datasets** provided by Oracle.

Once installed, you also review the output of the scripts in Object Browser to confirm the presence of the tables and data.

The sample tables and data that you load in these steps resemble the kind of information that real Application Express project management apps use every day. They include information typical of data sets for employees, projects, and calendars.

3.1 Installing the Sample Datasets

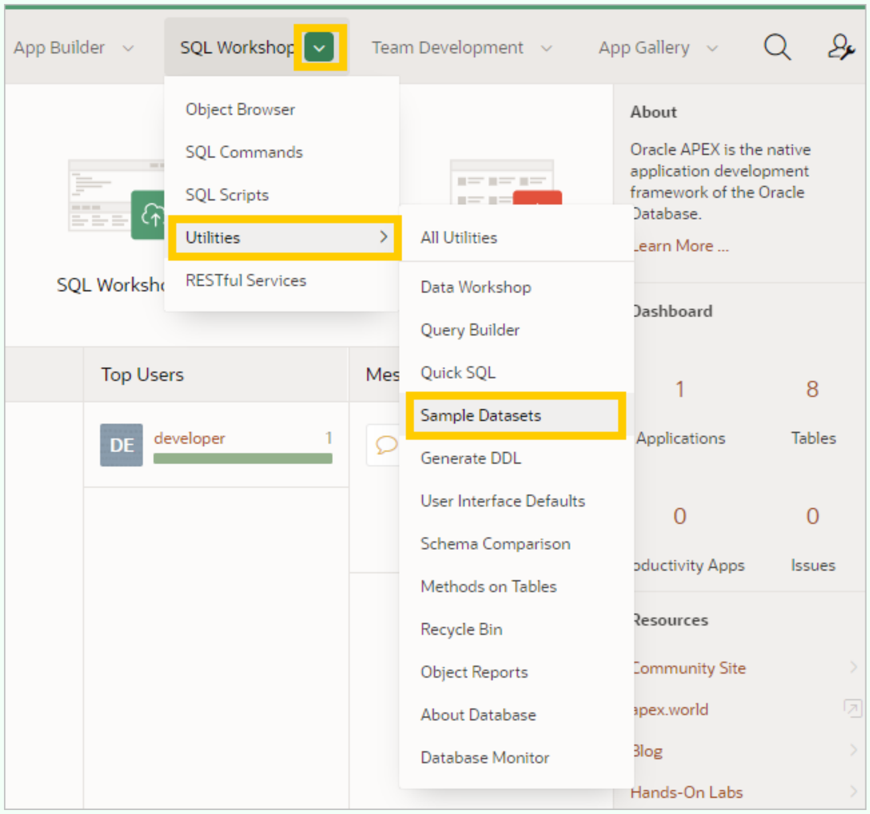
The Application Express SQL Workshop comes with several sample datasets intended to enhance app experimentation.

1. To install the Project Data sample dataset in SQL Workshop:

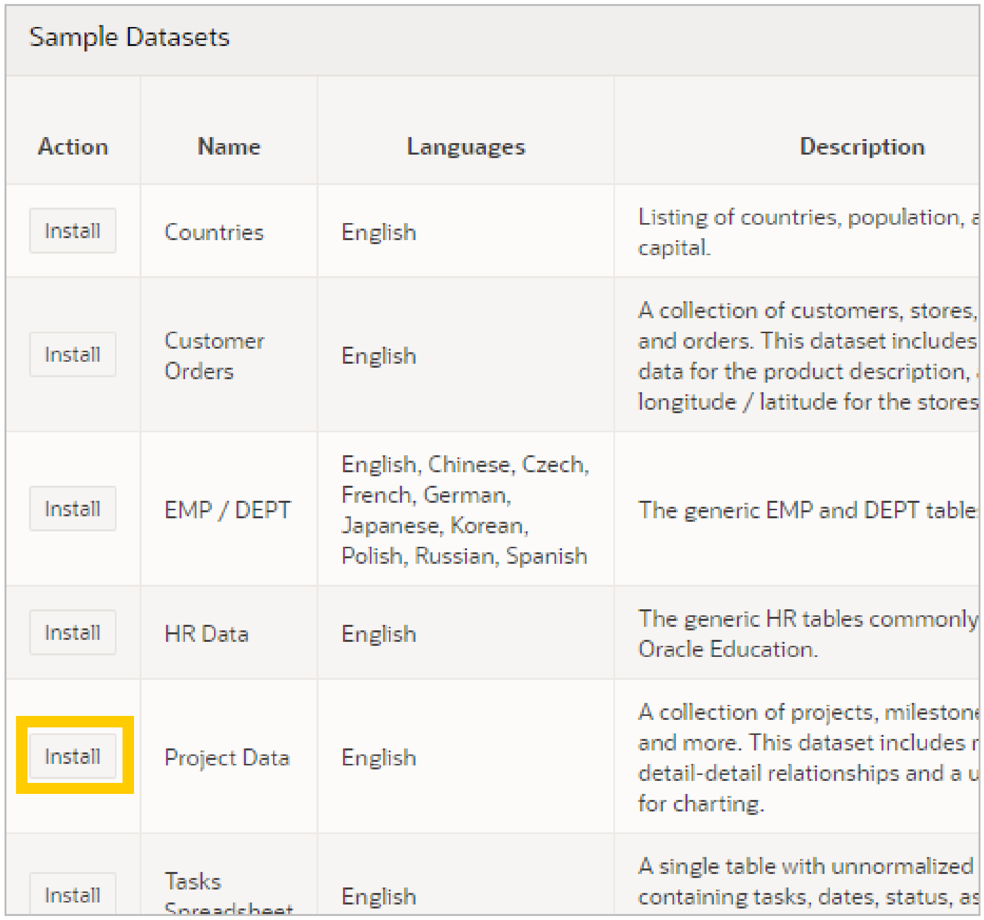
1. Sign in to your Oracle Application Express workspace.
2. Click **SQL Workshop**, click **Utilities**, and click **Sample Datasets**.

Tip:

You can also click the down arrow icons to open the drop-down menus on the tabs at the top of the screen to shortcut your way around your workspace.



3. Find *Project Data* in the list and click the adjacent **Install** button.

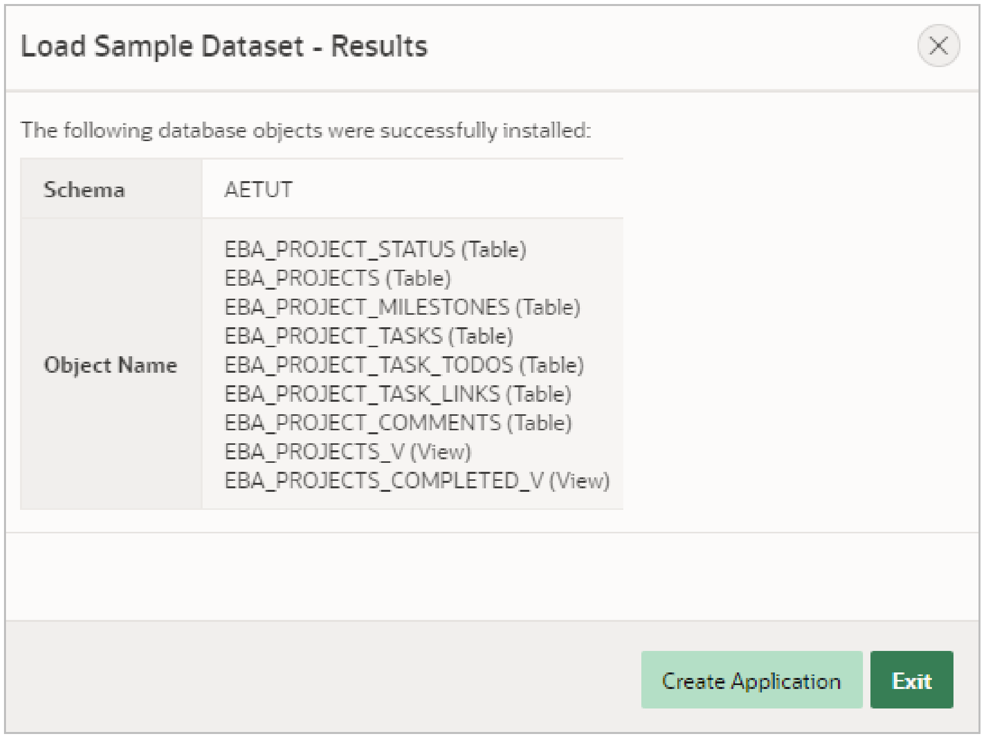


Sample Datasets

Action	Name	Languages	Description
Install	Countries	English	Listing of countries, population, a capital.
Install	Customer Orders	English	A collection of customers, stores, and orders. This dataset includes data for the product description, longitude / latitude for the stores
Install	EMP / DEPT	English, Chinese, Czech, French, German, Japanese, Korean, Polish, Russian, Spanish	The generic EMP and DEPT table
Install	HR Data	English	The generic HR tables commonly Oracle Education.
Install	Project Data	English	A collection of projects, milestone and more. This dataset includes r detail-detail relationships and a u for charting.
Install	Tasks Spreadsheet	English	A single table with unnormalized containing tasks, dates, status, as

The Manage Sample Dataset dialog displays.

4. Click **Next**.
5. Click **Install Dataset**.
6. In Results dialog, review the new objects.



The script created the following objects:

- EBA_PROJECT_STATUS (Table)
- EBA_PROJECTS (Table)
- EBA_PROJECT_MILESTONES (Table)
- EBA_PROJECT_TASKS (Table)
- EBA_PROJECT_TASK_TODOS (Table)
- EBA_PROJECT_TASK_LINKS (Table)
- EBA_PROJECT_COMMENTS (Table)
- EBA_PROJECTS_V (View)
- EBA_PROJECTS_COMPLETED_V (View)

7. Click **Exit**.

> **Note:**
>
> The Create Application button is a shortcut to the Create Application Wizard loaded with the sample data.

You have populated the sample tables and data in your workspace.

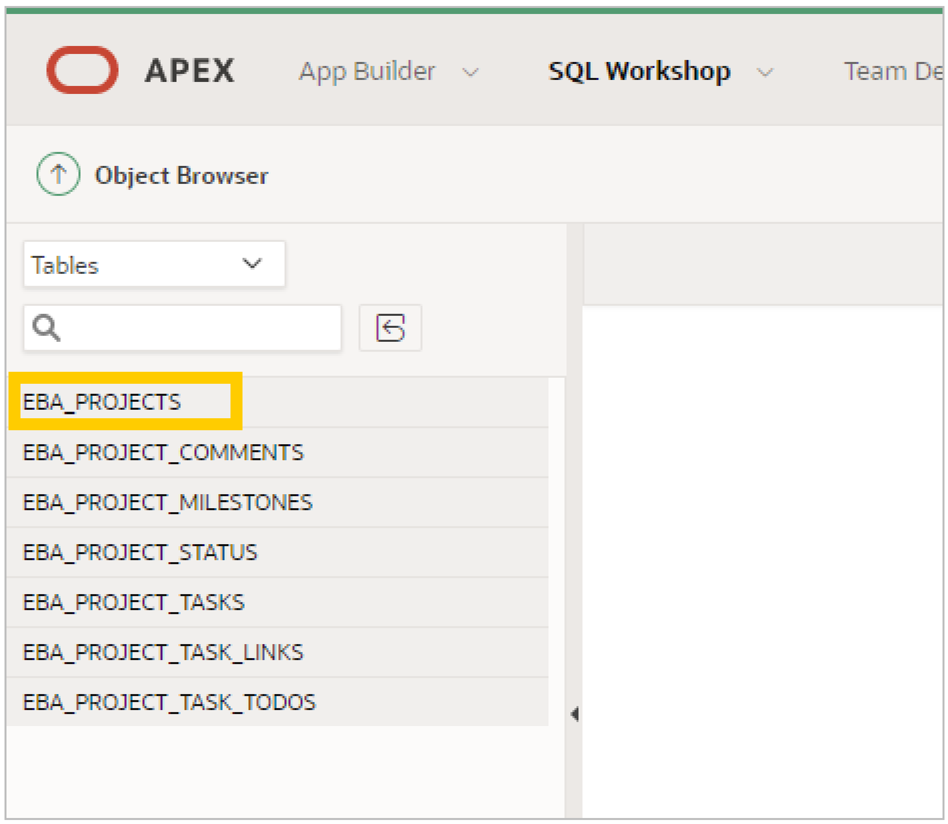
3.2 Reviewing the Created Tables with Object Browser

Object Browser displays all the raw objects present in the Oracle database schema associated with your workspace.

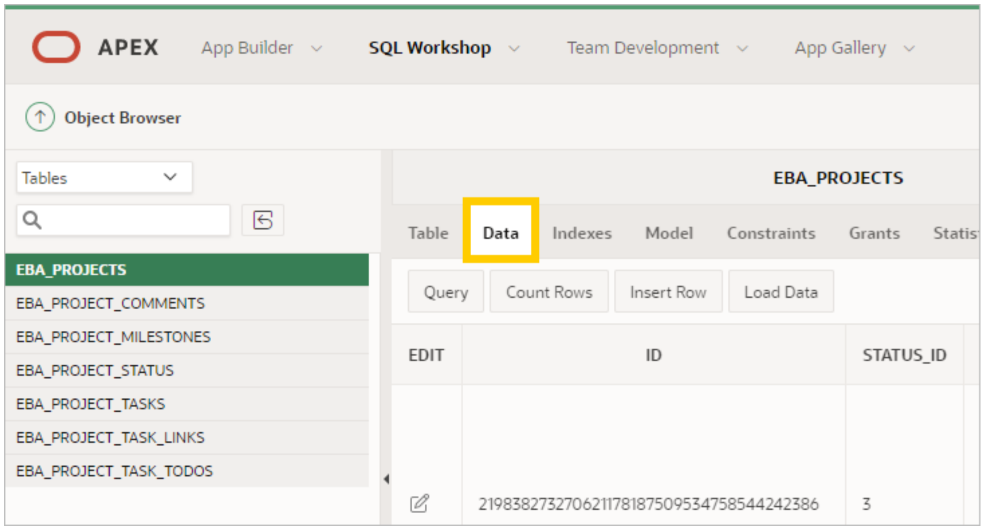
1. To navigate to Object Browser:
1. Click **SQL Workshop** to return to the SQL Workshop home page.
2. Click **Object Browser**.

> **Tip:**
>
> For quicker navigation, click the arrow next to **SQL Workshop** to display a drop-down menu.

3. In the list of tables, select **EBA_PROJECTS**.



4. Click the **Data** tab. The Data tab displays the raw information of the `EBA_PROJECTS` table.



Note:

You can edit the data directly by clicking the Edit icon on the Data report. However, leave the data unchanged for now.

5. When finished, click the **Oracle** logo in the top-left of the page to return to the Workspace home page.

You have fully populated your workspace and are ready to create a new application. Proceed to the next lesson.

4
Creating the Initial Application

About This Lesson

In this lesson, you use the **Create Application Wizard** to build the foundational pages of your application based on the sample dataset.

After you build the foundation of your app, use Page Designer's **Create Page Wizard** to add a new page to an existing app and run the app for the first time.

> **WARNING:**
>
> It is important to complete this chapter in one sitting. You cannot save your work until the end. If you stop before completion and your session times out, all your progress will be lost, and you will have to start the chapter again.

4.1 Running the Create Application Wizard

With the tables populated in your workspace, you can get started quickly with the **Create Application Wizard**.

The Create Application Wizard enables you to create many different types of pages, including reports, forms, and a master detail.

1. To create the initial application:
1. Click **App Builder** and select **Create**.

   The Create Application Wizard appears.

   > **Tip:**
   >
   > You can also click the down arrow icon on the tabs at the top of the screen to view a list of shortcuts to wizard and other pages.

2. Click **New Application**.
2. To customize your app name and appearance:
3. In Name, enter `Demo Projects`

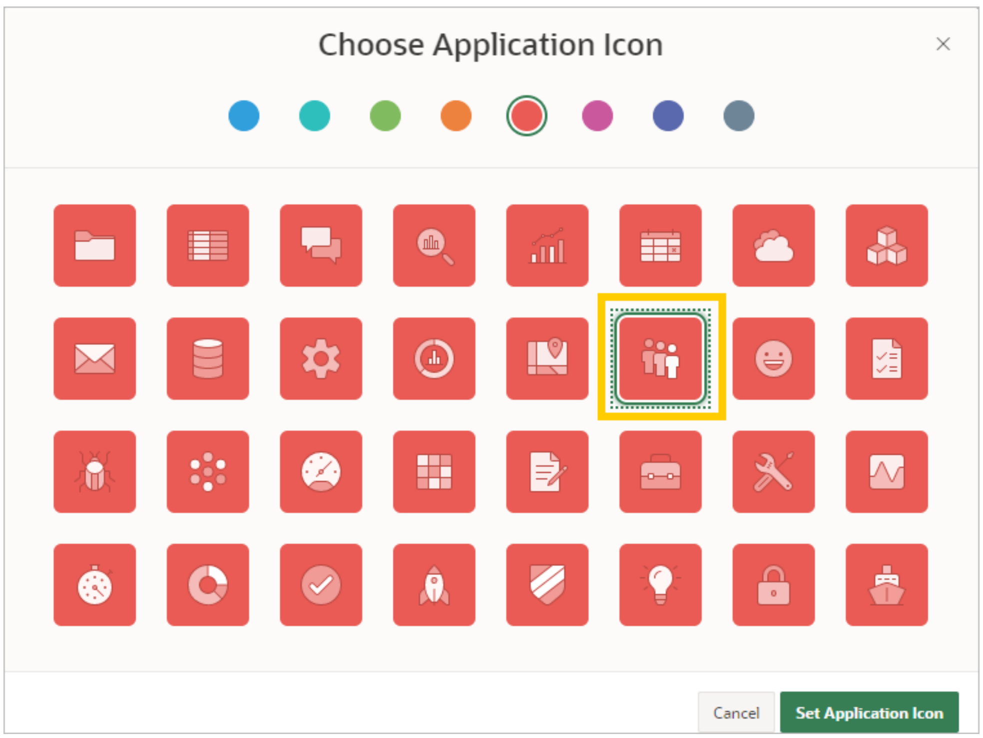
   > **Note:**
   >
   > The Create Application wizard creates a Home page automatically.

4. Click the **Set Appearance** icon.

The Appearance dialog displays.

5. Click **Vita - Red**.
6. For Application Icon, click **Choose New Icon**.

   The Choose Application Icon dialog displays.
7. Click the **red circle** icon.
8. Choose a new application icon, such as the trio of people.



9. Click **Set Application Icon** and click **Save Changes**.

4.2 Adding a Cards Page

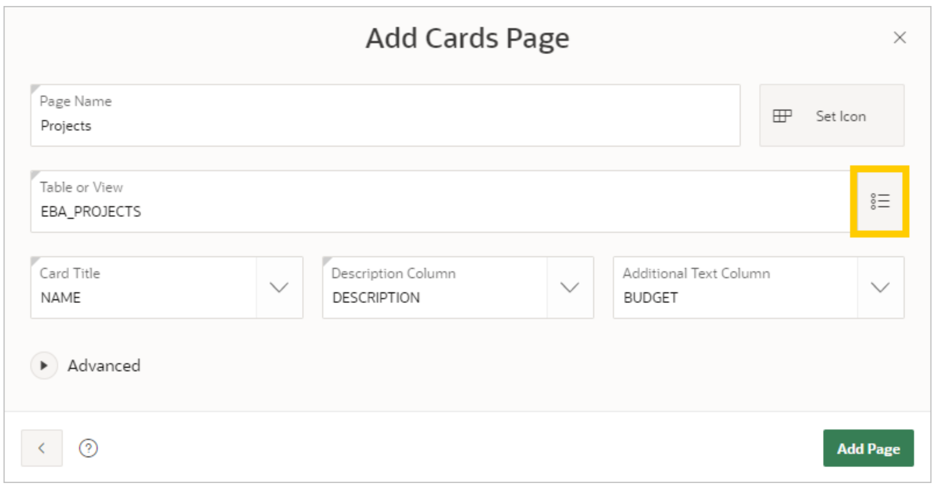
Often at the beginning of development, you only know some of the pages that your application requires. You can create as few or as many pages as you want in the Create Application Wizard. Save some time by generating a small batch of pages now. You can always add more later with a different wizard (the Create Page Wizard).

Start with a cards page that enables employees to quickly view and maintain their contact information.

Note:

A cards page consists of individual boxes, which resemble index cards, laid out on a page. Each card holds up to three pieces of information.

1. To add a cards page based on the `EBA_PROJECTS` table:
1. In the Pages section, click **Add Page**.
2. Click **Cards**.
3. Enter the following:
   a. Page Name - enter `Projects`
   b. Table or View - click the **LOV** icon (bullet points and lines) and select **EBA_PROJECTS**
   c. Card Title - select **NAME**
   d. Description Column - select **DESCRIPTION**
   e. Additional Text Column - select **BUDGET**



   f. Click **Add Page**.

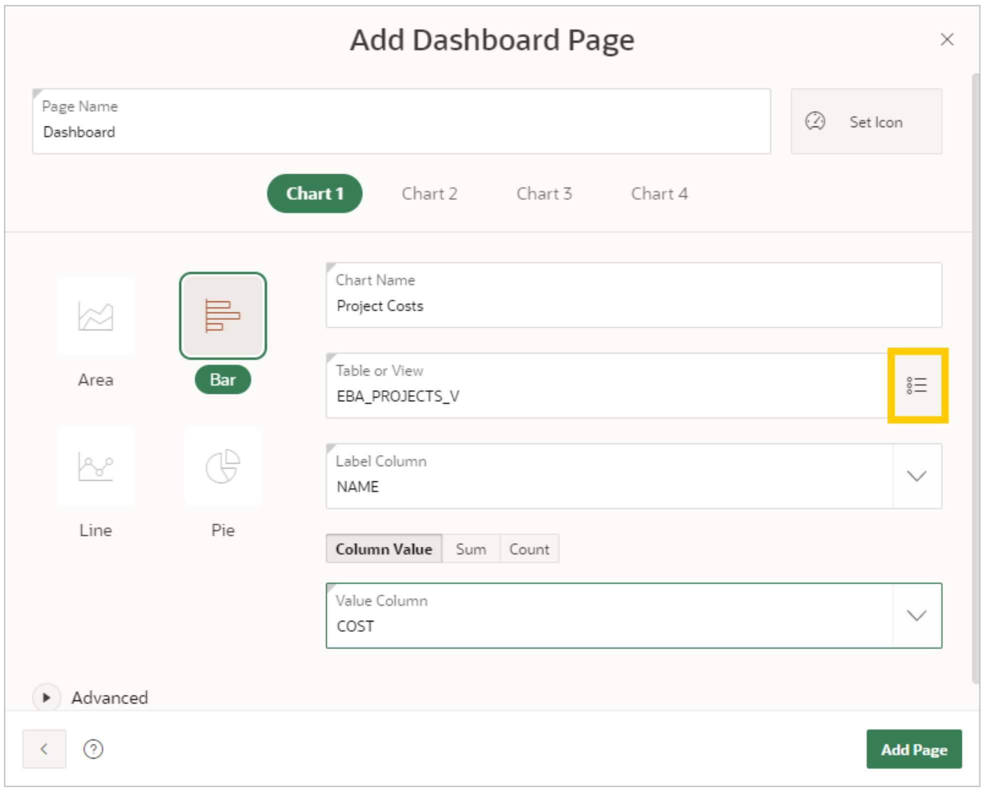
4.3 Adding a Dashboard Page

Next, add a dashboard page. A dashboard page consists of up to four charts. As a developer you can specify the specifics of each chart or leave the default sample charts, then update the page later.

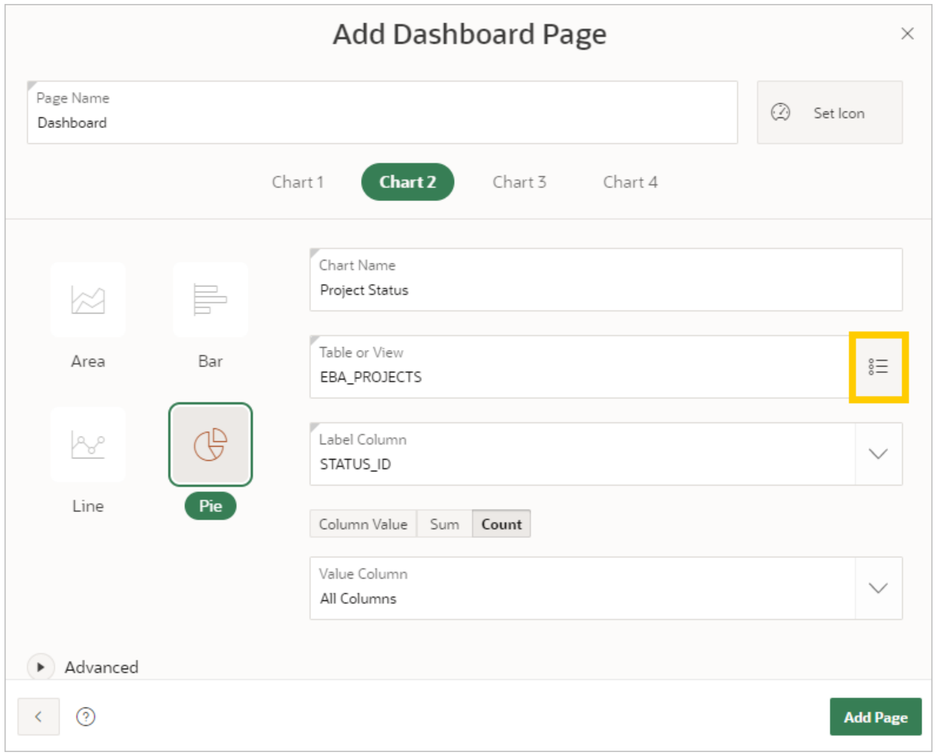
1. To add a dashboard page:
1. Click **Add Page**.
2. Click **Dashboard**.
2. Dashboard pages come populated with useful metrics. Configure two of the charts for tracking project budget and project status, and leave the other two unconfigured. You can evaluate whether to keep them later.

To configure the charts:

3. Enter the following for **Chart 1**:
   a. Chart Type - click **Bar**
   b. Chart Name - enter `Project Costs`
   c. Table or View - select **EBA_PROJECTS_V**
   d. Label Column - select **NAME**
   e. Aggregate Type - click **Column Value**
   f. Value Column - select **COST**



4. Click **Chart 2**.
5. Enter the following:
   a. Chart Type - click **Pie**
   b. Chart Name - enter `Project Status`
   c. Table or View - select **EBA_PROJECTS**
   d. Label Column - select **STATUS_ID**
   e. Aggregate Type - click **Count**



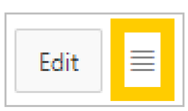
6. Click **Add Page**.

4.4 Moving Pages in the Create Application Wizard

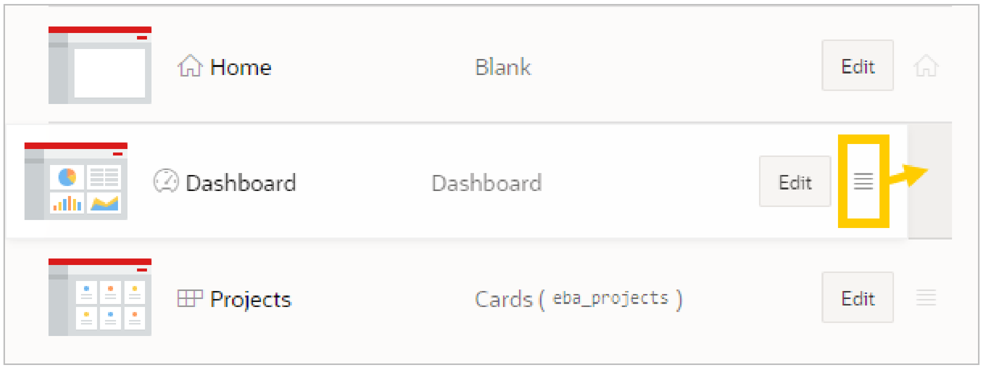
Once you create a page, you can click the Edit icon to edit the page name, change the icon that displays in the navigation menu, edit Advanced options, or delete the page. In addition to the Edit button, you can change the order of pages by dragging and dropping.

1. To move a page in the Create Application Wizard:

1. For the Dashboard page, adjacent to the Edit button, click and hold the **menu icon** (horizontal lines).

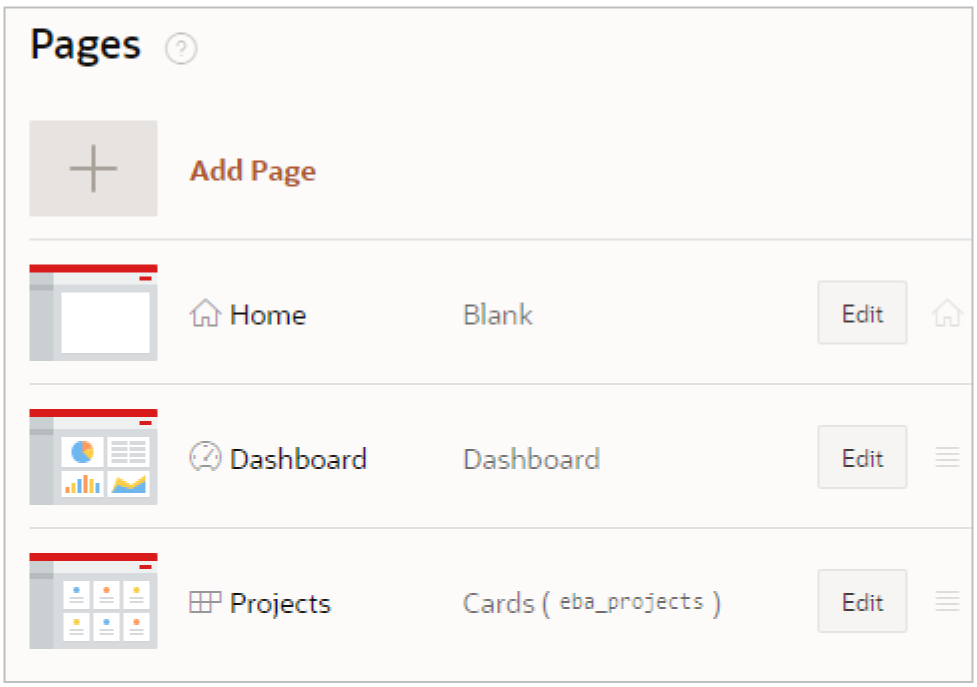


2. Drag the Dashboard page above the Projects page and release the mouse.



The Dashboard page snaps into place.

3. Verify that your list contains three pages in the following order:
   a. Home, Blank
   b. Dashboard, Dashboard
   c. Projects, Cards (`eba_projects`)

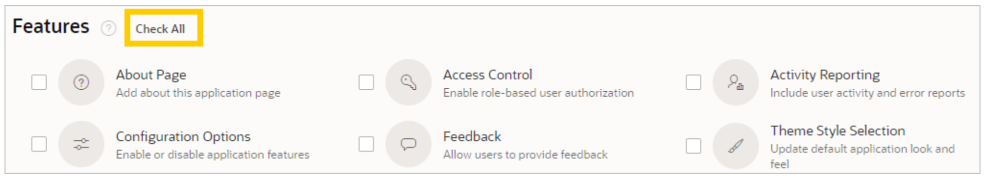


4.5 Configuring Features and Advanced Settings

Features provide application-level functionality and are typically added once per application. Features broaden the application's capabilities, making it more suitable for wide distribution, rather than just being suitable for a proof-of-concept.

> **Tip:**
>
> While sometimes more complicated, you can also add Features to an existing app later with the Create Page Wizard.

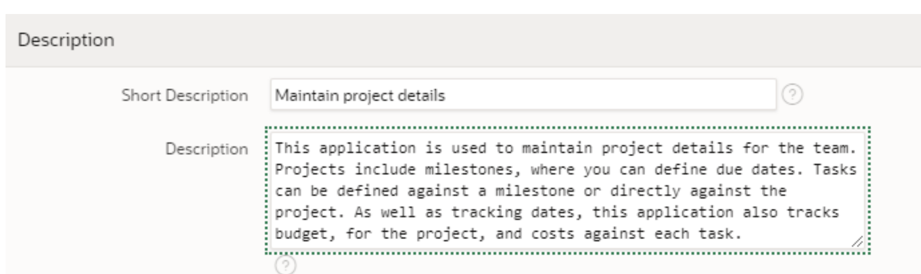
1. To add Features to the application:
1. Next to the Features heading, click **Check All**.



2. Settings are application-wide and define attributes used to generate the application.

   To edit advanced settings:
2. In the Settings section, in the Advanced Settings field, click the **Define Advanced Settings** icon (arrow in box).

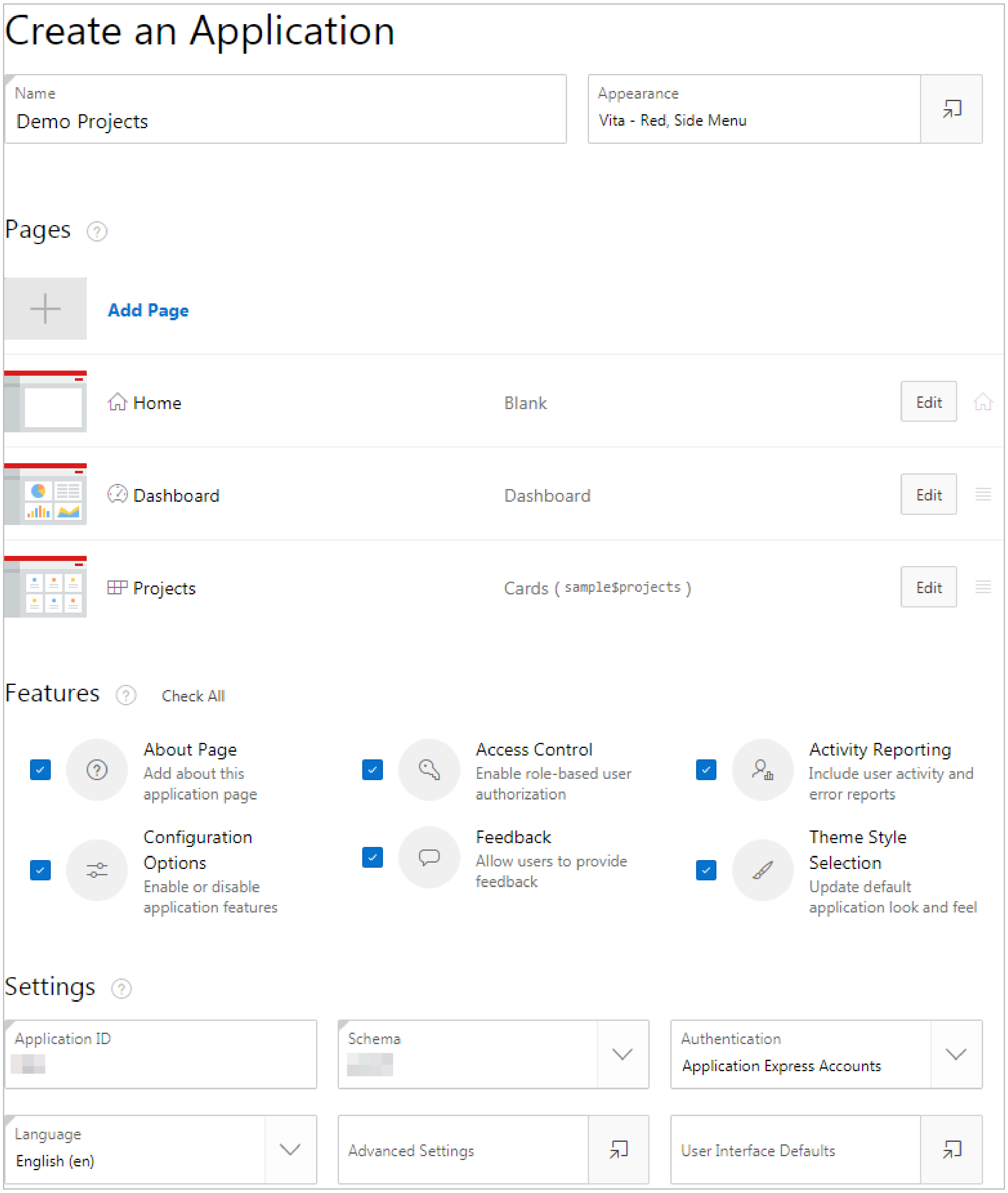
3. Under the Description section, enter the following:
   a. Short Description - enter `Maintain project details`
   b. Description - enter `This application is used to maintain project details for the team. Projects include milestones, where you can define due dates. Tasks can be defined against a milestone or directly against the project. As well as tracking dates, this application also tracks budget, for the project, and costs against each task.`



   c. Click **Save Changes**.

4.6 Completing the Create Application Wizard

1. To complete the Create Application wizard:
1. Compare your app with the following screenshot:



2. Click **Create Application**.

   A progress bar displays. When complete, Application Express navigates to the Application home page in App Builder.

> **Note:**
>
> Page `0` is a global page where you can define components to be displayed on all pages. Page `9999` is the Sign In page where end users authenticate when first accessing the application (enter their username and password). Pages `1000` and greater are administrative pages created for the features that you selected.

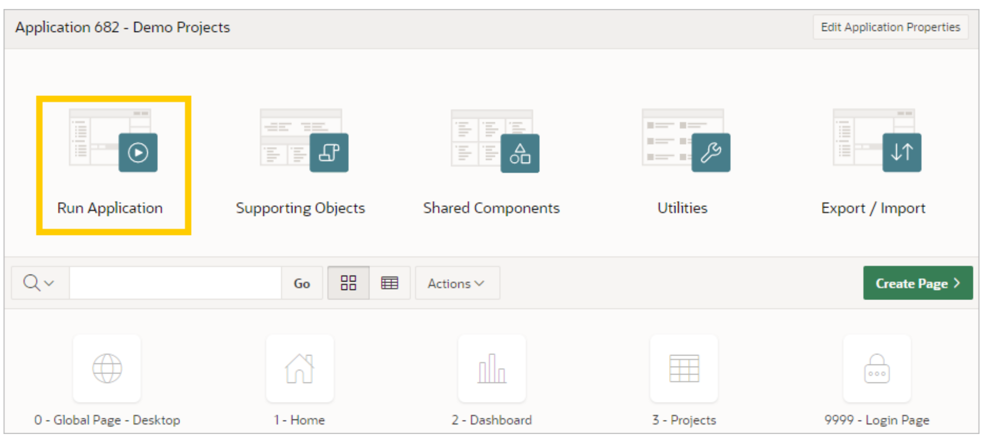
4.7 Running the Application for the First Time

Your app is functionally ready to run.

When you "run" an app, you are telling Application Express to open a new browser window and render the app. The rendered app is called the "application runtime" (or just "runtime"). As you create new pages, you can run them individually, or run an entire application.

Run the app for the first time from the Application home page and review the application runtime.

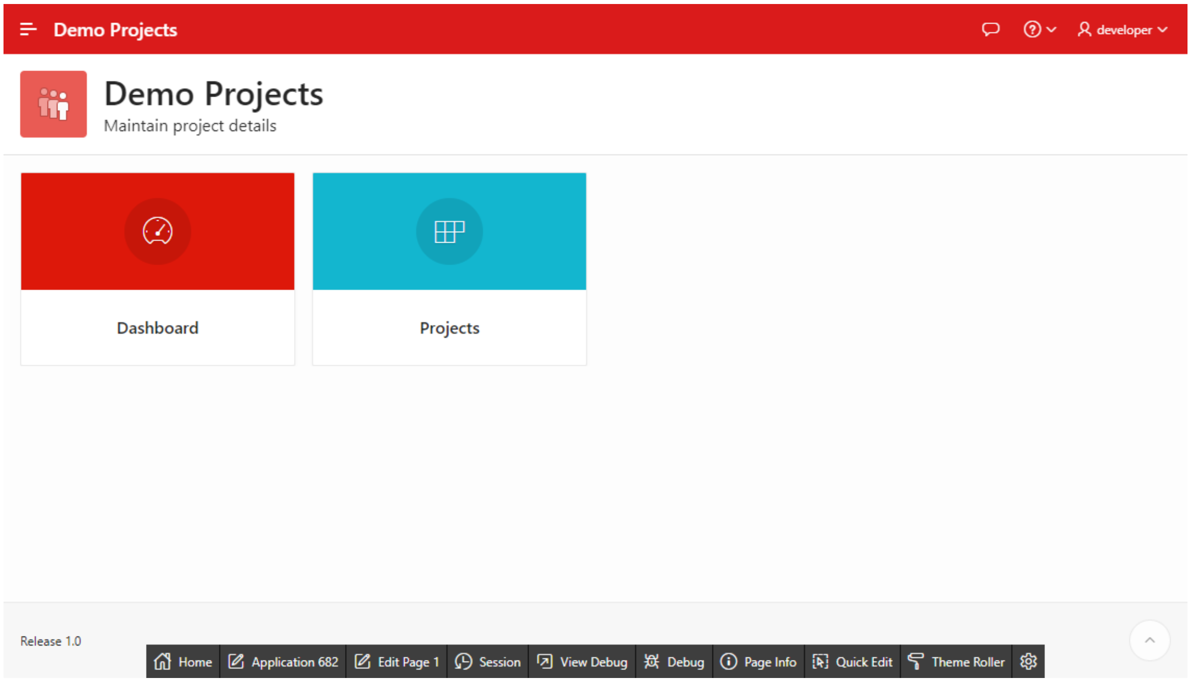
1. To run the application from the Application home page:
1. Click **Run Application**.



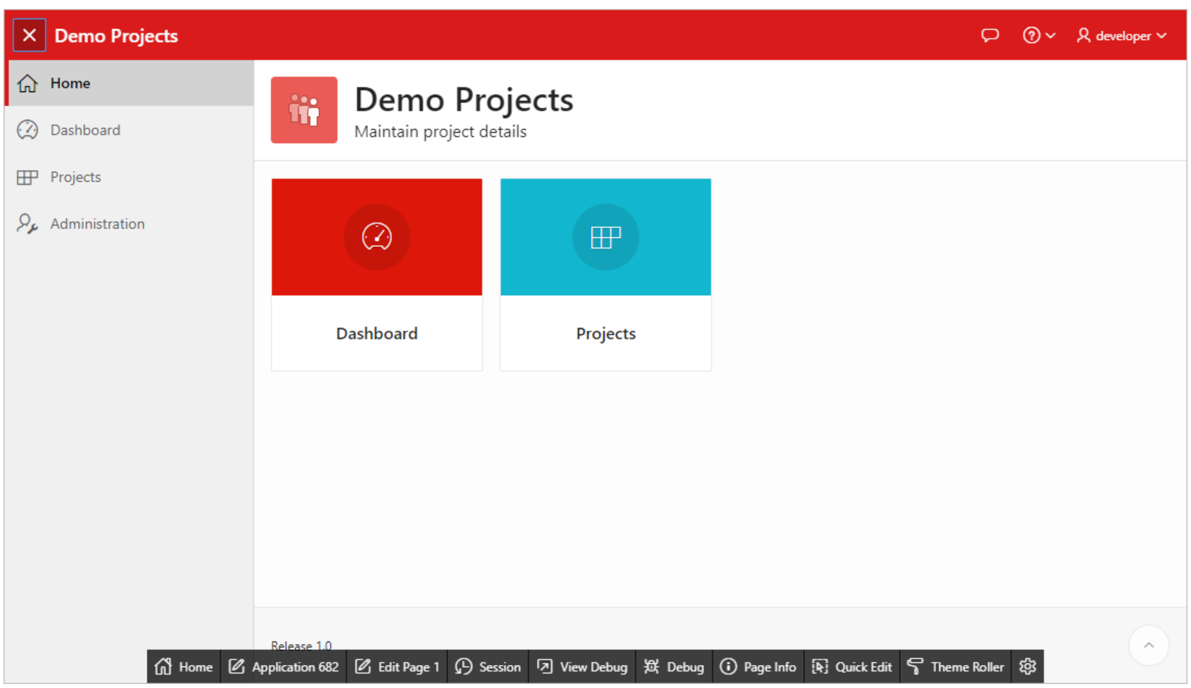
   A Sign In page appears.

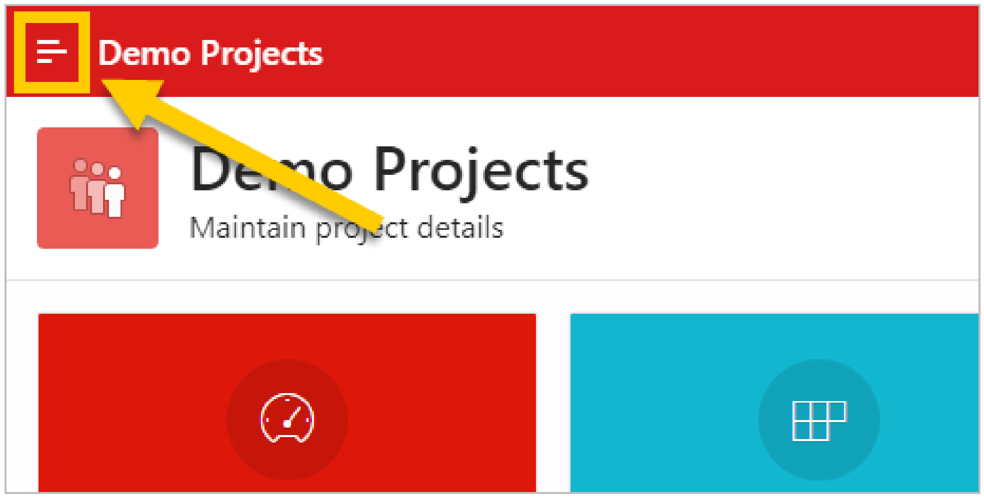
2. Enter your Application Express credentials and click **Sign In**.

   Your application opens to the Home page.



3. Click the **menu** icon (top-left) to view the navigation menu.





Memorize the location of the menu icon. You use it throughout the rest of the tutorial to navigate the app.

4. Explore the application by clicking on menu items and navigating to different pages in the navigation pane.
   The sample tables and data display on various pages in a raw format. The rest of this tutorial guides you through the development process to improve both the presentation and functionality of this data for your end users.

Proceed to the next lesson.

5
Developing the Projects Page

Use the Create Page Wizard and Page Designer to add a sophisticated form page for the Projects report.

About This Lesson

In this lesson, you are introduced to the two primary means of development: **Page Designer** and the **Application Runtime** ("runtime" for short).

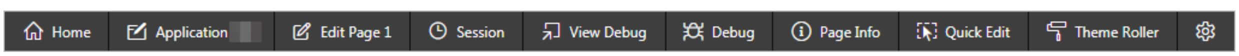
In Page Designer, use the **Rendering tab** and **Layout tab** to add new **regions** to the Projects page. Then, use the **Property Editor** to edit a wide array of attributes for region and page components, including SQL statements and appearance options.

In the runtime, you use the **Runtime Developer toolbar** to make changes on the page immediately and to quickly shift back to Page Designer.

5.1 Navigating to Page Designer from the Application Runtime

At the end of the previous lesson, you ran the application from the Application home page in App Builder and opened the Home page of the application.

Running an application from App Builder also displays the **Runtime Developer toolbar** at the bottom of the window.



You can use the Runtime Developer toolbar to quickly edit the page (and some aspects of the entire application). This toolbar only displays for users with developer or administrator privileges.

1. To view the Home page in Page Designer using the Runtime Developer toolbar:
1. In the top-left of the application runtime, do one of the following:
   - Click the name of the app **Demo Projects**.
   - Expand the navigation menu (click the **menu** icon) and click **Home**. (Do not click Home on the Developer Toolbar.)

   The runtime Home page displays.
2. On the Runtime Developer toolbar, click **Edit Page 1**.

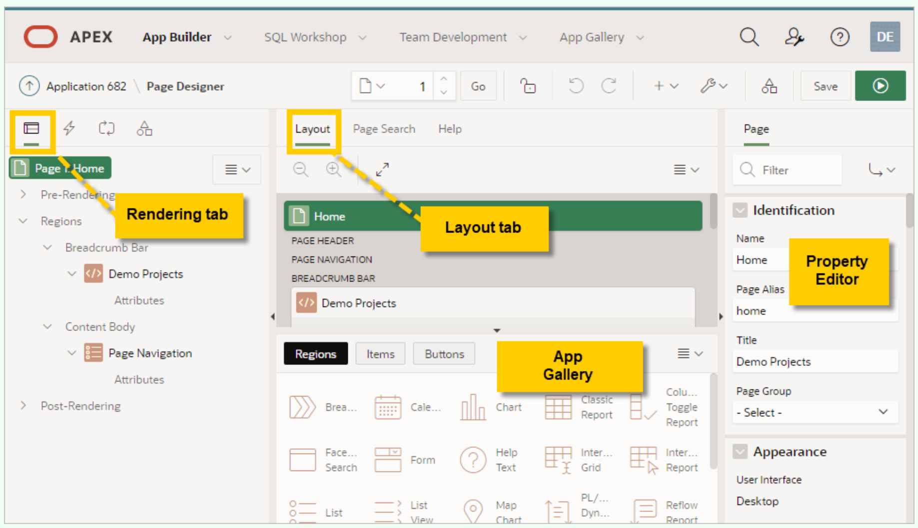
   Page Designer displays page 1.

Tip:

The number in the **Edit Page #** button corresponds to its assigned page number in Page Designer.

Tip:

Page Designer is the primary asset for Application Express developers. It's a powerful IDE (integrated development environment) with a robust array of tools for building, maintaining, and enhancing applications. Up to this point, you have mainly experienced the Create Application Wizard and SQL Workshop.



You rely primarily on Page Designer for the rest of this tutorial.

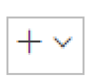
You can always learn more about Page Designer with the official *Oracle Application Express App Builder User's Guide*.

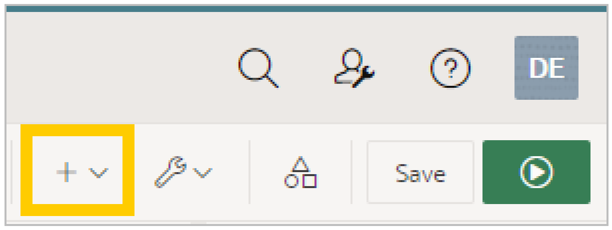
5.2 Creating a Form Page Using the Create Page Wizard

Use the Create Page Wizard to add new pages to an app. It has a more robust interface for adding new pages than the Create Application Wizard.

Add a form to the Projects report to give your users a way to edit the information themselves.

1. To open the Create Page Wizard in Page Designer:

1. Click the **Create** menu icon  (top-right) and select **Page**.



The Create Page Wizard appears.

2. Select **Form**.
3. Select **Form** (again).
4. Enter the following:
    a. Page Number - enter 4
    b. Page Name - enter `Maintain Project`
    c. Page Mode - select **Modal Dialog**
    d. Click **Next**.
5. For Navigation Preference, enter the following:
    a. Select **Do not associate this page with a navigation menu entry**.
    b. Click **Next**.
6. For Data Source, enter the following:
    a. Table / View name - click the **List of Values** icon  and select **EBA_PROJECTS (table)**
    b. Click **Next**.
7. For Create Form - Columns and Primary Key, enter the following:
    a. Primary Key Type - select **Managed by Database (ROWID)**
    b. Click **Create**.

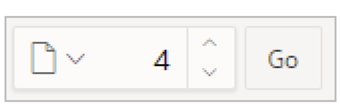
Page Designer reloads displaying Page 4: Maintain Project.

5.3 Linking Project Cards to Maintain Project Form

You can now update the SQL queries on the Projects report to call the Maintain Project form.

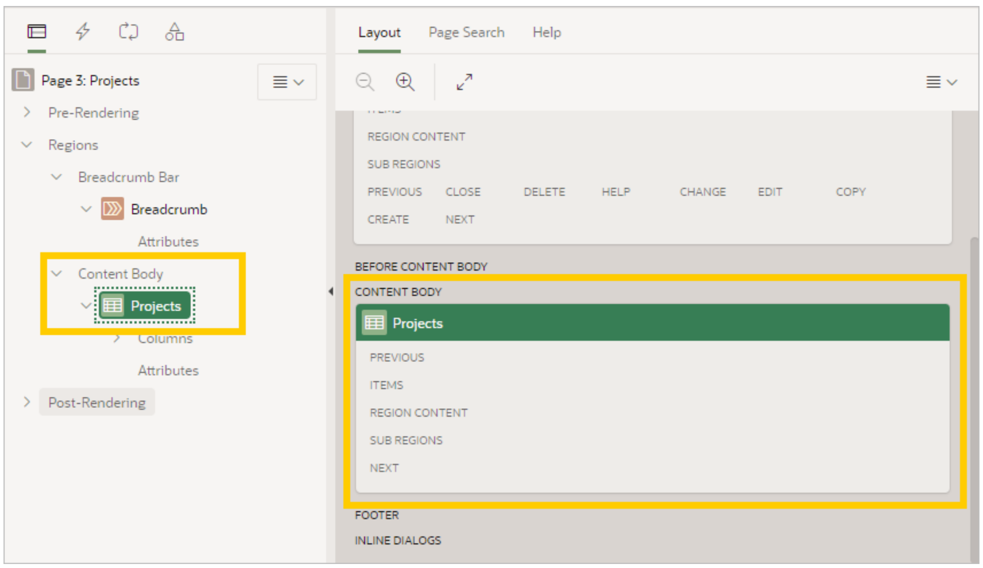
Reconfigure the cards on the Projects page to display Maintain Project form when clicked.

1. To navigate to the Projects page (page 3) in Page Designer:
1. On the toolbar, locate the Page Finder area.

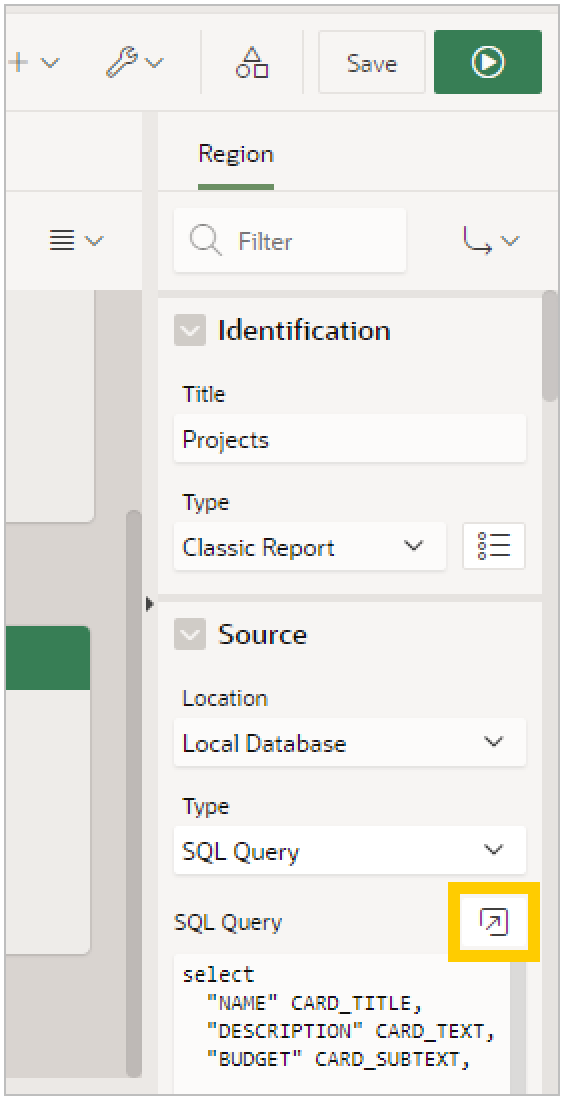


2. Do one of the following:
   - Click the **Page Finder** icon  and select **3** from the list.
   - Change the page number to 3 and press Enter.
   - Click the **Navigate to Previous Page** icon (down arrow).

   Page Designer loads Page 3: Projects.
2. To update the SQL of the Projects region:
3. Do one of the following to select the Projects region:
   - In the Rendering tab (left pane), under Regions - Content Body, select **Projects**.
   - In the Layout tab (center pane), scroll down and click the **Projects** region.



4. In Property Editor (right pane), in the Source group, locate the SQL Query field.



5. Click the **Code Editor: SQL Query** icon to read the code more easily. Reviewing the SQL Query, you can see that the SQL uses alias names, such as CARD_MODIFIERS and CARD_LINK. These specific aliases are required by the Cards region to produce the correct output. The alias `CARD_LINK` can be updated to link to the new page you just created.
6. In the SQL Query field, replace the contents with the following code:

```
select ' ' card_modifiers
  , apex_page.get_url( p_page => '4', p_clear_cache => '4', p_items =>
'P4_ROWID', p_values => rowid ) card_link
  , ' ' card_color
  , ' ' card_icon
  , apex_string.get_initials(name) card_initials
  , name card_title
  , description card_text
  , 'Budget '|| to_char(budget,'L99G999') card_subtext
from EBA_PROJECTS
```

7. Click the **Validate** icon to verify.

   The message `Validation successful` displays at the top of the window.

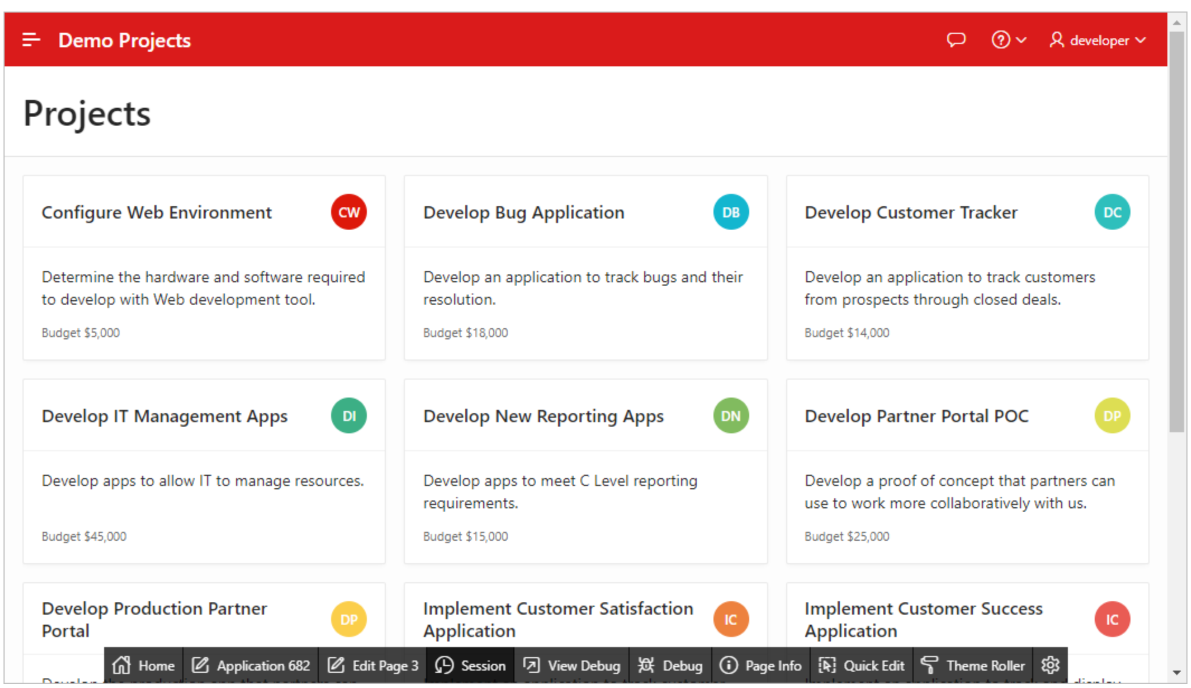
8. Click **OK**.

9. Click **Save and Run Page**.

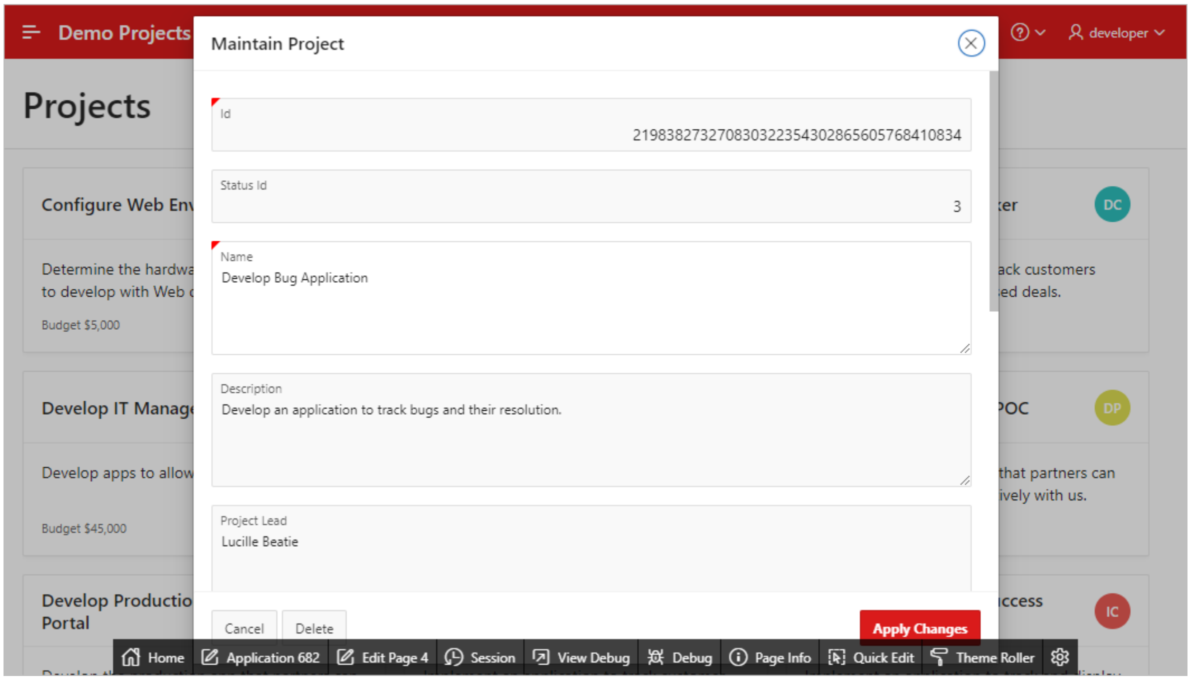
   - If you receive a warning dialog, click **Try Again**.

> **Tip:**
>
> You can also click the Save button and then Save and Run Page to avoid this warning.

The Projects page loads in the runtime.



10. Click a project to view the Maintain Project form for that project.



Your users should not have unlimited access to several fields, either because the field does not pertain to the task of updating project details (such as IDs) or the access compromises data integrity and security (various timestamps).

3. To quickly return to Maintain Project form in Page Designer:

11. On the Runtime Developer toolbar at the bottom of the screen, click **Edit Page 4**.

    Page Designer loads Page 4: Maintain Project.

5.4 Updating the Maintain Project Form in Page Designer

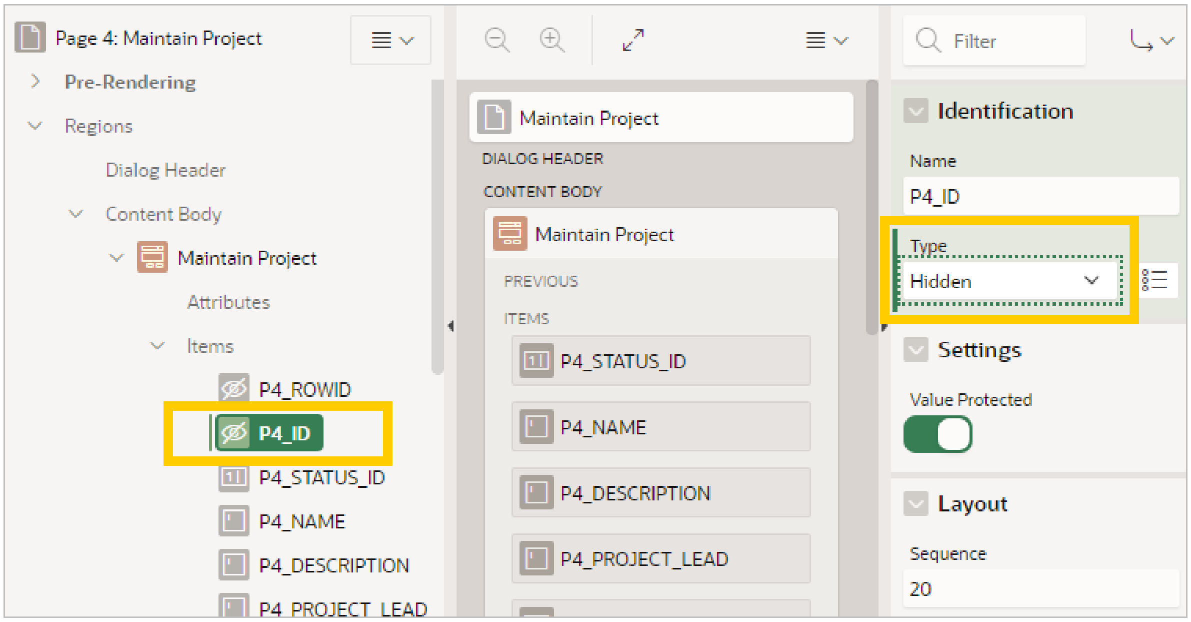
Use Page Designer to make the following updates to the Maintain Project form (page 4) to improve usability and security:

- Hide a column by changing the type to hidden
- Move an item within an existing region
- Change an item to a select list
- Change multiple items to text fields
- Create a sub region to organize items into a read-only, expandable group

1. End users do not need to see the ID column in the form. Change P4_ID to a hidden column to keep it from rendering in the app at all.

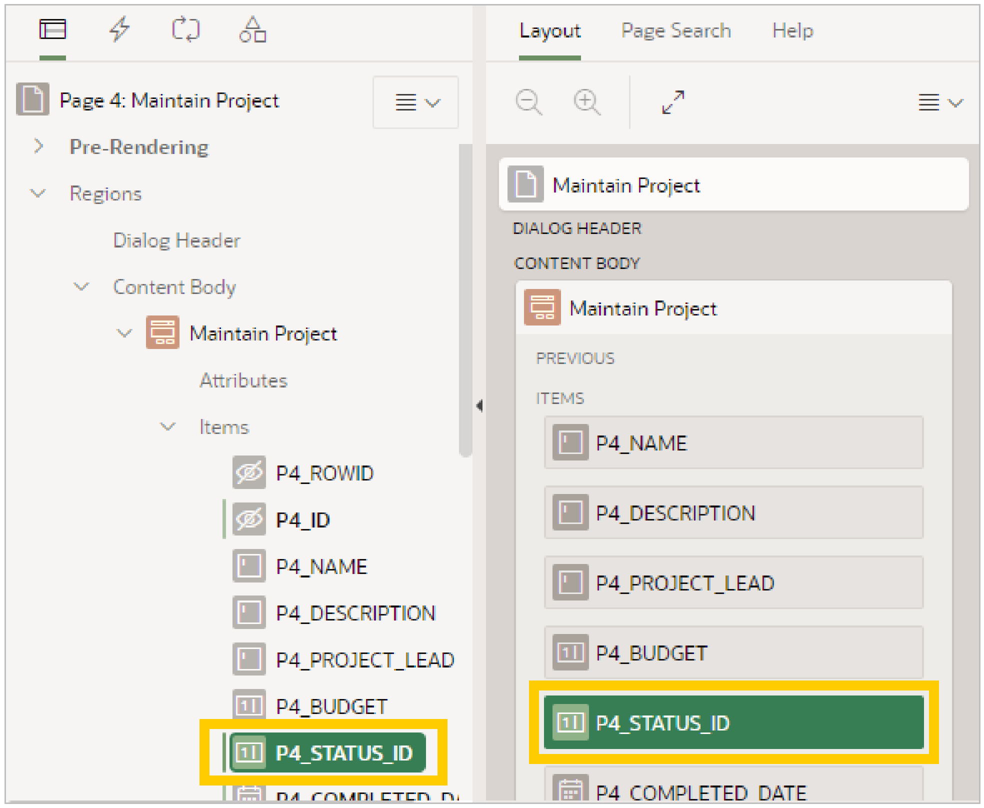
   To hide a column in Page Designer:

1. In the Layout tab, click the **P4_ID** item.
2. In Property Editor:
   - Identification: Type - select **Hidden**.

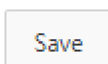


2. To move an item in a region:
3. In the Layout tab:
   a. Right-click the **P4_STATUS_ID** item.
   b. Select **Move To**, **Maintain Project**, **Items**, **P4_BUDGET**, and **After**.

> **Tip:**
>
> You can also use the mouse to drag and drop elements in the Rendering tab and Layout tab.



4. Click **Save**:

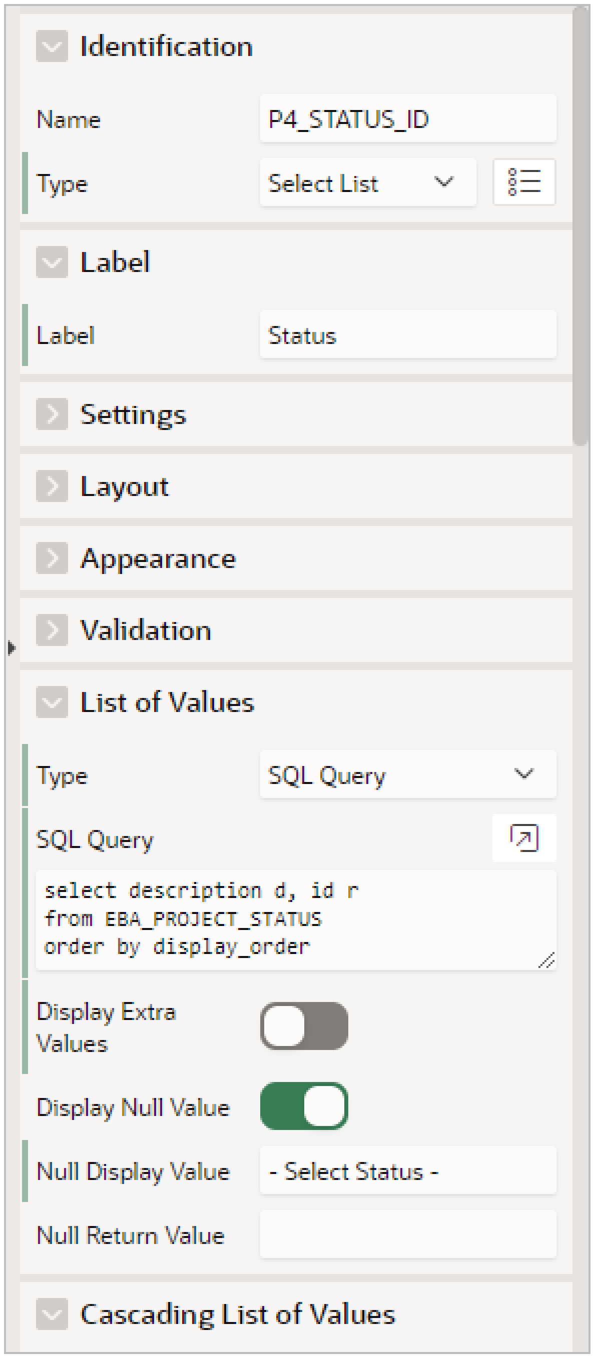


3. To convert an item to a select list:
5. Ensure **P4_STATUS_ID** is still selected.
6. In the Property Editor:
   a. Identification: Type - select **Select List**. (Ignore the warning icons that display.)
   b. Label: Label - enter `Status`
   c. List of Values: Type - select **SQL Query**.
   d. List of Values: SQL Query - enter the following:

```
select description d, id r
from EBA_PROJECT_STATUS
order by display_order
```

   e. List of Values: Display Extra Values - click to **disable**.
   f. List of Values: Null Display Value - enter the following:

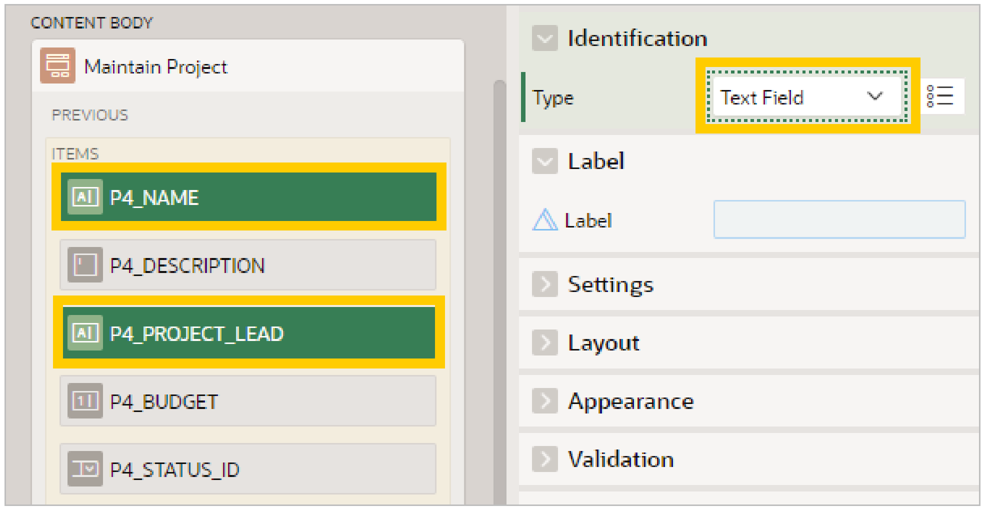
```
- Select Status -
```



The above SQL uses the base table `EBA_PROJECT_STATUS` which includes a column called `display_order` to ensure the records display in the correct order.

7. Click **Save**.
4. To change multiple items simultaneously:
8. Press and hold the **Ctrl** key and click the following items to select both of them:
   a. **P4_NAME**
   b. **P4_PROJECT_LEAD**
9. In the Property Editor:

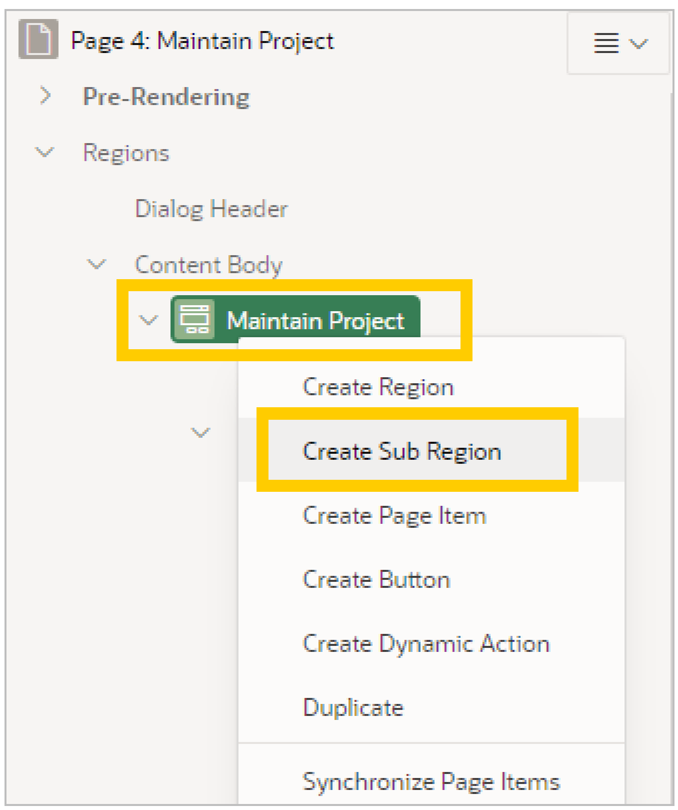
- Identification: Type - select **Text Field**.



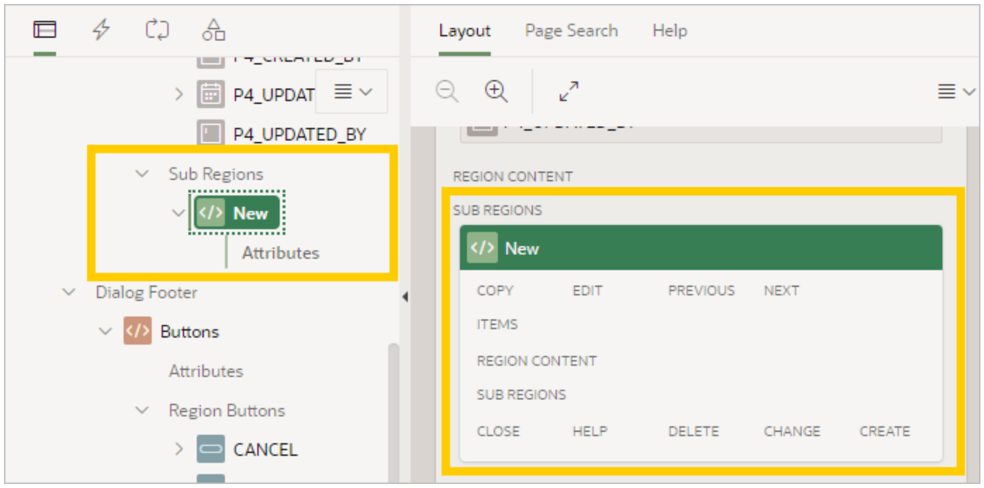
When selecting multiple elements, the Property Editor only displays the attributes that all the selected elements have in common.

5. To create a collapsible sub region:

10. In the Rendering tab, right-click the **Maintain Project** region and select **Create Sub Region**.

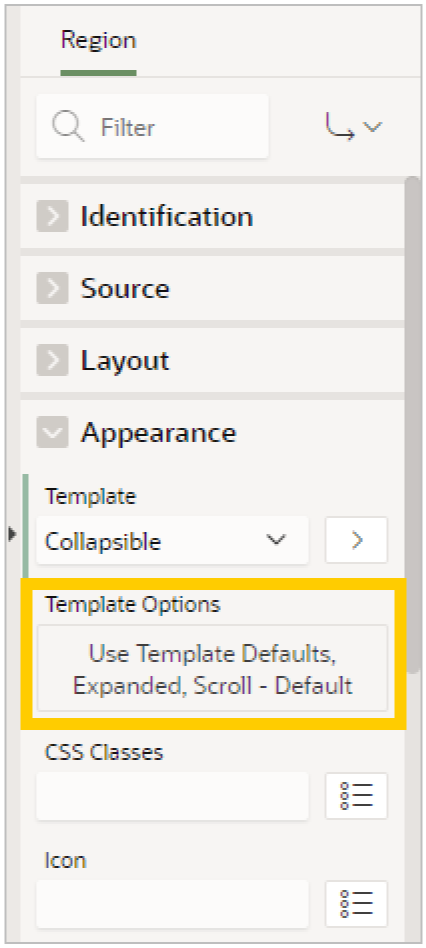


The New sub region appears within the Sub Regions folder.

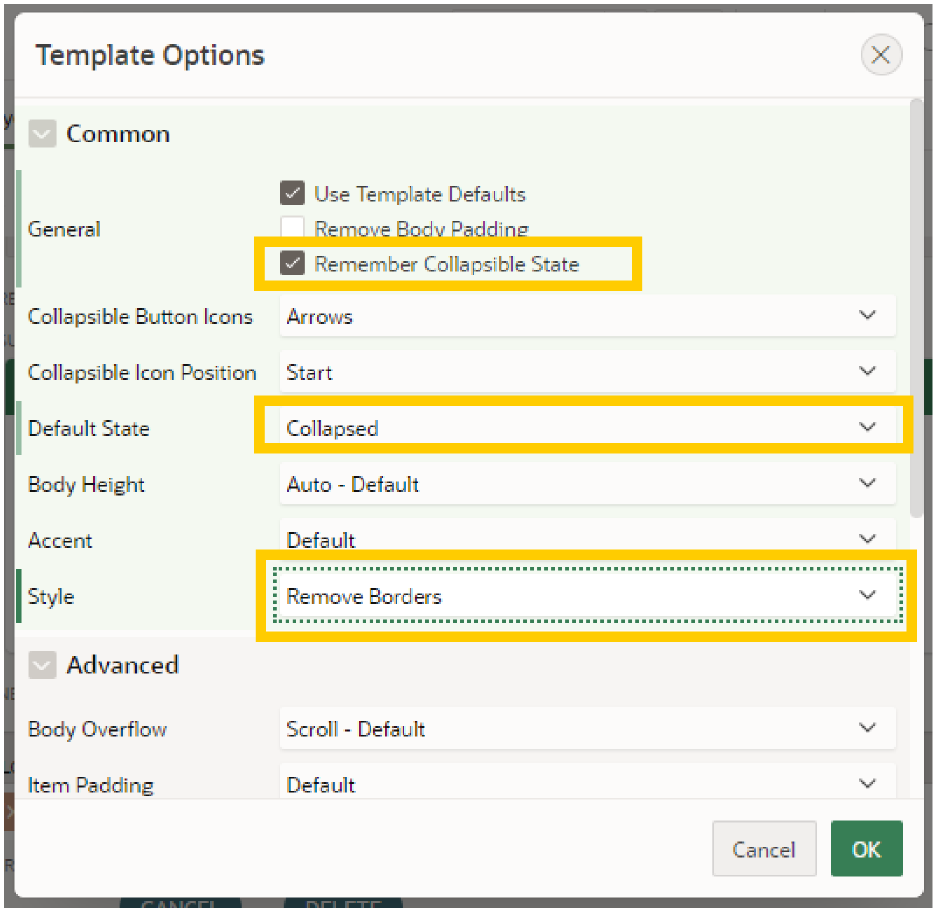


11. In the Property Editor:
    a. Identification: Title - enter `Audit Details`
    b. Appearance: Template - select **Collapsible**.
    c. Server-side Condition: Type - select **Item is NOT NULL**.
    d. Server-side Condition: Item - enter `P4_ROWID` (you can also select the page from a pop-up list).

    Setting the Server-side Condition checks that the Rowid is not null and only displays the region when a user updates the record.
12. Locate and click the Appearance: Template Options button (**Use Template Defaults, Expanded, Scroll - Default**).

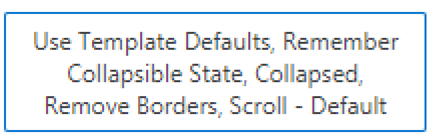


13. In Template Options:
    a. General: Remember Collapsible State - select the check box
    b. Default State - select **Collapsed**
    c. Style - select **Remove Borders**



d. Click **OK**.

The Template Options button reflects the current configuration: "Use Template Defaults, Remember Collapsible State, Collapsed, Remove Borders, Scroll - Default".



14. Click **Save**.

6. Rather than using drag and drop, you can use Property Editor to move multiple items into the Audit Details sub region, convert them to Display Only, and switch their appearance template all at once.

   To move items into a sub region with the Property Editor:

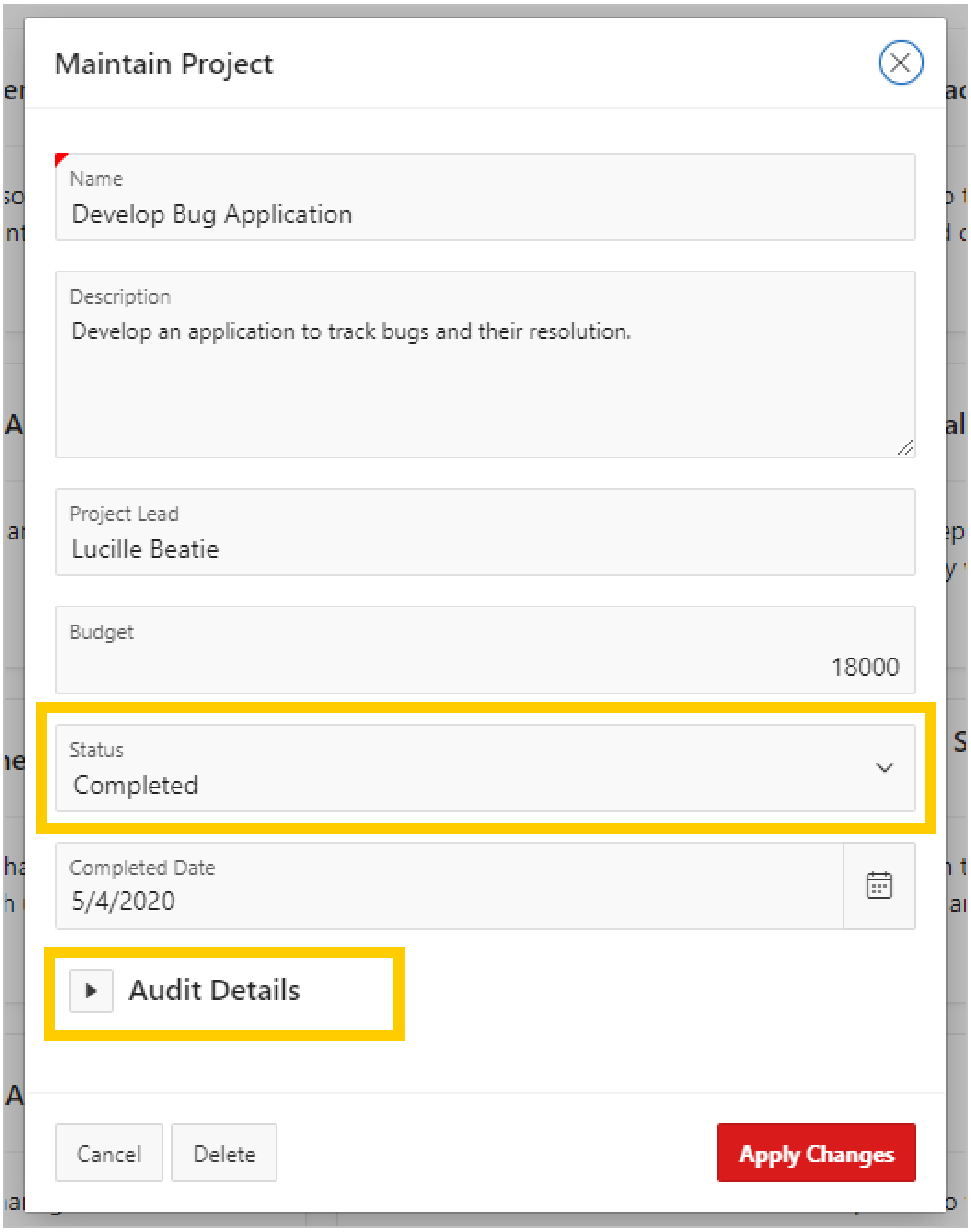
15. Hold the **Ctrl** key and select the following items:
    - **P4_CREATED**
    - **P4_CREATED_BY**
    - **P4_UPDATED**
    - **P4_UPDATED_BY**

16. In the Property Editor:
    a. Identification: Type - select **Display Only**
    b. Layout: Region - select **..Audit Details**
    c. Appearance: Template - select **Optional - Floating**

> **Note:**
>
> The double periods are a shortening device for the names of sub regions in the interface. Think of it as actually reading "the sub region *Audit Details*."

    The items move into the sub region.
17. Click **Save**.
7. The Maintain Project form is a modal page. You cannot run a modal page directly from Page Designer the way you can other pages. You must navigate to the associated non-modal page in the runtime (in this case, page 3 - Projects), then open the modal page from there.

    To run the modal Maintain Project page:
18. Switch back to the runtime tab in your browser and reload the Projects page. (Click your browser's refresh or reload button.)
19. Click a project card. Note the changed Status field and expandable Audit Details region.



Trying clicking each and observe how the page responds.

20. When finished, click **Edit Page 4** on the toolbar to return to Maintain Project in Page Designer.

5.5 Creating a Dynamic Action

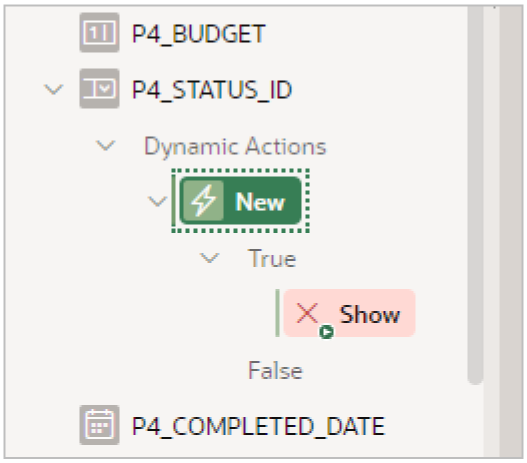
Add a Dynamic Action to the P4_STATUS_ID item select lists so that when the user changes the project Status to "Completed," the completion date displays.

Dynamic Actions within Application Express are used to declaratively define client-side behaviors without writing JavaScript or AJAX. Instead, the Application Express engine implements the necessary code based on your declaration.

1. To create a Dynamic Action:

1. In the Rendering tab, right-click the **P4_STATUS_ID** item and select **Create Dynamic Action**.

   A Dynamic Actions element populates as a child to P4_STATUS.

2. In the Property Editor:

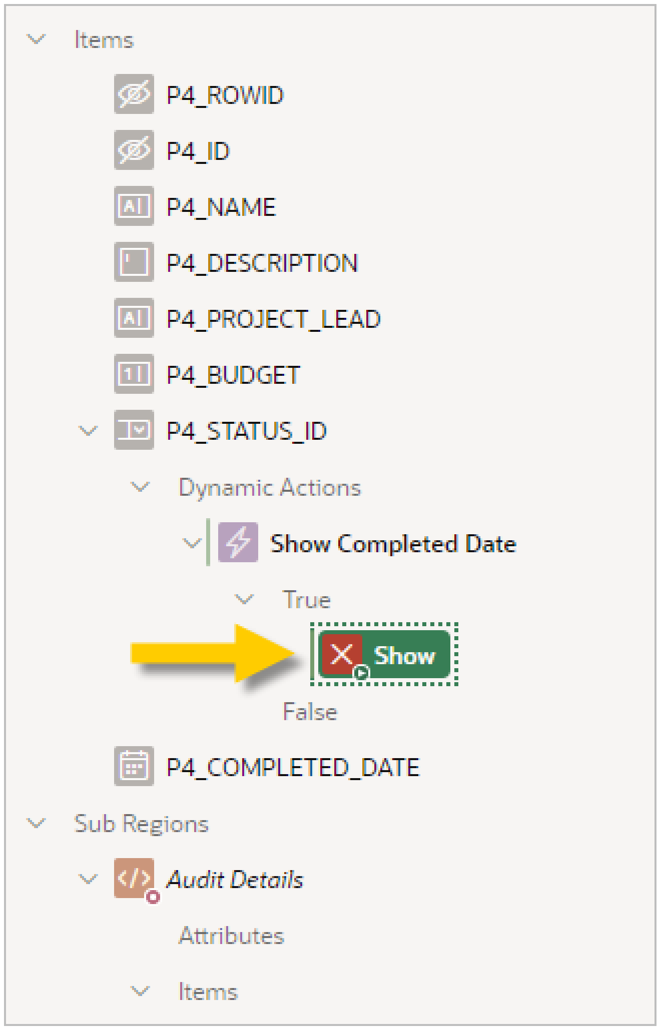
   a. Identification: Name - enter `Show Completed Date`

   b. Client-side Condition: Type - select **Item = Value**

   c. Client-side Condition: Value - enter 3

   > **Note:**
   >
   > Entering 3 in the Value field (`status_ID=3`) targets the third item in the select list, which in this case is the "Completed" status.

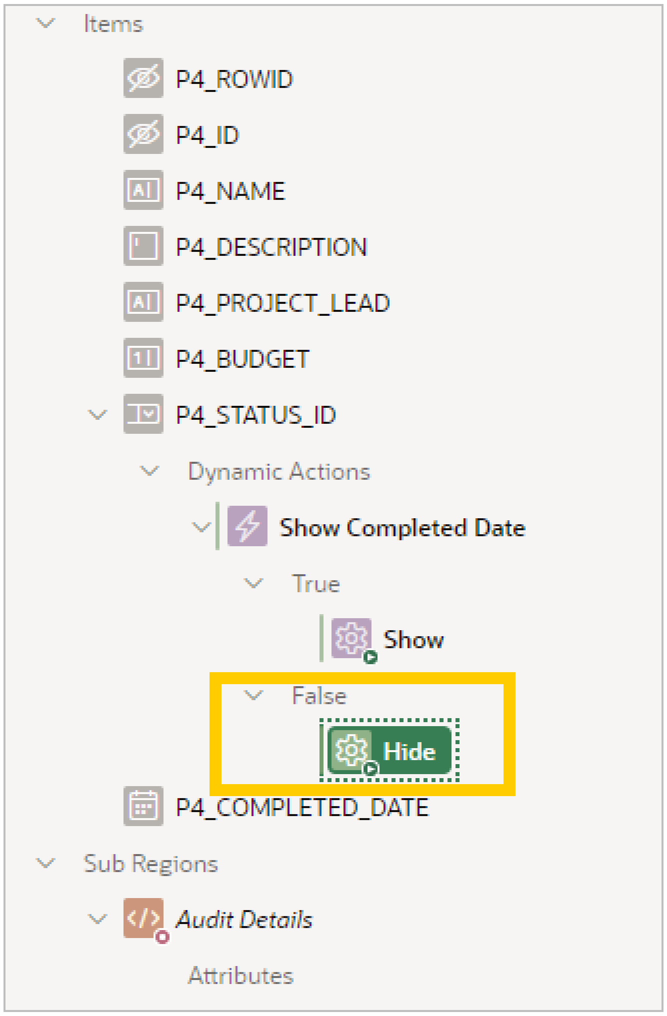
3. In the Rendering tab, under the Show Completed Date dynamic action, select the **Show** element.



4. In the Property Editor:
   - Affected Elements: Items(s) - click the **LOV** icon and select **P4_COMPLETED_DATE** (you can also enter `P4_COMPLETED_DATE`).
2. For some types of Dynamic Actions (such as Show, Enable, and Expand Tree), you must also create the corresponding opposite action. With an opposite action, if the True When Condition affects elements one way, then the False When Condition affects elements the opposite way.

   To add an opposite action:
5. In the Rendering tab, under Show Completed Date, right-click **Show** and select **Create Opposite Action**.

   The Hide dynamic action populates (Hide is the opposite of Show).



Here, the P4_COMPLETED_DATE item displays when P4_STATUS_ID equals Completed. When any other status is selected, P4_COMPLETED_DATE is hidden.

6. Click **Save**.

5.6 Adding Validations to Completed Date

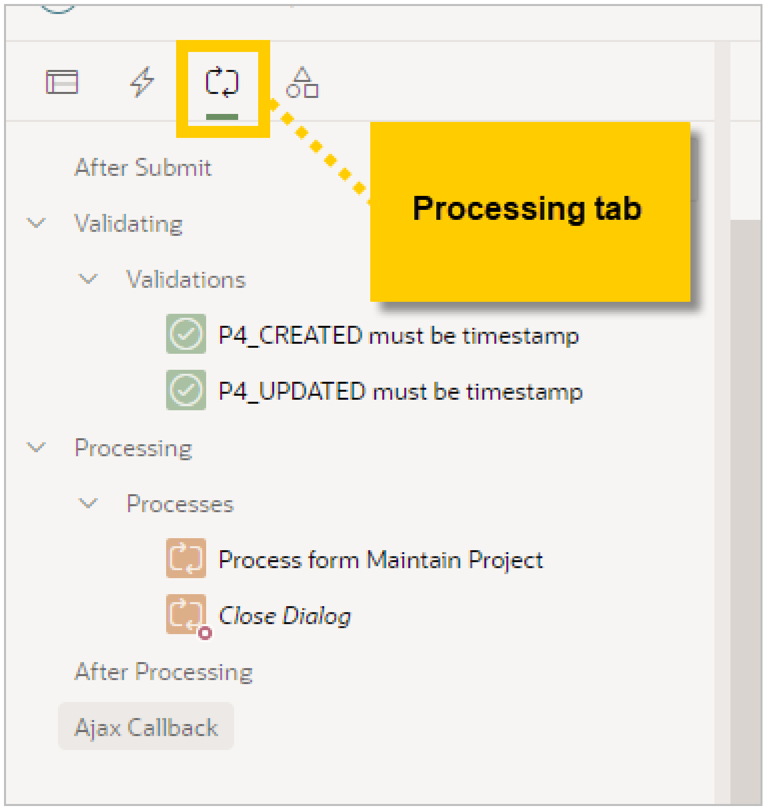
Page validations ensure the data entered by end users is correct. If a validation fails, then an error message is raised, and the values are not saved to the database.

Add two validations to the Completed Date item so that:

- When a user changes the status to Completed, they must also add the date.
- A user cannot enter a date in the future.

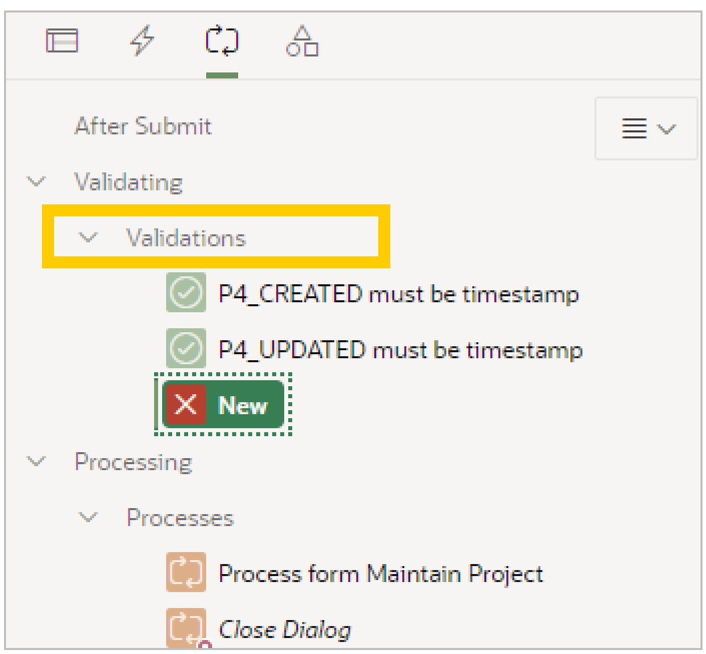
1. To create a new validation:

1. On the Maintain Project page in Page Designer, click the **Processing** tab (rotating arrows) at the top of the Rendering tab.



2. Right-click the **Validations** element and select **Create Validation**.

   New validation populates.



3. In the Property Editor:

   a. Identification: Name - enter `Completed Date is Not Null`

b. Validation: Type - select **Item is NOT NULL**
c. Validation: Item - enter `P4_COMPLETED_DATE`
d. Error: Error Message - enter `#LABEL# must have some value.`
e. Error: Associated Item - select **P4_COMPLETED_DATE**
f. Server-side Condition: Type - select **Item = Value**
g. Server-side Condition: Item - enter `P4_STATUS_ID`
h. Server-side Condition: Value - enter 3
This condition ensures that the validation only fires when the Status item is Completed.

> **Note:**
>
> The label from the associated item replaces the #LABEL# text within the Error Message. If you update the item label, the error message also updates automatically. This improves consistency and ensures that messages have current label references.

> **Tip:**
>
> When you click within an attribute in Property Editor, you can view examples of content (such as error messages) for that attribute by clicking the Help tab at the top of the Layout tab.

i. Click **Save**.

2. To copy a validation:
4. In the Processing tab, right-click **Completed Date is NOT NULL** and select **Duplicate**.

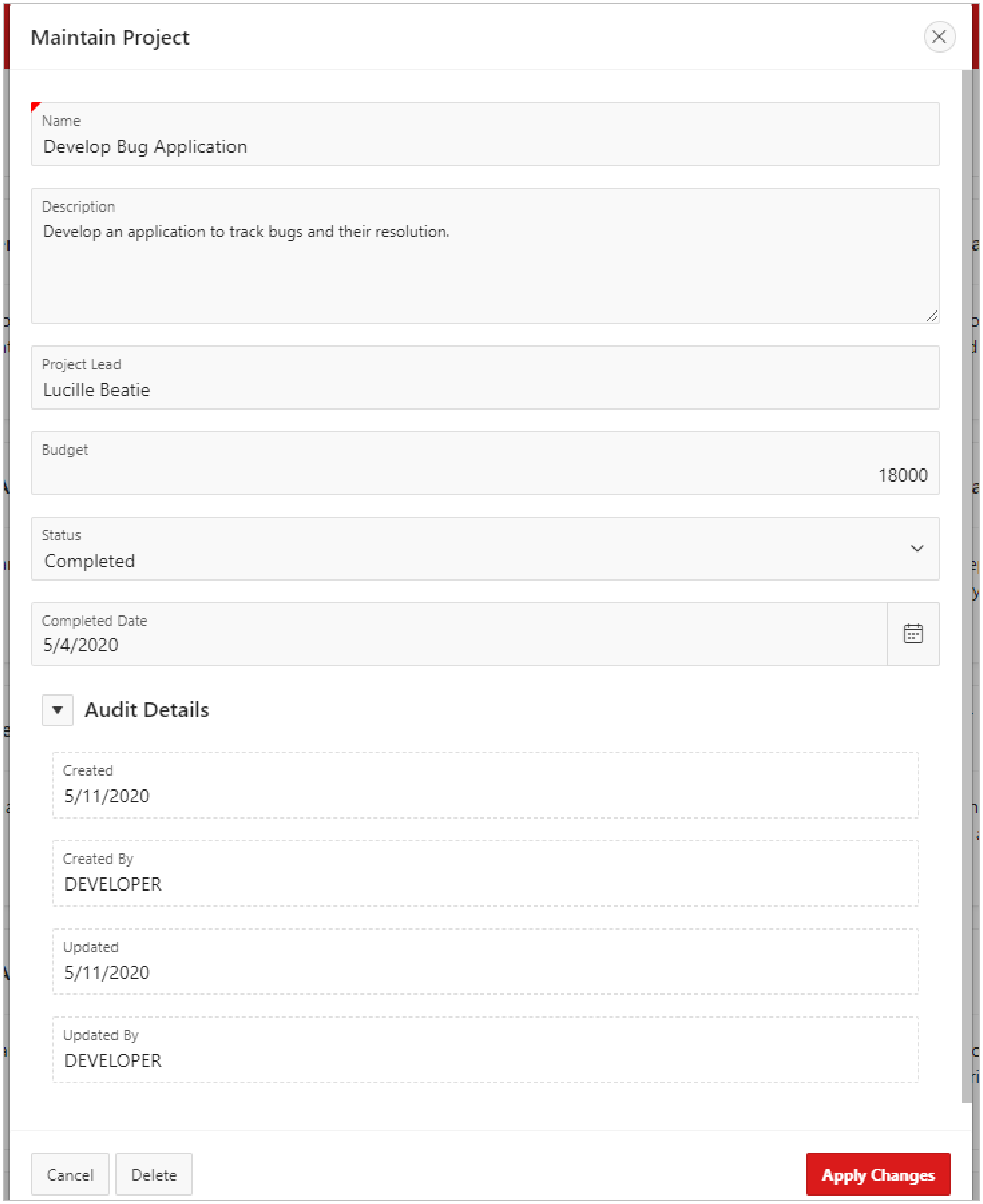
   The item "Completed Date is NOT NULL_1" populates, selected.
5. In the Property Editor:
   a. Identification: Name - enter `Completed Date is not Forward Dated`
   b. Validation: Type - select **PL/SQL Expression**
   c. Validation: PL/SQL Expression - enter `:P4_COMPLETED_DATE <= SYSDATE`

> **Tip:**
>
> Ensure you include the colon (:) . To reference a page item in PL/SQL, you use the `:ITEM_NAME` syntax. `SYSDATE` returns the current date from the Oracle Database.

   d. Error: Error Message - enter `#LABEL# cannot be forward dated`
   e. Server-side Condition: Type - select **Item is NOT NULL**
   f. Server-side Condition: Item - enter `P4_COMPLETED_DATE`

6. Click **Save**.
7. In the runtime, reload the Projects page (reload the browser tab) and click a project card to display Maintain Project.

The form is complete.



Try the following tasks to see how the application behaves:

- Change the Status and see how the Completed Date displays or vanishes.
- Find an In-Progress project, change the status to Completed but leave the Completion Date empty, and click **Apply Changes**. (An error message should display.)
- Enter a Completion Date in the future and click **Apply Changes**. (An error message should be displayed.)

When finished, click **Application #####** on the Developer Toolbar to return to the Application home page.

6 Developing the Milestones Page

Use the Create Page Wizard and Page Designer to add an interactive grid page to the application so that users can manage project Milestones.

In this lesson, you use the Create Page Wizard to add a new **interactive grid** page. Similar to the older interactive report, interactive grids do not require a paired form page to change the content displayed on the page.

In addition to the `EBA_PROJECTS` table, the app also contains the `EBA_PROJECT_MILESTONES` and `EBA_PROJECT_TASKS` tables. These two tables contain data for incremental milestones and tasks that help to track the progress of an entire project more precisely.

Currently, your app only supports changes to the status of entire projects. Develop the Milestones interactive grid so that your users can view and change the status of these tasks and milestones.

Add and configure a Milestones entry in the **Desktop Navigation Menu** so it displays across the entire app.

Use **Dynamic LOVs** (or **lookups**) to intelligently substitute information from another table by checking against the ID of the content in the original table.

Repeat some familiar tasks to clean up the interactive grid in Page Designer and in the runtime to make it more user-friendly.

6.1 Creating an Interactive Grid Page

Start by using the Create Page Wizard to add a new page.

1. To add an interactive grid page to the application:
1. On the Application home page, click **Create Page**.

   The Create Page Wizard displays.
2. Click **Report**.
3. Click **Interactive Grid**.
4. Enter the following:
   a. Page Number - enter 5
   b. Page Name - enter `Milestones`
   c. Click **Next**.
5. For Navigation Menu, click **Create a new navigation menu entry**.
6. Use the default settings and click **Next**.
7. For Report Source, enter the following:
   a. Editing Enabled - click to **enable**.

b. Table / View Name - click the **LOV icon** and select **EBA_PROJECT_MILESTONES (table)**

c. Click **Create**.

The new Milestones page loads in Page Designer.

8. Click **Save and Run Page**.

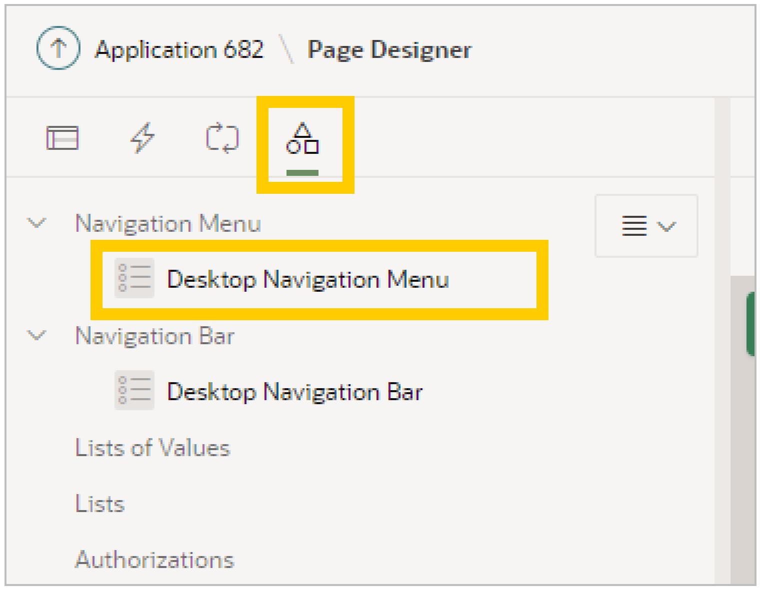
The Milestones report displays in the runtime.

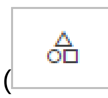
6.2 Updating the Navigation Menu for Milestones

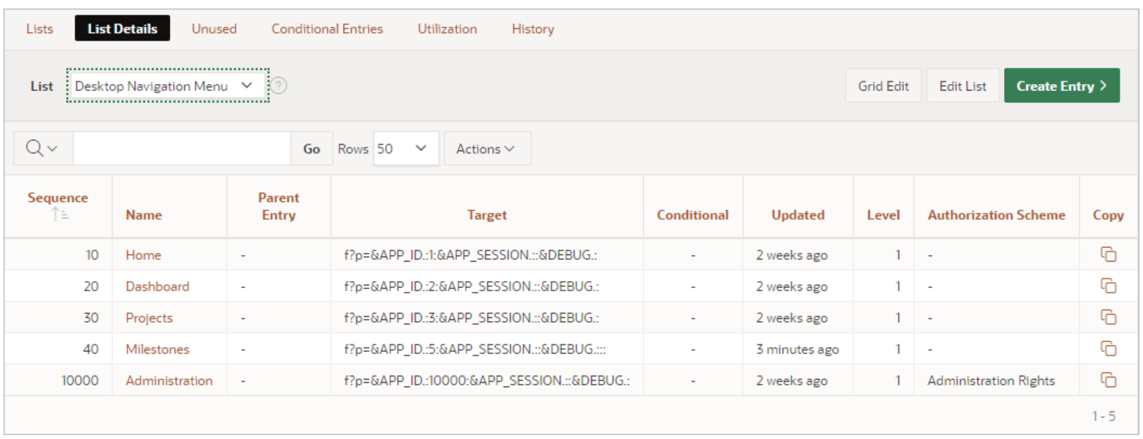
On the Milestones page in the runtime, examine the Milestones entry in the navigation sidebar (click the menu icon in the top-left to expand the menu).

Elements that appear on all pages (such as the Navigation Menu) are controlled in Shared Components.

1. To view the Navigation Menu in Shared Components:
1. Click **Edit Page 5** on the Runtime Developer toolbar to return to Page Designer.
2. Do one of the following:
   - Above the Rendering tab, click the **Shared Components** tab. Click **Desktop Navigation Menu** and in Property Editor click **Edit Component**.



- Near the Save button, click the **Shared Components** icon (). Under Navigation, click **Navigation Menu**, and click **Desktop Navigation Menu**.



Sequence	Name	Parent Entry	Target	Conditional	Updated	Level	Authorization Scheme	Copy
10	Home	-	f?p=&APP_ID.:1:&APP_SESSION.::&DEBUG.:	-	2 weeks ago	1	-	
20	Dashboard	-	f?p=&APP_ID.:2:&APP_SESSION.::&DEBUG.:	-	2 weeks ago	1	-	
30	Projects	-	f?p=&APP_ID.:3:&APP_SESSION.::&DEBUG.:	-	2 weeks ago	1	-	
40	Milestones	-	f?p=&APP_ID.:5:&APP_SESSION.::&DEBUG.:::	-	3 minutes ago	1	-	
10000	Administration	-	f?p=&APP_ID.:10000:&APP_SESSION.::&DEBUG.:	-	2 weeks ago	1	Administration Rights	

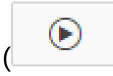
2. Update the sequence and the icon from the blank default for Milestones.

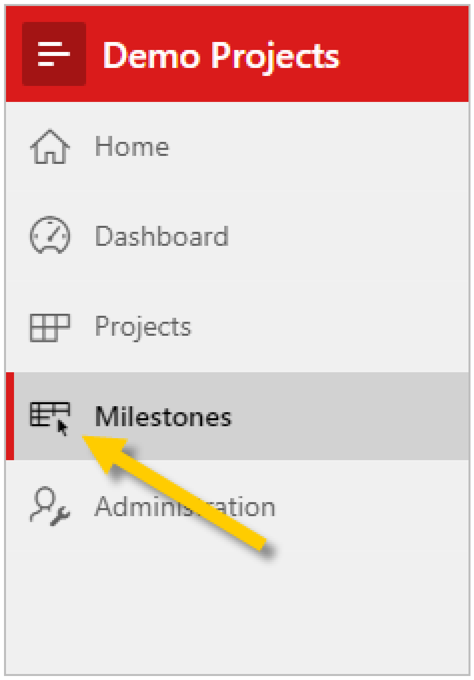
   To update the Milestones list entry:

3. Click **Milestones**.
4. Enter the following:
   a. Sequence - enter `50`
   Use `50` to stay in sync with the page number (5).
   b. Image/Class - click the **LOV** icon and select **fa-table-pointer**

> **Tip:**
>
> Use the search function in your browser to find the icon easily (Ctrl + F or Cmd + F).

c. Click **Apply Changes**.

5. Click the **Run** icon () in the top-right corner to run the app. Note the changes to the navigation sidebar.



6.3 Hiding Columns in the Application Runtime

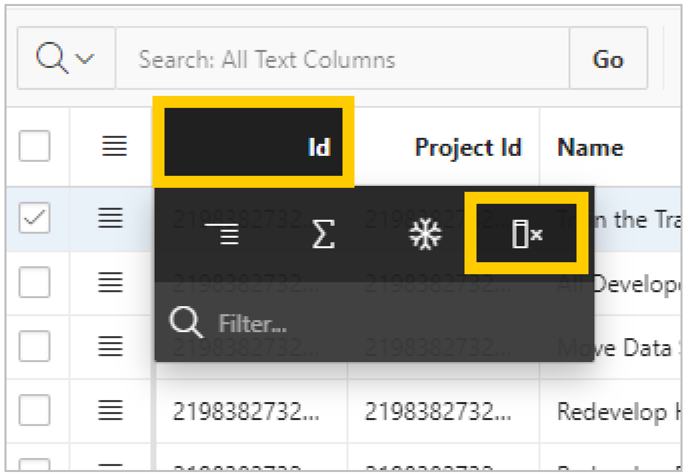
Develop the Milestones interactive grid on page 5 in the application runtime by hiding several columns from view and moving the Due Date column.

> **Tip:**
>
> Oracle recommends hiding columns rather than deleting them in case you need them in the future.

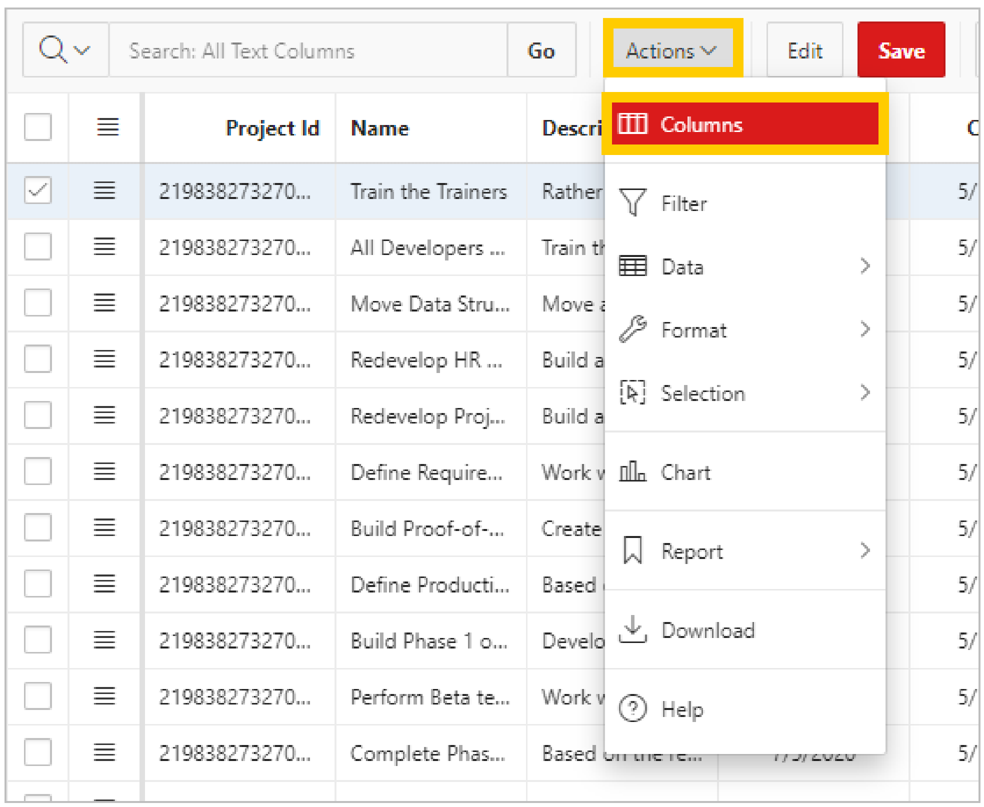
1. In the runtime, you can hide columns using the Column Heading menu or the Actions menu.

   To quickly hide a column in an interactive grid:

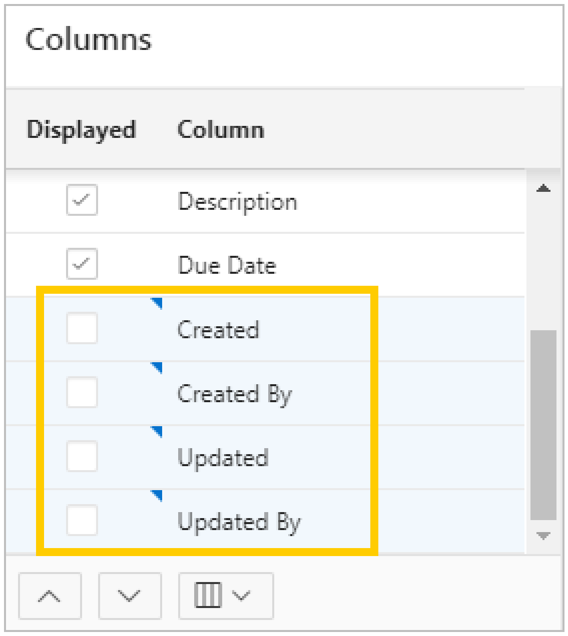
1. Click the **Id** column heading and select **Hide**.



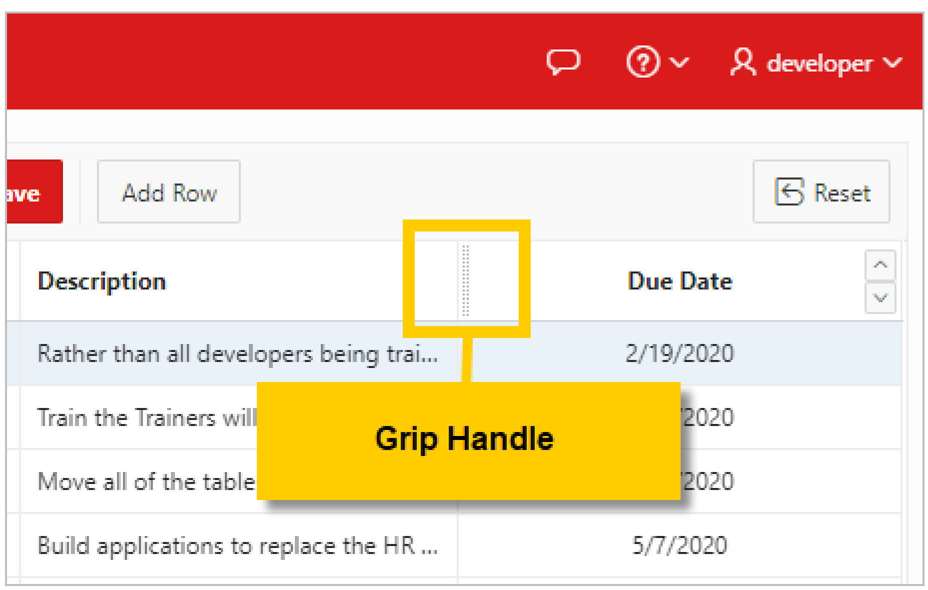
2. To hide multiple columns in an interactive grid:
2. Click the **Actions** menu and select **Columns**.



3. In the list of columns on the left, click the check boxes adjacent to the following columns to deselect them:
   - **Created**
   - **Created By**
   - **Updated**
   - **Updated By**

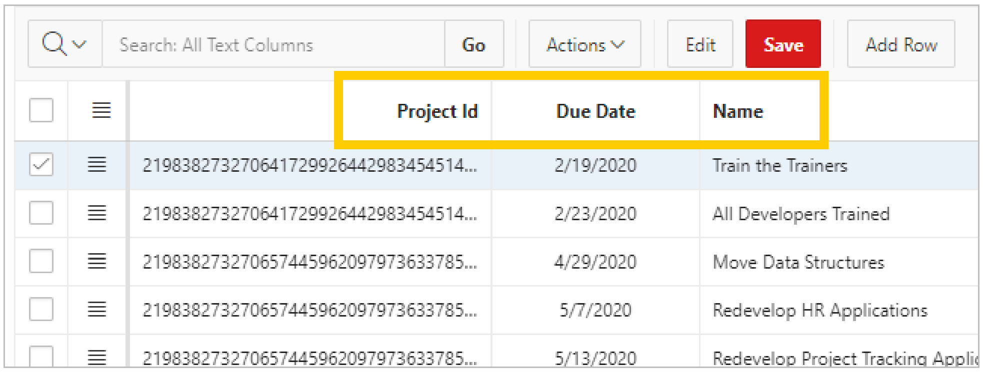


4. Click **Save**.
3. Rearrange the columns in the interactive grid to prioritize the Due Date over other information.
5. To move a column, do one of the following:
   - **Drag and Drop Column Heading**
     a. Hover the mouse over the Due Date column heading. Note the thin dotted columns that display at the start of the heading. These are the grip handle.



     b. Click and hold the grip handle and drag and drop the Due Date column between Project Id and Name.

- **Columns Dialog in Actions Menu**
  a. Click the **Actions** menu and select **Columns**.
  b. Click the **Due Date** column to select it. (Do not click the check box.)
  c. Use the Move Up and Move Down buttons below the list to move Due Date below Project Id.
  d. Click **Save**.



4. To save your changes to the report:
6. Click **Actions**, select **Report**, and click **Save**.

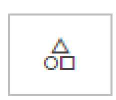
   The message "Default report saved for all users" displays.

6.4 Adding Project Names to the Milestones Interactive Grid

While the Milestones interactive grid is based on `EBA_PROJECT_MILESTONES`, note that none of the columns provide alphabetical names for the projects. Project names are stored in another table: the `NAME` column in `EBA_PROJECTS`. Report regions can query other tables with a Dynamic LOV. This is also called a **lookup**.

First, create the Dynamic LOV in Shared Components and configure it to query `EBA_PROJECTS`.

Then use Page Designer to convert the `PROJECT_ID` column to a Select List, and choose the Dynamic LOV / lookup to display the alphanumerical name of the referenced project instead of the numerical ID.

1. To return to Page Designer:
1. Click **Edit Page 5** on the Runtime Developer Toolbar.
2. To create a new Dynamic LOV lookup:
2. Click the **Shared Components** icon  (top-right).
3. Under Other Components, click **List of Values**.
4. Click **Create**.
5. Select **From Scratch** and click **Next**.
6. For Name and Type:

a. Name - enter `Project Name`

b. Type - select **Dynamic**

c. Click **Next**.

7. For Source Type, select **SQL Query**.

8. Copy and paste the following code:

```
select NAME d, ID r
from EBA_PROJECTS
order by NAME
```

9. Click **Next**.

10. Click **Create**.

    The Lists of Values screen redisplays with the `Project Name` LOV present.

11. Click the **Edit Page 5** icon in the top-right to return to the Milestones page in Page Designer.

3. To convert a column to a Select List:

12. Click the **Rendering tab** icon to switch back to it.

13. In the Rendering tab, under Milestones, expand **Columns** and select **PROJECT_ID**.

14. In Property Editor:

    a. Identification: Type - select **Select List**

    b. Heading: Heading - enter `Project`

    c. List of Values: Type - select **Shared Component**

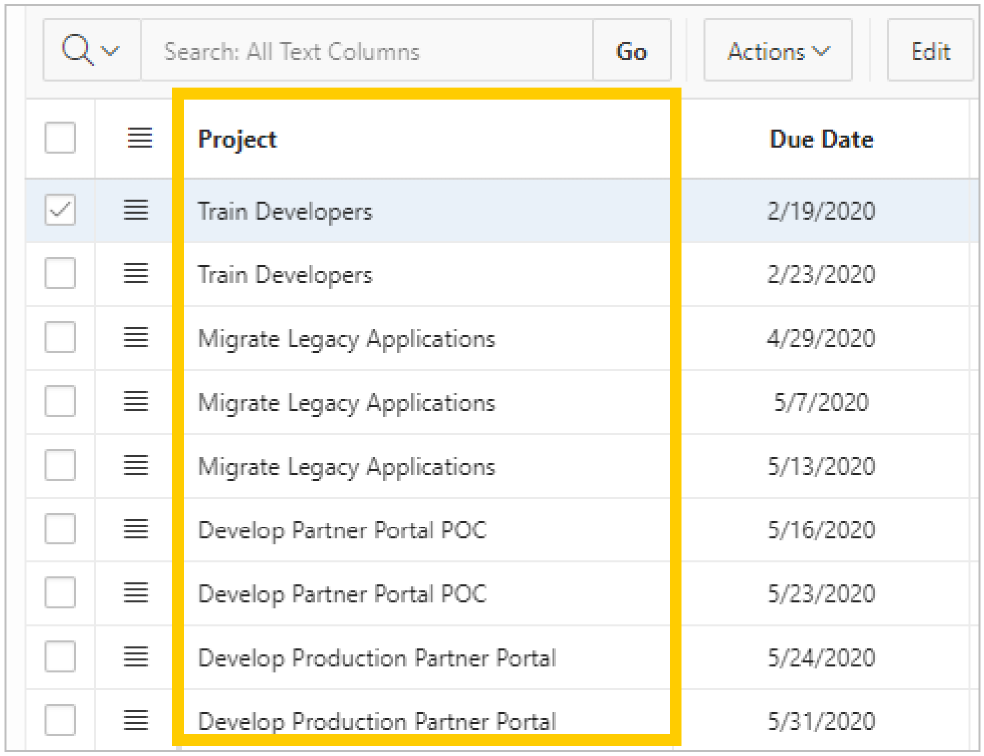
    d. List of Values: List of Values - select **Project Name**

    e. List of Values: Display Extra Values - click to **disable**

    f. List of Values: Null Display Value - enter the following:

    ```
    - Select Project -
    ```

15. Click **Save and Run Page**.



16. Review your changes to the Project column in the Runtime. When finished, click **Edit Page 5** to return to Page Designer.

6.5 Changing the Appearance of an Interactive Grid in Page Designer

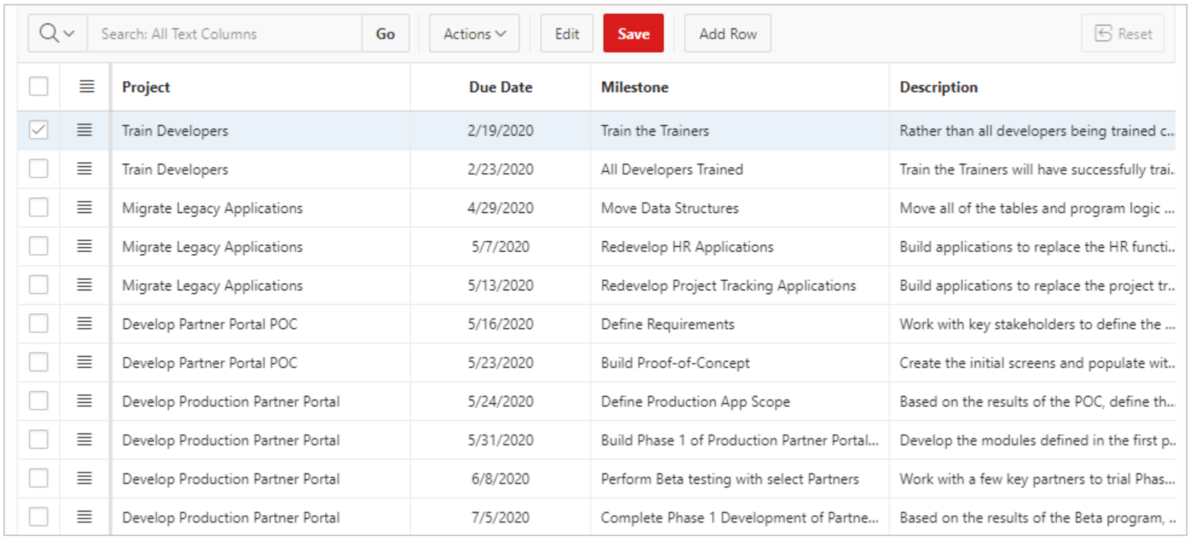
Perform some routine clean-up tasks to make the interactive grid more user-friendly:

- Change the heading of the `Name` column to instead refer specifically to Milestones.
- Convert the audit columns to Display Only to prevent end users from changing the contents.

1. To change a column heading:
1. In the Rendering tab, under Milestones, expand **Columns**.
2. Select **NAME**.
3. In Property Editor:
   a. Identification: Type - select **Text Field**
   b. Heading: Heading - enter `Milestone`
2. To change multiple columns to Display Only:
4. Hold **Ctrl** and select the following columns:
   a. **CREATED**
   b. **CREATED_BY**
   c. **UPDATED**

d. **UPDATED_BY**

5. In Property Editor:
   - Identification: Type - select **Display Only**
6. Click **Save and Run Page** to enter the runtime.



Project	Due Date	Milestone	Description
Train Developers	2/19/2020	Train the Trainers	Rather than all developers being trained c...
Train Developers	2/23/2020	All Developers Trained	Train the Trainers will have successfully trai...
Migrate Legacy Applications	4/29/2020	Move Data Structures	Move all of the tables and program logic ...
Migrate Legacy Applications	5/7/2020	Redevelop HR Applications	Build applications to replace the HR functi...
Migrate Legacy Applications	5/13/2020	Redevelop Project Tracking Applications	Build applications to replace the project tr...
Develop Partner Portal POC	5/16/2020	Define Requirements	Work with key stakeholders to define the ...
Develop Partner Portal POC	5/23/2020	Build Proof-of-Concept	Create the initial screens and populate wit...
Develop Production Partner Portal	5/24/2020	Define Production App Scope	Based on the results of the POC, define th...
Develop Production Partner Portal	5/31/2020	Build Phase 1 of Production Partner Portal...	Develop the modules defined in the first p...
Develop Production Partner Portal	6/8/2020	Perform Beta testing with select Partners	Work with a few key partners to trial Phas...
Develop Production Partner Portal	7/5/2020	Complete Phase 1 Development of Partne...	Based on the results of the Beta program, ...

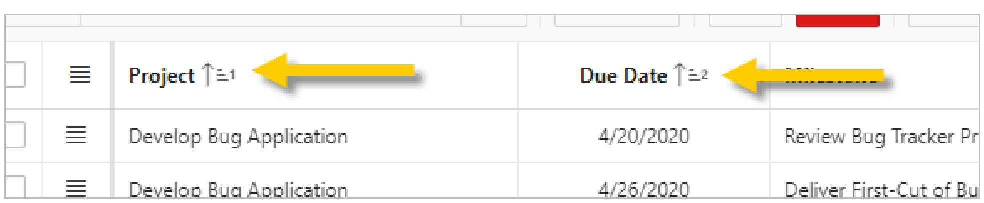
6.6 Finalizing the Milestones Interactive Grid in the Runtime

Perform some routine clean-up tasks to complete the default Milestones report:

- Sort the report so that it displays projects alphabetically.
- Save your changes to the report layout as the new default.

1. To set multiple columns to sort ascending:
1. Hover over the Project column heading and click the **Sort Ascending** icon (up arrow).
2. Hold the **Shift** key, hover over the Due Date column heading, and click the **Sort Ascending** icon (up arrow).

   Icons display next to the Project and Due Date column names indicating their sort order.



2. To save the report layout as the new default:
3. Click the **Actions** menu, select **Report**, and select **Save**.
   You cannot use the Save button at the top of the report for this step because it does not overwrite the report default.

4. Click **Application #####** on the Runtime Developer toolbar to return to the Application home page.

The Milestones page is complete. Proceed to the next lesson.

7 Developing the Tasks Page

Use the Create Page Wizard to create a new Report with Form for end users to manage their project tasks.

About This Lesson

In this lesson, you add a new pair of pages to your app: **Report with Form**.

"Report with Form" (or "Report and Form") is the most common page construct within web applications. End users view the **report** and submit changes with a **form** page.

In your app, the Tasks report displays details for work to be done toward the associated project (based on the `EBA_PROJECT_TASKS` table). The Update Task form enables users to update the task, such as changing the status or moving the due date.

Use the Create Page Wizard to generate the pair of pages. Begin with the Report page. Repeat some familiar tasks to develop the report (update Navigation Menu in Shared Components, hide extraneous columns, apply lookups to the report).

Apply a **format mask** for columns with set date and numbering formats.

Use the **decode** SQL statement to convert all instances of "Y" or "N" in a Yes/No column to display instead as Yes or No.

For the modal Form page, use Page Designer to refine the fields to mirror their counterparts in the Report. Many of the procedures for the Form are very similar to those for the Report.

7.1 Creating an Interactive Report Page

Use the Create Page Wizard to add a new interactive report with form page to your app. Base it on `EBA_PROJECTS_TASKS`.

1. To add an interactive report with form to the application:
1. In the Application home page, click **Create Page**.
2. Click **Report**.
3. Click **Report with Form**.
4. For Page Attributes:
    a. Report Page Number - enter 6
    b. Report Page Name - enter `Tasks`
    c. Form Page Number - enter 7
    d. Form Page Name - enter `Update Task`
    e. Form Page Mode - select **Modal Dialog**
    f. Click **Next**.
5. For Navigation Menu:

    a. Navigation Preference - select **Create a new navigation menu entry**
    b. Click **Next**.

6. For Data Source:
    a. Table / View Name - click the **LOV** icon.
    b. Select **EBA_PROJECT_TASKS**
    c. In the list of Columns, double-click **ID (Number)** to move it to the left column (this removes it from display in the report).
    The `ID` column contains the numeric identifier for each row in the table. Users do not need to view or access this information at any time. Since you would hide the columns in both pages later anyway, this step saves you time.
    d. Click **Next**.
    Note that the wizard removes `ID` from the next section to match the columns in the report in the previous screen.
7. For Create Form - Columns and Primary Key:
    a. Primary Key Column - select **ID (Number)**
    b. Click **Create**.

    The wizard creates the pages. Page Designer loads the interactive report page (page 6, Tasks).

    The page contains the interactive report region Report 1.
2. To rename a report region:
8. Click **Report 1** in Layout tab or Rendering tab.
9. In Property Editor:
    - Identification: Title - enter `Tasks`
10. Click **Save and Run Page** to view the interactive report in the runtime.

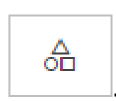
In the runtime, note that as you scroll right, the report displays numerical identifiers in several columns as well as audit detail columns.

Perform the same tasks as you did for Milestones to update the Tasks page.

7.2 Updating the Tasks Page in the Runtime

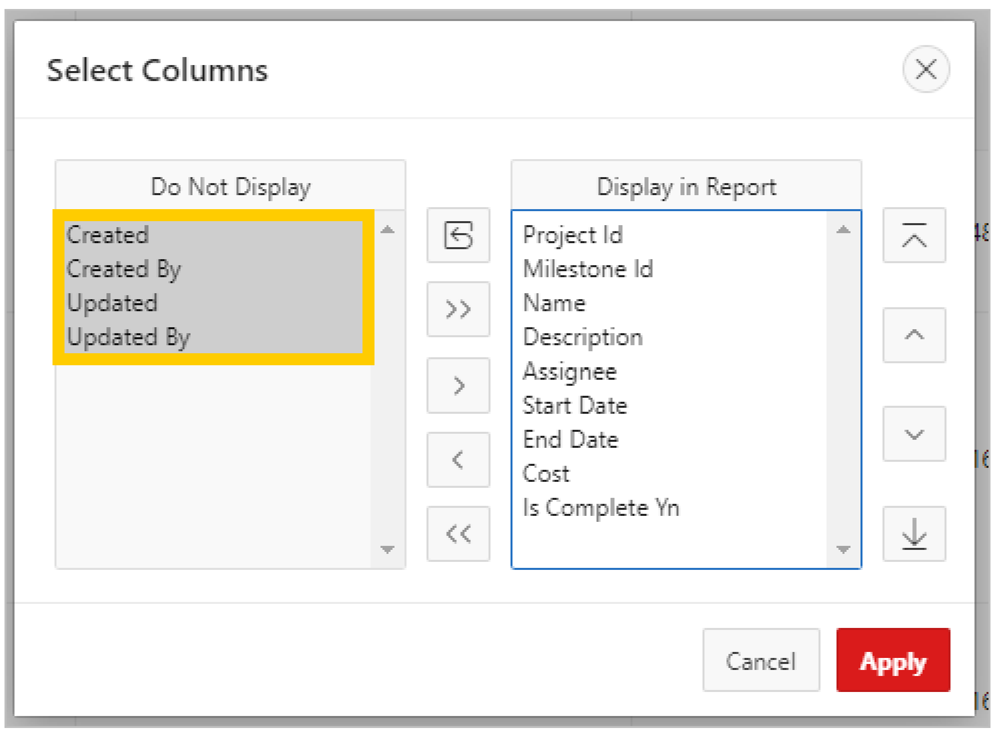
Complete some routine tasks in the runtime to perform an initial update to the Tasks page (similar to those that you performed for the Milestones page, except Tasks uses an interactive report instead of an interactive grid):

- Update the Navigation Menu in Shared Components
- Hide the audit columns from the default report in the runtime

1. To view the Navigation Menu in Shared Components:
1. Click **Edit Page 6** on the Runtime Developer toolbar to return to Page Designer.
2. Near the Save button, click the **Shared Components** icon .
3. Under Navigation, click **Navigation Menu**.

4. Click **Desktop Navigation Menu**.
2. To update the Tasks list entry:
5. Click **Tasks**.
6. For List Entry:
   a. Image/Class - click the **LOV** icon and select **fa-table**
   b. Click **Apply Changes**.
7. Click the **Run** icon (play button) in the top-right corner to run the app. Click the **menu** icon (top-left) and note the changes to the navigation sidebar.
3. Hide the audit columns from displaying in the default report in the runtime.

   To hide multiple columns in an interactive report:
8. Click the **Actions** menu and select **Columns**.
9. In the list of columns under Display in Report, double-click the following columns to move them to Do Not Display:
   - **Created**
   - **Created By**
   - **Updated**
   - **Updated By**



10. Click **Apply**.
4. To save the report layout as the new default:
11. Click the **Actions** menu, select **Report**, and click **Save Report**.
12. In Save Report:

a. Save - select **As Default Report Settings**.
b. Default Report Type - select **Primary**.
c. Click **Apply**.

7.3 Applying Lookups to the Tasks Interactive Report

The dynamic LOV you created earlier is also called a **lookup** (because the query "looks up" a value in another table).

First, copy the PROJECT NAME Dynamic LOV in Shared Components and configure it to query `EBA_PROJECT_MILESTONES`.

Then apply the two lookups to the `PROJECT_ID` and `MILESTONE_ID` columns.

1. To copy an LOV:
1. Click **Edit Page 6** on the Runtime Developer toolbar to return to Page Designer.
2. Click the **Shared Components** icon.
3. Under Other Components, click **List of Values**.
4. Click **Copy**.
5. For Copy List of Values:
   a. Copy List of Values - select **PROJECT NAME - Dynamic**
   b. New List of Values Name - enter `Milestone Name`
   c. Click **Copy**.

   The Lists of Values screen redisplays with the `MILESTONE NAME` item.
6. Click **MILESTONE NAME**.
7. Under Query, delete the contents then copy and paste the following code:

```
select NAME d, ID r
from EBA_PROJECT_MILESTONES
order by NAME
```

8. Click the **Validate** icon (checkmark) to confirm the query works.
9. Click **Apply Changes**.
10. Click the **Edit Page 6** icon in the top-right to return to the Tasks page in Page Designer.
2. Apply the Project Name dynamic LOV to the `PROJECT_ID` column (similar to the process for the Milestones page). Then apply the Milestone Name dynamic LOV to `MILESTONE_ID`.

   To apply the `PROJECT NAME` LOV to an interactive report:
11. In the Rendering tab, under Tasks, expand **Columns** and select **PROJECT_ID**.
12. In Property Editor:
   a. Identification: Type - select **Plain Text (based on List of Values)**
   b. List of Values: List of Values - select **PROJECT NAME**
   c. Heading: Heading - enter `Project`

d. Click the **Save** button.

3. To apply the `MILESTONE NAME` LOV to an interactive report:

13. In the Rendering tab, under Columns, select **MILESTONE_ID**.

14. In Property Editor:

    a. Identification: Type - select **Plain Text (based on List of Values)**

    b. List of Values: List of Values - select **MILESTONE NAME**

    c. Heading: Heading - enter `Milestone`

15. Click **Save and Run Page**.

16. Scroll down the report to review the Project and Milestone columns in the Runtime. When finished, click **Edit Page 6** to return to Page Designer.

7.4 Updating the Remaining Columns in the Tasks Report

Update the other remaining columns in the Tasks interactive report from their raw state generated by the Create Page Wizard:

- `NAME`
- `START_DATE`
- `END_DATE`
- `COST`
- `IS_COMPLETE_YN`

1. To update a column heading in an interactive report:

1. In the Rendering tab, under Tasks, expand **Columns** and select **NAME**.

2. In Property Editor:

    - Heading: Heading - enter `Task`

2. To apply a date format mask to multiple columns:

3. In the Rendering tab, hold Ctrl and select the two following columns:

    a. **START_DATE**

    b. **END_DATE**

4. In Property Editor:

    a. Appearance: Format Mask - click the **LOV** icon

    b. Select **12-JAN-2004**.

    > **Tip:**
    >
    > You can also enter `DD-MON-YYYY` in the field without opening the list.

    c. Click **Save**.

3. To apply a dollar amount format mask to a column:

5. In the Rendering tab, select **COST**.

6. In Property Editor:
   a. Appearance: Format Mask - click the **LOV** icon
   b. Scroll down and select **$5,234.10**.
   c. Click **Save**.
4. To configure an interactive report with a _YN column to display "Yes" and "No" (instead of Y or N):
7. In the Rendering tab, select **IS_COMPLETE_YN**.
8. In Property Editor:
   a. Heading: Heading - enter `Complete`
   b. Click **Save**.
9. Click the **Tasks** report region (under Content Body in the Rendering tab).
10. In Property Editor:
    a. Source: Type - select **SQL Query**.
    b. Source: SQL Query - delete the contents then copy and paste the following code:

```
select ID,
       PROJECT_ID,
       MILESTONE_ID,
       NAME,
       DESCRIPTION,
       ASSIGNEE,
       START_DATE,
       END_DATE,
       COST,
       decode(is_complete_yn, 'Y', 'Yes', 'No') IS_COMPLETE_YN,
       CREATED,
       CREATED_BY,
       UPDATED,
       UPDATED_BY
  from EBA_PROJECT_TASKS
```

    The `decode` statement is used to compare the column value against the first value ("`Y`") and replace it with the next value ("`Yes`"), and otherwise replace it with the final value ("`No`").
11. Click **Save and Run Page**.

	Project	Milestone	Task	Description	Assignee	Start Date	End Date	Cost	Complete
	Develop Bug Application	Review Bug Tracker Productivity App	Design Bug Tracker Look and Feel	Define how data will be displayed on bugs.	Madison Smith	20-APR-2020	22-APR-2020	$2,000.00	Yes
	Develop Bug Application	Deliver First-Cut of Bug Tracker	Define necessary customizations to the Bug Tracker app	Add the additional attributes required based on the bug information being delivered.	Miyazaki Yokohama	22-APR-2020	23-APR-2020	$2,000.00	Yes
	Develop Bug Application	Deliver First-Cut of Bug Tracker	Populate Data Structures for Bug Tracker	Upload existing bug data from external sources into local tables.	Mei Yu	24-APR-2020	24-APR-2020	$1,500.00	Yes
	Develop Bug Application	Deliver First-Cut of Bug Tracker	Customize the Bug Tracker app	Use built-in functionality and Theme Roller to tweak the application.	Madison Smith	24-APR-2020	24-APR-2020	$500.00	Yes
	Develop Bug Application	Deliver First-Cut of Bug Tracker	Present First Cut to stakeholders	Walk key stakeholders through the initial app and obtain their feedback.	Lucille Beatie	26-APR-2020	26-APR-2020	$500.00	Yes
	Develop Bug Application	Deliver Final Customer Tracker Application	Define additional tables / columns within the Bug Tracker app	Add the extra bug attributes required based on feedback.	Miyazaki Yokohama	28-APR-2020	30-MAR-2020	$2,000.00	Yes

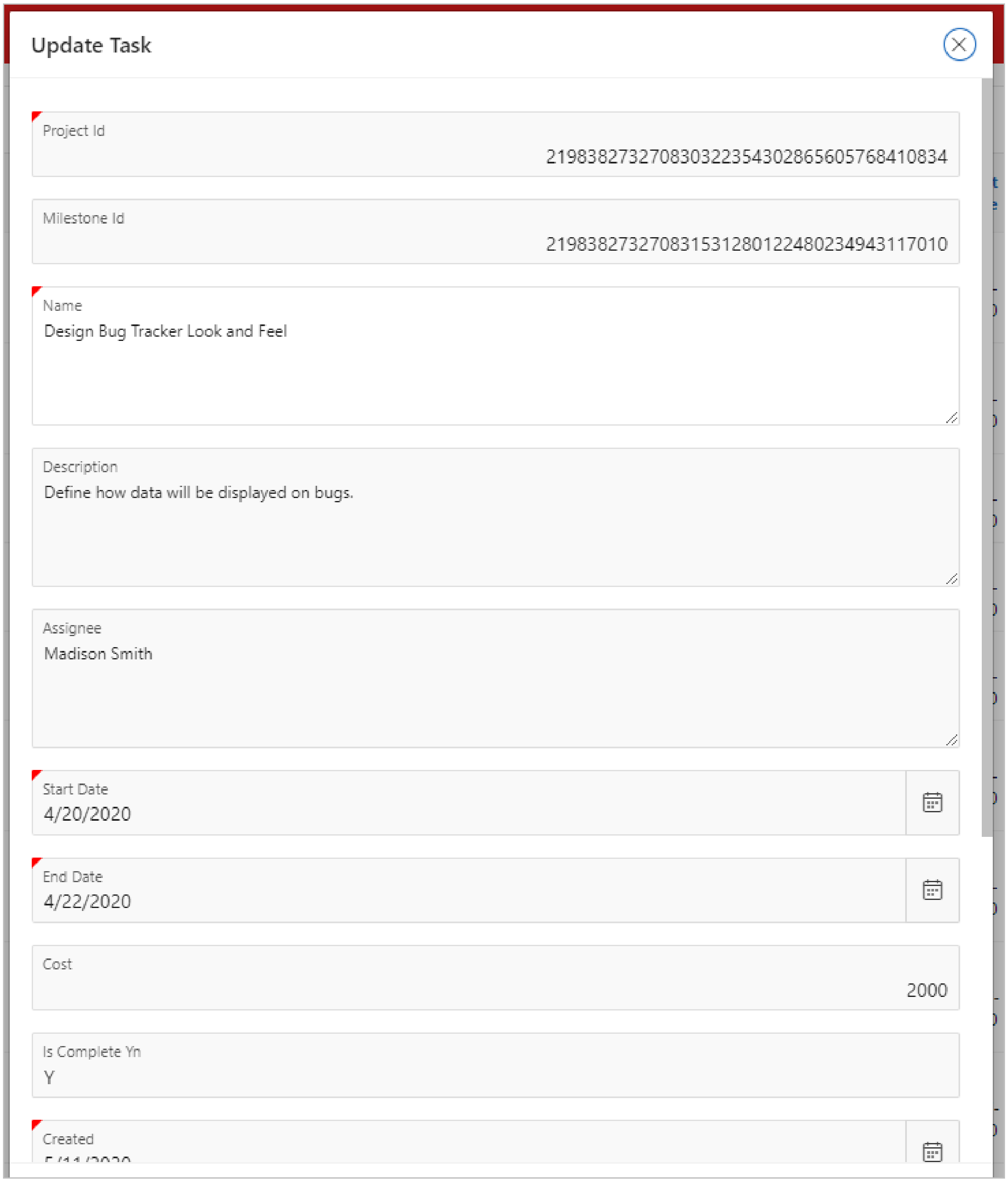
12. Review your changes to the report in the runtime. When finished, proceed to the next section.

7.5 Updating the Project and Milestone Fields in the Update Task Form

When you created the Tasks Report with Form in the Create Page Wizard, you chose to make the form **modal**. (If you had left the check box unselected, it would be a separate page in the runtime instead of a pop-up overlay.) To view a modal page in the runtime, you must open it from its associated report.

Open the Update Task form by clicking one of the Edit icons in the Tasks interactive report.

1. To view a modal form for an interactive report in the runtime:
1. Click the **Edit** icon (pencil) for a row.



The Update Task form displays.

Note also that the page number on the Runtime Developer toolbar changed from the report (page 6) to the form (page 7).

2. The form is still in a raw state, but because it is based on `EBA_PROJECT_TASKS`, the development process is very similar to what you did for the report:
   - The Milestone and Project name fields use numeric identifiers instead of names.

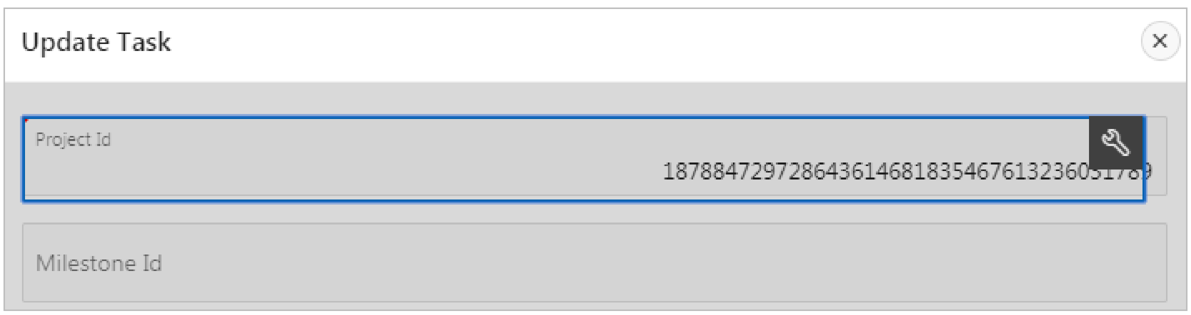
- The names of some fields (such as "Project Id") should be user-friendly.
- Some fields are editable text fields instead of restricted select lists or display only.
- The audit columns do not need to display here (they are present in the report).

Start by applying the `PROJECT NAME` and `MILESTONE NAME` lookups to the appropriate fields.

To return to Page Designer using Quick Edit:

2. On the Runtime Developer toolbar, click **Quick Edit** ().

   You enter Quick Edit mode. The screen darkens and when you mouse over different elements a wrench icon displays.
3. In Quick Edit mode, click the **Project Id** field (do not click the wrench icon).



Page Designer loads with P7_PROJECT_ID selected.

3. To apply lookups to the Project and Milestone fields:
4. In Property Editor:
   a. Identification: Type - select **Select List**.
   b. Label: Label - enter `Project`
   c. List of Values: Type - select **Shared Component**.
   d. List of Values: List of Values - select **PROJECT NAME**
5. Click **P7_MILESTONE_ID**.
6. In Property Editor:
   a. Identification: Type - select **Select List**.
   b. Label: Label - enter `Milestone`
   c. List of Values: Type - select **Shared Component**.
   d. List of Values: List of Values - select **MILESTONE NAME**
7. Click **Save**.
8. Return to the runtime and refresh the page, then click an **Edit** icon (pencil) to redisplay the form.
   Remember that you cannot run a modal page directly from Page Designer. You must run the non-modal page associated with it, then reopen it.

9. Note the changed Project and Milestone fields. Click each to see how they behave.
10. When finished, click **Edit Page 7** on the Runtime Developer toolbar.

7.6 Updating the Remaining Fields in the Update Task Form

Finally, perform a series of small tasks to update the Update Task form's presentation:

- Name - change the Name field to a text field and change the label to Task.
- Assignee - change to a select list based on SQL query.
- Start Date and End Date - change the format mask to DD-MM-YYYY.
- Cost - change the alignment and format mask ($5,234.10).
- Is Complete Yn - change the label and type to a switch.
- Hide the audit columns (Created, Created By, Updated, Updated By).

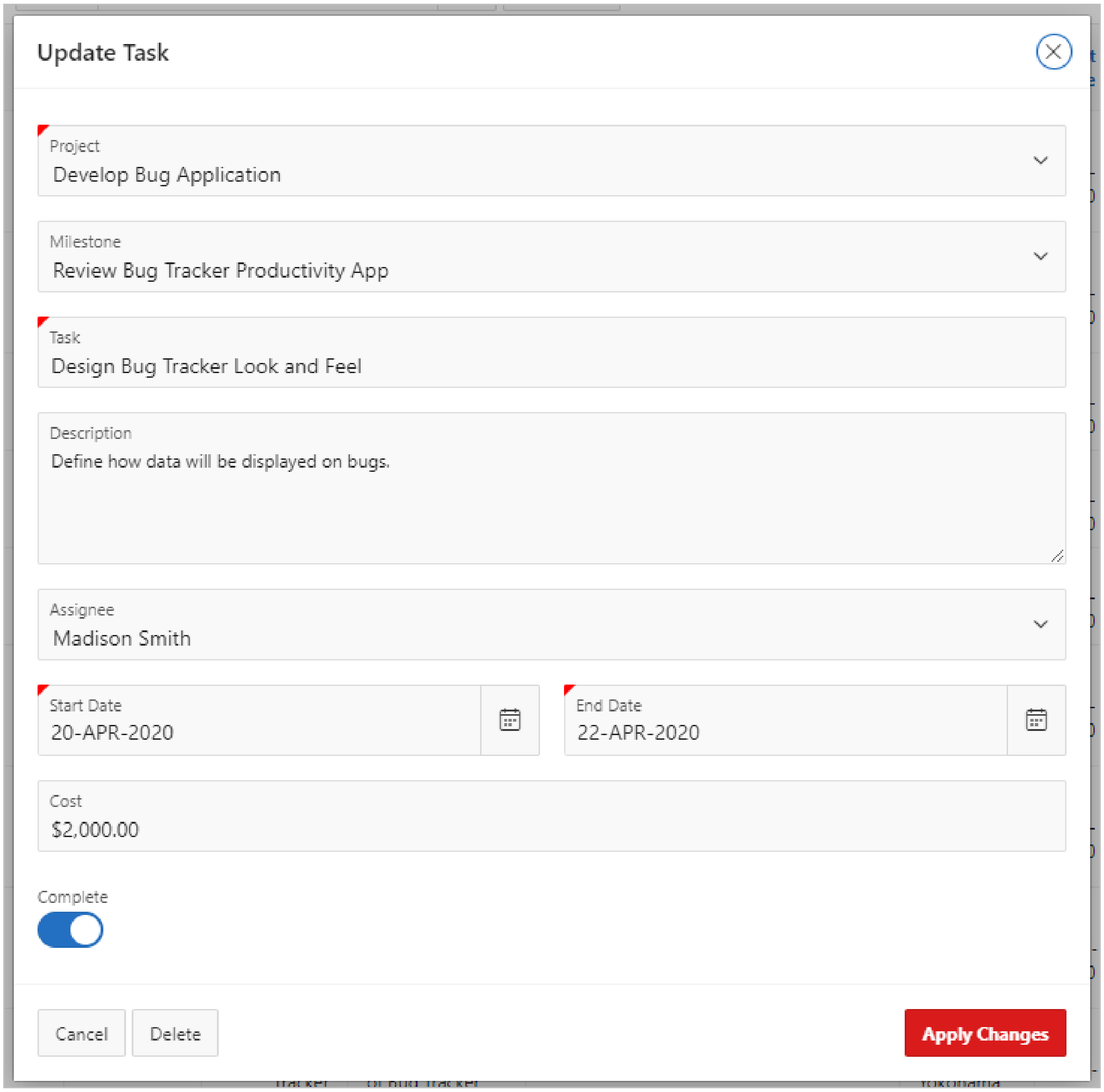
1. To update the P7_NAME field:
1. Click **P7_NAME**.
2. In Property Editor:
   a. Identification: Type - select **Text Field**.
   b. Label: Label - enter `Task`
2. To update the P7_ASSIGNEE field:
3. Click **P7_ASSIGNEE**.
4. In Property Editor:
   a. Identification: Type - select **Select List**.
   b. List of Values: Type - select **SQL Query**.
   c. List of Values: SQL Query - copy and paste the following code:

```
select distinct ASSIGNEE as d,
       ASSIGNEE as r
  from EBA_PROJECT_TASKS
 order by 1
```

   d. Click **Save**.
3. To update the P7_START_DATE and P7_END_DATE fields:
5. Hold Shift or Ctrl and click **P7_START_DATE** and **P7_END_DATE** to select them both.
6. In Property Editor:
   a. Settings: Show - select **Both**.
   b. Appearance: Format Mask - click the **LOV** icon.
   c. Select **12-JAN-2004**.
7. Click **P7_END_DATE** to only select it.
8. In Property Editor:

   a. Layout: Start New Row - click to **disable**.
   b. Click **Save**.

4. To update the P7_COST field:
9. Click **P7_COST**.
10. In Property Editor:
   a. Settings: Number Alignment - select **Left**.
   b. Appearance: Format Mask - click the **LOV** icon.
   c. Select **$5,234.10**.
   d. Click **Save**.
5. To update the P7_IS_COMPLETE_YN field:
11. Click **P7_IS_COMPLETE_YN**.
12. In Property Editor:
   a. Identification: Type - select **Switch**.
   b. Label: Label - enter `Complete`
6. To hide the audit column fields:
13. Hold Ctrl or Shift and select the four following items:
   - **P7_CREATED**
   - **P7_CREATED_BY**
   - **P7_UPDATED**
   - **P7_UPDATED_BY**
14. In Property Editor:
   a. Identification: Type - select **Hidden**.
   b. Click **Save**.
15. Return to the runtime and refresh the page.
16. Click an **Edit** icon (pencil) to redisplay the form.



17. Review your changes. Try clicking around the form to explore the new interface. When finished, click **Application** ##### on the Runtime Developer toolbar to return to the Application home page.

The Tasks report with form is complete. Proceed to the next lesson.

8 Developing the Dashboard Page

Update and add new regions to the Dashboard page with Page Designer.

About This Lesson

In this lesson, you modify the regions of an existing page without the aid of a wizard.

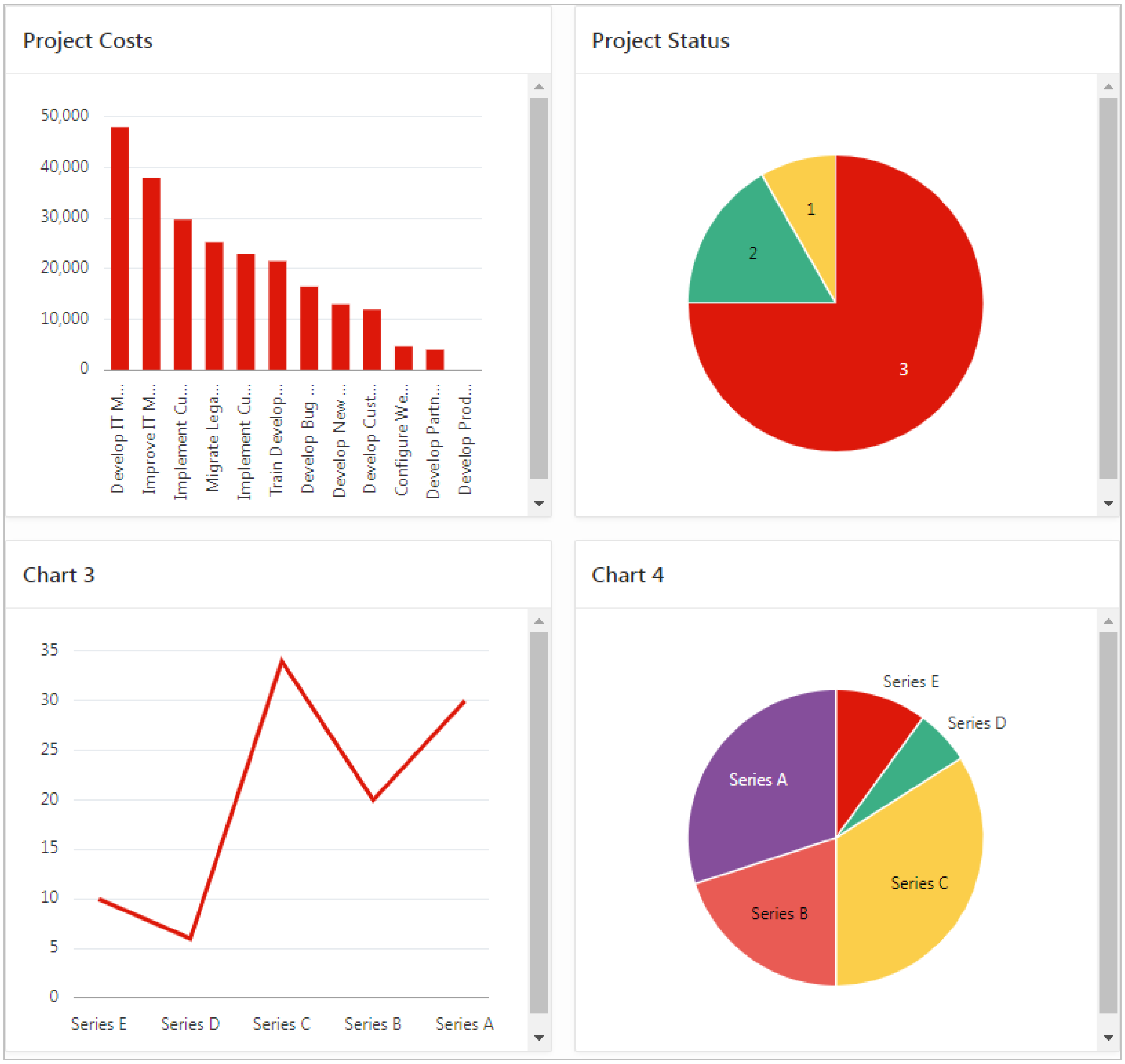
You develop the Dashboard page generated by the Create App Wizard by deleting all but one of the existing chart regions. You update the **series**, **attributes**, and **Template Options** of the remaining chart region to improve usability and appearance.

You add a new report region from scratch using the **Gallery** instead of a wizard. Reconfigure the report's SQL query and Template Options.

8.1 Deleting Regions in Page Designer

You created multiple charts for the Dashboard in the Create App Wizard. Review the output in the runtime.

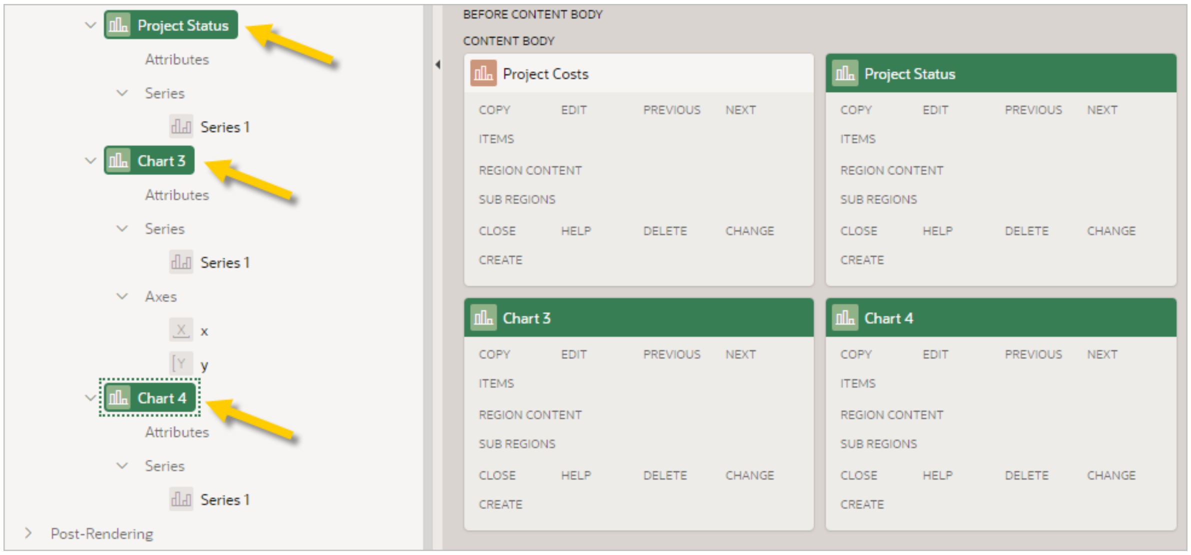
1. To view the runtime:
1. On the Application home page, click **2 - Dashboard**.
2. Click **Save and Run Page**.
2. Note the four charts on the page. You decide that the bar chart is the best way to present Costs info rather than a line or pie chart (Chart 3 and Chart 4). You also decide to replace one chart (Project Status) with a report later.



Start by deleting the charts you no longer want, then update the remaining chart with another series to display more budget information.

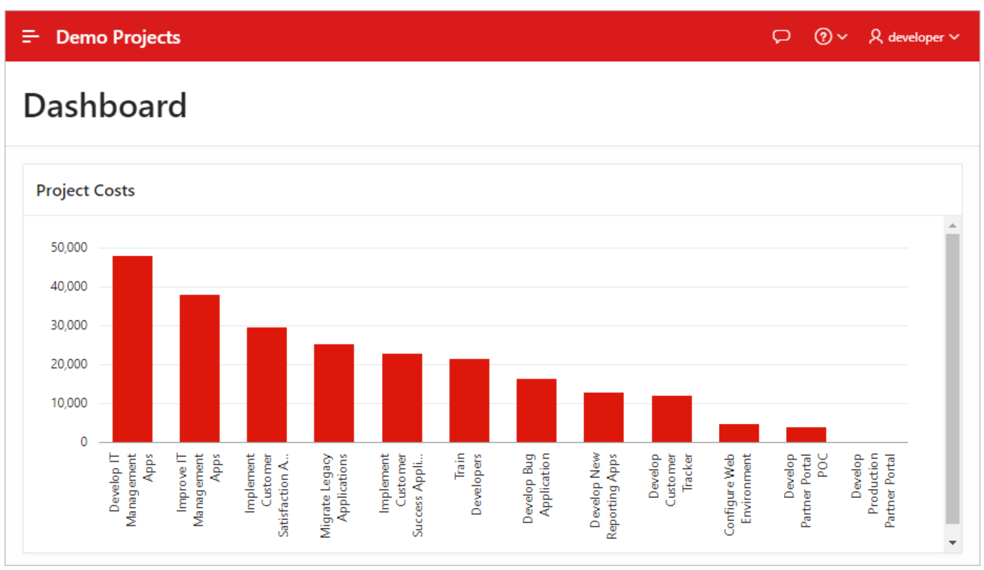
To delete multiple regions in Page Designer:

3. Click **Edit Page 2** on the Runtime Developer toolbar.
4. In Page Designer, hold Ctrl and click the three following items to select them:
   - **Project Status**
   - **Chart 3**
   - **Chart 4**



5. With the three chart regions selected, do one of the following:
   - Press **Delete**.
   - Right-click one of the selected chart regions and select **Delete**.

   Only Project Costs remains in Content Body.
6. Click **Save and Run Page**.



8.2 Updating the Series in the Project Costs Chart

The Project Costs chart only displays costs. This chart would be more meaningful if it also displayed project budgets for comparison.

First, update the SQL for the existing series in the chart to change the display order of the columns (among other updates), then create a new series in the chart to display project budgets.

1. To update the first series:
1. Click **Edit Page 2** on the Runtime Developer toolbar.
2. In the Layout or Rendering tab, click **Project Costs**.
3. In Property Editor:
   - Identification: Title - enter `Project Budgets and Costs`
4. In the Rendering tab, under Series, click **Series 1**.
5. In Property Editor:
   a. Identification: Name - enter `Costs`
   b. Source: SQL Query - click the **Code Editor** icon ( ).
   c. Copy and paste the following code:

```
select p.name, sum(cost) value
from eba_project_tasks t
, eba_projects p
where p.id = t.project_id
group by p.name
order by 1
```

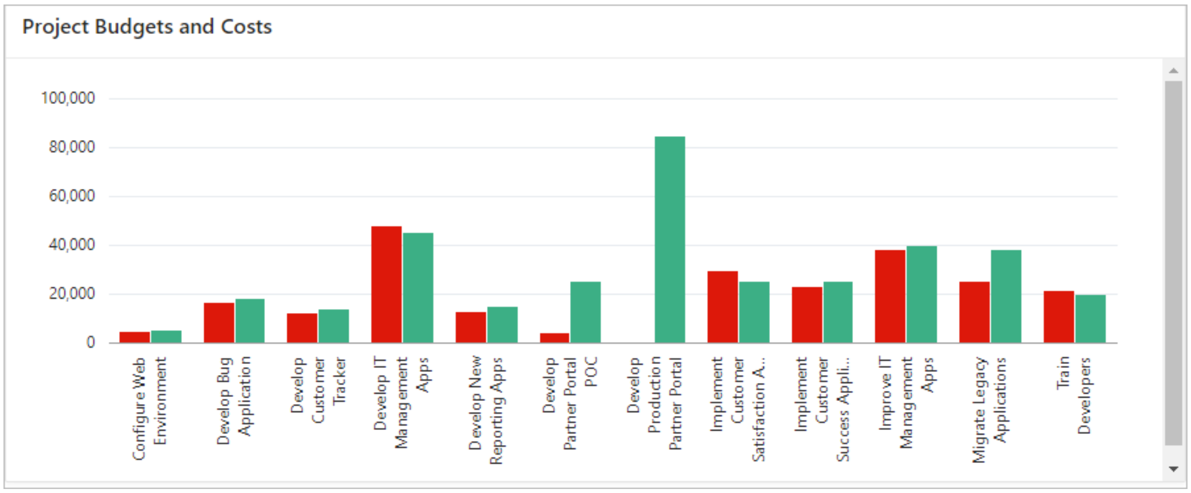
   d. Click **OK**.

   An error message displays under Column Mapping: Value.

> **Note:**
>
> The above SQL is a significant update to the old code. This revised SQL joins the `EBA_PROJECT_TASKS` and `EBA_PROJECTS` tables so the chart displays the project name instead of the project ID. This requires including the `where` condition to link the primary key column from Projects `(p.id)` with the foreign key column from Tasks `(t.project_id)`. Finally, the `group by` clause was updated because the specified column (`PROJECT_ID`) no longer displays (changed to `p.name`).

   e. Column Mapping: Value - select **VALUE**
   f. Click **Save**.
2. To add a series to a chart:
6. In the Rendering tab, right-click **Series** and select **Create Series**.
7. In Property Editor:
   a. Identification: Name - enter `Budgets`
   b. Source: Table Name - click the **LOV** icon.
   c. Select **EBA_PROJECTS**.
   d. Column Mapping: Label - select **NAME**
   e. Column Mapping: Value - select **BUDGET**

8. Click **Save and Run Page**. Review the changes to the labels along the X-axis and the new columns for each project. You can also mouse over each column for more details.



8.3 Updating the Appearance of the Dashboard Chart

While the chart is more usable now, it still needs some aesthetic improvements:

- The labels are too constrained by the space.
- The chart lacks a legend to indicate which column represents which value (cost or budget).
- The chart does not fit vertically in the region (note the scroll bar).
- The cost and budget values lack a dollar sign.

These changes are in the region attributes and axis properties for the chart.

1. To change the attributes of a region:
1. Click **Edit Page 2** on the Runtime Developer toolbar.
2. In the Rendering tab, under Project Budgets and Costs, click **Attributes**.
3. In Property Editor:
   a. Layout: Height - enter `600`
   b. Legend: Show - click to **enable**
   c. Legend: Position - select **Top**
   d. Legend: Hide and Show Behavior - select **No Rescaling**
2. To change the properties of an axis:
4. In the Rendering tab, under Axes, click **y**.
5. In Property Editor:
   a. Value: Format - select **Currency**
   b. Value: Currency - enter $
6. Click **Save and Run Page**.

The runtime reloads, but you must scroll down within the region to see your changes to the chart.

8.4 Updating the Live Template Options for the Dashboard Chart

If you scroll down the chart region in the runtime, you can see your changes. (You may need to maximize your window to view all the labels properly.) The individual elements look good, but obviously you must alter the way the region displays on the page.

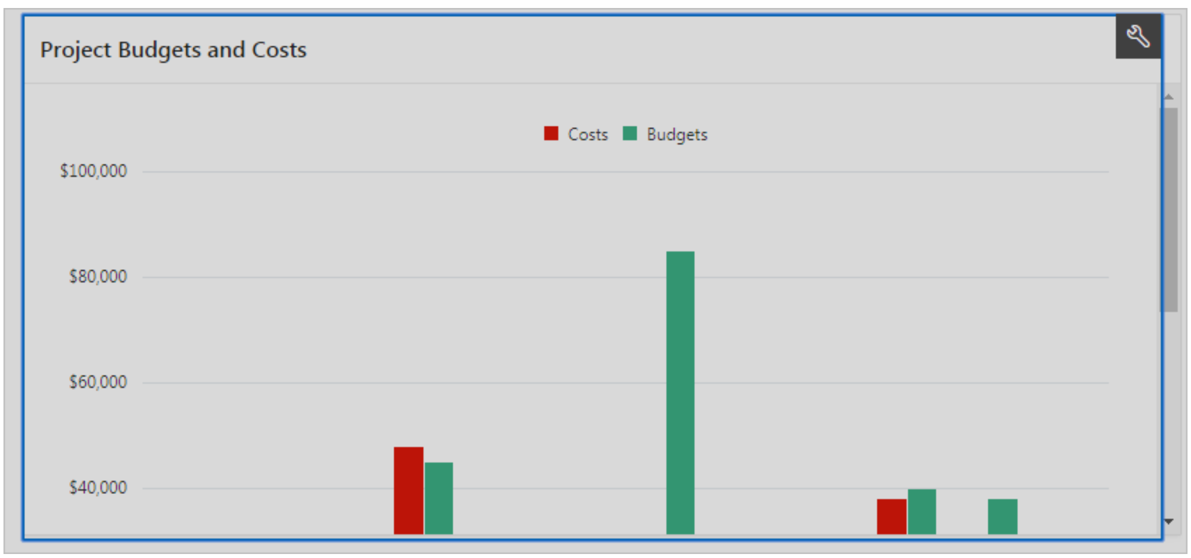
The final changes you need to make are in the **Live Template Options**, which you access using Quick Edit on the Runtime Developer toolbar.

1. To open Live Template Options:

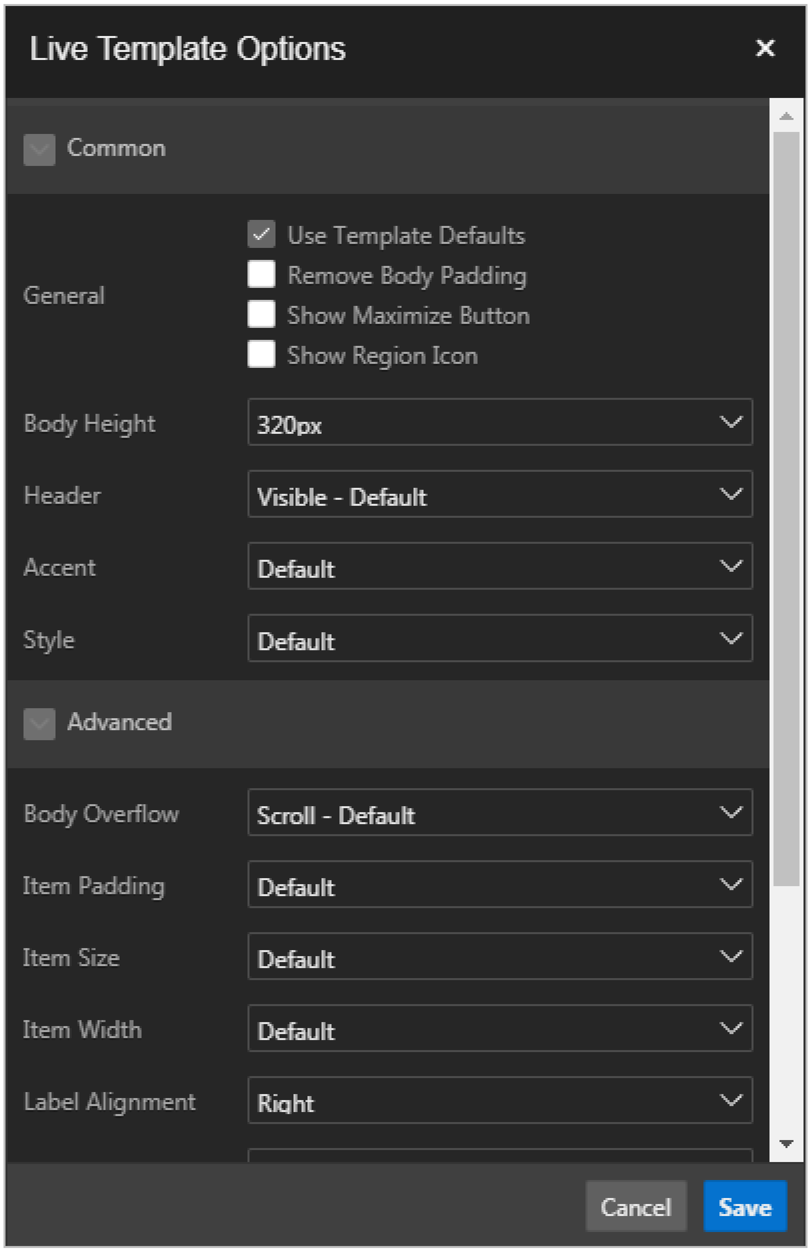
1. Click **Quick Edit** on the Runtime Developer toolbar.

   You enter Quick Edit mode (screen darkens, mouse cursor becomes a crosshair).

2. Mouse over the Project Budgets and Costs chart region and click the **wrench icon** (top-right).



The Live Template Options dialog displays.



3. In Live Template Options:
   a. Body Height - select **Auto - Default**
   b. Click **Save**.

The dashboard chart is complete.

Next, add a report region to replace the Project Status chart you deleted.

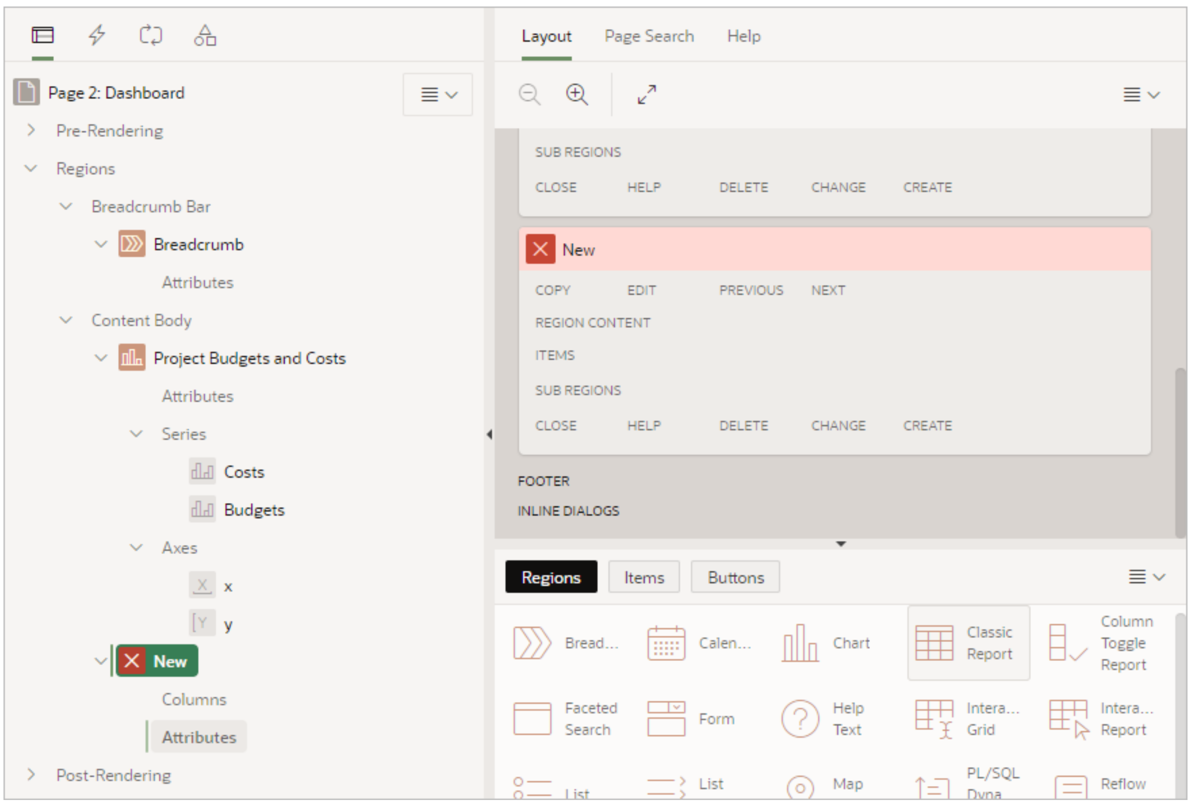
8.5 Adding a Classic Report Region from Gallery

Add a report to the page to display incomplete tasks.

Located beneath the central Layout tab, the **Gallery** is a quick way to peruse your options for a variety of elements.

1. To add a classic report region from the Gallery:
1. Click **Edit Page 2** on the Runtime Developer toolbar to return to Page Designer.
2. In the Gallery, click **Regions**.
3. Right-click **Classic Report**, select **Add To**, select **Content Body**, select **Project Budgets and Costs**, and select **After**.

> **Tip:**
>
> You can also add elements from the Gallery with the mouse using drag and drop.

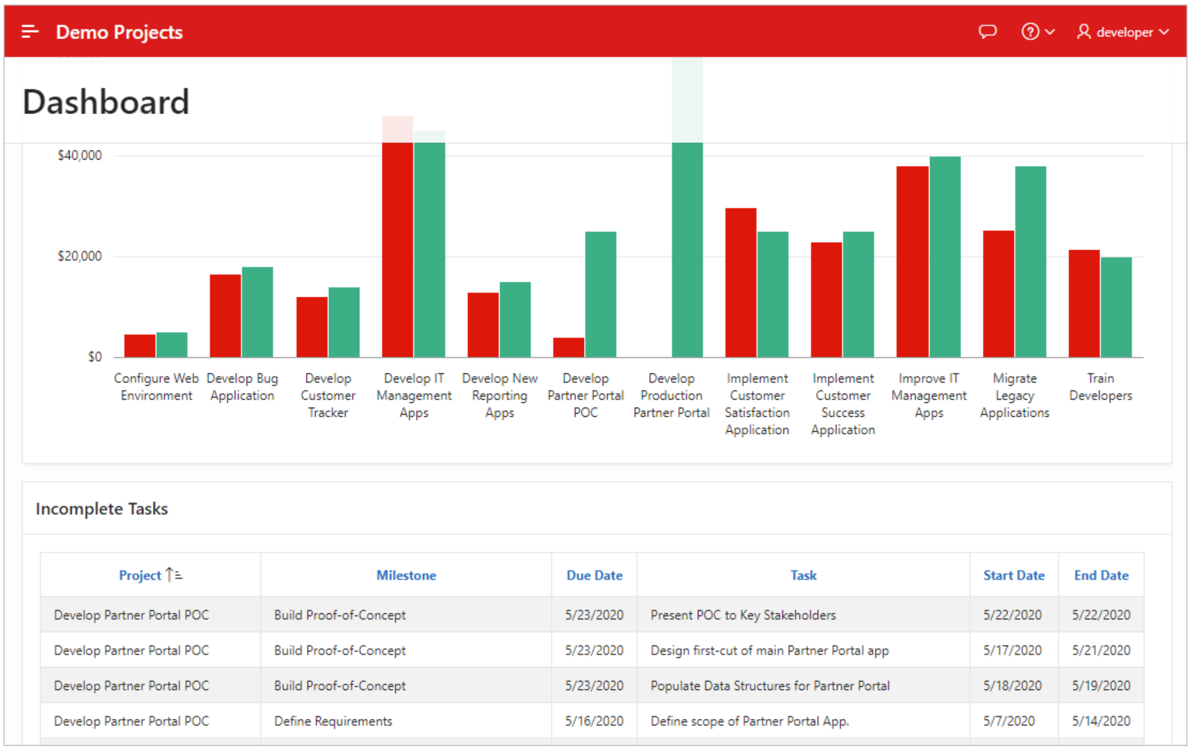


4. In Property Editor:
   a. Identification: Title - enter `Incomplete Tasks`
   b. Source: Type - select **SQL Query**
   c. Source: SQL Query - copy and paste the following code:

```
select p.name project
, m.name milestone
, m.due_date
, t.name task
, t.start_date
, t.end_date
from eba_projects p
, eba_project_milestones m
, eba_project_tasks t
```

```
where p.id = m.project_id
and p.id = t.project_id
and t.milestone_id = m.id (+)
and nvl(t.is_complete_yn, 'N') = 'N'
```

5. Click **Save and Run Page**. Scroll down to view the report in the runtime.



2. The report displays an appropriate amount of information and columns, but it has some residual layout problems. You can change this value in Live Template Options.

   To open Live Template Options in the runtime:

6. On the Runtime Developer toolbar, click **Quick Edit**.
7. Mouse over the Incomplete Tasks region and click the **wrench icon** (top-right).
8. In Live Template Options:
   a. General - check **Remove Body Padding**
   b. Click the **Attributes** tab (top).
   c. General - check **Stretch Report**
   d. Click **Save**.
9. Click **Application #####** on the Runtime Developer toolbar to return to the Application home page.

The report is finished and the Dashboard is complete.

Proceed to the next lesson.

9

Developing the Task Overview Page

Create a Faceted Search page based on the `EBA_PROJECT_TASKS` table that provides a broad, easily sortable overview of all project work tracked in the app.

About This Lesson

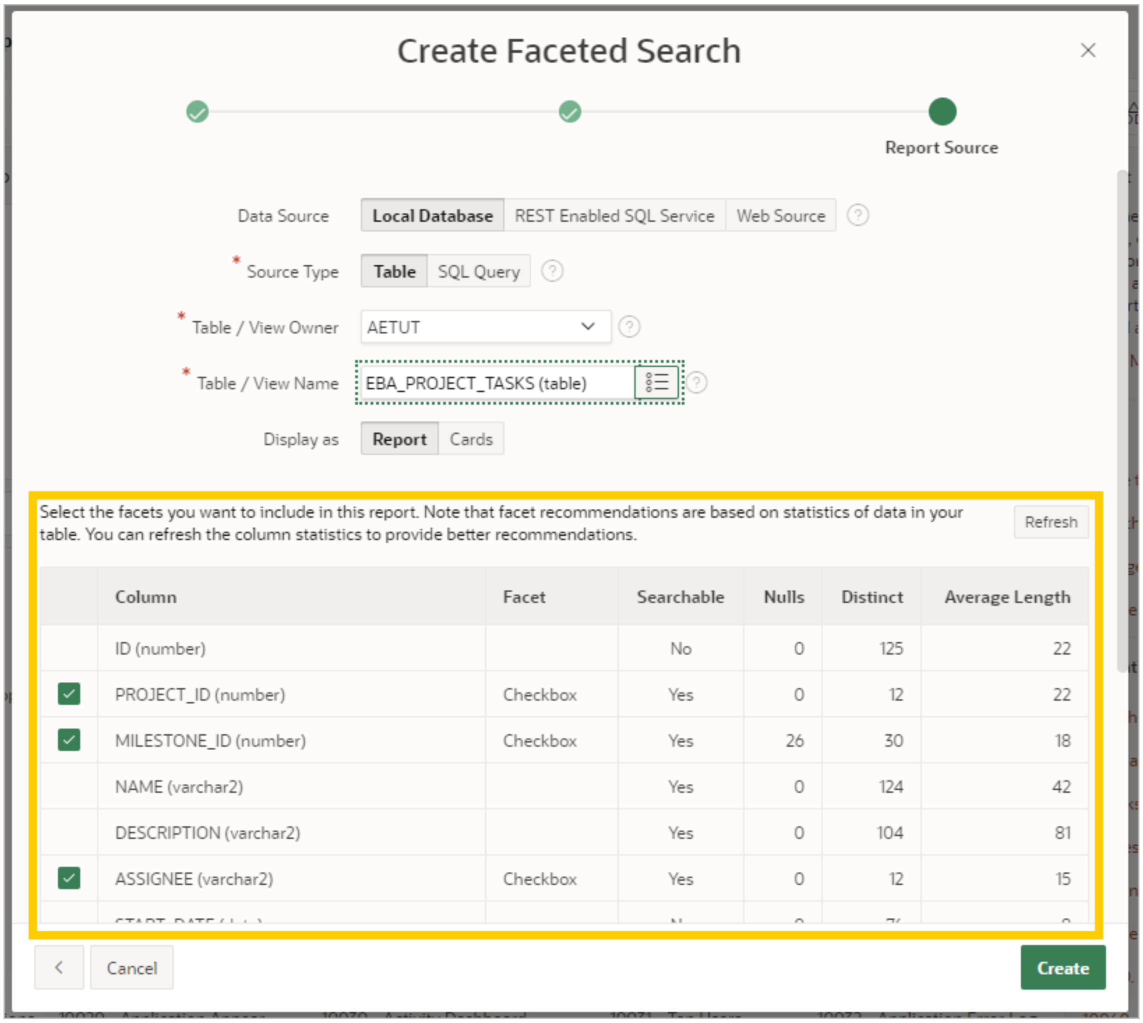
In this lesson, you add the final page to your app: a **Faceted Search** page. Faceted Search is a powerful tool for sorting through a large table.

You use the Create Page Wizard to add the page, then use Page Designer to update the **search results region**, which resembles a classic report, and the **search region**, which contains the **facets** users interact with to sort the results.

9.1 Creating a Faceted Search Page

1. To add a Faceted Search page to the application:

1. In the Application home page, click **Create Page**.
2. Click **Report**.
3. Click **Faceted Search**.
4. For Page Attributes:
   a. Report Page Number - enter 8
   b. Report Page Name - enter `Task Overview`
   c. Click **Next**.
5. For Navigation Menu:
   a. Select **Create a new navigation menu entry**.
   b. Click **Next**.
6. For Report Source:
   a. For Table / View Name, click the **LOV** icon.
   b. Select **EBA_PROJECT_TASKS (table)**.
   c. Wait for the list of facets to populate below before proceeding.

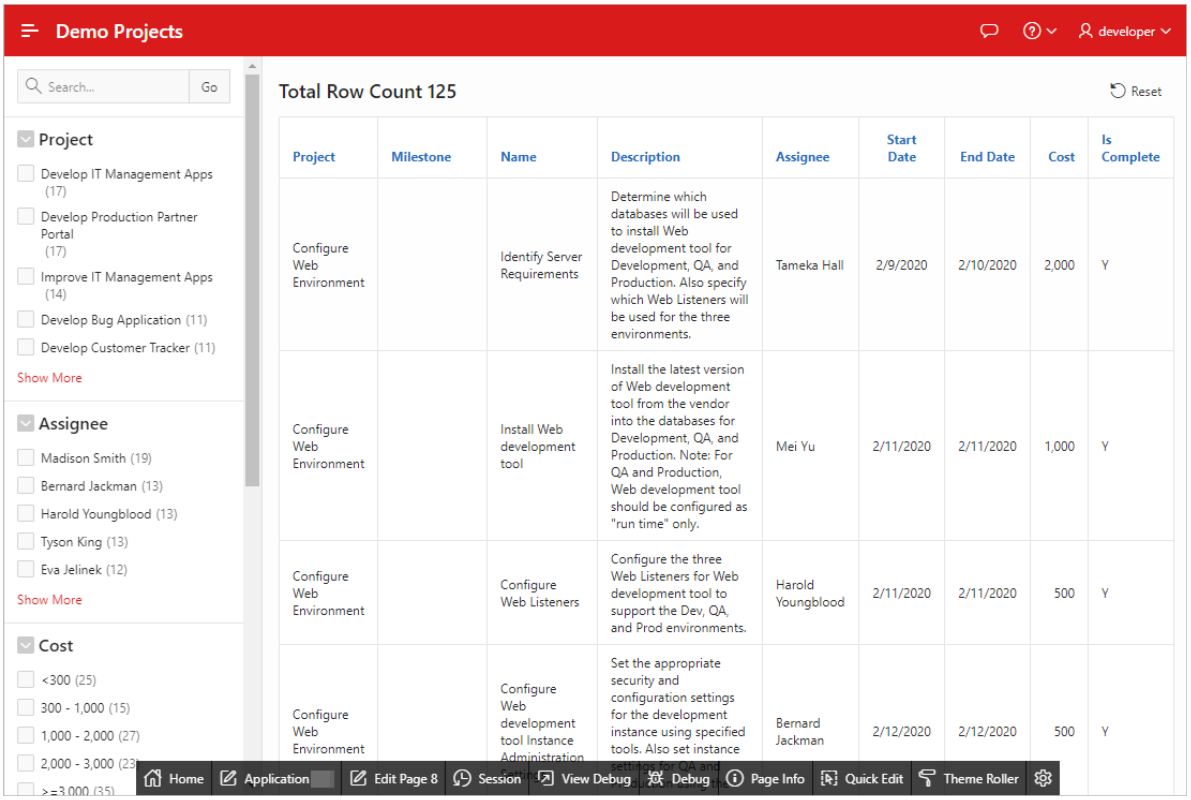


> **Note:**
>
> The Create Page Wizard uses the Data Dictionary Cache to discover valid facets. To learn more about this process, see "About Creating Facet Search Reports" in the *Oracle Application Express App Builder User's Guide*.

d. Click **Create**.

When the wizard completes, Application Express loads the Task Overview page in Page Designer automatically.

7. Click **Save and Run Page** to view the page in the runtime.



8. When finished, click **Edit Page 8** on the Runtime Developer toolbar to return to Page Designer.

9.2 Updating the Task Overview Search Results

Perform some routine updates to improve the report area of the Task Overview page:

- Update the `IS_COMPLETE` column.
- Apply a format mask to the `COST` column.
- Update the Navigation Menu in Shared Components.

1. To update the `IS_COMPLETE_YN` column:
1. In the Rendering tab, locate the Search Results region (not Search).
2. Expand **Columns** and select **IS_COMPLETE_YN**.
3. In Property Editor:
   - Heading: Heading - enter `Complete`
4. In the Rendering tab, click **Search Results**.
5. In Property Editor:
   a. Source: Type - select **SQL Query**.
   b. Source: SQL Query - delete the contents, then copy and paste the following code:

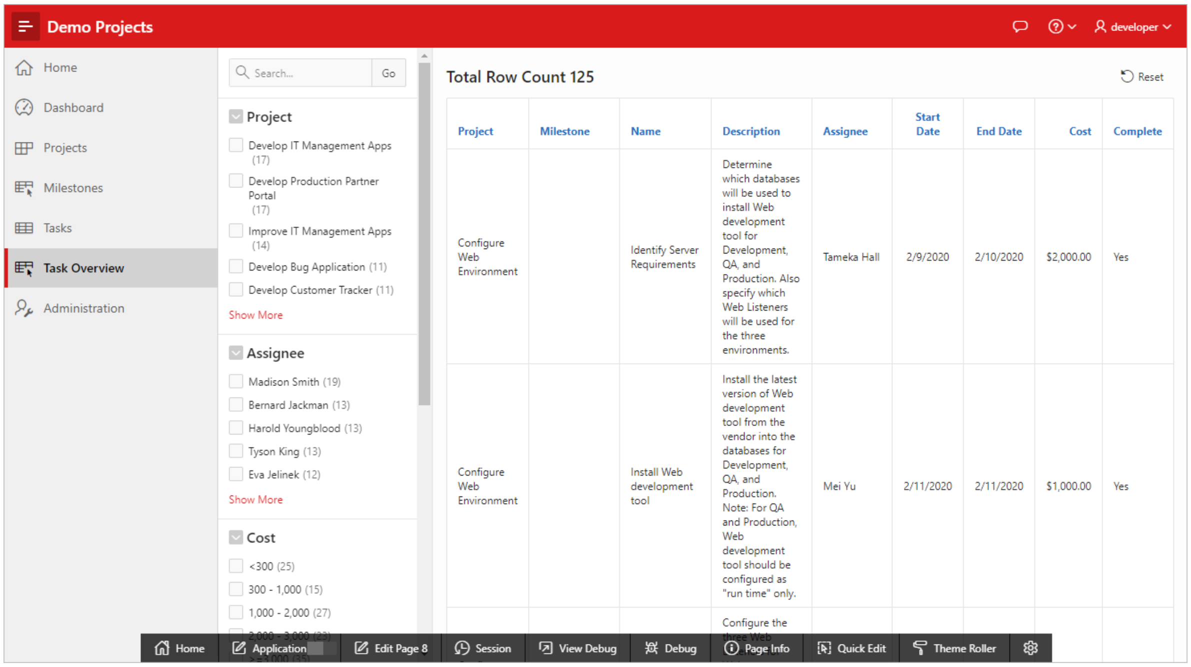
```
select ID,
       PROJECT_ID,
```

```
        MILESTONE_ID,
        NAME,
        DESCRIPTION,
        ASSIGNEE,
        START_DATE,
        END_DATE,
        COST,
        decode(is_complete_yn, 'Y', 'Yes', 'No') IS_COMPLETE_YN,
        CREATED,
        CREATED_BY,
        UPDATED,
        UPDATED_BY
   from EBA_PROJECT_TASKS
```

   c. Click **Save**.

2. To apply a format mask to COST:
6. In the Rendering tab, select the **COST** column.
7. In Property Editor:
   a. Appearance: Format Mask - click the **LOV** icon.
   b. Scroll down and select **$5,234.10**.
   c. Click **Save**.
3. To update the Navigation Menu entry for the Task Overview page:
8. Click the **Shared Components** icon.
9. Under Navigation, click **Navigation Menu**.
10. Click **Desktop Navigation Menu**.
11. Click **Task Overview**.

    The List Entry screen displays.
12. Under Entry, for Sequence enter `80`
13. For Image/Class, enter `fa-table-pointer`
14. Click **Apply Changes**.
15. Click the **Run** icon (top-right) to run the page.
16. In the runtime, click the **menu** icon (top-left) to expand the navigation menu.



The faceted search page is useful for quickly sorting through the contents of a table. Interact with the facets to learn how they affect the results:

- Select and deselect facets on the left to narrow the scope of the display.
- Select multiple facets in the same category.
- Click **Clear** to deselect all facets in a category.

17. When finished, click **Edit Page 8** on the Runtime Developer toolbar to return to Page Designer.

9.3 Updating the Task Overview Facets

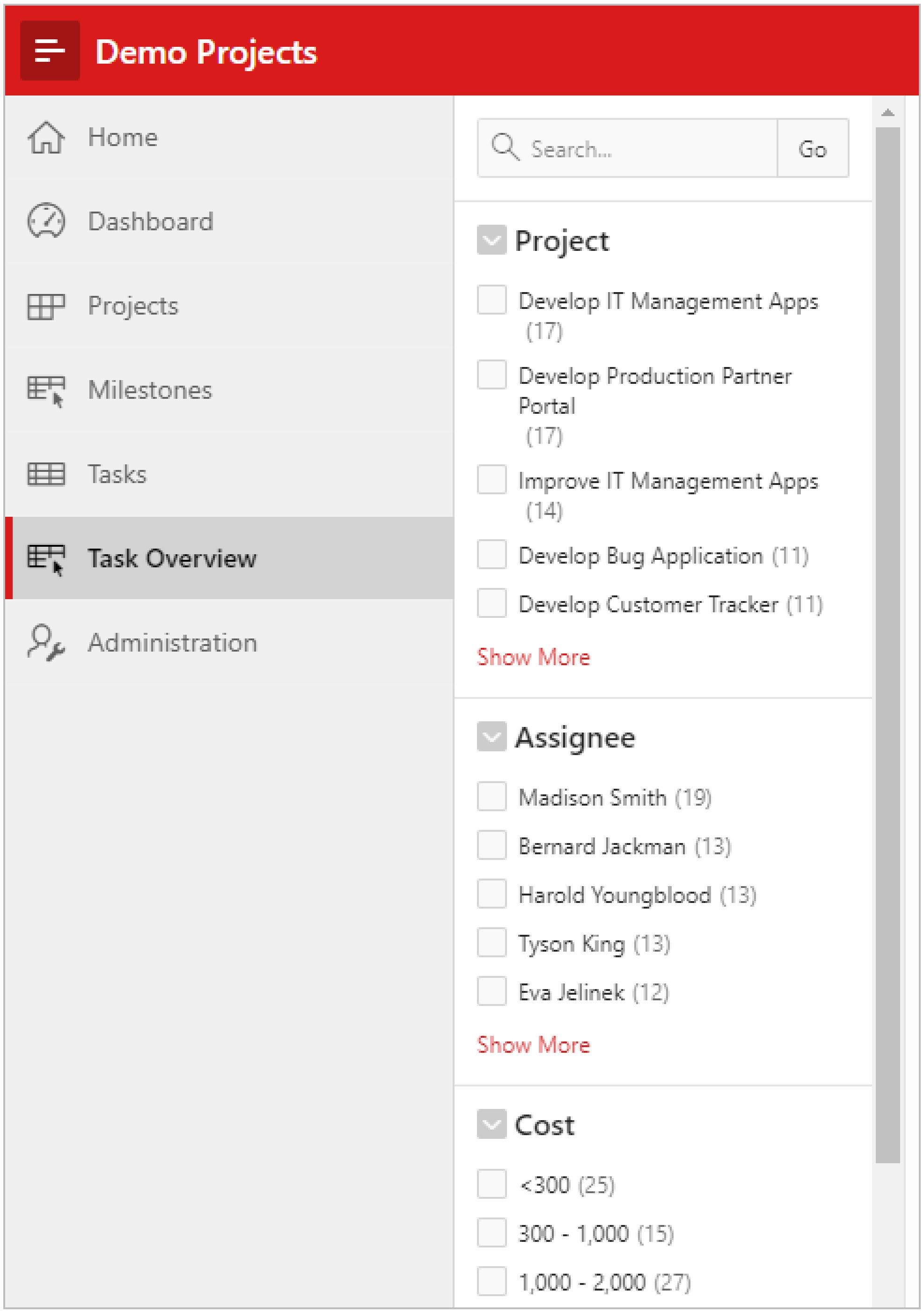
With the results report region updated, you can improve the look and function of the search region with some basic tweaks:

- Change the order of facet items so that Milestones appear below Projects in the Search region.
- Apply a Cascading LOV (List of Values) to the `MILESTONE_ID` column. A Cascading LOV creates a dependency where the Milestone facet group only displays when a Project facet is selected. This reduces clutter in the Search region.
- Add a search field to the Project facet group so that your users can quickly browse the Projects list with a search string.

1. To change the facet order in Page Designer:
1. In the Rendering tab, under Search, click and hold **P8_MILESTONE_ID** facet and drag it to display after P8_PROJECT_ID.
2. Click **Save**.
2. To apply a Cascading LOV to the Milestone facet group:
3. With P8_MILESTONE_ID still selected, in Property Editor:

a. List Entries: Sort by Top Counts - click to **disable**.
b. Cascading List of Values: Parent Facet - enter `P8_PROJECT_ID`
c. LOV Column - enter `PROJECT_ID`
d. Click **Save and Run Page**.

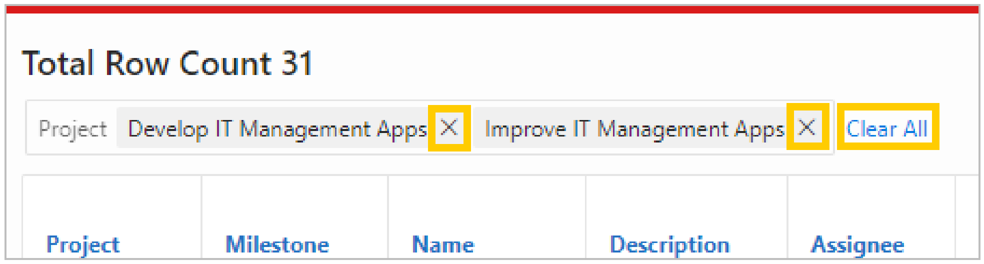
The runtime displays. Note that the Milestone group has disappeared.



4. In the runtime, click a Project facet. The Milestone category appears.

A Project filter displayed above the search results region.

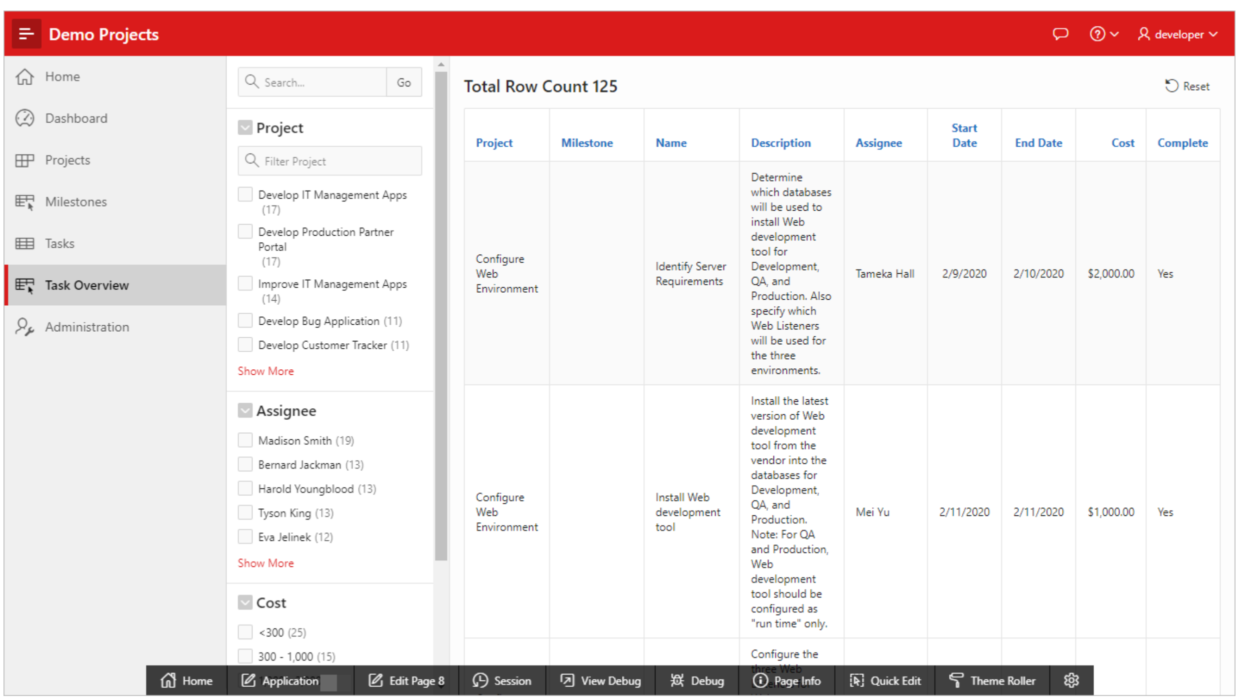
You can select multiple facets, and a filter displays for each one. Click the X icon to remove filters individually or click Clear All to deselect all facets.



If you select the Configure Web Environment project, the Milestone facet group does not display because this Project does not contain any Milestones.

5. When finished, click **Edit Page 8** on the Runtime Developer toolbar.
3. To add a search field to the Project facet group:
6. In the Rendering tab, under Search, select **P8_PROJECT_ID**.
7. In Property Editor:
   a. List Entries: Zero Count Entries - select **Show Last**.
   b. List Entries: Client-Side Filtering - click to **enable**.

      Enabling Client-Side Filtering adds the text search field to the region. "Zero Count Entries - Show Last" moves facets with no results for the selected facets to the bottom of the list. They display as null.
   c. Click **Save and Run Page**.



The faceted search page Task Overview is complete.

Congratulations! Your application is complete.

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