



Oracle Application Express: Developing Database Web Applications

Hands-On-Labs Guide

Unit 13: Implementing Security in your Application

Application security is very important in the majority of applications, except for "Public" applications. You must ensure users enter valid credentials, generally username and password (Authentication), and that once logged in that each user has appropriate rights within the application (Authorization).

This exercise includes three hands-on-labs.

HOL 13-1 uses the Demo Projects application.

HOL 13-2 and 13-3 use the Budget App application.

HOL 13-1 Creating and Using an Authorization Scheme: In this lab, you create an authorization scheme to ensure only people entered as Team Members can log into the Demo Projects application. You create a user and verify if the user can access the application.

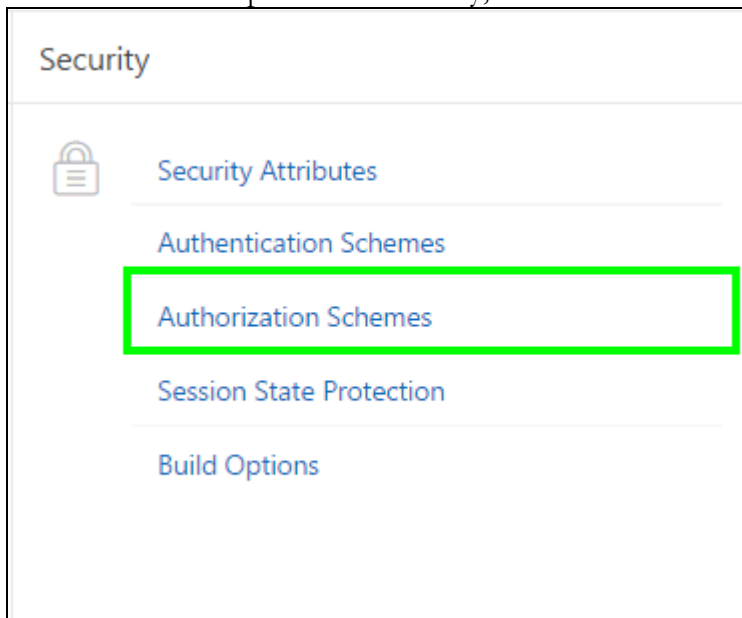
HOL 13-2 Creating and Using an Authentication Scheme: In this hands-on lab, you create an Open Door Credentials authentication scheme and make it current. You test the authentication scheme and then switch back to the default Application Express Authentication scheme.

HOL 13-3 Controlling User Access by Using the Access Control Administration: In this hands-on lab you create three different users as Administrator, Developer and End User. You create an Access Control Administration page, set the application mode to restrict access and add these users to the Access Control list. Finally, you apply the authorization scheme to pages and verify if users are allowed or denied access.

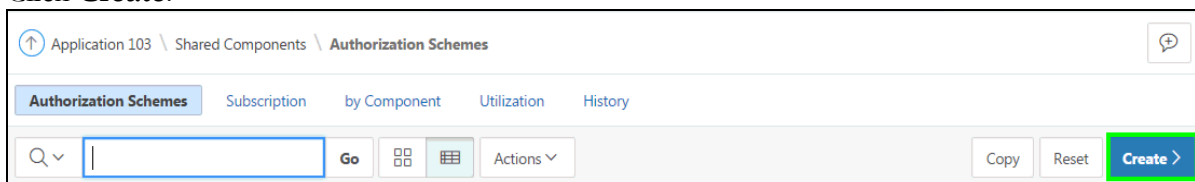
HOL 13-1: Creating and Using an Authorization Scheme

In this hands-on lab, you create an authorization scheme to ensure only people entered as Team Members can log into the Demo Projects application. You apply the authorization scheme to the application properties.

1. Navigate to **App Builder** and run the **Demo Projects** application.
In the Developer Toolbar, click **Application <n>**.
2. In the application home page, click **Shared Components**.
Under Shared Components > Security, click **Authorization Schemes**.



3. Click **Create**.



4. For Create Authorization Scheme, select **From Scratch** and click **Next**.

5. For Details, input the following:

- Name - enter **Team Members**
- Schema Type - select **Exists SQL Query**
- SQL Query - copy and paste the following:

```
select 1
from demo_proj_team_members
where upper(username) = upper(:APP_USER)
```

- Identify error message displayed when scheme violated - enter **You must be a team member to use this application.**

Click **Create Authorization Scheme**.

Note: **:APP_USER** is a built-in application item that returns the username of the currently logged in user.

Create Authorization Scheme

✓
●
Details

Use this page to define an authorization scheme. By creating an authorization schemes, you can protect applications, pages, and application components and extend the security provided by your application authentication scheme. You can use authorization schemes to identify additional security beyond simple user authentication. For example a user with administration rights may need access to more navigation bar icons, pages, and tabs than other users.

Application: **103 Demo Projects** ?

* Name ?

* Scheme Type ?

* SQL Query

```
select 1
from demo_proj_team_members
where upper(username) = upper(:APP_USER)
```

?

* Identify error message displayed when ?

6. The Team Members authorization scheme is created now. Rather than applying the authorization scheme to every page, apply the scheme to the application properties. Click the **Shared Components** breadcrumb entry. Alternatively, on the toolbar, click the Shared Components button, which is located in the top-right and contains a triangle, circle, and square in its icon.

Application 103 \ Shared Components \ Authorization Schemes

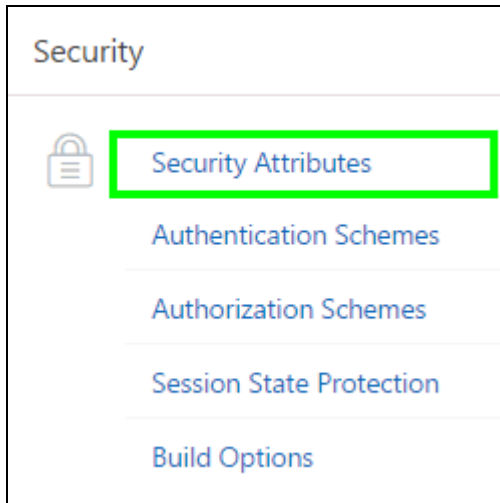
Authorization Schemes Subscription by Component Utilization History

Go

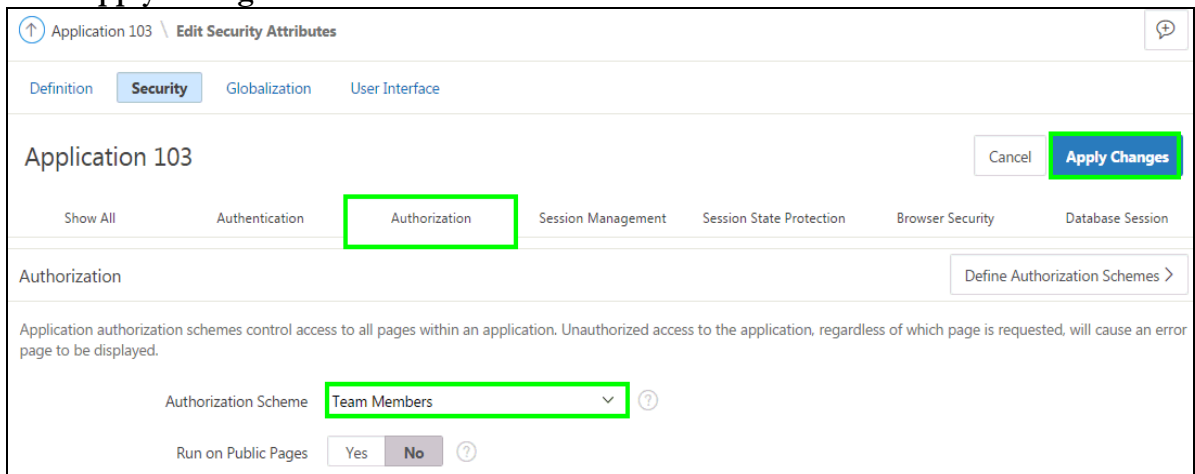
Name ↑	Type	Caching	Subscribed From	Subscribers	Updated
Team Members	Exists SQL Query	Once per session			1 seconds ago

1 - 1

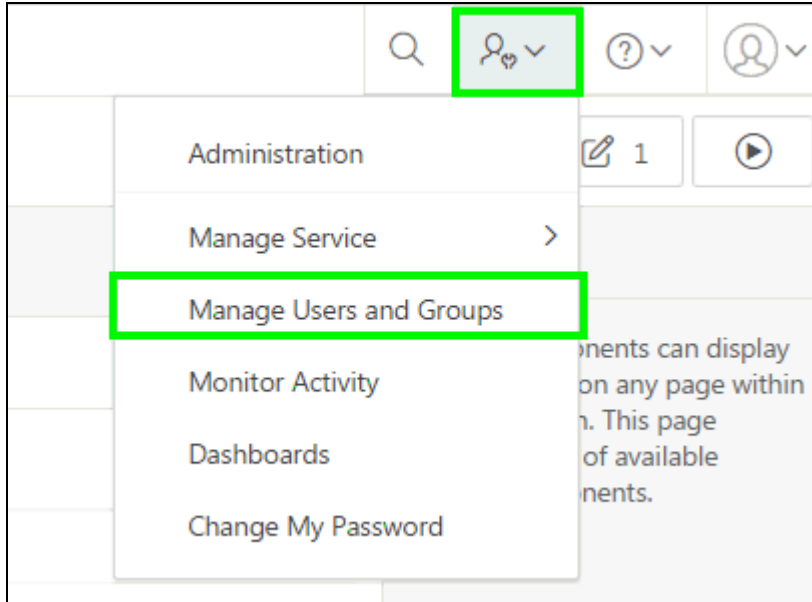
7. Under Security, click **Security Attributes**.



8. Click the **Authorization** tab.
For Authorization Scheme, select **Team Members** from the list.
Click **Apply Changes**.



9. In order to test the authorization scheme it is necessary to create a new user account.
In the Application Express toolbar, click **Administration**, identified by a user icon with a spanner, then select **Manage Users and Groups**.



10. Click **Create User**.

To create a user, input the following:

- Username - enter unauthorized
- Email Address - enter unauthorized@email.com
- Password - enter unauthorized
- Confirm Password - enter unauthorized
- Require Change of Password on First Use - No

Click **Create User**.

A screenshot of the 'Create User' form in Oracle Application Express. The breadcrumb navigation shows 'Manage Users and Groups > Create User'. The form title is 'Create User'. There are three tabs: 'Show All', 'User Identification', and 'Account Privileges'. The 'User Identification' tab is selected and highlighted with a green box. Below the tabs, there are two input fields. The first field is labeled 'Username' with a red asterisk and contains the text 'unauthorized'. The second field is labeled 'Email Address' with a red asterisk and contains the text 'unauthorized@email.com'. Both input fields are highlighted with green boxes.

The screenshot shows the 'Create User' form with the 'Password' tab selected. The form contains the following elements:

- Buttons: Cancel, Create and Create Another, Create User
- Navigation tabs: Show All, User Identification, Account Privileges, Password (selected), Group Assignments
- Section: Password
- Fields:
 - * Password: [masked] Passwords are case sensitive (?)
 - * Confirm Password: [masked] (?)
 - Require Change of Password on First Use: No (dropdown) (?)

11. Navigate to the runtime environment (tab or window). Click **Logout** in the navigation bar (top left).
12. On the Log In page, for Username enter **unauthorized**, and for Password enter **unauthorized**. Click **Log In**.

The screenshot shows the 'Demo Projects' login page. The page features a blue icon of a right-pointing arrow inside a square bracket. Below the icon, the text 'Demo Projects' is displayed. There are two input fields: the first is for the Username, containing the text 'unauthorized', and the second is for the Password, containing a series of dots. Below the input fields is a large blue button labeled 'Log In'.

13. Verify the access denied message is displayed. Click **OK**.



You must be a team member to use this application.

Access denied by Application security check

Technical Info (only visible for developers)

1. is_internal_error: true
2. apex_error_code:
APEX.AUTHORIZATION.ACCESS_DENIED
3. component.type:
APEX_APPLICATION_AUTHORIZATION
4. component.id: 23330514585264457
5. component.name: Team Members
6. error_backtrace:

```

----- PL/SQL Call Stack -----
   object      line  object
   handle      number name
000007FF854D6D38      935 package body APEX_050100.WWV_FLOW_ERROR
000007FF854D6D38     1003 package body APEX_050100.WWV_FLOW_ERROR
000007FF854D6D38     1395 package body APEX_050100.WWV_FLOW_ERROR
000007FF8589E060       796 package body APEX_050100.WWV_FLOW_AUTHORIZATION
000007FF8AAFFFC8     4509 package body APEX_050100.WWV_FLOW
000007FF854AA5D0       173 procedure APEX_050100.F
000007FF823AA0E8        35 anonymous block

```

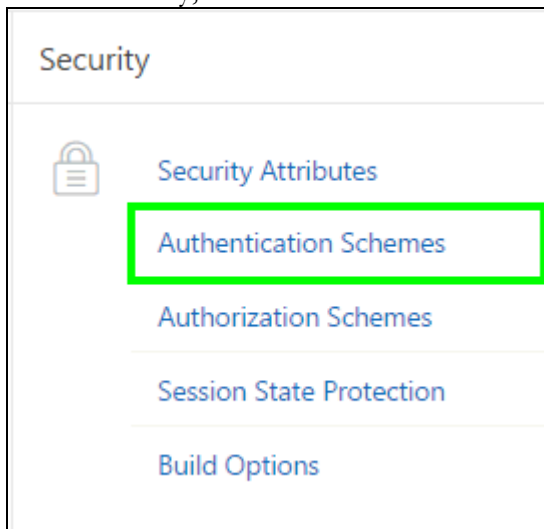
OK

14. On the Log In page, enter your username and password credentials that you use to log into the App Builder.
Click **Log In**.

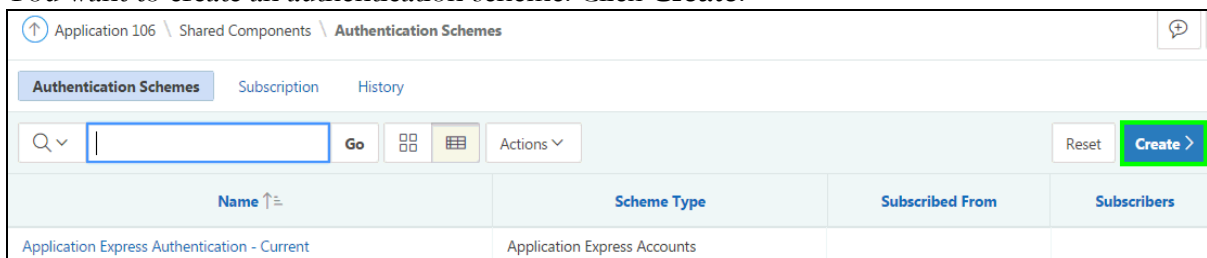
HOL 13-2: Creating and Using an Authentication Scheme

In this hands-on lab, you create an authentication scheme named Open Door Credentials in the Budget App application. Upon creation, this scheme becomes Current Scheme by default. You test this scheme by logging in to the application. Finally, you switch back to Application Express Authentication scheme.

1. In the App Builder, click **Budget App** application.
2. Navigate to **Shared Components**.
Under Security, click **Authentication Schemes**.



3. You want to create an authentication scheme. Click **Create**.



4. For Create Scheme, select **Based on a pre-configured scheme from the gallery**, and click **Next**.

Create Authentication Scheme

Method

When you create a new authentication scheme, you have several options. Most let you reuse implementations that already exist in your application or in other applications within your workspace. There are even some pretested schemes you can copy to get you up and running immediately.

Create Scheme: **Based on a pre-configured scheme from the gallery** ?
 As a copy of an existing authentication scheme

> Information

- For Name, enter **Open Door Credentials**.
 For Scheme Type, select **Open Door Credentials** from the list.
 Click **Create Authentication Scheme**.

Application 106 \ Shared Components \ Authentication Schemes \ Create / Edit

Name

* Name ?

* Scheme Type ?

- In the toolbar, click the **Run Page** icon.
 If you are already logged in, then click Logout to perform the next step.

7. Enter your Username and click **Login**.

Log In to Application 106

Enter your credentials in this form to start a new session in this Application Express application.

* Username

Login

8. The Home page is displayed.
In the Developer Toolbar, click **Application<n>**.

BUDGET APP Log Out

Interactive Grid

PROJECT_BUDGET

Project Budget Report

Home

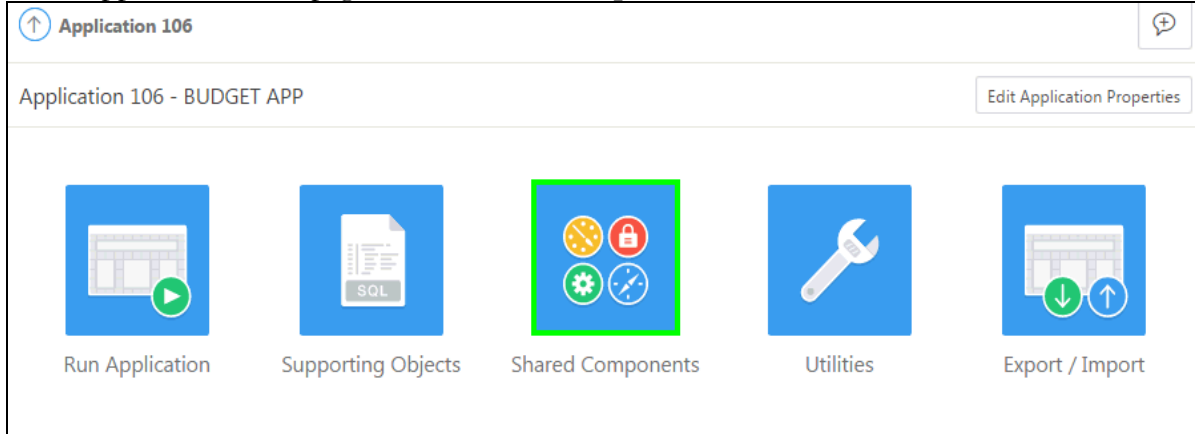
Q Go Actions Create

	Id	Project	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget
	43	New Packaged App	Prepare requirements doc	15-FEB-17	20-FEB-17	Open	PAM KING	500	800
	1	ACME Web Express Configuration	Create pilot workspace	02-FEB-17	02-FEB-17	Closed	JOHN WATSON	100	100
	2	ACME Web Express Configuration	Specify security authentication scheme(s)	02-JUL-17	02-JUL-17	Open	John Watson	200	300
	3	ACME Web Express Configuration	Configure Workspace provisioning	02-AUG-17	02-AUG-17	Open	JOHN WATSON	200	100
	4	Bug Tracker	Document quality assurance procedures	12-DEC-16	15-DEC-16	Closed	MYRA SUTCLIFF	3000	2000
	5	Bug Tracker	Review automated testing tools	16-DEC-16	18-DEC-16	Closed	Myra Sutcliff	750	1500
	6	Bug Tracker	Implement bug tracking software	31-DEC-16	31-DEC-16	Closed	Myra Sutcliff	100	100

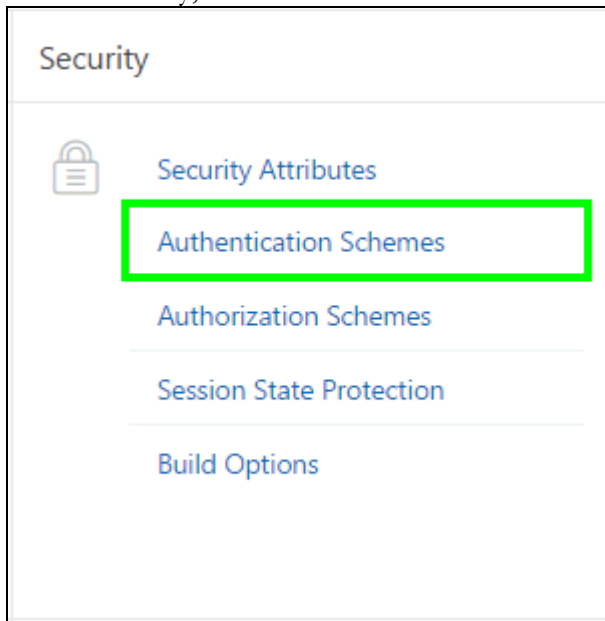
Home Application 106 Edit Page 1 Session View Debug Debug Show Layout Columns Quick Edit Theme Roller

Your application might display the Vita (Copy) Theme Style. Click the **Customize** link at the bottom of the page, select **Vita** for Theme Style and click **Apply Changes**.

9. You want to switch back to the Application Express Authentication scheme. In the application home page, click **Shared Components**.



10. Under Security, click **Authentication Schemes**.



11. Click **Application Express Authentication** in the report.

The screenshot shows the 'Authentication Schemes' report in Oracle Application Express. The breadcrumb is 'Application 106 \ Shared Components \ Authentication Schemes'. There are tabs for 'Authentication Schemes', 'Subscription', and 'History'. A search bar with a 'Go' button and a 'Create' button are visible. Below is a table with the following data:

Name ↑	Scheme Type	Subscribed From	Subscribers
Application Express Authentication	Application Express Accounts		
Open Door Credentials - Current	Open Door Credentials		

The 'Application Express Authentication' row is highlighted with a green rectangular border.

12. Click **Make Current Scheme**.

Application 106 \ Shared Components \ Authentication Schemes \ Create / Edit

Authentication Scheme

Cancel Delete **Make Current Scheme** Apply Changes

Show All Name Subscription Source Session Not Valid Login Processing Post-Logout URL Session Cookie ... Comments

Name

* Name Application Express Authentication ?

* Scheme Type Application Express Accounts ?

13. The Application Express Authentication scheme is now activated as current authentication scheme.

Application 106 \ Shared Components \ Authentication Schemes

✓ Authentication scheme activated as current authentication scheme. ✕

Authentication Schemes Subscription History

Q Go Actions Reset Create >

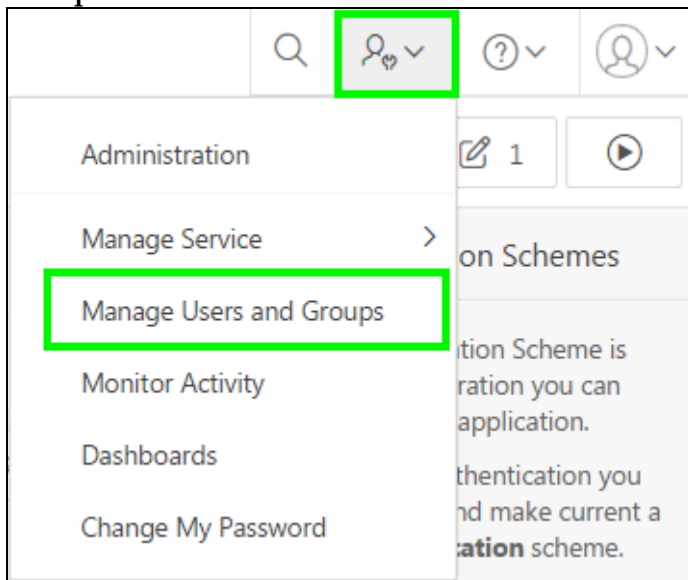
Name ↑	Scheme Type	Subscribed From	Subscribers
Application Express Authentication - Current	Application Express Accounts		
Open Door Credentials	Open Door Credentials		

14. In the toolbar, click the **Run Page** icon. Then, click **Logout**.15. Notice that the authentication scheme has changed. Enter your username and password and click **Log In**.

HOL 13-3: Controlling User Access by Using the Access Control Administration

In this hands-on lab, you first create an access control page and set the application mode to restrict access. Then, you create the access control list and assign the Budget App application components to an authorization scheme.

1. If you are in the application runtime environment, switch to the window or tab for App Builder environment.
2. In the Application Express toolbar, click **Administration** and select **Manage Users and Groups**.



3. Create the following users to add to the Access Control List.
 - apex_admin: Workspace Administrator
 - apex_dev: Developer
 - apex_user: End User
 Click **Create User**.
4. Enter the following information and click **Create and Create Another**.
 - Username: **apex_admin**
 - Email Address: **apex.admin@oracle.com**
 - Select **Yes** for User is a workspace administrator
 - Password: **apexadmin**
 - Confirm Password: **apexadmin**

- Select **No** for Require Change of Password on First Use.

* Username ?

* Email Address ?

Show All User Identification Account Privileges

Account Privileges

Default Schema ?

Accessible Schemas (null for all) ?

User is a workspace administrator: Yes No ?

User is a developer: Yes No ?

Create User Cancel Create and Create Another Create User

Show All User Identification Account Privileges Password Group Assignments

Password

* Password Passwords are case sensitive ?

* Confirm Password ?

Require Change of Password on First Use ?

5. Enter the following information and click **Create and Create Another**.
 - Username: **apex_dev**
 - Email Address: **apex.dev@oracle.com**
 - Select **No** for User is a workspace administrator
 - Select **Yes** for User is a developer
 - Password: **apexdev**
 - Confirm Password: **apexdev**
 - Select **No** for Require Change of Password on First Use.

6. Enter the following information and click **Create User**.
 - Username: **apex_user**
 - Email Address: **apex.user@oracle.com**
 - Select **No** for User is a workspace administrator
 - Select **No** for User is a developer
 - Password: **apexuser**
 - Confirm Password: **apexuser**
 - Select **No** for Require Change of Password on First Use.

7. You see users in the list now. Click **App Builder**.

ORACLE Application Express **App Builder** SQL Workshop Team Development Packaged Apps

Manage Users and Groups

Users Groups Group Assignments

Q Go Actions Reset View Dashboard Create Multiple Users > **Create User >**

User ↑	Email	Account Type	Locked	Builder Last Login	Created
APEX_ADMIN	apex.admin@oracle.com	Workspace Administrator	No	-	4 minutes ago
APEX_DEV	apex.dev@oracle.com	Developer	No	-	90 seconds ago
APEX_USER	apex.user@oracle.com	End User	No	-	39 seconds ago

8. In the report, click the **Budget App** application.

The screenshot shows the Oracle APEX application list interface. At the top, there are four icons: 'Create', 'Import', 'Dashboard', and 'Workspace Utilities'. Below these is a search bar with a 'Go' button and an 'Actions' dropdown menu. A table lists various applications, with the 'BUDGET APP' row highlighted in green. The table has columns for Application ID, Name, Pages, Type, Updated By, Updated, and Run.

Application	Name	Pages	Type	Updated By	Updated	Run
100	Sample Database Application	66	Packaged Application	chaitanya	13 days ago	
101	Sample Reporting	39	Packaged Application	chaitanya	7 days ago	
102	Sample Projects	52	Packaged Application	chaitanya	7 days ago	
103	Demo Projects	10	Database Application	chaitanya	69 minutes ago	
106	BUDGET APP	6	Database Application	chaitanya	19 minutes ago	
107	Team Status	3	Websheet Application	chaitanya	6 days ago	
110	Hardware	3	Database Application	chaitanya	2 days ago	

9. In the application home page, click **Create Page**.

The screenshot shows the Oracle APEX application home page for 'Application 106 - BUDGET APP'. At the top, there is a search bar and an 'Edit Application Properties' button. Below these are five icons: 'Run Application', 'Supporting Objects', 'Shared Components', 'Utilities', and 'Export / Import'. At the bottom, there is a search bar, a 'Go' button, and a 'Create Page' button highlighted in green.

10. Select **Access Control** for Page Type, and click **Next**.

The screenshot shows the 'Create a Page' dialog box. At the top, the title is 'Create a Page' with a close button (X) in the top right corner. Below the title, the 'Application' is set to '106 - BUDGET APP' with a help icon (?). The 'User Interface' is set to 'Desktop' with a dropdown arrow and a help icon (?). Under the heading 'Select a Page Type', there are two rows of icons. The first row includes 'Blank Page', 'Report', 'Form', 'Plug-ins', 'Chart', and 'Calendar'. The second row includes 'Tree', 'Wizard', 'Data Loading', 'Feedback Page', 'Access Control', and 'Global Page'. The 'Access Control' icon, which is a key, is highlighted with a red border. Below these options is a printer icon. At the bottom of the dialog, there are three buttons: 'Cancel', 'Help', and 'Next >'. The 'Next >' button is highlighted with a red border.

11. Click **Next**.

Create Access Control

Pages

This wizard creates a page to manage an access control list. Two tables will be created within this application's default parsing schema to manage the access control list. The access control list provides **view**, **edit** and **administration** privileges which can be associated with users. A corresponding authorization scheme will also be created for each privilege. These authorization schemes can be applied to pages and page components to manage access by user and privilege. All of these can be customized after they are created to meet the needs of your application.

* Administration Page Number ?

* Page Mode Normal Modal Dialog ?

< Cancel **Next >**

12. Select **Create a new navigation menu entry**.

Enter **Access Control** for New Navigation Menu Entry and click **Next**.

Create Access Control

✓ ● ●

Navigation Menu

Navigation Preference Do not associate this page with a navigation menu entry ?
 Create a new navigation menu entry
 Identify an existing navigation menu entry for this page

* New Navigation Menu Entry ?

Parent Navigation Menu Entry

?
PROJECT_BUDGET
Interactive Grid
Project Budget Report

< Cancel Next >

13. On the Confirmation page, click **Create**.

Create Access Control ×

✓
✓
● **Confirmation**

You have requested to create a page with the following attributes. Please confirm your selections.

Application	106
Page	15
Page Name	Access Control Administration Page
Page Title	Access Control Administration Page
Use Existing Table	APEX_ACCESS_SETUP
Use Existing Table	APEX_ACCESS_CONTROL
Create Authorization Scheme	access control - administrator
Create Authorization Scheme	access control - edit
Create Authorization Scheme	access control - view

< Cancel
Create

14. In the Page Designer, click **Save and Run Page**.

15. The Access Control page is displayed. Now, you set the application mode. For Application Mode, select the **Restricted access. Only users defined in the access control list are allowed.** radio button. Then, click **Set Application Mode**.

Application Administration

Application Mode Full access to all, access control list not used. ?

Restricted access. Only users defined in the access control list are allowed.

Public read only. Edit and administrative privileges controlled by access control list.

Administrative access only.

Set Application Mode

16. Now, add users to the access control list. You add the three users you created in a previous step and also your workspace administrator username.

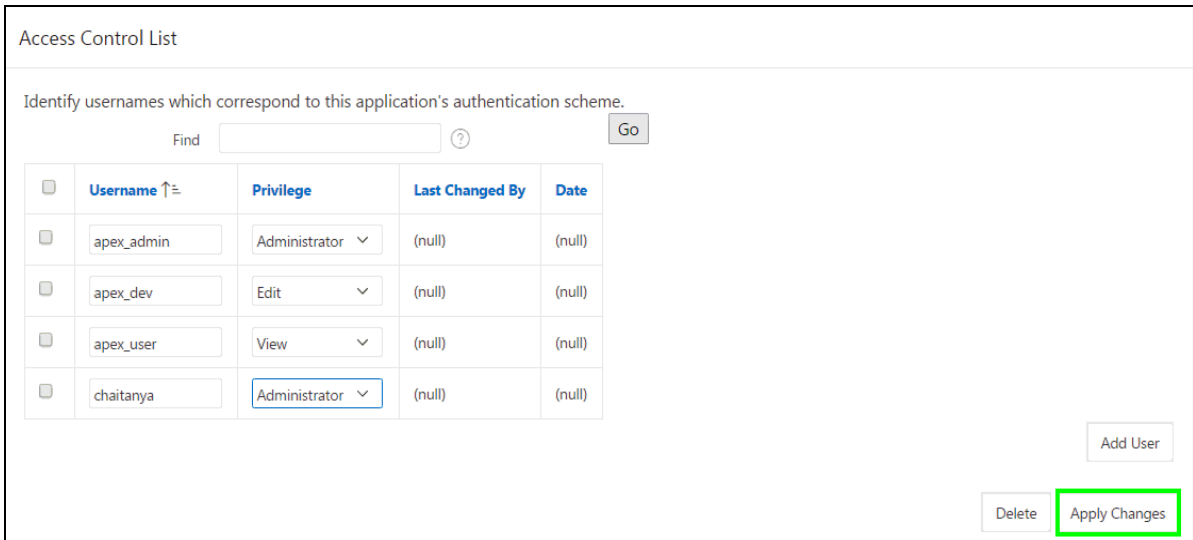
- apex_admin is the administrator and so can modify anything including the user privileges
- apex_dev is the developer and is allowed to edit application data. However, this user cannot change the application administration settings
- apex_user is the end user and can only view the application but cannot make any changes to the data
- <your username> is the administrator.

Click **Add User**.

The screenshot shows the Oracle Application Express Administration interface. At the top, a green notification banner reads "Application Mode Set." with a checkmark and a close button. Below this, the "Application Administration" section is visible, with "Application Mode" set to "Restricted access. Only users defined in the access control list are allowed." Other options include "Full access to all, access control list not used.", "Public read only. Edit and administrative privileges controlled by access control list.", and "Administrative access only." A "Set Application Mode" button is located to the right.

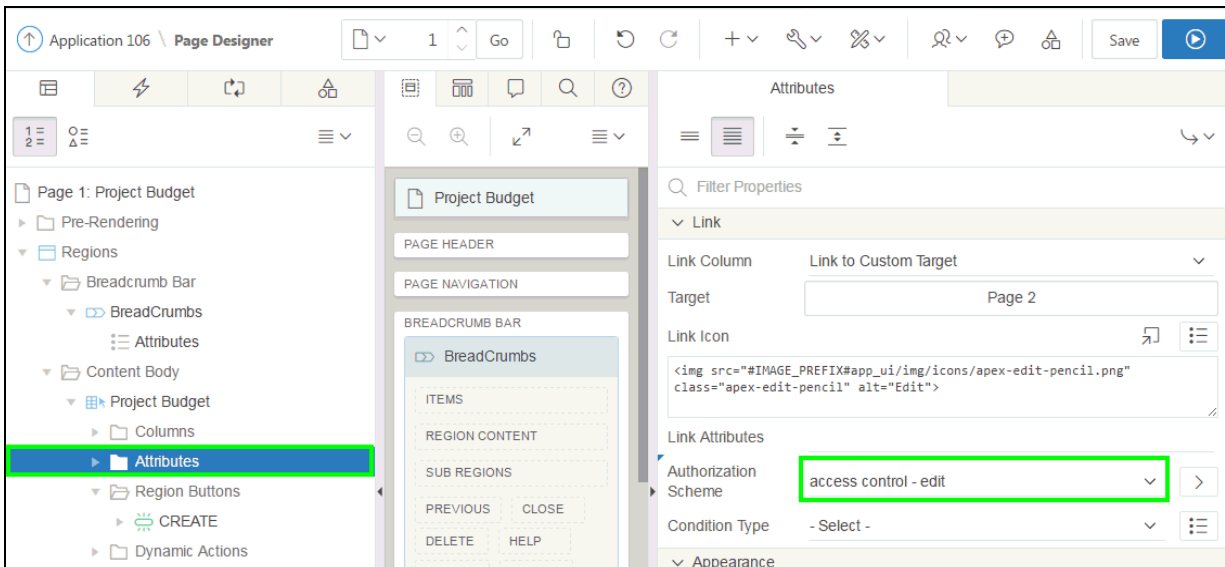
The "Access Control List" section is below, with the instruction "Identify usernames which correspond to this application's authentication scheme." It features a search box with a "Find" label and a "Go" button. Below the search box is a table with columns for "Username", "Privilege", "Last Changed By", and "Date". The table currently displays "No data found." A green box highlights the "Add User" button in the bottom right corner of the table area. At the very bottom of the page, there are "Delete" and "Apply Changes" buttons.

17. Enter **apex_admin** for Username, select **Administrator** for Privilege and click **Add User**.
18. Enter **apex_dev** for Username, select **Edit** for Privilege and click **Add User**.
19. Enter **apex_user** for Username, select **View** for Privilege and click **Add User**.
20. Enter **<your username>** for Username, select **Administrator** for Privilege and click **Apply Changes**.

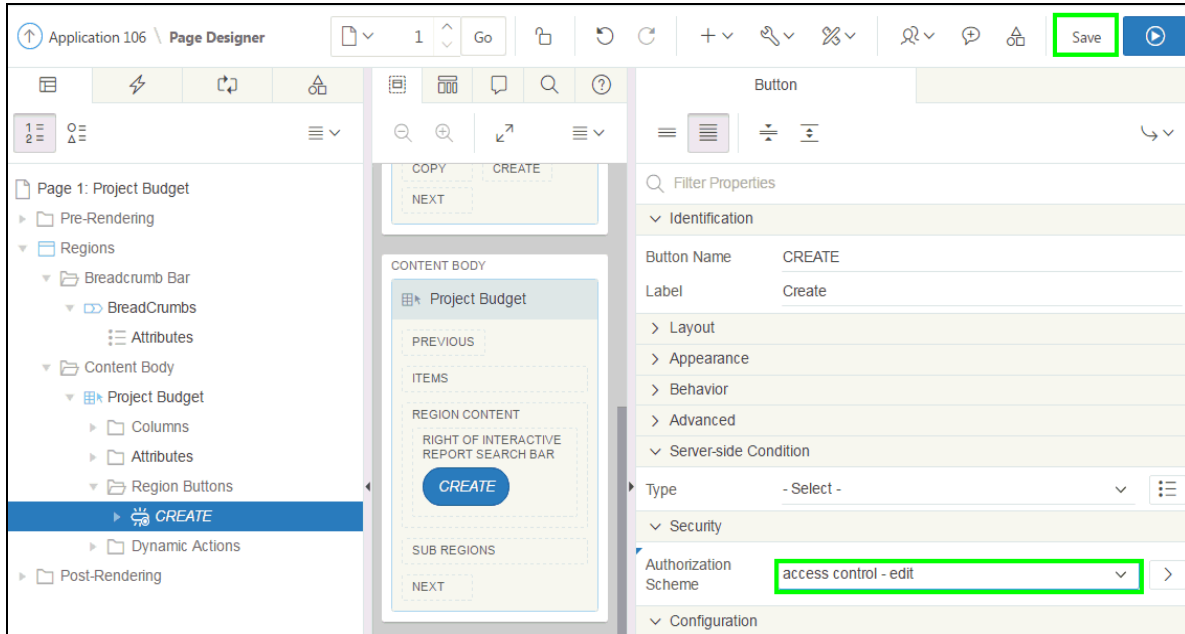


21. Now, you are ready to define and apply the authorization schemes to each application component.
- Users with the Administrator privilege can make any changes, including administering the Budget App application
 - Users with the Edit privilege can modify the data in the report but cannot make changes to the application mode and the access control list.
 - Users with the View privilege can review the interactive report, but cannot modify the data.
- In the application runtime environment, click **Project_Budget** in the navigation menu. In the Developer Toolbar, click **Edit Page 1**.

22. Under Rendering, expand Regions. Under the Project Budget region, select **Attributes**. In the property editor, locate Authorization Scheme and select **access control - edit** from the list.



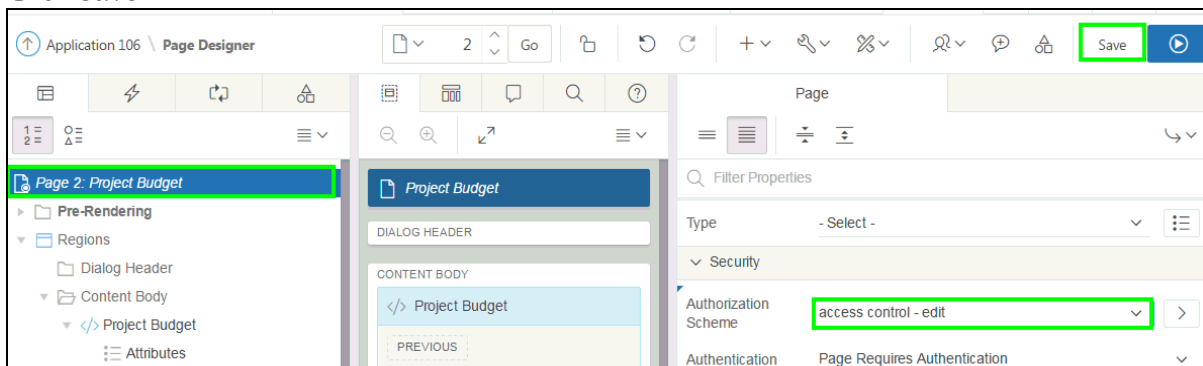
23. You want the Create Button to appear only if the user has either the Edit or Administrator privilege. Under Rendering, locate Region Buttons and select **CREATE**. In the property editor, navigate to Security and select **access control-edit** for Authorization Scheme. Click **Save**.



24. You also want to protect against direct access to the Project Budget form dialog page. Though you restrict end users from editing the interactive report on the Home page, they can still access the Project Budget form page by entering the correct URL in the browser. To avoid this, you must restrict the Form page access to only users with the Edit and Administrator privilege.

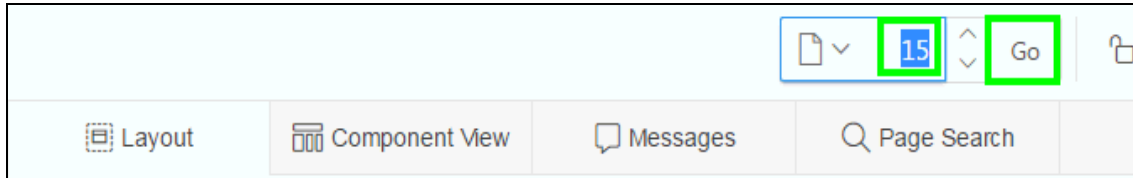
In the page designer, click **Navigate to Next Page** arrow in the toolbar. You are now viewing the Project Budget form page in page designer.

25. Under Rendering, select **Page 2: Project Budget**. Under Rendering, navigate to **Security** and select **access control-edit** for Authorization Scheme. Click **Save**.

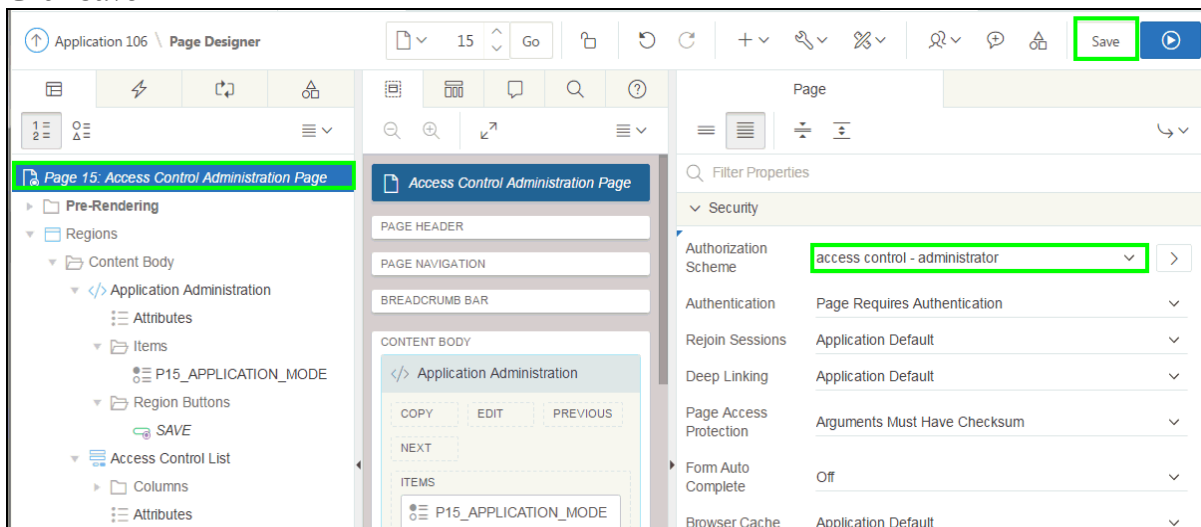


26. Users with the Administrator privilege can only make changes to the access control list. Therefore, you must set the authorization scheme for the Access Control Administration page accordingly.

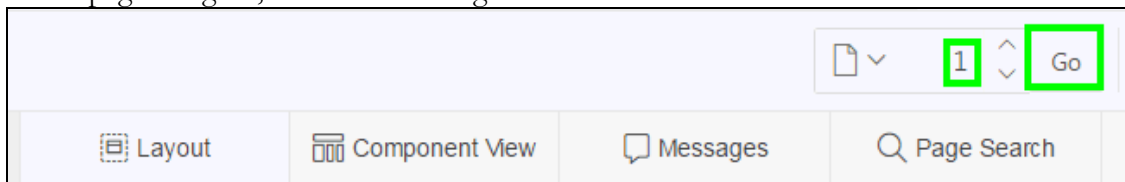
In the page designer, enter the Access Control Administration page number in the Page Finder and click **Go**.



27. Under Rendering, select **Page<n>: Access Control Administration Page**. In the property editor, navigate to Security and select **access control-administrator** for Authorization Scheme. Click **Save**.



28. In the page designer, enter **1** in the Page Finder and click **Go**.




29. In the page designer, click **Save and Run Page**. If you are logged in, click **Logout** before performing the next step.

30. Enter **apex_dev** for Username and **apexdev** for Password and click **Log In**.

31. Notice that apex_dev can edit the interactive report, and also create a new project. In the navigation menu, click **Access Control**.

	Id	Project	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget
	43	New Packaged App	Prepare requirements doc	15-FEB-17	20-FEB-17	Open	PAM KING	500	800
	1	ACME Web Express Configuration	Create pilot workspace	02-FEB-17	02-FEB-17	Closed	JOHN WATSON	100	100
	2	ACME Web Express Configuration	Specify security authentication scheme(s)	02-JUL-17	02-JUL-17	Open	John Watson	200	300
	3	ACME Web Express Configuration	Configure Workspace provisioning	02-AUG-17	02-AUG-17	Open	JOHN WATSON	200	100
	4	Bug Tracker	Document quality assurance procedures	12-DEC-16	15-DEC-16	Closed	MYRA SUTCLIFF	3000	2000

32. Notice that you receive an error as you need the Administrator privilege to use the Access Control Administration page.
Click **OK**.



No privilege for attempted action.

Access denied by Page security check

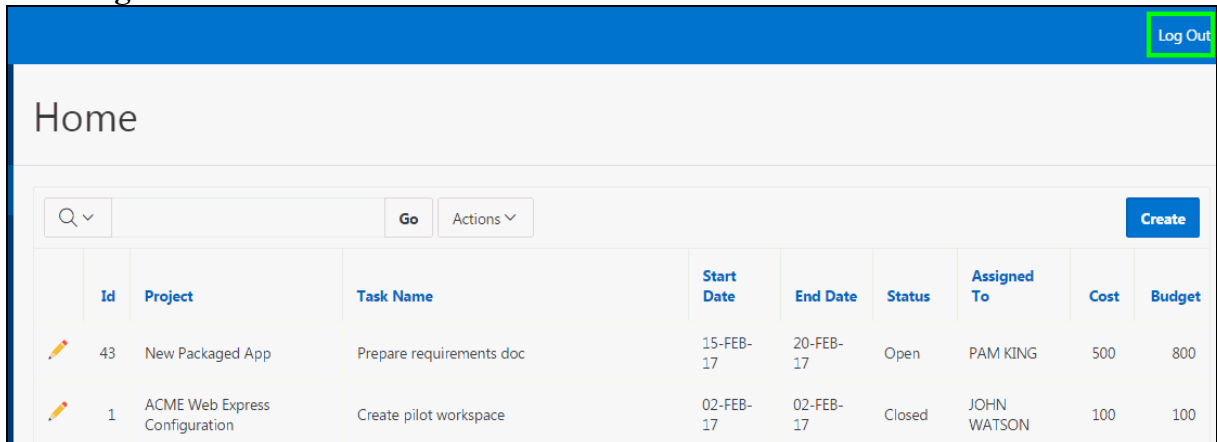
Technical Info (only visible for developers)

1. is_internal_error: true
2. apex_error_code:
APEX.AUTHORIZATION.ACCESS_DENIED
3. component.type:
APEX_APPLICATION_AUTHORIZATION
4. component.id: 23350563726711777
5. component.name: access control - administrator
6. error_backtrace:

```
----- PL/SQL Call Stack -----
  object      line  object
  handle      number name
000007FF854D6D38      935 package body APEX_050100.WWV_FLOW_ERROR
000007FF854D6D38     1003 package body APEX_050100.WWV_FLOW_ERROR
000007FF854D6D38     1395 package body APEX_050100.WWV_FLOW_ERROR
000007FF8589E060       796 package body APEX_050100.WWV_FLOW_AUTHORIZATION
000007FF8AAFFFC8     4630 package body APEX_050100.WWV_FLOW
000007FF854AA5D0       173 procedure APEX_050100.F
000007FF823AA0E8        35 anonymous block
```

OK

33. Click **Logout**.



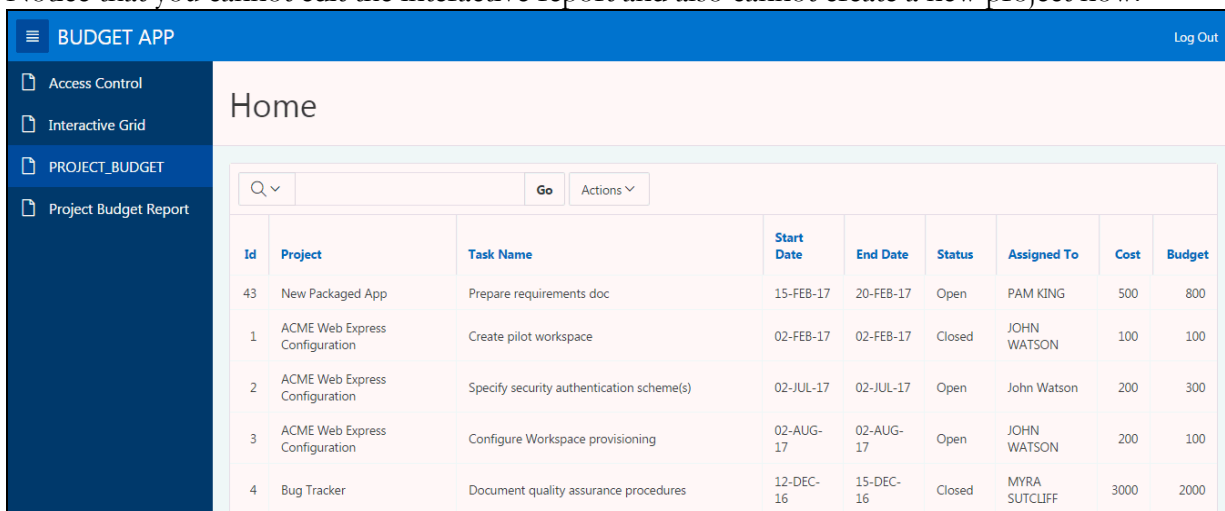
Home

Search: Go Actions

	Id	Project	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget
	43	New Packaged App	Prepare requirements doc	15-FEB-17	20-FEB-17	Open	PAM KING	500	800
	1	ACME Web Express Configuration	Create pilot workspace	02-FEB-17	02-FEB-17	Closed	JOHN WATSON	100	100

34. Now log in by entering **apex_user** for Username and **apexuser** for password.

35. Notice that you cannot edit the interactive report and also cannot create a new project now.



BUDGET APP Log Out

Home

Search: Go Actions

	Id	Project	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget
	43	New Packaged App	Prepare requirements doc	15-FEB-17	20-FEB-17	Open	PAM KING	500	800
	1	ACME Web Express Configuration	Create pilot workspace	02-FEB-17	02-FEB-17	Closed	JOHN WATSON	100	100
	2	ACME Web Express Configuration	Specify security authentication scheme(s)	02-JUL-17	02-JUL-17	Open	John Watson	200	300
	3	ACME Web Express Configuration	Configure Workspace provisioning	02-AUG-17	02-AUG-17	Open	JOHN WATSON	200	100
	4	Bug Tracker	Document quality assurance procedures	12-DEC-16	15-DEC-16	Closed	MYRA SUTCLIFF	3000	2000


36. Now, in your browser, change the page number in the URL to try to access the Project Budget form page. The Project Budget form is Page 2.

For example, if your URL is <http://<hostname>:8080/apex/f?p=106:1>, then change it to <http://<hostname>:8080/apex/f?p=106:2>

Press the **<Enter>** key.

37. Notice that you receive an error as the form page can be accessed only if you have either the Edit or the Administrator privilege.

Project Budget



No privilege for attempted action.

Access denied by Page security check

Technical Info (only visible for developers)

1. is_internal_error: true
2. apex_error_code: APEX.AUTHORIZATION.ACCESS_DENIED
3. component.type: APEX_APPLICATION_AUTHORIZATION
4. component.id: 23350722842711777
5. component.name: access control - edit
6. error_backtrace:

```

----- PL/SQL Call Stack -----
  object      line object
  handle      number name
000007FF854D6D38      935 package body APEX_050100.MWV_FLOW_ERROR
000007FF854D6D38     1003 package body APEX_050100.MWV_FLOW_ERROR
000007FF854D6D38     1395 package body APEX_050100.MWV_FLOW_ERROR
000007FF8589E060       796 package body APEX_050100.MWV_FLOW_AUTHORIZATION
000007FF8AAFFFC8     4630 package body APEX_050100.MWV_FLOW
000007FF854AA5D0       173 procedure APEX_050100.F
000007FF821680D0        35 anonymous block

```

Click **OK**.

Then, click **Logout**.

38. Now log in by entering **apex_admin** for Username and **apexadmin** for password.
39. Notice that you can now edit the interactive report, and also create a project. In the navigation menu, click **Access Control**.

The screenshot shows the 'Home' page of the 'BUDGET APP'. A sidebar on the left contains navigation items: 'Access Control' (highlighted with a green box), 'Interactive Grid', 'PROJECT_BUDGET', and 'Project Budget Report'. The main content area features a search bar and a table of tasks.

	Id	Project	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget
	43	New Packaged App	Prepare requirements doc	15-FEB-17	20-FEB-17	Open	PAM KING	500	800
	1	ACME Web Express Configuration	Create pilot workspace	02-FEB-17	02-FEB-17	Closed	JOHN WATSON	100	100
	2	ACME Web Express Configuration	Specify security authentication scheme(s)	02-JUL-17	02-JUL-17	Open	John Watson	200	300
	3	ACME Web Express Configuration	Configure Workspace provisioning	02-AUG-17	02-AUG-17	Open	JOHN WATSON	200	100
	4	Bug Tracker	Document quality assurance procedures	12-DEC-16	15-DEC-16	Closed	MYRA SUTCLIFF	3000	2000

40. As you have the Administrator privilege, you can access the Access Control Administration page.

In the Developer Toolbar, click **Application<n>**.

The screenshot shows the 'Access Control Administration' page within the 'BUDGET APP'. The sidebar on the left has 'Access Control' highlighted with a green box. The main content area is titled 'Application Administration' and includes the following sections:

- Application Mode:** Four radio buttons are present:
 - Full access to all, access control list not used.
 - Restricted access. Only users defined in the access control list are allowed.** (Selected)
 - Public read only. Edit and administrative privileges controlled by access control list.
 - Administrative access only.
- Access Control List:** A section with a search bar and a table of users.

Identify usernames which correspond to this application's authentication scheme.

Find

<input type="checkbox"/>	Username ↑	Privilege	Last Changed By	Date
<input type="checkbox"/>	apex_admin	Administrator	chaitanya	53 minutes ago
<input type="checkbox"/>	apex_dev	Edit	chaitanya	53 minutes ago
<input type="checkbox"/>	apex_user	View	chaitanya	53 minutes ago
<input type="checkbox"/>	chaitanya	Administrator	chaitanya	53 minutes ago

1 - 4

At the bottom of the page, the Developer Toolbar is visible, with 'Application 106' highlighted in green. Other toolbar items include Home, Edit Page 15, Session, View Debug, Debug, Show Layout Columns, Quick Edit, Theme Roller, and Apply Changes.



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