

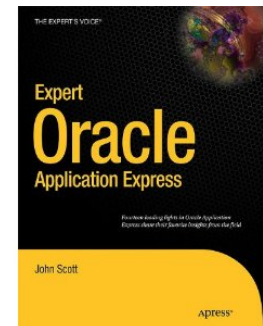
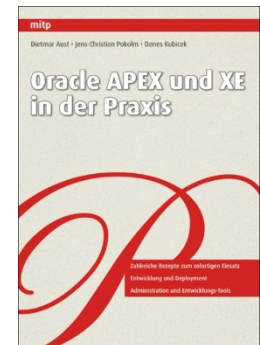


A Spotlight on the Smaller Features of Oracle Application Express 5.0

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- ▶ Building Oracle based Web Applications since 1997
 - Portal, Forms, Reports, OWA Toolkit, now APEX!
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 - Master's Degree in Computer Science (MSCS)
- ▶ 1997-2000: Consultant at Oracle Germany
- ▶ Since 09/2000: Freelance Consultant, Since 2006 – APEX only!
- ▶ Blog: <http://daust.blogspot.com/>
- ▶ Regular presenter at Oracle conferences (ODTUG, DOAG, OOW)
- ▶ Author of the JasperReportsIntegration toolkit
 - <http://www.opal-consulting.de/tools>



Which Features To Talk About?

APEX 5 New Features

Marquee Features of Oracle APEX 5.0

► Marquee Features of Oracle APEX 5.0:

- Page Designer
- Multiple Interactive Reports
- Modal Dialogs
- Navigation Lists
- Enhanced Mobile Support
- Enhanced Calendar Support
- Universal Theme
- HTML5 Capabilities
- Application Builder Security

► Numerous functional improvements.

APEX 5 New Features

List of available new features

- List of new features for Oracle APEX 5.0:
<https://apex.oracle.com/pls/apex/f?p=65339:1:0>

Oracle Application Express 5.0 Early Adopter Feature Descriptions

Logout

Features
Known Issues

Hierarchical View Flat View

Features
APEX 5.0 Early Adopter
Page Designer
Universal Theme
Interactive Reports
Modal Pages
Navigation Lists
Mobile
Calendars
Packaged Applications
File Handling
Worksheets

HIERARCHICAL VIEW - Marquee Feature:
 Go Reports 1. Primary Report Actions

Feature	Available	Summary	Lvl
(+) APEX 5.0 Early Adopter	EA1		1
... (+) 3rd Party Libraries	EA1	Upgrades, and new third-party components incorporated into the Application Builder	2
... (+) APEX 5.0 Other Features	EA1	Other features introduced in Application Express 5.0	2
... (+) Calendars	EA1	Completely new calendar component that allows displaying date entries in a monthly, weekly, daily and list view. This new calendar supports desktop and mobile applications, editing of date entries in a modal dialog and re-scheduling of events via drag & drop. The calendar look and feel can be customizable via CSS and uses responsive design. Date entries are also available for export in CSV, iCal, PDF and XML format.	2

What is possible =>
Samples!

APEX 5 New Features

List of available new features

► Packaged Applications => Lots of samples

Sample Database Application

Track and Manage Customers, Orders and Products

Search customers, orders & products

Dashboard

\$3,565
Monthly Sales

10
Total Products

Top Customers

Bradley, Eugene	\$2,760.00
Logan, Edward	\$2,420.00

Customer Details


Number of Orders	2
Address	Schoephoester Road
City	Windsor Locks
State	CT
Postal Code	06096
Email	
Phone Number	860-555-1835
Credit Limit	1000
Tags	REPEAT CUSTOMER

Bag - 16 x \$1,25


	\$2,700.00
	\$2,000.00


APEX 5 New Features


List of available new features


 Sample Dynamic Actions


Help dietmar.aust


 Home


 Simple

 Style

 Server Side

 Complex

 Administration



Sample Dynamic Actions

Add interactivity to your applications with dynamic actions

This application demonstrates many of the native dynamic actions that ship with Application Express and also a number of plug-in dynamic actions. Each page containing the dynamic action will have an 'Information' region on the top, explaining the purpose of the dynamic action and a breakdown of which are used and whether they are native or plug-in.

Debugging dynamic actions in Application Express is slightly different than other debugging, because much of the processing done with the dynamic action framework is done on the client, not on the server. In order to debug dynamic actions, we output debug information when running in 'Debug' mode to the browser's JavaScript console, if your browser supports it (for example Firefox with Firebug installed will show the debug information in its Console pane). The debug information will tell you when a dynamic action fires, the name of the dynamic action and also specifically which action has fired. In this application, debugging has already been enabled at application level. If you're interested to see exactly when a dynamic action is firing, just switch this on and interact with the example pages.

Please click on any of the examples to get started.

Disable/E...	Hide/Show	Add/Rem... Class (Error)	Add/Rem... Class (Focus)
Disable and enable items automatically	Declaratively hide and show items based on	Using the Add and Remove Class actions	Using the Add and Remove Class actions

APEX 5 New Features

List of available new features

The screenshot shows the Oracle APEX 5 Sample Reporting application. The interface has a blue header bar with a hamburger menu icon, the text "Sample Reporting", and links for "Help" and a user profile "dietmar.aust". A dark blue sidebar on the left contains a list of navigation items: "Sample Reports", "Use Cases", "SQL Examples", "Analytic Functions", and "Administration", each with a corresponding icon and a dropdown arrow. The main content area has a light blue header with a grid icon and the title "Sample Reporting", followed by the subtitle "Demonstration of reports and reporting techniques in Oracle APEX". Below this is a paragraph of introductory text. The main content is organized into a 2x3 grid of white boxes, each with a colored header bar and a description of a feature.

Interactive Report	Classic Report	Sidebar Filter Report
Reports which enable customization by the end user	Tabular data which can be filtered by page item values	Classic report with a sidebar "e-commerce" filter
Use Cases	SQL Examples	Analytic Functions
Demonstrations of advanced APEX report techniques	Demonstrations of advanced SQL techniques	Demonstrations of various analytic functions available in Oracle SQL.

APEX 5 New Features

List of available new features


► Universal Theme Sample Application

APEX 5.0 Universal Theme


Components

Built-in building blocks for your apps


Browse through the various APEX components that are part of Universal Theme. Each component type contains several individual templates which can be easily customized using Template Options.




Pages



Regions



Lists



Reports

Changes to the APEX IDE

Changes to the APEX IDE Workspace Login / Flexible Authentication






Use a different authentication scheme to log into the Development Environment.

► Why?

- Customers require to authenticate against the central user repository, typically an external SSO Server or LDAP directory

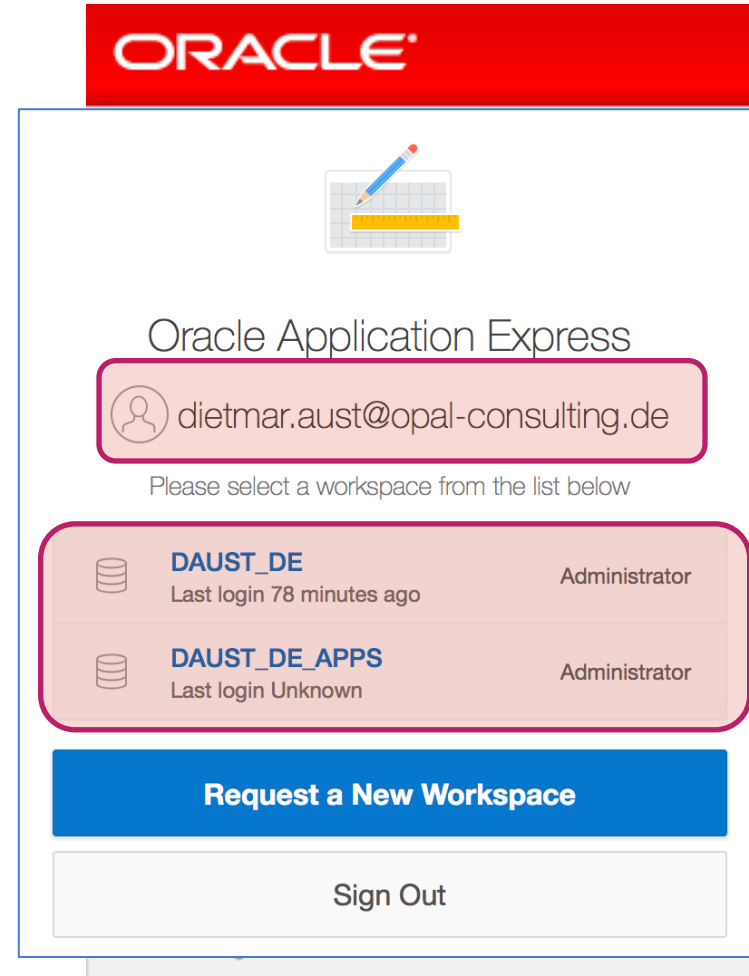
► How does it work?

- This can be configured in the INTERNAL Administration: Manage Instance > Security

Development Environment Authentication Schemes			
	Name	Description	Status
	Application Express Accounts	This is the default authentication scheme. It authenticates users against the workspace user repository.	Current
	Database Accounts	This scheme utilizes database credentials. The user name and password of the database account is used to authenticate the user.	Not Current
	HTTP Header Variable	This scheme relies on a HTTP header variable to contain the username and on an external login method to log in. Application Express presents the available workspaces for the user.	Not Current
	LDAP Directory	This scheme checks credentials against an LDAP repository.	Not Current
	Oracle Application Server Single Sign-On	This scheme authenticates developers with Oracle Single Sign-On, using SSO's external login page. After authentication Application Express presents the available workspaces for the user.	Not Current

Changes to the APEX IDE Workspace Login / Flexible Authentication

- Display a list of available workspaces for the following authentication schemes
 - HTTP Header Variable
 - Oracle Single Sign On Server





The screenshot shows the Oracle Application Express login page. At the top is a red banner with the "ORACLE" logo. Below it is a white box containing a grid icon with a pencil and a yellow bar. The text "Oracle Application Express" is displayed. A login field shows the email "dietmar.aust@opal-consulting.de" with a user icon. Below the login field, it says "Please select a workspace from the list below". There is a list of two workspaces: "DAUST_DE" with a database icon, "Last login 78 minutes ago", and "Administrator" role; and "DAUST_DE_APPS" with a database icon, "Last login Unknown", and "Administrator" role. At the bottom of the list is a blue button labeled "Request a New Workspace". Below that is a light gray button labeled "Sign Out".

ORACLE

Oracle Application Express

dietmar.aust@opal-consulting.de

Please select a workspace from the list below

	DAUST_DE Last login 78 minutes ago	Administrator
	DAUST_DE_APPS Last login Unknown	Administrator

Request a New Workspace

Sign Out

Changes to the APEX IDE Workspace Login / Flexible Authentication

- ▶ After upgrading to APEX 5.0 the status quo remains, **this feature has to be activated explicitly!**
- ▶ When upgrading APEX instances there is work to be done **BEFORE** we can activate the external authentication
- ▶ Translate all user accounts to a corresponding entity in your SSO system:

DIETMAR

DIETMAR.AUST

ADMIN (WS TEST)

ADMIN (WS INTERNAL)

=> DIETMAR.AUST@OPAL-CONSULTING.DE

=> DIETMAR.AUST@OPAL-CONSULTING.DE

=> DIETMAR.AUST@OPAL-CONSULTING.DE

=> DIETMAR.AUST@OPAL-CONSULTING.DE

- ▶ **Option 1:** Change the existing accounts (rename) either manually or via script:

```
BEGIN
  APEX_UTIL.SET_USERNAME(
    p_userid      => APEX_UTIL.GET_USER_ID('DIETMAR'),
    P_username    => 'DIETMAR.AUST@OPAL-CONSULTING.DE');
END;
```

Changes to the APEX IDE Workspace Login / Flexible Authentication

- ▶ **Option 2:** Create additional users, e.g. DIETMAR.AUST@OPAL-CONSULTING.DE
 - The users ADMIN, DIETMAR and DIETMAR.AUST will no longer be able to log into the workspace because they don't exist in the SSO server.
 - But they can still be used for your application and for the websheets.
- ▶ **Possible issues when the workspace users are used in your own applications:**
 - Applications which use the authentication scheme "Application Express Accounts":
 - Privileges and Auditing information reference the "old" username:
 - User "DIETMAR.AUST" has assigned the role ACCOUNT_MANAGER
 - Rows were updated by the user "DIETMAR.AUST" (LAST_UPDATED_FROM)
 - Websheets, where you use explicit privileges for CONTRIBUTOR, READ, ADMINISTRATOR

Changes to the APEX IDE Workspace Login / Flexible Authentication

- ▶ When we use the external authentication, the locally created workspace user doesn't have a password.
- ▶ Thus you have to set your password manually before you can use the Application Express Accounts in your applications.

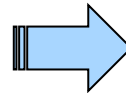
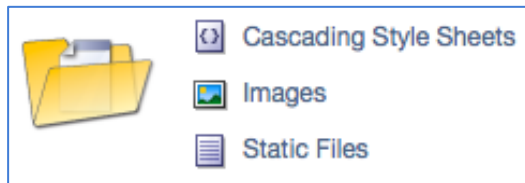
Changes to the APEX IDE

Improved File Storage

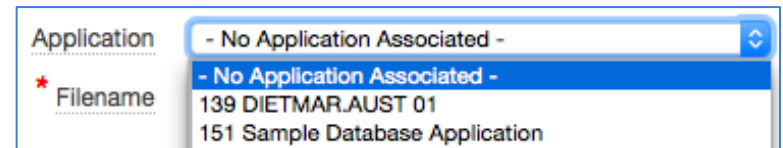
The storage of files in the application builder has been completely overhauled.

► Why?

► Too many different file types:



Assigned to either Workspace or Application

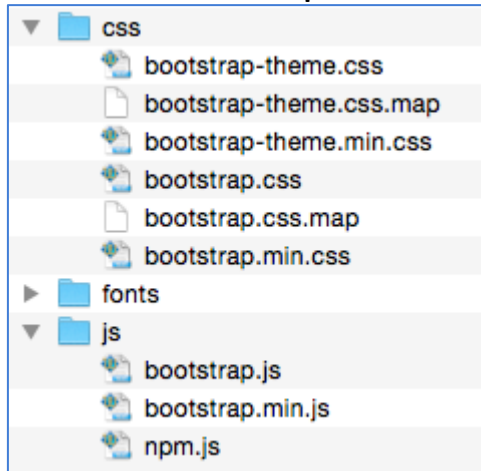


- Reference via
 - #WORKSPACE_IMAGES#
 - #APP_IMAGES#

Changes to the APEX IDE

Improved File Storage

► No relative file paths available

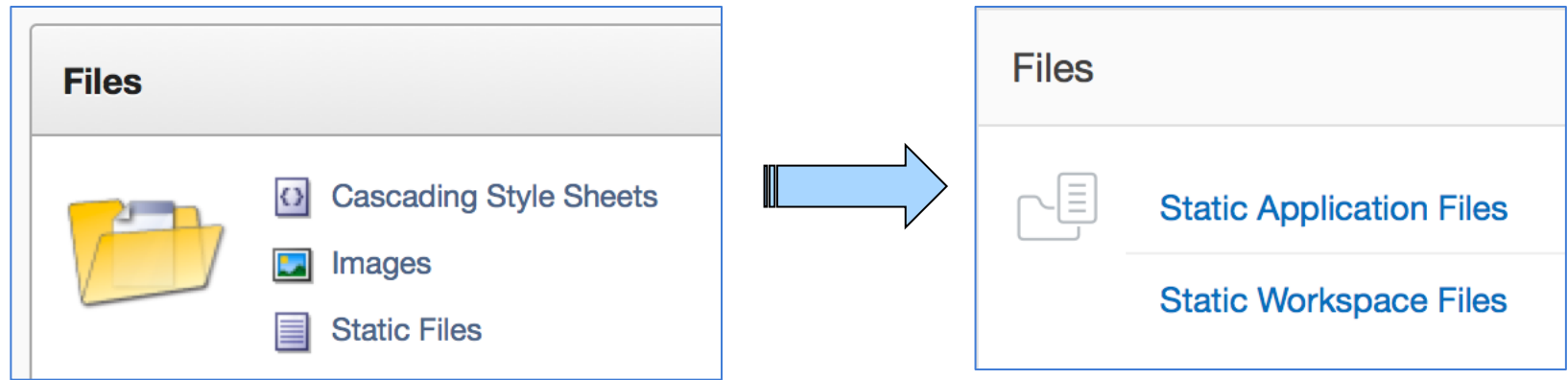


#WORKSPACE_IMAGES#grey-bg.png
#WORKSPACE_IMAGES#tbd-glyphicons-halflings-white.png
#WORKSPACE_IMAGES#tbd-glyphicons-halflings.png
#WORKSPACE_IMAGES#tbd.app.css
#WORKSPACE_IMAGES#tbd.bootstrap-responsive.min.css

- All files had to be uploaded individually by a manual procedure
- Updating many files was a pain
- Moving the files to a different instance was cumbersome
- Performance!

Changes to the APEX IDE Improved File Storage

The storage of files in the workspace has been unified:



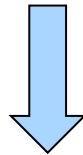
<input type="text" value="Q v"/>	<input type="button" value="Go"/>	<input type="button" value="List View"/>	<input type="button" value="Actions v"/>	<input type="button" value="Reset"/>	<input type="button" value="Delete All Files"/>	<input type="button" value="Download as Zip"/>	<input type="button" value="Upload File >"/>
Name	Size	Reference					
bootstrap-3.3.4-dist/css/bootstrap-theme.css	22KB	#WORKSPACE_IMAGES#bootstrap-3.3.4-dist/css/bootstrap-theme.css					
bootstrap-3.3.4-dist/css/bootstrap-theme.css.map	42KB	#WORKSPACE_IMAGES#bootstrap-3.3.4-dist/css/bootstrap-theme.css.map					
bootstrap-3.3.4-dist/css/bootstrap-theme.min.css	19KB	#WORKSPACE_IMAGES#bootstrap-3.3.4-dist/css/bootstrap-theme.min.css					

Changes to the APEX IDE

Improved File Storage

- At runtime the references will be translated:

#APP_IMAGES#readme.txt



daust_de/r/467/files/static/v6/readme.txt

- Once the files are changed (by uploading them again) a new url (containing a new version number) is generated and invalidates the browser cache.

daust_de/r/467/files/static/v7/readme.txt

- Caching of 10 years

Changes to the APEX IDE

Improved File Storage

► Mechanism works with:

- Oracle Rest Data Services
- OHS / mod_plsql
- Embedded PL/SQL Gateway

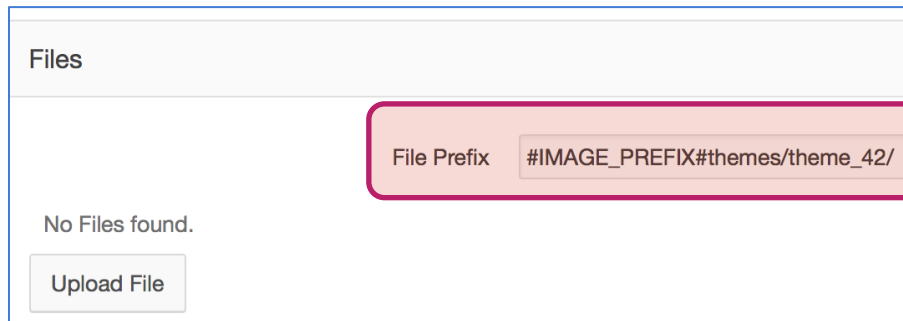
► Mechanism is available for (and their substitution variables)

- Static Application files `#APP_IMAGES#`
- Static Workspace files `#WORKSPACE_IMAGES#`
- Theme files `#THEME_IMAGES#`
- Plugin files `p_plugin.file_prefix` or `#PLUGIN_FILES#`

Changes to the APEX IDE Improved File Storage

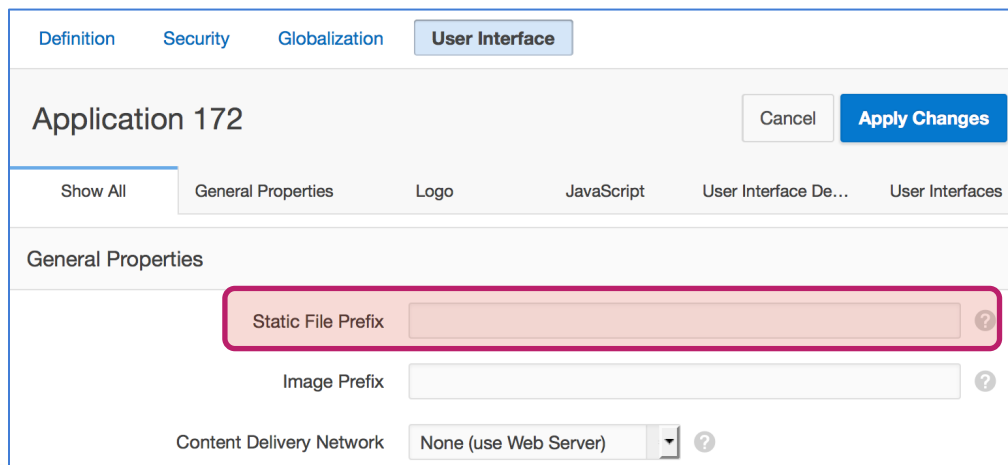
- For even increased performance (or a simplified development lifecycle) the files can be moved to the filesystem:

- Theme static files



The screenshot shows the 'Files' section of the APEX IDE. It contains a text input field labeled 'File Prefix' with the value '#IMAGE_PREFIX#themes/theme_42/'. Below the input field, it says 'No Files found.' and there is an 'Upload File' button.

- Application static files



The screenshot shows the 'User Interface' section of the APEX IDE for 'Application 172'. It has tabs for 'Definition', 'Security', 'Globalization', and 'User Interface'. The 'User Interface' tab is selected. Below the tabs, there are buttons for 'Cancel' and 'Apply Changes'. The 'General Properties' tab is selected, showing a 'Static File Prefix' input field, an 'Image Prefix' input field, and a 'Content Delivery Network' dropdown menu set to 'None (use Web Server)'. The 'Static File Prefix' field is highlighted with a red box.

Changes to the APEX IDE Improved File Storage

- Plugin static files:

Files Upload File

File Prefix ?

No Files found.

- ▶ The reference to the file will NOT change: #THEME_IMAGES#
 - => **NO change** in your application code is required!

Changes to the APEX IDE

Improved File Storage – Change to the Application Export File

- ▶ You cannot export the Application Static Files any more:

* File Type:

- ☒ **Database Application, Page or Component Export**
- ☐ Worksheet Application Export
- ☐ Plug-in
- ☐ Theme Export
- ☐ User Interface Defaults
- ☐ Team Development Feedback
- ☐ CSS Export [Deprecated]
- ☐ Image Export [Deprecated]
- ☐ File Export [Deprecated]

- ▶ The Application Static Files are now ALWAYS automatically a part of the application export **!!! This is a huge win!!!**
 - Shipping logos, user documentation (pdfs) or additional CSS files together with the application

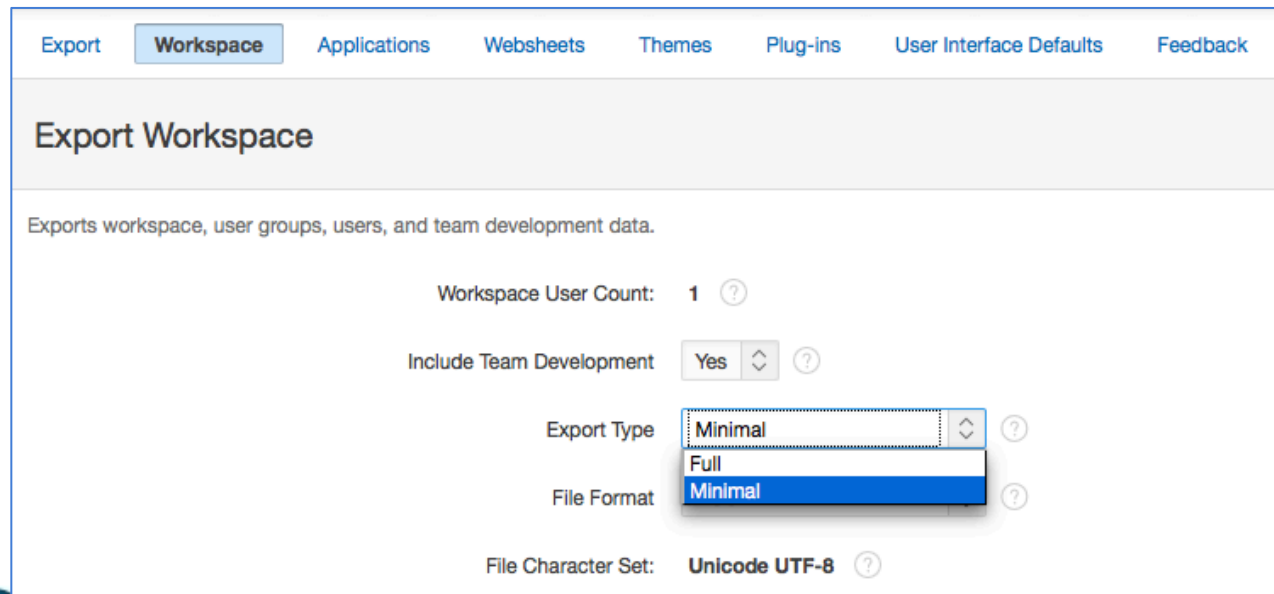
Changes to the APEX IDE

Improved File Storage – Change to the Application Export File

- ▶ The Workspace Static Files are part of the workspace export (or will be ;)

Export **Workspace** Application Worksheet Themes Plug-ins Defaults Feedback

- ▶ You can select the mode in the export dialog:
 - Minimal: The same as before
 - Full: Everything



Export **Workspace** Applications Worksheets Themes Plug-ins User Interface Defaults Feedback

Export Workspace

Exports workspace, user groups, users, and team development data.

Workspace User Count: 1 ?

Include Team Development: Yes ?

Export Type: Minimal ?
Full
Minimal

File Format: Minimal ?

File Character Set: Unicode UTF-8 ?

Changes to the APEX IDE

Improved File Storage – Change to the Application Export File

- ▶ The FULL workspace export now contains EVERYTHING (with the exception of applications and websheets)
 - -- W O R K S P A C E
 - -- G R O U P S
 - -- U S E R S
 - --Application Builder Preferences
 - --Click Count Logs
 - --csv data loading
 - --mail
 - --mail log
 - --app models
 - --password history
 - --preferences
 - --query builder
 - --sql scripts
 - --workspace static files
 - --sql workshop history
 - Restful service definitions, ...
- ▶ Why? Used for the Oracle Cloud to move workspaces do a different instance transparent to the user.
- ▶ Export of the workspace static files using APEXExport command line utility in the apex/utilities directory (see the Readme.txt file there):

```
java oracle.apex.APEXExport -db localhost:1521:xe -user test  
-password <pwdTest> -workspaceid 2614526486790575 -expFiles
```

Changes to the APEX IDE

Application Export – Command line install supporting objects

Install supporting objects automatically on the command line.

► Why?

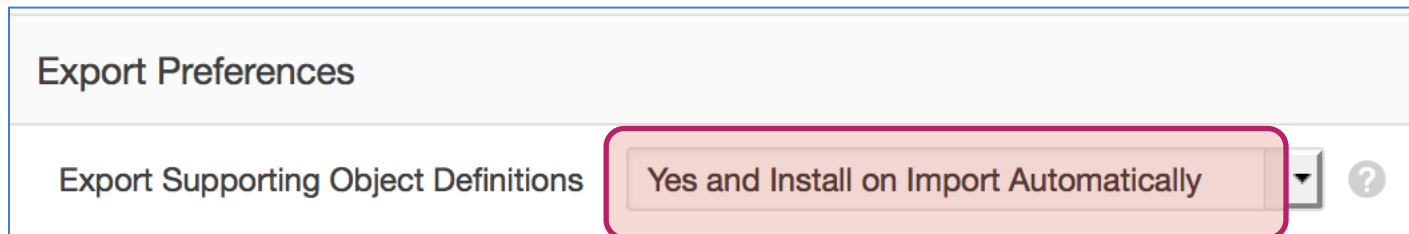
- Currently it is NOT possible to install supporting objects on the command line (install on Runtime Only environment **impossible**)



Supporting Objects

► How is it implemented?

- Added a new option in the export dialog: Export Preferences > Export Supporting Object Definitions:



- This will generate a changed export application file:

```
wwv_flow_api.import_end(p_auto_install_sup_obj => true);
```

Changes to the APEX IDE

Application Export – Optimized Application Export File Format

The export application file has been optimized.

► Smaller size, faster to install

► Option to export using the Original IDs

Export with Original IDs

No



- Better support for using file differencing tools to show the actual differences between files.
- Better suited for version control systems

Changes to the APEX IDE

Improved File Storage – Concatenated Files

Concatenated files in the user interface section, this is a runtime replacement of file urls to consolidate multiple single files into a consolidated one at runtime.

► Why?


- Performance vs. modular development:
- During development, you want to use multiple CSS, JS files
- In production you want to include just a single minified file

► How does it work?

- We can reference external files in our application (application level, page level)
- In the **user interface details** section we can specify **multiple** concatenated files:

Concatenated Files

Create Concatenated File >

File URL 	Only for Page	Build Option
#APP_IMAGES#js/all#MIN#.js?version=#APP_VERSION#	-	

1 - 1



Changes to the APEX IDE

Improved File Storage – Concatenated Files

► Concatenated file definition:

* Concatenated File URL `#APP_IMAGES#js/all#MIN#.js?version=#APP_VERSION#`

* Single File URLs `#APP_IMAGES#js/core#MIN_DIRECTORY#.js?version=#APP_VERSION#`
`#APP_IMAGES#js/search.widget#MIN#.js?version=#APP_VERSION#`
`#APP_IMAGES#js/profile.widget#MIN#.js?version=#APP_VERSION#`

Only for Page ^ ?

Build Option ?

► Each occurrence of a single file url will be replaced with the concatenated file (only once per page rendering)

```
src="test/r/101/files/static/v1/js/all.min.js?version=5.0.1"></script>
```

Changes to the APEX IDE

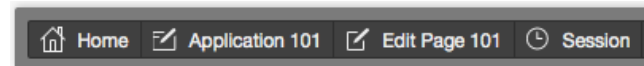
Improved File Storage – Concatenated Files

► Placeholders:

- **#MIN#** => .min
- **#MIN_DIRECTORY#** => minified/

► When we run the application while logged into the development environment:

1. Concatenated URLs **will not be replaced**
2. **#MIN#** and **#MIN_DIRECTORY#** => **NULL**



```
src="test/r/101/files/static/v1/js/core.js?version=5.0.1"></script>
src="test/r/101/files/static/v1/js/search.widget.js?version=5.0.1"></script>
src="test/r/101/files/static/v1/js/profile.widget.js?version=5.0.1"></script>
```

Changes to the APEX IDE

Subscription of themes

Themes and templates can be subscribed on a theme level now, even themes from the Theme Repository

► Why?

- Previously only individual templates could be subscribed to, now whole themes including all templates => ease of use
- Now templates can be updated safely (bug fixes, other improvements)

► How does it work?

- When subscribing, all templates are READONLY
- => Bugs can be fixed in patchsets or later releases because the theme clearly was not modified!

Theme Subscription

Verify

Unsubscribe

Refresh Theme

Subscribed to Standard Theme : **Universal Theme**




No themes subscribe to this theme.

Changes to the APEX IDE

View Subscription Easily

► See subscribed masters of elements:

- Plugins, LOVs, Themes, Authentication Schemes, Authorization Schemes, ...

Themes Reports History						
Q v		Go	 	Actions v		
Number 	Name	User Interface	Is Current	Subscribed From	Subscribers	Templates
42	Universal Theme - 42 *	Desktop	✓	Theme Repository		52
199	Scarlet - 199	Desktop		20150318		93

Changes to the APEX IDE

Application – Level CSS Files

Add application specific CSS files to the user interface which is NOT part of the theme.

► Why?

- Clean separation of concerns (themes were never truly generic)
 - a theme should be generic for all applications,
 - application specific styles should NOT be part of the theme

► How?

- New section in the Application Attributes > User Interface section

► The application specific Javascript section was moved to the User Interface defaults as well

► Used with the readonly subscription of themes this is really clean and themes can now be truly generic

Changes to the APEX IDE

User Interface Details

[Cancel](#)[Delete](#)[Apply Changes](#)[Show All](#)[Identification](#)[Attributes](#)[User Navigation Menu](#)[Navigation Bar](#)[JavaScript](#)[Cascading Styl...](#)[Concatenated ...](#)

JavaScript

Content Delivery Network

None (use Web Server)



File URLs

```
#APP_IMAGES#js/core#MIN#.js?version=#APP_VERSION#  
#APP_IMAGES#js/search.widget#MIN#.js?version=#APP_VERSION#  
#APP_IMAGES#js/profile.widget#MIN_DIRECTORY#.js?version=#APP_VERSION#
```



Include Legacy Javascript

No



Include jQuery Migrate

No



Cascading Style Sheets

File URLs



Concatenated Files

[Create Concatenated File >](#)

Changes to the APEX IDE

Session State Protection Enabled by Default

By default Session State Protection is enabled when creating new applications or new pages.

► Why?

- Improved security, now EVERY NEW application has session state protection enabled
- Now we cannot forget to add session state to the application or newly created pages

Application Development / Runtime Engine

Application Development / Runtime Engine

Modal Pages

Pages can have a page mode to make them being run as a modal page.

► Why?

- Common user interface technique well known in native application.
- Good usability, because no additional navigation context is required.
- Provide a rich, “complex” UI composed of simple technical elements.

► How? Requirements?

- Theme 42 (Universal Theme), because there is the dialog initialization code

Dialog Initialization Code	<code>apex.navigation.dialog(#PAGE_URL#,{title:#TITLE#,height:#DIALOG_HEIGHT#,width:#DIALOG_WID</code>	?
Dialog Closure Code	<code>apex.navigation.dialog.close(#IS_MODAL#,#TARGET#);</code>	?
Dialog Cancel Code	<code>apex.navigation.dialog.cancel(#IS_MODAL#);</code>	?

- Note that options *Modal* and *Non-Modal Dialog* will only be available for selection where the current application theme contains a default *Dialog Page Template*. => **it will not work otherwise**

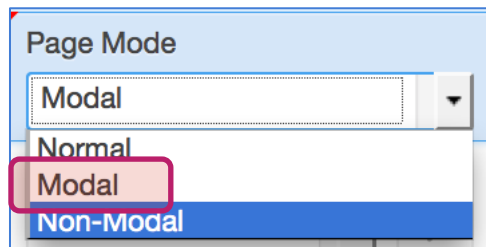
Application Development / Runtime Engine

Modal Pages

- ▶ Use Case #1: Simple Modal Page – the processing does not change
 - The target page is opened as a modal dialog
 - Regular ACCEPT / SHOW processing applies, **no partial page refresh**
 - Simplest integration

▶ Steps:

1. Set Page Mode of the target page to “Modal”



Application Development / Runtime Engine

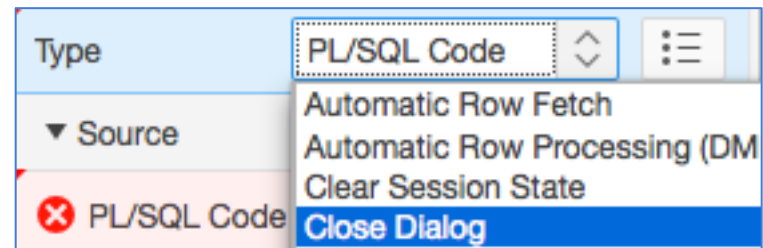
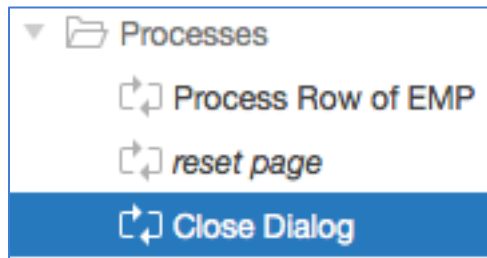
Modal Pages

► Use Case #2: Modal Page – **with partial page refresh**

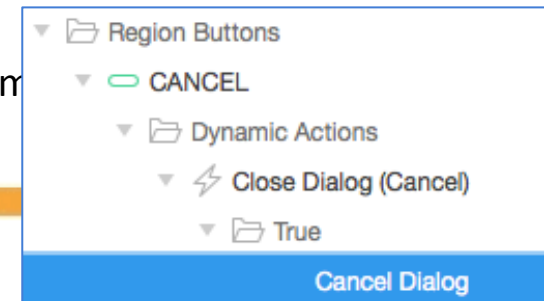
- The target page is opened as a modal dialog
- The dialog is closed
- The calling page processes the close event and refreshes a region

► Steps:

1. Target Page: Set Page Mode to “Modal”
2. Target Page: Add process “Close Dialog” without condition => Stops branching



3. Calling Page: Create Dynamic Action for the “Close Dialog” Event
4. Target Page: Cancel Button closes the page with a dynamic “Cancel Dialog”



Application Development / Runtime Engine

Modal Pages

► Use Case #3: Modal Page – **Return item values to the calling page**

- Return item values from the target page to the calling page

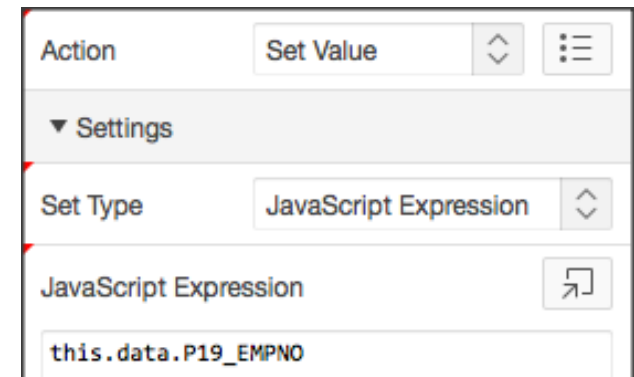
► Steps:

1. Target Page: Modify process “Close Dialog” and set the return items
2. Calling Page: Create Dynamic Action on “Dialog Closed” event
 - use Javascript to retrieve the value:
`this.data.P19_EMPNO`
 - Or use a dynamic action of type “Set Value”



▼ Settings

Items to Return: P19_EMPNO,P19_DEP ^

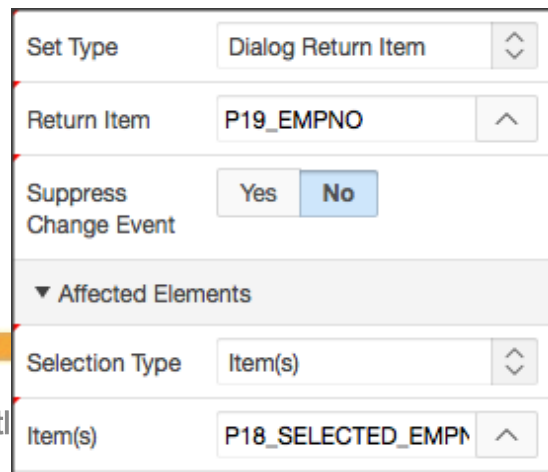


Action: Set Value ^ ☰

▼ Settings

Set Type: JavaScript Expression ^

JavaScript Expression: `this.data.P19_EMPNO` ↗



Set Type: Dialog Return Item ^

Return Item: P19_EMPNO ^

Suppress Change Event: Yes No

▼ Affected Elements

Selection Type: Item(s) ^

Item(s): P18_SELECTED_EMPNO ^

Application Development / Runtime Engine

Modal Pages

► Use Case #4: Modal Page – **Distinguish between Dialogs**

- We want to implement different Dynamic Actions on the calling page depending on the buttons we press.

► Steps:

1. Calling Page: Attach the Dynamic Action to the REGION “Employees”
 - This will catch all events created by the “Edit Link” and the “Create” button (all events will bubble upwards)
2. Calling Page: Attach the Dynamic Action to the button “Reset Data”

The screenshot displays an Oracle APEX application interface. A modal page titled "Employees" is open, showing a table with employee data. The table has columns: Employee, Job, Manager, Salary, and Department. The data rows are: ALLEN (SALESMAN, BLAKE, 1600, SALES), WARD (SALESMAN, BLAKE, 1250, SALES), MARTIN (SALESMAN, BLAKE, 1250, SALES), TURNER (SALESMAN, BLAKE, 1500, SALES), JAMES (CLERK, BLAKE, 950, SALES), and MILLER (CLERK, CLARK, 1300, ACCOUNTING). Above the table are search and action buttons. To the right of the modal page, there is a "Return Items" section with "Selected Employee" and "Selected Department" dropdowns. Below that is a "Reset Data" button and a "Last Reset On" text area.

	Employee	Job	Manager	Salary	Department
	ALLEN	SALESMAN	BLAKE	1600	SALES
	WARD	SALESMAN	BLAKE	1250	SALES
	MARTIN	SALESMAN	BLAKE	1250	SALES
	TURNER	SALESMAN	BLAKE	1500	SALES
	JAMES	CLERK	BLAKE	950	SALES
	MILLER	CLERK	CLARK	1300	ACCOUNTING

- ▶ Use Case #5: Create a link manually:

```
apex_util.prepare_url
```

Application Development / Runtime Engine

Session Joining

You can now join the current APEX application session in your browser.

► Why?

- When sending emails with links to your application in APEX 4.2 your current session gets killed.
 - You have to login again
 - The active session is invalidated

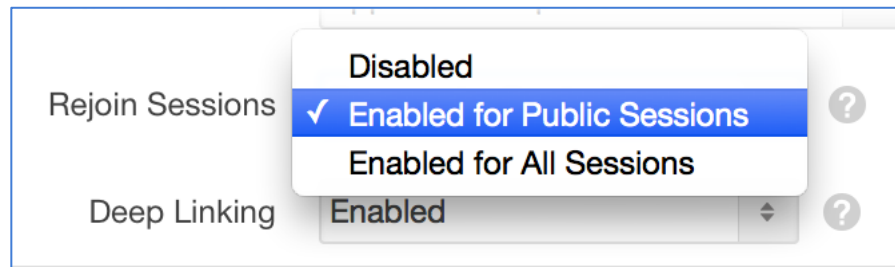
► How does it work?

- The session id is removed and the session is purely managed through the browser cookie.
- <http://apex.oracle.com:8080/ords/f?p=101:1:1234567890::NO::>
- =>
- <http://apex.oracle.com:8080/ords/f?p=101:1::NO::>

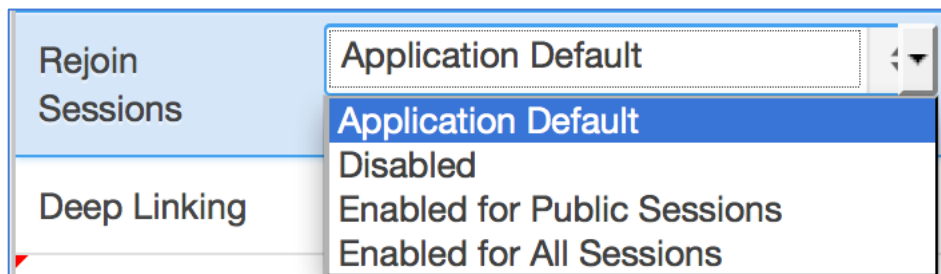
Application Development / Runtime Engine

Session Joining

- ▶ Can be disabled globally at the instance level.
- ▶ Can be controlled on application level



- ▶ and individual page level



Application Development / Runtime Engine

Session Joining

- ▶ Also, there are useful features in APEX 4.2 for sending out emails (configured in the instance settings):

`APEX_MAIL.GET_IMAGES_URL` return VARCHAR2;

`APEX_MAIL.GET_INSTANCE_URL` return VARCHAR2;

Email	
* Application Express Instance URL	<input type="text" value="http://vm1:8888/apex/"/>
* Application Express Images URL	<input type="text" value="http://vm1:8888/i/"/>
SMTP Host Address	<input type="text" value="localhost"/>
SMTP Host Port	<input type="text" value="25"/> ?

Application Development / Runtime Engine

Session context through SYS_CONTEXT

APEX session variables are now available through SYS_CONTEXT, to be used in Views, Packages and Triggers.

► Why?

- Make it consistent with other database information about the user
- Performance, more efficient compared to v('APP_USER'), v('APP_SESSION')

► How does it work?

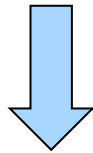
```
SELECT SYS_CONTEXT ('userenv', 'session_user') session_user,  
       SYS_CONTEXT ('userenv', 'current_user') parsing_schema,  
       SYS_CONTEXT ('APEX$SESSION', 'workspace_id') workspace_id,  
       SYS_CONTEXT ('APEX$SESSION', 'app_session') app_session,  
       SYS_CONTEXT ('APEX$SESSION', 'app_user') app_user  
FROM DUAL
```

Application Development / Runtime Engine

Session context through SYS_CONTEXT

- ▶ Typically used in Views and Triggers in the database for row level security and auditing of changes, e.g. in triggers to set :NEW.LAST_UPDATED_BY

`NVL(v('APP_USER'), USER)`



`COALESCE(SYS_CONTEXT('APEX$SESSION', 'app_user'), USER)`

- ▶ Using `v('APP_USER')` in Views CAN have negative performance impact:
 - <http://inside-apex.blogspot.com/2006/11/caution-when-using-plsql-functions-in.html>
- ▶ NVL always evaluates both arguments, while COALESCE stops evaluation whenever it finds first non-NULL

Application Development / Runtime Engine Improvement to Authorizations

New evaluation points for authorizations.

► Why?

- Implement a generic and user configurable approach to securing the app components

Evaluation Point

- Validate authorization scheme:
- ☒ Once per session
 - ☐ Once per page view
 - ☐ Once per component
 - ☐ Always (No Caching)

► New variables to be used in authorizations

- APP_COMPONENT_TYPE
- APP_COMPONENT_ID
- APP_COMPONENT_NAME

```
begin
  xlog('generic auth',
    'APP_PAGE_ID: ' || :app_page_id
    || '<br />APP_COMPONENT_TYPE: ' || :APP_COMPONENT_TYPE
    || '<br />APP_COMPONENT_ID: ' || :APP_COMPONENT_ID
    || '<br />APP_COMPONENT_NAME: ' || :APP_COMPONENT_NAME) ;
  return true;
end;
```

Application Development / Runtime Engine

Improved security with appropriate escaping

Extended substitution syntax where you define the escaping mode.

► Why?

- Protection against cross-site scripting attacks when using &P1_ITEM. references

► How to use it?

&P1_ITEM!HTML. -> apex_escape.html

&P1_ITEM!ATTR. -> apex_escape.html_attribute

&P1_ITEM!JS. -> apex_escape.js_literal(,null)

&P1_ITEM!RAW. -> unescaped

&P1_ITEM!STRIPHTML. -> strip tags, then apex_escape.html

Application Development / Runtime Engine

Improved security with appropriate escaping

- ▶ Demo
- ▶ Dynamic action using vulnerable Code: `alert("&P16_TEXT.");`
- ▶ Show regular use using the literal: `test`
- ▶ Show exploit using: `");alert("you got hacked!`
- ▶ Fixed Code: `alert("&P16_TEXT!JS.");`

Application Development / Runtime Engine

New Application Process Execution Point - After Login

New Application Process Execution Point - After Login

► Why?

- This is „On New Instance“ (new session) => done right ;)
- We need a process execution right after the user has been authenticated to initialize some variables for the application

► How does it work?

The screenshot shows the 'Process Point' dropdown menu in the Oracle APEX interface. The menu is open, displaying a list of execution points. The 'After Authentication' option is highlighted in blue. The list includes various options for when to execute a process, such as 'On Load: Before Header', 'On Load: After Header', 'On Load: Before "Body" Region(s)', 'On Load: After "Body" Region(s)', 'On Load: Before Footer', 'On Load: After Footer', 'On Submit: After Page Submission - Before Computations and Validations', 'On Submit: After Page Submission - After Computations and Validations', 'On New Instance (new session)', and 'On Demand: Run this application process when requested by a page process.'

Process Point
After Authentication
%
On Load: Before Header (page template header)
On Load: After Header (page template header)
On Load: Before "Body" Region(s)
On Load: After "Body" Region(s)
On Load: Before Footer (page template footer)
On Load: After Footer (page template footer)
On Submit: After Page Submission - Before Computations and Validations
On Submit: After Page Submission - After Computations and Validations
On New Instance (new session)
After Authentication
On Demand: Run this application process when requested by a page process.

Application Development / Runtime Engine

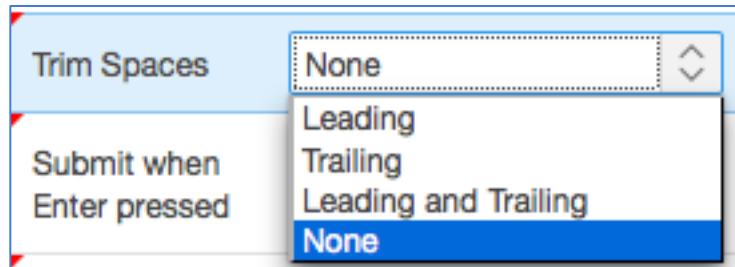
New Application Process Execution Point - After Login

"Trim Spaces" attribute to Textfield and Textarea Item Type

► Why?

- This feature is designed to avoid the need to create computation processes to remove unnecessary spaces from a text entry, as generally it is not desirable to store these extra spaces, tabs and new lines.
- In order to implement this we needed an additional computation or process (per page or on application level) to do that
 - => implementation overhead
 - => performance overhead

► How does it work?



Application Development / Runtime Engine

Lock Down Public APIs

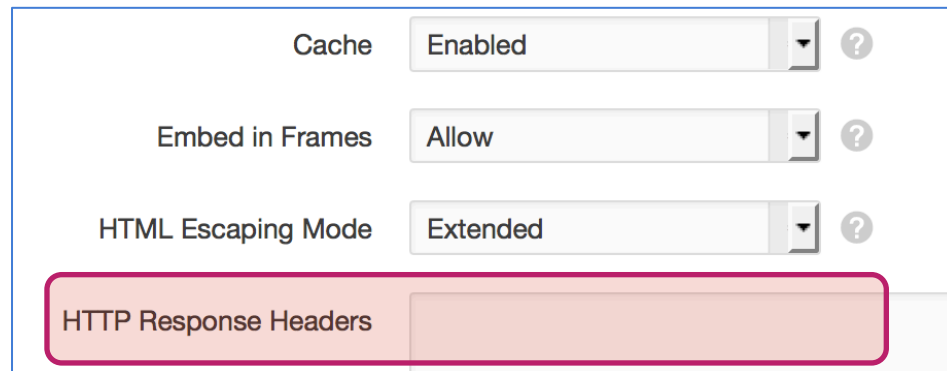
Support for sending additional HTTP Response Headers.

► Why?

- Being able to use specific browser security features which are not declaratively available through APEX

► How?

- Configuration setting the Application Properties > Security > Browser Security:



Cache	Enabled	?
Embed in Frames	Allow	?
HTML Escaping Mode	Extended	?
HTTP Response Headers		

- Sample:

X-XSS-Protection: 1; mode=block

X-Content-Type-Options: nosniff

Watch out – Upgrades and Deprecation

Deprecated Features

- ▶ Release Notes, Deprecated and Desupported Features:
 - https://docs.oracle.com/cd/E59726_01/doc.50/e39143/toc.htm#HTMRN198
- ▶ **If you used WWV_FLOW_FILES as a permanent store, the files should be copied into their own BLOB column(s) within a table within your schema.**
- ▶ Desupport of Building Applications for Microsoft Internet Explorer 6
- ▶ After the upgrade to APEX 5.0 the modal page plugin by Dan McGhan doesn't work any more, a fix is in the making

API - Packages

API Packages

APEX_JSON

▶ APEX_JSON

▶ Why?

- Generate and parse JSON programmatically
- apex_util.json_from_sql outputs using http.p directly, doesn't return string
- Cannot handle more complex structures and custom tags

▶ Functions:

- CLOSE_ALL
- CLOSE_ARRAY
- CLOSE_OBJECT
- DOES_EXIST
- FIND_PATHS_LIKE
- FLUSH

▶ Functions:

- GET_BOOLEAN
- GET_COUNT
- GET_DATE
- GET_MEMBERS
- GET_NUMBER
- GET_VALUE
- GET_VARCHAR2
- INITIALIZE_OUTPUT
- OPEN_ARRAY
- OPEN_OBJECT
- PARSE
- STRINGIFY
- TO_XMLTYPE
- WRITE

API Packages

APEX_ZIP

New Package APEX_ZIP to provide ZIP archive support. Based on the original package AS_ZIP by Anton Scheffer:

http://technology.amis.nl/wp-content/uploads/2010/06/as_zip8.txt

► APEX_ZIP

- ADD_FILE
- FINISH
- GET_FILE_CONTENT
- GET_FILES

API Packages

APEX_ZIP - Upload

```
DECLARE
    l_zip_file          BLOB;
    l_unzipped_file     BLOB;
    l_files              apex_zip.t_files;
BEGIN
    SELECT file_content
       INTO l_zip_file
    FROM my_zip_files
   WHERE file_name = :P13_file_name;

    l_files := apex_zip.get_files (p_zipped_blob => l_zip_file);

    FOR i IN 1 .. l_files.COUNT
    LOOP
        l_unzipped_file := apex_zip.get_file_content (p_zipped_blob  => l_zip_file,
                                                       p_file_name      => l_files (i));

        INSERT INTO my_files (file_name, file_content)
           VALUES (l_files (i), l_unzipped_file);
    END LOOP;
END;
```


API Packages

APEX_ZIP - Download

```
DECLARE
    l_zip_file    BLOB;
BEGIN
    FOR l_file IN (SELECT file_name, file_content FROM my_files)
    LOOP
        apex_zip.
            add_file (p_zipped_blob    => l_zip_file,
                    p_file_name       => l_file.file_name,
                    p_content         => l_file.file_content);
    END LOOP;

    apex_zip.finish (p_zipped_blob => l_zip_file);
END;
```

APEX Connect 2015

APEX

connect
by DOAG

Zwei Tage, nur ein Thema.

Konferenz für
9.+10.6.2015

APEX-Begeisterte.
Düsseldorf



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Q&A

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