Oracle APEX 18.1
Overview

May, 2018
Safe Harbor Statement

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Oracle APEX

Introduction
Oracle APEX
Database-centric web application development framework

Develop desktop and mobile web apps

Visualize and maintain database data

Leverage SQL Skills and database capabilities
Oracle APEX

Use Cases

- Developing opportunistic & self service web apps
- Extending enterprise application solutions
- Migrating file based and client server apps to the web
Oracle APEX

Distinguishing Characteristics

App Development IDE is a web browser.  
No client software needed

App definitions are stored in the database as meta data. 
Declarative – No code generation

Page generation is efficient with only one request and one response. 
Data processing done in the Database
Oracle APEX

No cost feature of the Oracle Database

• No-cost fully supported feature
  • Any number of apps, developers & end-users
  • Specialized Oracle Support Team
  • 11gR2, 12c, 18c
  • All DB editions: EE, SE, SE1, XE

• Included with Oracle Cloud Services
  • Schema Service
  • Exadata Express Service
  • Database as a Service
  • No cost evaluation [http://apex.oracle.com](http://apex.oracle.com)

• Easy to install
  • Included by default with all editions of Oracle database
  • Download latest release from [https://apex.oracle.com/otn](https://apex.oracle.com/otn)
Oracle APEX
Rapidly develop, customize, and deliver

Pre-built controls for security, authentication, database interaction, validation, session management and more...

Go from prototype to production in minutes

Develop

Customize

Deliver
Oracle APEX
Low Code Data First Application Development

START

Develop Database

Develop Application

Deploy

Database

App Builder

Test Application

Production Application

Existing

New

Existing

New

SQL

Wizard

Blueprint

Metrics & Feedback

Install & Upgrade

Export

Source Code Control

Database

Markdown

Model

SQL IDE

DML Script

Excel

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Oracle APEX

High productivity AppDev components on the no code to highly programmatic spectrum

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Oracle APEX components span the spectrum from no code to highly programmatic, with emphasis on high productivity for business users and more control for citizen developers.
Oracle APEX
3 Tier Architecture

Oracle REST Data Services
(Weblogic, Jetty, Tomcat)
No Application Logic
Converts HTTP to database API calls

Oracle Database
(Pluggable or Dedicated, 11g, 12c, 18c)
Zero latency database data access
Dynamically driven by APEX metadata

REST, SOAP
Schemas
APEX Engine
SQL & PL/SQL

Browser
Mid Tier
Database Tier
Data Sources

Utilize the Oracle Database / ORDS / Web Services

Remote Data Sources & Services

Local Data Source

Database Link

Enterprise Data Sources and Services

Oracle Database & APEX

HTTPS

REST, SOAP

JDBC

https://
Single Database Instance / Multiple Workspaces

Easily managed with optional self-service provisioning

- Workspaces used to define application definitions / Schemas hold data
- Many-to-many relationship between Workspaces and Schemas
- Instance Administrators manage the environment and schema access
- Departments can request more space, and access to a new schema
- For example, http://apex.oraclecorp.com has over 4,000 Workspaces for every line of business in Oracle
Development / Deployment Options

Local
- Install on stand-alone laptops using Oracle Express Edition (XE) or full database version
- Simply upgrade APEX to the required version
- Can work completely disconnected

On-Premise
- Typically run by the IT Department
- IT generally both production operations service, and a service provider
- Departments responsible for application development

Cloud
- Deploy Internet applications
- Leveraged for fast application development, user acceptance and training.
- Prototyping & Proof-of-Concept
- Consulting companies develop for deployment on customer premise

Browser based application development framework enables efficient development & deployment
Shoot someone a URL – Check this out – Application Development
# Oracle APEX History

<table>
<thead>
<tr>
<th>Version</th>
<th>Release Details</th>
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<td>1.5</td>
<td>HTML DB 1.5 - First Release</td>
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<td>1.6 – Themes</td>
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<td>Hosted free service apex.oracle.com</td>
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<tr>
<td>3.0</td>
<td>Flash Charts PDF Printing Access Migration Tabular Forms</td>
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<td>3.1</td>
<td>2008 Interactive Reports (IR)</td>
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<td>2016 Create App Wizard REST &amp; Remote SQL Oracle JET upgrade New REST Workshop</td>
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## Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
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<td>2004</td>
<td>SQL Workshop 2.0</td>
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<td>2005</td>
<td>2.1 - Oracle XE</td>
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*Oracle APEX*
Oracle APEX

Community

• Over 500,00 developers worldwide
  • Estimated from support requests, downloads, conferences, discussion forum activity

• More than 100 active bloggers
  http://odtug.com/apex

• http://apex.oracle.com/community
  Consulting companies, books, success stories, quotes, commercial apps
Oracle APEX

Community site built by the community for the community

http://apex.world

Community-authored site providing:

- Plug-ins
- Slack discussion channels
- Twitter feeds
- News
- Jobs
- Conferences
- Meetups
Oracle APEX

Internet Sites built with Oracle APEX

http://builtwithapex.com

- Showcases large diversity of types of applications and different themes
- Launched October, 2016
- > 130 sites published, more being added daily
Useful Links
Collateral, Resources and Hosted Services

• Free APEX Service
  [https://apex.oracle.com](https://apex.oracle.com)
• Oracle Technology Network
  [https://apex.oracle.com/otn](https://apex.oracle.com/otn)
• APEX Community
  [https://apex.oracle.com/community](https://apex.oracle.com/community)
• APEX & Low Code
  [https://apex.oracle.com/lowcode](https://apex.oracle.com/lowcode)
• Quick SQL
  [https://apex.oracle.com/quicksql](https://apex.oracle.com/quicksql)
• Database Cloud Services
  [https://cloud.oracle.com/database](https://cloud.oracle.com/database)
• Oracle Learning Library
  [https://www.oracle.com/oll](https://www.oracle.com/oll)
• Oracle APEX Education
  [https://apex.oracle.com/education](https://apex.oracle.com/education)
Oracle APEX
Product Components
Home Page

Comprehensive Development IDE, Web Application Development, and SQL Database Development
App Builder

Integrated Development Environment (IDE) with Application Development Graphical "Page Designer"
Features tight SQL and PL/SQL integration
App Builder - Page Designer
App Builder - Page Designer

Powerful browser-based IDE

• Multiple trees to view the page components
• Visualization of the page within the Grid Layout, and associated Gallery, allowing you to drag and drop components
• Update multiple attributes without leaving the page in the Property Editor
• Advanced Code Editor for defining SQL, HTML, CSS and text sections
• Highly configurable user interface:
  – Customize and refine view of page specific to current focus
  – Slideable panels
  – Drag and drop tabs
App Builder – Code Editor

Available for maintaining SQL, PL/SQL, JavaScript, HTML, CSS, and large text sections

• Syntax Highlighting
• Undo / Redo
• Find/Replace
• Auto completion
• Code validation
• Used in Page Designer, Component View and SQL Workshop
App Builder - Universal Theme

Overview

- Default theme for Oracle APEX applications
- Uses responsive HTML5 templates
- Grid-layout for HTML forms
- Modern flat-look
- Ships with a variety of pre-built theme styles
- JQuery Mobile Apps can be transitioned to Universal Theme
App Builder - Universal Theme

Theme Styles and Theme Roller

• Theme Styles provide a variety of different color schemes and styles for a single theme
• Defined as CSS file that is included in addition to the theme’s base CSS file
• Universal Theme includes several pre-built styles
• Additional styles can be easily generated using the built-in Theme Roller utility
App Builder - Universal Theme

Template Options

• Declarative CSS modifiers for HTML5 templates
• Enables developers to declaratively apply styles like borders, padding, icons, colors, size, etc.
• Uses easy-to-understand, descriptive names
• Available for most template types:
  – Page, Region, Report, Breadcrumb, List, Item, Button
• Significantly reduces the number of required templates for a theme
SQL Workshop

Browser based maintenance of database objects and data
Designed to meet application developers’ needs, especially in hosted environments
SQL Workshop

Quick SQL

Rapidly design and prototype data models using a markdown-like shorthand syntax that expands to standards-based Oracle SQL.
Collaborate with colleagues, track project details with associations to application pages.
Life cycle development: design, develop, deploy, view customer feedback, enhance, re-deploy.
Packaged Apps

- Robust suite of productivity and sample applications.
- Illustrates best practices and design patterns.
- Template to start customization (e.g. unlock your packaged app).
- Upgraded with every release.
Oracle APEX
Features
Create Application Wizard

Low Code Development

• Simpler and modernized wizards for creating pages.
• Allows creation of more advanced pages such as Dashboards, Master-Detail, etc.
• Supports adding common frameworks or "Features" when creating an application such as access control, activity reporting, theme selection, and more
• Customize user interface options such as Theme Style, application icon and page icons
Create Application Wizard

Blueprints

- Blueprints represent an application definition in JSON format.
- The Blueprint editor allows for editing the JSON based definition and updating application properties.
- Copy & paste the JSON code of one page to quickly create a large number of similar pages.
- Blueprints of previously generated applications can be loaded again to iterate the application design.
List-based Navigation Menus

- Alternative to using traditional tabs
- Available as top navigation menu and side menu
- Implemented as standard APEX lists
- Supports multi-level hierarchical menu structures
- Provides accessible pull-down menus
Interactive Reports

Powerful Reporting capabilities ➔ End-user customizable
Interactive Grid

• Modern, rich & interactive multi-row editing component
• Use of existing Item types
• Declarative support for Cascading LOVs and Dynamic Actions
• Upgrade utility for Tabular Forms
• Master Detail / Detail
Interactive Grid

Master Detail Layout – N-levels wide or deep
Charting Engine

Declarative support for Oracle JET Data Visualization Components

- Based on Oracle JET Data Visualization Components
- Oracle Jet (JavaScript Extension Toolkit) is open source
- JavaScript-based solution, data being provided in JSON format
- Highly Customizable
  - Using 'JavaScript code' to provide function to be called when chart is initialized
  - Using Dynamic Actions to add interactive behavior
- Built-in Accessibility Support
- Built-in Responsive Design Support
Charting Engine

Declarative support for Oracle JET Data Visualization Components
Calendars

Different views, drag and drop capability
Dynamic Actions

Declaratively define rich client-side interactivity without writing JavaScript or AJAX
Modal Dialogs

Readily switch between normal, modal, and non-modal page mode

- Replacement for Popup Windows
- A modal dialog is a stand-alone page, not a region on a page
- Any page be created as a dialog page
- Supports all the functionality of a regular page, incl. computations, validations, processes, and branches
Plug-Ins

Extend applications with custom components such as items and regions
REST Enabled SQL Support

Remote Database Connections

• Executing dynamic SQL or PL/SQL on remote databases using ORDS and REST
  • Relies on the ORDS "REST Enabled SQL" feature (ORDS 17.3 or later)
  • Requires ORDS instance having a connection pool configured for target database.

• Oracle APEX passes SQL query to ORDS over REST

• Self-describing JSON response

• Response contains a JSON object with:
  • Result set meta data (column names, data types)
  • The result data
  • Information about pagination
REST Enabled SQL Support

Using Remote Database Connections in Oracle APEX

• Create and maintain References to REST Enabled SQL Instances (Oracle REST Data Services) in Shared Components: A name, Endpoint URL, and Authentication information

• Use a REST Enabled SQL Service and therefore a remote Oracle database as the Data Source for Oracle APEX components like:
  • Classic Reports, Interactive Reports
  • Reflow Report, Toggle Columns Report
  • Tree Region, JET Charts
  • CSS Calendar
  • PL/SQL Process
Consuming a REST Service

Web Source Modules

- Oracle APEX 18.1 introduces a new data source type called "Web Source Modules", a declarative method to define references to external REST APIs and generic JSON data feeds.
- Web Source Modules store additional metadata about how to parse response data and map it as a virtual table with rows and columns.
- A module can contain one or many Web Source Operations which are the references to a concrete external web service.
- Create and maintain Web Source Modules in Shared Components.
Consuming a REST Service

Web Source Modules

- Use as data sources for Oracle APEX components such as:
  - Interactive Report, Classic Report
  - JET Chart, CSS Calendar
  - Tree Region, Reflow Report, Toggle Column Report
- Post Processing SQL modifies data before being processed by an Oracle APEX component:
  - Apply SQL functions, aggregations, join to local tables etc.
  - Avoid unnecessary HTTP requests by using **Caching**
Websheets

Allow end-users to build / maintain WIKI like pages with database capabilities

- Database enabled WIKI
- Annotations (easily add files, links, notes, and tags)
- Use [[SQL ]] tag
- Presentation mode
- Multi user
Oracle APEX

Examples of how Oracle uses Oracle APEX
Oracle Live SQL [Internet Application]

https://livesql.oracle.com
Oracle Dev Gym [Internet Application]

https://devgym.oracle.com
Oracle Ask Tom [Internet Application]

https://asktom.oracle.com
Oracle Container Registry [Internet Application]

https://container-registry.oracle.com
HR Directory [Internal Only – Intranet Application]

ARIA People

- Nightly download of HR data
- Employees can update profile, upload picture, add links ...
- Used to contact employees, see Org. Chart, etc.
- Fully responsive, works just as well on smartphones as it does on tablets and notebooks.
- Average ~ 1.5 million page views / day (> 50 page views / sec for hours)
- Median execution time of 0.04 seconds
Purchase Request Category Guide
[Internal Only – Intranet Application]
Oracle APEX

Leveraging Oracle Database Features
Oracle APEX

Security features of the Oracle Database

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Oracle APEX
High Performance features of the Oracle Database

Multi version read consistency
Row level locking
In-Memory
Compression
Partitioning
Hadoop, Big Data SQL, R
Cost based query optimizer
Scale-out with Oracle RAC
Exadata Smartscan & Infiniband

Works with APEX
Oracle APEX

Simplified consolidation and deployment with Oracle Multitenant

Works with APEX

- PDB Deployment
- PDB Cloning
- PDB Self Service App
- PDB Migration
- High Density Consolidation
- Automated Provisioning and Configuration
- PDB Resource Management
Oracle APEX

Database Application Development Features

Works with APEX

- SQL and PL/SQL
- Java in Database
- Analytics
- Text
- Regular Expressions
- Spatial
- Pattern Matching
- Database XML
- Database JSON
- AQ
Oracle Database as a Service

High Availability features of the Oracle Database

- Real Application Clusters
- Data Guard
- Active Data Guard
- Golden Gate
- Secure Backup
- Online Reorganization
- Edition-Based Redefinition
- Flashback, Total Recall
- Automated Rolling Upgrade of Database
- Failover to the Cloud

Works with APEX
Oracle APEX

Summary
Oracle APEX

Summary

• Used by real customers for real applications: Used for both opportunistic and mission critical apps that service tens of thousands of users.

• Well Established Product: First released in 2004

• Most powerful Low Code Application Development Platform: Allows developer to focus on solving the business problem and delivering superior solutions, with less time and effort spent on mundane and repetitive lower-level coding.

• Continually growing: Oracle install base is adopting Oracle APEX for increasing numbers of projects, and is increasingly an approved corporate IT standard.
• **Aligned with industry trends:** Strong support for HTML5 development frameworks, Modern & responsive CSS3 UI, integrated JavaScript libraries, Browser-based, self-service provisioning, flexible development and deployment including cloud services.

• **Consistent with Oracle developers skill set:** SQL, PL/SQL, Oracle Database. Proficiency in the Oracle database easily translates into an ability to develop web applications.
Integrated Cloud
Applications & Platform Services