Oracle Application Express (APEX)
Overview
Data – The World’s Most Valuable Resource

Data driven organizations are **23 times** more likely to acquire customers, **6x as likely** to retain those customers, and **19x as likely** to be profitable as a result.

Uber is Worth 70X More Than Hertz – Uber is 52% corporate transport market share compared to rental cars total of 33% in Q4/16.

“Information has replaced technology as the central and **most critical asset** to be managed by organizations. As a result, business leaders must shift to using the value of information as basis for new planning & funding models.”

- Doug Laney, Research Vice President, Gartner.

Source:
1. wolfstreet.com
2. IDC
3. McKinsey Global Institute
4. Gartner

$430B Advantage to Data Driven Organizations.
Managing Data in Spreadsheets Is Challenging

- **Data Validation** – Manual and error prone
- **Data Integrity** – Cannot guarantee accuracy of data in multi-user environment
- **Data Security** – Cell locking is ineffective
- **Data Sharing** – Excel is sluggish and hard to share

- Error Prone Manual Involvement: 95%
- Outdated / Data Silo: 38%
- Ineffective Data Redaction: 60%
- Too Slow and Too Hard to Share: 33%
Demonstration
Introduction
What Is Oracle APEX?

A low-code development platform that enables you to build scalable and secure enterprise apps with world-class features that can be deployed anywhere.
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
Distinguishing Characteristics

App Development IDE is a web browser.

App definitions are stored in the database as meta data.

Page generation is efficient with only one request and one response.

No client software needed

Declarative – No code generation

Data processing done in the Database
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
Modern, intuitive, accessible UI for any device
fully customizable and responsive apps
No-Cost Feature of the Oracle Database

- No-cost **fully supported** feature
  - Any number of apps, developers & end-users
  - Specialized Oracle Support Team
  - Versions: 11gR2, 12c, 18c, 19c
  - All DB editions: XE, SE2, EE

- Easy to install on-premises
  - Included by default with all editions of Oracle database
  - Download latest release from [https://apex.oracle.com/otn](https://apex.oracle.com/otn)
APEX Architecture

HTTP(s) → JDBC

Oracle REST Data Services
(Weblogic, Jetty, Tomcat)

Oracle Database
(Pluggable or Dedicated, 11gR2 or Above)

Zero latency database data access
Dynamically driven by APEX metadata

Browser

Mid Tier

Database Tier

Data Schemas
APEX Engine
SQL & PL/SQL
APEX Data Sources

- External APIs – Web Sources [REST, SOAP]
- Local Data Source [SQL, PL/SQL]
- Database Links [SQL*NET]
- REST Enabled SQL [REST / HTTP(s)]
- JDBC
- Remote Databases
- HTTP(s)
- JDBC
Included with New Always Free Service
Oracle Autonomous Database

- OLTP = Autonomous Transaction Processing (ATP)
- Analytics = Autonomous Data Warehouse (ADW)
- Document Store = Autonomous JSON Database (AJD)
- Fully Managed
- Includes Oracle APEX at no additional cost
Oracle APEX Application Development Service

Easy to use, fully managed, enterprise-class service on Oracle Cloud

APEX Application Development and Deployment + Oracle Autonomous Database + Exadata Cloud Infrastructure

Best low-code environment on best cloud database on best database infrastructure
Oracle APEX Application Development Service

Fully managed, mission-critical stack for $360/month

• $240 per OCPU and $120 per TB per month

Automatically scales up and down - supports dozens to millions of users

• Scales up to 128 OCPUs and 500TB storage

• Each OCPU supports hundreds of thousands of page views per hour

No extra fees per user, per developer, or per application

Try APEX Service on Oracle Cloud Free Tier
• 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, Oracle's internal-only service [http://apex.oraclecorp.com](http://apex.oraclecorp.com) has over 5,000 Workspaces, covering 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 Community

Welcome to the Oracle APEX Community!

Oracle Application Express (APEX) has a vast and ever-growing community of professionals around the world, who offer both products and services for Oracle APEX. This site proudly showcases the many companies, partners and customers who have helped make APEX a smashing success!

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

- More than 100 active bloggers [http://odtug.com/apex](http://odtug.com/apex)

- [http://apex.oracle.com/community](http://apex.oracle.com/community) Consulting companies, books, success stories, quotes, commercial apps
Community-authored site providing:

- Plug-ins
- Slack discussion channels
- Twitter feeds
- News
- Jobs
- Conferences
- Meetups
http://builtwithapex.com

- Showcases large diversity of types of applications and different themes
- Launched October, 2016
- > 150 sites published, more being added daily
Transform Your Spreadsheets to Web Apps in Minutes

**Features**

- Drag and Drop an XLS, CSV, XML, or JSON file
- Create table in Autonomous Database
- Upload data into new table
- Create App based on new table

**Solutions**

- Single source-of-truth
- Send out a URL not a file
- Secure, scalable, multi-user app
- Extend with Charts, Calendars, Validations, and more
Rapid Application Development

Build new business and productivity apps

Features

• Build apps in days / weeks not months / years
• Use powerful wizards to create fully featured apps
• Easily modify to meet changing requirements
• Rapidly iterate to production-ready app
• Low-code capabilities allow non-IT professionals to also build or help build apps

Solutions

• Opportunistic
• Simplistic, tactical apps to meet immediate need
• Webify paper processes
• Generally developed by one or two people
Modernizing Oracle Forms

**Features**

- APEX is the natural evolution of Forms
- Both based on SQL and PL / SQL
- Re-use DB packages, procedures, functions
- Easily train Forms Developers into developing with APEX

**Solutions**

- Proof-of-concept using subset of Forms apps
- Organization-wide apps, rather than back-office
- External apps for customers / partners
- Mobile-first apps
- Net new requirements
Extending Enterprise Systems

Features

- Extend ERPs and other enterprise software
- Provide organization-specific dashboards
- Improved workflows
- Fill gaps

Solutions

- Meet non-standard requirements
- Optimize common business functions
- Enhance data capture
- Integrate disparate data sources

See: Extend E-Business Suite using APEX - Official white paper
Transform Your Spreadsheets to Web Apps in Minutes

Features

• Quickly build custom mission-critical apps
• Corporate data reporting and maintenance
• Merge separate data silos
• Build organization-wide self-reporting apps

Solutions

• Simple deployment
• Single installation runs any number of apps
• Scale to hundreds of thousands of users
• Leverages enterprise features of Oracle Autonomous
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

• 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

• 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
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
Rapidly design and prototype data models using a markdown-like shorthand syntax that expands to standards-based Oracle SQL.
Team Development

Team Development has been reimagined as a new and more flexible way to work with colleagues and keep track of tasks, features, bugs and feedback.
Discover samples that showcase new features and design patterns, add new capabilities with plug-ins, and get pre-built apps that you can use as-is or customize.

**Samples**
These are apps designed to highlight specific functionality and are intended to serve as a developer guide on how to make use of a particular feature.

**Plug-ins**
Plug-ins are used to extend the capabilities of APEX and enable you to easily add new capabilities to your apps.

**Apps**
These are fully functional apps that are stand-alone point-solutions designed to meet simple requirements. You can use these apps as is, or make changes to suit your needs.
Features
Create Application Wizard

• Simple, modern wizard for creating pages.

• Allows creation of numerous page types including 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 Page Wizard

• Simple, modern wizard for creating individual pages in an existing app.

• Allows creation of more advanced pages such as Dashboards, additional Master-Detail page types, List View, mobile first reports, and more.

• Supports adding common frameworks or "Features" to an existing application such as access control, activity reporting, theme selection, and more
## Interactive Reports

Powerful Reporting capabilities → End-user customizable

### Interactive Report

<table>
<thead>
<tr>
<th>Name</th>
<th>Project Lead</th>
<th>Completed Date</th>
<th>Status</th>
<th>Cost</th>
<th>Budget</th>
<th>Budget V Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop Bug Application</td>
<td>Lucille Beatie</td>
<td>2/27/2021</td>
<td>Completed</td>
<td>$16,500.00</td>
<td>$18,000.00</td>
<td>$1,500.00</td>
</tr>
<tr>
<td>Develop Partner Portal POC</td>
<td>Bernard Jackman</td>
<td></td>
<td>In-Progress</td>
<td>$4,000.00</td>
<td>$25,000.00</td>
<td>$21,000.00</td>
</tr>
<tr>
<td>Implement Customer Success Application</td>
<td>Bernard Jackman</td>
<td>3/5/2021</td>
<td>Completed</td>
<td>$23,000.00</td>
<td>$25,000.00</td>
<td>$2,000.00</td>
</tr>
<tr>
<td>Migrate Legacy Applications</td>
<td>Miyazaki Yokohama</td>
<td></td>
<td>In-Progress</td>
<td>$25,250.00</td>
<td>$38,000.00</td>
<td>$12,750.00</td>
</tr>
<tr>
<td>Implement Customer Satisfaction Application</td>
<td>Bernard Jackman</td>
<td>2/2/2021</td>
<td>Completed</td>
<td>$29,750.00</td>
<td>$25,000.00</td>
<td>$-4,750.00</td>
</tr>
</tbody>
</table>
Faceted Search

- A powerful new way to filter and display your data.
- Faceted Search will make it easier for your users to find the data they want.
Cards

• Create cards as a native region type and control the layout declaratively.

• Provides entry to more detailed information and you can include a number of actions declaratively.
Maps

• The all-new native Map component allows you to add powerful, feature rich, and interactive maps.

• Powered by Oracle eLocation Service so it is ready to use, no API Key required.

• Create maps with layers for points, lines, polygons, 3D polygons, and heat maps.
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
Modal Dialogs

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

• 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, including computations, validations, processes, and branches
Charting Engine
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
Calendar

Different views, drag and drop capability
List-based Navigation Menus

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

Declaratively define rich client-side interactivity without writing JavaScript or AJAX
REST Enabled SQL Support

• 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 External REST APIs

- REST Data Sources are a declarative method to define references to external REST APIs and generic JSON data feeds.

- REST Data Sources 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 operations which are the references to a concrete external web service.

- Create and maintain REST Data Sources in Shared Components.
Consuming External REST APIs

• 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
Plug-Ins
Extend applications with custom components such as items and regions

https://apex.world/ords/f?p=100:700
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.
Oracle APEX

Summary

• **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.
Learn More…

Primary site
APEX Shortcuts
APEX Community
Blogs
APEX on Autonomous
Database Cloud Services
Oracle Learning Library
Oracle APEX Education

https://apex.oracle.com
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