



Oracle Application Express (APEX)

Overview



Name

Presenter's Title

Organization, Division or Business Unit

Month 00, 2020

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. ³



Uber is Worth 70X More Than Hertz – Uber is 52% corporate transport market share compared to rental cars total of 33% in Q4/16. ¹



“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. ⁴



\$430B Advantage to Data Driven Organizations. ²

Source:

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

Managing Data in Spreadsheets Is Challenging



Data Validation – Manual and error prone



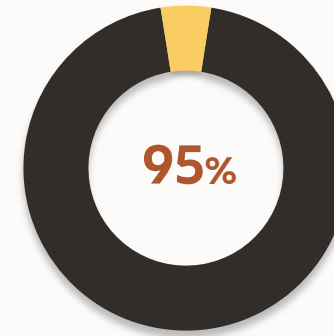
Data Integrity – Cannot guarantee accuracy of data in multi-user environment



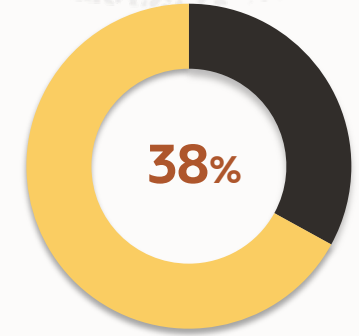
Data Security – Cell locking is ineffective



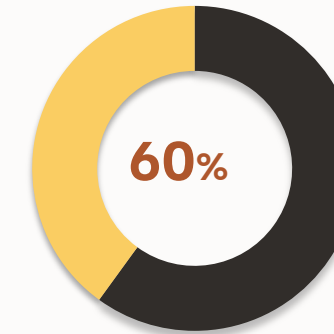
Data Sharing – Excel is sluggish and hard to share



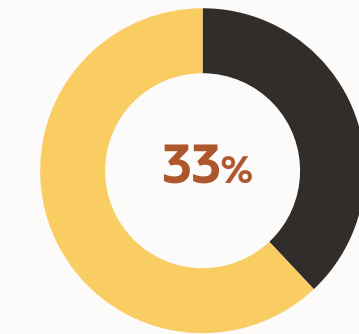
Error Prone
Manual Involvement



Outdated / Data Silo



Ineffective Data
Redaction



Too Slow and Too
Hard to Share

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.

ā'pěks
(#orclapex)

Oracle APEX

Database-centric web application development framework



Develop desktop and mobile web apps



Visualize and maintain database data



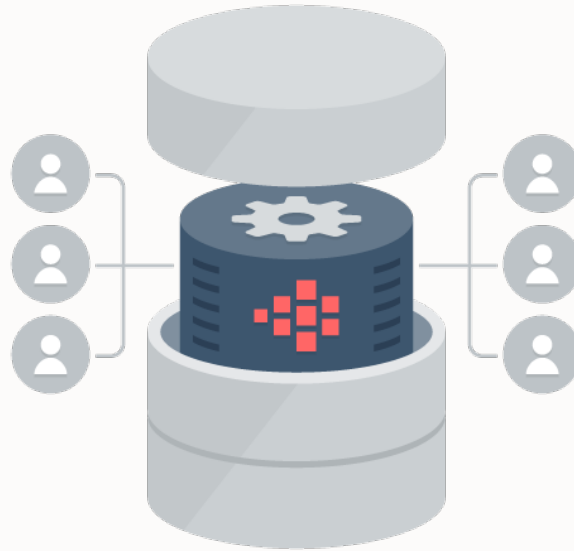
Leverage SQL Skills and database capabilities

Distinguishing Characteristics



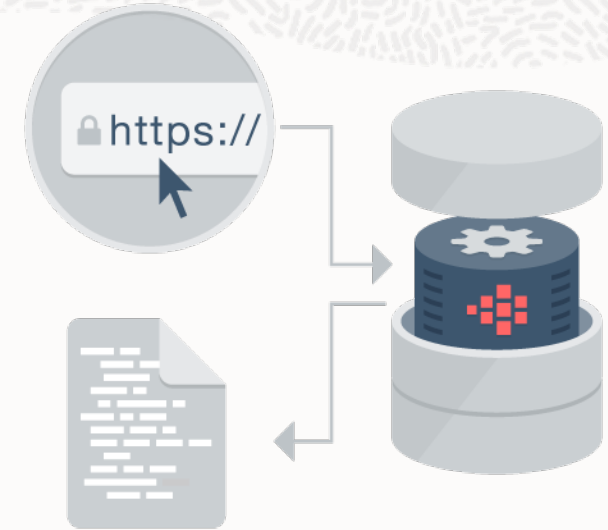
App Development IDE is a web browser.

No client software needed



App definitions are stored in the database as meta data.

Declarative – No code generation

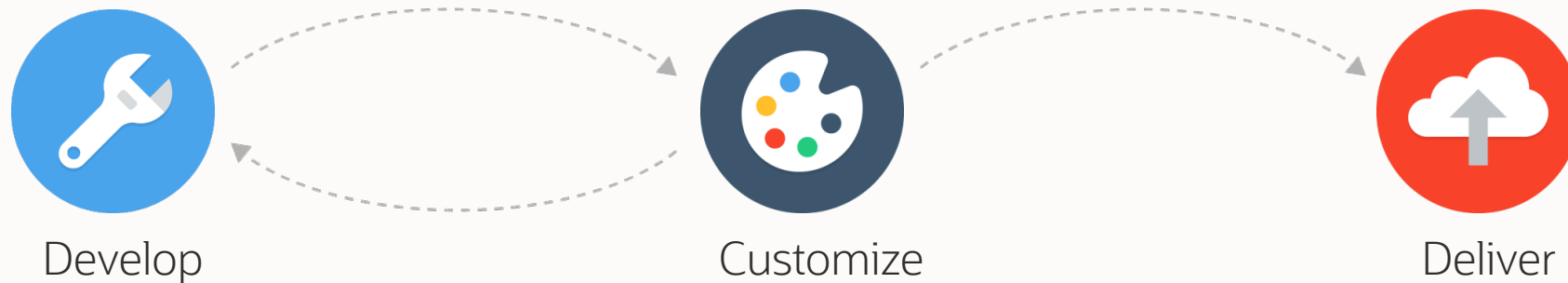


Page generation is efficient with only one request and one response.

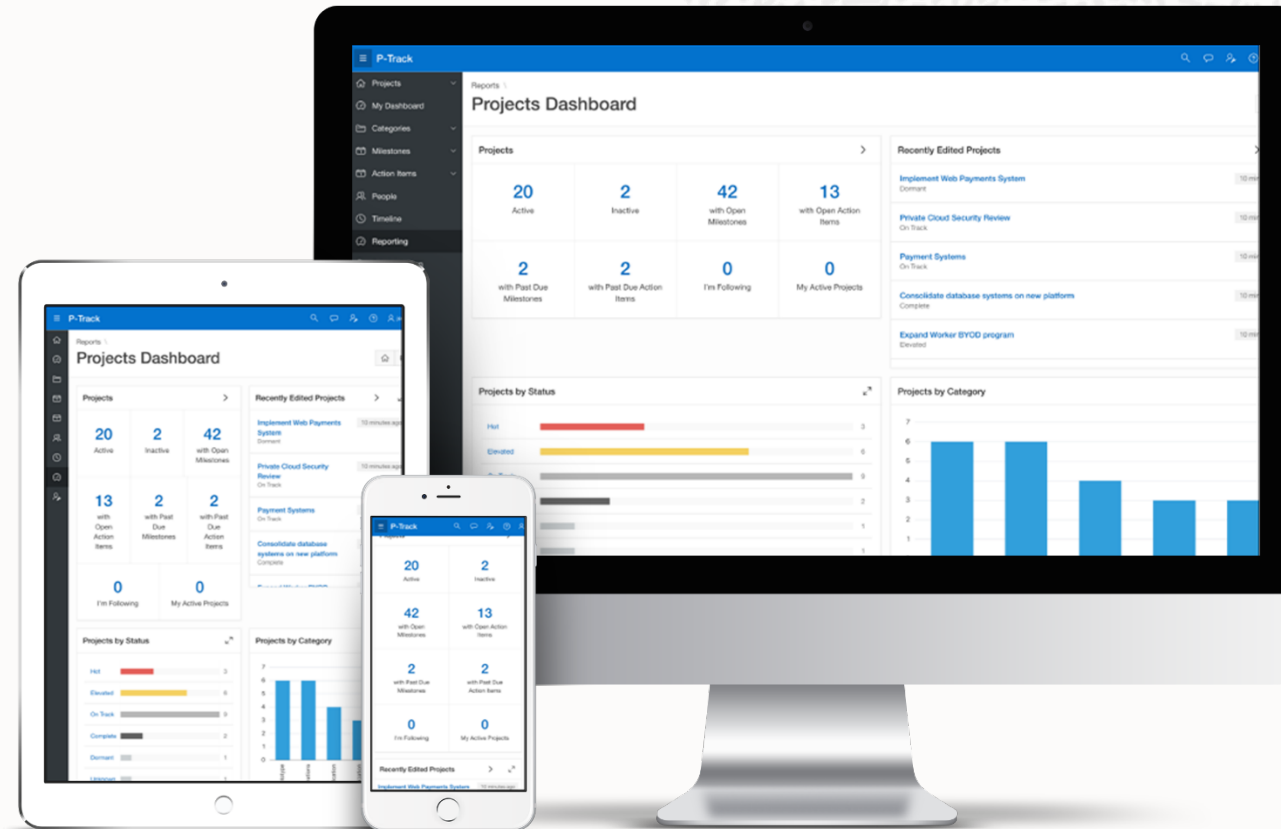
Data processing done in the Database

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



User Interface for Any Device



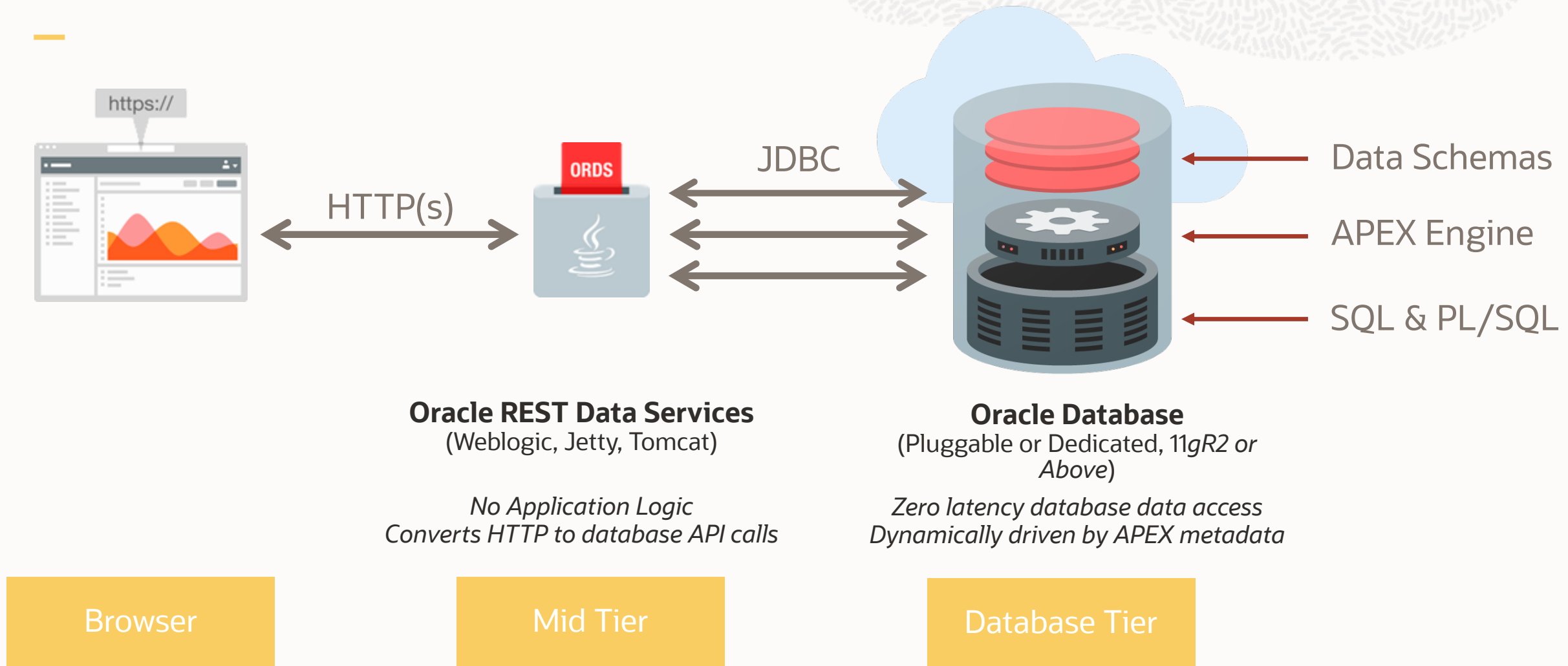
**Modern, intuitive, accessible UI for any device
fully customizable and responsive apps**

No-Cost Feature of the Oracle Database

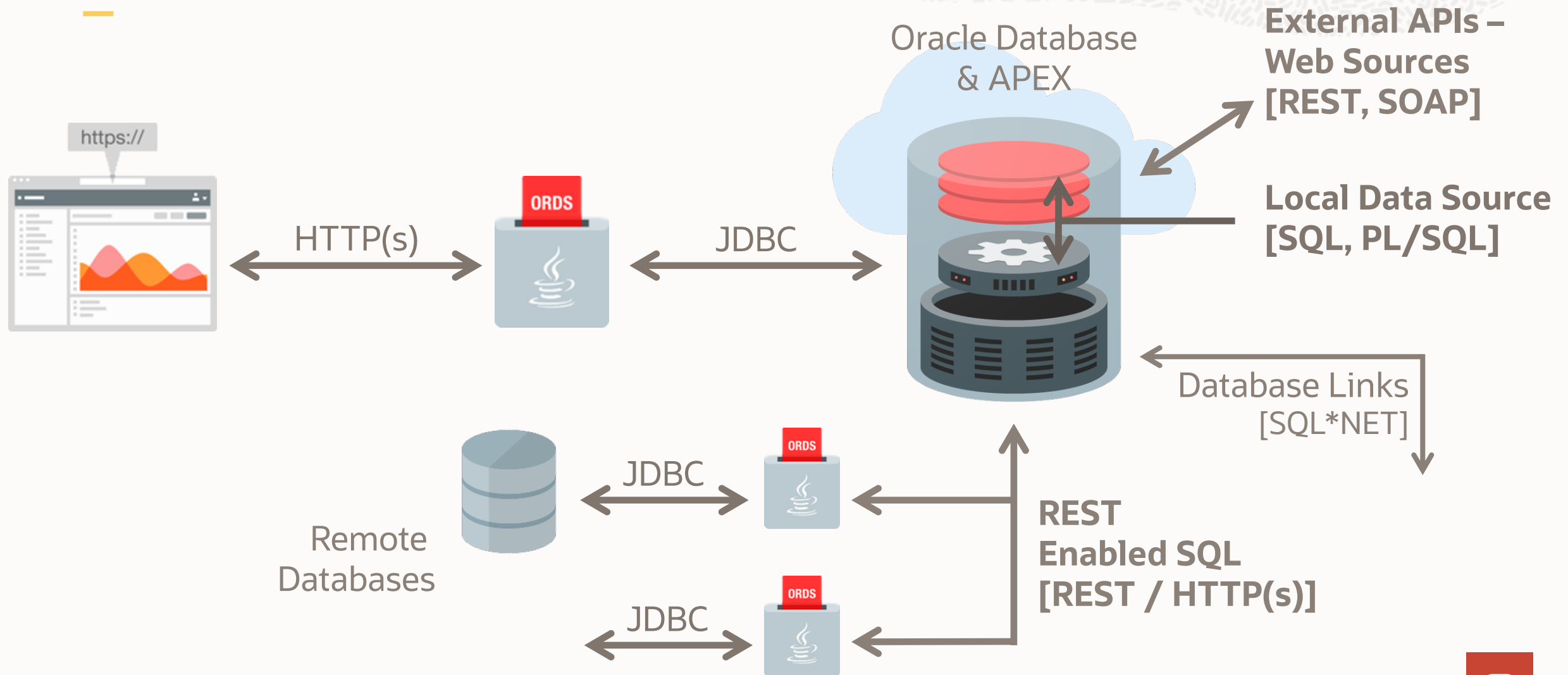
- No-cost **fully supported** feature
 - Any number of apps, developers & end-users
 - Specialized Oracle Support Team
 - Versions: 11gR2, 12c, 18c, 19c
 - All DB editions: XE, SE2, EE
- Easy to install on-premises
 - Included by default with all editions of Oracle database
 - Download latest release from <https://apex.oracle.com/otn>



APEX Architecture



APEX Data Sources





**Oracle
APEX**



**Oracle
Autonomous
Database**

Included with New Always Free Service

Oracle Autonomous Database

- OLTP = Autonomous Transaction Processing (ATP)
- Analytics = Autonomous Data Warehouse (ADW)
- Fully Managed
- Includes Oracle APEX at no additional cost

Autonomous
Transaction
Processing



Autonomous
Data Warehouse



APEX Service

Oracle APEX Application Development

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

Low cost, elastic

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

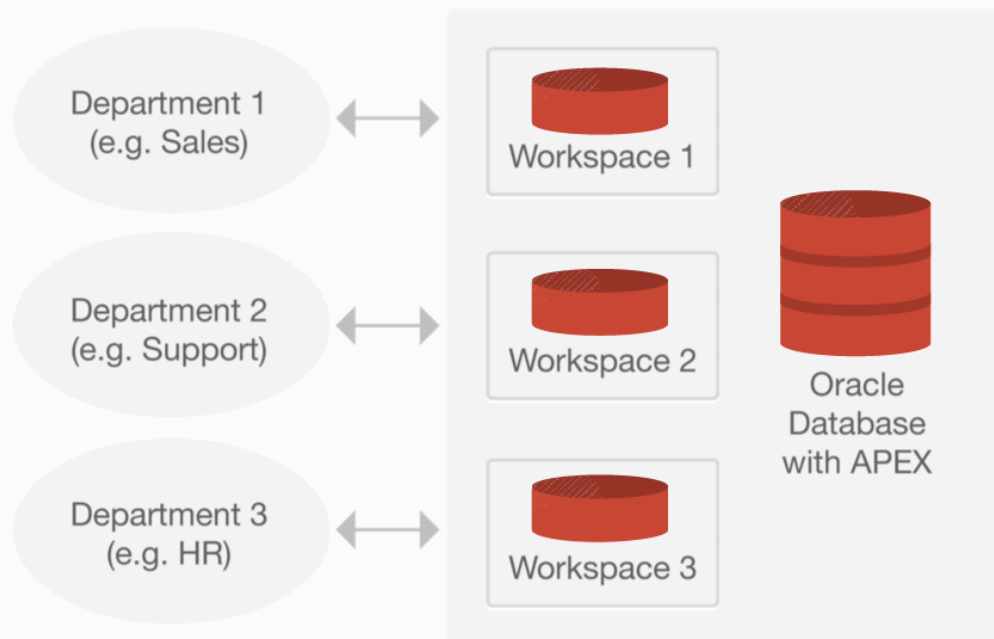
- Scales up to 128 OCPUs and 500TB storage
- Each OCPU supports hundreds of thousands of page views per hour

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

Try APEX Service on Oracle Cloud Free Tier



Single Database Instance / Multiple Workspaces



- 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> 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

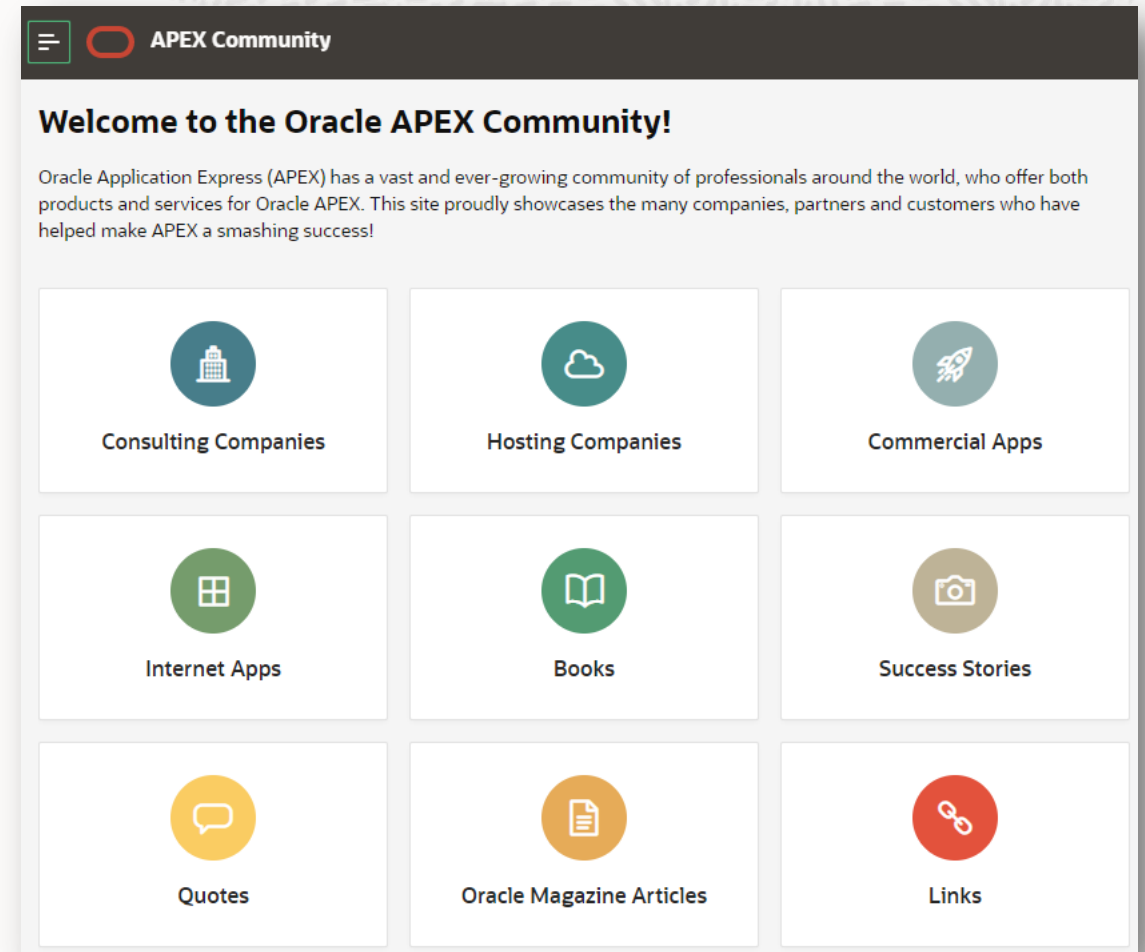
Cloud

- 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

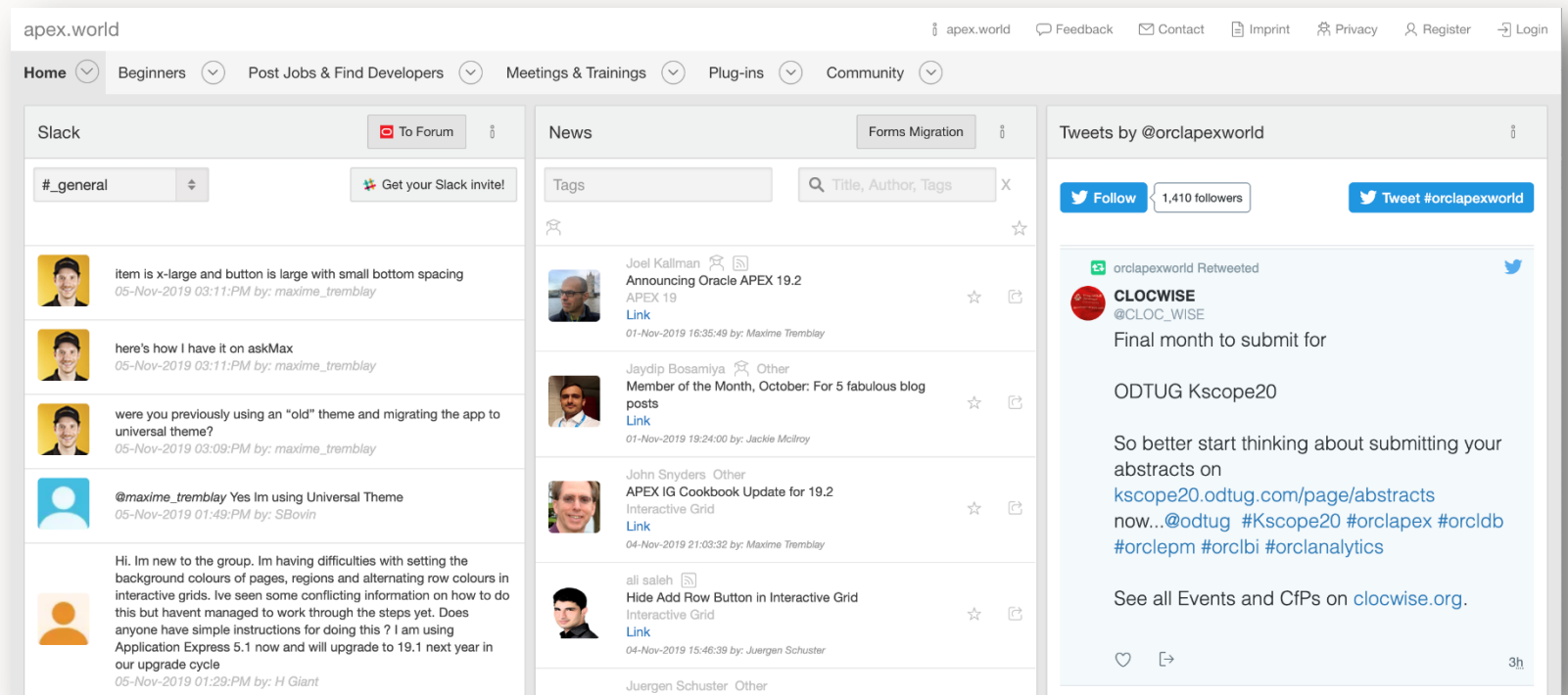
- Over 500,00 developers worldwide
 - Estimated from support requests, downloads, conferences, discussion forum activity
- More than 100 active bloggers
<http://odtug.com/apex>
- <http://apex.oracle.com/community>
Consulting companies, books, success stories, quotes, commercial apps



http://apex.world

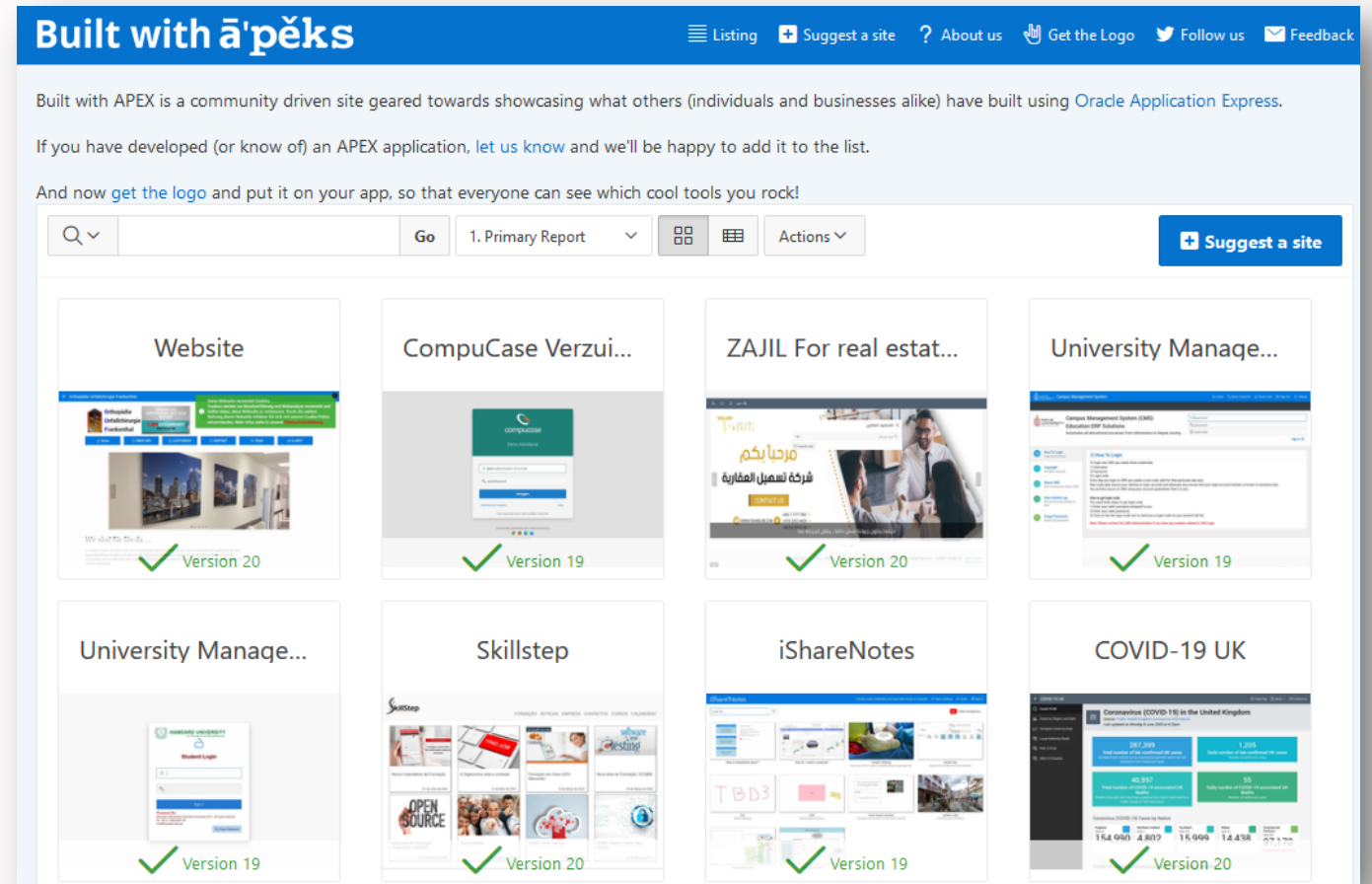
Community-authored site providing:

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



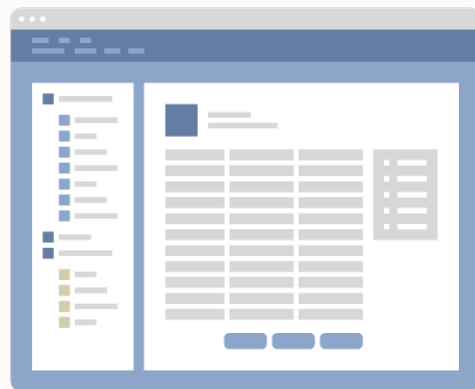
http://builtwithapex.com

- Showcases large diversity of types of applications and different themes
- Launched October, 2016
- > 150 sites published, more being added daily



Use Cases

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](#)

Build Large, Enterprise-scale Apps



Features

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

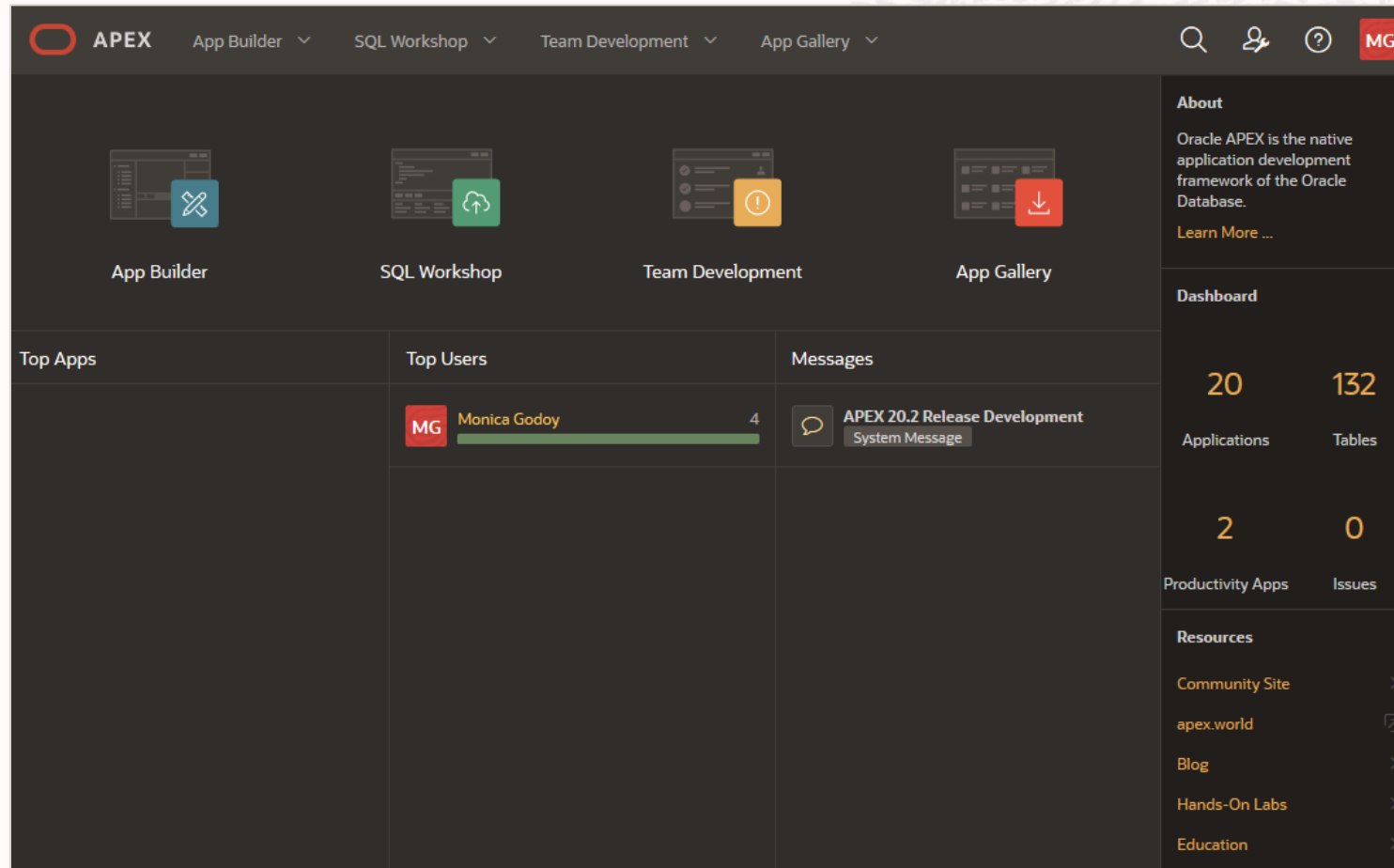


Solutions

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

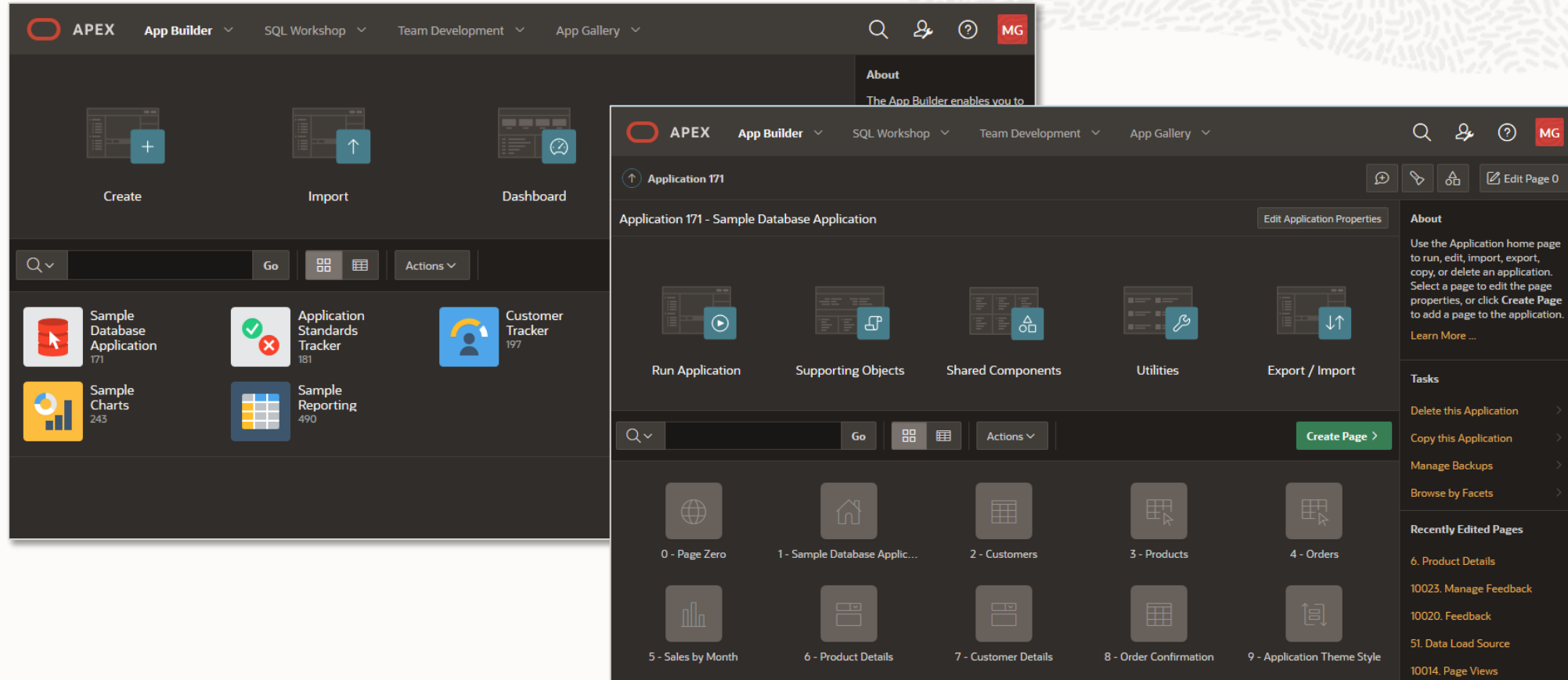
Product Components

Home Page



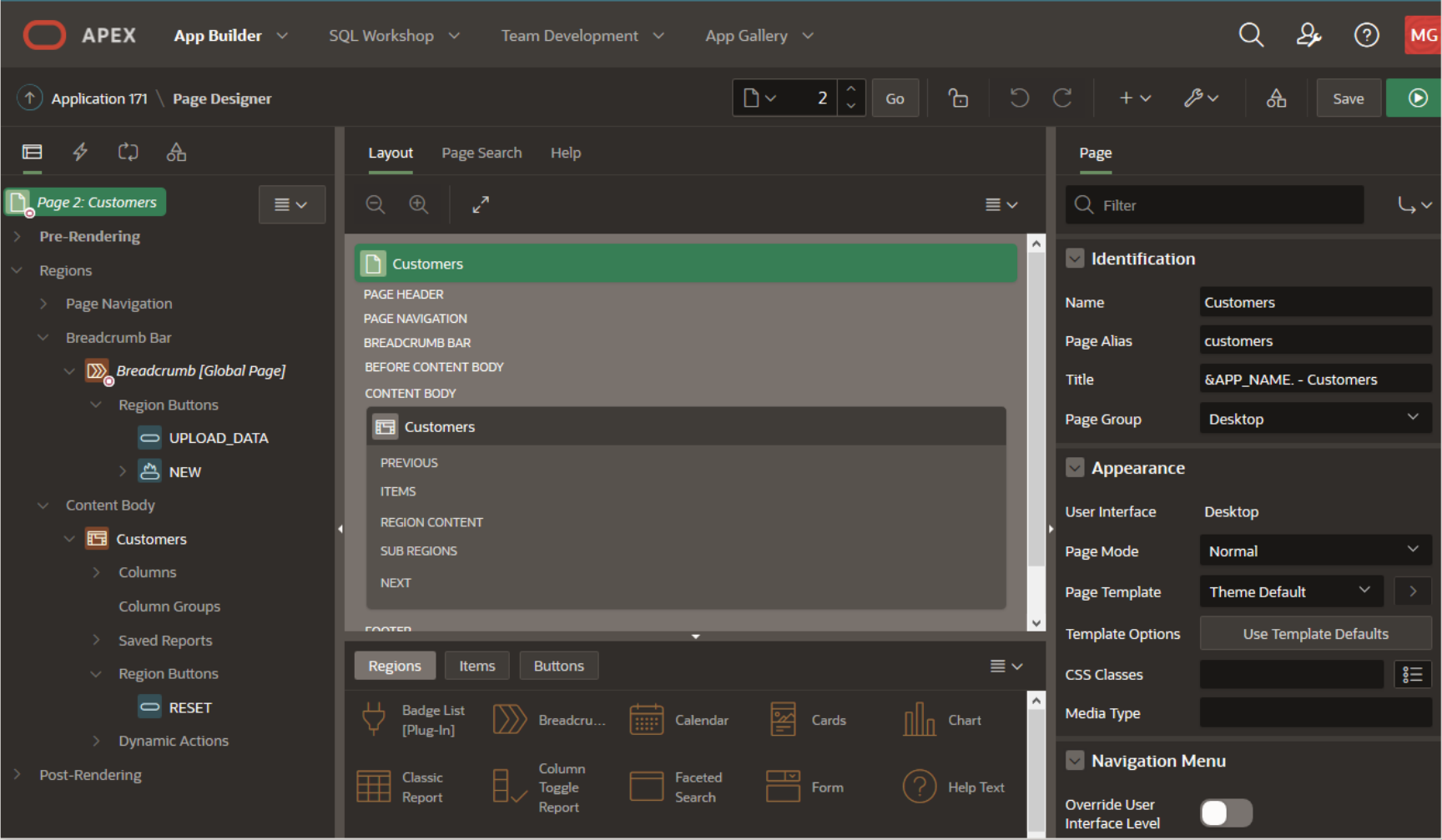
Comprehensive Development IDE, Web Application Development,
and SQL Database Development

App Builder



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

App Builder - Page Designer



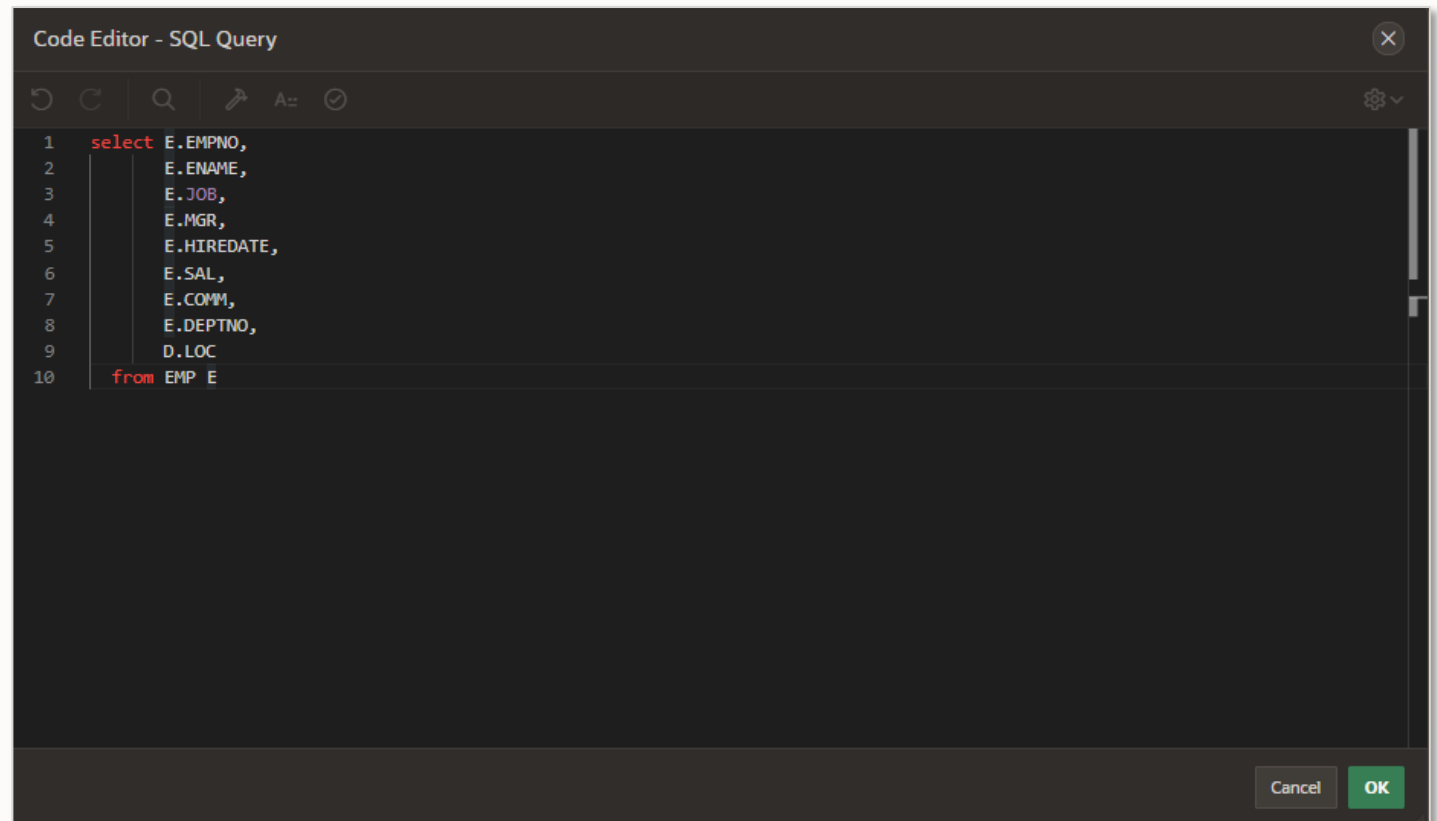
App Builder - Page Designer

- 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



The screenshot shows a dark-themed code editor window titled "Code Editor - SQL Query". The editor contains an SQL query with syntax highlighting: "select" is in red, column names like "EMPNO", "ENAME", "JOB", "MGR", "HIREDATE", "SAL", "COMM", "DEPTNO", and "LOC" are in blue, and "from" is in red. The query is as follows:

```
1 select E.EMPNO,  
2      E.ENAME,  
3      E.JOB,  
4      E.MGR,  
5      E.HIREDATE,  
6      E.SAL,  
7      E.COMM,  
8      E.DEPTNO,  
9      D.LOC  
10 from EMP E
```

The window has a toolbar at the top with icons for undo, redo, search, and other editing functions. At the bottom right, there are "Cancel" and "OK" buttons.

App Builder - Universal Theme

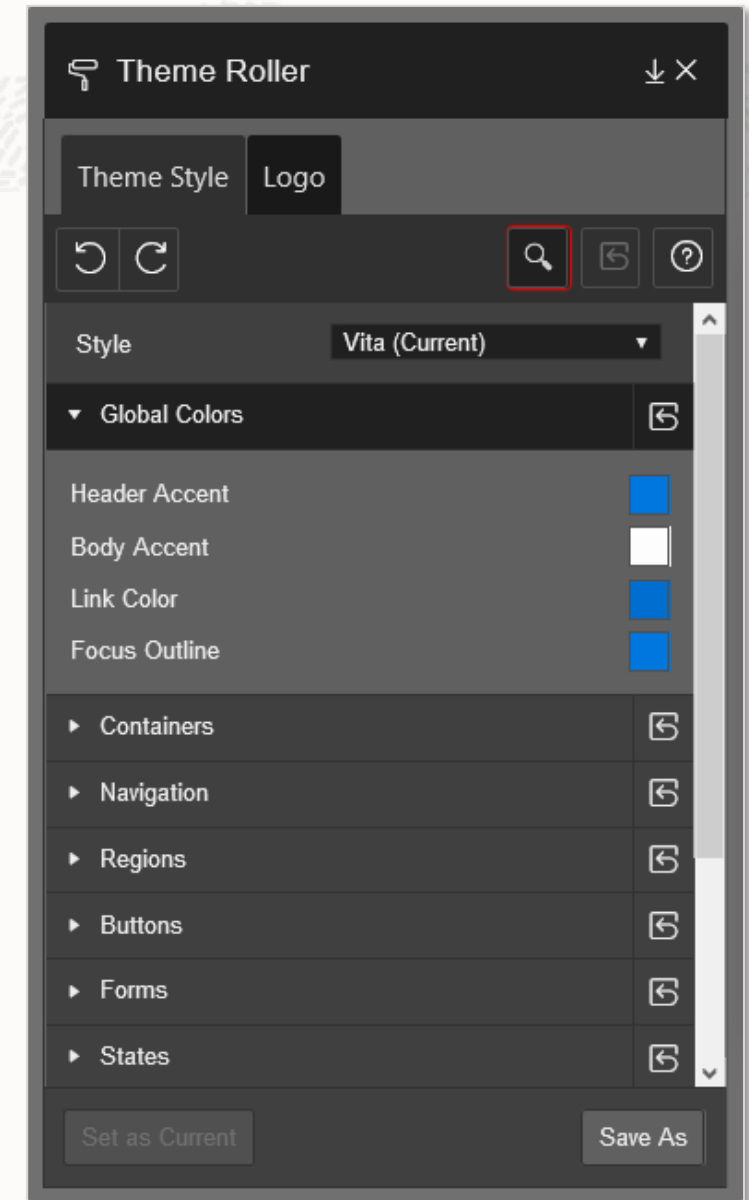


- Default theme for Oracle APEX applications
- Uses responsive HTML5 templates
- Grid-layout for HTML forms
- Modern flat-look
- Ships with a variety of pre-built theme styles
- jQuery Mobile Apps can be transitioned to Universal Theme

App Builder - Universal Theme

Theme Styles and Theme Roller

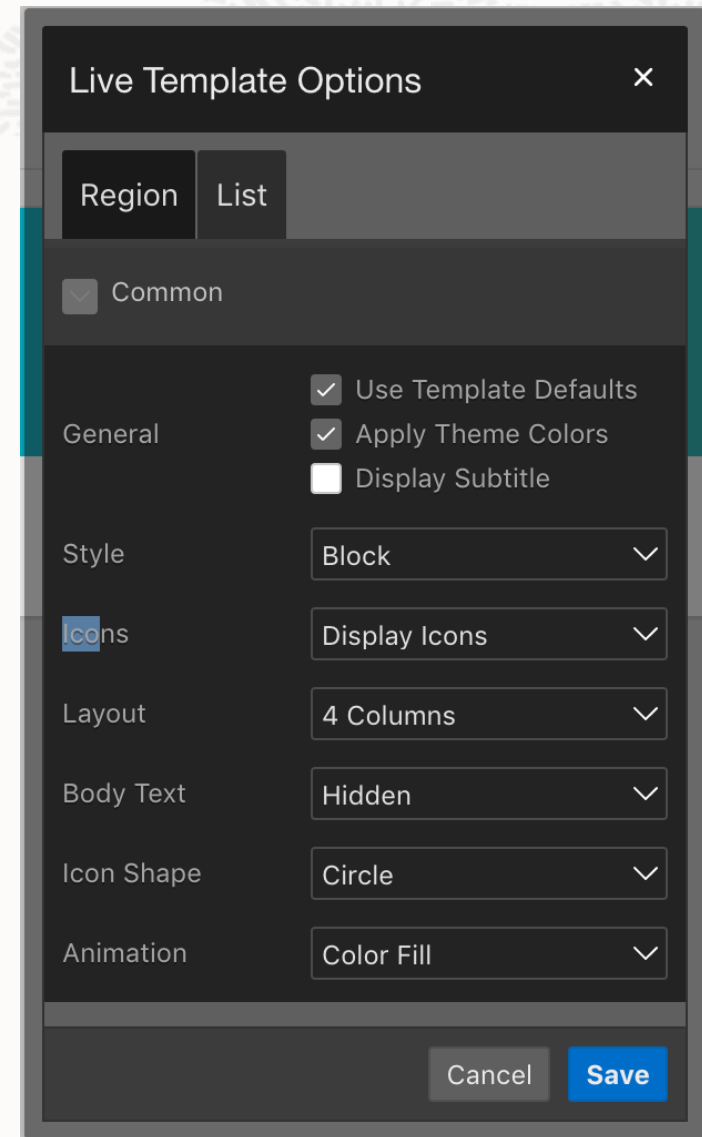
- Theme Styles provide a variety of different color schemes and styles for a single theme
- Defined as CSS file that is included in addition to the theme's base CSS file
- Universal Theme includes several pre-built styles
- Additional styles can be easily generated using the built-in Theme Roller utility



App Builder - Universal Theme

Template Options

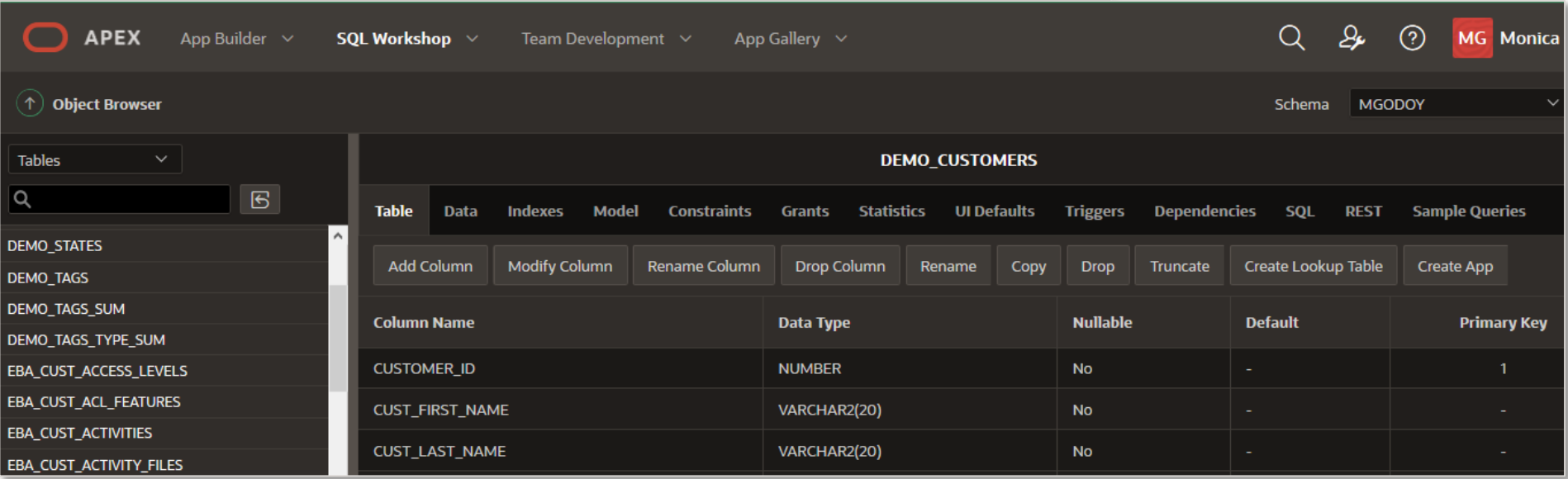
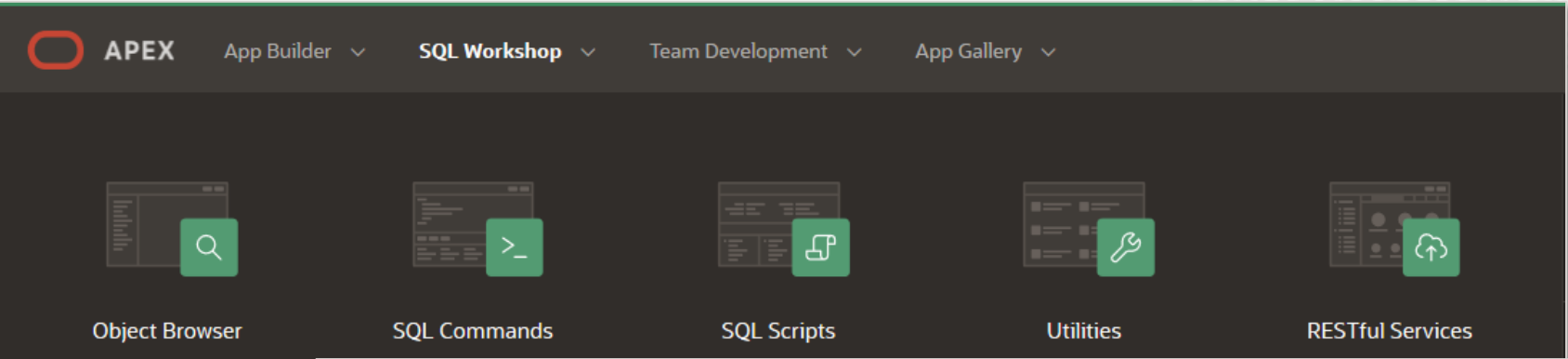
- Declarative CSS modifiers for HTML5 templates
- Enables developers to declaratively apply styles like borders, padding, icons, colors, size, etc.
- Uses easy-to-understand, descriptive names
- Available for most template types:
 - Page, Region, Report, Breadcrumb, List, Item, Button
- Significantly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



The screenshot shows a 'Live Template Options' dialog box with a close button (X) in the top right corner. It features two tabs: 'Region' and 'List', with 'List' currently selected. Below the tabs is a 'Common' section with a checked checkbox. The main area is divided into two columns. The left column lists categories: 'General', 'Style', 'Icons' (highlighted with a blue box), 'Layout', 'Body Text', 'Icon Shape', and 'Animation'. The right column contains settings for each category: 'Use Template Defaults' (checked), 'Apply Theme Colors' (checked), 'Display Subtitle' (unchecked), 'Block' (selected in a dropdown), 'Display Icons' (selected in a dropdown), '4 Columns' (selected in a dropdown), 'Hidden' (selected in a dropdown), 'Circle' (selected in a dropdown), and 'Color Fill' (selected in a dropdown). At the bottom right are 'Cancel' and 'Save' buttons.

Category	Option
Common	<input checked="" type="checkbox"/>
General	<input checked="" type="checkbox"/> Use Template Defaults
General	<input checked="" type="checkbox"/> Apply Theme Colors
General	<input type="checkbox"/> Display Subtitle
Style	Block
Icons	Display Icons
Layout	4 Columns
Body Text	Hidden
Icon Shape	Circle
Animation	Color Fill

SQL Workshop

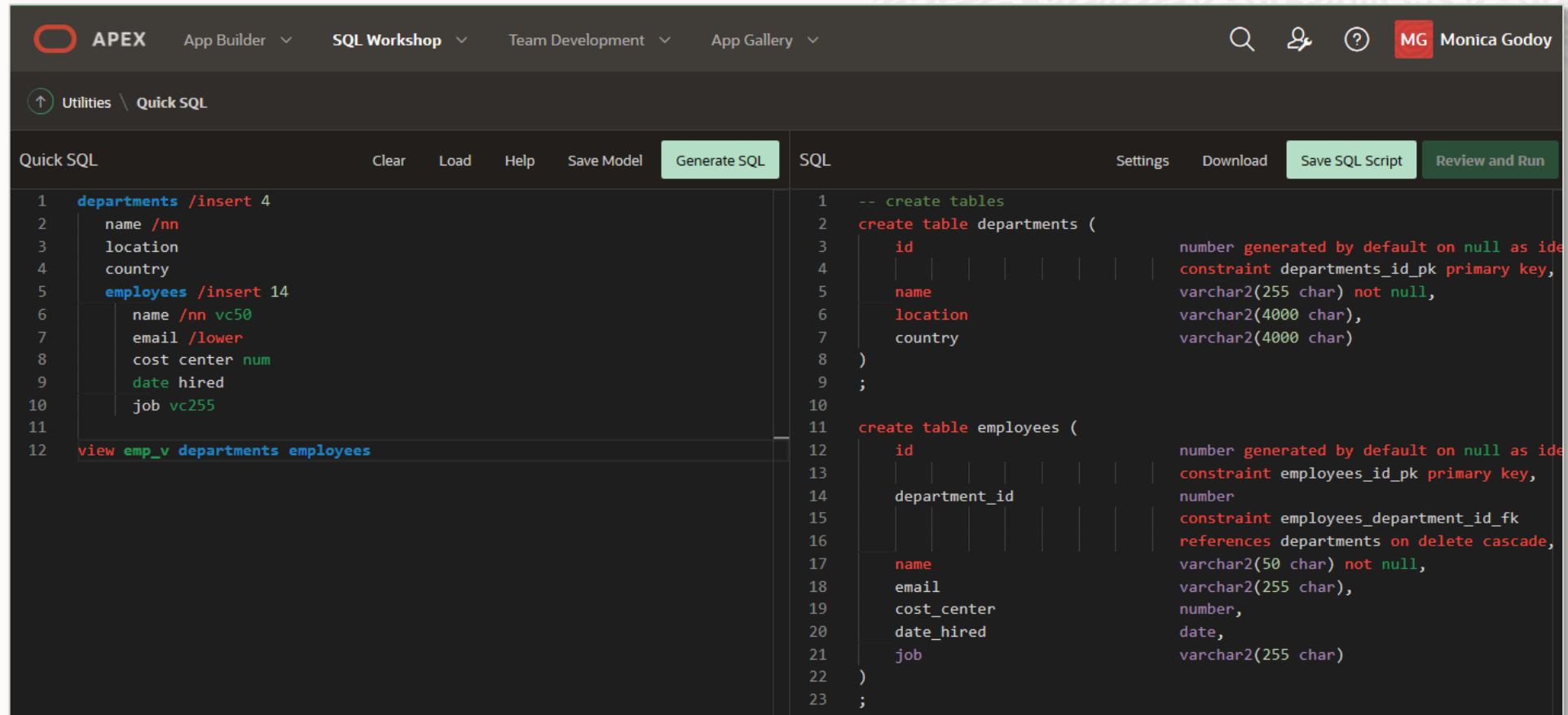


Browser based maintenance of database objects and data

Designed to meet application developers' needs, especially in hosted environments

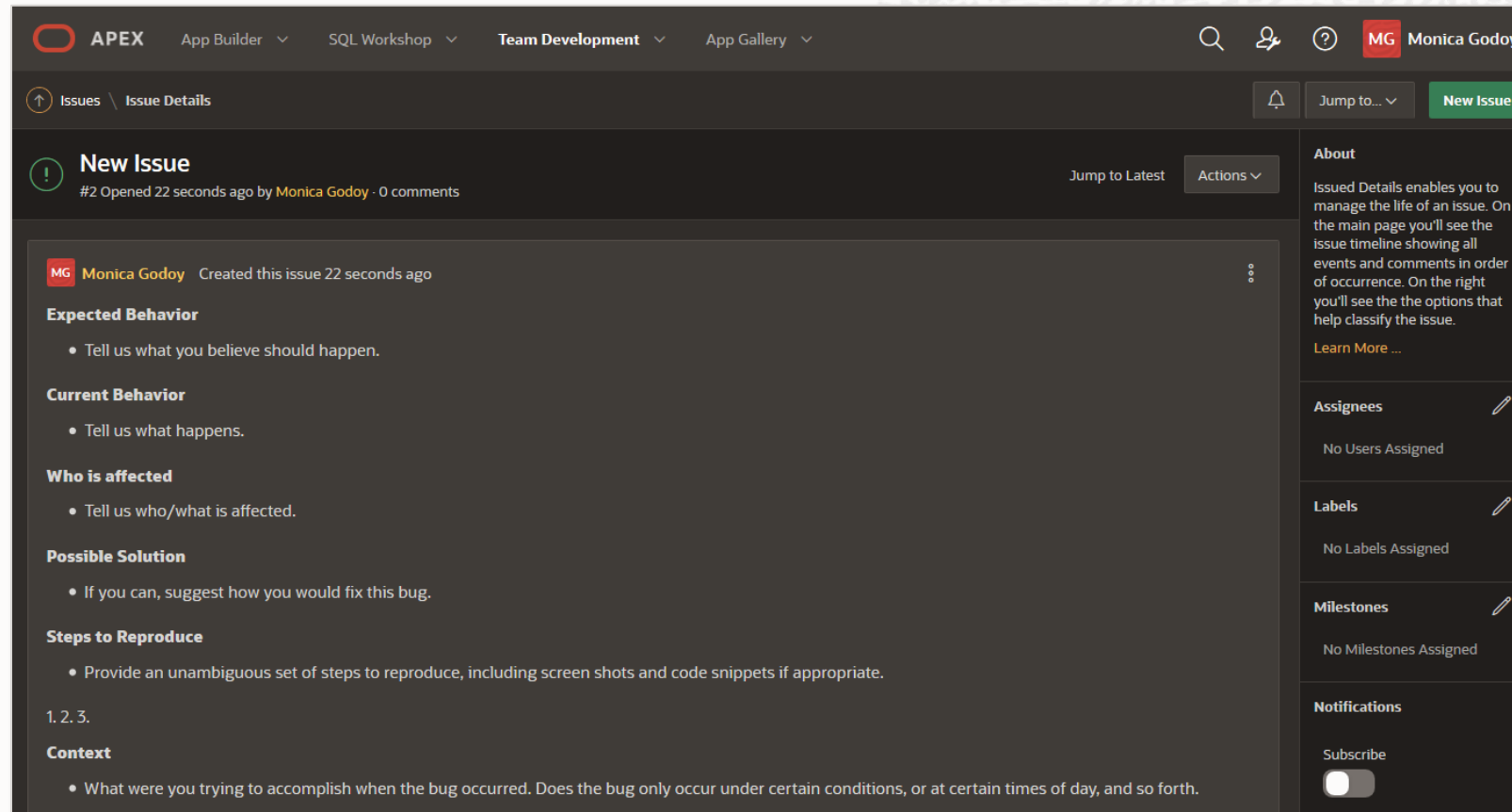


SQL Workshop – Quick SQL



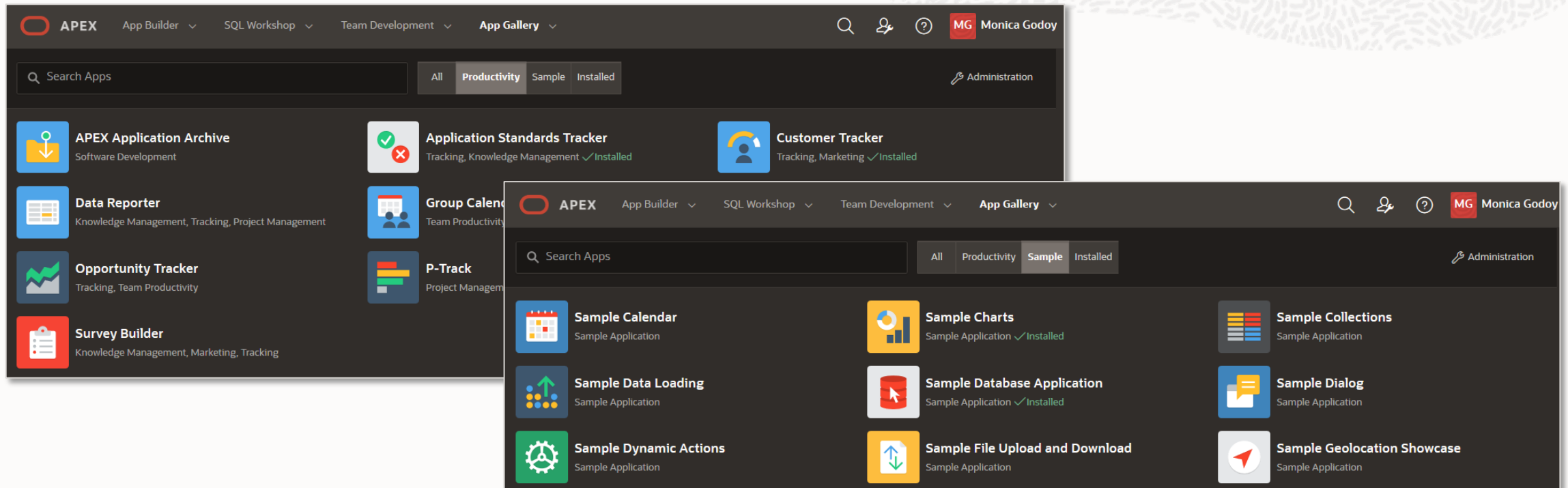
Rapidly design and prototype data models using a markdown-like shorthand syntax that expands to standards-based Oracle SQL.

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.

App Gallery

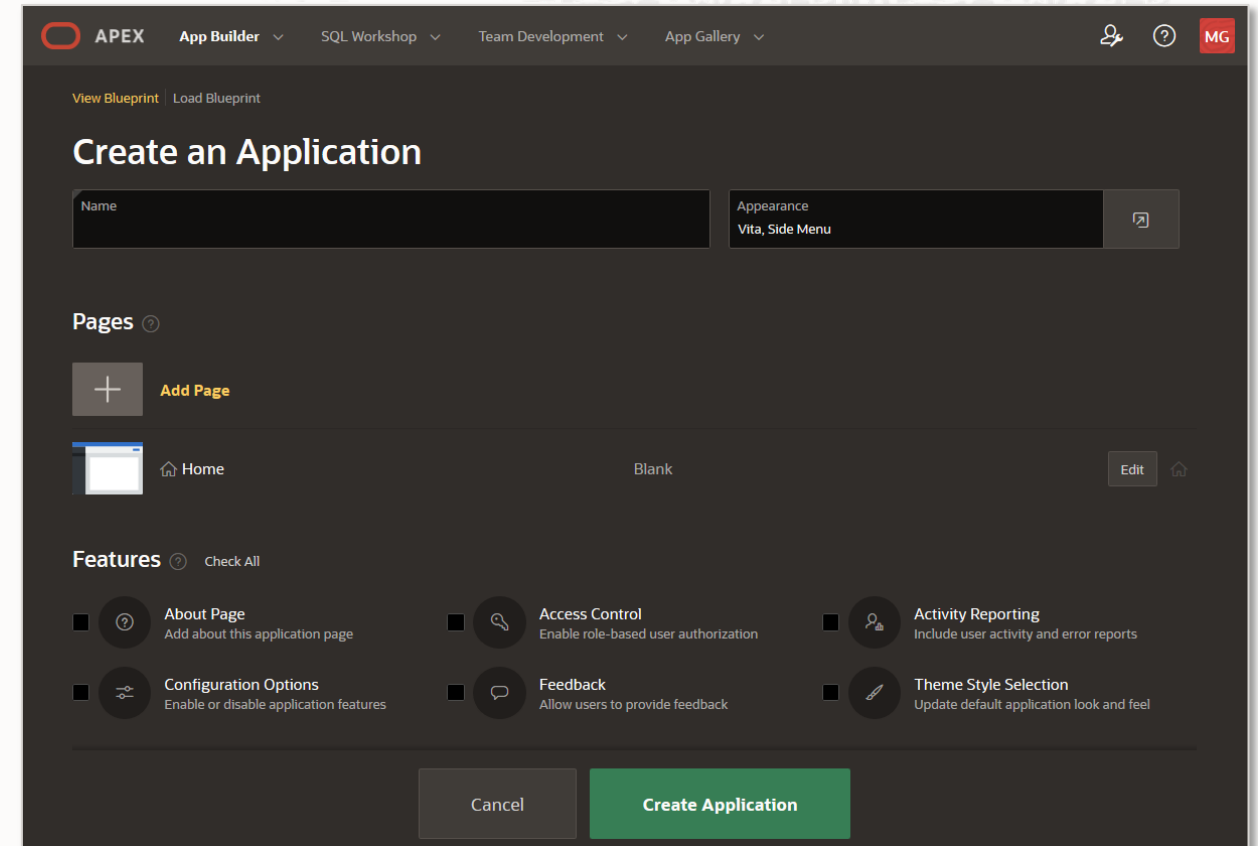


- Robust suite of productivity and sample applications.
- Illustrates best practices and design patterns.
- Template to start customization (e.g. unlock your packaged app).
- Upgraded with every release.

Features

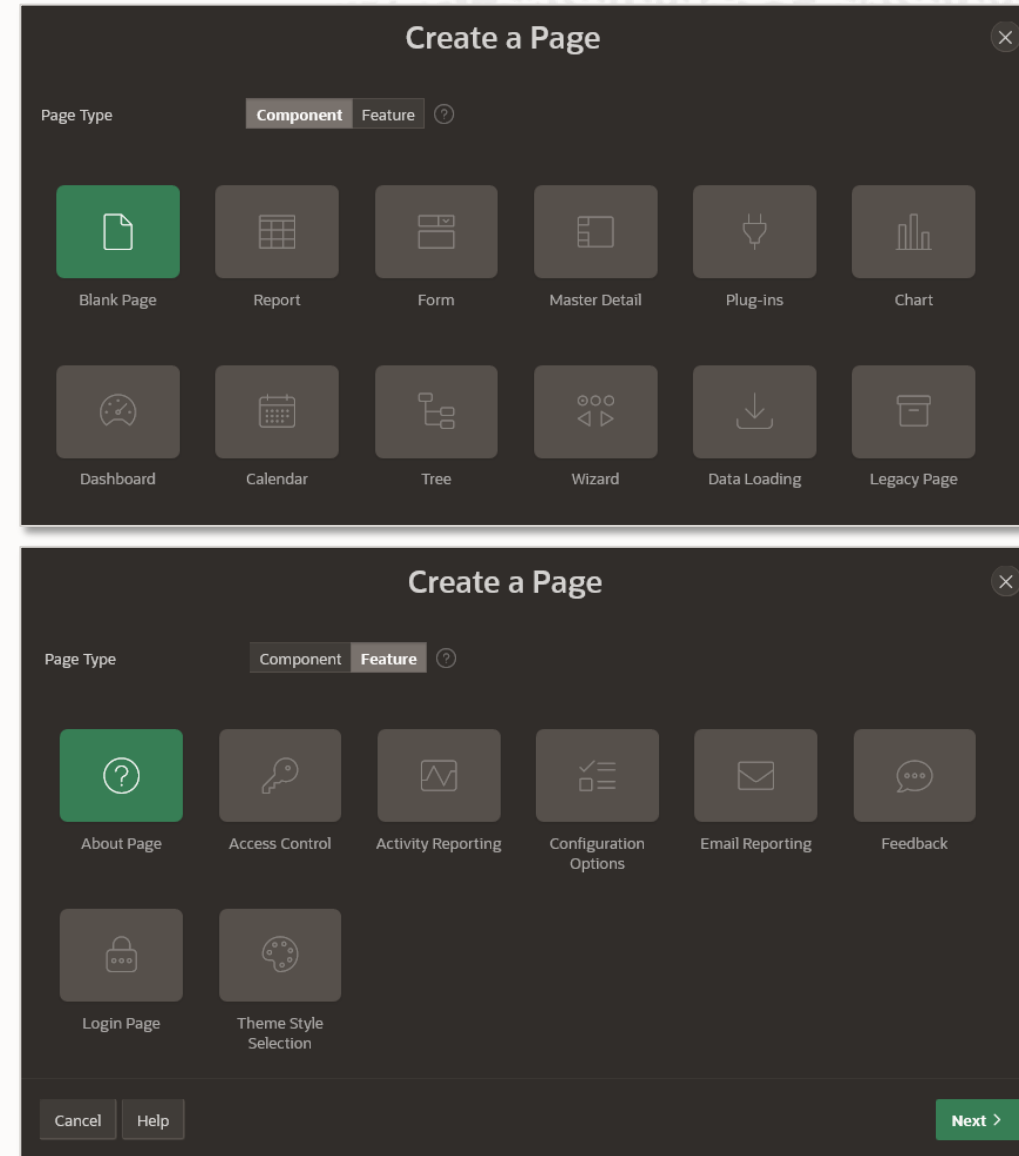
Create Application Wizard

- 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

Q

Go

Actions

Create

▼

✓

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Project

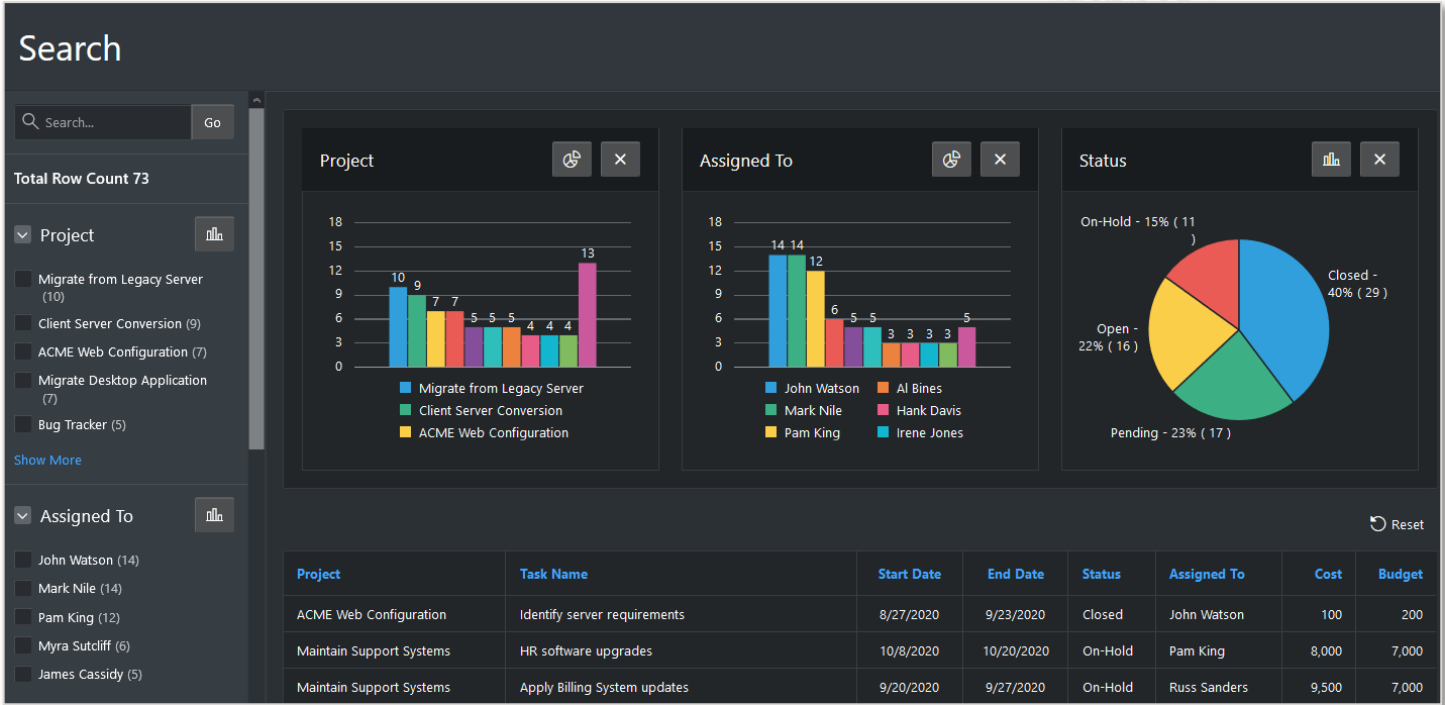
×

Project : ACME Web Configuration

	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget	
	Identify server requirements	10/14/2020	10/19/2020	<div><div>↑</div><div>↓</div><div>✕</div><div>☰</div><div>Filter...</div></div>	James Cassidy	100	200	
	Determine Web listener configuration(s)	7/22/2020	8/11/2020		James Cassidy	100	100	
	Specify security authentication scheme(s)	9/8/2020	9/15/2020		John Watson	200	300	
	Select servers for Development, Test, Production	10/14/2020	10/22/2020		Closed	James Cassidy	200	600
	Configure Workspace provisioning	7/23/2020	7/27/2020		On-Hold	John Watson	200	100
	Create pilot workspace	7/27/2020	8/9/2020		Open	John Watson	100	100
	Run installation	8/9/2020	8/10/2020		Pending	James Cassidy	100	100
Project : Bug Tracker								
	Task Name	Start Date	End Date	Status	Assigned To	Cost	Budget	
	Implement bug tracking software	8/3/2020	8/15/2020	Closed	Myra Sutcliff	100	100	
	Review automated testing tools	9/30/2020	10/1/2020	On-Hold	Myra Sutcliff	2750	1500	

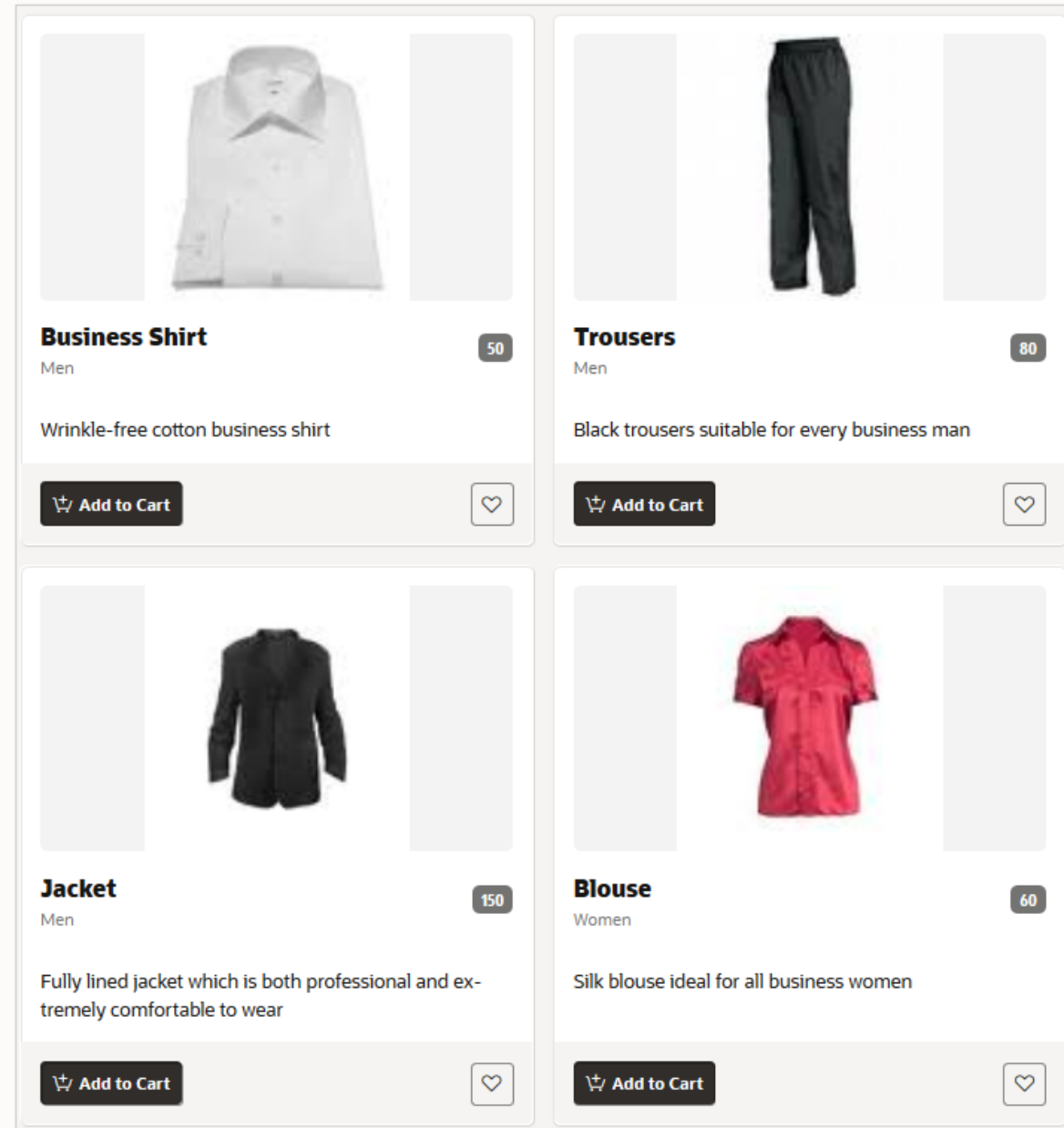
Faceted Search

- 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.



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

Search: All Text Columns

Go

Actions

Edit

Save

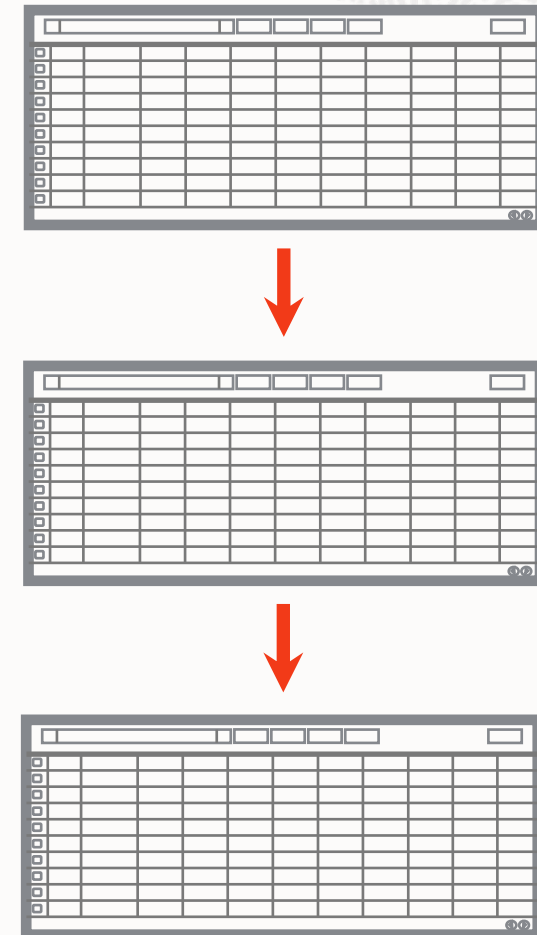
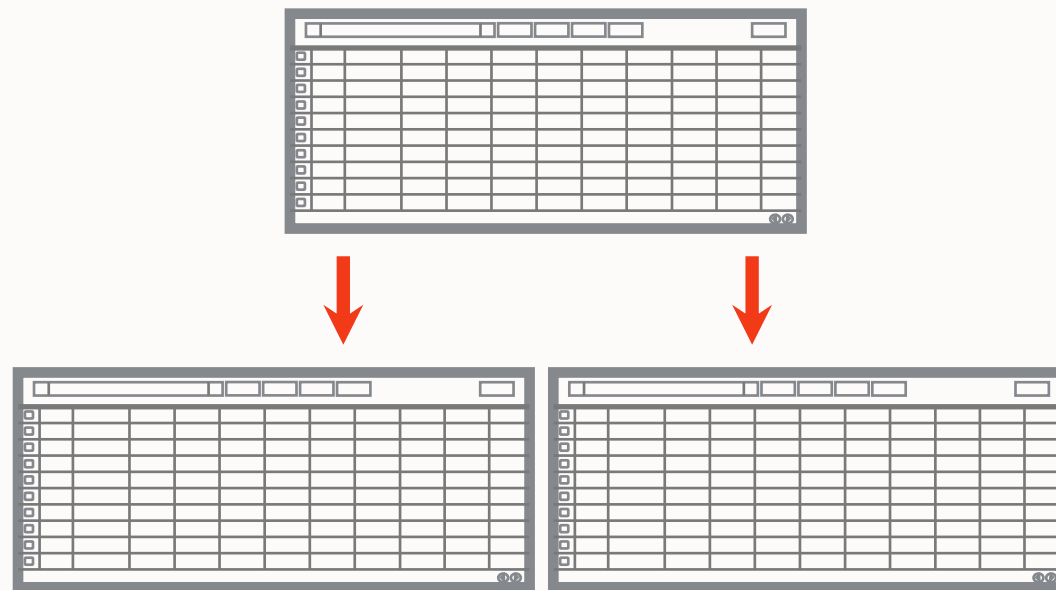
Add Row

Reset

<input type="checkbox"/>	<div></div>	Ename	Job	Mgr	Hiredate	Sal	Comm	Deptno
<input checked="" type="checkbox"/>	<div></div>	CLARK	MANAGER	KING	6/9/1981	2450		ACCOUNTING
<input type="checkbox"/>	<div></div>	JONES	MANAGER	KING	4/2/1981	2975		RESEARCH
<input type="checkbox"/>	<div></div>	BLAKE	MANAGER	KING	5/1/1981	2850		SALES
<input type="checkbox"/>	<div></div>	ALLEN	SALESMAN	BLAKE	2/20/1981	1600	300	SALES
<input type="checkbox"/>	<div></div>	WARD	SALESMAN	BLAKE	2/22/1981	1250	500	SALES
<input type="checkbox"/>	<div></div>	MARTIN	SALESMAN	BLAKE	9/28/1981	1250	1400	SALES
<input type="checkbox"/>	<div></div>	TURNER	SALESMAN	BLAKE	9/8/1981	1500	0	SALES
<input type="checkbox"/>	<div></div>	JAMES	CLERK	BLAKE	12/3/1981	950		SALES
<input type="checkbox"/>	<div></div>	MILLER	CLERK	CLARK	1/23/1982	1300		ACCOUNTING
<input type="checkbox"/>	<div></div>	SCOTT	ANALYST	JONES	12/9/1982	3000		RESEARCH
<input type="checkbox"/>	<div></div>	FORD	ANALYST	JONES	12/3/1981	3000		RESEARCH
<input type="checkbox"/>	<div></div>	ADAMS	CLERK	SCOTT	1/12/1983	1100		RESEARCH
<input type="checkbox"/>	<div></div>	SMITH	CLERK	FORD	12/17/1980	800		RESEARCH
<input type="checkbox"/>	<div></div>	KING	PRESIDENT		11/17/1981	5000		ACCOUNTING

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

The screenshot shows a modal dialog titled "Automated Test" overlaid on a background page titled "Sample Standard". The background page has a sidebar with sections like "Description", "Primary Development", "Started", "Types", and "Show All". The "Automated Test" dialog contains the following elements:

- Header:** "Automated Test" with a close button (X).
- Text:** "Automated tests are SQL queries which test specific parts of applications for compliance. 'Pass/Fail' tests should return a single value (Y or N) to indicate whether an application meets the requirements of the test or not. 'Report' tests should return a Y or an N in the first column for each record; the second column should be used for the ID column of the component being linked to; all other columns will be displayed in the report." and "The application ID will be used in the place of the Application Bind Variable parameter."
- Form Fields:**
 - Standard:** "Sample Standard"
 - Name ***: A text input field.
 - Type ***: A dropdown menu with "Report" selected.
 - Link to**: A dropdown menu with "- No Link -" selected.
 - Application Bind Variable ***: A text input field.
- Buttons:** "Cancel" and "Create" at the bottom right.

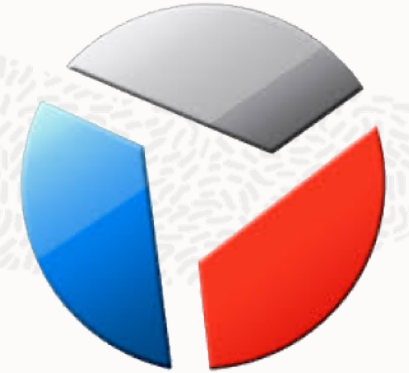
Charting Engine



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

Standard Calendars \

Monthly Calendar: Projects

This is a standard Oracle Application Express (APEX) calendar region component built using the create calendar region wizard. A **Button Bar** region was also created and a **P31_PROJECTS** page item to allow for filtering by project. Click on a calendar event to open a dialog which allows you to change details.

- All Projects -

◀ ▶ today

September 2020

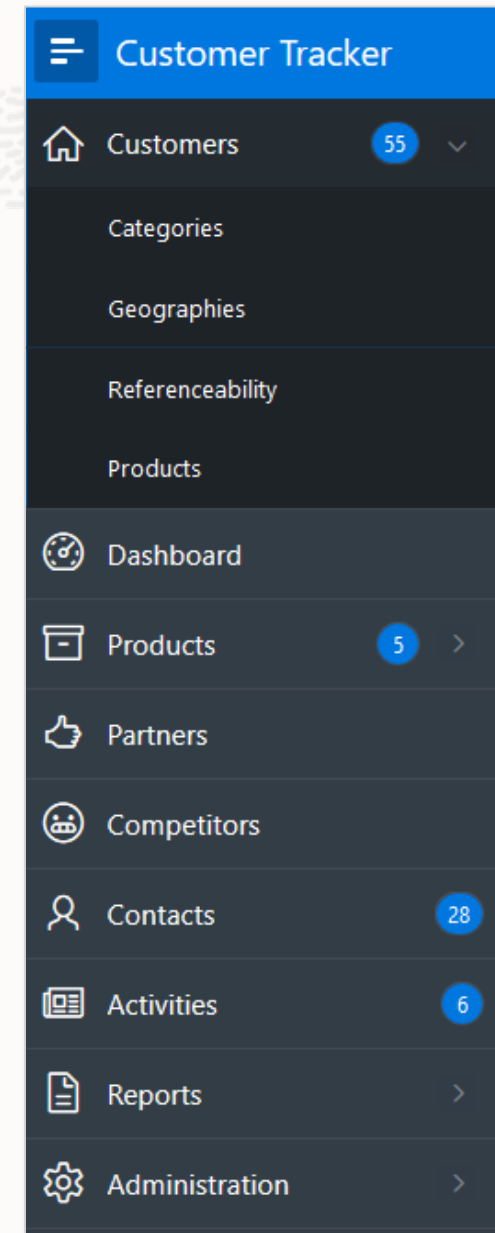
month list

Sun	Mon	Tue	Wed	Thu	Fri	Sat
30 Purchase additional software licenses Review with legal	31 Plan rollout schedule	1	2 Identify pilot desktop application	3	4 Complete plan Migrate pilot applications to ACME Web Express Measure effectiveness of improve	5
6	7 Check software licenses	8 Plan migration schedule	9 Create training workspace Identify pilot Client Server applic	10	11 Migrate pilot Client Server to ACME Web Express Collect mission-critical spreadsheets +3 more	12 +3 more
13 Migrate pilot Client Server to ACME Web Express Identify server requirements	14 Determine Web listener configura Lock spreadsheets	15 Post-migration review	16	17 Run installation	18 Implement in Production Plan migration schedule	19 Create pilot workspace
20 Conduct project kickoff meeting Train Administrators of Packaged	21 Get RFPs for new server	22	23 Migrate Client Server applications Create ACME Web Express applications from spreadsheets +2 more	24 +4 more	25 +3 more	26 Plan rollout schedule
27 Load current tasks and enhance	28 Select servers for Development, Test, Production Test migrated applications Send links to previous spreadsheets	29	30	1 Migrate desktop applications	2 User acceptance testing	3



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

Sample Dynamic Actions

Home

Simple

Style

Server Side

Execute PL/SQL Code

Set Values (SQL)

Set Values (PL/SQL)

Timer

Refresh

Filter and Refresh

Shuttle Refresh

Complex

Administration

Set Values (SQL) \ Edit

This page contains one dynamic action called 'GET DEPT INFORMATION'. This fires whenever the 'Department' page item changes and invokes an AJAX call that retrieves the 'Location' and 'Number of Employees' information for the selected department from the database.

It uses one native action ('Set Value' with a 'Set Type' of 'SQL Statement').

Employee Number 7698

Name BLAKE

Job MANAGER

Manager KING

Hire date 01-MAY-1981

Salary 2850

Commission

* Department SALES

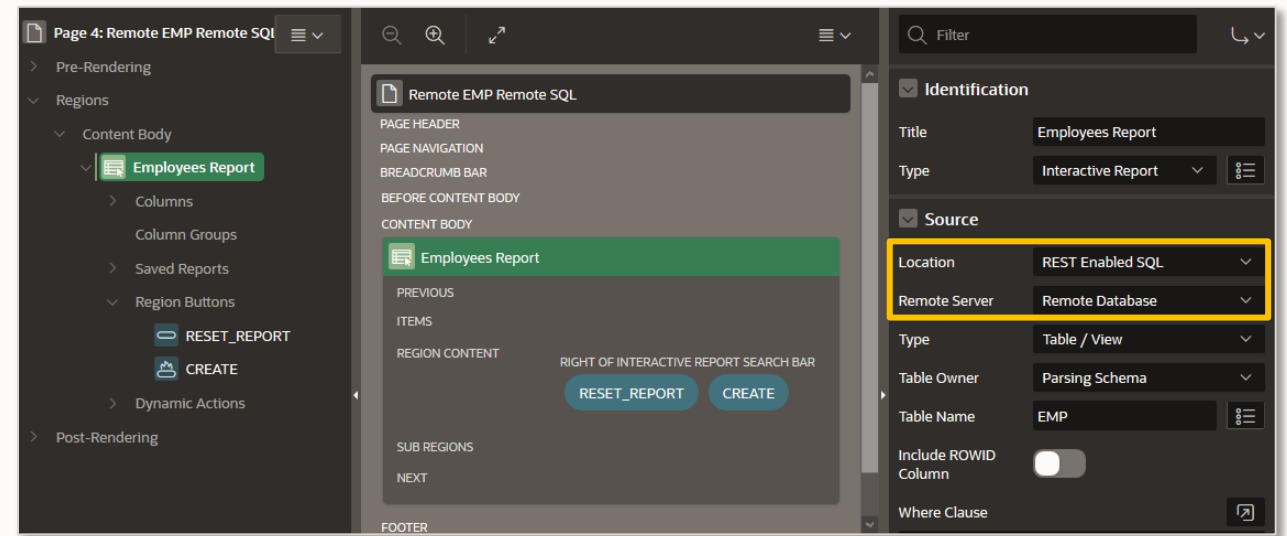
Location CHICAGO

Number of Employees 6

Cancel Apply Changes

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.

REST Data Source Delete Apply Changes

[Show All](#) [REST Data Source](#) [Authentication](#) [Data Profile](#) [Operations](#) [Parameters](#) [Subscription](#) [Advanced](#)

REST Data Source

Name Sample Application - Github Repository Commits

REST Data Source Type Simple HTTP

Remote Server Sample Application - Github Repositories

Base URL https://api.github.com/

URL Path Prefix repos/oracle/:repo/commits

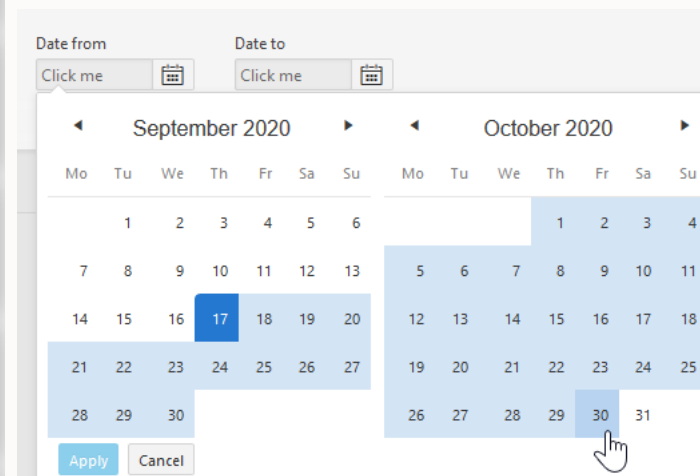
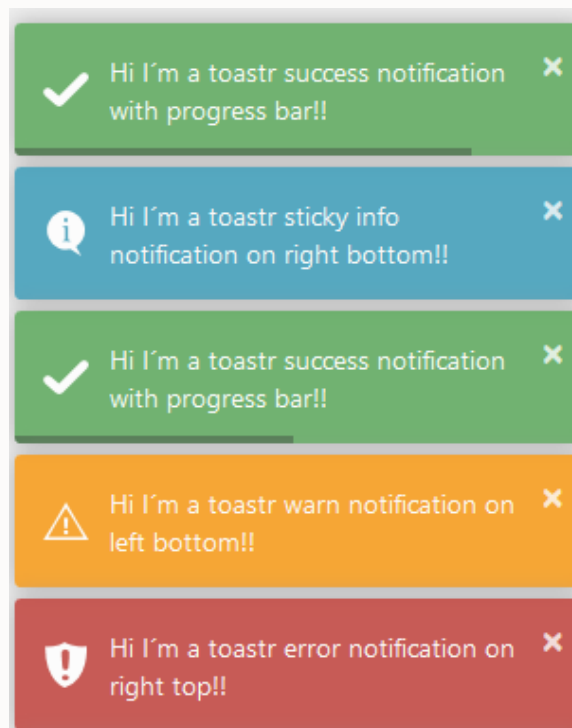
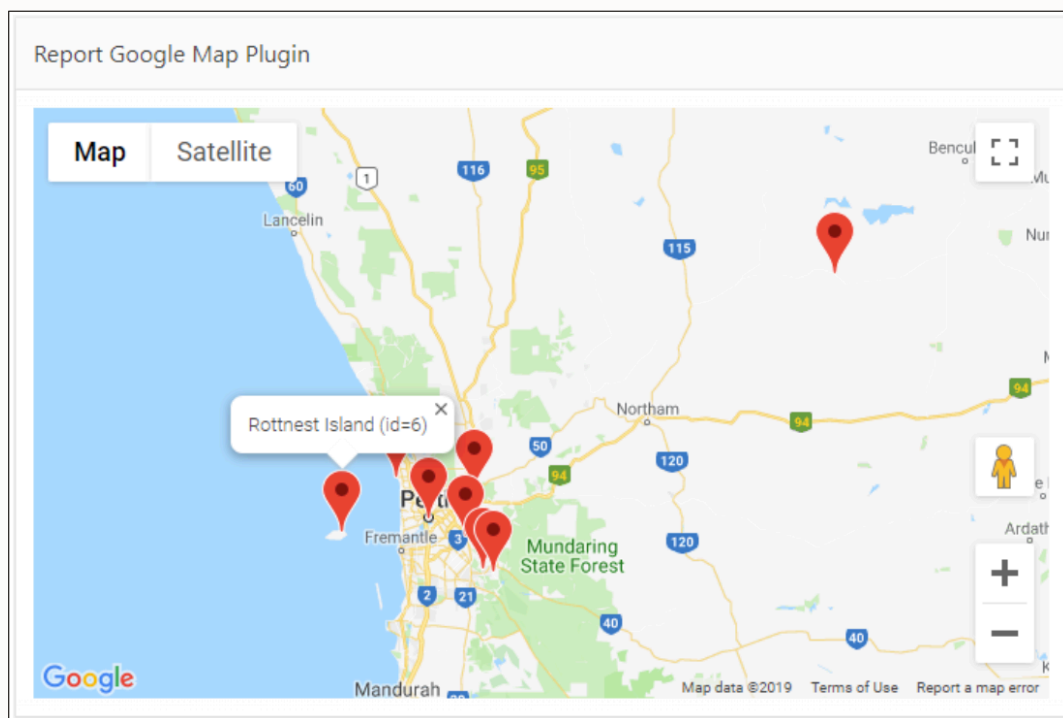
Consuming External REST APIs



- 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

<https://apex.oracle.com>

APEX Shortcuts

<https://apex.oracle.com/shortcuts>

APEX Community

<https://apex.oracle.com/community>

Blogs

<https://blogs.oracle.com/apex>

APEX on Autonomous

<https://apex.oracle.com/autonomous>

Database Cloud Services

<https://cloud.oracle.com/database>

Oracle Learning Library

<https://www.oracle.com/oll>

Oracle APEX Education

<https://apex.oracle.com/education>



Thank you

Presenter's Name

Presenter's Title

Organization, Division, or Business Unit