

ORACLE®

**DATABASE CLOUD –
DATABASE SCHEMA SERVICE**



Building Oracle Database Applications in the Cloud

ORACLE®



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Introduction

If you need a database schema and don't want to manage all the functionality of an Oracle Database instance in a virtual machine, [Oracle Database Cloud – Database Schema Service](#) is the Oracle Cloud service for you.

There are three major components of Database Schema Service: a platform to quickly develop and deploy applications, a set of easily installed built-in packaged applications, and the ability to conveniently access data using RESTful web services.

Build Applications Quickly

You automatically get [Oracle Application Express](#), a robust rapid application development environment. With this development environment, you can build state of the art desktop or mobile data-centric applications accessed through standard web browsers. You can readily enhance these into enterprise-level, mission critical systems.

Use Packaged Apps

Oracle Application Express also includes a variety of business productivity applications that can be installed with just a few clicks. These point solutions are designed to instantly solve many of the common business requirements you face. If necessary, you can unlock any of the packaged apps and enhance them to meet your specific needs.

Access Data with RESTful Web Services

You can use Oracle Application Express to define RESTful web services that consume data from other sources, which can then be utilized by applications in the Oracle Database Cloud Service. Using Oracle Application Express or [Oracle SQL Developer](#) you can also define RESTful web services that emit data queried from the Oracle Database Cloud Service which can then be used by external applications.



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Import Data

You import data into Oracle Database Cloud – Database Schema Service, by using either: Oracle SQL Developer or Oracle SQL Workshop (SQL Workshop) which are automated utilities. You can also use RESTful web services to create your own custom data loading process.

Import with SQL Developer

SQL Developer is a stand-alone tool that you install on your desktop. It gives you graphical access to your data and a simple wizard to load data and data structures into your service. You can download it for free from the Oracle Technology Network.

Import with SQL Workshop

Application Express includes SQL Workshop, a set of tools and utilities for working with data structures and data in the underlying database.

Import with RESTful Web Services

RESTful web services import data from outside your Oracle Cloud service. However, you'll need to write PL/SQL code to import the data and handle all other aspects of data import operations, such as marshalling data for upload.

Which Method Should You Use?

There are some differences in the process for each method. For example, SQL Developer runs as a separate client-side program and compresses data before transferring it to your Database Schema Service. SQL Workshop runs in your Database Schema Service and is accessed from a web browser. Importing large amounts of data is more efficient with SQL Developer. Making minor updates and modifications to data is easier with SQL Workshop.

Because using RESTful web services to import data requires more work than using SQL Developer or SQL Workshop, we recommend that you consider these utilities before you create your own approach.



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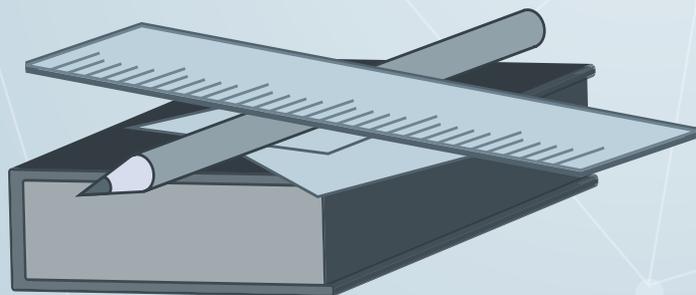
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Build Applications

Using Application Express, you can build applications to provide a user interface to the data in Oracle Database Cloud – Database Schema Service. The Application Express development environment is rich with utilities designed to help you create, maintain, secure, and administer applications.

Application Builder

You can create web applications that share data using only a web browser and needing only limited programming experience. You can deploy applications, manage users and application security by configuring application authentication and authorization access options.



SQL Workshop

You can view and manage database objects. You can update database objects, create new database objects, and populate them with data.

Team Development

You can manage the application development process with Team Development. From Team Development, you can track features, milestones, and bugs.

Packaged Applications

You can quickly install and run a variety of packaged business process applications. See [Use Packaged Apps](#).



Design, Develop, Deploy

Oracle Application Express enables you to design, develop, and deploy beautiful, responsive, database-driven applications using only your web browser. See how you can take advantage of this feature of the Oracle Database.

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Develop

Use the modern, intuitive, and powerful browser-based IDE to quickly build and run applications, enabling easy iterative development.



Customize/Design

Powerful and intuitive design tools enable easy and extensive customization of your application's UI.



Deliver

Deployment couldn't be simpler. It is as easy as providing your users the URL and user credentials to your application.



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Develop Applications

Use the modern, intuitive, and powerful browser-based IDE to quickly build and run applications, enabling easy iterative development. With Oracle Application Express, you can focus on the problem at hand. Much of the development process is managed for you: security, authentication, database interactions, input validation, session state management and many other dependencies work out of the box. All the tools you need are available in a single, extensible Oracle Database Cloud – Database Schema Service.

Powerful Tools and Development Features

Oracle Application Express offers all the tools you need to be productive: a modern browser-based IDE, drag and drop formatting, sophisticated code editing, and a rich property editor. Whether you are a citizen developer, or an experienced enterprise developer, Application Express minimizes the complexity involved with multi-faceted applications.

- Browser-based IDE
- Code editor with syntax highlighting and code completion
- Intuitive drag and drop formatting
- Make changes on the fly without having to compile or deploy
- Full SQL PL/SQL and JavaScript capabilities

- Seamless integration with the powerful features of the Oracle Database
- REST and SOAP Web Service integration
- Extensible with plug-ins
- Mobile user interfaces with jQuery Mobile





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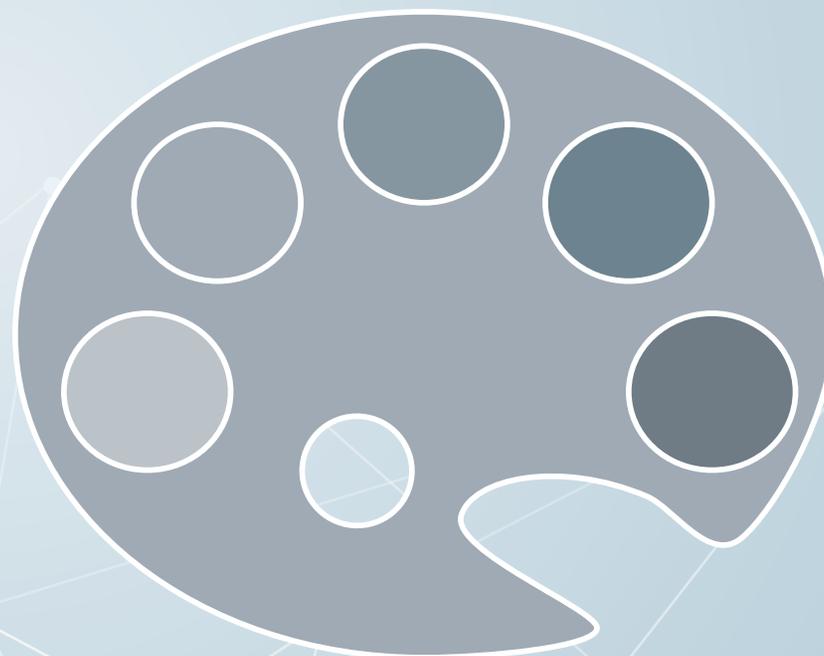
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Customize Applications

Customize your application's UI without writing a single line of CSS or Javascript. You can change everything from the way one button looks to the entire theme of the app, with a few points and clicks. All widgets and styles provided by Oracle Application Express have been tested extensively, meaning that your app will look good no matter what device or browser you use.

Effortless Design and Customization

- Fully customizable user interface
- All new responsive UI with smart layouts
- Accessibility-first approach to UI design
- Integration with FontAwesome icon library
- Modern UI components such as cards, media lists, and more
- Theme Roller to easily customize look and feel
- Template options to enable versatile, template-driven UI
- Powerful navigation controls





Deploy Applications

Oracle Application Express runs as a thin veneer over the Oracle Database. This means your application does not require complex build scripts to run in production. More importantly, your application automatically scales with your Oracle Database. You can seamlessly move applications to and from the Oracle Database Cloud – Database Schema Service, private clouds, public clouds, and on premises.

Simple Deployment to Oracle Cloud, On Premises, and More

- Portable application logic and data enables simple export/import.
- Easily deploy to Oracle Cloud, your private cloud, or third party public clouds.
- You can easily export an application and import into any other Oracle Database running Oracle Application Express.



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Use Packaged Apps

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Oracle Application Express includes a broad collection of point solutions called Packaged Apps. These are beautifully crafted and responsive Oracle Application Express applications that can be used out-of-the-box and are supported by Oracle. Examples include Project Tracking, Survey Builder, Meeting Minutes, and Group Calendar. There are 19 productivity applications in all. Additionally, there are 16 sample applications which are used to showcase the features of Oracle Application Express, from Sample Charts to Sample Data Loading. There's even a sample application demonstrating the powerful spatial capabilities present in every Oracle Database.

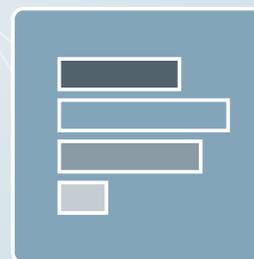
Along with the packaged applications, third-party applications that share the same infrastructure and user pool are supported.

Packaged Applications

Packaged applications are easily installed from Application Builder. They are fully supported by Oracle. You can add users, manage user access, and be operational in minutes.

Sample Code

The sample code is designed to illustrate a concept or demonstrate a technique. The samples are also easily installed, run, removed, and changed.





Oracle Applications Express 5

The result of a two and a half year engineering effort, Oracle Application Express 5 represents the greatest advancement of Oracle Application Express (APEX) in its ten-year history. Oracle Application Express 5 includes the following feature enhancements:

- Page Designer
- Universal Theme
- User interface enhancements
- All new Application Builder design
- Interactive reports
- Mobile reporting
- Modal dialogs
- All new calendar
- Packaged Applications

Two of the most prominent features, Page Designer and Universal Theme, are described in more detail on the following pages.

For more information on all of the new Application Express 5 features, visit the [Oracle Application Express New Features](#) web page.

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Page Designer is a modern, intuitive and exceedingly powerful browser-based IDE. It is a completely new IDE designed to greatly improve developer's productivity, allowing you to very quickly develop and maintain your Oracle Application Express applications. Page Designer provides better visual representation of your application pages, and provides an entirely new way to develop pages on the fly, via intuitive drag and drop. The enhanced code editor provides SQL and PL/SQL validation with inline errors, auto completion, syntax highlighting, search and replace with regex support, complete with undo and redo support.

Cohesive User Experience

With Page Designer, there is no context-switching when modifying multiple components. It is no longer necessary to drill into component pages simply to make changes. All modifications occur within Page Designer, where you can undo and redo changes as necessary, before saving your page.

Better Visual Representation

You can gain an immediate understanding of how your regions and items are laid out within the Grid Layout. Changes to components on your page are immediately reflected across the Rendering Tree and Grid Layout Property Editor. Additionally, errors and warnings are immediately visible.

Intuitive Drag and Drop

Page Designer completely reimagines 'drag and drop' and provides an entirely new way to develop pages on the fly. In the Grid Layout pane, you can drag new components from the Component Gallery, or move and copy existing components around. In the Tree pane, you can drag to move and copy multiple components at a time.

Enhanced Code Editor

It's never been easier to write code in Oracle Application Express. The new code editor provides SQL and PL/SQL validation with inline errors, auto completion, syntax highlighting, search and replace with regex support, complete with undo and redo support. You can even specify your preferences for tabs, indentation, and color scheme.



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Universal Theme

Universal Theme is an all-new user interface for your applications that has been built from the ground up for Oracle Application Express 5. It is a simpler, yet more capable theme that does away with excessive templates and enables effortless customization using the built-in Theme Roller and Template Options. Universal Theme aims to empower developers to build modern, responsive, sophisticated applications without requiring expert knowledge of HTML, CSS, or JavaScript.

Theme Roller

This flagship feature of Universal Theme enables easy customization of the look and feel of an application. You can tweak a number of style attributes and see changes applied to your application in real time. Once you are satisfied with the result, you can save your changes as a Theme Style directly to your app.

Template Options

Easily customize the way buttons, regions, lists, and other template-based components appear. A single template can be displayed in several different ways using these options. Universal Theme enables developers to use fewer templates but build far more versatile applications.

Responsive Design

Universal Theme has been designed to be responsive from the very beginning. You can build fully responsive apps that work flawlessly across a variety of screen sizes and form factors. Universal Theme includes key enhancements such as enabling complex form layout and using flexible grids.

Accessibility

Universal Theme delivers the most accessible user interface for applications built with Application Express. Theme Roller can be used to build accessible theme styles and includes built-in WCAG 2.0 color-contrast checking.



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With Oracle Database Cloud – Database Schema Service you can provide access to your data from applications that are outside of your service. For example, you can configure a RESTful web service to return all employee names for a department. The data exchange follows the REST architecture style. From an Oracle Application Express application within your Database Schema Service, you can access data outside of your service by consuming RESTful web services.

RESTful web services can be created from the Oracle Application Express wizard or from SQL Developer worksheets. To call the RESTful web service, use the RESTful web service URL. To learn how to control who has access to the RESTful web service, see Secure Data Access.

Creating RESTful Web Services with Application Express

For each web service you want your application to provide, you can configure a RESTful Service Module. This module is a grouping of common resource templates under a common URI prefix. For each method you want to expose that is associated with the same resource template prefix, you must define a resource handler.

Creating RESTful Web Services with SQL Developer

You can also use the RESTful Services Wizard and Object dialog boxes, provided by SQL Developer, to create RESTful web services.





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Oracle Database Cloud – Database Schema Service is based on a single schema. All data access through Oracle Application Express or RESTful web services to the service are run as the owner of the schema. Security for all Oracle Application Express applications can be easily managed and controlled through Application Express.

Without additional security limitations, all RESTful web services are public: any consumer that knows the URL of the RESTful web service can call the web service. You can add security at the module and handler levels for RESTful web services. These levels of security are separate from the security offered by Oracle Database Cloud.

RESTful Web Service Security at the Module and Handler Levels

Use Oracle Application Express to define security for a RESTful web service at the module and handler levels. These levels of security define who can access the web service.

To limit access at the module level, define a RESTful Service Privilege and assign it to one or more of your web services. To limit access at the handler level, add logic to the handler to deliver data based on user identity or some other variable included with the web service request.





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Moving an existing Oracle Database from your on-premises database instance to Oracle Database Cloud – Database Schema Service requires some effort. Any on-premises access that uses Oracle SQL*Net from outside Oracle Cloud needs to be migrated to methods supported by Oracle SQL Developer.

Moving Application Express Applications

Existing on-premises Oracle Application Express applications can be moved to Oracle Database Cloud – Database Schema Service, using Application Express import and export functions.

Migrating SQL Access Calls

You can use SQL Developer to move data in an Oracle database or other databases. You can load flat file data (.csv or .txt) or spreadsheet (.xls) data files using Oracle Application Express data loading utilities. Data can also be loaded using JSON and REST web service calls.



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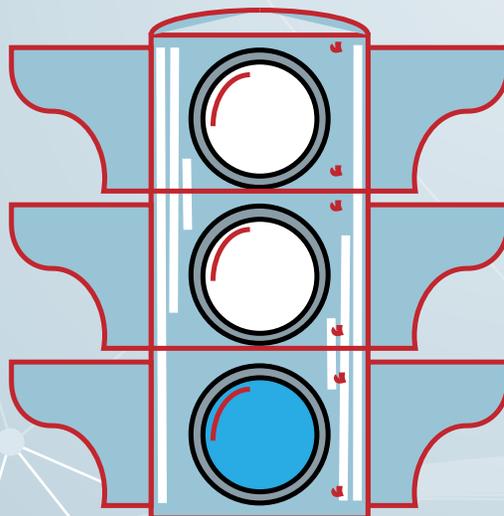
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