

# **CSC 244 – Database System Design**

California State University, Sacramento (CSUS)  
Computer Science Department  
Fall-2023

## **Project Proposal – Phase 2 Project Team - 7**

**Instructor – Ying Jin**

<i>Team Members</i>	<i>Contribution (%)</i>
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<i>Sandeep Reddy Yeruva</i>	<i>33</i>

### **Tools and Frameworks:**

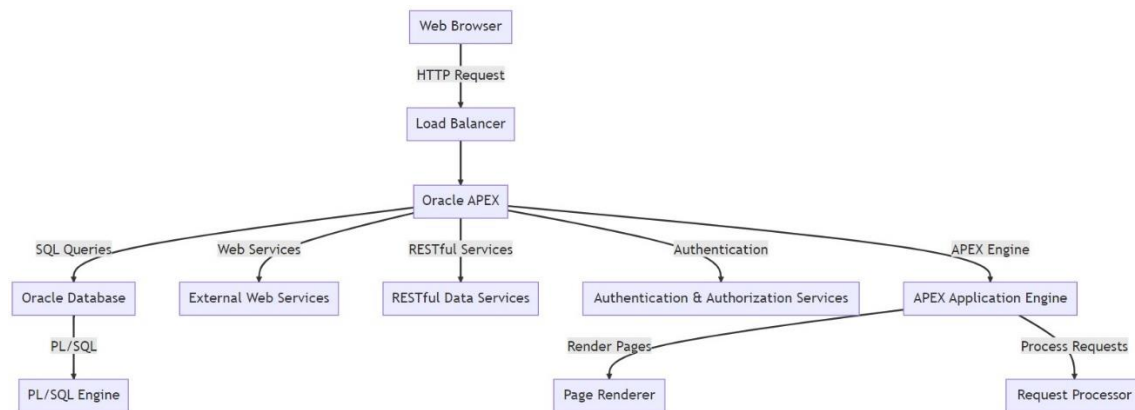
- Oracle Apex is the primary tool that we use to design, develop and deploy the applications/projects.
- Oracle Autonomous DB – It's a preconfigured database environment, where it supports both transaction processing and data warehousing applications.
- SQL Developer Web – We are using the web-based version of SQL Developer, which is integrated into Oracle Autonomous Database. Using SQL Developer Web, we will run SQL queries, manage database, and perform Database Related tasks.
- Oracle REST Data Services (ORDS) – With the help of Oracle REST data service, we will be able to develop the relational data in oracle database and with the help of these services and Apex tool, we will build our applications.
- Apex Inbuilt Plugins – Oracle Apex tools contains various built-in plugins, where we can display the data or perform analysis and present them in the form of charts, graphs etc.

## Where to Retrieve Real World Data:

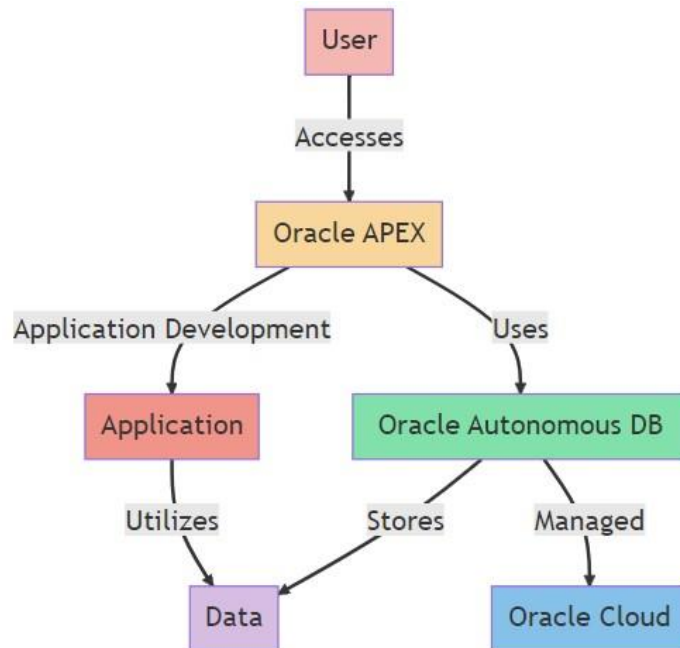
- In order to design an application using Oracle Apex, we need to input a dataset into Oracle Autonomous DB. In our project, we are making use of a Brazilian e-commerce public dataset by Olist (largest department store in Brazil marketplaces) available on the Kaggle website. This dataset has the data of 100k orders from 2016 to 2018 made at multiple market places in Brazil. Below is the link to access the dataset.

Link: <https://www.kaggle.com/datasets/olistbr/brazilian-ecommerce>

## Architectural Design and Design Flow:



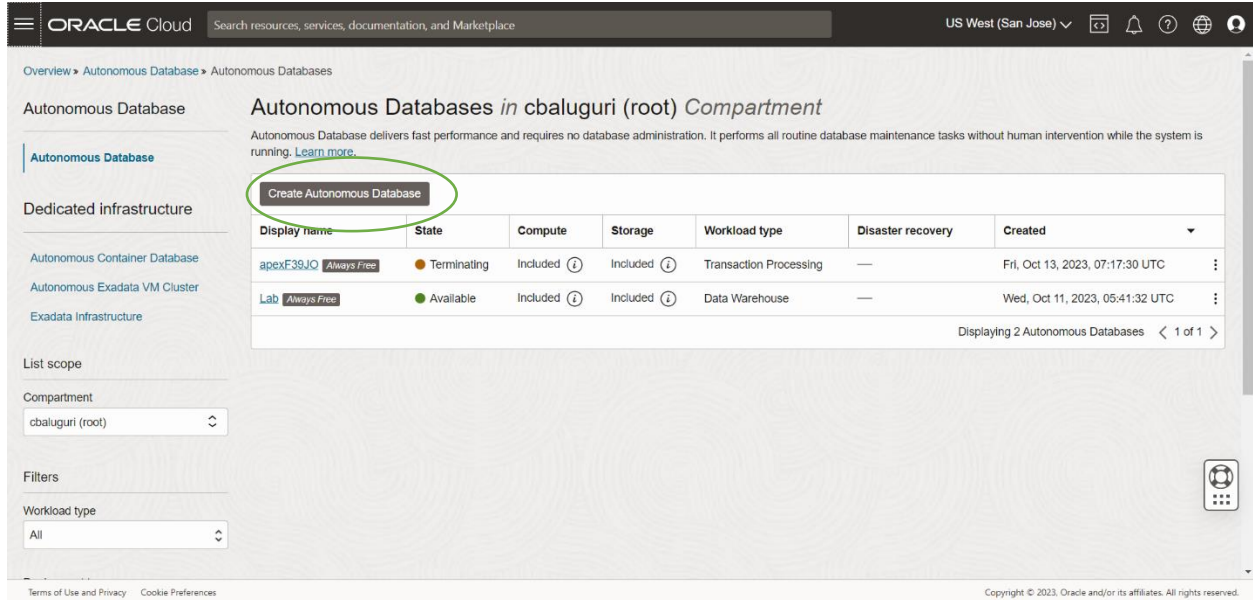
The flow chart gives a visual picture of the interactions and architecture of the oracle apex applications. An HTTP request is first performed to reach the APEX application via the user's web browser. The load balancer, which effectively distributes incoming traffic, receives this request first. The Oracle system platform receives the requests once it has been processed. Requests processing page rendering, and application logic all takes place here. Apex communicates with the Oracle Autonomous DB, which holds all application data and metadata, in order to perform data operations. Additionally, an Oracle SQL Engine for running procedural code is present in the database. For further functionality, APEX can also interface with external web services including RESTful Data services. To maintain security, separate services are in charge of managing user authentication and authorization.



- End-users' interaction with Oracle APEX, the user interacts with an application that is built using oracle APEX.
- Oracle APEX is a low-code development platform that allows user to build scalable and secure application, when building or running applications, APEX uses Oracle Autonomous Database to store and retrieve data.
- Application represents the software or system being developed or operated; this application uses data from Oracle Autonomous DB to perform the functions.
- Oracle Autonomous DB is Oracle's cloud native database service, which uses machine learning and automation to store data and provide self-driving, self-repairing and self-securing capabilities.
- Data represents the raw information or records that the application and the database handle.
- Oracle Cloud provides servers, storages, and other functionalities that allows businesses to run their applications in the cloud.

## Preliminary Implementation:

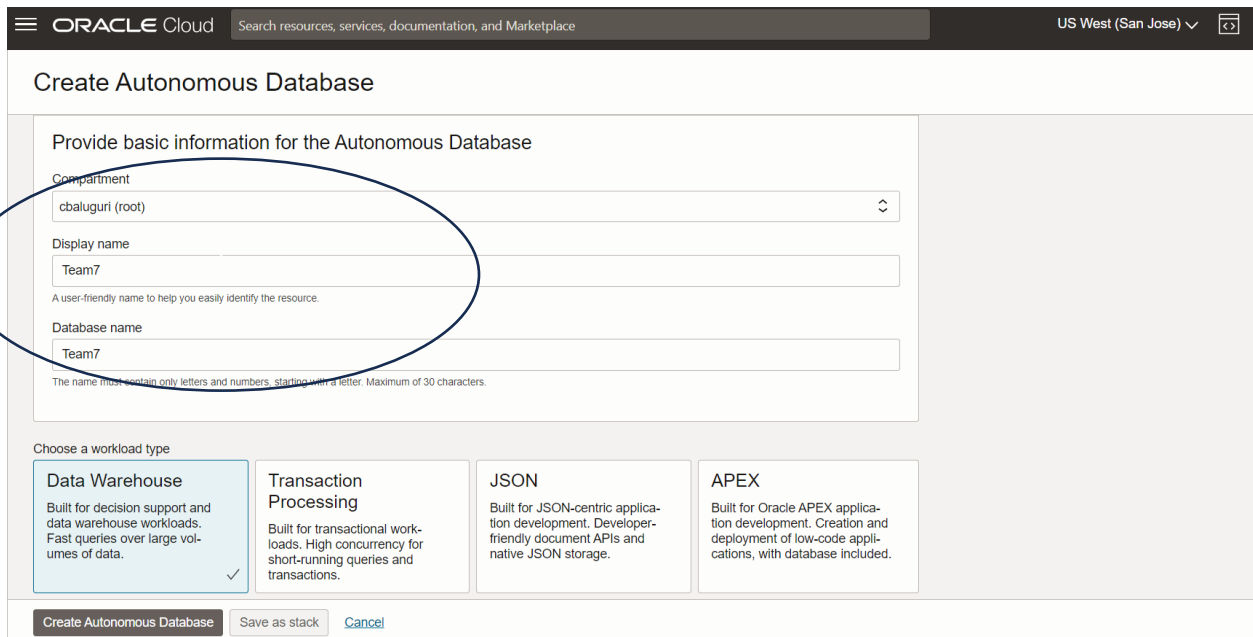
Create an Oracle Autonomous DB Instance from Oracle Cloud Infrastructure (OCI). We have created a free tier database instance service.



Oracle Cloud console showing the 'Autonomous Databases' page. The 'Create Autonomous Database' button is circled in green. The table below shows two databases:

Display name	State	Compute	Storage	Workload type	Disaster recovery	Created
apexF39JO	Always Free	Terminating	Included	Transaction Processing	—	Fri, Oct 13, 2023, 07:17:30 UTC
Lab	Always Free	Available	Included	Data Warehouse	—	Wed, Oct 11, 2023, 05:41:32 UTC

We can change the display and database name from default settings to user defined names.



Oracle Cloud console showing the 'Create Autonomous Database' form. The 'Display name' and 'Database name' fields are circled in blue. The 'Data Warehouse' workload type is selected.

Provide basic information for the Autonomous Database

Compartment: cbaluguri (root)

Display name: Team7

Database name: Team7

Choose a workload type

- Data Warehouse (Selected): Built for decision support and data warehouse workloads. Fast queries over large volumes of data.
- Transaction Processing: Built for transactional workloads. High concurrency for short-running queries and transactions.
- JSON: Built for JSON-centric application development. Developer-friendly document APIs and native JSON storage.
- APEX: Built for Oracle APEX application development. Creation and deployment of low-code applications, with database included.

Create Autonomous Database Save as stack Cancel

Once the details are provided, its firsts provision the database. During the provision, the database instance shows in orange color and wait until the instance turns into green color to use the database actions.

The screenshot displays the Oracle Cloud console interface for an Autonomous Database instance named 'Team7'. The instance is in the 'AVAILABLE' state, indicated by a green background and a green 'ADW' logo. The console shows various tabs for database actions, connection, performance, and resource allocation. The 'General information' tab is active, displaying details such as the database name, workload type (Data Warehouse), compartment, OCID, creation time, license type, database version, lifecycle state, instance type, character set, national character set, and mode. The 'Disaster recovery' and 'Backup' sections are also visible, showing that no active backups exist for this database.

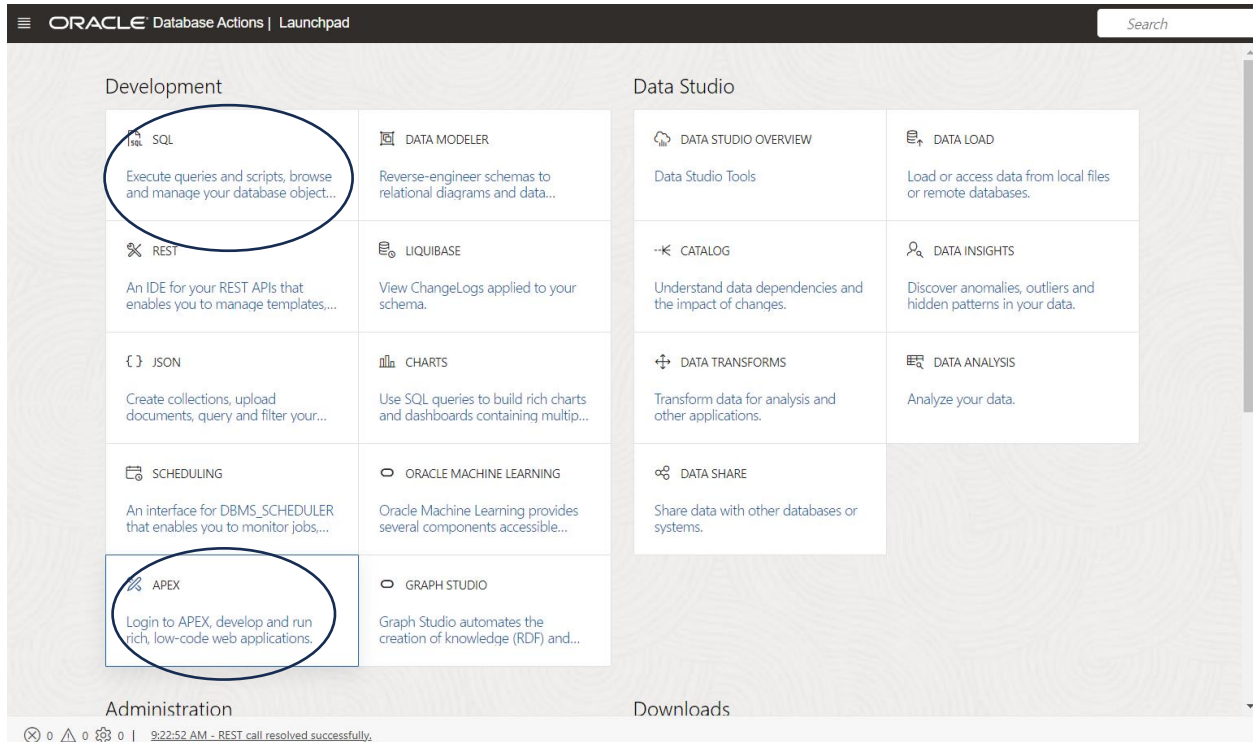
Oracle Cloud console showing the 'Team7' Autonomous Database instance. The instance is in the 'AVAILABLE' state (green background). The console displays various tabs for database actions, connection, performance, and resource allocation. The 'General information' tab is active, showing details like Database name, Workload type, Compartment, OCID, Created time, License type, Database version, Lifecycle state, Instance type, Character set, National character set, and Mode.

Once the database is available, you can find the database connections, where we can download the Instance wallet details, which contains the connection strings and keys needed for database connection or Oracle Apex connection.

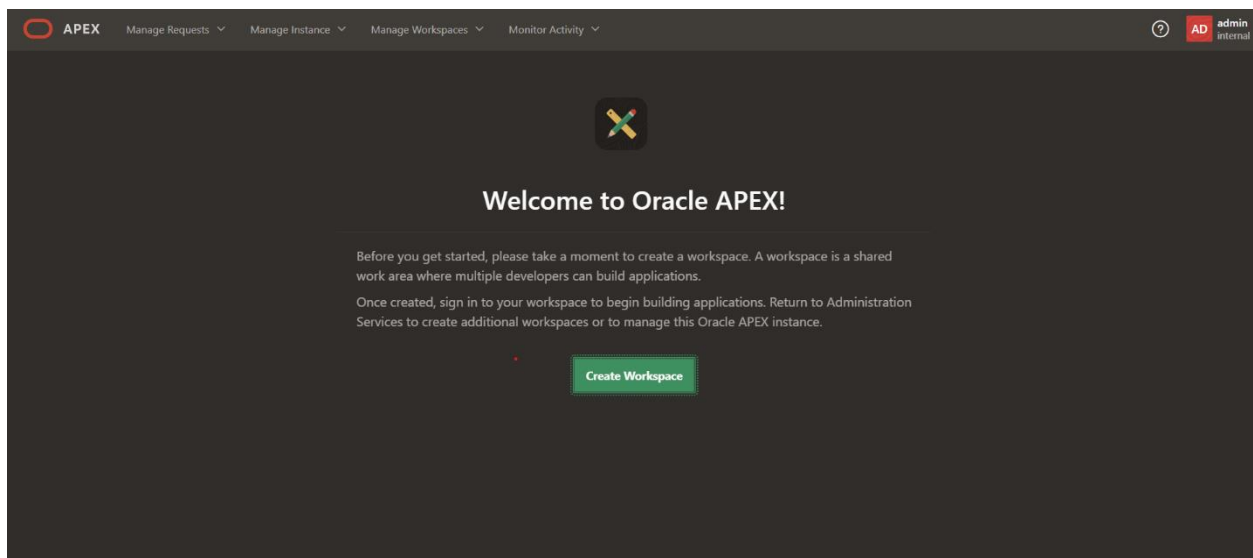
The screenshot shows the 'Database connection' panel for the 'Team7' Autonomous Database instance. The panel is divided into two main sections: 'Download client credentials (Wallet)' and 'Connection strings'. The 'Download client credentials (Wallet)' section allows users to select a wallet type (Instance wallet) and download or rotate the wallet. The 'Connection strings' section provides information on how to use connection strings or TNS names for connections, including TLS authentication details and a table for TNS names and connection strings.

Oracle Cloud console showing the 'Database connection' panel for the 'Team7' Autonomous Database instance. The panel displays options to download client credentials (wallet) and connection strings. The 'Download client credentials (Wallet)' section shows the wallet type (Instance wallet) and the 'Download wallet' button. The 'Connection strings' section shows the TNS name and connection string.

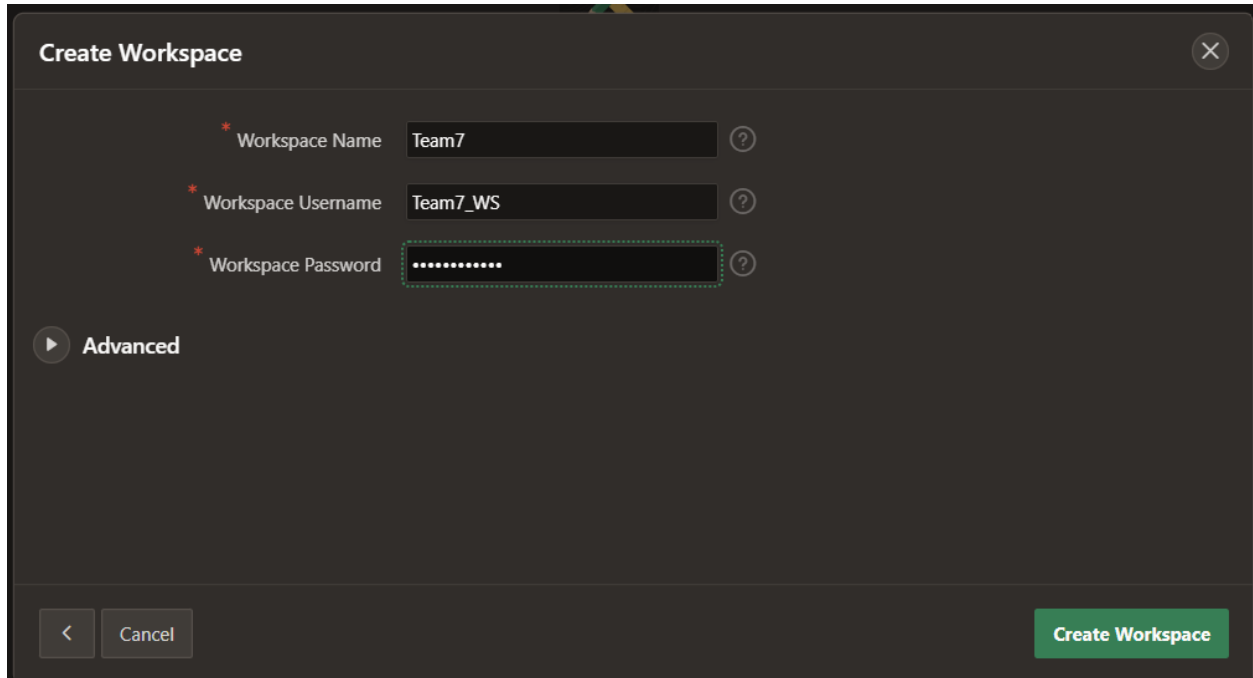
We can also navigate to Oracle Database actions and access SQL and Apex directly from the OCI.



Below is the Oracle Apex Welcome page and we need to create a workspace in order to develop the applications.



By providing the Apex Workspace name, Username and Password, we can create a workspace.



The screenshot shows the 'Create Workspace' dialog box in Oracle APEX. It has a dark theme and a close button (X) in the top right corner. The dialog contains three required fields, each marked with an asterisk (\*):

- Workspace Name:** The text 'Team7' is entered.
- Workspace Username:** The text 'Team7\_WS' is entered.
- Workspace Password:** The password is masked with dots.

Each field has a help icon (question mark) to its right. Below the fields is a section labeled 'Advanced' with a play button icon. At the bottom, there are three buttons: a back button with a left arrow, a 'Cancel' button, and a green 'Create Workspace' button.

Once, the Workspace is created, we will be redirected to Oracle Apex home page, where we can access App Builder to create the apps, SQL workshop to run the SQL queries and code development.

