



Accessing the Oracle APEX, ORDS and Database Actions from the Private Autonomous Database Using the OCI Bastion Service – Part 2

Development Tools – Oracle Support Services

Aug, 2024, Version [\[1.1\]](#)

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Public



Purpose Statement

This document provides the instructions necessary to configure the Oracle Autonomous Database in an OCI Private Subnet(as a private end point) and access it using Bastion service to connect with below Oracle Development Client tools and applications.

Part 1

[SQLplus](#)

[SQL Developer](#)

[SQL Developer for VS Code](#)

[SQLcl](#)

Ref: <https://blogs.oracle.com/fusionmiddlewaresupport/post/using-the-oracle-client-development-tools-to-connect-private-autonomous-database-using-oci-bastion-service-part-1>

Part 2

[Oracle APEX](#)

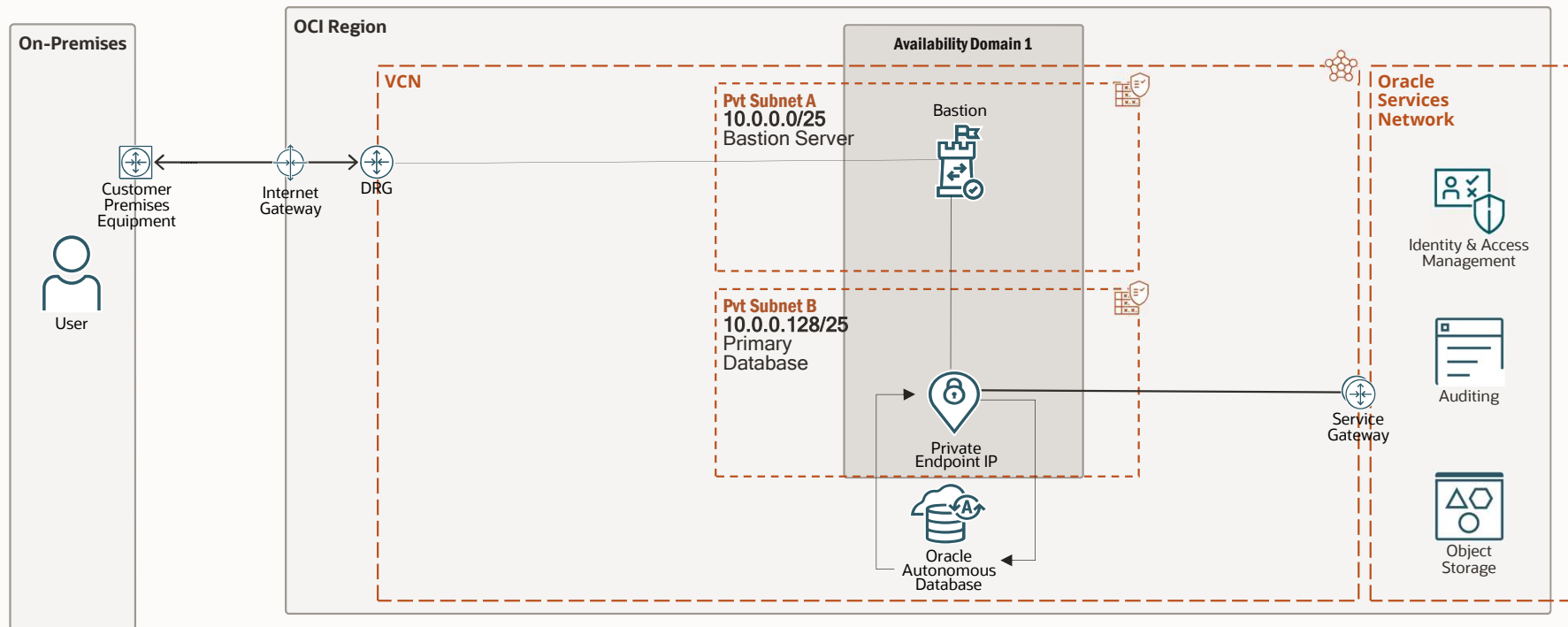
[ORDS\(Oracle REST Database Service\)](#)

[Database Actions\(Formerly SQL Developer Web\)](#)

It is assumed the tools above are used with the latest version available as of Aug-2024 and you have full access to the OCI console and compartments and IAM policies is already created.



Reference OCI Architecture



Use case

In a best designed OCI architecture all the Production databases are deployed in a Private Subnet with minimal and restricted access within the VCN network itself. From a production security standpoint, this is a typical setup but it is not easy for the Developers or Administrators to connect with the database for maintenance or short time development activity.

Such scenarios can be overcome at no cost by a OCI Bastion service, which is a fully managed service providing secured access to the private OCI resource. Prior to Bastion, a normal access setup would be to use a jump host at extra cost and that can lead to a weaker security for mission critical databases.

Now with the fast-growing OCI Autonomous Database which is a fully Oracle managed database service that is integrated with Generative AI, Analytics, and all types of production workloads built into a single service. The Developer and Administrator must access the databases for their activity. Oracle provides multiple Database Development tools for such activities. With a secured Autonomous database let us see how can we connect to the database using Bastion which is a time-bound, ephemeral SSH session service.

For more details on the OCI bastion service - <https://www.oracle.com/security/cloud-security/bastion/>



Pre-Requirement

It is expected the Part 1 series of this blog is already followed and below services are already provisioned.

<https://blogs.oracle.com/fusionmiddlewaresupport/post/using-the-oracle-client-development-tools-to-connect-private-autonomous-database-using-oci-bastion-service-part-1>

1. VCN
2. Autonomous Database
3. Bastion Service
4. Changes to the Autonomous Database wallet file
5. Amendments to the NSG(Network Security Group) in the VCN
6. Tested with SQLplus, SQL Developer, SQLcl and the database connection is successful



Working with ADB In-built Oracle APEX



From the Part1the 1522 Database port rule was enabled in the NSG to be accessed by the Bastion host. Similarly, as a first step create a NSG rule to allow Bastion host to access 443 port from the Autonomous Database. Click on the Add rules in the NSG Group Details.

ORACLE Cloud

Cloud Classic >

Search resources, services, documentation, and Marketplace

Japan East (Tokyo) >

Networking > Virtual cloud networks > adb-vcn-1 > Network Security Group Details

NSG

AVAILABLE

Edit

Move resource

Add tags

Terminate

Network Security Group Information

Tags

OCID: . Show Copy

Compartment:

Created: Fri, Apr 26, 2024, 14:15:54 UTC

Resources

Security Rules

VNICs

Filters

Direction

- Egress
- Ingress

➡

Add Rules

Edit

Remove

☐	Direction ⓘ	Source or Destination ⓘ	Protocol ⓘ	Details ⓘ	Description ⓘ
☐	Direction: Ingress ☐ Stateless: No	Source Type: CIDR Source: 10.0.0.0/25	TCP	Source Port Range: All Destination Port Range: 1522 Allow: TCP tra... Show	AllowBastionToAccessADB

0 selected

Showing 1 item < 1 of 1 >

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Create a new rule to allow port 443 for the CIDR **10.0.0.0/25** - PvtSubnetA

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Japan East (Tokyo) v

Add Rule

[Help](#)

Add Security Rules

Optionally add one or more rules to the network security group. [Learn more about security rules.](#)

Rule

☐ Stateless ⓘ

Direction

Ingress

IP Protocol ⓘ

TCP

Allows: Allows TCP traffic 443 HTTPS

Description ⓘ

AccessForADBApex

Maximum 255 characters

Source Type ⓘ

CIDR

Source Port Range ⓘ

all

Source CIDR ⓘ

10.0.0.0/25

Specified IP addresses: 10.0.0.0-10.0.0.127 (128 IP addresses)

Destination Port Range ⓘ

443

+ Another Rule

Add

Cancel



Now the NSG should have 2 rules, 1522 for the database and 443 for accessing the APEX application

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Cloud Classic >

Search resources, services, documentation, and Marketplace

Japan East (Tokyo)     

Networking > Virtual cloud networks > adb-vcn-1 > Network Security Group Details



AVAILABLE

AllowbastionNSG

Edit

Move resource

Add tags

Terminate

Network Security Group Information

Tags

OCID:  [Show](#) [Copy](#)

Compartment: 

Created: Fri, Apr 26, 2024, 14:15:54 UTC

Resources

Security Rules

VNICs

Filters

Direction

- ☒ Egress
- ☒ Ingress

Add Rules

Edit

Remove

☐	Direction 	Source or Destination 	Protocol 	Details 	Description 
☐	Direction: Ingress	Source Type: CIDR	TCP	Source Port Range: All Destination Port Range: 1522 Allow: TCP tra... Show	AllowBastionToAccessADB
☐	Stateless: No	Source: 10.0.0.0/25			
☐	Direction: Ingress	Source Type: CIDR	TCP	Source Port Range: All Destination Port Range: 443 Allow: TCP tra... Show	AccessForADBApex
☐	Stateless: No	Source: 10.0.0.0/25			



In the existing Bastion “adbdemobastion”, create a new SSH port forwarding session for port 443 with the IP Address of the Autonomous database.

Choose the Session type – SSH port forwarding session.

Update the Session name

Choose the Connect to the target host – IP address

IP address – Enter the IP address of the Autonomous Database machine.

Port – 443

Choose to Generate SSH key pair or if already key exists Choose SSH key file

The screenshot displays the Oracle Cloud console interface. On the left, a sidebar shows the navigation menu with 'Security > Bastion > adbdemobastion' selected. The main content area is divided into two panels. The left panel, titled 'adbdemobastion', shows the bastion host's status as 'ACTIVE' and provides details such as OCID, creation time, target virtual cloud network, target subnet, and maximum session time-to-live (TTL). The right panel, titled 'Create session', contains a form for creating a new session. The form fields include: Bastion name (adbdemobastion), Session type (SSH port forwarding session), Session name (ssh2for443), Connect to the target host by using (IP address selected), IP address (10.0.0.157), Port (443), and Add SSH key (Choose SSH key file selected). The 'Add SSH key' section includes a text area for the SSH key and a button to 'Or browse...'. At the bottom of the form, there are 'Create session' and 'Cancel' buttons. The footer of the console shows 'Terms of Use and Privacy' and 'Cookie Preferences' on the left, and 'Copyright © 2024, Oracle and/or its affiliates. All rights reserved.' on the right.

ORACLE Cloud Cloud Classic > Search resources, services, documentation, and Marketplace Japan East (Tokyo) ?

Security > Bastion > adbdemobastion

adbdemobastion

Edit Add tags Move resource Delete bastion

Bastion information Tags

OCID: [redacted] Show Copy

Created: Sat, 27 Apr 2024 10:28:48 UTC

Target virtual cloud network: [adb-vcn-1](#)

Target subnet: [PvtSubnetA](#)

Maximum session time-to-live (TTL): 3 hours, 00 m

ACTIVE

Resources

Sessions

Create session

Name	Session type	T
ssh1for443	Port forwarding	10

State

Any state

Create session

Bastion name
adbdemobastion

Session type
SSH port forwarding session

Session name
ssh2for443

Connect to the target host by using:
☒ IP address ☐ Instance name

IP address
10.0.0.157

Port
443

Add SSH key

Select SSH key options:
☒ Choose SSH key file ☐ Paste SSH key ☐ Generate SSH key pair

SSH key
Drop file here Or browse...
SSH public key (.pub) files only.

Bastionkey1522.pub x

Create session Cancel

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A new SSH session will be create for 3 hours and the state should be Active. Click on the Kebab menu (3 vertical dots) right corner of the SSH session to show options and click on “View SSH command”.

adbdemobastion

OCID: [redacted] [Show](#) [Copy](#)
Created: Sat, 27 Apr 2024 10:28:48 UTC
Target virtual cloud network: [adb-vcn-1](#)
Target subnet: [PvtSubnetA](#)
Maximum session time-to-live (TTL): 3 hours, 00 minutes

CIDR block allowlist: 0.0.0.0/0
Compartment: [redacted]
Private endpoint IP address: 10.0.0.27
Bastion type: Standard
FQDN support: Disabled
SOCKS5 support: Disabled

Sessions

Name	Session type	Target resource	Target port	Username	State	Session TTL	Started	
ssh2for443	Port forwarding	10.0.0.157	443	-	Active	3 hours, 00 minutes	Tue, Aug 20, 2024, 14:37:31 UTC	Edit session name
ssh1for443	Port forwarding	10.0.0.157	443	-	Deleted	3 hours, 00 minutes	Tue, Aug 20, 2024, 13:35:05 UTC	View SSH command

[Copy SSH command](#)
[Copy OCID](#)
[Delete session](#)
[Open support request](#)

View SSH command

[Help](#)

SSH command *Read-only*

```
ssh -i <privateKey> -N -L <localPort>:10.0.0.157:443 -p 22 ocid1.bastionsession.oc1.ap-tokyo-1-[redacted]@host.bastion.ap-tokyo-1.oc1.oraclecloud.com
```

[Copy](#)

When you use this command to establish an SSH connection to the target host, replace the placeholder text appropriately. For managed SSH sessions, replace the placeholder with the path to the private key (from the SSH key pair used to create the session). For SSH port forwarding sessions, replace the placeholders with the path to the private key and the local port on the machine from which you plan to run the SSH commands, respectively.

[Close](#)



By default the SSH command available from the OCI bastion is below

```
ssh -i <privateKey> -N -L <localPort>:10.0.0.157:443 -p 22 ocid1.bastionsession.oc1.ap-tokyo-1.XXXXXXXXXX@host.bastion.ap-tokyo-1.oci.oraclecloud.com
```

Replace the values to match the local machine details and capture addition details -v for debugging.

```
ssh -o ConnectTimeout=7200 -i <privateKey> -v -N -L 443:10.0.0.157:1443 -p 22 ocid1.bastionsession.oc1.ap-tokyo-1.XXXXXXXXXX@host.bastion.ap-tokyo-1.oci.oraclecloud.com
```

Running the above command should be forwarding the session to localhost with port 443.

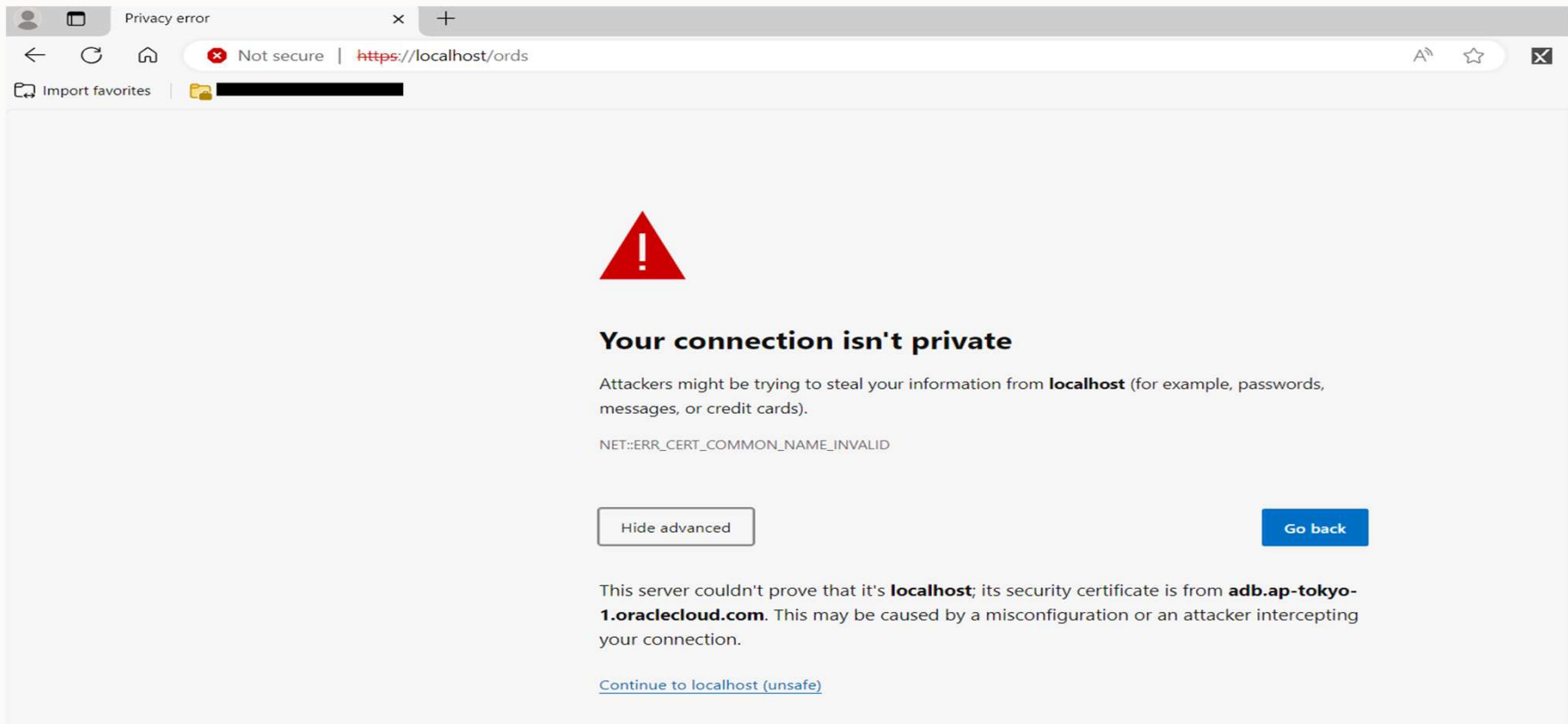
```
debug1: Authentication succeeded (publickey).
Authenticated to host.bastion.ap-tokyo-1.oci.oraclecloud.com ([REDACTED]:22).
debug1: Local connections to LOCALHOST:443 forwarded to remote address 10.0.0.157:443
debug1: Local forwarding listening on ::1 port 443.
debug1: channel 0: new [port listener]
debug1: Local forwarding listening on 127.0.0.1 port 443.
debug1: channel 1: new [port listener]
debug1: Entering interactive session.
debug1: pledge: filesystem full
```



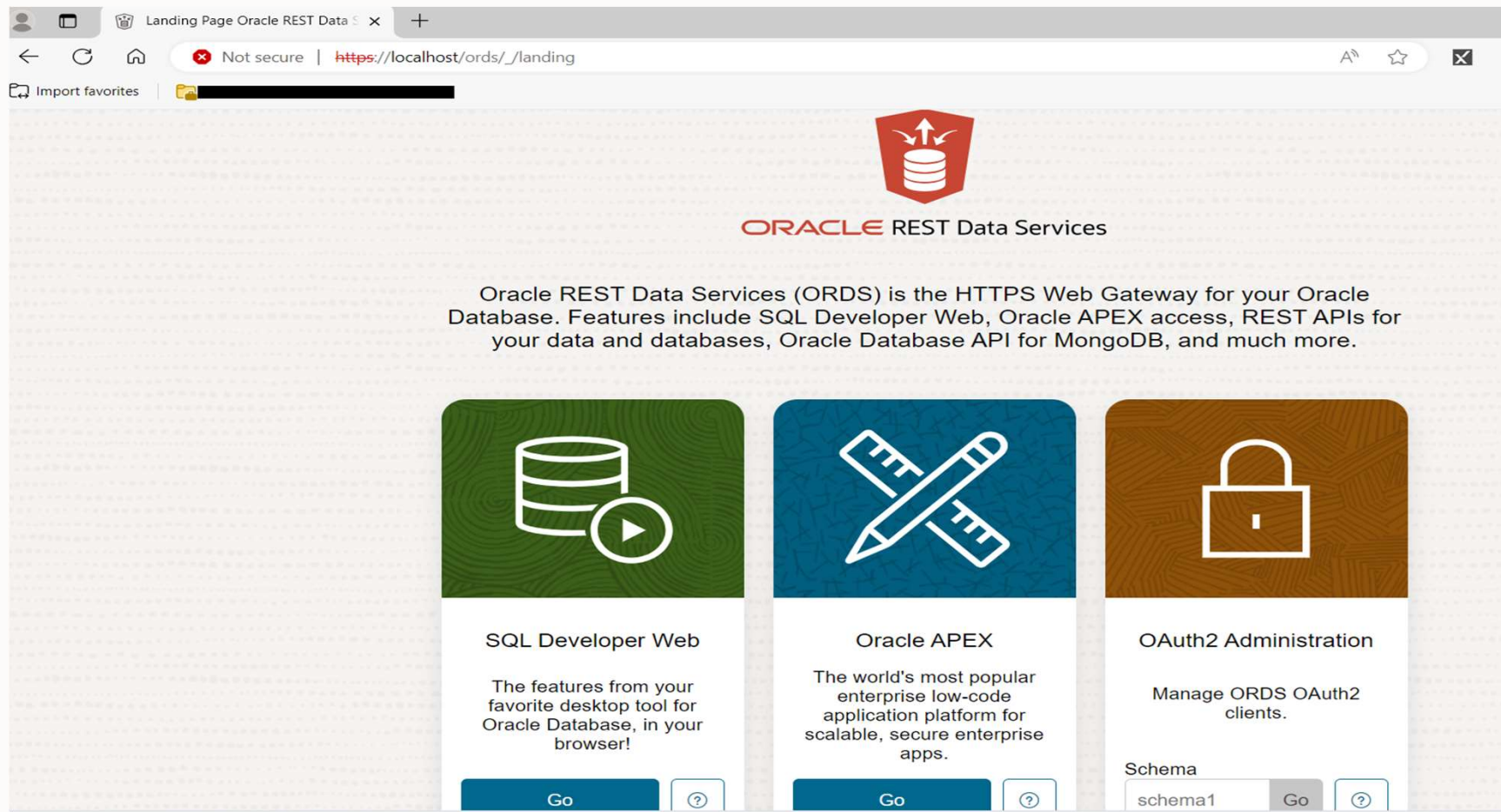
To access APEX application from ADB, run the below url

<https://localhost/ords>

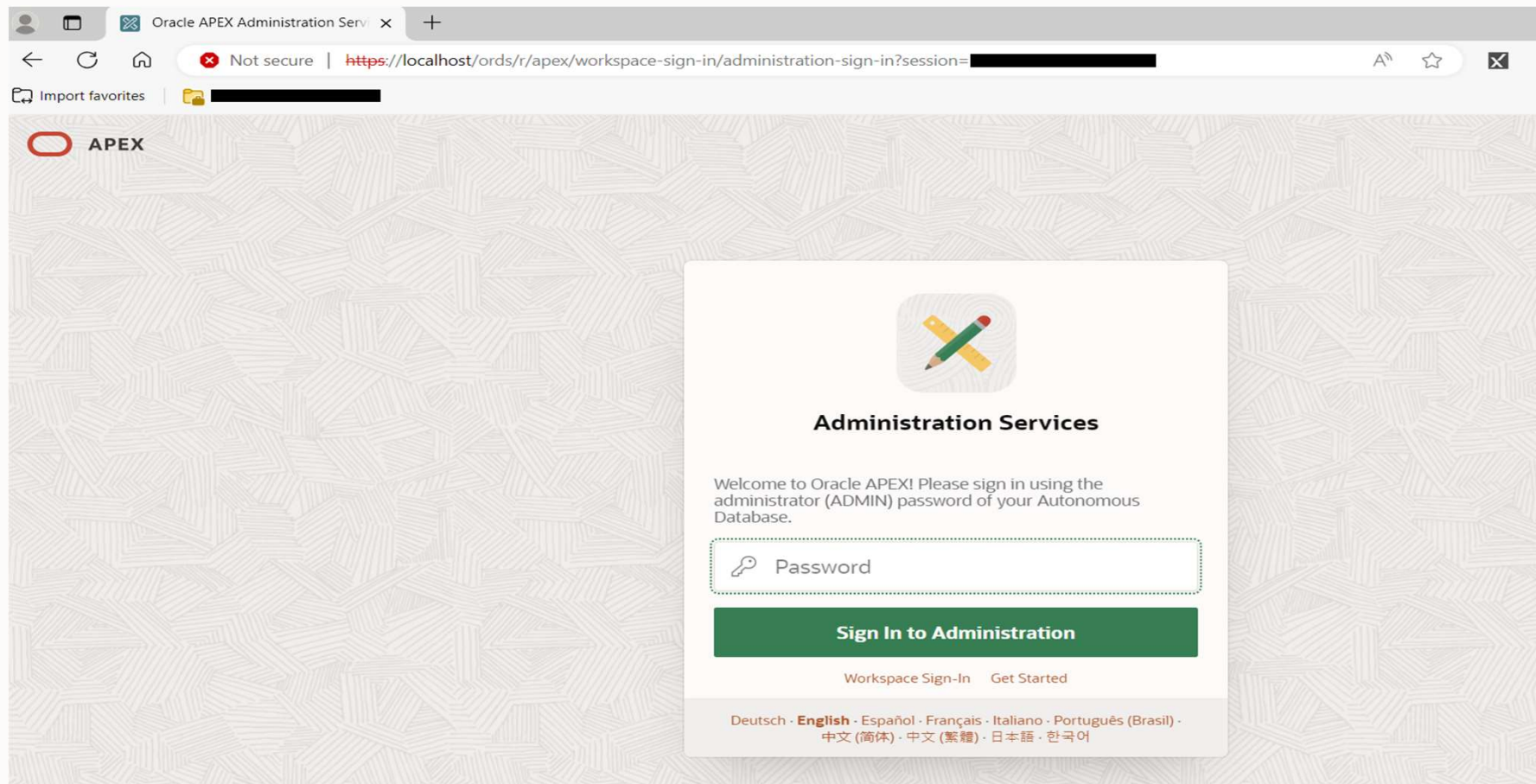
A warning will be displayed which is expected because the certificates used by the APEX is not recognized by the browser. Click on Advanced can continue to proceed with warning.



Continue to proceed with the warning should land on the ORDS/APEX landing page



Under Oracle Apex, click on “Go” button to launch the Oracle Apex application



Accessing Database Actions(Formerly SQL Developer Web)



Assuming the SSH session is still running for the port 443, in the ORDS landing page, click on the “Go” button under SQL Developer Web or launch the Database Actions using direct URL - <https://localhost/ords/sql-developer>

Landing Page Oracle REST Data Services x

Not secure | https://localhost/ords/_/landing

Import favorites

ORACLE REST Data Services

Oracle REST Data Services (ORDS) is the HTTPS Web Gateway for your Oracle Database. Features include SQL Developer Web, Oracle APEX access, REST APIs for your data and databases, Oracle Database API for MongoDB, and much more.

SQL Developer Web

The features from your favorite desktop tool for Oracle Database, in your browser!

Go ?

Oracle APEX

The world's most popular enterprise low-code application platform for scalable, secure enterprise apps.

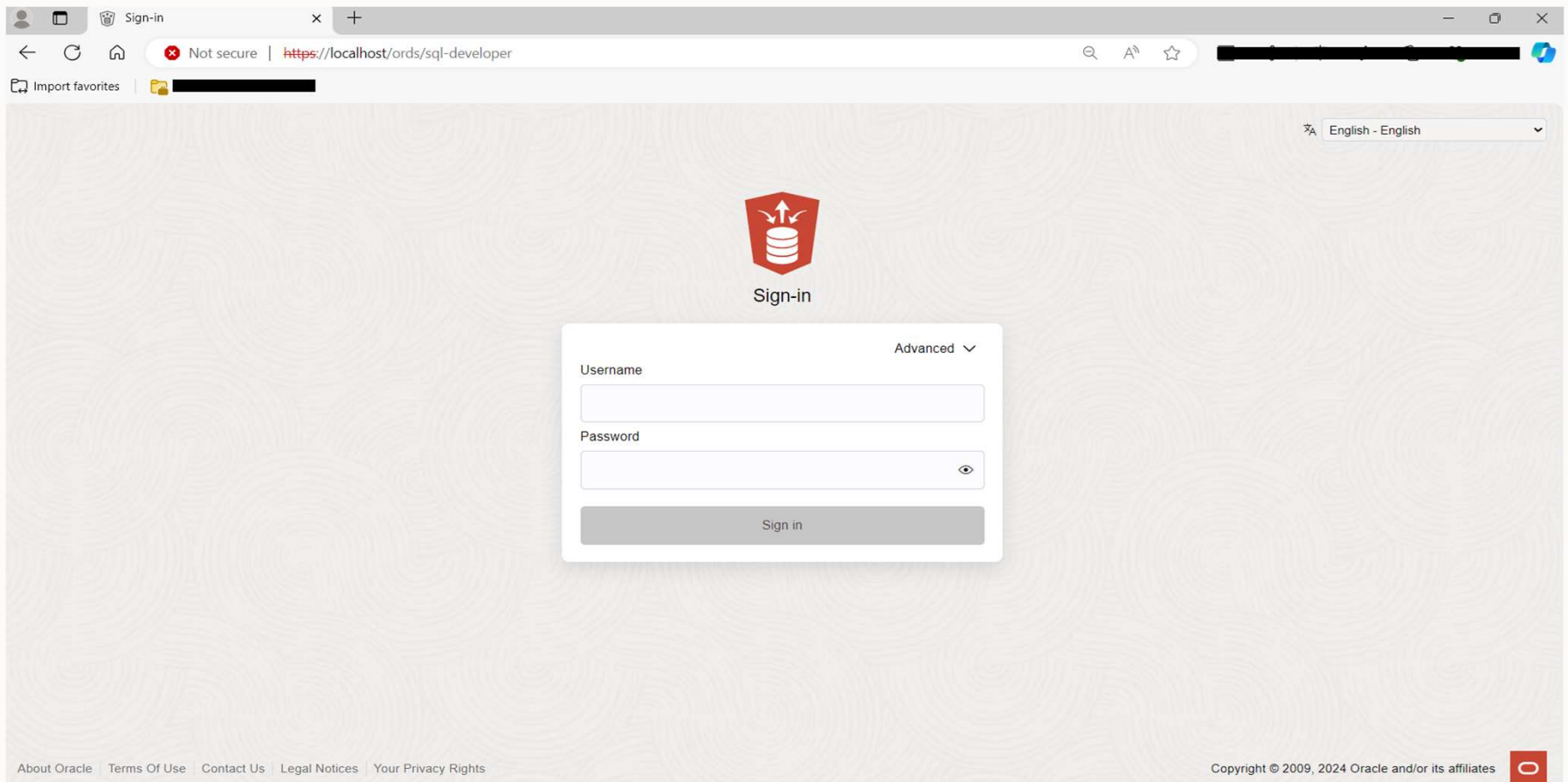
Go ?

OAuth2 Administration

Manage ORDS OAuth2 clients.

Schema
schema1 **Go** ?

Running the direct URL should land on the home page of Database Actions - <https://localhost/ords/sql-developer>



Login the Database Actions Home page using the database credentials to land on the Database Actions Launchpad page.

Oracle Database Actions

Not secure | https://localhost/ords/.../_sdw/

Import favorites

ORACLE Database Actions | Launchpad

Search Database (Ctrl+K)

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Oracle Machine Learning

APEX

Graph Studio

SQL

The SQL worksheet is where most of your work will be performed. Running SQL queries and scripts, creating and browsing objects, loading data, exporting data to CSV or JSON, and so much more. Your day will often start and end in the SQL interface.

```
1 drop table demo_emp;
2 drop materialized view demo_emp_mv;
3
4 create table demo_emp (
5   id number primary key,
6   name varchar2(255),
7   sal number
8 );
9
10 insert into demo_emp values(1, 'martin', 100);
11
```

Query Result

NAME	PAY	SAL
martin	100	1
scott	200	1

Elapsed: 00:00:00.004
2 rows selected.

Documentation

[Loading Data](#)

[Executing SQL Statements](#)

Walk through Open

1 0 0 | 3:09:49 PM - REST call failed.

Powered by ORDS



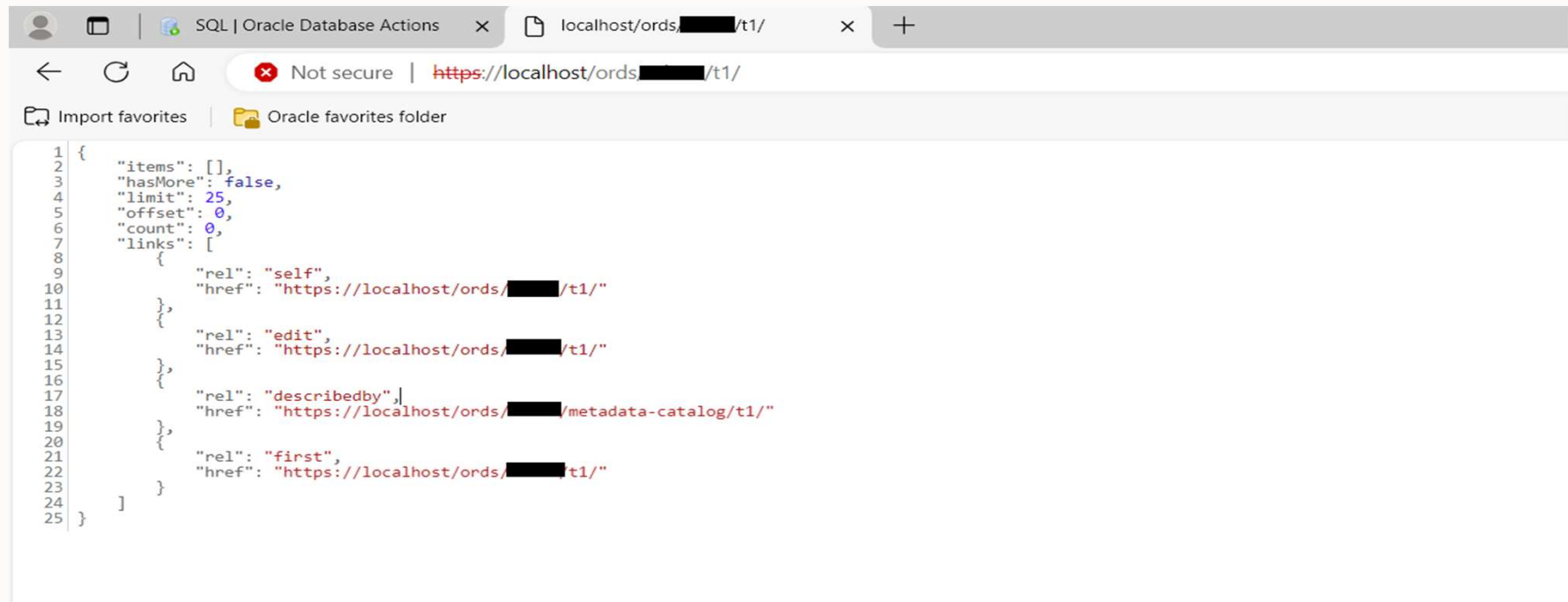
Accessing ORDS(Oracle REST Database Service)



For this demo a test table - **t1** using Database Actions is created and it is AutoREST enabled, the tables REST URL is below
<https://localhost/ords/admin/t1/>

Assuming the SSH port forward connection created for APEX is still running for port 443. Try to access the above url using curl and in the browser. The table meta-data is displayed, this shows the ORDS is accessible.

```
C:\Users\>curl -k --location "https://localhost/ords/ /t1/"
{"items":[,"hasMore":false,"limit":25,"offset":0,"count":0,"links":[{"rel":"self","href":"https://localhost/ords/ /t1/","rel":"edit","href":"https://localhost/ords/ /t1/","rel":"describedby","href":"https://localhost/ords/ /metadata-catalog/t1/","rel":"first","href":"https://localhost/ords/ /t1/"}]}
```



References

Overview of VCNs and Subnets

https://docs.oracle.com/en-us/iaas/Content/Network/Tasks/Overview_of_VCNs_and_Subnets.htm

Bastion

<https://docs.oracle.com/en-us/iaas/Content/Bastion/home.htm>

Provision Autonomous Database

<https://docs.oracle.com/en/cloud/paas/autonomous-database/serverless/adbsb/autonomous-provision.html#GUID-0B230036-0A05-4CA3-AF9D-97A255AE0C08>

Connect to Autonomous Database Using Oracle Database Tools

<https://docs.oracle.com/en/cloud/paas/autonomous-database/serverless/adbsb/connect-tools.html#GUID-CF6C7E1B-D0D4-4641-BADA-5C57DEA7C73B>

Configure Network Access with Private Endpoints

<https://docs.oracle.com/en/cloud/paas/autonomous-database/serverless/adbsb/private-endpoints-autonomous.html#GUID-5C3377FF-C396-4D2B-9218-E248EB1E7E99>

Connect with Built-In Oracle Database Actions

<https://docs.oracle.com/en/cloud/paas/autonomous-database/serverless/adbsb/connect-database-actions.html>



End

ORACLE