This Session will be Recorded

ORACLE

Oracle Machine Learning Feature Highlight

OML4Py Universal Client: Getting Started

OML AskTOM Office Hours

Move the Algorithms; Not the Data!

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supported by Mark Hornick

Product Management, Oracle Machine Learning

Agenda

- Overview
- Prerequisites and system requirements
- Installation and configuration
- Demo

Overview

OML4Py Universal Client

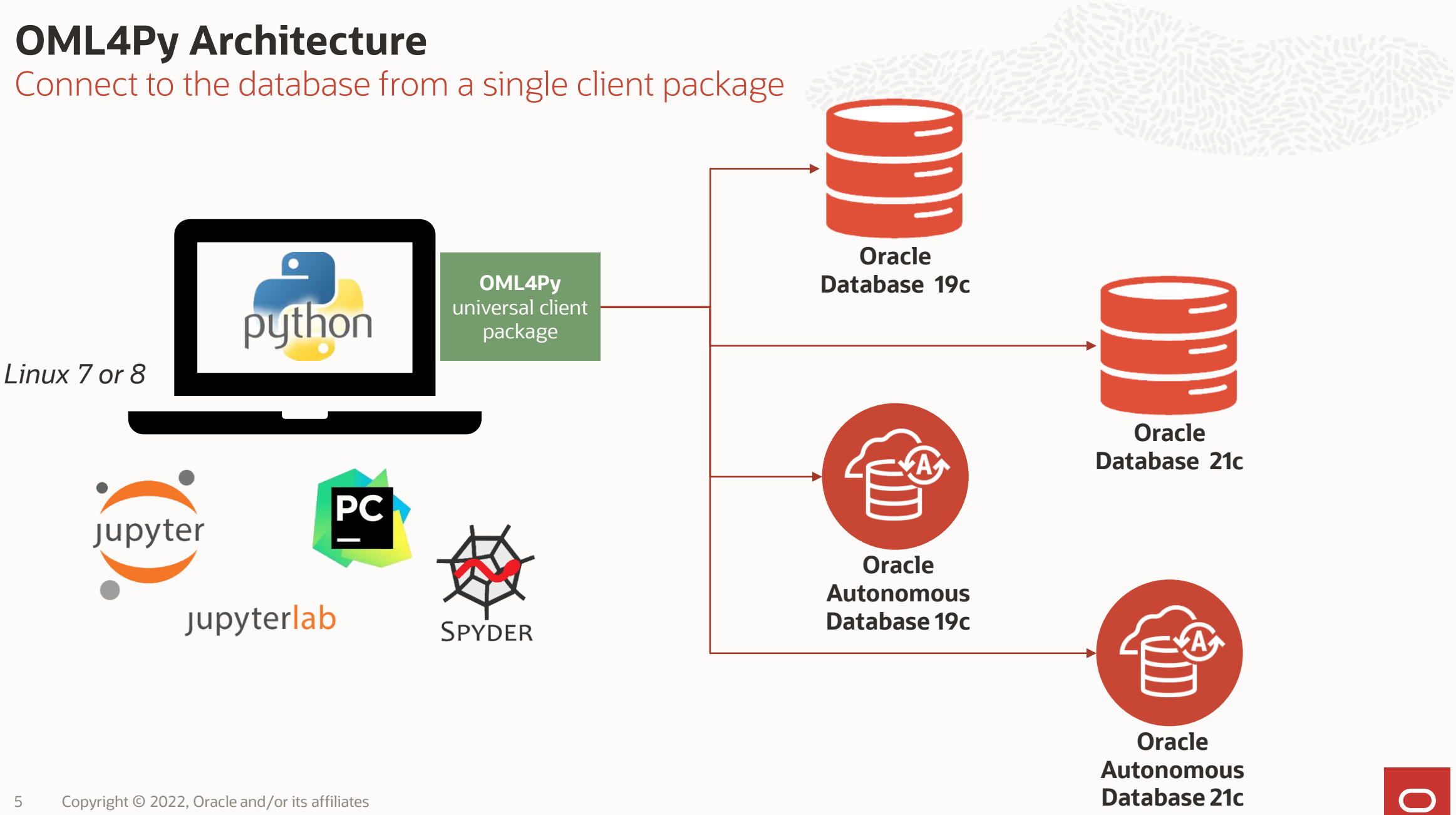
Why should I use the OML4Py client?

- Connect to Oracle Autonomous and on-premises Oracle Database instances
  - single standalone client
  - version 19c or 21c

- Enables use of external notebook environments
  - Jupyter, JupyterLab, and Zeppelin notebook environments
  - Python IDEs like PyCharm, Spyder

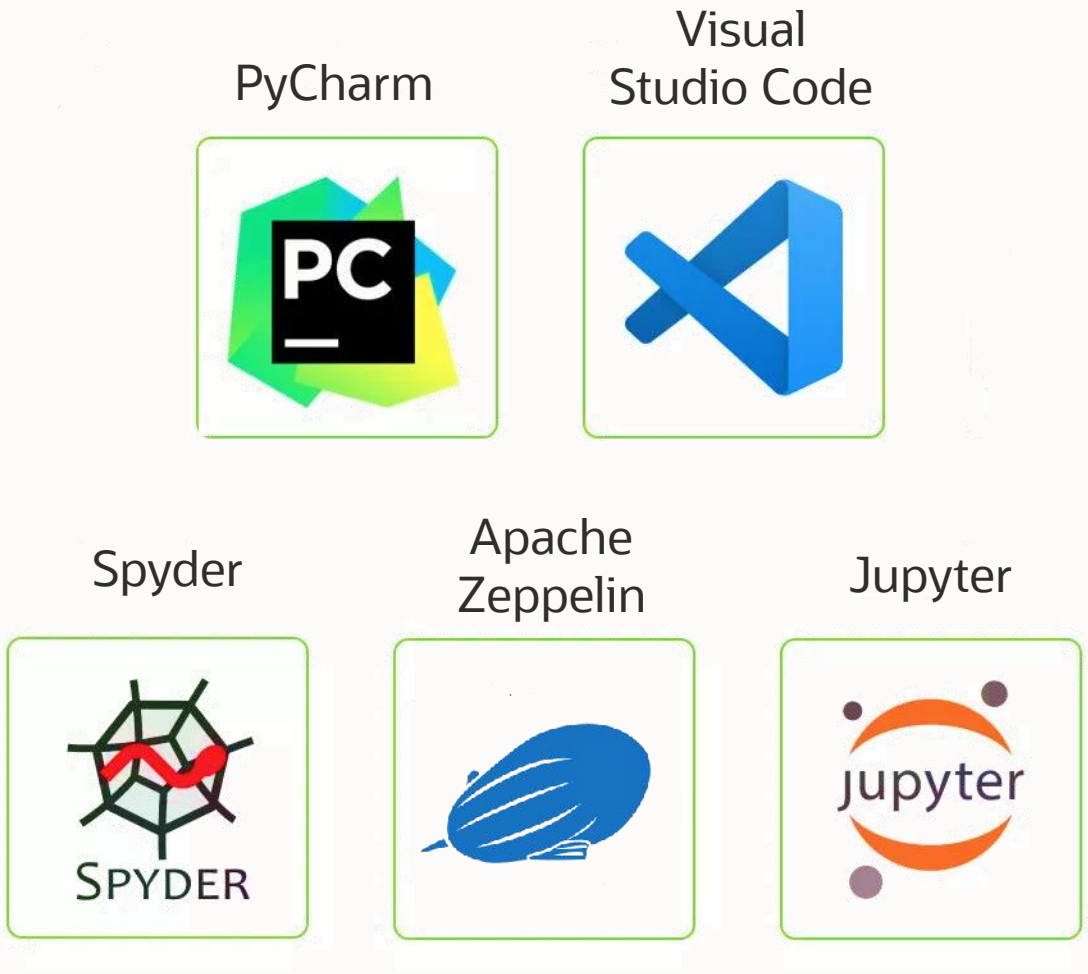
OML4Py Architecture

Connect to the database from a single client package



Python Client IDEs

Choose from a variety of Python notebook and client IDE's



Prerequisites and System Requirements

OML4Py Client Components and Prerequisites

- Oracle Linux 7 or 8
- Oracle Database Client or Instant Client
  - version 19c or 21c
- OML4Py 1.0 client installer
  - installs oml package
- Python 3.9.5
  - built from source
- OML4Py supporting packages
  - cx_Oracle, scikit-learn, scipy, matplotlib, numpy, pandas

Operating System Prerequisites

Linux OS library prerequisites

perl-Env	zlib-devel
libffi-devel	bzip2-devel
openssl-devel	tk-devel
xz-devel	readline-devel
libncurses-devel	libuuid-devel

perl-Env is required by OML4Py, the others are required by Python

Python Library Prerequisites

Open-source Python library prerequisites

cx_Oracle 8.1.0	matplotlib 3.3.3
Pandas 1.3.4	scipy 1.7.3
scikit-learn 1.0.1	numpy 1.21.5

OML4Py 1.0 is certified with the listed dependency versions

Installation and Configuration

Installation Steps

Steps to install and configure the OML4Py client

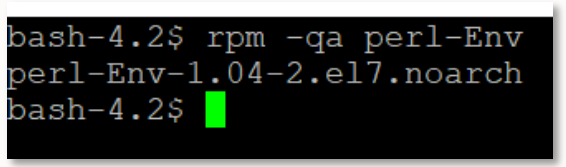
1. Verify prerequisites
2. Install Python
3. Install open-source Python supporting packages
4. Install Oracle Client or Instant Client
5. Install the OML4Py Client components
6. Configure Oracle Wallet

Operating System Prerequisites

Check for missing OS dependencies

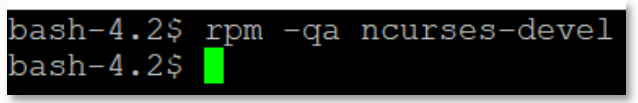
```
$ rpm -qa perl-Env
$ rpm -qa zlib-devel
$ rpm -qa libffi-devel
$ rpm -qa bzip2-devel
$ rpm -qa openssl-devel
$ rpm -qa tk-devel
$ rpm -qa xz-devel
$ rpm -qa readline-devel
$ rpm -qa ncurses-devel
$ rpm -qa libuuid-devel
```

Identify missing dependencies using rpm commands. If installed, the return value contains the library name and version



perl-Env is installed

If the library is not installed, no value is returned from the rpm command



ncurses-devel is not installed

Operating System Prerequisites

Install missing OS dependencies

Install ncurses-devel

```
bash-4.2$ sudo yum install ncurses-devel
Running transaction check
Running transaction test
Transaction test succeeded
Running transaction
  Installing : ncurses-devel-5.9-14.20130511.el7_4.x86_64
  Installing : ncurses-devel-5.9-14.20130511.el7_4.i686
  Verifying  : ncurses-devel-5.9-14.20130511.el7_4.x86_64
  Verifying  : ncurses-devel-5.9-14.20130511.el7_4.i686

Installed:
  ncurses-devel.i686 0:5.9-14.20130511.el7_4
  ncurses-devel.x86_64 0:5.9-14.20130511.el7_4

Complete!
```

- Install missing libraries using yum or rpm commands
- Running yum commands requires root or sudo access

Installation Steps

Steps to install and configure the OML4Py client

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Install Python from Source

https://www.python.org/downloads/release/python-395

Download Python and untar the archive

```
$ wget
https://www.python.org/ftp/python/3.9.5/Python-
3.9.5.tar.xz

$ tar xvf Python-3.9.5.tar.xz
```

Configure and install

```
$ export PREFIX=`pwd`/Python-3.9.5
$ cd $PREFIX
$ ./configure --prefix=$PREFIX --enable-shared

$ make clean; make
$ make altinstall
```

Python environment variables

```
$ export PYTHONHOME=$PREFIX
$ export PATH=$PYTHONHOME/bin:$PATH
$ export LD_LIBRARY_PATH=$PYTHONHOME/lib
```

Installation Steps

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Install Open-Source Python Package Dependencies

Install using pip

```
$ pip3.9 install pandas==1.3.4
$ pip3.9 install scipy==1.7.3
$ pip3.9 install matplotlib==3.3.3
$ pip3.9 install cx_Oracle==8.1.0
$ pip3.9 install threadpoolctl==2.1.0
$ pip3.9 install joblib==0.14.0
$ pip3.9 install scikit-learn==1.0.1 --no-deps
$ pip3.9 uninstall numpy
$ pip3.9 install numpy==1.21.5
```

pypi

install in this order to ensure correct dependency versions

Installation Steps

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Download Oracle Instant Client

Use the RPM or ZIP file to install the Basic Package and connect to the database

Oracle Instant Client Downloads for Linux x86-64 (64-bit)

See the Instant Client Home Page for more information about Instant Client.

The installation instructions are at the foot of the page.

Version 19.14.0.0.0 (Requires glibc 2.14)

Base - one of these packages is required

Name	Download
Basic Package (ZIP)	instantclient-basic-linux.x64-19.14.0.0.0dbru.zip
Basic Package (RPM)	oracle-instantclient19.14-basic-19.14.0.0.0-1.x86_64.rpm

choose either installer, the RPM package requires root or sudo access

Download Oracle Instant Client

Use the RPM or ZIP file to install the SQL*Plus package for SQL and PL/SQL

Oracle Instant Client Downloads for Linux x86-64 (64-bit)

See the Instant Client Home Page for more information about Instant Client.

The installation instructions are at the foot of the page.

Tools - optional packages

Name	Download
SQL*Plus Package (ZIP)	instantclient-sqlplus-linux.x64-19.14.0.0.0dbru.zip
SQL*Plus Package (RPM)	oracle-instantclient19.14-sqlplus-19.14.0.0.0-1.x86_64.rpm

choose either installer, the RPM package requires root or sudo access

Install Oracle Instant Client

Install the Basic package using either the RPM or ZIP file

RPM installation

```
$ wget
https://download.oracle.com/otn_soft
ware/linux/instantclient/1914000/ora
cle-instantclient19.14-basic-
19.14.0.0.0-1.x86_64.rpm

$ sudo rpm -ivh oracle-
instantclient19.14-basic-
19.14.0.0.0-1.x86_64.rpm
```

```
$ export LD_LIBRARY_PATH=
/usr/lib/oracle/19.14/client64/lib
```

Zip file installation

```
$ wget
https://download.oracle.com/otn_soft
ware/linux/instantclient/1914000/ins
tantclient-basic-linux.x64-
19.14.0.0.0dbru.zip

$ unzip instantclient-basic-
linux.x64-19.14.0.0.0dbru.zip
```

```
$ export LD_LIBRARY_PATH=
/path/to/instantclient_19_4
```

Install Oracle Instant Client

Install the SQL*Plus package using either the RPM or ZIP file

RPM installation

```
$ wget
https://download.oracle.com/otn_software/linux/instantclient/1914000/oracle-instantclient19.14-sqlplus-19.14.0.0.0-1.x86_64.rpm

$ sudo rpm -ivh oracle-instantclient19.14-sqlplus-19.14.0.0.0-1.x86_64.rpm
```

```
$ export LD_LIBRARY_PATH=
/usr/lib/oracle/19.14/client64/lib
```

Zip file installation

```
$ wget
https://download.oracle.com/otn_software/linux/instantclient/1914000/instantclient-sqlplus-linux.x64-19.14.0.0.0dbru.zip

$ unzip instantclient-sqlplus-linux.x64-19.14.0.0.0dbru.zip
```

```
$ export LD_LIBRARY_PATH=
/path/to/instantclient_19_4
```

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Install OML4Py Client

Download, unzip, and view the optional arguments for the client.pl script

Download OML4Py client installation zip file from the Oracle Machine Learning for Python Downloads page on the Oracle Technology Network

Unzip the file

```
$ unzip oml4py-client-linux-x86_64- 1.0.zip

$ ls client
 client.pl
 OML4PInstallShared.pm
 oml-1.0-cp39-cp39-linux_x86_64.whl
 oml4py.ver
```

```
$ perl -Iclient client/client.pl --help
Oracle Machine Learning for Python 1.0 Client.

Usage: client.pl [OPTION]...
Install, upgrade, or uninstall OML4P Client.

 -i, --install          install or upgrade (default)
 -u, --uninstall        uninstall
 -y                     never prompt
 --ask                  interactive mode (default)
 --no-embed             do not install embedded python
                          functionality
 --no-automl            do not install automl module
 --no-deps              turn off dependencies checking
 --target <dir>         install client into <dir>
```

Install OML4Py Client

Install the client using the client.pl script

```
$ perl -Iclient client/client.pl
Oracle Machine Learning for Python 1.0 Client.

Checking platform ................. Pass
Checking Python ................... Pass
Checking dependencies ............. Pass
Checking OML4P version ............ Pass
Current configuration
 Python Version .................. 3.9.5
 PYTHONHOME ...................... /opt/Python-3.9.5
 Existing OML4P module version .... None
 Operation ....................... Install/Upgrade
Proceed? [yes]
Processing ./client/oml-1.0-cp39-cp39-linux_x86_64.whl
Installing collected packages: oml
Successfully installed oml-1.0
Done
```

Verifying compatibility between the Linux, Python version, supporting packages with the OML4Py client version

Python configuration

Install/Upgrade or Uninstall

Installation completed successfully!

Installation Steps

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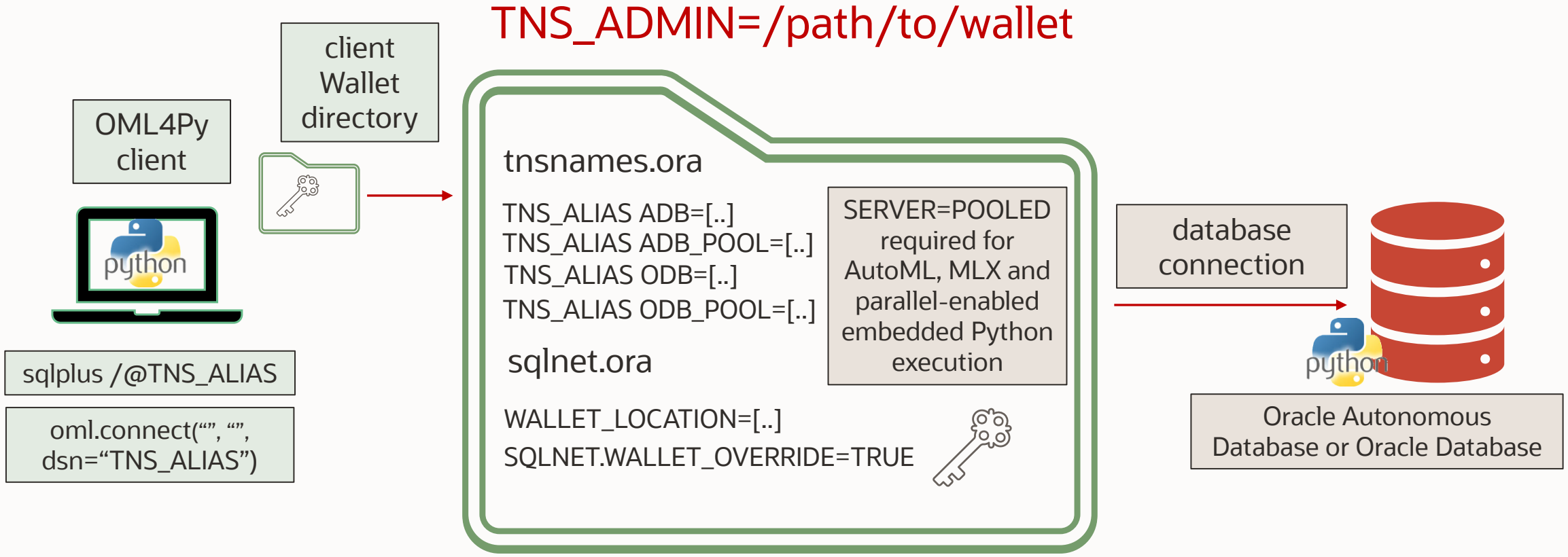
Wallet Architecture

OML4Py client Wallet architecture

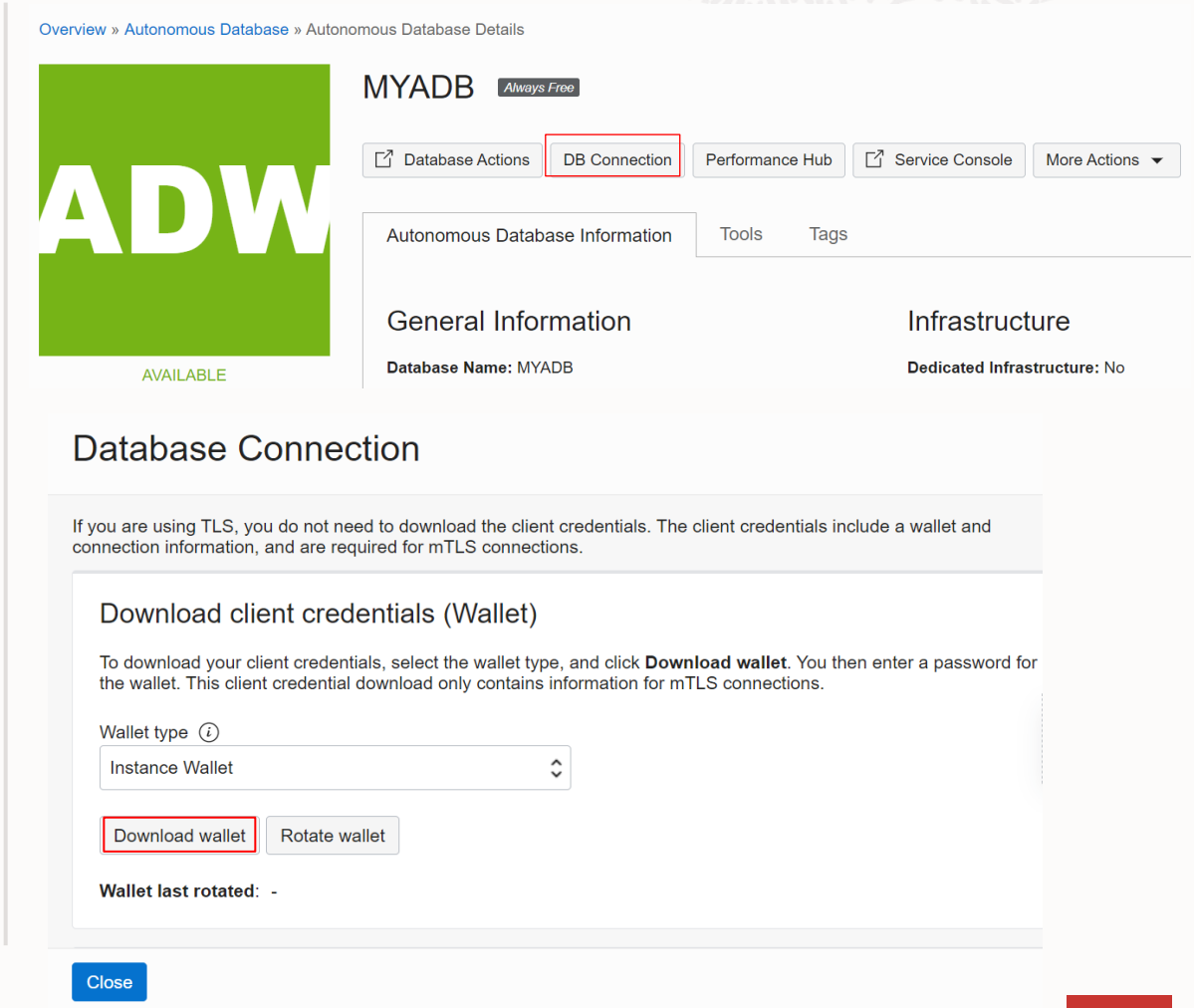


Autonomous Database Wallet Download

Download the Wallet ZIP file from your ADB DB Connection

To download the Oracle Wallet:

- Go to cloud.oracle.com
- Log in with the credentials provided when creating the Oracle Cloud account
- Select the Autonomous Database, followed by the DB Connection



Autonomous Database Wallet Credentials

mkstore -wrl *wallet directory* -createCredential *tns alias username password*

Assign Wallet Credentials for ADB medium service level

```
mkstore -wrl /path/to/wallet -createCredential myadb_medium OMLUSER Welcometo12345
```

Client Wallet directory — ADB tns alias — OML username — password

```
mkstore -wrl /path/to/wallet -createCredential myadb_medium_pool OMLUSER Welcome12345
```

Client Wallet directory — ADB tns alias pooled connection — OML username — password

repeat steps for service levels: low, low_pool, high, high_pool

Oracle Database Wallet Credentials

mkstore -wrl *wallet directory* -createCredential *ODB tns allias username password*

Assign Wallet Credentials

```
mkstore -wrl /path/to/wallet -createCredential myodb pyquser pyquser
```

Client Wallet directory

ODB tns alias

schema name

password

```
mkstore -wrl /path/to/wallet -createCredential myodb_pool pyquser pyquser
```

Client Wallet directory

ODB tns alias

schema name

password

```
export TNS_ADMIN=/path/to/wallet
```

Wallet Configuration

Add server pool connection to tnsnames.ora for Autonomous Database

```
myadb_medium=(description=
(retry_count=20)(retry_delay=3)(ENABLE=broken)(address=(https_proxy=www-proxy-
address.com)(https_proxy_port=80)(protocol=tcps)(port=1522)(host=adb.us-sanjose-
1.oraclecloud.com))(connect_data=(service_name=qtraya2braestch_myadb_medium.adb.oraclecloud
.com))(security=(ssl_server_cert_dn="CN=adb.us-sanjose-1.oraclecloud.com,OU=Oracle ADB
SANJOSE,O=Oracle Corporation,L=Redwood City,ST=California,C=US")))
```

```
myadb_medium_pool=(description=
(retry_count=20)(retry_delay=3)(ENABLE=broken)(address=(https_proxy=www-proxy-
address.com)(https_proxy_port=80)(protocol=tcps)(port=1522)(host=adb.us-sanjose-
1.oraclecloud.com))(connect_data=(service_name=qtraya2braestch_myadb_medium.adb.oraclecloud
.com)(SERVER=POOLED))(security=(ssl_server_cert_dn="CN=adb.us-sanjose-
1.oraclecloud.com,OU=Oracle ADB SANJOSE,O=Oracle Corporation,L=Redwood
City,ST=California,C=US")))
```

Repeat for service levels low, low_pool, high, high_pool
Optionally add proxy server address and port number

Wallet Configuration

Add tns alias and server pool connection to tnsnames.ora for Oracle Database

```
myodb=(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)
   (https_proxy=www-proxy-address.com)(https_proxy_port=80)
   (HOST=myhost)(PORT=1521))(CONNECT_DATA=(SERVICE_NAME=myservicename)))


myodb_pool=(DESCRIPTION=(ADDRESS=(PROTOCOL=tcp)
   (https_proxy=www-proxy-address.com)(https_proxy_port=80)
   (HOST=myhost)(PORT=1521))(CONNECT_DATA=(SERVICE_NAME=myservicename)
   (SERVER=POOLED)))
```

Use the same tnsnames.ora for Autonomous Database and Oracle Database
Optionally add proxy server address and port number

Wallet Configuration

Add Wallet location and override parameter to sqlnet.ora

```
WALLET_LOCATION=(SOURCE=(METHOD=file)(METHOD_DATA=(DIRECTORY="/path/to/wallet")))

SSL_SERVER_DN_MATCH=yes

SQLNET.WALLET_OVERRIDE=TRUE

SQLNET.USE_HTTPS_PROXY=on
```

To use the password credential stored in the Wallet when connecting to the database

Optionally enable proxy tunneling

```
$ export TNS_ADMIN=/path/to/wallet
```

Logging into the Database using Wallet

Connect to your databases from the universal client using wallet credential

Log into Autonomous Database

```
$ sqlplus /@myadb_medium_pool

SQL> show user;
USER is "OMLUSER"
```

```
oml.connect(user="",
  password="",
  dsn="myadb_medium",
  automl="myadb_medium_pool")

oml.isconnected()
>>>True
```

Log into Oracle Database

```
$ sqlplus /@myodb_pool

SQL> show user;
USER is "PYQUSER"
```

```
oml.connect(user="",
  password="",
  dsn="myodb_medium",
  automl="myodb_medium_pool")

oml.isconnected()
>>>True
```

Demo

Thank you

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