**Datacube Installation and Setup:**

**Step-1: Requirements**

**Datacube** runs the best on Ubuntu version 20.04. So it is recommended to use **Ubuntu.**

There is also a third-party tested software called as OSGeoLive VM which is based on LUbuntu 22.04. This provides pre-configured applications for a range of geo-spatial use-cases that includes storage, publishing, viewing, analysis and manipulation of data.

For more: <https://live.osgeo.org/en/index.html>

The other requirements for the installation and setup are

* Python- 3.8+

$ sudo apt-get install python3.8

* GDAL (libgdal-dev, gdal-bin, libgdal-doc)

## $ sudo apt-get install gdal-bin

## $ sudo apt-get install libgdal-dev

## $ sudo apt-get install libgdal-doc

* Rasterio – 1.3.2+

# $ pip install rasterio

* Miniconda

To install miniconda follow the following steps:

1. **Download the latest shell script**

wget https://repo.anaconda.com/miniconda/Miniconda3-latest-Linux-x86\_64.sh

1. **Make the miniconda installation script executable**

chmod +x Miniconda3-latest-Linux-x86\_64.sh

1. **Run miniconda installation script**

./Miniconda3-latest-Linux-x86\_64.sh

* NETCDF(libnetcdf-dev, netcdf-doc, netcdf-bin)

$ pip install libnetcdf-dev

$ pip install netcdf-doc

$ pip install netcdf-bin

* HDF(libhdf5-serial-dev, libhdf5-doc, hdf5-tools)

$ pip install libhdf5-serial-dev

$ pip install libhdf5-doc

$ pip install hdf5-tools

* Postgres (12+)

$ sudo apt-get -y postgresql

* Tornado 6.1

$ pip install tornado

**NOTE: Use ‘pip3’ instead of ‘pip’ if it won’t works.**

1. Add conda-forge to the package channels by running the following command:

**conda config –append channels conda-forge**

1. Create a conda environment with name odc\_env

**conda create –name odc\_env python=3.8 datacube**

1. Activate the odc environment

**conda activate odc\_env**

1. Once the odc\_env is activated, the terminal prompt should be similar to the below screenshot



1. Install the following python packages

**Jupyter, matplotlib, scipy, pytest-cov, hypothesis**

**[Use pip3 to install the above packages]**

**Step-2 Postgres Database Configuration for testing:**

1. If the postgres has been newly installed for the purpose of datacube setup, then it is better to set the postgres user password
2. In a terminal type:

**sudo –u postgres psql postgres**

1. Set a password for the user “postgres” by entering the below command in the terminal

**\password postgres**

1. Create a database called “agdcintegration” for testing and try connecting to the database

**CREATE DATABASE agdcintegration;**

**psql –d agdcintegration**

This concludes the Postgres database setup. Now the next step would be datacube installation

**Step-3 Datacube Installation:**

1. Clone the datacube repository from GitHub. The URL is provided below:

<https://github.com/opendatacube/datacube-core.git>

1. We need to specify the database user and password for the ODC integration testing. To do this copy the database conf file using the below command

cp integration\_tests/agdcintegration.conf ~/.datacube\_integration.conf

1. Edit the ~/.datacube\_integration.conf with a text editor and add the following lines.

[datacube]

db\_hostname: localhost

db\_database: agdcintegration

db\_username: postgres

db\_password: {Password\_for\_the\_user\_postgres}

[integration]

db\_hostname: localhost

db\_database: agdcintegration

db\_username: postgres

db\_password: {Password\_for\_the\_user\_postgres}

The above lines are for Ubuntu based setup.

Before going to next step do

**$ pip install moto**

in etc/postgresql/12/main/postgresql.conf

uncomment line 60(listen\_address) and save

pip install -e .

run req.txt file in

[https://github.com/greeshma-aeligeti/EODatacube.git](%20https:/github.com/greeshma-aeligeti/EODatacube.git)

by

**$ pip install -r req.txt**

**Step 4 Verification:**

1. Run the integration tests by running the below command

cd datacube-core

./check-code.sh integration\_tests

1. The integration tests will succeed if the database hostname and other credentials are provided accurately.

**Note:** 92% successful tests is an acceptable level to proceed with the data cube setup.

**Step-5 Database Setup for Datacube(Actual Datacube):**

1. Create a database named datacube using the following command

**CREATE DATABASE datacube;**

1. Now a configuration file needs to be created as datacube looks for a configuration file in **~/.datacube.conf** or in the location specified by **DATACUBE\_CONFIG\_PATH** path environment variable.

**Create the file and fill it up with the below details**

[datacube]

index\_driver: default

db\_database: datacube

*# A blank host will use a local socket. Specify a hostname (such as localhost) to use TCP.*

db\_hostname: localhost

*db\_username: postgres*

*db\_password: {postgres\_password}*

[test]

*# A "test" environment that accesses a separate test database.*

index\_driver: default

db\_database: datacube\_test

[null]

*# A "null" environment for working with no index.*

index\_driver: null

[local\_memory]

*# A local non-persistent in-memory index.*

*# Compatible with the default index driver, but resides purely in memory with no persistent database.*

*# Note that each new invocation will receive a new, empty index.*

index\_driver: memory

1. Now initialise the database schema by using the datacube system init. Run the following command

**$ datacube –v system init**

**Step-6 Product Definition:**

A product in odc could be considered as a set of properties that are common for the datasets.

It could be something like bands, CRS, resolution etc.

Sample Product yml file:

**name**: dem\_srtm

**metadata\_type**: eo3

**metadata**:

**product**:

**name**: dem\_srtm

**measurements**:

- **name**: elevation

**dtype**: int16

**nodata**: -32768.0

**units**: "metre"

You will be needing a product file to query the data. The product can be considered as a parameter that will help in filtration of data.

Add product by

**$ datacube product add** S2L2A\_eo3.yaml

Extract the yaml file from below link,

<https://github.com/greeshma-aeligeti/EODatacube.git>

**Step-7 Adding The satellite imagery to the file-system:**

* The next step would be to add the satellite images to the file system
* Create a parent directory in the hard disk in which the data is to be stored
* For Sentinel L2A data, the following link would be helpful in downloading data into the

<https://scihub.copernicus.eu/dhus/#/home>

* Download the data into this parent directory. The data would be downloaded in .zip format. Extract it into the same directory.

**Step-8 Transforming Metadata to YAML:**

* For each tile there is a .SAFE file from which the metadata can be obtained. The metadata is initially provided in an XML format.
* This needs to be converted into the YAML format.
* For this conversion, use the below script:

<https://github.com/greeshma-aeligeti/EODatacube.git>

run this command at extracted location of zip files

**for file in \*.SAFE; do**

**$ python <sen2cor\_new\_data.py path> $file --output <./datasets output path>/ ;**

done;

This will help you get the metadata for the datacube

Install gdal in parent directory using the below command

**$ pip install gdal**

* Note: This step required to go through the scripts directory in the **datacube-dataset-config** repository

**Step-9 Add datasets to the datacube:**

* The metadata YAML file obtained in the above step should now be added to the datacube
* This can be done by performing the command

**$ datacube dataset add** \*.yaml

for adding multiple files

for file in \*.yaml ;do datacube dataset add $file; done;

**Note:** \*.yaml file is the name of the metadata file to be added.

**Installing datacube explorer**

**$pip install datacube-explorer**

**$cubedash-gen --init --all**

**$cubedash-run**

check if products are available in datacube-explorer

**Step-10 Verify whether it works:**

* Now, one can verify whether this works by querying the datasets and the product.

To install Jupyter follow the commands

**$ pip install jupyter**

To open Notebook type the following

**$ jupyter notebook**

* Try running the jupyter notebooks from the below URL:

[**https://github.com/GeoscienceAustralia/dea-notebooks/tree/develop/Beginners\_guide**](https://github.com/GeoscienceAustralia/dea-notebooks/tree/develop/Beginners_guide)

**Note:** When performing operations that involve latitude, longitude and time, make sure that these values are well within the dataset that we use for the datacube.