01 dockerized hadoop

Objectives:

- Deployed Hadoop using Docker
- Created data in HDFS and viewed it on the GUI

What is a Hadoop Cluster?

A Hadoop cluster is a collection of computers, known as nodes, that are networked together to perform parallel computations on big data sets. The Name node is the master node of the Hadoop Distributed File System (HDFS). It maintains the meta data of the files in the RAM for quick access. An actual Hadoop Cluster setup involves extensive resources which are not within the scope of this lab. In this lab, you will use dockerized hadoop to create a Hadoop Cluster which will have:

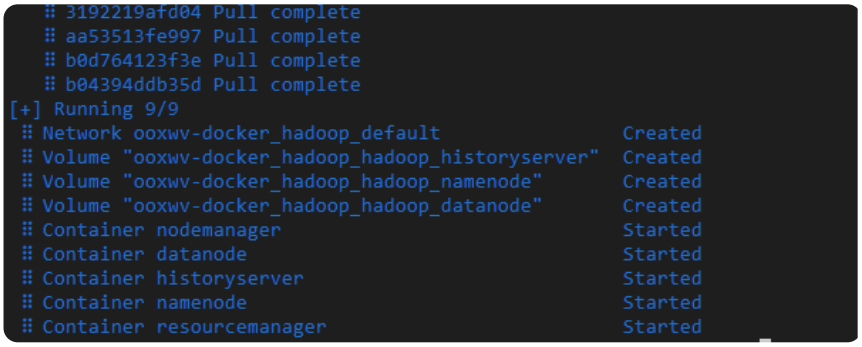
1. Namenode
2. Datanode
3. Node Manager
4. Resource manager
5. Hadoop history server

git clone

```
git clone https://github.com/ibm-developer-skills-network/ooxwv-docker_hadoop.git
cd ooxwv-docker_hadoop
```

```
docker-compose up -d
```

> **Compose** is a tool for defining and running multi-container Docker applications. It uses the YAML file to configure the services and enables us to create and start all the services from just one configuration file.



To Run HDFS Commands

Run the namenode as a mounted drive on bash.

```
docker exec -it namenode /bin/bash
```

Explore the hadoop environment

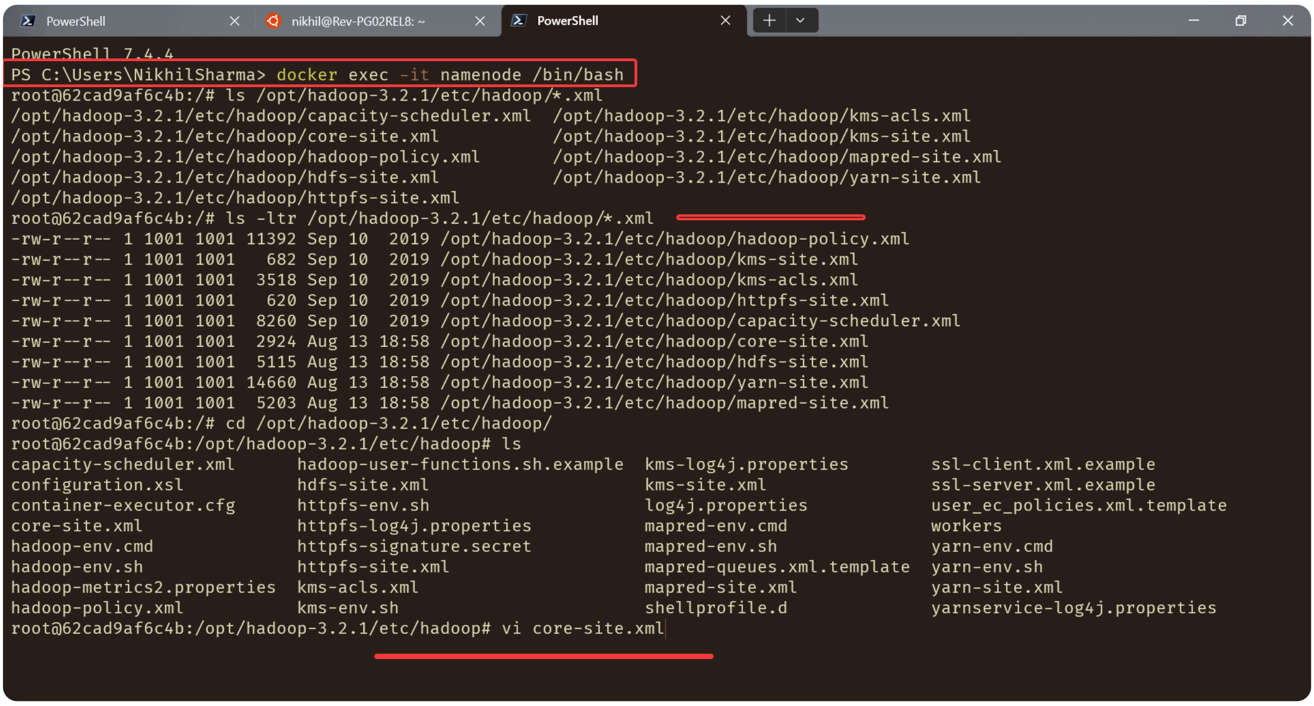
Hadoop environment is configured by editing a set of configuration files:

- **hadoop-env.sh** Serves as a master file to configure YARN, HDFS, MapReduce, and Hadoop-related project settings.
- **core-site.xml** Defines HDFS and Hadoop core properties

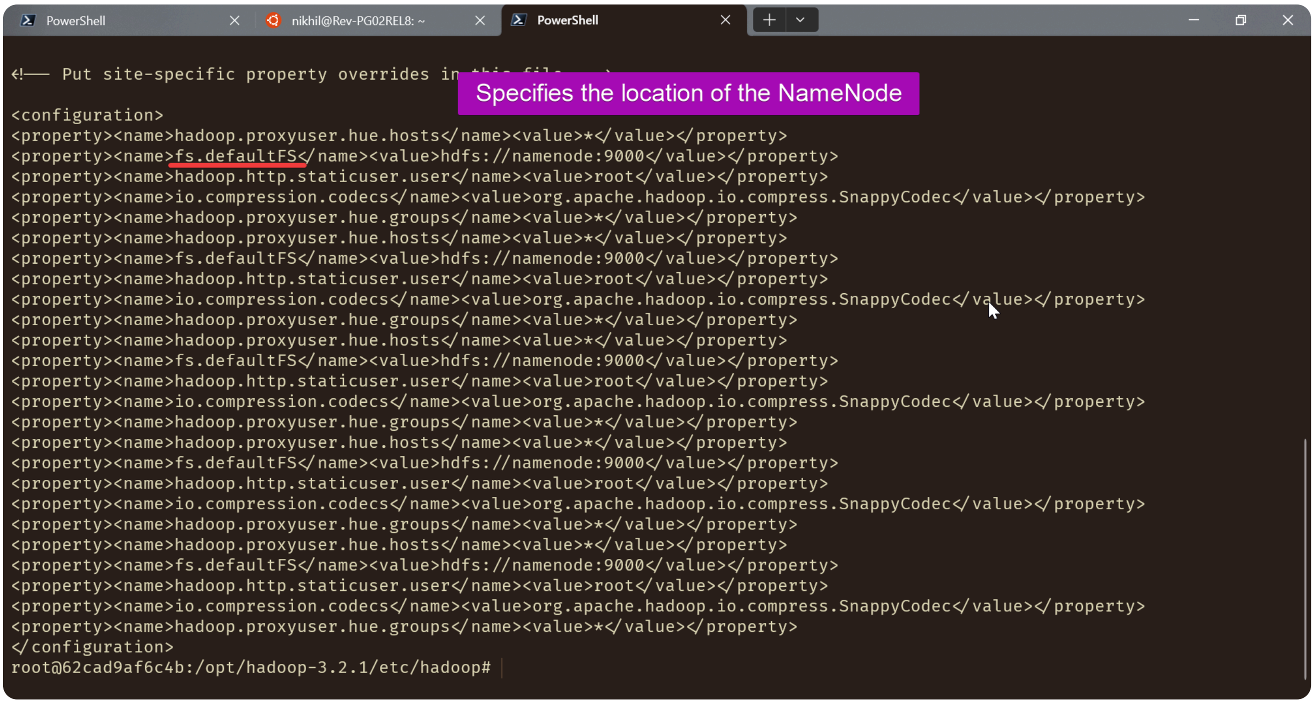
- **hdfs-site.xml** Governs the location for storing node metadata, fsimage file and log file.
- **mapred-site-xml** Lists the parameters for MapReduce configuration.
- **yarn-site.xml** Defines settings relevant to YARN. It contains configurations for the Node Manager, Resource Manager, Containers, and Application Master.

For the docker image, these xml files have been configured already. You can see these in the directory **/opt/hadoop-3.2.1/etc/hadoop/** by running

```
ls /opt/hadoop-3.2.1/etc/hadoop/*.xml
ls -ltr /opt/hadoop-3.2.1/etc/hadoop/*.xml
```



```
PowerShell 7.4.4
PS C:\Users\NikhilSharma> docker exec -it namenode /bin/bash
root@62cad9af6c4b:/# ls /opt/hadoop-3.2.1/etc/hadoop/*.xml
/opt/hadoop-3.2.1/etc/hadoop/capacity-scheduler.xml  /opt/hadoop-3.2.1/etc/hadoop/kms-acls.xml
/opt/hadoop-3.2.1/etc/hadoop/core-site.xml           /opt/hadoop-3.2.1/etc/hadoop/kms-site.xml
/opt/hadoop-3.2.1/etc/hadoop/hadoop-policy.xml       /opt/hadoop-3.2.1/etc/hadoop/mapred-site.xml
/opt/hadoop-3.2.1/etc/hadoop/hdfs-site.xml           /opt/hadoop-3.2.1/etc/hadoop/yarn-site.xml
/opt/hadoop-3.2.1/etc/hadoop/httpfs-site.xml
root@62cad9af6c4b:/# ls -ltr /opt/hadoop-3.2.1/etc/hadoop/*.xml
-rw-r--r-- 1 1001 1001 11392 Sep 10  2019 /opt/hadoop-3.2.1/etc/hadoop/hadoop-policy.xml
-rw-r--r-- 1 1001 1001   682 Sep 10  2019 /opt/hadoop-3.2.1/etc/hadoop/kms-site.xml
-rw-r--r-- 1 1001 1001  3518 Sep 10  2019 /opt/hadoop-3.2.1/etc/hadoop/kms-acls.xml
-rw-r--r-- 1 1001 1001   620 Sep 10  2019 /opt/hadoop-3.2.1/etc/hadoop/httpfs-site.xml
-rw-r--r-- 1 1001 1001  8260 Sep 10  2019 /opt/hadoop-3.2.1/etc/hadoop/capacity-scheduler.xml
-rw-r--r-- 1 1001 1001  2924 Aug 13 18:58 /opt/hadoop-3.2.1/etc/hadoop/core-site.xml
-rw-r--r-- 1 1001 1001  5115 Aug 13 18:58 /opt/hadoop-3.2.1/etc/hadoop/hdfs-site.xml
-rw-r--r-- 1 1001 1001 14660 Aug 13 18:58 /opt/hadoop-3.2.1/etc/hadoop/yarn-site.xml
-rw-r--r-- 1 1001 1001  5203 Aug 13 18:58 /opt/hadoop-3.2.1/etc/hadoop/mapred-site.xml
root@62cad9af6c4b:/# cd /opt/hadoop-3.2.1/etc/hadoop/
root@62cad9af6c4b:/opt/hadoop-3.2.1/etc/hadoop# ls
capacity-scheduler.xml      hadoop-user-functions.sh.example  kms-log4j.properties        ssl-client.xml.example
configuration.xsl           hdfs-site.xml                     kms-site.xml                ssl-server.xml.example
container-executor.cfg      httpfs-env.sh                     log4j.properties            user_ec_policies.xml.template
core-site.xml               httpfs-log4j.properties           mapred-env.cmd              workers
hadoop-env.cmd              httpfs-signature.secret           mapred-env.sh               yarn-env.cmd
hadoop-env.sh               httpfs-site.xml                   mapred-queues.xml.template  yarn-env.sh
hadoop-metrics2.properties  kms-acls.xml                      mapred-site.xml             yarn-site.xml
hadoop-policy.xml           kms-env.sh                        shellprofile.d              yarnservice-log4j.properties
root@62cad9af6c4b:/opt/hadoop-3.2.1/etc/hadoop# vi core-site.xml
```




```
<!-- Put site-specific property overrides in this file. -->

<configuration>
<property><name>hadoop.proxyuser.hue.hosts</name><value>*</value></property>
<property><name>fs.defaultFS</name><value>hdfs://namenode:9000</value></property>
<property><name>hadoop.http.staticuser.user</name><value>root</value></property>
<property><name>io.compression.codecs</name><value>org.apache.hadoop.io.compress.SnappyCodec</value></property>
<property><name>hadoop.proxyuser.hue.groups</name><value>*</value></property>
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<property><name>io.compression.codecs</name><value>org.apache.hadoop.io.compress.SnappyCodec</value></property>
<property><name>hadoop.proxyuser.hue.groups</name><value>*</value></property>
</configuration>
root@62cad9af6c4b:/opt/hadoop-3.2.1/etc/hadoop#
```

Explore the basic HDFS Commands:

1. In the HDFS, create a directory structure named `user/root/input`.

```
hdfs dfs -mkdir -p /user/root/input
```

2. Copy all the hadoop configuration xml files into the input directory.

```
hdfs dfs -put $HADOOP_HOME/etc/hadoop/*.xml /user/root/input
```

3. Create a `data.txt` file in the current directory.

```
curl https://raw.githubusercontent.com/KirkYagami/docker_hadoop/master/SampleMapReduce.txt
--output data.txt
```

4. Copy the `data.txt` file into `/user/root`.

```
hdfs dfs -put data.txt /user/root/
```

5. Check if the file has been copied into the HDFS by viewing its content.

```
hdfs dfs -cat /user/root/data.txt
```