Exp-1:

Downloading and installing Hadoop on Ubuntu, Understanding different Hadoop modes, Startup scripts, Configuration files

Aim:

To successfully install, configure, and run Hadoop on a local system using a single-node setup.

Procedure:

1. **Install Java and SSH:**
    - Update your package lists and install OpenJDK 8 and SSH.

      sudo apt update

      sudo apt install openjdk-8-jdk

      java -version # Verify Java installation

      sudo apt install ssh
2. **Create Hadoop User:**
    - Add a dedicated user for Hadoop and generate SSH keys for passwordless SSH.

      sudo adduser hadoop

      su - hadoop # Switch to Hadoop user

      ssh-keygen -t rsa

      cat ~/.ssh/id_rsa.pub >> ~/.ssh/authorized_keys

      chmod 640 ~/.ssh/authorized_keys

      ssh localhost # Test SSH connection to localhost
3. **Download and Install Hadoop:**
    - Download the latest Hadoop version (3.3.6), extract the tarball, and move it to the desired location.

      wget https://downloads.apache.org/hadoop/common/hadoop-3.3.6/hadoop-3.3.6.tar.gz

      tar -xvzf hadoop-3.3.6.tar.gz

      mv hadoop-3.3.6 hadoop
4. **Configure Environment Variables:**
    - **Update. bashrc to include Hadoop and Java paths.**

      nano ~/.bashrc

      # Add the following lines at the end

      export JAVA_HOME=/usr/lib/jvm/java-8-openjdk-amd64

```
export HADOOP_HOME=$HOME/hadoop
export PATH=$PATH:$HADOOP_HOME/bin:$HADOOP_HOME/sbin
source ~/.bashrc  # Apply changes
```

5. **Edit Hadoop Configuration Files:**
   - Modify configuration files to set up the necessary Hadoop directories and services.
   - **core-site.xml:**

```
nano $HADOOP_HOME/etc/hadoop/core-site.xml
# Add between <configuration></configuration>:
<property>
  <name>fs.defaultFS</name>
  <value>hdfs://localhost:9000</value>
</property>
```

   - **hdfs-site.xml:**

```
nano $HADOOP_HOME/etc/hadoop/hdfs-site.xml
```

Add:

```
<property>
  <name>dfs.replication</name>
  <value>1</value>
</property>
<property>
  <name>dfs.namenode.name.dir</name>
  <value>file:///home/hadoop/hadoopdata/hdfs/namenode</value>
</property>
<property>
  <name>dfs.datanode.data.dir</name>
  <value>file:///home/hadoop/hadoopdata/hdfs/datanode</value>
</property>
```

   - **mapred-site.xml:**

```
cp $HADOOP_HOME/etc/hadoop/mapred-site.xml.template
$HADOOP_HOME/etc/hadoop/mapred-site.xml
nano $HADOOP_HOME/etc/hadoop/mapred-site.xml
```

Add:

```
<property>
  <name>mapreduce.framework.name</name>
  <value>yarn</value>
</property>
```

- **yarn-site.xml:**

  nano $HADOOP_HOME/etc/hadoop/yarn-site.xml

  Add:

```
<property>
  <name>yarn.nodemanager.aux-services</name>
  <value>mapreduce_shuffle</value>
</property>
```

6. **Format the NameNode:**
   - Format the HDFS NameNode.

     hdfs namenode -format

7. **Start Hadoop:**
   - Start Hadoop services (NameNode, DataNode, ResourceManager, and NodeManager).

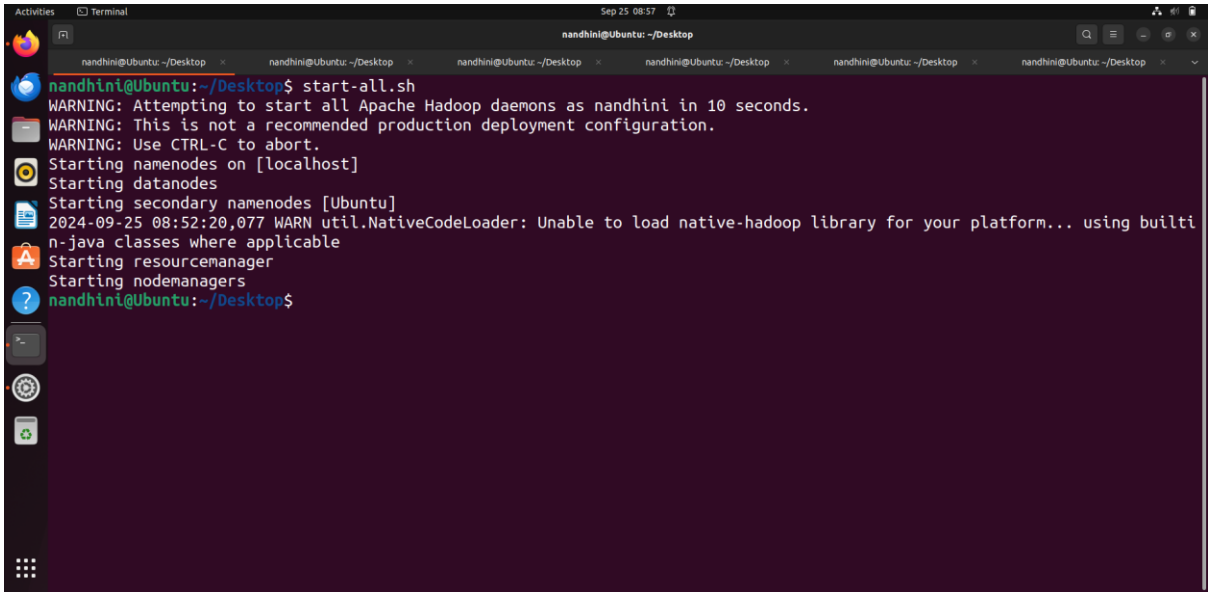
     start-all.sh

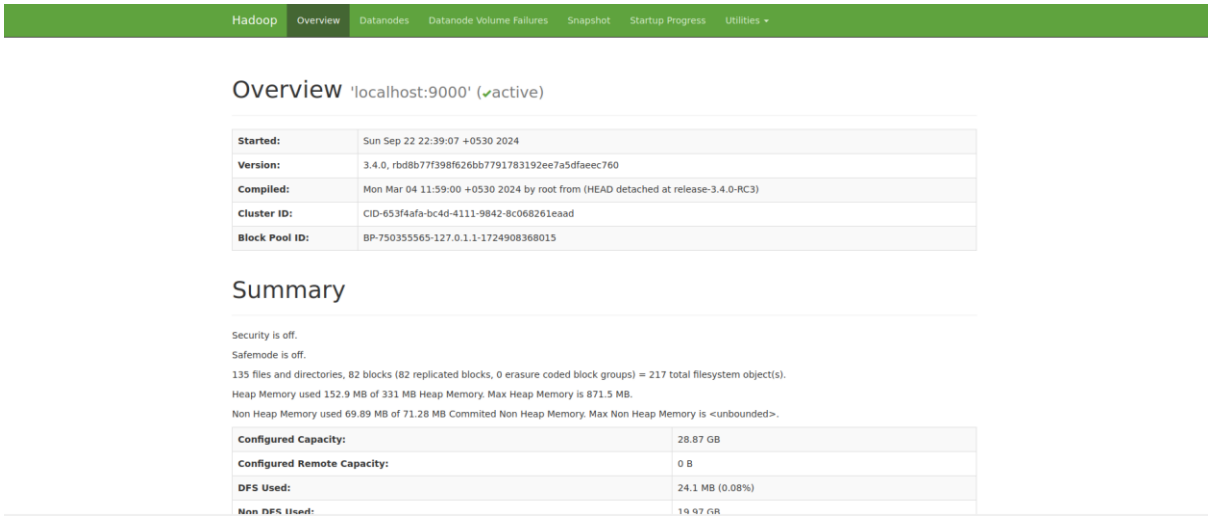
     jps # Verify running services

8. **Access Web Interfaces:**
   - Verify that Hadoop is running by accessing the following URLs:
     - **NameNode:** http://localhost:9870
     - **Resource Manager:** http://localhost:8088

9. **Stop Hadoop Cluster:**
   - Stop all Hadoop services.

     stop-all.sh





RESULT:

The step-by-step installation and configuration of Hadoop on Ubuntu system have been successfully completed.