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
     ```

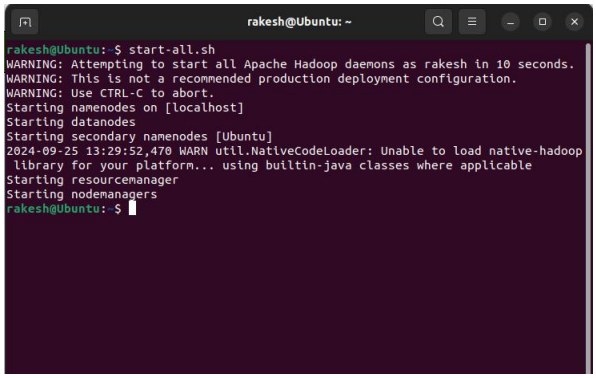
7. **Start Hadoop:**
   - Start Hadoop services (NameNode, DataNode, ResourceManager, and NodeManager).

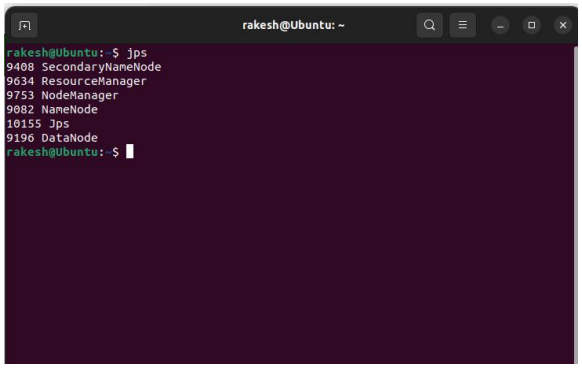
     ```
     start-all.sh
     jps  # Verify running services
     ```

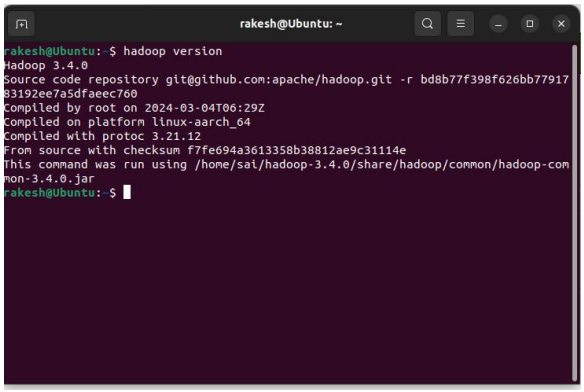
8. **Access Web Interfaces:**
   - Verify that Hadoop is running by accessing the following URLs:
     - **NameNode:** http://localhost:9870
     - **Resource Manager:** http://localhost:8088

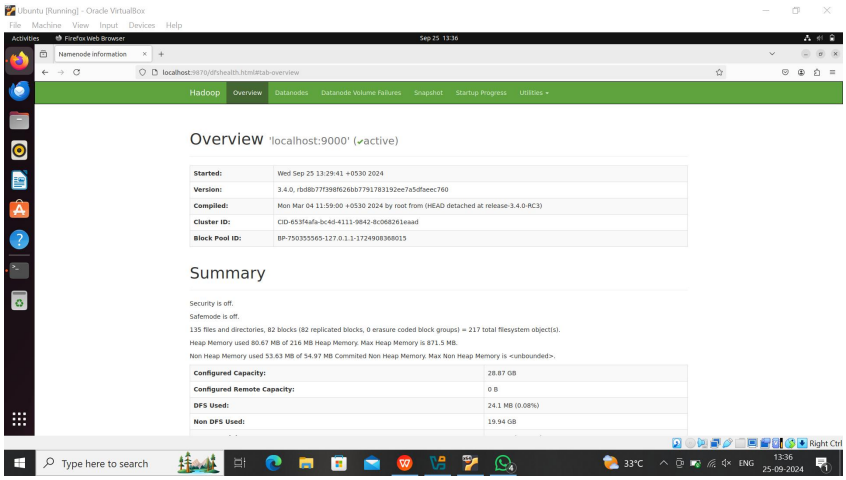
9. **Stop Hadoop Cluster:**
   - Stop all Hadoop services.

     ```
     stop-all.sh
     ```


rakesh@Ubuntu: ~
rakesh@Ubuntu:~$ start-all.sh
WARNING: Attempting to start all Apache Hadoop daemons as rakesh in 10 seconds.
WARNING: This is not a recommended production deployment configuration.
WARNING: Use CTRL-C to abort.
Starting namenodes on [localhost]
Starting datanodes
Starting secondary namenodes [Ubuntu]
2024-09-25 13:29:52,470 WARN util.NativeCodeLoader: Unable to load native-hadoop
library for your platform... using builtin-java classes where applicable
Starting resourcemanager
Starting nodemanagers
rakesh@Ubuntu:~$


rakesh@Ubuntu: ~
rakesh@Ubuntu:~$ jps
9408 SecondaryNameNode
9634 ResourceManager
9753 NodeManager
9082 NameNode
10155 Jps
9196 DataNode
rakesh@Ubuntu:~$


rakesh@Ubuntu: ~
rakesh@Ubuntu:~$ hadoop version
Hadoop 3.4.0
Source code repository git@github.com:apache/hadoop.git -r bd8b77f398f626bb77917
83192ee7a5dfaeec760
Compiled by root on 2024-03-04T06:29Z
Compiled on platform linux-aarch_64
Compiled with protoc 3.21.12
From source with checksum f7fe694a3613358b38812ae9c31114e
This command was run using /home/sai/hadoop-3.4.0/share/hadoop/common/hadoop-com
mon-3.4.0.jar
rakesh@Ubuntu:~$


Overview 'localhost:9000' (active)
Started: Wed Sep 25 13:29:41 +0530 2024
Version: 3.4.0, rbd8b77f398f626bb7791783192ee7a5dfaeec760
Compiled: Mon Mar 04 11:59:00 +0530 2024 by root from (HEAD detached at release-3.4.0-RC3)
Cluster ID: CID-653f4afa-bc4d-4111-9842-8c068261eaad
Block Pool ID: BP-750355565-127.0.1.1-1724908368015
Summary
Security is off.
Safemode is off.
135 files and directories, 82 blocks (82 replicated blocks, 0 erasure coded block groups) = 217 total filesystem object(s).
Heap Memory used 80.67 MB of 216 MB Heap Memory. Max Heap Memory is 871.5 MB.
Non Heap Memory used 53.63 MB of 54.97 MB Commited Non Heap Memory. Max Non Heap Memory is <unbounded>.
Configured Capacity: 28.87 GB
Configured Remote Capacity: 0 B
DFS Used: 24.1 MB (0.08%)
Non DFS Used: 19.94 GB

RESULT:

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