Ex. No	Downloading and installing Hadoop; Understanding different Hadoop modes. Startup scripts, Configuration files	Date
1		

Aim:

To Install Apache Hadoop.

DESCRIPTION:-

Hadoop is a Java-based programming framework that supports the processing and storage of extremely large datasets on a cluster of inexpensive machines. It was the first major open source project in the big data playing field and is sponsored by the Apache Software Foundation.

Hadoop-2.7.3 is comprised of four main layers:

- **Hadoop Common** is the collection of utilities and libraries that support other Hadoop modules.
- **HDFS**, which stands for Hadoop Distributed File System, is responsible for persisting data to disk.
- **YARN**, short for Yet Another Resource Negotiator, is the "operating system" for HDFS.
- **MapReduce** is the original processing model for Hadoop clusters. It distributes work within the cluster or map, then organizes and reduces the results from the nodes into a response to a query. Many other processing models are available for the 2.x version of Hadoop.

Hadoop clusters are relatively complex to set up, so the project includes a stand-alone mode which is suitable for learning about Hadoop, performing simple operations, and debugging.

Procedur:

Prerequisites:

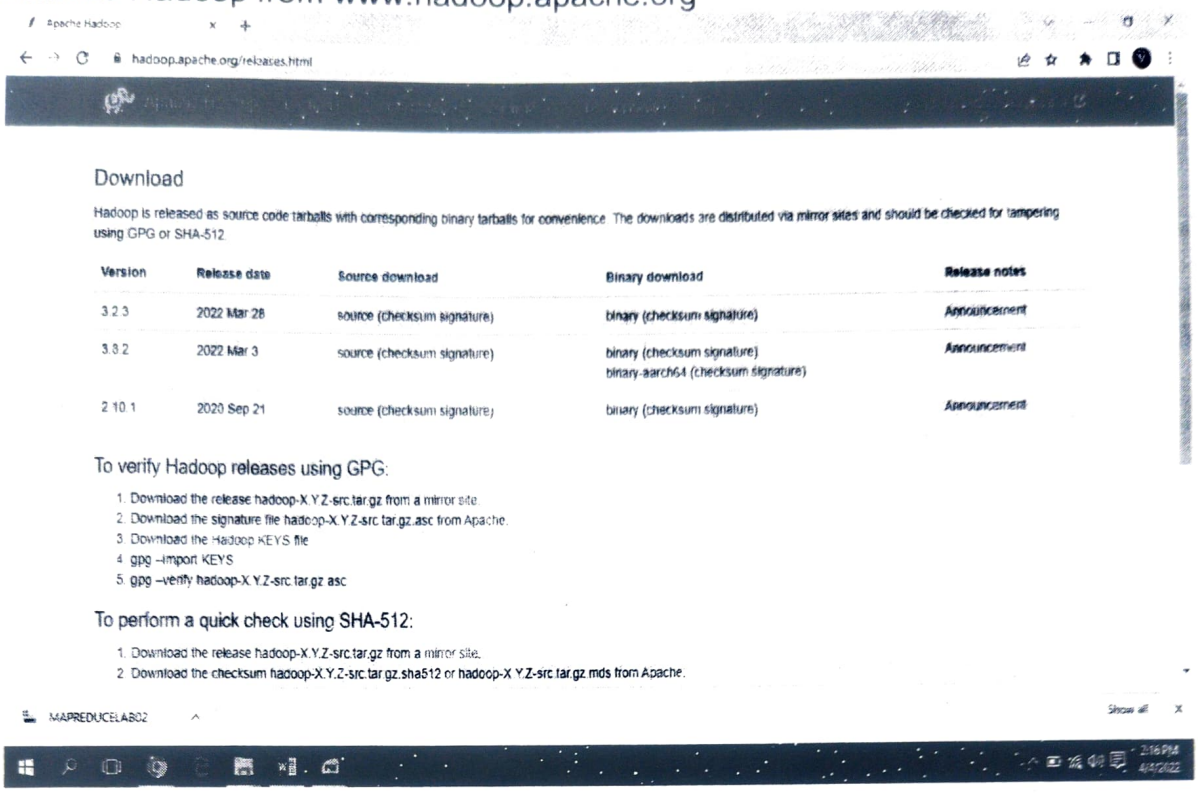
Step1: Installing Java 8 version.

Openjdk version "1.8.0_91"
OpenJDK Runtime Environment (build 1.8.0_91-8u91-b14-3ubuntu1~16.04.1-b14) OpenJDK 64-Bit Server VM (build 25.91-b14, mixed mode)

Step2: Installing Hadoop

With Java in place, we'll visit the Apache Hadoop Releases page to find the most recent stable release. Follow the binary for the current release:

Download Hadoop from www.hadoop.apache.org



Apache Hadoop

hadoop.apache.org/releases.html

Download

Hadoop is released as source code tarballs with corresponding binary tarballs for convenience. The downloads are distributed via mirror sites and should be checked for tampering using GPG or SHA-512.

Version	Release date	Source download	Binary download	Release notes
3.2.3	2022 Mar 28	source (checksum signature)	binary (checksum signature)	Announcement
3.3.2	2022 Mar 3	source (checksum signature)	binary (checksum signature) binary-aarch64 (checksum signature)	Announcement
2.10.1	2020 Sep 21	source (checksum signature)	binary (checksum signature)	Announcement

To verify Hadoop releases using GPG:

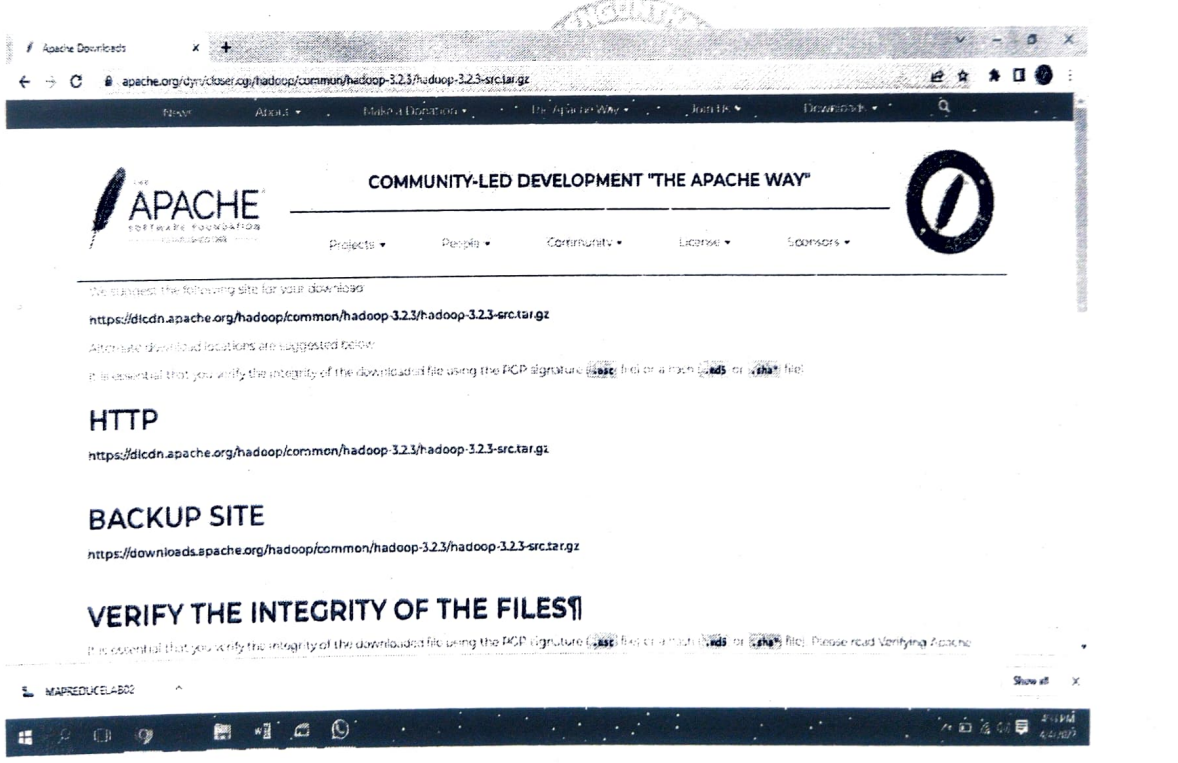
1. Download the release hadoop-X.Y.Z-src.tar.gz from a mirror site.
2. Download the signature file hadoop-X.Y.Z-src.tar.gz.asc from Apache.
3. Download the Hadoop KEYS file.
4. gpg –import KEYS
5. gpg –verify hadoop-X.Y.Z-src.tar.gz.asc

To perform a quick check using SHA-512:

1. Download the release hadoop-X.Y.Z-src.tar.gz from a mirror site.
2. Download the checksum hadoop-X.Y.Z-src.tar.gz.sha512 or hadoop-X.Y.Z-src.tar.gz.mds from Apache.

MAPREDUCELAB02

Show all



Apache Downloads

apache.org/dyn/closer.cgi/hadoop/common/hadoop-3.2.3/hadoop-3.2.3-src.tar.gz

COMMUNITY-LED DEVELOPMENT "THE APACHE WAY"

Projects ▾ People ▾ Community ▾ License ▾ Sponsors ▾

We suggest the following site for your download:

https://dlcdn.apache.org/hadoop/common/hadoop-3.2.3/hadoop-3.2.3-src.tar.gz

Alternate download locations are suggested below.

It is essential that you verify the integrity of the downloaded file using the PGP signature (.asc) file or a hash (.mds or .sha*) file.

HTTP

https://dlcdn.apache.org/hadoop/common/hadoop-3.2.3/hadoop-3.2.3-src.tar.gz

BACKUP SITE

https://downloads.apache.org/hadoop/common/hadoop-3.2.3/hadoop-3.2.3-src.tar.gz

VERIFY THE INTEGRITY OF THE FILES¶

It is essential that you verify the integrity of the downloaded file using the PGP signature (.asc) file or a hash (.mds or .sha*) file. Please read Verifying Apache

MAPREDUCELAB02

Show all

Procedure to Run Hadoop

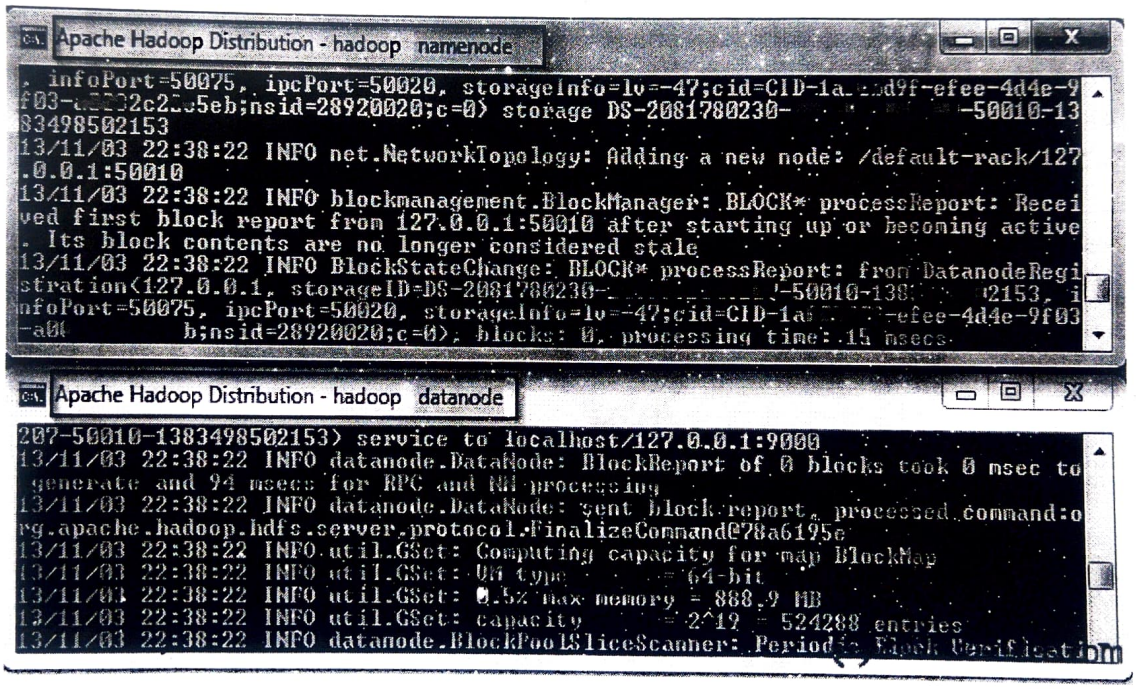
1. Install Apache Hadoop 2.2.0 in Microsoft Windows OS

   If Apache Hadoop 2.2.0 is not already installed then follow the post Build, Install, Configure and Run Apache Hadoop 2.2.0 in Microsoft Windows OS.

2. Start HDFS (Namenode and Datanode) and YARN (Resource Manager and Node Manager)

Run following commands. *Command Prompt* C:\Users\abhijitg>cd c:\hadoop c:\hadoop>sbin\start-dfs c:\hadoop>sbin\start-yarn starting yarn daemons

Namenode, Datanode, Resource Manager and Node Manager will be started in few minutes and ready to execute Hadoop MapReduce job in the Single Node (pseudo-distributed mode) cluster.



Run wordcount MapReduce job

Now we'll run wordcount MapReduce job available in %HADOOP_HOME%\share\hadoop\mapreduce\hadoop-mapreduce-examples- 2.2.0.jar Create a text file with some content. We'll pass this file as input to the wordcount MapReduce job for counting words.

C:\file1.txt

Install Hadoop

Run Hadoop Wordcount Mapreduce Example

Create a directory (say 'input') in HDFS to keep all the text files (say 'file1.txt') to be used for counting words.

C:\Users\abhijitg>cd c:\hadoop C:\hadoop>bin\hdfs dfs -mkdir input

Copy the text file(say 'file1.txt') from local disk to the newly created 'input' directory in HDFS.

C:\hadoop>bin\hdfs dfs -copyFromLocal c:/file1.txt input

Check content of the copied file.

```
C:\hadoop>hdfs dfs -ls
input Found 1 items
-rw-r--r--   1 ABHIJITG supergroup         55 2014-02-03 13:19 input/file1.txt

C:\hadoop>bin\hdfs dfs -cat input/file1.txt
Install Hadoop
Run Hadoop Wordcount Mapreduce Example
```

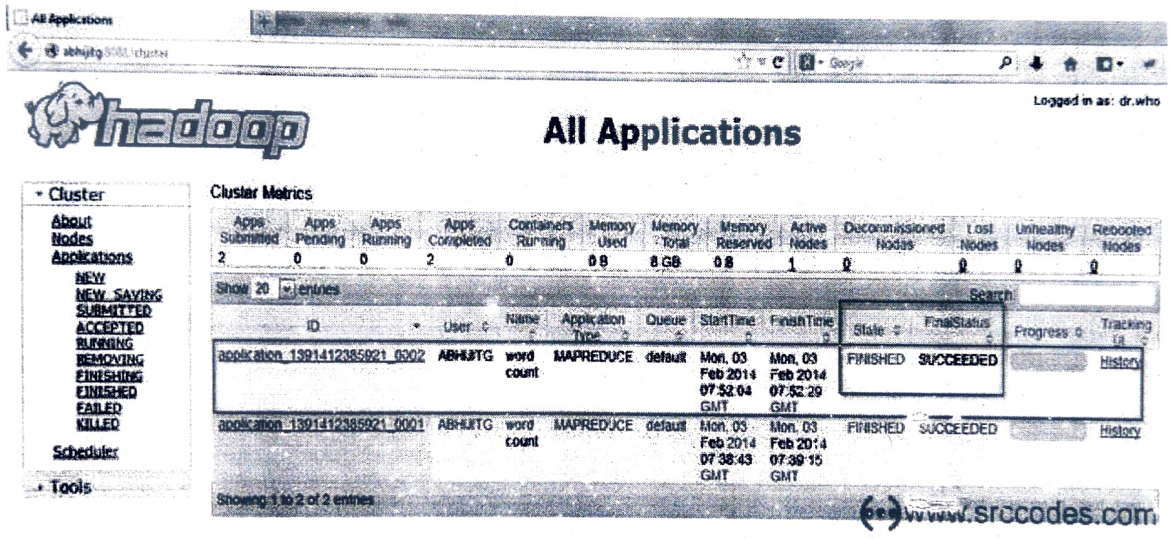
Run the wordcount MapReduce job provided in %HADOOP_HOME%\share\hadoop\mapreduce\hadoop-mapreduce-examples-2.2.0.jar

```
C:\hadoop>bin\yarn jar share/hadoop/mapreduce/hadoop-mapreduce-examples- 2.2.0.jar wordcount input output
14/02/03 13:22:02 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8032
14/02/03 13:22:03 INFO input.FileInputFormat: Total input paths to process : 1
14/02/03 13:22:03 INFO mapreduce.JobSubmitter: number of splits:1
:
:
14/02/03 13:22:04 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1391412385921_0002
14/02/03 13:22:04 INFO impl.YarnClientImpl: Submitted application application_1391412385921_0002 to ResourceManager at /0.0.0.0:8032
14/02/03 13:22:04 INFO mapreduce.Job: The url to track the job: http://ABHIJITG:8088/proxy/application_1391412385921_0002/
14/02/03 13:22:04 INFO mapreduce.Job: Running job: job_1391412385921_0002 14/02/03 13:22:14 INFO mapreduce.Job: Job job_1391412385921_0002 running in uber mode : false
14/02/03 13:22:14 INFO mapreduce.Job:  map 0% reduce 0%
14/02/03 13:22:22 INFO mapreduce.Job:  map 100% reduce 0%
14/02/03 13:22:30 INFO mapreduce.Job:  map 100% reduce 100%
14/02/03 13:22:30 INFO mapreduce.Job: Job job_1391412385921_0002 completed successfully
```

```
14/02/03 13:22:31 INFO mapreduce.Job:
    Counters: 43 File System Counters
        FILE: Number of bytes read=89
        FILE: Number of bytes
        written=160142 FILE: Number of
        read operations=0 FILE: Number of
        large read operations=0 FILE:
        Number of write operations=0
        HDFS: Number of bytes
        read=171 HDFS: Number of
        bytes written=59 HDFS: Number
        of read operations=6
        HDFS: Number of large read
        operations=0 HDFS: Number of write
        operations=2
    Job Counters
        Launched map
        tasks=1 Launched
        reduce tasks=1
        Data-local map
        tasks=1
        Total time spent by all maps in occupied slots
        (ms)=5657 Total time spent by all reduces in occupied
        slots (ms)=6128
Map-Reduce Framework
    Map input records=2
        Map output
        records=7 Map
        output bytes=82
        Map output materialized
        bytes=89 Input split bytes=116
        Combine input
        records=7 Combine
        output records=6
        Reduce input
        groups=6 Reduce
        shuffle bytes=89
        Reduce input
        records=6 Reduce
        output records=6
        Spilled Records=12
        Shuffled Maps =1
        Failed Shuffles=0
        Merged Map
        outputs=1
        GC time elapsed
        (ms)=145 CPU time
        spent (ms)=1418
```

Physical memory (bytes)
snapshot=368246784 Virtual memory (bytes)
snapshot=513716224 Total committed heap
usage (bytes)=307757056
Shuffle Errors
BAD_ID=0
CONNECTION=0
IO_ERROR=0
WRONG_LENGTH=0
WRONG_MAP=0
WRONG_REDUCE=0
File Input Format
Counters Bytes
Read=55
File Output Format Counters
Bytes Written=59

http://abhijitg:8088/cluster



Result:

Thus the Hadoop is installed in stand-alone mode and verified it by running an example program it provided.

Ex. No	Hadoop Implementation of file management tasks, such as Adding files and directories, retrieving files and Deleting files	Date
2		

Aim:

To implement the following file management tasks in Hadoop

1. Adding files and directories
2. Retrieving files
3. Deleting Files

DESCRIPTION:-

HDFS is a scalable distributed filesystem designed to scale to petabytes of data while running on top of the underlying filesystem of the operating system. HDFS keeps track of where the data resides in a network by associating the name of its rack (or network switch) with the dataset. This allows Hadoop to efficiently schedule tasks to those nodes that contain data, or which are nearest to it, optimizing bandwidth utilization. Hadoop provides a set of command line utilities that work similarly to the Linux file commands, and serve as your primary interface with HDFS.

We're going to have a look into HDFS by interacting with it from the command line.

We will take a look at the most common file management tasks in Hadoop, which include:

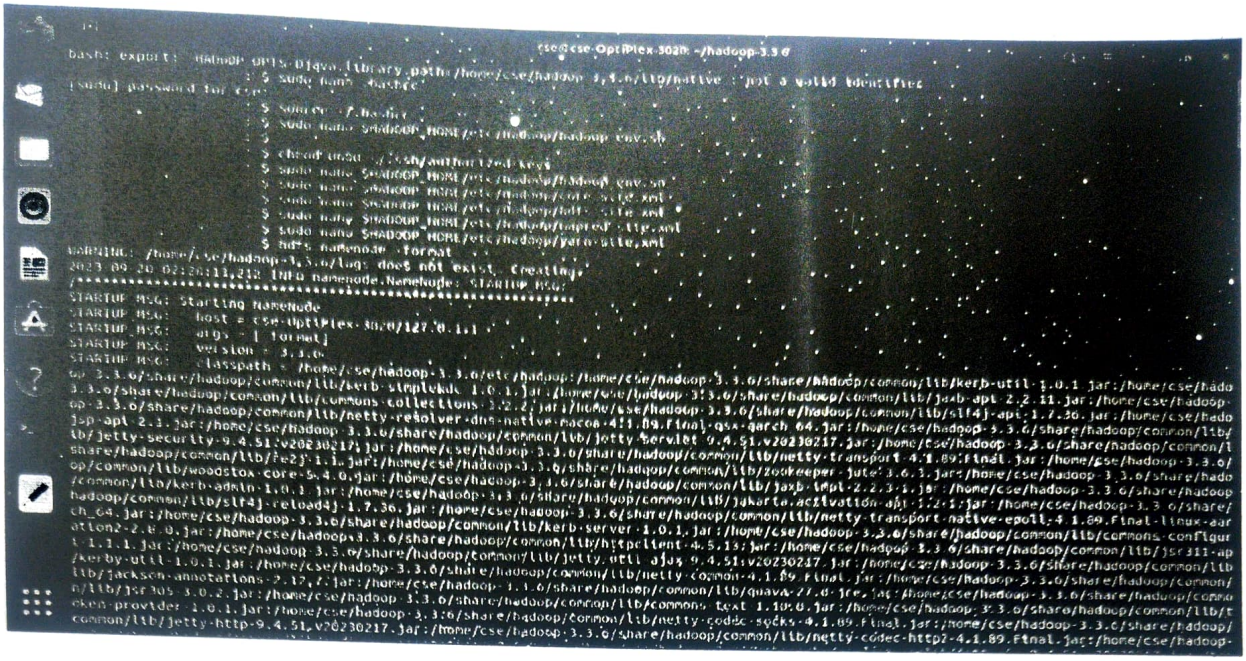
1. Adding files and directories to HDFS
2. Retrieving files from HDFS to local filesystem
3. Deleting files from HDFS

SYNTAX AND COMMANDS TO ADD, RETRIEVE AND DELETE DATA FROM HDFS

Step 1:Starting HDFS

Initially you have to format the configured HDFS file system, open namenode (HDFS server), and execute the following command.

$ hadoop namenode –format

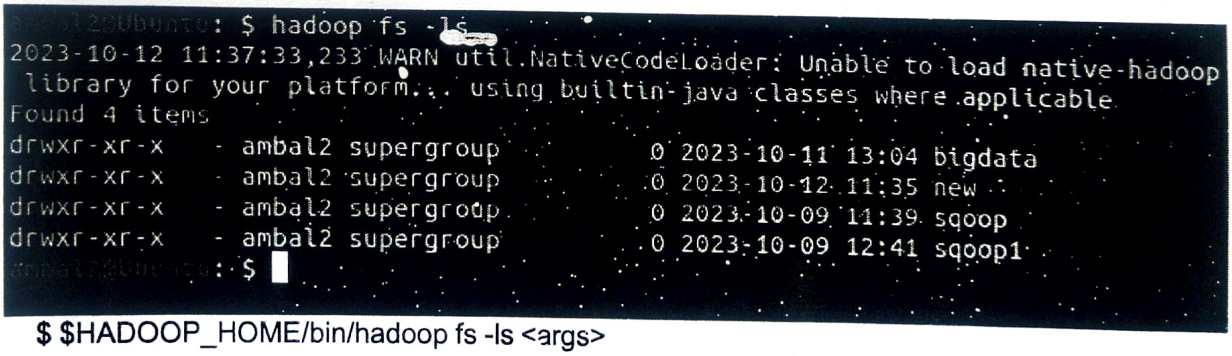


After formatting the HDFS, start the distributed file system. The following command will start the namenode as well as the data nodes as cluster.

$ start-dfs.sh

Listing Files in HDFS

After loading the information in the server, we can find the list of files in a directory, status of a file, using ls Given below is the syntax of ls that you can pass to a directory or a filename as an argument.



$ $HADOOP_HOME/bin/hadoop fs -ls <args>

Inserting Data into HDFS

Assume we have data in the file called file.txt in the local system which is ought to be saved in the hdfs file system. Follow the steps given below to insert the required file in the Hadoop file system.

Step-2: Adding Files and Directories to HDFS

$ $HADOOP_HOME/bin/hadoop fs -mkdir /user/input

Transfer and store a data file from local systems to the Hadoop file system using the put command.

$ $HADOOP_HOME/bin/hadoop fs -put /home/file.txt /user/input

Step 3 :You can verify the file using ls command.

$ $HADOOP_HOME/bin/hadoop fs -ls /user/input

Step 4 Retrieving Data from HDFS

Assume we have a file in HDFS called outfile. Given below is a simple demonstration for retrieving the required file from the Hadoop file system.

Initially, view the data from HDFS using cat command.

$ $HADOOP_HOME/bin/hadoop fs -cat /user/output/outfile

Get the file from HDFS to the local file system using get command.

$ $HADOOP_HOME/bin/hadoop fs -get /user/output/ /home/hadoop_tp/

Step-5: Deleting Files from HDFS

$ hadoop fs -rm file.txt

Step 6:Shutting Down the HDFS

You can shut down the HDFS by using the following command.

$ stop-dfs.sh

Result

Thus the Installation of Hadoop in three operating modes has been successfully completed

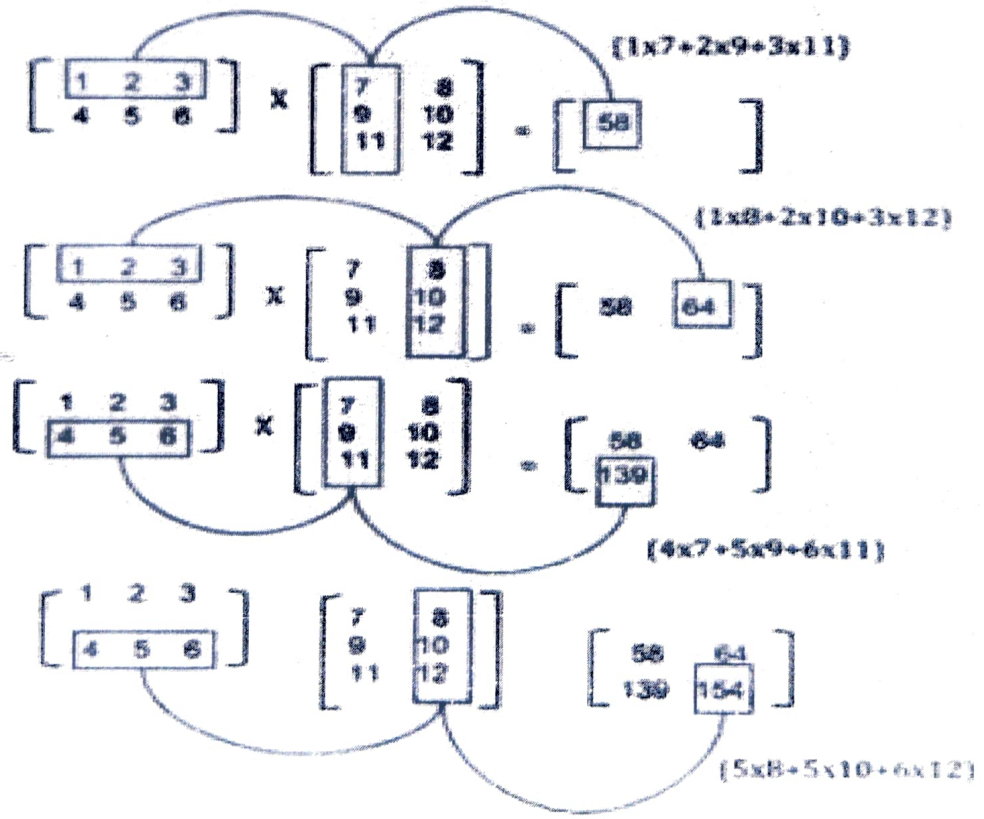
Ex. No	Implementation of Matrix Multiplication with Hadoop Map Reduce	Date
3		

Aim:

To Develop a Map Reduce program to implement Matrix Multiplication.

Theory:

In **mathematics**, **matrix multiplication** or the **matrix product** is a binary operation that produces a matrix from two matrices. The definition is motivated by linear equations and linear transformations on vectors, which have numerous applications in applied mathematics, physics, and engineering. In more detail, if **A** is an $n \times m$ matrix and **B** is an $m \times p$ matrix, their matrix product **AB** is an $n \times p$ matrix, in which the m entries across a row of **A** are multiplied with the m entries down a column of **B** and summed to produce an entry of **AB**. When two linear transformations are represented by matrices, then the matrix product represents the composition of the two transformations.



ALGORITHM :

Algorithm for Map Function.

a. for each element m_{ij} of M do
produce (key,value) pairs as ((i,k), (M,j,m_{ij}), for k=1,2,3,.. upto the number of columns of N

b. for each element njk of N do
produce (key,value) pairs as ((i,k),(N,j,N_{jk}), for i = 1,2,3,.. Upto the number of rows of M.

c. return Set of (key,value) pairs that each key (i,k), has list with values
(M,j,m_{ij}) and (N, j,n_{jk}) for all possible values of j.

Algorithm for Reduce Function.

d. for each key (i,k) do
sort values begin with M by j in listM sort values begin with N by j in listN multiply mij and njk for jth value of each list
sum up mij x njk return (i,k), Σj=1 mij x njk

procedure :

Step 1. Download the hadoop jar files with these links.

Download Hadoop Common Jar files: https://goo.gl/G4MyHp
$ wget https://goo.gl/G4MyHp -O hadoop-common-2.2.0.jar Download Hadoop Mapreduce Jar File: https://goo.gl/KT8yfB
$ wget https://goo.gl/KT8yfB -O hadoop-mapreduce-client-core-2.7.1.jar

Step 2. Creating Mapper file for Matrix Multiplication.

```
import java.io.DataInput;

import java.io.DataOutput;

import java.io.IOException; import
java.util.ArrayList

importorg.apache.hadoop.conf.Configuration; import
org.apache.hadoop.fs.Path;

importorg.apache.hadoop.io.DoubleWritable; import
org.apache.hadoop.io.IntWritable;

import org.apache.hadoop.io.Text;

importorg.apache.hadoop.mapreduce.Mapper;

import org.apache.hadoop.mapreduce.Reducer; import
org.apache.hadoop.mapreduce.lib.input.*;
importorg.apache.hadoop.mapreduce.lib.output.*; import
org.apache.hadoop.util.ReflectionUtils;

class Element implements Writable { int tag;

    int index;
```

```
        double value;
        Element() {
                tag = 0;
                index = 0;
                value = 0.0;
        }
        Element(int tag, int index, double value) {
                this.tag = tag;
                this.index = index;
                this.value = value;
        }
        @Override
        public void readFields(DataInput input) throws IOException { tag
                = input.readInt();
                index = input.readInt();
                value = input.readDouble();
        }
        @Override
        public void write(DataOutput output) throws IOException {
                output.writeInt(tag);
                output.writeInt(index);
                output.writeDouble(value);
        }
}
class Pair implements WritableComparable<Pair> {
        int i;
        int j;

        Pair() {
                i = 0;

j = 0;
}
Pair(int i, int j) {
this.i = i; this.j = j;
}
@Override
public void readFields(DataInput input) throws IOException {
i = input.readInt();
j = input.readInt();
```

```
}
@Override
public void write(DataOutput output) throws IOException { output.writeInt(i);
output.writeInt(j);
}
@Override
public int compareTo(Pair compare) { if (i > compare.i) {
return 1;
} else if ( i < compare.i) { return -1;
} else {
if(j > compare.j) {
return 1;
} else if (j < compare.j) { return -1;
}
}
return 0;
}
public String toString() { return i + " " + j + " ";
}
}
public class Multiply {
public static class MatriceMapperM extends Mapper<Object,Text,IntWritable,Element>
@Override
public void map(Object key, Text value, Context context) throws IOException, InterruptedException
{
String readLine = value.toString(); String[] stringTokens = readLine.split(",");
int index = Integer.parseInt(stringTokens[0]);
double elementValue = Double.parseDouble(stringTokens[2]); Element e = new Element(0,
index, elementValue); IntWritable keyValue = new
IntWritable(Integer.parseInt(stringTokens[1]));
context.write(keyValue, e);
}
}
public static class MatriceMapperN extends Mapper<Object,Text,IntWritable,Element> { @Override
public void map(Object key, Text value, Context context) throws IOException, InterruptedException {
String readLine = value.toString(); String[] stringTokens = readLine.split(",");
int index = Integer.parseInt(stringTokens[1]);
double elementValue = Double.parseDouble(stringTokens[2]); Element e = new Element(1,index,
elementValue);
IntWritable keyValue = new IntWritable(Integer.parseInt(stringTokens[0]));
```

```
context.write(keyValue, e);
}
}
public static class ReducerMxN extends Reducer<IntWritable,Element, Pair, DoubleWritable> {
@Override
public void reduce(IntWritable key, Iterable<Element> values, Context context) throws IOException,
InterruptedException {
ArrayList<Element> M = new ArrayList<Element>(); ArrayList<Element> N = new ArrayList<Element>();
Configuration conf = context.getConfiguration(); for(Element element : values) {
Element tempElement = ReflectionUtils.newInstance(Element.class,
ReflectionUtils.copy(conf, element, tempElement); if (tempElement.tag == 0) {
M.add(tempElement);
} else if(tempElement.tag == 1) { N.add(tempElement);
}
}
for(int i=0;i<M.size();i++) {
for(int j=0;j<N.size();j++) {
Pair p = new Pair(M.get(i).index,N.get(j).index);
double multiplyOutput = M.get(i).value * N.get(j).value;
context.write(p, new DoubleWritable(multiplyOutput));
}
}
}
}
public static class MapMxN extends Mapper<Object, Text, Pair, DoubleWritable> { @Override
public void map(Object key, Text value, Context context) throws IOException, InterruptedException {
String readLine = value.toString(); String[] pairValue = readLine.split(" "); Pair p = new
Pair(Integer.parseInt(pairValue[0]),Integer.parseInt(pairValue[1]));
DoubleWritable val = new DoubleWritable(Double.parseDouble(pairValue[2]));
context.write(p, val);
}
}
public static class ReduceMxN extends Reducer<Pair, DoubleWritable, Pair, DoubleWritable> {
@Override
public void reduce(Pair key, Iterable<DoubleWritable> values, Context context) throws IOException,
InterruptedException {
double sum = 0.0; for(DoubleWritable value : values) {
sum += value.get();
}
context.write(key, new DoubleWritable(sum));
```

```
}
}
public static void main(String[] args) throws Exception { Job job = Job.getInstance();
job.setJobName("MapIntermediate"); job.setJarByClass(Project1.class);
MultipleInputs.addInputPath(job, new Path(args[0]), TextInputFormat.class, MatriceMapperM.class);
MultipleInputs.addInputPath(job, new Path(args[1]), TextInputFormat.class, MatriceMapperN.class);
                job.setReducerClass(ReducerMxN.class);
                job.setMapOutputKeyClass(IntWritable.class);
                job.setMapOutputValueClass(Element.class);
                job.setOutputKeyClass(Pair.class);
                job.setOutputValueClass(DoubleWritable.class);
                job.setOutputFormatClass(TextOutputFormat.class);
                FileOutputFormat.setOutputPath(job, new Path(args[2]));
                job.waitForCompletion(true);

                Job job2 = Job.getInstance();
                job2.setJobName("MapFinalOutput");
                job2.setJarByClass(Project1.class);

                job2.setMapperClass(MapMxN.class);
                job2.setReducerClass(ReduceMxN.class)

                job2.setMapOutputKeyClass(Pair.class);
                job2.setMapOutputValueClass(DoubleWritable.class);

                job2.setOutputKeyClass(Pair.class);
                job2.setOutputValueClass(DoubleWritable.class);

                job2.setInputFormatClass(TextInputFormat.class);
                job2.setOutputFormatClass(TextOutputFormat.class);

                FileInputFormat.setInputPaths(job2, new Path(args[2]));
                FileOutputFormat.setOutputPath(job2, new Path(args[3]));

                job2.waitForCompletion(true);

        }
    }
```

Step 5. Compiling the program in particular folder named as operation

```
#!/bin/bash

rm -rf multiply.jar classes

module load hadoop/2.6.0 mkdir
-p classes

javac -d classes -cp classes:`$HADOOP_HOME/bin/hadoop classpath` Multiply.java jar
cf multiply.jar -C classes .

echo "end"
```

Step 6. Running the program in particular folder named as operation

```
export HADOOP_CONF_DIR=/home/$USER/cometcluster
module load hadoop/2.6.0

myhadoop-configure.sh
start-dfs.sh
```

start-yarn.sh

hdfs dfs -mkdir -p /user/$USER

hdfs dfs -put M-matrix-large.txt /user/$USER/M-matrix-large.txt
hdfs dfs -put N-matrix-large.txt /user/$USER/N-matrix-large.txt

hadoop jar multiply.jar edu.uta.cse6331.Multiply /user/$USER/M-matrix-large.txt

/user/$USER/N-matrix-large.txt /user/$USER/intermediate /user/$USER/output
rm -rf output-distr

mkdir output-distr

hdfs dfs -get /user/$USER/output/part* output-distr

stop-yarn.sh
stop-dfs.sh

myhadoop-cleanup.sh

Expected Output:

module load hadoop/2.6.0 rm -rf output intermediate

hadoop --config $HOME jar multiply.jar edu.uta.cse6331.Multiply M-matrix-small.txt N-matrix- small.txt

intermediate output

Result:

Thus the Matrix Multiplication with Hadoop Map Reduce was successfully executed.

Ex. No	Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm	Date
4		

Aim:

Implementing distinct word count problem using Map-Reduce.

Procedure:

The function of the mapper is as follows:

- Create a IntWritable variable 'one' with value as 1
- Convert the input line in Text type to a String
- Use a tokenizer to split the line into words
- Iterate through each word and a form key value pairs as

Assign each work from the tokenizer (of String type) to a Text 'word'

- Form key value pairs for each word as < word,one > and push it to the output collector

The function of Sort and Group:

After this, "aggregation" and "Shuffling and Sorting" done by framework. Then Reducers task these final pair to produce output.

The function of the reducer is as follows

- Initialize a variable 'sum' as 0
- Iterate through all the values with respect to a key and sum up all of them
- Push to the output collector the Key and the obtained sum as value

Program:

For the given sample input1 data file (input1.txt: Hello World Bye World) mapper emits:

<Hello, 1>

<World, 1>

<Bye, 1>

<World, 1>

The second input2 data file (input2.txt : Hello Hadoop Goodbye Hadoop) mapper emits:

<Hello, 1>

<Hadoop, 1>

<Goodbye, 1>

<Hadoop, 1>

WordCount also specifies a combiner. Hence, the output of each map is passed through the local combiner (which is same as the Reducer as per the job configuration) for local aggregation, after being sorted on the keys.

The output of the first map:

<Bye, 1>

<Hello, 1>

<World, 2>

The output of the second map:

<Goodbye, 1>

<Hadoop, 2>

<Hello, 1>

The Reducer implementation via the reduce method just sums up the values, which are the occurence counts for each key (i.e. words in this example).

Thus the output of the job is:

<Bye, 1>

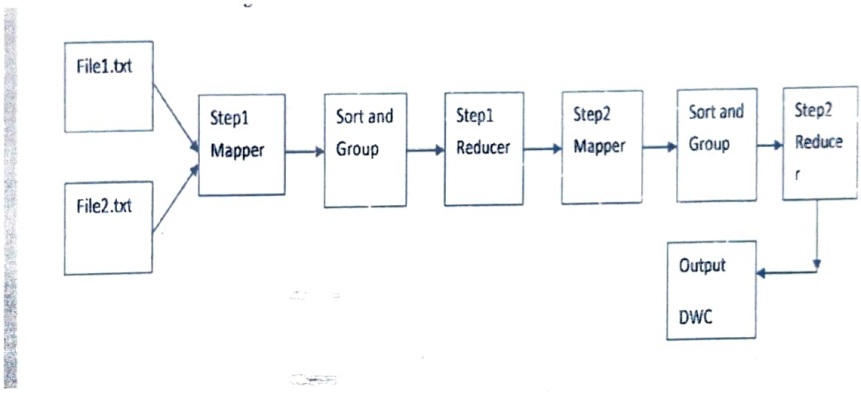
<Goodbye, 1>

<Hadoop, 2>

<Hello, 2>

<World, 2>

Data flow diagram :



Result:

Thus the Word Count Map Reduce program to understand Map Reduce Paradigm and verified it by running an example program successfully .

Ex. No	Installation of Hive along with practice examples.	Date
5		

Aim:

To install hive with proper procedure.

Steps for hive installation

- Download and Unzip Hive
- Edit .bashrc file
- Edit hive-config.sh file
- Create Hive directories in HDFS
- Initiate Derby database
- Configure hive-site.xml file

Step 1:

download and unzip Hive

==========

wget https://downloads.apache.org/hive/hive-3.1.2/apache-hive-3.1.2-bin.tar.gz tar xzf apache-hive-3.1.2-bin.tar.gz

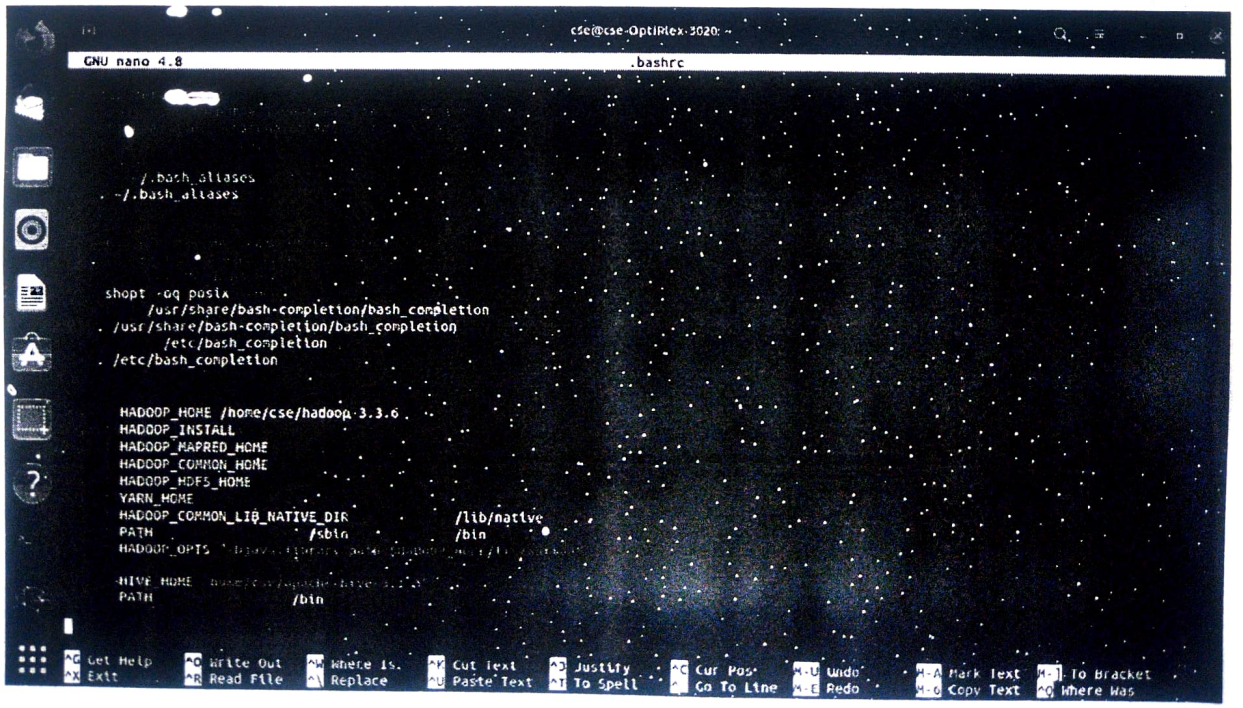
step 2:

Edit .bashrc file

==========

sudo nano .bashrc

export HIVE_HOME= /home/hdoop/apache-hive-3.1.2-bin export PATH=$PATH:$HIVE_HOME/bin



step 3:

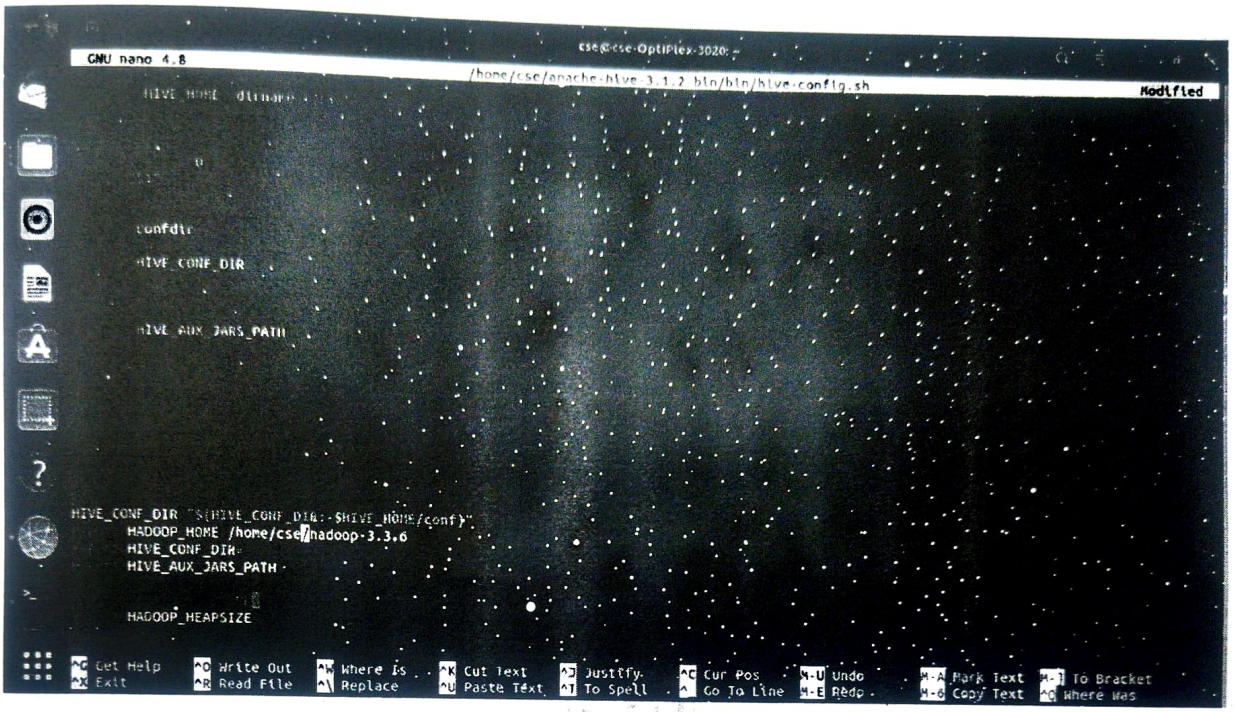
source ~/.bashrc

step 4:

Edit hive-config.sh file

==========

sudo nano $HIVE_HOME/bin/hive-config.sh export HADOOP_HOME=/home/cse/hadoop-3.3.6



step 5:

Create Hive directories in HDFS

==========

hdfs dfs -mkdir /tmp

hdfs dfs -chmod g+w /tmp

hdfs dfs -mkdir -p /user/hive/warehouse hdfs dfs -chmod g+w /user/hive/warehouse

step 6:

Fixing guava problem – Additional step

==========

rm $HIVE_HOME/lib/guava-19.0.jar

cp $HADOOP_HOME/share/hadoop/hdfs/lib/guava-27.0-jre.jar $HIVE_HOME/lib/

step 7: Configure hive-site.xml File (Optional)

Use the following command to locate the correct file:

cd $HIVE_HOME/conf

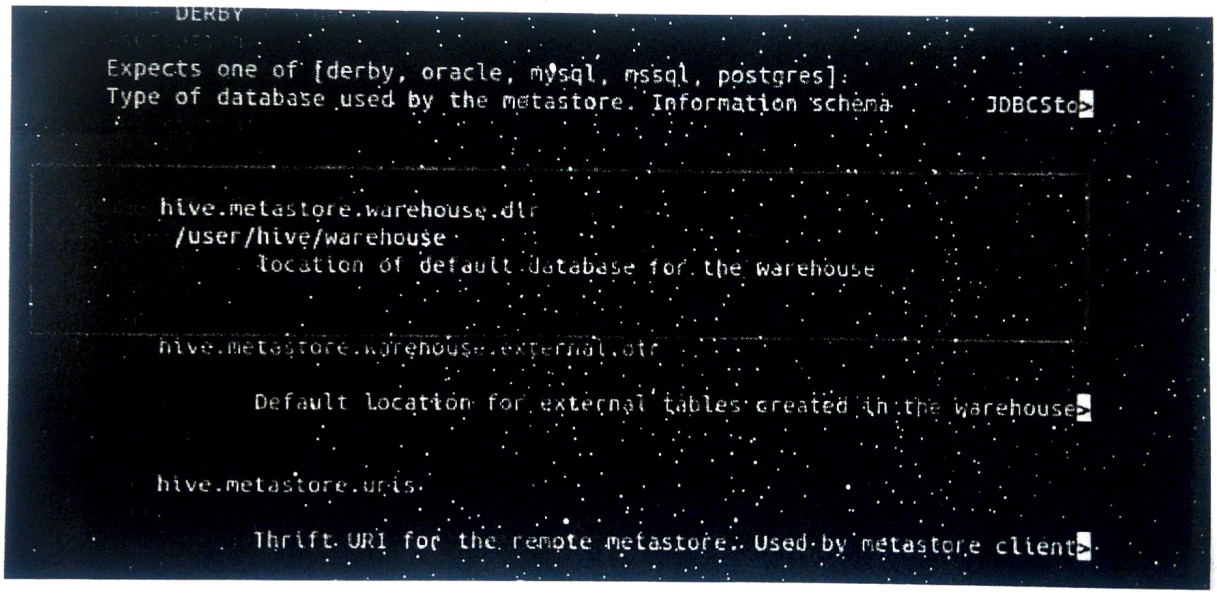
List the files contained in the folder using the ls command.

Use the hive-default.xml.template to create the hive-site.xml file:

cp hive-default.xml.template hive-site.xml

Access the hive-site.xml file using the nano text editor:

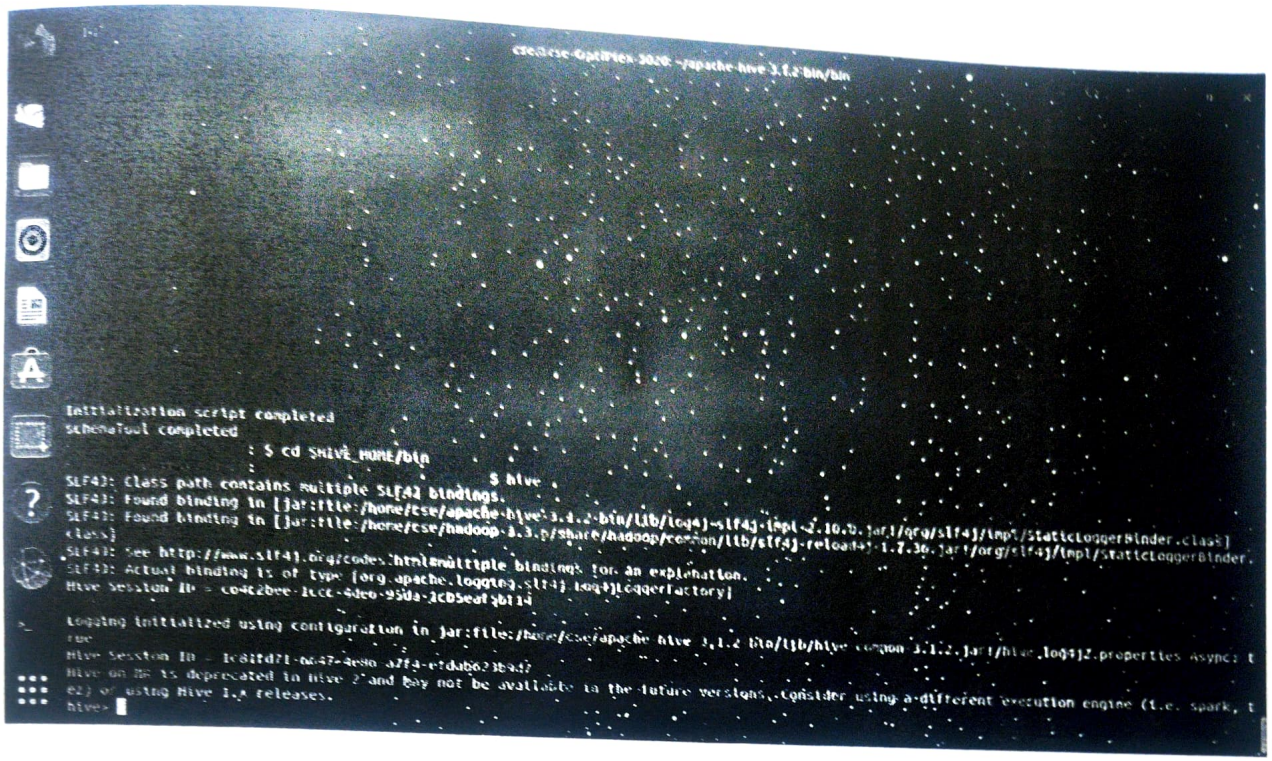
sudo nano hive-site.xml



Step 8: Initiate Derby Database

==========

$HIVE_HOME/bin/schematool -dbType derby –initSchema



Result:

Thus The Real Hive Installed Successfully .

Ex. No	Installation of Hive With Example	Date
5(B)		

Aim:

To install hive along with practical example.

Procedure:

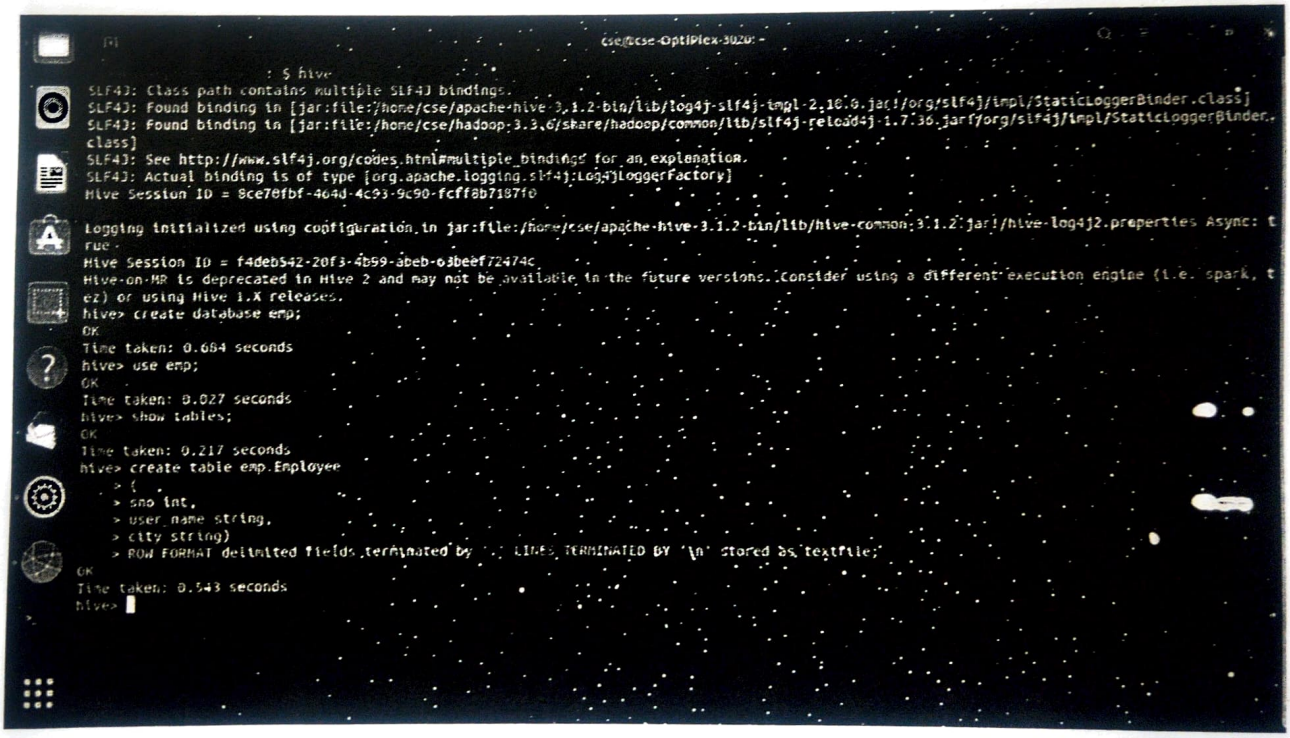
Create Database from Hive Beeline shell

1.Create database database_name; Ex:

>Create database Emp;

>use Emp;

>create table emp.employee(sno int,user String,city String)Row format delimited fields terminated by /n stored as textfile;



Show Database

Result:

Thus hive was successfully installed and executed with example

Ex. No	Installation of HBase, Installing thrift along with Practice examples	Date
6(A)		

Aim:

To Install H Base on Ubuntu 18.04 HBase

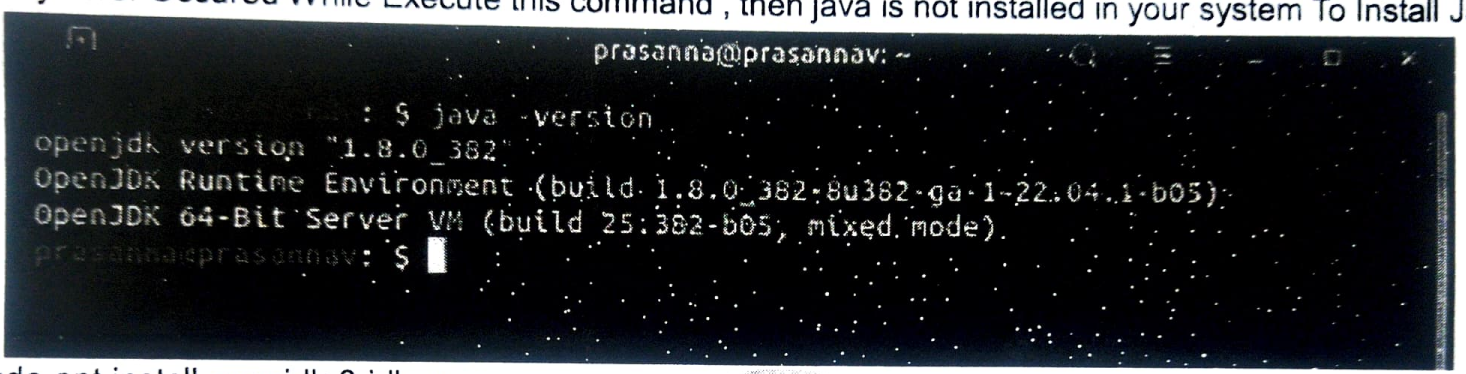
Procedure:

Pre-requisite:

Ubuntu 16.04 or higher installed on a virtual machine.

step-1:Make sure that java has installed in your machine to verify that run java –version

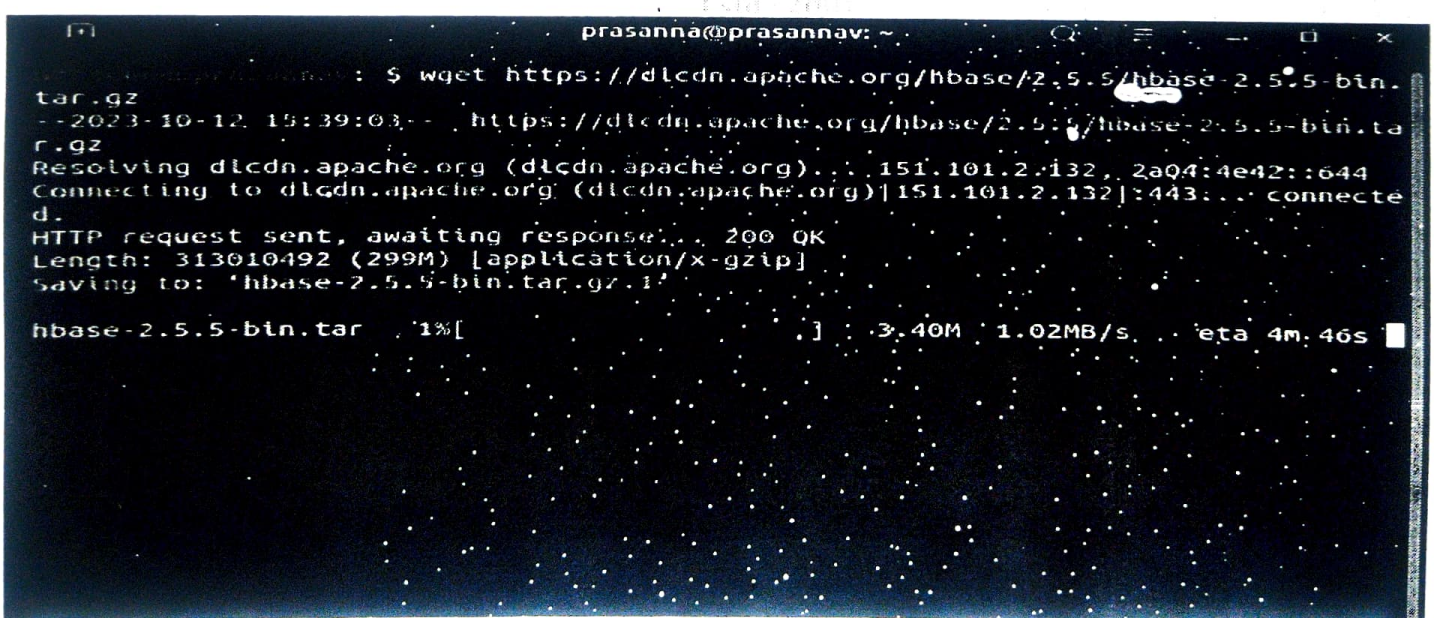
If any Error Occured While Execute this command , then java is not installed in your system To Install Java



sudo apt install openjdk-8-jdk -y

Step-2:Download Hbase

wget https://dlcdn.apache.org/hbase/2.5.5/hbase-2.5.5-bin.tar.gz



Step-3:Extract The hbase-2.5.5-bin.tar.gz file by using the command tar xvf hbase-2.5.5- bin.tar.gz

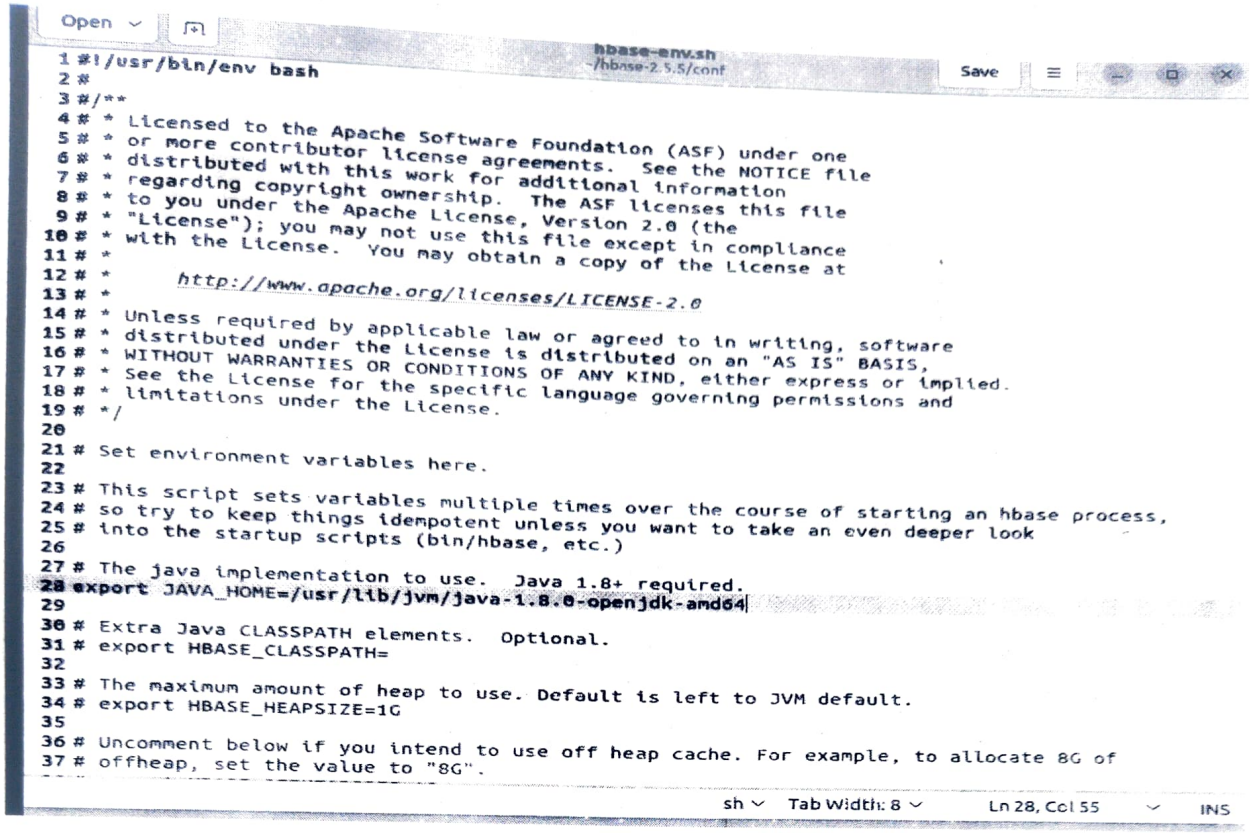
```
prasanna@prasannav:~
: $ ls
                                hbase-2.5.5-bin.tar.gz.1

                : $ tar xvf hbase-2.5.5-bin.tar.gz
hbase-2.5.5/LICENSE.txt
hbase-2.5.5/NOTICE.txt
hbase-2.5.5/LEGAL
hbase-2.5.5/docs/
hbase-2.5.5/docs/apidocs/
hbase-2.5.5/docs/apidocs/org/
hbase-2.5.5/docs/apidocs/org/apache/
hbase-2.5.5/docs/apidocs/org/apache/hadoop/
hbase-2.5.5/docs/apidocs/org/apache/hadoop/hbase/
hbase-2.5.5/docs/apidocs/org/apache/hadoop/hbase/backup/
hbase-2.5.5/docs/apidocs/org/apache/hadoop/hbase/chaos/
hbase-2.5.5/docs/apidocs/org/apache/hadoop/hbase/chaos/class-use/
hbase-2.5.5/docs/apidocs/org/apache/hadoop/hbase/class-use/
hbase-2.5.5/docs/apidocs/org/apache/hadoop/hbase/client/
hbase-2.5.5/docs/apidocs/org/apache/hadoop/hbase/client/backoff/
hbase-2.5.5/docs/apidocs/org/apache/hadoop/hbase/client/backoff/class-use/
hbase-2.5.5/docs/apidocs/org/apache/hadoop/hbase/client/class-use/
hbase-2.5.5/docs/apidocs/org/apache/hadoop/hbase/client/example/
```

step-4: goto hbase2.5.5/conf folder and open hbase-env.sh file

```
: $ ls
                                hbase-2.5.5-bin.tar.gz.1

: $ cd hbase-2.5.5/
          $ cd conf/
             $ ls
hadoop-metrics2-hbase.properties  hbase-policy.xml       log4j2.properties
hbase-env.cmd                     hbase-site.xml         regionservers
hbase-env.sh                      log4j2-hbtop.properties
                :                    $ gedit hbase-env.sh
```



step-5 : Edit .bashrc file

and then open .bashrc file and mention HBASE_HOME path as shown in

below export HBASE_HOME=/home/prasanna/hbase-2.5.5

here you can change name according to your local machine name

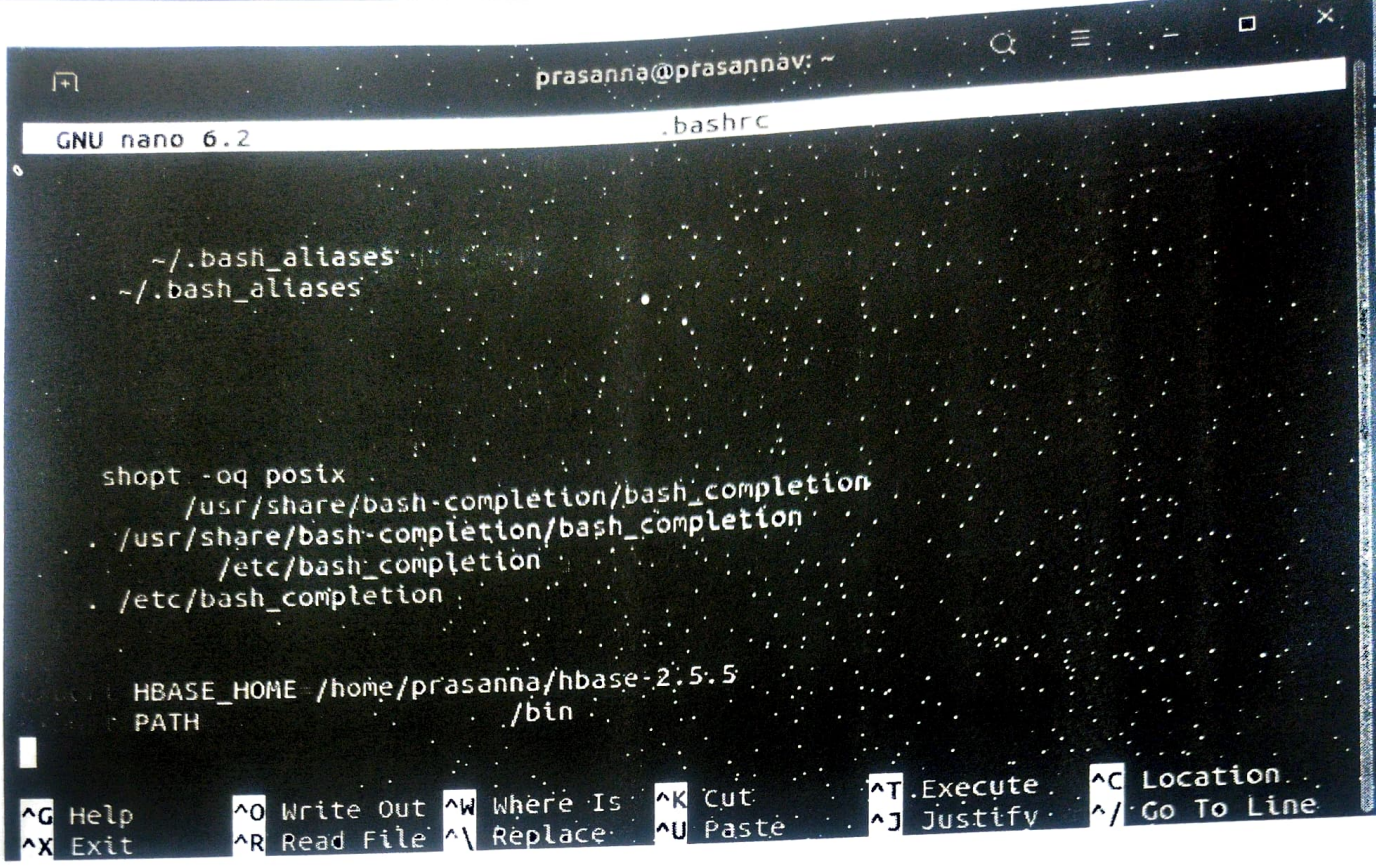
eg : export

HBASE_HOME=/home/<your_machine_name>/hbase-2.5.5

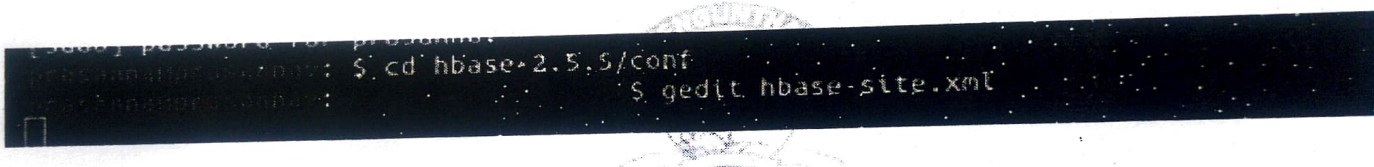
export PATH= $PATH:$HBASE_HOME/bin

Note:*make sure that the hbase-2.5.5 folderin home directory before setting HBASE_HOME path

, if not then move the hbase-2.5.5 file to home directory*



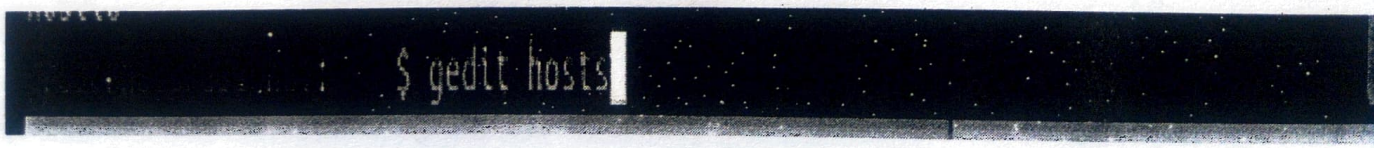
step-6 : Add properties in the hbase-site.xml

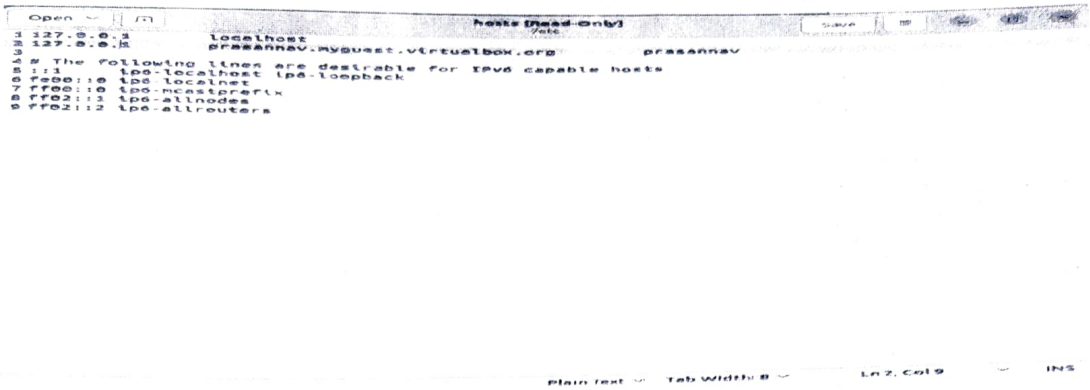


put the below property between the <ccnfiguratio></configuration> tag

```
<property>
<name>hbase.rootdir</name>
<value>file:///home/prasanna/HBASE/hbase</value>
</property>
<property>
<name>hbase.zookeeper.property.dataDir</name>
<value>/home/prasanna/HBASE/zookeeper</value>
</property>
```

step-7:Goto To /etc/ folderand run the following command and configure





change in line no-2 by default the ip is 127.0.1.1
change it to 127.0.0.1 in second line onlystep-8:starting hbase
goto hbase-2.5.5/bin folder

```
: $ cd hbase-2.5.5/bin/
: $ ./start-hbase.sh
running master, logging to /home/prasanna/hbase-2.5.5/logs/hbase-prasanna-master
-prasannav.out
: $
```

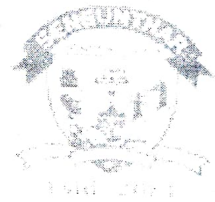
After this run jps command to ensure that hbase is running

```
prasanna@prasannav: $ jps
5126 Jps
4729 HMaster
prasanna@prasannav: $
```

run http://localhost:16010 to see hbase web UI

step-9: accessing hbase shell by running ./hbase shell command

```
prasanna@prasanna-vm: ~/hbase-2.5.5/bin
$ ./hbase shell
HBase Shell
Use "help" to get list of supported commands.
Use "exit" to quit this interactive shell.
For Reference, please visit: http://hbase.apache.org/2.0/book.html#shell
Version 2.5.5, r7ebd4381261fefd78fc2acf258a95184f4147cee, Thu Jun  1 17:42:49 PDT 2023
Took 0.0011 seconds
hbase:001:0>
```



Result:

HBase was successfully installed on Ubuntu 18.04

Ex. No 6(B)	HBase, Installing thrift along with Practice examples	Date

Aim:

To Installation HBase on Ubuntu 18.04.

EXAMPLE

1) **To create Table syntax:**

create 'Table_Name','col_fam_1','col_fam_1', 'col_fam-n'

code :

create 'aamec','dept','year'

2) **List All Tables**

code :

list

```
hbase:010:0> list
TABLE
aamec
amazon
college
prasanna
table_name
5 row(s)
Took 0.0133 seconds
=> ["aamec", "amazon", "college", "prasanna", "table_name"]
hbase:011:0>
```

3) **insert**

data

syntax:

put

'table_name','row_key','column_family:attribute','value' here

row_key is a unique key to retrive data

code :

this data will enter data into the dept column family

put
'aamec','cse','dept:studentname','prasan
na' put 'aamec','cse','dept:year','third'
put 'aamec','cse','dept:section','A'

```
hbase:008:0> put 'aamec','cse','dept:studentname','prasanna'
Took 0.0240 seconds
hbase:009:0> put 'aamec','cse','dept:year','third'
Took 0.0072 seconds
hbase:010:0> put 'aamec','cse','dept:section','A'
Took 0.0342 seconds
hbase:011:0>
```

This data will enter data into the year column family

put 'aamec','cse','year:joinedyear','2021' put 'aamec','cse','year:finishingyear','2025'

```
hbase:011:0> put 'aamec','cse','year:joinedyear','2021'
Took 0.0739 seconds
hbase:012:0> put 'aamec','cse','year:finishingyear','2025'
Took 0.0411 seconds
hbase:013:0>
```

4) Scan Table

same as desc in RDBMS

syntax:

scan 'table_name'

code:

scan 'aamec'

```
hbase:022:0> scan 'aamec'
ROW                    COLUMN+CELL
 cse                   column=dept:section, timestamp=2023-10-13T12:14:26.734, value=A
 cse                   column=dept:studentname, timestamp=2023-10-13T12:13:11.914, value=pras
                       anna
 cse                   column=dept:year, timestamp=2023-10-13T12:13:41.018, value=third
 cse                   column=year:finishingyear, timestamp=2023-10-13T12:16:57.291, value=20
                       25
 cse                   column=year:joinedyear, timestamp=2023-10-13T12:16:41.876, value=2021
 it                    column=dept:section, timestamp=2023-10-13T12:20:40.016, value=A
 it                    column=dept:studentname, timestamp=2023-10-13T12:20:06.012, value=amba
                       lavanan
 it                    column=dept:year, timestamp=2023-10-13T12:20:19.978, value=third
 it                    column=year:finishingyear, timestamp=2023-10-13T12:21:02.654, value=20
                       25
 it                    column=year:joinedyear, timestamp=2023-10-13T12:20:53.094, value=2021
2 row(s)
Took 0.0810 seconds
hbase:023:0>
```

5) To get specific data

syntax:

get 'table_name','row_key',[optional column family: attribute]

code :

get 'aamec','cse'

```
hbase:023:0> get 'aamec','cse'
COLUMN                  CELL
 dept:section           timestamp=2023-10-13T12:14:26.734, value=A
 dept:studentname       timestamp=2023-10-13T12:13:11.914, value=prasanna
 dept:year              timestamp=2023-10-13T12:13:41.018, value=third
 year:finishingyear     timestamp=2023-10-13T12:16:57.291, value=2025
 year:joinedyear        timestamp=2023-10-13T12:16:41.876, value=2021
1 row(s)
Took 0.0908 seconds
```

1.update table value

The same put command is used to update the table value ,if the row key is aldready present in the database then it will update data according to the value ,if not present the it will create new row with the given row key

```
hbase:025:0> put 'aamec','cse','dept:section','B'
Took 0.0134 seconds
hbase:026:0>
```

previously the value for the section in cse is A ,But after running this command the value will be changed into B

```
hbase:026:0> get 'aamec','cse'
COLUMN                  CELL
 dept:section           timestamp=2023-10-13T12:30:57.010, value=B
 dept:studentname       timestamp=2023-10-13T12:13:11.914, value=prasanna
 dept:year              timestamp=2023-10-13T12:13:41.018, value=third
 year:finishingyear     timestamp=2023-10-13T12:16:57.291, value=2025
 year:joinedyear        timestamp=2023-10-13T12:16:41.876, value=2021
1 row(s)
Took 0.0506 seconds
hbase:027:0>
```

7)To Delete Data

syntax:

delete 'table_name','row_key','column_family:attribute'

code :

delete 'aamec','cse','year:joinedyear'

```
hbase:027:0> delete 'aamec','cse','year:joinedyear'
Took 0.0138 seconds
hbase:028:0> get 'aamec','cse'
COLUMN                  CELL
 dept:section           timestamp=2023-10-13T12:30:57.010, value=B
 dept:studentname       timestamp=2023-10-13T12:13:11.914, value=prasanna
 dept:year              timestamp=2023-10-13T12:13:41.018, value=third
 year:finishingyear     timestamp=2023-10-13T12:16:57.291, value=2025
1 row(s)
Took 0.0686 seconds
```

Result:

HBase was successfully installed with an example on Ubuntu 18.04.

Ex. No	Practice importing and exporting data from various databases.	Date
7		

Aim:

To import and export, date from MySQL and Hive

Procedure:

Step 1:To start hdfs

```
: $ start-all.sh
WARNING: Attempting to start all Apache Hadoop daemons as ambal2 in 10 seconds.
WARNING: This is not a recommended production deployment configuration.
WARNING: Use CTRL-C to abort.
Starting namenodes on [localhost]
Starting datanodes
```

Step 2: MySQL Installation

```
root@ubuntu:/home/ambal2# mysql
Welcome to the MySQL monitor.  Commands end with ; or \g.
Your MySQL connection id is 9
Server version: 8.0.34-0ubuntu0.22.04.1 (Ubuntu)

Copyright (c) 2000, 2023, Oracle and/or its affiliates.

Oracle is a registered trademark of Oracle Corporation and/or its
affiliates. Other names may be trademarks of their respective
owners.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql>
```

sudo apt install mysql-server (use this command to install MySQL server)

COMMANDS:

~$ sudo su

After this enter your linux user password,then the root mode will be open here we don't need any authentication for mysql.

~root$ mysql

Creating user profiles and grant them permissions:

Mysql> CREATE USER 'bigdata'@'localhost' IDENTIFIED BY 'bigdata';

Mysql>grant all privileges on *.* to bigdata@localhost;

Note: This step is not required if you just use the root user to make CRUD operations in the MySQL

Mysql> CREATE USER 'bigdata'@'127.0.0.1' IDENTIFIED BY ' bigdata'; Mysql>grant all privileges on *.* to bigdata@127.0.0.1;

Note: Here, *.* means that the user we create has all the privileges on all the tables of all the databases.

Now, we have created user profiles which will be used to make CRUD operations in the mysql

Step 3: Create a database and table and insert data.

Example:

create database Employe;

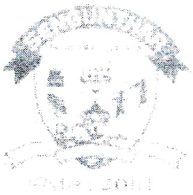
create table Employe.Emp(author_name varchar(65), total_no_of_articles int, phone_no int, address varchar(65));

insert into Emp values("Rohan",10,123456789,"Lucknow");

Step 3: Create a database and table in the hive where data should be imported.

create table geeks_hive_table(name string, total_articles int, phone_no int, address string) row format delimited fields terminated by ',';

Step 4: SQOOP INSTALLATION :



After downloading the sqoop , go to the directory where we downloaded the sqoop and then extract it using the following command :

$ tar -xvf sqoop-1.4.4.bin__hadoop-2.0.4-alpha.tar.gz Then enter into the super user : $ su

Next to move that to the usr/lib which requires a super user privilege

$ mv sqoop-1.4.4.bin_____hadoop-2.0.4-alpha /usr/lib/sqoop

Then exit : $ exit

Goto .bashrc: $ sudo nano .bashrc , and then add the following export SQOOP_HOME=/usr/lib/sqoop

export PATH=$PATH:$SQOOP_HOME/bin

$ source ~/.bashrc

Then configure the sqoop, goto the directory of the config folder of sqoop_home and then move the contents of template file to the environment file.

$ cd $SQOOP_HOME/conf

$ mv sqoop-env-template.sh sqoop-env.sh

Then open the sqoop-environment file and then add the following, export HADOOP_COMMON_HOME=/usr/local/Hadoop

export HADOOP_MAPRED_HOME=/usr/local/hadoop

Note : Here we add the path of the Hadoop libraries and files and it may different from the path which we mentioned here. So, add the Hadoop path based on your installation.

Step 5: Download and Configure mysql-connector-java :

We can download mysql-connector-java-5.1.30.tar.gz file from the following link.

ext, to extract the file and place it to the lib folder of sqoop

$ tar -zxf mysql-connector-java-5.1.30.tar.gz

$ su

$ cd mysql-connector-java-5.1.30

$ mv mysql-connector-java-5.1.30-bin.jar /usr/lib/sqoop/lib

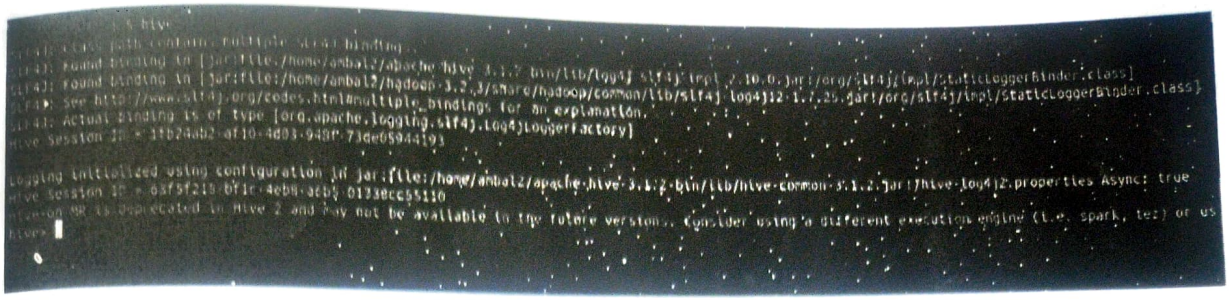
Note : This is library file is very important don't skip this step because it contains the libraries to connect the mysql databases to jdbc.

Verify sqoop: sqoop-version Step 3: hive database Creation

hive> create database sqoop_example; hive>use sqoop_example;

hive>create table sqoop(usr_name string,no_ops int,ops_names string);

Hive commands much more alike mysql commands.Here, we just create the structure to store the data which we want to import in hive.




```
hive> show databases;
OK
default
sqoop
Time taken: 0.683 seconds, Fetched: 2 row(s)
hive> use sqoop;
OK
Time taken: 0.08 seconds
hive> show tables;
OK
bigdata
sqoop
Time taken: 0.148 seconds, Fetched: 2 row(s)
hive> create table dell(mdl_name string,mdl_num int);
OK
Time taken: 2.564 seconds
hive>
```

Step 6: Importing data from MySQL to hive :

sqoop import --connect \ jdbc:mysql://127.0.0.1:3306/database_name_in_mysql \

--username root --password cloudera \

--table table_name_in_mysql \

--hive-import --hive-table database_name_in_hive.table_name_in_hive \

--m 1

OUTPUT:

Result:

Thus the import and export, the order of columns in MySQL queries are exported to hive successfully