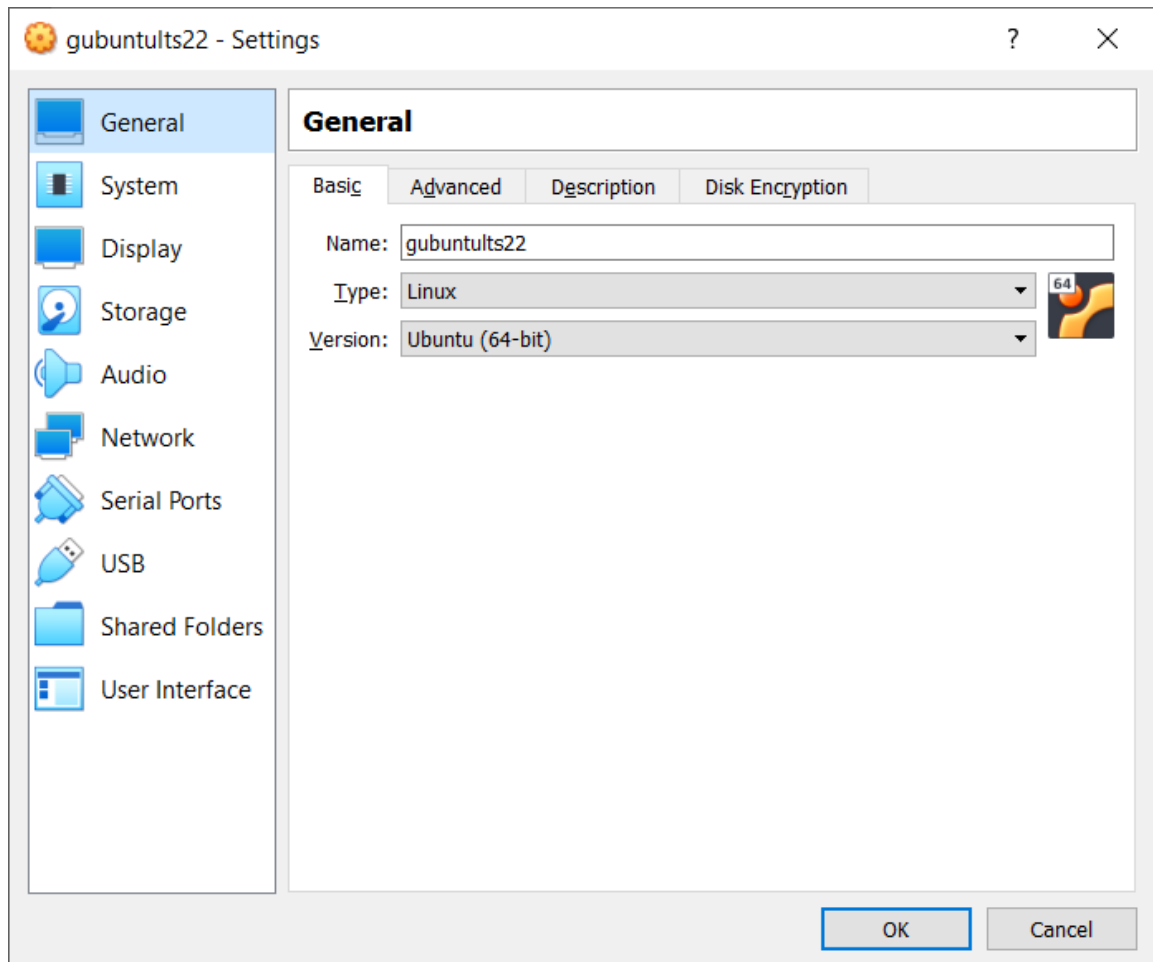
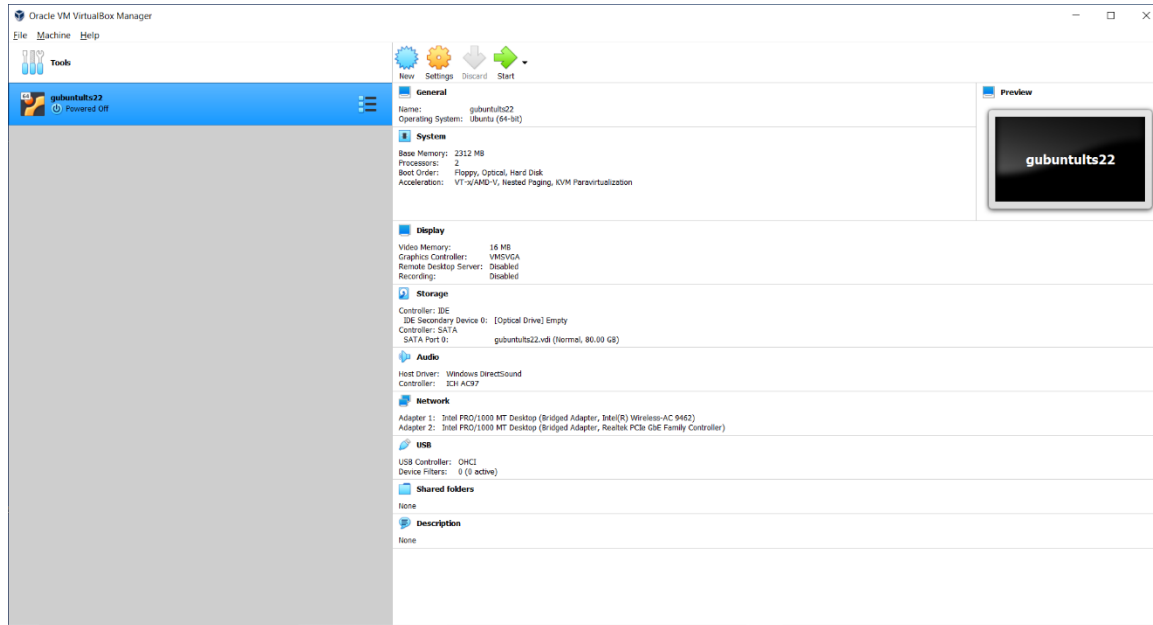
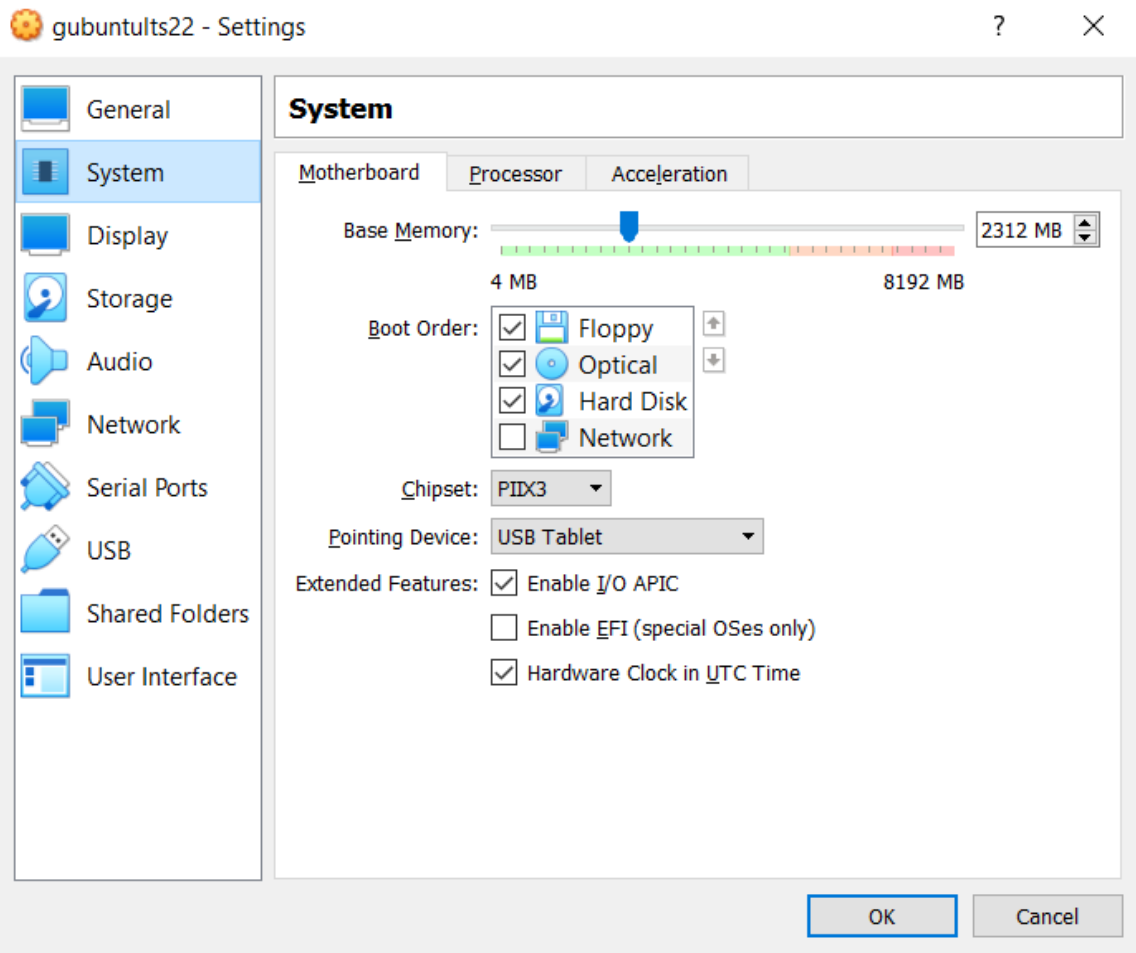
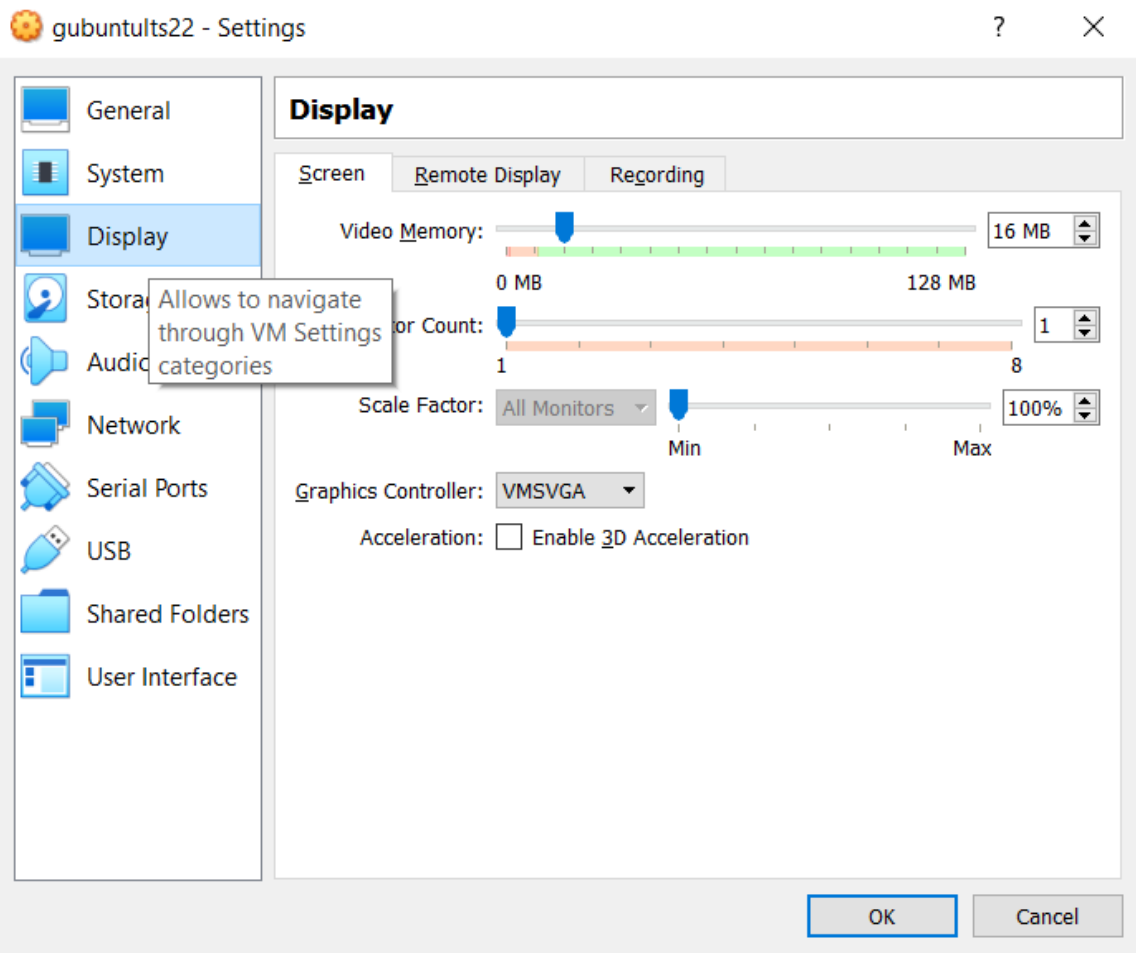


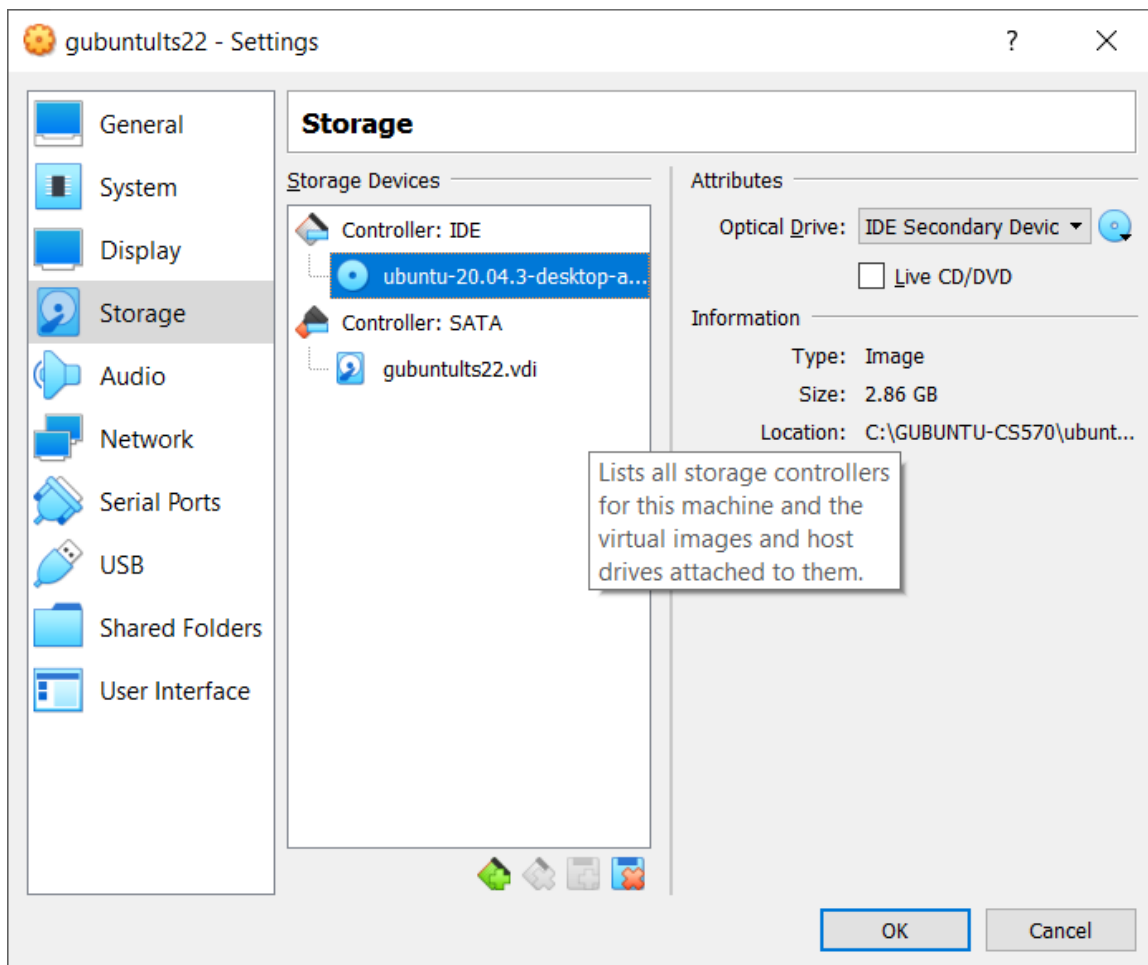
Student :
SFBU- 19599, Manickam Ravisekar - MSCS
Project : MapReduce – Pi

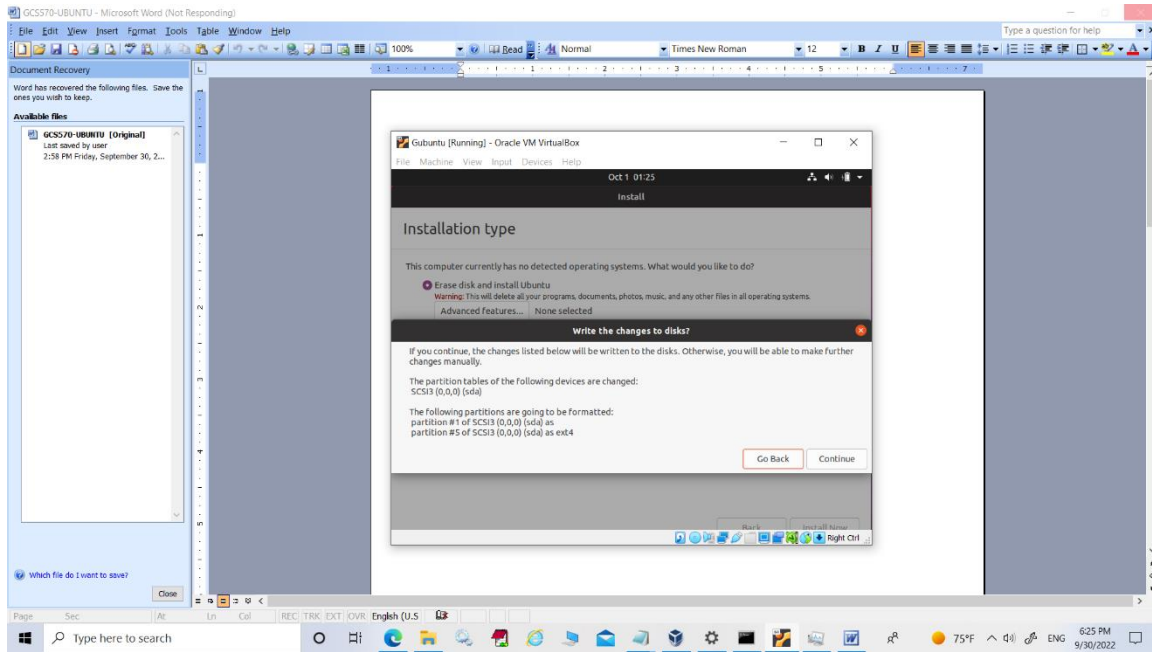
Installation Of Oracle Virtual machine on local host












? X

← Select start-up disk

Please select a virtual optical disk file or a physical optical drive containing a disk to start your new virtual machine from.

The disk should be suitable for starting a computer from and should contain the operating system you wish to install on the virtual machine if you want to do that now. The disk will be ejected from the virtual drive automatically next time you switch the virtual machine off, but you can also do this yourself if needed using the Devices menu.

ubuntu-22.04.1-desktop-amd64.iso (3.56 GB) 

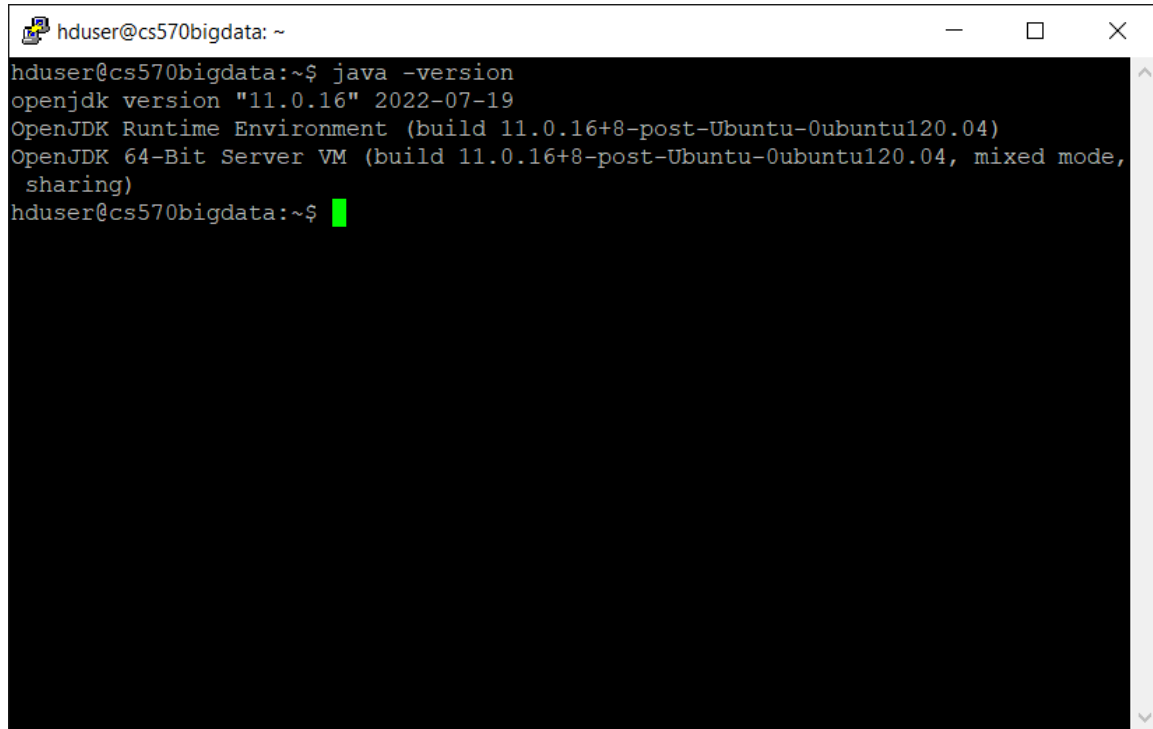
Start

Cancel

After completion of installation Oracle VM , install Java , Hadoop and the script files
 Download hadoop
 Download Java
 Extract hadoop

Java installation steps

```
sudo apt-get install openjdk-11-jre  
sudo apt-get install openjdk-11-jdk  
java -version
```

A terminal window titled 'hduser@cs570bigdata: ~' with standard window controls. The terminal shows the command 'java -version' and its output: 'openjdk version "11.0.16" 2022-07-19', 'OpenJDK Runtime Environment (build 11.0.16+8-post-Ubuntu-0ubuntu120.04)', and 'OpenJDK 64-Bit Server VM (build 11.0.16+8-post-Ubuntu-0ubuntu120.04, mixed mode, sharing)'. The prompt 'hduser@cs570bigdata:~\$' is followed by a green cursor.

```
hduser@cs570bigdata:~$ java -version  
openjdk version "11.0.16" 2022-07-19  
OpenJDK Runtime Environment (build 11.0.16+8-post-Ubuntu-0ubuntu120.04)  
OpenJDK 64-Bit Server VM (build 11.0.16+8-post-Ubuntu-0ubuntu120.04, mixed mode,  
sharing)  
hduser@cs570bigdata:~$
```

Setup hadoop user for Hadoop Installation

```
sudo addgroup hadoop
```

```
sudo adduser --ingroup hadoop hduser
```

```
sudo su hduser
```

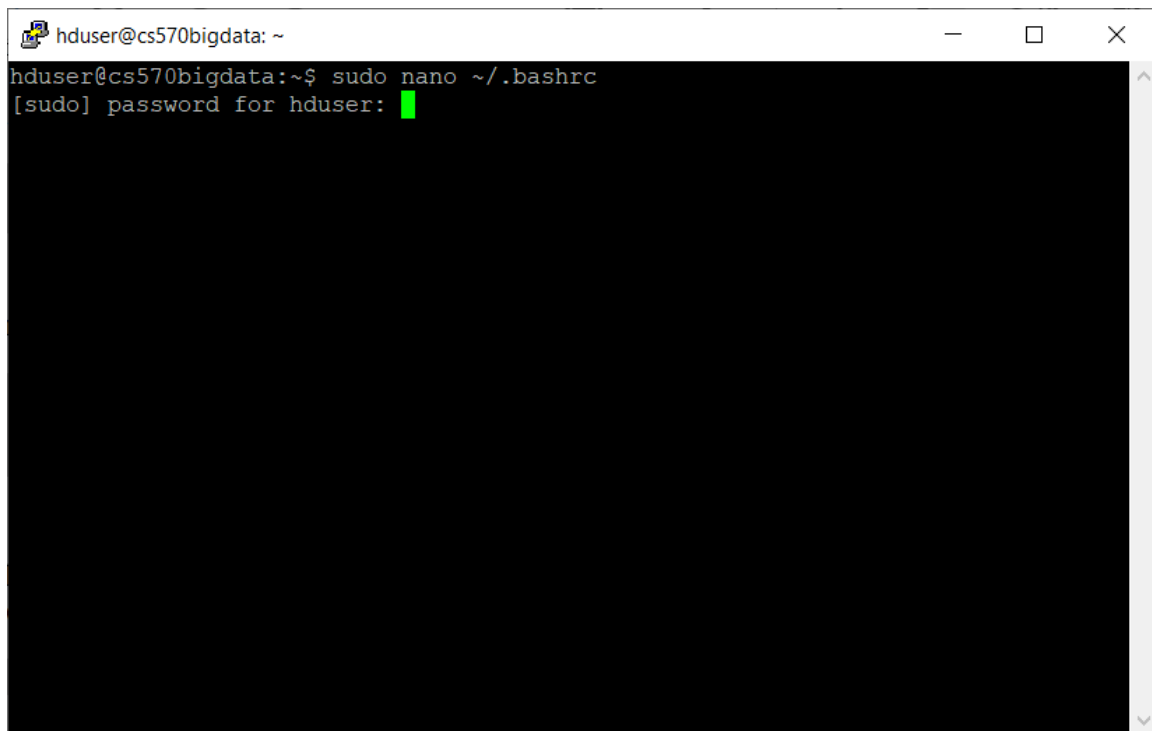
For this I used hadoop version `hadoop-2.10.2.tar.gz`

```
Sudo tar vxzf hadoop-2.10.2.tar.gz -C /usr/local
```

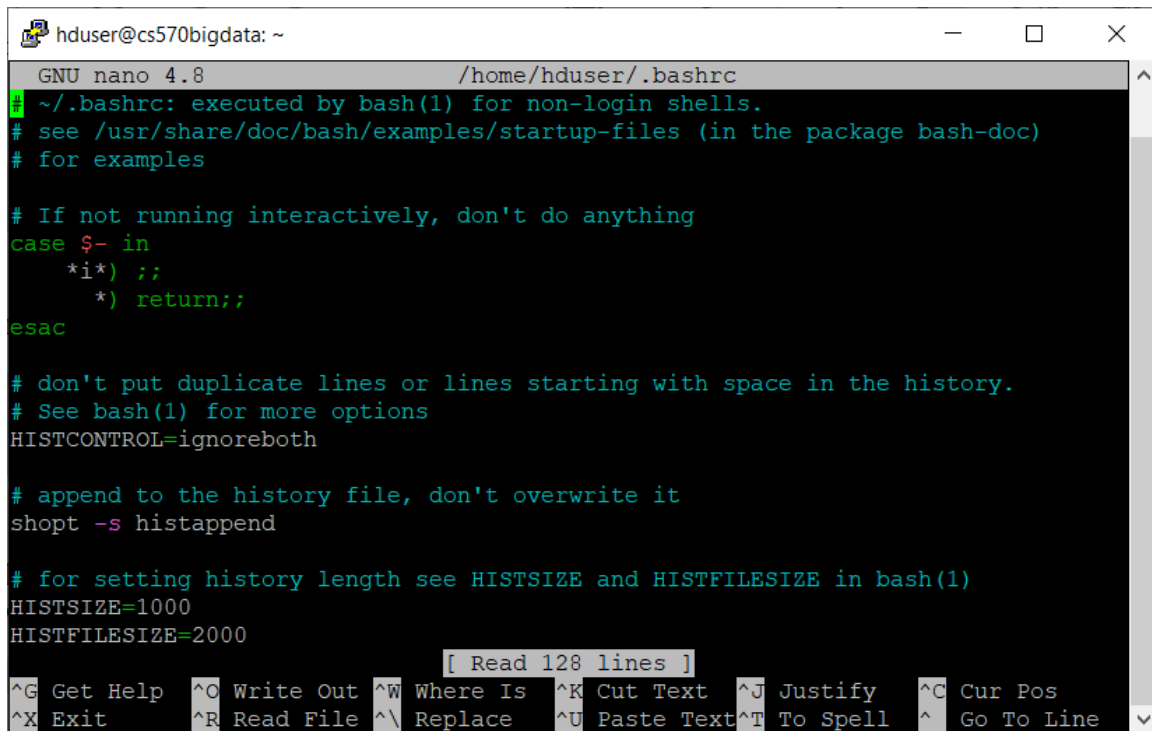
```
Cd /usr/local
```

```
Sudo mv hadoop-2.10.2 hadoop
```

```
Sudo chown -R hduser:hadoop hadoop
```



```
hduser@cs570bigdata: ~  
hduser@cs570bigdata:~$ sudo nano ~/.bashrc  
[sudo] password for hduser: 
```



```
GNU nano 4.8 /home/hduser/.bashrc
# ~/.bashrc: executed by bash(1) for non-login shells.
# see /usr/share/doc/bash/examples/startup-files (in the package bash-doc)
# for examples

# If not running interactively, don't do anything
case $- in
    *i*) ;;
    *) return;;
esac

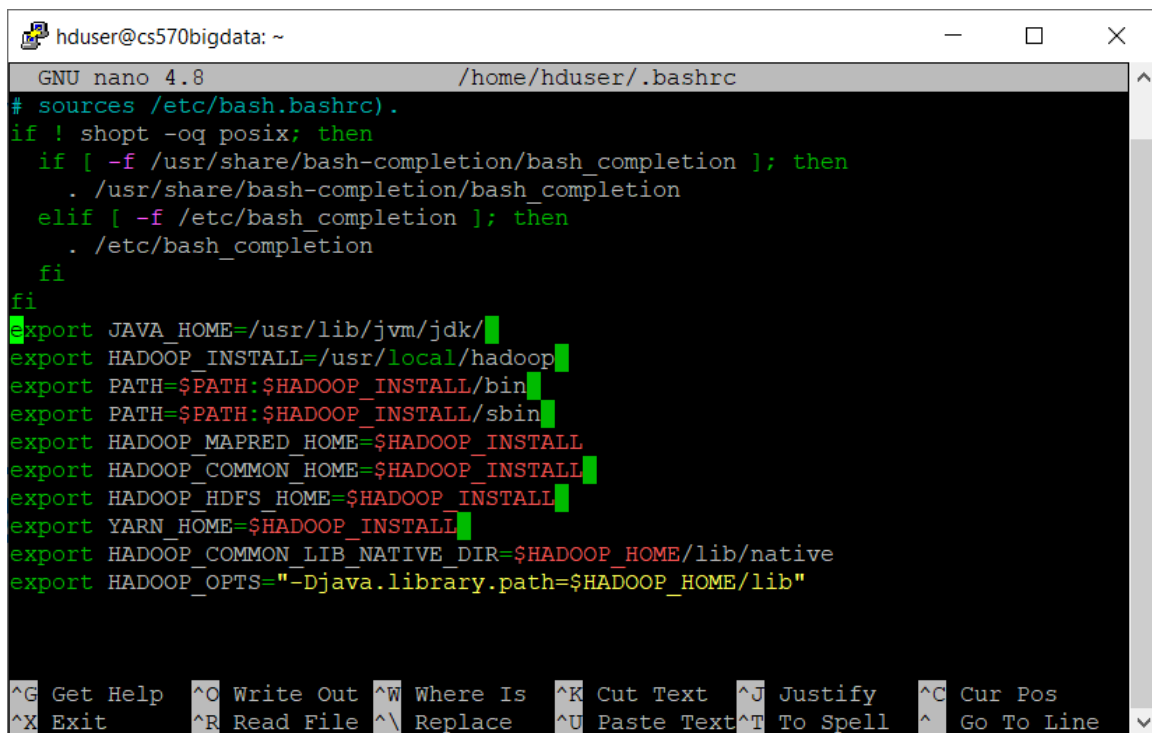
# don't put duplicate lines or lines starting with space in the history.
# See bash(1) for more options
HISTCONTROL=ignoreboth

# append to the history file, don't overwrite it
shopt -s histappend

# for setting history length see HISTSIZE and HISTFILESIZE in bash(1)
HISTSIZE=1000
HISTFILESIZE=2000

[ Read 128 lines ]
^G Get Help  ^O Write Out ^W Where Is  ^K Cut Text  ^J Justify   ^C Cur Pos
^X Exit      ^R Read File ^\ Replace   ^U Paste Text ^T To Spell  ^_ Go To Line
```

Move to the end and add following lines for hadoop



```
GNU nano 4.8 /home/hduser/.bashrc
# sources /etc/bash.bashrc).
if ! shopt -oq posix; then
  if [ -f /usr/share/bash-completion/bash_completion ]; then
    . /usr/share/bash-completion/bash_completion
  elif [ -f /etc/bash_completion ]; then
    . /etc/bash_completion
  fi
fi
export JAVA_HOME=/usr/lib/jvm/jdk/
export HADOOP_INSTALL=/usr/local/hadoop
export PATH=$PATH:$HADOOP_INSTALL/bin
export PATH=$PATH:$HADOOP_INSTALL/sbin
export HADOOP_MAPRED_HOME=$HADOOP_INSTALL
export HADOOP_COMMON_HOME=$HADOOP_INSTALL
export HADOOP_HDFS_HOME=$HADOOP_INSTALL
export YARN_HOME=$HADOOP_INSTALL
export HADOOP_COMMON_LIB_NATIVE_DIR=$HADOOP_HOME/lib/native
export HADOOP_OPTS="-Djava.library.path=$HADOOP_HOME/lib"
```

To save use source ~/.bashrc
systemctl reboot -i

Now do the following setting for hduser


```
hduser@cs570bigdata:~$ sudo nano ~/.bashrc
[sudo] password for hduser:
hduser@cs570bigdata:~$ sudo nano /usr/local/hadoop/etc/hadoop/hadoop-env.sh
```

export JAVA_HOME=/usr/lib/jvm/jdk

Ssh generation and creation of authorized keys from public ssh keys

```
ravisekar@ravisekar-VirtualBox: ~/ssh
ravisekar@ravisekar-VirtualBox:~$ ssh-keygen -t rsa -P ""
Generating public/private rsa key pair.
Enter file in which to save the key (/home/ravisekar/.ssh/id_rsa):
Created directory '/home/ravisekar/.ssh'.
Your identification has been saved in /home/ravisekar/.ssh/id_rsa
Your public key has been saved in /home/ravisekar/.ssh/id_rsa.pub
The key fingerprint is:
SHA256:ED7NPhgVsiLpRactOK5zhpB7zFqjTHcizmVj77Dw+Lw ravisekar@ravisekar-VirtualBox
The key's randomart image is:
+---[RSA 3072]-----+
| . + o. |
| + = B |
| = = B o |
| + + o * |
| o o . S |
|.* |
| =+OO . |
| =O@.B |
| o=.Eoo |
+---[SHA256]-----+
ravisekar@ravisekar-VirtualBox:~$ ls -al
total 88
drwxr-x--- 17 ravisekar ravisekar 4096 Sep 30 13:08 .
drwxr-xr-x  3 root      root      4096 Sep 29 21:12 ..
```

```
ravisekar@ravisekar-VirtualBox: ~/ssh
ravisekar@ravisekar-VirtualBox:~$ cd .ssh
ravisekar@ravisekar-VirtualBox:~/.ssh$ ls -al
total 16
drwx----- 2 ravisekar ravisekar 4096 Sep 30 13:08 .
drwxr-x--- 17 ravisekar ravisekar 4096 Sep 30 13:08 ..
-rw----- 1 ravisekar ravisekar 2622 Sep 30 13:08 id_rsa
-rw-r--r-- 1 ravisekar ravisekar 584 Sep 30 13:08 id_rsa.pub
ravisekar@ravisekar-VirtualBox:~/.ssh$
```

Now we need following files to be set for hadoop :

1 . sudo nano /usr/local/hadoop/etc/hadoop/core-site.xml



```
GNU nano 4.8 /usr/local/hadoop/etc/hadoop/core-site.xml
<?xml version="1.0" encoding="UTF-8"?>
<!--
Licensed under the Apache License, Version 2.0 (the "License");
you may not use this file except in compliance with the License.
You may obtain a copy of the License at

    http://www.apache.org/licenses/LICENSE-2.0

Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License. See accompanying LICENSE file.
-->

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

<configuration>
<property><name>fs.default.name</name>
<value>hdfs://cs570bigdata:9000</value>
</property>
</configuration>
```

2. sudo nano /usr/local/hadoop/etc/hadoop/yarn-site.xml



```
GNU nano 4.8 /usr/local/hadoop/etc/hadoop/yarn-site.xml
<?xml version="1.0"?>
<!--
Licensed under the Apache License, Version 2.0 (the "License");
you may not use this file except in compliance with the License.
You may obtain a copy of the License at

    http://www.apache.org/licenses/LICENSE-2.0

Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License. See accompanying LICENSE file.
-->

<configuration>

<!-- Site specific YARN configuration properties -->
<property>
<name>yarn.nodemanager.aux-services</name>
<value>mapreduce_shuffle</value>
</property>
<property>
<name>yarn.nodemanager.aux-services.mapreduce.shuffle.class</name>
<value>org.apache.hadoop.mapred.ShuffleHandler</value>
</property>
</configuration>
```

3. sudo nano /usr/local/hadoop/etc/hadoop/mapred-site.xml

```
hduser@cs570bigdata: ~
GNU nano 4.8 /usr/local/hadoop/etc/hadoop/mapred-site.xml
<?xml version="1.0"?>
<!-- Licensed under the Apache License, Version 2.0 (the "License");
you may not use this file except in compliance with the License.
You may obtain a copy of the License at
http://www.apache.org/licenses/LICENSE-2.0
Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License. See accompanying LICENSE file.
-->

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

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

4 For doing hdfs.xml
First complete this task's
mkdir -p mydata/hdfs/namenode
mkdir -p mydata/hdfs/datanode
sudo nano /usr/local/hadoop/etc/hadoop/hdfs-site.xml

```
hduser@cs570bigdata: ~
GNU nano 4.8 /usr/local/hadoop/etc/hadoop/hdfs-site.xml
<?xml version="1.0" encoding="UTF-8"?>
<!-- Licensed under the Apache License, Version 2.0 (the "License");
you may not use this file except in compliance with the License.
You may obtain a copy of the License at
http://www.apache.org/licenses/LICENSE-2.0
Unless required by applicable law or agreed to in writing, software
distributed under the License is distributed on an "AS IS" BASIS,
WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, either express or implied.
See the License for the specific language governing permissions and
limitations under the License. See accompanying LICENSE file.
-->

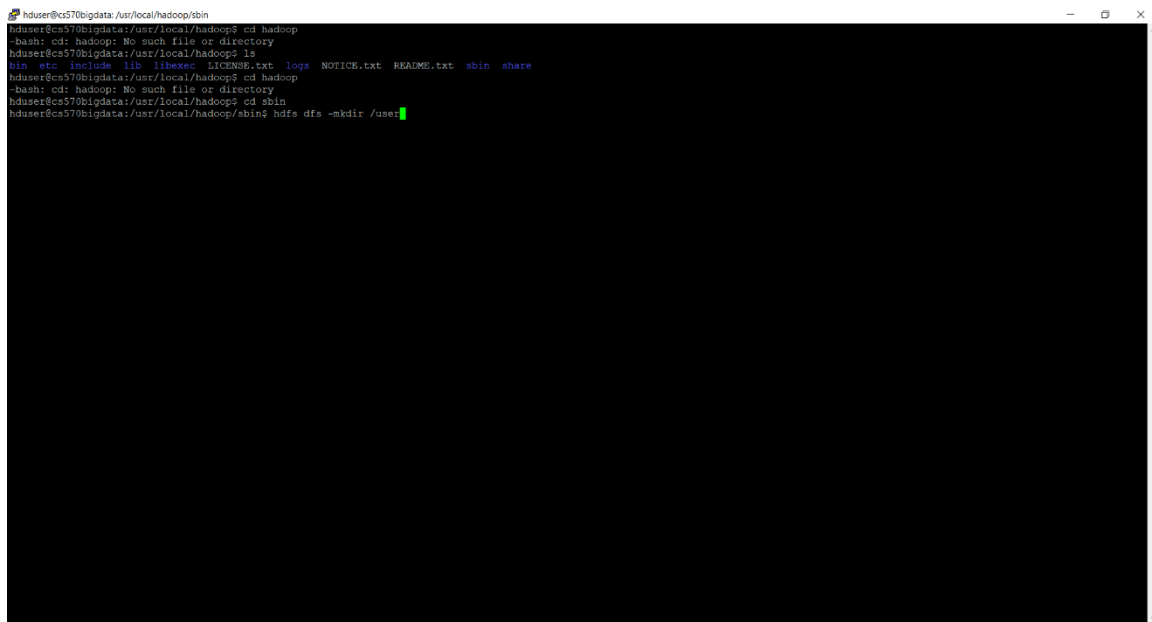
<!-- Put site-specific property overrides in this file. -->

<configuration>
  <property>
    <name>dfs.replication</name>
    <value>1</value>
  </property>
  <property>
    <name>dfs.namenode.name.dir</name>
    <value>file://home/hduser/mydata/hdfs/namenode</value>
  </property>
  <property>
    <name>dfs.datanode.data.dir</name>
    <value>file://home/hduser/mydata/hdfs/datanode</value>
  </property>
</configuration>
```

Create following test data file for hdfs

```
hduser@cs570bigdata: ~/Desktop/inputdata
hduser@cs570bigdata:~/Desktop/inputdata$ cat test.txt
hello world world hello hello
hduser@cs570bigdata:~/Desktop/inputdata$
```

Create directory as mentioned

A terminal window with a black background and white text. The prompt is 'hduser@cs570bigdata: /usr/local/hadoop/sbin'. The user enters 'cd /usr/local/hadoop' and then 'ls'. The output of 'ls' is: 'bin etc include lib libexec LICENSE.txt logs NOTICE.txt README.txt sbin share'. The user then enters 'cd sbin' and finally 'hdfs dfs -mkdir /user'.

```
hduser@cs570bigdata: /usr/local/hadoop/sbin
hduser@cs570bigdata: /usr/local/hadoop$ cd /usr/local/hadoop
-bash: cd: /usr/local/hadoop: No such file or directory
hduser@cs570bigdata: /usr/local/hadoop$ ls
bin  etc  include  lib  libexec  LICENSE.txt  logs  NOTICE.txt  README.txt  sbin  share
hduser@cs570bigdata: /usr/local/hadoop$ cd /usr/local/hadoop
-bash: cd: /usr/local/hadoop: No such file or directory
hduser@cs570bigdata: /usr/local/hadoop$ cd sbin
hduser@cs570bigdata: /usr/local/hadoop/sbin$ hdfs dfs -mkdir /user
```

Now copy to file created for input

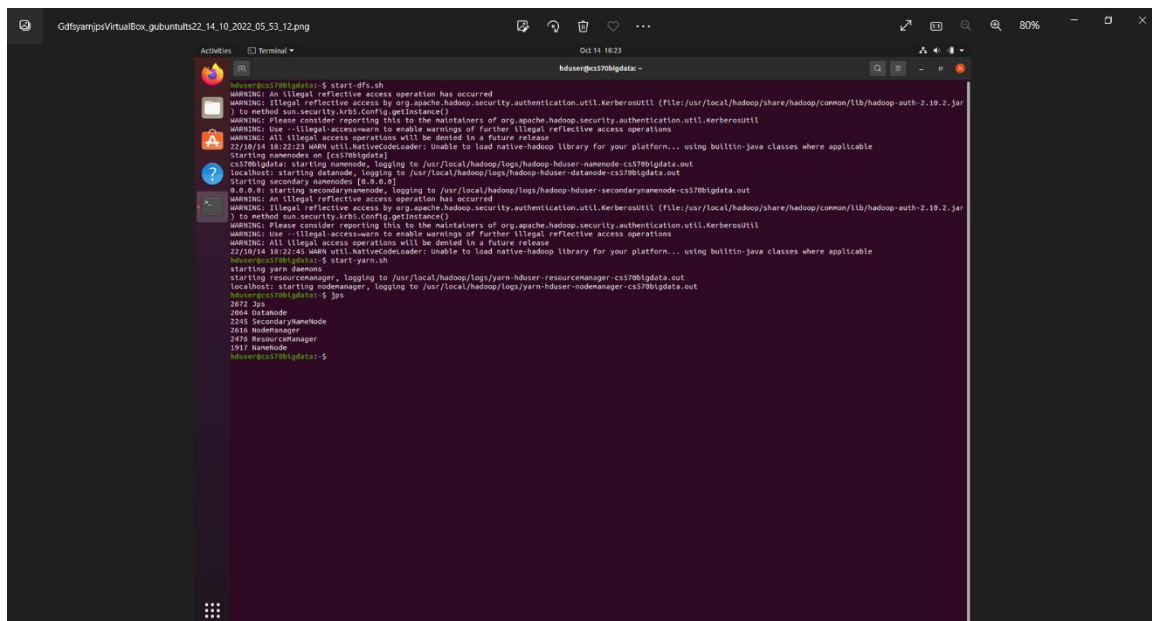
`/usr/local/hadoop/bin/hdfs dfs -put '/home/hduser/Desktop/inputdata' /user`

Next final step for hadoop

`hdfs namenode --format`

now everything is set we can start hadoop and run the jar for the word count and get the output as shown in below screen

now start hadoop as shown below by running
start-dfs.sh
start-yarn.sh and run jps to check the status of nodes as shown in below screens



```
Gdfsyanjps@VirtualBox: gubuntu22_14_10_2022_05_53_12.png
Oct 14 18:23
hduser@cs570bigdata: ~$ start-dfs.sh
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.10.2.jar)
to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
22/10/14 18:22:23 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Starting namenodes on [cs570bigdata]
cs570bigdata: starting namenode, logging to /usr/local/hadoop/logs/hadoop-hduser-namenode-cs570bigdata.out
localhost: starting datanode, logging to /usr/local/hadoop/logs/hadoop-hduser-datanode-cs570bigdata.out
0.0.0.0: starting secondarynamenode, logging to /usr/local/hadoop/logs/hadoop-hduser-secondarynamenode-cs570bigdata.out
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.10.2.jar)
to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
22/10/14 18:22:45 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@cs570bigdata: ~$ start-yarn.sh
starting yarn daemons
starting resourcemanager, logging to /usr/local/hadoop/logs/yarn-hduser-resourcemanager-cs570bigdata.out
localhost: starting nodemanager, logging to /usr/local/hadoop/logs/yarn-hduser-nodemanager-cs570bigdata.out
hduser@cs570bigdata: ~$ jps
2064 DataNode
2245 SecondaryNameNode
2616 NodeManager
2478 ResourceManager
1917 NameNode
hduser@cs570bigdata: ~$
```

Procedure to test mapreduce pi program :

1. Compile the java program(PiCalculation.java)
2. create the jar file for the class generated (picalculation.jar)
3. run the below command for your input data

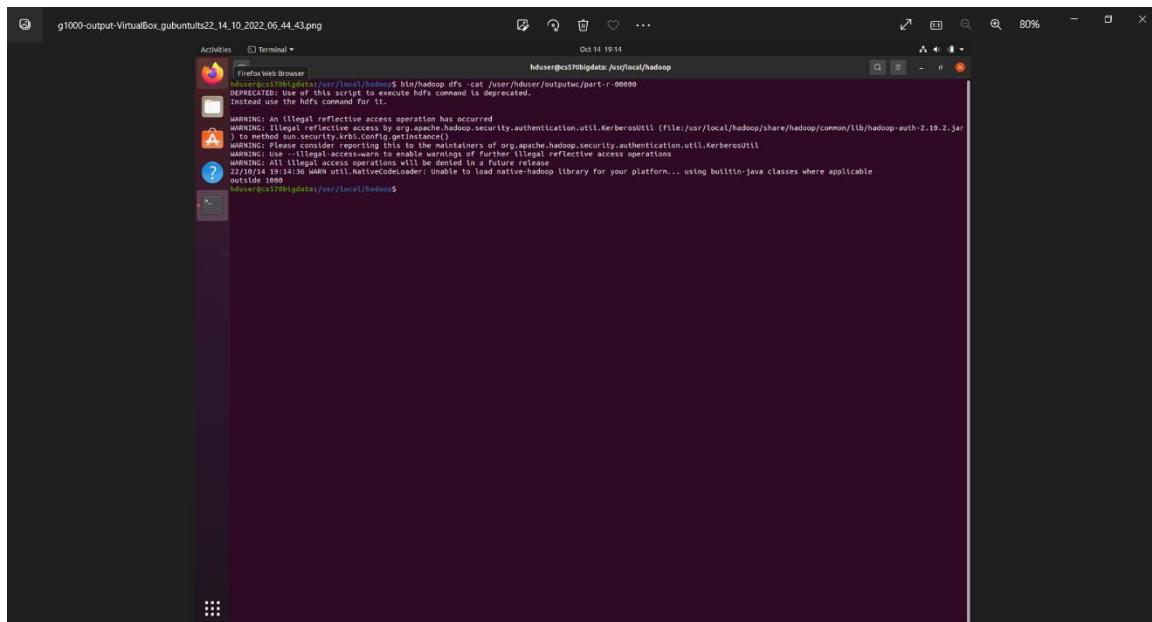
bin/hadoop jar /home/hduser/gHW/picalculation.jar PiCalculation
/user/hduser/inputdata/PiCalculationInput

Tests for Random Numbers : Random Numbers : 1000

Test output :

```
G1000-1VirtualBox_gubuntuts22_14_10_2022_06.43_20.png
Oct 11 19:13
hdsuser@cs570bigdata: /usr/local/hadoop

hdsuser@cs570bigdata: /usr/local/hadoop$ bin/hadoop jar /home/hdsuser/gjh/picalculation.jar Picalculation /user/hdsuser/inputdata/PicalculationInput outputwc
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.kerberosutil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.10.2.jar)
to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.kerberosutil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
22/10/14 19:11:02 INFO client.SMRProxy: Connecting to ResourceManager at /0.0.0.0:8032
22/10/14 19:11:08 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool Interface and execute your application with '
oolrunner -o rmeyw 3151.
22/10/14 19:11:07 INFO InputFileInputFormat: Total input files to process : 1
22/10/14 19:11:08 INFO mapreduce.JobSubmitter: number of splits:13
22/10/14 19:11:11 INFO mapreduce.JobSubmitter: Submitting tokens for job: Job_1665754711361_0001
22/10/14 19:11:12 INFO conf.Configuration: resource-types.xml not found
22/10/14 19:11:12 INFO resource.ResourceUtils: unable to find 'resource-types.xml'.
22/10/14 19:11:12 INFO resource.ResourceUtils: Adding resource type : name = memory-mb, units = MB, type = COUNTABLE
22/10/14 19:11:12 INFO resource.ResourceUtils: Adding resource type : name = vcores, units = , type = COUNTABLE
22/10/14 19:11:13 INFO mapreduce.Job: Submitting application application_1665754711361_0001
22/10/14 19:11:13 INFO mapreduce.Job: The url to track the job: http://cs570bigdata:8080/proxy/application_1665754711361_0001/
22/10/14 19:11:13 INFO mapreduce.Job: Running job: Job_1665754711361_0001
22/10/14 19:11:26 INFO mapreduce.Job: Job Job_1665754711361_0001 running in uber mode : false
22/10/14 19:11:26 INFO mapreduce.Job: map 0% reduce 0%
22/10/14 19:11:35 INFO mapreduce.Job: map 100% reduce 0%
22/10/14 19:11:43 INFO mapreduce.Job: map 100% reduce 100%
22/10/14 19:11:44 INFO mapreduce.Job: Job Job_1665754711361_0001 completed successfully
22/10/14 19:11:45 INFO mapreduce.Job: Counters: 49
File System Counters
  FILE: Number of bytes read=20
  FILE: Number of bytes written=10735
  FILE: Number of read operations=0
  FILE: Number of write operations=0
  HDFS: Number of bytes read=130
  HDFS: Number of bytes written=13
  HDFS: Number of 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)=4545
  Total time spent by all reduces in occupied slots (ms)=1233
  Total time spent by all map tasks (ms)=4545
  Total time spent by all reduce tasks (ms)=1233
  Total vcore-milliseconds taken by all map tasks=4545
  Total vcore-milliseconds taken by all reduce tasks=1233
  Total megabyte-milliseconds taken by all map tasks=6702080
  Total megabyte-milliseconds taken by all reduce tasks=1338592
Map-Reduce Framework
  Map input records=1
  Map output records=1000
  Map output bytes=1000
  Map output materialized bytes=20
  Input split bytes=130
  Combine input records=1000
  Combine output records=1
  Reduce input groups=1
  Reduce shuffle bytes=20
  Reduce input records=1
  Reduce output records=1
  Reduce output bytes=1
  Reduce output records=1
Total time spent by all reduces in occupied slots (ms)=1233
Total time spent by all map tasks (ms)=4545
Total vcore-milliseconds taken by all reduce tasks=1233
Total vcore-milliseconds taken by all map tasks=4545
Total megabyte-milliseconds taken by all reduce tasks=1233
Total megabyte-milliseconds taken by all map tasks=6702080
Map-Reduce Framework
  Map input records=1
  Map output records=1000
  Map output bytes=1000
  Map output materialized bytes=20
  Input split bytes=130
  Combine input records=1000
  Combine output records=1
  Reduce input groups=1
  Reduce shuffle bytes=20
  Reduce input records=1
  Reduce output records=1
  Reduce output bytes=1
  Reduce output records=1
Shuffled Map=1
Merged Map outputs=1
GC time elapsed (ms)=98
CPU time spent (ms)=1000
Physical memory (bytes) snapshot=407888720
Virtual memory (bytes) snapshot=4122698632
Total committed heap usage (bytes)=192397884
shuffle Error
  Bad Type
  CONNECTION=0
  IO_EXCEPTION=0
  WRONG_LENGTH=0
  WRONG_MAP=0
  WRONG_REDUCE=0
File Input Format Counters
  Bytes Read=0
File Output Format Counters
  Bytes Written=13
outside 1000
null
Exception in thread "main" java.lang.NullPointerException
at Picalculation.main(Picalculation.java:180)
at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Native Method)
at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorImpl.java:62)
at java.base/jdk.internal.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAccessorImpl.java:43)
at java.base/java.lang.reflect.Method.invoke(Method.java:566)
at org.apache.hadoop.util.RunJar.run(RunJar.java:264)
at org.apache.hadoop.util.RunJar.main(RunJar.java:158)
hdsuser@cs570bigdata: /usr/local/hadoop$ bin/hadoop -ls /user/hdsuser/outputwc
Error: No command named '-ls' was found. Perhaps you meant: hadoop ls
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.kerberosutil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.10.2.jar)
to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.kerberosutil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
22/10/14 19:11:13 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
Found 2 items
```

Tests for Random Numbers :

Random numbers – 10000

Test output :

```
hadoop@cs570bigdata: /usr/local/hadoop$ bin/hadoop jar /home/huser/gfw/picalculation.jar Picalculation /user/huser/inputdata/PicalculationInput10000 outputwc
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: all illegal access operations will be denied in a future release
22/10/14 19:42:13 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
22/10/14 19:42:14 INFO client.Werewolf: Connecting to ResourceManager at 10.0.0.0:8032
22/10/14 19:42:14 WARN mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool Interface and execute your application with 1
outnumber to remedy this.
22/10/14 19:42:14 INFO InputFileInputFormat: Total input files to process : 1
22/10/14 19:42:15 INFO mapreduce.JobSubmitter: number of splits:1
22/10/14 19:42:15 INFO mapreduce.JobSubmitter: submitting tokens for job: job_1605754711361_0007
22/10/14 19:42:15 INFO conf.Configuration: resource-types.xml not found
22/10/14 19:42:15 INFO resource.ResourceUtils: unable to find 'resource-types.xml'.
22/10/14 19:42:15 INFO resource.ResourceUtils: Adding resource type - name = memory-mb, units = M, type = COUNTABLE
22/10/14 19:42:15 INFO ImplVarientImp: Submitted application application_1605754711361_0007
22/10/14 19:42:15 INFO mapreduce.Job: The url to track the job: http://cs570bigdata:8080/proxy/application_1605754711361_0007/
22/10/14 19:42:15 INFO mapreduce.Job: Running job: job_1605754711361_0007
22/10/14 19:42:15 INFO mapreduce.Job: job_1605754711361_0007 running in uber mode : false
22/10/14 19:42:22 INFO mapreduce.Job: Map 0% reduce 0%
22/10/14 19:42:28 INFO mapreduce.Job: Map 100% reduce 0%
22/10/14 19:42:32 INFO mapreduce.Job: Map 100% reduce 100%
22/10/14 19:42:32 INFO mapreduce.Job: job_1605754711361_0007 completed successfully
22/10/14 19:42:32 INFO mapreduce.Job: Counters: 40
File System Counters
  FILE: Number of bytes read=20
  FILE: Number of bytes written=20745
  FILE: Number of read operations=0
  FILE: Number of large read operations=0
  FILE: Number of write operations=0
  HDFS: Number of bytes read=40315
  HDFS: Number of bytes written=44
  HDFS: Number of read operations=0
  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)=2716
Total time spent by all reduces in occupied slots (ms)=2175
Total time spent by all map tasks (ms)=2716
Total time spent by all reduce tasks (ms)=2175
Total vcore-milliseconds taken by all map tasks=2716
Total vcore-milliseconds taken by all reduce tasks=2175
Total megabyte-milliseconds taken by all map tasks=2781104
Total megabyte-milliseconds taken by all reduce tasks=2227200
Map-Reduce Framework
  Map input records=1
  Map output records=10000
  Map output bytes=120000
  Map output materialized bytes=20
  Input split bytes=115
  Combine input records=10000
  Combine output records=1
  Reduce input groups=1
  Reduce shuffle bytes=20
  Reduce input records=1
  Reduce output records=1
  ---
File System Counters
  FILE: Number of large read operations=0
  FILE: Number of write operations=0
  HDFS: Number of bytes read=40315
  HDFS: Number of bytes written=44
  HDFS: Number of read operations=0
  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)=2716
Total time spent by all reduces in occupied slots (ms)=2175
Total time spent by all map tasks (ms)=2716
Total time spent by all reduce tasks (ms)=2175
Total vcore-milliseconds taken by all map tasks=2716
Total vcore-milliseconds taken by all reduce tasks=2175
Total megabyte-milliseconds taken by all map tasks=2781104
Total megabyte-milliseconds taken by all reduce tasks=2227200
Map-Reduce Framework
  Map input records=1
  Map output records=10000
  Map output bytes=120000
  Map output materialized bytes=20
  Input split bytes=115
  Combine input records=10000
  Combine output records=1
  Reduce input groups=1
  Reduce shuffle bytes=20
  Reduce input records=1
  Reduce output records=1
  Spilled records=0
  Shuffled Maps=1
  Merged Map outputs=1
  GC time elapsed (ms)=0
  CPU time spent (ms)=1000
  Physical memory (bytes) snapshot=42891200
  Virtual memory (bytes) snapshot=414880256
  Total committed heap usage (bytes)=214958880
Shuffle Errors
  BAD_ID=0
  CONNECTION=0
  IO_ERROR=0
  WRONG_LENGTH=0
  WRONG_MAP=0
  WRONG_REPLICAS=0
File Input Format Counters
  Bytes Read=40000
File Output Format Counters
  Bytes Written=44
outside 10000
null
Exception in thread "main" java.lang.NullPointerException
  at Picalculation.main(Picalculation.java:104)
  at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(NativeMethod)
  at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorImpl.java:62)
  at java.base/jdk.internal.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAccessorImpl.java:43)
  at java.base/java.lang.reflect.Method.invoke(Method.java:566)
  at org.apache.hadoop.util.RunJar.run(RunJar.java:264)
  at org.apache.hadoop.util.RunJar.main(RunJar.java:158)
```

Glen-output-VirtualBox-gubuntuts22_14_10_2022_06.50.53.png

Activities Terminal

Oct 14 19:21

hduser@cs70b1gdata: /usr/local/hadoop

```
hduser@cs70b1gdata: /usr/local/hadoop$ bin/hadoop dfs -cat /user/hduser/outputwc/part-r-000000
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.

WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.10.2.jar)
to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
22/10/14 19:21:39 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
outside 10000
hduser@cs70b1gdata: /usr/local/hadoop$
```

Tests for Random Numbers :

Random numbers – 50000

Test output :

```
hadoop@cs70bipdata: /usr/local/hadoop$ bin/hadoop jar /home/hadoop/gfw/picalculation.jar Picalculation /user/hadoop/inputdata/PicalculationInput50000 outputwc
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.10.2.jar)
to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
22/10/14 19:22:18 INFO util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
22/10/14 19:22:19 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8032
22/10/14 19:22:19 INFO mapreduce.JobResourceUploader: Hadoop command-line option parsing not performed. Implement the Tool Interface and execute your application with 1
volunteer to remedy this.
22/10/14 19:22:19 INFO InputFileInputFormat: Total input files to process : 1
22/10/14 19:23:00 INFO mapreduce.JobSubmitter: number of splits:1
22/10/14 19:23:00 INFO mapreduce.JobSubmitter: Submitting tokens for job: Job_1665754711361_0003
22/10/14 19:23:00 INFO conf.Configuration: resource-types.xml not found
22/10/14 19:23:00 INFO resource.ResourceUtils: Unable to find 'resource-types.xml'
22/10/14 19:23:00 INFO resource.ResourceUtils: Adding resource type - name = memory-mb, units = M, type = COUNTABLE
22/10/14 19:23:00 INFO local.YarnClientImpl: Submitting application application_1665754711361_0003
22/10/14 19:23:00 INFO mapreduce.Job: The url to track the job: http://cs70bipdata:8080/proxy/application_1665754711361_0003/
22/10/14 19:23:00 INFO mapreduce.Job: Running job: Job_1665754711361_0003
22/10/14 19:23:11 INFO mapreduce.Job: Job Job_1665754711361_0003 running in uber mode : false
22/10/14 19:23:16 INFO mapreduce.Job: Map 0% reduce 0%
22/10/14 19:23:22 INFO mapreduce.Job: Map 100% reduce 100%
22/10/14 19:23:23 INFO mapreduce.Job: Job Job_1665754711361_0003 completed successfully
22/10/14 19:23:23 INFO mapreduce.Job: Counters: 49
File System Counters
FILE: Number of bytes read=20
FILE: Number of bytes written=10745
FILE: Number of read operations=0
FILE: Number of large read operations=0
FILE: Number of write operations=0
HDFS: Number of bytes read=10315
HDFS: Number of bytes written=14
HDFS: Number of read operations=0
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)=3360
Total time spent by all reduces in occupied slots (ms)=3478
Total time spent by all map tasks (ms)=3360
Total time spent by all reduce tasks (ms)=3478
Total vcore-milliseconds taken by all map tasks=3360
Total vcore-milliseconds taken by all reduce tasks=3478
Total megabyte-milliseconds taken by all map tasks=340840
Total megabyte-milliseconds taken by all reduce tasks=3501472
Map-Reduce Framework
Map Input records=1
Map output records=30000
Map output bytes=400000
Map output materialized bytes=20
Input split bytes=115
Combine input records=30000
Combine output records=1
Reduce input groups=1
Reduce shuffle bytes=20
Reduce input records=1
Reduce output records=1
Reduce output records=1
File System Counters
FILE: Number of large read operations=0
FILE: Number of bytes read=10315
HDFS: Number of bytes read=10315
HDFS: Number of bytes written=14
HDFS: Number of read operations=0
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)=3360
Total time spent by all reduces in occupied slots (ms)=3478
Total time spent by all map tasks (ms)=3360
Total time spent by all reduce tasks (ms)=3478
Total vcore-milliseconds taken by all map tasks=3360
Total vcore-milliseconds taken by all reduce tasks=3478
Total megabyte-milliseconds taken by all map tasks=340840
Total megabyte-milliseconds taken by all reduce tasks=3501472
Map-Reduce Framework
Map Input records=1
Map output records=30000
Map output bytes=400000
Map output materialized bytes=20
Input split bytes=115
Combine input records=30000
Combine output records=1
Reduce input groups=1
Reduce shuffle bytes=20
Reduce input records=1
Reduce output records=1
Reduce output records=1
Shuffled Maps=1
Failed Shuffles=0
Merged Map outputs=1
GC time elapsed (ms)=71
CPU time spent (ms)=1030
Physical memory (bytes) snapshot=410810000
Virtual memory (bytes) snapshot=413230730
Total committed heap usage (bytes)=207010800
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=300000
File Output Format Counters
Bytes written=14
outside 50000
null
Exception in thread "main" java.lang.NullPointerException
at Picalculation.main(Picalculation.java:184)
at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Native Method)
at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(NativeMethodAccessorImpl.java:62)
at java.base/jdk.internal.reflect.DelegatingMethodAccessorImpl.invoke(DelegatingMethodAccessorImpl.java:43)
at java.base/java.lang.reflect.Method.invoke(Method.java:560)
at org.apache.hadoop.util.RunJar.run(RunJar.java:244)
at org.apache.hadoop.util.RunJar.main(RunJar.java:158)
hadoop@cs70bipdata: /usr/local/hadoop$
```

GS0000-output-VirtualBox-gubuntu122_14_10_2022_06_54_55.png

Activities Terminal

Oct 14 19:24

hduser@cs70b1gdata: /usr/local/hadoop

```
hduser@cs70b1gdata: /usr/local/hadoop$ bin/hadoop dfs -cat /user/hduser/outputwc/part-r-000000
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.

WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.10.2.jar)
to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
22/10/14 19:24:50 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@cs70b1gdata: /usr/local/hadoop$
```

One Million Tests for Random Numbers : Random numbers – 1000000 Test output :

```
hadoop jar /home/hduser/ghw/picalculation.jar Picalculation /user/hduser/inputdata/PicalculationInputmillion outputwc
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.kerberosutil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.10.2.jar) to method sun.security.util.Config.getINSTANCE()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.kerberosutil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
22/10/14 19:29:18 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
22/10/14 19:29:18 INFO client.RetryProxy: Connecting to ResourceManager at /0.0.0.0:8032
22/10/14 19:29:19 WARN mapreduce.JobResourceProfile: Hadoop command-line option parsing not performed. Implement the Tool Interface and execute your application with ToolRunner to remedy this.
22/10/14 19:29:19 INFO InputFileInputFormat: Total input files to process : 1
22/10/14 19:29:19 INFO mapreduce.JobSubmitter: number of splits:1
22/10/14 19:29:20 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1665754711361_0004
22/10/14 19:29:20 INFO conf.Configuration: resource-types.xml not found
22/10/14 19:29:20 INFO resource.ResourceUtils: unable to find 'resource-types.xml'.
22/10/14 19:29:20 INFO resource.ResourceUtils: Adding resource type - name = memory-mb, units = MB, type = COUNTABLE
22/10/14 19:29:20 INFO resource.ResourceUtils: Adding resource type - name = vcores, units = , type = COUNTABLE
22/10/14 19:29:20 INFO mapreduce.Job: The url to track the job: http://cs570higdata:8088/proxy/application_1665754711361_0004/
22/10/14 19:29:20 INFO mapreduce.Job: Running job: job_1665754711361_0004
22/10/14 19:29:20 INFO mapreduce.Job: Job job_1665754711361_0004 running in uber mode : false
22/10/14 19:29:20 INFO mapreduce.Job: map 0% reduce 0%
22/10/14 19:29:34 INFO mapreduce.Job: map 100% reduce 0%
22/10/14 19:29:41 INFO mapreduce.Job: map 100% reduce 100%
22/10/14 19:29:41 INFO mapreduce.Job: Job job_1665754711361_0004 completed successfully
22/10/14 19:29:42 INFO mapreduce.Job: Counters: 49
File System Counters
  FILE: Number of bytes read=20
  FILE: Number of bytes written=20751
  FILE: Number of read operations=0
  FILE: Number of large read operations=0
  FILE: Number of write operations=0
HDFS: Number of bytes read=4000138
HDFS: Number of bytes written=16
HDFS: Number of read operations=0
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)=4041
  Total time spent by all reduces in occupied slots (ms)=3348
  Total time spent by all map tasks (ms)=4041
  Total time spent by all reduce tasks (ms)=3348
  Total vcore-milliseconds taken by all map tasks=4041
  Total vcore-milliseconds taken by all reduce tasks=3348
  Total megabyte-milliseconds taken by all map tasks=4137904
  Total megabyte-milliseconds taken by all reduce tasks=3428332
Map-Reduce Framework
  Map input records=1
  Map output records=1000000
  Map output bytes=1000000
  Map output materialized bytes=20
  Input split bytes=136
  Combine input records=1000000
  Combine output records=1
  Reduce input groups=1
  Reduce shuffle bytes=20
  Reduce input records=1
  Reduce output records=1
  ...
FILE: Number of large read operations=0
FILE: Number of write operations=0
HDFS: Number of bytes read=4000138
HDFS: Number of bytes written=16
HDFS: Number of read operations=0
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)=4041
  Total time spent by all reduces in occupied slots (ms)=3348
  Total time spent by all map tasks (ms)=4041
  Total time spent by all reduce tasks (ms)=3348
  Total vcore-milliseconds taken by all map tasks=4041
  Total vcore-milliseconds taken by all reduce tasks=3348
  Total megabyte-milliseconds taken by all map tasks=4137904
  Total megabyte-milliseconds taken by all reduce tasks=3428332
Map-Reduce Framework
  Map input records=1
  Map output records=1000000
  Map output bytes=1000000
  Map output materialized bytes=20
  Input split bytes=136
  Combine input records=1000000
  Combine output records=1
  Reduce input groups=1
  Reduce shuffle bytes=20
  Reduce input records=1
  Reduce output records=1
  Spilled Records=0
  Merged Map outputs=1
  GC time elapsed (ms)=10
  CPU time spent (ms)=302
  Physical memory (bytes) snapshot=40718272
  Virtual memory (bytes) snapshot=419814144
  Total committed heap usage (bytes)=11495888
Shuffle Errors
  BAD_ID=0
  CONNECTION=0
  ID_NOT_IN=0
  WRONG_LENGTH=0
  WRONG_MAP=0
  WRONG_REDUCE=0
File Input Format Counters
  Bytes Read=4000000
File Output Format Counters
  Bytes Written=16
outside 1000000
null
Exception in thread "main" java.lang.NullPointerException
    at Picalculation.main(Picalculation.java:184)
    at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Native Method)
    at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Native Method)
    at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Native Method)
    at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Native Method)
    at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Native Method)
    at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Native Method)
    at java.base/jdk.internal.reflect.NativeMethodAccessorImpl.invoke(Native Method)
    at org.apache.hadoop.util.RunJar.main(RunJar.java:158)
    at org.apache.hadoop.util.RunJar.main(RunJar.java:158)
```

GIM-outputwc-VirtualBox_gubuntu122_14_10_2022_07_01_18.png

Activities Terminal

Oct 14 19:31

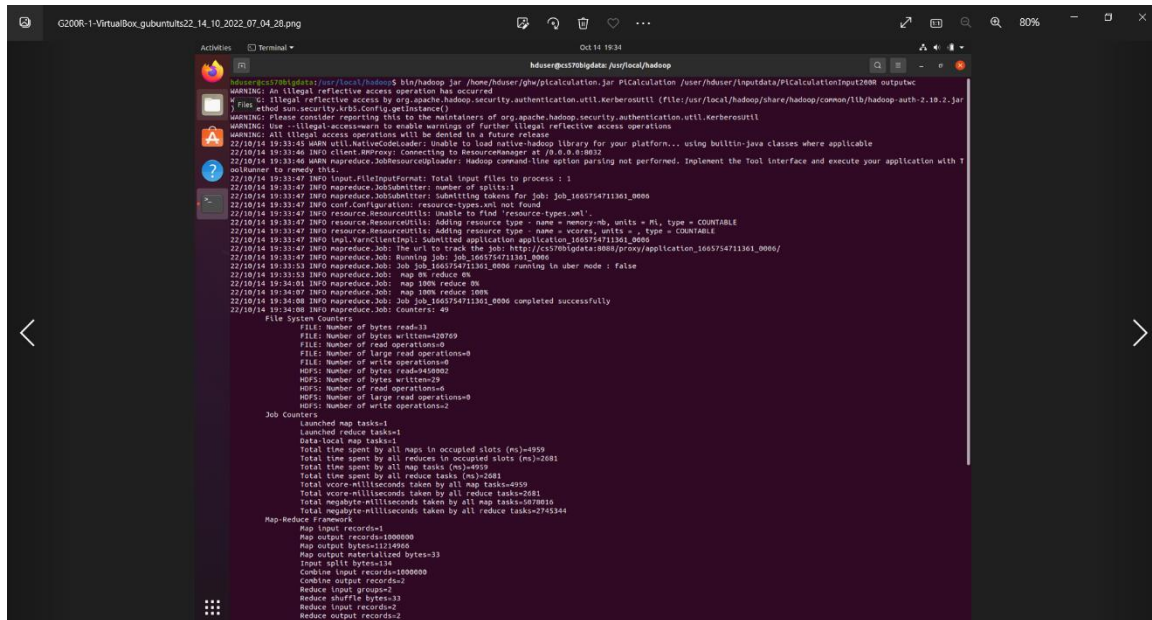
hduser@cs570bigdata: /usr/local/hadoop

```
hduser@cs570bigdata: /usr/local/hadoop$ bin/hadoop dfs -cat /user/hduser/outputwc/part-r-00000
DEPRECATED: Use of this script to execute hdfs command is deprecated.
Instead use the hdfs command for it.

WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.10.2.jar)
to method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
WARNING: All illegal access operations will be denied in a future release
22/10/14 19:31:06 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
hduser@cs570bigdata: /usr/local/hadoop$
```

Tests for Random Numbers :

Pi Value Display screen (bottom of 2nd page) output:
One Million and Radius - 200
Random numbers – 1000000
Test output :



```
hadoop@cs570bigdata: /usr/local/hadoop$ bin/hadoop jar /home/hadoop/gfw/picalculation.jar Picalculation /user/hadoop/inputdata/PicalculationInput2000 output.txt
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.10.2.jar)
method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
22/10/14 19:33:45 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
22/10/14 19:33:46 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8032
22/10/14 19:33:46 WARN mapreduce.JobResourceIndicator: Hadoop command line option parsing not performed. Implement the Tool interface and execute your application with 1
well-known to remedy this.
22/10/14 19:33:47 INFO InputFileInputFormat: Total input files to process : 1
22/10/14 19:33:47 INFO mapreduce.JobSubmitter: number of splits:1
22/10/14 19:33:47 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1665754711361_0006
22/10/14 19:33:47 INFO conf.Configuration: resource-types.xml not found
22/10/14 19:33:47 INFO resource.ResourceUtil: Adding resource type - name = memory-mb, units = Mb, type = COUNTABLE
22/10/14 19:33:47 INFO resource.ResourceUtil: Adding resource type - name = vcores, units = v, type = COUNTABLE
22/10/14 19:33:47 INFO Impl.VarClientImpl: Submitted application application_1665754711361_0006
22/10/14 19:33:47 INFO mapreduce.Job: The url to track the job: http://cs570bigdata:8080/proxy/application_1665754711361_0006/
22/10/14 19:33:53 INFO mapreduce.Job: Job job_1665754711361_0006 running in uber mode : false
22/10/14 19:33:53 INFO mapreduce.Job: map 0% reduce 0%
22/10/14 19:34:01 INFO mapreduce.Job: map 100% reduce 0%
22/10/14 19:34:07 INFO mapreduce.Job: map 100% reduce 100%
22/10/14 19:34:08 INFO mapreduce.Job: Job job_1665754711361_0006 completed successfully
22/10/14 19:34:08 INFO mapreduce.Job: Counters: 49

File System Counters
  FILE: Number of bytes read=33
  FILE: Number of bytes written=420769
  FILE: Number of read operations=0
  FILE: Number of large read operations=0
  FILE: Number of write operations=0
  HDFS: Number of bytes read=46002
  HDFS: Number of bytes written=29
  HDFS: Number of read operations=0
  HDFS: Number of large read operations=0
  HDFS: Number of write operations=2

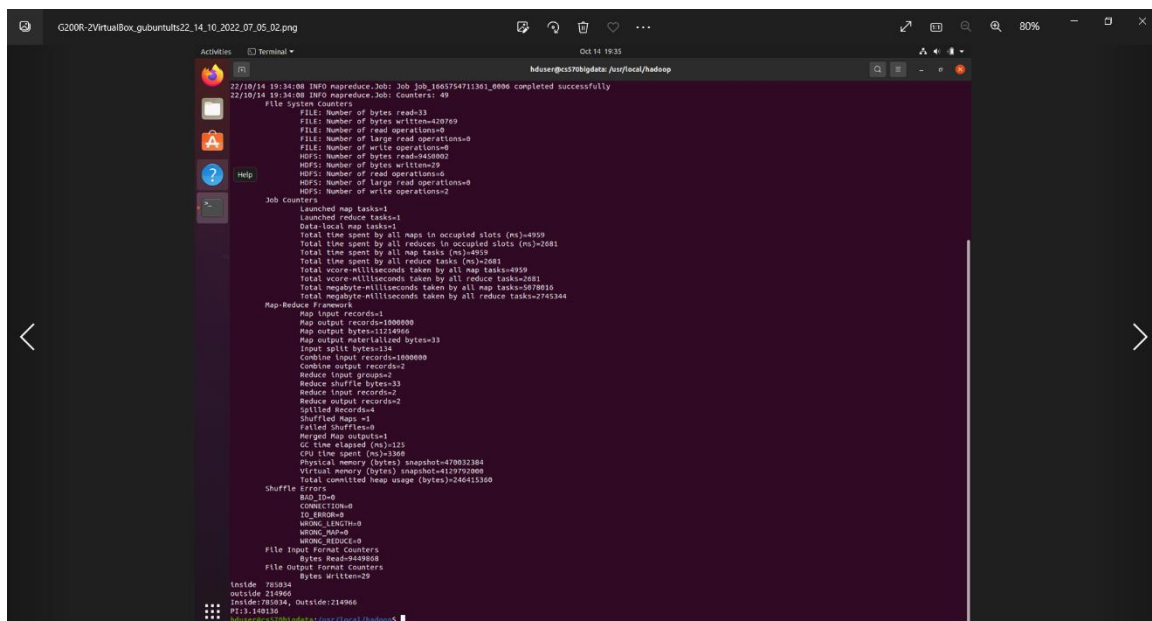
Job Counters
  Launched map tasks=1
  Launched reduce tasks=1
  Data-local map tasks=1
  Total time spent by all maps in occupied slots (ms)=4959
  Total time spent by all reduces in occupied slots (ms)=2681
  Total time spent by all map tasks (ms)=4959
  Total time spent by all reduce tasks (ms)=2681
  Total vcore-milliseconds taken by all map tasks=4959
  Total vcore-milliseconds taken by all reduce tasks=2681
  Total megabyte-milliseconds taken by all map tasks=5078036
  Total megabyte-milliseconds taken by all reduce tasks=2763344

Map-Reduce Framework
  Map input records=1
  Map output records=1000000
  Map output bytes=12124966
  Map output materialized bytes=33
  Input split bytes=134
  Combine input records=1000000
  Combine output records=49
  Reduce input groups=2
  Reduce shuffle bytes=33
  Reduce input records=2
  Reduce output records=2

File Input Format Counters
  Bytes Read=46002
  Bytes Written=29

File Output Format Counters
  Bytes Written=29

Inside 78034
  outside 21860
  Inside: 78034, Outside: 21860
  P13:140130
  hadoop@cs570bigdata: /usr/local/hadoop$
```



```
hadoop@cs570bigdata: /usr/local/hadoop$ bin/hadoop jar /home/hadoop/gfw/picalculation.jar Picalculation /user/hadoop/inputdata/PicalculationInput2000 output.txt
WARNING: An illegal reflective access operation has occurred
WARNING: Illegal reflective access by org.apache.hadoop.security.authentication.util.KerberosUtil (file:/usr/local/hadoop/share/hadoop/common/lib/hadoop-auth-2.10.2.jar)
method sun.security.krb5.Config.getInstance()
WARNING: Please consider reporting this to the maintainers of org.apache.hadoop.security.authentication.util.KerberosUtil
WARNING: Use --illegal-access=warn to enable warnings of further illegal reflective access operations
22/10/14 19:33:45 WARN util.NativeCodeLoader: Unable to load native-hadoop library for your platform... using builtin-java classes where applicable
22/10/14 19:33:46 INFO client.RMProxy: Connecting to ResourceManager at /0.0.0.0:8032
22/10/14 19:33:46 WARN mapreduce.JobResourceIndicator: Hadoop command line option parsing not performed. Implement the Tool interface and execute your application with 1
well-known to remedy this.
22/10/14 19:33:47 INFO InputFileInputFormat: Total input files to process : 1
22/10/14 19:33:47 INFO mapreduce.JobSubmitter: number of splits:1
22/10/14 19:33:47 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_1665754711361_0006
22/10/14 19:33:47 INFO conf.Configuration: resource-types.xml not found
22/10/14 19:33:47 INFO resource.ResourceUtil: Adding resource type - name = memory-mb, units = Mb, type = COUNTABLE
22/10/14 19:33:47 INFO resource.ResourceUtil: Adding resource type - name = vcores, units = v, type = COUNTABLE
22/10/14 19:33:47 INFO Impl.VarClientImpl: Submitted application application_1665754711361_0006
22/10/14 19:33:47 INFO mapreduce.Job: The url to track the job: http://cs570bigdata:8080/proxy/application_1665754711361_0006/
22/10/14 19:33:53 INFO mapreduce.Job: Job job_1665754711361_0006 running in uber mode : false
22/10/14 19:33:53 INFO mapreduce.Job: map 0% reduce 0%
22/10/14 19:34:01 INFO mapreduce.Job: map 100% reduce 0%
22/10/14 19:34:07 INFO mapreduce.Job: map 100% reduce 100%
22/10/14 19:34:08 INFO mapreduce.Job: Job job_1665754711361_0006 completed successfully
22/10/14 19:34:08 INFO mapreduce.Job: Counters: 49

File System Counters
  FILE: Number of bytes read=33
  FILE: Number of bytes written=420769
  FILE: Number of read operations=0
  FILE: Number of large read operations=0
  FILE: Number of write operations=0
  HDFS: Number of bytes read=46002
  HDFS: Number of bytes written=29
  HDFS: Number of read operations=0
  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)=4959
  Total time spent by all reduces in occupied slots (ms)=2681
  Total time spent by all map tasks (ms)=4959
  Total time spent by all reduce tasks (ms)=2681
  Total vcore-milliseconds taken by all map tasks=4959
  Total vcore-milliseconds taken by all reduce tasks=2681
  Total megabyte-milliseconds taken by all map tasks=5078036
  Total megabyte-milliseconds taken by all reduce tasks=2763344

Map-Reduce Framework
  Map input records=1
  Map output records=1000000
  Map output bytes=12124966
  Map output materialized bytes=33
  Input split bytes=134
  Combine input records=1000000
  Combine output records=49
  Reduce input groups=2
  Reduce shuffle bytes=33
  Reduce input records=2
  Reduce output records=2
  Spilled Records=49
  Shuffled Maps =1
  Failed Shuffles=0
  Merged Map outputs=1
  GC time elapsed (ms)=123
  CPU time spent (ms)=3360
  Physical memory (bytes) snapshot=470822084
  Virtual memory (bytes) snapshot=4129792000
  Total committed heap usage (bytes)=246413300

Shuffle Error
  BAD_ID=0
  COMMITTING=0
  ID_ERROR=0
  WRONG_LENGTH=0
  WRONG_MAP=0
  WRONG_REDUCE=0

File Input Format Counters
  Bytes Read=46002
  Bytes Written=29

File Output Format Counters
  Bytes Written=29

Inside 78034
  outside 21860
  Inside: 78034, Outside: 21860
  P13:140130
  hadoop@cs570bigdata: /usr/local/hadoop$
```