ASSIGNMENT

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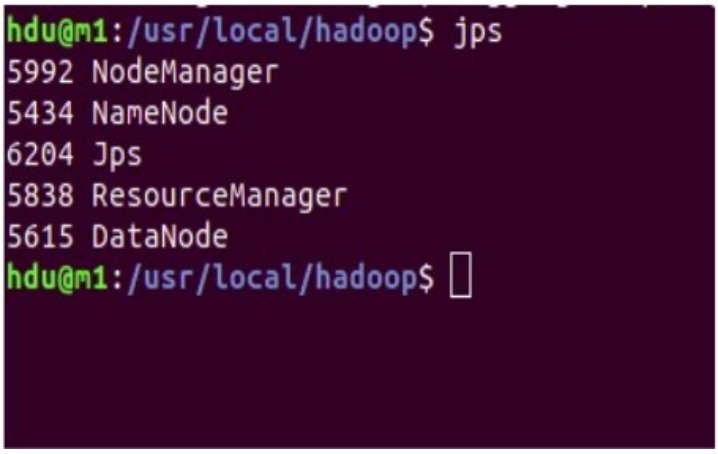
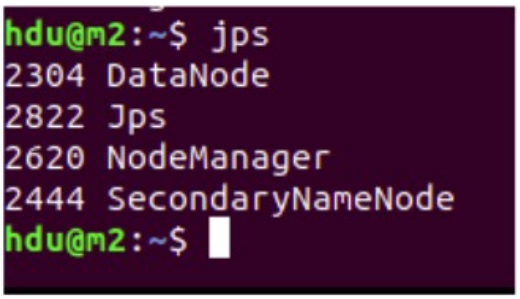
1.Setup 2 apache hadoop clusters with 2 nodes each i.e.
Cluster 1 : M1 - NN,RM,DN,NM
M2 - DN,NM,SNN
Cluster 2 : M3 - NN,RM,DN,NM
M4 - DN,NM,SNN
Now demonstrate writing data (such as directory containing files from Cluster 1 to Cluster 2. Also demonstrate updating the data if data in Cluster 1 changes (say new files added to directory that was copied earlier) and overwriting data.
Hint: Usage of Distcp

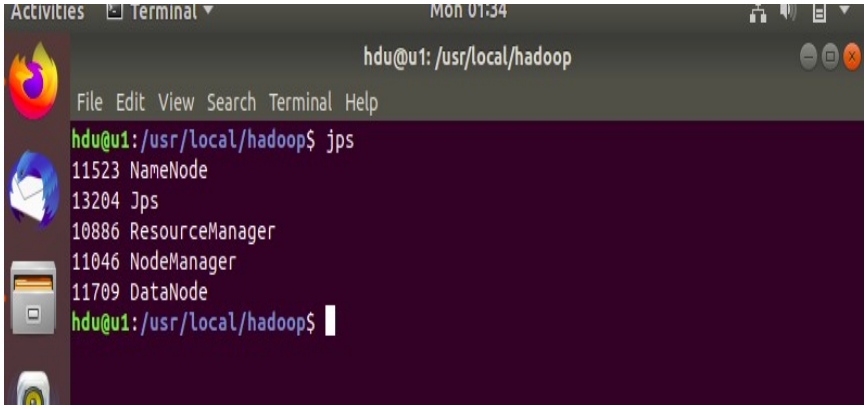
Ans-1

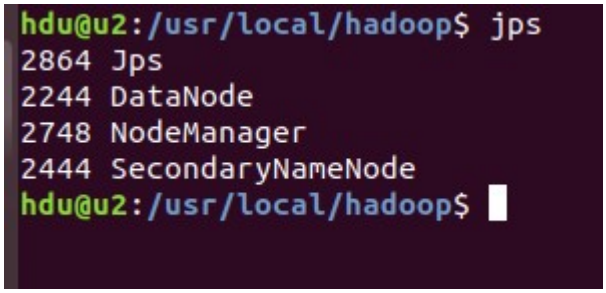
The Cluster1 having machines-m1,m2 with hadoop running on it





Cluster-2 having machines-u1,u2 with hadoop running on it

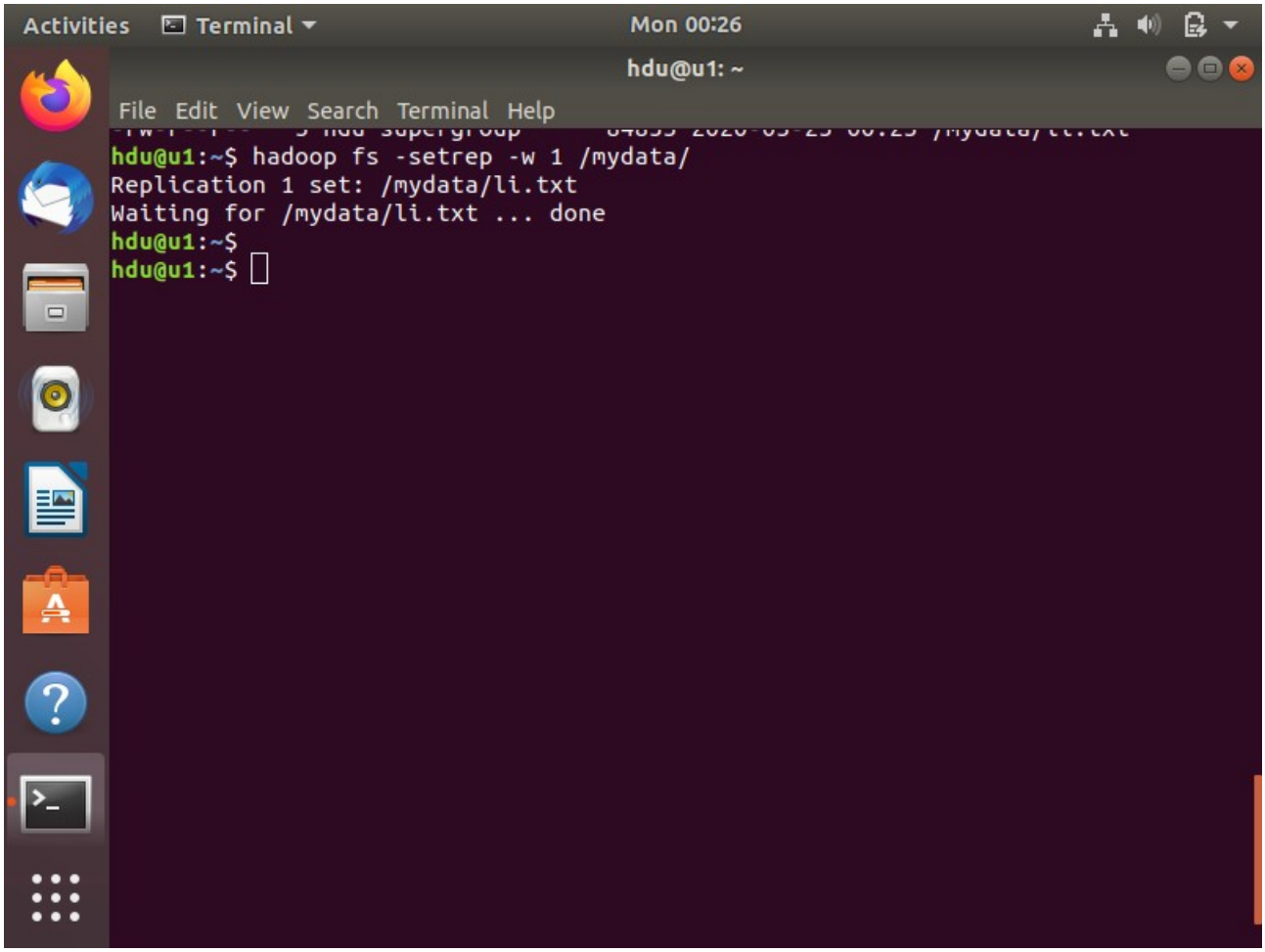




Distcp:-

```
hdu@m1:~$ hadoop distcp hdfs://m1:9000/mydata hdfs://u1:9000/mydatacpy12
20/03/21 21:52:35 INFO tools.DistCp: Input Options: DistCpOptions{atomicCommit=false, sync
ures=false, maxMaps=20, sslConfigurationFile='null', copyStrategy='uniformsize', sourceFil
data], targetPath=hdfs://u1:9000/mydatacpy12, targetPathExists=false, preserveRawXattrs=fa
20/03/21 21:52:35 INFO client.RMProxy: Connecting to ResourceManager at m1/192.168.56.104:
20/03/21 21:52:36 INFO Configuration.deprecation: io.sort.mb is deprecated. Instead, use m
20/03/21 21:52:36 INFO Configuration.deprecation: io.sort.factor is deprecated. Instead, u
20/03/21 21:52:37 INFO client.RMProxy: Connecting to ResourceManager at m1/192.168.56.104:
20/03/21 21:52:39 INFO mapreduce.JobSubmitter: number of splits:4
20/03/21 21:52:39 INFO mapreduce.JobSubmitter: Submitting tokens for job: job_15848045989
20/03/21 21:52:41 INFO impl.YarnClientImpl: Submitted application application_15848045989
```

2.Write data to hdfs with a different replication than set in configuration file and simulate a Under replicated sitiation and then fix this using a HDFS command.
Ans-2
hadoop fs -setrep -w 1 /mydata



```
hdu@u1:~$ hdfs fsck /
Connecting to namenode via http://u1:50070
FSCK started by hdu (auth:SIMPLE) from /192.168.56.101 for path / at Mon Mar 23
 00:31:43 IST 2020
..
/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job.jar:  Under re
plicated BP-183376081-192.168.56.101-1583999280591:blk_1073741849_1025. Target
Replicas is 10 but found 1 replica(s).
.
/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job.split: CORRUPT
 blockpool BP-183376081-192.168.56.101-1583999280591 block blk_1073741850

/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job.split: MISSING
 1 blocks of total size 189 B..
/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job.splitmetainfo:
  Under replicated BP-183376081-192.168.56.101-1583999280591:blk_1073741851_102
7. Target Replicas is 3 but found 1 replica(s).
.
/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job.xml:  Under re
plicated BP-183376081-192.168.56.101-1583999280591:blk_1073741852_1028. Target
Replicas is 3 but found 1 replica(s).
.
/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job_1584035052670_
0004_1_conf.xml:  Under replicated BP-183376081-192.168.56.101-1583999280591:bl
k_1073741857_1033. Target Replicas is 3 but found 1 replica(s).
.
/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0005/job.jar:  Under re
plicated BP-183376081-192.168.56.101-1583999280591:blk_1073741853_1029. Target
```

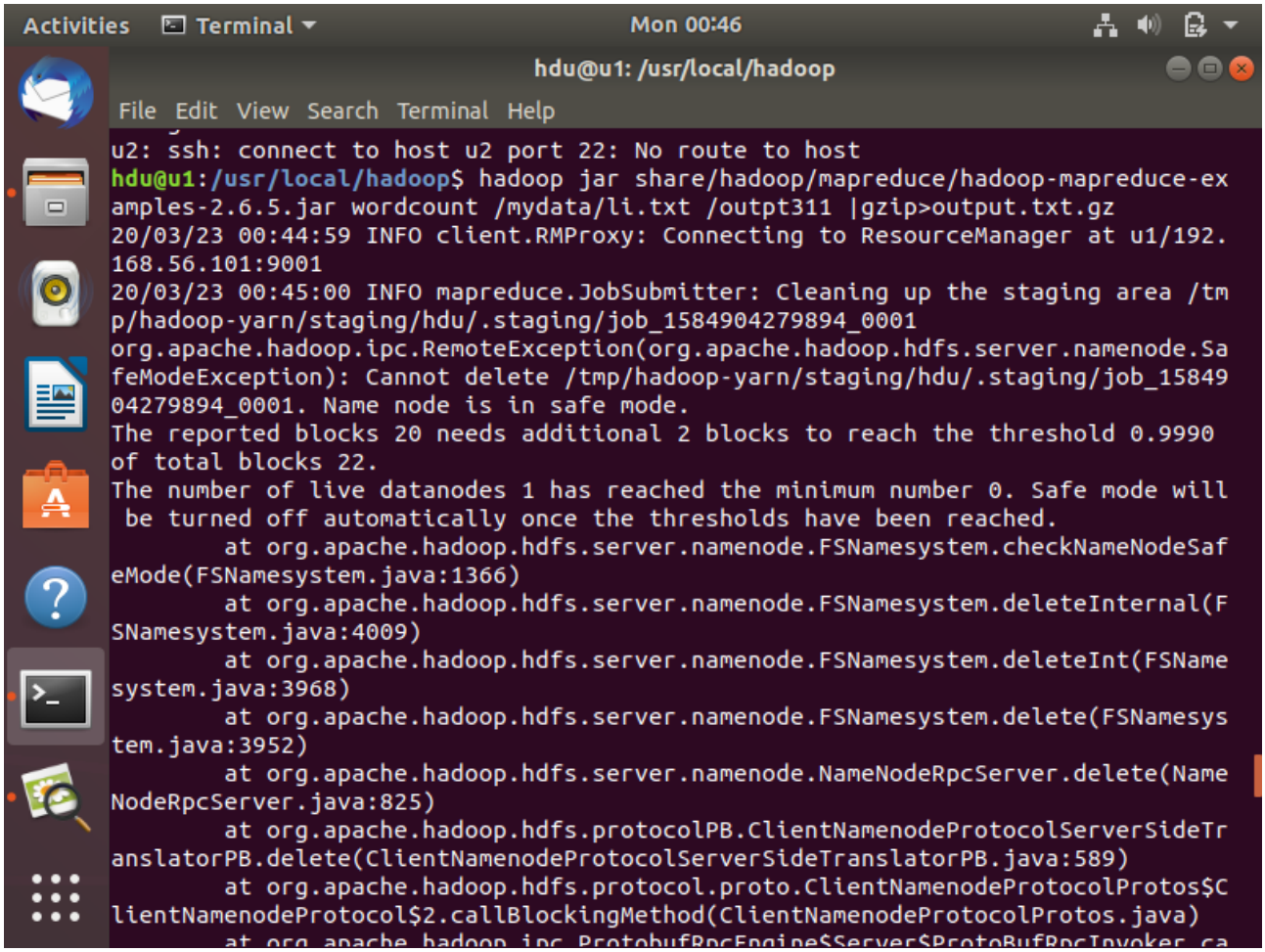
```
The filesystem under path '/' is CORRUPT
hdu@u1:~$ hdfs fsck / | grep 'Under replicated' | awk -F ':' '{print $1}' >> /t
mp/files
Connecting to namenode via http://u1:50070
hdu@u1:~$ hdfs fsck /
Connecting to namenode via http://u1:50070
FSCK started by hdu (auth:SIMPLE) from /192.168.56.101 for path / at Mon Mar 23
 00:37:07 IST 2020
..
/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job.jar:  Under re
plicated BP-183376081-192.168.56.101-1583999280591:blk_1073741849_1025. Target
Replicas is 10 but found 1 replica(s).
.
/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job.split: CORRUPT
 blockpool BP-183376081-192.168.56.101-1583999280591 block blk_1073741850

/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job.split: MISSING
 1 blocks of total size 189 B..
/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job.splitmetainfo:
  Under replicated BP-183376081-192.168.56.101-1583999280591:blk_1073741851_102
7. Target Replicas is 3 but found 1 replica(s).
.
/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job.xml:  Under re
plicated BP-183376081-192.168.56.101-1583999280591:blk_1073741852_1028. Target
Replicas is 3 but found 1 replica(s).
.
/tmp/hadoop-yarn/staging/hdu/.staging/job_1584035052670_0004/job_1584035052670_
```

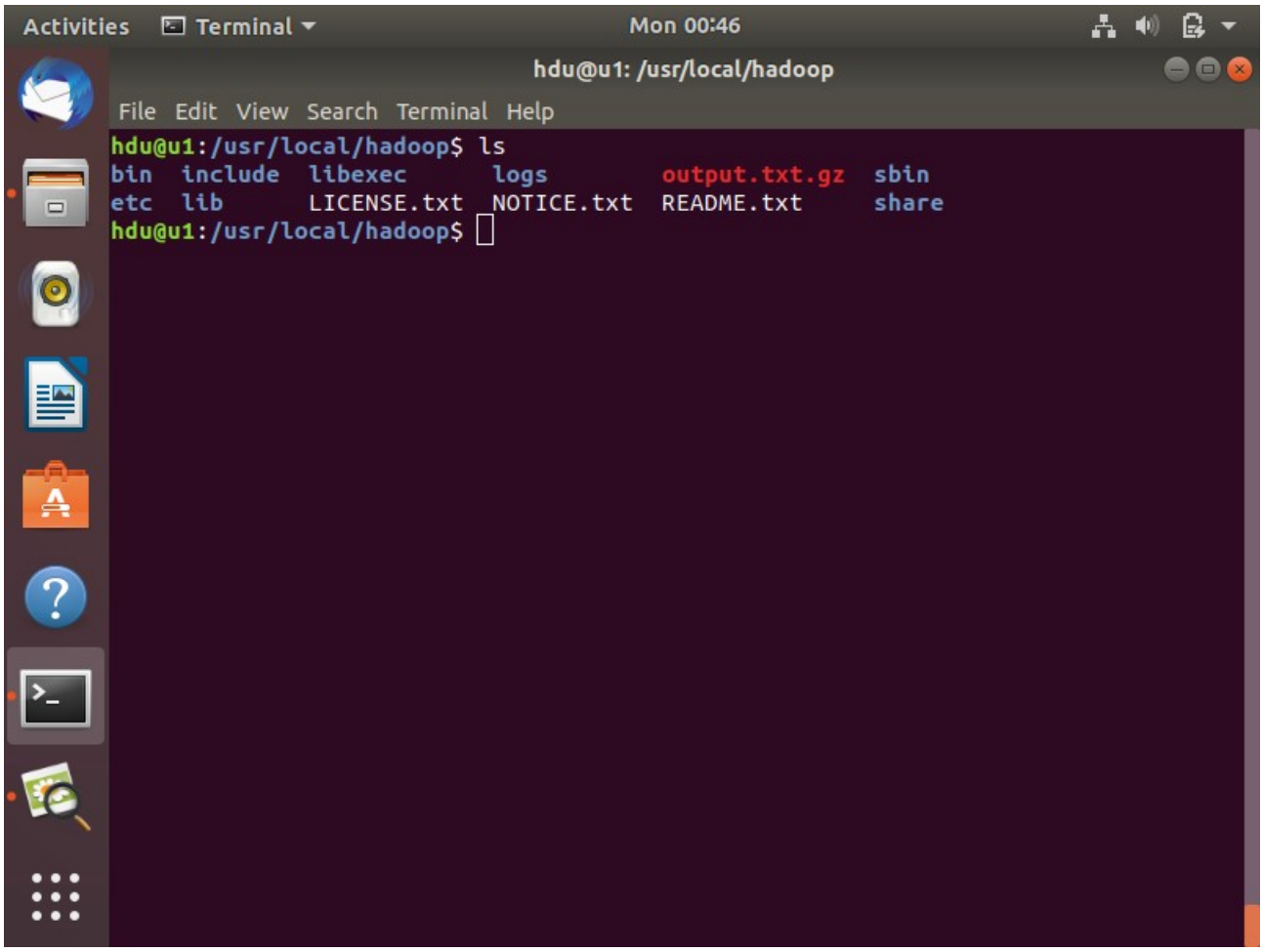
3. Demonstrate running a mapreduce job on hadoop cluster (wordcount) where the output written to
HDFS should be compressed (say Gzip or Snappy). Also demonstrate running Mapreduce job in
local mode instead of using YARN.

Ans-3

mapreduce of file li.txt to output.txt.gz

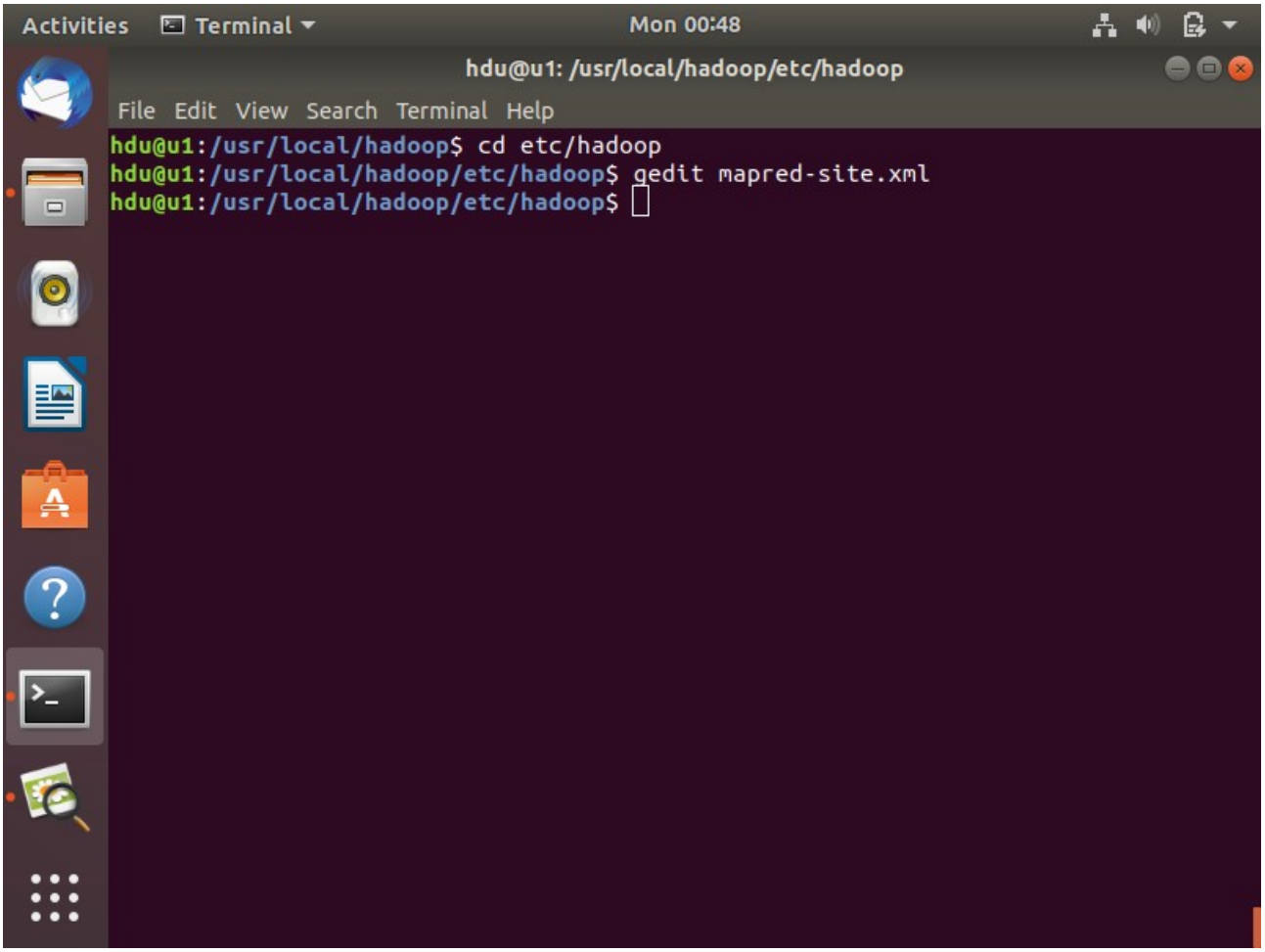


file created



Also demonstrate running Mapreduce job in local mode instead of using YARN.

Editting the mapred-site.xml to run it in local mode



changing default(yarn to local)

Activities Text Editor Mon 00:50

Open *mapred-site.xml /usr/local/hadoop/etc/hadoop Save

```xml
<?xml version="1.0"?>
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>
<!--
  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>local</value>
</property>


</configuration>
```

XML Tab Width: 8 Ln 22, Col 13 INS

Activities Terminal Mon 00:46

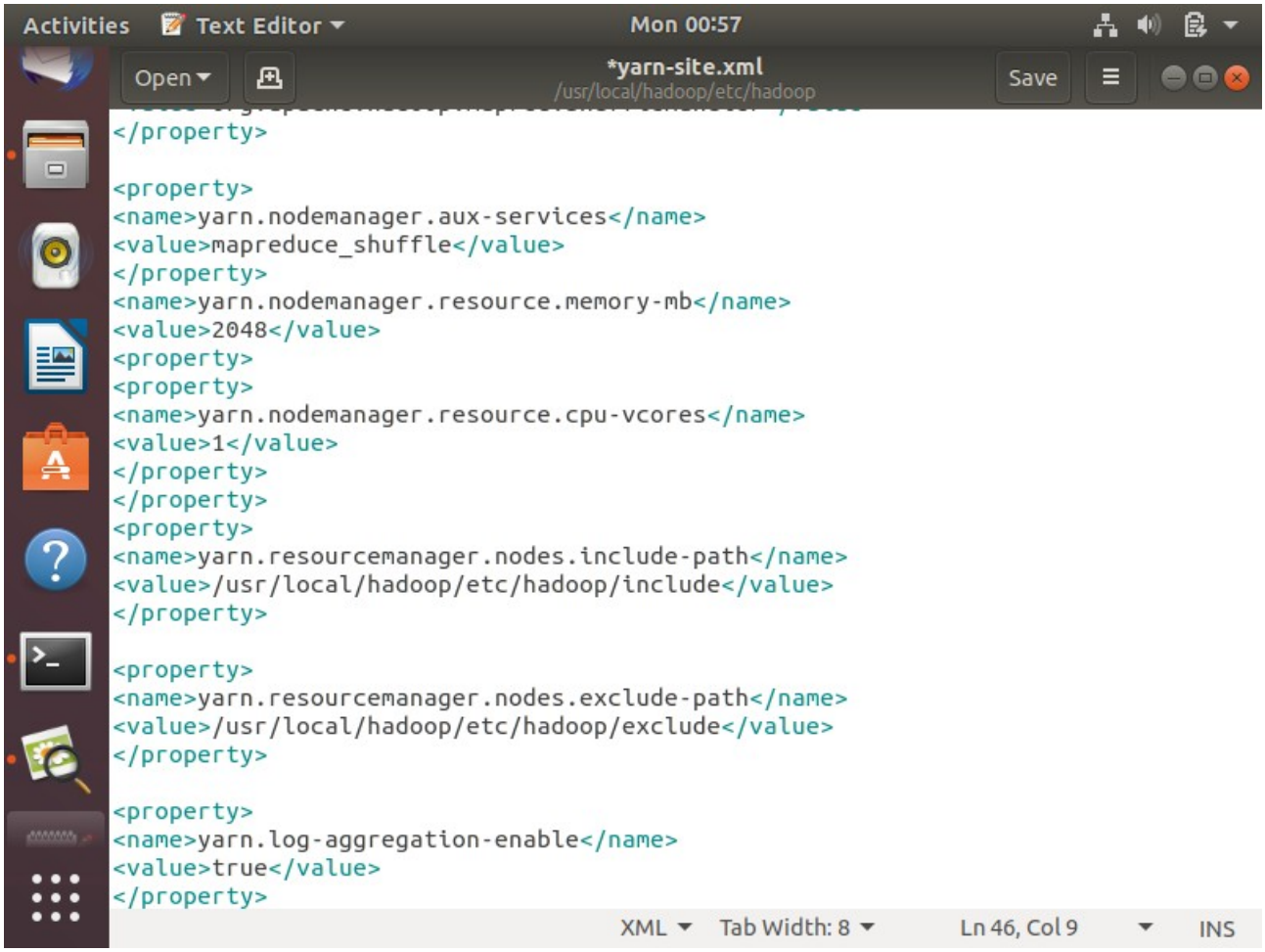
hdu@u1: /usr/local/hadoop

File Edit View Search Terminal Help

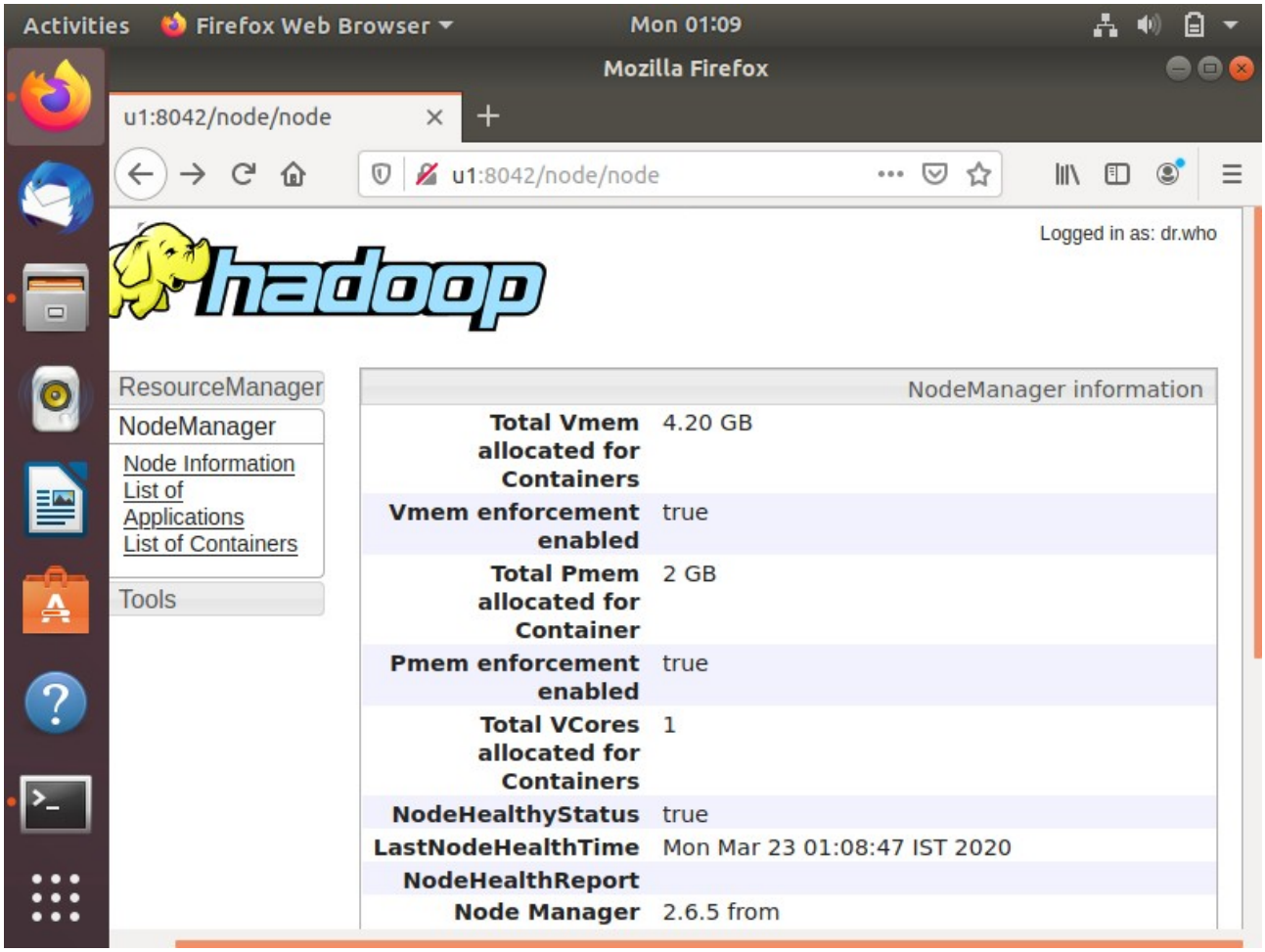
```
u2: ssh: connect to host u2 port 22: No route to host
hdu@u1:/usr/local/hadoop$ hadoop jar share/hadoop/mapreduce/hadoop-mapreduce-ex
amples-2.6.5.jar wordcount /mydata/li.txt /outpt311 |gzip>output.txt.gz
20/03/23 00:44:59 INFO client.RMProxy: Connecting to ResourceManager at u1/192.
168.56.101:9001
20/03/23 00:45:00 INFO mapreduce.JobSubmitter: Cleaning up the staging area /tm
p/hadoop-yarn/staging/hdu/.staging/job_1584904279894_0001
org.apache.hadoop.ipc.RemoteException(org.apache.hadoop.hdfs.server.namenode.Sa
feModeException): Cannot delete /tmp/hadoop-yarn/staging/hdu/.staging/job_15849
04279894_0001. Name node is in safe mode.
The reported blocks 20 needs additional 2 blocks to reach the threshold 0.9990
of total blocks 22.
The number of live datanodes 1 has reached the minimum number 0. Safe mode will
 be turned off automatically once the thresholds have been reached.
        at org.apache.hadoop.hdfs.server.namenode.FSNamesystem.checkNameNodeSaf
eMode(FSNamesystem.java:1366)
        at org.apache.hadoop.hdfs.server.namenode.FSNamesystem.deleteInternal(F
SNamesystem.java:4009)
        at org.apache.hadoop.hdfs.server.namenode.FSNamesystem.deleteInt(FSName
system.java:3968)
        at org.apache.hadoop.hdfs.server.namenode.FSNamesystem.delete(FSNamesys
tem.java:3952)
        at org.apache.hadoop.hdfs.server.namenode.NameNodeRpcServer.delete(Name
NodeRpcServer.java:825)
        at org.apache.hadoop.hdfs.protocolPB.ClientNamenodeProtocolServerSideTr
anslatorPB.delete(ClientNamenodeProtocolServerSideTranslatorPB.java:589)
        at org.apache.hadoop.hdfs.protocol.proto.ClientNamenodeProtocolProtos$C
lientNamenodeProtocol$2.callBlockingMethod(ClientNamenodeProtocolProtos.java)
        at org.apache.hadoop.ipc.ProtobufRpcEngine$ServerProtoBufRpcInvoker.ca
```

4. Assign specific amount of ram and cpu cores to Nodemanager by editing properties in YARN-site.xml. (for ex: node has 4gb ram and 2 cpu cores, then assign 2gb ram and 1 cpu core to the Nodemanager).This should show up in YARN UI.

Ans-4

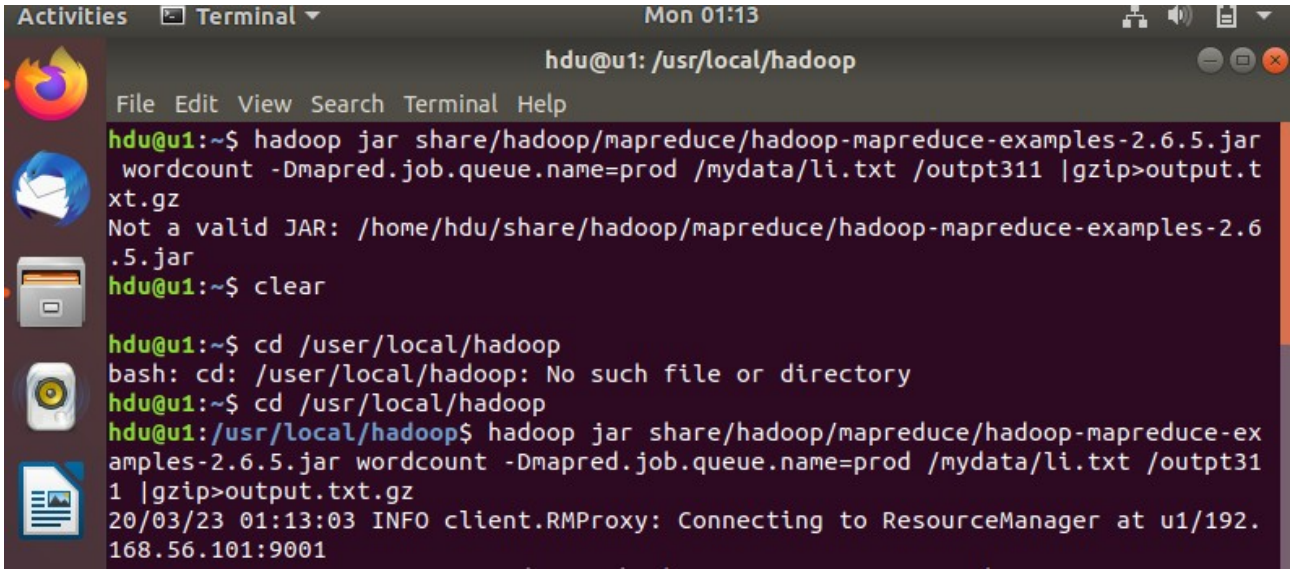


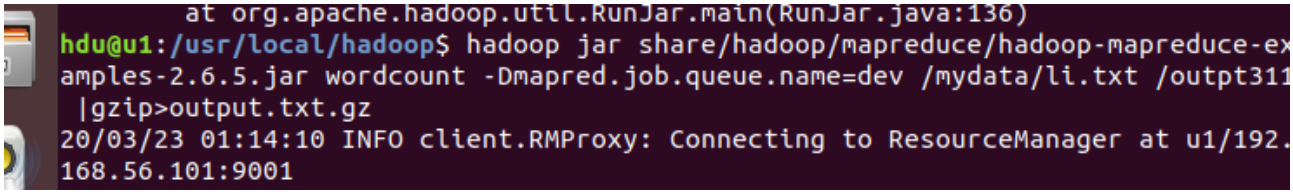
YARN-UI

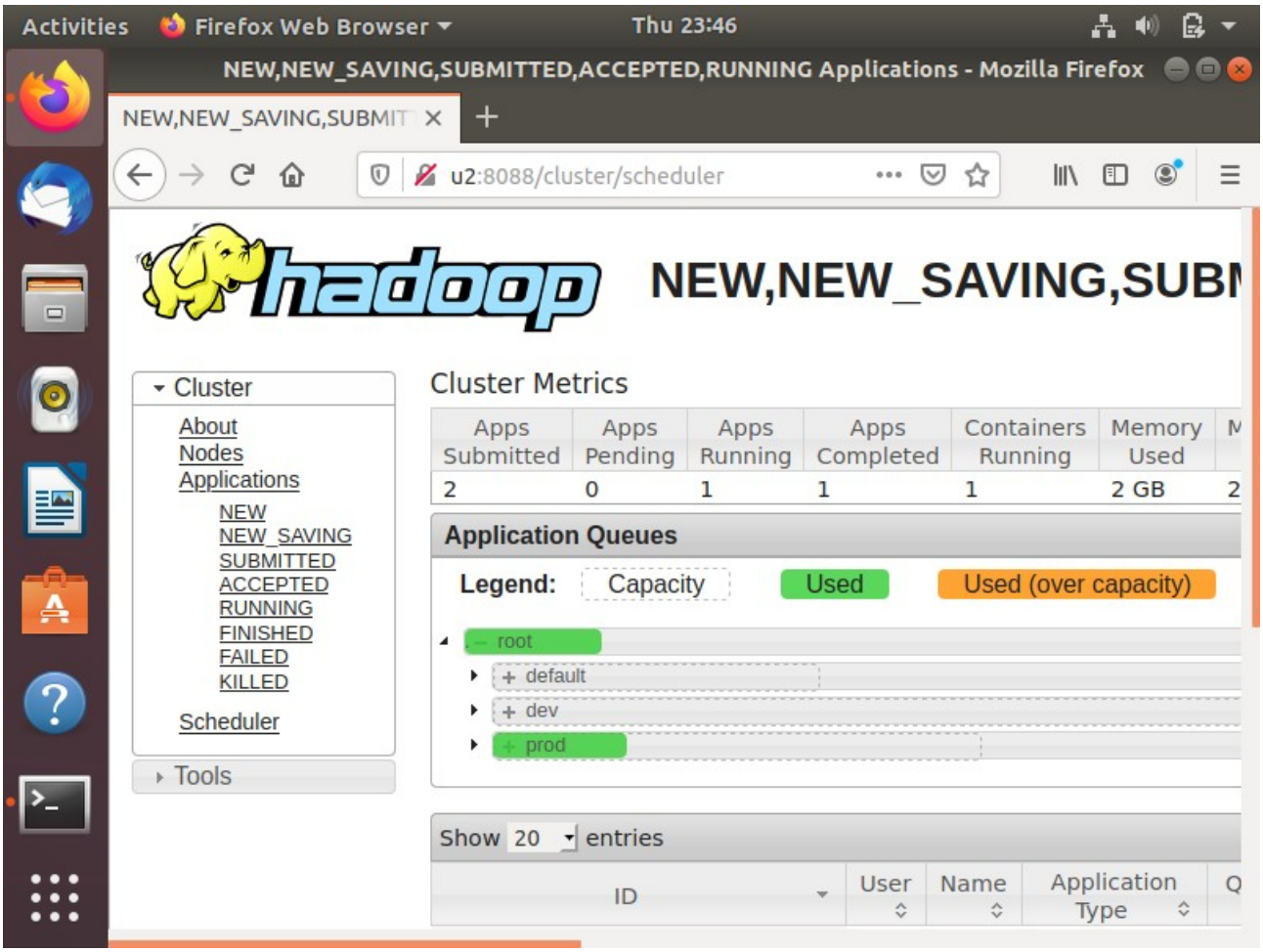

Activities
Firefox Web Browser
Mon 01:09
Mozilla Firefox
u1:8042/node/node
u1:8042/node/node
Logged in as: dr.who
hadoop
ResourceManager
NodeManager
Node Information
List of Applications
List of Containers
Tools
NodeManager information
Total Vmem allocated for Containers 4.20 GB
Vmem enforcement enabled true
Total Pmem allocated for Container 2 GB
Pmem enforcement enabled true
Total VCores allocated for Containers 1
NodeHealthyStatus true
LastNodeHealthTime Mon Mar 23 01:08:47 IST 2020
NodeHealthReport
Node Manager 2.6.5 from

5. Demonstrate setting up of capacity scheduler with 2 queues (prod n dev) and assign 40% resources to each and run a mapreduce job in each queue.

Ans-5






Activities
Firefox Web Browser
Thu 23:46
NEW,NEW_SAVING,SUBMITTED,ACCEPTED,RUNNING Applications - Mozilla Firefox
NEW,NEW_SAVING,SUBMIT
u2:8088/cluster/scheduler
hadoop
NEW,NEW_SAVING,SUBM
Cluster
About
Nodes
Applications
NEW
NEW_SAVING
SUBMITTED
ACCEPTED
RUNNING
FINISHED
FAILED
KILLED
Scheduler
Tools
Cluster Metrics
Apps Submitted
Apps Pending
Apps Running
Apps Completed
Containers Running
Memory Used
2
0
1
1
1
2 GB
2
Application Queues
Legend:
Capacity
Used
Used (over capacity)
root
default
dev
prod
Show 20 entries
ID
User
Name
Application Type