

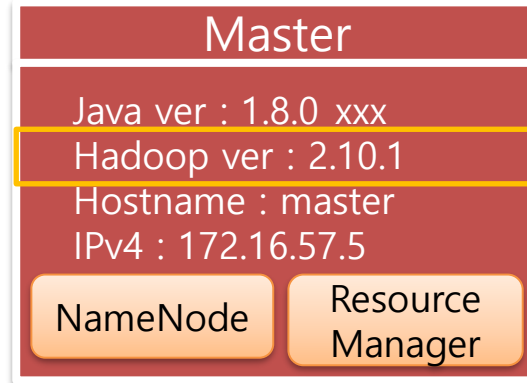
4. Hadoop 설치

목 차

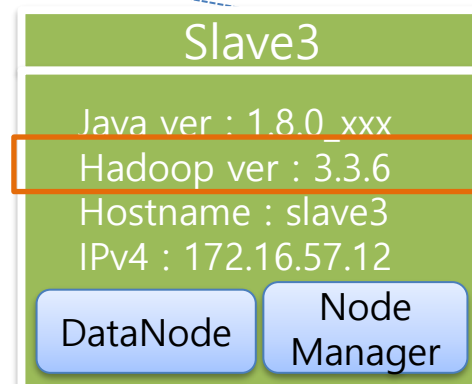
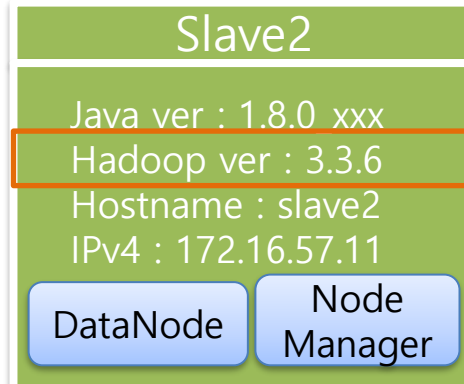
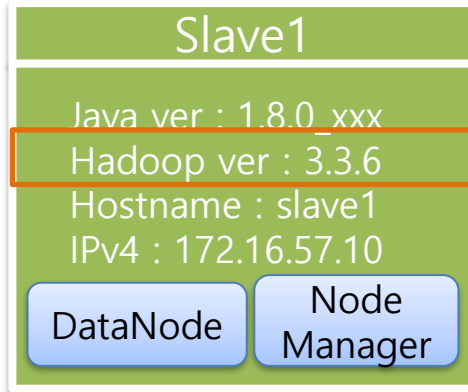
1. Hadoop 설치
2. Java & Hadoop 홈 Path 설정
3. Hadoop 환경설정
4. Hadoop 시스템 배포
5. HDFS 포맷
6. Hadoop/Yarn 데몬 시작
7. Hadoop system 상태 확인
8. Hadoop/Yarn 데몬 종료

Hadoop 클러스터 구축 시스템 구성도

하드웨어(master)
Memory : 2GB
Processor : 2개



실제 linux IP : **172.16.57.129**



하드웨어(slave)
Memory : 1GB
Processor : 1개

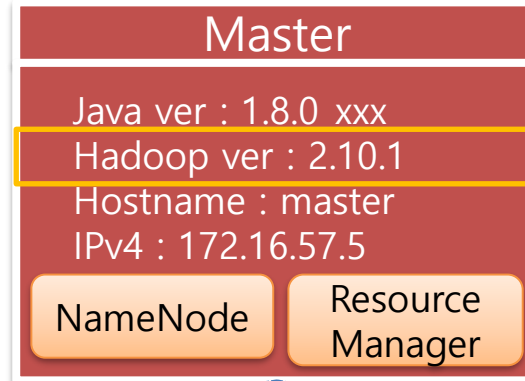
네트워크 카드/네임서버(공용)

넷마스크 : 255.255.255.0
기본라우팅(게이트웨어) : 172.16.57.2
네임서버 : 172.16.57.2

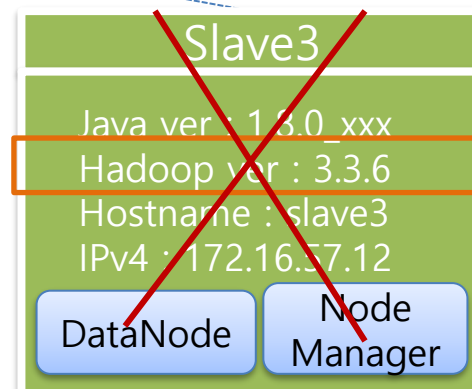
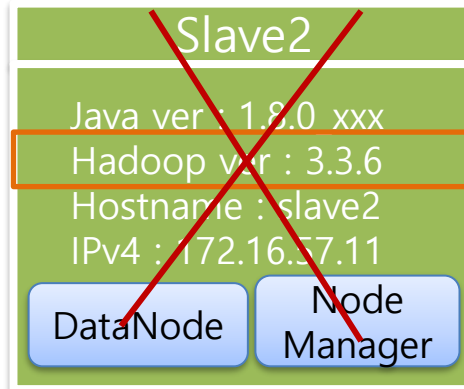
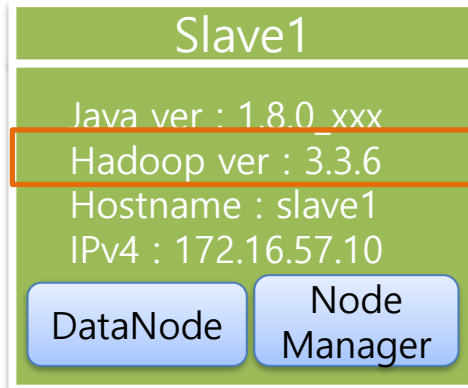
Hadoop 클러스터 구축 시스템 구성도

(실제 수업환경 : 속도/용량 고려)

하드웨어(master)
Memory : 2GB
Processor : 2개



실제 linux IP : 172.16.57.129

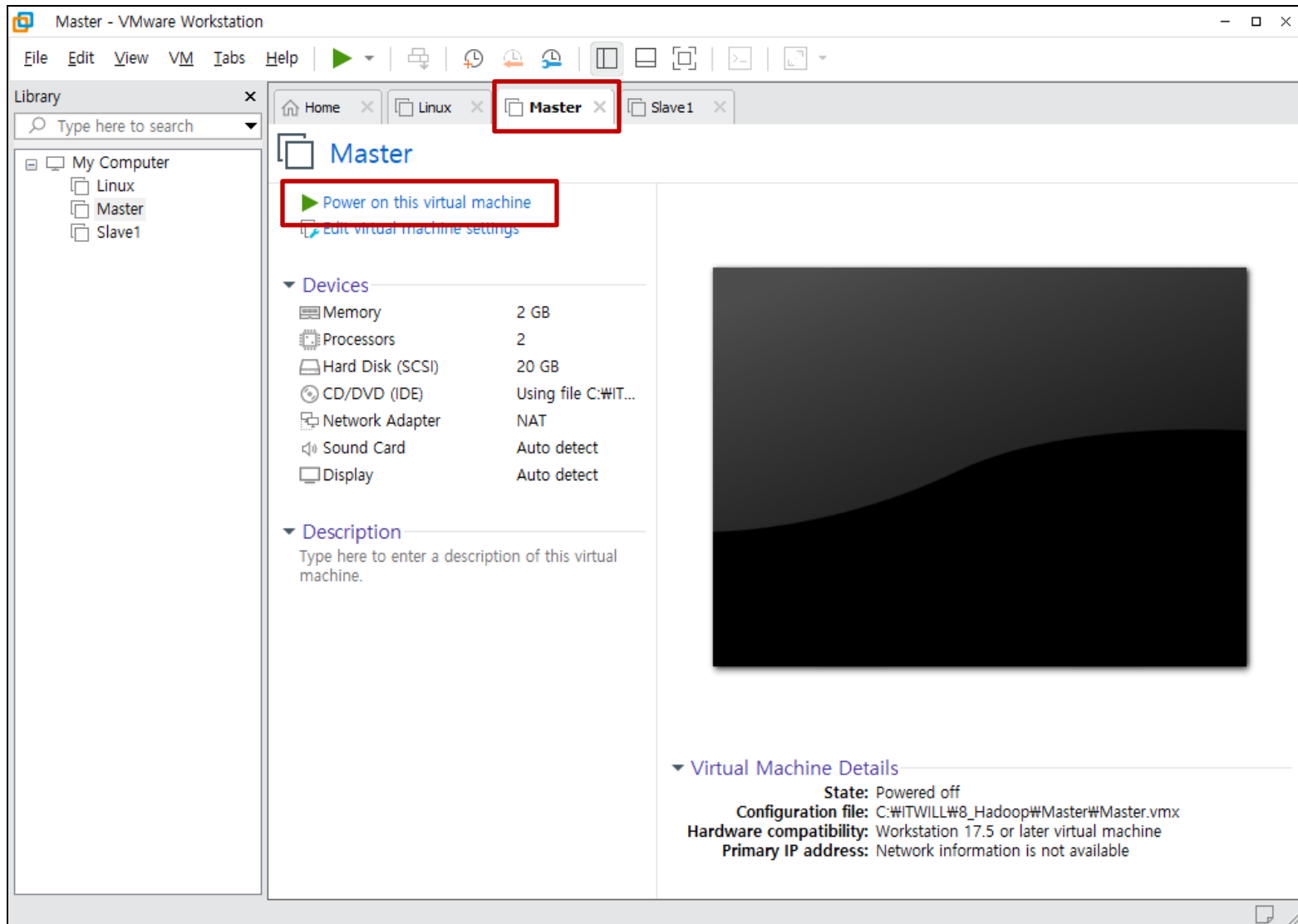


하드웨어(slave)
Memory : 1GB
Processor : 1개

네트워크 카드/네임서버(공용)

넷마스크 : 255.255.255.0
기본라우팅(게이트웨어) : 172.16.57.2
네임서버 : 172.16.57.2

Master 서버 수행



이제 진짜 hadoop 설치

Hadoop 설치 가능 버전 확인

<http://apache.mirror.cdnetworks.com/hadoop/common/> 에서 다운로드 가능한 버전 확인

Index of /hadoop/common

Name	Last modified	Size	Description
Parent Directory		-	
current/	18-Oct-2024 19:22	-	
current2/	17-Jun-2022 20:29	-	
hadoop-2.10.2/	17-Jun-2022 20:29	-	
hadoop-3.2.4/	22-Jul-2022 11:00	-	
hadoop-3.3.3/	24-Mar-2023 19:56	-	
hadoop-3.3.6/	26-Jun-2023 09:46	-	
hadoop-3.4.0/	17-Mar-2024 15:51	-	
hadoop-3.4.1/	18-Oct-2024 19:22	-	
stable/	18-Oct-2024 19:22	-	
stable2/	17-Jun-2022 20:29	-	
readme.txt	21-Apr-2015 10:32	184	

hadoop-3.3.6 버전으로 설치

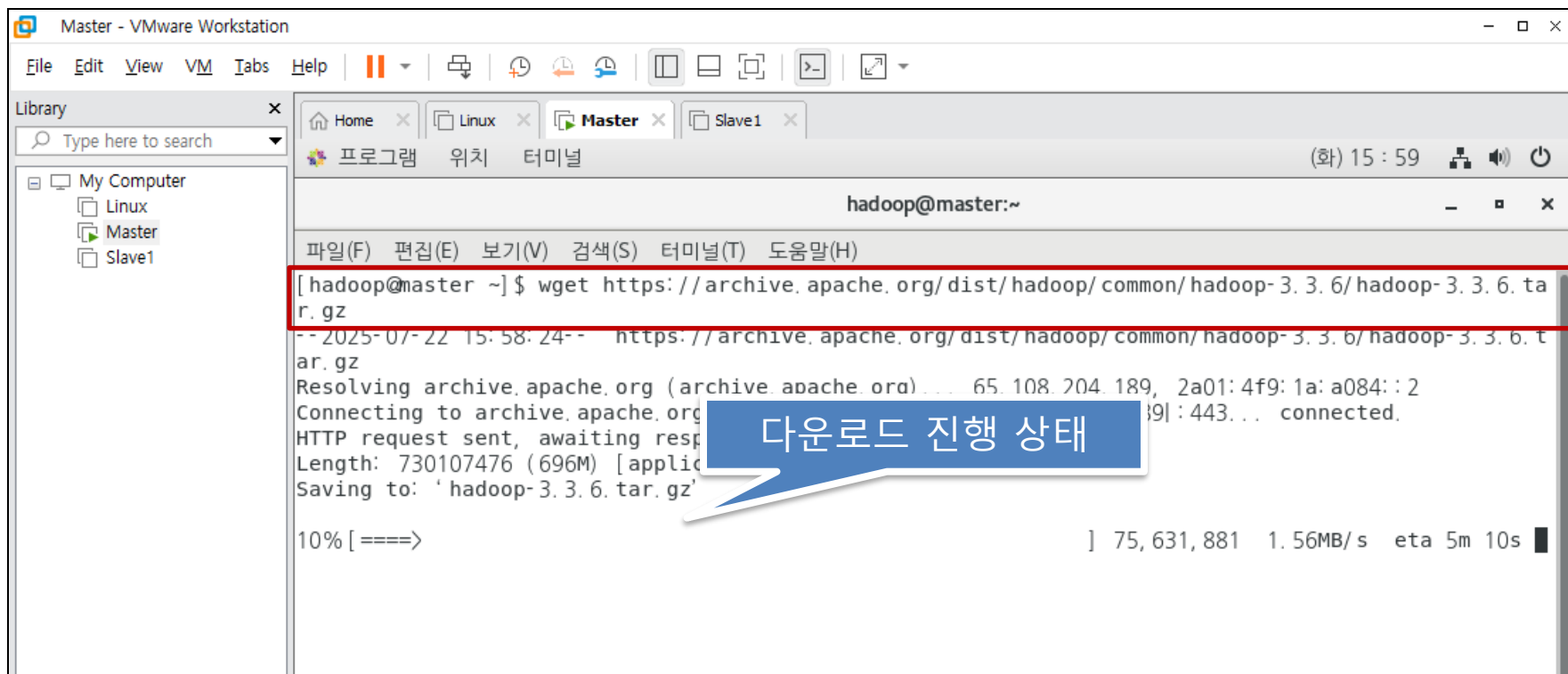
좀 시간 지난게 안전한 버전

Apache Server at apache.mirror.cdnetworks.com Port 80

1. Hadoop 다운로드 & 설치

단계1 : Hadoop 다운로드(Master 작업)

[방법1] wget 명령어로 다운받기 형식) \$ wget URL



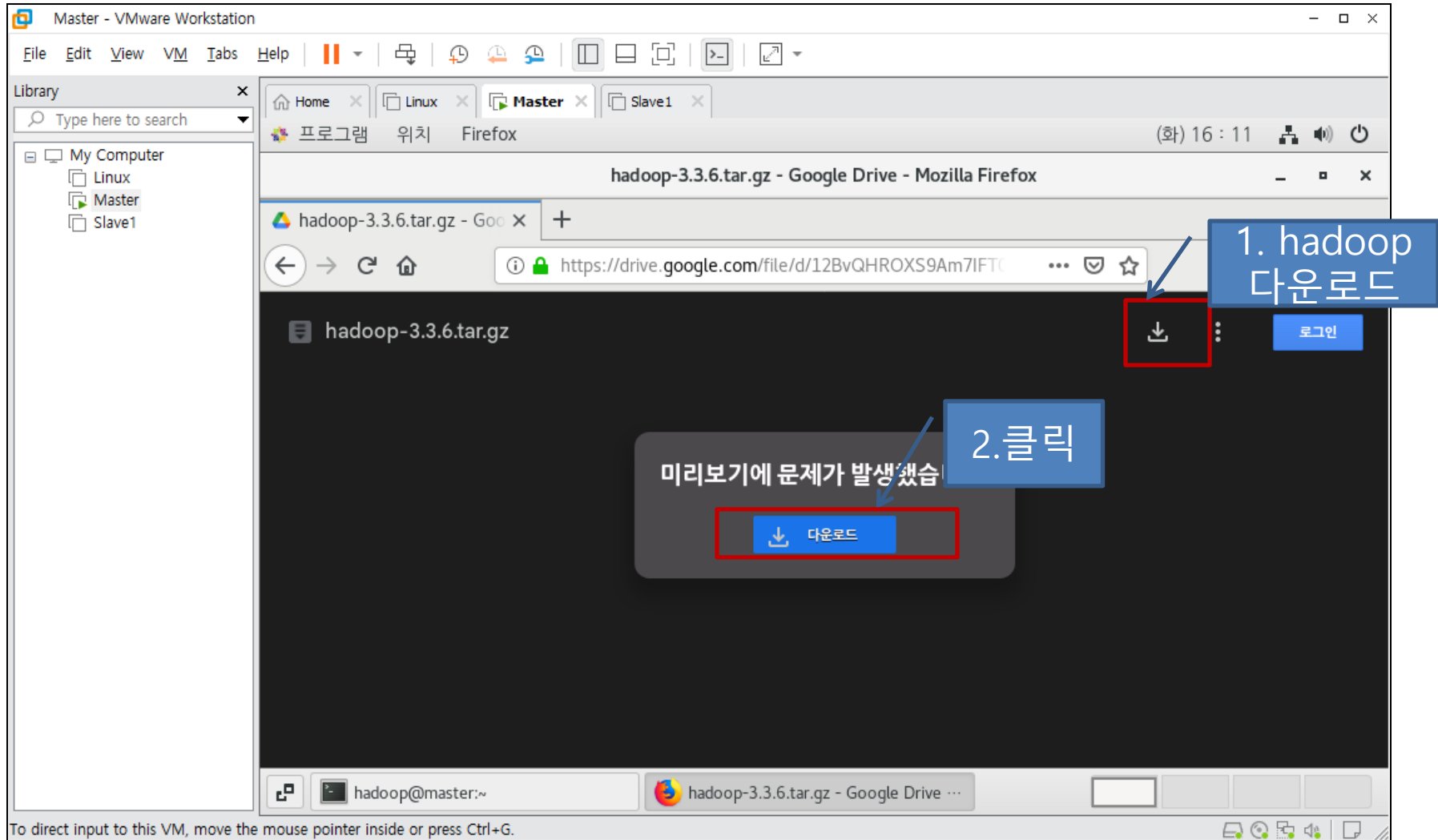
The screenshot shows a VMware Workstation window titled "Master - VMware Workstation". Inside, there's a terminal window titled "hadoop@master:~". The terminal displays the command `wget https://archive.apache.org/dist/hadoop/common/hadoop-3.3.6/hadoop-3.3.6.tar.gz` and its output, including the file size (730107476 bytes) and the progress bar. A blue callout bubble with the text "다운로드 진행 상태" (Download progress status) points to the progress bar.

```
hadoop@master:~$ wget https://archive.apache.org/dist/hadoop/common/hadoop-3.3.6/hadoop-3.3.6.tar.gz
--2025-07-22 15:58:24-- https://archive.apache.org/dist/hadoop/common/hadoop-3.3.6/hadoop-3.3.6.tar.gz
Resolving archive.apache.org (archive.apache.org)... 65.108.204.189, 2a01:4f9:1a:a084::2
Connecting to archive.apache.org ([65.108.204.189]:443)... connected.
HTTP request sent, awaiting response...
Length: 730107476 (696M) [application/gzip]
Saving to: 'hadoop-3.3.6.tar.gz'

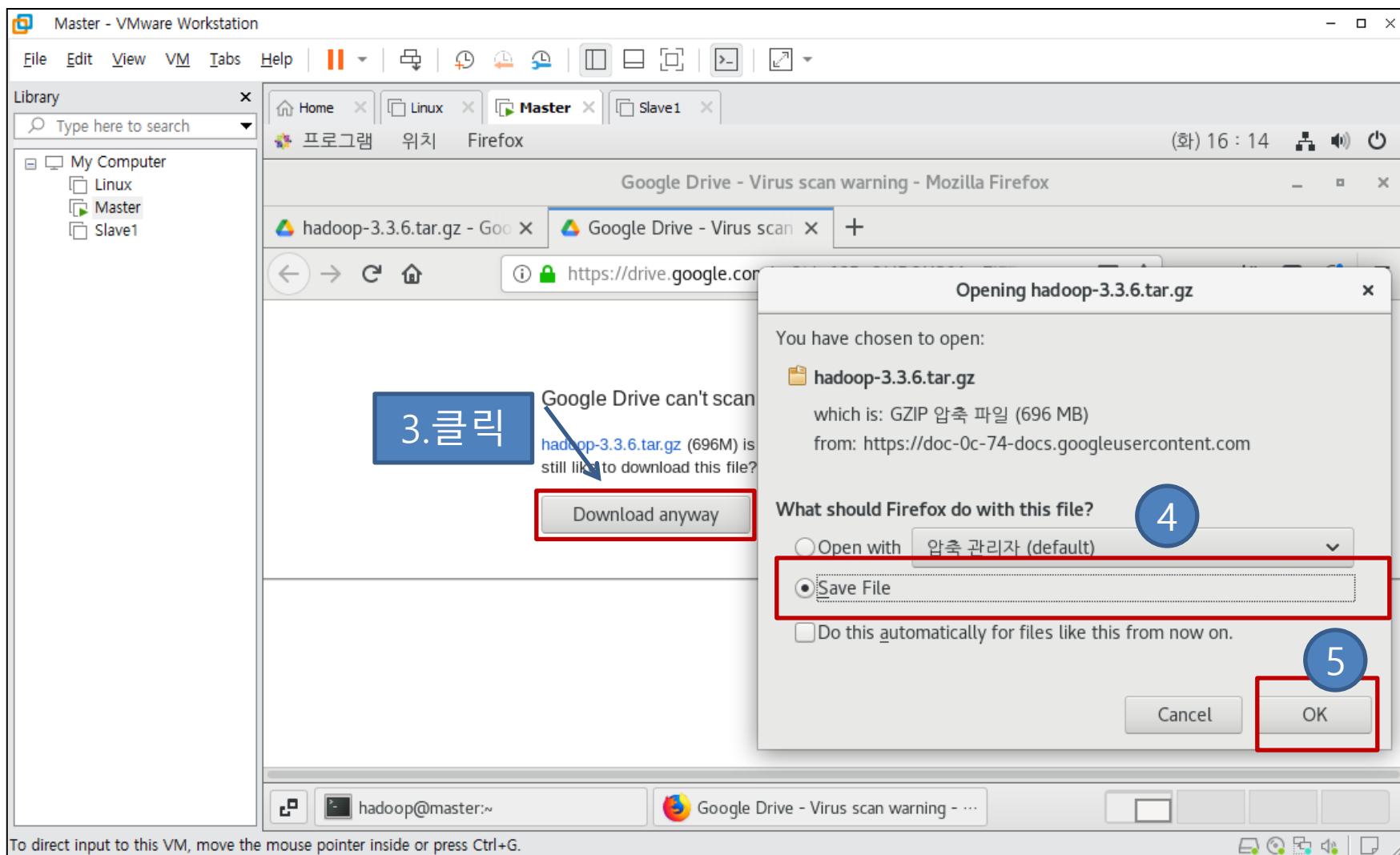
10% [====>] 75,631,881 1.56MB/s eta 5m 10s
```

[방법2] 가상머신의 Firefox에서 Google 드라이버의 링크 주소 접속 :

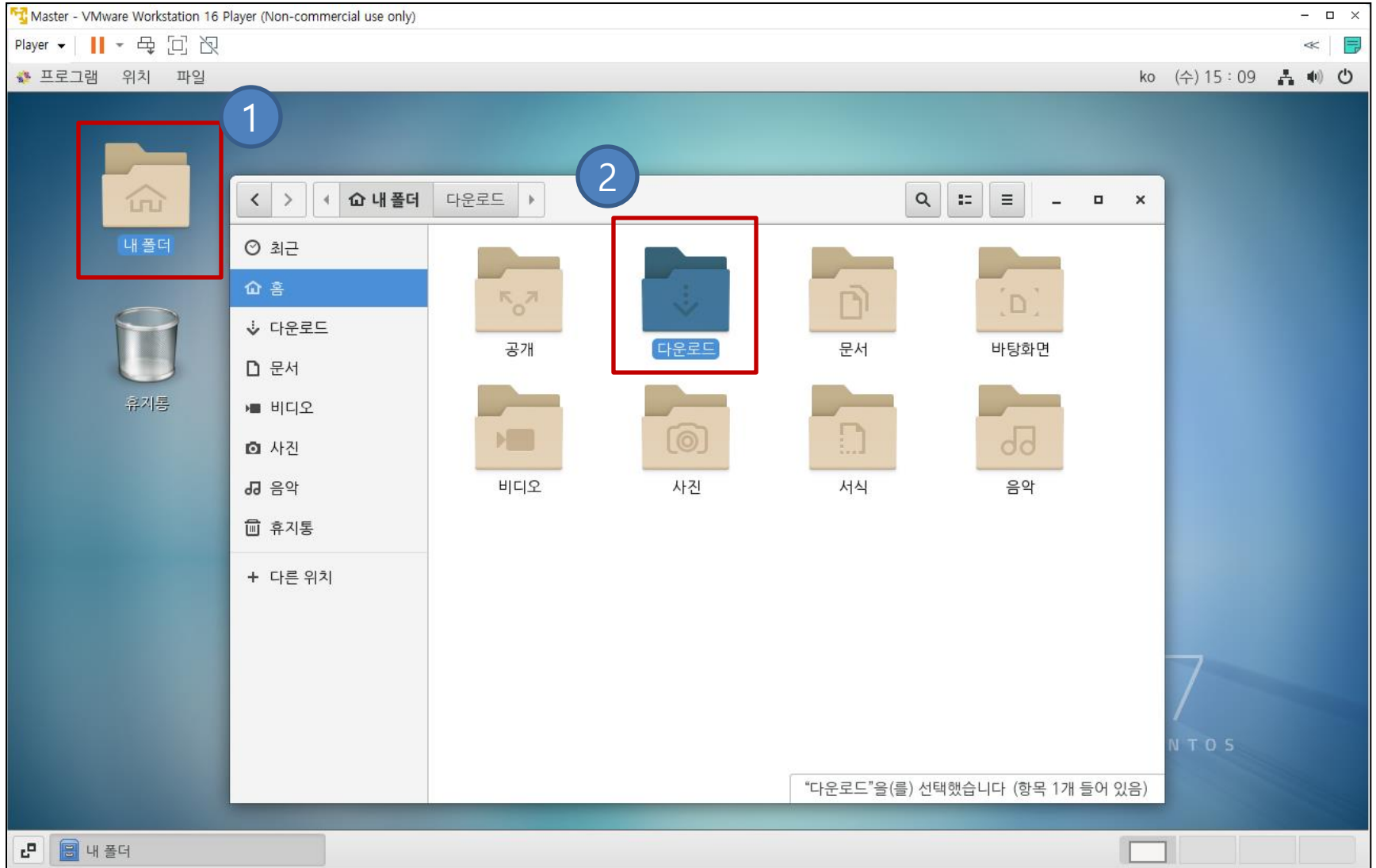
<https://drive.google.com/file/d/12BvQHROXS9Am7IFT0DR4VKXswgFU5Y4m/view?usp=sharing>



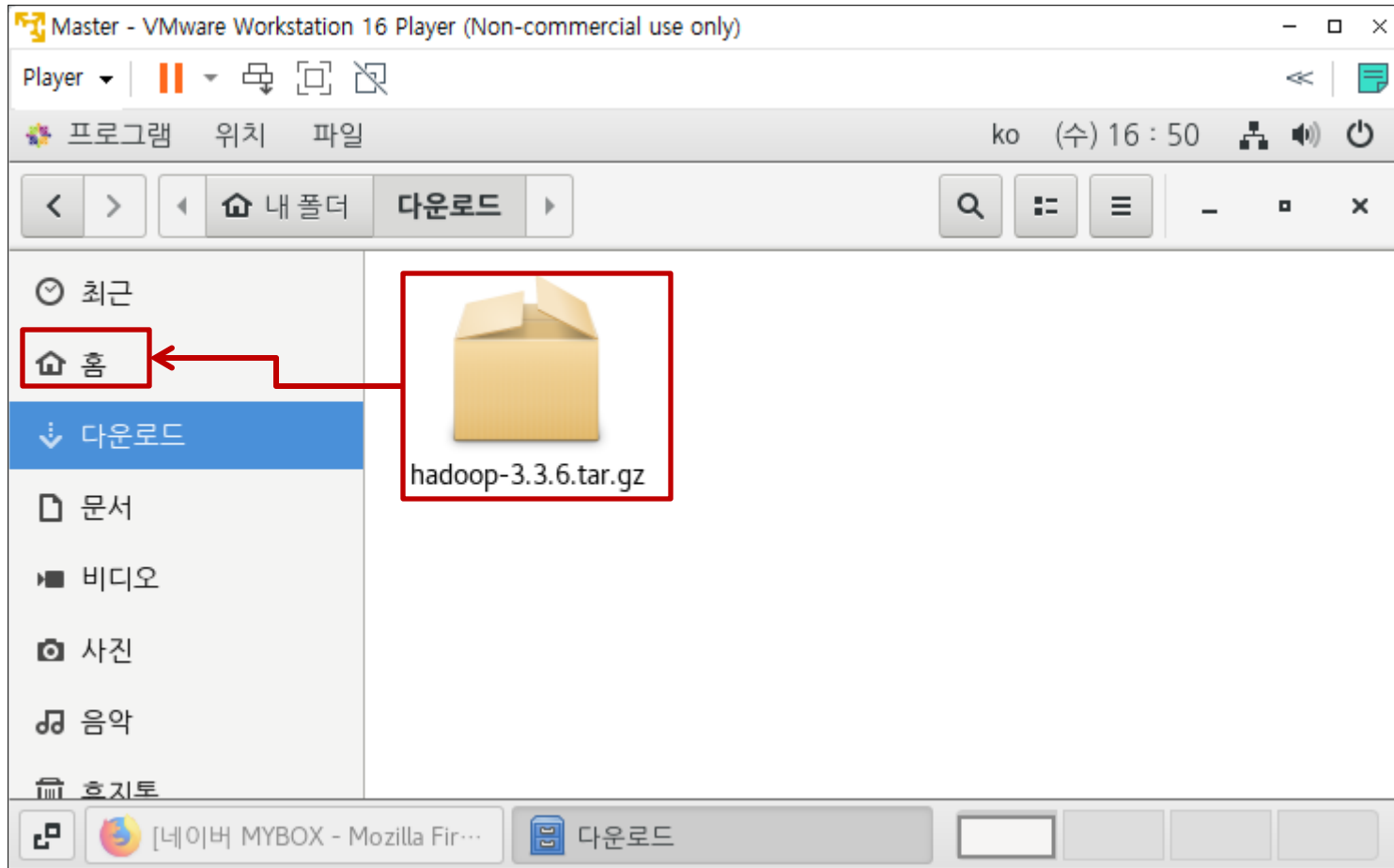
● 저장 위치 선택



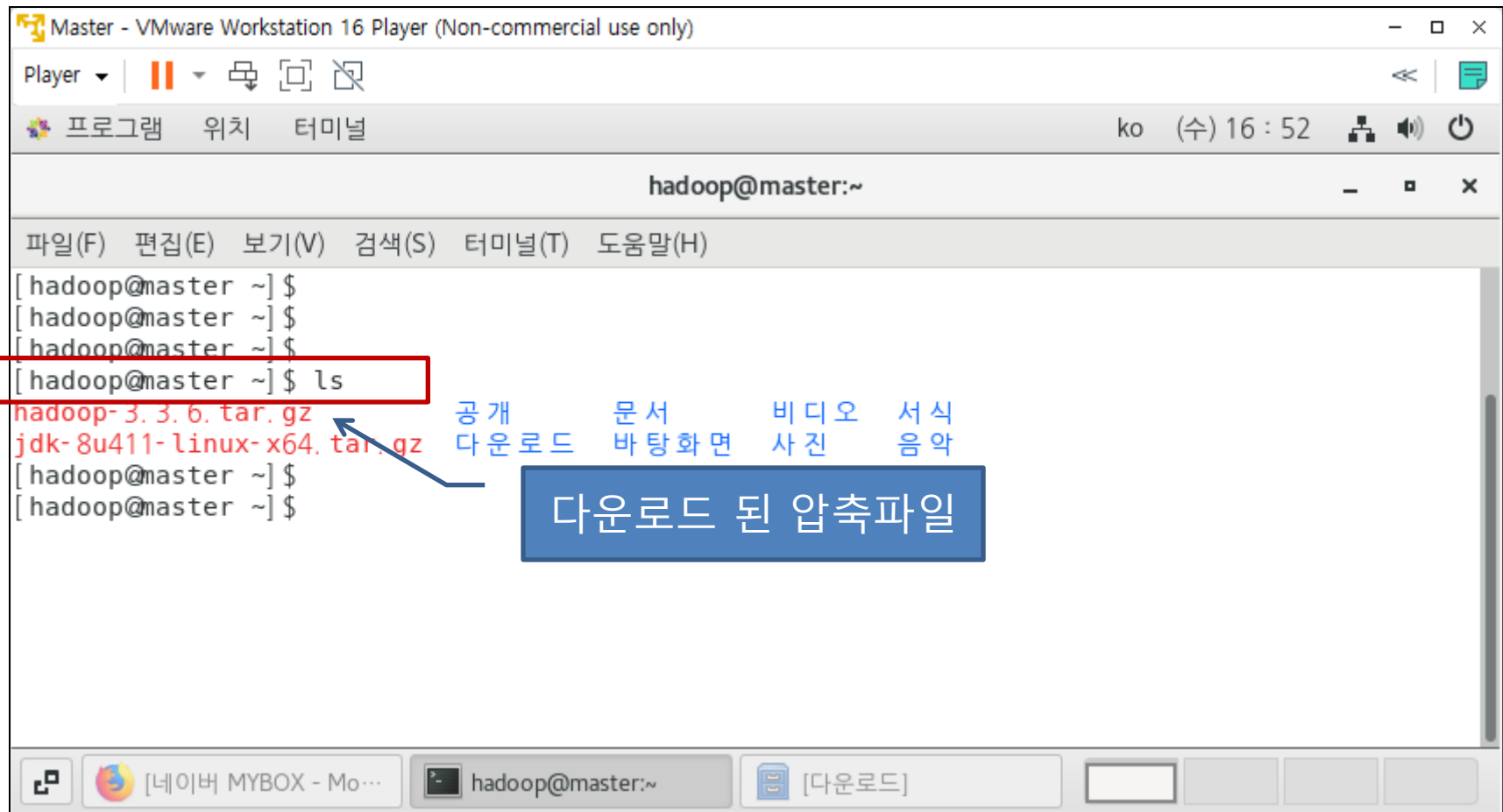
● 다운로드 디렉터리 선택



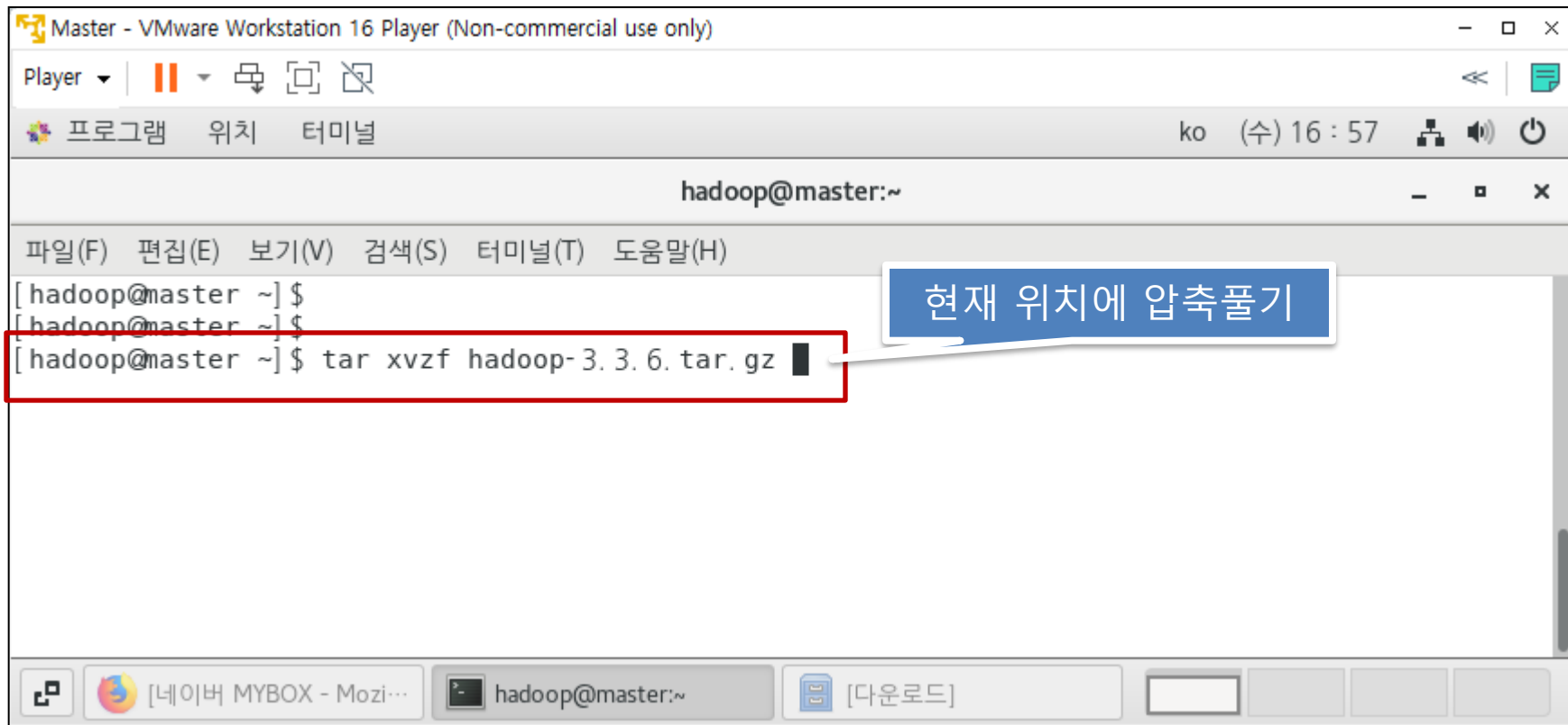
- Hadoop 압축파일을 [홈] 으로 끌어다 & 놓기



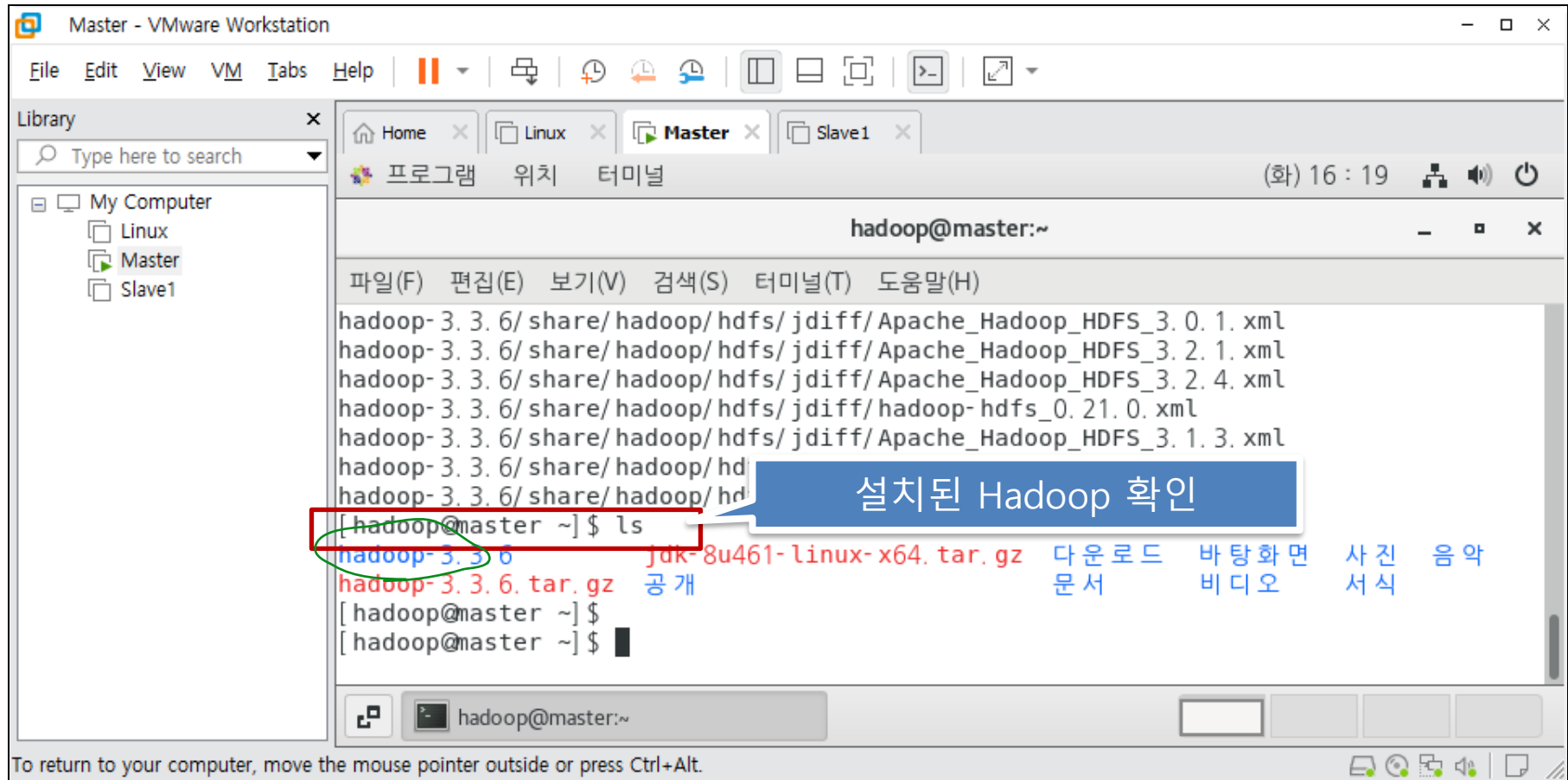
- hadoop [홈 디렉터리]에서 다운로드 파일 확인



단계2 : Hadoop 설치(압축풀기)

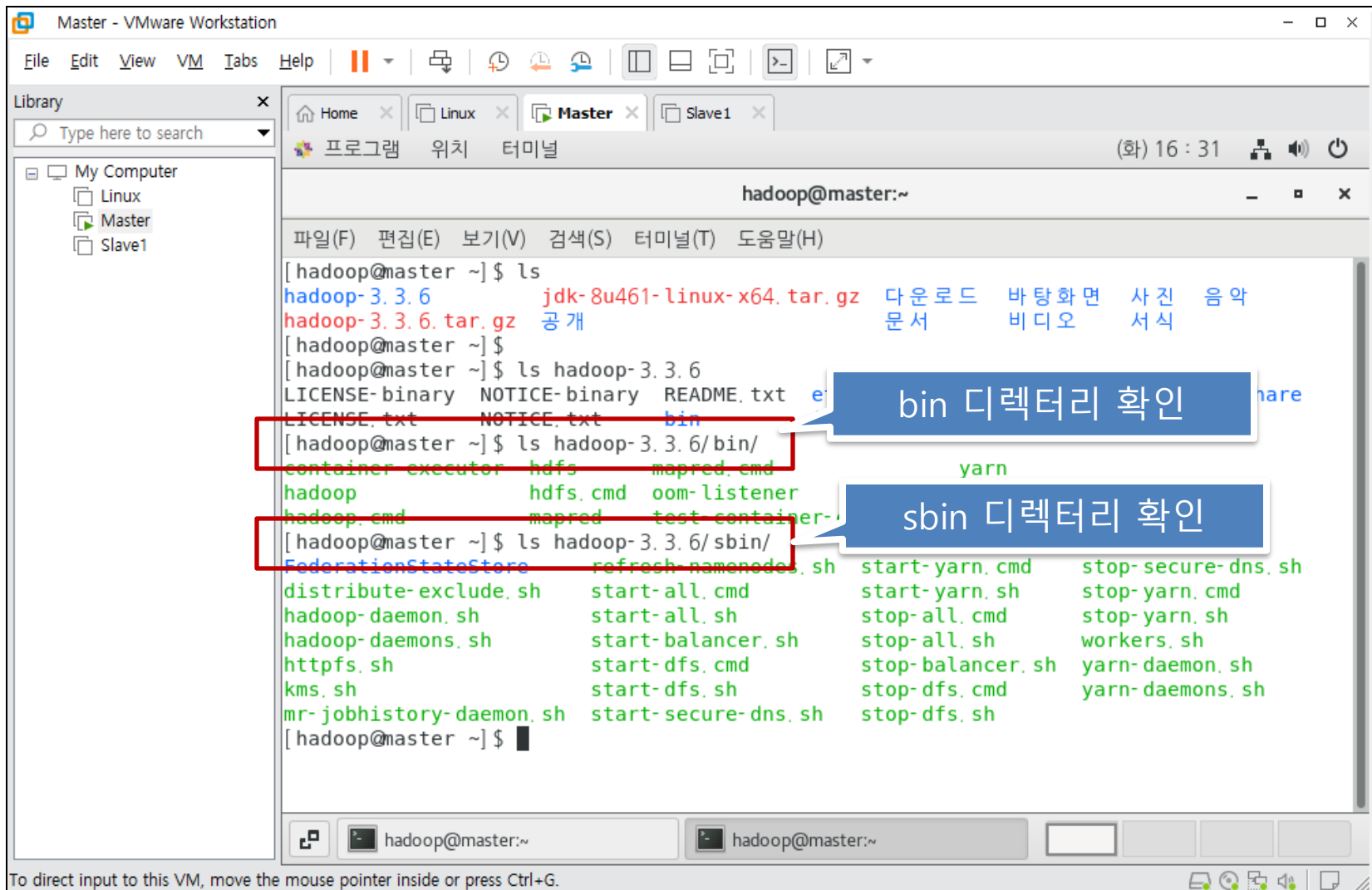


단계3 : Hadoop 설치 확인



❖ 현재 설치된 Hadoop 버전 : **hadoop-3.3.6**

단계4 : Hadoop 실행 파일 확인



```
Master - VMware Workstation
File Edit View VM Tabs Help
Library
Type here to search
My Computer
Linux
Master
Slave1
Home Linux Master Slave1
프로그램 위치 터미널
(화) 16 : 31
hadoop@master:~
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)
[hadoop@master ~]$ ls
hadoop-3.3.6 jdk-8u461-linux-x64.tar.gz 다운로드 바탕화면 사진 음악
hadoop-3.3.6.tar.gz 공개 문서 비디오 서식
[hadoop@master ~]$
[hadoop@master ~]$ ls hadoop-3.3.6
LICENSE-binary NOTICE-binary README.txt
LICENSE.txt NOTICE.txt bin
[hadoop@master ~]$ ls hadoop-3.3.6/bin/
container-executor hdfs mapred.cmd
hadoop hdfs.cmd oom-listener
hadoop.cmd mapred test-container-
[hadoop@master ~]$ ls hadoop-3.3.6/sbin/
FederationStateStore refresh-namenodes.sh start-yarn.cmd stop-secure-dns.sh
distribute-exclude.sh start-all.cmd start-yarn.sh stop-yarn.cmd
hadoop-daemon.sh start-all.sh stop-all.cmd stop-yarn.sh
hadoop-daemons.sh start-balancer.sh stop-all.sh workers.sh
httpfs.sh start-dfs.cmd stop-balancer.sh yarn-daemon.sh
kms.sh start-dfs.sh stop-dfs.cmd yarn-daemons.sh
mr-jobhistory-daemon.sh start-secure-dns.sh stop-dfs.sh
[hadoop@master ~]$
```

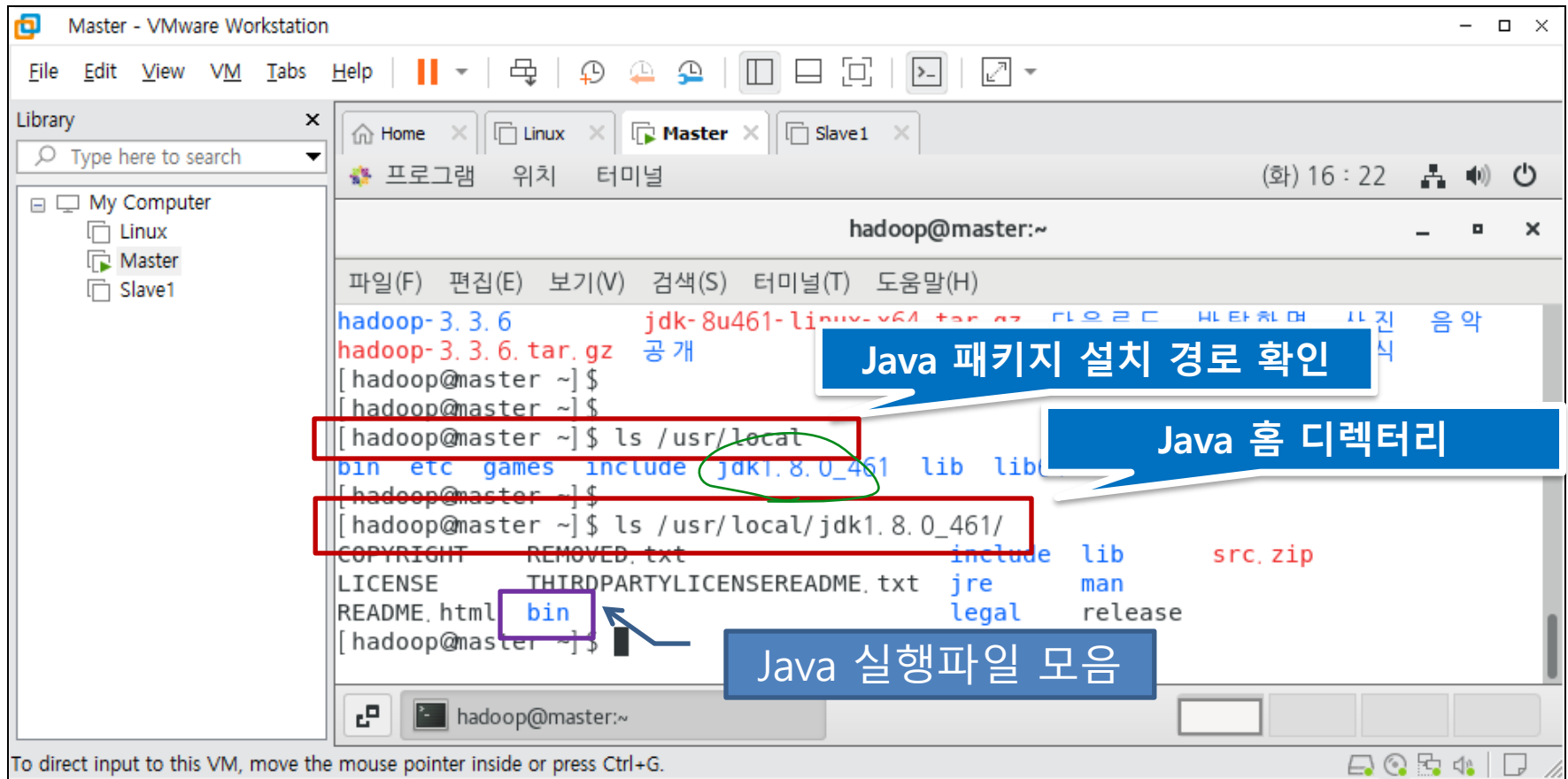
bin 디렉터리 확인

sbin 디렉터리 확인

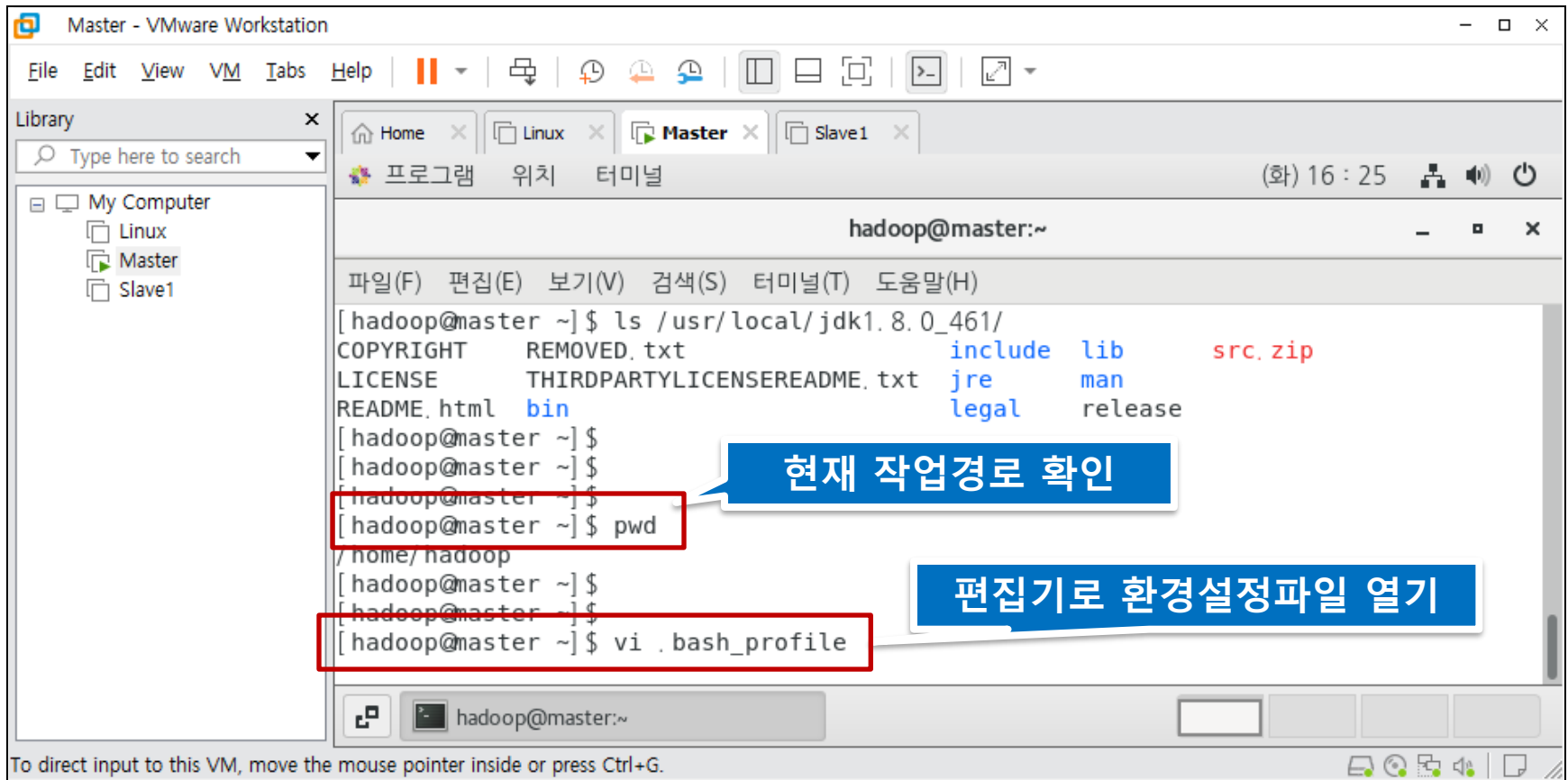
To direct input to this VM, move the mouse pointer inside or press Ctrl+G.

2. 환경설정 : Java/Hadoop 홈 Path 설정

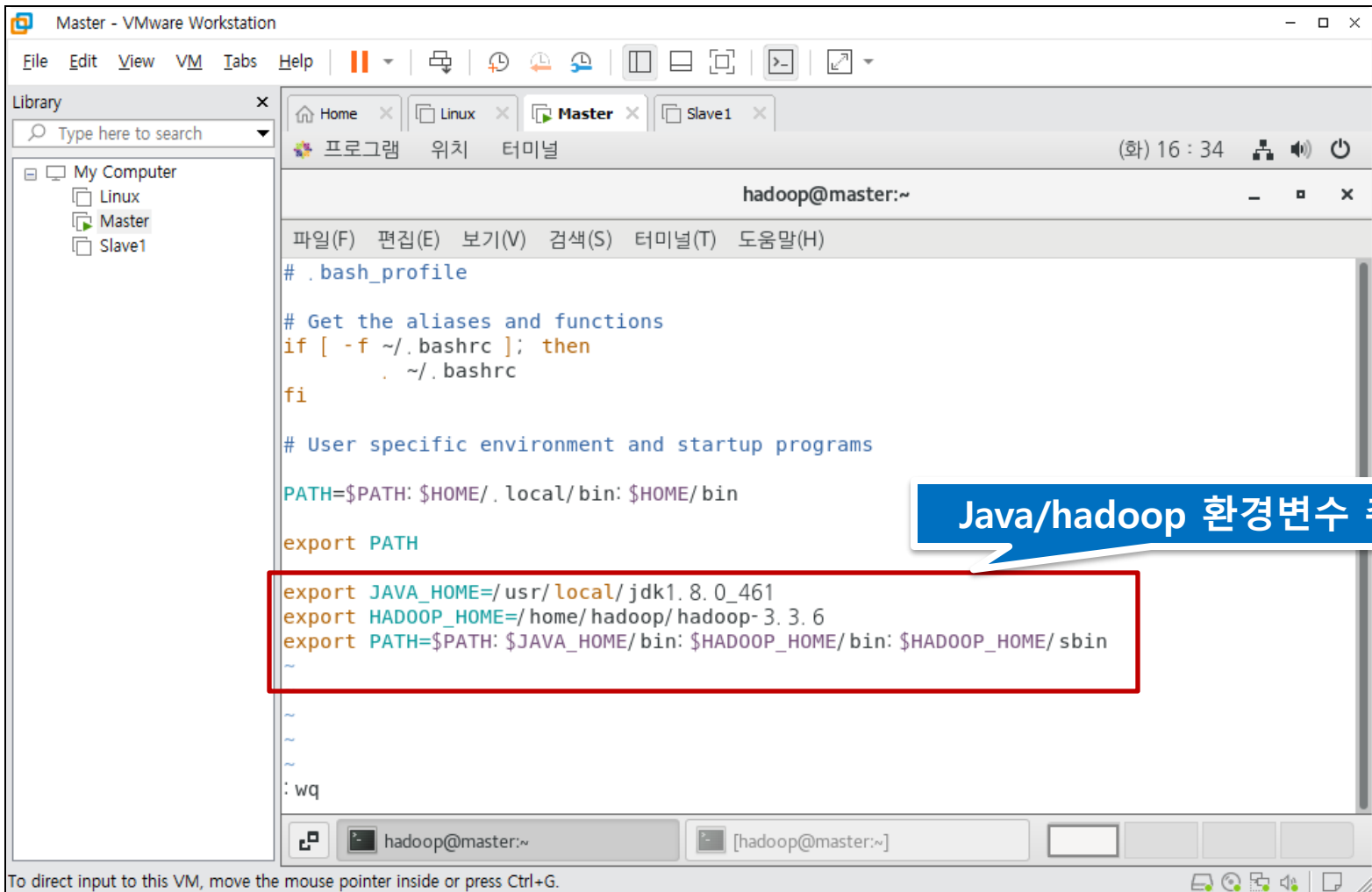
1) Java 홈 디렉터리 확인 : 환경설정 전에 홈 디렉터리 확인



2) 사용자 환경설정 파일(.bash_profile)에서 환경설정



3) Java & Hadoop 홈 환경변수와 PATH 환경변수 지정



The screenshot shows a VMware Workstation window titled "Master - VMware Workstation". Inside, there is a terminal window titled "hadoop@master:~". The terminal displays the contents of the `.bash_profile` file. The file contains the following code:

```
# .bash_profile

# Get the aliases and functions
if [ -f ~/.bashrc ]; then
    . ~/.bashrc
fi

# User specific environment and startup programs

PATH=$PATH: $HOME/. local/bin: $HOME/bin

export PATH

export JAVA_HOME=/usr/local/jdk1.8.0_461
export HADOOP_HOME=/home/hadoop/hadoop-3.3.6
export PATH=$PATH: $JAVA_HOME/bin: $HADOOP_HOME/bin: $HADOOP_HOME/sbin
~
~
~
: wq
```

A red rectangular box highlights the last three lines of the code, which are the environment variable assignments for Java and Hadoop. A blue speech bubble with white text points to this box, containing the text "Java/hadoop 환경변수 추가".

At the bottom of the terminal window, there is a status bar that reads "To direct input to this VM, move the mouse pointer inside or press Ctrl+G."

4) .bash_profile 적용/환경변수 확인

```
Master - VMware Workstation
File Edit View VM Tabs Help
Library
Type here to search
My Computer
Linux
Master
Slave1
hadoop@master:~/hadoop-3.3.6
(화) 16 : 37
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)
[hadoop@master ~]$
[hadoop@master ~]$ vi .bash_profile
[hadoop@master ~]$
[hadoop@master ~]$ source .bash_profile
[hadoop@master ~]$
[hadoop@master ~]$ cd $JAVA_HOME
[hadoop@master jdk1.8.0_461]$
[hadoop@master jdk1.8.0_461]$ cd
[hadoop@master ~]$
[hadoop@master ~]$ cd $HADOOP_HOME
[hadoop@master hadoop-3.3.6]$
[hadoop@master hadoop-3.3.6]$
[hadoop@master hadoop-3.3.6]$ ls
LICENSE-binary NOTICE-binary README.txt etc lib licenses-binary share
LICENSE.txt NOTICE.txt bin include libexec sbin
[hadoop@master hadoop-3.3.6]$
```

환경설정 파일 적용

Java 홈 디렉터리 이동

Hadoop 홈 디렉터리 이동

To return to your computer, move the mouse pointer outside or press Ctrl+Alt.

3. Hadoop 환경 설정 관련 파일

설정 파일	설정 내용
hadoop-env.sh	Hadoop을 실행하는 설정파일(JDK경로, Class 패스, 데몬 실행 등)
core-site.xml	분산파일시스템(HDFS)의 URL 지정
mapred-site.xml	Mapreduce에서 사용할 환경설정 파일
hdfs-site.xml	NameNode와 DataNode의 디렉터리 지정
yarn-site.xml	YARN(Hadoop 클러스터 관리도구) 설정파일, Resource Manager, Node Manager 지정
workers	DataNode를 실행할 서버(Slave) 설정

- Hadoop 환경설정 파일이 있는 경로 이동

```
hadoop@master:~/hadoop-3.3.6/etc/hadoop
[hadop@master ~]$ cd $HADOOP_HOME/etc/hadoop
[hadop@master hadoop]$ pwd
/home/hadoop/hadoop-3.3.6/etc/hadoop
[hadop@master hadoop]$ ls
capacity-scheduler.xml      kms-log4j.properties
configuration.xml           kms-site.xml
container-executor.cfg      log4j.properties
core-site.xml               mapred-env.cmd
hadoop-env.cmd              mapred-env.sh
hadoop-env.sh               mapred-queues.xml.template
hadoop-metrics2.properties mapred-site.xml
hadoop-policy.xml           shellprofile.d
hadoop-user-functions.sh.example
hdfs-rbf-site.xml           ssl-client.xml.example
hdfs-site.xml               ssl-server.xml.example
httpfs-env.sh               user_ec_policies.xml.template
workers
```

환경설정 파일

변경시키고

1) hadoop-env.sh(Hadoop 실행 설정파일)

Hadoop 환경 설정 (jdk 추가)

[hadoop@master hadoop]\$ vi hadoop-env.sh

1. 설정파일 열기

```
hadoop@master:~/hadoop-3.3.6/etc/hadoop
# export HDFS_NAMENODE_USER=hdfs

###
# Registry DNS specific parameters
###
# For privileged registry DNS, user to run as after dropping privileges
# This will replace the hadoop.id.str Java property in secure mode.
# export HADOOP_REGISTRYDNS_SECURE_USER=yarn

# Supplemental options for privileged registry DNS
# By default, Hadoop uses jsvc which needs to
# server jvm.
# export HADOOP_REGISTRYDNS_SECURE_EXTRA_OPTS=

export JAVA_HOME=/usr/local/jdk1.8.0_461

:wq
```

2) HDFS의 NameNode URL 지정

[hadoop@master hadoop]\$ vi core-site.xml

1. 설정파일 열기



```
hadoop@master:~/hadoop-3.3.6/etc/hadoop
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)

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 file LICENSE.txt for details.
-->

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

<configuration>
  <property>
    <name>fs.defaultFS</name>
    <value>hdfs://master:9000</value>
  </property>
</configuration>
```

HDFS url

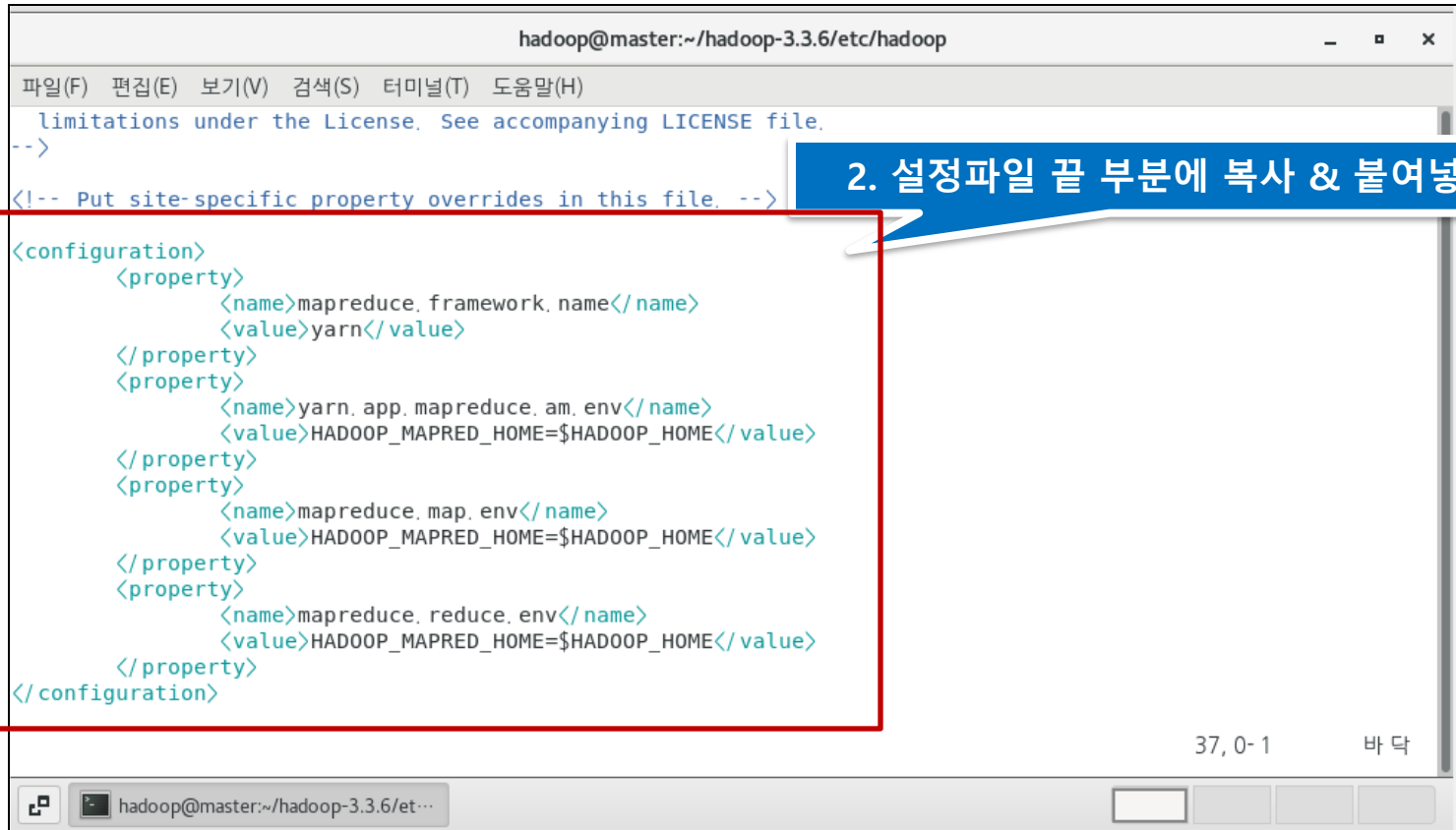
24, 1 바닥

2. 파일 끝 부분에 복사 & 붙여넣기

3) MapReduce 관련 설정

[hadoop@master hadoop]\$ vi mapred-site.xml

1. 설정파일 열기



```
hadoop@master:~/hadoop-3.3.6/etc/hadoop
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)
  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>
  <property>
    <name>yarn.app.mapreduce.am.env</name>
    <value>HADOOP_MAPRED_HOME=$HADOOP_HOME</value>
  </property>
  <property>
    <name>mapreduce.map.env</name>
    <value>HADOOP_MAPRED_HOME=$HADOOP_HOME</value>
  </property>
  <property>
    <name>mapreduce.reduce.env</name>
    <value>HADOOP_MAPRED_HOME=$HADOOP_HOME</value>
  </property>
</configuration>
```

2. 설정파일 끝 부분에 복사 & 붙여넣기

37, 0-1 바닥

4) namenode와 datanode 디렉터리 생성 (hdfs-site.xml 에서 지정한 디렉터리)

Hadoop 홈 디렉토리 아래 namenode와 datanode 디렉터리 생성

```
[hadoop@master hadoop]$ mkdir -p ~/hadoopdata/hdfs/namenode  
[hadoop@master hadoop]$ mkdir -p ~/hadoopdata/hdfs/datanode
```


5) 하둡분산파일시스템(HDFS) 환경설정

Multi-Node Cluster 모드용

[hadoop@master hadoop]\$ vi **hdfs-site.xml**

1. 설정파일 열기

```
hadoop@master:~/hadoop-3.3.6/etc/hadoop

파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)

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>3</value>
  </property>
  <property>
    <name>dfs.namenode.name.dir</name>
    <value>/home/hadoop/hadoopdata/hdfs/namenode</value>
    <final>true</final>
  </property>
  <property>
    <name>dfs.datanode.data.dir</name>
    <value>/home/hadoop/hadoopdata/hdfs/datanode</value>
    <final>true</final>
  </property>
</configuration>
```

2. 설정파일 끝 부분에 복사 & 붙여넣기

35, 0-1 바 닷

6) YARN 설정(Resource & Node Manager 지정)

Multi-Node Cluster 모드용

[hadoop@master hadoop]\$ vi yarn-site.xml

1. 설정파일 열기

```
<configuration>
<!-- Site specific YARN configuration properties -->
  <property>
    <name>yarn.resourcemanager.hostname</name>
    <value>master</value>
  </property>
  <property>
    <name>yarn.nodemanager.aux-services</name>
    <value>mapreduce_shuffle</value>
  </property>
  <property>
    <name>yarn.nodemanager.vmem-check-enabled</name>
    <value>>false</value>
  </property>
  <property>
    <name>yarn.resourcemanager.address</name>
    <value>master: 8032</value>
  </property>
  <property>
    <name>yarn.resourcemanager.scheduler.address</name>
    <value>master: 8030</value>
  </property>
  <property>
    <name>yarn.resourcemanager.resource-tracker.address</name>
    <value>master: 8031</value>
  </property>
</configuration>
```

2. 설정파일 끝 부분에 복사 & 붙여넣기

45, 0-1

바닥

7) Data node(Slave 서버) 지정

Multi-Node Cluster 모드용

[hadoop@master hadoop]\$ **vi workers**

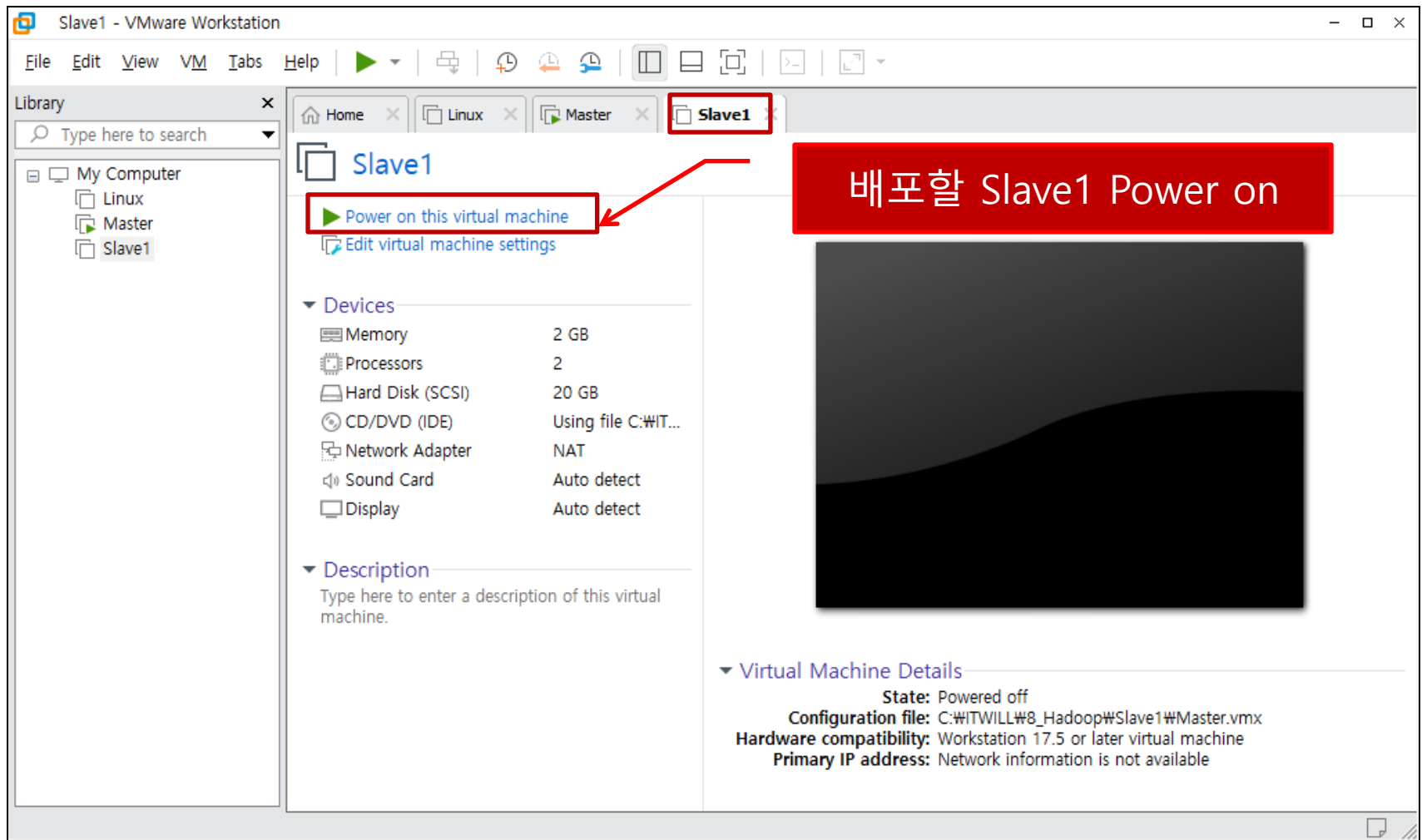
1. 설정파일 열기

```
hadoop@master:~/hadoop-3.3.6/etc/hadoop
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)
slave1
~
~
~
~
~
~
:wq
```

2. slave1 추가

3. 저장 후 종료

4. Hadoop 시스템 배포



4. Hadoop 시스템 배포(Master 작업)

hadoop@master:~

hadoop@master ~\$ cd /home/hadoop

hadoop@master ~\$ pwd

/home/hadoop

hadoop@master ~\$

hadoop@master ~\$

hadoop@master ~\$ scp -r /home/hadoop/hadoop-3.3.6 hadoop@slave1:~

hadoop@master:~

파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)

yarn.cmd	100%	12KB	18.6MB/s	00:00
hdfs	100%	13KB	22.6MB/s	00:00
mapred	100%	6237	9.0MB/s	00:00
yarn	100%	15KB	19.4MB/s	00:00
hadoop.cmd	100%	8786	13.5MB/s	00:00
container-executor	100%	363KB	98.6MB/s	00:00
mapred.cmd	100%	6310	4.0MB/s	00:00
rcc				
test-container-executor				

hadoop@master ~\$

hadoop@master ~\$

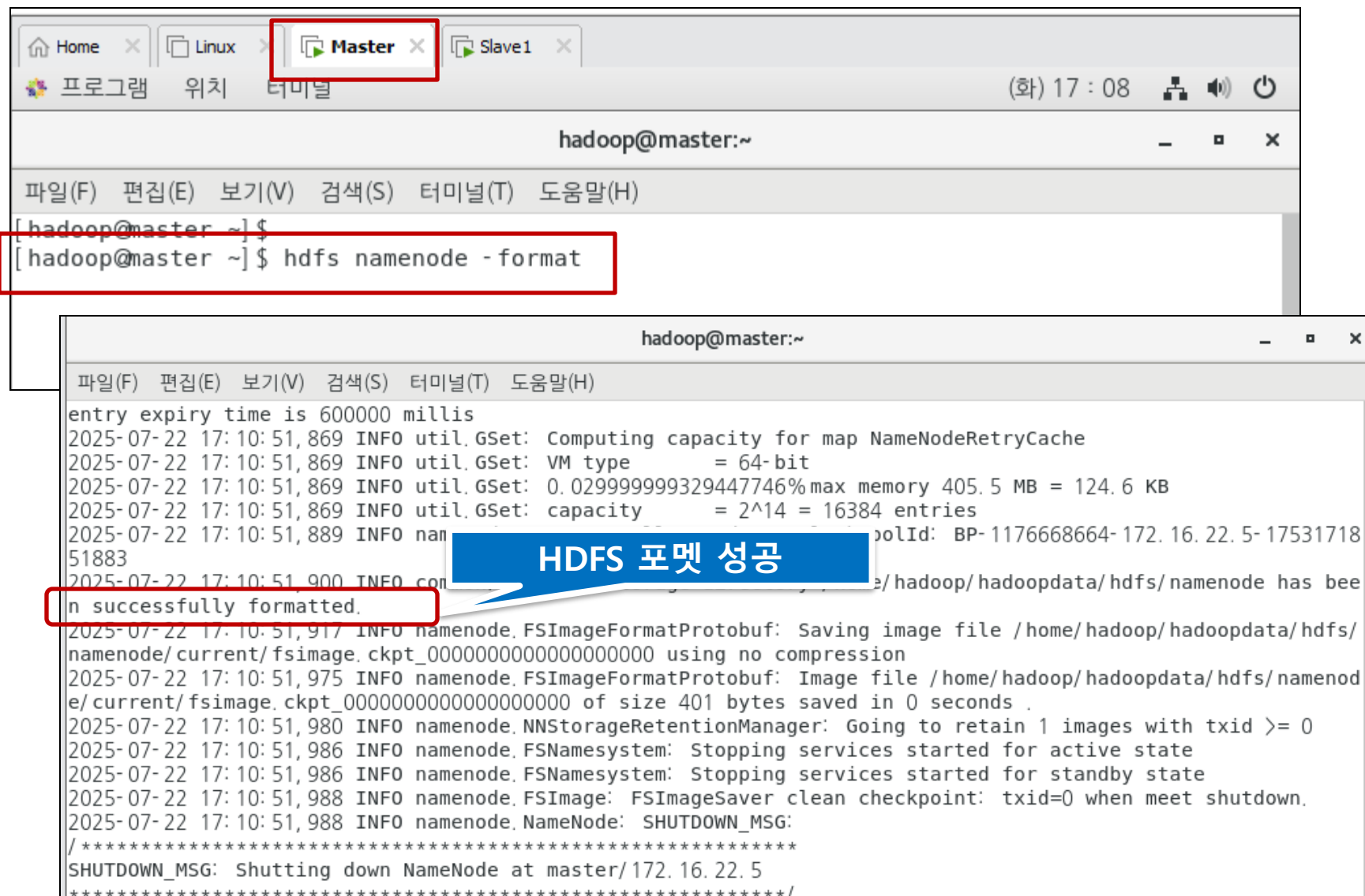
hadoop@master ~\$ scp /home/hadoop/.bash_profile hadoop@slave1:~

hadoop 홈 디렉터리 이동

Slave1 서버로 Hadoop 시스템 배포

Slave1 서버로 환경설정 파일 배포

5. HDFS 포맷(최초 사용시)



The screenshot shows a terminal window with two tabs: 'Master' and 'Slave1'. The 'Master' tab is active. The terminal prompt is 'hadoop@master:~'. The command 'hdfs namenode -format' is entered and executed. The output shows various system information and a confirmation message: 'HDFS 포맷 성공' (HDFS format success) and 'n successfully formatted.'.

```
hadoop@master:~  
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)  
[hadoop@master ~]$  
[hadoop@master ~]$ hdfs namenode -format  
  
entry expiry time is 600000 millis  
2025-07-22 17:10:51,869 INFO util.GSet: Computing capacity for map NameNodeRetryCache  
2025-07-22 17:10:51,869 INFO util.GSet: VM type = 64-bit  
2025-07-22 17:10:51,869 INFO util.GSet: 0.029999999329447746% max memory 405.5 MB = 124.6 KB  
2025-07-22 17:10:51,869 INFO util.GSet: capacity = 2^14 = 16384 entries  
2025-07-22 17:10:51,889 INFO nam ... polId: BP-1176668664-172.16.22.5-17531718  
51883  
2025-07-22 17:10:51,900 INFO con ... e/hadoop/hadoopdata/hdfs/namenode has bee  
n successfully formatted.  
2025-07-22 17:10:51,917 INFO namenode.FSImageFormatProtobuf: Saving image file /home/hadoop/hadoopdata/hdfs/  
namenode/current/fimage.ckpt_00000000000000000000 using no compression  
2025-07-22 17:10:51,975 INFO namenode.FSImageFormatProtobuf: Image file /home/hadoop/hadoopdata/hdfs/namenod  
e/current/fimage.ckpt_00000000000000000000 of size 401 bytes saved in 0 seconds .  
2025-07-22 17:10:51,980 INFO namenode.NNStorageRetentionManager: Going to retain 1 images with txid >= 0  
2025-07-22 17:10:51,986 INFO namenode.FSNamesystem: Stopping services started for active state  
2025-07-22 17:10:51,986 INFO namenode.FSNamesystem: Stopping services started for standby state  
2025-07-22 17:10:51,988 INFO namenode.FSImage: FSImageSaver clean checkpoint: txid=0 when meet shutdown.  
2025-07-22 17:10:51,988 INFO namenode.NameNode: SHUTDOWN_MSG:  
/ *****  
SHUTDOWN_MSG: Shutting down NameNode at master/172.16.22.5  
*****/
```

● 환경설정 파일에 오류가 있는 경우

오류 나면 여기 확인

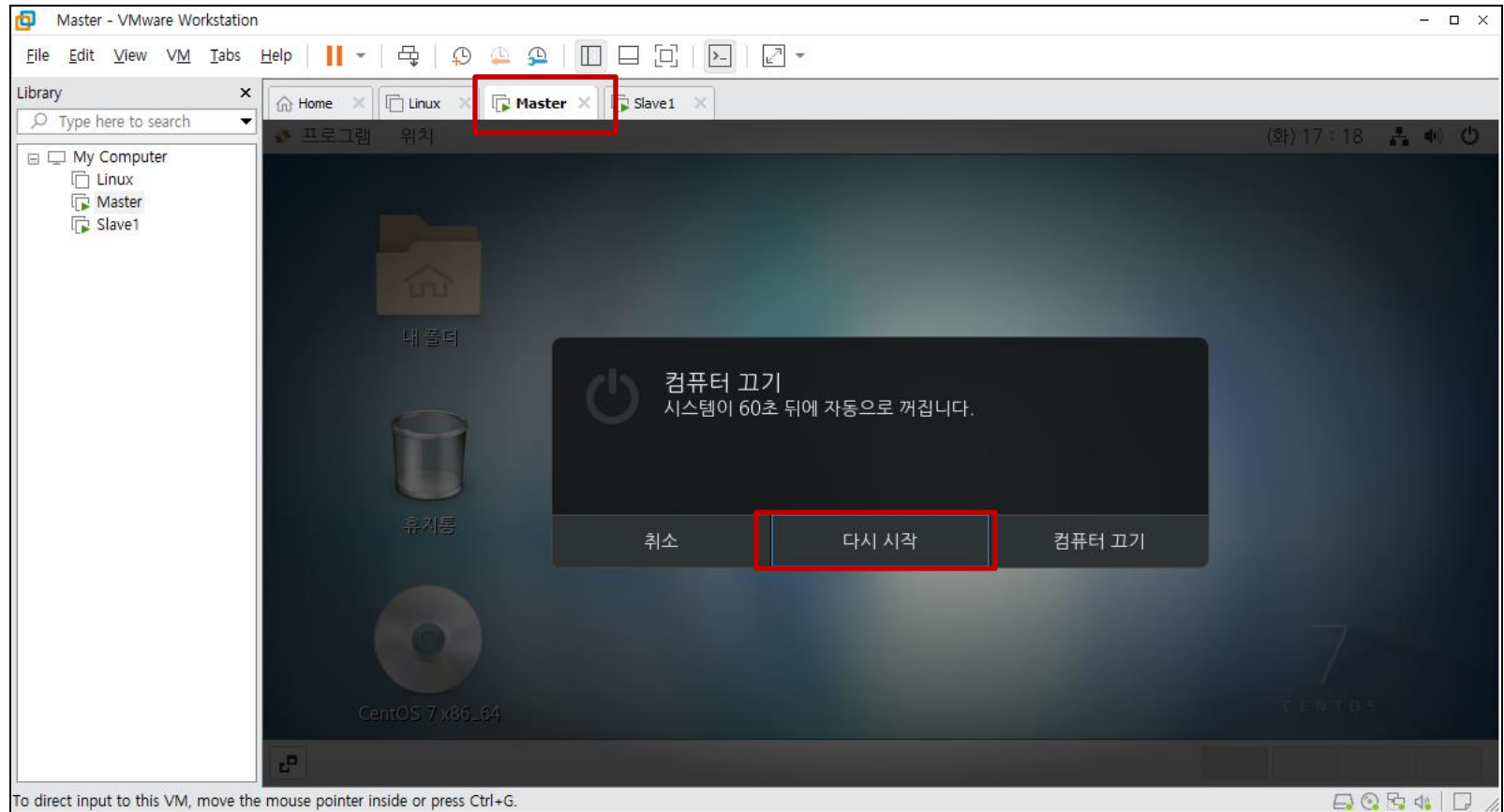
```
hadoop@master:~  
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)  
n. java: 395)  
    at org.apache.hadoop.security.UserGroupInformation.isEnabled(UserGroupInformation.java: 389)  
    at org.apache.hadoop.hdfs.server.namenode.NameNode.format(NameNode.java: 1243)  
    at org.apache.hadoop.hdfs.server.namenode.NameNode.createNameNode(NameNode.java: 1739)  
    at org.apache.hadoop.hdfs.server.namenode.NameNode.main(NameNode.java: 1847)  
Caused by: com.ctc.wstx.exc.WstxUnexpectedCharException: Unexpected character ''' (code 96) in epilog; expected '<'  
    at [row, col, system-id]: [45, 1, "file: /home/hadoop/hadoop-3.3.6/etc/hadoop/yarn-site.xml"]  
    at com.ctc.wstx.sr.StreamScanner.throwUnexpectedChar(StreamScanner.java: 666)  
    at com.ctc.wstx.sr.BasicStreamReader.nextFromProlog(BasicStreamReader.java: 2130)  
    at com.ctc.wstx.sr.BasicStreamReader.closeContentTree(BasicStreamReader.java: 2980)  
    at com.ctc.wstx.sr.BasicStreamReader.nextFromTree(BasicStreamReader.java: 2728)  
    at com.ctc.wstx.sr.BasicStreamReader.next(BasicStreamReader.java: 2600)  
    at org.apache.hadoop.conf.Configuration$Parser.parseNext(Configuration$Parser.java: 100)  
    at org.apache.hadoop.conf.Configuration$Parser.parse(Configuration$Parser.java: 130)  
    at org.apache.hadoop.conf.Configuration.loadResource(Configuration.java: 2000)  
    ... 12 more  
2025-07-22 17:08:56,929 INFO util.ExitUtil: Exiting with status 1: java.lang.RuntimeException: com.ctc.wstx.exc.WstxUnexpectedCharException: Unexpected character ''' (code 96) in epilog; expected '<'  
    at [row, col, system-id]: [45, 1, "file: /home/hadoop/hadoop-3.3.6/etc/hadoop/yarn-site.xml"]  
2025-07-22 17:08:56,931 INFO namenode.NameNode: SHUTDOWN MSG: Shutdown by user: root
```

오류가 있는 설정 파일을
vi편집기로 열어서 오류
수정 후

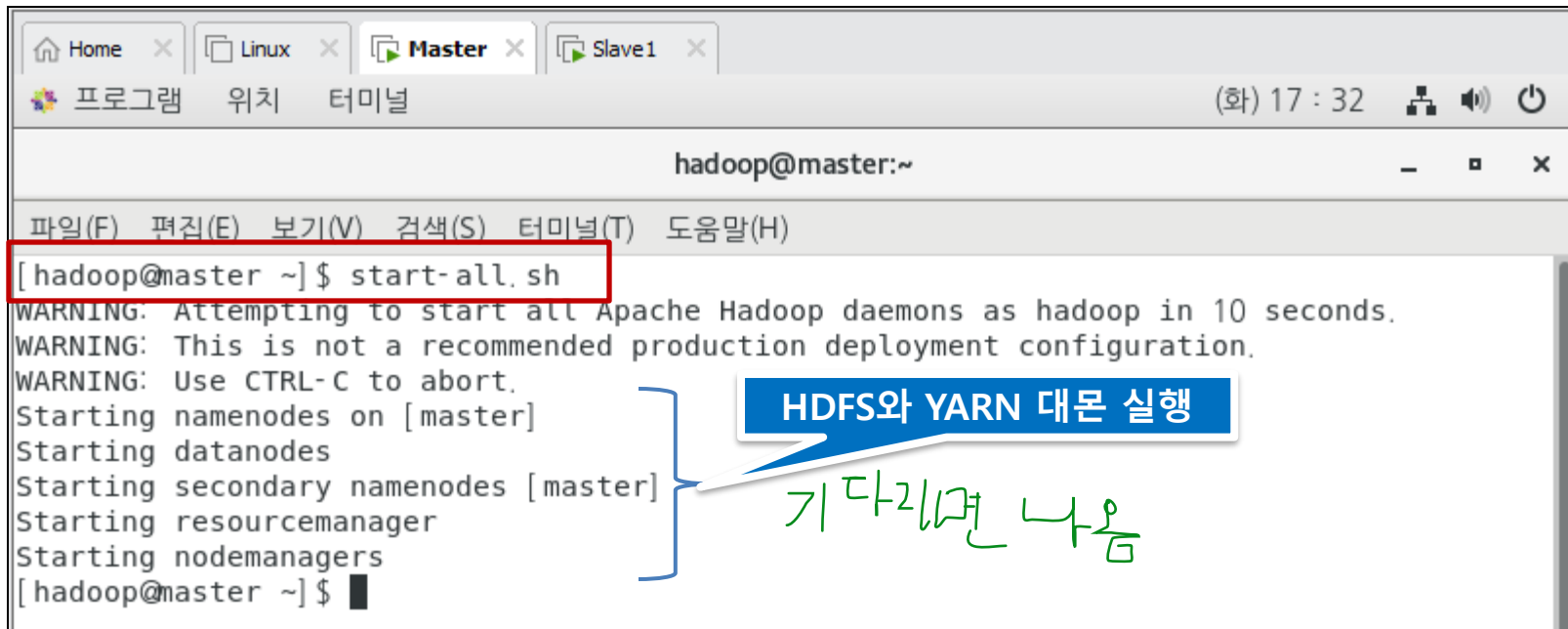
1. Hadoop 시스템 배포
2. 다시 포맷

6. Hadoop/Yarn 데몬 시작

1) Master server 재시작



2) Hadoop/Yarn ^{master 대의 프로그램} **동시 실행**(Master에서 실행)



```
hadoop@master:~  
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)  
[hadoop@master ~]$ start-all.sh  
WARNING: Attempting to start all Apache Hadoop daemons as hadoop in 10 seconds.  
WARNING: This is not a recommended production deployment configuration.  
WARNING: Use CTRL-C to abort.  
Starting namenodes on [master]  
Starting datanodes  
Starting secondary namenodes [master]  
Starting resourcemanager  
Starting nodemanagers  
[hadoop@master ~]$
```

HDFS와 YARN 대몬 실행
기다리면 나옴

2) Hadoop과 Yarn 각각 실행(Master에서 실행)

Master - VMware Workstation 16 Player (Non-commercial use only)

Player ▾ | || ▾ | 📄 | 🖥️ | 🗑️

프로그램 위치 터미널 ko (목) 15 : 52 🔊 🔌

hadoop@master:~

파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)

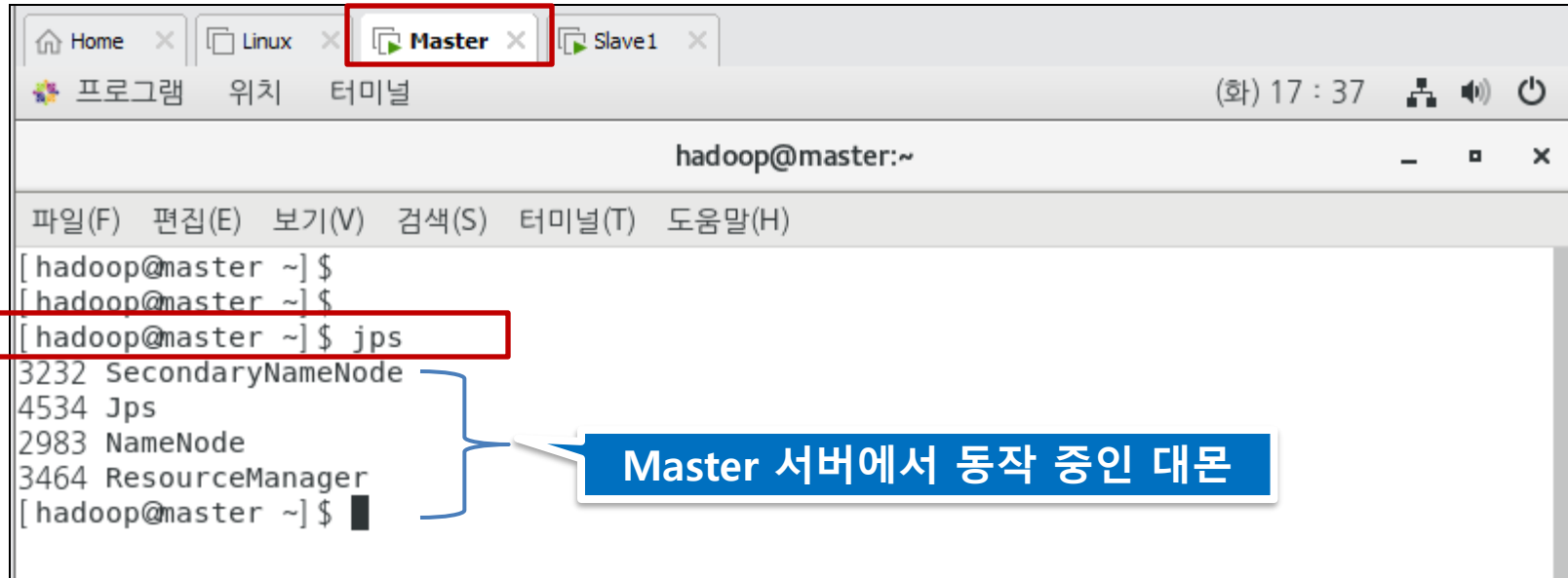
```
[hadoop@master ~]$  
[hadoop@master ~]$  
[hadoop@master ~]$ start-dfs.sh  
Starting namenodes on [master]  
master: Warning: Permanently added 'master,172.16.98.5' (ECDSA) to the list of known hosts.  
Starting datanodes  
slave1: WARNING: /home/hadoop/hadoop-3.3.6/logs does not exist. Creating.  
Starting secondary namenodes [master]  
[hadoop@master ~]$  
[hadoop@master ~]$ start-yarn.sh  
Starting resourcemanager  
Starting nodemanagers  
[hadoop@master ~]$  
[hadoop@master ~]$  
[hadoop@master ~]$
```

HDFS 대몬 실행

YARN 대몬 실행

7. Hadoop system 상태 확인

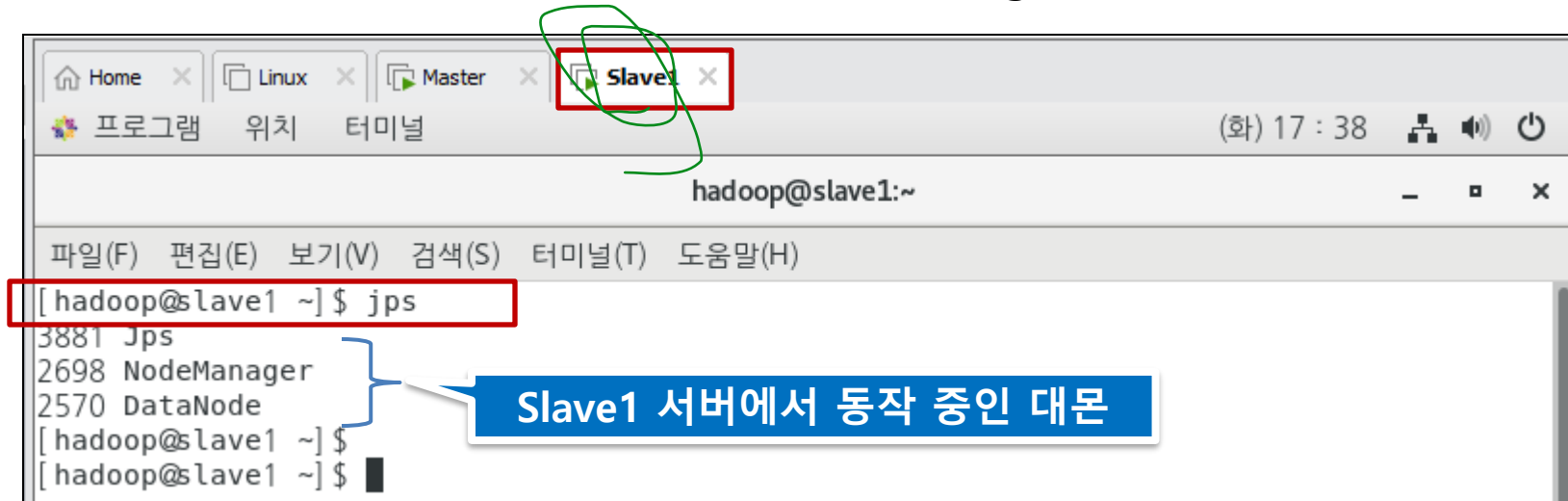
❖ Master(NameNode서버) : NameNode, ResourceManager 데몬 실행



```
hadoop@master:~  
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)  
[hadoop@master ~]$  
[hadoop@master ~]$  
[hadoop@master ~]$ jps  
3232 SecondaryNameNode  
4534 Jps  
2983 NameNode  
3464 ResourceManager  
[hadoop@master ~]$
```

Master 서버에서 동작 중인 데몬

❖ Slave(DataNode서버): DataNode, NodeManager데몬 실행



```
hadoop@slave1:~  
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)  
[hadoop@slave1 ~]$ jps  
3881 Jps  
2698 NodeManager  
2570 DataNode  
[hadoop@slave1 ~]$  
[hadoop@slave1 ~]$
```

Slave1 서버에서 동작 중인 대몬

Web에서 Hadoop 상태 확인

The screenshot shows a VMware Workstation window titled 'Master - VMware Workstation'. The 'Library' pane on the left lists 'My Computer', 'Linux', 'Master', and 'Slave1'. The 'Master' VM is selected and running. The browser window shows the Hadoop Namenode information page at <http://localhost:9870>. The page has a green header with 'Hadoop' and tabs for 'Overview', 'Datanodes', 'Datanode Volume Failures', 'Snapshot', and 'Startup Progress'. The 'Overview' tab is active, showing 'Overview 'master:9000' (✓active)'. Below this is a table with the following information:

Started:	Tue Jul 22 17:28:05 +0900 2025
Version:	3.3.6, r1be78238728da9266a4f88195058f08fd012bf9c
Compiled:	Sun Jun 18 17:22:00 +0900 2023 by ubuntu from (HEAD detached at release-3.3.6-RC1)
Cluster ID:	CID-3621a7e9-7862-4be5-aa4c-5ac05a3cfe9d

The bottom of the window shows a terminal with the prompt 'hadoop@master:~' and a taskbar with the 'Namenode information - Mozilla Fir...' window.

Master - VMware Workstation 15 Player (Non-commercial use only)

Player ▾ | || ▾ | | | |

프로그램 위치 Firefox ko (화) 18 : 12

Namenode information - Mozilla Firefox

Namenode information × +

← → ↺ 🏠 ⓘ localhost:50070/dfshealth.html#tab-overview ... ☆ 📄 🔍 ☰

Non DFS Used:	5.77 GB
DFS Remaining:	9.5
Block Pool Used:	28
DataNodes usages% (Min/Median/Max/stdDev):	0.00% / 0.00% / 0.00% / 0.00%
Live Nodes	1 (Decommissioned: 0, In Maintenance: 0)
Dead Nodes	0 (Decommissioned: 0, In Maintenance: 0)
Decommissioning Nodes	0
Entering Maintenance Nodes	0
Total Datanode Volume Failures	0 (0 B)
Number of Under-Replicated Blocks	0
Number of Blocks Pending Deletion	0
Block Deletion Start Time	Tue Dec 28 18:10:22 +0900 2021
Last Checkpoint Time	Tue Dec 28 17:50:37 +0900 2021

hadoop@slave1:~

Namenode information - Mozilla Fir...

링크 클릭

연결된 Data Node 수

● 선택된 Data Node 정보 및 사용 내용

Master - VMware Workstation 16 Player (Non-commercial use only)

Player ▾ || ▾ 🖨️ 📐 🗑️

프로그램 위치 Firefox ko (목) 15 : 46 🔊 🔌

Namenode information - Mozilla Firefox

Namenode information × +

🔍 localhost:9870/dfshealth.html#tab-datanode ... 📑 ⌂

DataNode State **All** ▾ Show **25** ▾ entries Search:

Node	Http Address	Last contact	Last Block Report	Used	Non DFS Used	Capacity	Blocks	Block pool used	Version
✓/default-rack/slave1:9866 (172.16.98.10:9866)	http://slave1:9866	3s	9m	24 KB	6 GB	16.6 GB	0	24 KB (0%)	3.3.6

Showing 1 to 1 of 1 entries

Previous **1** Next

실제 서버 주소 (Actual server address)

사용 공간 (Used space)

HDFS(하둡 저장소) 보기

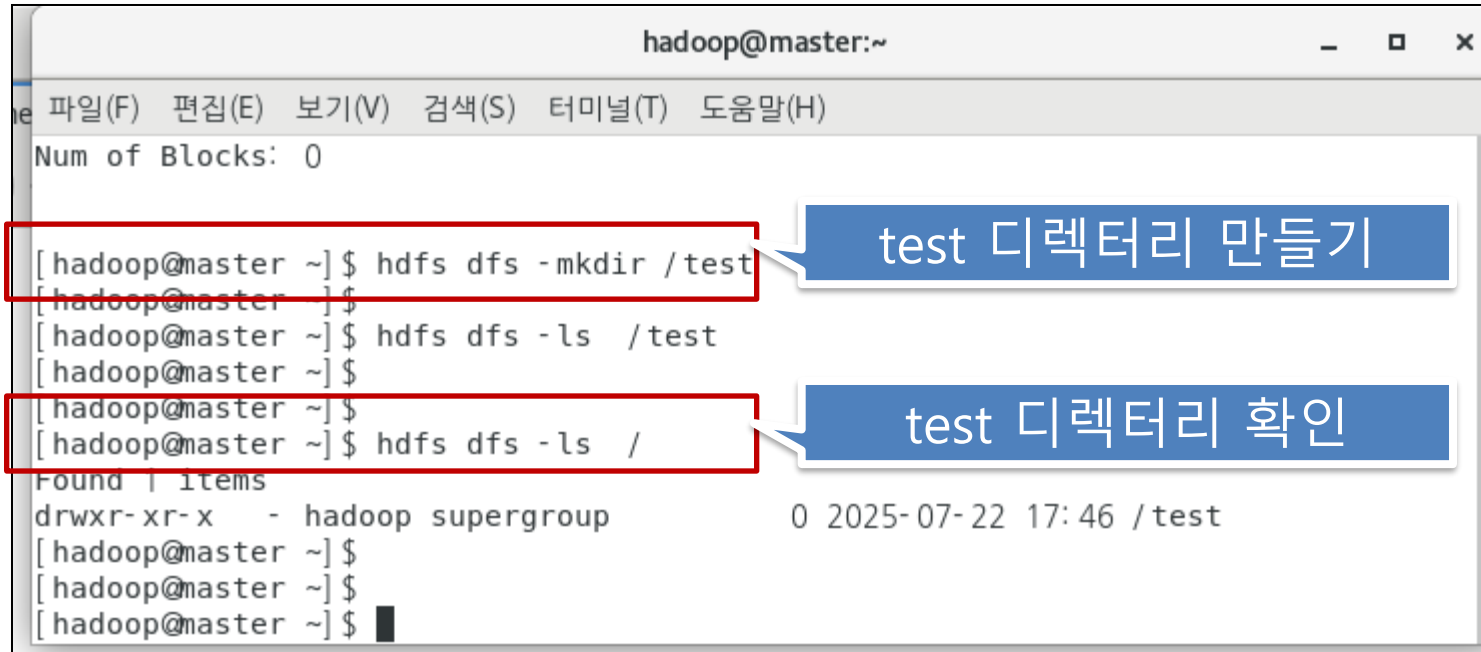
```
Master - VMware Workstation 15 Player (Non-commercial use only)
Player | [Icons] | ko (목) 13 : 59
hadoop@master:~
파일(F) 편집(E) 보기(V) 검색(S) 터미널(T) 도움말(H)

[hadoop@master ~]$ hdfs dfsadmin -report
Configured Capacity: 17828691968 (16.60 GB)
Present Capacity: 10571227136 (9.85 GB)
DFS Remaining: 10571202560 (9.85 GB)
DFS Used: 24576 (24 KB)
DFS Used% 0.00%
Under replicated blocks: 0
Blocks with corrupt replication: 0
Missing blocks: 0
Missing blocks (with replication): 0
Pending deletion blocks: 0

Live datanodes (1):
Name: 172.16.57.10:50010 (slave1)
Hostname: slave1
Decommission Status : Normal
Configured Capacity: 17828691968 (16.60 GB)
DFS Used: 24576 (24 KB)
Non DFS Used: 6328217600 (5.89 GB)
DFS Remaining: 10571202560 (9.85 GB)
DFS Used% 0.00%
DFS Remaining% 59.29%
```

DataNode에 실제 데이터를 블록 단위로 저장
(NameNode는 메타데이터만 관리한다.)

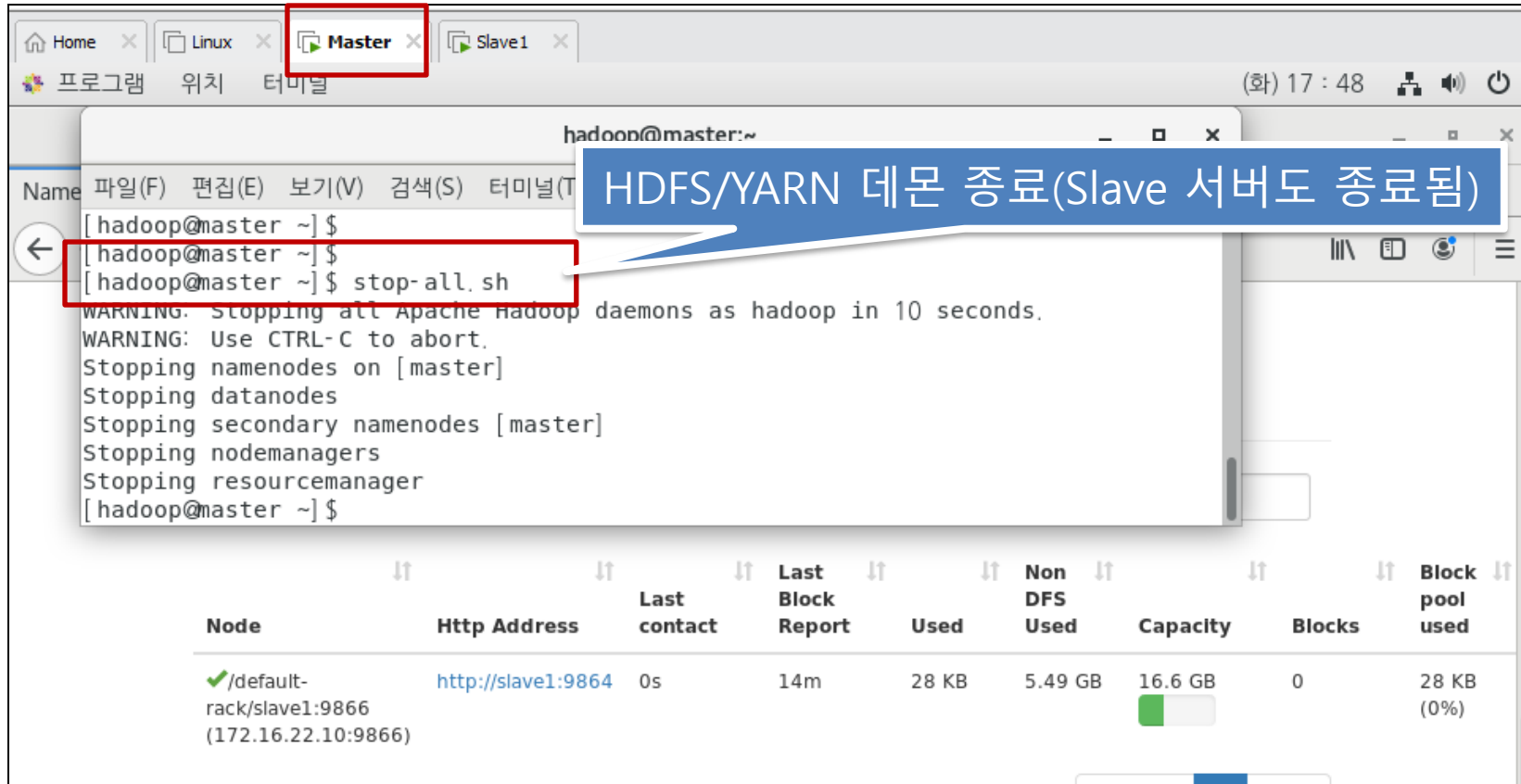
[실습] HDFS에 디렉터리 생성 & 확인



The screenshot shows a terminal window titled 'hadoop@master:~'. The window has a menu bar with '파일(F)', '편집(E)', '보기(V)', '검색(S)', '터미널(T)', and '도움말(H)'. The terminal content includes the command 'hdfs dfs -mkdir /test' and 'hdfs dfs -ls /'. Two blue callout boxes with white text point to these commands: 'test 디렉터리 만들기' points to the 'mkdir' command, and 'test 디렉터리 확인' points to the 'ls' command. The output of the 'ls' command shows the directory '/test' with permissions 'drwxr-xr-x', owner 'hadoop', group 'supergroup', size '0', and timestamp '2025-07-22 17:46'.

```
hadoop@master:~  
Num of Blocks: 0  
[hadoop@master ~]$ hdfs dfs -mkdir /test  
[hadoop@master ~]$  
[hadoop@master ~]$ hdfs dfs -ls /test  
[hadoop@master ~]$  
[hadoop@master ~]$  
[hadoop@master ~]$ hdfs dfs -ls /  
Found 1 items  
drwxr-xr-x - hadoop supergroup          0 2025-07-22 17:46 /test  
[hadoop@master ~]$  
[hadoop@master ~]$  
[hadoop@master ~]$
```

8. Hadoop/Yarn 데몬 종료



The screenshot shows a terminal window with the command `stop-all.sh` being executed. A blue callout bubble contains the text "HDFS/YARN 데몬 종료(Slave 서버도 종료됨)". Below the terminal, a table displays the status of the slave node.

Node	Http Address	Last contact	Last Block Report	Used	Non DFS Used	Capacity	Blocks	Block pool used
✓/default-rack/slave1:9866 (172.16.22.10:9866)	http://slave1:9864	0s	14m	28 KB	5.49 GB	16.6 GB	0	28 KB (0%)