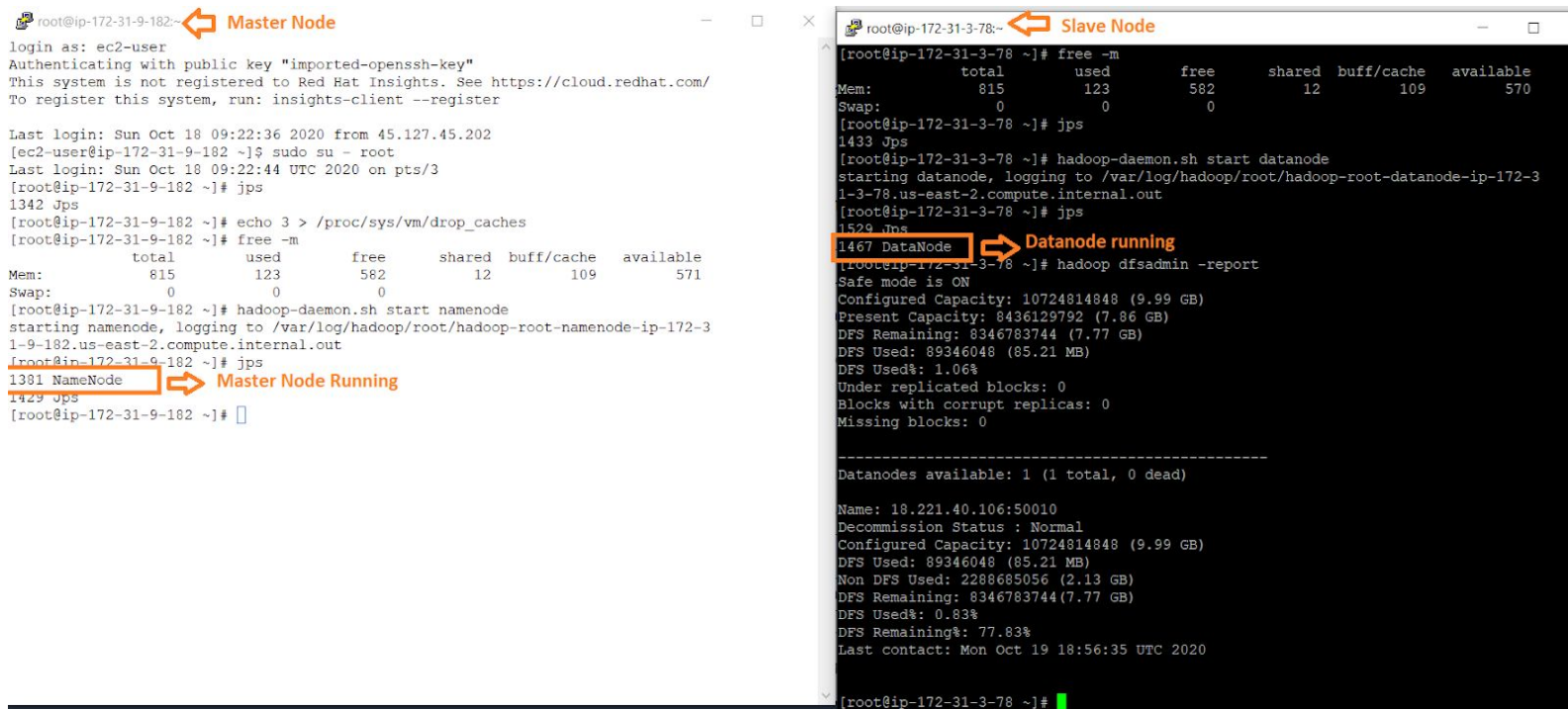


Task 4.1

◆ Question- In a Hadoop cluster, find how to contribute limited/specific amount of storage as slave to the cluster?

◆ Answer- Create a partition in the hard disk of desired size and mount it to the directory shared to master node.



The image shows two terminal windows side-by-side. The left window is titled 'Master Node' and the right is 'Slave Node'. Both show the execution of Hadoop commands to start the NameNode and DataNode respectively, along with system status checks like 'free -m' and 'jps'.

```
root@ip-172-31-9-182:~# login as: ec2-user
root@ip-172-31-9-182:~# Authenticating with public key "imported-openssh-key"
root@ip-172-31-9-182:~# This system is not registered to Red Hat Insights. See https://cloud.redhat.com/
root@ip-172-31-9-182:~# To register this system, run: insights-client --register

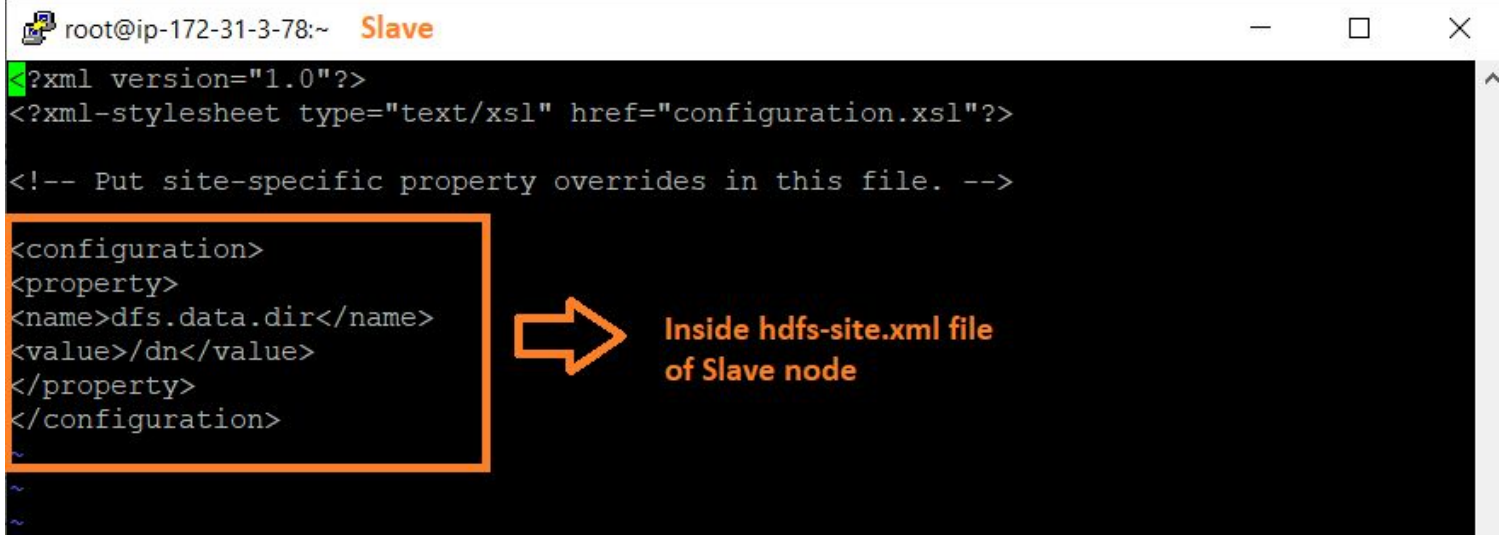
Last login: Sun Oct 18 09:22:36 2020 from 45.127.45.202
[ec2-user@ip-172-31-9-182 ~]$ sudo su - root
Last login: Sun Oct 18 09:22:44 UTC 2020 on pts/3
[root@ip-172-31-9-182 ~]# jps
1342 Jps
[root@ip-172-31-9-182 ~]# echo 3 > /proc/sys/vm/drop_caches
[root@ip-172-31-9-182 ~]# free -m
Mem:              total        used        free      shared  buff/cache   available
Swap:              0             0             0
[root@ip-172-31-9-182 ~]# hadoop-daemon.sh start namenode
starting namenode, logging to /var/log/hadoop/root/hadoop-root-namenode-ip-172-3
1-9-182.us-east-2.compute.internal.out
[root@ip-172-31-9-182 ~]# jps
1381 NameNode
1429 Jps
[root@ip-172-31-9-182 ~]#
```

```
root@ip-172-31-3-78:~# free -m
Mem:              total        used        free      shared  buff/cache   available
Swap:              0             0             0
[root@ip-172-31-3-78 ~]# jps
1433 Jps
[root@ip-172-31-3-78 ~]# hadoop-daemon.sh start datanode
starting datanode, logging to /var/log/hadoop/root/hadoop-root-datanode-ip-172-3
1-3-78.us-east-2.compute.internal.out
[root@ip-172-31-3-78 ~]# jps
1529 Jps
1467 DataNode
[root@ip-172-31-3-78 ~]# hadoop dfsadmin -report
Safe mode is ON
Configured Capacity: 10724814848 (9.99 GB)
Present Capacity: 8436129792 (7.86 GB)
DFS Remaining: 8346783744 (7.77 GB)
DFS Used: 89346048 (85.21 MB)
DFS Used%: 1.06%
Under replicated blocks: 0
Blocks with corrupt replicas: 0
Missing blocks: 0

-----
Datanodes available: 1 (1 total, 0 dead)

Name: 18.221.40.106:50010
Decommission Status : Normal
Configured Capacity: 10724814848 (9.99 GB)
DFS Used: 89346048 (85.21 MB)
Non DFS Used: 2288685056 (2.13 GB)
DFS Remaining: 8346783744 (7.77 GB)
DFS Used%: 0.83%
DFS Remaining%: 77.83%
Last contact: Mon Oct 19 18:56:35 UTC 2020

[root@ip-172-31-3-78 ~]#
```



The image shows a terminal window titled 'Slave' displaying the contents of the `hdfs-site.xml` file. A specific configuration block is highlighted with an orange box and an arrow pointing to it.

```
root@ip-172-31-3-78:~# cat /etc/hadoop/conf/hdfs-site.xml
<?xml version="1.0"?>
<?xml-stylesheet type="text/xsl" href="configuration.xsl"?>

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

<configuration>
<property>
<name>dfs.data.dir</name>
<value>/dn</value>
</property>
</configuration>

~
~
```

Inside hdfs-site.xml file of Slave node

```
root@ip-172-31-9-182:~ Master
[root@ip-172-31-9-182 ~]# hadoop dfsadmin -report
Configured Capacity: 10724814848 (9.99 GB)
Present Capacity: 8436260857 (7.86 GB)
DFS Remaining: 8346914816 (7.77 GB)
DFS Used: 89346041 (85.21 MB)
DFS Used%: 1.06%
Under replicated blocks: 3
Blocks with corrupt replicas: 0
Missing blocks: 0
```

Datanodes available: 1 (1 total, 0 dead)

```
Name: 18.221.40.106:50010 Slave IP
Decommission Status : Normal
Configured Capacity: 10724814848 (9.99 GB)
DFS Used: 89346041 (85.21 MB)
Non DFS Used: 2288553991 (2.13 GB)
DFS Remaining: 8346914816 (7.77 GB)
DFS Used%: 0.83%
DFS Remaining%: 77.83%
Last contact: Mon Oct 19 18:59:50 UTC 2020
```

```
[root@ip-172-31-9-182 ~]#
```

Single Root device
(Root Hard disk)
attached to slave node.

```
root@ip-172-31-3-78:~ Slave
[root@ip-172-31-3-78 ~]# fdisk -l
Disk /dev/xvda: 10 GiB, 10737418240 bytes, 209715200 sectors
Units: sectors of 1 * 512 = 512 bytes
Sector size (logical/physical): 512 bytes / 512 bytes
I/O size (minimum/optimal): 512 bytes / 512 bytes
Disklabel type: dos
Disk identifier: 0xd00a186f

Device      Boot  Start        End  Sectors  Size Id Type
/dev/xvda1   2048        4095     2048      1M 83 Linux
/dev/xvda2 * 4096 20971486 20967391    10G 83 Linux
[root@ip-172-31-3-78 ~]#
```

Currently slave node is contributing 9.99GB (nearly 10GB) to master node by sharing /dn directory getting all its space from slash drive(/) of 10 GB.

Create Volume

Volume Type General Purpose SSD (gp2)

Size (GiB) 10 (Min: 1 GiB, Max: 16384 GiB)

IOPS 100 / 3000 (Baseline of 3 IOPS per GiB with a minimum of 100 IOPS, burstable to 3000 IOPS)

Throughput (MB/s) Not applicable

Availability Zone* us-east-2a

Snapshot ID Select a snapshot

Encryption ☐ Encrypt this volume

Creating an EBS Volume
10 GB size in same AZ
as of slave node.

Key (128 characters maximum) Value (256 characters maximum)

Name ebs

Add Tag 49 remaining (Up to 50 tags maximum)

Volumes > Create Volume

Create Volume

✓ Volume created successfully

Volume ID vol-036c806ffc3fdf1c7

Close

aws Services ▾

New EC2 Experience
Tell us what you think X

EC2 Dashboard **New**

Events **New**

Tags

Limits

▼ Instances

Instances **New**

Instance Types

Launch Templates

Cost Explorer

Create Volume Actions ^

Filter by tags and

	Name	Volume Type	IOPS	Snapshot
<input type="checkbox"/>	Master	gp2	100	snap-0f9f5a3a...
<input type="checkbox"/>		gp2	100	snap-0f9f5a3a...
<input type="checkbox"/>		gp2	100	snap-0f9f5a3a...
<input checked="" type="checkbox"/>	ebs	gp2	100	

Attaching the EBS volume just created to the slave node.

New EC2 Experience
Tell us what you think X

EC2 Dashboard **New**

Events **New**

Tags

Limits

▼ Instances

Instances **New**

Instance Types

Launch Templates

Spot Requests

Savings Plans

Reserved Instances

Dedicated Hosts **New**

Capacity Reservations

▼ Images

AMIs

▼ Elastic Block Store

Volumes

Snapshots

subnets: subnet-9bc415f0

AWS Compute Optimizer
Opt-in to AWS Compute Optimizer for recommendations. [Learn more](#)

Details Security Networking **Storage** Monitoring Tags

▼ Root device details

Root device name	Root device type	EBS optimization
/dev/sda1	EBS	disabled

Block devices (2)

Filter block devices


Volume ID	Device name	Volume size (GiB)	Attachment status	Attachment time	Encrypted	KMS key ID
vol-07378b61595ca5087	/dev/sda1	10	✓ Attached	Sun Oct 18 2020 11:21:20 ...	No	-
vol-036c806ffc3fdf1c7	/dev/sdf	10	✓ Attached	Tue Oct 20 2020 00:38:26 ...	No	-

Attached the EBS volume to slave

```
root@ip-172-31-3-78:~  
[root@ip-172-31-3-78 ~]# fdisk -l  
Disk /dev/xvda: 10 GiB, 10737418240 bytes, 20971520 sectors  
Units: sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disklabel type: dos  
Disk identifier: 0xd00a186f  
  
Device      Boot Start      End  Sectors  Size Id Type  
/dev/xvda1   2048      4095      2048    1M 83 Linux  
/dev/xvda2 * 4096 20971486 20967391   10G 83 Linux  
  
Now we can see the volume as an available block device.  
Disk /dev/xvdf: 10GiB, 8589934592 bytes, 16777216 sectors  
Units: sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
[root@ip-172-31-3-78 ~]#
```

```
root@ip-172-31-3-78:~  
Disklabel type: dos  
Disk identifier: 0xd00a186f  
  
Device      Boot Start      End  Sectors  Size Id Type  
/dev/xvda1   2048      4095      2048    1M 83 Linux  
/dev/xvda2 * 4096 20971486 20967391   10G 83 Linux  
  
Disk /dev/xvdf: 10 GiB, 8589934592 bytes, 16777216 sectors  
Units: sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
[root@ip-172-31-3-78 ~]# fdisk /dev/xvdf  
  
Welcome to fdisk (util-linux 2.32.1).  
Changes will remain in memory only, until you decide to write them.  
Be careful before using the write command.  
  
Device does not contain a recognized partition table.  
Created a new DOS disklabel with disk identifier 0xd6cf086f.  
  
Command (m for help): n  
Partition type  
  p   primary (0 primary, 0 extended, 4 free)  
  e   extended (container for logical partitions)  
Select (default p): p  
Partition number (1-4, default 1):  
First sector (2048-16777215, default 2048):  
Last sector, +sectors or +size{K,M,G,T,P} (2048-16777215, default 16777215): +8G  
  
Created a new partition 1 of type 'Linux' and of size 8 GiB.  
  
Command (m for help): w  
The partition table has been altered.  
Calling ioctl() to re-read partition table.  
Syncing disks.  
[root@ip-172-31-3-78 ~]#
```

Created partition in the new storage device attached to slave(EBS volume) of size 8 GB




```
root@ip-172-31-3-78:~  
Partition type  
  p   primary (0 primary, 0 extended, 4 free)  
  e   extended (container for logical partitions)  
Select (default p): p  
Partition number (1-4, default 1):  
First sector (2048-16777215, default 2048):  
Last sector, +sectors or +size{K,M,G,T,P} (2048-16777215, default 16777215):  
  
Created a new partition 1 of type 'Linux' and of size 8 GiB.  
  
Command (m for help): w  
The partition table has been altered.  
Calling ioctl() to re-read partition table.  
Syncing disks.  
  
[root@ip-172-31-3-78 ~]# fdisk -l  
Disk /dev/xvda: 10 GiB, 10737418240 bytes, 20971520 sectors  
Units: sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disklabel type: dos  
Disk identifier: 0xd00a186f  
  
Device      Boot Start      End  Sectors  Size Id Type  
/dev/xvda1             2048    4095      2048    1M 83 Linux  
/dev/xvda2 *           4096 20971486 20967391   10G 83 Linux  
  
Disk /dev/xvdf: 10 GiB, 8589934592 bytes, 16777216 sectors  
Units: sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disklabel type: dos  
Disk identifier: 0xd6cf086f  
  
Device      Boot Start      End  Sectors  Size Id Type  
/dev/xvdf1             2048 16777215 16775168    8G 83 Linux  
[root@ip-172-31-3-78 ~]#
```

We can see
partition created in the
new block device.
Size - 8GB

```
root@ip-172-31-3-78:~  
[root@ip-172-31-3-78 ~]# fdisk -l  
Disk /dev/xvda: 10 GiB, 10737418240 bytes, 20971520 sectors  
Units: sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disklabel type: dos  
Disk identifier: 0xd00a186f  
  
Device      Boot Start      End  Sectors  Size Id Type  
/dev/xvda1          2048      4095      2048    1M 83 Linux  
/dev/xvda2 *        4096 20971486 20967391   10G 83 Linux  
  
Disk /dev/xvdf: 8 GiB, 8589934592 bytes, 16777216 sectors  
Units: sectors of 1 * 512 = 512 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disklabel type: dos  
Disk identifier: 0xd6cf086f  
  
Device      Boot Start      End  Sectors  Size Id Type  
/dev/xvdf1          2048 16777215 16775168    8G 83 Linux  
[root@ip-172-31-3-78 ~]# mkfs.ext4 /dev/xvdf1  
mke2fs 1.45.4 (23-Sep-2019)  
Creating filesystem with 2096896 4k blocks and 524288 inodes  
Filesystem UUID: 0126a9f9-1bfa-44a3-a965-412e164fc98a  
Superblock backups stored on blocks:  
        32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632  
  
Allocating group tables: done  
Writing inode tables: done  
Creating journal (16384 blocks): done  
Writing superblocks and filesystem accounting information: done  
  
[root@ip-172-31-3-78 ~]#
```

Formatted the partition

```
root@ip-172-31-3-78:~  
[root@ip-172-31-3-78 ~]# df -h  
Filesystem      Size  Used Avail Use% Mounted on  
devtmpfs        386M    0  386M   0% /dev  
tmpfs           408M    0  408M   0% /dev/shm  
tmpfs           408M   11M  398M   3% /run  
tmpfs           408M    0  408M   0% /sys/fs/cgroup  
/dev/xvda2       10G   2.3G   7.8G  23% /  
tmpfs           82M    0   82M   0% /run/user/1000  
/dev/xvdf1       7.9G   36M   7.4G   1% /dn  
[root@ip-172-31-3-78 ~]# lsblk  
NAME        MAJ:MIN RM  SIZE RO TYPE MOUNTPOINT  
xvda        202:0    0  10G  0 disk  
├─xvda1     202:1    0    1M  0 part  
└─xvda2     202:2    0  10G  0 part /  
xvdf        202:80    0  10G  0 disk  
└─xvdf1     202:81    0    8G  0 part /dn  
[root@ip-172-31-3-78 ~]#
```

New partition linked to directory /dn

root@ip-172-31-9-182:~

Datanodes available: 1 (1 total, 0 dead)

Name: 18.221.40.106:50010 ➡ Slave IP

Decommission Status : Normal

Configured Capacity: 10724814848 (9.99 GB) ➡

Initially slave shared 9.99 GB to master as /dn was in slash drive(10 GB)

DFS Used: 89346041 (85.21 MB)

Non DFS Used: 2288553991 (2.13 GB)

DFS Remaining: 8346914816 (7.77 GB)

DFS Used%: 0.83%

DFS Remaining%: 77.83%

Last contact: Mon Oct 19 18:59:50 UTC 2020

[root@ip-172-31-9-182 ~]# hadoop dfsadmin -report

Configured Capacity: 8386961408 (7.81 GB)

Present Capacity: 7992348672 (7.44 GB)

DFS Remaining: 7903006720 (7.36 GB)

DFS Used: 89341952 (85.2 MB)

DFS Used%: 1.12%

Under replicated blocks: 3

Blocks with corrupt replicas: 0

Missing blocks: 0

Datanodes available: 1 (1 total, 0 dead)

Name: 18.221.40.106:50010 ➡ Slave IP

Decommission Status : Normal

Configured Capacity: 8386961408 (7.81 GB) ➡

Now the /dn directory is linked to partition of size 8GB. Hence sharing its total space(nearly 8 GB) to master.

DFS Used: 89341952 (85.2 MB)

Non DFS Used: 394612736 (376.33 MB)

DFS Remaining: 7903006720 (7.36 GB)

DFS Used%: 1.07%

DFS Remaining%: 94.23%

Last contact: Mon Oct 19 19:23:39 UTC 2020

[root@ip-172-31-9-182 ~]#