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Home Hadoop Cluster

Linux and Cloudera Install

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Introduction

I wanted to set up a home Hadoop cluster for educational and demonstration purposes. Alex Breshears and Matt Harris provided some excellent guidance as they had already done this. I took the time to document this as I occasionally get requests from people who want to do this themselves.

I'm assuming that you have procured four or more bare metal servers and that you want to first install Linux and second install Cloudera. I have created a companion document which discusses server selection.

I'm also assuming that you have a working knowledge of Linux such that extra guidance with the install and configuration are helpful to you.

Installing Linux

Install Centos 6.5

It is likely that you will need to do a bare metal install where you need to set the BIOS on the servers to boot from either a USB or from a DVD drive.

How to make a bootable Centos 6.5 USB drive using a Mac

1. Download the minimal Centos 6.5 ISO or use wget curl

2. Format 8GB or larger USB as exFAT using Mac Disk Utility Erase tab. Disk needs to be empty.

3. In the MAC terminal window with the USB drive inserted:
Unmount the Disk, otherwise it is busy
sudo diskutil unmountDisk /dev/disk2
mount command will tell you the /dev information for the USB
Mine was /dev/disk2s1 - leave off the s1

4. use the DD command to do a raw write of the ISO image to the USB

sudo dd if=/Users/bbaillod/Desktop/CentOS-6.5-x86_64-bin-DVD1.isoof=/dev/disk2 bs=1m

I used the Full Centos image which gives you the choice of all the minimal versions to install as well as full desktop. Was 4.7GB, took 80 minutes to write to the USB.

It would have been faster to use the Minimal install.

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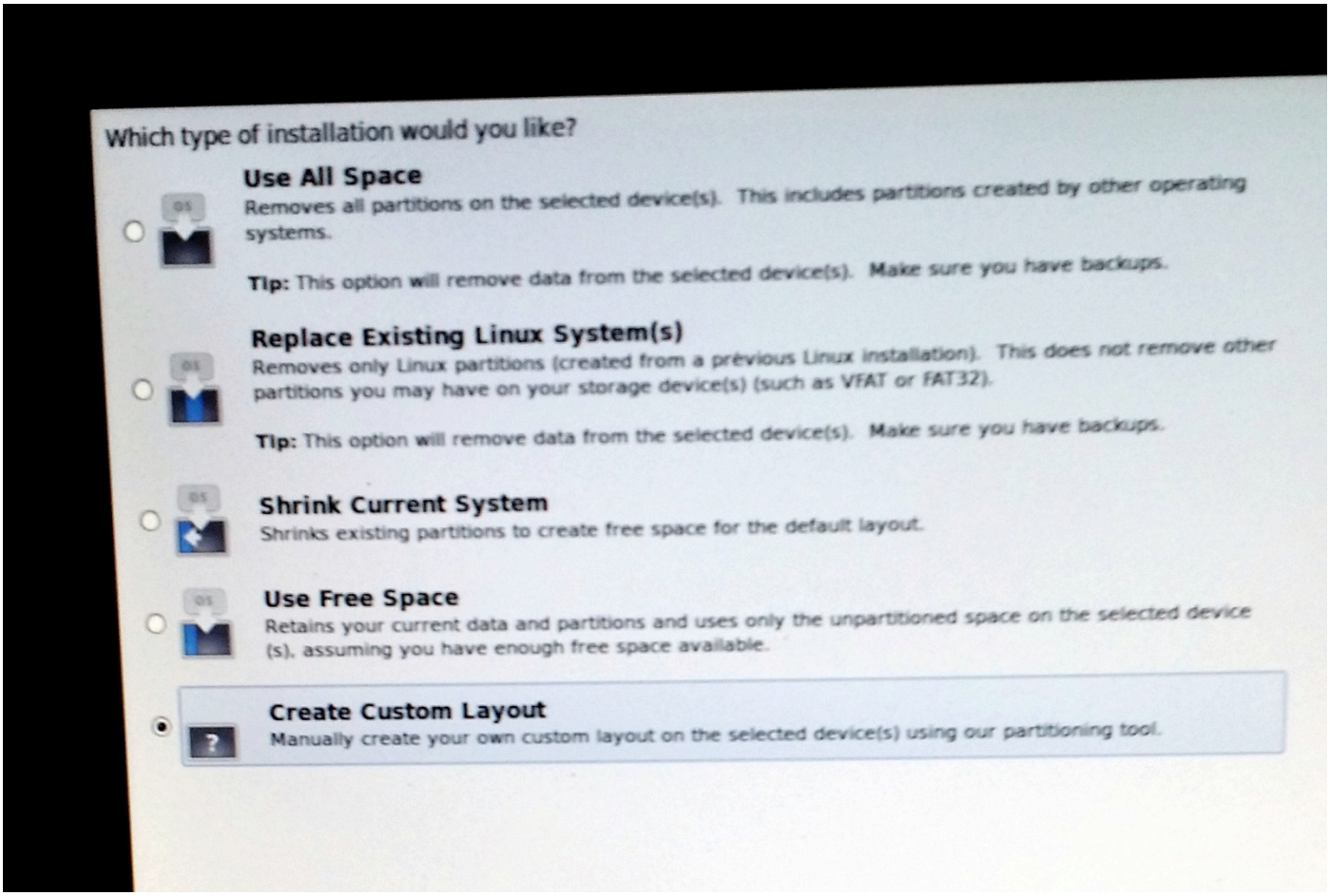
CENTOS Install Screenshots



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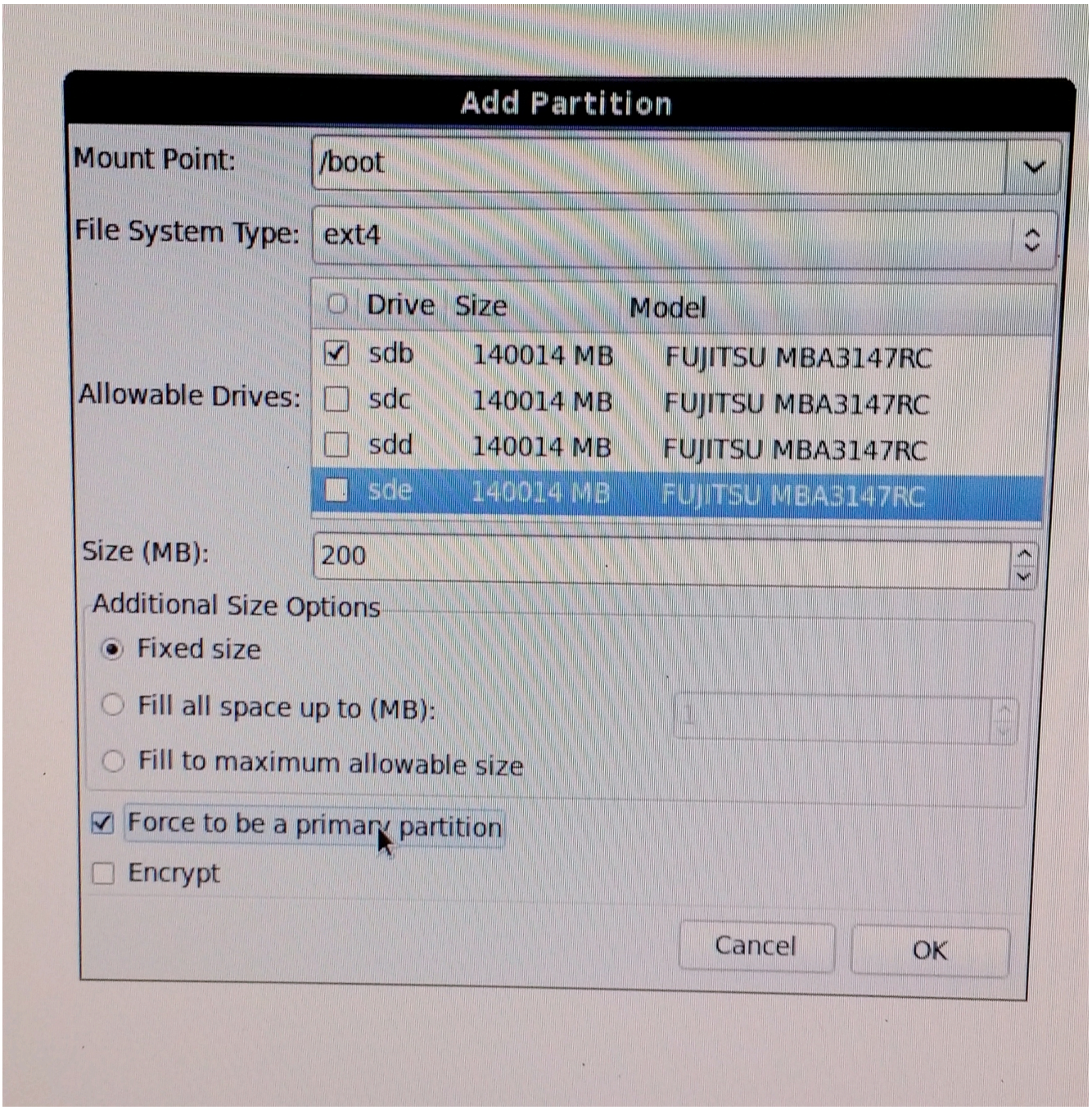
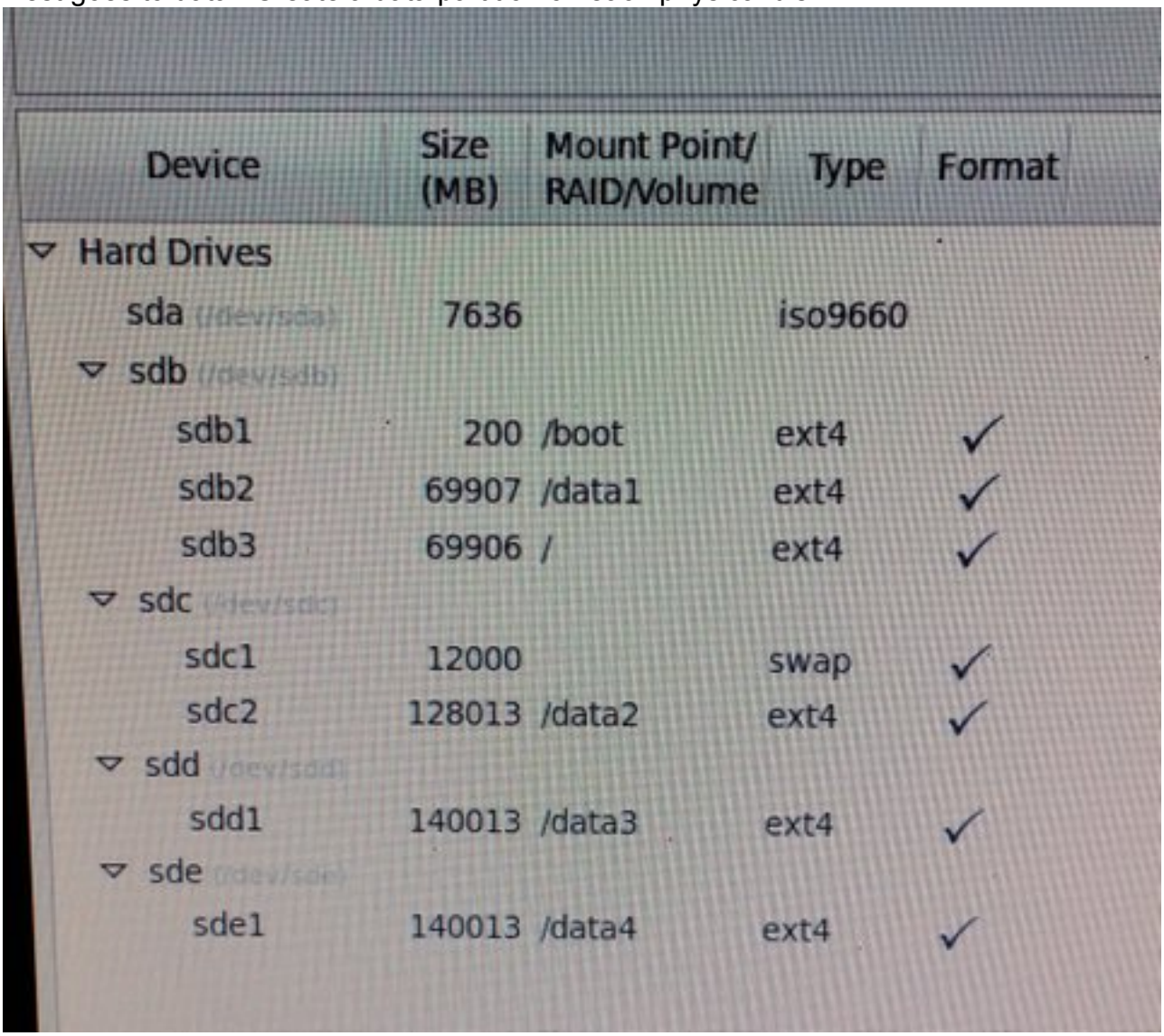


Mount data disks as JBODs. no striping, LVM, or RAID necessary with HDFS. In fact, this slows down HDFS workloads. Use the EXT4 filesystem.

You need a “noatime” parameter on your data partitions in /etc/fstab

- Make sure the mounts you’re using for DFS and MapReduce storage have been mounted with the noatime option. This disables access time tracking and can improve IO performance.

Partition Size overview
Root needs 70GB if VAR is a part of it
VAR needs 30GB (20GB shown in screenshot was too small) – can be under root or separate
Swap needs 2 to 12GB
Rest goes to data. Create a data partition on each physical disk.



Device	Size (MB)	Mount Point/ RAID/Volume	Type	Format
Hard Drives				
sda (/dev/sda)	7636		iso9660	
sdb (/dev/sdb)				
sdb1	200	/boot	ext4	✓
sdb2	69907	/data1	ext4	✓
sdb3	69906	/	ext4	✓
sdc (/dev/sdc)				
sdc1	12000		swap	✓
sdc2	128013	/data2	ext4	✓
sdd (/dev/sdd)				
sdd1	140013	/data3	ext4	✓
sde (/dev/sde)				
sde1	140013	/data4	ext4	✓

/etc/fstab example (Edit file and add noatime parameter as shown on HDFS data mounts. /data1, /data2, etc.)

```
UUID=9368806b-2eb9-413a-a375-0d1d58af4c08      /              ext4    defaults        1 1
UUID=9c759cbc-aaf4-400a-943e-17a5ec738310      /boot          ext4    defaults        1 2
UUID=4bccb632-c757-44c1-8866-a06d3114291f      /data1         ext4    defaults,noatime  1 2
UUID=4bccb632-c757-44c1-8866-a06d3114291f      /data2         ext4    defaults,noatime  1 2
UUID=4bccb632-c757-44c1-8866-a06d3114291f      /data3         ext4    defaults,noatime  1 2
UUID=3df86535-93be-401c-9829-23b9e698416b      swap           swap    defaults,       0 0
```

1. Network Configuration

The four primary network configuration files are as follows:

/etc/hosts The main purpose of this file is to resolve hostnames that cannot be resolved any other way. It can also be used to resolve hostnames on small networks with no DNS server.

/etc/resolv.conf This file specifies the IP addresses of DNS servers and the search domain

/etc/sysconfig/network This file specifies routing and host information for all network interfaces.

/etc/sysconfig/network-scripts/ifcfg-*<interface-name>* For each network interface, there is a corresponding interface configuration script. Each of these files provide information specific to a particular network interface.

a. Edit /etc/hosts

Make sure /etc/hosts does NOT have a hostname tied to the localhosts line. Some versions of Linux will do this incorrectly and this will create issue for Java applications.

For example, there should not be a line:
127.0.0.1 localhost localhost.localdomain myHostName
Instead it should be like this: 10.0.0.1 myhost.domainname.com myhost

Example /etc/hosts

```
127.0.0.1     localhost
10.0.1.100    musky.datalake.net    musky
10.0.1.101    pike.datalake.net     pike
10.0.1.102    bass.datalake.net     bass
10.0.1.103    perch.datalake.net    perch
```

b. Edit /etc/sysconfig/network-scripts/ifcfg-eth0:

Example: provide your IP, FQDN, DNS, MAC, NETMASK etc.

```
DEVICE="eth0"
HWADDR="00:1C:23:E1:9E:88"
TYPE="Ethernet"
UUID="c6418dc0-bf8d-448b-aa16-c040bb9c5aef"
```

```
BOOTPROTO=static
IPV6INIT=yes
MTU=1500
NETMASK=255.255.255.0
NM_CONTROLLED=yes
ONBOOT="yes"
DNS1=8.8.8.8
GATEWAY=10.0.1.1
IPADDR=10.0.1.100
HOSTNAME=musky.datalake.net
```

c. Edit or create /etc/resolv.conf to assign the DNS nameserver
Example:
Google DNS
nameserver 8.8.8.8

d. Edit /etc/sysconfig/network
Example contents:
NETWORKING=yes
HOSTNAME=walleye.datalake.net
GATEWAY=10.0.1.1

2. Preinstall Linux settings you can change on all machines in parallel using csshx

Use the Mac csshX utility on an IP range as shown to open multiple parallel SSH windows
csshx --login root 10.0.1.[100-103]

a. Add the EPEL RM repository which contains some packages you will need
curl -O http://mirror.steadfast.net/epel/6/x86_64/epel-release-6-8.noarch.rpm
rpm -i epel-release-6-8.noarch.rpm

b. Add some missing packages that the minimal Centos install does not include.
yum install ntp
yum install bind-utils # contains dig
yum install openssh-clients #scp and sftp
yum install python
yum install curl
yum install wget
yum install java-devel
yum install git

c. Turn off swappiness

echo "vm.swappiness=0" >> /etc/sysctl.conf

d. Configure NTP

ntpdate 0.us.pool.ntp.org
chkconfig ntpd on
edit /etc/ntp.conf so NTP survives VM sleeps without freaking out:
add the line "tinker panic 0" at the top
comment out "server 127.127.1.0" and "fudge 127.127.1.0 stratum 10"
service ntpd start

e. Disable unnecessary IP services

chkconfig iptables off
chkconfig ip6tables off

f. Miscellaneous Settings

If using DNS, make sure forward and reverse resolution are consistent and only return one value each with hostname -f
Transparent hugepage bug workaround:

```
sudo echo never> /sys/kernel/mm/redhat_transparent_hugepage/defrag
```

Disable SELinux
edit /etc/sysconfig/selinux and change the SELINUX= line to this: SELINUX=disabled

3. Copy Cloudera Manager BIN file to your namenode server

Download cloudera-manager-installer.bin from `Cloudera Downloads` to the host where you want to install the Cloudera Manager Server. The host must be on your cluster or accessible to your cluster over your network. Install Cloudera Manager on a single host.
Upload from your computer: $ scp cloudera-manager-installer.bin root@musky:~
Get directly from the Cloudera Archive: `wget http://archive.cloudera.com/cm5/installer/latest/cloudera-manager-installer.bin`

Change cloudera-manager-installer.bin to have executable permission.

```
$ chmod u+x cloudera-manager-installer.bin
```

Run cloudera-manager-installer.bin. You may need to first reboot the servers to pick up some of the config changes from above such as SELINUX=disabled

```
$ sudo ./cloudera-manager-installer.bin
```

Uninstall: Uninstall Cloudera Manager by running: /usr/share/cmf/uninstall-cloudera-manager.sh

4. Follow Install Path A for CDH5

http://www.cloudera.com/content/cloudera-content/cloudera-docs/CM5/latest/Cloudera-Manager-Installation-Guide/cm5ig_install_path_A.html?scroll=cmig_topic_6_5'

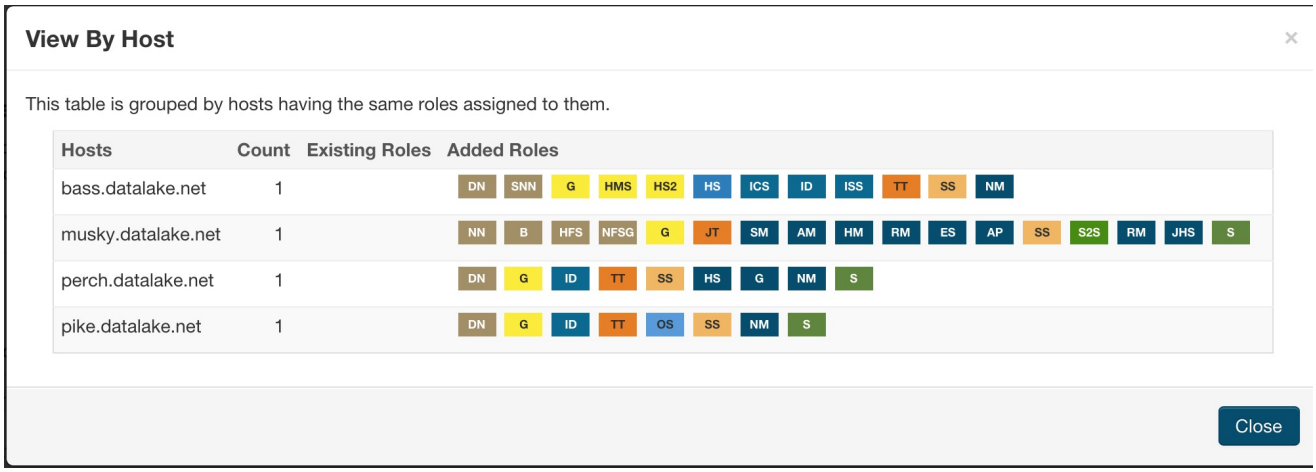
Sample Cluster Configuration:

Master Node: Musky: Namenode

Data Node 1: Bass: Secondary Namenode

Data Node 2: Perch:

Data Node 3: Pike:



7. Troubleshooting:

Look at the last entries in the install log
Cd/var/log/Cloudera/….

If you have Oracle JDK issues
Yum search jdk
Look in /etc/yum/repos.d
Java –version -- shows the java version
Rpm –i jdk -- will reinstall the JDK manually

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Pscp will move files to all nodes at once -- parallel scp

Parallel ssh – csshx for max pssh for linux `csshx --login root 10.0.1.[100-103]`

Yum clean all – resets the yum repository

Failed to receive heartbeat from agent – networking problem most likely.

Note; If upgrading, all namenode metadata directories must be deleted first.
/data1/dfs/nn /data2/dfs/nn etc.