Hadoop 集群环境搭建配置

1、hadoop是什么?

Hadoop是一个开源的框架，可编写和运行分布式应用，处理大规模数据，是**专为离线和大规模数据分析而设计**的，并**不适合**那种对几个记录随机读写的**在线事务处理**模式。Hadoop=HDFS（文件系统，数据存储技术相关）+ MapReduce（数据处理），Hadoop的数据来源可以是任何形式，在处理半结构化和非结构化数据上与关系型数据库相比有更好的性能，具有更灵活的处理能力，不管任何数据形式最终会转化为key/value，key/value是基本数据单元。用函数式编程Mapreduce代替SQL，SQL是查询语句，而Mapreduce则是使用脚本和代码，而对于适用于关系型数据库，习惯SQL的Hadoop有开源工具hive代替。

2、hadoop能做什么?

hadoop擅长日志分析，facebook就用Hive来进行日志分析，2009年时facebook就有非编程人员的30%的人使用HiveQL进行数据分析；淘宝搜索中的自定义筛选也使用的Hive；利用Pig还可以做高级的数据处理，包括Twitter、LinkedIn 上用于发现您可能认识的人，可以实现类似amazon.com的协同过滤的推荐效果。淘宝的商品推荐也是！在Yahoo！的40%的Hadoop作业是用pig运行的，包括垃圾邮件的识别和过滤，还有用户特征建模。

Hadoop的搭建分为三种形式：单机模式、伪分布模式、完全分布模式，一般使用的都是完全分布模式。HDFS集群一般包含了NameNode，Secondary NameNode 和 DataNode 。

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虚拟机安装

- 首先下载virtualBox或者VMware，然后下载linux系统。
  系统地址：http://mirrors.melbourne.co.uk/ubuntu-releases/16.04.4/ （64位的）
- 也可以直接导入OVA系统镜像。

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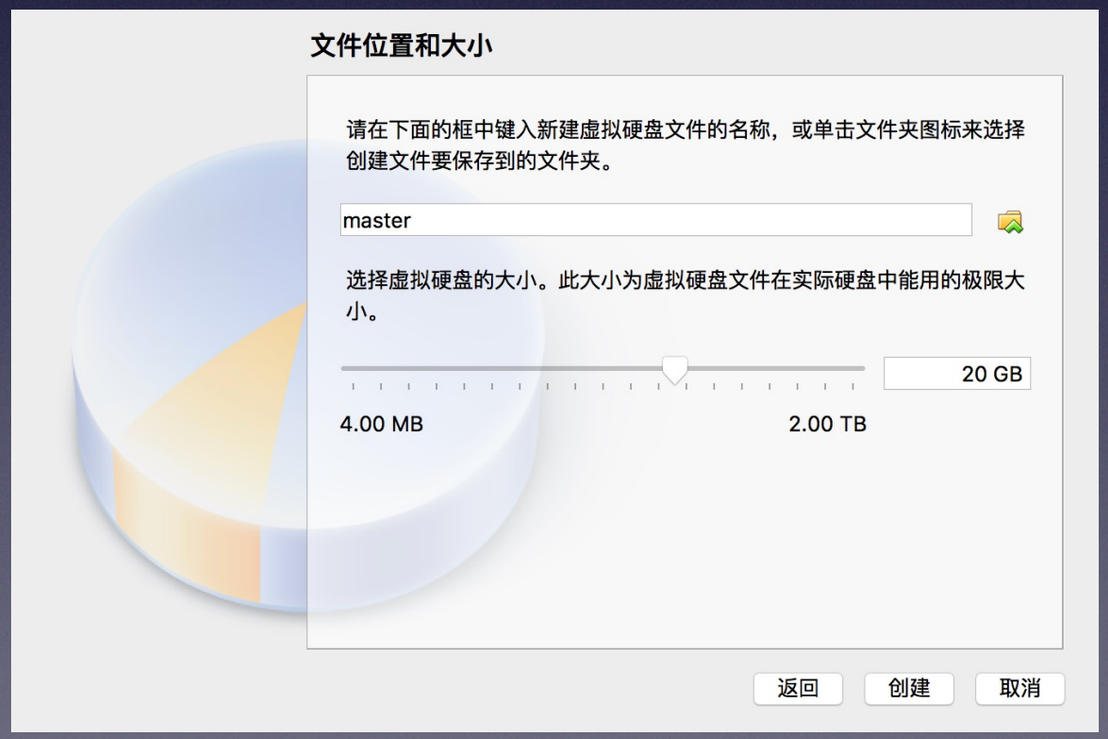

机器有条件可以直接设置30G+

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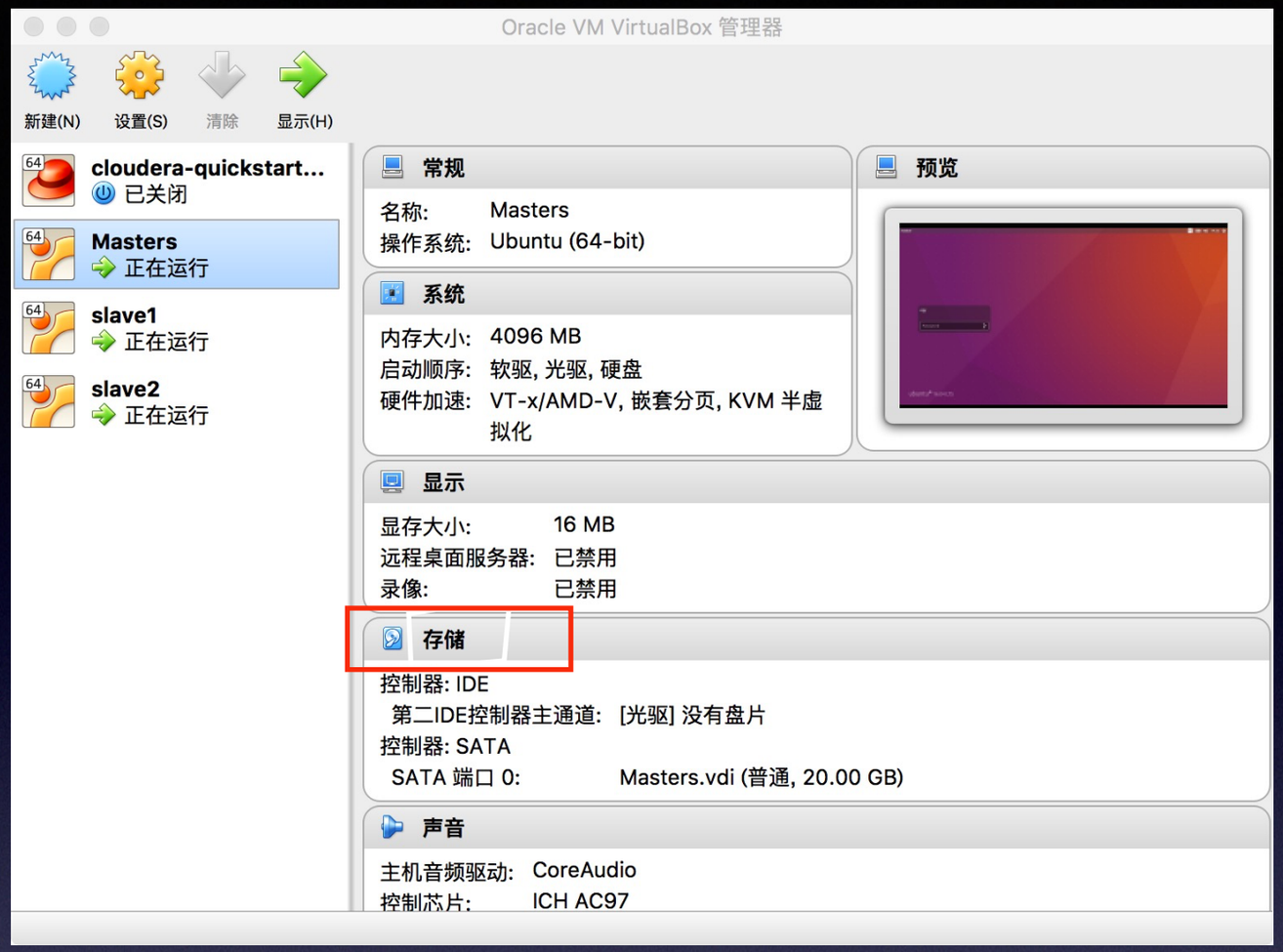

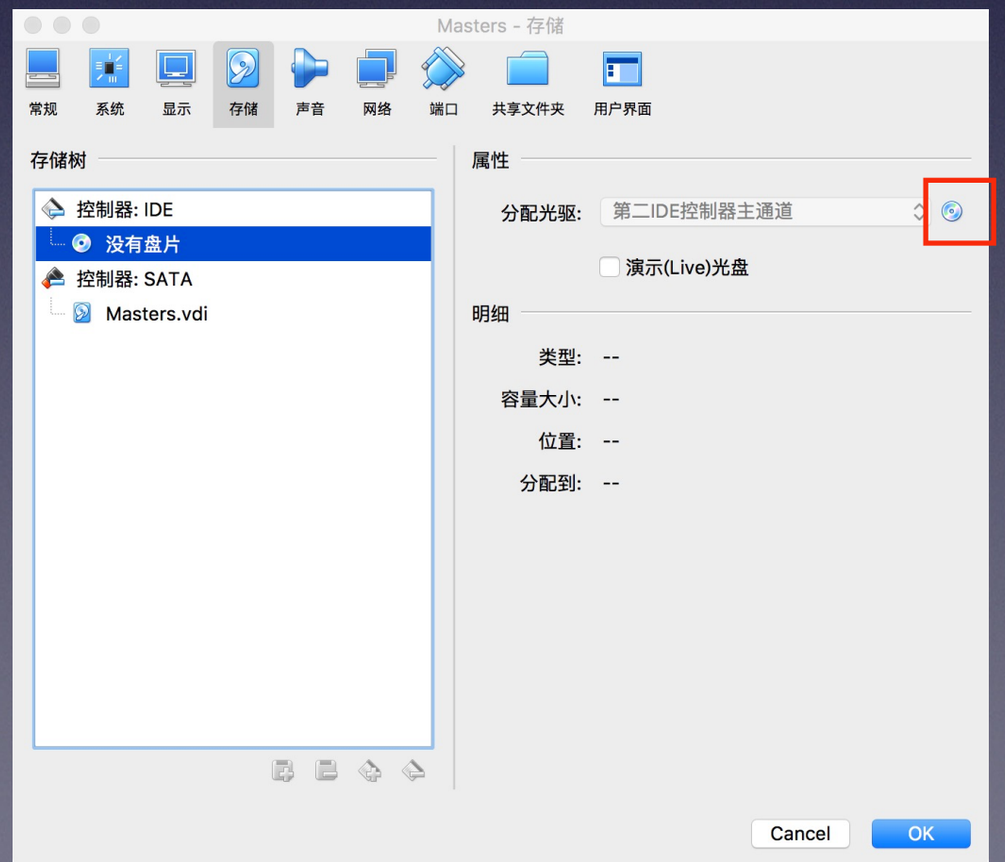

点击储存并选择刚下载的虚拟光盘

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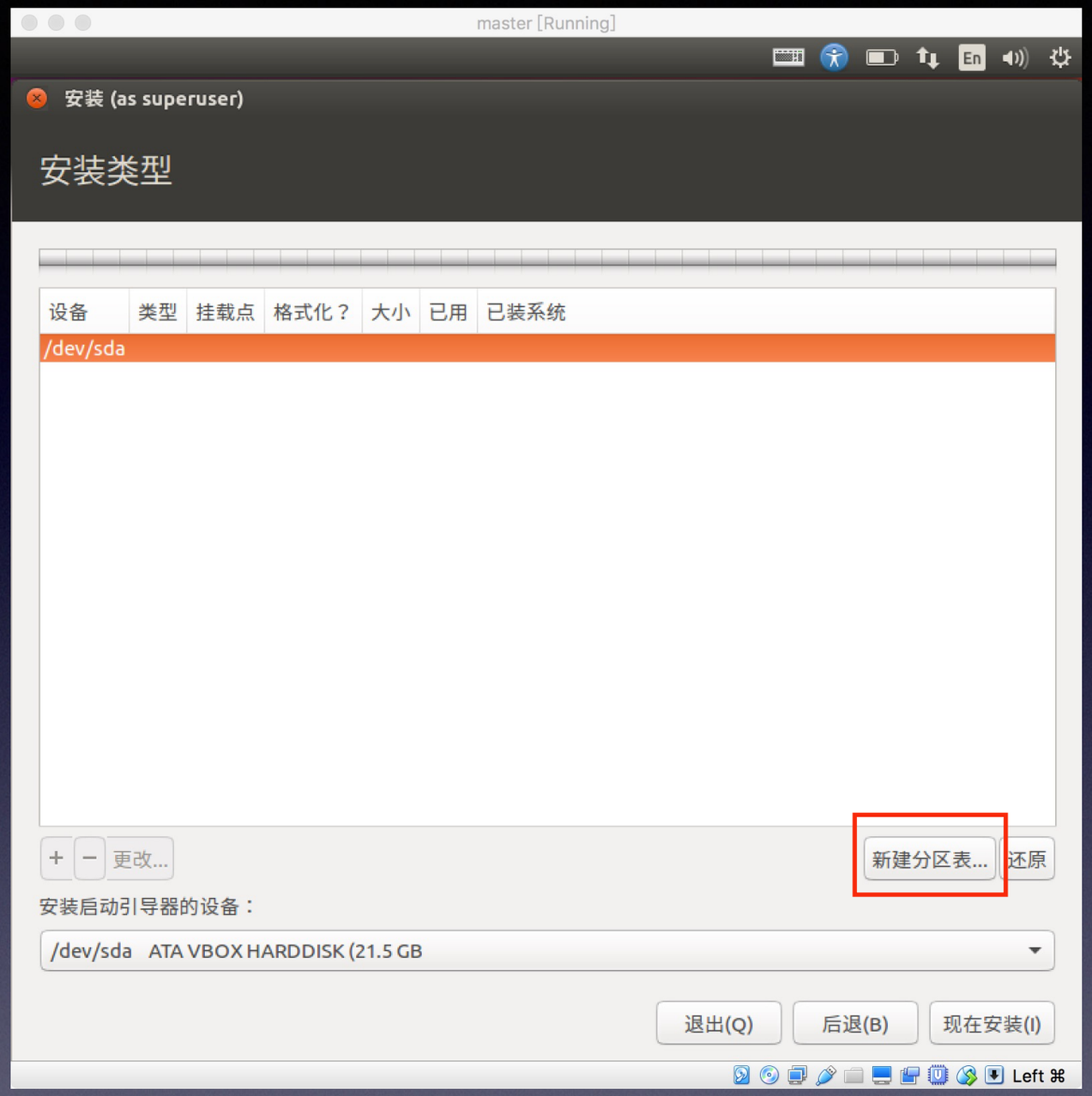

点击新建分区

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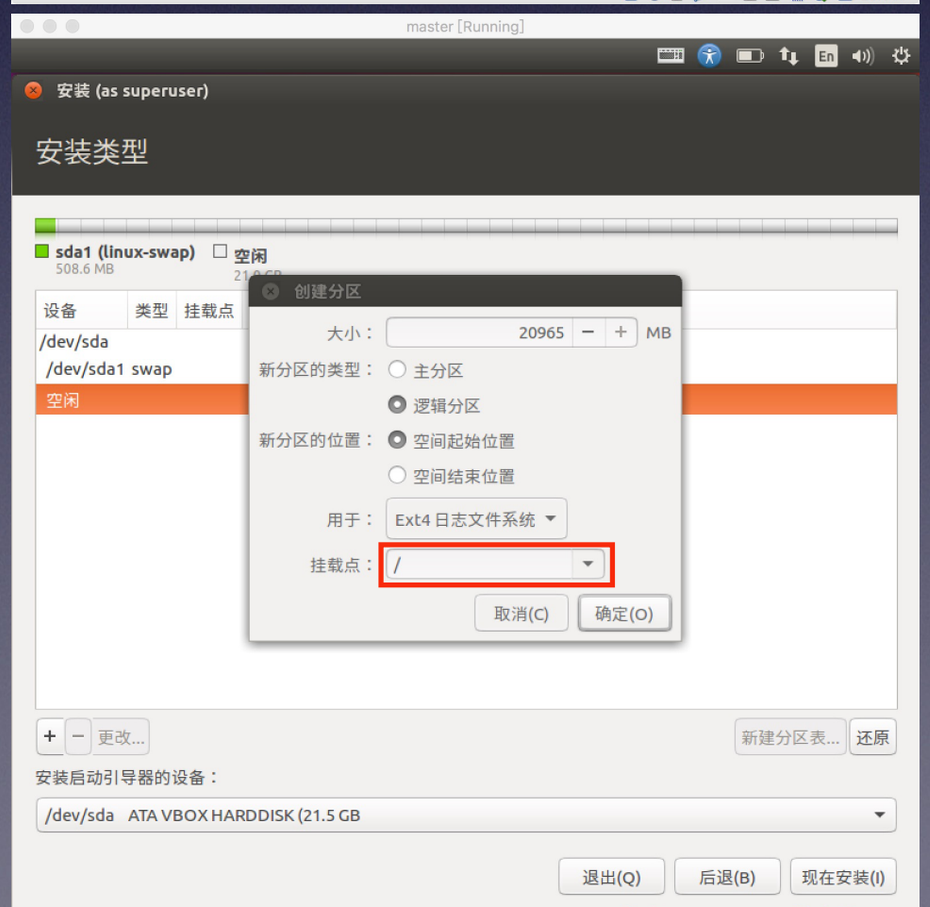
修改大小，用于交换
点击空闲并分区swap



修改剩余分区为Ext4文件系统，
挂载点 /
开始安装

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linux系统下，下载jdk，这里我下载的是jdk8
并移动到/usr/lib里，下载地址：http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html

- 新建密码：sudo passwd root
- 进入root模式：su root (输入刚才的密码)

安装vim：apt install vim

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vim /etc/profile
添加如下内容：JAVA_HOME根据实际目录更改
JAVA_HOME=/usr/lib/jdk1.8.0_60
CLASSPATH=$JAVA_HOME/lib/
PATH=$PATH:$JAVA_HOME/bin
export PATH JAVA_HOME CLASSPATH
esc： wq 退出

初始化：source /etc/profile

测试安装成功：java -version

```
root@cgy-VirtualBox:/home/cgy/Downloads# java -version
java version "1.8.0_171"
Java(TM) SE Runtime Environment (build 1.8.0_171-b11)
Java HotSpot(TM) 64-Bit Server VM (build 25.171-b11, mixed mode)
```

若是cannot execute binary file,
看一下是不是装成了32位系统

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安装openjdk：　　为了以后的jps命令

spt install openjdk-8-jdk-headless

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安装ssh-service： sudo apt install openssl-server

配置ssh-config文件： vim /etc/ssh/sshd_config

将PermitRootLogin 后面改为yes

```
# Authentication:
LoginGraceTime 120
PermitRootLogin yes
StrictModes yes
```

之后重启服务service sshd restart

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复刻虚拟机

- 将虚拟机关闭之后，可以在virtualBox里复制虚拟机，并修改ip与硬件地址

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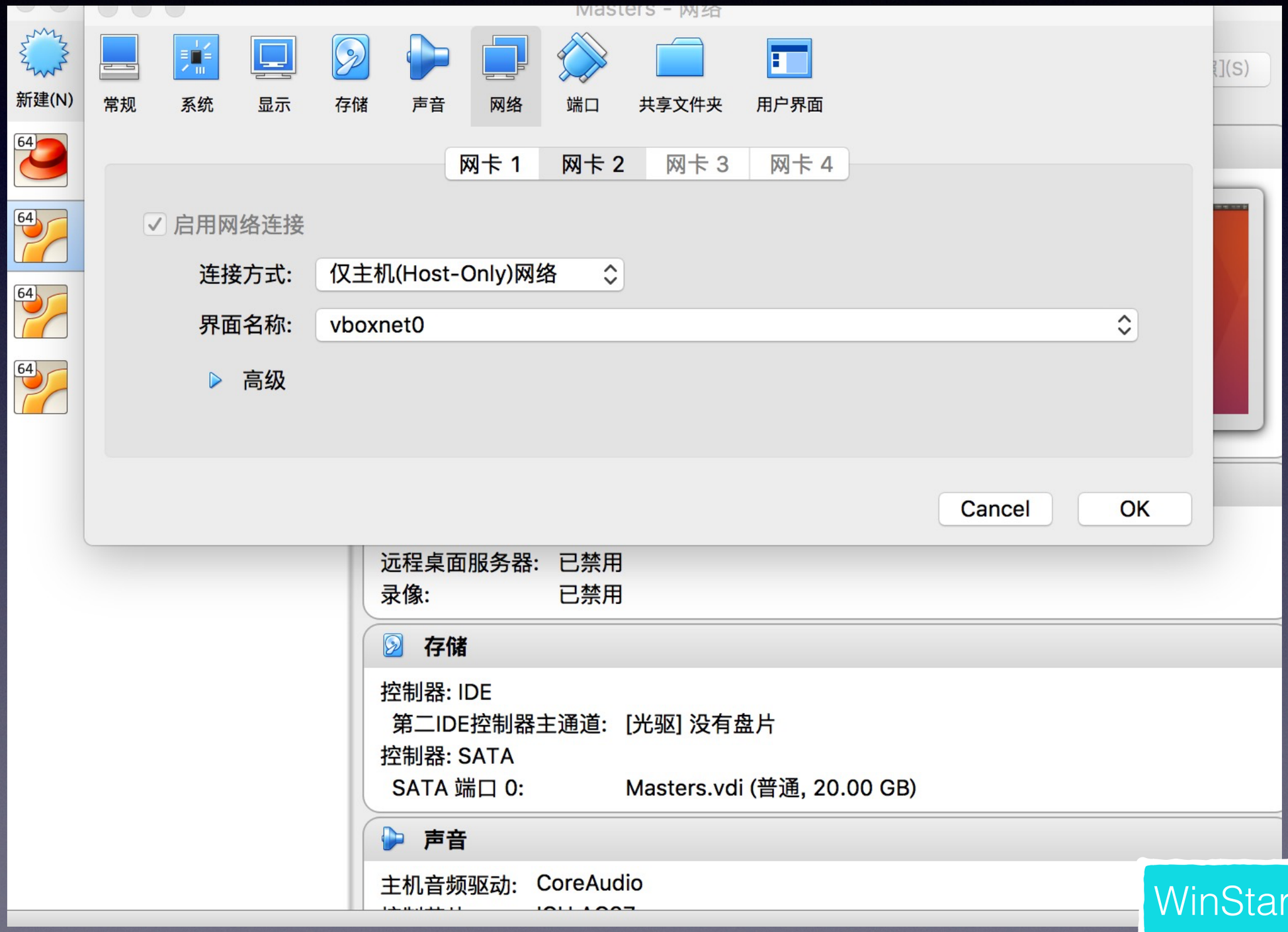
点击设置->网络->网卡二
选择仅主机连接



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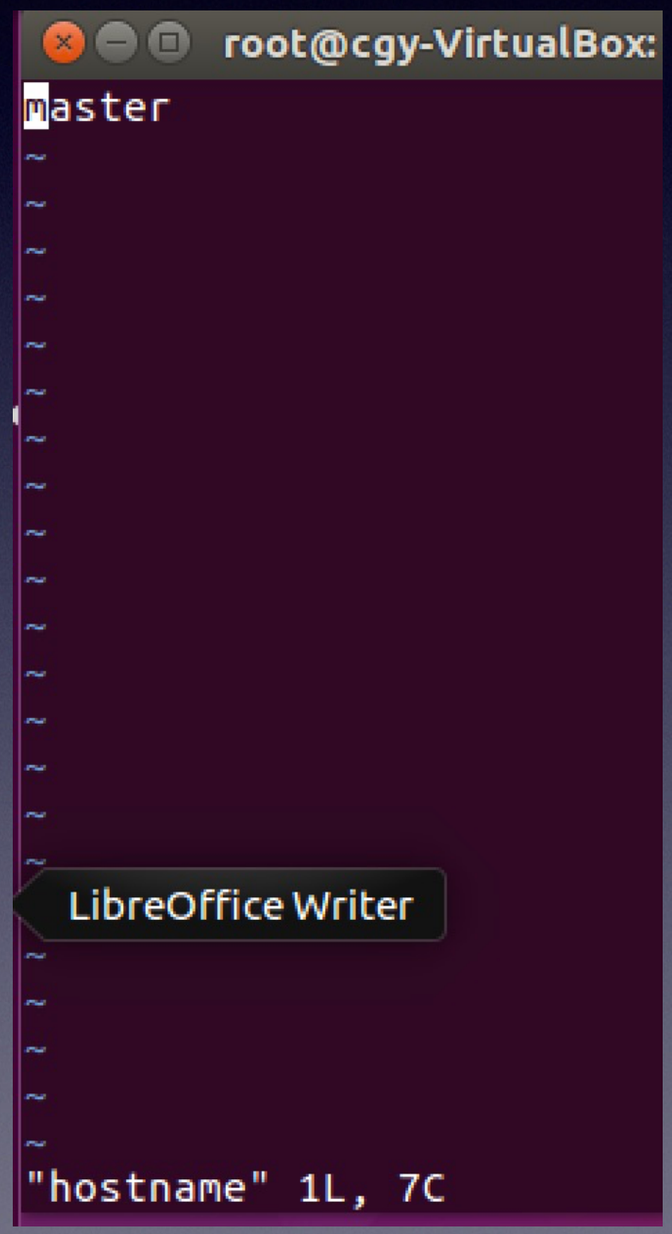
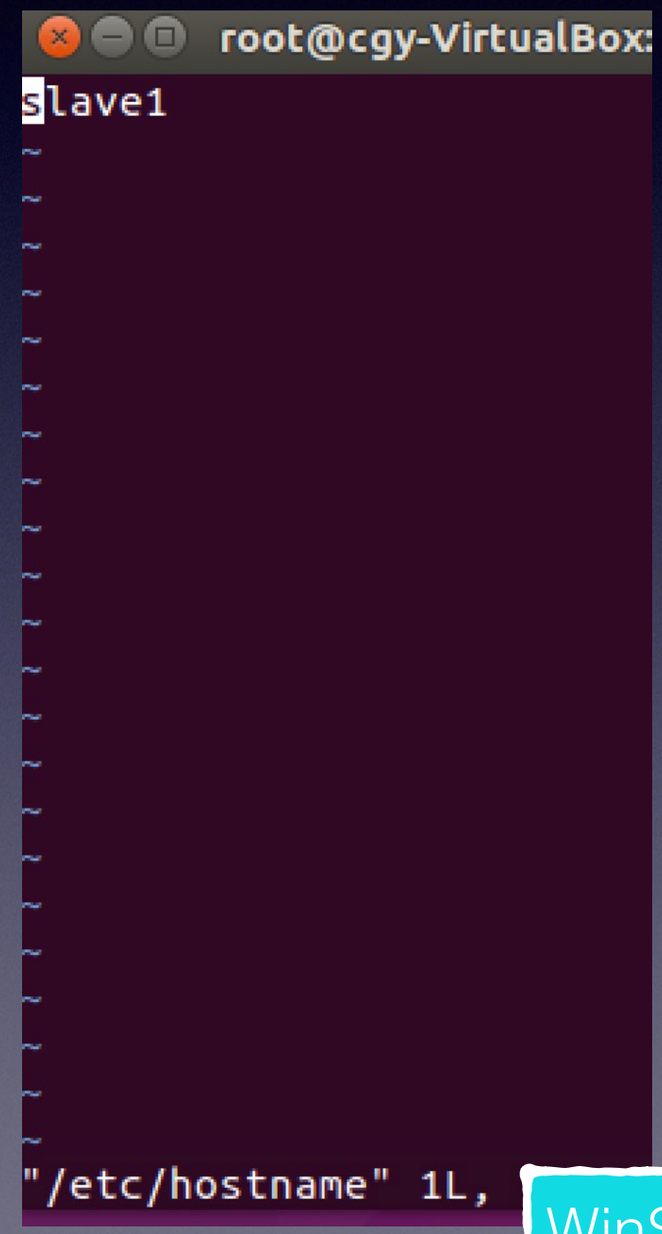
打开虚拟机修改主机名

ubantu系统：进入root模式后，输入

vim /etc/hostname





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- ifconfig得到新加入的IP地址
- 进入root模式：su root (输入刚才的密码)
- 修改hosts：vi /etc/hosts 将上面的IP加入到hosts文件并加上别名（如master、slave1、slave2）

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```
enp0s8    Link encap:Ethernet  HWaddr 08:00:27:11:7f:92
          inet addr:192.168.56.103  Bcast:192.168.56.255  Mask:255.255.255.
          inet6 addr: fe80::42b4:c204:5c08:a502/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:283751 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1490951 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:26500557 (26.5 MB)  TX bytes:2566675046 (2.5 GB)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
```

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root@cgy-VirtualBox: /etc

```
127.0.0.1       localhost
127.0.1.1       cgy-VirtualBox
192.168.56.103 master
192.168.56.104 slave1
192.168.56.105 slave2
# The following lines are desirable for IPv6 ca
::1     ip6-localhost ip6-loopback
fe00::0 ip6-localnet
ff00::0 ip6-mcastprefix
ff02::1 ip6-allnodes
ff02::2 ip6-allrouters
~
~
~
~
~
~
~
~
~
~
~
~
~
-- INSERT --
```

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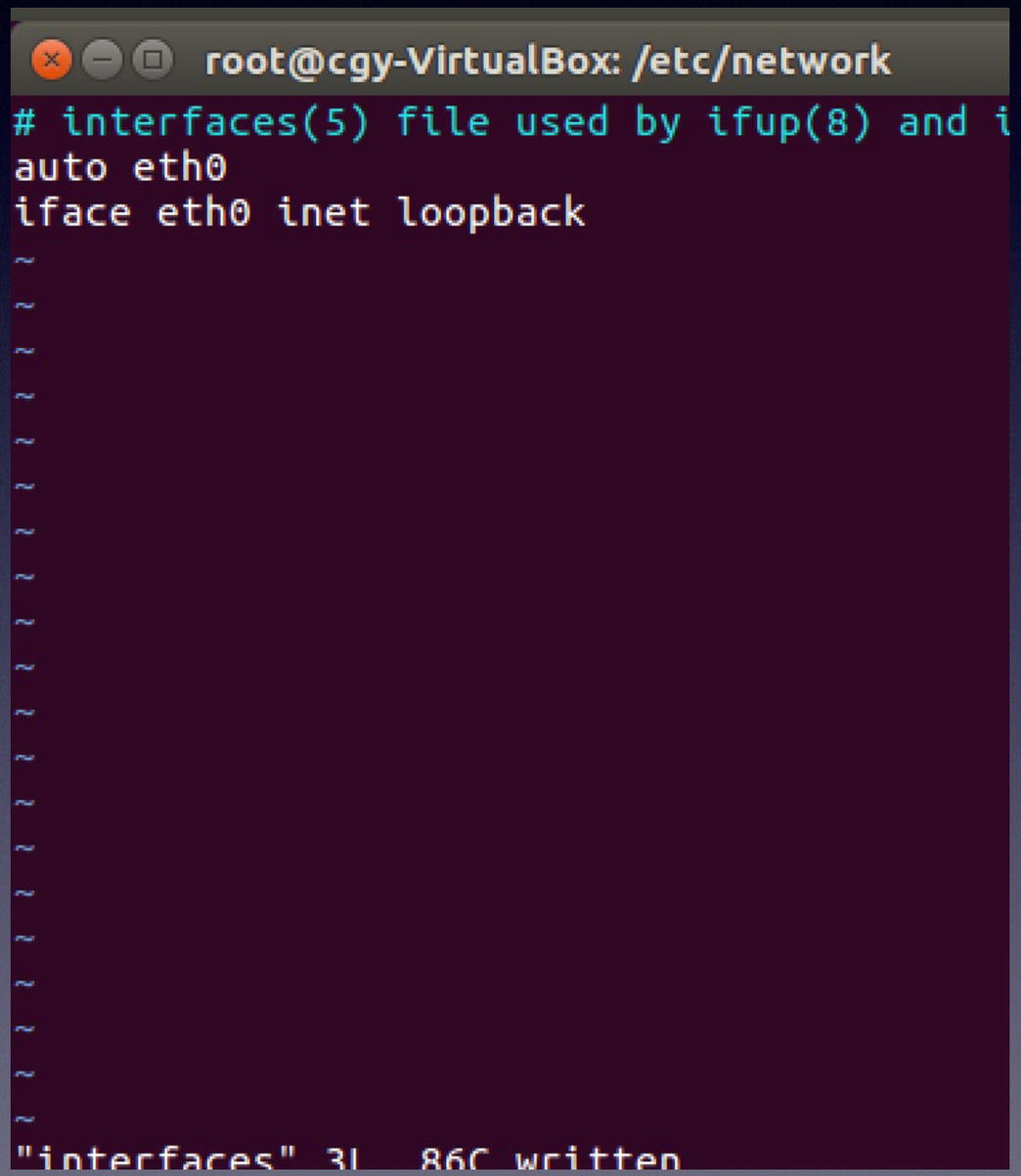
vim /etc/network/interfaces



修改端口分别
为eth1、2、3

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其他linux系统

3.修改主机名

```
[root@itcast01 ~]# vi /etc/sysconfig/network_
```

```
NETWORKING=yes
HOSTNAME=itcast03_
~
```

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4.修改主机名与ip的映射地址

```
[root@itcast03 ~]# vi /etc/hosts_
```

```
127.0.0.1   localhost localhost.localdomain localhost4 localhost4.localdomain4
::1         localhost localhost.localdomain localhost6 locoalhost6.localdomain6
192.168.1.203 itcast03_
```

5.查看硬件地址 eth1 和HWadder 00:0C.....

```
"/etc/sysconfig/network-scripts/ifcfg-eth0" 14L, 259C written
[root@itcast01 rules.d]# ifconfig -a
eth1      Link encap:Ethernet  HWaddr 00:0C:29:88:AE:71
          BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 b)  TX bytes:0 (0.0 b)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:4 errors:0 dropped:0 overruns:0 frame:0
          TX packets:4 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:272 (272.0 b)  TX bytes:272 (272.0 b)
```

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6.修改ip 及 eth1(原来是本机的 这里是eth0改为eth1) 及 硬件地址

```
[root@itcast01 rules.d]# vi /etc/sysconfig/network-scripts/ifcfg-eth0
```

```
DEVICE=eth1
TYPE=Ethernet
UUID=de4ee37f-eb88-4e88-a3d9-8e6a3171c63a
ONBOOT=yes
NM_CONTROLLED=yes
BOOTPROTO=none
IPADDR=192.168.1.203
PREFIX=24
DEFROUTE=yes
IPV4_FAILURE_FATAL=yes
IPV6INIT=no
NAME="System eth0"
HWADDR=00:0C:29:88:ae:71
LAST_CONNECT=1471423864
```

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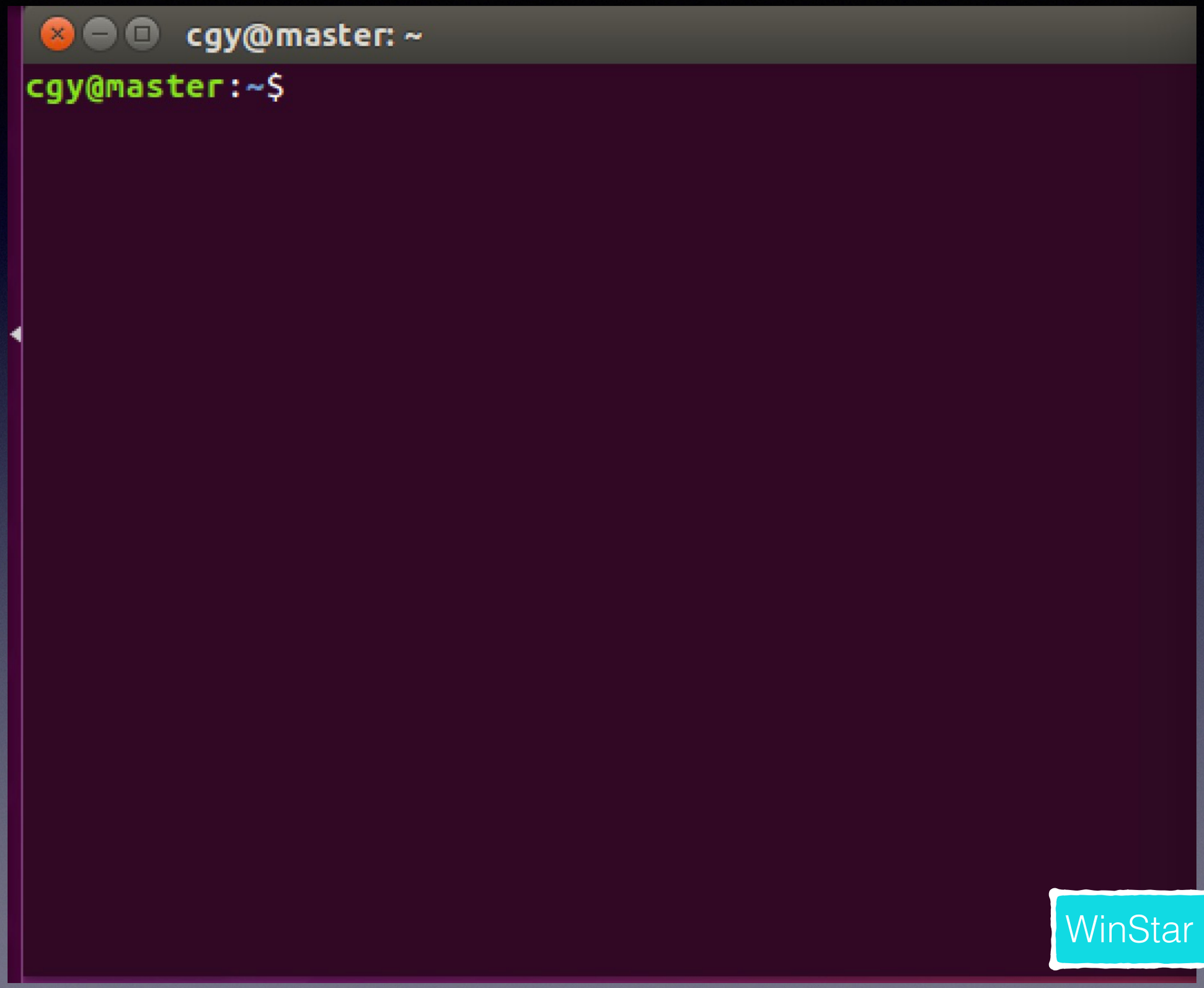
重新启动



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免密钥

- root模式下生成密钥：ssh-keygen(一路回车)
- 将密钥传到免登录机器上:　例如ssh-copy-id -i slave1
- 在目的机器上cat ～/.ssh/authorized_keys检查成功与否

namenode和secondary namenode
需要免密钥登陆其他机器

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目的

免密钥登陆

```
root@master:/home/cgy#
root@master:/home/cgy#
root@master:/home/cgy# ssh slave1
Welcome to Ubuntu 16.04.4 LTS (GNU/Linux 4.13.0-36-generic x86_64)

 * Documentation:  https://help.ubuntu.com
 * Management:     https://landscape.canonical.com
 * Support:        https://ubuntu.com/advantage

183 packages can be updated.
88 updates are security updates.

Last login: Wed Jun 27 14:10:37 2018 from 192.168.56.103
root@slave1:~#
```

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安装Hadoop

- 下载地址：
  http://hadoop.apache.org/releases.html
- 将hadoop解压到 / usr / hadoop / 文件夹里
- 例： mv /Download/hadoop-3.0.3 /usr/hadoop/

注意不要下载成了source

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修改环境变量

```
# 修改配置文件
vim /etc/profile
# 在最后下添加

export HADOOP_HOME=/usr/hadoop/hadoop-3.0.3
export PATH=$PATH:$HADOOP_HOME/bin

# 刷新配置文件
source /etc/profile
```

配置hadoop相关设置

这些配置文件全部位于/usr/hadoop/hadoop-3.0.3/etc/hadoop 文件夹下

修改hadoop-env.sh

```
# The java implementation to use. By default, this environment
# variable is REQUIRED on ALL platforms except OS X!
 export JAVA_HOME=/usr/lib/jdk1.8.0_171
```

修改core-site.xml

```
<configuration>
    <!-- 指定HDFS主节点（namenode）的通信地址 -->
    <property>
        <name>fs.defaultFS</name>
        <value>hdfs://master:9000</value>
    </property>
    <!-- 指定hadoop运行时产生文件的存储路径 -->
    <property>
        <name>hadoop.tmp.dir</name>
        <value>/data/hd3/tmp</value>
    </property>
</configuration>
```

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hdfs-site.xml

```
<configuration>

    <!-- 设置namenode的http通讯地址 -->
    <property>
        <name>dfs.namenode.http-address</name>
        <value>master:50070</value>
    </property>

    <!-- 设置secondarynamenode的http通讯地址 -->
    <property>
        <name>dfs.namenode.secondary.http-address</name>
        <value>slave1:50090</value>
    </property>

    <!-- 设置namenode存放的路径 -->
    <property>
        <name>dfs.namenode.name.dir</name>
        <value>/data/hd3/namenode</value>
    </property>

    <!-- 设置hdfs副本数量 -->
    <property>
        <name>dfs.replication</name>
        <value>2</value>
    </property>
    <!-- 设置datanode存放的路径 -->
    <property>
        <name>dfs.datanode.data.dir</name>
        <value>/data/hd3/datanode</value>
    </property>
</configuration>
```

这里需要
先建立相关
文件夹

mkdir -p /data/hd3/datanode
/data/hd3/namenode
/data/hd3/tmp

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修改mapred-site.xml

```
<configuration>
    <!-- 通知框架MR使用YARN -->
    <property>
        <name>mapreduce.framework.name</name>
        <value>yarn</value>
    </property>
    <!-- MR jar包路径 -->
    <property>
        <name>mapreduce.application.classpath</name>
        <value>
            $HADOOP_HOME/etc/hadoop,
            $HADOOP_HOME/share/hadoop/common/*,
            $HADOOP_HOME/share/hadoop/common/lib/*,
            $HADOOP_HOME/share/hadoop/hdfs/*,
            $HADOOP_HOME/share/hadoop/hdfs/lib/*,
            $HADOOP_HOME/share/hadoop/mapreduce/*,
            $HADOOP_HOME/share/hadoop/mapreduce/lib/*,
            $HADOOP_HOME/share/hadoop/yarn/*,
            $HADOOP_HOME/share/hadoop/yarn/lib/*
        </value>
    </property>
</configuration>
```

yarn-site.xml

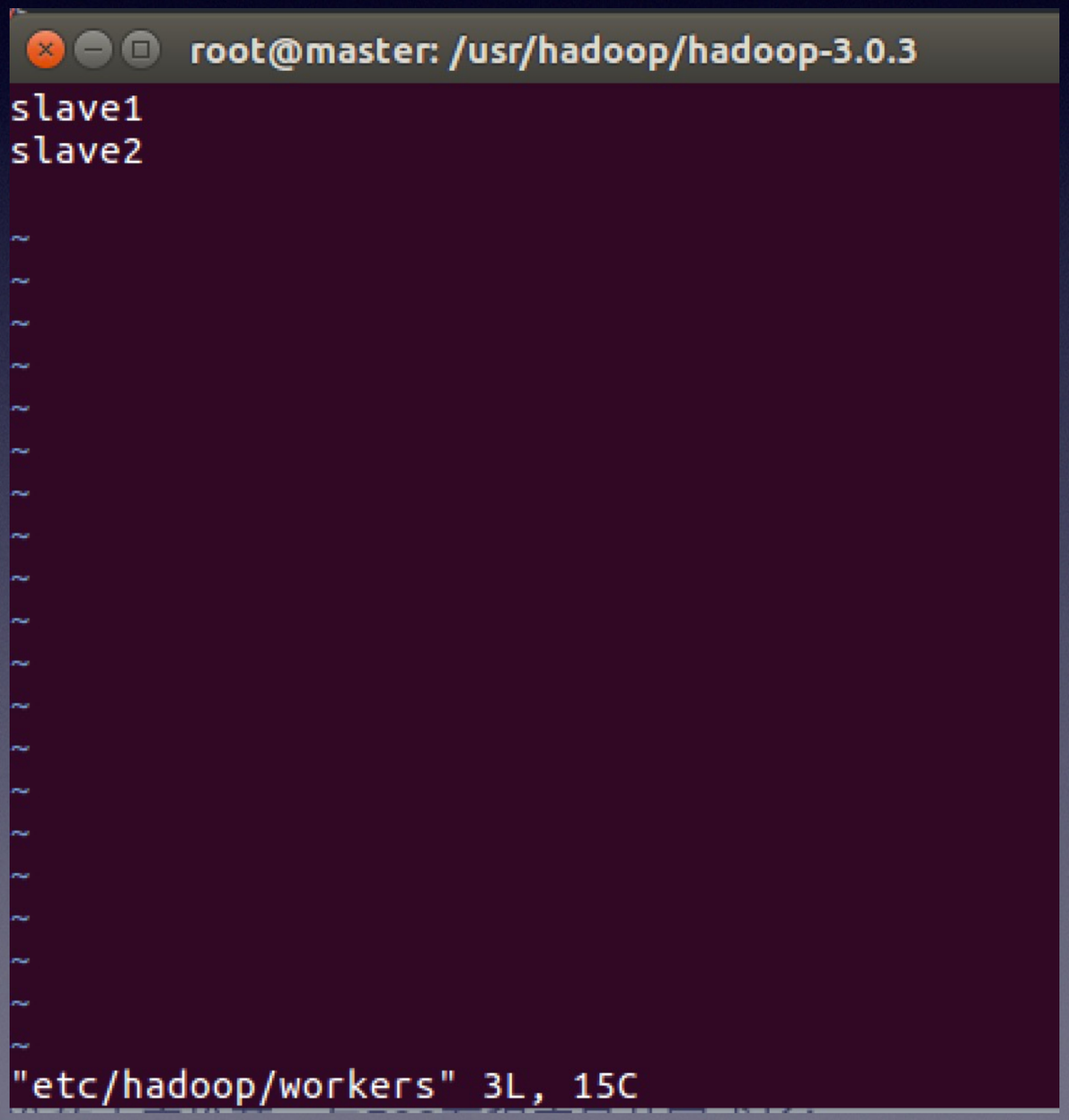
```
<configuration>
    <!-- 设置 resourcemanager 在哪个节点-->
    <property>
        <name>yarn.resourcemanager.hostname</name>
        <value>master</value>
    </property>

    <!-- reducer取数据的方式是mapreduce_shuffle -->
    <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>
```

修改worker　　vim workers

将worker里localhost改为slave1回车slave2



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修改启动器,进入到
/usr/hadoop/hadoop-3.0.1/sbin/

在start-yarn.sh和stop-yarn.sh中添加

root@master: /usr/hadoop/hadoop-3.0.3

```
#
#     http://www.apache.org/licenses/LICENSE-2.0
#
# Unless required by applicable law or agreed to i
# distributed under the License is distributed on
# WITHOUT WARRANTIES OR CONDITIONS OF ANY KIND, ei
# See the License for the specific language goverr
# limitations under the License.

## @description  usage info
## @audience     private
## @stability    evolving
## @replaceable  no
YARN_RESOURCEMANAGER_USER=root
HADOOP_SECURE_DN_USER=yarn
YARN_NODEMANAGER_USER=root

function hadoop_usage
```

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在start-dfs.sh和stop-dfs.sh中添加

root@master: /usr/hadoop/hadoop-3.0.3

```
# Stop hadoop dfs daemons.
# Run this on master node.

## @description  usage info
## @audience     private
## @stability    evolving
## @replaceable  no
HDFS_DATANODE_USER=root
HDFS_DATANODE_SECURE_DN_USER=hdfs
HDFS_NAMENODE_USER=root
HDFS_SECONDARYNAMENODE_USER=root

function hadoop_usage
```

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复制到其他主机

复制/etc/hosts

```
scp /etc/hosts slave1:/etc/
scp /etc/hosts slave2:/etc/
```

复制/etc/profile (记得要刷新环境变量)

```
scp /etc/profile slave1:/etc/
scp /etc/profile slave2:/etc/
```

复制/hadoop

```
scp -r /usr/hadoop slave1:/usr/
scp -r /usr/hadoop slave2:/usr/
```

复制/data

```
scp -r /data slave1:/
scp -r /data slave2:/
```

记得在slave1和slave2上刷新环境变量

然后将slave1和slave2上的

/ data/hd3/datanode删掉

启动

第一次启动得格式化

```
./bin/hdfs namenode -format
```

启动dfs

```
./sbin/start-dfs.sh
```

启动yarn

```
./sbin/start-yarn.sh
```

或者直接

```
./sbin/start-all.sh
```

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```
root@master:/usr/hadoop/hadoop-3.0.3# ./sbin/start-all.sh
Starting namenodes on [master]
Starting datanodes
Starting secondary namenodes [slave1]
Starting resourcemanager
Starting nodemanagers
root@master:/usr/hadoop/hadoop-3.0.3#
```

jps查看

master

```
root@master:/usr/hadoop/hadoop-3.0.3# jps
29537 ResourceManager
29844 Jps
29151 NameNode
root@master:/usr/hadoop/hadoop-3.0.3#
```

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slave1

```
root@slave1:/home/cgy# jps
10884 SecondaryNameNode
11143 Jps
10730 DataNode
11003 NodeManager
root@slave1:/home/cgy#
```

slave2

```
root@slave2:/usr/hadoop/hadoop# jps
7666 NodeManager
7512 DataNode
7804 Jps
root@slave2:/usr/hadoop/hadoop#
```

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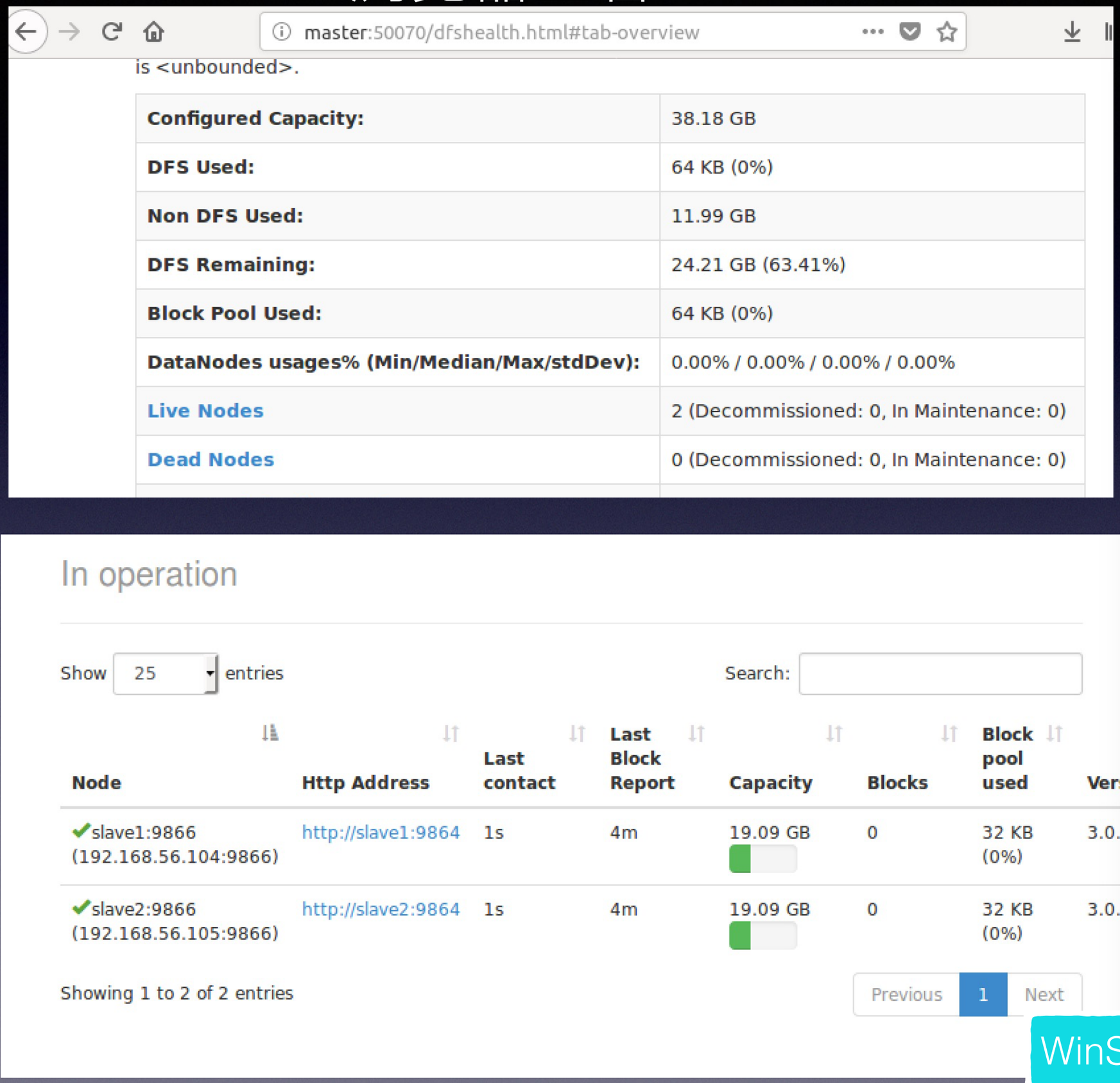
浏览器查看hdfs



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浏览器查看Yarn

Logged in as: dr.whoo

Nodes of the cluster

- Cluster
  - About
  - Nodes
  - Node Labels
  - 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	Memory Total	Memory Reserved	VCores Used	VCores Total	VCores Reserved
0	0	0	0	0	0 B	16 GB	0 B	0	16	0

Cluster Nodes Metrics

Active Nodes	Decommissioning Nodes	Decommissioned Nodes	Lost Nodes	Unhealthy Nodes	Rebooted Nodes	Shutdown Nodes
2	0	0	0	0	0	0

Scheduler Metrics

Scheduler Type	Scheduling Resource Type	Minimum Allocation	Maximum Allocation	Maximum Cluster Application Priority
Capacity Scheduler	[memory-mb (unit=Mi), vcores]	<memory:1024, vCores:1>	<memory:8192, vCores:4>	0

Show 20 entries Search:

Node Labels	Rack	Node State	Node Address	Node HTTP Address	Last health-update	Health-report	Containers	Mem Used	Mem Avail	VCores Used	VCores Avail	Version
	/default-rack	RUNNING	slave2:35999	slave2:8042	Wed Jun 27 16:38:16 +0800 2018		0	0 B	8 GB	0	8	3.0.3
	/default-rack	RUNNING	slave1:43213	slave1:8042	Wed Jun 27 16:38:16 +0800 2018		0	0 B	8 GB	0	8	3.0.3

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