

《大数据导论》实验报告

实验题目

华为特色实验-MRS

一、实验目的

通过本次实验，了解华为云 MRS，并熟悉使用。

二、实验项目内容

1. 申请华为云免费资源 MRS
2. 通过弹性公网 IP 访问 Manager
3. 下载客户端到主节点
4. 主节点安装客户端
5. 主节点使用客户端
6. 案例实现

三、实验过程或算法（源程序）

1. 申请华为云免费资源 MRS

保持默认+勾选全部组件 (Hadoop, Spark, HBase, Hive, Flink)+立即购买，过程较为简单，在此仅展示结果。

组件名	版本	描述
<input checked="" type="checkbox"/> Hadoop	2.8.3	针对大数据集的分布式数据存储和处理框架，包含HDFS、YARN、MapReduce等核心组件
<input checked="" type="checkbox"/> Spark	2.2.2	快速、通用的大数据处理引擎
<input checked="" type="checkbox"/> HBase	1.3.1	可扩展、分布式数据库，支持存储结构化数据
<input checked="" type="checkbox"/> Hive	2.3.3	提供数据汇聚和即席查询的数据库
<input checked="" type="checkbox"/> Flink	1.7.0	一个分布式大数据处理引擎，可对有限数据流和无限数据流进行有状态计算。
<input type="checkbox"/> Presto	0.216	一种开源、分布式SQL查询引擎。
<input type="checkbox"/> Opentsdb	2.3.0	一个可扩展的分布式时间序列数据库，可以存储和服务于大量时间序列数据，而不会丢失粒度。

设置密码

名称/ID	集群版本	集群类型	节点数	状态	计费类型	创建时间	可用区	操作
mrs_promotion_166903C	MRS 1.9.2	分析集群	5	启动中	包年/包月	2022/11/21 19:34:42 G...	可用区1	...

启动集群比较费时，大概需要 1 个多小时。

2. 通过弹性公网IP 访问 Manager

(1) 集群信息，在集群列表中单击指定的集群名称，进入集群信息页面。

<

mrs_promotion_1669030336689

使用指南

评价

下载认证凭证

配置

概览

节点管理

组件管理

告警管理

补丁管理

文件管理

作业管理

租户管理

备份恢复

引导操作

弹性伸缩

标签管理

基本信息

了解更多

集群名称

mrs_promotion_1669030336689

集群状态

运行中

集群管理页面

前往 Manager

付费类型

包年/包月

自动续费

--

订单号

集群版本

MRS 1.9.2

集群类型

分析集群

IAM用户同步

未同步 同步

集群ID

创建时间

2022/11/21 19:34:42 GMT+08:00

可用区

可用区1

虚拟私有云

vpc-default

默认生双子网

subnet-default 切换子网

数据连接

单击管理

委托

-- 管理委托

弹性公网IP

暂未绑定

Kerberos认证

关闭

日志记录

☒

安全组

mrs_mrs_promotion_16_Ggbx

通信安全授权

☒

组件版本

Hadoop 版本

2.8.3

Spark 版本

2.2.2

HBase 版本

1.3.1

Hive 版本

2.3.3

Flink 版本

1.7.0

Tez 版本

0.9.1

(2) 前往 Manager，然后购买弹性公网 IP，注意选择按需付费

<

购买弹性公网IP

返回

页码

页码

产品类型	产品规格	计费模式	数量	价格
弹性公网IP	名称	--		
	区域	北京四		
	类型	全动态BGP		
	IPv4转换	停用		
	标签	--		
带宽	带宽名称	bandwidth-bbb		
	带宽类型	独享带宽		
	计费方式	按需计费		
	带宽大小	5 Mbit/s		

弹性公网IP费用: ¥0.02/小时 + 带宽费用: ¥0.315/小时

上一步

提交

此处一定要记得**手动**放通 9022 端口，否则无法访问后续页面：

[添加方向规则](#) [教我设置](#)

安全规则对不同规格的云服务器生效情况不同，为了避免您的安全规则不生效，请查看安全组规则限制。

安全组 mrs_mrs_promotion_16_Ggbx

如您要添加多条规则，建议单击 导入规则 以进行批量导入。

优先级	策略	协议端口	类型	源地址	描述	操作
1	允许	基本协议/自定义TCP	IPv4	IP地址		复制 删除
		9022		0.0.0.0/0		

增加1条规则

确定 取消

(3) 进入MRS Manager 登录页面

HUAWEI

MRS Manager

用户登录

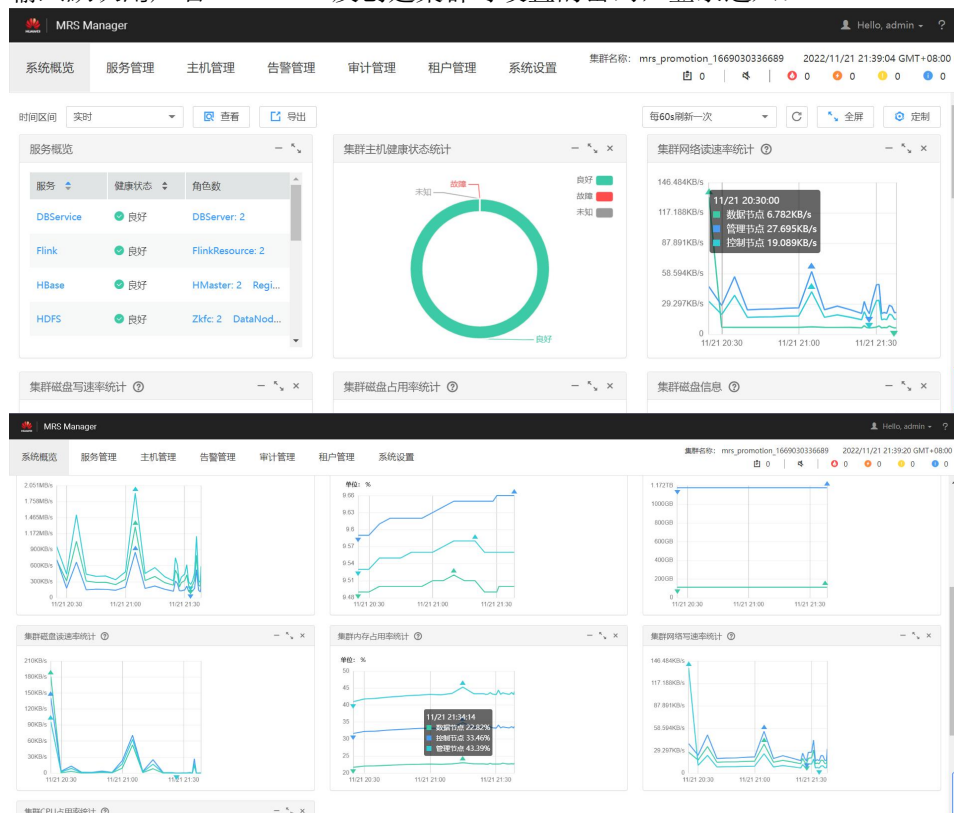
用户名

密码

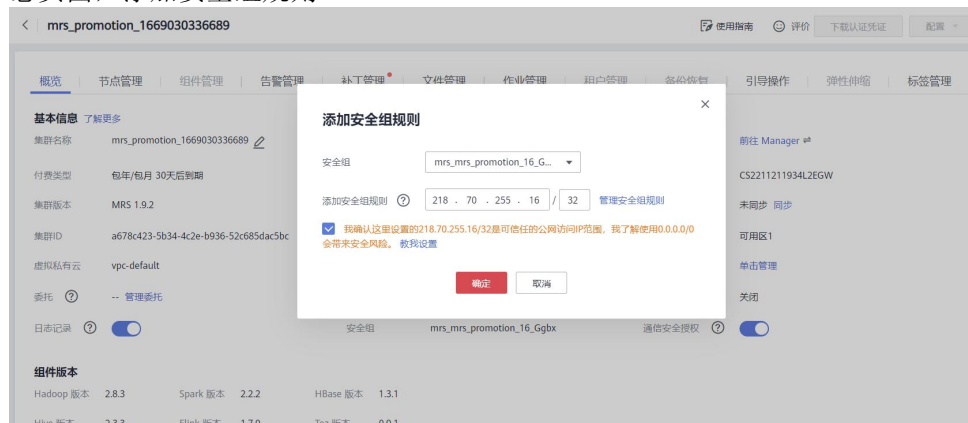
登录

☐ 记住登录名

输入默认用户名“admin”及创建集群时设置的密码，登录进入：



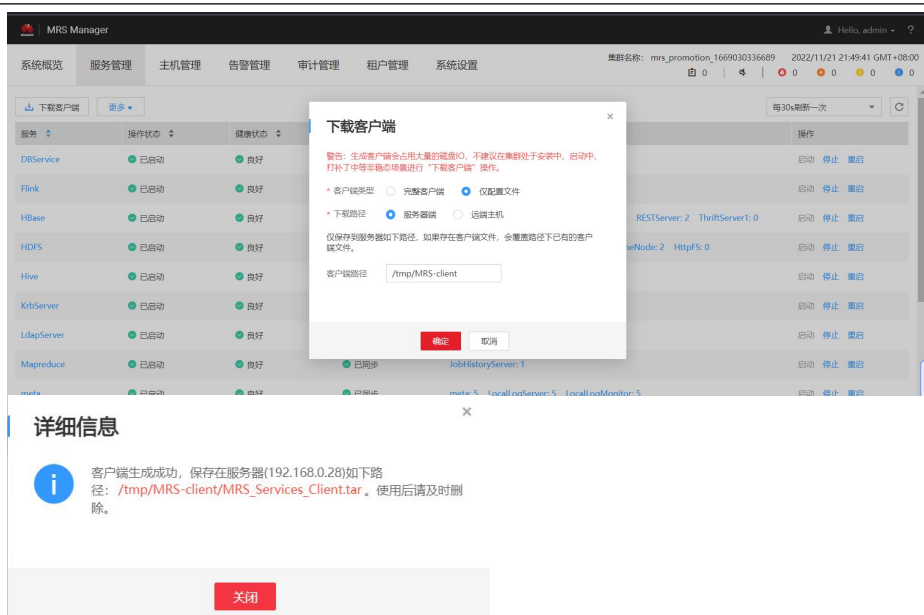
(4) 在 MRS 管理控制台，在“现有集群”列表，单击指定的集群名称，进入集群信息页面，添加安全组规则



3. 下载客户端到主节点

(1) 访问集群 Manager，点击“服务管理”

(2) 下载客户端，“客户端类型”选择“仅配置文件”，“下载路径”选择“服务器端”，单击“确定”开始生成客户端配置文件，文件生成后默认保存在主管理节点“/tmp/MRS-client”。



4. 主节点安装客户端

(1) MRS页面->现有集群->单击集群名称进入-点击节点管理，节点如图：



(2) 此处选择...，单击并远程登录：



记得选择 **VNC** 登录而不是 CloudShell
输入账号和密码：

```
Hint: Num Lock on

node-master1aUxU login: root
Password:
Last login: Thu Jan  1 08:00:10 on

[root@node-master1aUxU ~]# _
```

此处需注意，直接输密码会导致一直 incorrect

(3) 确认 MRS Manager 的主管理节点

```
Hint: Num Lock on

node-master2BZiG login: root
Password:
Last login: Thu Jan  1 08:00:10 on

[root@node-master2BZiG ~]# sudo su - root
Last login: Mon Nov 21 23:56:41 CST 2022 on tty1
[root@node-master2BZiG ~]# su - omm
Last login: Mon Nov 21 20:06:03 CST 2022
[omm@node-master2BZiG ~]# sh ${BIGDATA_HOME}/om-0.0.1/sbin/status-oms.sh
```

回显信息如下：

192-168-0-28	pms	Normal	Normal
Single_active			
192-168-0-28	tomcat	Normal	Normal
Single_active			
192-168-0-51	acs	Stopped	Normal
Single_active			
192-168-0-51	aos	Stopped	Normal
Single_active			
192-168-0-51	controller	Stopped	Normal
Single_active			
192-168-0-51	executor	Stopped	Normal
Single_active			
192-168-0-51	floatip	Stopped	Normal
Single_active			
192-168-0-51	fms	Stopped	Normal
Single_active			
192-168-0-51	gaussDB	Standby_normal	Normal
Active_standby			
192-168-0-51	heartBeatCheck	Stopped	Normal
Single_active			
192-168-0-51	httpd	Stopped	Normal
Single_active			
192-168-0-51	iam	Stopped	Normal
Single_active			
192-168-0-51	knox	Normal	Normal
Double_active			
192-168-0-51	ntp	Standby_normal	Normal
Active_standby			
192-168-0-51	okerberos	Normal	Normal
Double_active			
192-168-0-51	oldap	Standby_normal	Normal
Active_standby			
192-168-0-51	pms	Stopped	Normal
Single_active			
192-168-0-51	tomcat	Stopped	Normal
Single_active			

没有显示全部，无法确定主节点和备节点，因此将其输出到文本文件

```
[omm@node-master2BZiG ~]# nohup sh ${BIGDATA_HOME}/om-0.0.1/sbin/status-oms.sh > myout.txt 2>&1 &
[1] 18037
[omm@node-master2BZiG ~]# vim myout.txt
```

按 i 进入编辑模式，上滑至顶部可以看到主备点信息：

```
nohup: ignoring input
HAMode
double
```

NodeName	HAAllResOK	HostName	HAVersion	StartTime
HAActive		HARunPhase		
192-168-0-51	normal	node-master2BZiG.mrs-qggh.com	U100R001C01	2022-11-21 20:07:17
standby		Deactivated		
192-168-0-28	normal	node-master1aUxU.mrs-qggh.com	U100R001C01	2022-11-21 20:07:17
active		Activated		

NodeName	ResName	ResStatus	ResHAStatus
ResType			
192-168-0-51	acs	Stopped	Normal
Single_active			
192-168-0-51	aos	Stopped	Normal

192-168-0-28 为主管理节点，192-168-0-51 为备管理节点

- (4) 已经在 omm 用户中了, 该指令不用执行
(5) 切换到客户端安装目录

```
omm@node-master2BZiG ~1$ cd /opt/client
omm@node-master2BZiG client1$
```

- (6) 更新主管理节点的客户端配置

```
[22-11-22 00:38:23]: Start to refresh hive configuration from /tmp/MRS-client/tmp_client/MRS_Services_ClientConfig_ConfigFile
hive
[22-11-22 00:38:23]: URI is 'jdbc:hive2://192.168.0.32:2181,192.168.0.51:2181,192.168.0.28:2181/;serviceDiscoveryMode=zooKeeper;
zooKeeperNamespace=hiveserver2'
[22-11-22 00:38:23]: URI for HPLSQL is 'jdbc:hive2://192.168.0.32:2181,192.168.0.51:2181,192.168.0.28:2181/;serviceDiscoveryM
=zooKeeper;zooKeeperNamespace=hiveserver2'.
[22-11-22 00:38:23]: Replace hive client URI finished.
[22-11-22 00:38:23]: Start to replace new hive-site.xml & hive metastore-site.xml & hiveclient.properties
sed: -e expression #1, char 108: unknown command: '.'
[22-11-22 00:38:23]: Refresh hive configuration finished.
[22-11-22 00:38:23]: Hive refreshConfig is complete.
[22-11-22 00:38:23]: RefreshConfig krbClient begin ...
enter refresh krbclient file function.
it is not kerberos authentication.
refresh krbclient file successfully.
[22-11-22 00:38:24]: KrbClient refreshConfig is complete.
[22-11-22 00:38:24]: RefreshConfig Spark begin ...
[22-11-22 00:38:24]: Start to replace Spark configuration files
[22-11-22 00:38:24]: finish to replace configuration files
[22-11-22 00:38:24]: Spark refreshConfig is complete.
[22-11-22 00:38:24]: RefreshConfig Yarn begin ...
[22-11-22 00:38:24]: Yarn refreshConfig is complete.
[22-11-22 00:38:24]: RefreshConfig ZooKeeper begin ...
[22-11-22 00:38:24]: ZooKeeper refreshConfig is complete.
[22-11-22 00:38:24]: Refresh components client config is complete.
[22-11-22 00:38:24]: Deploy "dest version" begin ...
[22-11-22 00:38:24]: Deploy "/opt/client/4version" is complete.
[22-11-22 00:38:24]: Checking "/etc/hosts" config.
[22-11-22 00:38:24]: Deploy "dest hosts" begin ...
[22-11-22 00:38:24]: Warning: "hadoop.a678c423_5b34_4c2e_b936_52c685dac5bc.com" already exists in "/etc/hosts", it will be ov
ritten.
[22-11-22 00:38:24]: Warning: "hadoop.hadoop.com" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "hacluster" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "hadoop.hadoop.com" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "hacluster" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "haclusterX" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "haclusterX1" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "haclusterX2" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "haclusterX3" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "haclusterX4" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "ClusterX" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "manager" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "node-master1aUxU.mrs-ggnh.com" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "node-master2BZiG.mrs-ggnh.com" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "node-ana-core1Mlb.mrs-ggnh.com" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "node-ana-core1Mq.mrs-ggnh.com" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Warning: "node-ana-coreXbXm.mrs-ggnh.com" already exists in "/etc/hosts", it will be overwritten.
[22-11-22 00:38:24]: Deploy "dest hosts" is complete.
[22-11-22 00:38:24]: Succeed to refresh components client config.
```

如图, 更新成功。

5. 主节点使用客户端

- (1) 在已更新客户端的主管理节点, 执行 `cd/opt/client` 命令切换到客户端目录。
(2) 执行 `source bigdata_env` 命令配置环境变量
(3) 当前集群未启用Kerberos 认证, 跳过
(4) 执行 HBase 组件的客户端, `hbase shell`

```
[root@node-master1aUxU client]# cd /opt/client
[root@node-master1aUxU client]# source bigdata_env
[root@node-master1aUxU client]# hbase shell
```

结果如下:


```

2022-11-22 08:44:47,072 INFO [main] zookeeper.ZooKeeper: Client environment:os.arch=aarch64
2022-11-22 08:44:47,074 INFO [main] zookeeper.ZooKeeper: Client environment:os.version=4.19.36-vhulk1906.1.0.h288.eulerosv2r6
arch64
2022-11-22 08:44:47,076 INFO [main] zookeeper.ZooKeeper: Client environment:user.name=root
2022-11-22 08:44:47,078 INFO [main] zookeeper.ZooKeeper: Client environment:user.home=/root
2022-11-22 08:44:47,079 INFO [main] zookeeper.ZooKeeper: Client environment:user.dir=/opt/client
2022-11-22 08:44:47,081 INFO [main] zookeeper.ZooKeeper: Client environment:os.memory.free=208MB
2022-11-22 08:44:47,082 INFO [main] zookeeper.ZooKeeper: Client environment:os.memory.max=3044MB
2022-11-22 08:44:47,083 INFO [main] zookeeper.ZooKeeper: Client environment:os.memory.total=235MB
2022-11-22 08:44:47,088 INFO [main] zookeeper.ZooKeeper: Initiating client connection, connectString=node-ana-coreimab.mrs-qgnh.com:2181,node-master2big.mrs-qgnh.com:2181,sessionTimeout=90000,watcher=org.apache.hadoop
base.zookeeper.PendingWatcher@2b960a7
2022-11-22 08:44:47,113 INFO [main] zookeeper.ClientCnxn: zookeeper.request.timeout is not configured. Using default value 12000.
2022-11-22 08:44:47,115 INFO [main] zookeeper.ClientCnxn: zookeeper.client.bind.port.range is not configured.
2022-11-22 08:44:47,117 INFO [main] zookeeper.ClientCnxn: zookeeper.client.bind.address is not configured.
2022-11-22 08:44:47,127 INFO [main-SendThread(node-ana-coreimab.mrs-qgnh.com:2181)] client.FourLetterWordMain: connecting to
de-ana-coreimab.mrs-qgnh.com 2181
2022-11-22 08:44:47,141 INFO [main-SendThread(node-ana-coreimab.mrs-qgnh.com:2181)] zookeeper.ClientCnxn: Got server principals
from the server and it is null
2022-11-22 08:44:47,144 INFO [main-SendThread(node-ana-coreimab.mrs-qgnh.com:2181)] zookeeper.ClientCnxn: Using server principals
1 zookeeper/node-ana-coreimab.mrs-qgnh.com
2022-11-22 08:44:47,148 INFO [main-SendThread(node-ana-coreimab.mrs-qgnh.com:2181)] zookeeper.ClientCnxn: Opening socket connection
to server node-ana-coreimab.mrs-qgnh.com/192.168.0.32:2181. Will not attempt to authenticate using SASL (unknown error)
2022-11-22 08:44:47,157 INFO [main-SendThread(node-ana-coreimab.mrs-qgnh.com:2181)] zookeeper.ClientCnxn: Socket connection established,
initiating session, client: /192.168.0.28:63738, server: node-ana-coreimab.mrs-qgnh.com/192.168.0.32:2181
2022-11-22 08:44:47,166 INFO [main-SendThread(node-ana-coreimab.mrs-qgnh.com:2181)] zookeeper.ClientCnxn: Session established
complete on server node-ana-coreimab.mrs-qgnh.com/192.168.0.32:2181, sessionId = 0x240000098fa710d6, negotiated timeout = 90000
HBase Shell: enter 'help(RETURN)' for list of supported commands.
Type "exit(RETURN)" to leave the HBase Shell
Version 1.3.1-mrs-1.9.0, rUnknown, Sat Dec 7 14:43:10 CST 2019
hbase(main):001:0>

```

6. 案例实现

本案例选取华为官方商城中部分数据构建电商数据库，如下所示：

base_info				sale_info		
row key	name	publish	OS	RAM	ROM	price
001	mate50	2022	HarmonyOS3	8GB	128GB	4999
002	P50	2021	HarmonyOS2	8GB	128GB	<u>4488</u> 3758
003	P50	2021	HarmonyOS2	8GB	256GB	<u>4988</u> 4258

(0) 查看 create 命令的帮助文件

```

Create a table with namespace=ns1 and table qualifier=t1
hbase> create 'ns1:t1', (NAME => 'f1', VERSIONS => 5)

Create a table with namespace=default and table qualifier=t1
hbase> create 't1', (NAME => 'f1'), (NAME => 'f2'), (NAME => 'f3')
hbase> # The above in shorthand would be the following:
hbase> create 't1', 'f1', 'f2', 'f3'
hbase> create 't1', (NAME => 'f1', VERSIONS => 1, TTL => 2592000, BLOCKCACHE => true)
hbase> create 't1', (NAME => 'f1', CONFIGURATION => ('hbase.hstore.blockingStoreFiles' => '10'))
hbase> create 't1', (NAME => 'f1', IS_MOB => true, MOB_THRESHOLD => 1000000, MOB_COMPACT_PARTITION_POLICY => 'weekly')

Table configuration options can be put at the end.
Examples:

hbase> create 'ns1:t1', 'f1', SPLITS => ['10', '20', '30', '40']
hbase> create 't1', 'f1', SPLITS => ['10', '20', '30', '40']
hbase> create 't1', 'f1', SPLITS_FILE => 'splits.txt', OWNER => 'johndoe'
hbase> create 't1', (NAME => 'f1', VERSIONS => 5), METADATA => ( 'mykey' => 'myvalue' )
hbase> # Optionally pre-split the table into NUMREGIONS, using
hbase> # SPLITALGO ("HexStringSplit", "UniformSplit" or classname)
hbase> create 't1', 'f1', (NUMREGIONS => 15, SPLITALGO => 'HexStringSplit')
hbase> create 't1', 'f1', (NUMREGIONS => 15, SPLITALGO => 'HexStringSplit', REGION_REPLICATION => 2, CONFIGURATION => ('hbase
hregion.scan.loadColumnFamiliesOnDemand' => 'true'))
hbase> create 't1', (NAME => 'f1', DFS_REPLICATION => 1)

You can also keep around a reference to the created table:

hbase> t1 = create 't1', 'f1'

Which gives you a reference to the table named 't1', on which you can then
call methods.

```

(1) 创建华为手机存储表，包含了基础信息和销售信息两个列族

```

hbase(main):003:0> create 'huawei_phones', (NAME => 'base_info', VERSIONS => 2), (NAME => 'sale_info', VERSIONS => 10)
2022-11-22 01:22:54,900 INFO [main] client.HBaseAdmin: Created huawei_phones
0 row(s) in 1.6408 seconds
=> Hbase::Table - huawei_phones
hbase(main):004:0>

```

可以查看表的信息：

```
hbase(main):004:0> describe 'huawei_phones'
Table huawei_phones is ENABLED
huawei_phones
COLUMN FAMILIES DESCRIPTION
(NAME => 'base_info', BLOOMFILTER => 'ROW', VERSIONS => '2', IN_MEMORY => 'false', KEEP_DELETED_CELLS => 'FALSE', DATA_BLOCK_ENCODING => 'NONE', TTL => 'FOREVER', COMPRESSION => 'NONE', MIN_VERSIONS => '0', BLOCKCACHE => 'true', BLOCKSIZE => '65536', REPLICATION_SCOPE => '0')
(NAME => 'sale_info', BLOOMFILTER => 'ROW', VERSIONS => '10', IN_MEMORY => 'false', KEEP_DELETED_CELLS => 'FALSE', DATA_BLOCK_ENCODING => 'NONE', TTL => 'FOREVER', COMPRESSION => 'NONE', MIN_VERSIONS => '0', BLOCKCACHE => 'true', BLOCKSIZE => '65536', REPLICATION_SCOPE => '0')
2 row(s) in 0.1640 seconds
```

(2) 存入 mate50

```
hbase(main):005:0> put 'huawei_phones','001','base_info:name','mate50'
put 'hu0 row(s) in 0.1230 seconds

hbase(main):006:0> put 'huawei_phones','001','base_info:publish','2022'
0 row(s) in 0.0170 seconds

hbase(main):007:0> put 'huawei_phones','001','base_info:os','harmonyos3'
p0 row(s) in 0.0200 seconds

uhbase(main):008:0> put 'huawei_phones','001','sale_info:ram','8'
0 row(s) in 0.0060 seconds

hbase(main):009:0> put 'huawei_phones','001','sale_info:rom','128'
p0 row(s) in 0.0160 seconds

uhbase(main):010:0> put 'huawei_phones','001','sale_info:price','4999'
0 row(s) in 0.0170 seconds
```

(3) 存入p50 128G

```
hbase(main):011:0> put 'huawei_phones','002','base_info:name','p50'
0 row(s) in 0.0110 seconds

phbase(main):012:0> put 'huawei_phones','002','base_info:publish','2021'
p0 row(s) in 0.0200 seconds

uhbase(main):013:0> put 'huawei_phones','002','base_info:os','harmonyos2'
pu0 row(s) in 0.0300 seconds

hbase(main):014:0> put 'huawei_phones','002','sale_info:ram','8'
0 row(s) in 0.0060 seconds

phbase(main):015:0> put 'huawei_phones','002','sale_info:rom','128'
put 0 row(s) in 0.0360 seconds

'hbase(main):016:0> put 'huawei_phones','002','sale_info:price','4488'
0 row(s) in 0.0560 seconds
```

(4) 存入 p50 256G

```
hbase(main):017:0> put 'huawei_phones','003','base_info:name','p50'
p0 row(s) in 0.0120 seconds

hbase(main):018:0> put 'huawei_phones','003','base_info:publish','2021'
0 row(s) in 0.0140 seconds
p
hbase(main):019:0> put 'huawei_phones','003','base_info:os','harmonyos2'
p0 row(s) in 0.0150 seconds

uhbase(main):020:0> put 'huawei_phones','003','sale_info:ram','8'
0 row(s) in 0.0110 seconds

puhbase(main):021:0> put 'huawei_phones','003','sale_info:rom','256'
p0 row(s) in 0.0170 seconds

hbase(main):022:0> put 'huawei_phones','003','sale_info:price','4988'
0 row(s) in 0.0340 seconds
```

(5) 更新 p50 的双十一折扣价格


```
hbase(main):023:0> put 'huawei_phones','002','sale_info:price','3758'
put 0 row(s) in 0.0240 seconds

hbase(main):024:0> put 'huawei_phones','003','sale_info:price','4988'
0 row(s) in 0.0120 seconds
```

(6) 查询 p50 的所有数据

```
hbase(main):025:0> scan 'huawei_phones', FILTER=>"ColumnPrefixFilter('name') AND ValueFilter(=,'binary:p50')"
ROW COLUMN+CELL
002 column=base_info:name, timestamp=1669051600628, value=p50
003 column=base_info:name, timestamp=1669051834387, value=p50
2 row(s) in 0.1330 seconds
```

查询 p50,128GB 的当前价格

```
hbase(main):026:0> get 'huawei_phones','002','sale_info:price'
COLUMN CELL
sale_info:price timestamp=1669051898072, value=3758
1 row(s) in 0.0370 seconds
```

(7) 查看 p50,128GB 历史价格

```
hbase(main):027:0> get 'huawei_phones','002',{COLUMN=>'sale_info:price',VERSIONS=>2}
COLUMN CELL
sale_info:price timestamp=1669051898072, value=3758
sale_info:price timestamp=1669051771377, value=4488
1 row(s) in 0.0350 seconds
```

(8) 查看全表

```
hbase(main):028:0> scan 'huawei_phones'
ROW COLUMN+CELL
001 column=base_info:name, timestamp=1669051473725, value=mate50
001 column=base_info:os, timestamp=1669051519489, value=harmonyos3
001 column=base_info:publish, timestamp=1669051470002, value=2022
001 column=sale_info:price, timestamp=1669051523056, value=4999
001 column=sale_info:ram, timestamp=1669051520483, value=8
001 column=sale_info:rom, timestamp=1669051521512, value=128
002 column=base_info:name, timestamp=1669051600628, value=p50
002 column=base_info:os, timestamp=1669051602955, value=harmonyos2
002 column=base_info:publish, timestamp=1669051601800, value=2021
002 column=sale_info:price, timestamp=1669051898072, value=3758
002 column=sale_info:ram, timestamp=1669051603924, value=8
002 column=sale_info:rom, timestamp=1669051604980, value=128
003 column=base_info:name, timestamp=1669051834387, value=p50
003 column=base_info:os, timestamp=1669051837517, value=harmonyos2
003 column=base_info:publish, timestamp=1669051836360, value=2021
003 column=sale_info:price, timestamp=1669051900313, value=4988
003 column=sale_info:ram, timestamp=1669051838485, value=8
003 column=sale_info:rom, timestamp=1669051839510, value=256
3 row(s) in 0.0640 seconds
```

(9) 数据库删除表

```
hbase(main):029:0> disable 'huawei_phones'
drop2022-11-22 01:35:30,458 INFO [main] client.HBaseAdmin: Started disable of huawei_phones
'huawei_phones'2022-11-22 01:35:32,775 INFO [main] client.HBaseAdmin: Disabled huawei_phones
0 row(s) in 2.4050 seconds

hbase(main):030:0> drop 'huawei_phones'
2022-11-22 01:35:36,095 INFO [main] client.HBaseAdmin: Deleted huawei_phones
0 row(s) in 1.2640 seconds
```

到此，华为云 MRS 特色实验完成。

四、实验结果及分析和（或）源程序调试过程

实验结果

添加完数据后查看全表如下：

```
hbase(main):028:0> scan 'huawei_phones'
ROW                                COLUMN+CELL
001                                column=base_info:name, timestamp=1669051473725, value=mate50
001                                column=base_info:os, timestamp=1669051519489, value=harmonyos3
001                                column=base_info:publish, timestamp=1669051478002, value=2022
001                                column=sale_info:price, timestamp=1669051523856, value=4999
001                                column=sale_info:ram, timestamp=1669051520483, value=8
001                                column=sale_info:rom, timestamp=1669051521512, value=128
002                                column=base_info:name, timestamp=1669051600628, value=p50
002                                column=base_info:os, timestamp=1669051602955, value=harmonyos2
002                                column=base_info:publish, timestamp=1669051601808, value=2021
002                                column=sale_info:price, timestamp=1669051898072, value=3758
002                                column=sale_info:ram, timestamp=1669051603924, value=8
002                                column=sale_info:rom, timestamp=1669051604900, value=128
003                                column=base_info:name, timestamp=1669051834387, value=p50
003                                column=base_info:os, timestamp=1669051837517, value=harmonyos2
003                                column=base_info:publish, timestamp=1669051836360, value=2021
003                                column=sale_info:price, timestamp=1669051900313, value=4980
003                                column=sale_info:ram, timestamp=1669051838485, value=8
003                                column=sale_info:rom, timestamp=1669051839510, value=256
3 row(s) in 0.0640 seconds
```

最后数据库成功删除表：

```
hbase(main):029:0> disable 'huawei_phones'
drop2022-11-22 01:35:30,458 INFO [main] client.HBaseAdmin: Started disable of huawei_phones
'huawei_phones'2022-11-22 01:35:32,775 INFO [main] client.HBaseAdmin: Disabled huawei_phones
0 row(s) in 2.4050 seconds

hbase(main):030:0> drop 'huawei_phones'
2022-11-22 01:35:36,095 INFO [main] client.HBaseAdmin: Deleted huawei_phones
0 row(s) in 1.2640 seconds
```

调试过程

1. 前往 manager 失败，网页无法打开。

解决办法是**手动**放通 9022 端口；

[添加入方向规则](#) [帮我设置](#)

安全组规则对不同规格的云服务器生效情况不同，为了避免您的安全组规则不生效，请查看安全组规则限制。

安全组 mrs_mrs_promotion_16_GbX

如您想添加多条规则，建议单击 [导入规则](#) 以进行批量导入。

优先级	策略	协议端口	类型	源地址	描述	操作
1	允许	基本协议/自定义TCP	IPv4	IP地址 0.0.0.0		复制 删除

增加1条规则

[确定](#) [取消](#)

2. 登录时一直 incorrect:

```
sudo su - root
Password:
Login incorrect

node-master1aUxU login:
```

解决办法是先输入用户名即“root”再输密码；

3. 更新主管理节点的客户端配置失败：

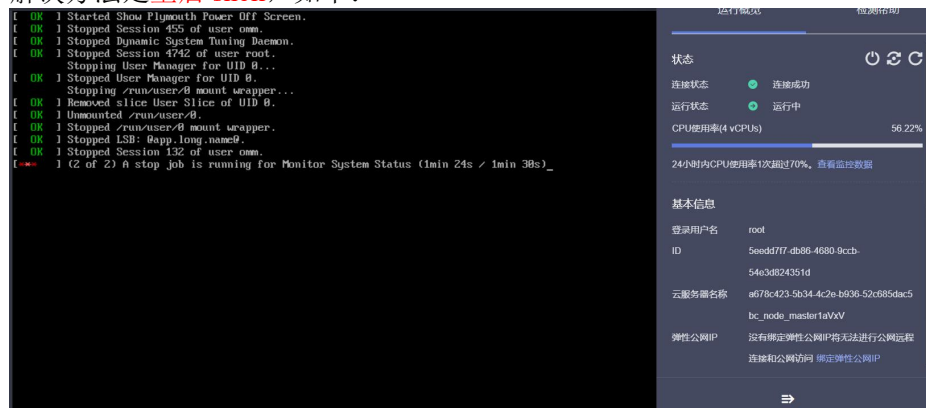
```
[omm@node-master2BZiG ~]$ cd /opt/client
[omm@node-master2BZiG client]$ sh refreshConfig.sh /opt/client /tmp/MRS-client/MRS_Services_Client.tar
[22-11-22 00:17:03]: The current user is not user root.
Failed to decompress outer client config.
[22-11-22 00:17:03]: Error: Failed to refresh components client config.
[omm@node-master2BZiG client]$
```

解决办法是**重新登录 VNC** 即可；

4. 查询指令不展示结果:

```
hbase(main):026:1> scan 'huawei_phones', FILTER=>'ColumnPrefixFilter('name') AND ValueFilter(=, 'binary:p50')
hbase(main):027:1> get 'huawei_phones', '002', 'sale_info:price'
hbase(main):028:1> get 'huawei_phones', '002', {COLUMN=>'sale_info:price', VERSIONS=>2}
hbase(main):029:1> scan 'huawei_phones'
hbase(main):030:1> disable 'huawei_phones'
hbase(main):031:1> drop 'huawei_phones'
hbase(main):032:1>
```

解决办法是**重启 shell**，如下：



The image shows a terminal window on the left with the following output:

```
[ OK ] Started Show Plymouth Power Off Screen.
[ OK ] Stopped Session 455 of user omm.
[ OK ] Stopped Dynamic System Tuning Daemon.
[ OK ] Stopped Session 4742 of user root.
      Stopping User Manager for UID 0...
[ OK ] Stopped User Manager for UID 0.
      Stopping /run/user/0 mount wrapper...
[ OK ] Removed slice User Slice of UID 0.
[ OK ] Unmounted /run/user/0.
[ OK ] Stopped /run/user/0 mount wrapper.
[ OK ] Stopped LSB: @app.long.name@.
[ OK ] Stopped Session 132 of user omm.
[ - ] (2 of 2) A stop job is running for Monitor System Status (1min 24s / 1min 30s)_
```

On the right is the Huawei Cloud Manager interface. It displays the following information:

- 状态 (Status):** 连接状态 (Connection Status) is 连接成功 (Connected), 运行状态 (Running Status) is 运行中 (Running), and CPU使用率 (4 vCPUs) (CPU Usage (4 vCPUs)) is 56.22%.
- 基本信息 (Basic Information):**
 - 登录用户名 (Login Username): root
 - ID: 5eedd777-d866-4680-9ccb-54e3b824351d
 - 云服务端名称 (Cloud Service Name): a678c423-5b34-4c2e-b636-52c685d0c5
 - 弹性公网IP (Elastic Public IP): bc_node_master1aVwV
 - 弹性公网IP (Elastic Public IP): 没有绑定弹性公网IP将无法进行公网远程 (No elastic public IP bound, cannot perform public network remote)
 - 连接和公网访问 (Connection and Public Network Access): 绑定弹性公网IP (Bind elastic public IP)

实验感悟:

本次实验中，我们认识了华为云的 MRS，并通过弹性公网 IP 访问 Manager，实现了主节点客户端的下载、安装和使用。并且我们在最后成功完成了案例的实现——利用华为官方商城中部分数据构建电商数据库，收获颇丰。

当然，我们在配置过程和实现过程中也遇到了很多困难，例如最开始前往 manager 失败，网页无法打开，研究了很久才发现需要考虑端口的问题，在本次实验中解决办法是手动放通 9022 端口。还有一些看似比较容易的地方也会出错，比如登录时直接输入密码，导致一直无法成功登录，这里要注意先输入默认的用户名 root；此外，还有更新主管理节点时的客户端配置失败和查询指令不展示结果这样的问题，它们都可以通过重启进行解决.....

最终，在我们的尝试探索下，终于成功完成该次实验，对于华为云有了更加深刻的理解，也可以更好的使用它！