Exploring HBase 1

Objective: Use the HBase Shell to populate and explore the `hbase:meta` table.

HDFS paths: `/hbase/data/default` `/hbase/data/default/tags` `/hbase/data/default/movie`

HBase tables: `movies, tags, hbase:meta, [some name]`

Data Source: grouplens.org/datasets

In this exercise you will use the HBase Shell to explore the `hbase:meta` table.

<img src="https://user-images.githubusercontent.com/558905/40613898-7a6c70d6-624e-11e8-9178-7bde851ac7bd.png" align="left" width="50" height="50" title="ToDo Logo">
<h4>1. The HBase Shell</h4>

Invoke the HBase shell and print the help menu:

```
hbase shell
```

Get the status of the HBase cluster:

```
hbase(main):000:0> status 'simple'

1 live servers
localhost:60020 1425572833316 requestsPerSecond=0.0, numbe
rOfOnlineRegions=4,usedHeapMB=72, maxHeapMB=503, numberOfS
tores=6, numberOfStorefiles=8, storefileUncompressedSizeMB
=34, storefileSizeMB=34, compressionRatio=1.0000, memstore
SizeMB=0, storefileIndexSizeMB=0, readRequestsCount=82856,
 writeRequestsCount=37055, rootIndexSizeKB=43, totalStatic
IndexSizeKB=20, totalStaticBloomSizeKB=32, totalCompacting
KVs=33915, currentCompactedKVs=33915, compactionProgressPc
t=1.0, coprocessors=[]
0 dead servers
Aggregate load: 0, regions: 4
```

This command shows the status of all nodes in the cluster. It breaks the information down into live and dead servers.
The live servers show information about the load and number of regions each node is handling. It will display
details about the system status like a number of servers present in the cluster, active server count, and average load value.
You can also pass parameters depending on how detailed status you want.
The parameters can be ‘summary’, ‘simple’, or ‘detailed’. The default is ‘summary’.

You can also get a detailed status by adding `detailed` to the status

command:

```
hbase(main):000:0> status 'detailed'
version 0.96.0.2.0.6.0-76-hadoop2
0   regionsInTransition master coprocessors: [ ]
1   live servers
sandbox.hortonworks.com:60020 1390046418833 requestsPerSec
ond=0.0, numberOfOnlineRegions=4,
usedHeapMB=102, maxHeapMB=1004, numberOfStores=4, numberOf
Storefiles=4, storefileUncompressedSizeMB=14, storefileSiz
eMB=14,
compressionRatio=1.0000, memstoreSizeMB=0, storefileIndexS
izeMB=0, readRequestsCount=1231, writeRequestsCount=46, ro
otIndexSizeKB=16,
totalStaticIndexSizeKB=8, totalStaticBloomSizeKB=64, total
CompactingKVs=37,
...
```

Now do more status check for summary:

```
hbase(main):000:0> status 'summary'
```

Determine what user you are connected as. Use the whoami command:

```
hbase> whoami
root (auth:SIMPLE)
```

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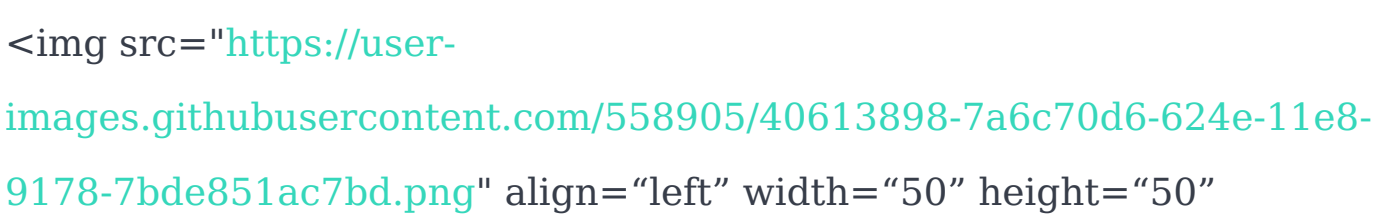
<h4>2. Getting Help</h4>

Run the help command and view the output:

```
hbase(main):027:0> help
```

Type `help "COMMAND"`, (e.g. `help "get"` - the quotes are necessary) for help on a specific command. Commands are grouped. Type `help "COMMAND_GROUP"`, (e.g. `help "general"`) for help on a command group.


align="left" width="50" height="50" title="ToDo Logo">
<h4>3. HBase Meta Table</h4>

Now scan the `hbase:meta` It will give information about the tables that HBase is serving (your results may vary):

```
hbase> scan 'hbase:meta'
```

ROW	COLUMN+CELL

hbase:namespace,	… column=info:regioninfo, timestamp=1425389660
movie,	…column=info:regioninfo, timestamp=14254029136
movie, …	column=info:seqnumDuringOpen, timestamp=1425572846014,value=\x00\x00\x00\x0(…
movie, …	column=info:server, timestamp=1425572846014,value=localhost:60020,
movie, …	column=info:serverstartcode, timestamp=1425572846014,value=1425572833316
user, …	column=info:regioninfo, timestamp=142540293339
…	

The `hbase:meta` table contains information about the node that is serving the table. It also keeps track of the start and end keys for the region. Clients use this information to know which node or RegionServer to contact to access a row.

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<h4>4. Create a Table</h4>

Now let’s create a new table (whatever name you wish):

```
hbase> create [some name], 'cf1', 'cf2', {SPLITS => ['A',
```

```
'M', 'Z']}
```

When creating a new table in HBase, you can split the table into regions as the starting point. The splits passed in during the create will serve as the initial regions for the table.

Now again get the status of the HBase cluster:

```
hbase> status 'simple'

1 live servers
localhost:60020 1425572833316 requestsPerSecond=0.0, numbe
rOfOnlineRegions=8,
usedHeapMB=71, maxHeapMB=503, numberOfStores=14, numberOfS
torefiles=8, storefileUncompressedSizeMB=34, storefileSize
MB=34, compressionRatio=1.0000, memstoreSizeMB=0, storefil
eIndexSizeMB=0, readRequestsCount=82887, writeRequestsCoun
t=37063, rootIndexSizeKB=43, totalStaticIndexSizeKB=20, to
talStaticBloomSizeKB=32, totalCompactingKVs=33915, current
CompactedKVs=33915, compactionProgressPct=1.0, coprocessor
s=[]

0 dead servers
Aggregate load: 0, regions: 8
```

> *Note: the number of regions increased by four to account for the four regions in the your table.*

Scan the `hbase:meta` table again:

```
hbase> scan 'hbase:meta'
```

> *Note that the `hbase:meta` information for the table has multiple regions and those regions have start and end row keys. Look at how HBase took the splits in the table creation command and made regions out of them.*

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<h4>5. Drop the Table</h4>

So now drop your table:

```
hbase> disable '[some name]'
hbase> drop '[some name]'
```

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<h4>6. Flushing Tables</h4>

Put some data into hbase:

```
hbase> create 'movie', 'cf1'
hbase> create 'location', 'cf1'
hbase> put 'movie', 1001, 'cf1:title', 'All The Kings Men'
hbase> put 'movie', 1001, 'cf1:title', 'Ulysses'
hbase> put 'movie', 1001, 'cf1:title', 'The Sting'
hbase> put 'movie', 1001, 'cf1:title', 'When We Were Young
'
hbase> put 'location', 1012, 'cf1:city', 'Los Angeles'
hbase> put 'location', 1034, 'cf1:city', 'London'
hbase> put 'location', 1056, 'cf1:city', 'Benhru'
hbase> put 'location', 1052, 'cf1:city', 'Nashik'
```

Flush the movie and tags tables. This writes out the data from the memstore to HDFS:

```
hbase> flush 'movie'
hbase> flush 'location'
```

Now scan the tables:

```
hbase> scan 'movie'
hbase> scan 'location'
```

Quit the HBase shell:

```
hbase> quit
```

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<h4>7. Look at the table Information</h4>

Get the full path in HDFS where the movie table’s info column family’s data is stored:

```
hdfs dfs -ls -R /apps/hbase/data/data/default
hdfs dfs -ls -R /apps/hbase/data/data/default/movie/*/*info
```

Using the path from the ls, run the following command and replace the movie path with the previous command’s path output:

```
hbase hfile --printkv --file /apps/hbase/data/data/default/<moviepath>
```

Results:

```
2015-03-05 18:44:00,210 INFO [main] Configuration.deprecation: hadoop.native.lib is deprecated. Instead, use io.native.lib.available
```

```
2015-03-05 18:44:00,580 INFO [main] util.ChecksumType: Che
cksum using org.apache.hadoop.util.PureJavaCrc32
2015-03-05 18:44:00,581 INFO [main] util.ChecksumType: Che
cksum can use org.apache.hadoop.util.PureJavaCrc32C
2015-03-05 18:44:02,680 INFO [main] Configuration.deprecat
ion:  fs.default.name is deprecated. Instead, use fs.defau
ltFS
2015-03-05 18:44:03,056 INFO [main] hfile.CacheConfig: All
ocating LruBlockCache with maximum size 396.7 M
K: 1/info:average/1425593979703/Put/vlen=4/mvcc=0 V: 4.15
K: 1/info:count/1425593979703/Put/vlen=4/mvcc=0 V: 2077
K: 10/info:average/1425593979703/Put/vlen=4/mvcc=0 V: 3.54

K: 10/info:count/1425593979703/Put/vlen=3/mvcc=0 V: 888
K: 100/info:average/1425593979703/Put/vlen=4/mvcc=0 V: 3.0
6
K: 100/info:count/1425593979703/Put/vlen=3/mvcc=0 V: 128
K: 1000/info:average/1425593979703/Put/vlen=4/mvcc=0 V: 3.
05
K: 1000/info:count/1425593979703/Put/vlen=2/mvcc=0 V: 20
K: 1002/info:average/1425593979703/Put/vlen=4/mvcc=0 V: 4.
25
K: 1002/info:count/1425593979703/Put/vlen=1/mvcc=0 V: 8
K: 1003/info:average/1425593979703/Put/vlen=4/mvcc=0 V: 2.
94
...
```

The above command allows you to see how HBase stores the HFiles. All row keys are stored in sorted order; and, for each row key, all column descriptors are stored in sorted order.

> *Note: The preceding screen shot shows an output labeled mvcc. HBase maintains ACID semantics using Multiversion Concurrency Control (MVCC). MVCC as implemented in HBase enables updates to occur without impacting readers, and without the need to use read locks. With MVCC, old data is not overwritten. Instead, the old data is marked as obsolete once the new data has been added.*

An mvcc value of zero means that all of the file contents can participate in any ongoing transaction.

In the case of an ongoing scan or read, a just-flushed update can be added to the ongoing read. However, if the mvcc has a higher value than that of the ongoing read, the update is not sent to the Client.

Get the full path in HDFS where the user table's info column family's data is stored:

```
hdfs dfs -ls /hbase/data/default/user/*/info
```

Using the path from the ls, run the following command and replace the user path with the previous command's path output:

```
hbase hfile --printkv --file /hbase/data/default/user/<use
```

```
rpath>
```

The above command allows you to see how HBase stores the HFiles. All row keys are stored in sorted order and all Column Descriptors are stored in sorted order.

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<h4>8. clean</h4>

And to get rid of everything:

```
$ bin/hbase clean
```

> *Note: beware!*

```
Usage: hbase clean (--cleanZk|--cleanHdfs|--cleanAll)
Options:
    --cleanZk   cleans hbase related data from zookeeper.
    --cleanHdfs cleans hbase related data from hdfs.
    --cleanAll  cleans hbase related data from both zookee
per and hdfs.
```

Results

Well, you did it! You can see where the command line gives you lots of usability.

<button type=“button”>Go Back</button>

