



# HBase

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Install HBase

```
C:\Users\askarays>docker create --name hbase --network bigdata_network -it ofrir119/hbase:1.0.0
Unable to find image 'ofrir119/hbase:1.0.0' locally
1.0.0: Pulling from ofrir119/hbase
6cf436f81810: Pull complete
987088a85b96: Pull complete
b4624b3efe06: Pull complete
d42beb8ded59: Pull complete
775d6b0e96a1: Pull complete
07a63c413574: Pull complete
6ca6a8251fdd: Pull complete
4974a4e01874: Pull complete
a6f65183f1a9: Pull complete
159beed970fa: Pull complete
Digest: sha256:daa36a6d90b118ced866b6c76fcd918e7da73302b0e4971f506f0f61f645a9fe
Status: Downloaded newer image for ofrir119/hbase:1.0.0
e9cd1fad24604e8c6c14c72bb191fa992fbee900a91ceb706e32cf9557c3317a
```

## 1. NOTES REGARDING THE PRACTICE

o For all practices below – write all the commands you have used in a “Practice answers document”.

When you are complete, you can submit this document for review.

### ▼ Practice answers document

```
#install HBase
docker create --name hbase --network bigdata_network -it o
#Connecting
docker ps -a
docker exec -it hbase /bin/bash
#GENERAL DETAILS
# View HBase scripts in the "Bin" directory
ls /opt/hbase/bin
# Enter HBase Shell
hbase shell
```

```

# Get HBase status in different levels
status
status 'simple'
status 'detailed'

# List all filters
list
can 'hbase:meta', {COLUMNS => 'info:regioninfo', FILTER =>
# List all tables
list
# Create "employees" table with column families and version
create 'employees', {NAME=>'personal_data', VERSIONS=>2},

# List all tables
list

# Insert data for ten employees
put 'employees', '1', 'personal_data:first_name', 'Aisha'
put 'employees', '1', 'personal_data:surname', 'Askarova'
put 'employees', '1', 'personal_data:age', '23'
put 'employees', '1', 'professional_data:role', 'Data Scie

put 'employees', '2', 'personal_data:first_name', 'Roman'
put 'employees', '2', 'personal_data:surname', 'Tsoy'
put 'employees', '2', 'personal_data:age', '21'
put 'employees', '2', 'professional_data:role', 'Data anal
put 'employees', '2', 'professional_data:expertise', 'Powe

put 'employees', '3', 'personal_data:first_name', 'Didar'
put 'employees', '3', 'personal_data:surname', 'Suleymenov'
put 'employees', '3', 'personal_data:age', '35'
put 'employees', '3', 'professional_data:role', 'Data Scie
put 'employees', '3', 'professional_data:expertise', 'Mach

put 'employees', '4', 'personal_data:first_name', 'Elena'

```

```

put 'employees', '4', 'personal_data:surname', 'Ivanova'
put 'employees', '4', 'personal_data:age', '28'
put 'employees', '4', 'professional_data:role', 'UX Design'
put 'employees', '4', 'professional_data:expertise', 'User

put 'employees', '5', 'personal_data:first_name', 'Aidyn'
put 'employees', '5', 'personal_data:surname', 'Abdrahman'
put 'employees', '5', 'personal_data:age', '40'
put 'employees', '5', 'professional_data:role', 'Product M
put 'employees', '5', 'professional_data:expertise', 'Prod

put 'employees', '6', 'personal_data:first_name', 'Ravil'
put 'employees', '6', 'personal_data:surname', 'Brankov'
put 'employees', '6', 'personal_data:age', '33'
put 'employees', '6', 'professional_data:role', 'Software
put 'employees', '6', 'professional_data:expertise', 'Web

put 'employees', '7', 'personal_data:first_name', 'Aisulu'
put 'employees', '7', 'personal_data:surname', 'Mukanova'
put 'employees', '7', 'personal_data:age', '36'
put 'employees', '7', 'professional_data:role', 'Data Anal
put 'employees', '7', 'professional_data:expertise', 'Data

put 'employees', '8', 'personal_data:first_name', 'Victori
put 'employees', '8', 'personal_data:surname', 'Tsoy'
put 'employees', '8', 'personal_data:age', '38'
put 'employees', '8', 'professional_data:role', 'System Ad
put 'employees', '8', 'professional_data:expertise', 'IT I

put 'employees', '9', 'personal_data:first_name', 'Olya'
put 'employees', '9', 'personal_data:surname', 'Danilova'
put 'employees', '9', 'personal_data:age', '33'
put 'employees', '9', 'professional_data:role', 'Data Anal
put 'employees', '9', 'professional_data:expertise', 'Data

put 'employees', '10', 'personal_data:first_name', 'Victor

```

```

put 'employees', '10', 'personal_data:surname', 'Popov'
put 'employees', '10', 'personal_data:age', '29'
put 'employees', '10', 'professional_data:role', 'Marketing'
put 'employees', '10', 'professional_data:expertise', 'Digital'

# Scan employee table to print all rows
scan 'employees'

# Get all data of employee with id 7
get 'employees', 7

# Update age and role of employee number 3
put 'employees', 3, 'personal_data:age', '25', 'professional_data:role', 'Marketing'

# Get all data of employee with id 3 and ensure updates applied
get 'employees', 3

#Query Data
# Query all records in employees table
scan 'employees'

# Get all data of employee with id 3 and the 3 last versions
get 'employees', 3, {COLUMN=>'personal_data', VERSIONS=>3}

# Get all data of employees with age bigger or equals to 4
scan 'employees', {FILTER => "SingleColumnValueFilter('personal_data:age', true, GreaterThanOrEqual, '4')"}

# Get only role value of all employees with age bigger than 4
scan 'employees', { FILTER => "SingleColumnValueFilter('personal_data:age', true, GreaterThanOrEqual, '4'), SingleColumnValueFilter('professional_data:role', true, Equals, 'Marketing')"}

# Count the number of all employees
count 'employees'

# Count the number of employees with age less than 40
scan 'employees', {FILTER => "SingleColumnValueFilter('personal_data:age', true, LessThan, '40')"}

```

```
# Delete the newer age for employee with id 3
delete 'employees', 3, 'personal_data:age'

# Get the data of employee with id 3 and validate his age
get 'employees', 3

#Delete Table
disable 'employees'
drop 'employees'

#Checking
scan 'employees'
```

## 2. CONNECT TO THE THE HBASE ENVIRONMENT

o Verify the “hbase” environment is up and running:

```
docker ps -a
```

o Open a BASH session to the practice environment

```
docker exec -it hbase /bin/bash
```

```
C:\Users\askarays>docker start hbase
hbase

C:\Users\askarays>docker ps -a
```

CONTAINER ID	IMAGE	COMMAND	NAMES	CREATED	STATUS
e9cd1fad2460	ofrir119/hbase:1.0.0	"/opt/hbase-server"	hbase	6 minutes ago	Up 13 seconds
dadc2f83ff7b	mongo	"docker-entrypoint.s..."	mongo	7 days ago	Exited (255)
f212e9ae415a	mysql	"docker-entrypoint.s..."	mysql	2 weeks ago	Exited (255)
6d48f1e1fee7	ofrir119/kafka:2.4.0	"supervisord -n"	kafka	3 weeks ago	Exited (0)
158171c04fe4	bde2020/hive:2.3.2-postgresql-metastore	"entrypoint.sh /opt/..."	docker-hive-hive-metastore-1	2 months ago	Exited (143)
3e241645f9cc	gethue/hue	". /startup.sh"	docker-hive-hue-1	2 months ago	Exited (137)
0f5959428f70	bde2020/hadoop-namenode:2.0.0-hadoop2.7.4-java8	"/entrypoint.sh /run..."	docker-hive-namenode-1	2 months ago	Exited (137)
bab2e686a1a4	bde2020/hive:2.3.2-postgresql-metastore	"entrypoint.sh /bin/..."	docker-hive-hive-server-1	2 months ago	Exited (137)
f8018166a486	bde2020/hadoop-datanode:2.0.0-hadoop2.7.4-java8	"/entrypoint.sh /run..."	docker-hive-datanode-1	2 months ago	Exited (137)
7aa8c4c4ca7f	bde2020/hive-metastore-postgresql:2.3.0	"/docker-entrypoint..."	docker-hive-hive-metastore-postgresql-1	2 months ago	Exited (0)

```
C:\Users\askarays>docker exec -it hbase /bin/bash
root@e9cd1fad2460:/#
```

### 3. GENERAL DETAILS (10)

o View the HBase related scripts in the HBase “Bin” directory

- Hint: The location of the base directory should be in “/opt”
- You should see ~25 scripts

```
root@e9cd1fad2460:/# ls /opt/hbase/bin
considerAsDead.sh      hbase-cleanup.sh      hbase-jruby            region_mover.rb        shutdown_regionserver.rb
draining_servers.rb    hbase-common.sh        hirb.rb                region_status.rb       start-hbase.sh
get-active-master.rb    hbase-config.sh        local-master-backup.sh  regionserver.sh        stop-hbase.sh
graceful_stop.sh        hbase-daemon.sh        local-regionserver.sh  replication            test
hbase                  hbase-daemons.sh      master-backup.sh        rolling-restart.sh     zookeepers.sh
root@e9cd1fad2460:/#
```

o Enter HBase Shell

```
root@e9cd1fad2460:/# hbase shell
2024-02-05 09:18:29,058 WARN [main] util.NativeCodeLoader: Unable to load native-hadoop library for your platform... us
ing builtin-java classes where applicable
HBase Shell
Use "help" to get list of supported commands.
Use "exit" to quit this interactive shell.
For Reference, please visit: http://hbase.apache.org/2.0/book.html#shell
Version 2.1.2, r1d4c18f77801fbfb59a125756891b9100c1fc6d, Sun Dec 30 21:45:09 PST 2018
Took 0.0018 seconds
hbase(main):001:0>
```

o Get the HBase status in different levels

- Retrieve base status, simple status, and detailed status

```
hbase(main):001:0> status
1 active master, 0 backup masters, 1 servers, 0 dead, 2.0000 average load
Took 0.2783 seconds
hbase(main):002:0> status 'simple'
active master: e9cd1fad2460:16000 1707124290903
0 backup masters
1 live servers
  e9cd1fad2460:16020 1707124292007
    requestsPerSecond=0.0, numberOfOnlineRegions=2, usedHeapMB=128, maxHeapMB=6292, numberOfStores=4, numberOfStoref
iles=4, storefileUncompressedSizeMB=0, storefileSizeMB=0, memstoreSizeMB=0, storefileIndexSizeKB=0, readRequestsCount=5,
  filteredReadRequestsCount=0, writeRequestsCount=7, rootIndexSizeKB=0, totalStaticIndexSizeKB=0, totalStaticBloomSizeKB=
0, totalCompactingKVs=0, currentCompactedKVs=0, compactionProgressPct=NaN, coprocessors=[MultiRowMutationEndpoint]
0 dead servers
Aggregate load: 0, regions: 2
Took 0.0182 seconds
hbase(main):003:0> status 'detailed'
version 2.1.2
0 regionsInTransition
active master: e9cd1fad2460:16000 1707124290903
0 backup masters
master coprocessors: []
1 live servers
  e9cd1fad2460:16020 1707124292007
    requestsPerSecond=0.0, numberOfOnlineRegions=2, usedHeapMB=128, maxHeapMB=6292, numberOfStores=4, numberOfStoref
iles=4, storefileUncompressedSizeMB=0, storefileSizeMB=0, memstoreSizeMB=0, storefileIndexSizeKB=0, readRequestsCount=5,
  filteredReadRequestsCount=0, writeRequestsCount=7, rootIndexSizeKB=0, totalStaticIndexSizeKB=0, totalStaticBloomSizeKB=
0, totalCompactingKVs=0, currentCompactedKVs=0, compactionProgressPct=NaN, coprocessors=[MultiRowMutationEndpoint]
    "hbase:meta,1"
      numberOfStores=3, numberOfStorefiles=3, storefileUncompressedSizeMB=0, lastMajorCompactionTimestamp=0, store
fileSizeMB=0, memstoreSizeMB=0, readRequestsCount=3, writeRequestsCount=5, rootIndexSizeKB=0, totalStaticIndexSizeKB=0,
totalStaticBloomSizeKB=0, totalCompactingKVs=0, currentCompactedKVs=0, compactionProgressPct=NaN, completeSequenceId=9,
dataLocality=0.0
    "hbase:namespace,,1707124303816.873a15c6a917b15a87efb0e4ce70622d."
      numberOfStores=1, numberOfStorefiles=1, storefileUncompressedSizeMB=0, lastMajorCompactionTimestamp=0, store
fileSizeMB=0, memstoreSizeMB=0, readRequestsCount=2, writeRequestsCount=2, rootIndexSizeKB=0, totalStaticIndexSizeKB=0,
totalStaticBloomSizeKB=0, totalCompactingKVs=0, currentCompactedKVs=0, compactionProgressPct=NaN, completeSequenceId=-1,
dataLocality=0.0
0 dead servers
Took 0.0158 seconds
=> #<Java::JavaUtil::Collections::UnmodifiableRandomAccessList:0x542ff147>
hbase(main):004:0>
```

- o List all filters

```
hbase(main):007:0> list_peers
PEER_ID CLUSTER_KEY ENDPOINT_CLASSNAME STATE REPLICATE_ALL NAMESPACES TABLE_CFS BANDWIDTH SERIAL
0 row(s)
Took 0.0201 seconds
=> #<Java::JavaUtil::ArrayList:0x1de30c31>
```

- o List all tables

```
hbase(main):005:0> list
TABLE
0 row(s)
Took 0.0175 seconds
=> []
hbase(main):006:0> _
```

#### 4. TABLE AND DATA CREATION (30)

- o Create a table with the name: “employees” with the following column families
  - personal\_data

```
create 'employees', 'personal_data'
```

```
hbase(main):008:0> create 'employees', 'personal_data'
Created table employees
Took 0.7801 seconds
=> Hbase::Table - employees
hbase(main):009:0>
```

- Store 2 versions for this column
  - professional\_data

```
alter 'employees', {NAME=>'personal_data', VERSIONS=>2}, {NAME=>'professional_data',
VERSIONS=>2}
```

```
hbase(main):011:0* alter 'employees', {NAME=>'personal_data', VERSIONS=>2}, {NAME=>'professional_data', VERSIONS=>2}
Updating all regions with the new schema...
1/1 regions updated.
Done.
Took 1.7033 seconds
hbase(main):012:0> _
```

- Store 4 versions for this column
  - o List all tables

```

Took 1.7033 seconds
hbase(main):012:0> list
TABLE
employees
1 row(s)
Took 0.0061 seconds
=> ["employees"]
hbase(main):013:0>

```

o Insert data for ten employees

- The id of each employee must be a unique value
- Insert employee's id to be 1 - 10
- Fill the following data
  - personal\_data
  - first\_name
  - surname
  - age
  - professional\_data
  - role
  - expertise

```

Took 0.2326 seconds
hbase(main):002:0> put 'employees', '1', 'personal_data:first_name', 'Aisha'
Took 0.0249 seconds
hbase(main):003:0> put 'employees', '1', 'personal_data:surname', 'Askarova'
Took 0.0028 seconds
hbase(main):004:0> put 'employees', '1', 'personal_data:age', '23'
Took 0.0030 seconds
hbase(main):005:0> put 'employees', '1', 'professional_data:role', 'Data Scientist'
Took 0.0023 seconds
hbase(main):006:0> scan 'employees'
ROW                                COLUMN+CELL
1                                  column=personal_data:age, timestamp=1707129546263, value=23
1                                  column=personal_data:first_name, timestamp=1707129546229, value=Aisha
1                                  column=personal_data:surname, timestamp=1707129546245, value=Askarova
1                                  column=professional_data:expertise, timestamp=1707129548556, value=Python
1                                  column=professional_data:role, timestamp=1707129546281, value=Data Scientist
row(s)

```

o Scan employee table to print all rows



```

hbase(main):010:0> scan 'employees'
ROW COLUMN+CELL
1 column=personal_data:age, timestamp=1707129546263, value=23
1 column=personal_data:first_name, timestamp=1707129546229, value=Aisha
1 column=personal_data:surname, timestamp=1707129546245, value=Askarova
1 column=professional_data:expertise, timestamp=1707129548556, value=Python
1 column=professional_data:role, timestamp=1707129546281, value=Data Scientist
10 column=personal_data:age, timestamp=1707130115648, value=29
10 column=personal_data:first_name, timestamp=1707130115614, value=Victor
10 column=personal_data:surname, timestamp=1707130115631, value=Popov
10 column=professional_data:expertise, timestamp=1707130115714, value=Digital Marketing
10 column=professional_data:role, timestamp=1707130115678, value=Marketing Specialist
2 column=personal_data:age, timestamp=1707129661334, value=21
2 column=personal_data:first_name, timestamp=1707129661313, value=Roman
2 column=personal_data:surname, timestamp=1707129661324, value=Tsoy
2 column=professional_data:expertise, timestamp=1707129661359, value=PowerBI
2 column=professional_data:role, timestamp=1707129661347, value=Data analyst
3 column=personal_data:age, timestamp=1707129761661, value=35
3 column=personal_data:first_name, timestamp=1707129761632, value=Didar
3 column=personal_data:surname, timestamp=1707129761645, value=Suleymenov
3 column=professional_data:expertise, timestamp=1707129761692, value=Machine Learning
3 column=professional_data:role, timestamp=1707129761676, value=Data Scientist
4 column=personal_data:age, timestamp=1707129770983, value=28
4 column=personal_data:first_name, timestamp=1707129770962, value=Elena
4 column=personal_data:surname, timestamp=1707129770973, value=Ivanova
4 column=professional_data:expertise, timestamp=1707129800474, value=User Experience
4 column=professional_data:role, timestamp=1707129770995, value=UX Designer
5 column=personal_data:age, timestamp=1707129801901, value=40
5 column=personal_data:first_name, timestamp=1707129801882, value=Aidyn
5 column=personal_data:surname, timestamp=1707129801892, value=Abdrahman
5 column=professional_data:expertise, timestamp=1707129802929, value=Product Development
5 column=professional_data:role, timestamp=1707129801912, value=Product Manager
6 column=personal_data:age, timestamp=1707129829976, value=33
6 column=personal_data:first_name, timestamp=1707129829959, value=Ravil
6 column=personal_data:surname, timestamp=1707129829967, value=Brankov
6 column=professional_data:expertise, timestamp=1707129830792, value=Web Development
6 column=professional_data:role, timestamp=1707129829986, value=Software Developer
7 column=personal_data:age, timestamp=1707129869607, value=36
7 column=personal_data:first_name, timestamp=1707129869587, value=Aisulu
7 column=personal_data:surname, timestamp=1707129869597, value=Mukanova
7 column=professional_data:expertise, timestamp=1707129870654, value=Data Analysis
7 column=professional_data:role, timestamp=1707129869618, value=Data Analyst
8 column=personal_data:age, timestamp=1707129903216, value=38
8 column=personal_data:first_name, timestamp=1707129903198, value=Victoria
8 column=personal_data:surname, timestamp=1707129903207, value=Tsoy
8 column=professional_data:expertise, timestamp=1707129904181, value=IT Infrastructure
8 column=professional_data:role, timestamp=1707129903229, value=System Administrator
9 column=personal_data:age, timestamp=1707130220724, value=33
9 column=personal_data:first_name, timestamp=1707129980892, value=Olya
9 column=personal_data:surname, timestamp=1707129980901, value=Danilova
9 column=professional_data:expertise, timestamp=1707130222310, value=Data Analysis
9 column=professional_data:role, timestamp=1707130220740, value=Data Analyst

```

o Get all data of employee with id 7

```

hbase(main):011:0> get 'employees', 7
COLUMN CELL
personal_data:age timestamp=1707129869607, value=36
personal_data:first_name timestamp=1707129869587, value=Aisulu
personal_data:surname timestamp=1707129869597, value=Mukanova
professional_data:expertise timestamp=1707129870654, value=Data Analysis
professional_data:role timestamp=1707129869618, value=Data Analyst
1 row(s)

```

o Update age and role of employee number 3

```

Took 0.0150 seconds
hbase(main):010:0> put 'employees', '3', 'professional_data:role', 'UI-UX designer'
Took 0.0026 seconds
hbase(main):011:0> put 'employees', '3', 'personal_data:age', '25'
Took 0.0022 seconds
hbase(main):012:0>

```

- o Get all data of employee with id 3 and make sure updates applied

```

hbase(main):012:0> get 'employees', 3
COLUMN                                CELL
personal_data:age                     timestamp=1707130666420, value=25
personal_data:first_name              timestamp=1707129761632, value=Didar
personal_data:surname                 timestamp=1707129761645, value=Suleymenov
professional_data:expertise            timestamp=1707129761692, value=Machine Learning
professional_data:role                 timestamp=1707130649997, value=UI-UX designer
1 row(s)
Took 0.0225 seconds

```

## 5. QUREY DATA (60)

- o Query all record in employees table

```
hbase(main):013:0> scan 'employees'
COLUMN+CELL
1 column=personal_data:age, timestamp=1707129546263, value=23
1 column=personal_data:first_name, timestamp=1707129546229, value=Aisha
1 column=personal_data:surname, timestamp=1707129546245, value=Askarova
1 column=professional_data:expertise, timestamp=1707129548556, value=Python
1 column=professional_data:role, timestamp=1707129546281, value=Data Scientist
10 column=personal_data:age, timestamp=1707130115648, value=29
10 column=personal_data:first_name, timestamp=1707130115614, value=Victor
10 column=personal_data:surname, timestamp=1707130115631, value=Popov
10 column=professional_data:expertise, timestamp=1707130115714, value=Digital Marketing
10 column=professional_data:role, timestamp=1707130115678, value=Marketing Specialist
2 column=personal_data:age, timestamp=1707129661334, value=21
2 column=personal_data:first_name, timestamp=1707129661313, value=Roman
2 column=personal_data:surname, timestamp=1707129661324, value=Tsoy
2 column=professional_data:expertise, timestamp=1707129661359, value=PowerBI
2 column=professional_data:role, timestamp=1707129661347, value=Data analyst
3 column=personal_data:age, timestamp=1707130666420, value=25
3 column=personal_data:first_name, timestamp=1707129761632, value=Didar
3 column=personal_data:surname, timestamp=1707129761645, value=Suleymenov
3 column=professional_data:expertise, timestamp=1707129761692, value=Machine Learning
3 column=professional_data:role, timestamp=1707130649997, value=UI-UX designer
4 column=personal_data:age, timestamp=1707129770983, value=28
4 column=personal_data:first_name, timestamp=1707129770962, value=Elena
4 column=personal_data:surname, timestamp=1707129770973, value=Ivanova
4 column=professional_data:expertise, timestamp=1707129800474, value=User Experience
4 column=professional_data:role, timestamp=1707129770995, value=UX Designer
5 column=personal_data:age, timestamp=1707129801901, value=40
5 column=personal_data:first_name, timestamp=1707129801882, value=Aidyn
5 column=personal_data:surname, timestamp=1707129801892, value=Abdrahman
5 column=professional_data:expertise, timestamp=1707129802929, value=Product Development
5 column=professional_data:role, timestamp=1707129801912, value=Product Manager
6 column=personal_data:age, timestamp=1707129829976, value=33
6 column=personal_data:first_name, timestamp=1707129829959, value=Ravil
6 column=personal_data:surname, timestamp=1707129829967, value=Brankov
6 column=professional_data:expertise, timestamp=1707129830792, value=Web Development
6 column=professional_data:role, timestamp=1707129829986, value=Software Developer
7 column=personal_data:age, timestamp=1707129869607, value=36
7 column=personal_data:first_name, timestamp=1707129869587, value=Aisulu
7 column=personal_data:surname, timestamp=1707129869597, value=Mukanova
7 column=professional_data:expertise, timestamp=1707129870654, value=Data Analysis
7 column=professional_data:role, timestamp=1707129869618, value=Data Analyst
8 column=personal_data:age, timestamp=1707129903216, value=38
8 column=personal_data:first_name, timestamp=1707129903198, value=Victoria
8 column=personal_data:surname, timestamp=1707129903207, value=Tsoy
8 column=professional_data:expertise, timestamp=1707129904181, value=IT Infrastructure
8 column=professional_data:role, timestamp=1707129903229, value=System Administrator
9 column=personal_data:age, timestamp=1707130220724, value=33
9 column=personal_data:first_name, timestamp=1707129980892, value=Olya
9 column=personal_data:surname, timestamp=1707129980901, value=Danilova
9 column=professional_data:expertise, timestamp=1707130222310, value=Data Analysis
9 column=professional_data:role, timestamp=1707130220740, value=Data Analyst
10 row(s)
```

o Get all data of employee with id 3 and the 3 last versions of his column families: personal\_data, professional\_data

```
hbase(main):016:0> get 'employees', 3, {COLUMN=>'personal_data', VERSIONS=>3}, {COLUMN=>'professional_data', VERSIONS=>3}
COLUMN CELL
personal_data:age timestamp=1707130666420, value=25
personal_data:age timestamp=1707130603709, value=35
personal_data:first_name timestamp=1707129761632, value=Didar
personal_data:surname timestamp=1707129761645, value=Suleymenov
1 row(s)
Took 0.0070 seconds
```

o Get all data of employees with age bigger or equals to 40

```
hbase(main):017:0> scan 'employees', {FILTER => "SingleColumnValueFilter('personal_data', 'age', >=, 'binary:40')"}
COLUMN+CELL
5 column=personal_data:age, timestamp=1707129801901, value=40
5 column=personal_data:first_name, timestamp=1707129801882, value=Aidyn
5 column=personal_data:surname, timestamp=1707129801892, value=Abdrahman
5 column=professional_data:expertise, timestamp=1707129802929, value=Product Development
5 column=professional_data:role, timestamp=1707129801912, value=Product Manager
1 row(s)
Took 0.0140 seconds
```

- o Get only role value of all employees with age bigger than 35

```
hbase(main):001:0> scan 'employees', { FILTER => "SingleColumnValueFilter('personal_data', 'age', >=, 'binary:35') AND MultipleColumnPrefixFilter('professional_data', 'role')"}
COLUMN+CELL
5      column=professional_data:role, timestamp=1707129801912, value=Product Manager
7      column=professional_data:role, timestamp=1707129869618, value=Data Analyst
8      column=professional_data:role, timestamp=1707129903229, value=System Administrator
9 row(s)
Took 0.0513 seconds
```

- o Count the number of all employees

```
hbase(main):002:0> count 'employees'
10 row(s)
Took 0.0059 seconds
=> 10
hbase(main):003:0>
```

- o Count the number of employees with age less than 40

```
hbase(main):003:0> scan 'employees', {FILTER => "SingleColumnValueFilter('personal_data', 'age', <, 'binary:40')"}
COLUMN+CELL
1      column=personal_data:age, timestamp=1707129546263, value=23
1      column=personal_data:first_name, timestamp=1707129546229, value=Aisha
1      column=personal_data:surname, timestamp=1707129546245, value=Askarova
1      column=professional_data:expertise, timestamp=1707129548556, value=Python
1      column=professional_data:role, timestamp=1707129546281, value=Data Scientist
10     column=personal_data:age, timestamp=1707130115648, value=29
10     column=personal_data:first_name, timestamp=1707130115614, value=Victor
10     column=personal_data:surname, timestamp=1707130115631, value=Popov
10     column=professional_data:expertise, timestamp=1707130115714, value=Digital Marketing
10     column=professional_data:role, timestamp=1707130115678, value=Marketing Specialist
2      column=personal_data:age, timestamp=1707129661334, value=21
2      column=personal_data:first_name, timestamp=1707129661313, value=Roman
2      column=personal_data:surname, timestamp=1707129661324, value=Tsoy
2      column=professional_data:expertise, timestamp=1707129661359, value=PowerBI
2      column=professional_data:role, timestamp=1707129661347, value=Data analyst
3      column=personal_data:age, timestamp=1707130666420, value=25
3      column=personal_data:first_name, timestamp=1707129761632, value=Didar
3      column=personal_data:surname, timestamp=1707129761645, value=Suleymenov
3      column=professional_data:expertise, timestamp=1707129761692, value=Machine Learning
3      column=professional_data:role, timestamp=1707130649997, value=UI-UX designer
4      column=personal_data:age, timestamp=1707129770983, value=28
4      column=personal_data:first_name, timestamp=1707129770962, value=Elena
4      column=personal_data:surname, timestamp=1707129770973, value=Ivanova
4      column=professional_data:expertise, timestamp=1707129800474, value=User Experience
4      column=professional_data:role, timestamp=1707129770995, value=UX Designer
6      column=personal_data:age, timestamp=1707129820976, value=33
6      column=personal_data:first_name, timestamp=1707129829959, value=Ravil
6      column=personal_data:surname, timestamp=1707129829967, value=Brankov
6      column=professional_data:expertise, timestamp=1707129830792, value=Web Development
6      column=professional_data:role, timestamp=1707129829986, value=Software Developer
7      column=personal_data:age, timestamp=1707129869607, value=36
7      column=personal_data:first_name, timestamp=1707129869587, value=Aisulu
7      column=personal_data:surname, timestamp=1707129869597, value=Mukanova
7      column=professional_data:expertise, timestamp=1707129870654, value=Data Analysis
7      column=professional_data:role, timestamp=1707129869618, value=Data Analyst
8      column=personal_data:age, timestamp=1707129903216, value=38
8      column=personal_data:first_name, timestamp=1707129903198, value=Victoria
8      column=personal_data:surname, timestamp=1707129903207, value=Tsoy
8      column=professional_data:expertise, timestamp=1707129904181, value=IT Infrastructure
8      column=professional_data:role, timestamp=1707129903229, value=System Administrator
9      column=personal_data:age, timestamp=1707130220724, value=33
9      column=personal_data:first_name, timestamp=1707129980892, value=Olga
9      column=personal_data:surname, timestamp=1707129980901, value=Danilova
9      column=professional_data:expertise, timestamp=1707130222310, value=Data Analysis
9      column=professional_data:role, timestamp=1707130220740, value=Data Analyst
9 row(s)
Took 0.0059 seconds
```

- o Delete the newer age (that updated in topic 4) for employee with id 3

```
hbase(main):004:0> delete 'employees', 3, 'personal_data:age'  
Took 0.0225 seconds
```

- o Get the data of employee with id 3 and validate his age reverted to first value

```
hbase(main):005:0> get 'employees', 3  
COLUMN                                CELL  
personal_data:age                     timestamp=1707130603709, value=35  
personal_data:first_name              timestamp=1707129761632, value=Didar  
personal_data:surname                 timestamp=1707129761645, value=Suleymenov  
professional_data:expertise           timestamp=1707129761692, value=Machine Learning  
professional_data:role                timestamp=1707130649997, value=UI-UX designer  
1 row(s)  
Took 0.0214 seconds
```

## 6. DELETE TABLE (10)

- o Delete table employees

```
hbase(main):006:0> disable 'employees'  
Took 0.4901 seconds  
hbase(main):007:0> drop 'employees'  
Took 0.2416 seconds  
hbase(main):008:0>
```

Checking:

```
hbase(main):008:0> scan 'employees'  
ROW                                COLUMN+CELL  
  
ERROR: Unknown table employees!  
  
For usage try 'help "scan"'  
  
Took 0.0061 seconds  
hbase(main):009:0>
```