



Shri Vile Parle Kelavani Mandal's

DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING

(Autonomous College Affiliated to the University of Mumbai)

NAAC Accredited with "A" Grade (CGPA : 3.18)



Department of Computer Science and Engineering (Data Science)

Subject: Big Data Engineering (DJ19DSL604)

AY: 2023-24

Experiment 7

(No SQL Data Store)

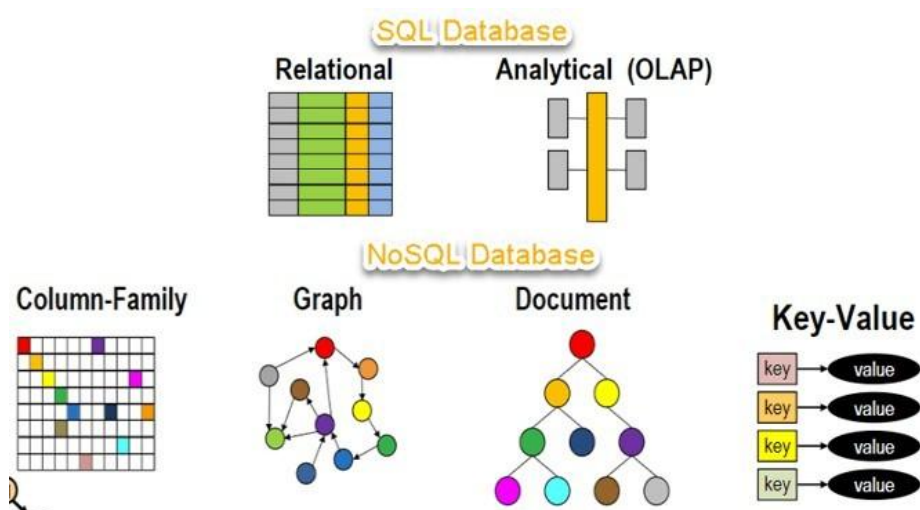
Bhuvi Ghosh
60009210191

Aim: Implement No SQL Data Store using HBase.

Theory:

NoSQL:

NoSQL Database is a non-relational Data Management System, that does not require a fixed schema. It avoids joins, and is easy to scale. The major purpose of using a NoSQL database is for distributed data stores with humongous data storage needs. NoSQL is used for Big data and real-time web apps. For example, companies like Twitter, Facebook and Google collect terabytes of user data every single day. **NoSQL database** stands for “Not Only SQL” or “Not SQL.”



Difference between SQL and NoSQL data stores:

- SQL databases are relational, and NoSQL databases are non-relational.
- SQL databases use structured query language (SQL) and have a predefined schema. NoSQL databases have dynamic schemas for unstructured data.
- SQL databases are vertically scalable, while NoSQL databases are horizontally scalable.



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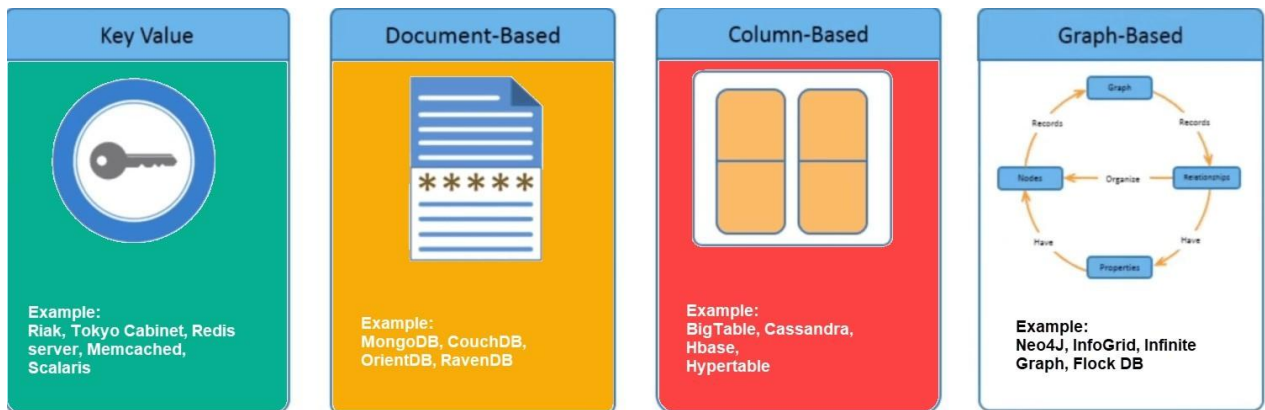
- SQL databases are table-based, while NoSQL databases are document, key-value, graph, or wide-column stores.
- SQL databases are better for multi-row transactions, while NoSQL is better for unstructured data like documents or JSON.

Types of NoSQL Databases

NoSQL Databases are mainly categorized into four types: Key-value pair, Column-oriented, Graph-based and Document-oriented. Every category has its unique attributes and limitations. None of the above-specified database is better to solve all the problems. Users should select the database based on their product needs.

Types of NoSQL Databases:

- Key-value Pair Based
- Column-oriented Graph
- Graphs based
- Document-oriented



Introduction to HBase

HBase is a distributed column-oriented database built on top of the Hadoop file system. It is an open-source project and is horizontally scalable.

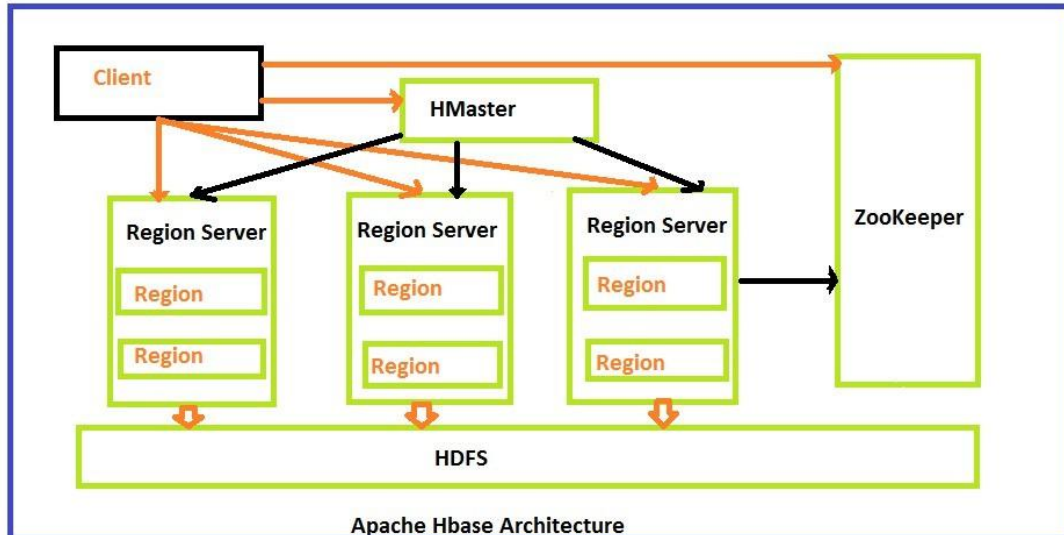
HBase is a data model that is similar to Google's big table designed to provide quick random access to huge amounts of structured data. It leverages the fault tolerance provided by the Hadoop File System (HDFS).

It is a part of the Hadoop ecosystem that provides random real-time read/write access to data in the Hadoop File System.

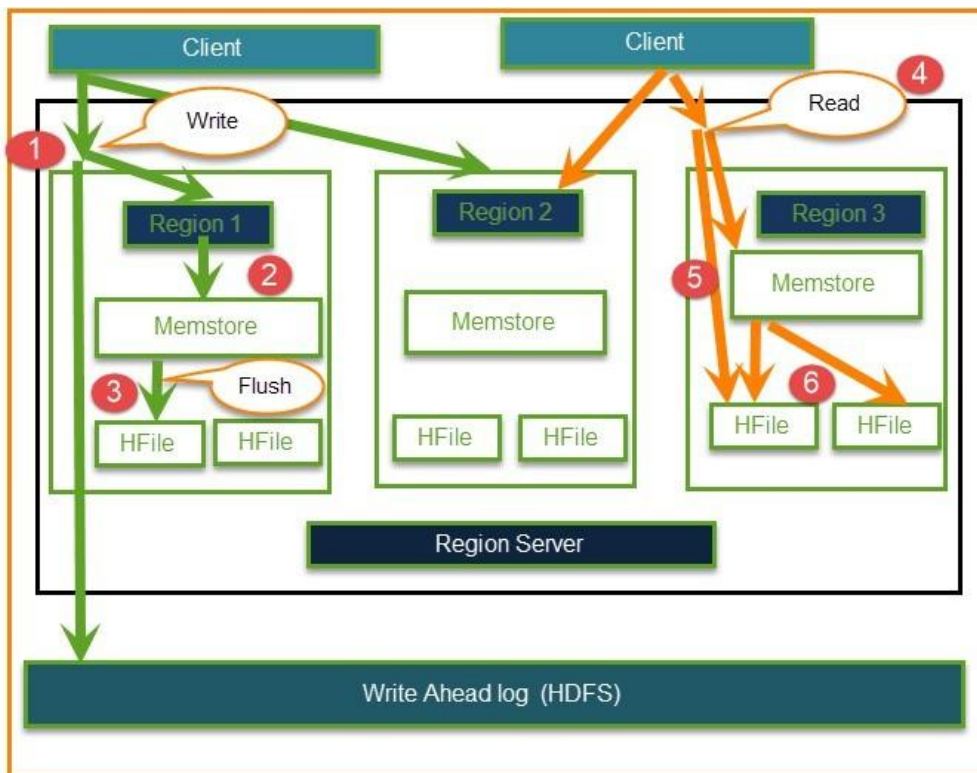
One can store the data in HDFS either directly or through HBase. Data consumer reads/accesses the data in HDFS randomly using HBase. HBase sits on top of the Hadoop File System and provides read and write access.



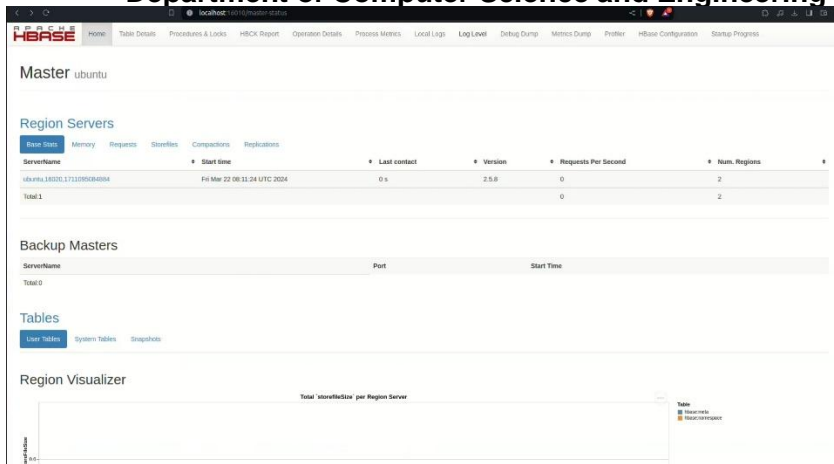
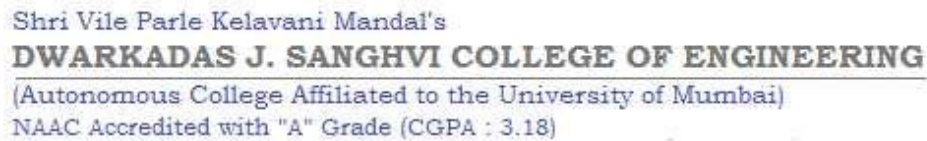
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HBASE Architecture



HBase Read and Write Data



[illegible]



localhost:8080/master/status

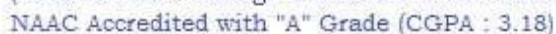
HBASE home Table Details Procedures & Locks HBase Report Operation Details Process Metrics Local Logs Log Level Debug Dump Metrics Dump Profiler HBase Configuration Startup Progress

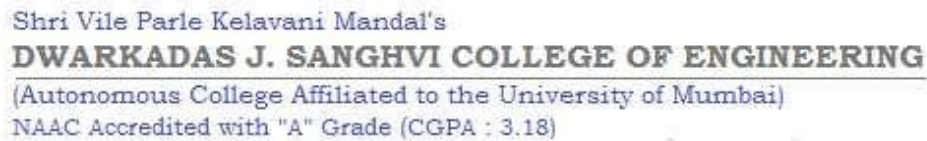
Attribute Name	Value	Description
JVM Version	Private Build 1.8_0_202-300	JVM vendor and version
HBase version	2.5.8, revision: 3744668f5312b4682f445c320581aef903	HBase version and revision
HBase Compiled	Thu Feb 29 15:37:32 PST 2024, Apache	When HBase version was compiled and by whom
HBase Source Checksum	810142409a7e676b613c58898e6d2505c758b0c5b6a00809c023e6a356d52993d6517605709653c7898942776c1d51748-6946d7035e75a3	HBase source SHA512 checksum
Hadoop Version	2.10.2, revision: 9068080000c878021356688c76b32d18009c	Hadoop version and revision
Hadoop Compiled	2022-09-29T00:12Z, cloudera	When Hadoop version was compiled and by whom
Hadoop Source Checksum	43ab71977f806666778fa060738e	Hadoop source MD5 checksum
ZooKeeper Client Version	3.8.3, revision: 6a5d5528c743cd703d42204ebef3c205096a058	ZooKeeper client version and revision hash
ZooKeeper Client Compiled	2023-10-05 10:34 UTC	When ZooKeeper client version was compiled
ZooKeeper Quorum	127.0.0.1:2181	Addresses of all registered ZK servers. For more, see zk.dump .
ZooKeeper Base Path	/hbase	Root node of this cluster in ZK.
Cluster Key	127.0.0.1:2181/hbase	Key to add this cluster as a peer for replication. Use <code>help "add_peer"</code> in the shell for details.
HBase Root Directory	file:/home/ubuntu/.Downloads/hbase-2.5.8rnp/hbase	Location of HBase home directory
HMaster Start Time	Fri Mar 22 08:15:27 UTC 2024	Date stamp of when this HMaster was started
HMaster Active Time	Fri Mar 22 08:15:41 UTC 2024	Date stamp of when this HMaster became active
HBase Cluster ID	53f936a1-c8b7-495a-b881-112045548896	Unique identifier generated for each HBase cluster
Load average	2.00	Average number of regions per regionserver. Name computation.
Compactions	0	Compactions currently held by the master
LoadBalancer	org.apache.hadoop.hbase.master.balancer.StochasticLoadBalancer	LoadBalancer to be used in the Master

HBase uses some fixed-size ring buffers to maintain rolling window history of specific server-side operation details. This page list all operation details retrieve from these ring buffers

Balancer Rejection explain why balancer is skipping runs and explain all factors considered

Reason	CostFunctions Details
--------	-----------------------

[illegible]



The screenshot displays the HBase Admin web interface. At the top, there's a navigation bar with links like Home, Table Details, Procedures & Locks, HBase Report, Operation Details, Process Metrics, Local Logs, Log Level, Debug Dump, Metrics Dump, Profiler, HBase Configuration, and Startup Progress. Below this, a chart titled 'Total storefiles per Region Server' is shown. The y-axis represents 'Total storefiles' ranging from 0 to 2,000. The x-axis represents 'Region Server'. The chart is a stacked area chart with two series: 'Hbase meta' (blue) and 'Hbase namespace' (orange). The 'Hbase meta' series is the upper part of the stack, and the 'Hbase namespace' series is the lower part. The total height of the stack represents the total storefiles for each region server. Below the chart, there's a 'Peers' section with a table listing various metrics for each peer.

Peer ID	Cluster Key	Endpoint	State	IsMaster	Bandwidth	ReplicateAll	Namespaces	Exclude Namespaces	Table Cfs	Exclude Table Cfs
Total: 0										

[Home](#)
[Table Details](#)
[Procedures & Links](#)
[HBase Report](#)
[Operation Details](#)
[Process Metrics](#)
[Local Logs](#)
[Log Level](#)
[Output Dump](#)
[Metrics Dump](#)
[Profiler](#)
[HBase Configuration](#)
[Startup Progress](#)

Master

ubuntu

Regions in Transition

1 region(s) in transition, 0 region(s) in transition for more than 90000 milliseconds.

Region	State	RIT time (ms)	Retries
1588230740	Hbase meta_1.1588230740 state=OPEN, to=Pi Mar 22 08:25:42 UTC 2024 (2h ago), server=ll	3287	0

[prev](#)
[1](#)
[next](#)

Region Servers

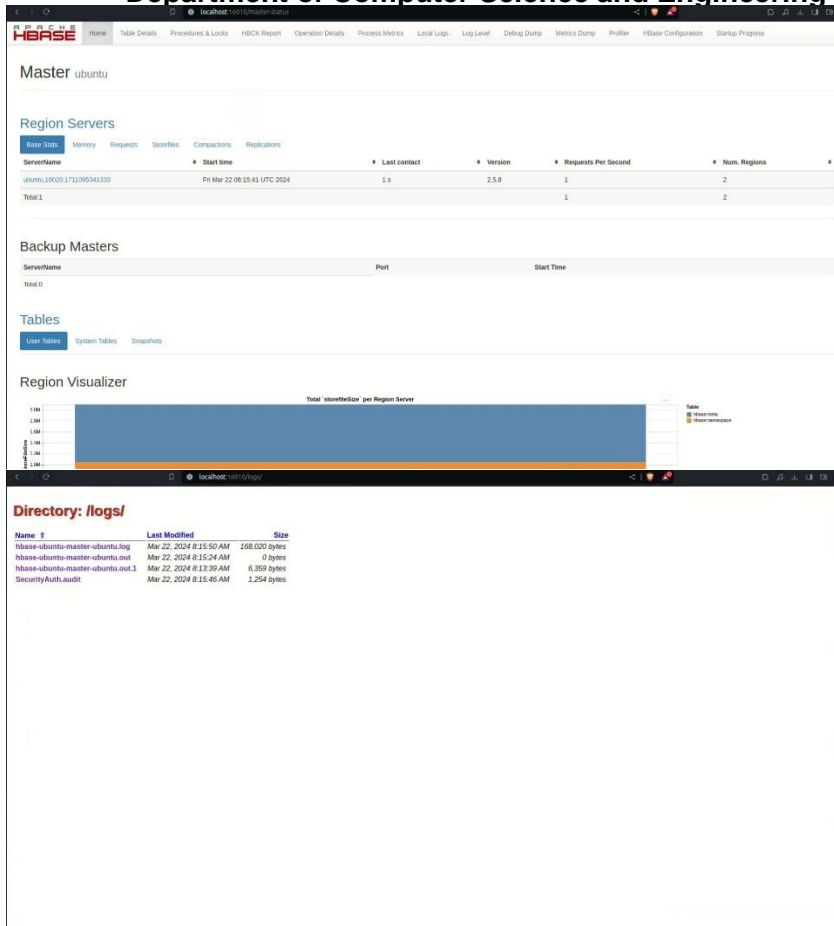
[Node State](#)
[Memory](#)
[Requests](#)
[Storefiles](#)
[Compactions](#)
[Replications](#)

ServerName	Start time	Last contact	Version	Requests Per Second	Num. Regions
ubuntu20020.171090541333	Pi Mar 22 08:25:43 UTC 2024	3 s	2.5.0	0	0
TIME#1				0	0

Backup Masters		
ServerName	Port	Start Time
Total 0		



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2. Implementation of HBase Create Table with Java API & Shell.
3. Implement HBase Shell Commands and dynamic scaling:
 - a. General commands
 - b. Tables Managements commands
 - c. Data manipulation commands
 - d. Cluster Replication Commands

```
ubuntu@ubuntu: ~/Downloads/hbase-2.5.8
$ ./bin/hbase-shell
HBase Shell
Use 'help' to get list of supported commands.
Use 'quit' to quit this interactive shell.
For Reference, please visit: http://hbase.apache.org/2.0/book.html#shell
Version 2.5.8, r37644d65333bd4f2e44c83d82d8ab1af919, Thu Feb 29 13:37:32 PST 2024
Took 0.0018 seconds
hbase:001> create 'employee', 'cf'
Created table 'employee'
Took 0.9382 seconds
ns hbase:1> table -employee
hbase:002> put 'employee', 'm', 'cf:1d', '1'
Took 0.1040 seconds
hbase:003> put 'employee', 'm', 'cf:1d', '2'
Took 0.0020 seconds
hbase:004> put 'employee', 'm', 'cf:1d', '3'
Took 0.0020 seconds
hbase:005> put 'employee', 'm', 'cf:1d', '4'
Took 0.0020 seconds
hbase:006> put 'employee', 'm', 'cf:1d', '5'
Took 0.0020 seconds
hbase:007> put 'employee', 'm', 'cf:1d', '6'
Took 0.0020 seconds
hbase:008> put 'employee', 'm', 'cf:1d', '7'
Took 0.0020 seconds
hbase:009>
```




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```
ubuntu@ubuntu: ~/Downloads/hbase-2.5.8
hbase:018:0> put 'employee', 'yash', 'cf:name', 'Yash'
Took 0.0103 seconds
hbase:019:0> put 'employee', 'aryan', 'cf:name', 'Aryan'
Took 0.0027 seconds
hbase:020:0> put 'employee', 'atharv', 'cf:name', 'Atharv'
Took 0.0034 seconds
hbase:021:0> put 'employee', 'krish', 'cf:name', 'Krish'
Took 0.0055 seconds
hbase:022:0> put 'employee', 'foran', 'cf:name', 'Foran'
Took 0.0027 seconds
hbase:023:0>
hbase:024:0> put 'employee', 'on', 'cf:salary', '50000'
Took 0.0051 seconds
hbase:025:0> put 'employee', 'nithir', 'cf:salary', '60000'
Took 0.0002 seconds
hbase:026:0> put 'employee', 'bhuvil', 'cf:salary', '55000'
Took 0.0058 seconds
hbase:027:0> put 'employee', 'anuradha', 'cf:salary', '70000'
Took 0.0047 seconds
hbase:028:0> put 'employee', 'vishna', 'cf:salary', '65000'
Took 0.0050 seconds
hbase:029:0> put 'employee', 'yash', 'cf:salary', '48000'
Took 0.0029 seconds
hbase:030:0> put 'employee', 'aryan', 'cf:salary', '52000'
Took 0.0025 seconds
hbase:031:0> put 'employee', 'atharv', 'cf:salary', '58000'
Took 0.0029 seconds
hbase:032:0> put 'employee', 'krish', 'cf:salary', '63000'
Took 0.0034 seconds
hbase:033:0> put 'employee', 'foran', 'cf:salary', '54000'
Took 0.0021 seconds
hbase:034:0>
hbase:035:0> put 'employee', 'on', 'cf:designation', 'Manager'
Took 0.0021 seconds
hbase:036:0> put 'employee', 'nithir', 'cf:designation', 'Developer'
Took 0.0020 seconds
hbase:037:0> put 'employee', 'bhuvil', 'cf:designation', 'Analyst'
Took 0.0019 seconds
hbase:038:0> put 'employee', 'anuradha', 'cf:designation', 'Designer'
Took 0.0024 seconds
hbase:039:0> put 'employee', 'vishna', 'cf:designation', 'Engineer'
Took 0.0021 seconds
hbase:040:0> put 'employee', 'yash', 'cf:designation', 'Consultant'
Took 0.0022 seconds
hbase:041:0> put 'employee', 'aryan', 'cf:designation', 'Team Lead'
Took 0.0035 seconds
hbase:042:0> put 'employee', 'atharv', 'cf:designation', 'HR'
Took 0.0024 seconds
hbase:043:0> put 'employee', 'krish', 'cf:designation', 'Tester'
Took 0.0022 seconds
hbase:044:0> put 'employee', 'foran', 'cf:designation', 'Architect'
Took 0.0037 seconds
hbase:045:0> scan 'employee'
ROW
anuradha
anuradha
anuradha
aryan
aryan
aryan
atharv
atharv
atharv
bhuvil
bhuvil
bhuvil
foran
foran
foran
krish
krish
krish
nithir
nithir
nithir
on
on
on
vishna
vishna
vishna
vishna
yash
yash
yash
10 row(s)
Took 0.1022 seconds
hbase:046:0>
```

```
ubuntu@ubuntu: ~/Downloads/hbase-2.5.8
COLUMN+CELL
column=cf:designation, timestamp=2024-03-22T08:44:13.938, value=Designer
column=cf:id, timestamp=2024-03-22T08:44:13.237, value=4
column=cf:name, timestamp=2024-03-22T08:44:13.573, value=anuradha
column=cf:salary, timestamp=2024-03-22T08:44:13.790, value=70000
column=cf:designation, timestamp=2024-03-22T08:44:13.968, value=Team Lead
column=cf:id, timestamp=2024-03-22T08:44:13.331, value=7
column=cf:name, timestamp=2024-03-22T08:44:13.686, value=Aryan
column=cf:salary, timestamp=2024-03-22T08:44:13.844, value=52000
column=cf:designation, timestamp=2024-03-22T08:44:13.980, value=HR
column=cf:id, timestamp=2024-03-22T08:44:13.383, value=8
column=cf:name, timestamp=2024-03-22T08:44:13.698, value=Atharv
column=cf:salary, timestamp=2024-03-22T08:44:13.861, value=58000
column=cf:designation, timestamp=2024-03-22T08:44:13.926, value=Analyst
column=cf:id, timestamp=2024-03-22T08:44:13.217, value=3
column=cf:name, timestamp=2024-03-22T08:44:13.548, value=Bhuvil
column=cf:salary, timestamp=2024-03-22T08:44:13.781, value=55000
column=cf:designation, timestamp=2024-03-22T08:44:13.801, value=Architect
column=cf:id, timestamp=2024-03-22T08:44:13.447, value=10
column=cf:name, timestamp=2024-03-22T08:44:13.726, value=Foran
column=cf:salary, timestamp=2024-03-22T08:44:13.888, value=54000
column=cf:designation, timestamp=2024-03-22T08:44:13.990, value=Tester
column=cf:id, timestamp=2024-03-22T08:44:13.410, value=9
column=cf:name, timestamp=2024-03-22T08:44:13.713, value=Krish
column=cf:salary, timestamp=2024-03-22T08:44:13.875, value=63000
column=cf:designation, timestamp=2024-03-22T08:44:13.917, value=Developer
column=cf:id, timestamp=2024-03-22T08:44:13.185, value=2
column=cf:name, timestamp=2024-03-22T08:44:13.510, value=Nithir
column=cf:salary, timestamp=2024-03-22T08:44:13.769, value=60000
column=cf:designation, timestamp=2024-03-22T08:44:13.907, value=Manager
column=cf:id, timestamp=2024-03-22T08:44:13.170, value=1
column=cf:name, timestamp=2024-03-22T08:44:13.486, value=On
column=cf:salary, timestamp=2024-03-22T08:44:13.749, value=50000
column=cf:designation, timestamp=2024-03-22T08:44:13.948, value=Engineer
column=cf:id, timestamp=2024-03-22T08:44:13.260, value=5
column=cf:name, timestamp=2024-03-22T08:44:13.632, value=Vishna
column=cf:salary, timestamp=2024-03-22T08:44:13.814, value=65000
column=cf:designation, timestamp=2024-03-22T08:44:13.957, value=Consultant
column=cf:id, timestamp=2024-03-22T08:44:13.287, value=6
column=cf:name, timestamp=2024-03-22T08:44:13.656, value=Yash
column=cf:salary, timestamp=2024-03-22T08:44:13.828, value=48000
```



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```
ubuntu@ubuntu: ~/Downloads/hbase-2.5.8
hbase:045:0> scan 'employee'
ROW
anuradha
anuradha
anuradha
aryan
aryan
atharv
atharv
bhuv
bhuv
bhuv
foran
foran
foran
krish
krish
krish
mihir
mihir
mihir
on
on
on
vishna
vishna
vishna
yash
yash
yash
10 row(s)
Took 0.1022 seconds
hbase:046:0> get 'employee', 'on'
COLUMN
cf:designat
cf:id
cf:name
cf:salary
1 row(s)
Took 0.0206 seconds
hbase:047:0> disable 'employee'
Took 0.3387 seconds
hbase:048:0> drop 'employee'
Took 0.3352 seconds
COLUMN+CELL
column=cf:designat, timestamp=2024-03-22T08:44:13.938, value=Designer
column=cf:id, timestamp=2024-03-22T08:44:13.237, value=4
column=cf:name, timestamp=2024-03-22T08:44:13.573, value=Anuradha
column=cf:salary, timestamp=2024-03-22T08:44:13.798, value=70000
column=cf:designat, timestamp=2024-03-22T08:44:13.968, value=Team Lead
column=cf:id, timestamp=2024-03-22T08:44:13.331, value=7
column=cf:name, timestamp=2024-03-22T08:44:13.686, value=Aryan
column=cf:salary, timestamp=2024-03-22T08:44:13.844, value=52000
column=cf:designat, timestamp=2024-03-22T08:44:13.980, value=HR
column=cf:id, timestamp=2024-03-22T08:44:13.383, value=8
column=cf:name, timestamp=2024-03-22T08:44:13.698, value=Atharv
column=cf:salary, timestamp=2024-03-22T08:44:13.864, value=58000
column=cf:designat, timestamp=2024-03-22T08:44:13.926, value=Analyst
column=cf:id, timestamp=2024-03-22T08:44:13.217, value=3
column=cf:name, timestamp=2024-03-22T08:44:13.548, value=Bhuv
column=cf:salary, timestamp=2024-03-22T08:44:13.781, value=55000
column=cf:designat, timestamp=2024-03-22T08:44:14.001, value=Architect
column=cf:id, timestamp=2024-03-22T08:44:13.447, value=10
column=cf:name, timestamp=2024-03-22T08:44:13.726, value=Foran
column=cf:salary, timestamp=2024-03-22T08:44:13.888, value=54000
column=cf:designat, timestamp=2024-03-22T08:44:13.998, value=Tester
column=cf:id, timestamp=2024-03-22T08:44:13.430, value=9
column=cf:name, timestamp=2024-03-22T08:44:13.713, value=Krish
column=cf:salary, timestamp=2024-03-22T08:44:13.875, value=63000
column=cf:designat, timestamp=2024-03-22T08:44:13.917, value=Developer
column=cf:id, timestamp=2024-03-22T08:44:13.185, value=2
column=cf:name, timestamp=2024-03-22T08:44:13.510, value=Mihir
column=cf:salary, timestamp=2024-03-22T08:44:13.769, value=60000
column=cf:designat, timestamp=2024-03-22T08:44:13.907, value=Manager
column=cf:id, timestamp=2024-03-22T08:44:13.170, value=1
column=cf:name, timestamp=2024-03-22T08:44:13.486, value=On
column=cf:salary, timestamp=2024-03-22T08:44:13.749, value=50000
column=cf:designat, timestamp=2024-03-22T08:44:13.948, value=Engineer
column=cf:id, timestamp=2024-03-22T08:44:13.260, value=5
column=cf:name, timestamp=2024-03-22T08:44:13.632, value=Vishna
column=cf:salary, timestamp=2024-03-22T08:44:13.814, value=65000
column=cf:designat, timestamp=2024-03-22T08:44:13.957, value=Consultant
column=cf:id, timestamp=2024-03-22T08:44:13.287, value=6
column=cf:name, timestamp=2024-03-22T08:44:13.656, value=Yash
column=cf:salary, timestamp=2024-03-22T08:44:13.828, value=48000
CELL
timestamp=2024-03-22T08:44:13.907, value=Manager
timestamp=2024-03-22T08:44:13.170, value=1
timestamp=2024-03-22T08:44:13.486, value=On
timestamp=2024-03-22T08:44:13.749, value=50000
```

```
ubuntu@ubuntu: ~/Downloads/hbase-2.5.8
ubuntu@ubuntu:~/Downloads/hbase-2.5.8$ ./bin/hbase shell
HBase Shell
Use "help" to get list of supported commands.
Use "exit" to quit this interactive shell.
For Reference, please visit: https://hbase.apache.org/2.0/book.html#shell
Version 2.5.8, r37444de531b1dbdf2e445c83d0268ab1a6f919, Thu Feb 29 15:37:32 PST 2024
Took 0.0010 seconds
hbase:001:0> status
1 active master, 0 backup masters, 1 servers, 0 dead, 2.0000 average load
Took 0.3099 seconds
hbase:002:0> version
2.5.8, r37444de531b1dbdf2e445c83d0268ab1a6f919, Thu Feb 29 15:37:32 PST 2024
Took 0.0002 seconds
hbase:003:0> table help
Help for table-reference commands.

You can either create a table via 'create' and then manipulate the table via commands like 'put', 'get', etc.
See the standard help information for how to use each of these commands.

However, as of 0.96, you can also get a reference to a table, on which you can invoke commands.
For instance, you can get create a table and keep around a reference to it via:

    hbase> t = create 't', 'cf'

Or, if you have already created the table, you can get a reference to it:

    hbase> t = get_table 't'

You can do things like call 'put' on the table:

    hbase> t.put 'r', 'cf:q', 'v'

which puts a row 'r' with column family 'cf', qualifier 'q' and value 'v' into table t.

To read the data out, you can scan the table:

    hbase> t.scan

which will read all the rows in table 't'.

Essentially, any command that takes a table name can also be done via table reference.
Other commands include things like: get, delete, deleteall,
get_all_columns, get_counter, count, incr. These functions, along with
the standard JRuby object methods are also available via tab completion.

For more information on how to use each of these commands, you can also just type:

    hbase> t.help 'scan'

which will output more information on how to use that command.

You can also do general admin actions directly on a table; things like enable, disable,
flush and drop just by typing:

    hbase> t.enable
    hbase> t.flush
    hbase> t.disable
    hbase> t.drop

Note that after dropping a table, your reference to it becomes useless and further usage
is undefined (and not recommended).
Took 0.0003 seconds
hbase:004:0> whoami
ubuntu (auth:SIMPLE)
groups: ubuntu, adm, cdrom, sudo, dip, plugdev, kvm, lpadmin, lxd, sambashare
Took 0.0059 seconds
hbase:005:0>
```



Shri Vile Parle Kelavani Mandal's

DWARKADAS J. SANGHVI COLLEGE OF ENGINEERING

(Autonomous College Affiliated to the University of Mumbai)

NAAC Accredited with "A" Grade (CGPA : 3.18)



Department of Computer Science and Engineering (Data Science)

```
ubuntu@ubuntu: ~/Downloads/hbase-2.5.8
hbase@ubuntu:~/Downloads/hbase-2.5.8$ ./bin/hbase shell
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 2.5.8, r37444de0531b1bdab72e445c3d0268ab1a6f919, Thu Feb 29 15:37:32 PST 2024
Took 0.0009 seconds
hbase:001:0> create 'employee', (NAME => 'id'), (NAME => 'name'), (NAME => 'salary'), (NAME => 'designation')
Created table employee
Took 0.0001 seconds
=> hbase:Table - employee
hbase:002:0>

ubuntu@ubuntu:~/Downloads/hbase-2.5.8

Took 0.0022 seconds
hbase:023:0> put 'employee', 'row5', 'name', 'vishna'
Took 0.0025 seconds
hbase:024:0> put 'employee', 'row5', 'salary', '11000'
Took 0.0021 seconds
hbase:025:0> put 'employee', 'row5', 'designation', 'Analyst'
Took 0.0019 seconds
hbase:026:0>
hbase:027:0> put 'employee', 'row6', 'id', '6'
Took 0.0020 seconds
hbase:028:0> put 'employee', 'row6', 'name', 'yash'
Took 0.0022 seconds
hbase:029:0> put 'employee', 'row6', 'salary', '13000'
Took 0.0020 seconds
hbase:030:0> put 'employee', 'row6', 'designation', 'Engineer'
Took 0.0082 seconds
hbase:031:0>
hbase:032:0> put 'employee', 'row7', 'id', '7'
Took 0.0023 seconds
hbase:033:0> put 'employee', 'row7', 'name', 'aryan'
Took 0.0031 seconds
hbase:034:0> put 'employee', 'row7', 'salary', '9000'
Took 0.0039 seconds
hbase:035:0> put 'employee', 'row7', 'designation', 'Assistant'
Took 0.0024 seconds
hbase:036:0>
hbase:037:0> put 'employee', 'row8', 'id', '8'
Took 0.0027 seconds
hbase:038:0> put 'employee', 'row8', 'name', 'atharv'
Took 0.0018 seconds
hbase:039:0> put 'employee', 'row8', 'salary', '14000'
Took 0.0017 seconds
hbase:040:0> put 'employee', 'row8', 'designation', 'Manager'
Took 0.0027 seconds
hbase:041:0>
hbase:042:0> put 'employee', 'row9', 'id', '9'
Took 0.0018 seconds
hbase:043:0> put 'employee', 'row9', 'name', 'krish'
Took 0.0019 seconds
hbase:044:0> put 'employee', 'row9', 'salary', '10000'
Took 0.0029 seconds
hbase:045:0> put 'employee', 'row9', 'designation', 'Analyst'
Took 0.0022 seconds
hbase:046:0>
hbase:047:0> put 'employee', 'row10', 'id', '10'
Took 0.0026 seconds
hbase:048:0> put 'employee', 'row10', 'name', 'foran'
Took 0.0019 seconds
hbase:049:0> put 'employee', 'row10', 'salary', '12000'
Took 0.0018 seconds
hbase:050:0> put 'employee', 'row10', 'designation', 'Engineer'
Took 0.0019 seconds
hbase:051:0>
hbase:051:0> list
TABLE
employee
test
2 row(s)
Took 0.0081 seconds
=> ["employee", "test"]
hbase:052:0>
hbase:052:0> describe 'employee'
Table employee is ENABLED
employee, {TABLE_ATTRIBUTES => {METADATA => {('hbase.store.file.tracker.inpl' => 'DEFAULT')}}}
COLUMN FAMILIES DESCRIPTION
(NAME => 'designation', INDEX_BLOCK_ENCODING => 'NONE', VERSIONS => '1', KEEP_DELETED_CELLS => 'FALSE', DATA_BLOCK_ENCODING => 'NONE', TTL => 'FOREVER', MIN_VERSIONS => '0', REPLICATION_SCOPE => '0', BLOOMFILTER => 'ROW', IN_MEMORY => 'false', COMPRESSION => 'NONE', BLOCKCACHE => 'true', BLOCKSIZE => '65536 B (64KB)')
(NAME => 'id', INDEX_BLOCK_ENCODING => 'NONE', VERSIONS => '1', KEEP_DELETED_CELLS => 'FALSE', DATA_BLOCK_ENCODING => 'NONE', TTL => 'FOREVER', MIN_VERSIONS => '0', REPLICATION_SCOPE => '0', BLOOMFILTER => 'ROW', IN_MEMORY => 'false', COMPRESSION => 'NONE', BLOCKCACHE => 'true', BLOCKSIZE => '65536 B (64KB)')
(NAME => 'name', INDEX_BLOCK_ENCODING => 'NONE', VERSIONS => '1', KEEP_DELETED_CELLS => 'FALSE', DATA_BLOCK_ENCODING => 'NONE', TTL => 'FOREVER', MIN_VERSIONS => '0', REPLICATION_SCOPE => '0', BLOOMFILTER => 'ROW', IN_MEMORY => 'false', COMPRESSION => 'NONE', BLOCKCACHE => 'true', BLOCKSIZE => '65536 B (64KB)')
(NAME => 'salary', INDEX_BLOCK_ENCODING => 'NONE', VERSIONS => '1', KEEP_DELETED_CELLS => 'FALSE', DATA_BLOCK_ENCODING => 'NONE', TTL => 'FOREVER', MIN_VERSIONS => '0', REPLICATION_SCOPE => '0', BLOOMFILTER => 'ROW', IN_MEMORY => 'false', COMPRESSION => 'NONE', BLOCKCACHE => 'true', BLOCKSIZE => '65536 B (64KB)')
4 row(s)
Quota is disabled
Took 0.0510 seconds
hbase:053:0>
```




Department of Computer Science and Engineering (Data Science)

```
hbase:053:0> disable 'employee'
Took 0.3194 seconds
hbase:054:0> enable 'employee'
Took 0.6280 seconds
hbase:055:0> drop 'employee'

ERROR: Table employee is enabled. Disable it first.

For usage try 'help "drop"'

Took 0.0129 seconds
hbase:056:0> disable 'employee'
Took 0.3134 seconds
hbase:057:0> []
hbase:057:0> drop 'employee'
Took 0.1184 seconds
hbase:058:0> list
TABLE
test
1 row(s)
Took 0.0036 seconds
=> ["test"]
hbase:059:0> []
```

```
ubuntu@ubuntu: ~/Downloads/hbase-2.5.8
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 2.5.8, r37444de6531b1dbdf2e445c83d0268ab1a6f919, Thu Feb 29 15:37:32 PST 2024
Took 0.0014 seconds
hbase:001:0> get 'employees', '1'
COLUMN                                CELL
personal_info:id, timestamp=2024-03-22T09:16:25.428, value=1
personal_info:name, timestamp=2024-03-22T09:16:25.437, value=on
personal_info:salary, timestamp=2024-03-22T09:16:25.447, value=10000
professional_info:designation, timestamp=2024-03-22T09:16:25.455, value=Manager
1 row(s)
Took 0.3212 seconds
hbase:002:0> get 'employees', '1', {COLUMN => 'personal_info:name'}
COLUMN                                CELL
personal_info:name, timestamp=2024-03-22T09:16:25.437, value=on
1 row(s)
Took 0.0042 seconds
hbase:003:0> scan 'employees'
ROW                                    COLUMN+CELL
1                                     column=personal_info:id, timestamp=2024-03-22T09:16:25.428, value=1
1                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.437, value=on
1                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.447, value=10000
1                                     column=professional_info:designation, timestamp=2024-03-22T09:16:25.455, value=Manager
10                                    column=personal_info:id, timestamp=2024-03-22T09:16:25.732, value=10
10                                    column=personal_info:name, timestamp=2024-03-22T09:16:25.739, value=foran
10                                    column=personal_info:salary, timestamp=2024-03-22T09:16:25.746, value=12000
10                                    column=professional_info:designation, timestamp=2024-03-22T09:16:25.753, value=Engineer
2                                     column=personal_info:id, timestamp=2024-03-22T09:16:25.467, value=2
2                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.476, value=nlhr
2                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.484, value=12000
2                                     column=professional_info:designation, timestamp=2024-03-22T09:16:25.492, value=Engineer
3                                     column=personal_info:id, timestamp=2024-03-22T09:16:25.504, value=3
3                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.512, value=bhuvl
3                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.520, value=8000
3                                     column=professional_info:designation, timestamp=2024-03-22T09:16:25.528, value=Assistant
4                                     column=personal_info:id, timestamp=2024-03-22T09:16:25.540, value=4

hbase:004:0> scan 'employees', {COLUMNS => ['personal_info:name', 'personal_info:salary']}
ROW                                    COLUMN+CELL
1                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.437, value=on
1                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.447, value=10000
10                                    column=personal_info:name, timestamp=2024-03-22T09:16:25.739, value=foran
10                                    column=personal_info:salary, timestamp=2024-03-22T09:16:25.746, value=12000
2                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.476, value=nlhr
2                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.484, value=12000
3                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.512, value=bhuvl
3                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.520, value=8000
4                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.547, value=anuradha
4                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.555, value=15000
5                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.580, value=vishna
5                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.587, value=11000
6                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.611, value=yash
6                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.618, value=13000
7                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.645, value=aryan
7                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.652, value=9000
8                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.676, value=atharv
8                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.683, value=14000
9                                     column=personal_info:name, timestamp=2024-03-22T09:16:25.707, value=krish
9                                     column=personal_info:salary, timestamp=2024-03-22T09:16:25.714, value=10000
10 row(s)
Took 0.0668 seconds
hbase:005:0>
hbase:005:0> deleteall 'employees', '1'
Took 0.0278 seconds
hbase:006:0> delete 'employees', '1', 'personal_info:name'
Took 0.0027 seconds
hbase:007:0>
```

Conclusion: HBase has been utilised as a no-SQL database to implement queries for retrieval & modification of data & for cluster replication.