

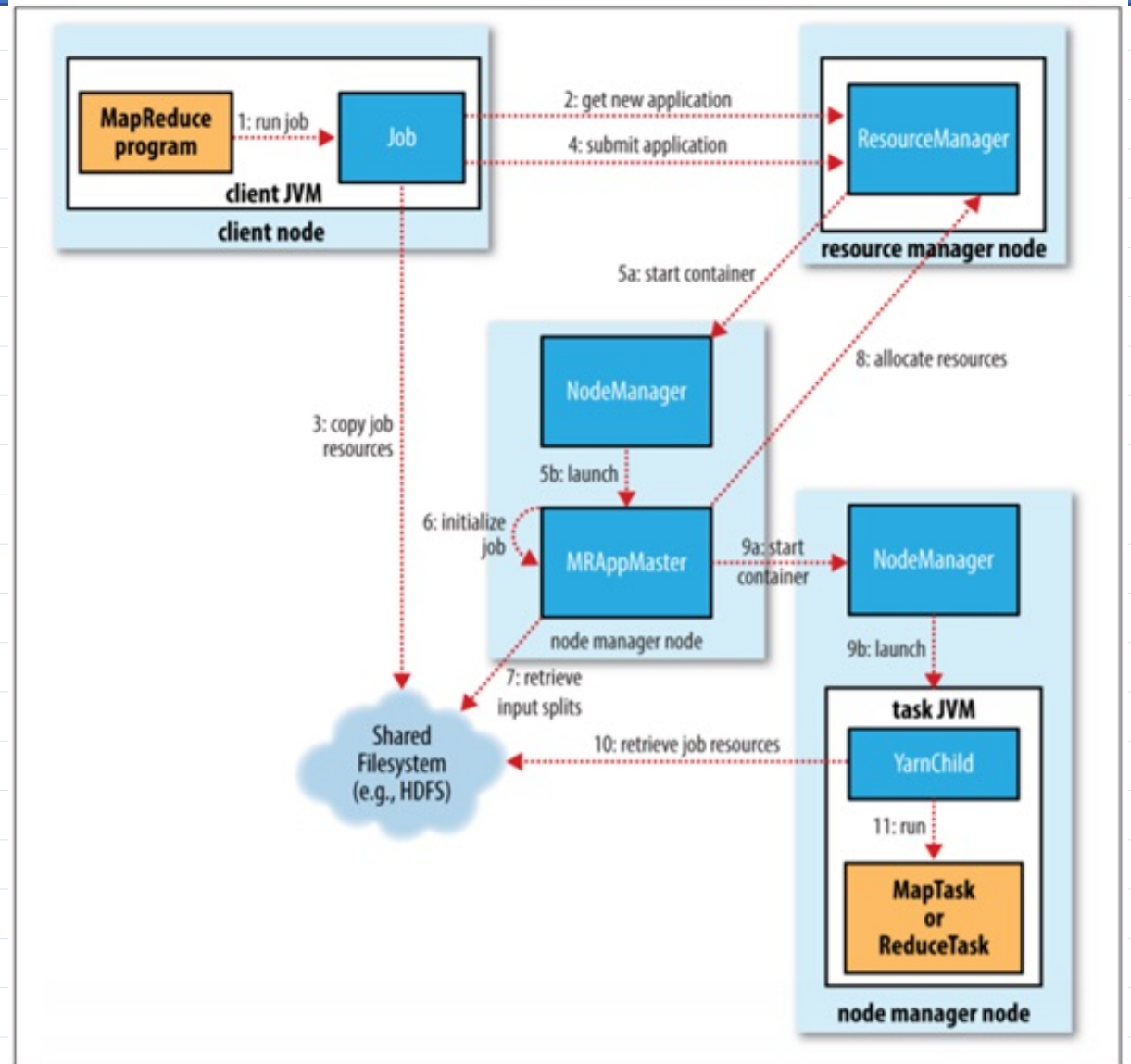
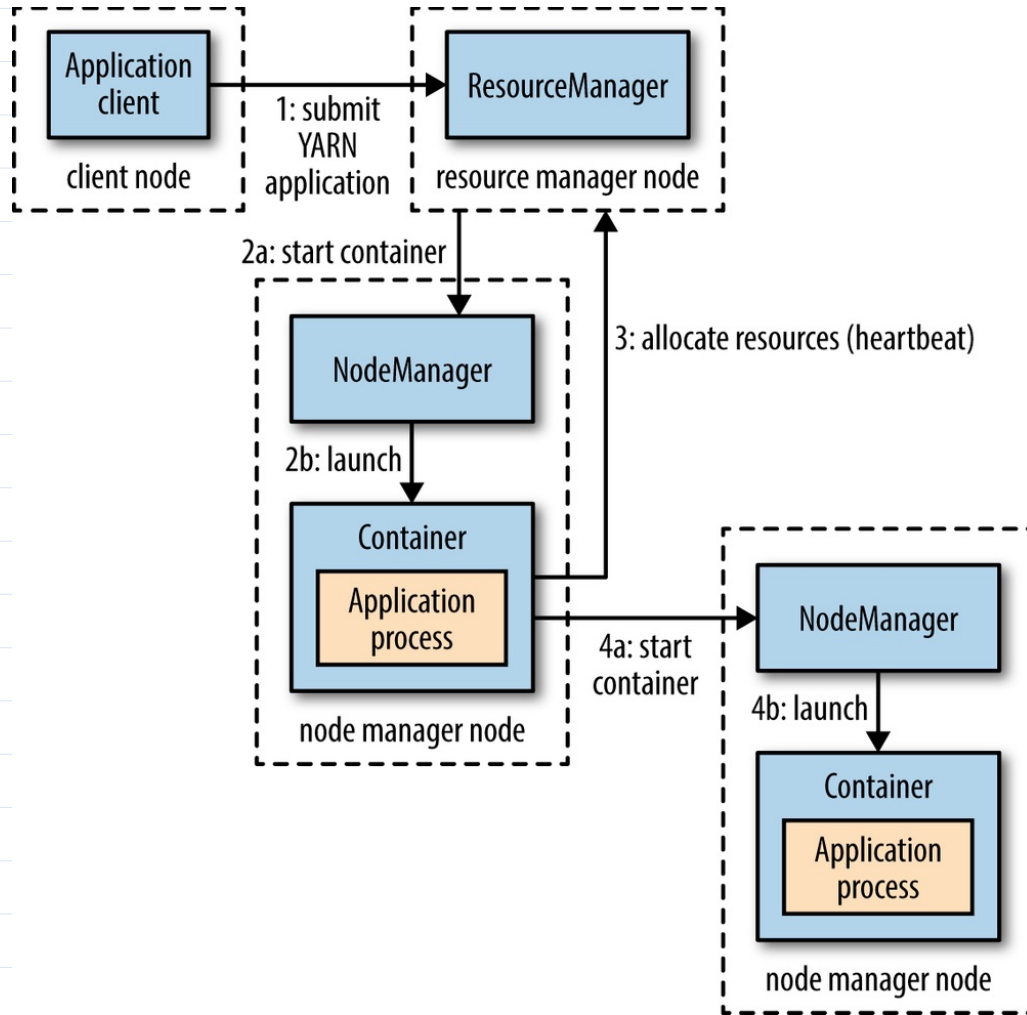


# Big Data Technologies

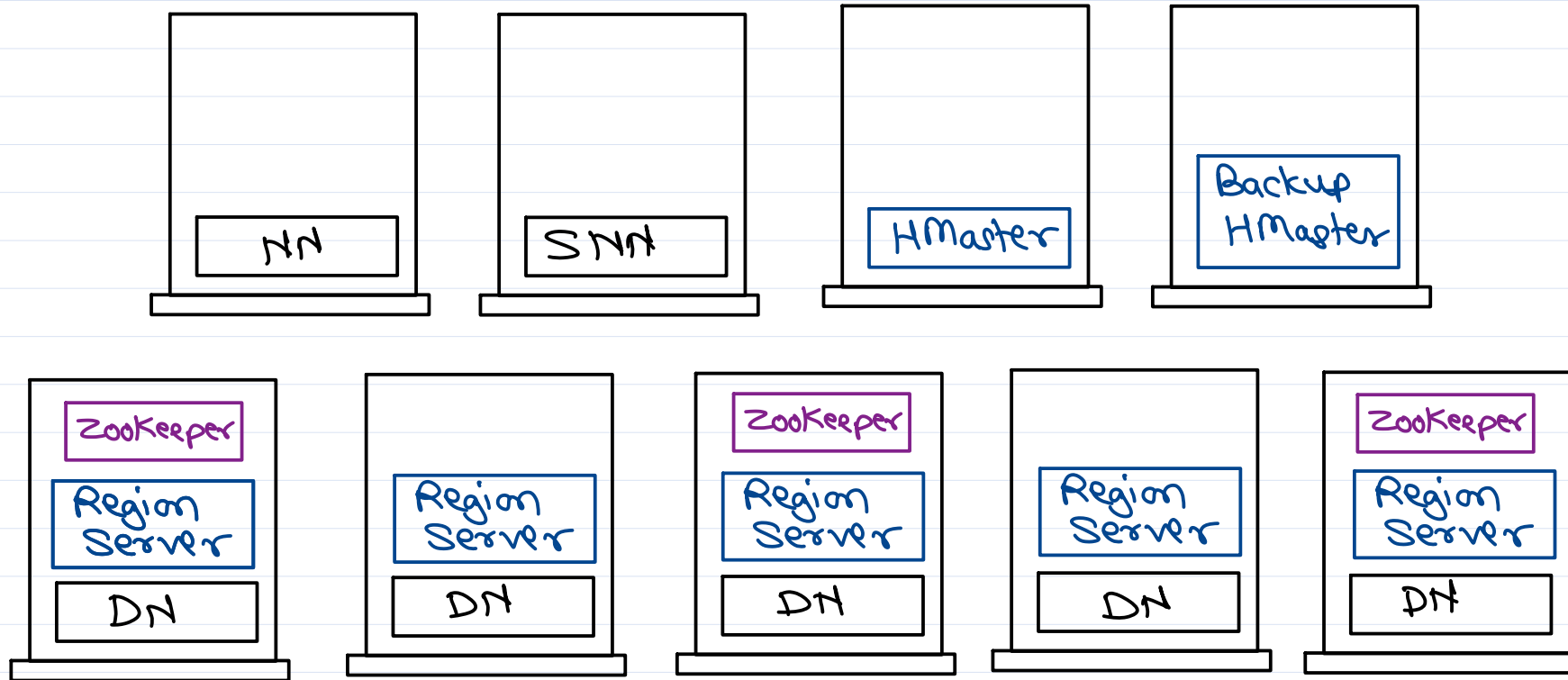
Trainer: Mr. Nilesh Ghule.



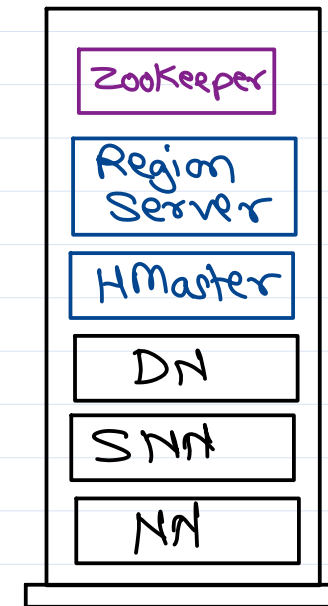
# YARN



# HBase Cluster



\* HBase Multi Node cluster



\* HBase Single Node cluster

# people table Columnar Db/ Wide Column Db

name (col family)			info (col family)				
sal col qual	fname col qual	lname col qual	mobile col qual	email col qual	fax col qual	company col qual	website col qual
001 2018	Nilegh	Ghule	001 9527..	m@S.Com	2426	x	x
002 x	Nitin	x	002 98812...	m@S.Com	x	x	x
003 x	Poash	Lad	003 98812..	p@S.Com	x	x	x
005 x	Sunbeam	x	005 x	x	x	x	Sun.Com
007 x	James	Band	007 x	x	x	U.F.	x

\* Sparse data → null is not stored.



# Data versions at Timestamps

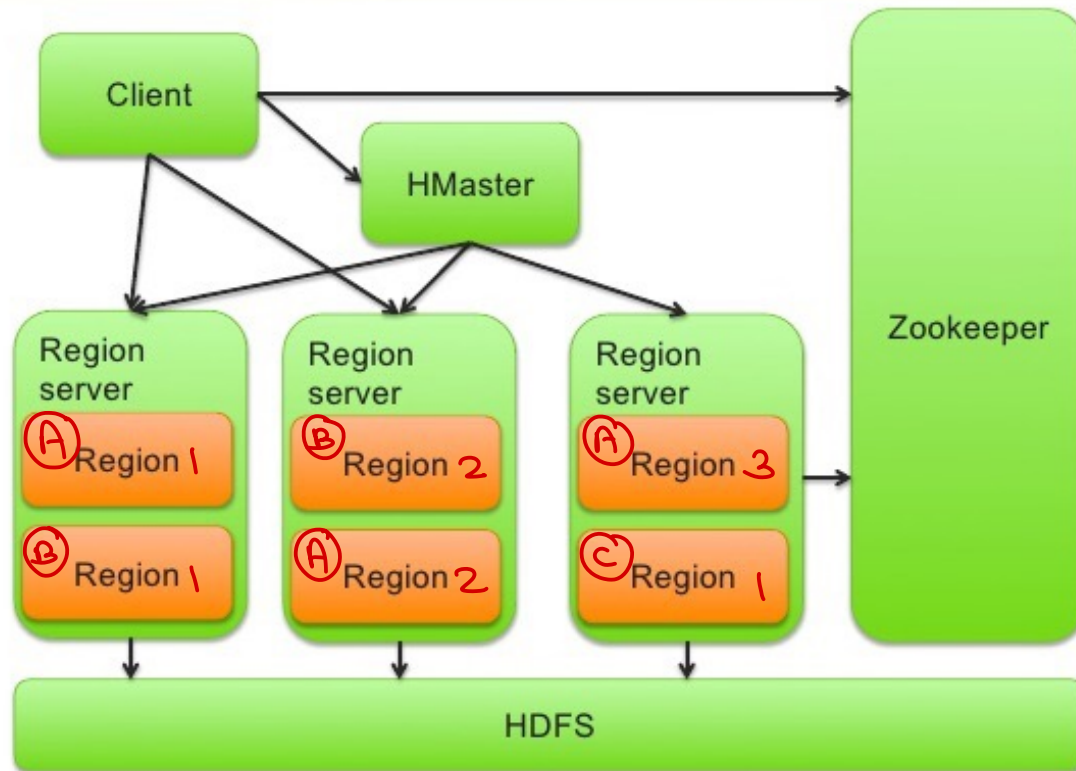
credentials		info	
username	password	birthdate	gender
① User 1	Pass1	1-Jan	male
② User 2	Pass2	1-Feb	Female
③ User 3	<del>Pass3@2023</del> <del>Pass3a@2024</del> Pass3b@2025	1-Mar	Male

name		qualifications			
①	Nilesh	Crhule	SSC	1998	78.66 @ 1998
			HSC	2000	77.06 @ 2000
			BSc	2004	60.00 @ 2004
			MSc	2008	60.00 @ 2008



# Apache HBase Architecture

APACHE  
HBASE



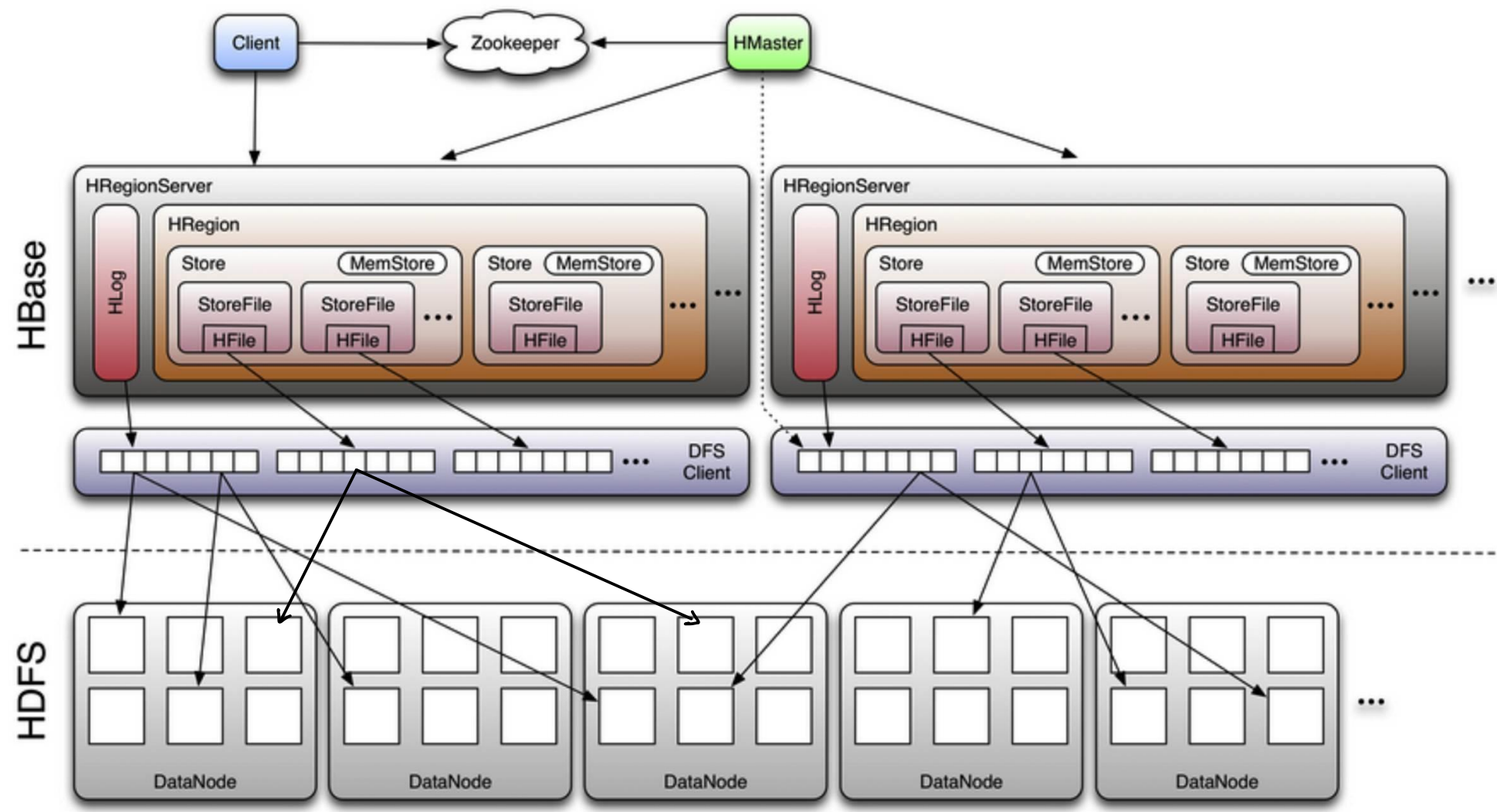
Id/key	name			Info			
	sal.	fname	lname	mobile	email	form	website
1	Mr.	Nilesh	Ghule	9527331338	nilesh@sun.com	24280308	x
2	x	Nitin	x	9881208115	nitin@sun.com	x	x
3	Ms.	x	Hule	x	x	1234567	x
4	x	x	Kulkarni	x	sun@sun.com	x	x
5	x	Sunbeam	Indotech	x	x	x	sunbeam.com

region 1

region 2



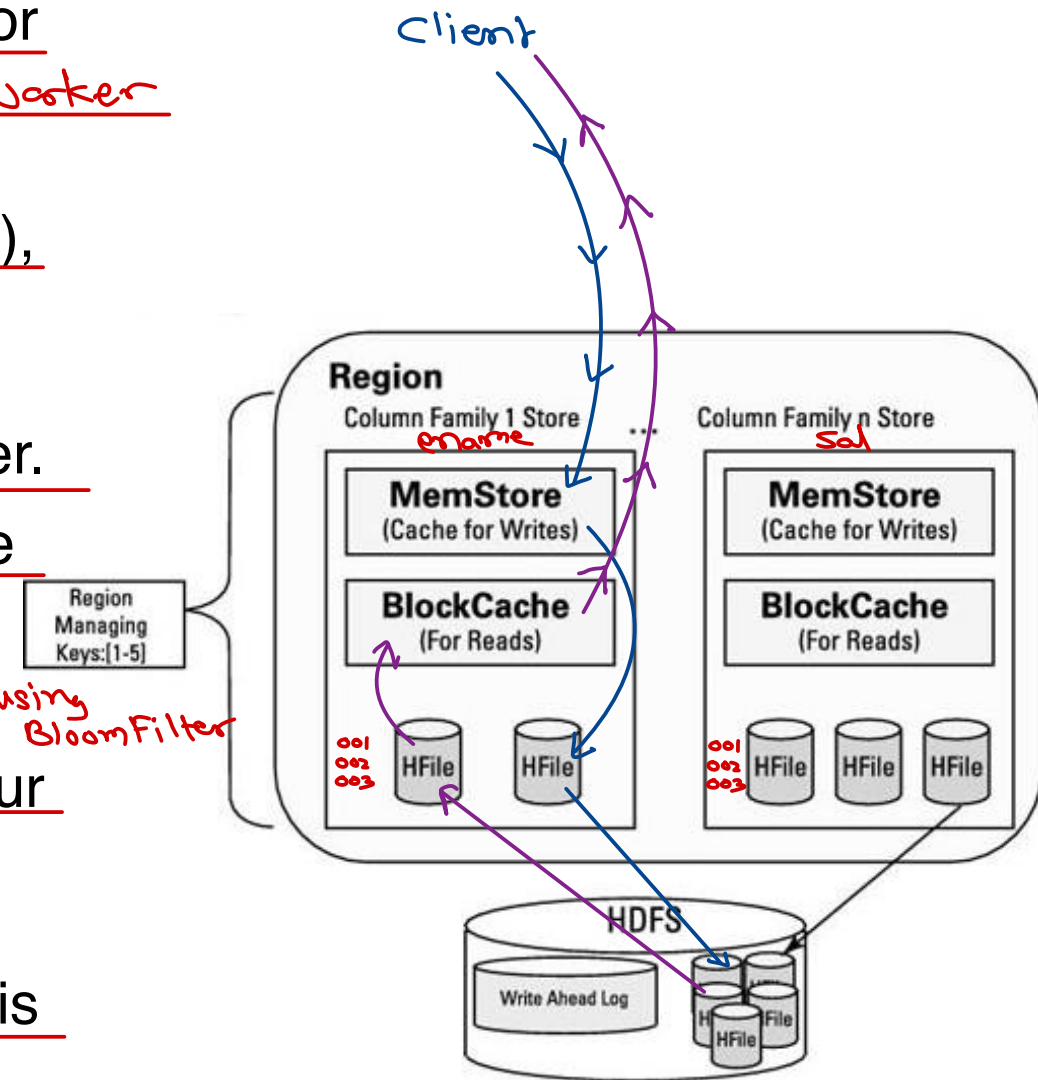
# HBase on HDFS





# HBase RegionServers

- They are software processes/daemons responsible for store and retrieve data in HBase. Running on each *woker* node in cluster.
- When a table grows beyond threshold (as per config), it is auto split & distributed the load to another node. This is called auto-sharding.
- Each split is separate region managed by a rgn server.
- Each column family store has a read cache called the BlockCache and a write cache called the MemStore.
- BlockCache helps with random read performance. → *using BloomFilter*
- The Write Ahead Log (WAL, for short) ensures that our Hbase writes are reliable.
- The design of HBase is to flush column family data stored in the MemStore to one HFile per flush. HFile is finally stored in HDFS blocks.

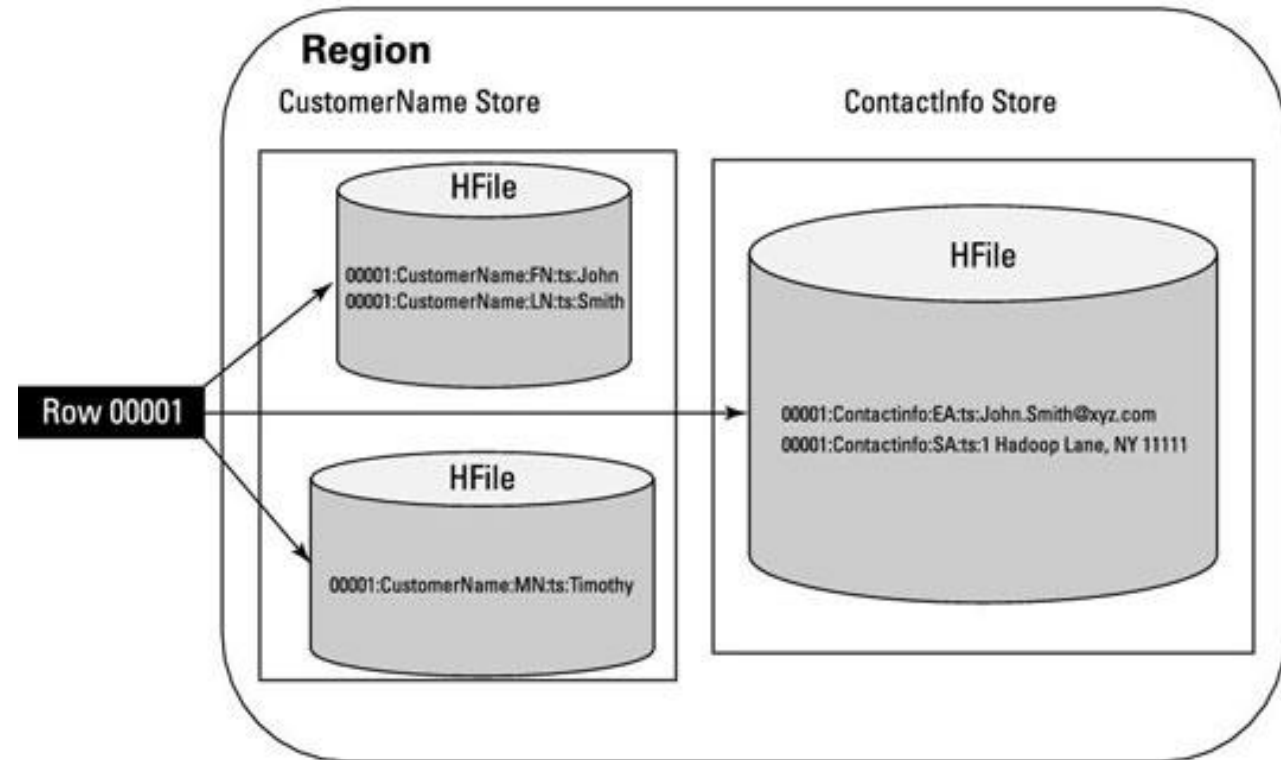




# HBase Compactions

- Compaction, the process by which HBase cleans up itself.
- Minor compactions combine (a configurable number of smaller HFiles into one larger HFile. Due to combining data together, disk access speed increases.
- Major compaction combine all HFiles into one large HFile. It also removes extra versions & deleted cells as per config.

## HFiles and Minor Compaction



# HBase Master

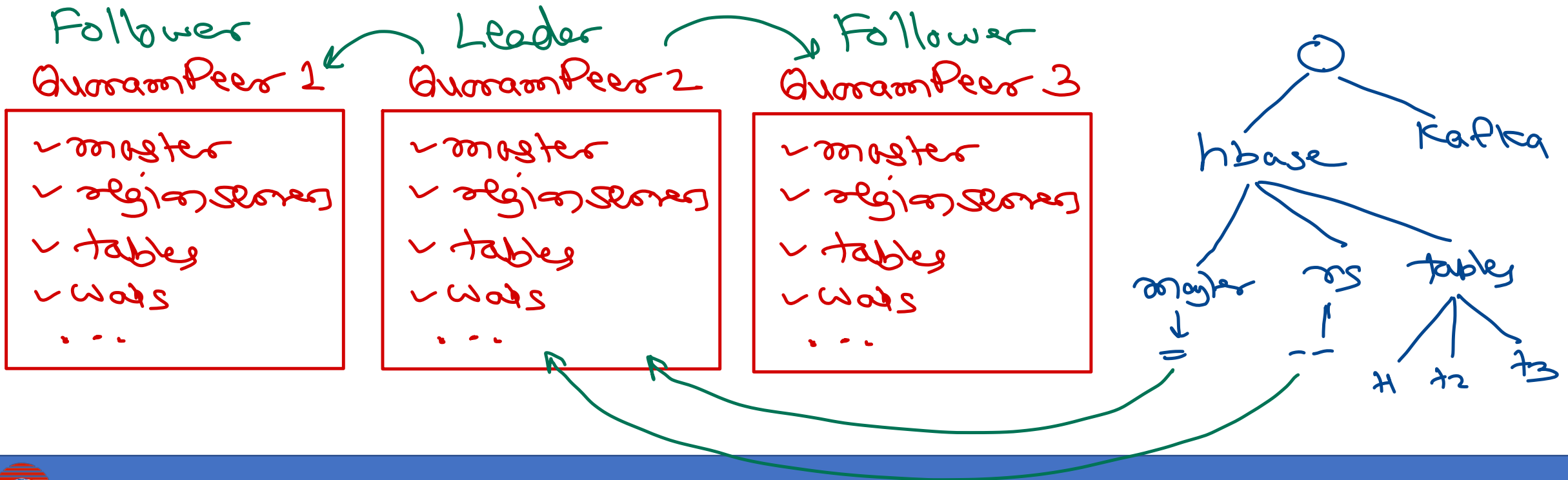
- Monitor region servers in cluster.
- Handle metadata operations. (system tables)
- Assign regions (after split) & balance load.
- Manage region server failover.
- Manage and clean catalog tables. (hbase namespace)
- Clear the WAL (Write Ahead Logs).
- Usually a back copy of master server is maintained to handle failover of master.

HBase 2.x allows to configure  
upto 9 backup masters.



# HBase ZooKeeper

- ZooKeeper is a distributed cluster that provides reliable coordination & synchronization services for clustered applications.
- This team consists of ZooKeeper Leader and ZooKeeper Follower(s).
- HBase comes with an instance of ZK that coordinates operations of master server, region server(s) and client(s).





Thank you!

*Nilesh Ghule <nilesh@sunbeaminfo.com>*

