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BRIDGING THE TECHNOLOGY GAP

APACHE HBASE

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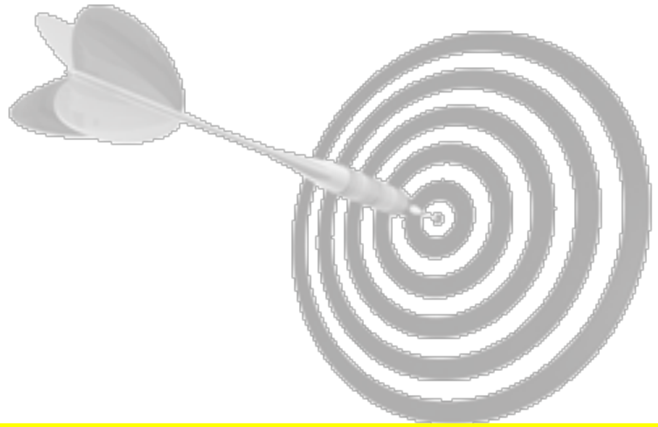
About myself:

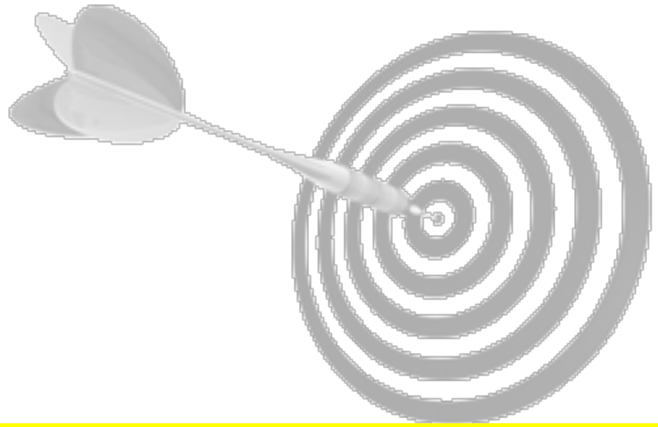
- My Name is Gurmukh Singh, popularly know by the handle “Aman Singh”.
- Certifications: RHCA, Cloudera, Mapr Certified.
- Author of two Book:
  - Monitoring Hadoop (https://www.amazon.com/Monitoring-Hadoop-Gurmukh-Singh/dp/1783281553)
  - Hadoop 2.x Administration Cookbook (https://www.packtpub.com/big-data-and-business-intelligence/hadoop-2x-administration-cookbook)
- Has over 14+ years in Systems Engineering and Design.
- Into BigData from last 4+ years.
- Worked with companies like HP, JP Morgan, Yahoo and few more.
- Founder of “Netxillon Technologies” - which is into Big Data Consultancy and Trainings.
- Github: https://github.com/netxillon/hadoop



Objectives

This session helps you to:

- HBASE Architecture.
- HBase Working/Operations
- Hbase write Path and Read Path
- Important Optimization considerations.



Introduction

- HBase is a distributed, scalable NoSQL Database.
- Natively integrates with Hadoop and its components
- Designed for Random Read/Write Access.
- Can scale to PB store with thousands on nodes with thousands of regions.
- Supports Sharding/Partitioning of Data by default
- Balances the data across the nodes in the cluster for optimization

Architecture

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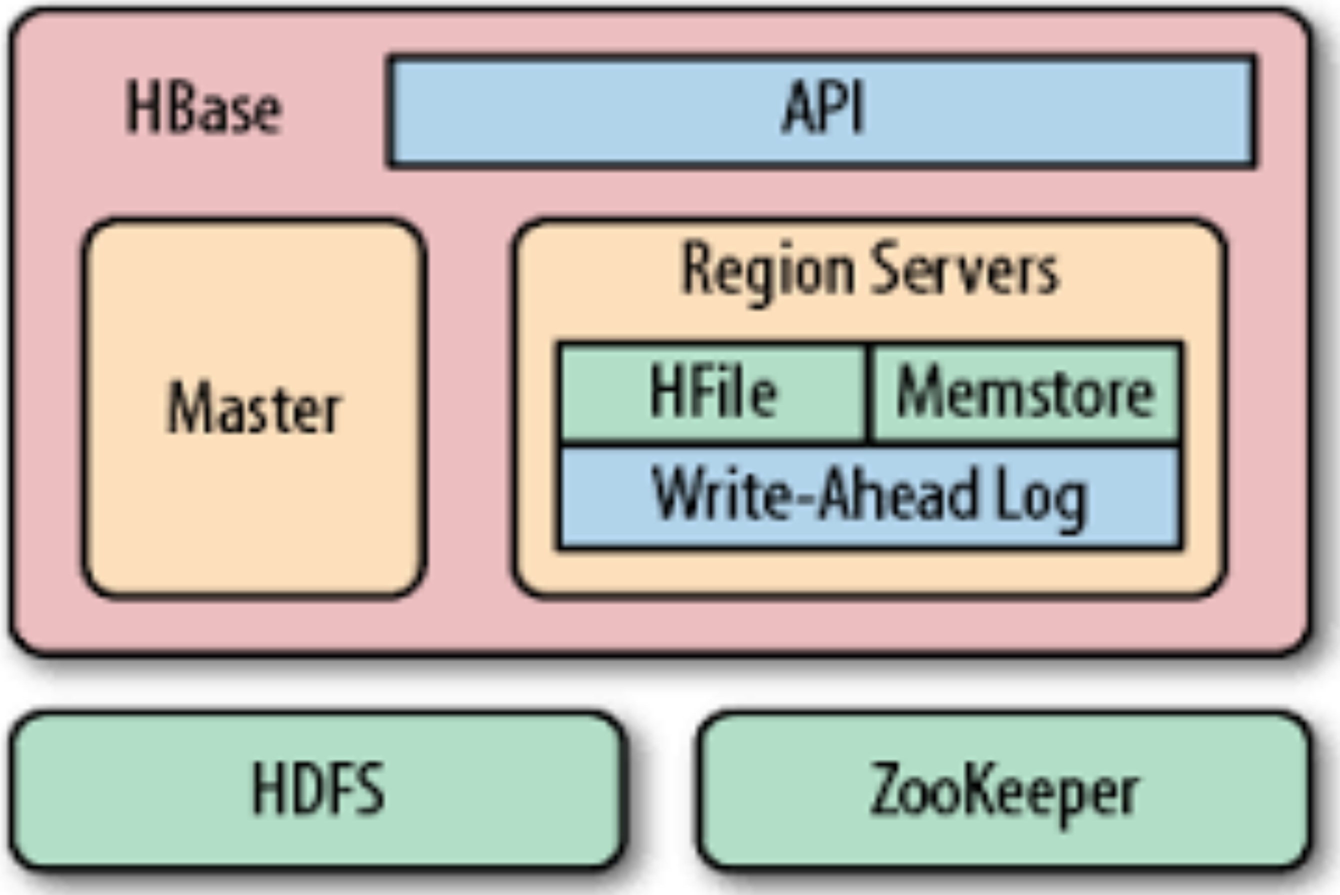

Architecture

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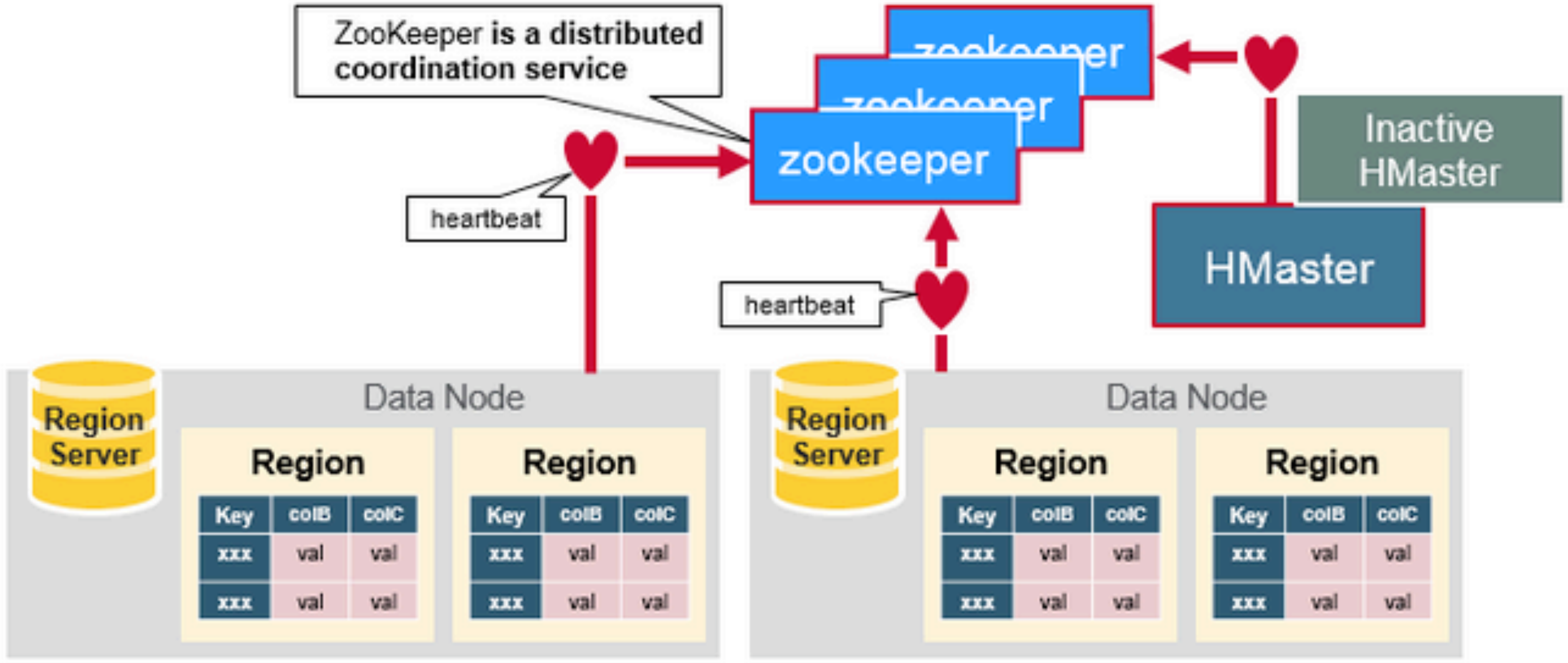
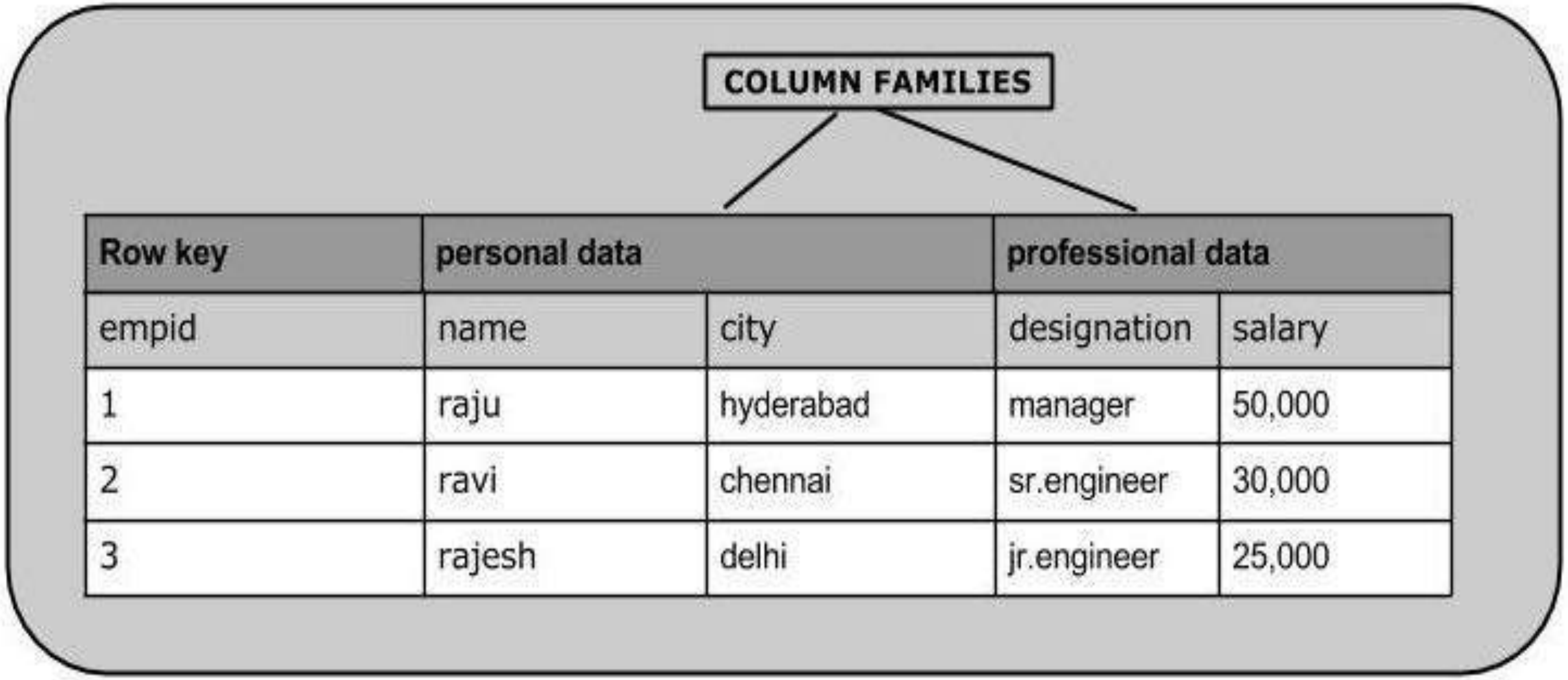


HBase Table



Row key	personal data		professional data	
empid	name	city	designation	salary
1	raju	hyderabad	manager	50,000
2	ravi	chennai	sr.engineer	30,000
3	rajesh	delhi	jr.engineer	25,000

HBase Table

- Each table is composed of column families and each CF will have a Store (memstore and HFile combination).
- When a record is written, it first goes to WAL on HDFS and then it is pushed into memstore -> Hfile on disk.
- As the table grows, it is split into regions and regions can be across multiple nodes.
- Whenever any Store of a region is flushed, all the Stores of that region are flushed as well.
- So, having too many CF’s per table and not using them evenly could be a bad design.

Important Files

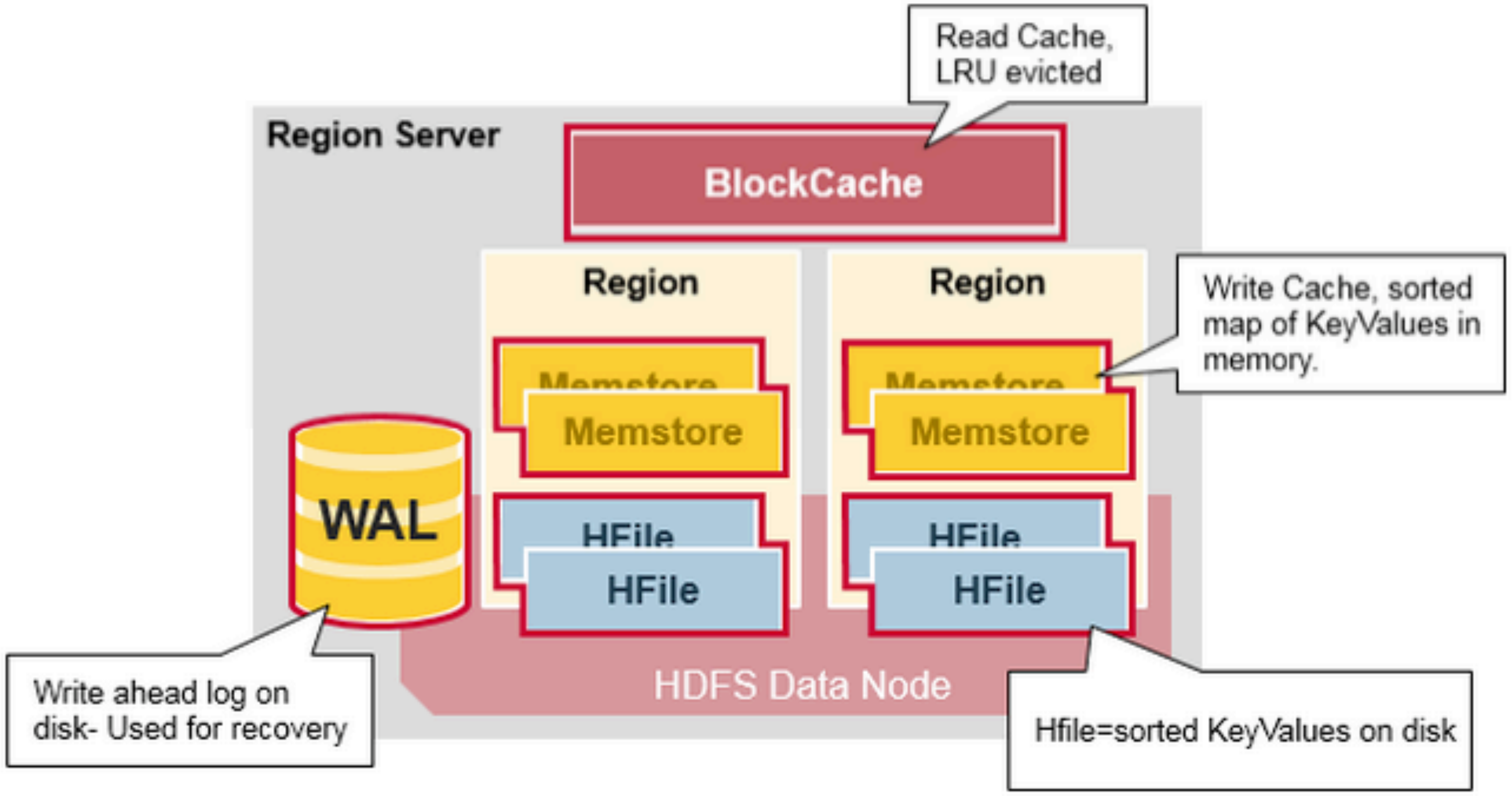


Table Regions

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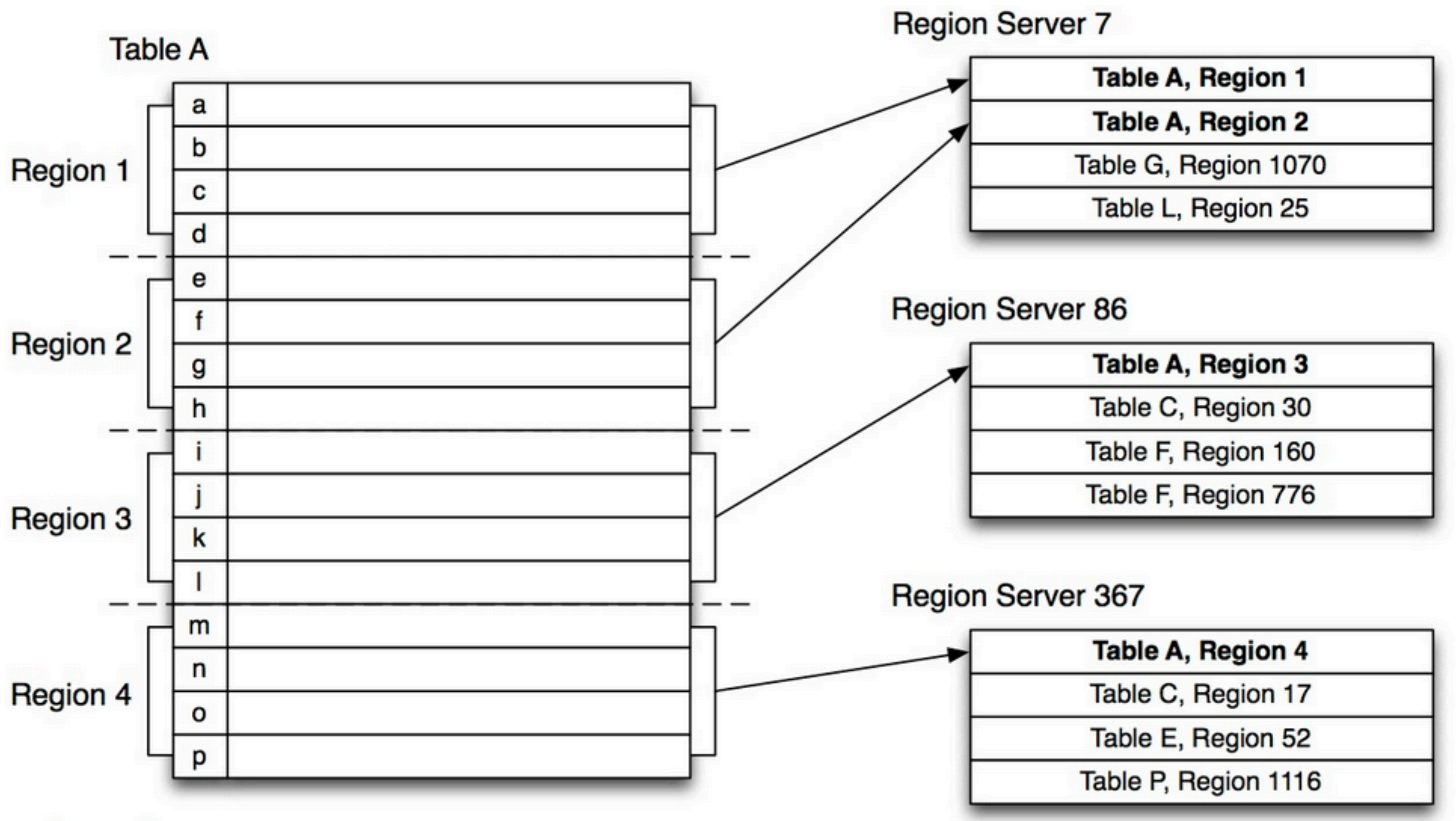

HBase Operations

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- It is a client server architecture, with HBase master and slaves being called region servers (RS).
- Most of the times clients talk directly to the Region servers.
- For normal operation HBaster master is not needed and even if master fails, we can do read/write operations, as long as there is no region move/update or DML operation.
- Obviously, we cannot afford to keep master offline for too long.
- During cluster boot up, the catalog tables “meta and ROOT” are with the master and then copied to a region server.
- This information is kept in zookeeper.

HBase Operations

- Zookeeper is contacted for all operations like find the hbase:meta table, region servers and region information.
- Also, tables, transitions states will be marked in zookeeper.
- The meta table will have a “start row key”, region server, region ID.
- Using the meta table, we can jump directly to the region on a region server.
- Meta table will be cached on the clients till they are valid.

Meta Table

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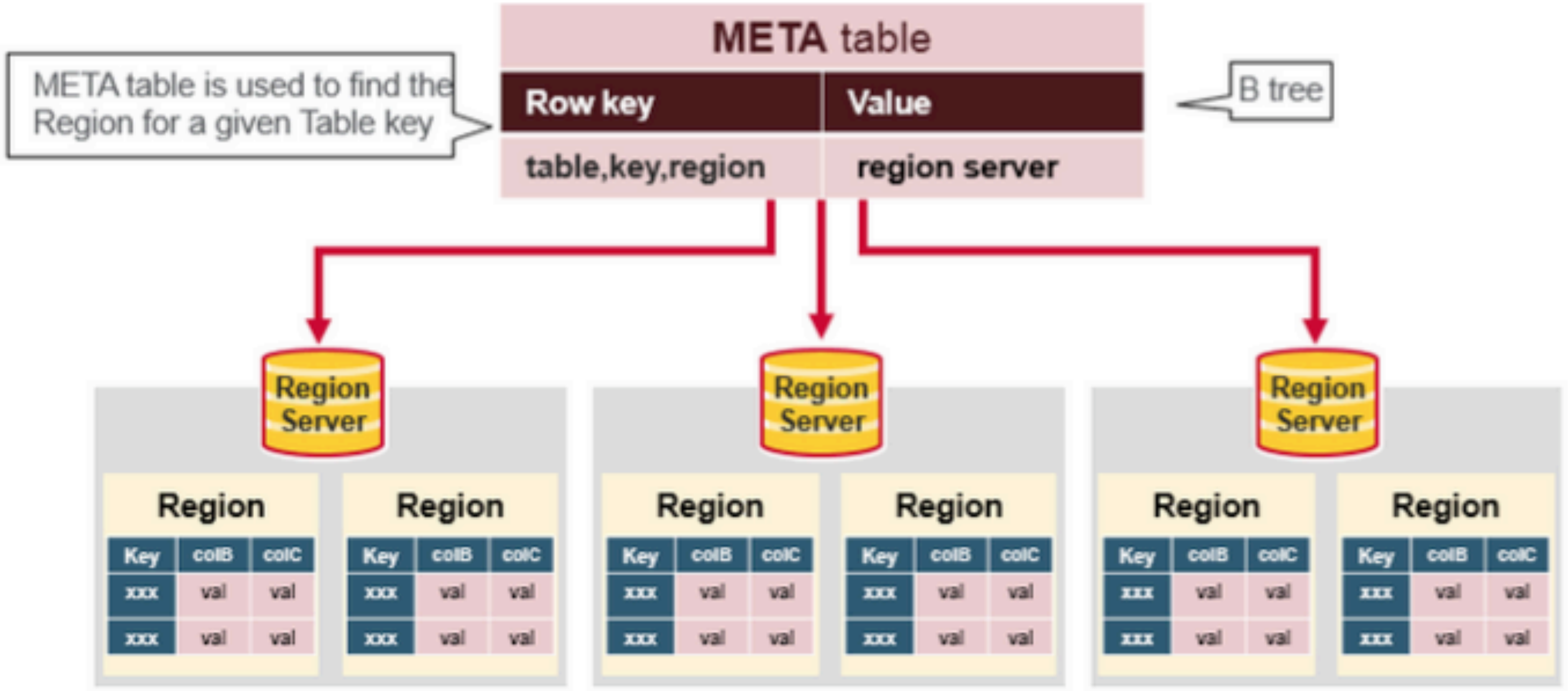

HBase Write Path

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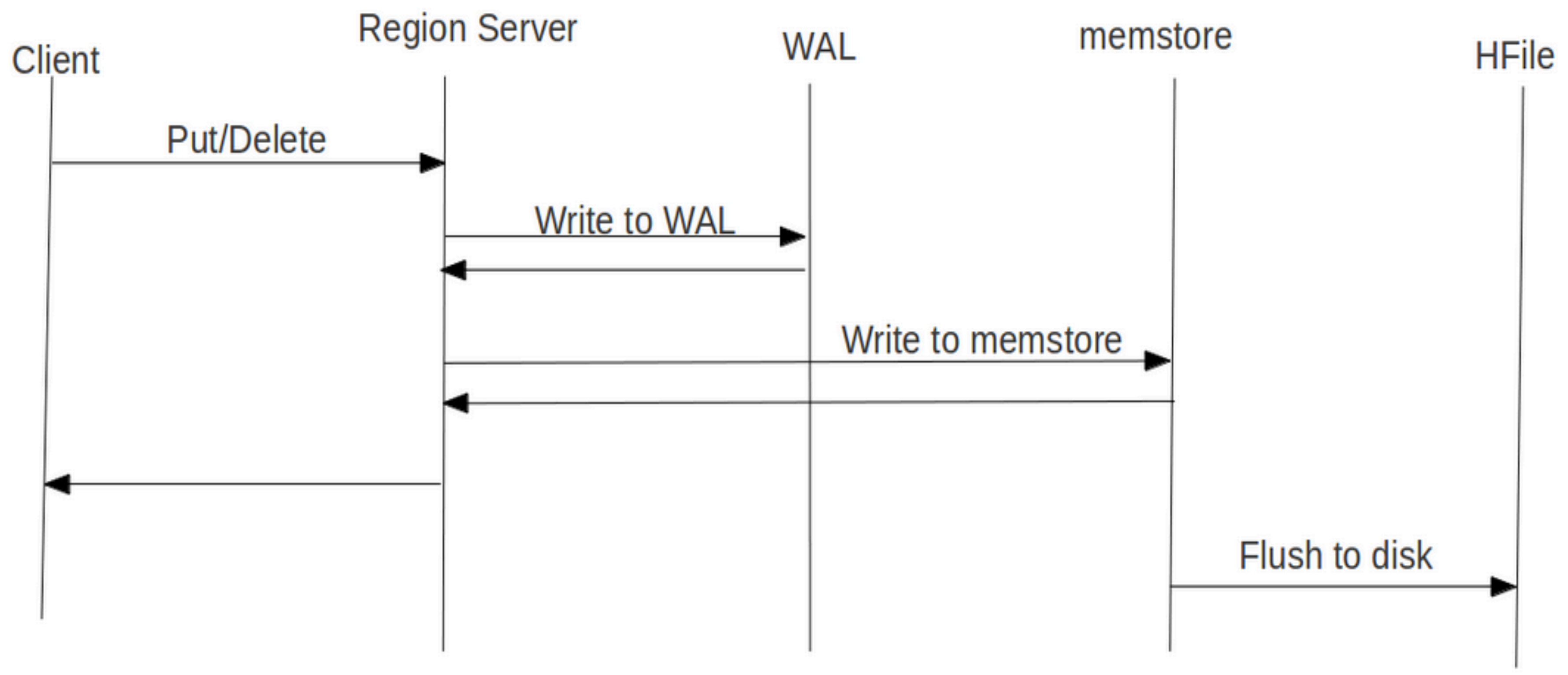
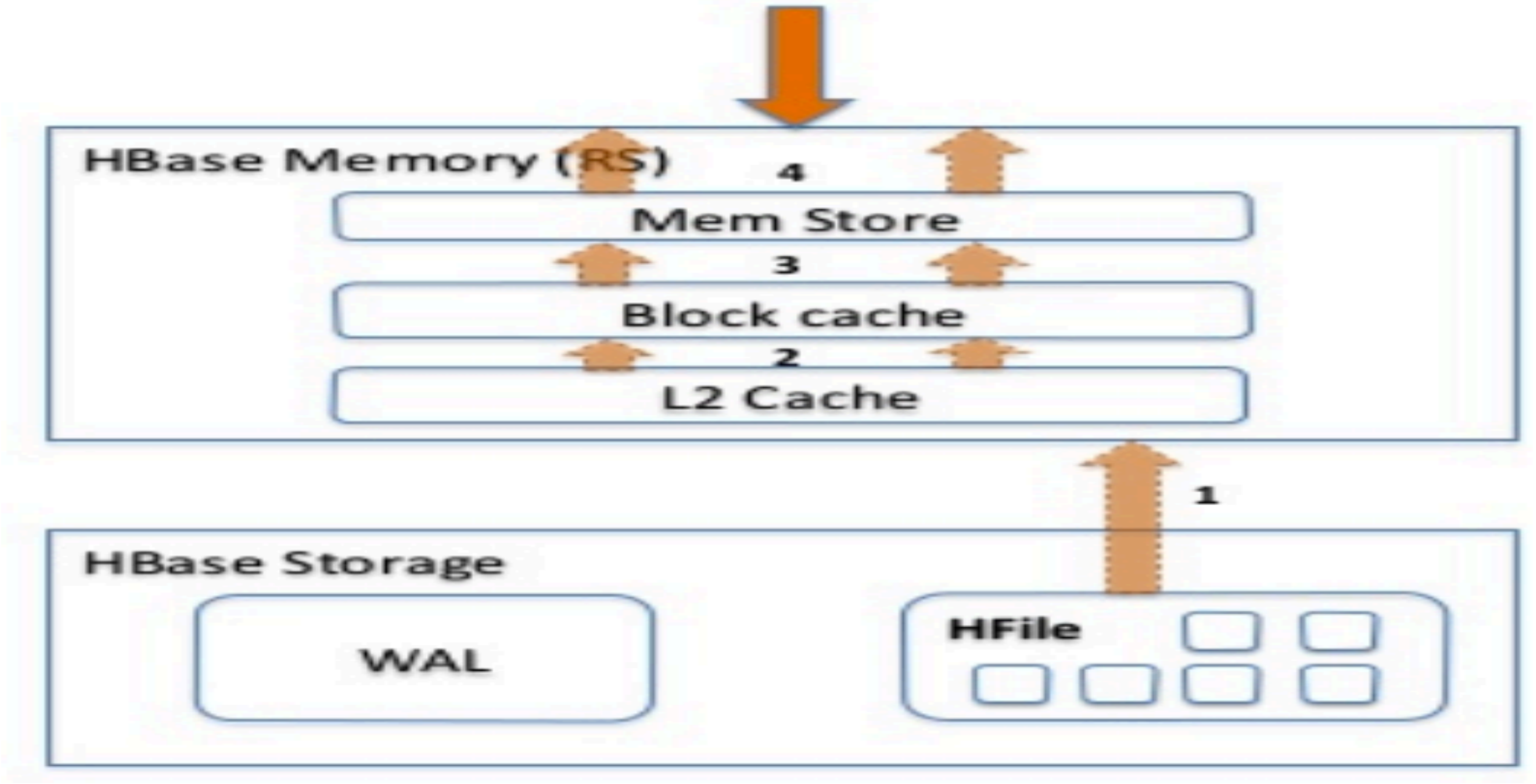


HBase Read Path



Optimizations

- What about the size of memstore? Smaller the memstore, more frequent will be the flushed.
- More number of smaller Hfiles.
- Minor compaction will kick in too often.
- What about WAL files. How many we can have?
- When does the split of a region happens?
- Too many splits can cause problems.
- What about region balancer – moving regions across?
    - Data locality
- What about major compactions. It is a stop the world event.
- Hbase Table Design – Salting

Lets look at Hbase and create see tables.

DEMO

Reach me

You can reach me anytime for any help or guidance:

Email: trainings@netxillon.com

Github: https://github.com/netxillon/hadoop

We provided Consultancy on Big Data implementations, right from hardware provisioning to application support and Optimizations.

"We are not just a training provider but a Solutions Provider"

"Doing a course is not a guarantee for a job, but having a solid foundation surely is"

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thank you!