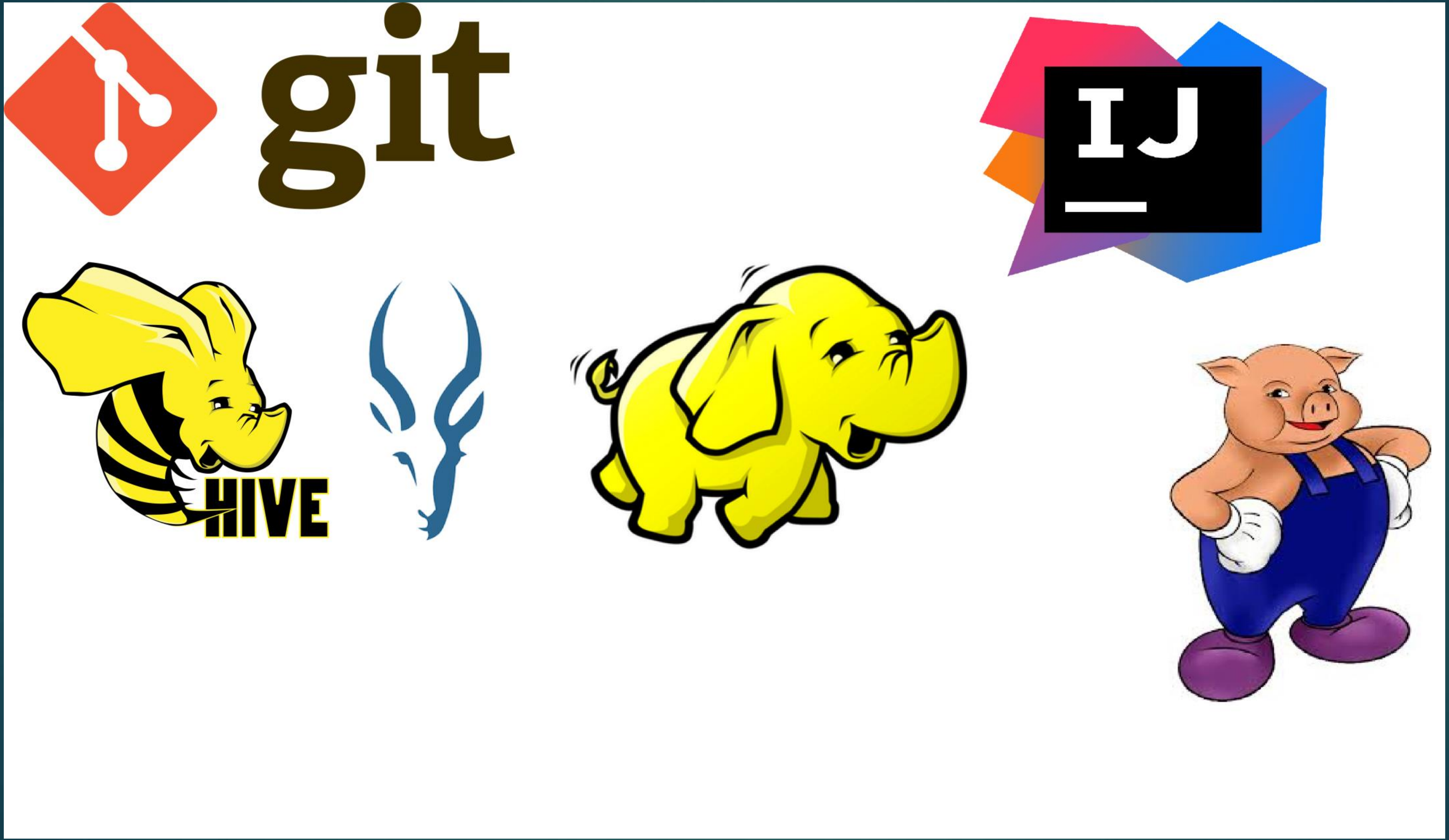

git
IJ
HIVE

Recap

- Pig
- Hive
- Impala

Agenda for today

- Sqoop
- Hbase

Introduction

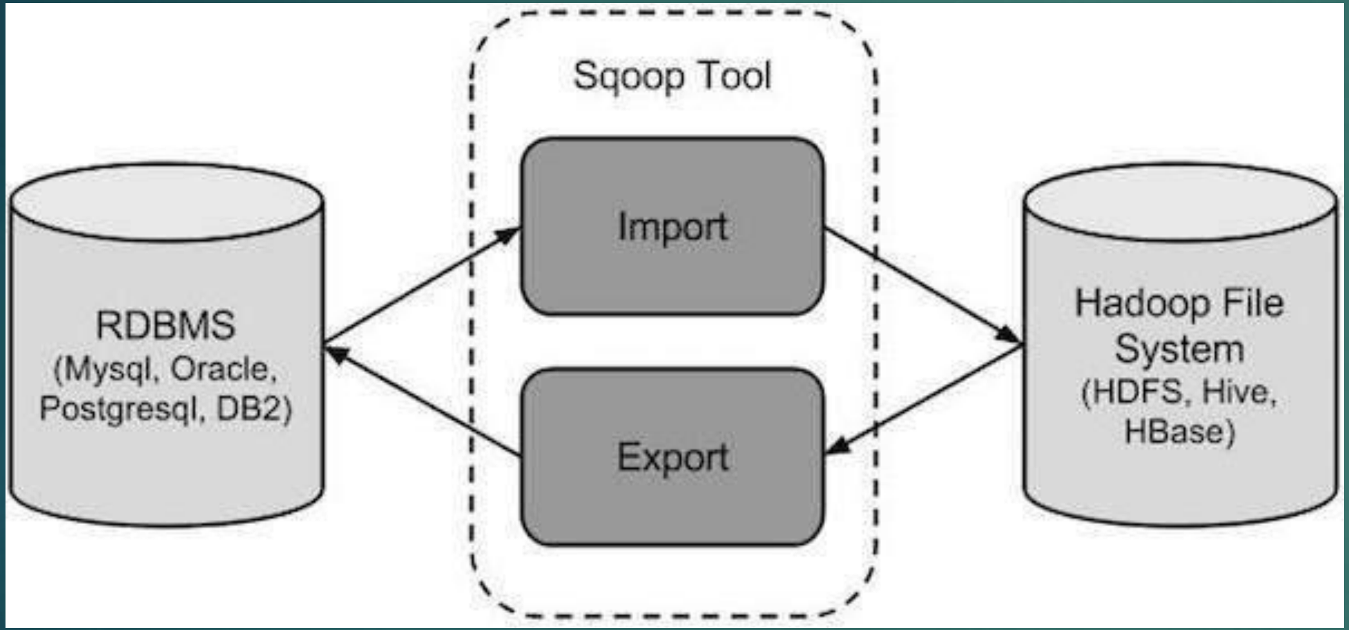


Image Ref: Tutorialspoint

Export

Parameter	Description
--table	Target table name
--export-dir	HDFS source dir name
--fields-terminated-by	Field delimiter
-m, --num-mappers	#mappers to launch
--staging-table	Staging table for temp storage
--jar-file	Use mentioned jar file to export
--update-key	Update data in RDBMS based on mentioned key

- sqoop export --connect jdbc:mysql://localhost :3306/retail_db --username retail_dba --password cloudera --table test --fields-terminated-by ‘,’ --export-dir <HDFS DIRECTORY NAME>

Import

Parameter	Description
--table	Source table name
--target-dir	HDFS target dir name
--fields-terminated-by	Field delimiter
-m, --num-mappers	#mappers to launch
--split-by	Unique column name
--delete-target-dir	Delete target HDFS dir if exists
--where	Condition to apply while fetching data from RDBMS

- sqoop import --connect jdbc:mysql://localhost :3306/<DATABASE NAME> --username root **-p** --table <TABLE NAME> --m 1 --target-dir <HDFS DIRECTORY NAME>

Jobs

- Compile sqoop jobs for regular execution
- Create Job

```
sqoop job --create myjob -- import --connect jdbc:mysql:// localhost
:3306/retail_db --username retail_dba  --password cloudera --table departments
--target-dir <HDFS DIRECTORY NAME>
```

- List all created jobs

```
sqoop job --list
```

- Show details of one specific job

```
sqoop job --show myjob
```

- Execute created job

```
sqoop job --exec myjob
```

Codegen

- Generate java code for sqoop commands

```
sqoop codegen --connect jdbc:mysql://
localhost :3306/retail_db --username retail_dba
--password cloudera --table departments
```

- What could be the use case of codegen tool?

Eval

- Evaluate a single command on RDBMS

```
sqoop eval -- connect jdbc:mysql://localhost
:3306/retail_db --username retail_dba  --
password cloudera  -e "INSERT INTO Test
VALUES(999, 'name999')“
```

- What could be the use case of eval tool?

Others

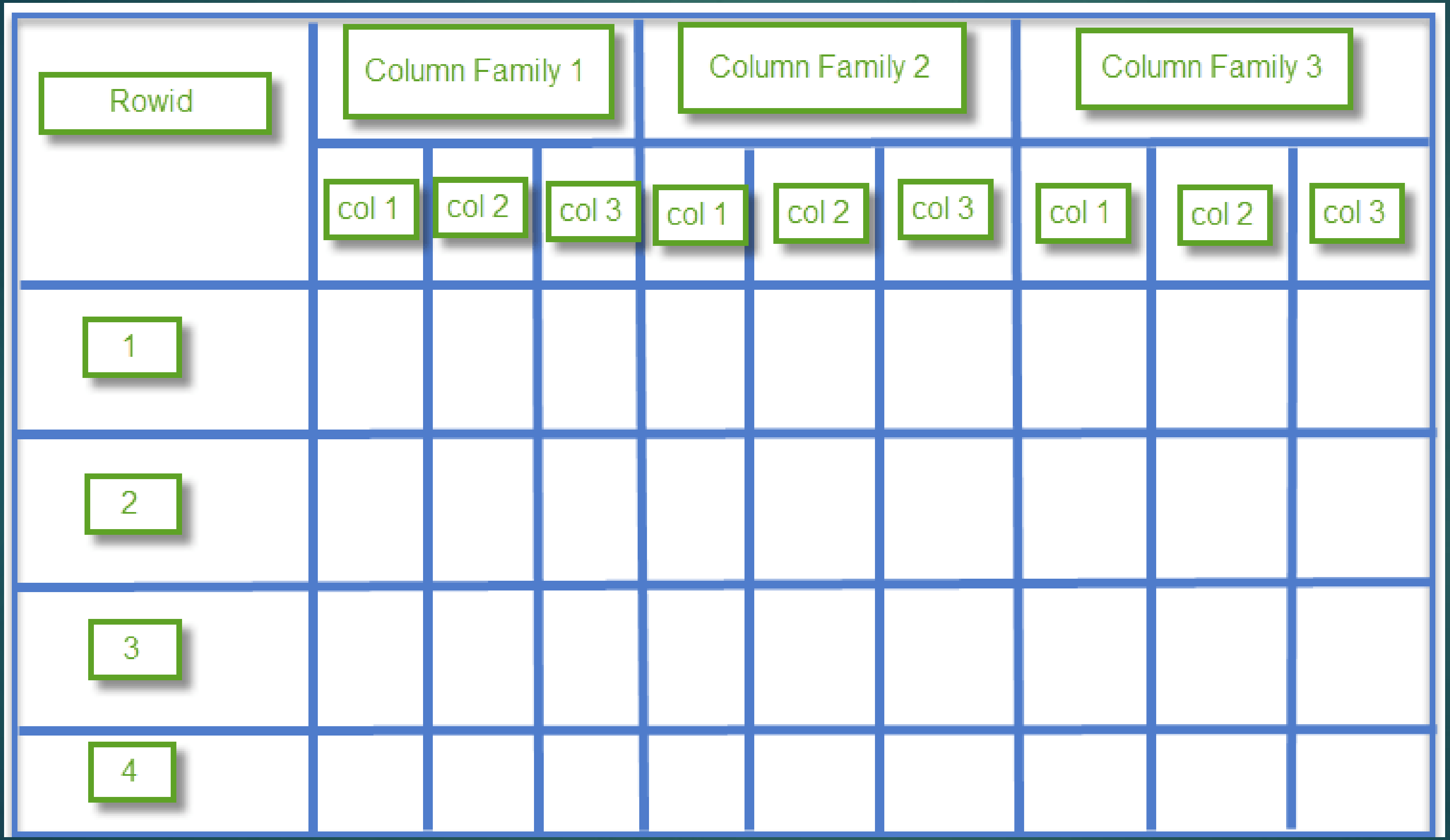
- sqoop-import-all-tables
- sqoop-import-mainframe
- Validation
- sqoop-metastore
- sqoop-merge

Hbase

Introduction

- Column-oriented database built on top of HDFS
- Horizontally scalable
- Built for low latency operations
- Random read and write
- Strictly consistent
- Support for Java API for client access
- Compatibility with MapReduce jobs

Data structure

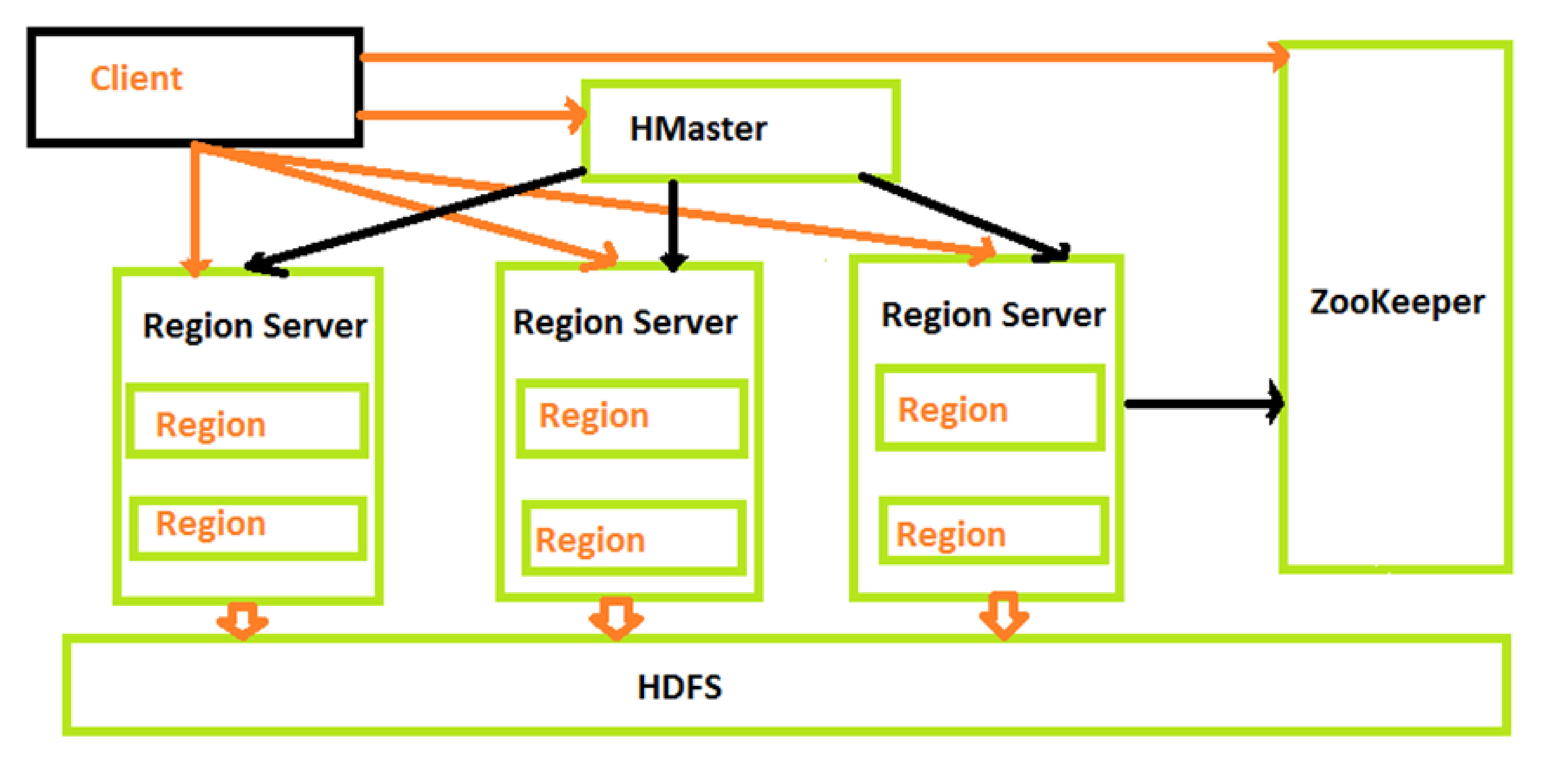


Rowid	Column Family 1			Column Family 2			Column Family 3		
	col 1	col 2	col 3	col 1	col 2	col 3	col 1	col 2	col 3
1									
2									
3									
4									

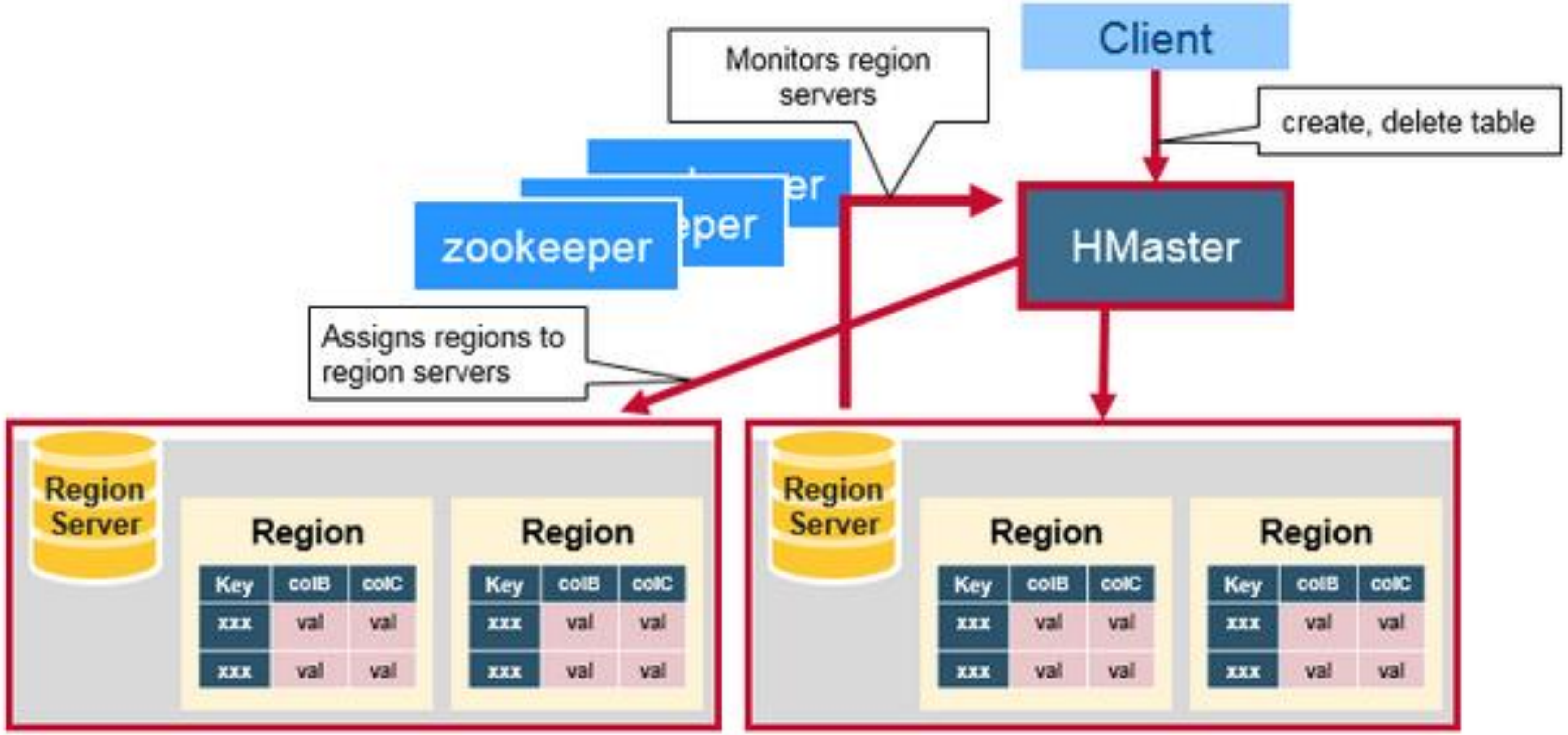
Data structure: Cont…

- Table: Collection of rows present
- Row: Collection of column families
- Column Family: Collection of columns
- Column: Collection of key-value pairs
- Namespace: Logical grouping of tables
- Cell: A {row, column, version} tuple exactly specifies a cell definition in HBase

Architecture



Architecture: HMaster

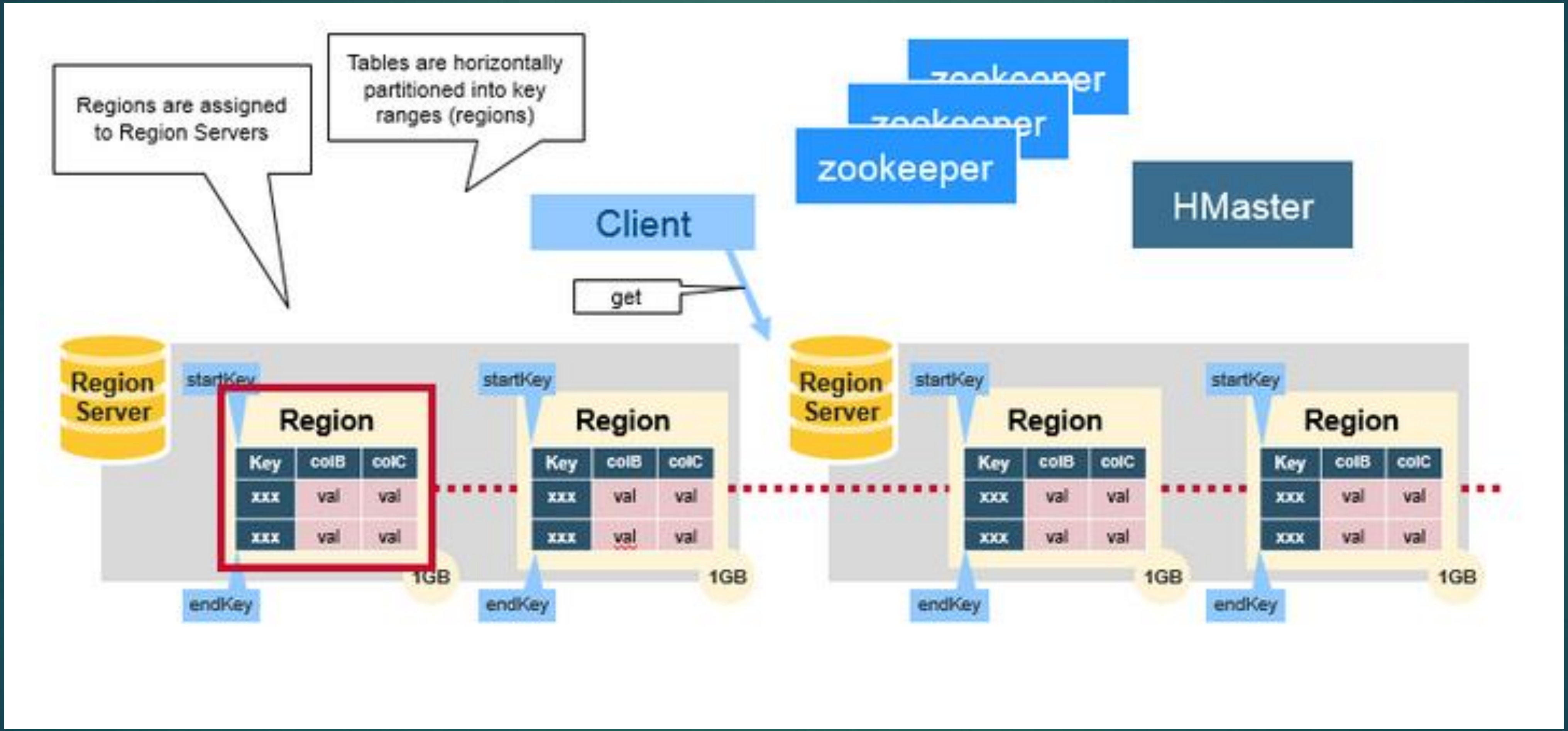


Monitors region servers

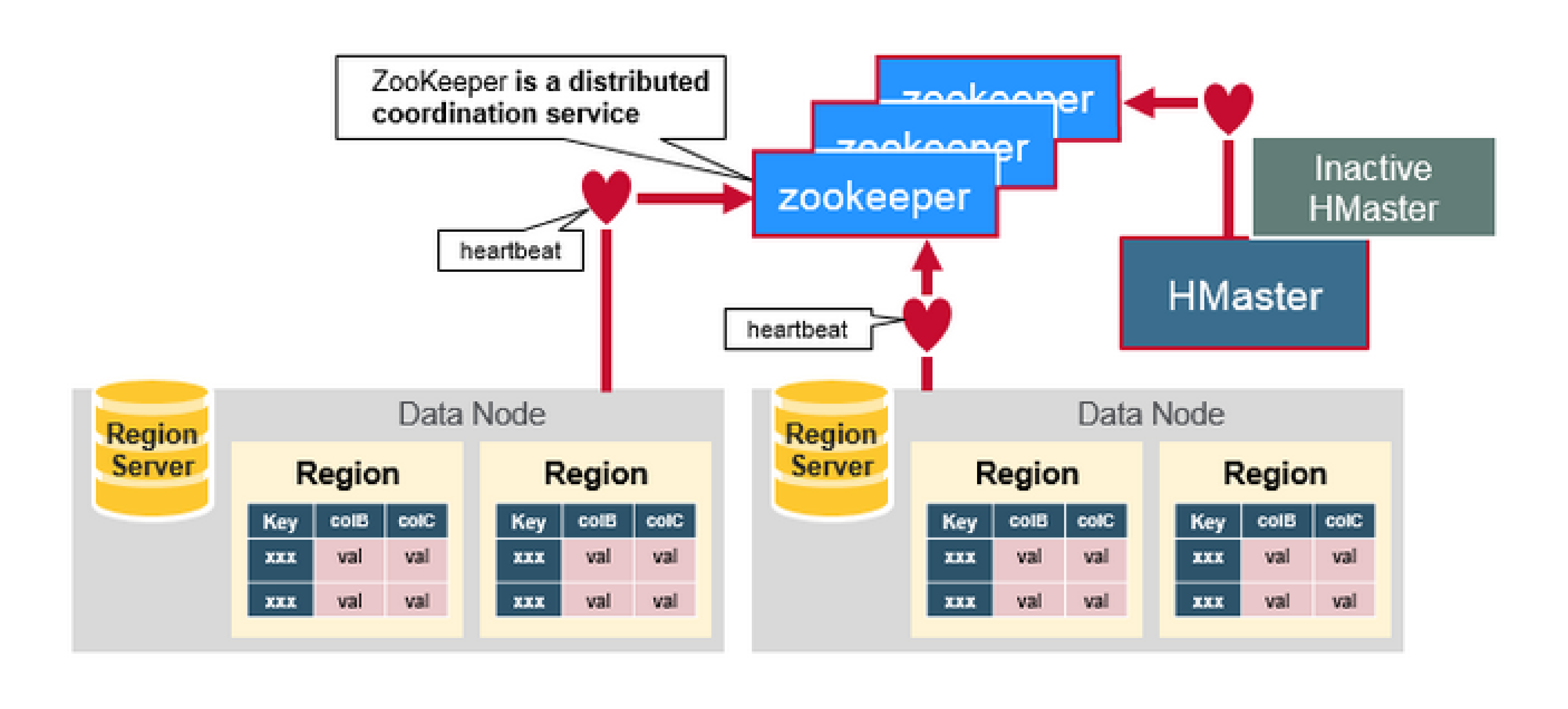
create, delete table

Assigns regions to region servers

Architecture: Region Server



Architecture: Zookeeper



META table

- Keeps a list of all regions in the system
- Structure:

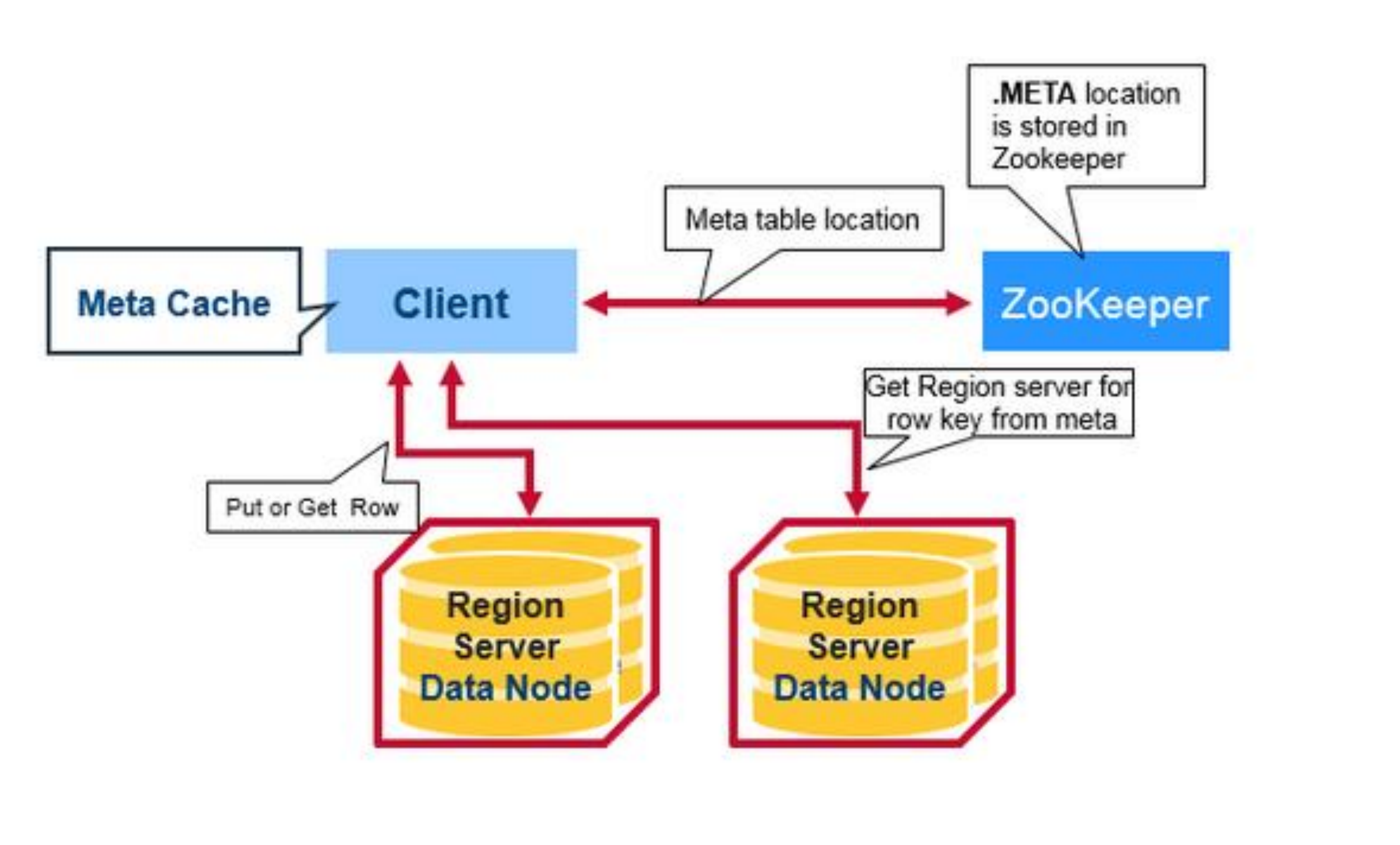
  - Key: region start key,region id

  - Values: RegionServer

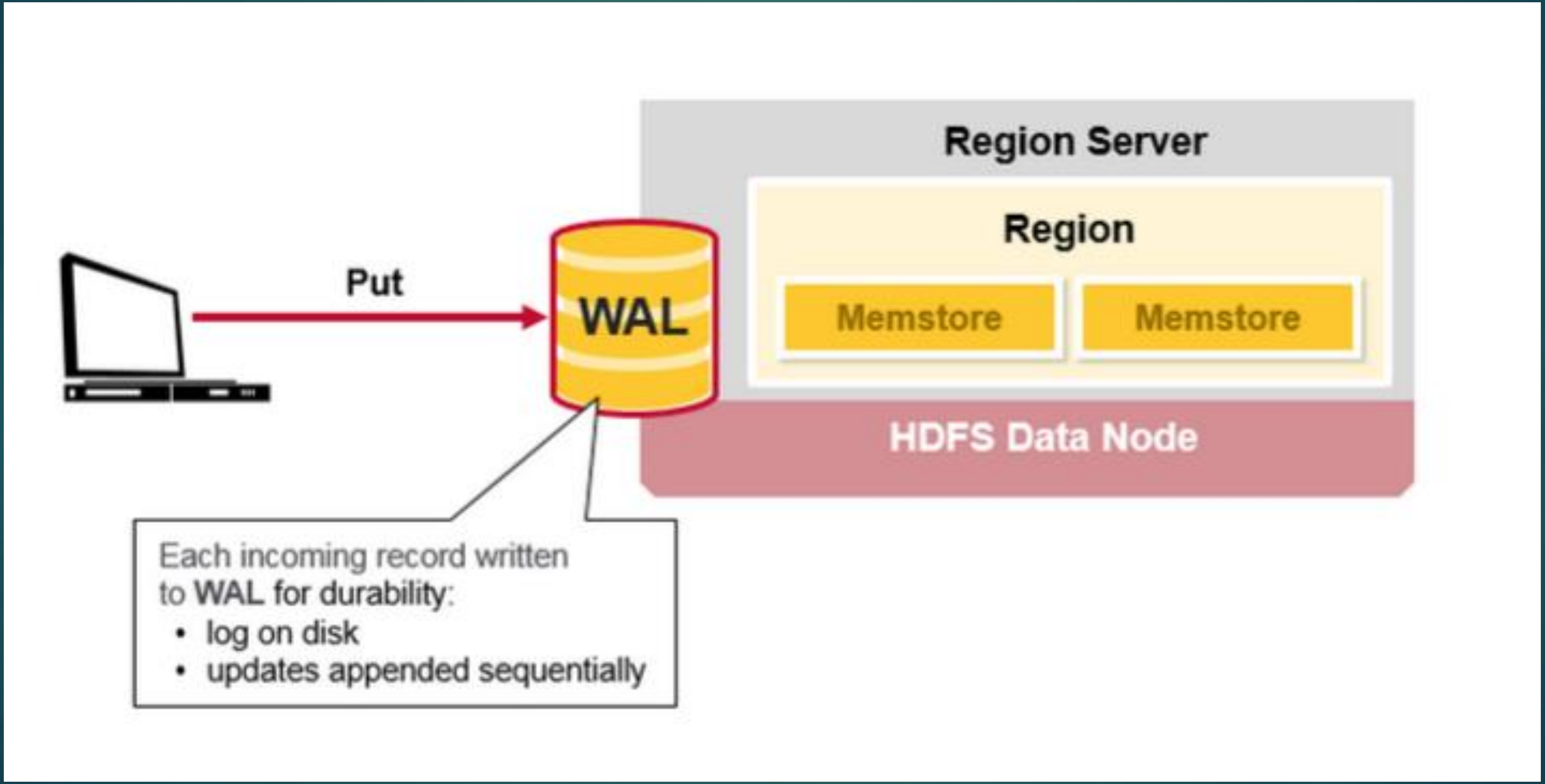
Region Server Components

- WAL: Write Ahead Log is a file on distributed file system
- BlockCache: is the read cache
- MemStore: is the write cache
- Hfiles store the rows as sorted KeyValues on disk.

Locate a Row


.META location is stored in Zookeeper
Meta table location
Meta Cache
Client
ZooKeeper
Get Region server for row key from meta
Put or Get Row
Region Server Data Node
Region Server Data Node

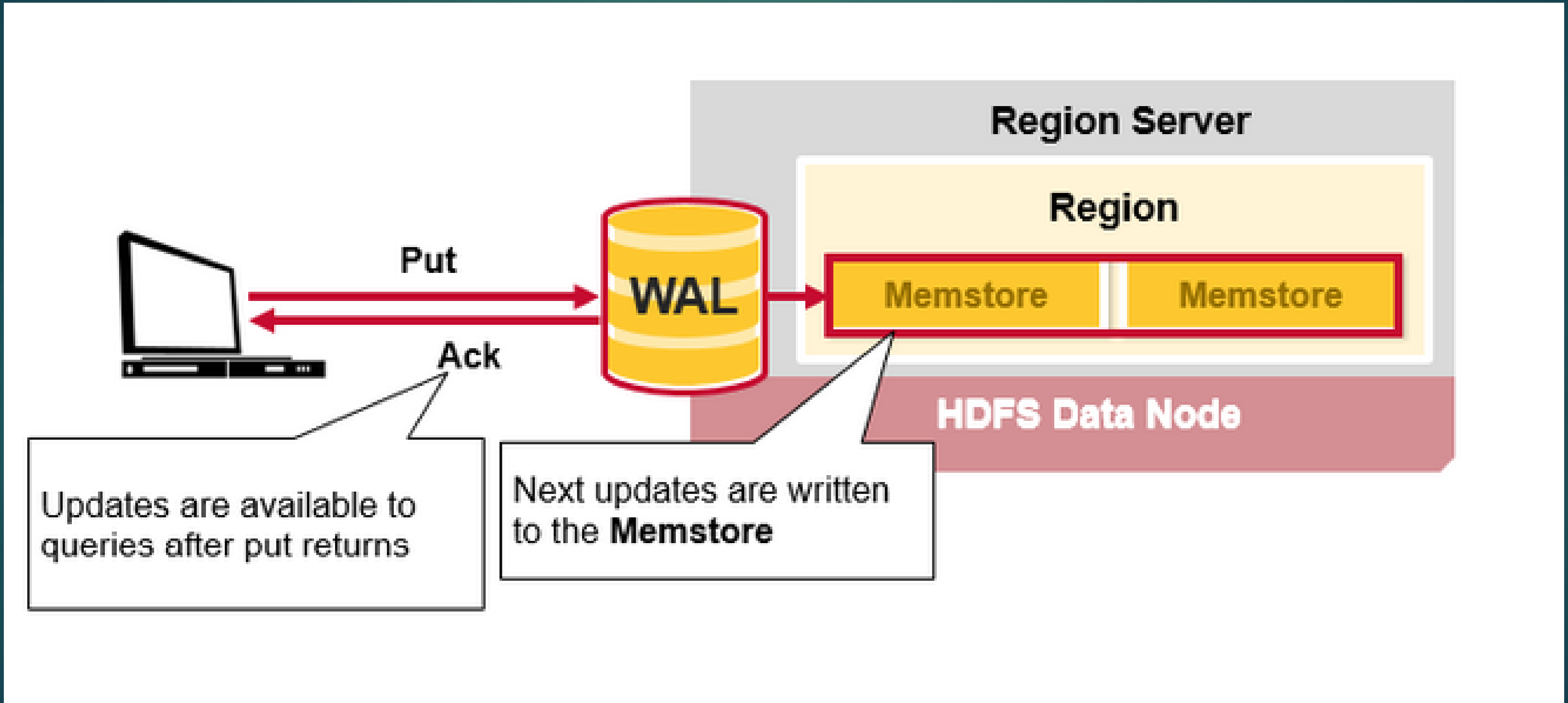
Write Operation: Cont…



Each incoming record written to WAL for durability:

- log on disk
- updates appended sequentially

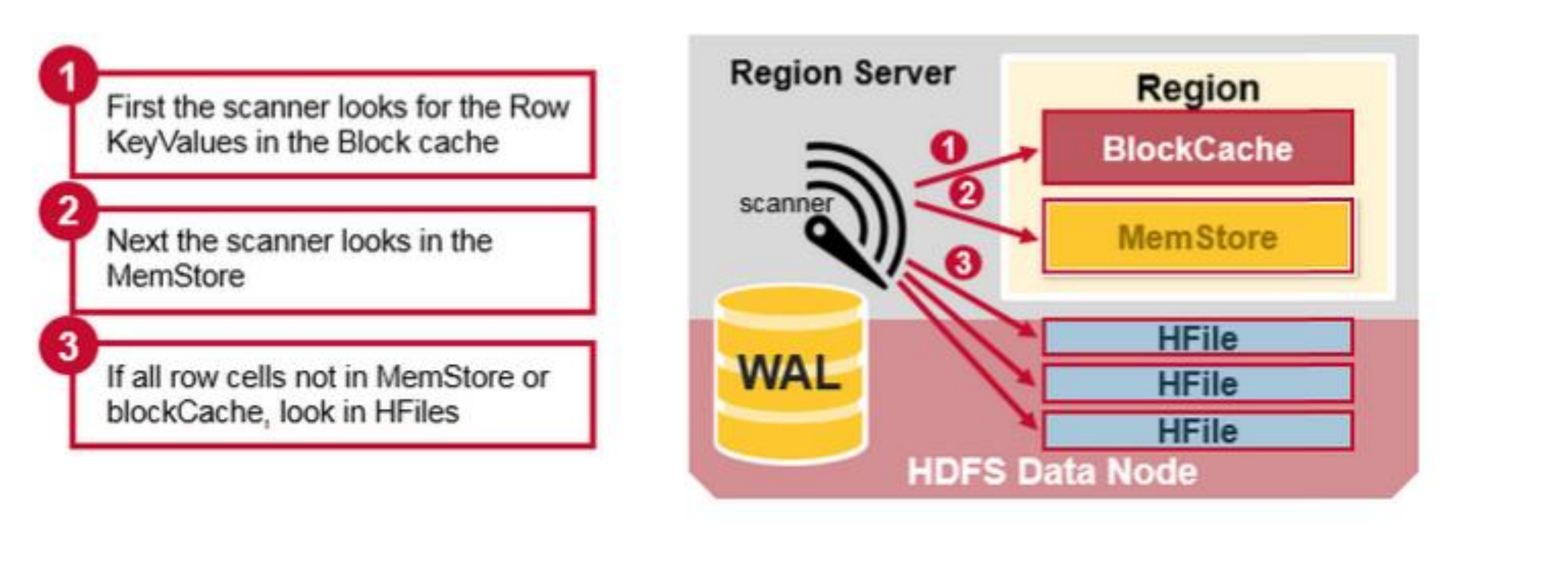
Write Operation: Cont…



Updates are available to queries after put returns

Next updates are written to the **Memstore**

Read Operation

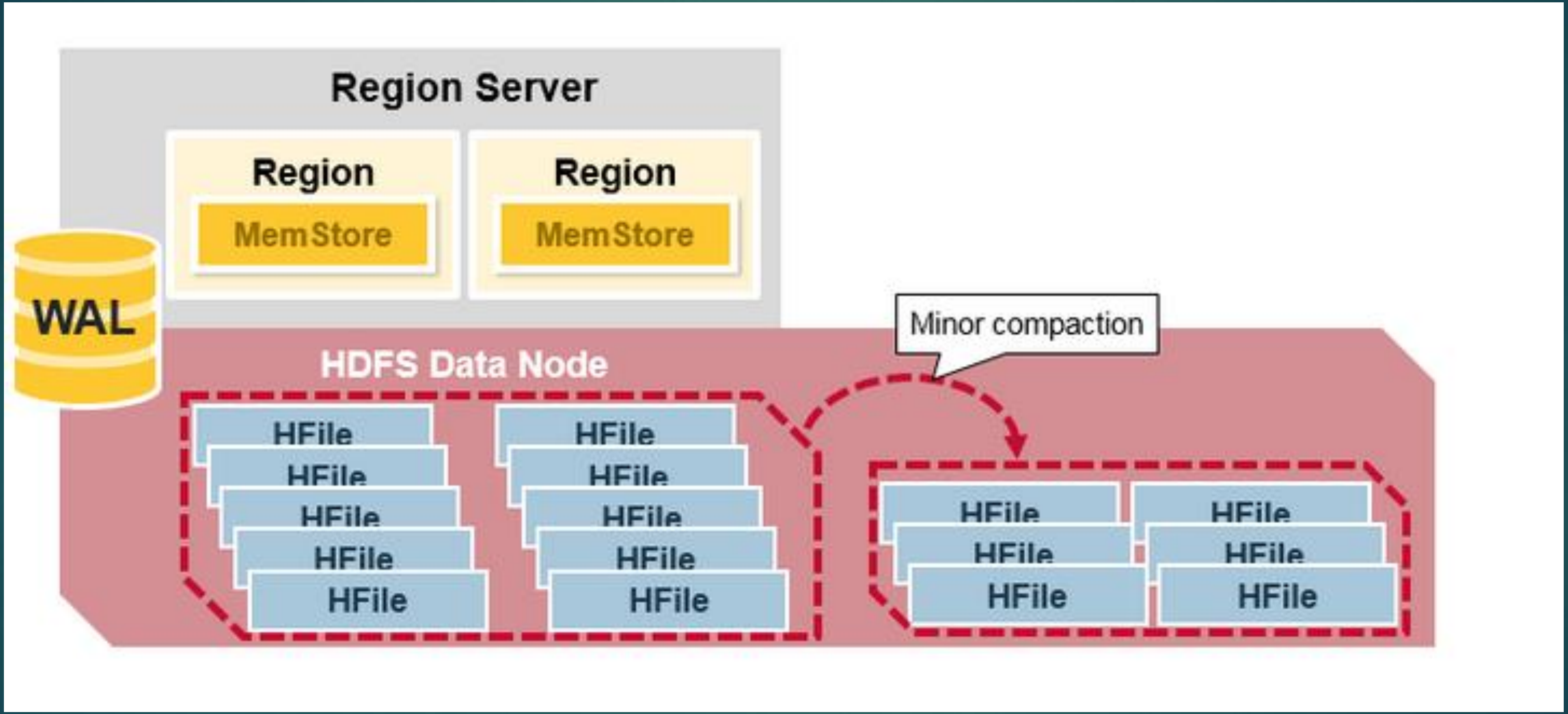


1. First the scanner looks for the Row KeyValues in the Block cache

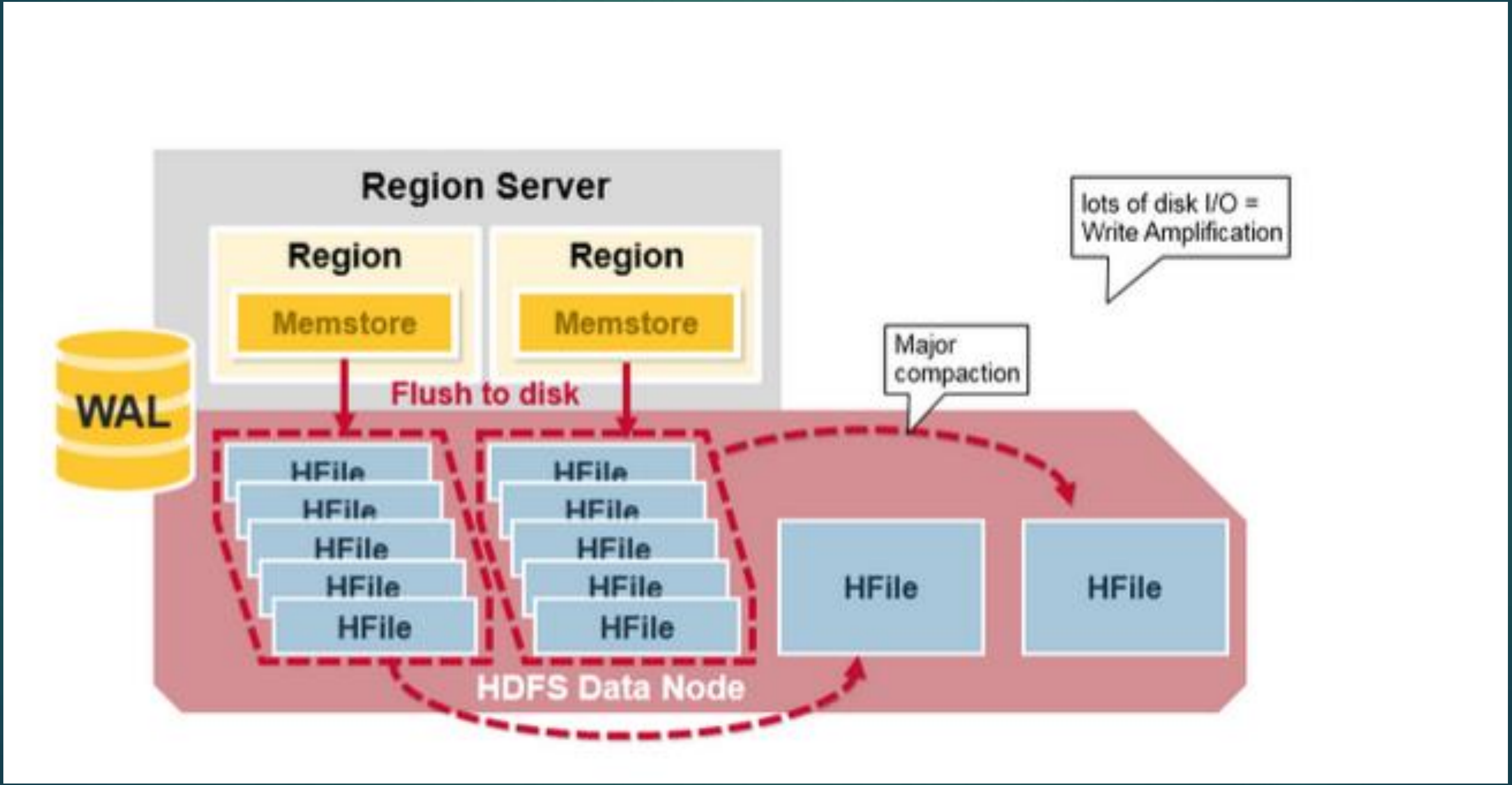
2. Next the scanner looks in the MemStore

3. If all row cells not in MemStore or blockCache, look in HFiles

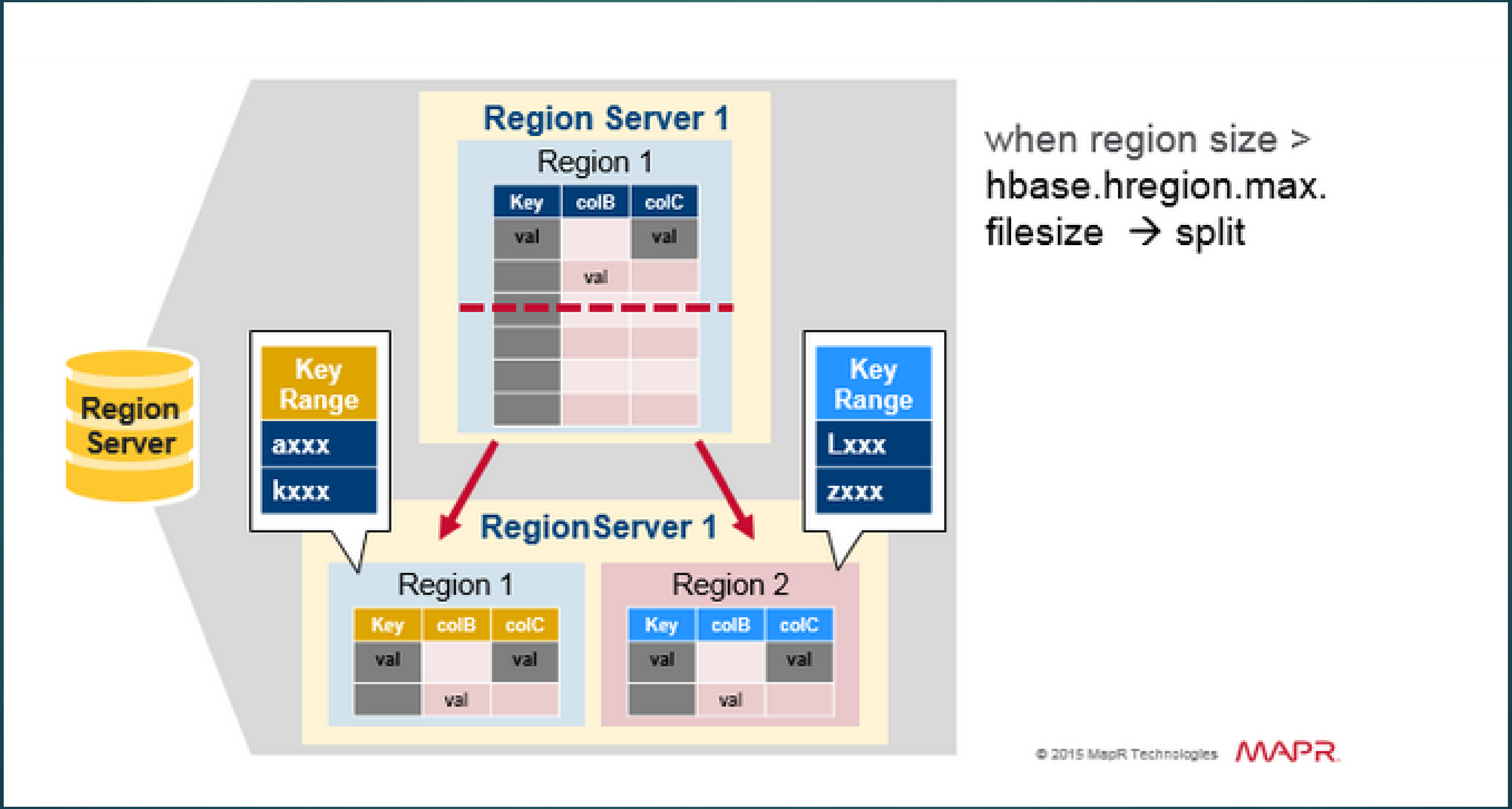
Minor Compaction



Major Compaction

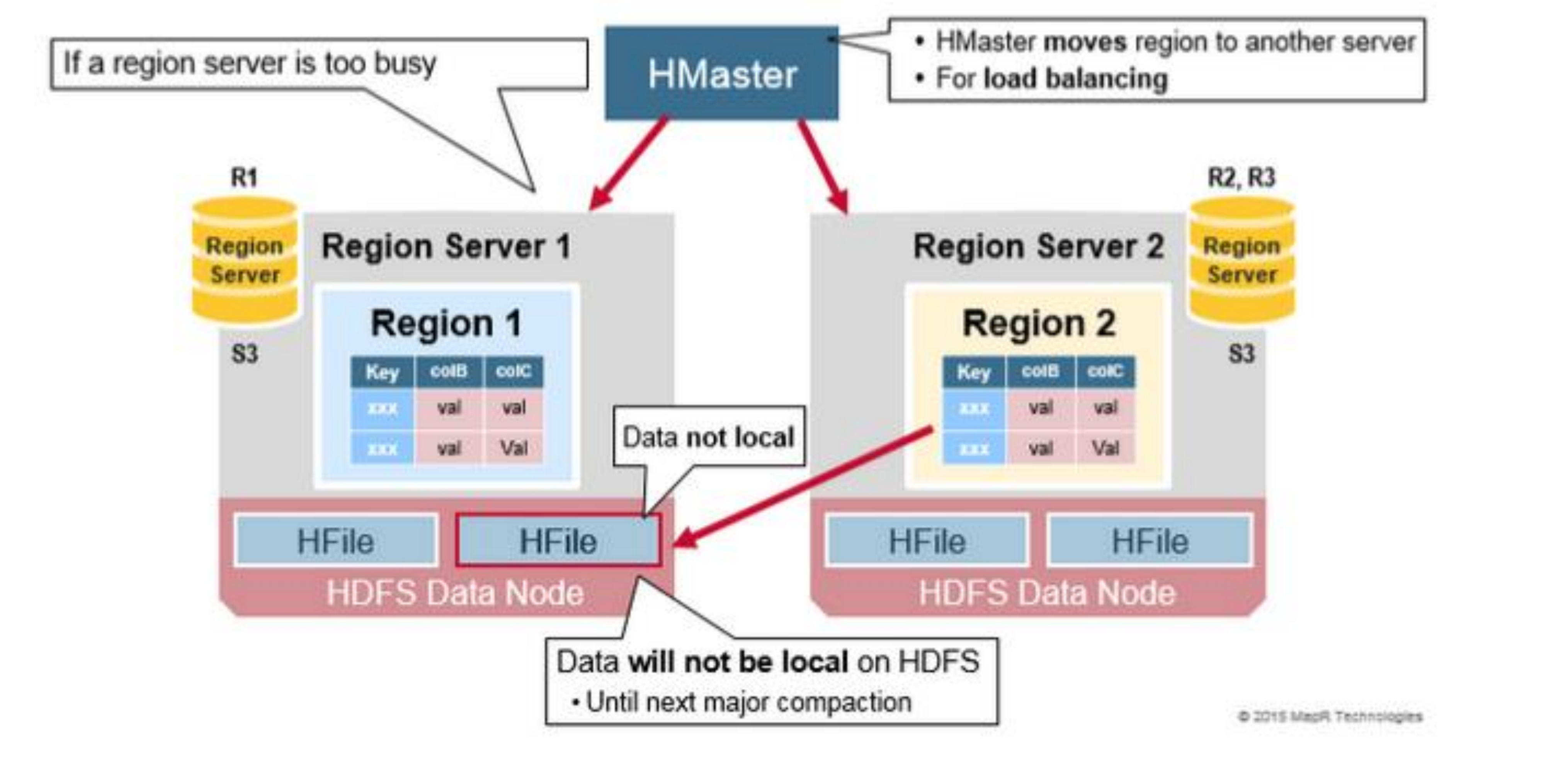


Region Split



when region size > hbase.hregion.max.filesize → split

Load balancing



If a region server is too busy

- HMaster **moves** region to another server
- For **load balancing**

Data not local

Data **will not be local** on HDFS

- Until next major compaction

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Hbase shell Commands

Microsoft Word
Document

References

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- Hadoop: the definitive guide 4th edition