HBASE Understanding

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SQL vs No SQL

SQL	NO SQL
Relational DB	Distributed DB
Defined Schema	Dynamic Schema
Vertical Scalable	Horizontal Scalable
Low Availability	Highly Available
Support Complex Queries	Not Supported for Complex Queries

Types of No SQL

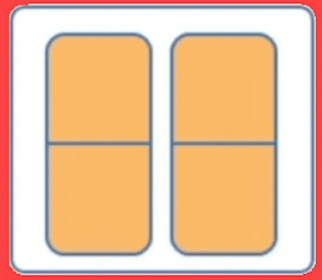
Key Value

Example:
Riak, Tokyo Cabinet, Redis server, Memcached, Scalaris

Document-Based

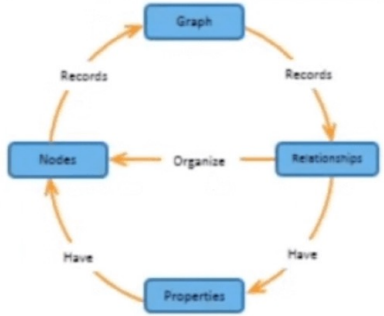
Example:
MongoDB, CouchDB, OrientDB, RavenDB

Column-Based



Example:
BigTable, Cassandra, Hbase,
Hypertable

Graph-Based



Example:
Neo4J, InfoGrid, Infinite Graph, Flock DB

json

Why json format?

json vs XML

json vs YAML

YAML

```yaml
apis:
  - name: login
    port: 8080
  - name: profile
    port: 8090
```

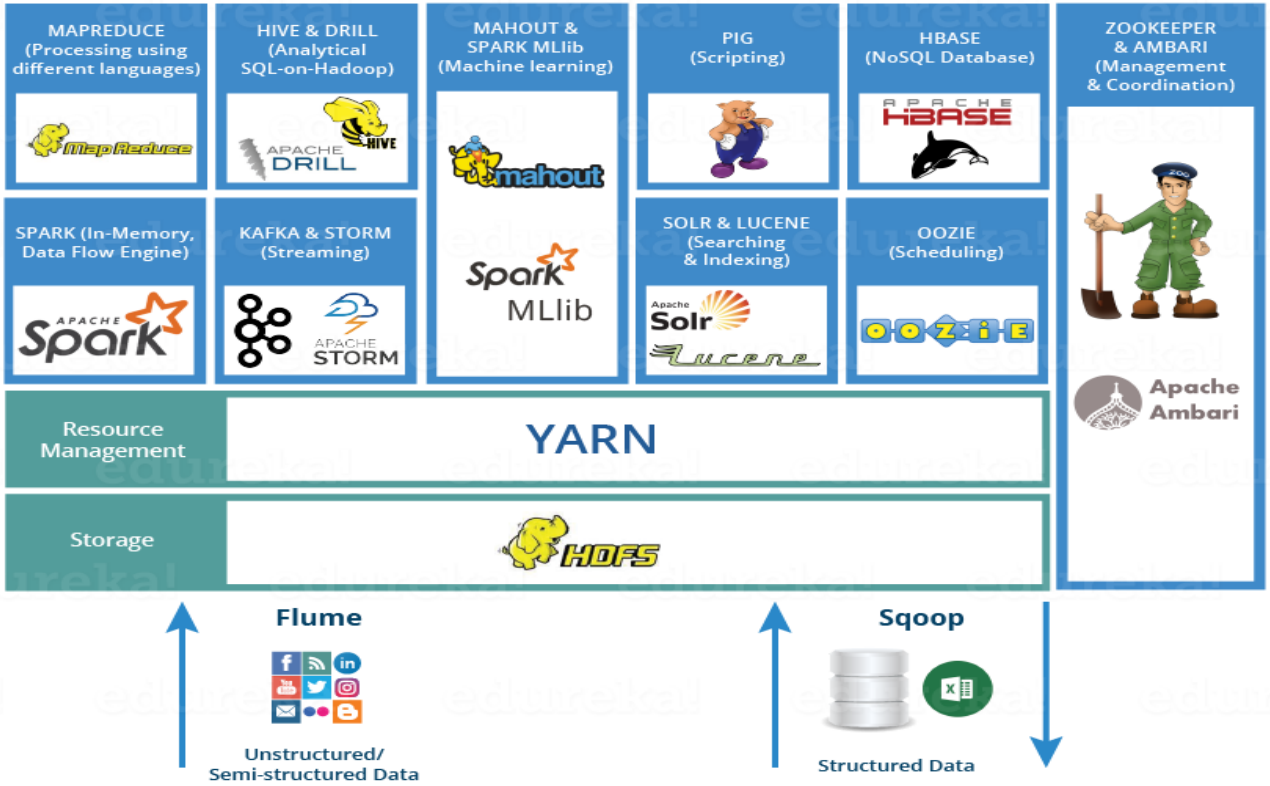
XML

```xml
<apis>
    <api>
        <name>login</name>
        <port>8080</port>
    </api>
    <api>
        <name>profile</name>
        <port>8090</port>
    </api>
</apis>
```

JSON

```json
{
  "apis": [
    {
      "name": "login",
      "port": 8080
    },
    {
      "name": "profile",
      "port": 8090
    }
  ]
}
```

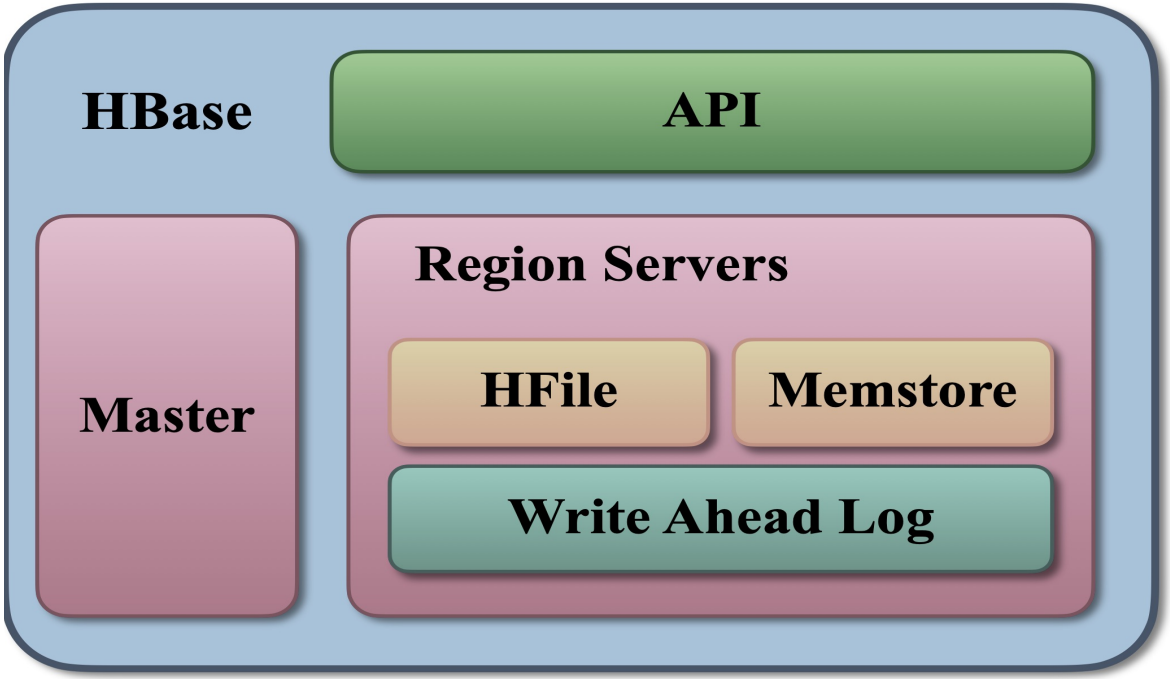
Hadoop Ecosystem



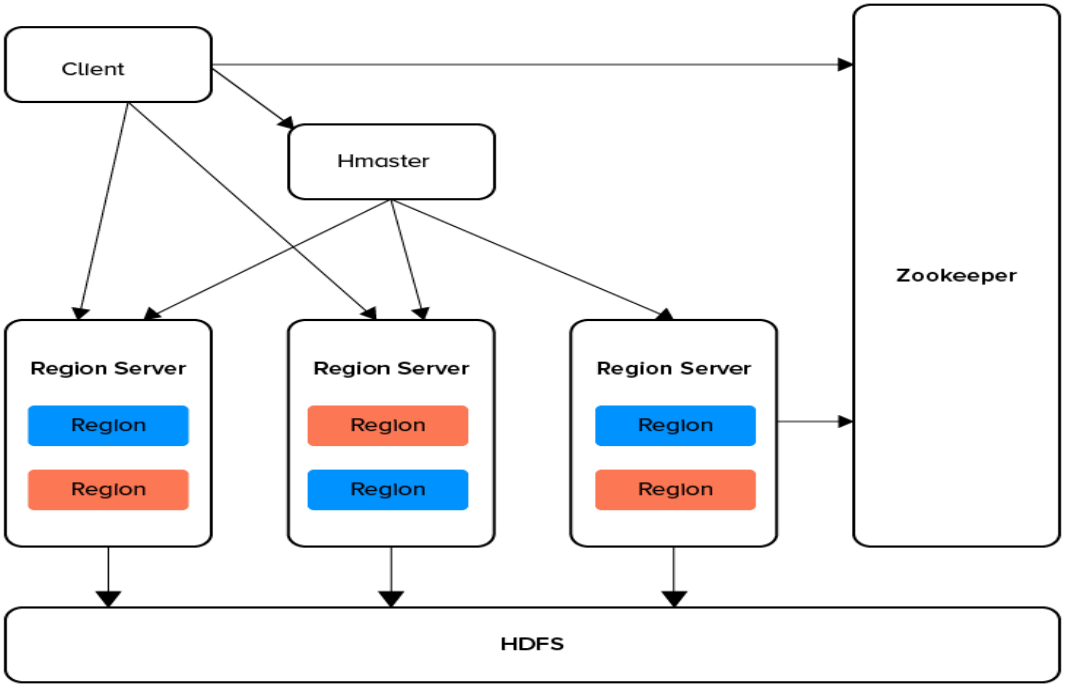
HBASE

- Apache HBase is a column-oriented key/value data(NoSQL) store built to run on top of the Hadoop Distributed File System (HDFS)
- Real-time read/write access to large datasets
- Provides random, real time access to Hadoop Data
- Multi-structured or sparse data
- Low latency storage

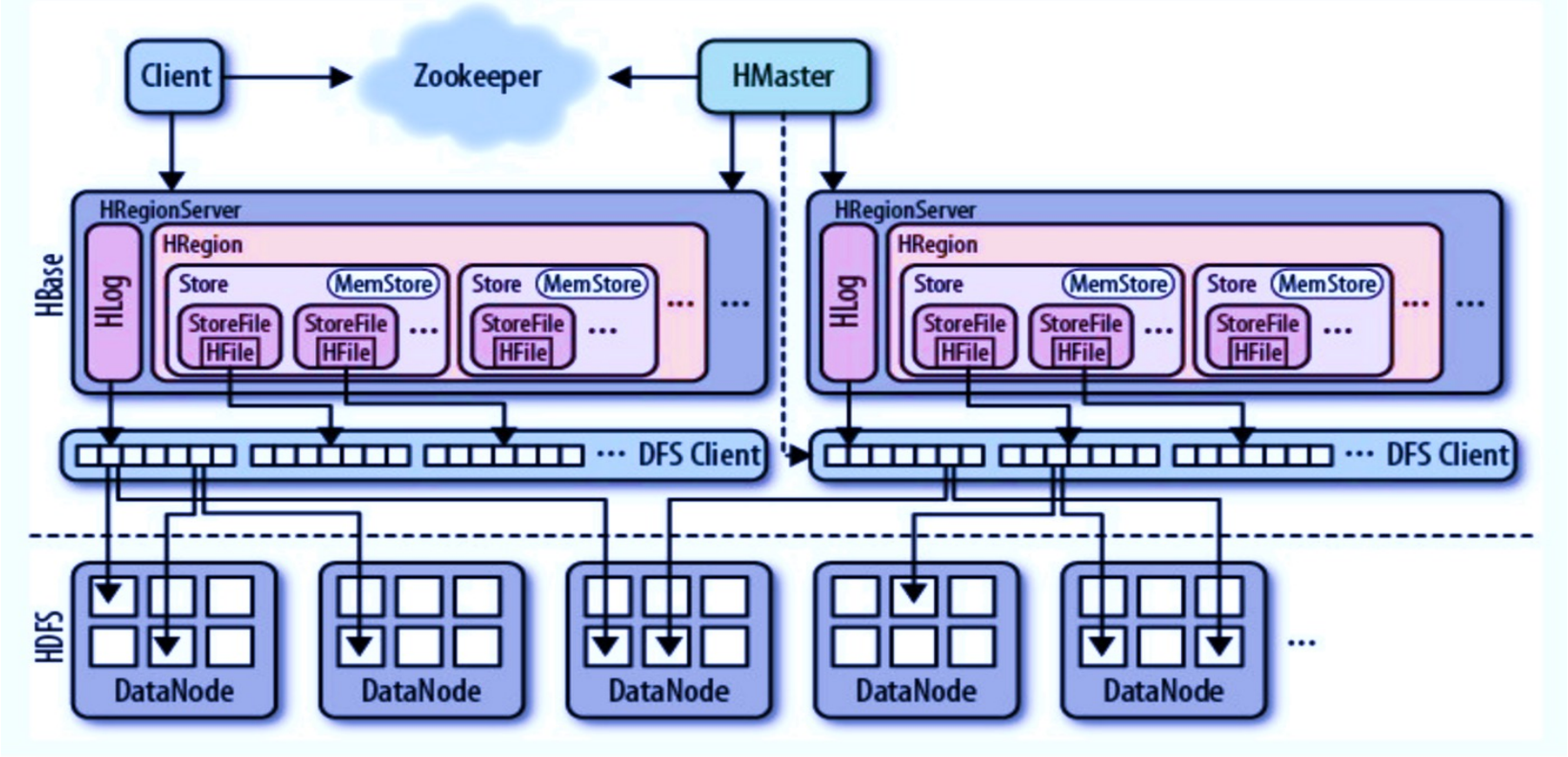
HBASE API


HBase
API
Master
Region Servers
HFile
Memstore
Write Ahead Log

Simple Architecture



Architecture



HMaster

HBase HMaster is a lightweight process that assigns regions to region servers in the Hadoop cluster for load balancing.

- ✓ Manages and Monitors the Hadoop Cluster
- ✓ Performs Administration (Interface for creating, updating and deleting tables)
- ✓ Controlling the failover
- ✓ DDL operations are handled by the HMaster
- ✓ Whenever a client wants to change the schema and change any of the metadata operations

Regional Server

These are the worker nodes which handle read, write, update, and delete requests from clients. Region Server process, runs on every node in the Hadoop cluster. Region Server runs on HDFS Data Node and consists of the following components

- ✓ Block Cache : This is the read cache. Most frequently read data is stored in the read cache and whenever the block cache is full, recently used data is evicted.
- ✓ MemStore: This is the write cache and stores new data that is not yet written to the disk. Every column family in a region has a MemStore.
- ✓ Write Ahead Log (WAL): is a file that stores new data that is not persisted to permanent storage.
- ✓ Hfile: is the actual storage file that stores the rows as sorted key values on a disk.

Zookeeper

Zookeeper is a centralized monitoring server that maintains configuration information and provides distributed synchronization

- ✓ Whenever a client wants to communicate with regions, they have to approach Zookeeper first
- ✓ Hmaster and Region servers are registered with Zookeeper service, client needs to access Zookeeper quorum in order to connect with region servers and Hmaster
- ✓ In case of node failure within an HBase cluster, ZKquoram will trigger error messages and start repairing failed nodes

HBASE Interaction

Row key – Unique Identifier

Column Family – CF1,CF2 (Partition)

Region – Start & End key(.Meta table - ZK)

Size of the Region = 1 GB

Memstore → Write Cache in RAM (sorted)

WAL→ Write a head log used for recovery

Block cache → Read Cache follows LRU

HFile→ Sorted key value data on Disk

HBASE Query

hbase(main):002:0> create ‘Product’, ‘Basic detail’, ‘Other detail’
0 row(s) in 1.1600 seconds => Hbase::Table – Product

hbase(main):005:0> list
TABLE
Product

hbase(main):027:0> disable ‘Product’
hbase(main):029:0> scan ‘Product’
ROW COLUMN + CELL ERROR: Product is disabled.

hbase(main):031:0> is_disabled ‘Product’
true 0 row(s) in 0.0545 seconds

HBASE Query

hbase> disable_all ‘p.*’
Product
Product1
Disable the above 2 tables (y/n)?
y

hbase(main):0035:0> enable ‘Product’
0 row(s) in 0.4580 seconds

DESCRIBE
ALTER
DROP
COUNT
READ
DELETE
UPDATE

Q&A ?

Thank You