Lec-13 Short
at 11:05 AM

Lec due tomorrow.

1) Redis
2) Aerospike
3) Data sharding

Agenda

1) Consistent Hashing
2) Google Big Table.
3) NoSQL
4) Diff storage systems in NoSQL

Consistent Hashing

Diff → User Hash → is used to select a data node to write data.

Machine Hash: is used to determine a virtual location for the machine

Problem: How Data (100K) sharding key

server
UH(name) → (0, 10)

Addition of Machines

MH(machine)
MH1(machine1)
MH2(machine2)
MH3(machine3)

Google Big Table

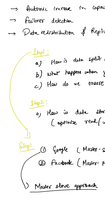
→ store (key, value) → Data
→ Hash. (key)
→ All keys should have at least 3 replicas
→ Horizontal increase in capacity (Auto scale)
→ Failover detection.
→ Data redistribution & Replication.

Step:
a) How's data split between machines
b) what happens when you add/delete a machine
c) How do we ensure replication & fault node

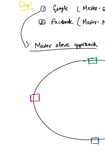
Step:
a) How is data stored internally?
(optimize read/update deletes)

Step:
① Google (Master-slave approach) → BigTable
② Facebook (Master-Master) → Cassandra, Dynamo DB

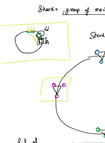
1) Master slave approach (Big Table)



Fail of replica



What happens when we add a machine?



Step: Warming Up
Step: Block & Gateway

→ for timestamp t_1 (Started warming up)
Take ← for a value $t \le t_1$ value stored in (C, range).
→ get the data from machine A
→ finished warming up at time t_2
⇒ '$t_2 - t_1$' time has elapsed
→ Block the machine to the city
· Block the write for 'C' range.
· Gateway to get data stored from $(t_2 - t_1)$

→ Warming Up
→ Block & Gateway

NoSQL

Lec-13 Short at 10:20 AM

Data storage systems that take one of:
1) sharding data using "key"
2) Inbuilt algorithm (support) for adding, removing, replication & fault tolerance

Types of NoSQL systems

a) Document Store
→ Store data
→ Type: varied, nested, data, lists: [ ]
→ Schema, D not enforced
Example
{ name: hardik, }
Eg: · Mongo DB
· AWS Document DB
· Couchbase
· Couchdb
· Google DB
Not open source

b) Search DB
→ type of document store
→ for either full text search
→ Elastic Search, Apache Solr → Apache Lucene

c) Key Value Store
Key → value
eg: · Redis
· Memcache
· Riak
· Dynamo DB

d) Column Family Store
→ Column Family like a table

key	name	email	phone

CFs

eg: · Big Table
· Cassandra
· HBase

Column Family

Example
A row with name but no email set

key → Fetch the count of the row

Fetch the color blue

USERID (key)	email	profile	message

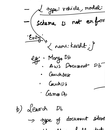
ROW key TC Row Value

Facebook

USERID key	about	posts	friends	Profile

CFs

Fetch Profile

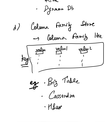


USERID → Row (key → value)

USER → Profile
ID
Name
Age
Sex
Email
key
Column Family Sorted Order

Step:
Take (Lec-13)

User-id (Lec)	name (Lec 25)	city (Lec 26)	
8	256	100	= 364 bytes



Problem: There is no search. Its key → value

name: hardik (7 bytes)
name: Abhi → 3
Value: 364 | 700 bytes | 8000 bytes