

Big Data

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NoSQL - MongoDB

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MongoDB

- Develop By 10gen : 2007
- A Document – Oriented Database , NoSQL Database
 - Hash-based , schema-less
 - No Data Definition Language
 - Hashed store as keys – values
 - BSON format : Binary – JSON
- Written C++
- Support API (Drivers) :
 - JavaScript, Python, Ruby, Perl, Java, Scala, C#, C++ , PHP, Haskell

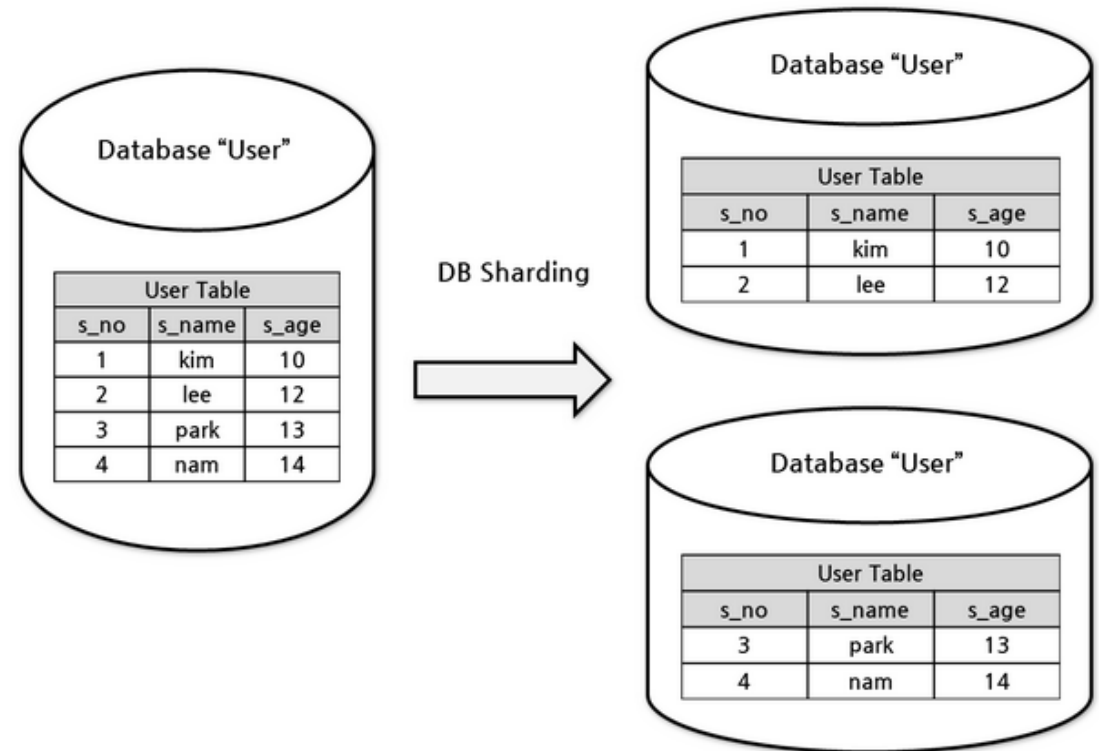


Fungsionalitas MongoDB

- Dynamic Schema : NO DDL
- Document Based Database
- Secondary Index
- Query Language via an API
- Atomic writes and fully-consistent reads
- Master-slave replication with automated failover
- Built-in horizontal scaling via automated range-based partitioning of data (**sharding**)
- No joins
- No transaction

Sharding of data

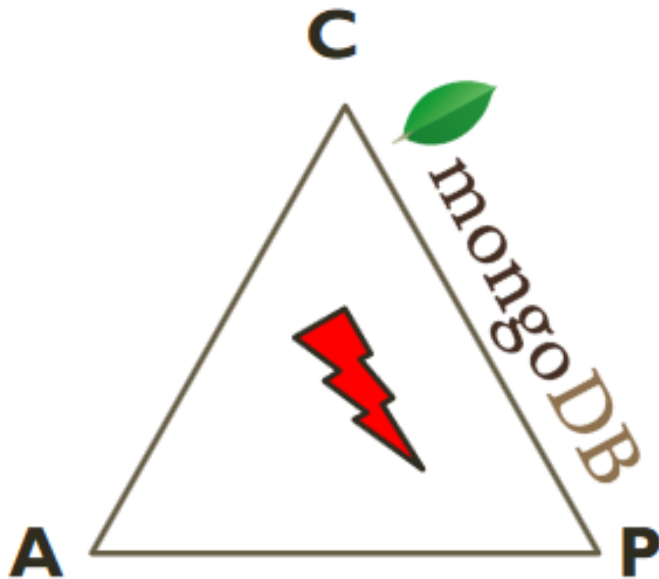
- Distributes a single logical database system across a cluster of machines
- Uses range based partitioning to distribute documents based on a specific shard key
- Automatically balances the data associated with each shard
- Can be turned on and off per collection (table)



Why use mongoDB ?

- Simple Queries
- Memiliki fungsionalitas yang dapat diterapkan di semua aplikasi berbasis web
- Easy and fast integration of data (No ERD Diagram)
- Not Well suited for heavy and complex transactions systems

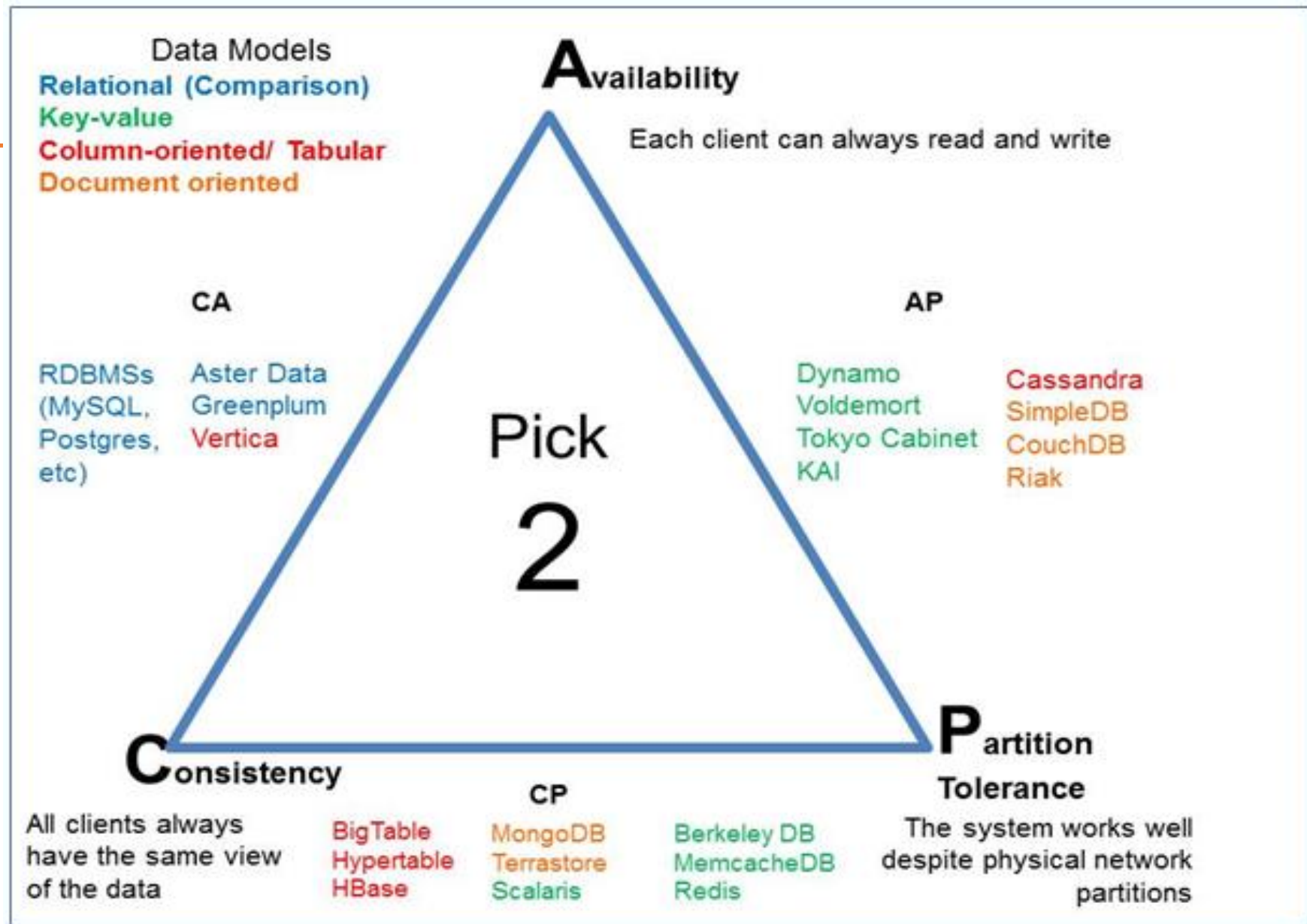
Theory of NoSQL : CAP - MongoDB



CAP Theorem:
satisfying all three at the same time is
impossible

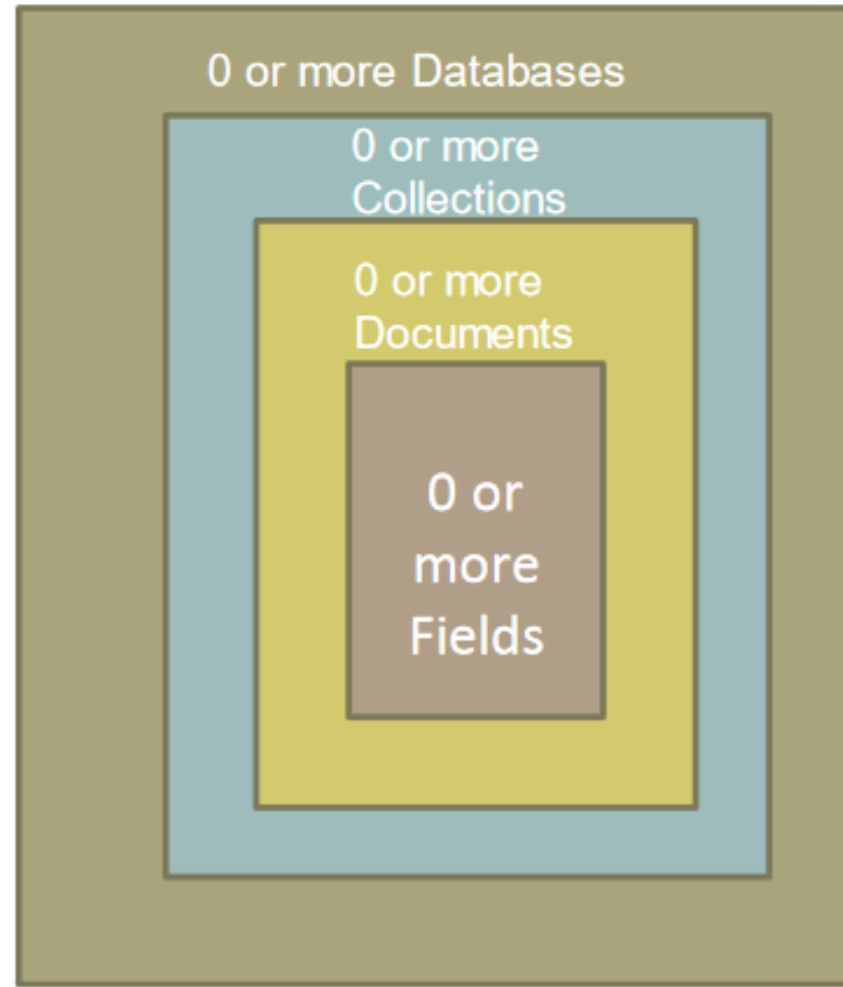
- Given:
 - Many Nodes
 - Nodes contains replicas of partitions of the data
- **Consistency**
 - All replicas contain the same version of data
 - Client Always has the same view of the data (no matter what node)
- **Availability**
 - System remains operations on falling nodes
 - All client can always read and write
- **Partition Tolerance**
 - Multiple entry points
 - System remain operational on system split (communication malfunction)
 - System works well across physical network partitions

CAP Theorem & Database



MongoDB: Hierarchical Object

- A MongoDB instance may have zero or more 'databases'
- A database may have zero or more 'collections'.
- A collection may have zero or more 'documents'.
- A document may have one or more 'fields'.
- MongoDB 'Indexes' function much like their RDBMS counterparts.



Terminologi: SQL – MongoDB

SQL Terms/Concepts

MongoDB Terms/Concepts

database

database

table

collection

row

document or BSON document

column

field

index

index

table joins

`$lookup`, embedded documents

primary key

primary key

Tutorial Instalasi

- Source :

<https://docs.mongodb.com/manual/tutorial/install-mongodb-on-linux/>

- Binary : Ubuntu 16.04

<https://www.digitalocean.com/community/tutorials/how-to-install-mongodb-on-ubuntu-16-04>

Praktikum - MongoDB

Instalasi mongodb – Linux System

- Download source mongodb:

- <https://docs.mongodb.com/getting-started/shell/tutorial/install-on-linux/>

- Pilih download format tarball sistem linux

- Download via curl atau wget:

- `curl -O https://fastdl.mongodb.org/linux/mongodb-linux-x86_64-3.6.0.tgz`

- `wget https://fastdl.mongodb.org/linux/mongodb-linux-x86_64-3.6.0.tgz`

- Ekstrak dalam direktori /opt/



- Rename direktori menjadi lebih singkat : mongodb

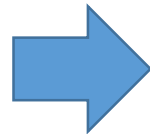
Setup Database MongoDB – Linux System



- Direktori mongoddb ada dalam /opt/mongoddb
- Buat direktori data mongoddb
`$ sudo mkdir -p /opt/data/db`
- Jalankan service mongoddb
`$ sudo /opt/mongoddb/bin/mongod --dbpath /opt/data/db`
- MongoDB akan berjalan di localhost (127.0.0.1) port:27017
- Login ke konsol database mongoddb
`$sudo /opt/mongoddb/bin/mongo`
- Keluar dari konsol database mongoddb
`> exit`

Instalasi MongoDB – Windows System

- Download MongoDB pada mongodb.com
 - Pilih Windows System x64
 - Version : 4.x.x
 - Package : ZIP (Pada tutorial ini package ZIP yang dipilih)
- Siapkan direktori instalasi, pada contoh ini dalam direktori D
- Pindahkan source hasil download ke dalam direktori D
- Ekstrak package ZIP yang telah didownload dalam direktori D, dan ubah direktori ekstrak menjadi mongodbVersion (mongodb409)

 mongodb-win32-x86_64-2008plus-ssl-4.0.9
 mongodb-win32-x86_64-2008plus-ssl-4.0.9



 mongodb-win32-x86_64-2008plus-ssl-4.0.9
 mongodb409

Setup Database MongoDB – Window System (1)

- Direktori mongoddb ada dalam D:\mongoddb409
- Buat direktori data mongoddb, buka command shell

```
shell : D:
```

```
shell : mkdir mongoddb409\data
```

- Jalankan service mongoddb

```
shell : cd mongoddb409\bin
```

```
shell : mongod --dbpath D:\mongoddb409\data
```

- MongoDB akan berjalan di localhost (127.0.0.1) port:27017

```
D:\mongoddb409\bin>mongod --dbpath D:\mongoddb409\data
2020-03-27T20:39:04.812+0700 I CONTROL [main] Automatically disabling TLS 1.0, to force-enable TLS 1.0 specify --sslDisabledProtocols 'none'
2020-03-27T20:39:04.821+0700 I CONTROL [initandlisten] MongoDB starting : pid=34908 port=27017 dbpath=D:\mongoddb409\data 64-bit host=WINDOWS-8GNCTQF
```


Setup Database MongoDB – Window System (2)

- Login ke konsol / terminal mongodb, buka kembali command shell baru (yang lama biarkan jangan ditutup yang menyatakan konsol shell service mongodb tetap berjalan)
- Login anonymous ke database mongodb

```
shell : cd mongodb409\bin
```

```
shell : mongo
```

```
D:\mongodb409\bin>mongo
MongoDB shell version v4.0.9
connecting to: mongodb://127.0.0.1:27017/?gssapiServiceName=mongodb
Implicit session: session { "id" : UUID("63cfd551-5b2d-49e8-b85d-11fb8cc8cdce") }
MongoDB server version: 4.0.9
```

- Keluar konsol mongodb

```
shell : exit
```

Buat database

- Pastikan sudah login dalam konsol mongodb
- Lihat database yang ada
 `>show dbs`
- Buat database dbexample
 `>use dbexample`
- Buat collection mahasiswa
 `> db.mahasiswa.insert({nim:'01101',nama:'ahmad agus'});`
- Lihat collection yang ada
 `> show collections;`
- Query ke collection
 `> db.mahasiswa.find();`
 `> db.mahasiswa.find().pretty();`

Latihan

- Akses website update corona :
<https://www.worldometers.info/coronavirus/>
- Buat database untuk menyimpan data update corona, perhatikan data bisa ditambahkan setiap harinya untuk tiap negara

Now Yesterday Search:

Country, Other	Total Cases	New Cases	Total Deaths	New Deaths	Total Recovered	Active Cases	Serious, Critical	Tot Cases/ 1M pop	Tot Deaths/ 1M pop
USA	85,435	+17,224	1,295	+268	1,868	82,272	2,122	258	4
China	81,285	+67	3,287	+6	74,051	3,947	1,235	56	2
Italy	80,589	+6,203	8,215	+712	10,361	62,013	3,612	1,333	136
Spain	57,786	+8,271	4,365	+718	7,015	46,406	3,166	1,236	93
Germany	43,938	+6,615	267	+61	5,673	37,998	23	524	3