NoSQL Database
Hands-On: R Flow Control
Database Design Project

BMI701 Introduction of Biomedical Informatics
Lab Session 4

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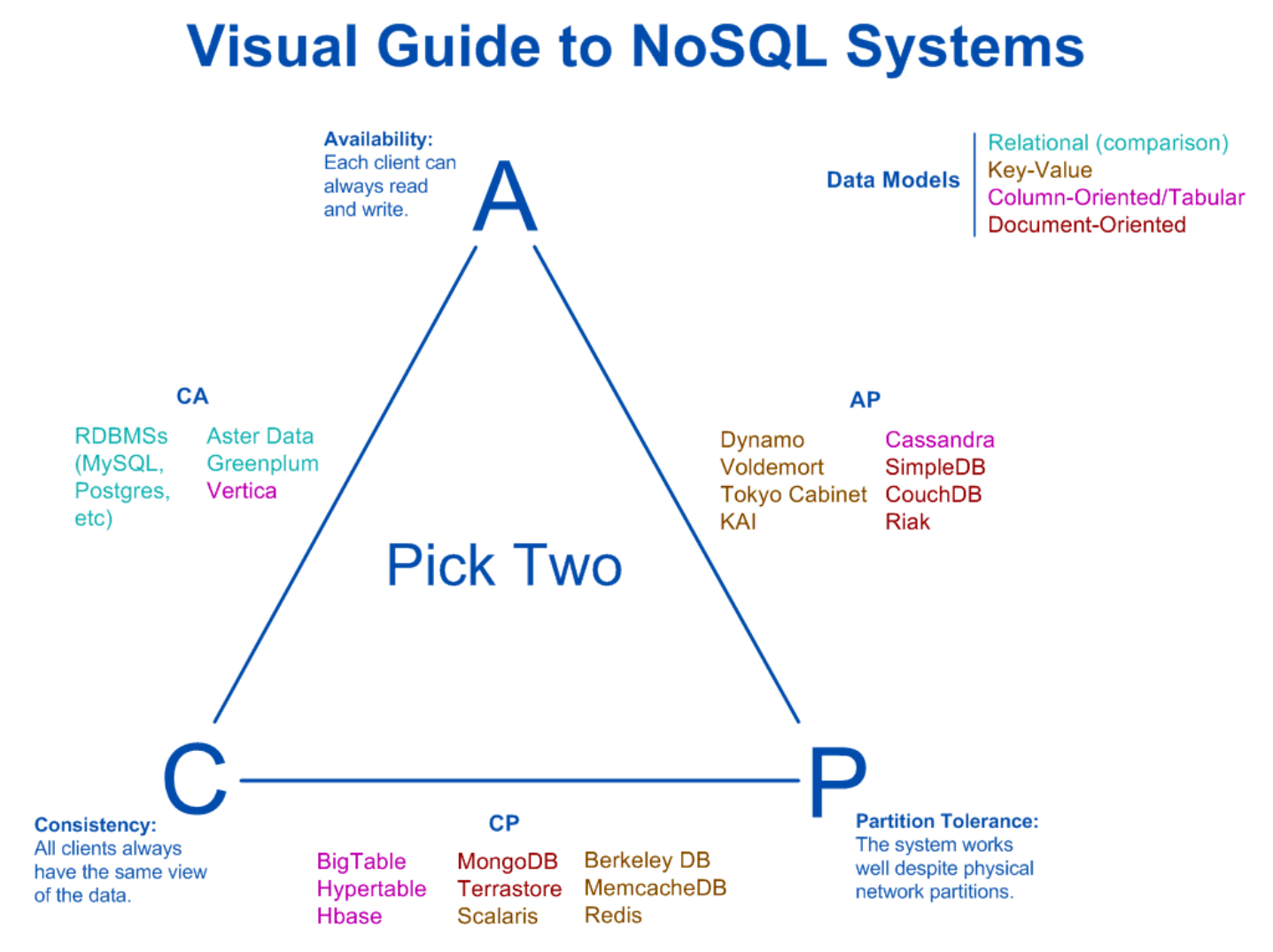
HMS DBMI — MGH LCS

Database Selection



Courtesy by digbigdata.com

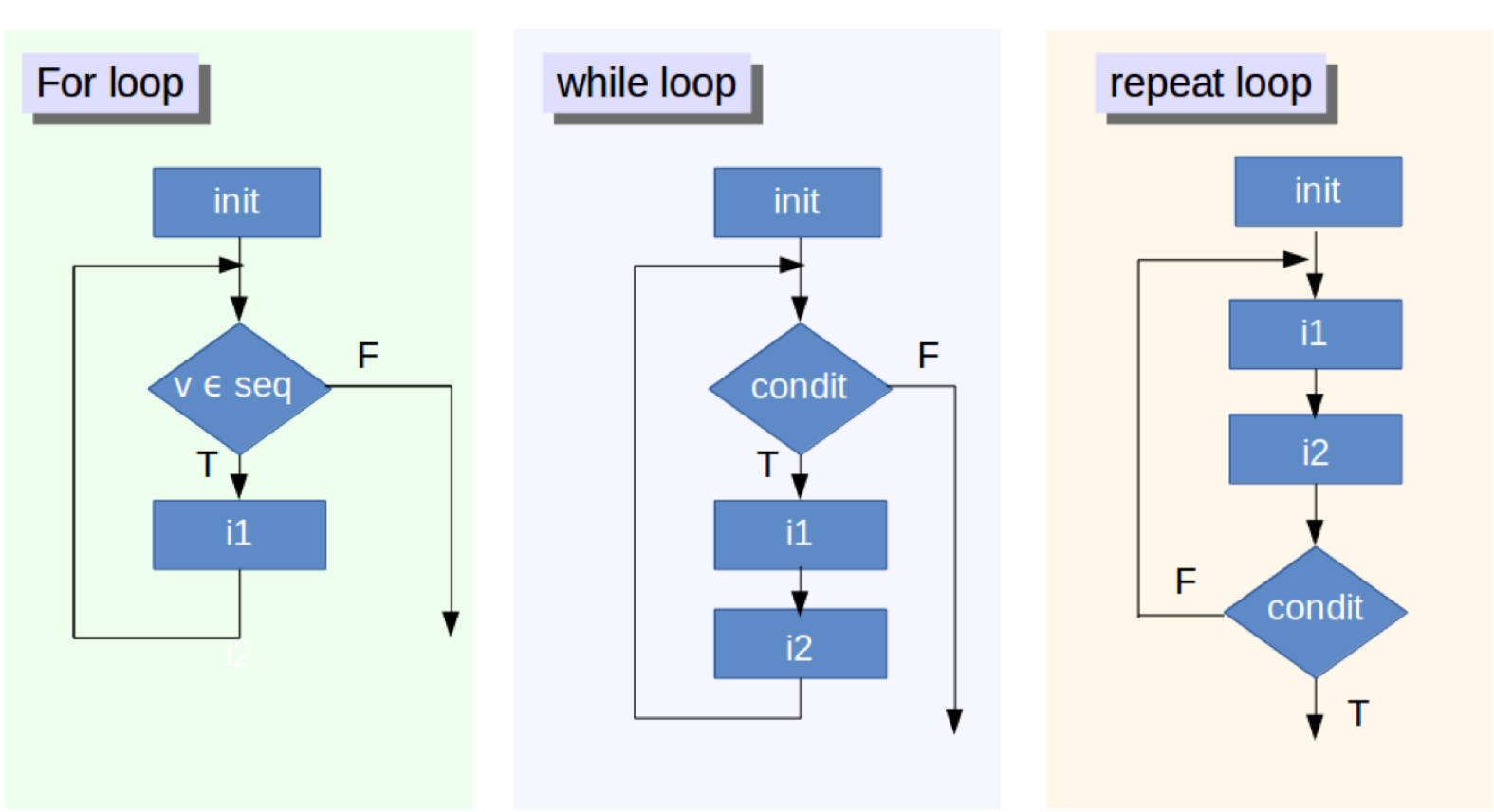
NoSQL

- Key-value Stores
  - Hash table: key: value
  - Redis: data in RAM, not HD (so limited to RAM)
- Column Family Stores
  - Also key-value hash table, but one key may map to different columns (not the single value)
  - Cassandra: super fast write, slow read: e.g. facebook LIKE)
  - HBase: best to run MapReducr with Hadoop/HDFS stack, good for realtime queries (logs)
- Document Databases
  - JSON like document (BSON: binary JSON)
  - Nested: {`Key:{Key:Value, Key:Value}`}
  - MongoDB: very good for general use
  - CouchDB: can use RESTful HTTP API, use request
- Graph Databases
  - Node / Relation / Property
  - Neo4J

MongoDB

- Download and install MongoDB
- Open your terminal
  - `brew update`
  - `brew install mongodb`
  - `mkdir -p  /mongo/db`
  - `mongod --dbpath  /mongo/db`
- Running MondoDB in R
  - `install.packages("rmongodb")`
  - `library(rmongodb)`
  - Then we can follow the cheat sheet

Flow Control



Courtesy by Dr. Mujeeb Basit

- `for, while, if/else, next/break, stop`
- Sample codes

R: Apply Function

- `apply`
  - apply a given function to the rows (index 1) or columns (index 2) of a matrix
- `lapply`
  - apply a given function to every element of a list and obtain a list
- `sapply`
  - apply a given function to every element of a list and obtain a vector
- `tapply`
  - function to process vector subsets

R: More Apply

- `Map()` and `mapply()`
  - iterate over multiple input data structures in parallel
- `mclapply()` and `mcMap()`
  - parallel versions of `lapply()` and `Map()`
  - Only for Linux or Mac
- `clusterApply()` and `clusterApplyLB()`
  - Linux, Mac, Windows

R: Other Useful Packages/Functions

- `foreach`, `parallel`, `doParallel`
- `sqldf`
- `system()`
- Sample codes

Take Home Message

- NoSQL summary
- Good luck on your presentation!
- Contact
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