Database

Agenda

- What is database?
- Relational database – postgereSQL
- NoSQL vs. SQL
- What is MongoDB?
- New Words
- Installing MongoDB
- Query assignments.

What is database?

*A **database** is an organized collection of data, generally stored and accessed electronically from a computer system. Where databases are more complex they are often developed using formal design and modeling techniques.

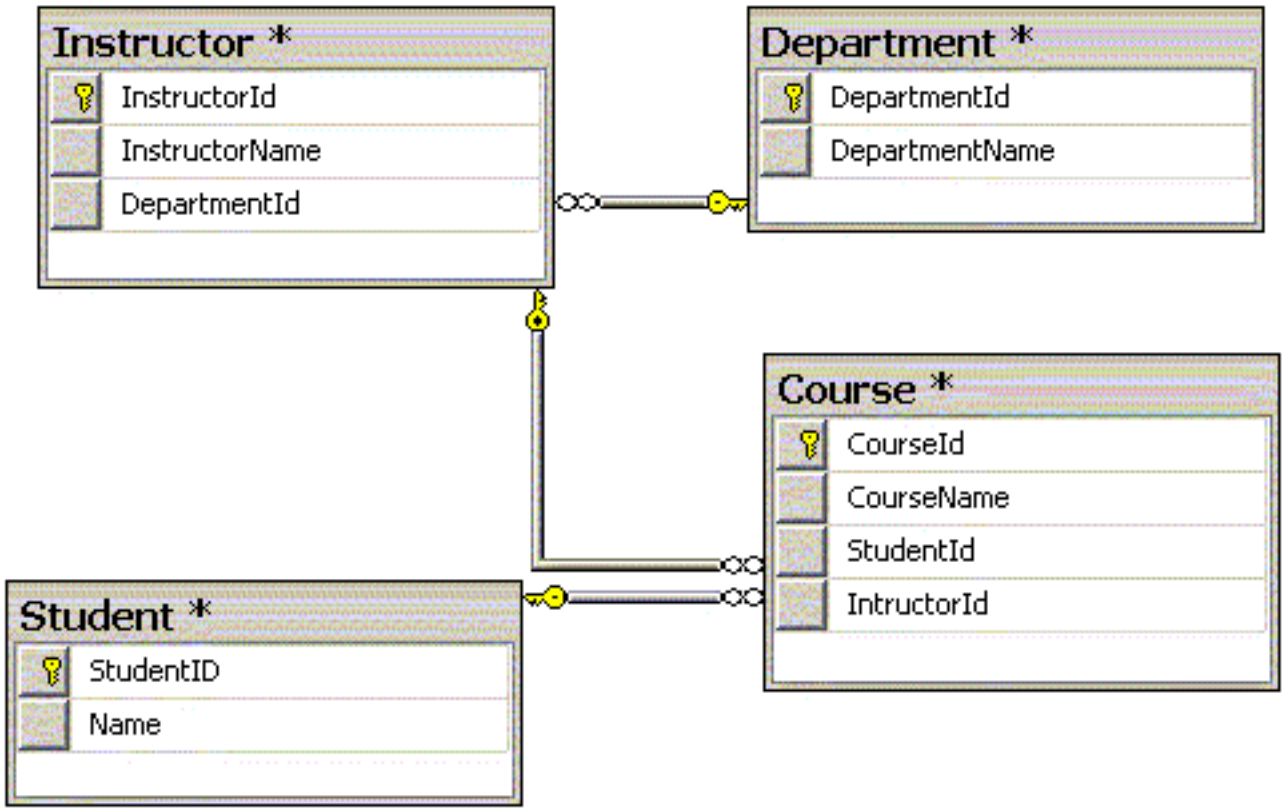
* https://en.wikipedia.org/wiki/Database

Classification of database-management systems (DBMS) according to the database models

- Database models:
  - Relational databases (SQL) - **SQL** - Structured Query Language
    - MySQL, PostgreSQL, Oracle …
  - Non-Realational databases (NoSQL)
    - MongoDB, DocumentDB, Cassandra, Coachbase, HBase, Redis …

Relational database

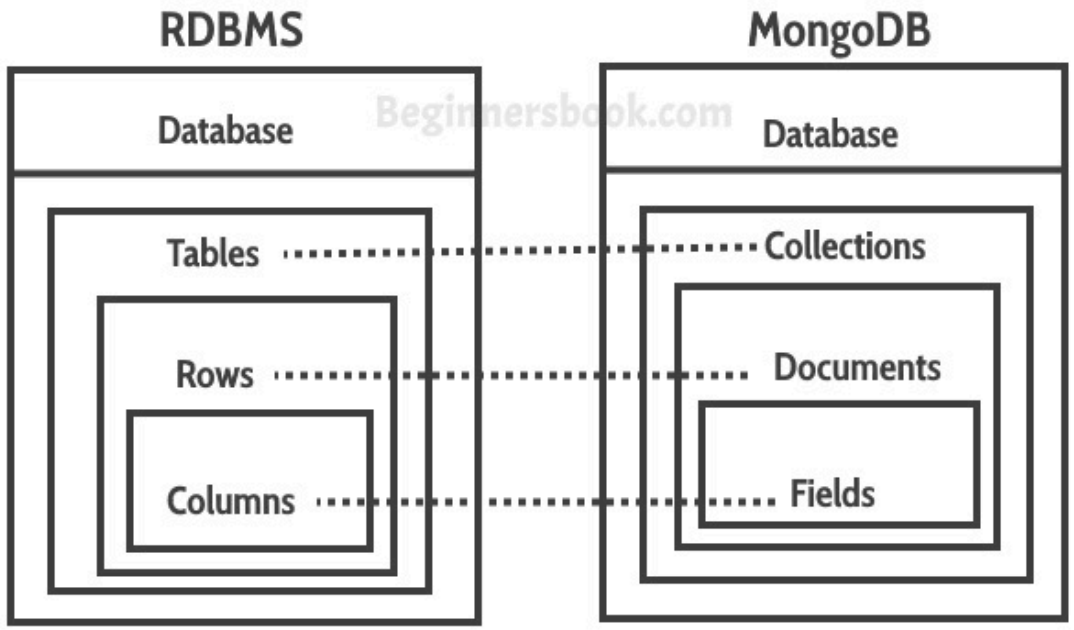
Database: **University**



Non-Realational database (MongoDB)

* https://docs.mongodb.com/manual/core/databases-and-collections/

Relational vs. Non-Relational




```
Collection                Document
    ↓                        ↓
db.users.insert(
                    {
                       name: "sue",
                        age: 26,
                     status: "A",
                     groups: [ "news", "sports" ]
                    }
                )
```

Document

```
{
  name: "sue",
  age: 26,
  status: "A",
  groups: [ "news", "sports" ]
}
```

insert

Collection

```
{ name: "al", age: 18, ... }
{ name: "lee", age: 28, ... }
{ name: "jan", age: 21, ... }
{ name: "kai", age: 38, ... }
{ name: "sam", age: 18, ... }
{ name: "mel", age: 38, ... }
{ name: "ryan", age: 31, ... }
{ name: "sue", age: 26, ... }
```

users

* https://beginnersbook.com/2017/09/mapping-relational-databases-to-mongodb/

Relational vs. Non-Relational

Relational

ID	first_name	last_name	cell	city	year_of_birth	location_x	location_y
1	'Mary'	'Jones'	'516-555-2048'	'Long Island'	1986	'-73.9876'	'40.7574'

ID	user_id	profession
10	1	'Developer'
11	1	'Engineer'

ID	user_id	name	version
20	1	'MyApp'	1.0.4
21	1	'DocFinder'	2.5.7

ID	user_id	make	year
30	1	'Bentley'	1973
31	1	'Rolls Royce'	1965

MongoDB

```
{
first_name: "Mary",
last_name: "Jones",
cell: "516-555-2048",
city: "Long Island",
year_of_birth: 1986,
location: {
        type: "Point",
        coordinates: [-73.9876, 40.7574]
},
profession: ["Developer", "Engineer"],
apps: [
 { name: "MyApp",
   version: 1.0.4 },
 { name: "DocFinder",
   version: 2.5.7 }
],
cars: [
   { make: "Bentley",
     year: 1973 },
   { make: "Rolls Royce",
     year: 1965 }
 ]
}
```

* https://www.hivemq.com/blog/building-a-reliable-and-scalable-iot-platform/

What is MongoDB

MongoDB is a source-available cross-platform document-oriented database program.

Classified as a NoSQL database program, **MongoDB** uses JSON-like documents with optional schemas.

New words (MongoDB)

- **MongoDB comes with its own language**
  - **Collection** - Think of this like an array of documents
  - **Document** - An individual record
  - **Embedded Documents** - We can embed records inside another
  - **Schema** - A "pattern" which the data must follow
  - **Model** - We use a schema to build a Model. A Model contains mongoose methods which we can run.
  - **Field** - like a key in an object (a name for a value)
  - **_id** - A unique value which identifies a Document

Installing MongoDB

- For Mac:
  - https://www.mongodb.com/try/download/community
  - Download ‘tgz‘ package then extract it
  - Copy files from ‘bin’ folder to /usr/locale/bin
  - Create a folder in order to store database
    - sudo mkdir –p /data/db
  - Change owner of the new created folder:
    - sudo chown – R `id -un` /data/db
  - Open 2 tabs:
    - 1st tab run: mongod
    - 2nd tab in order to open shell run: mongo

Installing MongoDB

- For Linux:
  - sudo apt update
  - sudo apt install mongodb
  - sudo systemctl status mongodb
    - active(running)
  - mongod --version
  - In order to run shell: mongo

Installing MongoDB

- For Windows:
  - Step 1: Go to the link (given in the description)
  - https://www.mongodb.com/try/download/community
  - Step 2: Download execute the installer by double click on exe.
    - Accept license agreement
    - Select “Complete” , **do not** change anything and click “Next”
    - Next step, uncheck “**Install MongoDB Compass**”
  - Step 3: Mongo DB Configuration (most Important step)
    Mongo configuration folder**: C:\Program Files\MongoDB\Server\4.2**
    Open Command Prompt as Administrator
    To check server started run following command: **net start MongoDB**
  - Step 4: Open mongo shell prompt.
    - cd C:\Program Files\MongoDB\Server\4.2\bin
    - Mongo
    - exit from console : press **CTRL+ C** or type - **quit()**
  - Step 5: Starting server - **net start MongoDB**
  - Step 6: stopping server- **net stop MongoDB**

Query examples

- show dbs – show DBs
- use blogs– create and switch DB
- db – current DB
- Create a user:

```
db.createUser({
    user: "dilshod",
    pwd: "1234",
    roles: ["readWrite", "dbAdmin"]
});
```

- Create a collaction:

  db.createCollection(,posts');
- show collections