Two Types of Databases

BASIC PRINCIPLE OF DATABASE :- C.R.U.D
CREATE,READ,UPDATE,DELETE

Relational Databases (SQL)

- Organize data into one or more tables
  - Each table has columns and rows
  - A unique key identifies each row

Non-Relational (noSQL / not just SQL)

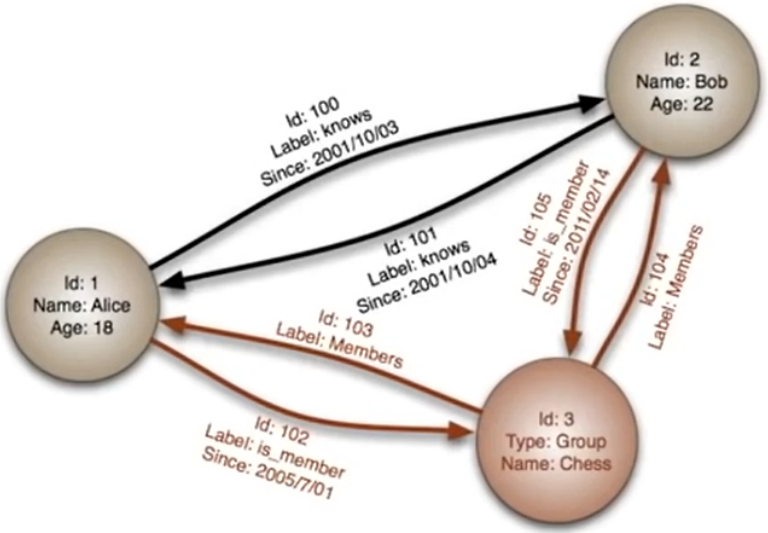
- Organize data is anything but a traditional table
  - Key-value stores
  - Documents (JSON, XML, etc)
  - Graphs
  - Flexible Tables

Relational Databases (SQL)

- Relational Database Management Systems (RDBMS)
  - Help users create and maintain a relational database
    - mySQL, Oracle, postgreSQL, mariaDB, etc.
- Structured Query Language (SQL)
  - Standardized language for interacting with RDBMS
  - Used to to perform C.R.U.D operations, as well as other administrative tasks (user management, security, backup, etc).
  - Used to define tables and structures
  - SQL code used on one RDBMS is not always portable to another without modification.

Non-Relational Databases (noSQL / not just SQL)

```
[{
    "_id": 1345,
    "name": "Jack",
    "major": "Biology"
}, {
    "_id": 2267,
    "name": "Kate",
    "major": "Sociology"
}, {
    "_id": 2453,
    "name": "Claire",
    "major": "English"
}, {
    "_id": 1957,
    "name": "John",
    "major": "Chemistry"
}]
```



Key	Value
“xyz”	*string*
“abc”	*JSON*
“pqr”	*BLOB*
“lmno”	*etc...*

Document

(JSON, BLOB, XML, etc..)

Graph

Relational nodes

Key-Value Hash

Keys are mapped to values (strings, json, blob, etc..)

Non-Relational Databases (noSQL / not just SQL)

- Non-Relational Database Management Systems (NRDBMS)
  - Help users create and maintain a non-relational database
    - mongoDB, dynamoDB, apache cassandra, firebase, etc

- Implementation Specific
  - Any non-relational database falls under this category, so there's no set language standard.
  - Most NRDBMS will implement their own language for performing C.R.U.D and administrative operations on the database.

Database Queries

Queries are requests made to the database management system for specific information

As the database's structure become more and more complex, it becomes more difficult to get the specific pieces of information we want.

A google search is a query

Wrap Up

- Database is any collection of related information
- Computer are great for storing databases
- Database Management Systems (DBMS) make it easy to create, maintain and secure a database.
- DBMS allow you to perform the C.R.U.D operations and other administrative tasks
- Two types of Databases, Relational & Non-Relational
- Relational databases use SQL and store data in tables with rows and columns
- Non-Relational data store data using other data structures

Employee

emp_id	first_name	last_name	birth_date	sex	salary	branch_id	super_id
100	Jan	Levinson	1961-05-11	F	110,000	1	NULL
101	Michael	Scott	1964-03-15	M	75,000	2	100
102	Josh	Porter	1969-09-05	M	78,000	3	100
103	Angela	Martin	1971-06-25	F	63,000	2	101
104	Andy	Bernard	1973-07-22	M	65,000	3	101

Branch

branch_id	branch_name	mgr_id
2	Scranton	101
3	Stamford	102
1	Corporate	108

Client

client_id	client_name	branch_id
400	Dunmore Highschool	2
401	Lackawana Country	2
402	FedEx	3
403	John Daly Law, LLC	3
404	Scranton Whitepages	2

Works_With

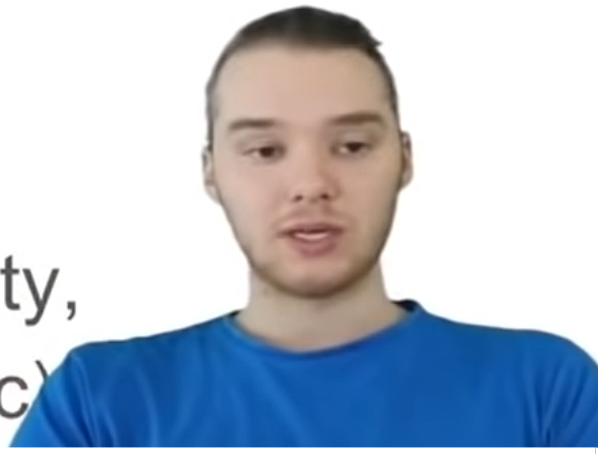
emp_id	client_id	total_sales
107	400	55,000
101	401	267,000
105	402	22,500
104	403	5,000
105	403	12,000
107	404	33,000

RED :- PRIMARY KEY , GREEN :- FOREIGN KEY, BLUE :- KEY/ATTRIBUTE

So, primary key of one table is acting as a foreign key for another table, which in turns links/connects them.
Here super_id is a supervisor id and its a foreign key referring to the same table,
For ex:- row 2 tells us that Michael's supervisor is Jan.
<-- In this table, we have a composite primary key, because we can't really make a single unique column so we selected 2 columns together to do that. But if gets more complex i.e. more than 2 primary keys are there then we make a new table and add an artificial key to reference them.

Structured Query Language (SQL)

- SQL is a language used for interacting with Relational Database Management Systems (RDBMS)
  - You can use SQL to get the RDBMS to do things for you
    - Create, retrieve, update & delete data
    - Create & manage databases
    - Design & create database tables
    - Perform administration tasks (security, user management, import/export, etc)

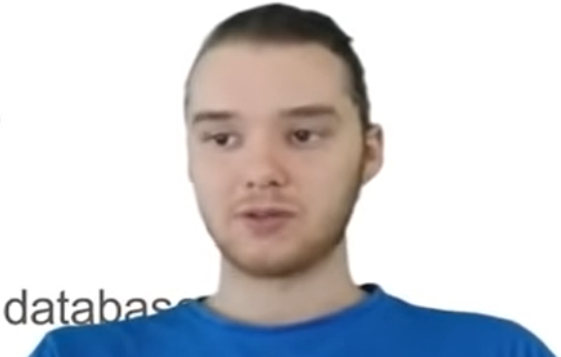


- SQL implementations vary between systems
  - Not all RDBMS' follow the SQL standard to a 'T'
  - The concepts are the same but the implementation may vary

Variation is very less.
Mostly, it is the same.

Structured Query Language (SQL)

- SQL is actually a hybrid language, it's basically 4 types of languages in one
  - **Data Query Language (DQL)**
    - Used to query the database for information.
    - Get information that is already stored there
  - **Data Definition Language (DDL)**
    - Used for defining database schemas.
  - **Data Control Language (DCL)**
    - Used for controlling access to the data in the database.
    - User & permissions management
  - **Data Manipulation Language (DML)**
    - Used for inserting, updating and deleting data from the databas



Queries

- A query is a set of instructions given to the RDBMS (written is SQL) that tell the RDBMS what information you want it to retrieve for you
  - TONS of data in a DB
  - Often hidden in a complex schema
  - Goal is to only get the data you need

```sql
SELECT employee.name, employee.age
FROM employee
WHERE employee.salary > 30000;
```