- File system is on disk partition, logically divided into 4 sections
    - Boot block, Super block, inode list, data blocks

DBMS - Database Management System

- Is a program that store data, retrieve data and manipulate data
- CRUD operations
    - Create - Insert new records
    - Retrieve - Select existing records
    - Update - Modify existing records
    - Delete - Delete existing records
- Generic program for any data e.g. students, employees exams, financial,...
- e.g. Excel/Spreadsheets

RDBMS - Relational DBMS

- is a generic program that store data, retrieve data and manipulate data ie perform CRUD operations efficiently
- RDBMS organize data into Tables, Rows and Columns. These tables are related to each others --> Relational DBMS
- Built-in relational feature
- Built-in CRUD and other operations
- Less network use (only records)
- Server side processing
- Faster
- huge data support (100s of GB)
- Client-server architecture
- Multi-user systems
- Row level locking
- e.g. MySQL, MariaDb, Oracle, MSSQL, Informix, Sybase, Paradox, SQLite

SQL - Structure Query Language

- RDBMS data processing is done using SQL queries
- Client fire query on server, server process query, produce result and send result back to client
- Case insensitive language
- Categories:
    - DDL : Data Definition Language
        - create, drop, rename, alter
    - DML : Data Manipulation Language *
        - insert, update, delete
    - DQL : Data Query Language *
        - select
    - DCL : Data Control Language
        - create user, grant, revoke
    - TCL : Transaction Control Language
        - commit, rollback

MySQL - RDBMS software

MySQL Installation - Ubuntu

- open the terminal and give following commands.
    - sudo apt-get update
    - sudo apt-get install mysql-server -y
- After Successfull Installation, give following command to open mysql prompt
    - sudo mysql
- Set password of root user as 'root'
    - use mysql;
    - alter user 'root'@'localhost' identified with mysql_native_password by 'root';
    - exit;
- Open Mysql prompt with password
    - mysql -u root -p
        - or
    - mysql -u root -proot
- Create a new user
    - use mysql;
    - CREATE USER 'sunbeam'@'localhost' IDENTIFIED BY 'sunbeam';
- Create database for your usage
    - create database iotdb;
- Grant all permissions for database(iotdb) to user(sunbeam)
    - grant all on iotdb.* to sunbeam@'%';
    - FLUSH PRIVILEGES;
    - exit
- Login with new user and start creating and using tables
- MySQL server - mysqld
    - without UI
    - implemented in C/C++
    - To check status of MySQL server
        - sudo systemctl status mysql
    - To start the service of MySQL server
        - sudo systemctl start mysql
    - To stop the service of MySQL server
        - sudo systemctl stop mysqld

- MySQL client - mysql
    - CLI based
    - To start the MySQL client
        - mysql
        - mysql -u root
        - mysql -u root -p

SQL Queries

- To display all the databases
    - show databases;
- To create a new database
    - create database iotdb;
- To use/change the database
    - use iotdb;
- Person - uid, name, age, address, mobile
- To create a new table
    - create table persons(uid INT, name VARCHAR(36), age INT, address VARCHAR(64), mobile VARCHAR(16));
    - create table persons(uid INT NOT NULL, name VARCHAR(36), age INT, address VARCHAR(64), mobile VARCHAR(16));
    - create table persons(uid INT AUTO_INCREMENT, name VARCHAR(36), age INT, address VARCHAR(64), mobile VARCHAR(16));
- To display all tables
    - show tables;
- To describe the table
    - desc persons;
- To add record into table
    - insert into persons values(42, "abc", 30, "pune", "1234567890");
    - insert into persons(name, uid, age, address, mobile) values("pqr", 65, 25, "mumbai", "9765977654");
    - insert into persons(name, uid, age, address) values("xyz", 60, 27, "mumbai");
    - insert into persons values(41, "abc", 32, "pune", "1234567890"),(34, "mno", 34, "delhi", "9890662093");

- To read records form table
    - select * from persons;
    - select uid from persons;
    - select name from persons;
    - select uid,name from persons;
    - select DISTINCT address from persons;
    - select * from persons where address = "pune";
    - select * from persons where age <= 30;
    - select * from persons where age < 30 or age > 30;
    - select * from persons order by address;
    - select * from persons order by address DESC;
    - select * from persons order by address ASC;
    - select * from persons order by age DESC LIMIT 1;
    - select * from persons order by uid, address;
- To update existing records
    - update persons SET mobile="7658612345" where uid = 60;
    - update persons SET mobile="7658612345", address = "chennai" where uid = 60;
    - update persons SET mobile="7658612345";
- To delete existing records
    - delete from persons where uid = 60;
    - delete from persons;
        - -- all records will be deleted
- To delete all records
    - truncate table persons;
- To delete table
    - drop table persons;
        - -- give error if table does not exist
    - drop table IF EXISTS persons;
- Create table to log data generated by different sensors

    - type
    - location
    - value
    - time

- create table sensorsLog(type VARCHAR(16), location VARCHAR(20), value float, time datetime default CURRENT_TIMESTAMP);
- insert into sensorsLog(type, location, value) values("LM35", "Nira", 39);

Install MySQL connector for python

- sudo pip3 install mysql-connector-python