

Database – Overview

- What is a database?

"A database is a shared collection of logically related data (and description of this data), designed to meet the information needs of multiple users in an organization."

– From: Modern Database Management by Jeffrey A. Hoffer

Or

An organized collection of information that serves a specific purpose efficiently.

Relational Database

- A database that stores two things:
 - The data (and description of data) and
 - The relationships between the data.

Database - Examples

- Hotel Booking System – Typical example
 - Stores data related to hotel bookings.
 - For example...

Customer		
First Name	Telephone	...
James	089890909	...
David	098776576	...

Staff		
ID	First Name	...
0111	Andy	...
0123	Greg	...

Room		
ID	Type	...
01D	Double	...
03V	Single	...

Booking		
ID	Cust. ID	...
1	DKIL	...
2	VNDL	...

Characteristics of a relational database

- A relational database must be:
 - Efficient,
 - Thousands of queries/updates per second.
 - Reliable,
 - Telecommunication systems, banking systems
 - Safe (consistent),
 - Failures: hardware, software, power, users, etc.
 - Allowing multi-user access to **massive** amounts of **persistent** data.

Important terms

- Data
- Information
- Metadata
- Relational database terminology
- Flat database vs. Relational database
- Database
- Database Management Systems (DBMS)
- Structured Query Language (SQL)

Relational database terms

- Attribute
 - Column or field: Name and data type
 - Examples: F name, address, phone number
- Attribute value
 - Valid value for an attribute
 - Examples: Adam, lower clanbrassil street, 0862934323
- Tuple
 - Set of attribute values: Row or record
 - Example: Adam's personal information
- Relation
 - Table: set of tuples sharing the same attributes.

Relational database terms

Attribute

First Name	Last Name	Age	Salary
Adam	Brennan	27	47,000
Declan	Delaney	33	53,000
Alex	Sintoni	31	46,000

Tuple {

Relation

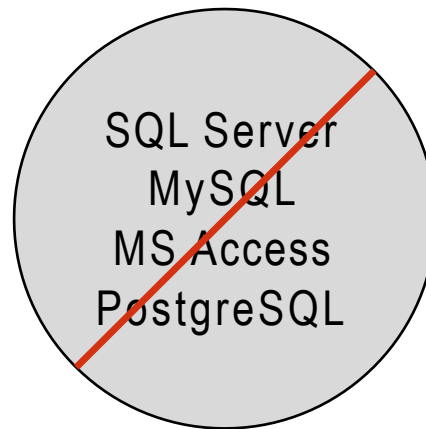
Attribute Value

Flat database vs. Relational database

- Flat database:
 - All the data is stored into a single table.
 - Data duplication occurs.
 - For example: A phone directory
- Relational database:
 - Splits the data into several tables.
 - Reduces data duplication.
 - For example: A phone directory (broken down into many tables)

Database

- Databases
 - They are not



- A database is -> the data and its rules.
- Examples: A library database, a school database, a hospital database, etc.

Database Management System (DBMS)

- Software program or a set of programs that manage the data and perform certain operation on data.
- A DBMS can have many different databases inside it.
- Two basic functions of DBMS are:
 - Management of Data in a database.
 - Management of Users associated with a database.
- Examples:
 - SQL Server
 - MS Access
 - Oracle
 - MySQL
 - PostgreSQL

Structured Query Language (SQL)

- DBMS use SQL to:
 - Interact with the database
 - Create new tables
 - Insert data into tables
 - Update data
 - Delete data from tables
 - Retrieve information across tables