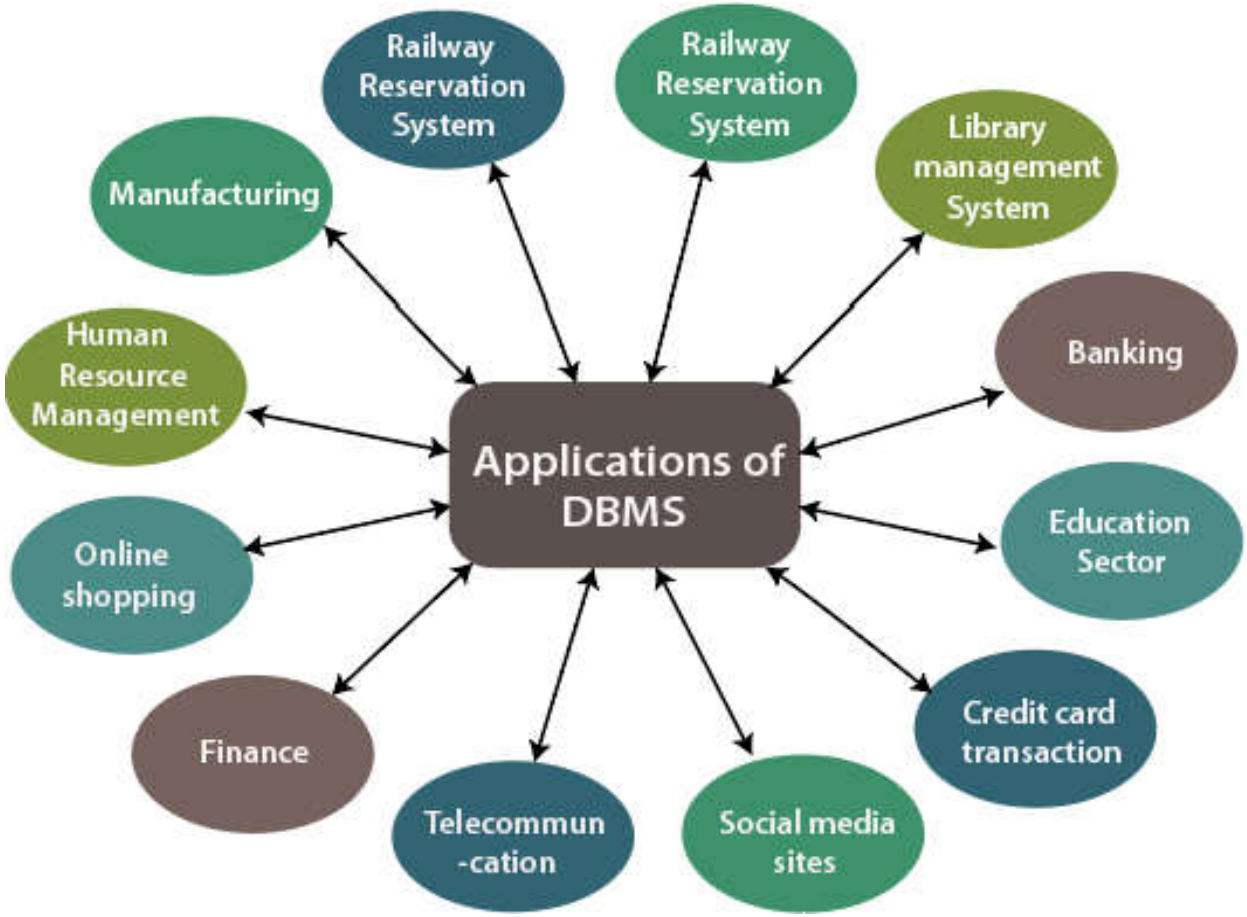
Database Tutorial -1

By:
Virendra Kumar Meghwal
Research Scholar
MNIT Jaipur

Why Study Databases?

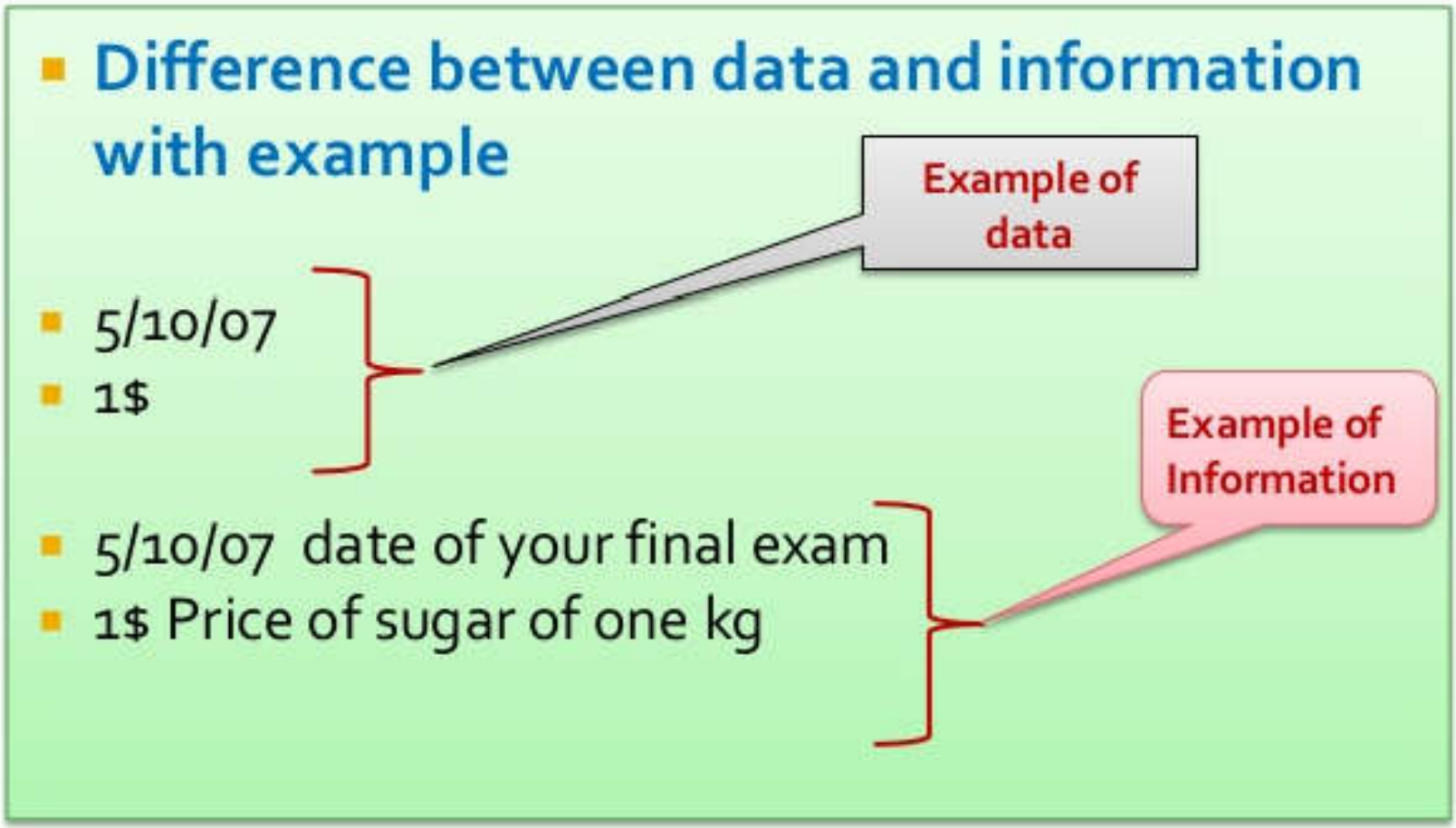
- Most of the applications use databases.



Data and Information

- **Data:**
  - Data is raw, unorganized facts related to any object in consideration.
  - Example: if you consider an object 'Person' then - name, age, height, weight, etc. are some data related to you.
- **Information:**
  - Data + Processing = Information
  - When data is processed, organized, structured or presented in a given context so as to make it useful, it is called information.
  - Example – considering above example – average height of all people is an information.

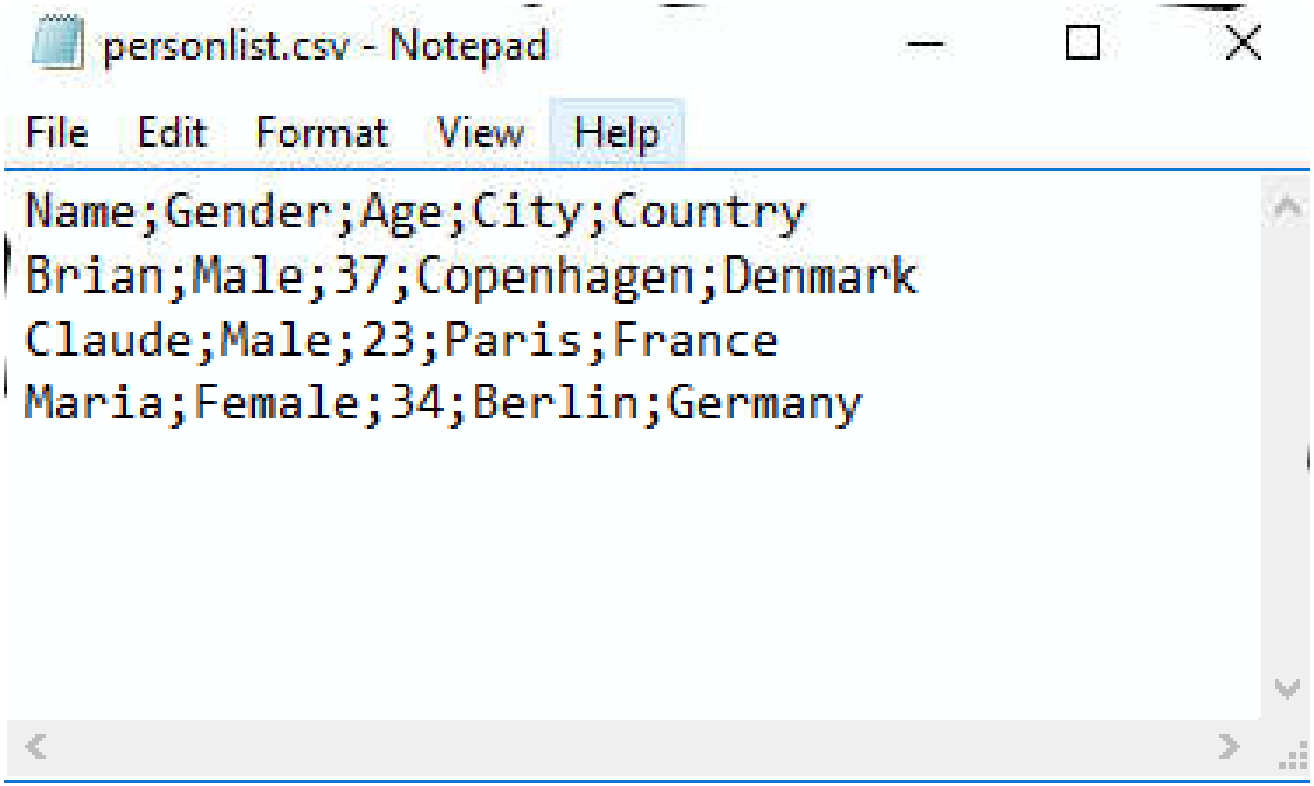
Example: Data vs Information



File Systems

- A software system that manages and controls the data files in a computer system.
- **Manages** the way of **reading and writing** data to the hard disk.
- Data is stored in **isolated files** which have their own physical location on the drive.
- To **access** a particular file user has to **manually** go to the location of that particular file.
- Various Operating System have there own file systems.
- Example: Windows- **NTFS**, Linux- **EXT**

Example of a file in File System



Disadvantages of File Systems

- Data Redundancy Problem
- No Backup and Recovery
- No efficient data storage mechanism
- No efficient access mechanism
- Lower Data Consistency
- Lower Security
- No proper Concurrent Access

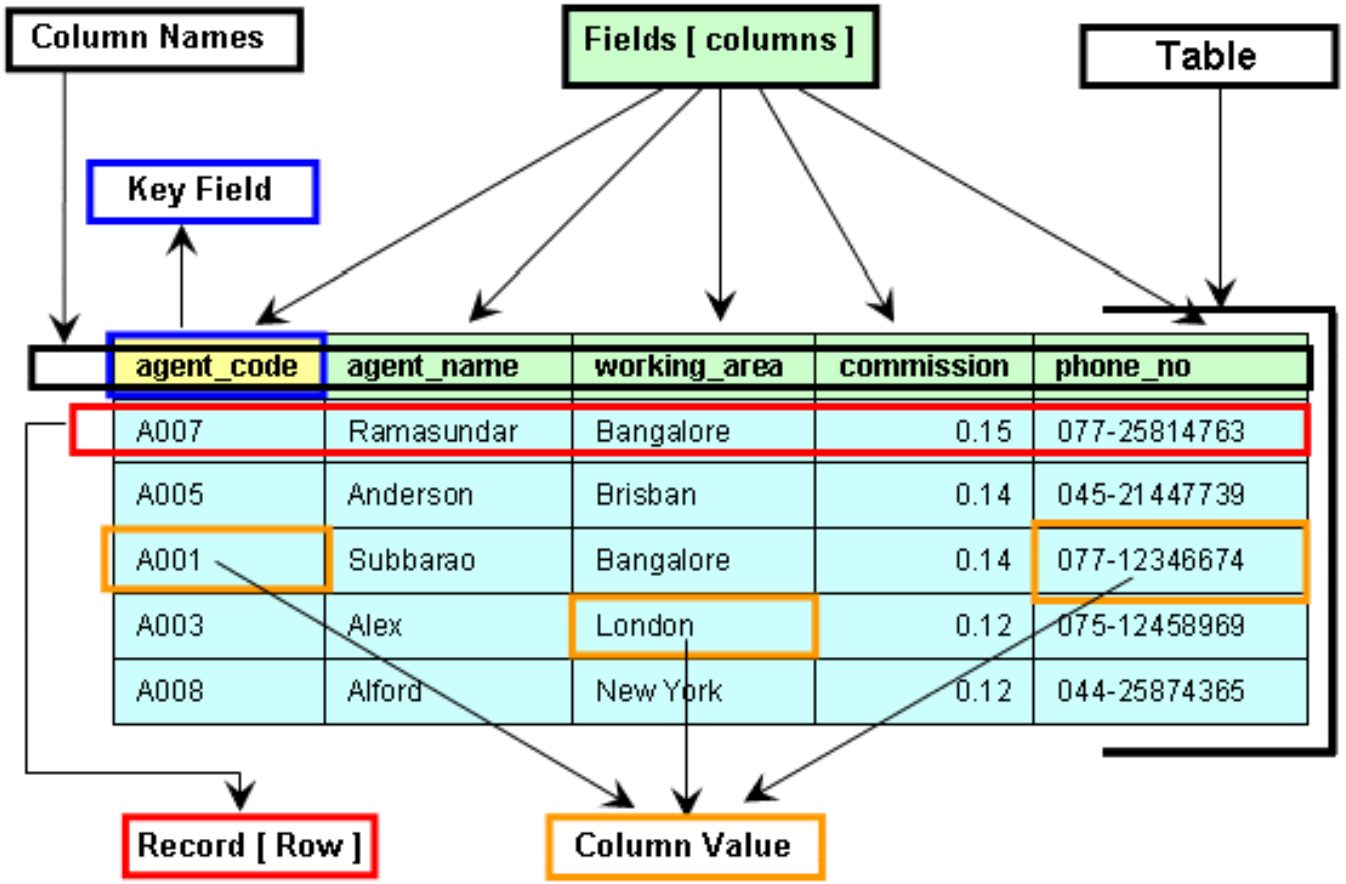
Database

- A **database** is an organized collection of inter-related data, so that it can be easily accessed and managed.
- In databases, data is stored in the form of tables.
- Each table has a set of predefined columns.
- Data is entered in the table in form of rows.
- Each row of data contains data related to each column.

- Common terminology to remember:
  - Row = Tuple
  - Column = Field

Database Table

- Data in databases is stored in the form of tables.



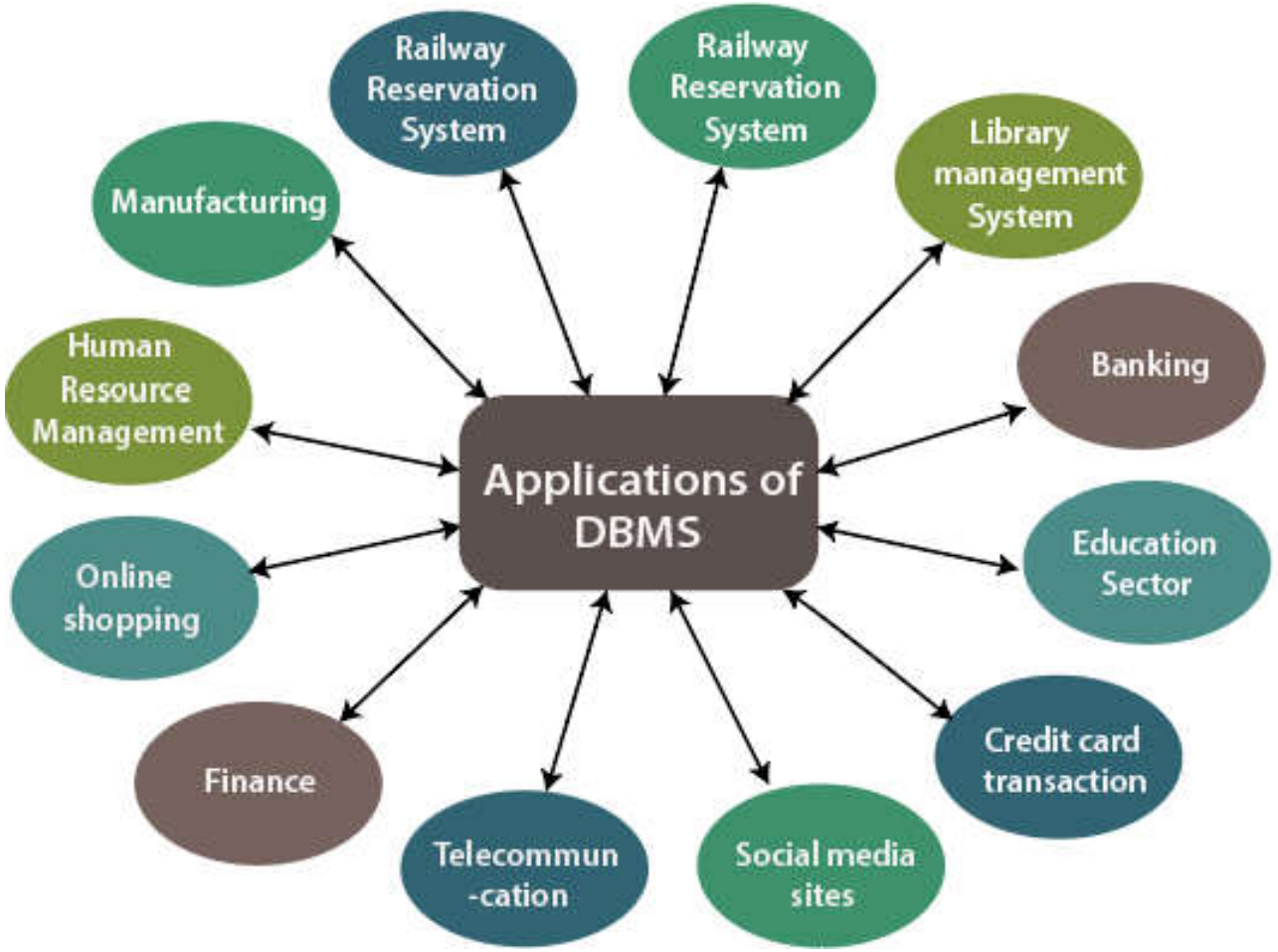
Database Management Systems

- **What is a DBMS?**
- A Database Management System (*DBMS*) is a software designed to store, retrieve, define, and manage data in a database efficiently.
- Example: Oracle, MySQL, MS SQL server, MS Access, Sybase, Informix, Postgres etc.
- These DBMS use SQL for Language for storing manipulating and retrieving data in databases.
- We will be using MySQL as this is open source database and is freely available.

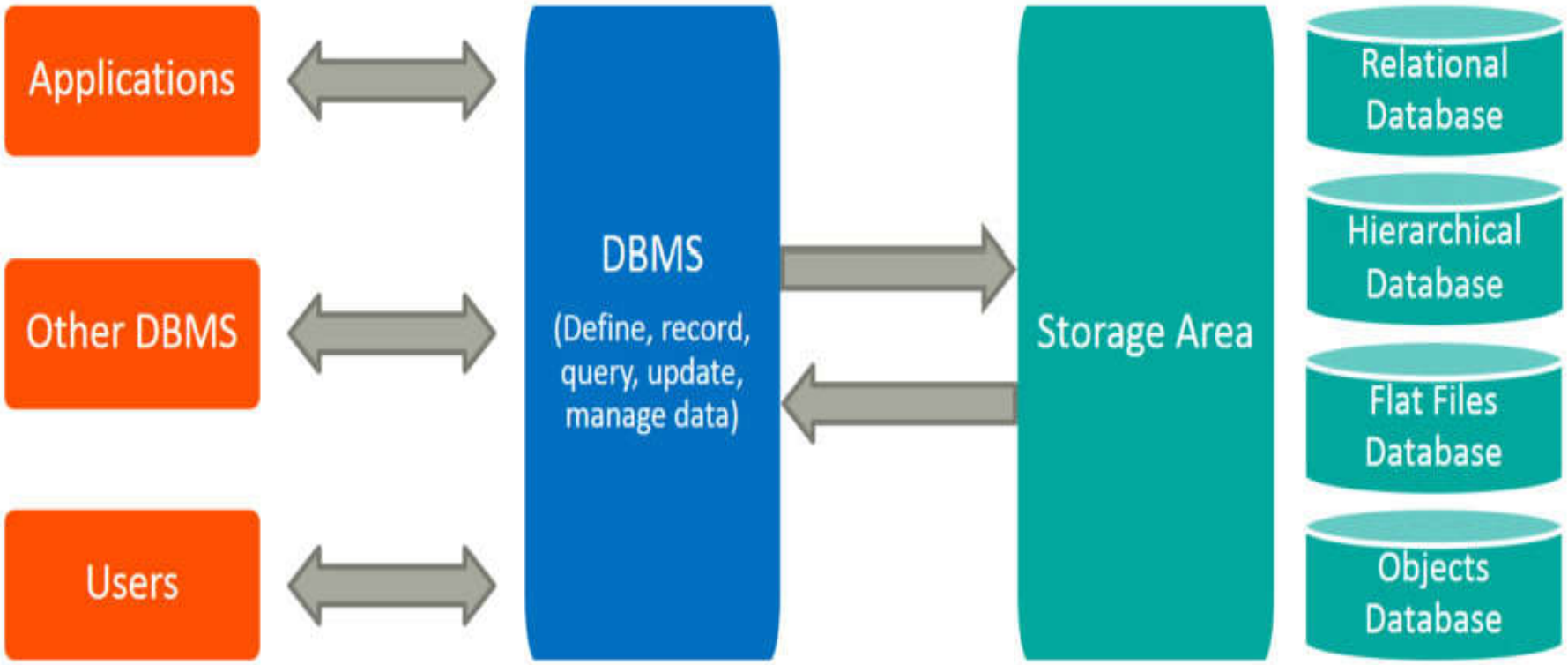
Why use DBMS?

- Separation of the data definition and the program.
- Data independence
- Efficient access and storage
- Data Integrity and Security
- Data Administration
- Concurrent Access
- Recovery from Crashes
- Support for Views
- Reduced Application Development Time

Application of DBMS



Working of DBMS



SQL

- SQL stands for Structured Query Language
- SQL is a standard language for storing, manipulating and retrieving data in databases.
- SQL is an ANSI/ISO standard for working with databases.
- But there are different versions of SQL language.
- Each of the DBMS developing companies modified the SQL according to the needs of their DBMS software.
- However, to be compliant with the ANSI standard, they all support at least the major commands (such as SELECT, UPDATE, DELETE, INSERT, WHERE) in a similar manner.

Important SQL Commands

- **SELECT** - extracts data from a database
- **UPDATE** - updates data in a database
- **DELETE** - deletes data from a database
- **INSERT INTO** - inserts new data into a database
- **CREATE DATABASE** - creates a new database
- **ALTER DATABASE** - modifies a database
- **CREATE TABLE** - creates a new table
- **ALTER TABLE** - modifies a table
- **DROP TABLE** - deletes a table
- **CREATE INDEX** - creates an index (search key)
- **DROP INDEX** - deletes an index

Creating a database and table

- CREATE DATABASE *databasename*;
- USE *databasename;*

- CREATE TABLE *table_name* (
  column1 datatype,
  column2 datatype,
  column3 datatype,
  ....
  );

Inserting & Showing records in a table

- INSERT INTO *table_name* (*column1*, *column2*, *column3*, …)
  VALUES (*value1*, *value2*, *value3*, …);

- SELECT *column1*, *column2*, …
  FROM *table_name*;

Example

CREATE DATBASE **Library**;

USE **Library**;

CREATE TABLE **Book**(
Id INT NOT NULL AUTO_INCREMENT,
Title VARCHAR(50) NOT NULL,
Author VARCHAR(40) NOT NULL,
Pub_date DATE,
PRIMARY KEY (**id**));

Example (continued..)

```
INSERT INTO Book
( Id, Title, Author, pub_date)
VALUES
( 01, “DBMS”, “Rahul Bose“, “2012-09-21”);

INSERT INTO Book
VALUES
( 02, “DS”, “Vikram Kumar“, “2018-04-10”);
```

Example (continued..)

SELECT Id, Title, Author FROM Book;

Id	Title	Author
01	DBMS	Rahul Bose
02	DS	Vikram Kumar

SELECT * from Book; (Show all columns)

Id	Title	Author	Pub_date
01	DBMS	Rahul Bose	2012-09-21
02	DS	Vikram Kumar	2018-04-10