Database

* Distinguish between the physical and the logical view of data
* Describe how data is organized
* Describe databases and advantages of a database
* Describe 4 DBMS structures
* Hierarchical, Networking, Relational, Object Oriented
* Distinguish among the different databases
* Understand how DBMS differ from earlier file access methods.

The types of Database

* Sequel(relational database)
  + for storing and processing information in a relational database.
* NoSQL Database
  + databases that store data in a format other than relational tables.

Data

* Facts or observations about people, places, things, and events
* Two ways to view data
* Physical view
* Actual format and location

Databases, Data and Information

| Database | Data | Information |
| --- | --- | --- |
| * Collection of data organized in a manner that allows access retrieval, and use of that data | * Collection of unprocessed items * Text * Numbers * Images * Audio * Video | * Processed data * Organized * Meaningful * Useful |

CRUD is the acronym for CREATE, READ, UPDATE and DELETE. These terms describe the four essential operations for creating and managing persistent data elements, mainly in relational and NoSQL databases.

Element of database file

* Character: is the most basic logical data element. It is a single letter, number or special character.
* Field: group of related characters
* A data field represents an attribute: description of some entity (person, place, thing)
* Record: collection of related fields. A record represents a collection of attributes that describe an entity
* File: collection of related records.
* Database: is an integrated collection of logically related records

Key field

* Unique identifier
  + Contains unique information so that each record can be distinguished from any other
* Common examples
  + Social security number
  + Drivers license
  + Credit card account
* This helps with finding records, sorting records, compiling information contained in the database

# Batch processing (Later)

* Batch processing: data is collected over several hours, days and even weeks. It is then processed all at once – as a “Batch”

# Real time processing (Now)

* Real time processing: also known as online processing, occurs when data is processed at the same time as the transaction occurs.

Advantages of database

* Less data redundancy: with several departments having access to one file, there are fewer files.
  + Computers linked by a network to a file server could replace the hard disk located in several individual computers.
* Data integrity: older filing systems many times did not have integrity, a change made in the file in one department might not be made in the file in another department
  + Causes serious problems and conflicts when the data used for important decisions affecting both departments

DBMS Structures

* The arrangement of logically structured data is called data model.
* Hierarchical
* Network
* Relational
* Object-oriented

Hierarchical database

* In a hierarchical database, fields or records are structured in nodes. Nodes are points connected like branches of an upside down tree. Each entry has one parent note, although the parent may have several child nodes. This is sometimes described as a one-to-many relationship.

Airlines may use a hierarchical database

Network database

* A network database also has a hierarchical arrangement of nodes. Each child node may have more than one parent
* This is sometimes described as a many-to-many relationship
* The interconnected design allows for access via multiple pathways; i.e., more flexible

Relational database

* A more flexible type of organization is the relational database.
* There are no access paths down a hierarchy. Rather, the data element are stored in different tables, each of which consists of rows and columns
* A table is called a relation. Within the table, a row resembles a record, a column resembles a field. All related tables must have a common data item (key field)
* The most valuable feature of a relational database is its simplicity, entries can be easily added, deleted, and modified

Object oriented database

* Works with unstructured data
  + Photographs
  + Graphics
  + Audio
  + Video

Types of database

* Databases may be small or large, limited in accessibility or widely accessible. Database may be classified into 5 types
  + Individual or microcomputer database
  + Company or shared
  + Distributed
  + Proprietary
  + Web

Individual database

* Individual database is also called microcomputer database, it is a collection of

proprietary database

* Is generally an enormous database that an organization develops to cover particular subjects
* It offers access to this database to the public or selected outside individuals for a fee
* some important proprietary databases are
  + Prodigy: offers news and info on business and econ, as well as leisure services
  + Dialog information services: offers business info and technical and scientific info

SELECT STATEMENT

* Used for queries on single or multiple tables
* Clauses of the select statement
  + SELECT
    - List the columns (and expressions) to be returned from the query
  + FROM
    - Indicate the table(s) or views(s) from which data will be obtained
  + WHERE
    - Indicate the conditions under which a row will be included in the result
  + GROUP BY
    - Indicate categorization of results
  + HAVING
    - Indicate the conditions under which a category (group) will be included
  + ORDER
    - Sorts the result according to the specified criteria

What is SQL ( Structured Query Language)?

* SQL stands for Structured Query Language
* SQL is domain-specific language, NOT a general programming language
  + SQL is specialized to handle structured data that follows relational model - date that incorporates relations among entities and variables
* Used to interact with relational databases to manage data: create, ~

SQL is a standard language

* SQL is a language. It has language specifications - a set of lang elements rules and syntax
* Rigid and structural
  + Underlying data model is structural. SQL is structural requiring rigid predefined schema as compared to those of noSQL
  + Syntax and grammar strict
* SQL specific features - triggers, stored procedures

DROP TABLE IF EXISTS top\_speed;

CREATE TABLE student\_result (

id INTEGER PRIMARY KEY,

student\_name TEXT,

maths INTEGER,

english INTEGER,

compoter INTEGER

);

INSERT INTO student\_result VALUES (

001, "Mazeen" , 85, 87, 57

);

INSERT INTO student\_result VALUES (

002, "Firas" , 69, 69, 69

);

SELECT \* FROM student\_result;

CREATE TABLE top\_speed (

id INTEGER PRIMARY KEY,

brand TEXT,

"0-60" INTEGER,

"0-100" INTEGER,

"60-100" INTEGER

);

INSERT INTO top\_speed VALUES (

01, "Suzuki" , 3, 5, 2

);

INSERT INTO top\_speed VALUES (

02, "Honda" , 3, 5, 2

);

SELECT \* FROM top\_speed;

CREATE TABLE BOOK(

ID INTEGER PRIMARY KEY,

NAME TEXT,

AUTHOR TEXT,

GENRE TEXT,

NO\_OF\_PAGES INTEGER,

COPIES\_SOLD INTEGER

);

INSERT INTO BOOK VALUES(

01, "I AM RADAR", "REIF LARSEN", "HISTORICAL FICTION", 672, 70000

);

INSERT INTO BOOK VALUES(

02, "HARDY BOYS - DARKNESS FALLS", "Franklin W. Dixon", "FICTION", 160, 53220

);

SELECT \* FROM BOOK;