

### Lesson Objectives

Introduction to flat files  
Characteristics of DBMS  
ACID Properties  
Relational DBMS



### Flat file – A Simple Database



Flat files are stored at operating system level. Made up of set of strings in one or more files that can be parsed to get the information they store. They are good for storing simple lists and data. Can get complicated when tried to replicate more complex data structures.

#### WHAT'S GOOD

- All operating systems come with an inbuilt file system.
- Standardized formats that can be read across platforms.

#### WHAT'S NOT

- Near absence of access concurrency.
- Possibility of data corruption.
- Needle-in-the-haystack method of finding data.
- Data is not structured and can not be easily related
- Usually necessary to store redundant data.

Add the notes here.

### Introduction to database



#### Database

- Organized collection of related data which captures the essential properties of objects and records the relationships among them.

#### Database system

- It is an integrated collection of related files, along with details of interpretation of data.

#### Database Management System (DBMS)

- A set of computer programs for organizing the information in a database.
- A DBMS supports the structuring of the database in a standard format and provides tools for data input, verification, storage, retrieval, query and manipulation.

### Why DBMS?



#### DBMS

- Allows to store information as binary strings, a key, which is used to find the associated value. It provides a way for end-users to use the database without having to worry about how the data is stored or how to retrieve the values.

#### Advantages of DBMS over Files:

- Allows users to define, create, manipulate, store, maintain, retrieve, and process the data in a database in order to produce meaningful information.
- Focus on information representation.
- Data stored as records in various database files that can be combined to produce meaningful information for users.
- DBMS controls all functions of capturing, processing, storing, retrieving data and generates various forms of data output.
- Manages access by multiple users and multiple programs to a common store of data.

Add the notes here.

### Benefits of Database Approach



- Redundancy can be reduced
- Inconsistency can be avoided
- Data can be shared
- Standards can be enforced
- Security restrictions can be applied
- Integrity can be maintained
- Data independence can be provided

Add the notes here.

### Characteristics of DBMS



Data persistence – Stored on some hardware and persist after access.  
Concurrency – Multi user access  
Managed Transactions – Data manipulation and saving of work  
Query language – for retrieval of data  
Data recoverability – To recover from failure

Add the notes here.

## ACID Properties



The concept of **ACID**:

- **A**tomicity: Results of a transaction's execution are either all committed or all rolled back. All changes take effect, or none do.
- **C**onsistency: The database is transformed from one valid state to another valid state
- **I**solation: The results of a transaction are invisible to other transactions until the transaction is complete.
- **D**urability: Once committed (completed), the results of a transaction are permanent and survive future system and media failures.

Add the notes here.



### CODD's Rules



Codd's twelve rules are a set of thirteen rules (numbered zero to twelve) proposed by Edgar F. Codd, a pioneer of the relational model for databases, designed to define what is required from a database management system in order for it to be considered relational, i.e., a relational database management system (RDBMS).

#### Rule (0):

- The system must qualify as relational, as a database, and as a management system. For a system to qualify as a relational database management system (RDBMS), that system must use its relational facilities (exclusively) to manage the database.

#### Rule 1: The Information Rule

- All data should be presented to the user in table form.

### CODD's Rules



#### Rule 2: Guaranteed Access Rule

- All data should be accessible without ambiguity. This can be accomplished through a combination of the table name, primary key, and column name.

#### Rule 3: Systematic Treatment of Null Values

- A field should be allowed to remain empty.
- This involves the support of a null value, which is distinct from an empty string or a number with a value of zero.
- This rule should not apply to primary keys.
- In addition, most database implementations support the concept of a non-null field constraint that prevents null values in a specific table column.

#### Rule 4: Dynamic On-Line Catalog Based on the Relational Model

- A relational database must provide access to its structure through the same tools that are used to access the data.
- This is usually accomplished by storing the structure definition within special system tables.

### CODD's Rules



#### Rule 5: Comprehensive Data Sublanguage Rule

- The database must support at least one clearly defined language that includes functionality for data definition, data manipulation, data integrity, and database transaction control.
- All commercial relational databases use forms of the standard SQL (Structured Query Language) as their supported comprehensive language.

#### Rule 6: View Updating Rule

- Data can be presented to the user in different logical combinations, called views.
- Each view should support the same full range of data manipulation that direct-access to a table has available.
- In practice, providing update and delete access to logical views is difficult and is not fully supported by any current database

### Relational DBMS

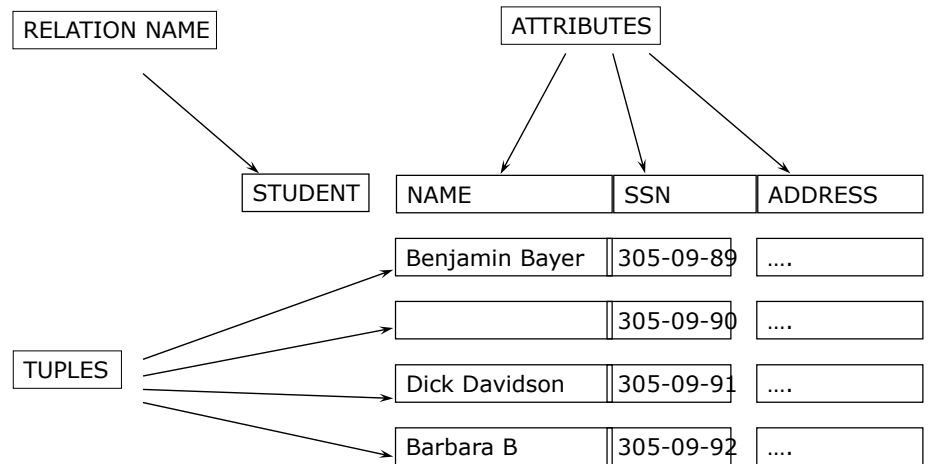


A DBMS is said to be a Relational Data Base Management System (RDBMS) if it follows the following main criteria:

- Represents data as two dimensional tables called relations .Data is organized as tables of data values.
- Primary unit of storage is called table which contains rows and columns.
- Relationships are maintained by common data values stored in the related tables.
- Tables can be related to one another through common column values called keys.
- Should be able to retrieve the data stored in such tables using `SELECT`, `JOIN` and `PROJECT` operators.

Add the notes here.

## Relational Database Model – continued



Add the notes here.

Example: Relational Database



STORE	
Store Name	City

INVENTORY		
Store Name	Part No	Quantity

STORE	
Store 1	Colombo
Store 2	Kandy

ORDERS				
Store Name	Part No	Vendor No	Order No	Quantity

INVENTORY		
Store 1	P1	50
Store 1	P3	20
Store 2	P2	100
Store 2	P1	30

PART	
Part No	Description

VENDOR	
Vendor No	Vendor Name

ORDERS				
Store 1	P3	3428	0052	10
Store 2	P2	3428	0098	7
Store 2	P3	3428	0098	15
Store 2	P4	5726	0099	1

PART	
P1	Printer
P2	Diskette
P3	Disk Drive
P4	Modem

VENDOR	
3428	East West
5726	DMS

Add the notes here.

## SUMMARY

- In this module, you learned about the following:
  - What is flat files
  - Characteristics of data modeling
  - Codd's Rules
  - Relational databases

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## Review Question

- ❖ 1. A relational database consists of a collection of \_\_\_\_
  - Tables
  - Fields
  - Keys
- ❖ Question 2 DBMS provides only single user access
  - True/False
- ❖ Question 3: A \_\_\_\_ is an association among several entities?

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