

KARACHI EDU • GRADE 9 COMPUTER SCIENCE MASTERCLASS

Chapter 7: Introduction to Databases

Comprehensive study notes covering data management fundamentals, file-processing systems versus DBMS, relational database models, tables, keys, and structured query basics.

Core Concepts: Data, Information & Files



Data vs. Information

Data: Raw, unorganized facts and figures. **Information:** Processed, structured, and meaningful data used for decision-making.



Traditional File System

Early method where data was stored in separate flat files managed by distinct application programs.



Limitations

Suffers from severe data redundancy, inconsistency, isolation, and security vulnerabilities.

What is a Database & DBMS?

CENTRALIZED STORAGE

Database Definition

An organized collection of logically related data stored electronically in a computer system for rapid access and retrieval.

SOFTWARE INTERFACE

DBMS Definition

Database Management System (DBMS) is software that enables users to create, protect, manipulate, and maintain databases (e.g., MySQL, MS Access).

Advantages of DBMS

Key Benefits

- **Data Sharing:** Multiple authorized users can access data concurrently.
- **Reduced Redundancy:** Centralized storage eliminates duplicate file copies.
- **Data Security:** Restricted user accounts, passwords, and permission controls.
- **Data Integrity:** Rules and constraints ensure accuracy and consistency.

Karachi Edu Student Portal Example

Instead of separate grade sheets in different folders, student records, fee statuses, and attendance are unified in one secured database.

Updates made by administration reflect instantly across all authorized teacher dashboards.

Components of a Relational Database

Table (Relation)

Matrix of rows and columns storing data about a specific entity.

Record (Tuple)

A single horizontal row representing an individual entry.

Field (Attribute)

A vertical column representing a specific data property.

Cell

The intersection point of a row and a column holding a specific value.

Database Keys: Ensuring Uniqueness & Relationships

Key Types

- **Primary Key (PK):** Uniquely identifies each record in a table (e.g., `RollNumber`). Cannot be null or duplicated.
- **Foreign Key (FK):** A field in one table that references the Primary Key of another table, establishing relational links.

```
-- Student Table Structure
CREATE TABLE Students (
    RollNumber INT PRIMARY KEY,
    FullName VARCHAR(50),
    Class VARCHAR(10)
);

-- RollNumber uniquely identifies every student
```

Introduction to SQL (Structured Query Language)

What is SQL?

SQL is the standard programming language specifically designed for managing and querying relational databases.

Used to insert, retrieve, update, and delete database records efficiently.

```
-- Basic SQL Query Example
```

```
SELECT FullName, Class
```

```
FROM Students
```

```
WHERE Grade ≥ '80';
```

```
-- Retrieves names of high-scoring students
```

Chapter Summary & Key Takeaways

Data Systems

Understanding the shift from manual file systems to centralized DBMS.

Relational Design

Mastering tables, records, fields, and relational attributes.

Database Keys

Using Primary and Foreign keys to maintain uniqueness and links.

SQL Queries

Writing basic SELECT statements to query data.

Questions & Answers

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