



BCA



Semester - 5th



Relational Database Management System

Notes - 1

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Introduction & Features: Concept of RDBMS

Concept of RDBMS

RDBMS stands for Relational Database Management System.

It is a software system used to store, manage, and retrieve data in the form of tables (relations).

Each table is made up of rows (records) and columns (fields).

Data is related to each other through keys (like primary key and foreign key).

Example:

A “Student” table can have columns like RollNo, Name, Course, Marks.

A “Course” table can have CourseID, CourseName.

These two tables can be linked using CourseID – this relation forms the “Relational Model.”

Features of RDBMS

Data stored in tables:

All information is stored in rows and columns.

Data independence:

Changes in data structure do not affect the entire system.

Data integrity:

Ensures correctness and accuracy of data using keys and constraints.

Data security:

Access to data is controlled using privileges and permissions.

Reduced data redundancy:

Avoids duplicate data by normalizing the database.

Data consistency:

Maintains uniform data throughout all related tables.

Support for SQL:

RDBMS supports Structured Query Language (SQL) for data manipulation.

Relationships between tables:

Tables are related using primary and foreign keys.

● Examples of RDBMS software: Oracle, MySQL, SQL Server, PostgreSQL, MS Access.

Properties of RDBMS

RDBMS follows some important properties that make it reliable and efficient. These are often called the ACID properties:

A – Atomicity

Each transaction is treated as a single unit.

Either all operations are done or none are done.

👉 Example: If you transfer money between two accounts, either both debit and credit happen, or none happen.

C – Consistency

After a transaction, the database remains in a valid and consistent state.

👉 Example: The total balance before and after a transaction should be the same.

I – Isolation

Each transaction is executed independently without interference from others.

👉 Example: Two people booking the same seat simultaneously are handled separately.

D – Durability

Once a transaction is committed, the changes are permanent, even if the system crashes.

CODD's Commandments (12 Rules of Dr. E.F. Codd)

Dr. E.F. Codd, the father of the relational model, gave 12 rules to define what a true RDBMS should follow.

Here's a simple version:

Information Rule:

Data should be stored in tables (relations).

Guaranteed Access Rule:

Every data item should be accessible using table name, column name, and primary key.

Systematic Treatment of NULL Values:

NULL represents missing or unknown values and must be treated properly.

Dynamic Online Catalog:

Database structure should be stored in tables and accessible using SQL.

Comprehensive Data Sub-language Rule:

The system must support at least one language (like SQL) for all operations.

View Updating Rule:

All views that can be updated must be automatically updated.

High-level Insert, Update, Delete:

Data manipulation should be possible using SQL commands.

Physical Data Independence:

Changing storage structure should not affect the user.

Logical Data Independence:

Changing logical structure (like adding new fields) should not affect applications.

Integrity Independence:

Integrity constraints should be stored in the database, not in application programs.

Distribution Independence:

The system should work properly even if the database is distributed across different locations.

Non-subversion Rule:

Security rules should not be bypassed through low-level access methods.

SQL Plus

SQL* or SQL Plus is an Oracle command-line tool used to interact with Oracle databases.

It allows users to execute SQL (Structured Query Language) and PL/SQL commands easily.

It's used to create, update, delete, and retrieve data, as well as manage database users.

Features of SQL Plus:

Executes SQL and PL/SQL commands.

Displays query results in tabular format.

Can save SQL scripts and run them later.

Provides formatting options for better report generation.

Allows connecting, disconnecting, and managing multiple databases.

● Example Commands in SQL Plus:

```
SQL> CONNECT system/password;
```

```
SQL> SELECT * FROM student;
```

```
SQL> INSERT INTO student VALUES (101, 'Rahul', 'BCA', 78);
```

```
SQL> EXIT;
```

Data Manipulations in RDBMS

Data manipulation refers to operations performed on data using DML (Data Manipulation Language) commands in SQL.

These are used to insert, update, delete, and retrieve records from tables.

Main DML Commands:

1. **SELECT** – retrieves data from tables.

```
sql|
```

```
SELECT * FROM student;
```

2. **INSERT** – adds new data to a table.

```
sql|
```

```
INSERT INTO student (rollno, name, course, marks)  
VALUES (101, 'Ravi', 'BCA', 85);
```

3. **UPDATE** – modifies existing data.

```
sql|
```

```
UPDATE student SET marks = 90 WHERE rollno = 101;
```

4. **DELETE** – removes data from a table.

```
sql|
```

```
DELETE FROM student WHERE rollno = 101;
```

Oracle Data Types

Oracle supports various data types for storing different kinds of values.

Here's a simple list:

Data Type	Description	Example
CHAR(size)	Fixed-length character	'A', 'Yes'
VARCHAR2(size)	Variable-length	'BCA Student'
NUMBER(p,s)	Numeric values (p =	123.45
DATE	Stores date and time	'06-NOV-2025'
LONG	Variable-length	Description text
CLOB	Character Large Object	Essay text
BLOB	Binary Large Object	Image file
RAW / LONG RAW	Binary data in raw	Stored password hash

In Short:

RDBMS = Table-based system for managing relational data.

Properties (ACID) = Ensures reliability and accuracy.

Codd's Rules = Standards for a perfect RDBMS.

SQL Plus = Oracle tool to execute SQL/PLSQL commands.

DML = Used to manage table data (SELECT, INSERT, UPDATE, DELETE).

Oracle Data Types = Define the kind of values stored in columns.



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