

SQL & DBMS Notes + Interview Questions

Introduction to DBMS

- DBMS (Database Management System): Software for creating, storing, and managing databases.
- Examples: MySQL, Oracle, PostgreSQL, SQL Server.
- Benefits: Data security, consistency, integrity, concurrent access, and recovery.

What is SQL

- SQL: Structured Query Language for interacting with relational databases.
- Used for: Creating structures, inserting, updating, deleting, and querying data.

MySQL Installation

- Download MySQL from dev.mysql.com
- Install MySQL Server, MySQL Workbench.
- Configure root password, connect via GUI (Workbench).

Sub Languages of SQL

1. DDL - CREATE, ALTER, DROP
2. DML - INSERT, UPDATE, DELETE
3. DQL - SELECT
4. TCL - COMMIT, ROLLBACK
5. DCL - GRANT, REVOKE

Creating a Database

```
CREATE DATABASE school;  
USE school;
```

Data Types in SQL Server

- Numeric: INT, FLOAT, DECIMAL
- String: CHAR(n), VARCHAR(n)
- Date/Time: DATE, DATETIME, TIME
- Others: BOOLEAN, TEXT, BLOB

Creating a Table

```
CREATE TABLE students (  
    student_id INT PRIMARY KEY,  
    name VARCHAR(100),  
    age INT,  
    grade VARCHAR(10)  
);
```

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Adding, Modifying, and Deleting Columns

- Add: ALTER TABLE students ADD email VARCHAR(100);
- Modify: ALTER TABLE students MODIFY age SMALLINT;
- Delete: ALTER TABLE students DROP COLUMN email;

Deleting a Table

DROP TABLE students;

SELECT Query

SELECT * FROM students;

SELECT name, age FROM students WHERE age > 15;

Insert Data

INSERT INTO students (student_id, name, age, grade)
VALUES (1, 'John', 16, '10th');

Update Data

UPDATE students SET age = 17 WHERE student_id = 1;

Delete Data

DELETE FROM students WHERE student_id = 1;

Primary Key

- Unique identifier, not NULL, no duplicates.

Example:

```
CREATE TABLE teachers (  
    teacher_id INT PRIMARY KEY,  
    name VARCHAR(100)  
);
```

Foreign Key

- References primary key of another table.

Example:

```
CREATE TABLE classes (  
    class_id INT PRIMARY KEY,  
    teacher_id INT,  
    FOREIGN KEY (teacher_id) REFERENCES teachers(teacher_id)
```

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);

Interview Questions and Answers

Q: What is DBMS?

A: DBMS is software for managing data in a structured format, allowing operations like insert, update, and query.

Q: What is SQL?

A: SQL is the language used to interact with relational databases using commands like SELECT, INSERT, UPDATE.

Q: Types of SQL Commands

A: DDL, DML, DQL, TCL, DCL.

Q: Difference between DELETE, TRUNCATE, DROP

A: DELETE: removes rows (with WHERE), TRUNCATE: removes all rows (faster), DROP: deletes the table.

Q: What is a Primary Key?

A: A unique column that identifies rows in a table.

Q: What is a Foreign Key?

A: A column that creates a relationship with another table's primary key.

Q: How to modify a column

A: ALTER TABLE students MODIFY age INT;

Q: Safe update mode

A: Prevents updates/deletes without key-based WHERE clause. Can disable via SET SQL_SAFE_UPDATES = 0;

Q: WHERE vs HAVING

A: WHERE filters rows before aggregation. HAVING filters after aggregation.

Q: What is normalization?

A: Process of organizing data to reduce redundancy and improve integrity.