**SQL Notes**

SQL is a structured query language that involves using relational databases, which requires pre-defined schemas.

Table

Description automatically generated

CRUD Operations are most used in SQL. (Create, Read, Update, Delete)

SQL statements are divided into 4 main categories:

1. Data Definition Language (DDL)

* CREATE (Create new database/table)
* ALTER (Modify database/table structure)
* DROP (Delete database or table)
* TRUNCATE (Remove table records)

1. Data Manipulation Language (DML)

* SELECT (Retrieve data from table)
* INSERT (Insert new records into table)
* UPDATE (Update existing records from a table)
* DELETE (Remove existing records from a table)

1. Data Control Language (DCL)

* GRANT (Assign privilege to users for accessing data)
* REVOKE (Remove privilege to users for accessing data)

1. Transaction Control Statement (TCS)

* COMMIT (Permanent work save into database)
* ROLLBACK (Restore database to previous form since last commit)
* SAVEPOINT (Create save point for future rollbacks)
* SET TRANSACTION (Setting transaction to read-write/read only access)

**SQL Query Basic Template**

SELECT <column\_names>

FROM <table\_name>

WHERE <condition on columns from table>

GROUP BY <column\_names>

HAVING <condition on grouped-by columns>

ORDER BY <column\_names>

SQL works in the following order of statement execution:

1. Gathers all data with FROM clause
2. Filters the data with WHERE clause
3. Groups rows together with GROUP BY clause
4. Filters grouped rows with HAVING clause
5. Specifies columns to display with SELECT clause
6. Sorts the results with ORDER BY clause

Types of RDBMS and its database tools:

1. SQLite: DB Browser for SQLite
2. MySQL: MySQL Workbench
3. Oracle: Oracle SQL Developer (PL/SQL – Procedural Language Extension to SQL)
4. PostgreSQL: pgAdmin
5. SQL Server: SQL Server Management Studio (T-SQL – Transact SQL)

ANSI (American National Standards Institute) standard in SQL refers to SQL code that will run in any RDBMS software.

**Identifiers vs Aliases**

Identifiers are name of database objects

Aliases rename column or table temporarily, mostly useful in subqueries.

**Statements vs Clauses**

Statements are blocks of code that starts with a SQL keyword like SELECT and ends with a semicolon.

Clauses are specific sections of the statement that refers to specific SQL keywords like WHERE, FROM etc.

**Single vs Multi-Line Comments**

Single Line Comment:

-- This is a single line comment

Multi Line Comment:

/\* These are

multi line comments \*/

**Single vs Double Quotes**

Single quote: Used for string reference

Double quote: Used for identifier reference

**Wildcard expressions**

%: Represents any n number of characters

\_: Represents any single character

Note that these wildcard expressions are used together with LIKE or NOT LIKE keyword in WHERE clause.

**SQL Data Types**

1. Numeric (INT, DECIMAL, FLOAT)

* INT: Used for values that do not allow for decimals (i.e. 45)
* DECIMAL: Used for fixing number of decimals (i.e. 24.524)
* FLOAT: Store limited number of decimals with power notation (i.e. 2.4524 \* 10^5)

Note: MySQL has the option of setting numeric variables as positive only using UNSIGNED keyword.

1. String (CHAR, VARCHAR, TEXT, NCHAR, NVARCHAR)

* CHAR: Stores fixed length of characters as ASCII data
* VARCHAR: Stores maximum length of specified characters as ASCII data
* TEXT: Used for storing long strings of text like paragraphs
* NCHAR: Stores fixed length of characters as Unicode data
* NVARCHAR: Stores maximum length of specified characters as Unicode data

Note: Unicode data refers to non-ASCII characters (non-English mostly)

1. Date (DATE, TIME, DATETIME, TIMESTAMP, YEAR – For MYSQL)

* DATE: YYYY-MM-DD
* DATETIME: YYYY-MM-DD hh:mm:ss
* TIMESTAMP: YYYY-MM-DD hh:mm:ss UTC
* TIME: hh:mm:ss
* YEAR: YYYY

Note: DATETIME variable type does not store time zone, while TIMESTAMP variable type does store time zone.

1. Boolean (BOOLEAN): FALSE value as 0 and TRUE value as 1

Note: Boolean variable type is currently not supported in Oracle and SQL server.

1. External files like images, documents etc.

Approach 1: Store links to files using VARCHAR variable type

Approach 2: Convert files to binary format and store files using BLOB variable type