

Report on things learned from the textbooks above.

SQL is a query language that is been used to access information in a database. The retrieved information is based on the instruction given in the SQL statement.

The database is a storage for information collected over some time in a specific and efficient way and can be retrieved when needed.

A database Management system (DBMS) consists of a set of programs that define, manage, and process databases and all applications associated with them. There are two main types of users which are the conventional user (retrieves/modifies data) and administrator (maintain the structure of the database).

SQL languages can be classified into:

- Data Definition Language (DDL): To create, change/restructure, and delete. Common commands are CREATE, ALTER, and DROP.
- Data Manipulation Language (DML): It handles data maintenance functions, i.e., enter, change, remove/retrieve data. DML commands are: INSERT, UPDATE, and DELETE.
- Data Query Language (DQL): performs data selection (SELECT).
- Data Control Language (DCL): manage data access within the database. This includes granting access to users (GRANT) and revoking user access and privileges (REVOKE).
- Transactional Control Commands: manipulate various transactions in maintaining database integrity. These commands are COMMIT, ROLLBACK, and SAVEPOINT.
- ** RESTRICT: used if an error is to be returned when a table referenced by another database object is dropped.
- ** CASCADE: allows the table and all other referencing objects to be deleted.

There are also various data types supported by SQL, some of them are:

- Numeric: integer, smallint, bigint, numeric (precision, scale), decimal (precision, scale), real (scale), double precision (precision, scale), float (precision, scale).
- String: character(n) or char(n), character varying(n) or varchar(n), character large object (CLOB).
- Date and Time: Date, Time, Datetime, timestamp.
- User-Defined Data Type (CREATE TYPE): This allows users to create the data type themselves.

** Data types can be converted from one form to another, e.g., CAST ('2008-09-17 15:30:00' AS DATETIME), this converts a string to datetime.

Some of the things that can be performed using an SQL server include the following.

- Database Views:
A view is a database object formed when your SELECT queries are saved in the database for future use. It's saved temporarily on the computer memory and can't be modified. It can simplify data retrieval, implement database security, and support data summarization and report generation.

- Triggers are an SQL procedure that is compiled in the database that executes certain transactions based on other transactions that have previously occurred.
- Error-handling mechanisms are the status parameter SQLSTATE and the WHENEVER clause.

WHENEVER CONDITION ACTION

CONDITION – value can either be SQLERROR (returns TRUE if SQLSTATE class code is other than 00, 01, or 02) or NOT FOUND (returns TRUE if SQLSTATE is 02000)

ACTION – value can either be CONTINUE (execution of the program is continued normally) or GOTO address (execution of a designated program address)

**** In designing a database, there is a need for brainstorming and considering things that should be included in the table and also the data types. Also, there is a need for applying the concept of normalization i.e., ensuring that there is no duplicate where not necessary.**

- In creating a column in a table, a check constraint can be added, this constraint is the allowable values for a certain column e.g., gender CHAR (1) CHECK (gender IN ('M', 'F'))
- A constraint is a restriction placed on one or more columns of a table. This includes a primary key, foreign key, unique, and check.
- Aliases can be provided to columns and also tables with the keyword 'as' or by adding the column alias after the column or table you want to rename.
- During querying, there are various keywords and clause that can be used in achieving the desired result, some of them includes: where (for filtering), having, order by (for sorting), group by, and aggregation functions like count, distinct, sum, etc., Conditional statements (comparison operators (e.g., =, !=), arithmetic operators (e.g., +, -, *), arithmetic functions(MOD, POW, TAN), etc.
- It can also be used to query more than one table at a time. This is done by joining the tables together using INNER JOIN, OUTER JOIN(RIGHT/LEFT), and CROSS JOIN.
- SET operations can also be performed. Some of the operators used are UNION/UNION ALL, INTERSECT, and EXCEPT.
- SQL also always querying inside a query, this is called subqueries. It can be done from the FROM clause, SELECT clause, and WHERE clause. In a compound query, the query can be sorted according to the result you want but must be noted that the query will start from the first one to the last one.
- Conditional logic operations can be performed using the case expression (Case when x then y, ..., else, end). An alias should be given after the statement, and it must be written under the select statement.
- Indexes are a mechanism for finding a specific item within a resource. It is created in a database to easily locate rows in a table. The index contains only the column that

will be used to locate the rows, along with information describing where the rows are physically located. Therefore, the role of indexes is to facilitate the retrieval of a subset of a table's rows and columns without the need to inspect every row in the table. A primary key serves as an automatically created index for its table. In a table, if there is more than one index, the optimizer will decide on the best.

- Indexes are also used to create uniqueness in a column and errors will be a flag if a duplicate value has been added to the column.