Introduction to SQL:

SQL (Structured Query Language) is a language that provides an interface to relational database system. IBM developed SQL in the 1970s for use in data base system SQL is often pronounced as SEQUEL. In fact, SQL makes an RDBMS possible. SQL is a nonprocedural language, in contrast to the procedural or third-generation languages such as COBOL and C that had been created up to that time

SQL is set oriented means that that SQL processes sets of data in groups. In common usage SQL also encompasses DML, used for creating, insert, update and delete operation and also for creating and modifying tables & other database structures.

SQL has been a command language for communication with the oracle 9i server from any tools or application. When SQL statement is entered it is stored in a part of memory called this SQL buffer & remains there until a new SQL statement is entered.

SQL *plus is an oracle tool that recognize & submits SQL statements to the oracle 9i server for execution.

SQL * Plus

Oracle server is a multi-user tool that works in a client/server environment. Client /Server programming is a form of distributed application processing. The components of it are

- Oracle Server
- Oracle client

Oracle server

The oracle server's primary job is to manage data optimally, among multiple users that concurrently request for the same data. Main functions include:

- Updating the database
- Retrieving information from the database
- Accepting query language statements
- Enforcing security specifications
- Enforcing data integrity specifications
- Enforcing transaction consistency
- Managing data sharing
- Optimizing queries
- Managing system catalogs

Oracle client side tool

Sql * plus is a separate oracle client side tool that work on any 95,98 or 2000 OS.

SQL * Plus

- ⇒ Oracle SQL * Plus is a separate tool that comes as a part of Oracle Enterprise Server as well as Oracle Workgroup Server via which users can communicate interactively with the Oracle Server.
- ⇒ To work with Oracle Engine the user needs to be able to communicate with it when loaded in a server's memory.
- ⇒ The natural language of the Oracle Engine is SQL.
- ⇒ Oracle provides an interactive SQL tool called SQL* plus, which allows user to enter SQL sentence and pass them to the Oracle Engine for execution.
- ⇒ These sentence allow the user to create, access and maintain data structure like table, indexes etc.
- ⇒ To use SQL the user must load the SQL* Plus tool in a client's memory, link to

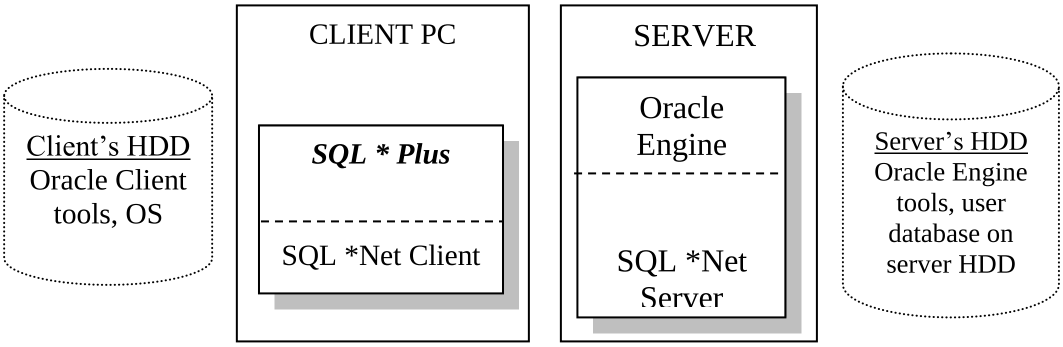
the server and then communicate with the Oracle Engine loaded on the server.

⇒ SQL * Plus is a character based interactive tool, that runs in a GUI environment.

⇒ It is loaded on the client machine.

⇒ This is the first tool to be used by most programmers when they begin their work with Oracle

⇒ The below figure shows how Oracle works



Features of SQL * Plus

⇒ SQL * Plus accepts ad hoc entry of statement.
(**Ad-hoc:** This is the Latin term means an unprepared simple query.)

⇒ It accepts SQL input from files.

⇒ It provides a line editor for modifying SQL statements.

⇒ It controls environmental settings.

⇒ It formats query results into basic reports.

⇒ It access local and remote database.

SQL enables a programmer or database administrator to do the following:

- Modify a database's structure
- Change system security settings
- Add user permissions on databases or tables
- Query a database for information
- Update the content of a database

Feature of SQL:

- SQL can be used by a range of users, including, those with little or no programming experience.
- It is non-procedural language.
- It reduces the amount of time required for creating and maintaining systems.
- It is an English like language.

Rules for SQL:

- SQL stores with verb.
- Each verb is followed by number of clause.
- A space separates clauses
- A comma separates parameter without a clause.
- A ';' is used to end SQL statements.
- Statements may be split a across lines but key word may not.

- Lexical units such as identifiers operator names, literals are separated by one or more space or other delimiters that will not to be confused with lexical unit.
- Reserved words cannot be used as identifiers unless enclosed with double quotes.
- Identifiers can contain up to 30 characters and must start with alphabetic character.
- Character & date literal must be enclosed within single quotes.
- Numeric literals can be represented by simple value such as 0.32,-34 & so on, Scientific notation as 2E5 meaning 2x10 to the power of 5=200000.

Naming Rules:

⇒ In SQL, name can be given to the following database objects: Database link, Tables, Table Spaces, Users, Views, Clusters, Constraints, Indexes, Rollback Segments, SavePoints, Sequences and Synonyms.

⇒ The general naming rules that apply to them are:

  - The name of a database object must be from 1 to 30 characters long. Except for database name which are limited to 8 characters.
  - A name may not contain a quotation mark.
  - Database object name is case-sensitive.
  - The name must begin with a letter and it must contain only the characters A-Z, 0-9, _, $ and #.
  - SQL reserved words may not be used.
  - A name must not duplicate the name another database objects owned by that user.

SQL Commands:

DDL (Data Definition Language):

It is a set of SQL commands used to create, modify and delete database structure but not data. A general user, who should be accessing the database via an application, normally uses these commands. They are normally use by the DBA to a limited extent a database designer or application developer. These statements are immediate i.e. they are not susceptible to ROLLBACK commands. It should also be noted that if several DML statements for example updates were executed then issuing any DDL command would COMMIT all the updates as every DDL command implicitly issues a COMMIT command to the database.

Example:
CREATE: To create object in the database.
ALTER: Alters the structure of the database.
DROP: Delete objects from the database.
TRUNCATE: Remove all records from a table, including all spaces allocated for the records are removed.
COMMENT: Add comments to the data dictionary.
GRANT: Gives user’s access privileges to database.
REVOKE: Withdraw access privileges given with the GRANT command.

DML (Data Manipulation Language):

Through this commands SQL allows to change database. This commands are used for manipulation of data.

Example:

INSERT: Insert data into a table.
UPDATE: Update existing data within a table.
DELETE: Deletes all records from a table, the space for the records remain.
CALL: Call a PL/SQL or java subprogram
LOCK: Table control concurrency.

DCL (Data Control Language):

It is the component of SQL statement that control access to data and to the database. Occasionally DCL statements are grouped with DML statements.

Example:

COMMIT: Save work done.
SAVEPOINT: Identified a point in a transaction to which you can later rollback.
ROLLBACK: Restore database to original since the last COMMIT.
SET TRANSACTION: Change transaction option like what rollback segment to use.
GRANT/REVOKE: Grant or take back permissions to or from the oracle users.

DQL (Data Query Language):

It is the components of SQL statement that allows getting data from the database and imposing ordering upon it. In includes the SELECT statement. This commands the heart of SQL. It allows getting the data out of the database perform operations with it. When a SELECT is fired against a table or tables the result is compiled into a further temporary table, which is displayed or perhaps received by the program i.e. a front-end.

Example:

SELECT: Retrieve data from the database.

The character set

The basic character set includes the following:

Uppercase alphabets [A-Z]
Lowercase alphabets [a-z]
Numerals [0 – 9]
Symbols () + - * / < > = ! : ; . ‘ @ % , “ # $ ^ & _ \ {} ? []

Literals:

A literal is a numeric values or a character string used to represent itself:

<u>Numeric Literal:</u>

These can be either integers or floats. If a float is being represented, then the

Integer part must be separated from the float part by a period.

25, 6.34, 7g2, 25e-03,.1, 1., 1.e4, +17, -5

<u>String Literal:</u>

These are represented by one or more legal characters and must be enclosed within single quotes. Writing it twice in a string literal can represent the single quote character. This is definitely not the same as a double quote.

Ex.: ‘Hello’, ’don’t’ go without saving your work’<u>Character Literal:</u>

These are string literals consisting of single character.

Ex: ‘*’, ‘A’, ‘Y’

Logical Literal:

These are predetermined constraints. The values that can be assigned to this data type are: TRUE, FALSE, And NULL

SQL Data types:

CHAR:

This data type is used to store character type description in any column.

- Fieldname Char (Size)

⇒ The size determines the number of characters the column can hold.

⇒ The maximum number of character this data type can hold is 255 characters.

⇒ When this data type is used and user has gives more than selected size than it will print error message.

⇒ While user give less value than selected size than rest of width will be shown as blank pad.

VARCHAR:

⇒ This data type is used to store alphabetic numeric data in any column.

- Fieldname Varchar (size)

⇒ The size determines the number of characters the column can hold.

⇒ The maximum number of character this data type can hold is 255 characters.

⇒ Varchar data type is more flexible than CHAR data type because when user gives less value than selected width than rest of width will not shown as blank pad.

VARCHAR2:.

⇒ This data type is used to store alphabetic numeric data in any column.

⇒ We can use this data type when required to store string in any column.

- Fieldname Varchar2 (size)

⇒ The size determines the number of characters the column can hold.

⇒ The maximum number of character this data type can hold is 4000 characters.

⇒ Varchar data type is more flexible than CHAR data type because when user gives less value than selected width than rest of width will not shown as blank pad.

DATE:

⇒ When users want to store date and time to any column in a table then Date data type is used.

⇒ This data type is use to represent date & time.

- Fieldname date
  - Default date format: DD-MON-YY (31-DEC-08)
  - Default time format: HH: MI: SS (12:20:30)
  - Default date: Current month starting date
  - Default time: 12:00:00 AM

⇒ Valid dates range from 1, January 4712 B.C. to 31, December 4712 A.D.

NUMBER:

- ⇒ When user wants to store numeric data in any column we should select number data type to that particular column.
- ⇒ Number data type also holds floating values.
- ⇒ Number may be stored upto38 digits of precision and values may be zero, positive numbers and negative numbers with range 9.99 *10^{124} i.e. 1 followed by 125 zeros.
  - ▪ Fieldname number (P, S)
- ⇒ The precision (P) determines the maximum length of the data, whereas the scale (S) determines the number of places to the right of the decimal.
- ⇒ If scale is omitted then the default is zero.
- ⇒ If precision is omitted then values are stored with their original precision up to the maximum 38 digits.

***LONG**:*

- ⇒ This data type is used to store variable length character strings containing data up to 2 GB. LONG data can be used to store arrays of binary data in ASCII format.
  - ▪ Fieldname long
- ⇒ Be aware that there are some restrictions to the using LONG data types such as:
  - o Only one column per table can be defined as LONG.
  - o A column that has LONG data type is not indexed.
  - o A column that has LONG data type can’t be passed as an argument to a procedure
  - o A function can’t be used to return a LONG column.
  - o A column that has LONG data type can’t be used in sub queries, WHER, GROUP BY, or CONNECT BY clauses.

RAW:

- ⇒ The RAW data type is used to store binary data, such as digitized picture or image.
  - ▪ Fieldname raw (Size)
- ⇒ User must give the width when this data type is used because there is no default width.
- ⇒ RAW a data type can have a maximum length of 255 bytes.
- ⇒ Values stored in columns have RAW data type cannot be indexed.

LONG RAW:

- ⇒ RAW data type can hold data up to 255 bytes if user want to give more then its size then LONG RAW data type is used
- ⇒ The LONG RAW data type is also used to store binary data, such as digitized picture or image.
  - ▪ Fieldname long raw
- ⇒ LONG RAW a data type can have a maximum length of 2GB.
- ⇒ Values stored in columns have LONG RAW data type cannot be indexed.

SQL v/s SQL * Plus

- ⇒ ***SQL***

- SQL is a language for communicating with the Oracle Server to access data.
- SQL is based on American National Standards Institute (ANSI) standard SQL.
- SQL manipulates data and table definitions in the database.
- SQL is entered into the SQL buffer on one or more lines.
- SQL does not have a continuance character.
- Keywords cannot be shortened.
- SQL uses a termination character to execute commands immediately.
- SQL uses functions to perform some formatting.

⇒ ***SQL*PLUS***

- SQL*PLUS recognizes SQL statements and sends them to the server.
- SQL*PLUS is the Oracle proprietary interface for executing SQL statements.
- SQL*PLUS does not allow manipulates of values of the database.
- SQL*PLUS is entered one line at a time not stored in the SQL buffer.
- SQL*PLUS uses a dash as a continuance character if the command is longer than on line.
- Keywords can be shortened.
- SQL*PLUS does not require termination character execute commands immediately.
- SQL*PLUS uses commands to format data.

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