Course Outline

DBMS and SQL

Course Description

The primary role of a data scientist is to turn raw data into actionable insights. Much of the world's raw data—from customer transactions to medical records —lives in organized collections of tables called relational databases. Therefore, to be an effective data scientist, you must know how to query, wrangle and extract data from these databases using a language called SQL (pronounced ess-que-ell, or sequel). This course teaches you everything you need to know to begin working with databases. SQL is core and foundation skill – without proficiency in SQL, a person hardly can be a data scientist.

Course Objectives

The participants will be able to

Understand the RDBMS concepts, Relationships between multiple tables, and database design concepts

Master both basic and advance SQL statements for querying tables across single or multiple tables using JOINS

Create Table, Insert, update and delete records

Analyze data using Aggregate functions, Sub-Queries, SET operators

Become proficient in handling data of any size spread across multiple table and advance ETL processes using SQL

Pedagogy

The objectives envisaged in this course will be met through Interactive Lectures and hands on exercises and practice sessions.

Course Content

Session 1 :

- DBMS & Data Models
    - What is Database
    - DBMS Terminologies
    - RBMS Basics
    - Create Database

- SQL - Commands Introduction DDL, DML, DQL
    - Create, Drop Database

- Data Type Data Types
- Key Attributes Primary key, Foreign key, parent/child table

DML

- INSERT, UPDATE, DELETE

DQL

- Select where clause
- Operators with where clause, Limit
- Compound search condition
- Missing Data
- More on ALTER
- Simple date function to work with date datatype

SQL Constraints

- NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY, CHECK, DEFAULT

Session 2:

- SELECT with predicates
  - Comparison Operator, Between, IN, Like
  - Wildcard Filters, LIMIT
- SET Operators
  - Union, Union All, Intersect, Minus
  - Duplicate Rows
  - Operator Precedence
- Functions
  - Round, Trunc, Floor, Ceil
  - String Function, Numeric Function
  - Date Function, Bin, Cast, Coalesce
- Sort
  - Order By

Session 3

- GROUP Functions
  - count(), Avg(), Max(), Min(),sum()
  - GROUP By with aggregate function
  - Grouped queries
  - Aggregation with Group by

- Multiple Grouping Columns
- Null values in Grouping

- Having
  - Having Clause
  - Aggregation with Having class
  - Having without Group by
  - Restriction on Grouped Queries

Session 4

Joins

- ER Diagram, Introduction to Join
- Simple Join
- Table Aliases
- Multi table joins
- Joins with Groupby
- JOINS with WHERE / ON/USING
- Join with Row selection
- Natural Join
- Equi Join
- Non Equi Joins
- Left ,Right and outer join
- Cross joins
- Rules for Multi Join query

Session 5

Sub Queries

- ER Diagram
- Introduction to Subquery
- Subqueries with ALL, ANY, IN, or SOME
- Subqueries using where clause
- Subqueries with EXISTS or NOT EXISTS
- Subquery in From clause
- Nested Subqueries
- Set comparison with Nested subquery
- WITH clause, Having clause
- scalar valued expression with subquery

More on Sub queries

- Sub queries and Joins
- Row Valued Expression
- Query Expression

Session 6

Windows function

- Advanced Aggregate Function
- Analytical Function
- Rank, Dense_Rank,Percent_Rank, Lead, Lag, First_Value, Last_Value, Ntile, Cum_dist
- Recursive Query Expression

Data Integrity

- Column Check Constraints
- Uniqueness and Null Values
- Referential Integrity Problems
- ACID properties
- Normalization
- Check Constraints
- Uniqueness constraints
- Delete and Update Rules
- Cascaded, deletes and updates
- Referential Cycles
- Foreign Keys and NULL values

Session 7

Transaction Processing

- What is Transaction Processing
- Transactional Model
- Isolation, Classification of Isolation Model
- SAVE POINT and RELEASE SAVE POINT statement
- Locking level, shared and Exclusive Locks

Views

- Views and its types
- Joined Views
- Horizontal and Vertical queries
- Row column subset view
- Group View
- Joined Views
- CHECK OPTION and DROP VIEW