

Data Analytics with T-SQL

Introduction to RDBMS

1. File Management System

- Database Management System (DBMS) and Data Models
- Physical Data Models
- Logical Data Models
- Relational Data Model (RDBMS)
- Object-Relational Data Model (ORDBMS)
- Entity-Relationship (E-R) Model, Connecting to Server
- Sql Server Authentication Mode, Windows Authentication Mode
- Login and Password
- Sql Server Management Studio and Tool explanation
- Types Of TSQL Commands
- Data Definition Language (DDL) - Create, Alter and Drop
- Data Manipulation Language (DML) - Insert, Delete, Update, Truncate
- Data Query Language (DQL) - Select
- Data Control Language (DCL) - Grant and Revoke
- Transaction Control Language (TCL) - Rollback, Save point
- Constrains (Not Null, Unique, Default, Check constraints, Primary Key and Referential Integrity or foreign key constraints)
- Data Types In T-SQL

Clauses

- Where
- Match
- Group by
- Having
- Order by

Scalar Functions

- Numeric Functions
- Date Functions
- Aggregate Functions
- Super Aggregates Over (partition by ...) Clause
- Window Functions (Rank, Dense Rank, Lag, etc)
- Common Table Expressions (CTE)

Joins

- Inner Join
- Self-Join
- Outer Join
- Left Outer Join
- Right Outer Join
- Full Outer Join
- Cross Join

Single Row Sub Queries

- Multi Row Sub Queries
- Co-Related Sub Queries

Index

- Clustered Index
- Non-Clustered Index
- Filtered Index

Views

- Creating, Altering and Dropping Indexes
- Simple and Complex View

Transaction Structure Query Language

1. Transaction Management

- Begin Transaction
- Commit Transaction
- Rollback Transaction
- Save Transaction

2. Loops

- While
- Do While
- For

3. Cursor

- Working with Cursors
- Types of Cursors
- Static
- Dynamic
- Keyset Cursors
- Local and Global Cursors

4. Stored procedure

- Creating
- Altering
- Dropping
- Input and Output Parameters

5. User-Defined Functions

- Creating, Altering, and Dropping
- Types of User-Defined Functions
- Table Valued Functions
- Inline Table-Valued Functions
- Multi Statement Table Valued Functions

6. Trigger

- Purpose of Triggers
- Differences Between Stored Procedures and User-Defined Functions and

Triggers

- Creating, Altering and Dropping Triggers

SQL Integration with Excel

Exception Handling

- Try
- Catch
- Throw

Tasks:

Students should resolve them in the class and 2+ Projects will be given depending on the student's performance

Data Analytics with Power BI

1.Introduction to Excel

- Pivot Table
- Pivot Chart
- Creating Dashboards

2.Introduction to Power BI

- History of Business Intelligence
- Power BI Service
- Power BI Desktop
- Power BI Mobile

3.Understanding Data warehouse

- Difference between OLAP and OLTP
- ETL
- Fact and Dimension Tables

4.Power BI Desktop

- Connecting to data
- Using Power query Editor
- Data Types
- Renaming Columns and Queries
- Report or Canvas View
- Data view
- Data Model View
- Creating and deleting relationships

5. Visualizations

- Create a column or bar chart
- Focus mode
- Create a Line chart
- Create a Card visualisation
- Create a gauge visualisation
- Create a table visualisation
- Create a matrix visualisation

6. Visualisations to Reports

- Adding and naming report pages
- Re-using visualisations
- Text boxes and other visual elements
- Create tree map visualisation
- Create pie or donut chart
- Interacting by Filtering

7. Working with Filters and Slicer

- Slicers
- Slicers and the data model
- Filters pane
- Visual filters
- Filter an Entire Page or report
- Create a map visualisation
- Create filled map visualisation

8.Q & A and Analysis

- Analyse data in visual

9.Publish to Power BI Service

- Power BI Service layout
- Create a new repor

10.Dashboards

- Reports to dashboards
- Create a new dashboard
- Pin visualisations from other pages and reports
- Pin entire report page
- Quick Insights
- Add an image to a dashboard
- Add web content to a dashboard
- Add a text box to a dashboard

11.Working with Dashboards

- Renaming dashboards
- Favorite dashboards
- Dashboard Actions
- Duplicate dashboard
- Print dashboard
- Performance inspector settings
- Dashboard Themes
- Arrange a dashboard for mobile use
- Generating alerts from cards and KPIs

12.Refreshing Data

- Refreshing data in Power BI Desktop
- Refreshing local data from power bi service
- Refreshing data from the cloud from Power BI Service

13.Share Reports and Dashboards

- Sharing reports
- Sharing dashboard

Intermediate Power BI

14.Data Model & Transformation

- Data transformation principles
- Data normalisation
- Fact and Dimension tables
- Data Model
- Star schema
- Snowflake schema
- Optimising the data model

15.Get Data

- Data sources
- Dataset
- Get data from Excel
- Import Vs DirectQuery

16.Power Query Editor

- PQ user interface
- Queries Pane
- Data Pane
- Ribbon
- Query Settings

17.Data Transformations

- Filter Data
- Rename Queries
- Group Queries
- Remove top rows
- Use row as headers
- Rename Columns
- Duplicate columns
- Split Columns
- Rename Applied Steps
- Format data
- Unpivot columns
- Conditional Columns
- Fill values
- Reorder Columns
- Combine queries
- Append
- Merge
- Replace Values
- Custom Columns
- Remove Columns
- Evaluate and change column data types

18. Check the Data: Profiling

- Column Quality
- Column Distribution
- Column profile

19. Date Transformations

- Auto Date/Time
- Create a date dimension table
- Dynamic date dimension tables
- Extract date components as columns
- Fiscal Quarter and Fiscal Year

20. Load Data

- Include in report refresh
- Enable load
- Query dependencies
- Advanced Editor
- Close and Apply

21. Data Modelling

- Importance of a good data model
- Manage relationships
- Relationship Cardinality
- Cross-filter direction
- Typical cardinality and cross filtering
- Modify data formats

22.Data Analysis Expression (DAX)

- M (Power Query) vs DAX
- Calculated Columns
- Measures
- Implicit vs explicit measures
- Filter context and measures
- Referring to measures and calculated columns
- Calculating values row-by-row in a measure
- X functions vs Aggregators and Calculated Columns

23.Quick Measures

- Quick measure Categories
- Aggregate per category
- Filters
- Totals
- Mathematical Operations
- Text

24.Time Intelligence Quick Measures

- Auto date/time option
- Visuals for date/time reporting
- Quick measure using an existing measure

25.Secure and Share Data

- Online Sharing
- Introducing to row-level Security (RLS)
- Multi-row cards
- Testing row level Security
- Add users to RLS roles

26. More Visualisations

- Combo Charts
- Small multiples
- Waterfall Charts
- Drill down charts
- What-if
- Bookmarks
- Buttons to navigate

Power BI --- Advanced

27. DAX Functions

Calculate, Date(), Calendar(), filter(), All(), allselected(), related(), Aggregated functions(sum, sumx, count, countx, avg, min, max, etc...), Calendarauto(), etc..

28. Row Level Security

- Overview of RLS in Power BI
- Dynamic RLS using username
- DAX parent-child functions
- Publish and assign roles in Power BI Service
- Create App Workspace.

29. Reporting features

- Overview of Drill-through
- Interacting with drill-through
- Overview of Custom report tool tips
- Apply a tooltip to a field or visual
- Overview of Grouping/
- Create a Group
- Create a bin

30.Extended Topics with Paginated Reports

31.Extended topics with Python

32.Extended Topics with Microsoft Fabric

Tasks will provide for every Practical work, and 2+ projects will be given depending on Students interests.

Data Analytics with Python

Introduction to Python

- Python Installation
- Interpreters' vs Compilers
- Integrated Development Environments (IDES)
(Notebook, VS code, Azure Data Studio etc.)

Basic concepts

1.Types of Operators

- Python Arithmetic Operators
- Python Comparison Operators
- Python Assignment Operators
- Python Bitwise Operators
- Python Logical Operators

2.Data Types

- Variables
- Assigning Values to Variables
- Multiple Assignment

3.Python Numbers

4.Python Strings

5.Accessing Values in Strings

6.String Special Operators

7.String Formatting Operator

8. Triple Quotes

9. Built-in String Operations

10. Python Lists

- Accessing Values in Lists
- Updating Lists
- Delete List Elements
- Basic List Operations
- Indexing, Slicing, and Matrixes
- Built-in List Functions & Methods

11. Python Tuples

- Accessing Values in Tuples
- Updating Tuples
- Delete Tuple Elements
- Basic Tuples Operations
- Indexing, Slicing, and Matrixes
- No Enclosing Delimiters
- Built-in Tuple Functions

12. Python Dictionary

- Accessing Values in Dictionary
- Updating Dictionary
- Delete Dictionary Elements
- Properties of Dictionary Keys
- Built-in Dictionary Functions & Methods

13. Loops and Decision Making

- if statements
- ..else statements
- nested if statements
- while loop
- for loop
- nested loops
- Loop Control Statements
- break statement
- continue statement
- pass statement

14. Functions

- Defining a Function
- Calling a Function
- Pass by reference vs value
- Function Arguments
- Required arguments
- Keyword arguments
- Default arguments
- Variable-length arguments
- The return Statement
- Scope of Variables
- Global vs. Local variables

15. Basic OOPs Concept

- Creating class in Python
- Documented String
- Private Identifier
- Constructor
- Inheritance
- Polymorphism

16. Decorator, Iterator and Generator

17. Anonymous Function

- Lambda
- Map
- Filter
- Reduce

18. File Handling

- Create
- Open
- Read
- Write
- Delete
- Append
- Others

19. Connecting to Databases

20. Creating Json Files

21. Sending emails with Python

Data Analysis with Python

- NumPy - Introduction
- Initializing an Array
- NumPy Datatypes
- Accessing or changing specific elements
- Initializing different Arrays
- Basic Mathematics
- Linear Algebra and Statistics
- Reorganizing Array • Load data using NumPy
- Advanced Indexing and Boolean Masking

Pandas

- Pandas Installation
- Understanding Datasets
- Understanding File Systems
- Reading Excel & CSV files
- Writing data using Pandas
- What is a Data Frame & its operation?
- Selecting columns & rows (Indexing)
- Descriptive Statistics using Pandas
- Plotting using Pandas
- Renaming Columns
- Sorting Data in Pandas Data frame
- Handling Missing Values
- Apply functions in pandas for element wise operations
- Types of aggregations in Pandas
- Merging Data in Pandas Data frame

Matplotlib - Visualization Library

- Introduction
- Line Plot
- Bar plot and Horizontal Bar plot
- Scatter plot
- Histogram and Box Plot
- Violin plot, Pie chart and Donut Chart

Seaborn - Visualization Library

- Introduction to Seaborn Library
- Scatter plot & Line Plots
- Showing Multiple Relationships with Facets
- Categorical Scatterplots
- Distribution of observations withing categories
- Statistical Estimation within Categories
- Count Plot
- Point plot
- Boxen plot
- Violin plot
- Bar plot
- Swarm plot
- Strip plot
- Cat plot

Projects

Python Projects - 2+ depending on Students performance.