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Become a Big Data Engineer

About Course:

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10 years+ Industry Expert

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Demo Class: [Click Here](#)

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Former Senior Software Engineer, IMPulse (BD) Ltd

Former Specialist, BI/DW & CLM Systems, Robi Axiata Limited

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Module 1: Introduction to Data Engineering: 1 hour

- What is Data? Importance of data.
- Introduction to Data Engineering
- Importance of Data-Driven Decision Making
- Component of Big Data
- Big Data Tools
- Data Engineering vs. Data Science vs. Data Analysis
- Skills required for Data Engineers
- Daily Role and Responsibility of a Data Engineer
- Challenges and Opportunities in Data Engineering
- Data Engineering Lifecycle
- Key Concepts: Big Data, Databases, Data Warehousing
- Question & Answer Session

Module 2: SQL(PostgreSQL) for Data Engineers: 12 hours

- Introduction to Databases:
 - Overview of databases.
 - Understanding relational database management systems (RDBMS).
 - OLAP vs OLTP.
- PostgreSQL setup & configuration
- SQL Basics
 - What is SQL?
 - Syntax and structure of SQL table creation.
 - Data types: numeric, string, date/time, etc.
 - Overview of DDL, DML and DCL
 - CRUD operations: SELECT, INSERT, UPDATE, DELETE.
- Querying Data
 - SELECT statement:
 - Retrieving data from table.
 - Filtering rows using WHERE clause.
 - Sorting results with ORDER BY.
 - Limiting results with LIMIT.
- Joins:
 - Inner joins, outer joins (left, right, full) joins.
- Aggregating Data
 - Aggregate functions: SUM, AVG, COUNT, MIN, MAX.
 - Grouping data with GROUP BY clause.
 - Filtering grouped data with HAVING clause.

- Subqueries
- Modifying Data
 - INSERT.
 - UPDATE.
 - DELETE.
 - MERGE.
- Working with Views
 - Creating and managing views.
 - Advantages of using views.
- Introduction to PL/pgSQL
 - Overview of PL/pgSQL as the procedural language for PostgreSQL.
 - Importance of stored procedures, functions, and triggers.
- PL/pgSQL Syntax Basics
 - Structure of PL/pgSQL blocks.
 - Declaration of variables and data types.
 - Comments in PL/pgSQL code.
- Flow Control Statements
 - Conditional statements
 - Looping
- Creating and Calling Functions
 - Syntax for creating user-defined functions in PL/pgSQL.
 - Defining function parameters and return types.
 - Calling functions from SQL queries or other PL/pgSQL code.
- Stored Procedures
 - Creating stored procedures in PL/pgSQL.
 - Difference between functions and stored procedures.
 - Advantages of using stored procedures for application logic.
- Normalization (1NF, 2NF, 3NF & BCNF)
- Indexes and Performance Optimization
 - Importance of indexes in database performance.
 - Creating and managing indexes.
 - Query optimization techniques.
- Question & Answer Session
- Assignment

Module 3: Python for Data Engineering: 08 Hours

- Python Basics
 - Introduction to Python and its relevance in Data Engineering.
 - Setting up Python development environment.
 - Basic syntax, variables, data types, and operators.
- Data Structures in Python
 - Lists, tuples, dictionaries, and sets
- Control Flow Structures and Functions
 - Conditional statements
 - Looping
 - Writing and calling functions.
 - Function parameters and return values.
- File Handling and Input/Output
 - Reading from and writing to files.
- Working with Libraries
 - Introduction to Python standard libraries.
 - Exploring Python libraries: NumPy, Pandas, Polars etc.
 - Installing and managing libraries using pip.
- Data Manipulation with Pandas
 - Introduction to Pandas library.
 - DataFrame basics.
 - Data loading and manipulating data using DataFrames.
 - Data cleaning, filtering, and transformation.
 - Handling missing data.
- NumPy for Numerical Computing
 - Basics of NumPy arrays.
 - Mathematical operations with NumPy.
- Working with SQL Databases in Python
 - Connecting to PostgreSQL using SQLAlchemy/psycopg2.
 - Executing SQL queries from Python.
- Question & Answer Session
- Assignment

Module 4: Data warehousing & ETL: 2 hours

- Introduction to Data Warehousing
 - Importance & understanding the concept of data warehousing.
 - Data warehousing architecture.
- Data Modeling for Data Warehousing
 - Dimensional modeling vs. relational modeling.
 - Star schema and snowflake schema.
 - Fact and dimension tables.
 - Slowly changing dimensions (SCDs).
- ETL Concepts and Processes
 - Understanding ETL and its role in data warehousing.
 - ETL vs. ELT
- Question & Answer Session

Module 5: Workflow Orchestration Tool: Apache Airflow: 06 hours

- Overview of popular ETL tools: Informatica, ODI, SSIS, Apache NiFi, Talend etc
- Batch Processing vs. Streaming Processing
- Setting up Apache Airflow environment.
- Components of workflow orchestration: tasks, dependencies, scheduling, etc.
- Directed Acyclic Graphs (DAGs) in Apache Airflow
- Introduction to operators in Apache Airflow.
- Types of operators.
- Defining tasks and dependencies between tasks.
- Automating ETL processes with scheduling and dependencies.
- Monitoring ETL pipelines.
- Question & Answer Session
- Assignment

Module 6: Big Data Technologies: 06 hours

- Introduction to Big Data
 - Understanding the concept of Big Data.
 - Characteristics of Big Data: volume, velocity, variety, integrity, and value.
 - Importance and applications of Big Data in various industries.
- Hadoop Ecosystem
 - Overview of Apache Hadoop and its components.

- Understanding Hadoop Distributed File System (HDFS) for distributed storage.
 - Introduction to Hadoop MapReduce.
- Apache Spark
 - Introduction to Apache Spark.
 - Hadoop vs. Apache Spark.
 - Basics of Spark programming using Python (PySpark).
- Databricks
 - Introduction to Databricks
 - Databricks architecture
 - Delta Lake.
 - Setting up Databricks account creation and community edition setup.
 - Magic Commands in Databricks
- Question & Answer Session
- Assignment

Module 7: NoSQL Technologies: 04 hours

- Introduction to NoSQL Databases
 - Overview of NoSQL databases and their characteristics.
 - Comparison between NoSQL and relational databases.
- Introduction to MongoDB
 - Overview of MongoDB as a document-oriented NoSQL database.
 - Features and advantages of MongoDB.
 - Installation and setup of MongoDB
- MongoDB Data Model
 - Understanding the document-oriented data model.
 - Collections and documents.
- CRUD Operations in MongoDB
 - Basic CRUD operations (Create, Read, Update, Delete) using MongoDB.
- Querying and Aggregation
 - Query operators and expressions in MongoDB.
 - Aggregation pipeline.
- Question & Answer Session
- Assignment

Module 8: GCP & Google big query: 04 hours

- Introduction to GCP
 - Understanding of cloud computing
 - Types of cloud systems.

- Overview of and GCP & understanding GCP services
- Introduction to Google BigQuery
 - What is BigQuery and its key features?
 - Exploring the BigQuery UI and running queries
- Data Loading & Manipulation
 - Loading data into BigQuery from various sources.
 - Writing basic SQL queries in BigQuery
 - Filtering, sorting, and aggregating data
- Question & Answer Session
- Assignment

Module 9: Capstone project

- Extract data from public API.
- Pre-processing, cleansing, and transformation of raw data.
- Loading in fact layer using Apache Airflow.
- Schedule workflow in Airflow.

Contact Details:

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