Postgres - SQL/PLSQL Training Programme

Day 1

1. Welcome
    - Introduction
2. Introduction to PostgreSQL
    - Installing PostgreSQL on Mac
    - Installing PostgreSQL on Windows
    - Configure pgAdmin 4 client
    - Creating a Database User
    - Creating a Database
    - Running a query in pgAdmin tool
    - Install sample data files on server
    - Install Human Resources (hr) database
    - Install sample stocks market data
    - Install northwind database
    - Drop a database
3. Creating and Modifying Tables
    - Movie Database Structure
    - Creating the movie database and a actors table
    - Creating the directors table
    - Creating the movies table with a foreign key
    - Creating the movies_revenues table
    - Creating a Junction table with movies and actors tables
    - Install sample data for 'movies' database
    - Create a sample Database "mydata"
    - Using pgAdmin - Create and modify a table
    - Using pgAdmin - View table structure, and create column
    - Using pgAdmin - Rename, delete and change the data type of a column
    - Deleting tables from a database
4. Modifying Data in the tables
    - Insert a data into table
    - Insert multiple records into a table
    - Insert a data that had quotes
    - Use RETURNING to get info on added rows
    - Update data in a table
    - Updating a row and returning the updated row
    - Updating all records in a table
    - Delete data from a table
    - Using UPSERT

Day 2

5. Querying Data
    - Select all data from a table
    - Selecting specific columns from a table
    - Adding Aliases to columns in a table
    - Using SELECT statement for expressions
    - Using ORDER BY to sort records
    - Using ORDER BY with alias column name
    - Using ORDER BY to sort rows by expressions
    - Using ORDER BY with column name or column number
    - Using ORDER BY with NULL values
    - Using DISTINCT for selecting distinct values
6. Filtering Data
    - Comparison, Logical and Arithmetic operators
    - AND operator
    - OR operator
    - Combining AND, OR operators
    - What goes before and after WHERE clause
    - Execution order with AND, OR operators
    - Can we use column aliases with WHERE?
    - Order of execution of WHERE, SELECT and ORDER BY clauses
    - Using Logical operators
    - Using LIMIT and OFFSET
    - Using FETCH
    - Using IN, NOT IN
    - Using BETWEEN and NOT BETWEEN
    - Using LIKE and ILIKE
    - Using IS NULL and IS NOT NULL keywords
    - Concatenation techniques
    - Concatenation with ||, CONCAT and CONCAT_WS

Day 3

7. PostgreSQL Data types
    - Boolean
    - CHAR, VARCHAR and TEXT
    - NUMERIC
    - DECIMALS
    - Selecting Numbers data types
    - Date/Time data types

- DATE
- TIME
- TIMESTAMP and TIMESTAMPTZ
- UUID
- Array
- hstore
- JSON
- Network Addresses

8. Modifying Table Structures, Add constraints
   - Creating sample database 'mydata', adding columns
   - Modify Table Structures, Add/Modify Columns
   - Add constraints to columns
9. Data type conversions
   - What is a data type conversion
   - Using CAST for data conversions
   - Implicit to Explicit conversions
   - Table data conversion
10. Conversion Functions
    - to_char
    - to_number
    - to_date
    - to_timestamp
11. Explore PostgreSQL Constraints
    - Introduction to constraints
    - NOT NULL constraint
    - UNIQUE constraint
    - DEFAULT constraint
    - PRIMARY KEY Constraints
    - PRIMARY KEY Constraints on multiple columns
    - FOREIGN KEY Constraints
    - Tables without foreign key constraints
    - Creating foreign key constraints
    - Foreign keys maintains referential data integrity
    - Drop a constraint
    - Add or update foreign key constraint on existing table
    - CHECK constraint - An Introduction
    - CHECK constraint - Add to new table
    - CHECK constraint - Add, Rename, Drop on existing table

Day 4

12. PostgreSQL Sequences

Create a sequence, advance a sequence, get current value, set value
Restart, rename a sequence, and use pgAdmin to alter a sequence
Create a sequence with START WITH, INCREMENT, MINVALUE and MAXVALUE
Create a sequence using a specific data type
Creating a descending sequence, and CYCLE sequence
Delete a sequence
Attach a sequence to a table column
List all sequences in a database
Share one sequence between two tables
Create an alphanumeric sequence

13. String Functions
UPPER, LOWER and INITCAP
LEFT and RIGHT
REVERSE
SPLIT_PART
TRIM, BTRIM, LTRIM and RTRIM
LPAD and RPAD
LENGTH
POSITION
STRPOS
SUBSTRING
REPEAT
REPLACE

14. Aggregate functions
Counting results via COUNT function
COUNT(), COUNT(*) and COUNT(1)
Sum with SUM function
MIN and MAX functions
GREATEST AND LEAST functions
GREATEST vs. MAX()
Average with AVG function
Combining Columns using Mathematical operators

Day 5

15. Grouping Data
Using GROUP BY
Using GROUP BY with multiple columns, ORDER BY
Order of execution in GROUP BY clause

Using HAVING
Order of execution in HAVING clause
HAVING vs WHERE
Handling NULL values with GROUP BY

Day 6,7

16. Joining Multiple Tables
    INNER joins
    INNER joins with USING
    INNER joins with filter data Part 1
    INNER joins with filter data Part 2
    INNER joins with filter data Part 3
    INNER joins with different data type columns
    LEFT joins Part 1
    LEFT joins Part 2
    LEFT joins Part 3
    LEFT joins Part 4
    RIGHT joins
    RIGHT joins Part 2
    FULL Joins
    Joining multiple tables
    Self Joins Part 1
    Self Joins Part 2
    CROSS Joins
    Natural Joins Part 1
    Natural Joins Part 2
    Append tables with different columns
    ON versus WHERE

Day 8

17. Combining queries together
    Combine results sets with UNION
    UNION with filters and conditions
    UNION tables with different number of columns
    INTERSECT with tables
    EXCEPT with tables

18. All about Views
    Introduction to views
    Creating a view

Rename a view
Delete a view
Using filters with views
A view with UNION of multiple tables
Connecting multiple tables with a single view
Re-arrange columns in a view
Delete a column in a view
Add a column in a view
Regular views are dynamic
What is an updatable view?
An updatable view with CRUD operations
Updatable views using WITH CHECK OPTION
Updatable views using WITH LOCAL and CASCADED CHECK OPTION
What is a Materialized View
Creating a materialized view
Drop a materialized view
Changing materialized view data
How to check if a materialized view is populated or not?
Refreshing data in materialize views
Why not use a table instead of materialized view?
The downsides of using materialized views
Using materialized view for websites page analysis
List all materialized views by a SELECT statement
List materialized views with no unique index
Quick queries for materialized views

19. Fun with subqueries
Introduction to subqueries
Subqueries with WHERE Clause
Subquery with IN operator
Subquery with JOINs
Get total revenues for all 'English' films.
Order entries in UNION without using ORDER BY
Subquery with an alias
A SELECT without a FROM
Correlated Queries
SELECT.. IN (Subquery)
Using ANY with subquery
Using ALL with subquery
Subquery using EXISTS

Day 9

20. Server Programming
    - PostgreSQL as a development platform?
    - Procedural languages
    - Keep the data on the server!
    - Functions vs stored procedures
    - User-defined functions
    - Structure of a function
21. Functions with SQL language
    - Creating our first SQL function
    - Introducing dollar quoting
    - Function returning no values
    - Function returning a single value
    - Function returning a single value Part 2
    - Function returning a single value Part 3
    - Function using parameters
    - Function using parameters Part 2
    - Function using parameters Part 3
    - Function using parameters Part 4
    - Function returning a composite
    - Function returning multiple rows
    - Function returning a table
    - Function - order matters!
    - Function as a table source
    - Function parameter modes
    - Function parameters with default values
    - Function based on views
    - Drop a function

Day 10,11,12

22. Functions with PL/pgSQL language
    - Introduction to PL/pgSQL language
    - PL/pgSQL vs SQL
    - Structure of a PL/pgSQL function
    - PL/pgSQL block structure
    - Declaring variables
    - Declaring variables via ALIAS FOR
    - Declaring variables in function
    - Variable initializing timing

Copying data types
Assigning variables from query
Using IN, OUT without RETURNS
Variables in block and subblock
How to return query results
Control Structures - IF statement
Using IF with table data
CASE Statement
Searched CASE statement
LOOP statement
FOR Loops
FOR Loops iterate over result set
CONTINUE statement
FOREACH loop with arrays
WHILE loop
Using RETURN QUERY
Returning a table
Using RETURN NEXT
Error and exception handling
Exception - Too many rows
Using SQLSTATE codes for exception handling
Exception with data exception errors

Day 13

22. Exploring Stored Procedures
    Functions vs Stored Procedures
    Create a transactions
    Understanding the use of stored procedures
    Returning a value
    Drop a procedure

Day 14

23. Using Cursors
    Understanding row by row operations
    Cursors and procedural languages
    Steps to create a cursor
    Creating a cursor
    Opening a cursor
    Using a cursor
    Updating data