Global Nexus Institute
Innovation & Excellence

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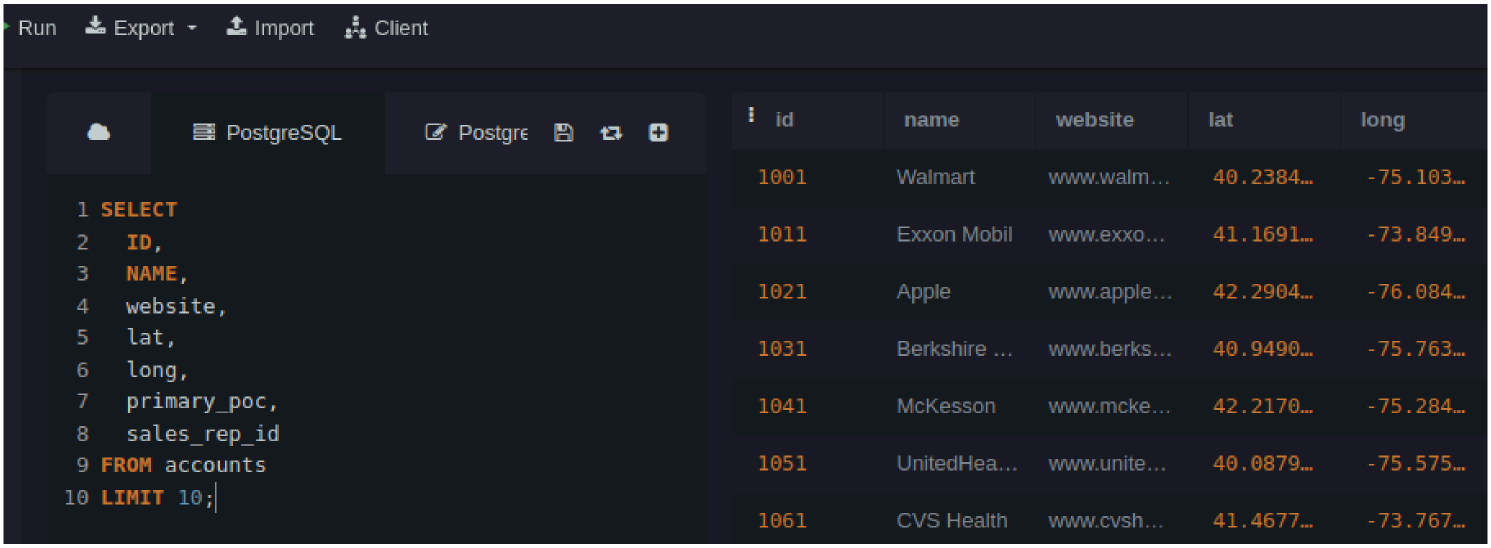
SQL for Data Analysis

Learn how to execute core SQL commands to define, select, manipulate, control access, aggregate, and join data and data tables. Understand when and how to use subqueries, several window functions, and partitions to complete complex tasks. Clean data, optimize SQL queries and write select advanced JOINs to enhance analysis performance.

1. Basic SQL

In this section, you will gain knowledge about SQL basics for working with a single table. You will learn the key commands to filter a table in many different ways.



```
SELECT
  ID,
  NAME,
  website,
  lat,
  long,
  primary_poc,
  sales_rep_id
FROM accounts
LIMIT 10;
```

id	name	website	lat	long
1001	Walmart	www.walm…	40.2384…	-75.103…
1011	Exxon Mobil	www.exxo…	41.1691…	-73.849…
1021	Apple	www.apple…	42.2904…	-76.084…
1031	Berkshire …	www.berks…	40.9490…	-75.763…
1041	McKesson	www.mcke…	42.2170…	-75.284…
1051	UnitedHea…	www.unite…	40.0879…	-75.575…
1061	CVS Health	www.cvsh…	41.4677…	-73.767…

- **Write common SQL commands:**
  - **`SELECT`**
  - **`FROM`**
  - **`WHERE`**
- **Use logical operators:**
  - **`LIKE`**
  - **`AND`**
  - **`OR`**

2. SQL Joins

In this lesson, you'll learn how to combine data from multiple tables using SQL JOIN operations to merge related information based on common fields. You'll also explore how to use UNION to stack data from similar tables together for comprehensive analysis.

- Write JOINs in SQL to combine data from multiple sources to answer more complex business questions.
- Understand different types of JOINs:
  - Inner JOIN
  - Left JOIN (or Left Outer JOIN)
  - Right JOIN (or Right Outer JOIN)
  - Full JOIN (or Full Outer JOIN)
  - Cross JOIN
- Know when to use each type of JOIN.

3. SQL Aggregations

In this lesson, you will learn how to aggregate data using SQL functions like SUM, AVG, and COUNT to summarize information efficiently. Additionally, you'll explore how to use CASE, HAVING, and DATE functions to handle complex conditions and filter results based on specific criteria.

- Write common aggregations in SQL:
  - `COUNT`
  - `SUM`
  - `MIN`
  - `MAX`
- Write and use:
  - `CASE` functions
  - `DATE` functions
  - Handle `NULL` values

4. SQL Subqueries & Temporary Tables

In this lesson, you will learn to tackle more complex business questions using nested querying methods, also known as subqueries. These techniques allow you to perform advanced data analysis by embedding queries within queries for more refined and detailed results.

- Write subqueries to run multiple queries together.
- Learn the types of subquery placement and formatting:
  - Scalar subqueries
  - Inline views (or derived tables)
  - Correlated subqueries
- Use temp tables to access a table with more than one query.

5. SQL Data Cleaning

In this lesson, you will learn how to perform data cleaning using SQL to ensure accuracy and consistency in your datasets. You'll explore techniques for identifying and correcting errors, handling missing values, and standardizing data to prepare it for analysis.

- Learn and apply the basics of data cleaning strategies in SQL:
  - Normalize data
  - Create new columns from existing data
- Perform the appropriate data-cleaning methodology based on goals for further analysis.

Bonus: (Learn Independently)

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6. SQL Window Functions

Compare one row to another without using joins by leveraging one of the most powerful concepts in SQL data analysis: window functions. These functions allow you to perform calculations across a set of table rows related to the current row, providing insights into patterns and trends within your dataset.

- Apply core window functions to tackle analysis tasks that require further targeting or segmentation.
- Use other window functions:
  - `RANK`
  - `NTILE`
  - `LAG`
  - `LEAD`
- Use these functions along with partitions to complete complex tasks.

7. SQL Window Functions

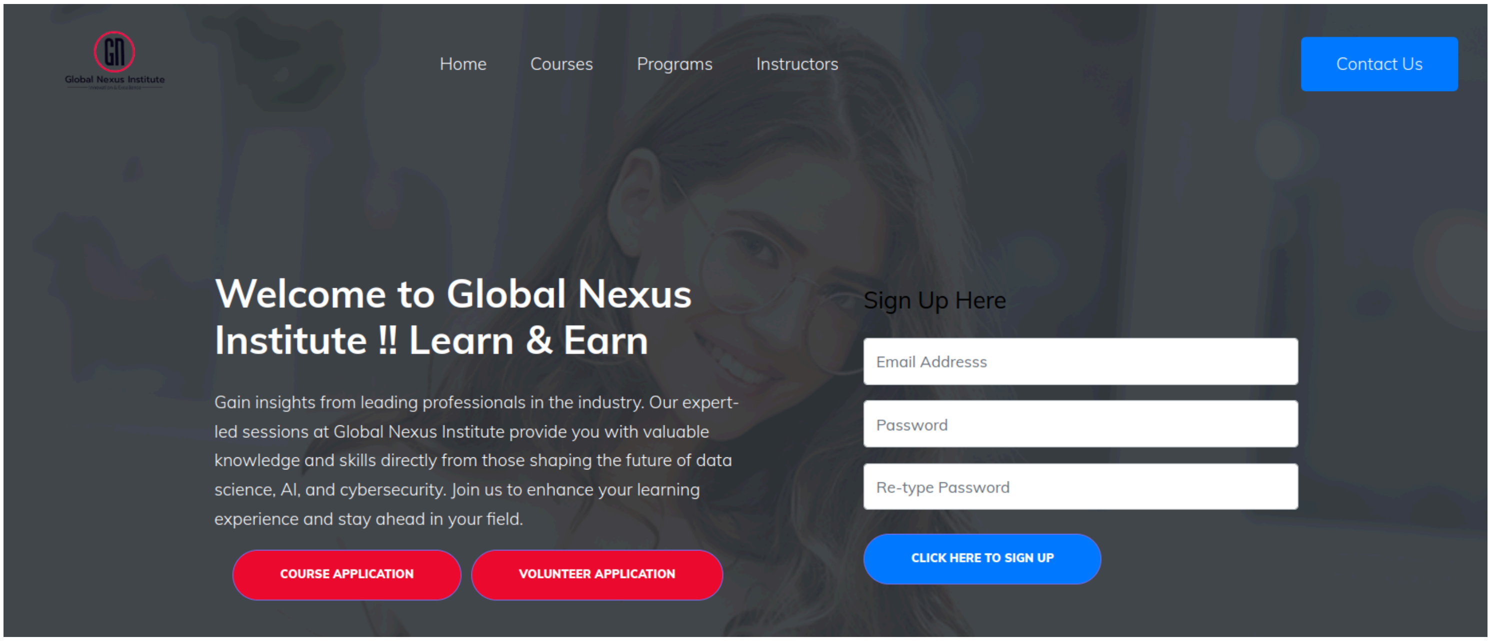
Learn advanced join techniques and strategies to optimize queries for faster performance on large datasets. This lesson includes edge case scenarios often encountered in interviews, providing practical insights into efficient query design and performance enhancement.

- Learn how and when to use advanced JOINs:
  - Self-JOINs
  - Other advanced JOIN types (e.g., multiple JOINs)
- Learn the high-level tradeoffs with queries, including:
  - Performance considerations
  - Techniques to optimize query performance

Conclusions:

- Master the use of advanced JOINs, such as self-JOINs, to efficiently write queries for large datasets.

- Understand the tradeoffs associated with query performance and apply optimization techniques to enhance query efficiency.



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