Data Analyst Training Programme

Advanced JOINs & Set Operations

Introduction to Advanced Data Combination Techniques

Beyond Basic JOINs

- Set operations combine query results vertically
- Advanced JOIN conditions handle complex relationships
- **EXISTS** and **NOT EXISTS** for sophisticated filtering
- Conditional logic within JOIN operations

Set Operation vs JOINs

- JOINs combine tables horizontally by matching keys
- Set operations stack results from multiple queries
- **UNION**, **INTERSECT**, and **EXCEPT** for data comparison
- Enables complex data consolidation and analysis

Enterprise Applications

- Data warehouse integration scenarios
- Multi-source reporting requirements
- Historical data comparison analysis
- Complex business rule implementation

UNION Operations and Data Consolidation

UNION Types and Application

- **UNION:** combines results, removes duplicates
- **UNION ALL:** combines results, keeps duplicates
- Column count and data types must match
- Implicit sorting with UNION operations

Data Consolidation Scenarios

- Historical and current data integration
- Multi-regional reporting combinations
- Product catalogue consolidation
- Customer data from multiple systems

Performance Considerations

- **UNION ALL** typically faster than **UNION**
- Column ordering affects result structure
- Index usage in underlying queries
- Memory requirements for large datasets

EXISTS and Correlated Subqueries

EXISTS Clause Applications

- Tests for row existence in related tables
- More efficient than IN for large datasets
- Supports complex correlation conditions
- Natural language query translation

NOT EXISTS for Exclusion Logic

- Find records without matching relationships
- Identify gaps in data relationships
- Exception reporting scenarios
- Data quality validation queries

Correlated Subquery Patterns

- Outer query values referenced in inner query
- Row-by-row evaluation process
- Complex business logic implementation
- Performance optimisation strategies

Conditional JOINs and Advanced Filtering

Conditional JOIN Techniques

- Multiple JOIN conditions with AND/OR logic
- Date range and temporal JOIN conditions
- CASE statements within JOIN clauses
- Dynamic relationship matching

Advanced Filtering Patterns

- JOIN conditions vs WHERE clause placement
- Performance implications of filter location
- NULL handling in complex JOINs
- Outer JOIN with additional conditions

Complex Business Logic

- Multi-criteria relationship matching
- Hierarchical data navigation
- Time-sensitive data relationships
- Exception handling in JOIN operations

Assignment

Complete these advanced SQL challenges using the Northwind database:

UNION and Data Consolidation

- Create a consolidated customer contact list combining customers and suppliers with their contact information
- Build a product availability report combining current products with discontinued items
- Generate a unified order summary combining regular orders with high-value orders (above average)

EXISTS and Correlated Subqueries

- Find customers who have placed orders for products from every category using EXISTS
- Identify products that have never been ordered using NOT EXISTS
- Create a customer analysis showing those who have ordered above-average quantities

Advanced JOIN Conditions

- Build a seasonal sales analysis with conditional JOINs based on order dates and product categories
- Create a customer loyalty report using conditional JOINs to identify repeat customers within specific timeframes
- Develop a supplier performance analysis with complex JOIN conditions based on delivery patterns

Integrated Complex Analysis

- Design a comprehensive business intelligence report combining UNION, EXISTS, and conditional JOINs
- Create a market analysis dashboard showing product performance across different customer segments
- Build a strategic analysis report identifying growth opportunities using advanced data combination techniques

Until Next Week Sunday...

See you next week on Sunday, **[student name]**.

Advanced JOINs and set operations represent the sophisticated data combination techniques that enable enterprise-level analysis and complex business intelligence reporting. You now possess the advanced SQL skills necessary to handle multi-source data integration, implement complex business rules, and create analytical solutions that drive strategic decision-making across any organisation.

Thank you, [student name].

Any Questions?