Data Analyst Training Programme

Data Types & Functions

Understanding Data Types in MySQL

Why Data Types Matter

- Storage efficiency and performance

- Data validation and integrity

- Function compatibility and behaviour

- Query optimisations and indexing

Core MySQL Data Types

- **Numeric:** INT, DECIMAL, FLOAT

- **Text:** VARCHAR, CHAR, TEXT

- **Date/Time:** DATE, DATETIME, TIMESTAMP

- **Boolean:** BOOLEAN/TINYINT(1)

Business Impact

- Accurate calculations with proper numeric types

- Efficient text storage and searching

- Reliable date arithmetic and comparisons

- Data quality through type constraints

String Functions for Text Analysis

Essential String Functions

- **LENGTH()**: count characters
- **UPPER()/LOWER()**: change case
- **SUBSTRING()**: extract parts of text
- **CONCAT()**: combine strings
- **TRIM()**: remove whitespace

Pattern Matching Functions

- **LEFT()/RIGHT()**: extract from ends
- **LOCATE()**: find position of substring
- **REPLACE()**: substitute text
- **REVERSE()**: flip text backwards

Business Applications

- Customer name standardisation
- Product code extraction
- Address parsing and cleaning
- Report formatting and presentation

Numeric Functions for Mathematical Analysis

Basic Mathematical Functions

- **ROUND()**: control decimal places
- **FLOOR()/CEILING()**: round down/up
- **ABS()**: absolute values
- **MOD()**: remainder after division
- **POWER()**: exponentiation

Statistical Functions

- **GREATEST()/LEAST()**: compare values
- **SIGN()**: positive/negative indicator
- **SQRT()**: square root calculations
- **RAND()**: random number generation

Financial Applications

- Price calculations with proper rounding
- Percentage calculations
- Tax and discount computations
- Statistical analysis of sales data

Date and Time Functions

Date Extraction Functions

- **YEAR()/MONTH()/DAY()**: extract components
- **DAYOFWEEK()/MONTHNAME()**: readable formats
- **QUARTER()**: business quarters
- **WEEK()**: week numbers

Date Arithmetic Functions

- DATE_ADD()/DATE_SUB(): add/subtract periods
- DATEDIFF(): calculate differences
- NOW()/CURDATE(): current date/time
- DATE_FORMAT(): custom formatting

Business Time Analysis

- Sales trends by time periods
- Age calculations for customers
- Order processing time analysis
- Seasonal pattern identification

Conditional Functions and Data Transformation

Conditional Logic Functions

- **CASE WHEN**: multi-condition logic

- **IF()**: simple condition testing

- **IFNULL()/COALESCE()**: handle missing data

- **NULLIF()**: convert values to NULL

Data Classification Functions

- Creating categories from continuous data

- Status indicators and flags

- Performance ratings and grades

- Risk assessments and scoring

Advanced Transformations

- Complex business rule implementation

- Data quality scoring

- Dynamic categorisation

- Calculated performance metrics

Assignment

Complete these data type and function challenges using the Northwind database:

String Function Analysis

- Find customers with names longer than 20 characters and format them as "NAME (COUNTRY)"
- Extract the first word from product names and count how many products start with each word
- Clean and standardise customer contact names by removing extra spaces and converting to title case

Numeric Function Applications

- Create price bands for products (Budget: <£15, Standard: £15-£40, Premium: >£40) and show count in each band
- Calculate percentage markup for each product assuming cost is 60% of selling price
- Find products where the price rounded to nearest £5 would create a "cleaner" pricing structure

Data Analysis Challenges

- Analyse order patterns by day of the week and identify the busiest/quietest days
- Calculate customer lifetime (days between first and last order) and categorise customers by engagement
- Find seasonal trends by comparing quarterly sales performance across available years

Advanced Function Integration

- Build a customer scoring system combining order frequency, total spend, and recency
- Create a product performance dashboard showing sales rank, price position, and category performance
- Design a monthly business report showing growth rates, seasonal adjustments, and performance indicators
- Develop a data quality report identifying missing values, inconsistent formatting, and outliers across all tables

Until Next Week Sunday...

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

Functions are the tools that transform raw data into polished business intelligence and professional analytical reports. With string, numeric, date, and conditional functions mastered, you can handle any data transformation challenge and create enterprise-quality analysis that drives strategic decisions.

Thank you, [student name].

Any Questions?