



# HPE NonStop SQL/MX Basics U4184S

**HPE course number** U4184S

**Course length** 5 days

**Delivery mode** ILT

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## Why HPE Education Services?

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This 5-day course is an introduction to SQL, relational database principles, and the HPE NonStop SQL/MX product and serves as a prerequisite to more advanced NonStop SQL/MX courses. Hands-on lab sessions provide practical experience with generating SQL/MX queries to access data and creating database objects (catalogs, tables, indexes, views, and constraints).

## Audience

- Anyone requiring an introduction to SQL and working with the NonStop SQL/MX product

## Prerequisites

- Concepts and Facilities course (U4147S)

## Course objectives

- Describe relational database concepts and terminology
- Describe the HPE NonStop SQL/MX processes and objects
- Use a mxci session and reference ANSI names for SQL/MX database objects
- Describe the basic process to write queries and the tools to evaluate the query performance
- Use the mxci SELECT statement and predicates to retrieve data from single tables
- List the types of functions supported in SQL/MX

- Retrieve data from:

- multiple tables using joins and union operations
- derived tables using Query Expression by using subqueries

- Create a SQL/MX database (Catalog, Schema, Tables, Indexes, Views, and Constraints)

- Modify data in a table using SQL/MX INSERT, UPDATE, and DELETE statements

- Describe the SQL/MX access options and isolation levels

- Describe SQL/MX database management functions

## Benefits to you

- Upon completion of this course, you will:
  - Understand key relational database concepts and terminology
  - Be able to use mxci commands to create SQL/MX objects
  - Be able to use SQL statements to retrieve or modify data in SQL/MX tables

## Detailed course outline

### Module 1: Introduction to SQL Relational Databases

- Definition of a relational database
- Components of a relational database table
- Forming relationships in a relational database
- Types of relationships
- Description of Structured Query Language: Data Definition Language, Data Manipulation Language, Data Control Language, and Transaction Control Language
- Characteristics of a Relational Database Management System (RDBMS)
- Lab exercise

### Module 2 Overview of SQL/MX Architecture

- SQL/MX Architecture
- SQL/MX System Metadata
- User Metadata (UMD) Tables
- User Catalog and Schemas
- SQL/MX User Tables, Objects, Tables, Indexes, Views, Constraints, Triggers, Object Namespaces–Object Type, Security Model, Process Architecture, Components, Catalog Manager, DDL Operations, Utilities
- NSM/web Architecture
- Lab exercise

### Module 3 Introduction to mxci

- SQL/MX Help Facilities
- Starting an mxci session
- mxci Prompts and Termination Character
- SQL/MX Identifiers
- Logical (ANSI) Names
- Specifying ANSI
- Using Logical Names in an mxci Session
- mxci:
  - SET NAMETYPE Command (ANSI)
  - SET CATALOG Command
  - SET SCHEMA Command
- mxci cd Command, ls Commands
- mxci—LOG Command
- Lab exercise

### Module 4 Query Writing Process

- Overview of query execution
- Overview of query development process
- Analyzing the query objective, Generating the query, Executing the query
- Verifying the results, Assessing performance
- Lab exercise

### Module 5 Retrieving Data from a Single Table

- Data Types, Character Data Types, Numeric Data Types–Exact and Approximate, Datetime Data Types, Interval Data Types
- INVOKE Command
- SELECT Statement–Clauses, Syntax, Select List
- SELECT–Select List, ALL or DISTINCT Rows, [ANY N] or [FIRST N]
- FROM and WHERE Clause
- Predicates
- Row-Value-Constructor
- Comparison Predicates–Syntax, Examples
- LIKE, BETWEEN, and IN Predicates
- Boolean Operators and Compound Predicates
- NULL Values
- IS [NOT] Predicate
- ORDER BY, GROUP By, HAVING Clause
- Lab exercise

### Module 6 Functions and Expressions

- Aggregate functions
- Character functions
- Datetime functions
- Mathematical functions
- Types of expressions
- Literal expressions
- Numeric expressions
- Lab exercise

### Module 7 Retrieving Data from Multiple Tables

- Generating the following types of joins: CROSS, NATURAL, INNER, EQUI, LEFT, RIGHT, Self
- Correlation Names
- Join with Additional Search Conditions
- UNION Operation
- Lab exercise

### Module 8 Query Expressions

- Query expression: Definition, Types, Joined Table, Syntax
- Non-Joined Query Expression Table: VALUES Statement, TABLE Statement, SELECT Query Specification
- Simple Table—SELECT expression
- Subquery: Definition, Non-Correlated, Correlated, Evaluation of a Correlated Subquery, Classification, SELECT Form of a subquery
- Predicates: Subquery, Comparison, BETWEEN, IN, and EXISTS, and EXISTS Examples
- Subqueries using the Comparison, BETWEEN, and IN Predicates
- Subquery key points
- Lab exercise

<b>Module: 9 Creating SQL/MX Objects</b>	<ul style="list-style-type: none"> <li>• Creating SQL/MX Objects</li> <li>• SQL/MX Object Naming</li> <li>• CREATE CATALOG Command—Syntax, REGISTER CATALOG Command—Syntax, UNREGISTER CATALOG Command—Syntax, Catalog Considerations</li> <li>• CREATE SCHEMA Command—Syntax</li> <li>• Rules for Naming SQL/MX Schema Subvolumes, Schema Considerations, Creating a User Schema</li> <li>• Creating a SQL/MX Table—Topics</li> <li>• Column Definitions, Column Name Rules, Character Sets, Default Value, ISO88591 Character Set Examples</li> <li>• SYSTEM_DEFAULTS Table—NOT_NULL_CONSTRAINT_DROPPABLE_OPTION</li> </ul>	<ul style="list-style-type: none"> <li>• Constraints, Constraints Names, Table Constraints</li> <li>• Specifying Physical Location and Name for the Underlying Guardian File</li> <li>• Specifying a Clustering Key, Specifying a Clustering Key—STORE BY Clause, Terminology</li> <li>• Clustering Key—No STORE BY Clause and No Primary Key Specified, Clustering Key—STORE BY PRIMARY KEY: Primary Key Specified As DROPPABLE</li> <li>• Specifying Guardian File Attributes</li> <li>• CREATE INDEX—Syntax, CREATE VIEW—Syntax, CREATE VIEW—Example, Considerations for Creating a View</li> <li>• Lab exercise</li> </ul>
<b>Module: 10 Inserting Data and Updating Statistics</b>	<ul style="list-style-type: none"> <li>• Methods for Loading Multiple Rows of Data</li> <li>• Inserting Data into the Database, INSERT Statement—Syntax, Inserting a Single Row, Inserting Multiple Rows, INSERT Considerations</li> </ul>	<ul style="list-style-type: none"> <li>• SQL/MX Histogram Statistics, Statistics Tables, mxci UPDATE STATISTICS Utility, Examples of mxci UPDATE STATISTICS</li> <li>• Lab exercise</li> </ul>
<b>Module: 11 Modifying Data</b>	<ul style="list-style-type: none"> <li>• Maintaining Database Consistency</li> <li>• Transaction Management Statements</li> <li>• Explicit Transaction: User-Defined Transaction, INSERT, UPDATE, DELETE</li> <li>• Implicit Transaction: System-Defined Transactions, SELECT, INSERT, UPDATE, DELETE</li> <li>• Modifying Existing Data</li> </ul>	<ul style="list-style-type: none"> <li>• UPDATE Statement—Syntax, Updating a Single Row, Updating Multiple Rows, UPDATE Statement—Scalar Subquery, UPDATE Considerations</li> <li>• Removing Data from the Database</li> <li>• DELETE Statement—Syntax, Deleting Data, DELETE Considerations</li> <li>• Lab exercise</li> </ul>
<b>Module: 12 Access Options and Isolation Levels</b>	<ul style="list-style-type: none"> <li>• Concurrency Control and Contention</li> <li>• Locking Considerations, Dirty Reads, Non-Repeatable Reads, Phantoms</li> <li>• Access Options and Isolation Levels, READ UNCOMMITTED Access Option, READ COMMITTED Access Option, READ COMMITTED Considerations, SERIALIZABLE or REPEATABLE READ Access Option</li> </ul>	<ul style="list-style-type: none"> <li>• Lock Modes, Access Options and Lock Modes</li> <li>• SET TRANSACTION Statement, SET TRANSACTION Statement—Example, Transaction Isolation-Level Rules</li> <li>• DEADLOCK, Viewing Locks on a Table</li> <li>• Lab exercise</li> </ul>
<b>Module: 13 Management Functions</b>	<ul style="list-style-type: none"> <li>• SQL/MX Object Dependencies</li> <li>• SQL Authorization ID</li> <li>• Object Ownership and Security Rules</li> <li>• Granting Privileges to Users—Example</li> <li>• Altering SQL/MX Objects in a SQL/MX Database</li> <li>• Authorization Requirements for Altering Database Object</li> <li>• Altering TABLE or INDEX FILE Attributes, Adding Columns to a Table, Altering Considerations</li> <li>• Removing SQL/MX Database Objects, Dropping SQL/MX Objects From a SQL/MX Database, Removing Your Database Objects</li> </ul>	<ul style="list-style-type: none"> <li>• Managing Data</li> <li>• mxtool VERIFY Utility, mxtool VERIFY Utility—Security Considerations, mxtool VERIFY Utility—Syntax</li> <li>• Performance, Monitoring Performance</li> <li>• Using the EXPLAIN Function with a Prepared Query</li> <li>• EXPLAIN statement with OPTIONS 'f'</li> <li>• NSM/web Connectivity Services, Visual Query Planner DISPLAY STATISTICS</li> <li>• Lab exercise</li> </ul>
<b>Module: 14 Advanced Topics</b>	<ul style="list-style-type: none"> <li>• Referential Integrity (RI)</li> <li>• Trigger Definition</li> <li>• Partitioning—Range Partitioning, Hash Partitioning</li> <li>• Publish and Subscribe Services</li> <li>• Rowsets</li> </ul>	<ul style="list-style-type: none"> <li>• Compound Statements</li> <li>• SELECT statement—TRANSPOSE Clause, SAMPLE Clause</li> <li>• Sequence Function</li> </ul>
<b>Module: 15 MXDM</b>	<ul style="list-style-type: none"> <li>• Features and requirements of MXDM</li> <li>• Installing and Uninstalling MXDM</li> </ul>	<ul style="list-style-type: none"> <li>• Example screens</li> </ul>

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