



Module Presenter's Manual

For

Data Management with SQL Server

*Effective from: March 2023
Ver 1.0*

Amendment Record

Version No.	Effective Date	Change	Replaced Pages
1.0	March 2023	New	-

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1. Introduction

At the end of this module, student will be able to:

- Describe the architecture and editions of SQL Server.
- Work with SQL Server Management Studio.
- Describe the basic architecture, versions, and editions of SQL Server.
- Describe the role of SQL Azure compared to on-premises SQL Server.
- Describe how to connect to SQL Azure with SSMS.
- Categorize SQL statements into their dialects.
- Identify the elements of T-SQL, including predicates, operators, expressions, and comments.
- Describe the elements of a SELECT statement.
- Write SELECT DISTINCT clauses.
- Describe the common join types in T-SQL queries.
- Write queries that use joins.
- Describe how to sort and filter data.
- Describe the difference between implicit and explicit data type conversion.
- Describe the character data types supplied by SQL Server.
- Describe the impact of collation on character data.
- Concatenate strings.
- Extract and manipulate character data using built-in functions.
- Write queries comparing dates and times.
- Write queries that use the HAVING clause to filter groups.
- Use Table Expressions.
- Use Set Operators.
- Write queries that use window aggregate, window ranking, and window offset functions.
- Describe the architecture of SQL Server.
- Describe how to configure the number of tempdb data files.
- Explain Multiple TempDB data files.
- Outline the Execution Plans feature in SQL Server.
- Explain how to automatically keep the history of the data in the table.
- Explain how to protect data at rest and in motion.
- Describe Security enhancements in SQL Server.
- Explain how to work with JSON data.
- Explain how to work with PolyBase.
- Define and describe Query Store.
- Explain how to dynamically stretch warm and cold transactional data from SQL Server to Azure.
- Describe how to tune workload performance with Query Store.
- Explain how to start and use Database Engine Tuning Advisor in SQL Server.
- Explain the set of tools for monitoring events in SQL Server 2019 and for tuning the physical database design.
- Outline the enhancements in T-SQL.

2. Information on Session Allocation

Module	Online (No. of Hours)	Self-Study (No. of Hours)
SQL	32	10

Throughout this Presenter's Manual, the module **Database Management with SQL Server** will be referred to as **SQL**.










3. Module Deliverables

To aid the learning process, following are the deliverables:

(Faculties can access eBooks and other components in Onlinevarsity through Aptrack.)

Student Deliverables:

Resources available on Onlinevarsity:

Icons	Feature - Description/Functionality
	Download Book - Student has the option to download the subject related e-book and read offline.
	Glossary - Student can access a list of subject related specialized words with their definitions.
	FAQ - Student can access frequently asked questions and their answers.
	Show Me How - Student can view a step-wise simulation/demonstration of the module related topics.
	Practice 4 Me - Student can test and evaluate their understanding of module related topics.
	Work Assignments - Student can solve scenario based lab assignments (Hands-on). The faculty will evaluate and give their feedbacks.
	References - Student can access additional subject related material for reading.
	Feedback - Student can provide feedback on the course material.
	Ask to Learn – Student can submit subject related technical queries. Queries submitted will be directed to the particular course coordinator/head.

4. Week-wise Session Schedule

- A session is of 2 hours duration.

Week	Day 1		Day 2		Day 3		Day 4	
1	Session 1 SQL – TL1		Session 2 SQL – TL2		Session 3 SQL – TL3	S1	Session 4 SQL – TL4	
2	Session 5 SQL – TL5		Session 6 SQL – TL6	S2	Session 7 SQL – TL7		Session 8 SQL – TL8	
3	Session 9 SQL – TL9		Session 10 SQL – TL10	S3	Session 11 SQL – TL11		Session 12 SQL – TL12	
4	Session 13 SQL – TL13	S4	Session 14 SQL – TL14		Session 15 SQL – TL15		Session 16 SQL – TL16	S5

SQL: Data Management with SQL Server

TL: Online Session

S: Self-Study Session (over and above the module duration)

5. Session Coverage

Session No.	Session Title	Session Details	Deliverables' Mapping
1	SQL – TL1	<p>All the topics from Session 1 and Session 2 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.</p> <p><u>Session 1 – RDBMS Concepts</u></p> <ul style="list-style-type: none"> ➤ Explain the concept of data and database ➤ Describe the approaches to data management ➤ Define a Database Management System and list its benefits ➤ Explain the different database models ➤ Define and explain RDBMS ➤ Describe entities and tables and list the characteristics of tables ➤ List the differences between a DBMS and RDBMS <p><u>Session 2 – Entity-Relationship (E-R) Model and Normalization</u></p> <ul style="list-style-type: none"> ➤ Define and describe data modeling ➤ Identify and describe the components of the E-R model ➤ Identify the relationships that can be formed between entities ➤ Explain E-R diagrams and their use ➤ Describe symbols used in an E-R diagram ➤ Define normalization ➤ Describe the various normal forms ➤ Outline the various relational operators used in relational data models 	<p><u>Intelligent Data Management with SQL Server</u></p> <p>SG - Session 1 & 2 XP - Session 1 & 2 TG - Session 1 & 2</p>

Session No.	Session Title	Session Details	Deliverables' Mapping
2	SQL – TL2	<p>All the topics from Session 3 and Session 4 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.</p> <p><u>Session 3 – Introduction to SQL Server 2019</u></p> <ul style="list-style-type: none"> ➤ Describe an overview of SQL Server 2019 ➤ Describe basic architecture and version history of SQL Server 2019 ➤ Outline the process of connecting to SQL Server instances ➤ Define databases and list the key features of AdventureWorks2019 sample database ➤ Explain the components of SQL Server Management Studio GUI ➤ Explain script file creation and organization ➤ Explain the process to execute Transact-SQL queries <p><u>Session 4 – Transact-SQL</u></p> <ul style="list-style-type: none"> ➤ Explain Transact-SQL ➤ List different categories of Transact-SQL statements ➤ Explain various data types supported by Transact-SQL ➤ Explain Transact-SQL language elements ➤ Explain sets and predicate logic ➤ Describe logical order of operators in the SELECT statement 	<p><u>Intelligent Data Management with SQL Server</u></p> <p>SG - Session 3 & 4 XP - Session 3 & 4 <u>TG - Session 3 & 4</u></p>
3	SQL – TL3	<p>The Try It Yourself section of Session 1 to Session 4 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.</p>	<p><u>Intelligent Data Management with SQL Server</u></p> <p>Session 1-4</p>

Session No.	Session Title	Session Details	Deliverables' Mapping
	S1	All the assignments from Session 1 to Session 4 of <i>Intelligent Data Management with SQL Server</i> course should be covered in this session.	<u>Intelligent Data Management with SQL Server</u> (OnlineVarsity) Session 1-4
4	SQL – TL4	<p>All the topics from Session 5 and Session 6 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.</p> <p><u>Session 5 – Creating and Managing Databases</u></p> <ul style="list-style-type: none"> ➤ Explain about modification of system data ➤ Describe adding of filegroups and transaction logs ➤ Outline the process to create a database ➤ Describe how to drop a database ➤ Explain database snapshots <p><u>Session 6 – Creating Tables</u></p> <ul style="list-style-type: none"> ➤ List SQL Server 2019 data types ➤ Describe the procedure to create, modify, and drop tables in an SQL Server database ➤ Describe the procedure to add, modify, and drop columns in a table 	<p><u>Intelligent Data Management with SQL Server</u></p> <p>SG - Session 5 & 6 XP - Session 5 & 6 TG - Session 5 & 6</p>
5	SQL – TL5	<p>All the topics from Session 7 and Session 8 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.</p> <p><u>Session 7 – Azure SQL</u></p> <ul style="list-style-type: none"> ➤ Explain Azure SQL ➤ List the features and benefits of Azure SQL ➤ State the differences between 	<p><u>Intelligent Data Management with SQL Server</u></p> <p>SG - Session 7 & 8 XP - Session 7 & 8 TG - Session 7 & 8</p>

Session No.	Session Title	Session Details	Deliverables' Mapping
		<p>Azure SQL and on-premises SQL Server</p> <ul style="list-style-type: none"> ➤ Explain steps to connect Azure SQL with SSMS <p><u>Session 8 – Accessing Data</u></p> <ul style="list-style-type: none"> ➤ Describe SELECT statement, its syntax, and use ➤ Explain various clauses used with SELECT ➤ State the use of ORDER BY clause ➤ Describe working with typed and untyped XML ➤ Explain the procedure to create, use, and view XML schemas 	
6	SQL – TL6	The Try It Yourself section of Session 5 to Session 8 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.	<p><u>Intelligent Data Management with SQL Server</u></p> <p>Session 5-8</p>
	S2	All the assignments from Session 5 to Session 8 of <i>Intelligent Data Management with SQL Server</i> course should be covered in this session.	<p><u>Intelligent Data Management with SQL Server (OnlineVarsity)</u></p> <p>Session 5-8</p>
7	SQL – TL7	<p>All the topics from Session 9 and Session 10 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.</p> <p><u>Session 9 – Advanced Queries and Joins</u></p> <ul style="list-style-type: none"> ➤ Explain grouping and aggregating data ➤ Describe subqueries ➤ Describe table expressions ➤ Explain Joins ➤ Describe various types of Joins ➤ Explain the use of various set 	<p><u>Intelligent Data Management with SQL Server</u></p> <p>SG - Session 9 & 10 XP - Session 9 & 10 TG - Session 9 & 10</p>

Session No.	Session Title	Session Details	Deliverables' Mapping
		<p>operators to combine data</p> <ul style="list-style-type: none"> ➤ Describe pivoting and grouping set operations <p><u>Session 10 – Views, Stored Procedures, and Querying Metadata</u></p> <ul style="list-style-type: none"> ➤ Define views ➤ Describe the technique to create, alter, and drop views ➤ Define stored procedures and its types ➤ Describe the procedure to create, alter, and execute stored procedures ➤ Describe nested stored procedures ➤ Describe querying SQL Server metadata System Catalog views and functions 	
8	SQL – TL8	<p>The Try It Yourself section of Session 9 and Session 10 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.</p>	<p><u>Intelligent Data Management with SQL Server</u></p> <p>Session 9 & 10</p>
9	SQL – TL9	<p>All the topics from Session 11 and Session 12 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.</p> <p><u>Session 11 – Indexes</u></p> <ul style="list-style-type: none"> ➤ Define and explain Indexes ➤ Explain Storage Structure ➤ Explain types of Indexes ➤ Understand Index Management <p><u>Session 12 – Triggers</u></p> <ul style="list-style-type: none"> ➤ Explain triggers ➤ Explain the procedure to create and alter DML triggers 	<p><u>Intelligent Data Management with SQL Server</u></p> <p>SG - Session 11 & 12 XP - Session 11 & 12 TG - Session 11 & 12</p>

Session No.	Session Title	Session Details	Deliverables' Mapping
		<ul style="list-style-type: none"> ➤ Describe nested triggers ➤ Describe update functions ➤ Explain the handling of multiple rows in a session ➤ Explain the performance implication of triggers implication 	
10	SQL – TL10	The Try It Yourself section of Session 11 and Session 12 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.	<u>Intelligent Data Management with SQL Server</u> Session 11 & 12
	S3	All the assignments from Session 9 to Session 12 of <i>Intelligent Data Management with SQL Server</i> course should be covered in this session.	<u>Intelligent Data Management with SQL Server (OnlineVarsity)</u> Session 9-12
11	SQL – TL11	All the topics from Session 13 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session. <u>Session 13 – Programming Transact-SQL</u> <ul style="list-style-type: none"> ➤ Describe Transact-SQL programming ➤ Describe program flow statements ➤ Describe various Transact-SQL functions ➤ Explain the procedure to create and alter User-Defined Functions (UDFs) ➤ Explain creation of windows with OVER ➤ Describe window functions 	<u>Intelligent Data Management with SQL Server</u> SG - Session 13 XP - Session 13 TG - Session 13
12	SQL – TL12	All the topics from Session 14 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.	<u>Intelligent Data Management with SQL Server</u> SG - Session 14

Session No.	Session Title	Session Details	Deliverables' Mapping
		<u>Session 14 – Transactions</u> <ul style="list-style-type: none"> ➤ Define and describe transactions ➤ Explain the procedure to implement transactions ➤ Explain the steps to mark a transaction ➤ Distinguish between implicit and explicit transactions ➤ Explain isolation levels ➤ Explain the scope and different types of locks ➤ Explain transaction management 	XP - Session 14 TG - Session 14
13	SQL – TL13	The Try It Yourself section of Session 13 and Session 14 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.	<u>Intelligent Data Management with SQL Server</u> Session 13 & 14
	S4	All the assignments from Session 13 and Session 14 of <i>Intelligent Data Management with SQL Server</i> course should be covered in this session.	<u>Intelligent Data Management with SQL Server (OnlineVarsity)</u> Session 13-14
14	SQL – TL14	All the topics from Session 15 and Session 16 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session. <u>Session 15 – Error Handling</u> <ul style="list-style-type: none"> ➤ Explain error handling and its implementation ➤ Describe the TRY-CATCH block ➤ Explain the procedure to display error information ➤ Describe the @@ERROR and RAISERROR statements ➤ Explain the use of ERROR_STATE, ERROR_SEVERITY, and 	<u>Intelligent Data Management with SQL Server</u> SG - Session 15 & 16 XP - Session 15 & 16 TG - Session 15 & 16

Session No.	Session Title	Session Details	Deliverables' Mapping
		<ul style="list-style-type: none"> ➤ ERROR_PROCEDURE ➤ Explain the use of ERROR_NUMBER, ERROR_MESSAGE, and ERROR_LINE ➤ Describe the THROW statement <p><u>Session 16 – Enhancements in SQL Server 2019</u></p> <ul style="list-style-type: none"> ➤ Describe the importance of new error messages ➤ Describe how to perform vulnerability assessment ➤ Explain Big Data clusters ➤ Explain how to use JSON data with SQL Server 2019 	
15	SQL – TL15	<p>All the topics from Session 17 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.</p> <p><u>Session 17 – PolyBase, Query Store, and Stretch Database</u></p> <ul style="list-style-type: none"> ➤ Describe PolyBase ➤ Explain features and advantages of PolyBase ➤ Define and describe Query Store ➤ ➤ Explain how to dynamically stretch warm and cold transactional data from SQL Server to Azure ➤ Describe how to tune workload performance with Query Store 	<p><u>Intelligent Data Management with SQL Server</u></p> <p>SG - Session 17 XP - Session 17 TG - Session 17</p>
16	SQL – TL16	<p>The Try It Yourself section of Session 15 to Session 17 of <i>Intelligent Data Management with SQL Server</i> book should be covered in this session.</p>	<p><u>Intelligent Data Management with SQL Server</u></p> <p>Session 15-17</p>

Session No.	Session Title	Session Details	Deliverables' Mapping
	S5	All the assignments from Session 15 to Session 17 of <i>Intelligent Data Management with SQL Server</i> course should be covered in this session.	<u>Intelligent Data Management with SQL Server</u> (OnlineVarsity) Session 15-17

6. Library References

➤ Microsoft SQL Server 2019: A Beginner's Guide, Seventh Edition by Dusan Petkovic
➤ Expert T-SQL Window Functions in SQL Server 2019 The Hidden Secret to Fast Analytic and Reporting Queries by Kathi Kellenberger, Clayton Groom, Ed Pollack
➤ Querying Microsoft SQL Server 2019 by Adam Wilbert
➤ Query Store for SQL Server 2019: Identify and Fix Poorly Performing Queries by Grant Fritchey and Tracy Boggiano

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