Module
Presenter's Manual

For

Database Management (SQL Server)

Effective from: March 2018
Ver 1.0

Amendment Record

Version No.	Effective Date	Change	Replaced Pages
1.0	March 2018	New	-

Table Of Contents

1. Introduction

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

➢ Describe the architecture and editions of SQL Server 2012.
➢ Work with SQL Server Management Studio.
➢ Describe the basic architecture, versions, and editions of SQL Server 2012.
➢ 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 an overview of SQL Server 2016.
➢ Describe the architecture of SQL Server 2016.
➢ List and describe the different editions and versions of SQL Server.
➢ Outline the new features of SQL Server 2016.
➢ Explain In-database Advanced Analytics.
➢ Explain JSON support in SQL Server 2016.
➢ Describe SQL Server 2016 In-memory enhancements.
➢ Explain support for in-database analytics with R integration.
➢ Describe how to configure the number of tempdb data files.
➢ Explain Multiple TempDB data files.
➢ Outline the Execution Plans feature in SQL Server 2016.
➢ 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 2016.
➢ 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 2016.
➢ Explain the set of tools for monitoring events in SQL Server 2016 and for tuning the physical database design.
➢ Outline the enhancements in T-SQL.

2. Information on Session Allocation

Module	Online (No. of Hrs)
SQL	40

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

3. Module Deliverables
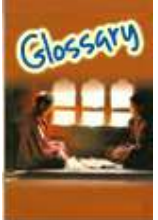
To aid the learning process, following are the deliverables

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

Student Deliverables:

Resources available on Onlinevarsity:

Icons	Feature - Description / Functionality
	Download eBook - 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 has duration of 2 hrs.**

Wk	Day 1	Day 2	Day 3	Day 4
1	**Session 1** **SQL – TL1**	**Session 2** **SQL – TL2**	**Session 3** **SQL – TL3**	**Session 4** **SQL – TL4**
2	**Session 5** **SQL – TL5**	**Session 6** **SQL – TL6**	**Session 7** **SQL – TL7**	**Session 8** **SQL – TL8**
3	**Session 9** **SQL – TL9**	**Session 10** **SQL – TL10**	**Session 11** **SQL – TL11**	**Session 12** **SQL – TL12**
4	**Session 13** **SQL – TL13**	**Session 14** **SQL – TL14**	**Session 15** **SQL – TL15**	**Session 16** **SQL – TL16**
5	**Session 17** **SQL – TL17**	**Session 18** **SQL – TL18**	**Session 19** **SQL – TL19**	**Session 20** **SQL – TL20**

TL – Online Session
SQL – Database Management (SQL Server)

5. Session Coverage

Session No.	Session Title	Session Details	Deliverables' Mapping
1	**SQL – TL1**	All the topics from Session 1, Session 2, and Session 3 of *SQL Server Inside Out* book should be covered in this session. **Session 1 – RDBMS Concepts** ➢ 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 **Session 2 – Entity-Relationship (E-R) Model and Normalization** ➢ 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	**SQL Server Inside Out** SG - Session 1 & 2 XP - Session 1 & 2 TG - Session 1 & 2

Session No.	Session Title	Session Details	Deliverables' Mapping
		relational operators used in relational data models	
2	**SQL – TL2**	All the topics from Session 3, and Session 4 of *SQL Server Inside Out* book should be covered in this session. **Session 3 – Introduction to SQL Server 2012** ➢ Describe the basic architecture of SQL Server 2012 ➢ List the various versions of SQL Server ➢ List the different editions of SQL Server ➢ Explain the role and structure of SQL Server databases ➢ List the new features of SQL Server 2012 ➢ Describe an overview of SSMS ➢ Describe connecting to SQL Server instances through SSMS ➢ Explain the use of Object Explorer ➢ Describe script files ➢ Explain executing T-SQL queries **Session 4 – SQL Azure** ➢ Define and Explain SQL Azure ➢ List the benefits of SQL Azure ➢ State the differences between the SQL Azure and On-premises SQL Server ➢ Describe connecting to SQL Azure with SSMS	**SQL Server Inside Out** SG - Session 3 & 4 XP - Session 3 & 4 TG - Session 3 & 4

Session No.	Session Title	Session Details	Deliverables' Mapping
3	**SQL – TL3**	All the topics as listed below from Session 5 and Session 6 of *SQL Server Inside Out* book should be covered in this session. **Session 5 – Transact-SQL** ➢ Explain Transact-SQL ➢ Describe the different categories of T-SQL statements ➢ Explain the various data types supported by T-SQL ➢ Explain T-SQL Language elements ➢ Explain Sets and Predicate Logic ➢ Describe the logical order of operators in SELECT statements **Session 6 – Creating and Managing Databases** ➢ Describe system and user-defined databases ➢ List the key features of the AdventureWorks sample database ➢ Describe adding of filegroups and transaction logs ➢ Describe the procedure to create a database ➢ List and describe types of database modifications ➢ Describe the procedure to drop a database ➢ Describe database snapshots	**SQL Server Inside Out** SG - Session 5 & 6 XP - Session 5 & 6 TG - Session 5 & 6
4	**SQL – TL4**	The workshop lessons of Session 3 to Session 6 of *SQL Server Inside Out* course should be covered in this session.	**SQL Server Inside Out** Session 3, 4, 5, & 6 **(OnlineVarsity)**

Session No.	Session Title	Session Details	Deliverables' Mapping
5	**SQL – TL5**	All the topics as listed below from Session 7 and Session 8 of *SQL Server Inside Out* book should be covered in this session. **Session 7 – Creating Tables** ➢ List SQL Server 2012 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 **Session 8 – Accessing Data** ➢ Describe the SELECT statement, its syntax, and use ➢ Explain expressions with SELECT statement ➢ Explain the various clauses used with SELECT ➢ State the use of ORDER BY clause ➢ Describe working with typed and untyped XML ➢ Explain XML namespaces ➢ Explain the procedure to create, use, and view XML schemas Explain use of XQuery to access XML data	**SQL Server Inside Out** SG - Session 7 & 8 XP - Session 7 & 8 TG - Session 7 & 8
6	**SQL – TL6**	All the topics as listed below from Session 9 and Session 10 of *SQL Server Inside Out* book should be covered in this session. **Session 9 – Advanced Queries and Joins** ➢ Explain grouping and aggregating data	**SQL Server Inside Out** SG - Session 9 & 10 XP - Session 9 & 10 TG - Session 9 & 10

Session No.	Session Title	Session Details	Deliverables' Mapping
		➢ Describe subqueries ➢ Describe table expressions ➢ Explain joins ➢ Describe various types of joins ➢ Explain the use of various set operators to combine data ➢ Describe pivoting and grouping set operations **Session 10 – Using Views, Stored Procedures, and Querying Metadata** ➢ Define views ➢ Describe the procedure to create, alter, and drop views ➢ Define stored procedures ➢ Explain the types of stored procedures ➢ Describe the procedure to create, alter, and execute stored procedures ➢ Describe nested stored procedures ➢ Describe querying SQL Server metadata	
7	SQL – TL7	The workshop lessons of Session 7 to Session 10 of *SQL Server Inside Out* course should be covered in this session.	**SQL Server Inside Out** Session 7, 8, 9, & 10 **(OnlineVarsity)**
8	SQL – TL8	All the topics as listed below from Session 11 and Session 12 of *SQL Server Inside Out* book should be covered in this session. **Session 11 – Indexes** ➢ Define and explain indexes ➢ Describe the performance of	**SQL Server Inside Out** SG - Session 11 & 12 XP - Session 11 & 12 TG - Session 11 & 12

Session No.	Session Title	Session Details	Deliverables' Mapping
		indexes ➢ Explain clustered indexes ➢ Explain nonclustered indexes ➢ Explain partitioning of data ➢ Explain the steps to display query performance data using indexes **Session 12 – Triggers** ➢ Explain triggers ➢ Explain the different types of triggers ➢ Explain the procedure to create DML triggers ➢ Explain the procedure to alter DML triggers ➢ Describe nested triggers ➢ Explain the handling of multiple rows in a session ➢ Explain the performance implication of triggers	
9	**SQL – TL9**	All the topics as listed below from Session 13 of *SQL Server Inside Out* book should be covered in this session. **Session 13 – Programming Transact-SQL** ➢ Describe an overview of programming with Transact-SQL ➢ Describe the Transact-SQL programming elements ➢ Describe program flow statements and functions ➢ Describe various Transact-SQL functions ➢ Explain the procedure to create and alter user-defined functions (UDFs) ➢ Explain creation of Windows	**SQL Server Inside Out** SG - Session 13 XP - Session 13 TG - Session 13

Session No.	Session Title	Session Details	Deliverables' Mapping
		with OVER ➢ Describe Window functions	
10	**SQL – TL10**	All the topics as listed below from Session 14 of *SQL Server Inside Out* book should be covered in this session. **Session 14 – Transactions** ➢ Define and describe transactions ➢ Explain the procedure to implement transactions ➢ Explain the process of controlling transactions ➢ Explain the steps to mark a transaction ➢ Distinguish between the Implicit and Explicit transactions	**SQL Server Inside Out** SG - Session 14 XP - Session 14 TG - Session 14
11	**SQL – TL11**	The workshop lessons of Session 11 to Session 14 of *SQL Server Inside Out* course should be covered in this session.	**SQL Server Inside Out** Session 11, 12, 13, 14 **(OnlineVarsity)**
12	**SQL – TL12**	All the topics as listed below from Session 15 of *SQL Server Inside Out* book should be covered in this session. **Session 15 – Error Handling** ➢ Explain the various types of errors ➢ Explain error handling and the 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 ERROR_PROCEDURE ➢ Explain the use of	**SQL Server Inside Out** SG - Session 15 XP - Session 15 TG - Session 15

Session No.	Session Title	Session Details	Deliverables' Mapping
		ERROR_NUMBER, ERROR_MESSAGE, and ERROR_LINE ➢ Describe the THROW statement	
13	SQL – TL13	All the topics as listed below from Session 16 of *SQL Server Inside Out* book should be covered in this session. **Session 16 – Introduction to SQL Server 2016** ➢ Describe an overview of SQL Server 2016 ➢ Outline the new features of SQL Server 2016 ➢ List and describe the different editions of SQL Server 2016	**SQL Server Inside Out** SG - Session 16 XP - Session 16 TG - Session 16
14	SQL – TL14	All the topics from Session 17 of *SQL Server Inside Out* book should be covered in this session. **Session 17 – New Features of SQL Server 2016** ➢ List new features of SQL Server 2016 ➢ Explain Real-time Operational Analytics ➢ Describe native JSON support ➢ Explain AlwaysOn feature ➢ Describe the enhancements made to In-Memory OLTP (Hekaton) ➢ Explain support for in-database analytics with R integration	**SQL Server Inside Out** SG - Session 17 XP - Session 17 TG - Session 17
15	SQL – TL15	All the topics from Session 18 of *SQL Server Inside Out* book should be covered in this session. **Session 18 – Enhancements in SQL Server 2016** ➢ Describe the importance of	**SQL Server Inside Out** SG - Session 18 XP - Session 18 TG - Session 18

Session No.	Session Title	Session Details	Deliverables' Mapping
		configuring tempdb database files ➤ Describe how to configure tempdb during installation of an instance of SQL Server 2016 ➤ Outline the allocation and autogrowth of tempdb files in SQL Server 2016 ➤ List the differences between the two execution plans ➤ Explain how to enable system-versioning on tables	
16	SQL – TL16	The workshop lessons of Session 16 to Session 18 of *SQL Server Inside Out* course should be covered in this session.	**SQL Server Inside Out** Session 16, 17, & 18 **(OnlineVarsity)**
17	SQL – TL17	All the topics from Session 19 of *SQL Server Inside Out* book should be covered in this session. **Session 19 – Security Upgrades and Working with JSON** ➤ Explain how to use SQL Server features to protect data at rest and in motion ➤ Describe security enhancements in SQL Server 2016 ➤ Explain how to work with JSON data	**SQL Server Inside Out** SG - Session 19 XP - Session 19 TG - Session 19
18	SQL – TL18	All the topics from Session 20 of *SQL Server Inside Out* book should be covered in this session. **Session 20 – PolyBase, Query Store, and Stretch Database** ➤ Define PolyBase ➤ Explain features and advantages of PolyBase	**SQL Server Inside Out** SG - Session 20 XP - Session 20 TG - Session 20

Session No.	Session Title	Session Details	Deliverables' Mapping
		➢ 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	
19	SQL – TL19	All the topics from Session 21 of *SQL Server Inside Out* book should be covered in this session. **Session 21 – Improved Performance Tools and Transact-SQL Enhancements** ➢ Explain how to start and use Database Engine Tuning Advisor in SQL Server 2016. ➢ Explain the set of tools for monitoring events in SQL Server 2016 and for tuning the physical database design. ➢ Outline the enhancements in Transact-SQL.	**SQL Server Inside Out** Session 21
20	SQL – TL20	The workshop lessons of Session 19 to Session 21 of *SQL Server Inside Out* course should be covered in this session.	**SQL Server Inside Out** Session 19, 20, & 21 **(OnlineVarsity)**

6. Library References

➢ **Introducing Microsoft SQL Server 2016** by Stacia Varga, Denny Cherry, and Joseph D'Antoni
➢ **Microsoft SQL Server 2012 T-SQL Fundamentals** by Itzik Ben-Gan
➢ **Introducing Microsoft SQL Server 2012** by Ross Mistry, Stacia Misner
➢ **Microsoft SQL Server 2012 Bible** by Adam Jorgensen, Jorge Segarra, Patrick Leblanc, Denny Cherry, Aaron Nelson

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