

An abstract graphic of a network or data structure, consisting of numerous white dots (nodes) connected by thin white lines (edges), set against a dark blue background. The network is dense and complex, with many nodes and connections, suggesting a large dataset or a complex system.

SQL Fundamentals

For Analyst and Data Analyst

SQL Server 2022

SQL Server Management Studio 20

31 March 2024 @ 2.00 PM

Learning Objectives

- Setting up SQL Server and SQL Server Management Studio
- How to create a table – from Excel to SQL – and query them!
- Understanding scripts for database creation and administration and setup popular database in your local machine
- Connect SQL Server to Excel and PowerBI
- Expand learning curve using MOOCs and Github for learning

Prerequisites and setup steps

- A virtual machine or computer running Windows 10, Windows 11, with at least 4 CPUs and 8GB RAM.
- **Display:** At least 1440x900 or 1600x900 (16:9) recommended.
- **Internet connectivity:** You must have the ability to connect to the Internet
- Microsoft Excel (recommended) and Microsoft Power BI Desktop installed (optional)
- You will need Administrator rights on the virtual machine or computer. It is recommended to use your own personal laptop, **do not** use company laptop or owned by others.

Why SQL?

- ✓ SQL stands for Structured Query Language, and was designed in the **early 1970s** at IBM to manipulate and retrieve data stored in a relational database management system (RDMS)
- ✓ Universal standard for SQL set by the International Organization for Standards and the American National Standards Institute (ANSI), with updates released every ~3-5 years
- ✓ Companies are constantly adding new features on top of the standards, which creates different “flavors” of SQL (MySQL, PostgreSQL, SQLite, etc.)
- ✓ SQL is the standard language for relational database management

Important Concept #1

Technology / Concept	Description
SQL Server 2022	The latest major version of SQL Server. Microsoft SQL Server is a relational database management system (RDBMS). Applications and tools connect to a SQL Server instance or database, and communicate using Transact-SQL (T-SQL).
SQL Server Management Studio (SSMS)	Graphical User Interface Management and Query Tool
Microsoft Azure	Microsoft's cloud platform for computing, data, and applications.
Database	A database in SQL Server is made up of a collection of tables that stores a specific set of structured data.
Tables	Tables are database objects that contain all the data in a database. In table, data is logically organized in a row-and-column format similar to a spreadsheet
Schema	In a SQL database, a schema is a list of logical structures of data
Instance	The name of the server or instance. For example, MyServer or MyServer\MyInstance.
Database normalization	Normalization is the process of structuring the tables and columns in a relational database to minimize redundancy and preserve data integrity.
Cardinality	Cardinality refers to the uniqueness of values in a column of a table, commonly described as how two tables relate (one-to-one, one-to-many, or many-to-many). <ul style="list-style-type: none">• Primary keys are unique, cannot contain duplicates and null• Foreign keys are non-unique, may contain duplicates and null

Important Concept #2

Technology / Concept	Description
The “Big 6” statements and clauses	SELECT, FROM, WHERE, GROUP BY, HAVING, and ORDER BY
“GROUP BY” aggregate functions	COUNT, COUNT(DISTINCT), MIN, MAX, AVG, and SUM
Query Multiple Tables using JOINS	INNER JOIN, LEFT JOIN, RIGHT JOIN, FULL OUTER JOIN, and UNION

Important Concept #3



These flavors of SQL are much more similar than they are different – all are based on the same universal standard, with slight variations in syntax.

Common T-SQL Data Types

Data Types	Specification	Storage
INT	INT(-2,147,483,648 to 2,147,483,647)	4 bytes
BIGINT	INT(-9,223,372,036,854,775,808) to (9,223,372,036,854,775,807)	8 bytes
FLOAT	Decimal (precise to 23 digits)	Depends on value of n
DECIMAL	DECIMAL Decimal (to 65 digits – most precise)	
Date	yyyy-MM-dd	
Datetime2	yyyy-MM-dd HH:mm:ss[.nnnnnnnn]	
Time	hh:mm:ss[.nnnnnnnn]	

Data Types	Specification	Storage
CHAR	String (0 – 255)	
VARCHAR	String (0 – 255)	
TEXT	String (0 – 65535)	
Date	yyyy-MM-dd	
Datetime2	yyyy-MM-dd HH:mm:ss[.nnnnnnnn]	
Time	hh:mm:ss[.nnnnnnnn]	

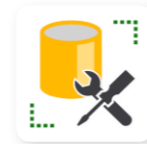
Module 1

Setting SQL Server and SQL Server Management Studio



Setting up SQL Server (Developer) and SQL Server Management Studio

- Learn how to install SQL Server Management Studio
 - [Install SQL Server 2022 \(Developer\)](#):
 - Choose basic installation
 - [Install SQL Server Management Studio](#):
 - [Installation instruction](#):
 - [SQL Documentation Navigation Tips](#)
 - Tools: SQL Server, SQL Server Management Studio, Excel, [PowerBI \(optional\)](#)
 - PC Requirement: <https://learn.microsoft.com/en-us/sql/ssms/download-sql-server-management-studio-ssms?view=sql-server-ver16>



Module 2

Creating a Database and Table

From Excel to SQL

Creating a Database and Table - From Excel to SQL

Understanding the logic



Excel



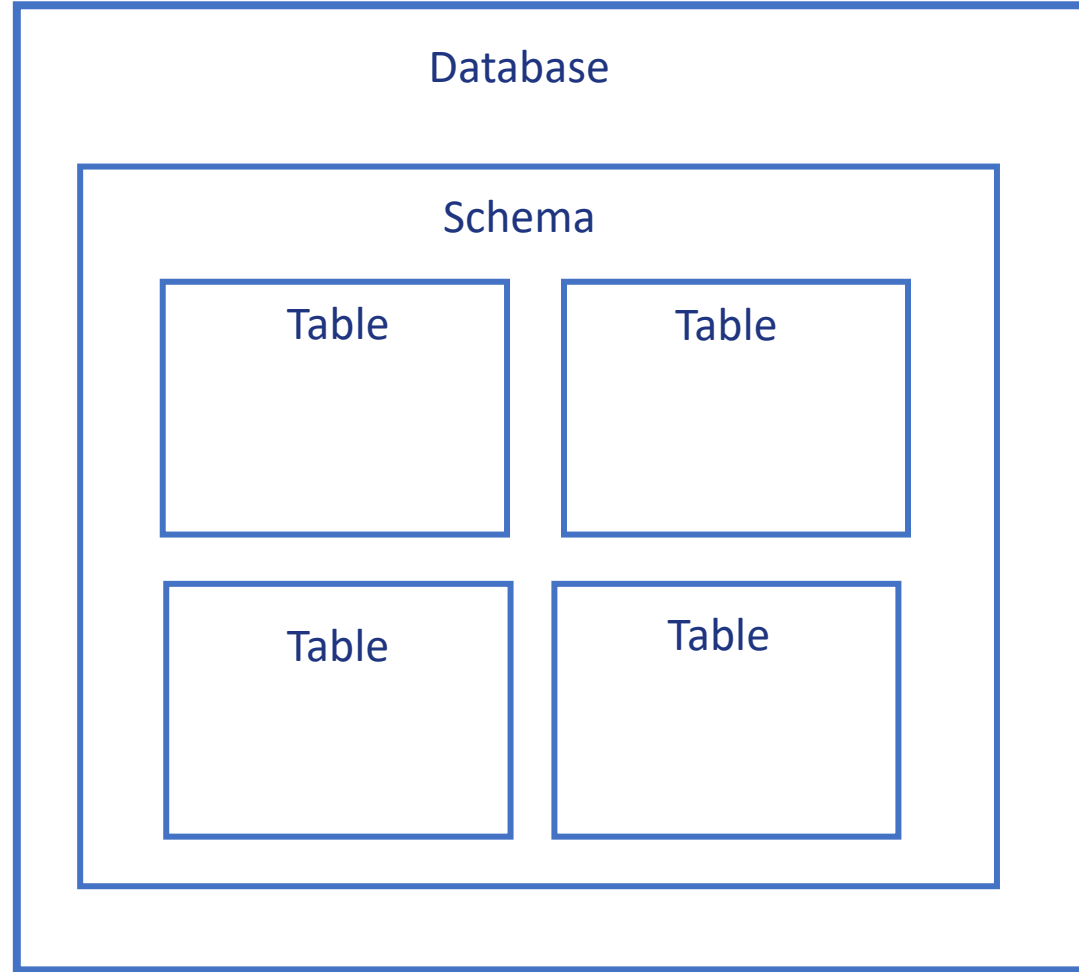
PowerBI



SQL SSMS

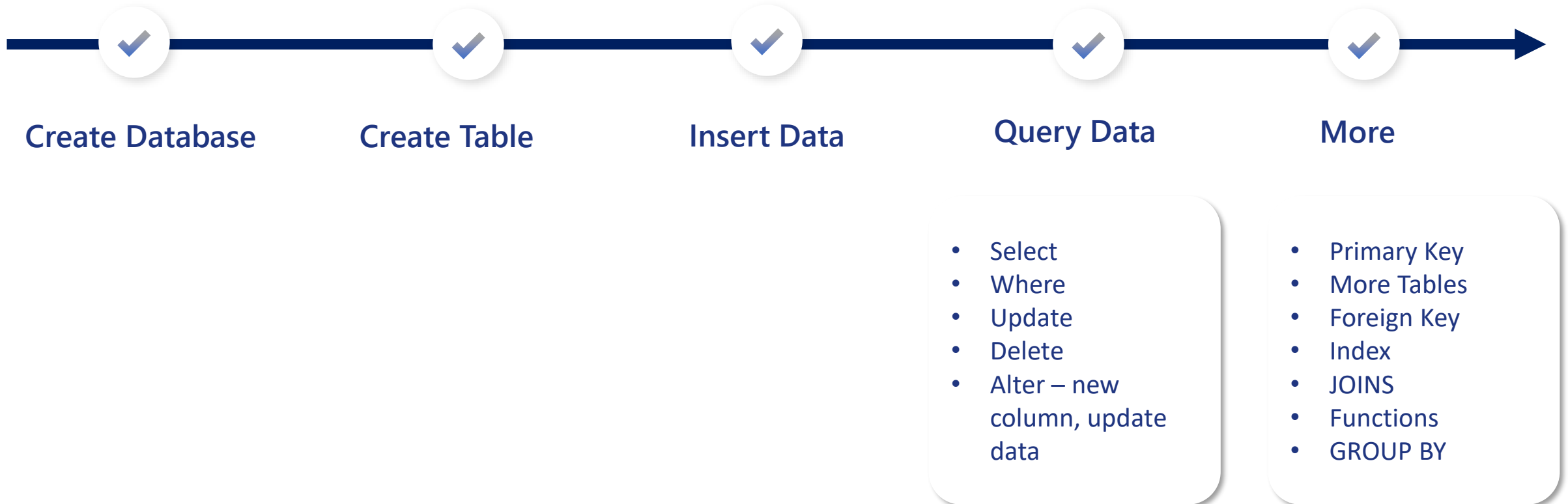
Creating a Database and Table - From Excel to SQL

Understanding the logic



Creating a Database and Table - From Excel to SQL

Understanding the logic



The “Big 6” Elements of SQL SELECT Statement

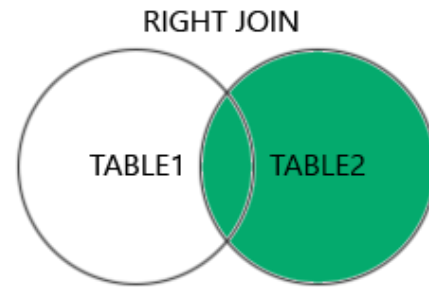
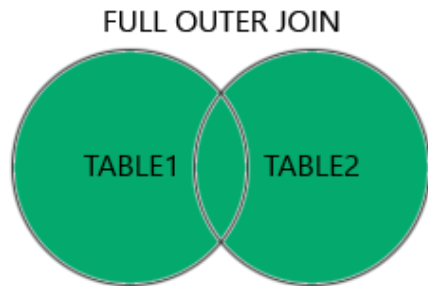
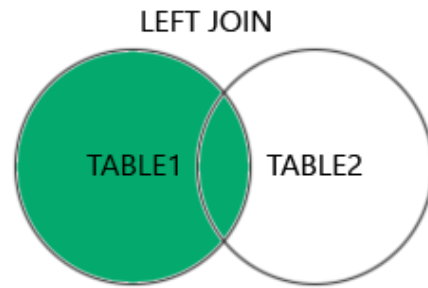
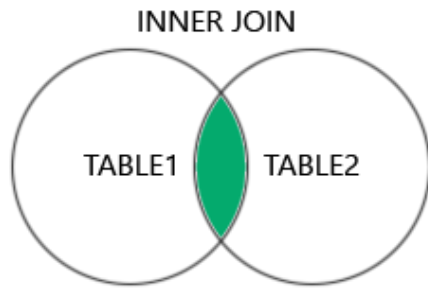
START OF STATEMENT



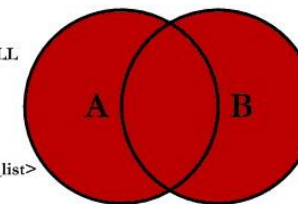
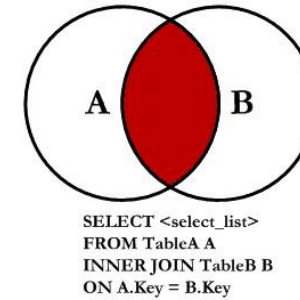
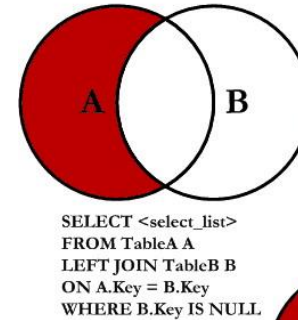
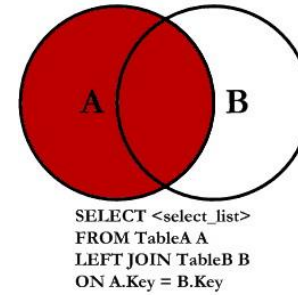
SELECT	Identifies the column(s) you want your	SELECT columnName
FROM	Identifies the table(s) your query will pull data from	FROM tableName
WHERE	(Optional) Specifies record-filtering criteria for filtering your results	WHERE logicalCondition
GROUP BY	(Optional) Specifies how to group the data in your results	GROUP BY columnName
HAVING	(Optional) Specifies group-filtering criteria for filtering your results	HAVING logicalCondition
ORDER BY	(Optional) Specifies the order in which your query results are displayed	ORDER BY columnName

END OF STATEMENT

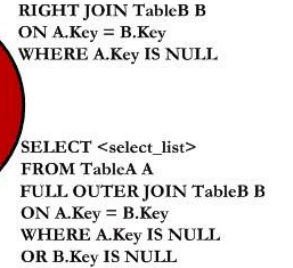
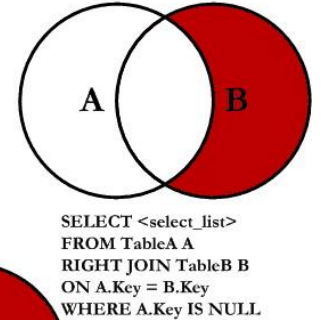
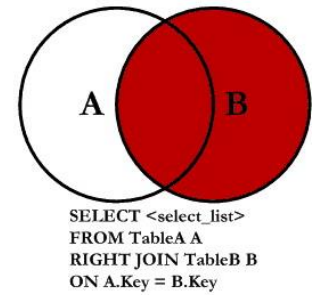
Database Join



SQL JOINS



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Module 3

Understanding scripts, restore a database and templates for database creation

Understanding scripts and database restore from popular databases

- Go to [this Github repositories](#) and download the sample databases:
 - [Adventureworks](#)
 - [AdventureWorks Data Dictionary](#)
 - [Stored Procedures in AdventureWorks](#)
 - [Functions in AdventureWorks](#)
 - Contoso
 - Northwind
 - Wide World Importers
- You can replicate these databases by **installing the database** or **installing from a backup**.
- Read more here: <https://learn.microsoft.com/en-us/sql/samples/adventureworks-install-configure?view=sql-server-ver16&tabs=ssms>

Understanding **scripts** and database restore from popular databases

- Installing AdventureWorks
 - Download AdventureWorks-oltp-install-script.zip and extract the zip file to the C:\Samples\AdventureWorks folder.
 - Open C:\Samples\AdventureWorks\instawdb.sql in SQL Server Management Studio and follow the instructions at the top of the file.
 - *Enable SQLCMD mode via Query tab*

Understanding scripts and **database restore** from popular databases

- Install a database from database backup
 - Locate the Backup folder for your SQL Server instance. The default path for 64-bit SQL Server 2016 is **C:\Program Files\Microsoft SQL Server\MSSQL13.MSSQLSERVER\MSSQL\Backup**. The MSSQL value is MSSQL14 for SQL Server 2017, MSSQL13 for SQL Server 2016, MSSQL12 for SQL Server 2014, MSSQL11 for SQL Server 2012, and MSSQL10 for SQL Server 2008R2.
 - **Download the .bak file** from AdventureWorks release and save it to the Backup folder for your SQL Server instance.
 - Open SQL Server Management Studio and connect to your SQL Server instance.
 - **Restore the database** using the SQL Server Management Studio user interface. For more information, see Restore a database backup using SSMS.
 - Or, run the RESTORE DATABASE command in a new query Window. On the Standard toolbar, click the New Query button.

Use templates in SQL Server Management Studio

- There are pre-built Transact-SQL Templates that are available in SSMS.
- Use Template Browser to locate the template. You can:
 - Open a template
 - Create a database
 - Create a table
 - Edit a template
 - Locate the template on disk
 - Save the template
 - Save custom template
- Read more here: <https://learn.microsoft.com/en-us/sql/ssms/template/templates-ssms?view=sql-server-ver16>

Module 4

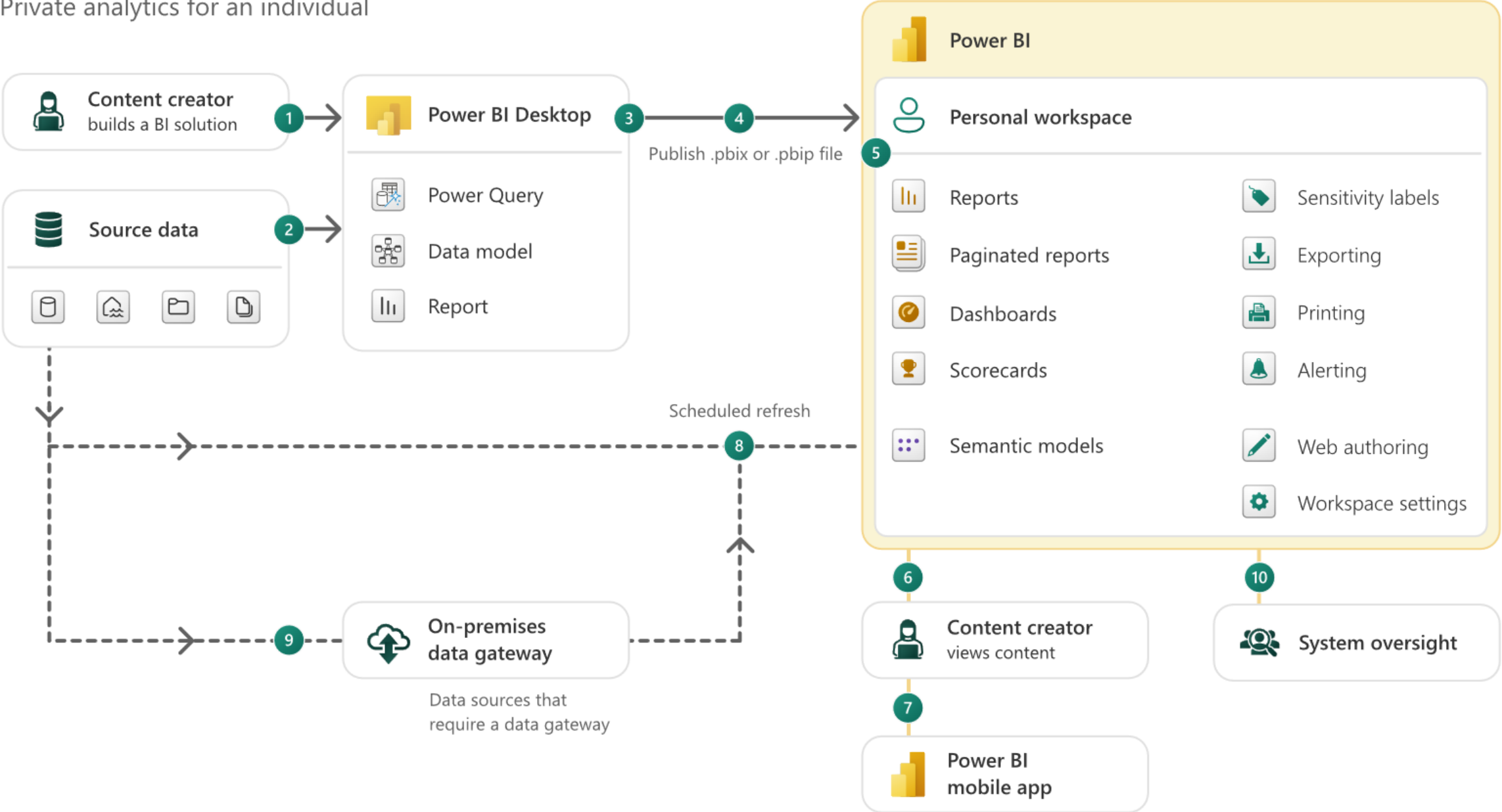
Connecting SQL Server to Excel and PowerBI

Connect to the Database Engine

- **Connection options:** When you connect to the Database Engine, you must provide an instance name (that is, the server or instance where the Database Engine is installed), a network protocol, and a connection port, in the following format:
- **Connect to SQL Server on the same machine as the client (this session):** If you're connecting to a server configured with default settings, use one of the following options:
 - localhost
 - 127.0.0.1
 - . (a single period)
- Use **get data** from Excel or PowerBI.

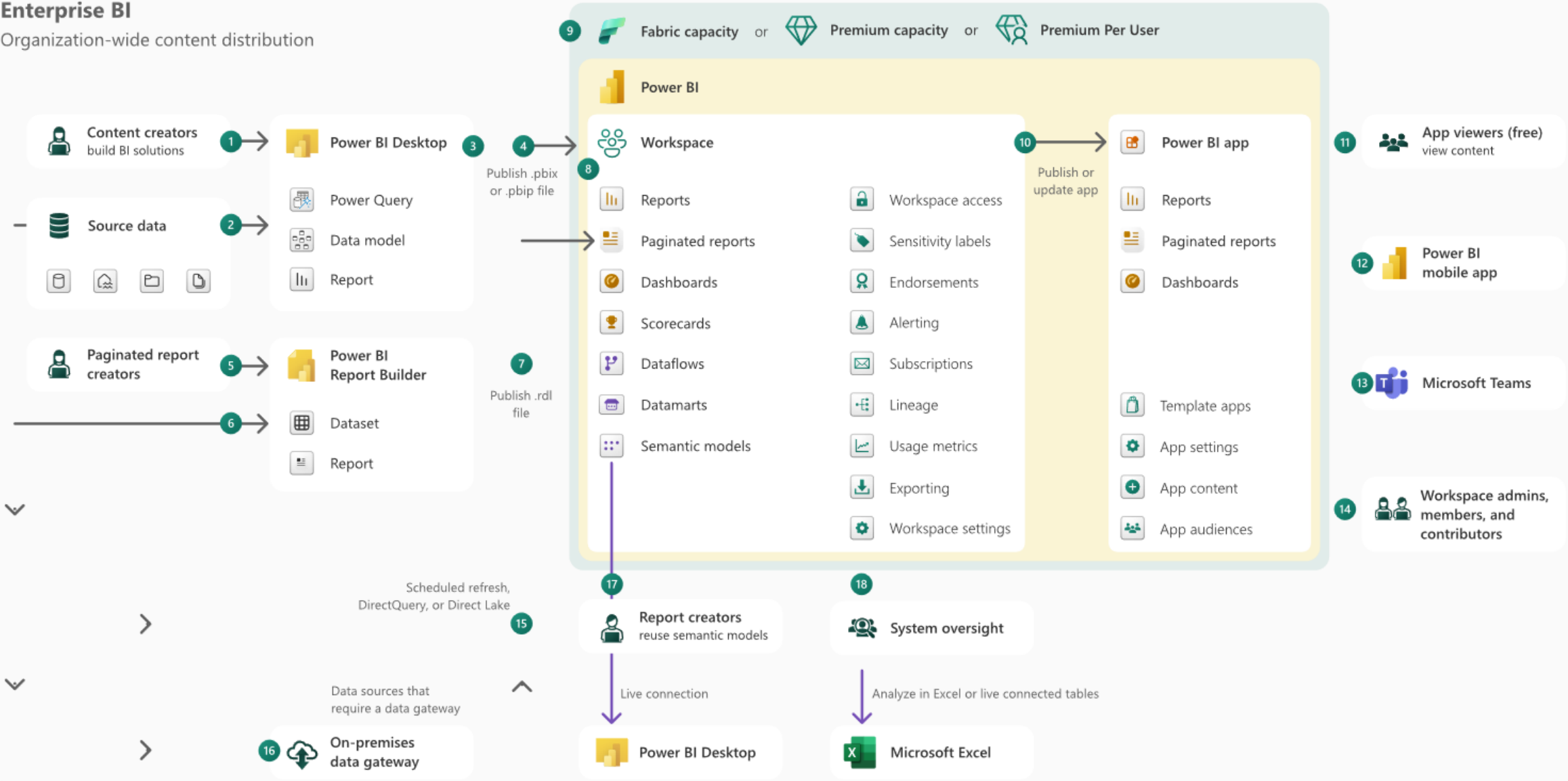
Personal BI

Private analytics for an individual



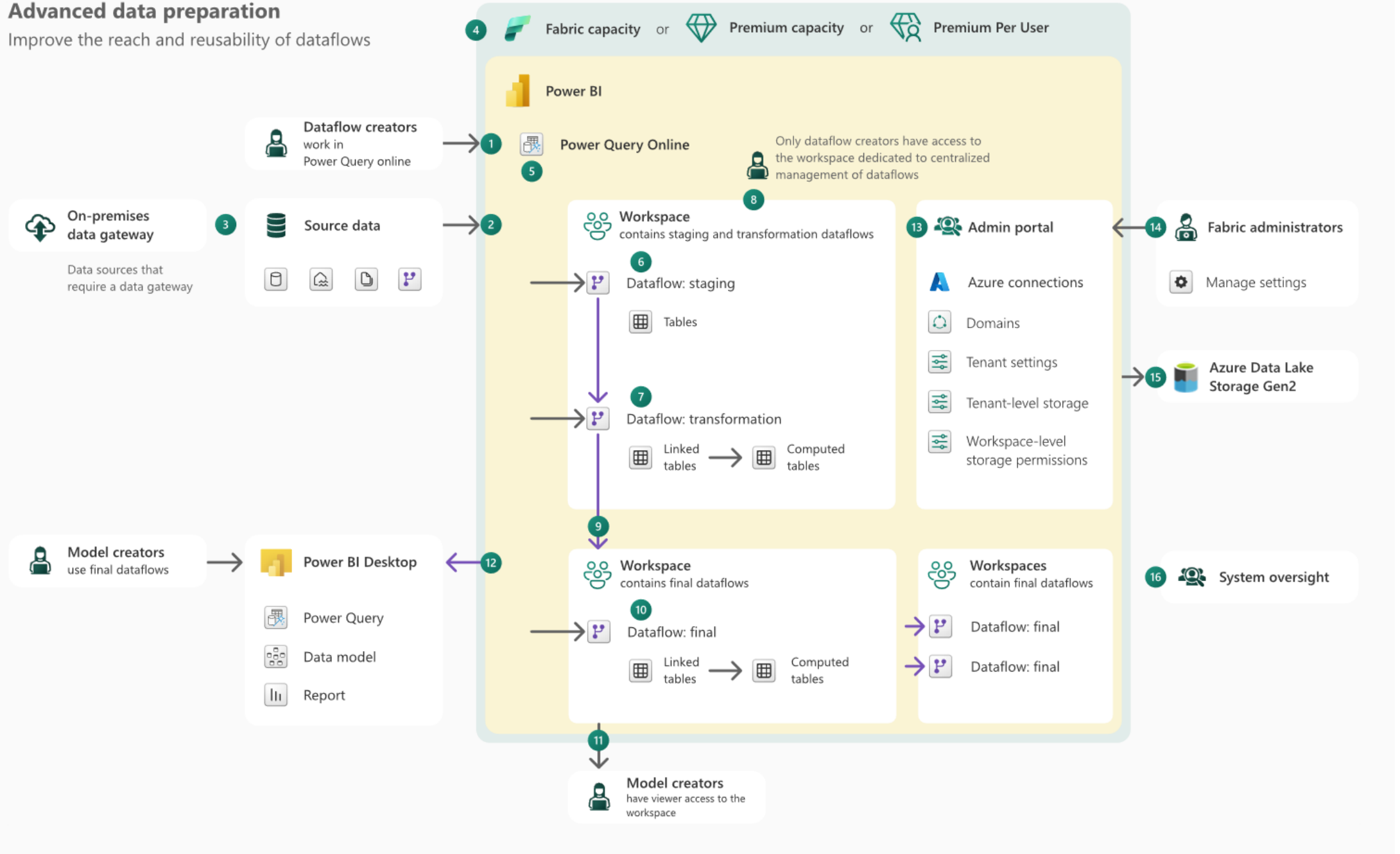
Enterprise BI

Organization-wide content distribution

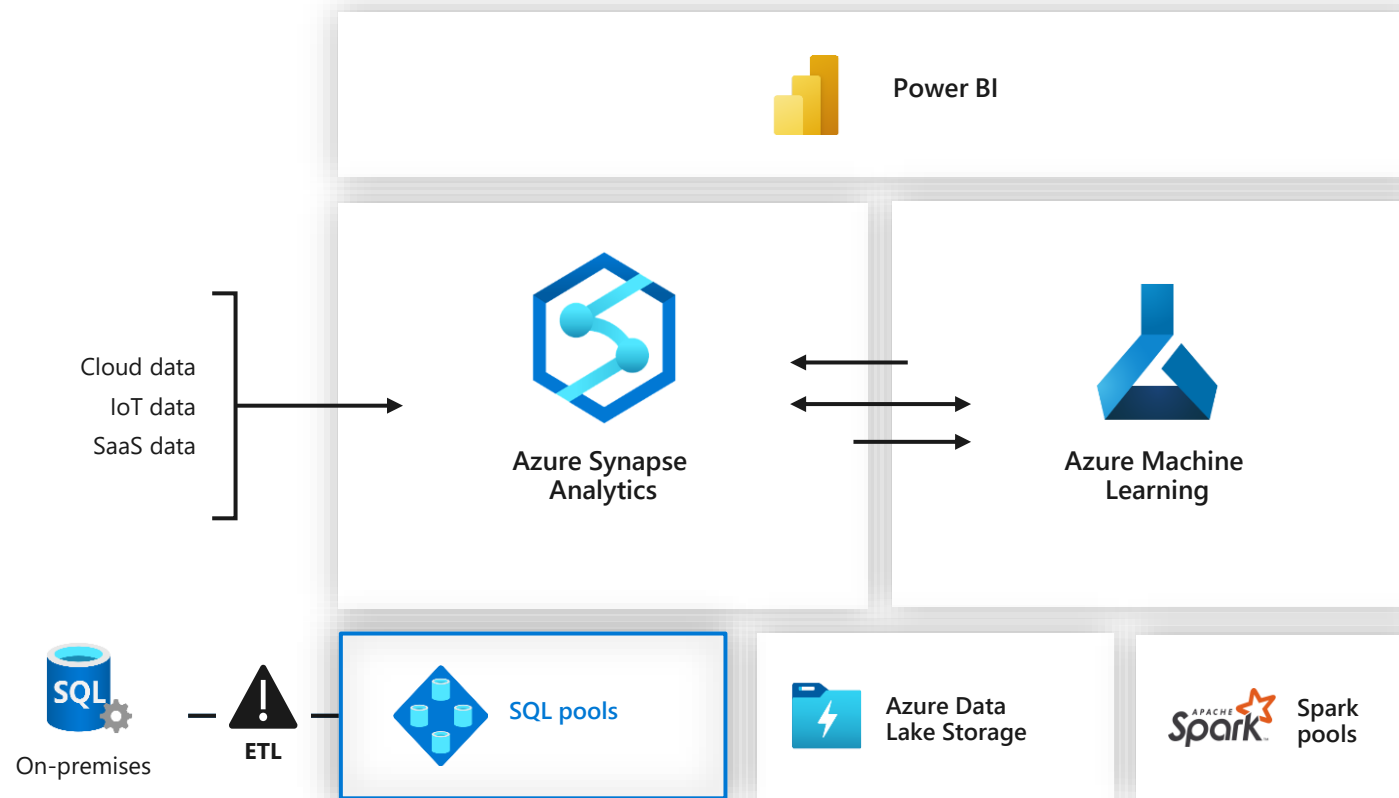


Advanced data preparation

Improve the reach and reusability of dataflows



Azure Synapse Link for SQL Server



Module 5

Expand learning curve using MOOCs and Github for learning

Microsoft Career Path

Explore careers



Administrator

Scale technical solutions across the company.



AI Engineer

Define and implement cutting-edge AI solutions.



App Maker

Build business applications the easy way.



Business User

Increase efficiency and productivity in your business.



Data Analyst

Make meaningful decisions with your data.



Data Engineer

Make your complex data available and accessible.



Data Scientist

Find the trends and develop data-driven solutions for your business.



Developer

Make technology work for everyone.



DevOps Engineer

Blend your technical expertise with business savvy.



Functional Consultant

Implement custom business applications.

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Full certification title

★ Expert certification

🔒 This certification has prerequisites

MB-300 MB-310 Exam requirements

	Infrastructure	Data and AI		Digital app and innovation	Modern work	Business applications			Security
Fundamentals Master the basics	Azure Fundamentals AZ-900	Azure AI Fundamentals AI-900	Azure Data Fundamentals DP-900		Microsoft 365 Fundamentals MS-900	Dynamics 365 Fundamentals (CRM) MB-910	Dynamics 365 Fundamentals (ERP) MB-920	Power Platform Fundamentals PL-900	Security, Compliance, and Identity Fundamentals SC-900
Role-based Expand your technical skill set	Azure Administrator Associate AZ-104 Azure Solutions Architect Expert AZ-805 Azure Network Engineer Associate AZ-700 Windows Server Hybrid Administrator Associate AZ-800 + AZ-801	Azure AI Engineer Associate AI-102 Azure Data Scientist Associate DP-100 Azure Database Administrator Associate DP-300	Azure Data Engineer Associate DP-203 Azure Enterprise Data Analyst Associate DP-500 Fabric Analytics Engineer Associate DP-600	Azure Developer Associate AZ-204 DevOps Engineer Expert AZ-400	Endpoint Administrator Associate MD-102 Administrator Expert MS-102 Teams Administrator Associate MS-700 Collaboration Communications Systems Engineer Associate MS-721	Dynamics 365 Sales Functional Consultant Associate MB-210 Dynamics 365 Customer Service Functional Consultant Associate MB-230 Dynamics 365 Finance Functional Consultant Associate MB-300 + MB-310 Dynamics 365 Supply Chain Management Functional Consultant Expert MB-300 + MB-315 Dynamics 365 Finance and Operations Apps Solution Architect Expert MB-700 Dynamics 365 Marketing Functional Consultant Associate MB-220	Dynamics 365 Field Service Functional Consultant Associate MB-240 Dynamics 365 Supply Chain Management Functional Consultant Associate MB-300 + MB-310 Dynamics 365 Finance and Operations Apps Developer Associate MB-300 + MB-500 Dynamics 365 Business Central Functional Consultant Associate MB-600 Dynamics 365 Business Central Developer Associate MB-620 Power Platform App Maker Associate PL-100	Power Platform Functional Consultant Associate PL-200 Power BI Data Analyst Associate PL-300 Power Platform Developer Associate PL-400 Power Automate RPA Developer Associate PL-500 Power Platform Solution Architect Expert PL-600	Azure Security Engineer Associate AZ-500 Cybersecurity Architect Expert SC-100 Security Operations Analyst Associate SC-200 Identity and Access Administrator Associate SC-300 Information Protection and Compliance Administrator Associate SC-400
Specialty Deepen your technical skills and manage industry solutions	Azure for SAP Workloads Specialty AZ-120 Azure Virtual Desktop Specialty AZ-140	Azure Cosmos DB Developer Specialty DP-420				Customer Data Platform Specialty MB-260			

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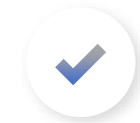
Microsoft Learn, Documentation, Github and Microsoft Github



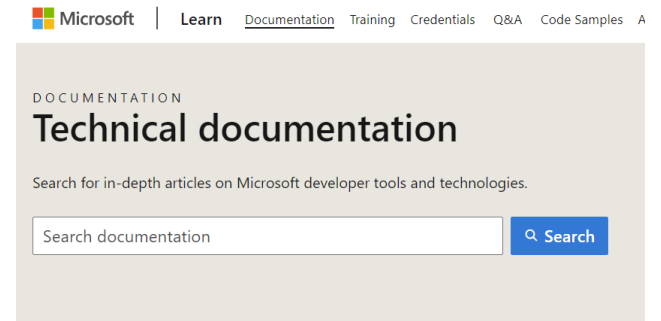
Introduction to [Microsoft Learn](#) and [Documentation](#)



[Introduction to Github](#) and [Microsoft Github](#)



Leveraging X for learning – lots of nerds on X!



Thank you for your attention!

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