



Designing and Implementing Enterprise-Scale Analytics Solutions Using Microsoft Azure and Microsoft Power BI

Course DP-500T00: 4 days; Instructor-Led

Introduction

This course covers methods and practices for performing advanced data analytics at scale. Students will build on existing analytics experience and will learn to implement and manage a data analytics environment, query and transform data, implement and manage data models, and explore and visualize data. In this course, students will use Microsoft Purview, Azure Synapse Analytics, and Power BI to build analytics solutions.

Audience

Candidates for this course should have subject matter expertise in designing, creating, and deploying enterprise-scale data analytics solutions. Specifically, candidates should have advanced Power BI skills, including managing data repositories and data processing in the cloud and on-premises, along with using Power Query and Data Analysis Expressions (DAX). They should also be proficient in consuming data from Azure Synapse Analytics and should have experience querying relational databases, analyzing data by using Transact-SQL (T-SQL), and visualizing data.

Job role: Data Analyst

Preparation for exam: [DP-500](#)

Prerequisites

Before attending this course, it is recommended that students have:

- A foundational knowledge of core data concepts and how they're implemented using Azure data services. For more information see Azure Data Fundamentals.
- Experience designing and building scalable data models, cleaning and transforming data, and enabling advanced analytic capabilities that provide meaningful business value using Microsoft Power BI. For more information see Power BI Data Analyst.

Course Outline

Module 1: Explore Azure data services for modern analytics

Understand analytics solutions in the Azure data ecosystem. Explore the architecture of a scalable analytics solution to meet business needs.

In this module, you will:

- Describe the Azure data ecosystem for analytics

Lessons

- Introduction
- Understand the Azure data ecosystem
- Explore modern analytics solution architecture

Module 2: Understand concepts of data analytics

Explore key concepts of data analytics, including types of analytics, data, and storage. Explore the analytics process and tools used to discover insights.

In this module, you will:

- Describe types of data analytics
- Understand the data analytics process

Lessons

- Introduction
- Understand data analytics types
- Explore the data analytics process
- Understand types of data and data storage

Module 3: Explore data analytics at scale

Describe data analytics at scale and understand the roles of a data team. Learn about the responsibilities of an enterprise data analyst and what tools are available to build scalable solutions.

In this module, you will:

- Explore data job roles in analytics
- Understand tools for scaling analytics solutions

Lessons

- Introduction
- Explore data team roles and responsibilities
- Review tasks and tools for data analysts
- Scale analytics with Azure Synapse Analytics and Power BI
- Strategies to scale analytics

Module 4: Introduction to Microsoft Purview

In this module, you'll evaluate whether Microsoft Purview is the right choice for your data discovery and governance needs.

In this module, you will:

- Evaluate whether Microsoft Purview is appropriate for data discovery and governance needs.
- Describe how the features of Microsoft Purview work to provide data discovery and governance.

Lessons

- Introduction
- What is Microsoft Purview?
- How Microsoft Purview works
- When to use Microsoft Purview

Module 5: Discover trusted data using Microsoft Purview

Use Microsoft Purview Studio to discover trusted organizational assets for reporting.

In this module, you will:

- Browse, search, and manage data catalog assets.
- Use data catalog assets with Power BI.
- Use Microsoft Purview in Azure Synapse Studio.

Lessons

- Introduction
- Search for assets
- Browse assets
- Use assets with Power BI
- Integrate with Azure Synapse Analytics

Module 6: Catalog data artifacts by using Microsoft Purview

Register, scan, catalog, and view data assets and their relevant details in Microsoft Purview.

In this module, you will:

- Describe asset classification in Microsoft Purview.

Lessons

- Introduction
- Register and scan data
- Classify and label data
- Search the data catalog

Module 7: Manage Power BI assets by using Microsoft Purview

Improve data governance and asset discovery using Power BI and Microsoft Purview integration.

In this module, you will:

- Register and scan a Power BI tenant.
- Use the search and browse functions to find data assets.
- Describe the schema details and data lineage tracing of Power BI data assets.

Lessons

- Introduction
- Register and scan a Power BI tenant
- Search and browse Power BI assets
- View Power BI metadata and lineage

Module 8: Integrate Microsoft Purview and Azure Synapse Analytics

Learn how to integrate Microsoft Purview with Azure Synapse Analytics to improve data discoverability and lineage tracking.

In this module, you will:

- Catalog Azure Synapse Analytics database assets in Microsoft Purview.
- Configure Microsoft Purview integration in Azure Synapse Analytics.
- Search the Microsoft Purview catalog from Synapse Studio.
- Track data lineage in Azure Synapse Analytics pipelines activities.

Lessons

- Introduction
- Catalog Azure Synapse Analytics data assets in Microsoft Purview
- Connect Microsoft Purview to an Azure Synapse Analytics workspace
- Search a Purview catalog in Synapse Studio
- Track data lineage in pipelines
- Exercise - Integrate Azure Synapse Analytics and Microsoft Purview

Module 9: Introduction to Azure Synapse Analytics

Learn about the features and capabilities of Azure Synapse Analytics - a cloud-based platform for big data processing and analysis.

In this module, you will:

- Identify the business problems that Azure Synapse Analytics addresses.
- Describe core capabilities of Azure Synapse Analytics.
- Determine when to use Azure Synapse Analytics.

Lessons

- Introduction
- What is Azure Synapse Analytics
- How Azure Synapse Analytics works
- When to use Azure Synapse Analytics
- Exercise - Explore Azure Synapse Analytics

Module 10: Use Azure Synapse serverless SQL pool to query files in a data lake

With Azure Synapse serverless SQL pool, you can leverage your SQL skills to explore and analyze data in files, without the need to load the data into a relational database.

In this module, you will:

- Identify capabilities and use cases for serverless SQL pools in Azure Synapse Analytics
- Query CSV, JSON, and Parquet files using a serverless SQL pool
- Create external database objects in a serverless SQL pool

Lessons

- Introduction
- Understand Azure Synapse serverless SQL pool capabilities and use cases
- Query files using a serverless SQL pool
- Create external database objects
- Exercise - Query files using a serverless SQL pool

Module 11: Analyze data with Apache Spark in Azure Synapse Analytics

Apache Spark is a core technology for large-scale data analytics. Learn how to use Spark in Azure Synapse Analytics to analyze and visualize data in a data lake.

In this module, you will:

- Identify capabilities and use cases for serverless SQL pools in Azure Synapse Analytics
- Query CSV, JSON, and Parquet files using a serverless SQL pool
- Create external database objects in a serverless SQL pool

Lessons

- Introduction
- Get to know Apache Spark
- Use Spark in Azure Synapse Analytics
- Analyze data with Spark
- Visualize data with Spark
- Exercise - Analyze data with Spark

Module 12: Analyze data in a relational data warehouse

Relational data warehouses are a core element of most enterprise Business Intelligence (BI) solutions, and are used as the basis for data models, reports, and analysis.

In this module, you will:

- Design a schema for a relational data warehouse.
- Create fact, dimension, and staging tables.
- Use SQL to load data into data warehouse tables.
- Use SQL to query relational data warehouse tables.

Lessons

- Introduction
- Design a data warehouse schema
- Create data warehouse tables
- Load data warehouse tables
- Query a data warehouse
- Exercise - Explore a data warehouse

Module 13: Choose a Power BI model framework

Describe model frameworks, their benefits and limitations, and features to help optimize your Power BI data models.

In this module, you will:

- Describe Power BI model fundamentals.

- Determine when to develop an import model.
- Determine when to develop a DirectQuery model.
- Determine when to develop a composite model.
- Choose an appropriate Power BI model framework.

Lessons

- Introduction
- Describe Power BI model fundamentals
- Determine when to develop an import model
- Determine when to develop a DirectQuery model
- Determine when to develop a composite model
- Choose a model framework

Module 14: Understand scalability in Power BI

Scalable data models enable enterprise-scale analytics in Power BI. Implement data modeling best practices, use large dataset storage format, and practice building a star schema to design analytics solutions that can scale.

In this module, you will:

- Describe the importance of building scalable data models
- Implement Power BI data modeling best practices
- Use the Power BI large dataset storage format

Lessons

- Introduction
- Describe the significance of scalable models
- Implement Power BI data modeling best practices
- Configure large datasets
- Exercise: Create a star schema model

Module 15: Create and manage scalable Power BI dataflows

Create Power BI transformation logic for reuse across your organization with Power BI dataflows. Learn how to combine Power BI dataflows with Power BI Premium for scalable ETL, and practice creating and consuming dataflows.

In this module, you will:

- Describe best practices for implementing Power BI dataflows.
- Create and consume Power BI dataflows.

Lessons

- Introduction
- Define use cases for dataflows
- Create reusable assets
- Implement best practices
- Exercise: Create a dataflow

Module 16: Create Power BI model relationships

Power BI model relationships form the basis of a tabular model. Define Power BI model relationships, set up relationships, recognize DAX relationship functions, and describe relationship evaluation.

In this module, you will:

- Understand how model relationship work.
- Set up relationships.
- Use DAX relationship functions.
- Understand relationship evaluation.

Lessons

- Introduction

- Understand model relationships
- Set up relationships
- Use DAX relationship functions
- Understand relationship evaluation
- Exercise: Work with model relationships

Module 17: Use DAX time intelligence functions in Power BI Desktop models

By the end of this module, you'll learn the meaning of time intelligence and how to add time intelligence DAX calculations to your model.

In this module, you will:

- Define time intelligence.
- Use common DAX time intelligence functions.
- Create useful intelligence calculations.

Lessons

- Introduction
- Use DAX time intelligence functions
- Additional time intelligence calculations

Module 18: Create calculation groups

In this module you'll learn what calculation groups are, explore key features and usage scenarios, and learn to create calculation groups.

In this module, you will:

- Explore how calculation groups work.
- Maintain calculation groups in a model.
- Use calculation groups in a Power BI report.

Lessons

- Introduction
- Understand calculation groups
- Explore calculation groups features and usage
- Create calculation groups in a model
- Exercise: Create calculation groups

Module 19: Enforce Power BI model security

Enforce model security in Power BI using row-level security and object-level security.

In this module, you will:

- Restrict access to Power BI model data with RLS.
- Restrict access to Power BI model objects with OLS.
- Apply good development practices to enforce Power BI model security.

Lessons

- Introduction
- Restrict access to Power BI model data
- Restrict access to Power BI model objects
- Apply good modeling practices
- Exercise: Enforce model security

Module 20: Use tools to optimize Power BI performance

Use tools to develop, manage, and optimize Power BI data model and DAX query performance.

In this module, you will:

- Optimize queries using performance analyzer.

- Troubleshoot DAX performance using DAX Studio.
- Optimize a data model using Tabular Editor.

Lessons

- Introduction
- Use Performance analyzer
- Troubleshoot DAX performance by using DAX Studio
- Optimize a data model by using Best Practice Analyzer
- Exercise: Use tools to optimize Power BI performance

Module 21: Understand advanced data visualization concepts

Create cohesive, inclusive, and efficient Power BI reports to effectively communicate results.

In this module, you will:

- Create and import a custom report theme.
- Create custom visuals with R or Python.
- Enable personalized visuals in a report.
- Review report performance using Performance Analyzer.
- Design and configure Power BI reports for accessibility.

Lessons

- Introduction
- Create and import a custom report theme
- Enable personalized visuals in a report
- Design and configure Power BI reports for accessibility
- Create custom visuals with R or Python
- Review report performance using Performance Analyzer

Module 22: Monitor data in real-time with Power BI

Describe real-time analytics in Power BI using automatic page refresh, real-time dashboards, and auto-refresh in paginated reports.

In this module, you will:

- Describe Power BI real-time analytics.
- Set up automatic page refresh.
- Create real-time dashboards.
- Set up auto-refresh paginated reports.

Lessons

- Introduction
- Describe Power BI real-time analytics
- Set up automatic page refresh
- Create real-time dashboards
- Set-up auto-refresh paginated reports
- Exercise: Monitor data in real-time with Power BI

Module 23: Create paginated reports

Paginated reports allow report developers to create Power BI artifacts that have tightly controlled rendering requirements. Paginated reports are ideal for creating sales invoices, receipts, purchase orders, and tabular data. This module will teach you how to create reports, add parameters, and work with tables and charts in paginated reports.

In this module, you will:

- Get data.
- Create a paginated report.
- Work with charts and tables on the report.
- Publish the report.

Lessons

- Introduction to paginated reports
- Get data
- Create a paginated report
- Work with charts on the report
- Publish the report

Module 24: Provide governance in a Power BI environment

Power BI governance is a set of rules, regulations, and policies that define and ensure the effective, controlled, and valuable operation of a BI environment. In this module, you'll learn the fundamental components and practices necessary to govern a Power BI tenant.

In this module, you will:

- Define the key components of an effective BI governance model
- Describe the key elements associated with data governance
- Configure, deploy, and manage elements of a BI governance strategy
- Set up BI help and support settings

Lessons

- Introduction
- Elements of data governance
- Configure tenant settings
- Deploy organizational visuals
- Manage embed codes
- Help and support settings

Module 25: Facilitate collaboration and sharing in Power BI

You've created dashboards and reports. Perhaps you want to collaborate on them with your coworkers. Or maybe you're ready to distribute them more widely. What's the best way to collaborate and share them? In this module, we compare your options.

In this module, you will:

- Understand the differences between My workspace, workspaces, and apps
- Describe new workspace capabilities and how they improve the user experience
- Anticipate migration impact to Power BI users
- Share, publish to the web, embed links and secure Power BI reports, dashboards, and content

Lessons

- Introduction
- Workspaces evolved
- Impact to Power BI users
- Permissions in workspaces v2
- Apps in Power BI
- Share
- Publish to web
- Embed and link in portals
- Data sensitivity labels
- Data privacy

Module 26: Monitor and audit usage

Usage metrics help you understand the impact of your dashboards and reports. When you run either dashboard usage metrics or report usage metrics, you discover how those dashboards and reports are being used throughout your organization, who's using them, and for what purpose. Knowing who is taking what action on which item in your Power BI tenant can be critical in helping your organization fulfill its requirements, like meeting regulatory compliance and records management. This module outlines what is available in usage metrics reports and audit logs.

In this module, you will:

- Discover what usage metrics are available through the Power BI admin portal
- Optimize use of usage metrics for dashboards and reports
- Distinguish between audit logs and the activity logs

Lessons

- Introduction
- Usage metrics for dashboards and reports
- Usage metrics for dashboards and reports - new version
- Audit logs
- Activity log

Module 27: Provision Premium capacity in Power BI

Power BI Premium is a dedicated, capacity-based offering. Learn about the differences between Power BI Pro and Power BI Premium, and how Power BI Premium manages capacity resources. Featured tools you can use with Power BI premium are also covered.

In this module, you will:

- Describe the difference between Power BI Pro and Power BI Premium
- Define dataset eviction
- Explain how Power BI manages memory resources
- List three external tools you can use with Power BI Premium.

Lessons

- Introduction
- Premium resource management
- Supporting multi geographies
- Bring your own key (BYOK)
- Featured external tools

Module 28: Establish a data access infrastructure in Power BI

Working with on-premises data sources requires configuring a gateway between Power BI and the on-premises data source. This module examines how to work with gateways and SQL Server Analysis Services (SSAS) data sources that are used either for scheduled refresh or for live connections.

In this module, you will:

- Understand the difference between gateways, the various connectivity modes, and data refresh methods.
- Describe the gateway network requirements, where to place the gateway in your network, and how to use clustering to ensure high availability.
- Scale, monitor, and manage gateway performance and users.

Lessons

- Introduction
- Personal gateways versus enterprise gateways
- How data is refreshed
- Gateway network requirements
- Where to install gateway?
- Establish high availability gateways
- Establish load balancing of gateways
- Gateway performance monitoring documentation
- Multiple data sources per gateway
- Manage gateway users
- Active Directory user mapping with custom property lookup

Module 29: Broaden the reach of Power BI

You can broaden the reach of Power BI by sharing your reports beyond your Power BI environment. You can publish reports to the public internet, embed reports in Microsoft Teams or in PowerApps, and place BI reports in a SharePoint online web part. There's also a special version of Power BI service called Microsoft Power BI Embedded (PBIE) which allows application developers to embed fully interactive reports into their applications without having to build their own data visualizations and controls from scratch.

In this module, you will:

- Describe the various embedding scenarios that allow you to broaden the reach of Power BI
- Understand the options for developers to customize Power BI solutions
- Learn to provision and optimize Power BI embedded capacity and create and deploy dataflows
- Build custom Power BI solutions template apps

Lessons

- Introduction
- REST API custom development
- Provision a Power BI embedded capacity
- Dataflow introduction
- Dataflow explained
- Create a Dataflow
- Dataflow capabilities on Power BI Premium
- Template apps - install packages
- Template apps - installed entities
- Template app governance

Module 30: Automate Power BI administration

Cmdlets are functions written in PowerShell script language that execute commands in the Windows PowerShell environment. Running these cmdlets will allow you to interact with your Power BI Platform without having to go through the admin portal in a web browser. Combine these cmdlets with other PowerShell functions to write complex scripts that can optimize your workflow.

In this module, you will:

- Use REST APIs to automate common Power BI admin tasks
- Apply Power BI Cmdlets for Windows PowerShell and PowerShell core
- Use Power BI Cmdlets
- Automate common Power BI admin tasks with scripting

Lessons

- Introduction
- REST API - Power BI service
- Microsoft Power BI cmdlets for Windows PowerShell and PowerShell core
- Install and use the Power BI cmdlet
- Test REST API calls
- Script typical administrator tasks
- Lab

Module 31: Build reports using Power BI within Azure Synapse Analytics

In this module, you will learn how you can build Power BI reports from within Azure Synapse Analytics.

In this module, you will:

- Describe the Power BI and Synapse workspace integration
- Understand Power BI data sources
- Describe optimization options
- Visualize data with serverless SQL pools

Lessons

- Introduction
- Describe the Power BI and Synapse workspace integration

- Exercise - Connect to Power BI from Synapse
- Understand Power BI data sources
- Exercise - Create a new data source to use in Power BI
- Exercise - Create a new Power BI report in Synapse Studio
- Describe Power BI optimization options
- Exercise - Improve performance with materialized views and result-set caching
- Visualize data with serverless SQL pools

Module 32: Design a Power BI application lifecycle management strategy

The use of OneDrive, Git repositories, and Power BI deployment pipelines allows us to follow application lifecycle management techniques. This reduces administrative overhead and provides continuity in the development process.

In this module, you will:

- Outline the application lifecycle process.
- Choose a source control strategy.
- Design a deployment strategy.

Lessons

- Introduction
- Define application lifecycle management
- Recommend a source control strategy
- Design a deployment strategy

Module 33: Create and manage a Power BI deployment pipeline

Deployment pipelines enable creators to develop and test Power BI content in the Power BI service before the content is made available for consumption by users. It offers creators improved productivity, faster delivery of content updates, and reduced manual work and errors. The tool is designed as a pipeline with three stages: development, test, and production.

In this module, you will:

- Articulate the benefits of deployment pipelines
- Create a deployment pipeline using Premium workspaces
- Assign and deploy content to pipeline stages
- Describe the purpose of deployment rules
- Deploy content from one pipeline stage to another

Lessons

- Introduction
- Understand the deployment process
- Create a deployment pipeline
- Assign a workspace
- Deploy content
- Work with deployment pipelines

Module 34: Create and manage Power BI assets

Creating shared data assets for your analytics environment provides structure and consistency. Maintaining those assets is as important, and XMLA endpoint provides additional administrative capabilities.

In this module, you will:

- Create specialized datasets.
- Create live and DirectQuery connections.
- Use Power BI service lineage view.
- Use XMLA endpoint to connect datasets.

Lessons

- Introduction

- Create reusable Power BI assets
- Explore Power BI assets using lineage view
- Manage a Power BI dataset using XMLA endpoint
- Exercise: Create reusable Power BI assets