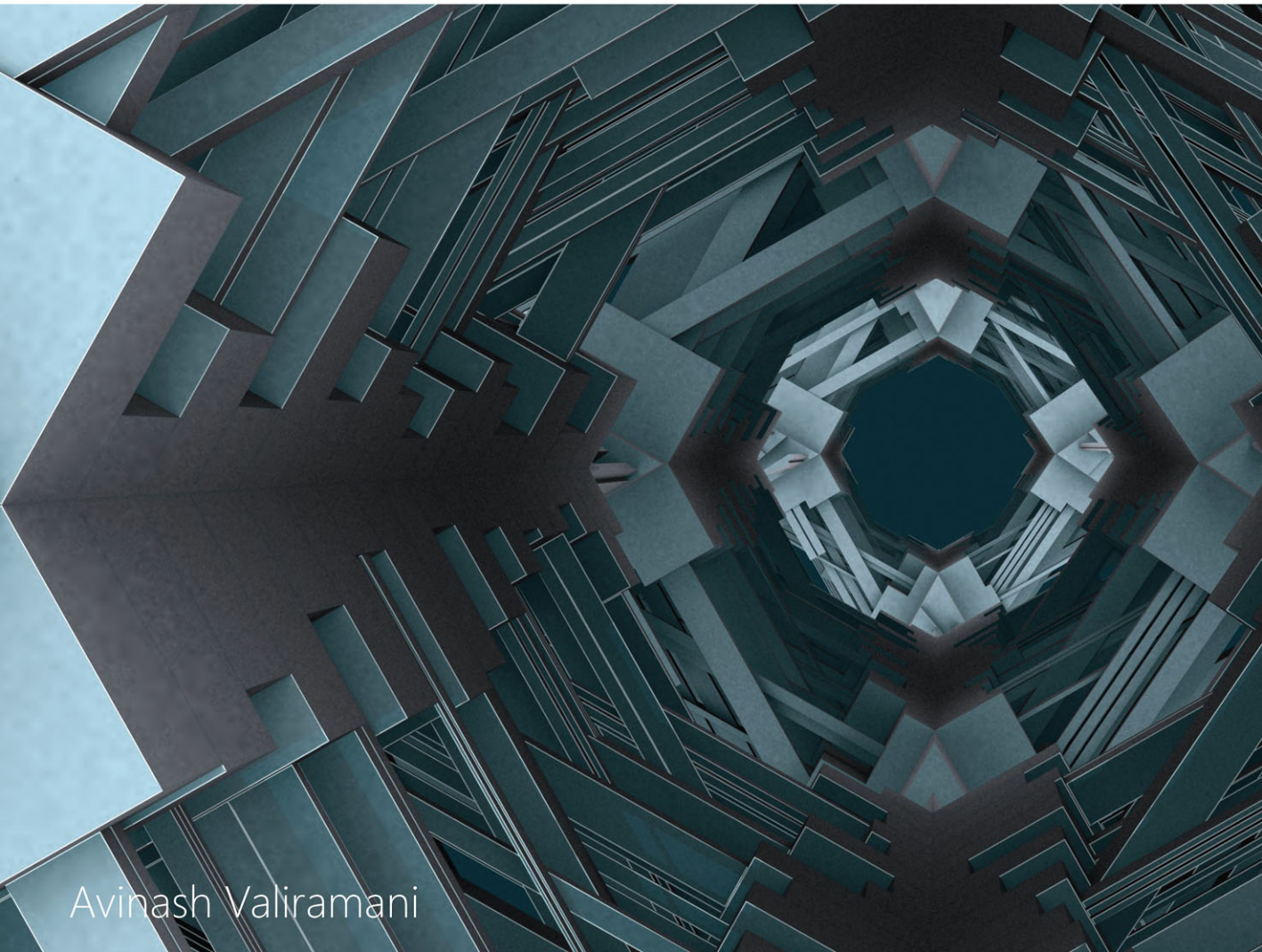
Microsoft

Microsoft Azure
Monitoring & Management

The Definitive Guide



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Chapter 3

Azure Migrate

Overview

Microsoft introduced Azure Migrate in November of 2017 to consolidate a set of Azure services to discover, assess, and migrate on-premises workloads to the Azure Cloud. Initially, the service was limited to assessing and migrating VMware virtual machines (VMs) to Azure. Over time, however, Microsoft added new features to the service to allow you to migrate a number of different workloads, including the following:

- VMs
- Web applications
- Databases
- Large amounts of data not associated with VMs, databases, or web apps
- Virtual Desktop Infrastructure (VDI) running in on-premises or co-located datacenters or other cloud services such as Amazon Web Services (AWS) or Google Cloud Platform (GCP)

Azure Migrate service centralizes tools provided by Microsoft and integrated third-party solutions used for the discovery, assessment, and migration of workloads. Currently, third-party solutions include RackWare, Carbonite, and Cloudamize, among many others. Each solution provides different capabilities that are specialized in different workloads based on your individual needs. More importantly, Azure Migrate provides an integrated set of discovery, assessment, and migration tools from Microsoft itself that work seamlessly together for the migration of a majority of workloads. It is therefore important to identify which solution will work best in your environment before choosing which one to use.

> ***NOTE*** **This chapter focuses on the tools provided by Microsoft as part of the Azure Migrate service.**

Key features

The key features of the Azure Migrate service are as follows:

- **Centralized migration service** Azure Migrate consolidates all the different tools provided by Microsoft to discover, assess, and migrate workloads to Azure. This enables you to easily track, monitor, and manage all your migrations.
- **Support for different workloads** Azure Migrate provides the capability to assess and migrate workloads such as VMs, databases, web apps, data storage, and VDI.
- **Support for different source platforms** Azure Migrate provides the assessment and migration capabilities of specific workloads hosted on different infrastructure platforms such as Hyper-V, VMware, and physical servers.
- **Support for different cloud platforms** Azure Migrate provides the assessment and migration capabilities of specific workloads hosted on different cloud platforms such as Amazon Web Services (AWS) and Google Cloud Platform (GCP).
- **Extensibility** You can extend Azure Migrate functionality using offerings from third-party solution providers, also known as independent software vendors (ISVs). In other words, you can use tools that you are more comfortable with or have prior investments in to achieve your migration objectives.
- **Migration to different services** Azure Migrate enables you to migrate your workloads to different Azure services such as Azure VMs, Azure SQL Database, Azure SQL Managed Instance, Azure App Service, Azure Virtual Desktop, and Azure Storage. So, you can optimize your migration and use cloud-native solutions to maximize your cloud investments.

The following sections discuss some of the various tools provided by Microsoft to assess and migrate your workloads.

Assessment tools

Assessment tools include the following:

- **Azure Migrate Discovery and Assessment Tool** This tool enables you to discover and assess on-premises physical servers and Hyper-V- or VMware-based VMs. It requires the deployment of a lightweight appliance on a VM or physical server in the on-premises environment to perform an agent-based or agentless assessment that sends continuous server metadata and performance data to Azure. It then generates readiness reports to provide you with clarity on:
  - Whether the on-premises workload meets the prerequisites for migration to Azure.
  - The estimated size and VM SKU the workload could use post-migration.
  - Associated dependencies with other servers that would need to be incorporated into the migration plan.
  - The estimated costs for running the workloads in Azure post-migration.

- **Data Migration Assistant** You can use this tool to assess on-premises SQL Server workloads for migration to Azure SQL Database, Azure SQL Managed Instance, or SQL Server hosted on Azure VMs. It can help identify potential migration roadblocks, migration approaches, and strategies based on the assessment to ensure the migration is as efficient as possible.
- **Web App Migration Assistant** This free tool enables you to assess on-premises websites and web apps for migration to Azure App Service. It provides tools to easily and automatically assess on-premises .NET, Java, and Linux web apps.

Migration tools

Migration tools include the following:

- **Azure Migrate Server Migration Tool** This tool enables you to migrate on-premises physical servers and Hyper-V- or VMware-based VMs to Azure VMs. It also supports the migration of VMs hosted in other cloud services such as AWS and GCP. You can perform data synchronization in different ways for each of the different source's platforms:
  - **Hyper-V** You can use provider agents installed on the Hyper-V host migration without requiring the deployment of agents on the VMs.
  - **Physical servers** Physical servers include servers hosted in AWS, GCP, and standalone ESX hosts, along with servers in a traditional physical server infrastructure. Migration of physical servers requires the use of a replication appliance, which you deploy in the on-premises environment to sync the initial data and data changes to the Azure cloud.
  - **VMware** You can perform VMware migration using either an agentless or agent-based approach. The agentless approach uses the discovery and assessment appliance, whereas the agent-based approach requires the deployment of a replication appliance in the onpremises environment. VMware migration requires a vCenter appliance to be in place for integration; otherwise, for standalone ESX hosts, the migration must be performed using the same approach as physical servers, using a replication appliance.
  - **Azure Database Migration Service** This tool enables you to automatically migrate various databases to Azure services, including Azure SQL Database, Azure SQL Managed Instance, SQL Servers running on Azure VMs, Azure Database for MySQL, Azure Database for PostgreSQL, and others with minimal downtime.
  - **Web App Migration Assistant** In addition to providing assessment capabilities, this tool offers migration capabilities to move your on-premises .NET, Java, or Linux web apps to Azure App Service.
  - **Azure Data Box** This tool includes different products, such as Data Box, Data Box Disk, Data Box Gateway, and Data Box Heavy to migrate large amounts of data to Azure Storage.

Deployment concepts and considerations

Now that you have a sense of the various features and integrated tools provided by Microsoft within the Azure Migrate service, let's discuss the Azure Migrate Discovery and Assessment Tool and the Azure Migrate Server Migration Tool.

Azure Migrate Discovery and Assessment Tool

One of the most important steps in any migration is to perform a discovery and assessment of your on-premises environment to gain better insight into your workloads and how effectively they will support migration to Azure. Based on the platform(s) on which your on-premises servers are hosted, and on the Azure service that you intend to migrate them to, you will need to use various tools for this discovery and assessment.

To perform discovery and assessment of on-premises Windows or Linux virtual machines hosted on Hyper-V, VMware, or physical servers, you deploy the Azure Migrate appliance that is part of the Azure Migrate Discovery and Assessment Tool. You can deploy the appliance using an Open Virtualization Appliance (OVA) template, Hyper-V VHD, or a PowerShell script, depending on the source platform. The appliance can perform discovery using the vCenter server or Hyper-V hosts set up during appliance configuration, and you can select the VMs that you would like to assess post-discovery. In the case of physical servers, you will need to define the administrative credentials and their IP address/hostnames for the appliance to query and connect to those servers to perform an assessment. VMs hosted in other solutions such as AWS or GCP will need to be set up for discovery and assessment similar to physical servers.

In each scenario, there is a set of Windows and Linux OS versions that are supported by the appliance for discovery and assessment. You will need to refer to Microsoft's publicly available guidance on the latest supported release when you perform your build. This guidance changes based on the end of support or end of life of various Windows and Linux OS releases.

Hypervisor OS version support is also updated on a regular basis based on the OEM's support guidelines. For example, at present, the appliance supports the use of Hyper-V hosts running on Windows Server 2019, Windows Server 2016, and Windows Server 2012 R2. Any version older than this—for example, Windows Server 2012 or Windows Server 2008 R2—is not supported.

> ***TIP*** **Check the supported hypervisor versions at the time of your build. If your current hypervisor is not patched or up to date, you will need to ensure that the prerequisites are met before attempting to use the appliance in your environment.**

The appliance performs discovery of the following:

- The metadata of the discovered servers with server details, including current OS and patch levels, CPU size, RAM, disk, network interfaces, and a host of other information based on the underlying hypervisor

- Installed software, ASP .NET web apps, SQL Server instances, and databases
- Dependencies among different on-premises servers that are in the scope of the discovery (identified through agentless dependency analysis)

For assessments that are more accurate, you can set up the appliance to gather performance data from the servers for a set period. This helps it to accurately identify the right size for the Azure VM and disk SKU for these servers. Based on the time period for which you perform the assessment, the appliance collects data points to gain deeper insights and assign a confidence rating to help you understand how suitable its size recommendations are for production use. This confidence rating will be low if the appliance hasn't been able to collect performance data for a sufficient period of time (or at all).

NOTE **If you do not perform performance-based assessments, the appliance will use the size information gathered during the metadata discovery of the servers to ascertain an appropriate size.**

Data collected by the appliance—including the metadata of the discovered servers and the performance data—is transferred to Azure over HTTPS and stored in Azure Cosmos DB and Azure Storage with encryption, meaning it is encrypted both during transit and at rest.

Each appliance can support thousands of VMs—a limit that continues to scale upward as Microsoft releases newer versions. You can also deploy multiple appliances in an environment if a single appliance does not meet your needs. See the latest guidance available online to determine the number of servers and hosts supported by the appliance, as the limits differ between Hyper-V, VMware, and physical infrastructure environments, and could change depending on the appliance version that you deploy.

Dependency analysis

Now that you have a better understanding of discovery, let's briefly understand dependency analysis and how it can help in your migrations. *Dependency analysis* **identifies dependencies among discovered servers so you can better understand the impact of migrating those servers on other related servers in your environment. This enables you to do the following:**

- **Take into account potential roadblocks and outages when planning and performing workload migrations.**
- **Analyze and plan for groups of servers that need to be migrated together to ensure they continue to work correctly post-migration.**
- **Identify dependencies of which you were unaware so you can remove them before the migration if they are no longer required.**

- Communicate with all stakeholders, including the ones responsible for dependent workloads, so they can come together for more cohesive planning and migration.

Azure Migrate supports two types of dependency analysis: agentless and agent-based. Agentless dependency analysis is supported only for VMware-based environments that use vCenter servers and is currently in preview at the time of this writing. For its part, agent-based dependency analysis currently covers a broader set of hypervisors and infrastructure. With the agent-based approach:

- You must deploy the Microsoft Monitoring agent (MMA) and the dependency agent on every on-premises server for which you would like to perform dependency analysis.
- Agents gather information about TCP processes and inbound/outbound connections for each process, including the source and destination server name, process, application name, ports, number of connections, latency, and data-transfer information.
- Data is uploaded to Azure Cosmos DB and Azure Storage for analysis using Azure Log Analytics. Azure then uses Service Map to analyze the data, discover application components on Windows and Linux servers, and identify communication routes between servers and services to create a visualization map.

NOTE If you have servers that do not have internet connectivity, you will need to download and install an additional component called Log Analytics Gateway to capture the local data and upload it to Microsoft Azure. The gateway acts as an interface between your on-premises servers and Azure.

Azure Migrate Server Migration Tool

After you have successfully completed the discovery and assessment phase, you must begin migrating your workloads. First, though, you must develop a migration plan to cover all aspects of the migration. These include the following:

- Pre-migration strategy and activities
- Migration strategy
- Roles and responsibilities
- Post-migration Azure management strategies