



Azure IaaS Fundamentals

Module 1

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Learning Units covered in this Module

- Lesson 1: Azure Fundamentals
- Lesson 2: Azure IaaS Fundamentals
- Lesson 3: SQL Server IaaS Agent Extension

Lesson 1: Basic concepts of Azure SQL

Objectives

After completing this learning, you will be able to:

- Describe the basic concept and architecture
- Describe the difference between the purchase models.
- Describe the service tiers compute and hardware generation of the Azure SQL Database.



What is Microsoft Azure?

Microsoft Azure is Microsoft's public cloud computing platform

Over 140 countries across 60 regions worldwide

Windows and Linux

Scale globally

- Reach more locations, faster, with the performance and reliability of a vast global infrastructure.

Safeguard data

- Rely on industry-leading data security in the region and across our network.

Promote sustainability

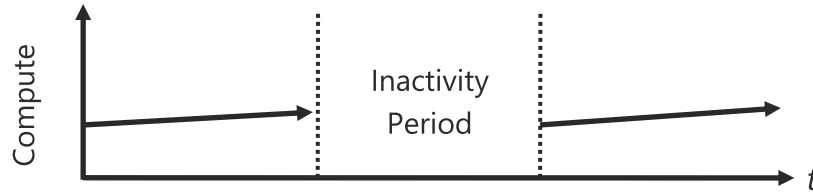
- Help build a clean-energy future and accelerate progress toward your sustainability goals.

What is Microsoft Azure?

<https://azure.microsoft.com/en-us/global-infrastructure/regions/>

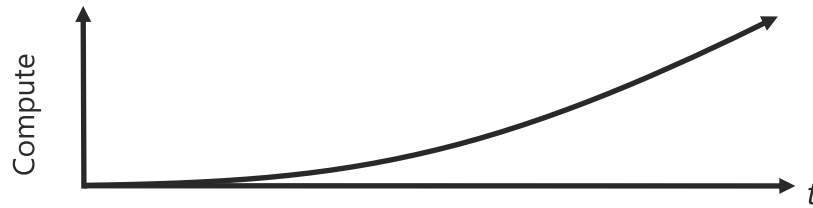


Benefits of Cloud Computing



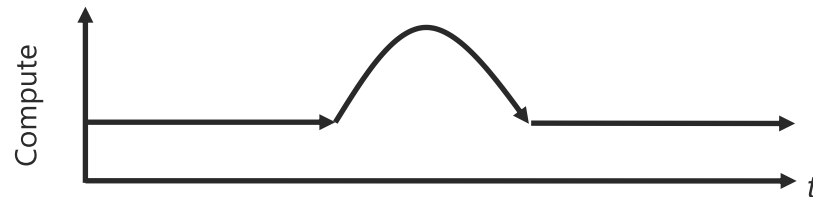
On and Off

On and off workloads (for example: batch job).
Over provisioned capacity is wasted.
Time to market can be cumbersome.



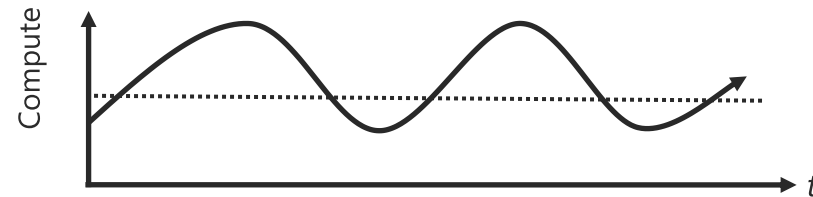
Growing Fast

Successful services needs to grow/scale.
Keeping up with growth is a big IT challenge.
Cannot provision hardware fast enough.



Unpredictable Bursting

Unexpected/unplanned peak in demand.
Sudden spike impacts performance.
Cannot over provision for extreme cases.



Predictable Bursting

Services with micro seasonality trends.
Peaks due to periodic increased demand.
IT complexity and wasted capacity.

Hosting Models

Managed by customer

Managed by Microsoft

On-premises costs tend to be driven by hardware and data center management costs

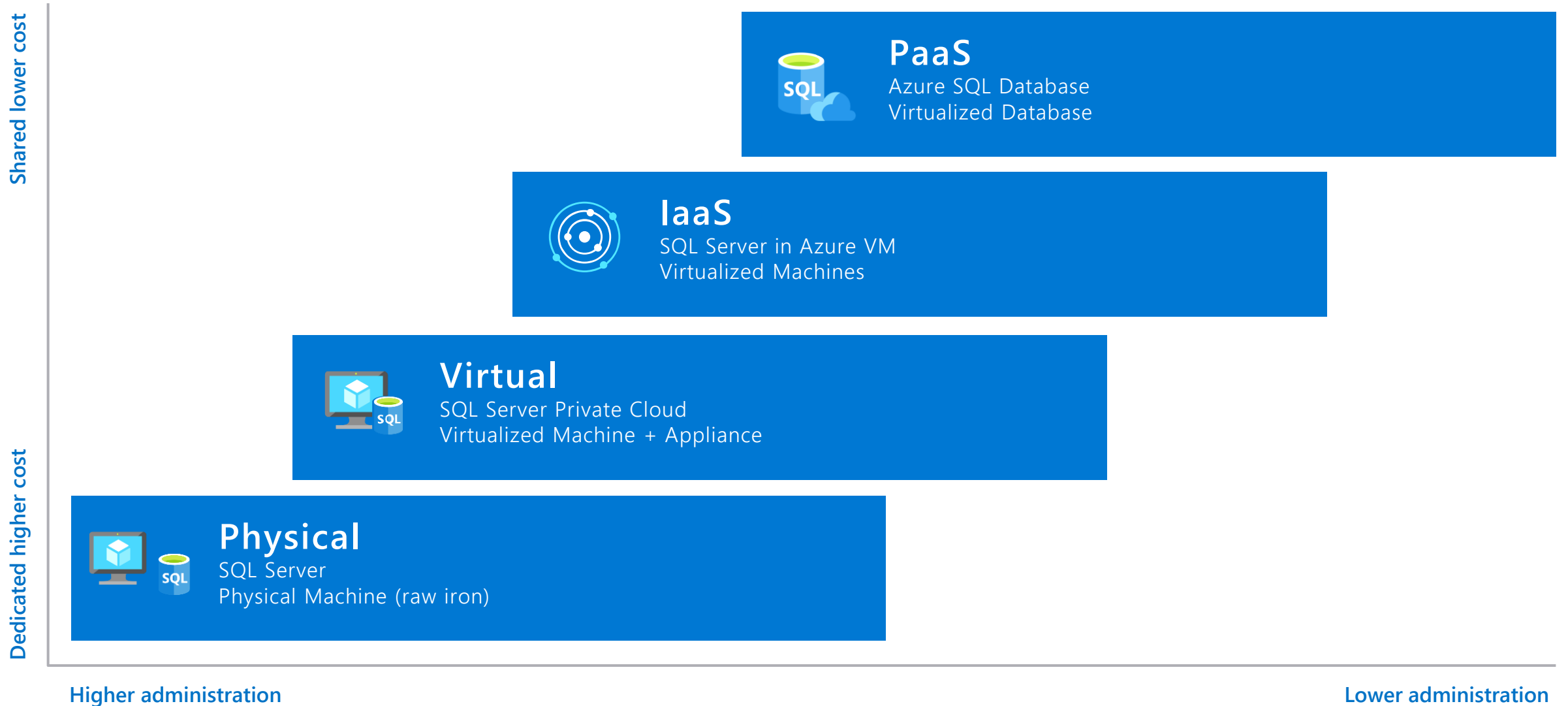
Infrastructure-as-a-Service reduces cost categories related to data center and compute

Platform-as-a-Service off-loads customers' most administrative tasks to Azure, further improving efficiency with machine-learning capabilities for performance and security

- **Managed Instance:** instance-level deployment for lift-shift existing apps to Azure, fully backward compatible
- **Single database:** database-level deployment for new apps

| On-premises | Infrastructure (as a Service) | Platform (as a Service) |
|--------------------------------------|--------------------------------------|--|
| Applications | Applications | Applications |
| Data | Data | Data |
| High availability /DR/Backups | High availability /DR/Backups | High Availability/ DR/Backups |
| Database Provision/ Patch/Scaling | Database Provision/ Patch/Scaling | Database Provision/ Patch/Scaling |
| O/S provision /patching | O/S | O/S |
| Virtualization | Virtualization | Virtualization |
| Hardware | Hardware | Hardware |
| Datacenter Management | Datacenter Management | Datacenter Management |
| SQL Server 2017/2019 | Azure SQL VMs | Azure SQL Database SQL Managed Instance |

Data platform continuum



Azure SQL Family

Explore Azure SQL database services



SQL Server on Azure Virtual Machines

Migrate your SQL workloads to Azure with ease while maintaining complete SQL Server compatibility and operating system-level access

[Learn more >](#)



Azure SQL Managed Instance

Modernize your existing SQL Server applications at scale with an intelligent, fully managed service

[Learn more >](#)



Azure SQL Database

Support modern cloud applications on an intelligent, fully managed service that includes serverless compute

[Learn more >](#)

A closer look... Best for

SQL Server in Azure VM

- Existing applications that require fast migration to the cloud with minimal changes or no changes.
- Teams that can configure, fine tune, customize, and manage high availability, disaster recovery, and patching for SQL Server.
- You need a customized environment with full administrative rights.
- SQL Server instances with up to 64 TB of storage. The instance can support as many databases as needed.

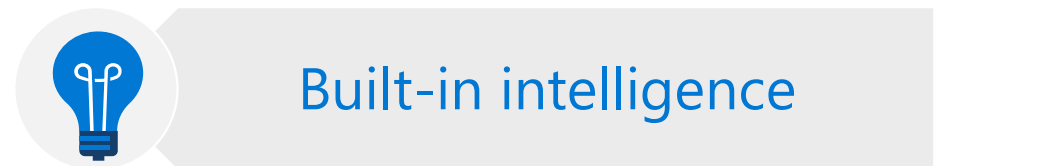
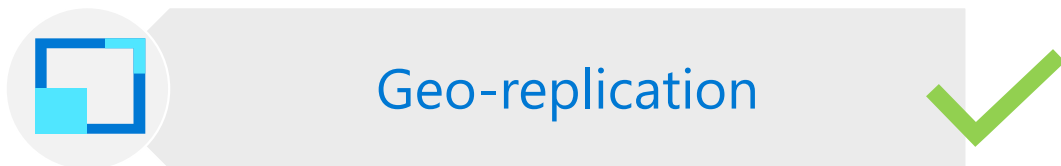
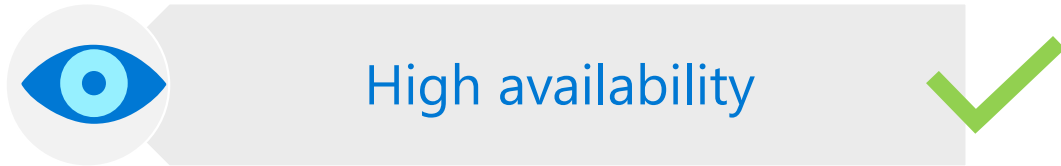
Managed Instance

- New applications or existing on-premises applications that want to use the latest stable SQL Server features and that are migrated to the cloud with minimal changes.
- Teams that need built-in high availability, disaster recovery, and upgrade for the database.
- Teams that do not want to manage the underlying operating system and configuration settings.
- Databases of up to 8 TB, or larger databases that can be horizontally or vertically partitioned using a scale-out pattern.

Azure SQL Database

- New cloud-designed applications that want to use the latest stable SQL Server features and have time constraints in development and marketing.
- Teams that need built-in high availability, disaster recovery, and upgrade for the database.
- Teams that do not want to manage the underlying operating system and configuration settings.
- Databases of up to 4 TB, or larger databases that can be horizontally or vertically partitioned using a scale-out pattern.

Azure SQL Virtual Machines — Everything Configurable



Azure Hybrid Benefit

Achieve significant savings in Azure for Windows Server and SQL Server



Azure Hybrid Benefit for Windows Server

Convert, or re-use Windows licensing with active Software Assurance in Azure for IaaS.

Significantly reduce costs with deep savings.



Azure Hybrid Benefit for SQL Server

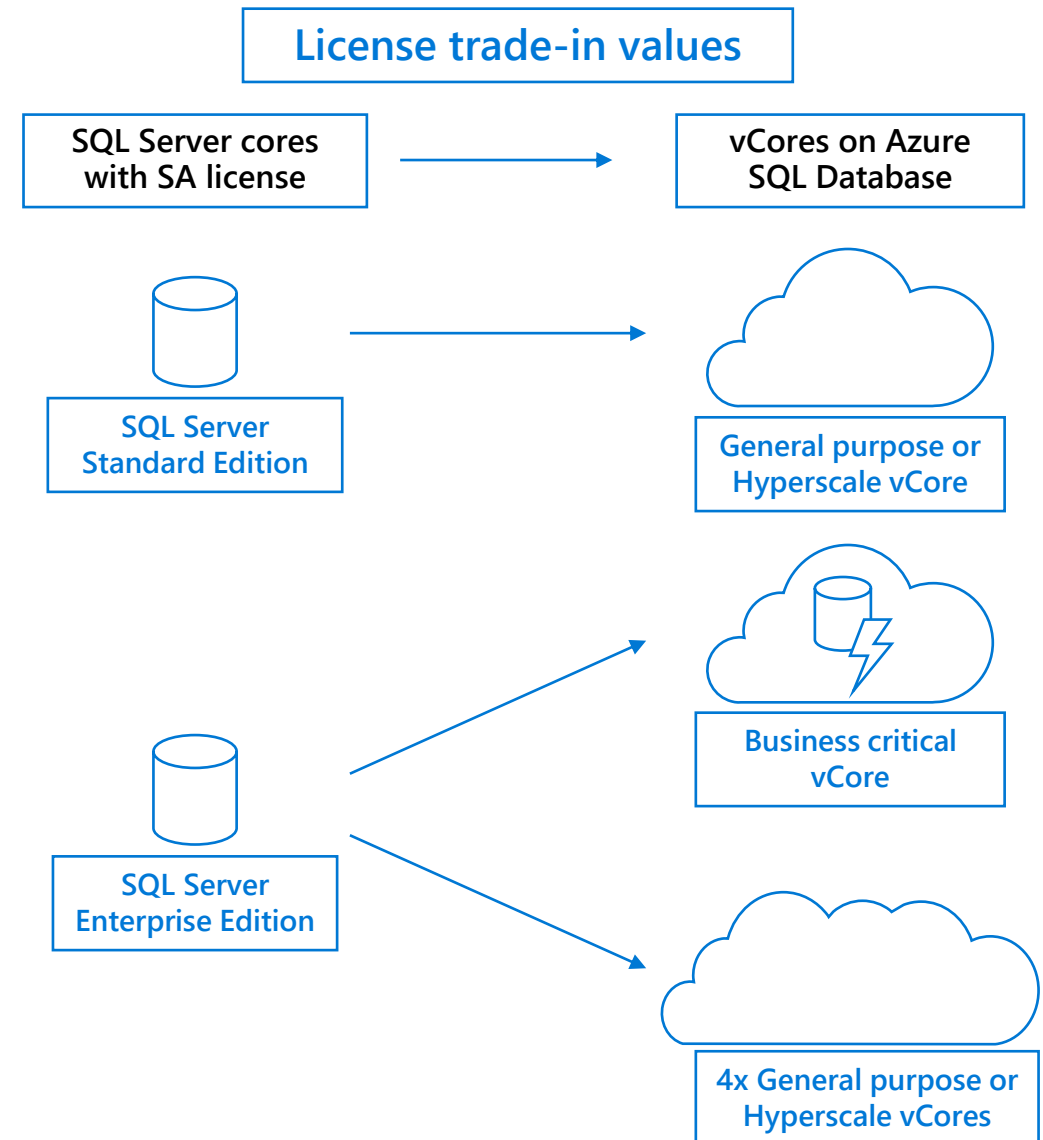
Convert SQL Server licensing with active Software Assurance to save in Azure for IaaS and PaaS.

Use licenses on-premises and under the Hybrid Benefit simultaneously for 180 days.

Azure Hybrid Benefit for SQL Server

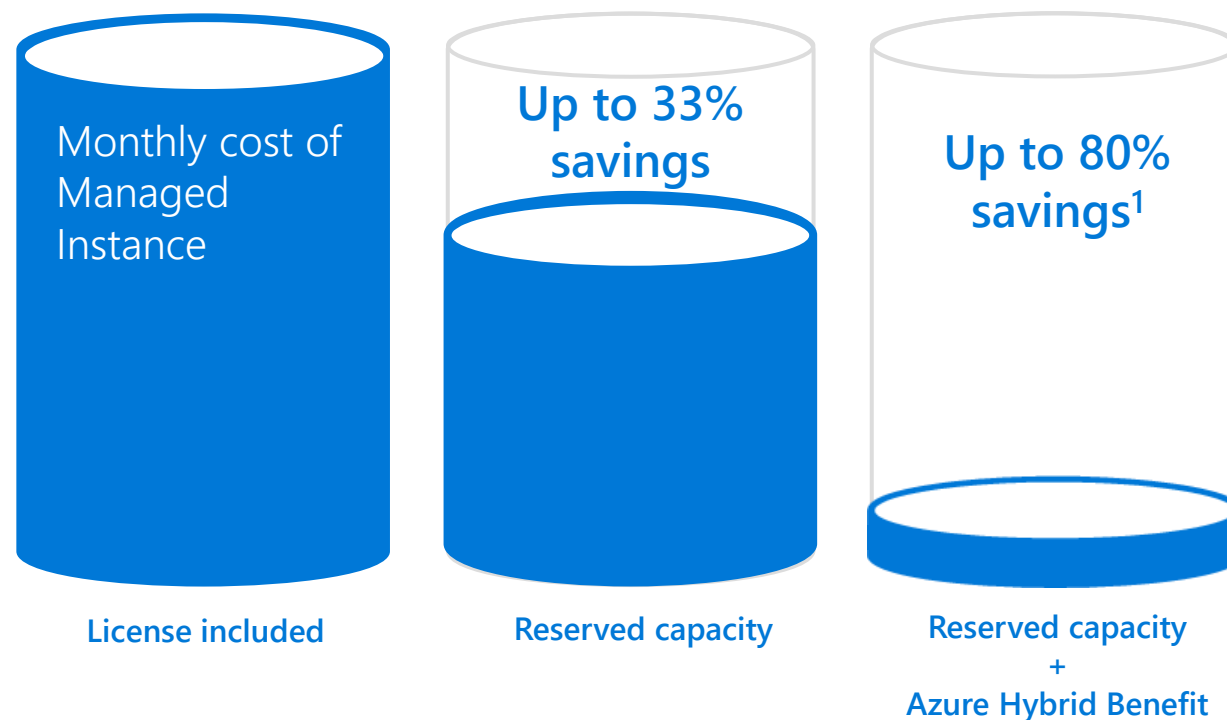
Take an inventory of on-premises licenses to determine potential for conversion. Convert on-premises cores to vCores to maximize value of investments.

- 1 Standard license core = 1 General Purpose or Hyperscale core.
- 1 Enterprise license core = 1 Business Critical core.
- **1 Enterprise license core = 4 General Purpose or Hyperscale cores** (virtualization benefit).



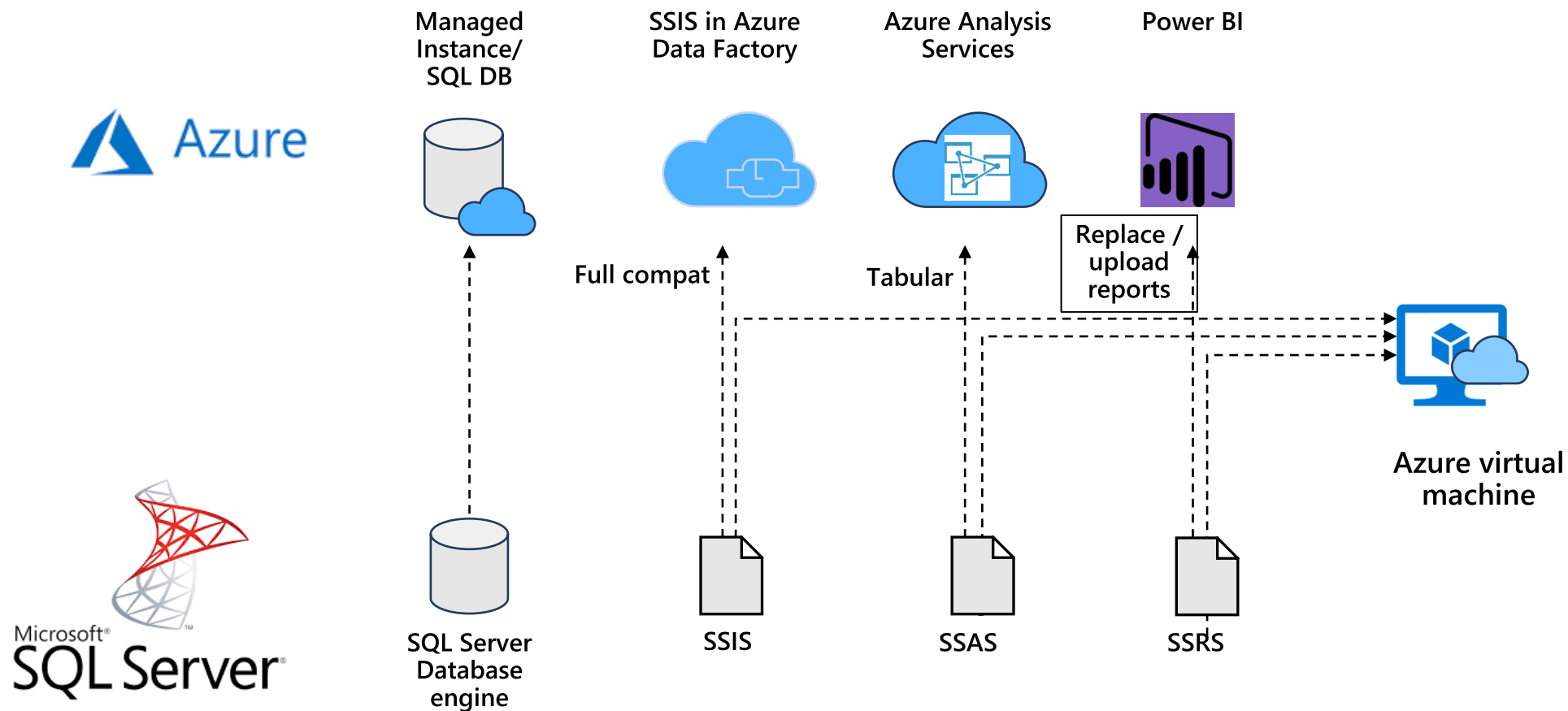
Save up to 80% with Azure SQL reserved capacity combined with AHB

- **Up to 33%** savings by pre-paying compute resources for 1 or 3 years
- **Up to 80%** when combined with AHB
- Single reservation for one or multiple subscriptions
- Reservation applies to any number of databases, elastic pools or managed instances in the same service tier



¹ Savings based on three-year commitment. Savings do not account for SA costs which may vary based on terms of the EA. Savings vary depending on the service tier, and region.

Migrate full SQL Server stack to Azure

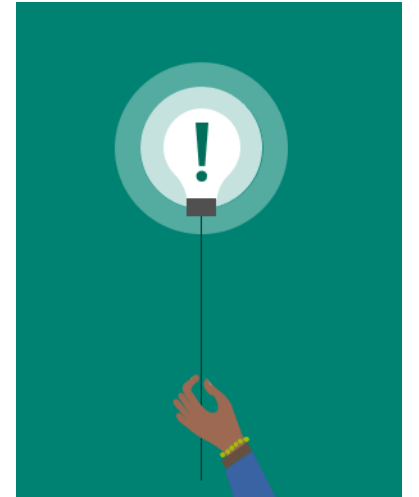


Lesson 2: Azure IaaS Fundamentals

Objectives

After completing this learning, you will be able to:

- Explain the basic aspects of the Azure architecture that can affect the performance of SQL Server on IaaS.
- Learn Azure Storage Services.
- Understand the basics of Azure Virtual Machines storage.



Resource Groups

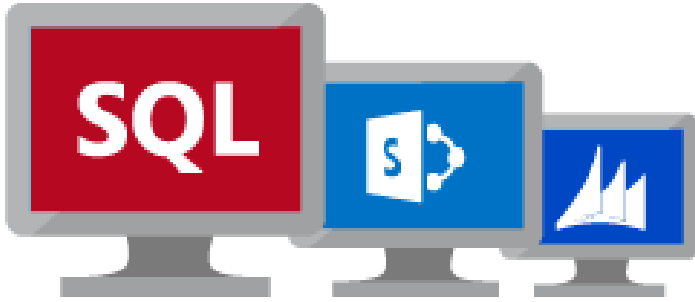
Resource Group is collection of resources with the same lifecycle.

Every resource belongs to only one resource group.

Resources have types defined by resource providers.



Azure Virtual Machines

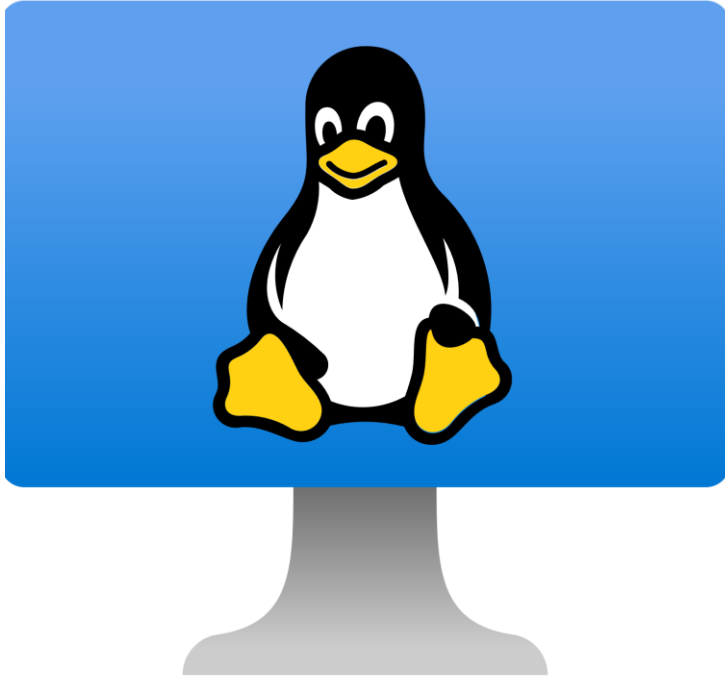


An Azure Virtual Machine gives you the flexibility of virtualization without having to buy and maintain the physical hardware that runs the virtual machine.

You still need to maintain the virtual machine: configuring, patching, and maintaining the software that runs on the virtual machine.

Variety of VM series for all application needs.

Azure Virtual Machine (VM)



Linux Options



SQL Server on Azure SQL VM



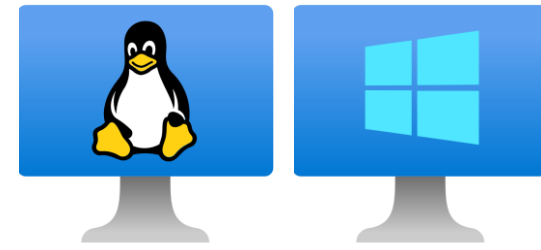
Windows Options

[Overview of SQL Server on Azure Windows Virtual Machines - SQL Server on Azure VM | Microsoft Docs](#)

[Virtual machines in Azure - Azure Virtual Machines | Microsoft Docs](#)

[VM sizes - Azure Virtual Machines | Microsoft Docs](#)

Azure - VM Naming Convention (1)



- **Family** and Sub-family - Indicates the VM Family Series and specialized variations
- # of **vCPUs** - Denotes the number of vCPUs of the VM
- **Features:**
 - a - AMD-based processor
 - d - disk (local temp disk is present); this is for newer Azure VMs
 - m - the most amount of memory in a particular size
 - s - Premium Storage capable
 - i - isolated size
 - h - hibernation capable
 - l - low memory; a lower amount than the memory intensive size
 - t - tiny memory; the smallest amount of memory in a particular size
 - r - RDMA capable
- Accelerator Type - Denotes the type of hardware accelerator in the specialized/GPU SKUs.
- Version - Denotes the version of the VM Family Series

Azure VM - Naming Convention (2)

[Family] + *[Sub-family]* + **[# of vCPUs]** + **[Additive Features]** + *[Accelerator Type]** + **[Version]**

Virtual Machine: E80ids_v4

| Value | Details |
|-------------------|--|
| Family | E |
| # of vCPUs | 80 |
| Additive Features | i = isolated size d = local temp disk is present s = Premium Storage capable |

Azure SQL VM - Deployment

Azure Marketplace images come with prebuilt SQL Server default configurations

Often customers must configure their instance after the deployment

Configuration options available during deployment:

- Move system databases to a data disk
- Configure tempdb data and log files
- Ability to change collation from default collation
- Configure Maximum Degree of Parallelism
- Configure Min Server Memory and Max Server Memory
- Configure Optimize for Adhoc Workloads

Configure Instance Settings

SQL Server settings



Server Collation

Server collation defines the rules that sort and compare data, and will be applied to all databases in this SQL instance. The default server collation is SQL_Latin1_General_CP1_CI_AS. [Learn more](#)

Collation *

SQL_Latin1_General_CP1_CI_AS

[Find a collation](#)

MAXDOP

Customize the max degree of parallelism option to limit the number of processors to use in parallel plan execution. [Learn more](#)

MAXDOP * ⓘ

0

SQL Server memory limits

Configure the minimum and maximum amount of memory that SQL Server Memory Manager can allocate to a SQL Server process. [Learn more](#)

Minimum server memory (MB) * ⓘ

0

Maximum server memory (MB) * ⓘ

2147483647

Optimize for ad-hoc workload

Optimize for ad-hoc workload to improve the efficiency of the plan cache for workloads that contains many single use ad-hoc batches. [Learn more](#)

Optimize for ad-hoc workload



Demonstration

- Get familiar with the Microsoft Azure portal and see the services Microsoft Azure provides.
- Get familiar with the process of creating an Azure Virtual Machine.



Azure Virtual Machine Sizing



Each series have different capabilities such as SSD local drives or support for Premium Storage.

The size affects the processing, memory, and storage capacity and pricing of the virtual machine.

| Type of Computing | Sizes | Description |
|----------------------------|---|--|
| General | B, Dsv3, Dv3, Dasv4, Dav4, DSv2, Dv2, Av2, DC, DCv2 | Balanced CPU-to-memory ratio. Ideal for testing and development, small to medium databases, and low to medium traffic web servers. |
| Compute Optimized | Fsv2 | High CPU-to-memory ratio. Good for medium traffic web servers, network appliances, batch processes, and application servers. |
| Memory Optimized | Esv3, Ev3, Easv4, Eav4, Mv2, M, DSv2, Dv2 | High memory-to-CPU ratio. Great for relational database servers , medium to large caches, and in-memory analytics. |
| Storage Optimized | Lsv2 | High disk throughput and IO. Ideal for Big Data, SQL, NoSQL databases, data warehousing and large transactional databases. |
| GPU | NC, NCv2, NCv3, ND, NDv2 (Preview), NV, NVv3, NVv4 | Heavy graphic rendering and video editing. |
| High Performance Optimized | HB, HBv2, HC, H | Our fastest and most powerful CPU virtual machines. |

Azure VM – Explore Pricing Options

OS/Software:

Currency:

Showing 27 applicable virtual machine series.

Category:

VM series:

Region:

☒ Show Azure Hybrid Benefit pricing

| Instance | vCPU(s) | RAM | Temporary storage | Pay as you go with AHB | Pay as you go with Azure Hybrid Benefit for SQL Server | 1 year reserved with AHB | 3 year reserved with AHB | 3 year reserved with AHB for SQL Server and Windows Server |
|----------|---------|---------|-------------------|------------------------|--|------------------------------------|------------------------------------|--|
| E4ds v5 | 4 | 32 GiB | 150 GiB | \$1,305.2400/month | \$344.5600/month ~76% savings | \$1,218.9978/month ~6% savings | \$1,174.8912/month ~9% savings | \$79.8912/month ~94% savings |
| E8ds v5 | 8 | 64 GiB | 300 GiB | \$2,610.4800/month | \$689.1200/month ~76% savings | \$2,438.0832/month ~6% savings | \$2,349.7751/month ~9% savings | \$159.7751/month ~94% savings |
| E16ds v5 | 16 | 128 GiB | 600 GiB | \$5,220.9600/month | \$1,378.2400/month ~76% savings | \$4,876.1664/month ~6% savings | \$4,699.5575/month ~9% savings | \$319.5575/month ~94% savings |
| E20ds v5 | 20 | 160 GiB | 750 GiB | \$6,526.2000/month | \$1,722.8000/month ~76% savings | \$6,095.1642/month ~6% savings | \$5,874.4414/month ~9% savings | \$399.4414/month ~94% savings |
| E32ds v5 | 32 | 256 GiB | 1,200 GiB | \$10,441.9200/month | \$2,756.4800/month ~76% savings | \$9,752.3328/month ~6% savings | \$9,399.1369/month ~9% savings | \$639.1369/month ~94% savings |
| E48ds v5 | 48 | 384 GiB | 1,800 GiB | \$15,662.8800/month | \$4,134.7200/month ~76% savings | \$14,628.4992/month ~6% savings | \$14,098.6944/month ~9% savings | \$958.6944/month ~94% savings |

Azure VM – Explore Series Options

| Size | vCPU | Memory: GiB | Temp storage (SSD) GiB | Max data disks | Max temp storage throughput: IOPS/MBps [*] | Max uncached disk throughput: IOPS/MBps | Max burst uncached disk throughput: IOPS/MBps ⁵ | Max NICs | Max network bandwidth (Mbps) |
|-------------------|------|----------------|---------------------------------|----------------------|--|---|--|-------------|---------------------------------------|
| Standard_E4ds_v5 | 4 | 32 | 150 | 8 | 19000/250 | 6400/145 | 20000/1200 | 2 | 12500 |
| Standard_E8ds_v5 | 8 | 64 | 300 | 16 | 38000/500 | 12800/290 | 20000/1200 | 4 | 12500 |
| Standard_E16ds_v5 | 16 | 128 | 600 | 32 | 75000/1000 | 25600/600 | 40000/1200 | 8 | 12500 |
| Standard_E20ds_v5 | 20 | 160 | 750 | 32 | 94000/1250 | 32000/750 | 64000/1600 | 8 | 12500 |
| Standard_E32ds_v5 | 32 | 256 | 1200 | 32 | 150000/2000 | 51200/865 | 80000/2000 | 8 | 16000 |
| Standard_E48ds_v5 | 48 | 384 | 1800 | 32 | 225000/3000 | 76800/1315 | 80000/3000 | 8 | 24000 |

Azure VM – Explore Storage Options

| | Disk Size | Price per month | 1-Year Reserved Price Per Month | Max IOPS (Max IOPS w/ bursting) | Max throughput (Max throughput w/ bursting) | Price per mount per month (Shared Disk) |
|-----|--------------------|-----------------|---------------------------------|---------------------------------|---|---|
| P30 | 1 TiB | \$122.88 | \$116.75 | 5,000 (30,000) | 200 MB/second (1,000 MB/second) | \$6.57 |
| P40 | 2 TiB | \$235.52 | \$223.75 | 7,500 (30,000) | 250 MB/second (1,000 MB/second) | \$13.14 |
| P50 | 4 TiB | \$450.56 | \$428 | 7,500 (30,000) | 250 MB/second (1,000 MB/second) | \$25.55 |
| P60 | 8 TiB | \$860.16 | \$817.17 | 16,000 (30,000) | 500 MB/second (1,000 MB/second) | \$51.10 |
| P70 | 16 TiB | \$1,638.40 | \$1,556.50 | 18,000 (30,000) | 750 MB/second (1,000 MB/second) | \$109.50 |
| P80 | 32 TiB (32767 GiB) | \$3,276.80 | \$3,113 | 20,000 (30,000) | 900 MB/second (1,000 MB/second) | \$219 |

Checklist: Best practices for SQL Server on Azure VMs

VM Size

- The new EbdsV5-series provides the highest I/O throughput-to-vCore ratio in Azure along with a memory-to-vCore ratio of 8. This series offers the best price-performance for SQL Server workloads on Azure VMs. Consider this series first for most SQL Server workloads.
- Use VM sizes with 4 or more vCPUs like the [E4ds v5](#) or higher

Storage

- To optimize storage performance, plan for highest uncached IOPS available and use data caching as a performance feature for data reads while avoiding [virtual machine and disks capping/throttling](#).
- For the data drive, use [premium P30 and P40 or smaller disks](#) to ensure the availability of cache support
- Place [tempdb](#) on the local ephemeral SSD (default) drive

Demonstration

Overview of Service Tiers available for Azure SQL VM

- Review the different Service Tiers, Compute and Hardware options available while creating an Azure SQL VM



Azure Storage Services

Durable and highly available

- Redundancy ensures that your data is safe in the event of transient hardware failures. You can also opt to replicate data across datacentres or geographical regions for additional protection from local catastrophe or natural disaster.

Secure

- All data written to an Azure storage account is encrypted by the service.

Scalable

- Azure Storage is designed to be massively scalable to meet the data storage and performance needs of today's applications.

Managed

- Azure handles hardware maintenance, updates, and critical issues for you.

Azure Storage Services

| Feature | Description | When to use |
|---|--|--|
| Azure Files <i>Managed file shares for cloud or on-premises deployments.</i> | Offers fully managed cloud file shares that you can access from anywhere via the industry standard Server Message Block (SMB) protocol. You can mount Azure file shares from cloud or on-premises deployments of Windows, Linux, and macOS. | You want to "lift and shift" an application to the cloud that already uses the native file system APIs to share data between it and other applications running in Azure. You want to replace or supplement on-premises file servers or NAS devices. |
| Azure Blobs <i>A massively scalable object store for text and binary data. Also includes support for big data analytics through Data Lake Storage Gen2.</i> | Allows unstructured data to be stored and accessed at a massive scale in block blobs. Also supports Azure Data Lake Storage Gen2 for enterprise big data analytics solutions. | You want your application to support streaming and random-access scenarios. You want to be able to access application data from anywhere. You want to build an enterprise data lake on Azure and perform big data analytics. |
| Azure Disks <i>Block-level storage volumes for Azure VMs.</i> | Allows data to be persistently stored and accessed from an attached virtual hard disk. | You want to "lift and shift" applications that use native file system APIs to read and write data to persistent disks. You want to store data that is not required to be accessed from outside the virtual machine to which the disk is attached. |
| Azure Queues <i>A messaging store for reliable messaging between application components.</i> | Allows for asynchronous message queueing between application components. | You want to decouple application components and use asynchronous messaging to communicate between them. |
| Azure Tables <i>A NoSQL store for schema less storage of structured data.</i> | Allow you to store structured NoSQL data in the cloud, providing a key/attribute store with a schema less design. | You want to store flexible datasets like user data for web applications, address books, device information, or other types of metadata your service requires. |

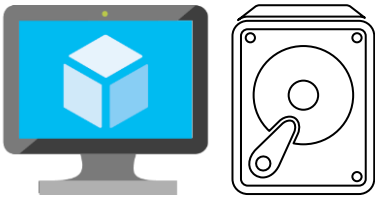
Azure VM - Disks

Block-level storage volumes for Azure VMs



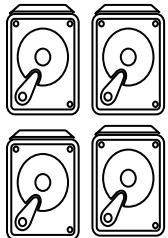
Operating System Disk

- Every virtual machine has one attached operating system disk
- The OS disk has a pre-installed OS, which was selected when the VM was created
- This disk contains the boot volume
- This disk has a maximum capacity of 2,048 GiB



Temporary disk

- Provides short-term storage
- Intended to only store data such as page or swap files
- Data may be lost during a [maintenance event](#) or when you [redeploy a VM](#)
- During a successful standard reboot of the VM, the data on the temporary disk will persist



Data disks

- A managed disk to store application data, or other data
- Registered as SCSI drives and are labeled with a letter that you choose
- Each data disk has a maximum capacity of 32,767 gibibytes (GiB)
- The size of the VM determines how many data disks you can attach to it and the type of storage you can use to host the disks

[Azure Disk Storage overview - Azure Virtual Machines | Microsoft Docs](#)

Basics – Azure Managed Disks

Block-level storage volumes that are managed by Azure

Just like physical disk in an on-premises server but, virtualized

Need to only specify the disk size and the disk type to provision the disk

Benefits of managed disks:

- Highly durable and available
- Simple and scalable VM deployment
- Integration with Availability Sets
- Integration with Availability Zones
- Azure Backup support
- Granular access control
- Upload your VHD
- Encryption

Basics – Azure Disk Types

| | Ultra SSD | Premium SSD | Standard SSD | Standard HDD |
|-----------------------|---|---|--|---|
| Disk type | SSD | SSD | SSD | HDD |
| Scenario | IO-intensive workloads such as SAP HANA, top tier databases (for example, SQL, Oracle), and other transaction-heavy workloads | Production and performance sensitive workloads To get IOPS and Bandwidth higher than the maximum value of a single premium storage disk, use multiple premium disks striped together | Web servers, lightly used enterprise applications and dev/test | Backup, non-critical, infrequent access |
| Max disk size | 65,536 gibibyte (GiB) | 32,767 GiB | 32,767 GiB | 32,767 GiB |
| Max throughput | 2,000 MiB/s | 900 MiB/s | 750 MiB/s | 500 MiB/s |
| Max IOPS | 160,000 | 20,000 | 6,000 | 2,000 |

Adding a new disk: Non-SQL image

Create a virtual machine ...

Basics Disks Networking Management Monitoring Advanced Tags Review + create

Azure VMs have one operating system disk and a temporary disk for short-term storage. You can attach additional data disks. The size of the VM determines the type of storage you can use and the number of data disks allowed. [Learn more](#)

OS disk

OS disk type * ⓘ Premium SSD (locally-redundant storage) ▼

Delete with VM ⓘ ☒

Key management ⓘ Platform-managed key

Enable Ultra Disk compatibility ⓘ ☐

Data disks for jdtestbasic

You can add and configure additional data disks for your virtual machine or attach existing disks. This VM also has a temporary disk.

| LUN | Name | Size (GiB) | Disk type | Host caching | Delete with VM |
|-----|------|------------|-----------|--------------|----------------|
|-----|------|------------|-----------|--------------|----------------|

[Create and attach a new disk](#) [Attach an existing disk](#)

Enable Ultra Disk compatibility ⓘ ☐

Create a new disk ...

Create a new disk to store applications and data on your VM. Disk pricing varies based on factors including disk size, storage type, and number of transactions. [Learn more](#)

Name * jdtestbasic_DataDisk_0

Source type * ⓘ None (empty disk) ▼

Size * ⓘ **1024 GiB**
Premium SSD LRS
[Change size](#)

Key management ⓘ Platform-managed key ▼

Enable shared disk ☐ Yes ☒ No

Delete disk with VM ☒

Adding a new disk: With SQL image

Home > Azure SQL > Select SQL deployment option >

Create a virtual machine ...

BasicsDisksNetworkingManagementMonitoringAdvancedSQL Server settingsTagsReview + create

Storage configuration

Customize performance, size, and workload type to optimize storage for this virtual machine. By default, two data drives will be created for data and log storage by default. [Learn more about SQL storage options](#)

Storage

SQL Data: 1024 GiB, 5000 IOPS, 200 MB/s
SQL Log: 1024 GiB, 5000 IOPS, 200 MB/s
SQL TempDb: Use local SSD drive

Change configuration

Configure storage

Data storage

These disks will be attached to your virtual machine as data disks and will be stored in storage as page blobs.

Data drive location * ⓘ

Disk type * ⓘ

F:\data ✓

Premium SSD ▾

| Disk type | Size (GiB) | Max IOPS | Max Throughput | Number of disks |
|-------------------------------|------------|----------|----------------|-----------------|
| 1024 GiB, Premium SSD (... ▾) | 1024 | 5000 | 200 | 1 |

ⓘ 1024 GiB, 5000 IOPS, 200 MB/s

☐ Set system databases (except tempDb) location to newly created data storage(F:\data)

Basics - Azure Storage Redundancy

Redundancy in the Primary region

- Locally redundant storage (**LRS**)
- Zone-redundant storage (**ZRS**)

Redundancy in a Secondary region

- Geo-redundant storage (**GRS**) / Read-access geo-redundant storage (**RA-GRS**)
- Geo-zone-redundant storage (**GZRS**) / Read-access geo-zone-redundant storage (**RA-GZRS**)

| Outage scenario | LRS | ZRS | GRS/RA-GRS | GZRS/RA-GZRS |
|--|-----|-----|-------------------|--------------------|
| A node within a data center becomes unavailable | Yes | Yes | Yes | Yes |
| An entire data center (zonal or non-zonal) becomes unavailable | No | Yes | Yes | Yes |
| A region-wide outage occurs in the primary region | No | No | Yes | Yes |
| Read access to the secondary region is available if the primary region becomes unavailable | No | No | Yes (with RA-GRS) | Yes (with RA-GZRS) |
| Copies of data | 3 | 3 | 6 | 6 |

Questions?



Lesson 3: SQL Server IaaS Agent Extension

Objectives

After completing this learning, you will be able to:












- Understand what is SQL Server IaaS Agent Extension.
- Understand the different options available to register a SQL Server VM in Azure with the SQL Server IaaS agent extension
- Understand the steps to register a SQL VM in Azure with the SQL Server IaaS agent extension



What is the SQL Server IaaS Agent Extension?

| Features | Registration | Licensing | Compliance |
|---|---|---|--|
| <ul style="list-style-type: none">• The SQL Server IaaS Agent Extension runs on Azure VMs.• Automates task like Backups and Patching.• Unified experience in managing all of Azure SQL family.• Enables customers to adopt PaaS-like capabilities with IaaS-based SQL Servers at no additional charge. | <ul style="list-style-type: none">• Deploying a SQL Server VM Azure Marketplace image through the Azure portal automatically registers the SQL Server VM with the resource provider• Self-installs of SQL Server on an Azure virtual machine will need to register the SQL Server VM to install the SQL Server IaaS Agent Extension. | <ul style="list-style-type: none">• Self-installed VMs with IaaS extensions can be easily converted to PayGo images.• Save money by converting variable workloads with Software Assurance to PayGo images. | <ul style="list-style-type: none">• Self-installed VMs with IaaS extension automatically indicate usage of Azure Hybrid Benefit.• Ensure compliance with Azure terms and conditions without any extra effort. |

PaaS features for Azure SQL VMs

| Features of SQL IaaS Extensions | Extensions enabled | |
|--|---|---|
| | Lightweight mode | Full mode |
| Visibility of SQL editions and configuration state via Portal Management |  |  |
| Visibility to the licensing of SQL Server instances |  |  |
| SQL IaaS/PaaS deployments managed in one location |  |  |
| SQL Server integration with Azure Key Vault | |  |
| Automatic configuration of Always On for High Availability | |  |
| Automated Patching (for critical updates) | |  |
| Automated Backup (with Point-in-Time Restore) | |  |
| Disk Scaling and Utilization view | |  |

Management Modes

If the **SQL Server IaaS Agent Extension** has not already been installed, registering with the SQL Server IaaS Agent Extension automatically installs the SQL Server IaaS agent extension in one of three management modes, specified during the registration process. Not specifying the management mode will install the SQL IaaS agent extension in full management mode.

Lightweight

- Does not require the restart of SQL Server
- Supports only changing the license type and edition of SQL Server
- Use this option for SQL Server VMs with multiple instances, or participating in a failover cluster instance (FCI)
- No impact to memory or CPU
- No associated cost
- It is recommended to register your SQL Server VM in lightweight mode first, and then upgrade to Full mode during a scheduled maintenance window.

Full

- Requires a restart of the SQL Server and system administrator permissions
- Supports all functionality
- Use it for managing a SQL Server VM with a single instance
- Installs two windows services that have a minimal impact to memory and CPU
- No associated cost

NoAgent

- Dedicated only for SQL Server 2008 and SQL Server 2008 R2 installed on Windows Server 2008
- No associated cost

Automatic Azure SQL VM registration

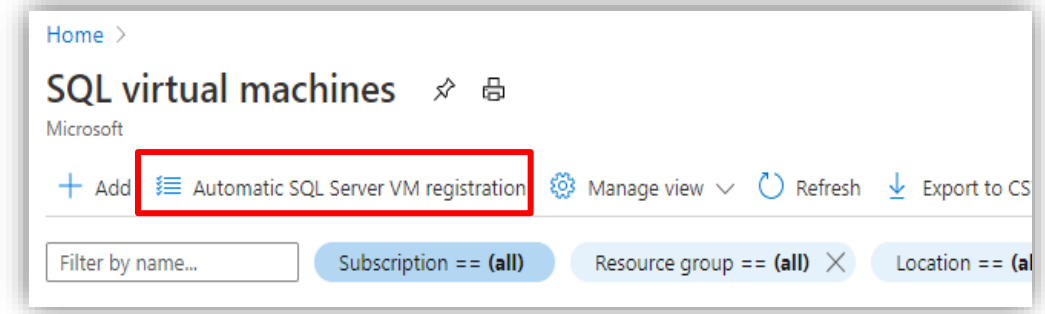
Automatic SQL Server VM registration button enables SQL IaaS Extensions features for all SQL VMs within a given subscription automatically.

Activation will require consent of the person who performs activation.

Microsoft will not use this data for licensing audits without customer's advance consent.

The SQL IaaS extensions will become active for all SQL Server VMs, and the features of lightweight mode will be activated within 24 hours after the activation.

Registering extension in full mode does not require restart of the server.



SQL VM Management Experience

Manage SQL Server configuration under the Virtual Machine blade.

SQL management experience on Virtual Machines

The new SQL focused management experience provides a single view of all your [Virtual Machines running SQL Server](#). You can manage your SQL Virtual Machines with features like automated patching, automated backup, licensing and edition flexibility.

Earlier SQL manageability was offered for only SQL Server Azure marketplace images, but you can now register any Azure virtual machine, with SQL Server installed, with the [SQL VM Resource provider](#) and unlock all manageability features.

All upcoming manageability features and improvements will only be made available through this new experience.

[Manage SQL virtual machine](#)

Manageability options

Lightweight Mode

- Different manageability options that are enabled when the SQL Server IaaS extension is enabled

data-sqlvm02
SQL virtual machine

Search (Ctrl+/) << Refresh Delete Feedback

Overview Access control (IAM) Settings Automation Tasks Support + troubleshooting New support request

Settings

- Configure
- Security
- Patching
- Backups
- Additional features
- High Availability (Preview)
- Properties

Automation

Tasks

Storage chart data is not available for current resource

Only license type and edition updates are available with the current SQL IaaS extension mode (LightWeight), to enable all manageability features for the SQL virtual machine click here. →

Essentials

Resource group (change) : MIP-DataAI-RG03
Status : Online
Location : West US 2
Subscription (change) :
Subscription ID :
SQL configuration : [Click here to view SQL extension configuration](#)
Tags (change) : [Click here to add tags](#)

Version : SQL Server 2019
Edition : Developer
Virtual machine : data-sqlvm02
Virtual machine OS : Windows (Windows Server 2019 Datacenter)
Virtual machine size : Standard A4 v2
License type : Pay As You Go

Notifications (0) **Features (7)**

All Pricing (2) Security (2) Configuration (3)

License type
Configure the licensing model and SQL server edition for the SQL Server virtual machine.
CONFIGURED

Storage configuration
Automate your storage configuration by attaching storage to the VM, making that storage accessible to SQL Server.
NOT AVAILABLE

SQL connectivity
Configuration the connection to the SQL Server instance running on your Azure virtual machine.
NOT AVAILABLE

Azure Key Vault integration
Configure the Azure Key Vault (AKV) service to manage and store the cryptographic keys.
NOT AVAILABLE

Automated patching
Establish a maintenance window for an Azure Virtual Machine running SQL Server.
NOT AVAILABLE

Automated backup
Configure the backups options for SQL Server running in a Windows virtual machine.
NOT AVAILABLE

R Services (Advanced analytics)
Configure the the machine learning capabilities for SQL Server running in a Windows virtual machine.
NOT AVAILABLE

Manageability options


Full Mode

- Different manageability options that are enabled when the SQL Server IaaS extension is enabled

The screenshot displays the Azure portal interface for an SQL virtual machine. The left-hand navigation pane is highlighted with a red rectangle, showing the 'Settings' section with options like 'Configure', 'Security', 'Patching', 'Backups', 'Additional features', 'High Availability (Preview)', and 'Properties'. The main content area is divided into several sections:

- Overview:** Displays basic information about the resource, including the resource group (MIP-DataAI-RG03), status (Online), location (West US 2), subscription, and subscription ID. It also provides links to view the SQL extension configuration and add tags.
- Properties:** A table listing various properties of the SQL virtual machine, such as Version (SQL Server 2019), Edition (Developer), Virtual machine (data-sqlvm02), Virtual machine OS (Windows (Windows Server 2019 Datacenter)), Virtual machine size (Standard A4 v2), and License type (Pay As You Go).
- Storage:** A bar chart showing the storage usage for the SQL virtual machine. The chart compares the available storage (140 GiB) with the storage used by SQL data (59 MiB), SQL log (18 MiB), and Other (14.6 GiB). The total storage used is 87.6 MiB.
- Features:** A section titled 'Features (7)' that lists various features and their configuration status. The features are: License type (CONFIGURED), Storage configuration (CONFIGURED), SQL connectivity (CONFIGURED), Azure Key Vault integration (NOT CONFIGURED), Automated patching (NOT CONFIGURED), Automated backup (NOT CONFIGURED), and R Services (Advanced analytics) (NOT CONFIGURED).

Simplify License Management

 **data-sqlvm02** | Configure

SQL virtual machine

[Feedback](#)

Overview

Access control (IAM)

Tags

Settings

Configure

Security

Patching

Backups

Additional features

High Availability (Preview)

Properties

Automation

SQL Server License

Save up to 43% with a license you already own with Azure Hybrid Benefit. Get a free SQL server licenses in Azure for High Availability and Disaster Recovery through Software Assurance. These discounts are only supported for Standard and Enterprise editions. [Learn more](#)

SQL Server License ⓘ

Pay As You Go

Azure Hybrid Benefit

HA/DR

Edition

Edition of SQL Server running on the virtual machine. SQL Server is billed based on this edition type.

Edition ⓘ

Developer

Developer

Express

Standard

Enterprise

Web

STORAGE USAGE

Review your storage optimization config

Storage for this virtual machine is op

Drive

Drive capacity

Storage Configuration

- Once the SQL Server virtual machine is running, you have the option of increasing the storage capacity of your disks and the wizard will help you determine if you are picking a configuration setting which could be the victim of a capacity limit.
- Extending drives adds more storage capacity but does not add more IOPS and throughput capacity. If you need more IOPS and throughput, you will need to build a new storage pool and migrate the data to the new pool.

The image shows the Azure portal interface for configuring a SQL virtual machine. On the left, the 'Configure' page for 'data-sqlvm03' is visible, showing various settings like SQL Server License, Edition, and Storage Usage. A blue arrow points from the 'Extend drive' button in the 'Data' row of the 'STORAGE USAGE' table to a modal window titled 'Extend Data drive'.

data-sqlvm03 | Configure

SQL virtual machine

Search (Ctrl+/) << Feedback

Overview

Access control (IAM)

Tags

Settings

Configure

Security

Patching

Backups

Additional features

High Availability (Preview)

Properties

Automation

Tasks

Support + troubleshooting

New support request

SQL Server License

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SQL Server License ⓘ

Pay As You Go Azure Hybrid Benefit HA/DR

Edition

Edition of SQL Server running on the virtual machine. SQL Server is billed based on this edition type.

Edition ⓘ

Developer

STORAGE USAGE

Review your storage optimization configuration here or extend your storage capacity by selecting from a variety of disk types.

Storage for this virtual machine is optimized for General use.

| Drive | Drive capacity | |
|--------|--|-------------------------------|
| Data | SQLVM DATA1 (F:) 1023 Gib free of 1023 Gib | <button>Extend drive</button> |
| Log | Shared drive with the Data drive | Not extendable ⓘ |
| TempDb | Shared drive with the Data drive | Not extendable ⓘ |

Extend Data drive

SQL virtual machine

ⓘ Add more capacity for high volume data needs. Note that the desired disk performance might not be reached if the overall IOPS, throughput and storage size exceeded the current virtual machine maximum (Standard_DS3_v3).

| Disk | Disk size | Max IOPS | Max Throughput (M... | Number of disks |
|----------------------|-----------|----------|----------------------|-----------------|
| 1024 Gib, Premium... | 1024 | 5000 | 200 | 1 |

ⓘ 1024 Gib storage will be added to Data drive 'F'.

⚠ The desired disk performance might not be reached due to the maximum virtual machine performance cap. The selected VM size (Standard_DS3_v3) only supports up to 0 remaining IOPS out of 3200 virtual machine maximum IOPS, 0 MB/s remaining data disk throughput out of 48 MB/s virtual machine maximum throughput.

SQL Connectivity

Set the port for the SQL Server instance to ensure that you are able to listen on another port other than a well-known port.

Configure the connectivity rules to make it as restrictive like allowing local connectivity only or opening it up to public internet for external applications and clients to connect to the SQL Server instance (see screenshot below).

Enable SQL Authentication for the SQL Server instance if your applications and users require this authentication method.

Configure Azure Key Vault for the SQL Server instance to leverage Key Vault for Transparent Database Encryption, Column Level Encryption and Always Encrypted features of SQL Server to enable encryption of data at rest and in motion.

The screenshot shows the Azure portal interface for an SQL virtual machine named 'data-sqlvm02'. The left sidebar contains navigation links: Overview, Access control (IAM), Tags, Settings (with sub-links for Configure, Security, Patching, Backups, and Additional features), and a search bar. The main content area is titled 'Security & Networking' and includes a 'Feedback' link. Under 'SQL connectivity', there is a dropdown menu currently showing 'Private' and a 'Port' field set to '1433'. Below this, the 'SQL CREDENTIALS' section shows 'SQL Authentication' as 'Enabled'. The 'AZURE KEY VAULT INTEGRATION' section includes a description and a toggle for 'Azure Key Vault integration' which is currently set to 'Disable'.

SQL Connectivity Options:

- Private (within Virtual Network)
- Local (inside VM only)
- Public (Internet)

Azure Key Vault Integration

Different SQL Server encryption features, such as transparent data encryption (TDE), column level encryption (CLE), and backup encryption, require you to manage and store the cryptographic keys you use for encryption.

The Azure Key Vault service is designed to improve the security and management of these keys in a secure and highly available location.

When this feature is enabled, it automatically installs the SQL Server Connector, configures the EKM provider to access Azure Key Vault, and creates the credential to allow you to access your vault.




The screenshot shows the Azure portal interface for an SQL virtual machine named 'data-sqlvm02'. The 'Security' settings page is displayed, with the 'Azure Key Vault Integration' section expanded. The 'Enable' radio button is selected, indicating that the integration is active. Below this, there are input fields for 'Key Vault URL', 'Principal name', 'Principal secret', and 'Credential name', all of which are currently empty. The left sidebar shows various navigation options like Overview, Access control, Tags, Settings, Configuration, Security, Patching, Backups, Additional features, High Availability, Properties, Automation, and Tasks.


Steps:


- Create a new key vault using **New-AzKeyVault** command. It will return **vaultUri** property, which is the **key vault URL**.
- After key vault is created, add your keys to the key vault.


Automated Patching Feature


- The **Automated Patching** feature allows a SQL Server administrator to select a maintenance window schedule for applying Important Windows Server and SQL Server updates that are distributed through the Windows Update channel.

**data-sqlvm02 | Patching**
SQL virtual machine


 Feedback


 Overview


 Access control (IAM)


 Tags


Settings


 Configure


 Security

 Patching

 Backups



 Additional features

 High Availability (Preview)

 Properties

Automated patching

Set a patching window during which all Windows and SQL patches will be applied.

 Only Windows and SQL Server updates marked Important are installed. Other SQL Server updates, such as Cumulative Updates, must be installed manually.
[Learn more](#) 

Automated patching

Disable

Enable

Maintenance schedule ⓘ

Daily

Maintenance start hour (local time)

23:00 (11:00 p.m.)

Maintenance window duration (minutes)

60

Automated Backup

- The **Automated Backup** feature allows you to setup SQL Server backups with various options like encrypting backups, set a retention period, backup system databases, configuring a manual backup schedule or setting up an automated backup.

The screenshot shows the 'Backups' configuration page for a SQL virtual machine named 'data-sqlvm02'. The left sidebar contains navigation links: Overview, Access control (IAM), Tags, Settings (with sub-links for Configure, Security, Patching, Backups, Additional features, High Availability (Preview), and Properties), Automation (with a link for Tasks), and Support + troubleshooting (with a link for New support request). The 'Backups' section is currently selected. The main content area is titled 'data-sqlvm02 | Backups' and includes a search bar and a feedback link. The 'Automated backup' section contains the following settings: 'Automated backup' is enabled (toggle); 'Retention period (days)' is set to 30; 'Storage account' is 'mipdataaistorage02 (Premium_LRS)' with a link to 'Select storage account'; 'Encryption' is enabled (toggle); 'Password' and 'Confirm password' fields are empty; 'Backup system databases' is enabled (toggle); 'Configure backup schedule' is set to 'Automated' (toggle), with a note 'Specify the schedule for full and log backups'; 'FULL BACKUP SCHEDULE' section includes 'Backup frequency' set to 'Weekly' (toggle), 'Backup schedule' set to 'Sunday' (dropdown), 'Backup start time (local VM time)' set to '00:00 (12:00 midnight)' (dropdown), and 'Full backup time window (hours)' set to 2 (slider).

data-sqlvm02 | Backups

SQL virtual machine

Search (Ctrl+/) << Feedback

Overview

Access control (IAM)

Tags

Settings

Configure

Security

Patching

Backups

Additional features

High Availability (Preview)

Properties

Automation

Tasks

Support + troubleshooting

New support request

Automated backup

Configure backups for databases in your virtual machine. All your SQL Server databases in this virtual machine will be backed up automatically per the settings you choose. If you decide to change settings via SQL Server Managed Backup in the future, the new settings will override the Automated Backup settings.

Automated backup

Retention period (days)

Storage account * mipdataaistorage02 (Premium_LRS)
<https://mipdataaistorage02.blob.core.windows.net/>
[Select storage account](#)

Encryption

Password *

Confirm password

Backup system databases

Configure backup schedule

Specify the schedule for full and log backups

FULL BACKUP SCHEDULE

Backup frequency

Take full backups every week beginning at the next specified start time

Backup schedule *

Backup start time (local VM time)

Full backup time window (hours)

High Availability Feature

- The new **High Availability** feature allows you to create a new cluster or onboard an existing cluster, and then create the availability group, listener, and internal load balancer.

data-sqlvm02 | High Availability (Preview)

SQL virtual machine

Search (Ctrl+ /)

<

+ New Always On availability group

+ New Windows Server Failover Cluster

Feedback

Overview

Access control (IAM)

Tags

Settings

Configure

Security

Patching

Backups

Additional features

High Availability (Preview)

Availability Groups

This SQL Server VM does not meet the prerequisites for creating an availability group. Join the current SQL Server VM to a domain. [Learn more.](#)

The Always On availability group feature is a high-availability solution that maximizes the availability of a set of user databases for an enterprise. An availability group supports a failover environment for a discrete set of user databases, known as availability databases, that fail over together. An availability group supports a set of read-write primary databases and one to eight sets of corresponding secondary databases. [Learn more](#)

| Availability Group | Role | Synchronization Health | Listener |
|---|------|------------------------|----------|
| Always On availability group not configured | | | |

IaaS Agent Extension Options

Configuring the options while creating the SQL Virtual Machine from Marketplace

[Home](#) > [SQL virtual machines](#) > [Select SQL deployment option](#) >

Create a virtual machine

Basics Disks Networking Management Advanced SQL Server settings Tags Review + create

Security & Networking

SQL connectivity *

Port *


SQL Authentication

SQL Authentication  Disable Enable

Azure Key Vault integration  Disable Enable

Storage configuration

Customize performance, size, and workload type to optimize storage for this virtual machine. For optimal performance, separate drives will be created for data and log storage by default. [Learn more about SQL Server best performance practices.](#)

 The default storage configuration for SQL virtual machines has changed, now including OLTP optimization and separate drives for data and log storage.

Storage

Storage optimization: Transactional processing

SQL Data: 1024 GiB, 5000 IOPS, 200 MB/s

SQL Log: 1024 GiB, 5000 IOPS, 200 MB/s

SQL TempDb: Use local SSD drive

[Change configuration](#)

SQL Server License

Save up to 43% with licenses you already own. Already have a SQL Server license? [Learn more](#)

SQL Server License  ☒ No ☐ Yes

Automated patching

Set a patching window during which all Windows and SQL patches will be applied.

Automated patching  Enabled
Sunday at 2:00
[Change configuration](#)

Automated backup

Automated backup  Disable Enable

R Services(Advanced Analytics)

SQL Server Machine Learning Services (In-Database)  Disable Enable


Configure storage


Storage optimization  General Transactional processing Data warehousing

Data storage

These disks will be attached to your virtual machine as data disks and will be stored in storage as page blobs.

Data drive location *   Disk type * 

| Disk type | Size (GiB) | Max IOPS | Max Throughput | Number of disks |
|---|------------|----------|----------------|--------------------------------|
| 1024 GiB, Premium SSD (P...  | 1024 | 5000 | 200 | <input type="text" value="1"/> |

 1024 GiB, 5000 IOPS, 200 MB/s





Log storage

Transaction logs are a critical component of the database as they record all transactions and database modifications made by each transaction.

Shared drive space *   Log drive location *  

TempDb storage

The tempDb system database is a global resource that is available to all users connected to the instance of SQL Server. It is used to store temporary user objects and internal objects created by the database engine.

Shared drive space *   TempDb drive location *  

Share the data drive for tempDb
Share the log drive for tempDb
Use local SSD drive
Use a separate drive for tempDb

Discover Azure VMs running SQL Server

Azure Marketplace SQL Server Images









- Microsoft Certified Images
- Provision SQL VM in ~5 min
- Choose PAYG or AHB licensing models
- SQL VM IaaS extension is enabled by default

Custom installed SQL Server instances

- SQL Server installation is owned by you
- Requires indicating AHB usage to Microsoft
- Enables only Virtual Machine services
- **You should register with SQL VM IaaS extension to access free SQL Server Manageability**

SQL virtual machines

Microsoft


 Add  Automatic SQL Server VM registration  Manage view  Refresh  Export to CSV  Open query  Assign tags  Feedback

Filter by name...

Subscription == 11 of 23 selected

Resource group == all X

Location == all X

 Add filter

Showing 1 to 3 of 3 records.

| <input type="checkbox"/> Name ↑↓ | Resource group ↑↓ | License... ↑↓ | Version ↑↓ | Edition ↑↓ | Location ↑↓ |
|---|-------------------|----------------|--------------|------------|-------------|
| <input type="checkbox"/>  data-sqlvm01 | MIP-DataAI-RG03 | Pay As You ... | SQL2019-W... | Developer | West US 2 |
| <input type="checkbox"/>  data-sqlvm02 | MIP-DataAI-RG03 | Pay As You ... | SQL2019-W... | Developer | West US 2 |
| <input type="checkbox"/>  data-sqlvm03 | MIP-DataAI-RG03 | Pay As You ... | SQL2019-W... | Developer | West US 2 |

Register a SQL Server VM in Azure with the SQL Server IaaS Agent extension

Registration methods



Automatic Registration

Single VM Registration

Bulk register multiple VMs

Automatic Registration

The automatic registration feature allows customers to automatically register all current and future SQL Server VMs in their Azure subscription with the SQL VM IaaS Agent Extension.

Automatic registration registers your SQL Server VMs in lightweight mode which does not touch the SQL Server service or databases at all, it's simply a lightweight background agent.

You need to manually upgrade to full manageability mode to take advantage of the full feature set. Once it is upgraded to FULL mode, SQL Server is restarted simply to grant access to the agent login.

Automatic Registration - Enable

Automatic registration of your SQL Server VMs

Sign into the Azure portal.

Navigate to the **SQL virtual machines** resource page.

Select **Automatic SQL Server VM registration** to open the Automatic registration page.

Choose your subscription from the drop-down.

Read through the terms and if you agree, select **I accept**.

Select **Register** to enable the feature and automatically register all current and future SQL Server VMs with the SQL VM IaaS agent extension. This will not restart the SQL Server service on any of the VMs.

SQL virtual machines

Microsoft

+

Add

Automatic SQL Server VM registration

⚙️

Manage view

↺

Refresh

↓

Export to CSV

🔗

Open query

🏷️

Assign tags

💡

Feedback

Filter by name...

Subscription == 11 of 23 selected

Resource group == all

Location == all

+

Add filter

Showing 1 to 3 of 3 records.

| <input type="checkbox"/> Name ↑↓ | Resource group ↑↓ | License... ↑↓ | Version ↑↓ | Edition ↑↓ | Location ↑↓ |
|---------------------------------------|-------------------|----------------|--------------|------------|-------------|
| <input type="checkbox"/> data-sqlvm01 | MIP-DataAI-RG03 | Pay As You ... | SQL2019-W... | Developer | West US 2 |
| <input type="checkbox"/> data-sqlvm02 | MIP-DataAI-RG03 | Pay As You ... | SQL2019-W... | Developer | West US 2 |
| <input type="checkbox"/> data-sqlvm03 | MIP-DataAI-RG03 | Pay As You ... | SQL2019-W... | Developer | West US 2 |

Automatic SQL Server VM registration

SQL virtual machine

Registering SQL Server on Azure virtual machines (VMs) with the SQL VM resource provider has several advantages including monitoring and manageability capabilities (such as [automated patching](#) and [automated backup](#)), as well as unlocking [licensing](#) and [edition](#) flexibility. The capabilities provided will expand over time as Microsoft will continue to add new benefits over time. [Learn more](#)

Automatic SQL VM resource provider registration

The automatic registration of a subscription will register all currently available SQL VMs with the SQL VM resource provider in lightweight mode as well as any SQL VMs deployed to the subscription in the future. This process does not restart the SQL Server service. Manually upgrading to full manageability mode is recommended to take advantage of the full feature set. [Learn more](#)

Subscription *

EULA

☒ I accept the terms in the agreement *

By clicking "I accept", I confirm that I have authority to enter into agreements on behalf of the above subscription ID, and I consent to allow Microsoft to access SQL Server environment information on all Azure Virtual Machines belonging to the above subscription ID. Furthermore, I permit Microsoft to register all SQL Server instances with the SQL VM resource provider as described here. [Learn more](#)

To learn more about SQL Server data processing and privacy controls, please see the SQL Server Privacy Supplement. [Learn more](#)

Register

Cancel

Automatic Registration - Disable

- Use the [Azure CLI](#) or [Azure PowerShell](#) to disable the automatic registration feature. When the automatic registration feature is disabled, SQL Server VMs added to the subscription need to be manually registered with the SQL VM IaaS agent extension.
- This will not unregister existing SQL Server VMs that have already been registered.

Azure CLI

```
az feature unregister --namespace Microsoft.SqlVirtualMachine --name BulkRegistration
```

PowerShell

```
Unregister-AzProviderFeature -FeatureName BulkRegistration -ProviderNamespace Microsoft.SqlVirtualMachine
```


Automatic Registration

Enable for multiple subscriptions

- You can enable the automatic registration feature for multiple Azure subscriptions by using PowerShell. Follow the steps:
 - Save this [script](#) to a .ps1 file, such as **EnableBySubscription.ps1**.
 - Navigate to where you saved the script by using an administrative Command Prompt or PowerShell window.
 - Connect to Azure (az login).
 - Execute the script, passing in SubscriptionIds as parameters such as

`.\EnableBySubscription.ps1 -SubscriptionList SubscriptionId1,SubscriptionId2`

For example:

`.\EnableBySubscription.ps1 -SubscriptionList a1a1a-aa11-11aa-a1a1-a11a111a1,b2b2b2-bb22-22bb-b2b2-b2b2b2bb`

- **Note:** Failed registration errors are stored in **RegistrationErrors.csv** located in the same directory where you saved and executed the .ps1 script from.

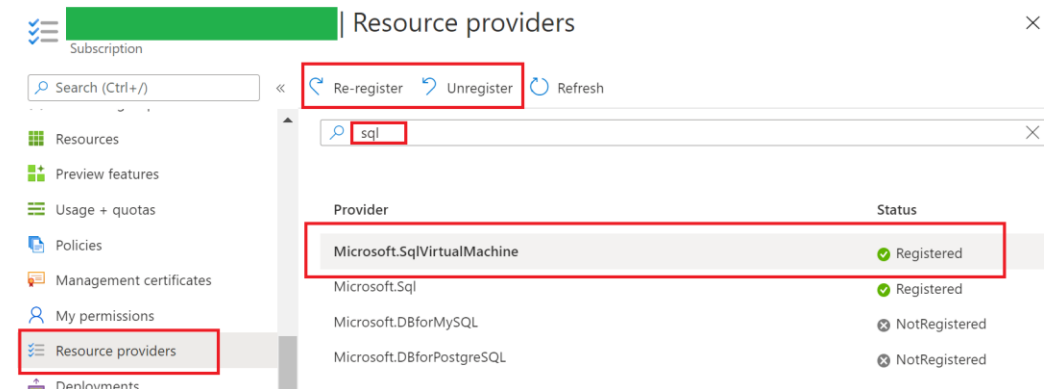
Single VM Registration

Register Subscription with the SQL Server IaaS Agent Extension

- To register your SQL Server VM with the SQL Server VM IaaS agent extension, you must first register your subscription with the SQL IaaS agent extension. This gives the SQL IaaS agent extension the ability to create resources within your subscription.
- Azure Portal
 - Open the Azure portal and go to **All Services**.
 - Go to **Subscriptions** and select the subscription of interest.
 - On the **Subscriptions** page, go to **Resource providers**.
 - Enter **sql** in the filter to bring up the SQL-related resource providers.
 - Select **Register**, **Re-register**, or **Unregister** for the **Microsoft.SqlVirtualMachine** provider, depending on your desired action.
- Command Line
 - **Azure CLI**

```
# Register the SQL VM resource provider to your subscription
az provider register --namespace Microsoft.SqlVirtualMachine
```
 - **PowerShell**

```
# Register the SQL VM resource provider to your subscription
Register-AzResourceProvider -ProviderNamespace Microsoft.SqlVirtualMachine
```



Single VM Registration

Lightweight management mode using Command Line

If the SQL Server IaaS Agent Extension has not been installed on the virtual machine, then the recommendation is to register with the SQL VM resource provider in lightweight mode.

This will install the SQL IaaS extension in lightweight mode and prevent the SQL Server service from restarting. You can then upgrade to full mode at any time but doing so will restart the SQL Server service, so it is recommended to wait until a scheduled maintenance window.

- **Azure CLI**

Register Enterprise or Standard self-installed VM in Lightweight mode

```
az sql vm create --name <vm_name> --resource-group <resource_group_name> --location <vm_location> --license-type PAYG
```

- **PowerShell**

Get the existing compute VM

```
$vm = Get-AzVM -Name <vm_name> -ResourceGroupName <resource_group_name>
```

Register SQL VM with 'Lightweight' SQL IaaS agent

```
New-AzSqlVM -Name $vm.Name -ResourceGroupName $vm.ResourceGroupName -Location $vm.Location -LicenseType PAYG -SqlManagementType LightWeight
```

Single VM Registration

Full management mode using Command Line

Registering the SQL VM in full mode will install the SQL IaaS extension and restart the SQL Server service. Please proceed with caution.

- **PowerShell**

Get the existing Compute VM

```
$vm = Get-AzVM -Name <vm_name> -ResourceGroupName <resource_group_name>
```

Register with SQL VM resource provider in full mode

```
New-AzSqlVM -Name $vm.Name -ResourceGroupName $vm.ResourceGroupName -SqlManagementType Full
```

Single VM Registration

Upgrade to full using Azure Portal

- Sign into the Azure portal.
- Go to your SQL virtual machines resource.
- Select your SQL Server VM, and select Overview.
- For SQL Server VMs with the NoAgent or lightweight IaaS mode, select the Only license type and edition updates are available with the SQL IaaS extension message.
- Select the I agree to restart the SQL Server service on the virtual machine check box, and then select Confirm to upgrade your IaaS mode to full.

SQL data-sqlvm01
SQL virtual machine

Search (Ctrl+ /) <<

Refresh Delete Feedback

Overview

Access control (IAM)

Tags

Settings

Configure

Only license type and edition updates are available with the current SQL IaaS extension mode (LightWeight), to enable all manageability features for the SQL virtual machine [click here. →](#)

Essentials

Resource group (change) : MIP-DataAI-RG03

Status : Online

Location : West US 2

Version : SQL Server 2019


Edition : Developer

Virtual machine : data-sqlvm01

Enable full manageability for SQL virtual m... ×

data-sqlvm01

SQL virtual machine full manageability mode enables automated storage, security, backup and patching configurations.

 Updating the manageability mode of SQL virtual machine to full will update the SQL IaaS extension and restart the SQL Server service on the virtual machine. [Learn more](#)

☒ I agree to restart the SQL Server service on the virtual machine. *

Confirm

Cancel

Single VM Registration

Upgrade to full using Command Line

- **Azure CLI**

Update to full mode

```
az sql vm update --name <vm_name> --resource-group <resource_group_name> --sql-mgmt-type full
```

- **PowerShell**

Get the existing Compute VM

```
$vm = Get-AzVM -Name <vm_name> -ResourceGroupName <resource_group_name>
```

Register with SQL VM resource provider in full mode

```
Update-AzSqlVM -Name $vm.Name -ResourceGroupName $vm.ResourceGroupName -SqlManagementType Full
```

Verify Status

Using Azure Portal

- Sign into the Azure portal.
- Go to your SQL Server VMs.
- Select your SQL Server VM from the list. If your SQL Server VM is not listed here, it likely hasn't been registered with the SQL VM resource provider.
- View the value under Status. If Status is **Online**, then the SQL Server VM has been registered with the SQL VM resource provider successfully.

Using Command Line

- Azure CLI

```
az sql vm show -n <vm_name> -g <resource_group>
```

- PowerShell

```
Get-AzSqlVM -Name <vm_name> -ResourceGroupName  
<resource_group>
```

The screenshot shows the Azure Portal interface for a SQL virtual machine named 'data-sqlvm02'. The machine is identified as an 'SQL virtual machine'. The left sidebar contains navigation options: Overview (selected), Access control (IAM), and Tags. The main content area shows the 'Essentials' section with the resource group 'MIP-DataAI-RG03'. A red box highlights the 'Status' field, which is 'Online'. The 'Location' is 'West US 2'. At the top of the main content area, there are links for 'Refresh', 'Delete', and 'Feedback'.

| Property | Value |
|----------|-----------|
| Status | Online |
| Location | West US 2 |

Unregister Azure SQL Virtual Machine

Using Azure Portal

Sign into the Azure portal.

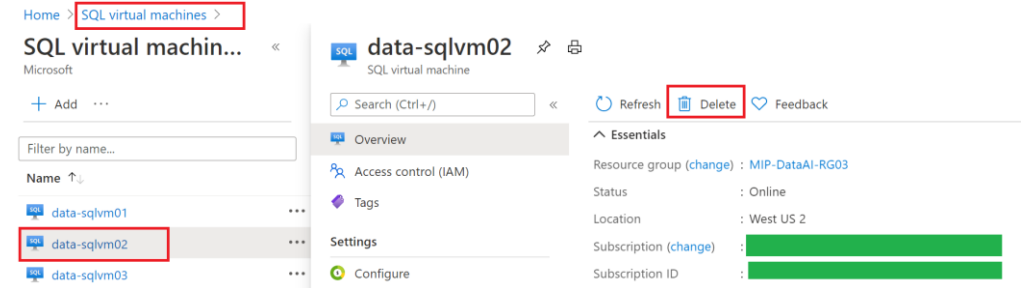
Navigate to the SQL VM resource.

Select **Delete**

Type the name of the SQL virtual machine and **clear the check box next to the virtual machine.**

Select **Delete** to confirm the deletion of the SQL virtual machine resource, and not the SQL Server VM.

NOTE: Failure to clear the checkbox next to the virtual machine name will *delete* the virtual machine entirely. Clear the checkbox to unregister the SQL Server VM from the resource provider but not delete the actual virtual machine.



Are you sure you want to delete... ×



Warning! Deleting data-sqlvm02 is irreversible. The action you're about to take can't be undone. Going further will delete it and all the items in it permanently.

TYPE THE SQL VIRTUAL MACHINE NAME

data-sqlvm02 ✓

The selected resources below will be deleted permanently. Please uncheck the resources below if you don't want to delete them. Other associated resources (disks, virtual networks, etc) will not be deleted and can be removed manually.

| <input type="checkbox"/> | Name | Type |
|--------------------------|--------------|----------------|
| <input type="checkbox"/> | data-sqlvm02 | Virtual machir |

Delete

Cancel

Unregister Azure SQL Virtual Machine

Using Command Line

- **Azure CLI**

- To unregister your SQL Server VM from the resource provider with Azure CLI, use the [az sql vm delete](#) command. This will remove the SQL Server VM resource but will not delete the virtual machine.

```
az sql vm delete --name <SQL VM resource name> | --resource-group <Resource group name> | --yes
```

- **PowerShell**

- To unregister your SQL Server VM from the resource provider with PowerShell, use the [Remove-AzSqlVM](#) command. This will remove the SQL Server VM resource but will not delete the virtual machine.

```
Remove-AzSqlVM -ResourceGroupName <resource_group_name> -Name <VM_name>
```

Bulk Register Multiple VMs

- The **Register-SqlVMs** cmdlet can be used to register all virtual machines in a given list of subscriptions, resource groups, or a list of specific virtual machines.
- The cmdlet will register the virtual machines in *lightweight* management mode and then generate both a report and a log file.
- The registration process carries no risk, has no downtime, and will not restart SQL Server or the virtual machine.
- The script to perform this operation can be found [here](#).

- **Examples:**

```
Register-SqlVMs -SubscriptionList SubscriptionId1,SubscriptionId2
```

```
Register-SqlVMs -Subscription SubscriptionId1 -ResourceGroupList ResourceGroup1,ResourceGroup2
```

```
Register-SqlVMs -Subscription SubscriptionId1 -ResourceGroupName ResourceGroup1 -VmList VM1,VM2,VM3
```

Questions?



