

SQL Server Modernization on Azure

Microsoft training



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Introduction

Welcome to the SQL Server Migration and Modernization Course in Azure. This course will allow you to learn the basics of SQL Server in the Microsoft Azure cloud, including IaaS and PaaS services.

Keep in mind that this course requires some knowledge of technology and general concepts of software development, which are not covered in it.

The Contents of this course are optimized to prepare you in the best possible way to learn in a practical way. Likewise, in addition to having access to this course, you will be participating in the Microsoft Workshop with the same name for 2 days of 3 hours each.

Thank you for your participation!



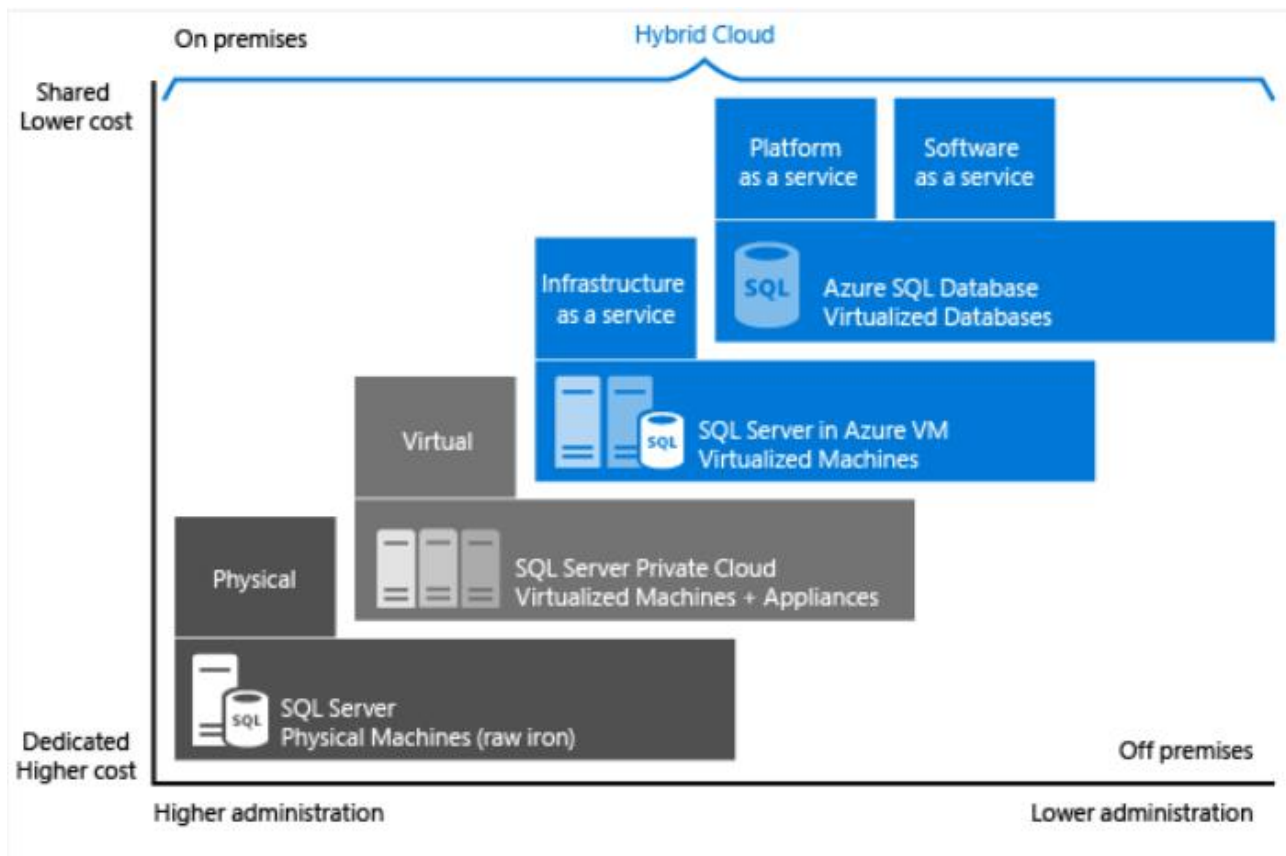
About Azure SQL

Azure SQL is a family of intelligent, secure, and managed products that use the Azure cloud SQL Server database engine. The options currently present are:

- Azure SQL Database – Support modern cloud applications in an intelligent, managed database service that includes serverless compute.
- Azure SQL Managed Instance – Modernize your existing SQL Server applications at scale with an intelligent fully managed instance as a service, which has near 100% feature parity with the SQL Server database engine. the best option for most cloud migrations.
- SQL Server on Azure Virtual Machines: Lift-and-shift your SQL Server workloads with ease and retain 100% SQL Server compatibility and OS-level access.

Azure SQL is built on the familiar SQL Server engine, so you can easily migrate applications and continue to use the tools, languages, and resources you're familiar with. Your skills and experience move to the cloud, so you can get more done with what you already have.

As seen in the diagram, each service offer can be characterized by the level of administration that is given over the infrastructure and the degree of cost-effectiveness.



In Azure, you can have SQL Server workloads run on a hosted service (PaaS) or on a hosted infrastructure (IaaS). In PaaS, you have multiple product options and service levels within each option. The key question to ask when deciding between PaaS or IaaS is whether you want to manage your database, patch, and perform backups, or delegate these operations to Azure.

Exercise 1: SQL Virtual Machines

Intro

In this section we will make the first experience together. This experience requires you to have a Microsoft Azure subscription set up and available and consumes any credits you have on it. Please review this topic to avoid charges on subscriptions where you don't want them to exist.

In this experience we will:

- Create a SQL Server on Virtual Machine with Windows.
- Learn how to check images available in Azure for VMs with integrated SQL Server.
- Access administration tools that we will use throughout the course.
- Know what is the IaaS agent for virtual machines with SQL Server.

About

SQL Server on Azure Virtual Machines allows us to use full versions of SQL Server in the cloud without having to manage all the local hardware. SQL Server on Azure Virtual Machines is an IaaS option that also simplifies license costs when you pay as you go through a consistent experience that we'll cover in this experience.

Let's explore some points about Licensing, Availability and Management.

SQL Server Licensing on Azure Virtual Machines

SQL Server software on an Azure VM must be licensed. There are automatic mechanisms to detect that a computer is running SQL Server, so one of the following models must be chosen.

Pay Per Use License

There are virtual machine images that implement SQL Server on a pay-as-you-go model. The scope is for both Enterprise, Standard, Web, Developer and Express editions (depending on the version of SQL Server). This will cause the cost of the license to be charged to the monthly price of the virtual machine (or virtual machines).

BYOL license

You can also bring your own license (BYOL). In this scenario, you only pay for the virtual machine without any additional SQL Server license charges in the monthly price. Bringing your own license can save money over time in ongoing production workloads.

To use your own license, you can convert an existing pay-as-you-go SQL Server virtual machine, or deploy an image with {BYOL} as a prefix.

Managing SQL Server on Azure Virtual Machines

Updates

SQL Server on Azure Virtual Machines provides facilities for scheduling SQL Server and Windows updates. This is possible through a special configuration panel for SQL Server on VMs. However, do not forget that being IaaS you are responsible for its maintenance.

Backups

SQL Server on Azure Virtual Machines can take advantage of Automated Backup, which regularly backs up the database to an Azure storage account, specifically in block blobs. However, do not forget that being IaaS you are responsible for its maintenance.

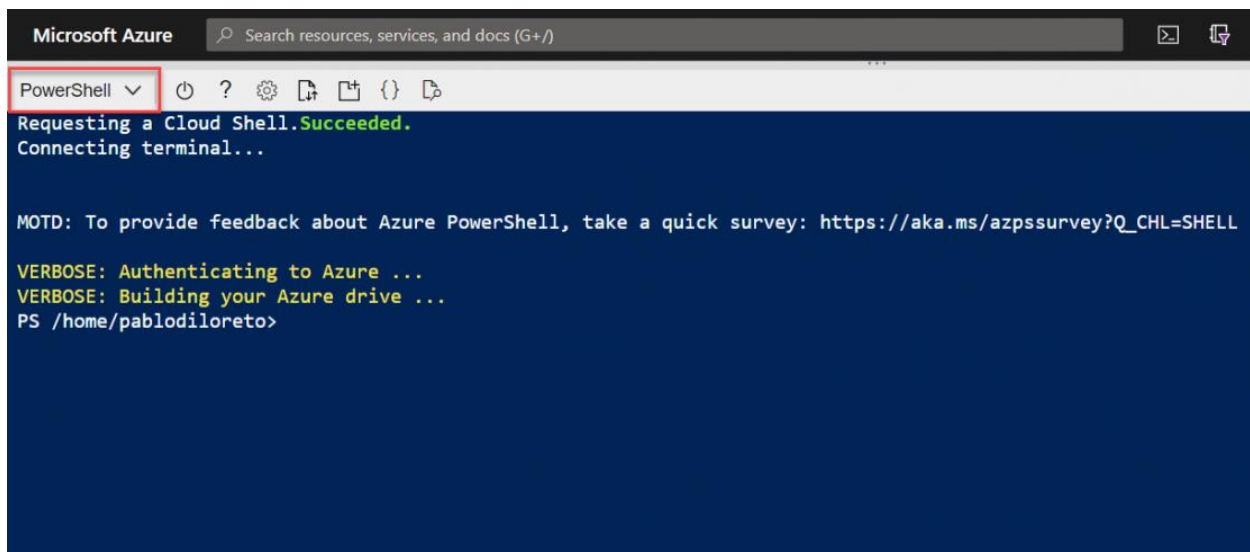
Query Available Images of Microsoft SQL Server on Azure

We are going to explore by command line what are the offers of Microsoft SQL Server in Azure (that is, in VMs). This can be done by pre-specifying an Azure location. Doing it from the command line is a simple and fast way to get the results, without exploring extensive documentation or the graphical interface.

Enter the URL <https://shell.azure.com/> and log in with your Azure user:

If you have never started Cloud Shell before, you may be prompted to create a storage account. Follow the steps to generate it.

Once you've done that, choose "PowerShell" as your scripting option:



To find out about SQL Server offerings on Azure for "IaaS", and as we said before, we must specify a location. Let's generate a variable called `$Location` and store a location there: eastus:

```
$Location = "eastus"
```



```
PowerShell | [Icons]
PS /home/pablodiloreto> $Location = "eastus"
PS /home/pablodiloreto> 
```

You will run the following command to find out the offers, reusing the "Location" variable and specifying the Publisher in MicrosoftSQLServer:

Get-AzVMImageOffer -Location \$Location -Publisher 'MicrosoftSQLServer'

```
PowerShell | [Icons]
Offer
-----
SQL2008R2SP3-WS2008R2SP1 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2008r2sp3-ws2008r2sp1-byol MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2012SP4-WS2012R2 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2012SP4-WS2012R2-BYOL MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2014SP2-WS2012R2 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2014SP2-WS2012R2-BYOL MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2014sp3-ws2012r2 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2014sp3-ws2012r2-byol MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2016SP1-WS2016 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2016SP1-WS2016-BYOL MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2016SP2-WS2012R2 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2016SP2-WS2016 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2016SP2-WS2016-BYOL MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2016sp2-ws2019 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2016sp2-ws2019-byol MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2017-RHEL7 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2017-rhel8 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2017-Ubuntu1604 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2017-ubuntu1804 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2017-WS2016 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2017-WS2016-BYOL MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2017-ws2019 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2019-RHEL7 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2019-rhel8 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2019-sles12sp5 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
SQL2019-Ubuntu1604 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2019-ubuntu1804 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2019-ubuntu2004 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2019-ubuntupro2004 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2019-ws2019 MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
sql2019-ws2019-byol MicrosoftSQLServer eastus /Subscriptions/cb197f27-ebc5-4546-b0f6-76b10bdd4d78/Providers/Microsoft.Compute/Locations/...
PS /home/pablodiloreto> 
```

You are welcome to build queries using the \$Location variable with other locations. The list of current locations can be obtained with the following PowerShell command:

Get-AzLocation / select displayname,location

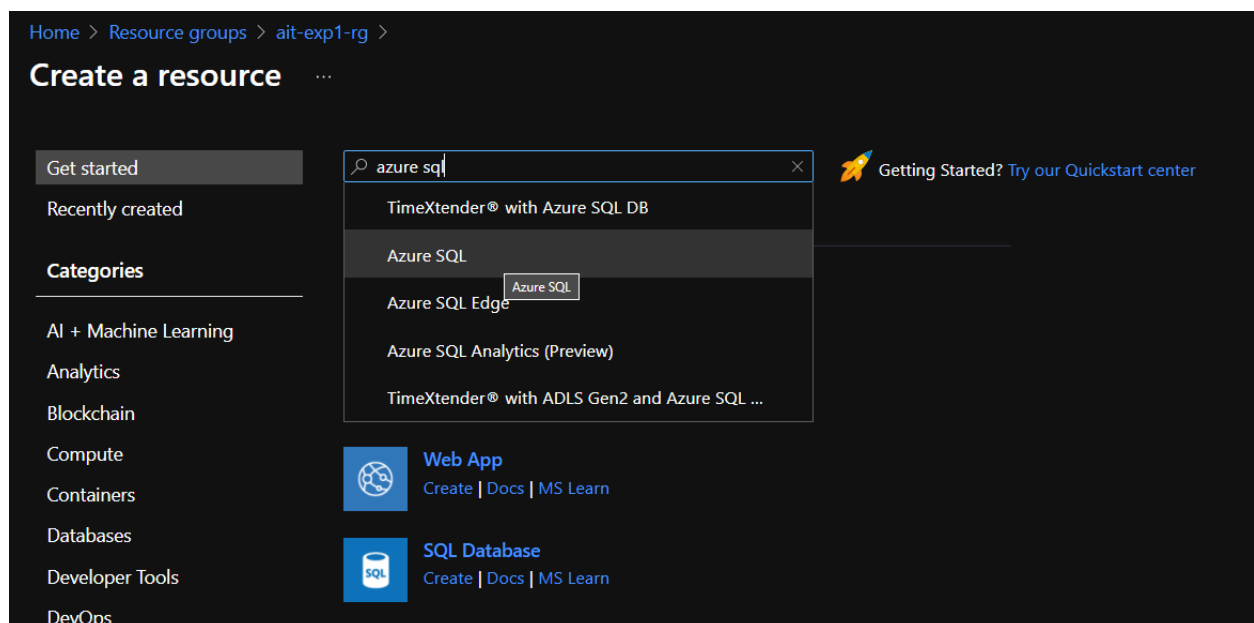
Creating a Windows VM with SQL Server

Let's create our first VM in Azure with Integrated SQL. In this case we are going to use a virtual computer with Windows operating system. Remember that you also have Linux options.

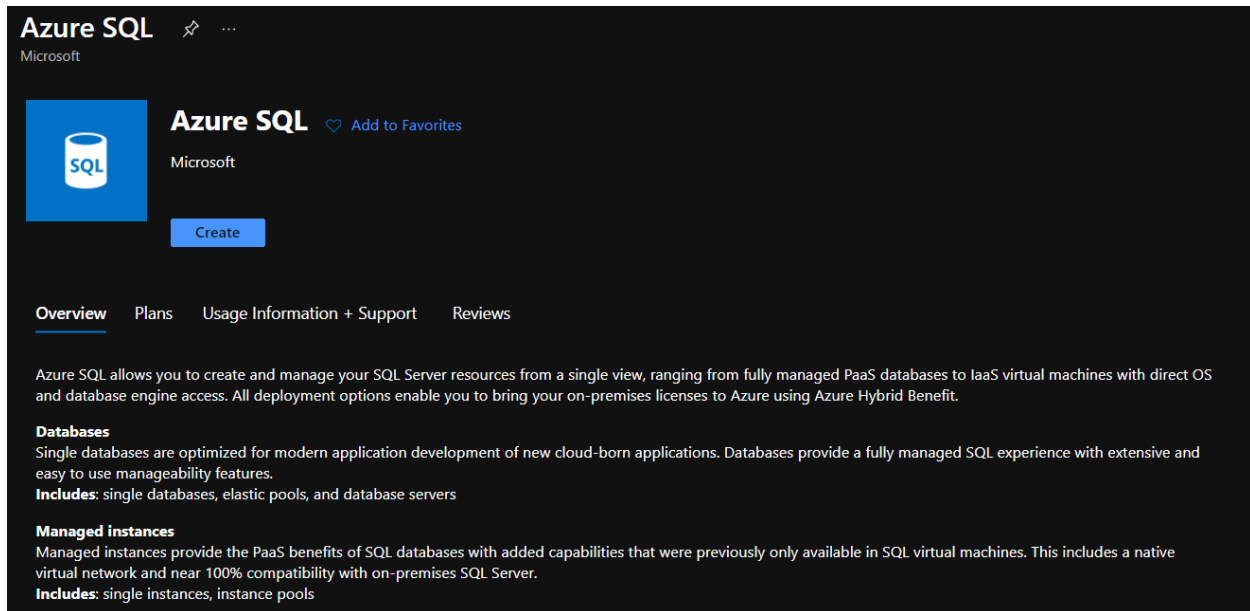
Selecting the IaaS Deployment Method

From the Azure portal we are going to work on the same Resource Group that we worked on before, whose suggested name is “sql101a-exp1-rg”. Once there you will click on new resource.

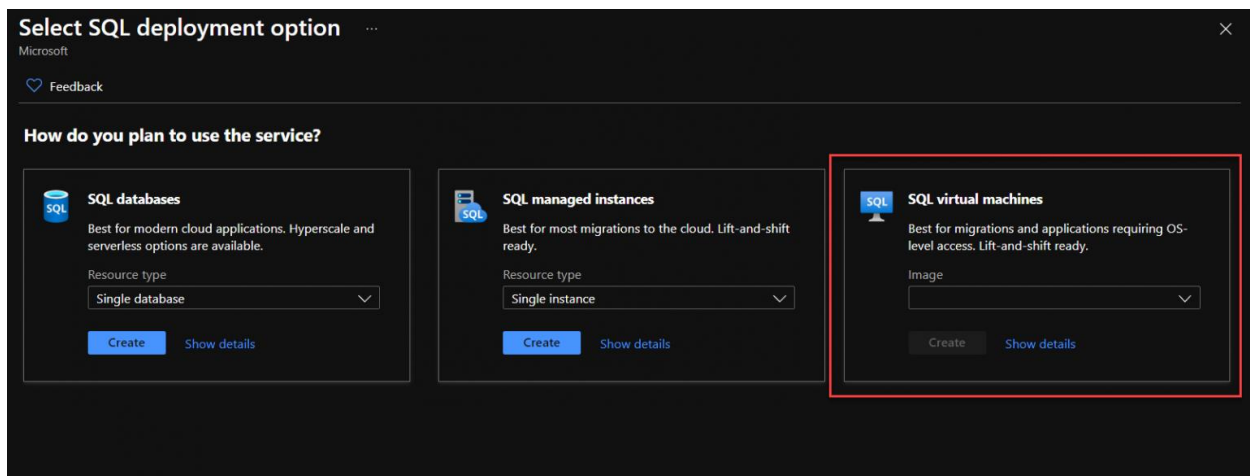
In the new resource window you will search for “azure sql” as seen on the screen:



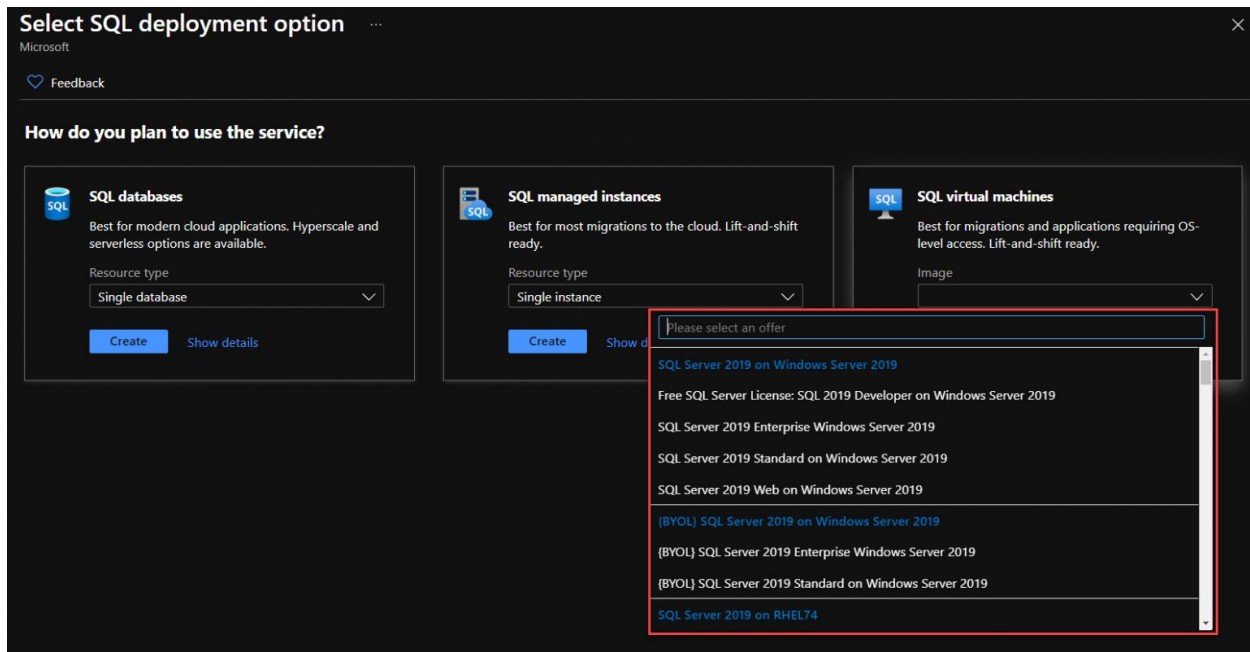
The result that will appear will be the one published by Microsoft, which is called “Azure SQL. We will click on Create:



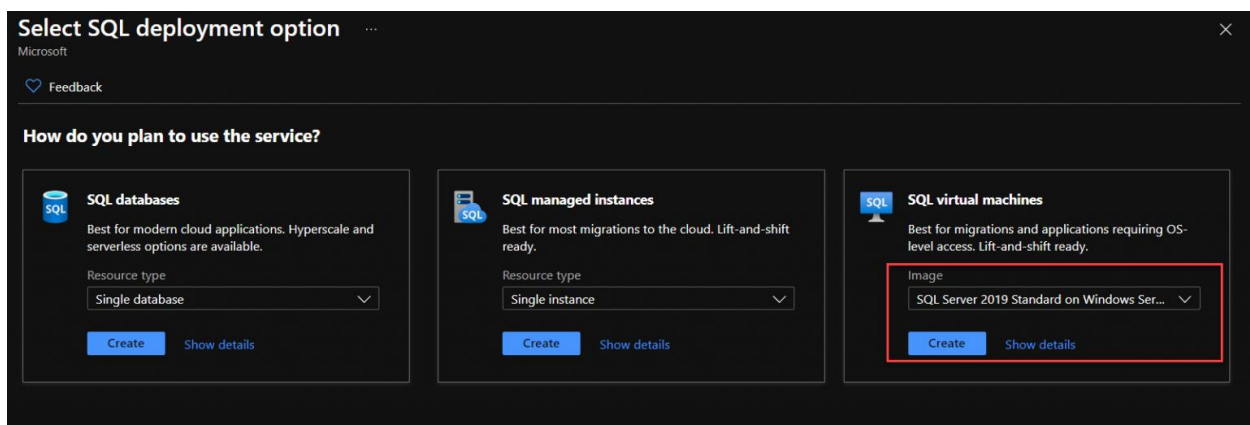
A set of options will appear that is the same as the one we have seen in the theoretical introduction. We can choose to create an Azure SQL as a Database, as a Managed Instance and as a Virtual Machine. We will focus on Virtual Machine:



If we display the image option, we can quickly see all the images offered:



We are going to choose the option “SQL Server 2019 Standard on Windows Server 2019”:



Creation of the VM

The wizard that we will find next is nothing more than the creation of a virtual machine, although with a specific image with integrated SQL. Beyond the similarity, we will discover that we will have a tab of the wizard dedicated to SQL Server settings.

Basic Options

The basic options of the virtual machine are those that we must enter YES OR YES to advance in the wizard. This flap looks like the following image:

Create a virtual machine

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

Create a virtual machine that runs Linux or Windows. Select an image from Azure marketplace or use your own customized image. Complete the Basics tab then Review + create to provision a virtual machine with default parameters or review each tab for full customization. [Learn more](#)

Project details

Select the subscription to manage deployed resources and costs. Use resource groups like folders to organize and manage all your resources.

Subscription * ⓘ Visual Studio Enterprise – MPN [5.8k] ▼

Resource group * ⓘ ait-exp1-rg ▼

[Create new](#)

Instance details

Virtual machine name * ⓘ

Region * ⓘ (US) West US 2 ▼

Availability options ⓘ No infrastructure redundancy required ▼

Image * ⓘ SQL Server 2019 Standard on Windows Server 2019 - Gen1 ▼

[See all images](#)

We are going to create the machine with the following configuration:

- Resource Group: sql101a-exp1-rg
- Operating System: SQL Server 2019 on Windows Server 2019
- VM Name: sql101a-exp1-sql19-vm
- VM Size: Standard_B2ms
- Suggested Region: East US
- VM username and password: generate a personalized one
- RDP access: enabled
- Disks: 1 disk only (operating system)
- Network configuration: leave the suggested ones
- Boot diagnostics: disabled

- Auto shutdown: set at a convenient time

We will leave the disk options at default.

Network Options

It is important that when we are configuring the network options, we leave the default options making sure that the virtual network is /16 and the subnet created is /24.

Create a virtual machine

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

Define network connectivity for your virtual machine by configuring network interface card (NIC) settings. You can control ports, inbound and outbound connectivity with security group rules, or place behind an existing load balancing solution.
[Learn more](#)

Network interface

When creating a virtual machine, a network interface will be created for you.

Virtual network * ⓘ

ait-exp1-rg-vnet

Create new

Subnet * ⓘ

default (10.0.0.0/24)

Manage subnet configuration

Public IP ⓘ

(new) sql101a-exp1-sql19-vm-ip

Create new

NIC network security group ⓘ

☐ None

☒ Basic

☐ Advanced

Public inbound ports * ⓘ

☐ None

☒ Allow selected ports

Select inbound ports *

RDP (3389)

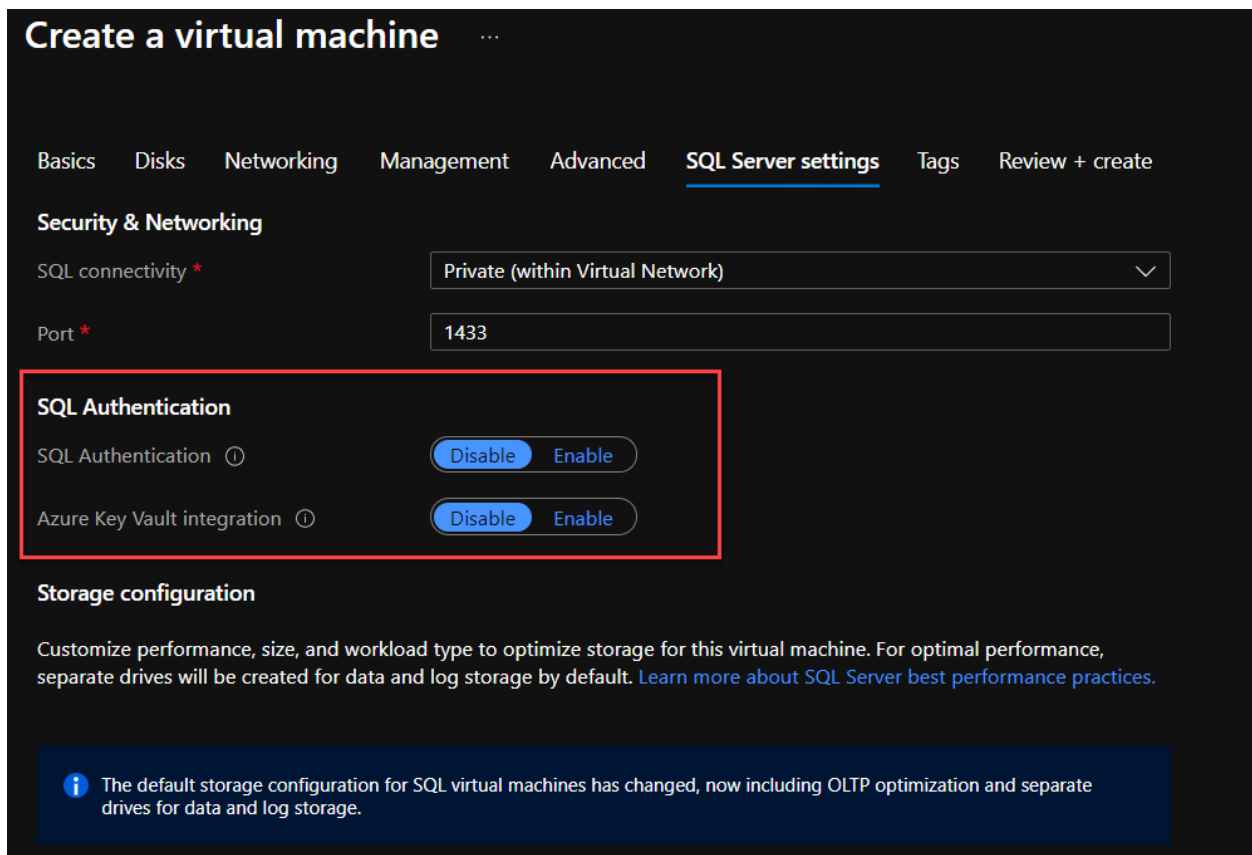
We will not modify the Management and Advanced options. We will move on to the SQL Server settings option.

SQL Server Options

This tab is a novelty, since we are talking about virtual machines for SQL Server. From here we can configure several aspects that we do not have in a normal virtual machine.

Authentication

To begin we can configure the authentication part:



The screenshot shows the 'Create a virtual machine' wizard with the 'SQL Server settings' tab selected. The 'Security & Networking' section is visible, showing 'SQL connectivity' set to 'Private (within Virtual Network)' and 'Port' set to '1433'. The 'SQL Authentication' section is highlighted with a red box, showing 'SQL Authentication' and 'Azure Key Vault integration' both set to 'Disable'. The 'Storage configuration' section is also visible, with a note about default storage configuration for SQL virtual machines.

Create a virtual machine ...

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

Security & Networking

SQL connectivity * Private (within Virtual Network) ▼

Port * 1433

SQL Authentication

SQL Authentication ⓘ

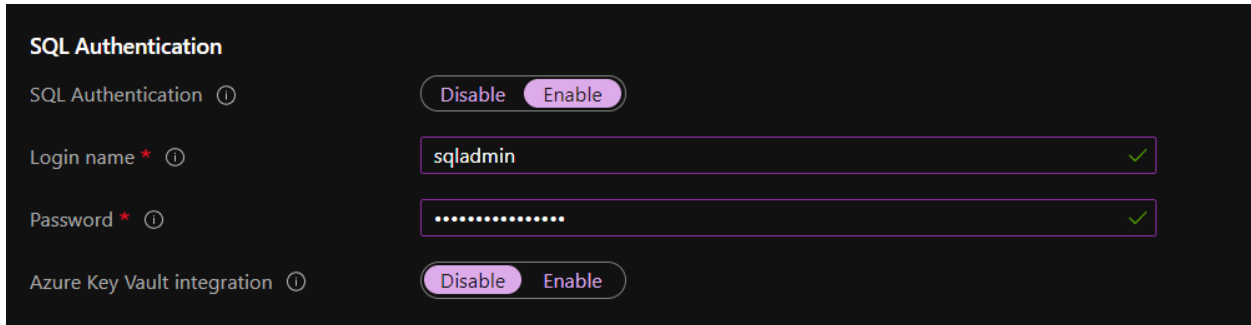
Azure Key Vault integration ⓘ

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.](#)

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

If we enable SQL authentication, we can generate a local authentication user on the server. Let's generate one with the username sqladmin and a password of your own choosing:



Storage Settings

On the other hand, we can find a complete storage configuration. For this reason we have previously skipped the disk configuration in the VM creation wizard. This option allows us to focus on the storage for SQL Server:

Create a virtual machine ...

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

We are going to select “Change configuration” to customize the disk storage:

Create a virtual machine ...

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 ⓘ

R Services(Advanced Analytics)

SQL Server Machine Learning Services
(In-Database) ⓘ

We will be able to observe that, if you chose the size that we recommend, an alert will appear since the desired performance for the selection of "Storage optimization" is not according to the size of VM that we have. Let's dismiss this alert and continue with the wizard:

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 (...)	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 * ⓘ ✓ Disk type * ⓘ ✓

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

ⓘ 1024 GiB, 5000 IOPS, 200 MB/s

⚠ The desired performance might not be reached due to the maximum virtual machine disk performance cap. The selected VM size (Standard_B2ms) only supports up to 1920 disk max iops (currently 10000 iops), 22.5 disk max throughput in MBps (currently 400 in MBps).

Note that we have options to choose from three storage optimization options: for general use, for transactional use, and for data warehouse. Let's choose the transactional use:

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 (... ▼)	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 * ⓘ ✓

Disk type * ⓘ ▼

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

ⓘ 1024 GiB, 5000 IOPS, 200 MB/s

⚠ The desired performance might not be reached due to the maximum virtual machine disk performance cap. The selected VM size (Standard_B2ms) only supports up to 1920 disk max iops (currently 10000 iops), 22.5 disk max throughput in MBps (currently 400 in MBps).

Once we choose transactional use, we will be able to customize the disk configuration for SQL Server Data. We propose you to configure the disk you want according to the options of location of the unit (Data drive location) and type of disk (Disk type):

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 (...)	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 * ⓘ ✓ Disk type * ⓘ

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

ⓘ 1024 GiB, 5000 IOPS, 200 MB/s

⚠ The desired performance might not be reached due to the maximum virtual machine disk performance cap. The selected VM size (Standard_B2ms) only supports up to 1920 disk max iops (currently 10000 iops), 22.5 disk max throughput in MBps (currently 400 in MBps).

Below we will have the option to customize the storage of logs. By default, SQL Server on VMs logically separates configuration data and configuration logs onto two separate disks. As in the previous step, we invite you to customize these options:

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 (...)	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 * ⓘ ✓ Disk type * ⓘ ✓

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

ⓘ 1024 GiB, 5000 IOPS, 200 MB/s

⚠ The desired performance might not be reached due to the maximum virtual machine disk performance cap. The selected VM size (Standard_B2ms) only supports up to 1920 disk max iops (currently 10000 iops), 22.5 disk max throughput in MBps (currently 400 in MBps).

Keep in mind that the Data and Logs configuration must be sized, according to the use that we will give to the SQL Server and the amount of data that we will have to host, as well as the periodicity of the backups and their strategy.

SQL Server License Configuration

We will accept this configuration and move on to configure the Licensing aspects. At this time we can:

- Choose pay per use according to the selected image (in our case SQL Server Standard).

- Choose a hybrid benefit option, which is the case that we already have a SQL Server license that can be applied to an Azure VM.

If you have questions about your license, you should consult a Microsoft or partner licensing specialist. In our case we will choose the "No" option (that is, we will advance by payment for use):

Create a virtual machine

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

Update Settings

SQL Server in virtual machines allows us to have facilities in relation to the installation of updates. The wizard allows us to configure automatic patching, which applies updates to SQL Server at a pre-established day and time. This does not remove our responsibility for updates: we are responsible for any problems in the VM, since we are in the IaaS delivery method. Let's choose Change configuration to explore the options we have:

Create a virtual machine

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

From here we can enable or disable automatic patching, and if we choose, we can select the day and time preference with a maintenance window. The maintenance window allows a space for patches to be applied.

SQL Automated Patching

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

Automated patching

Disable
 ☒ Enable

Maintenance schedule *i*

Sunday

✓

Maintenance start hour (local time)

02:00

✓

Maintenance window duration (minutes)

60

Backup Configuration

Another aspect with which we have facilities when we talk about SQL Server VM is backup copies. We can choose to have automatic backups made in the VM to protect our databases. However, this aspect cannot be customized from here, only enabled and disabled.

Remember that we are in IaaS delivery method: this means that the configuration we select does not remove our responsibility for backup and recovery, it is only an enabler.

Create a virtual machine ...

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

At the moment we will not configure the advanced analytics services.

Validation and Creation of VM

The last step is the validation of the selected options. If all goes well, we can generate the VM:

Create a virtual machine

✓ Validation passed

[Basics](#)
[Disks](#)
[Networking](#)
[Management](#)
[Advanced](#)
[SQL Server settings](#)
[Tags](#)
[Review + create](#)


PRODUCT DETAILS

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8.3744 ARS/hr
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TERMS

By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; (b) authorize Microsoft to bill my current payment method for the fees associated with the offering(s), with the same billing frequency as my Azure subscription; and (c) agree that Microsoft may share my contact, usage and transactional information with the provider(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not provide rights for third-party offerings. See the [Azure Marketplace Terms](#) for additional details.

 **You have set RDP port(s) open to the internet.** This is only recommended for testing. If you want to change this setting, go back to Basics tab.

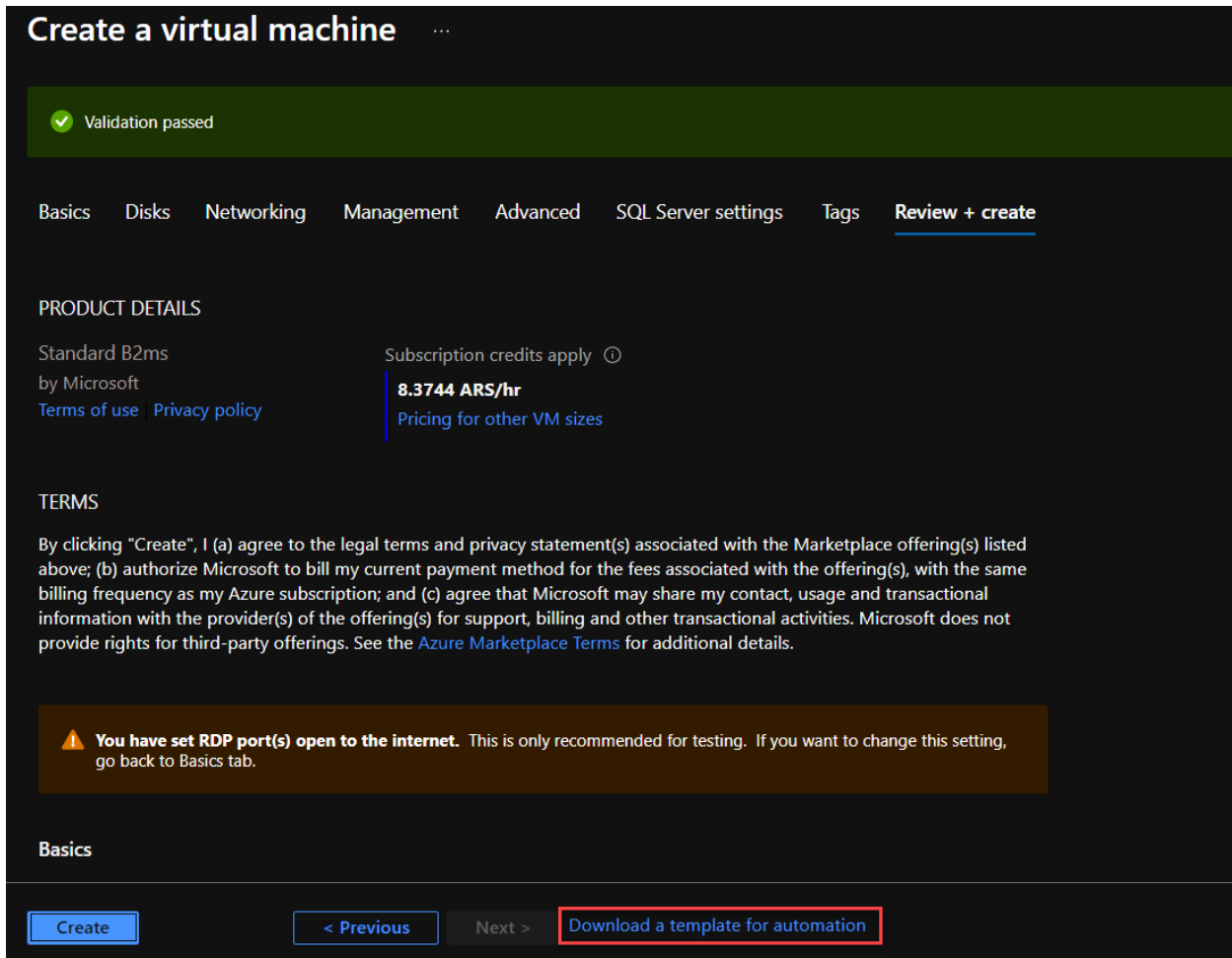
Basics

Create

[< Previous](#)
[Next >](#)
[Download a template for automation](#)

Build by Infrastructure as Code

If we want to automate the tasks performed by the graphical interface, we can choose to export the template for future use:



Create a virtual machine ...

✓ Validation passed

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

PRODUCT DETAILS

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⚠ You have set RDP port(s) open to the internet. This is only recommended for testing. If you want to change this setting, go back to Basics tab.

Basics

Create < Previous Next > **Download a template for automation**

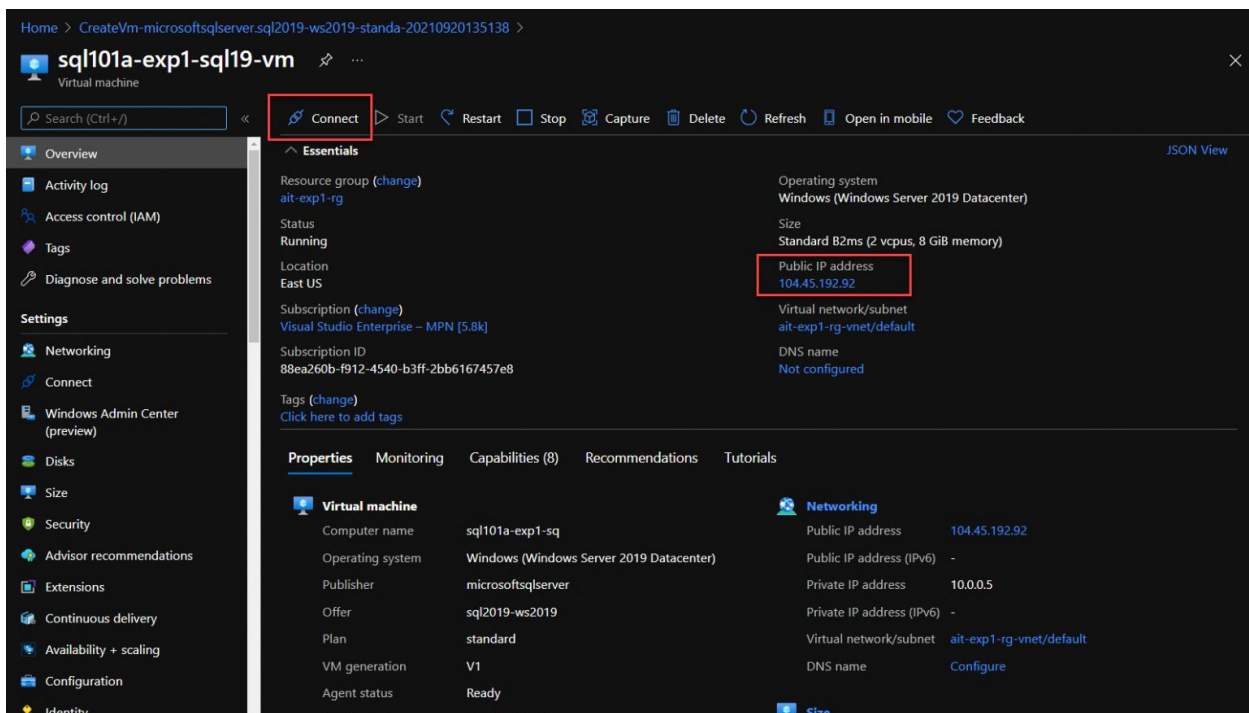
When the VM finishes creating, we can enter. We suggest you move forward.

Login to our Windows VM with SQL Server

Once the VM has been generated, we can log in via RDP. In the case of a VM with Linux, we can use SSH.

Connect to the VM via RDP

Since the goal of the course and this experience is to create a simple SQL Server VM, we have done basic configurations on our computer. To enter via RDP we will have to use the Connect button or the Public IP address from an RDP client:

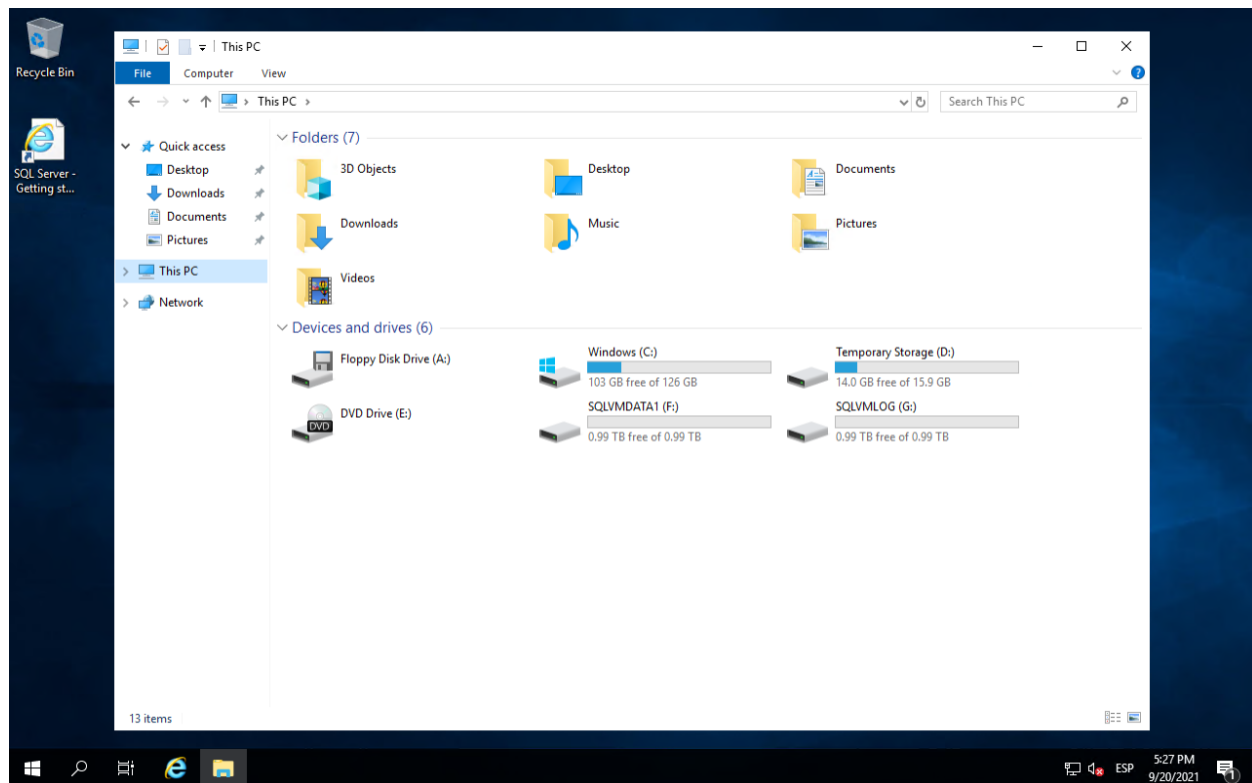


The screenshot displays the Azure portal interface for a virtual machine named 'sql101a-exp1-sql19-vm'. The 'Connect' button in the top toolbar is highlighted with a red box. The 'Public IP address' is also highlighted with a red box and shows the value '104.45.192.92'. The 'Networking' section on the right provides details about the network configuration, including the public IP address, private IP address, and virtual network/subnet.

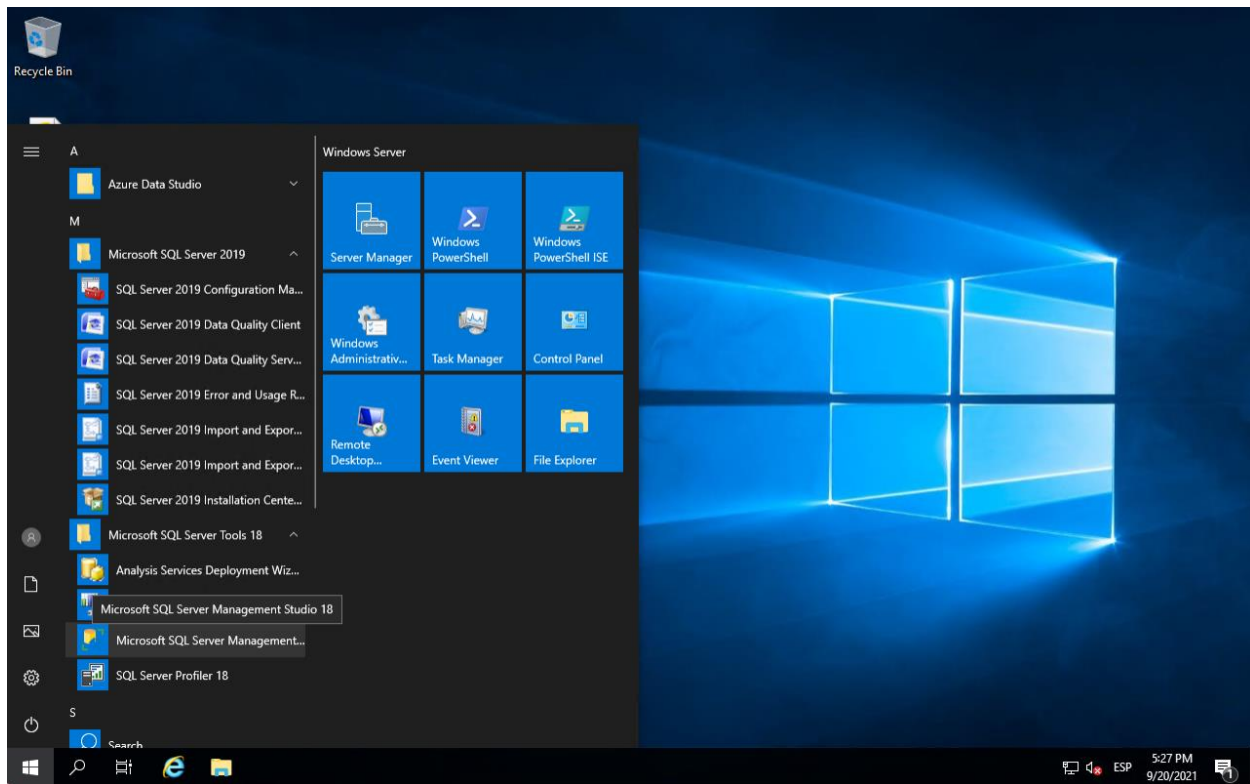
Section	Property	Value
Essentials	Resource group	alt-exp1-rg
	Status	Running
	Location	East US
	Subscription	Visual Studio Enterprise – MPN [5.8k]
	Subscription ID	88ea260b-f912-4540-b3ff-2bb6167457e8
	Operating system	Windows (Windows Server 2019 Datacenter)
	Size	Standard B2ms (2 vcpus, 8 GiB memory)
	Public IP address	104.45.192.92
	Virtual network/subnet	alt-exp1-rg-vnet/default
	DNS name	Not configured
Properties	Computer name	sql101a-exp1-sq
	Operating system	Windows (Windows Server 2019 Datacenter)
	Publisher	microsoftsqlserver
	Offer	sql2019-ws2019
	Plan	standard
	VM generation	V1
	Agent status	Ready
	Public IP address	104.45.192.92
	Private IP address	10.0.0.5
	Virtual network/subnet	alt-exp1-rg-vnet/default

SQL Server VM Validations

We can see that the virtual disk configuration in the VM is as chosen in the configuration:

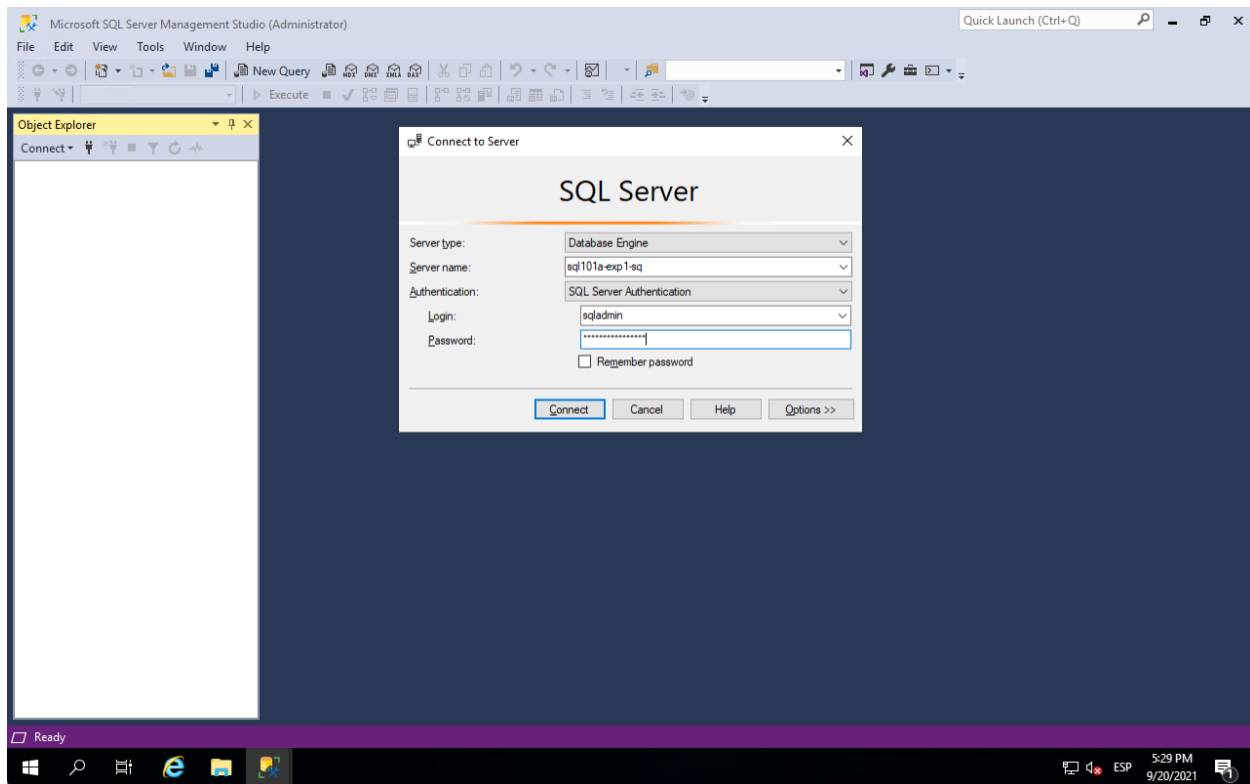


On the other hand, we can validate that management tools such as SQL Management Studio have been installed:

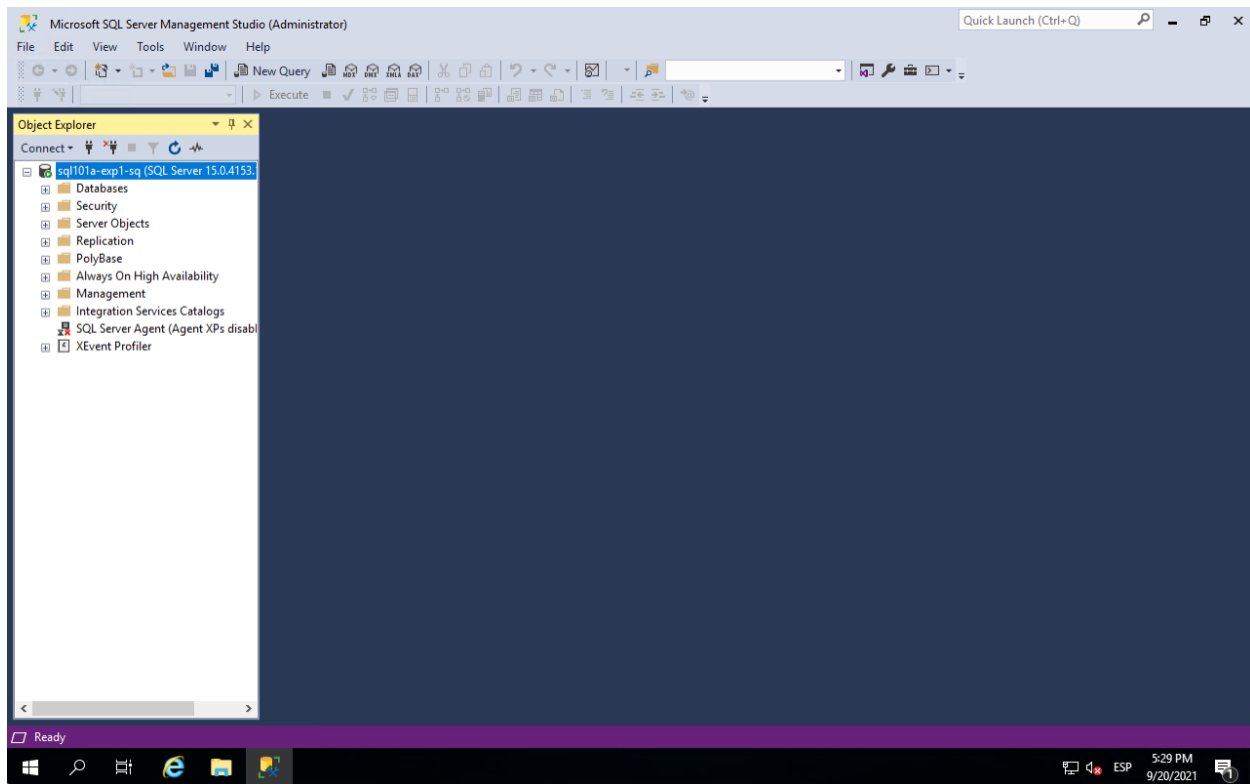


Connection to local SQL Management Studio

If we enter the SQL Management Studio we can connect with our local engine. For this we will use the credentials created during the creation of the VM, in the SQL Server settings tab:



If all goes well, we have been able to connect to the local SQL Server:



You will also be able to use Azure Data Studio to connect. Check with your instructor.