😊 SQL Server on Azure VM

What is SQL Server on an Azure VM?

SQL Server on an Azure Virtual Machine (VM) is a cloud-based deployment of Microsoft SQL Server running on an Azure virtual machine. It provides a full SQL Server instance within an Infrastructure-as-a-Service (IaaS) environment, giving users complete control over database management, configurations, and performance tuning.

Unlike **Azure SQL Database**, which is a fully managed Platform-as-a-Service (PaaS) offering, **SQL Server on an Azure VM** is a self-managed solution where users are responsible for database maintenance, patching, backups, and scaling.

Benefits of SQL Server on Azure VM

1. Full SQL Server Control

- Complete access to SQL Server configurations, instances, and OS-level settings.
- Ability to install custom extensions and third-party applications.

2. Easy Migration from On-Premises

- Lift and shift existing SQL Server workloads with minimal changes.
- Supports older SQL Server versions, reducing compatibility issues.

3. High Performance and Scalability

- Supports **Azure premium disks, memory-optimized VMs, and high IOPS** storage options.
- Can scale vertically (upgrade VM size) or horizontally (add more VMs in a cluster).

4. Built-in Licensing Flexibility

- **Azure Hybrid Benefit** allows users with existing SQL Server licenses to save costs.
- Options for **pay-as-you-go or Bring Your Own License (BYOL)** models.

5. High Availability and Disaster Recovery

- Can be configured with **Always On Availability Groups** for failover clustering.
- Supports **automatic backups to Azure Blob Storage**.

6. Security and Compliance

- **Azure Security Center** integration for threat protection.
- **Transparent Data Encryption (TDE)** and **Advanced Threat Protection (ATP)** support.

Use Cases for SQL Server on Azure VM

1. Lift-and-Shift Migration

- Organizations moving legacy SQL Server workloads from on-prem to Azure without modifying the application.

2. Custom SQL Server Configurations

- Businesses needing fine-grained control over database tuning, configurations, and OS-level settings.

3. High-Performance Applications

- Enterprise applications that require **low-latency, high-IOPS storage, and memory-intensive processing**.

4. Disaster Recovery & Backup

- Running a **standby SQL Server VM** in Azure for quick failover during outages.
- Using **Azure Site Recovery (ASR)** to replicate on-prem databases for business continuity.

5. Dev/Test Environments

- Temporary SQL Server instances for software testing before deployment.
- Cost-efficient solution using **auto-shutdown and pay-as-you-go** pricing.

6. Hybrid Cloud Deployments

- Extending on-prem SQL Server workloads to Azure using **VPN or ExpressRoute**.
- Using **Azure Arc** to manage both on-prem and cloud databases centrally.

When to Use SQL Server on Azure VM vs. Azure SQL Database?

Feature	**SQL Server on Azure VM**	**Azure SQL Database**
Control	Full control over OS, SQL Server settings	Limited (managed by Microsoft)
Migration	Best for lift-and-shift	Requires some rearchitecting
Performance	High-performance workloads supported	Optimized for managed workloads
Scalability	Scale VM size, manual configuration	Automatic scaling
Maintenance	User-managed backups, patching	Fully managed by Azure
Cost	Pay for VM & SQL Server license	Pay per database, no VM costs

If you need **full SQL Server control and on-prem compatibility**, go with **SQL Server on AzureVM**.
If you prefer **a managed service with minimal maintenance**, use **Azure SQL Database**.

Conclusion

SQL Server on an Azure VM is a powerful choice for businesses needing a **lift-and-shift migration, full SQL Server control, and high performance** in the cloud. It offers the flexibility of **custom configurations**, **hybrid deployments**, and **enterprise-grade security** while leveraging Azure's scalability and reliability. However, it requires **manual maintenance** compared to fully managed alternatives like Azure SQL Database.

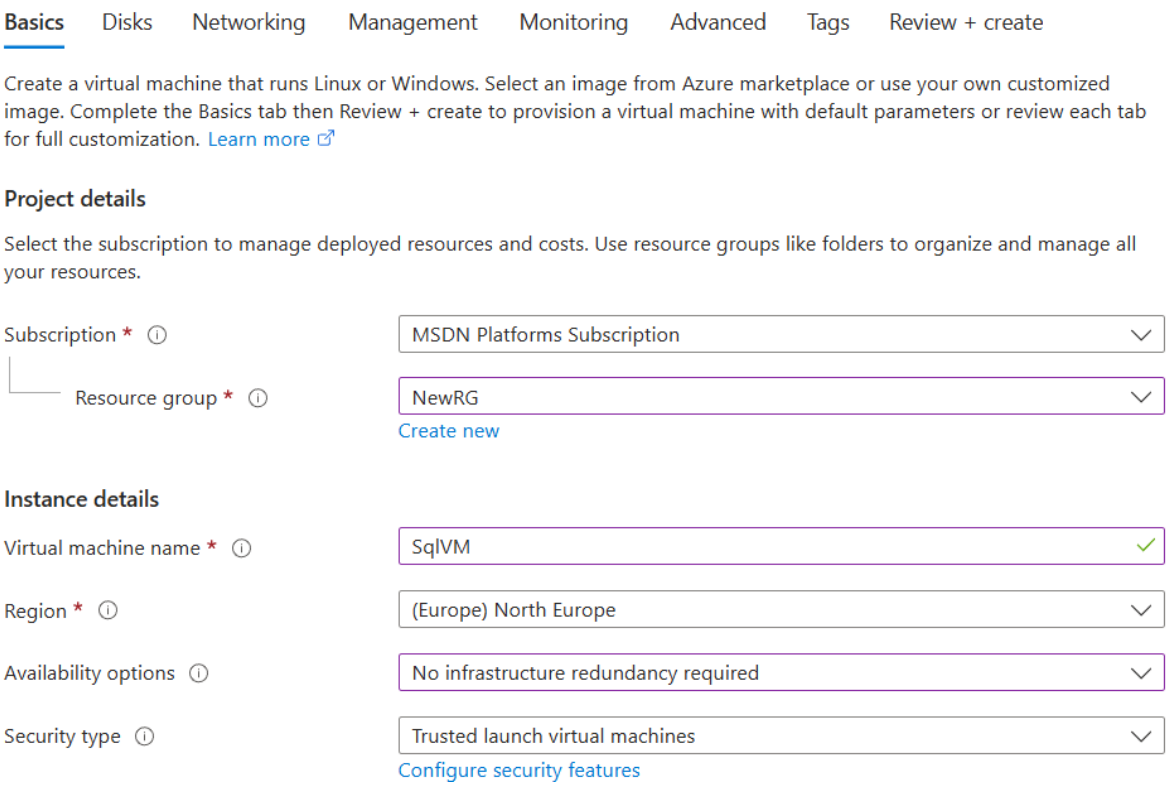
In this lab, we create an Azure Virtual Machine (VM) with SQL Server 2022 pre-installed. First, search for Virtual Machine in the Azure Marketplace, select a resource group, name the VM, choose a region, and set availability options. Select the SQL Server 2022 Windows image, configure VM size, set up login credentials, enable SQL authentication, and create the VM. Once launched, connect using Azure Data Studio or SSMS via the public IP. This setup provides a full-fledged SQL Server with replication and high availability features. After testing queries, delete resources to optimize costs.

End Goal:

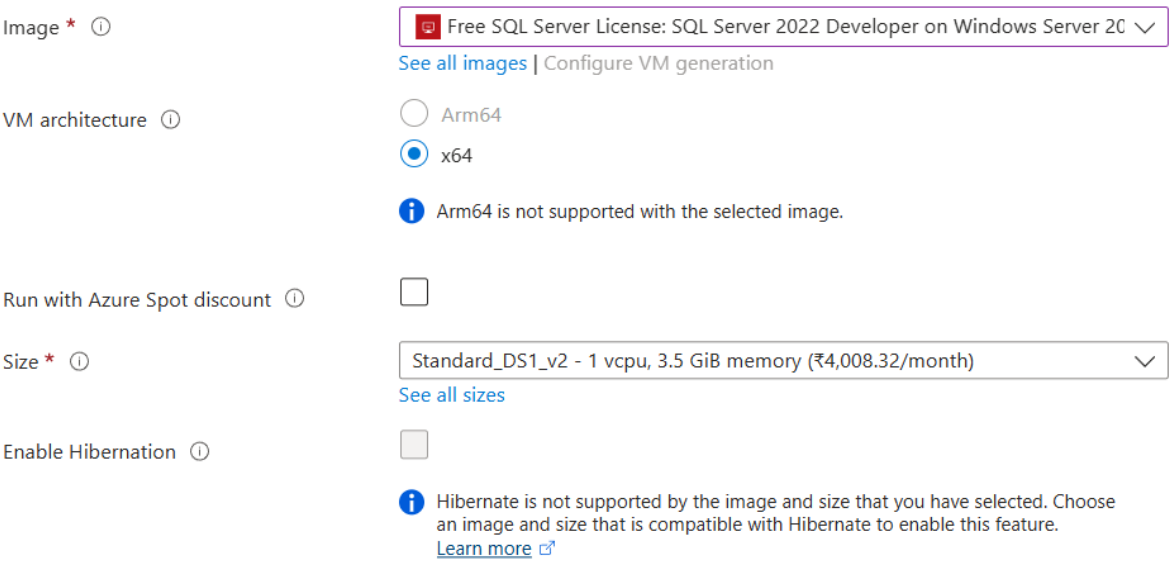
To set up and connect to a fully functional SQL Server on an Azure VM, providing complete control over configurations, availability, and management.

😄 To begin with the Lab:

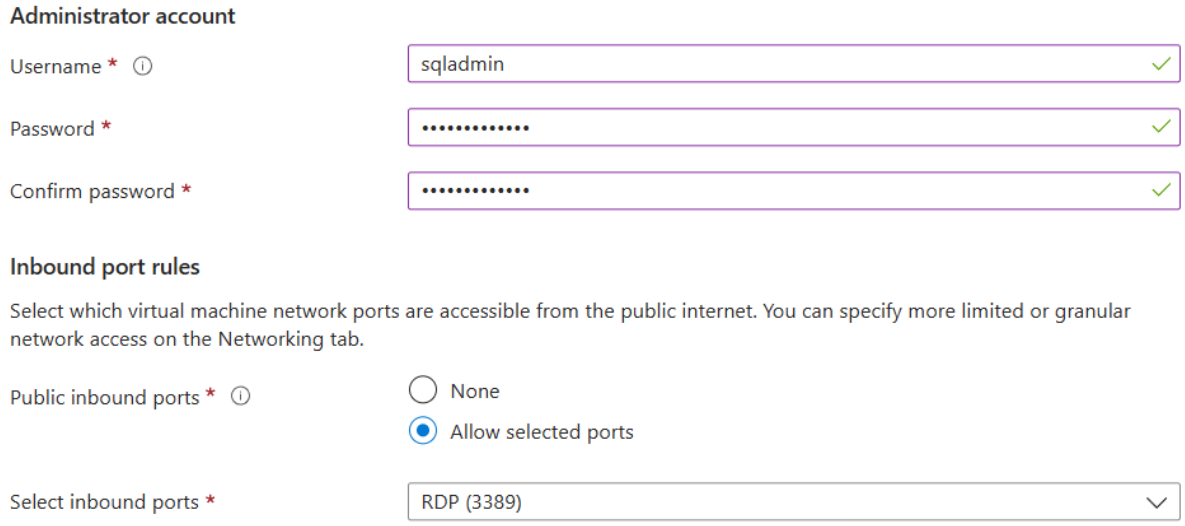
1. In this lab, we will create a virtual machine with SQL Server installed on it by the time of its creation.
2. So, search for Virtual Machine from the marketplace and move to the creation page. Choose your resource group and give a name to your VM then choose your region, for availability options choose no infrastructure required.



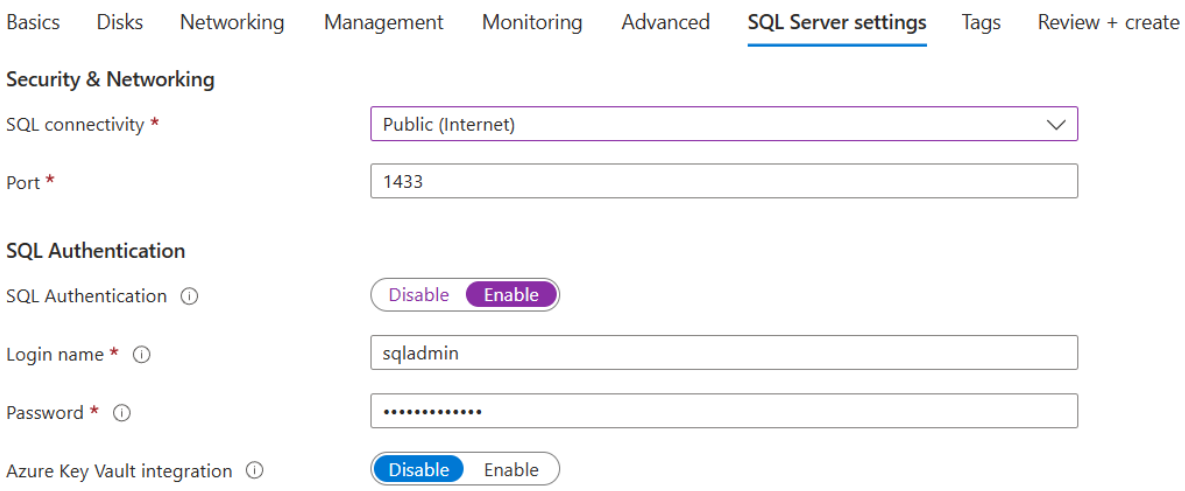
3. Now for the image click on the sell all images options then search for SQL Server and choose free SQL Server 2022 windows image. For size choose the same shown in snapshot.



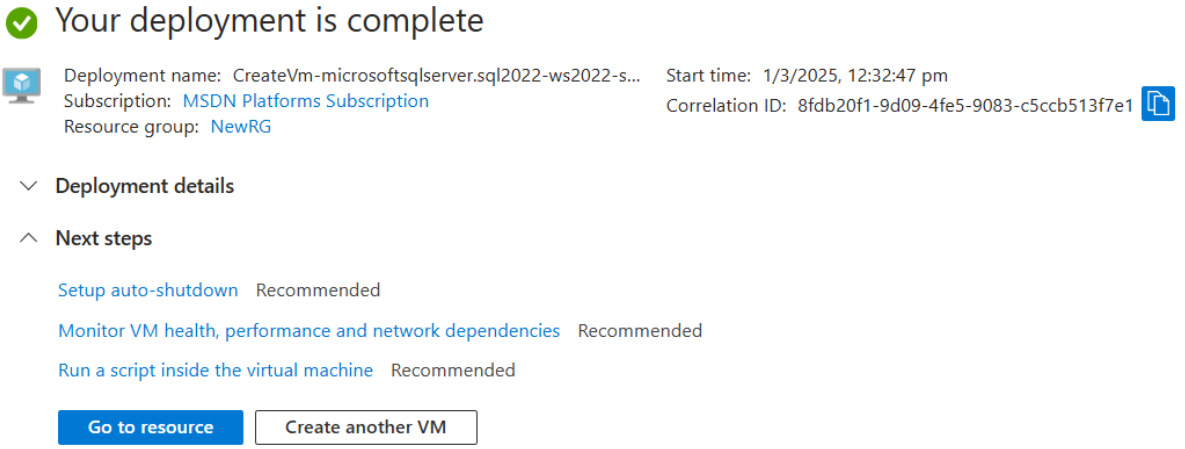
4. Then give a username and password to your VM and move to SQL Server setting option.



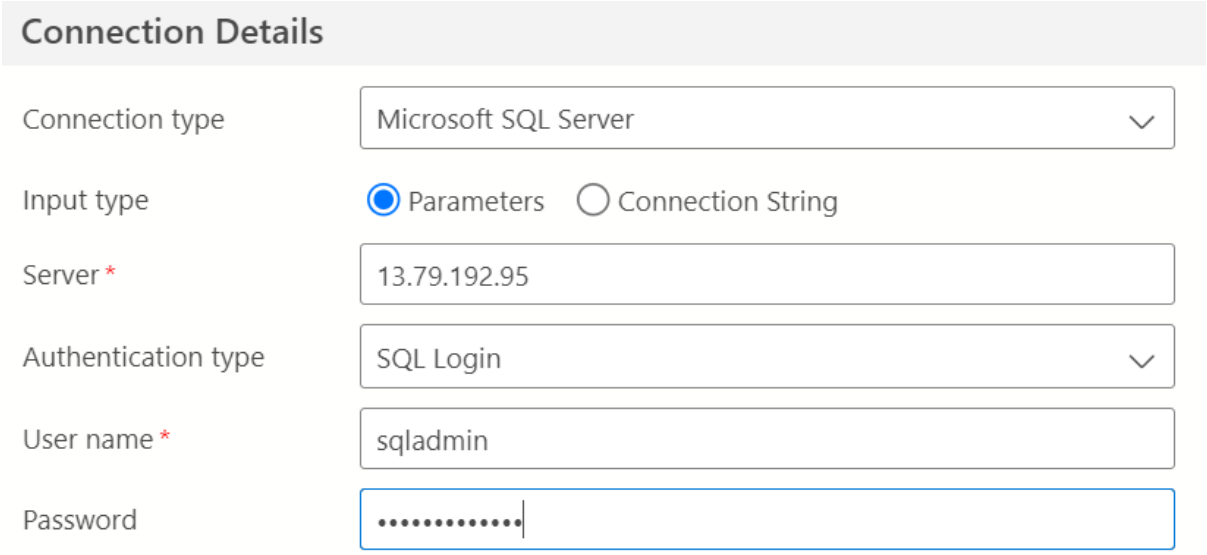
5. On the SQL Server settings you have to choose public for the SQL connectivity and enable the SQL authentication. It will pick up the username and password itself. This is the same username and password as the VM login.



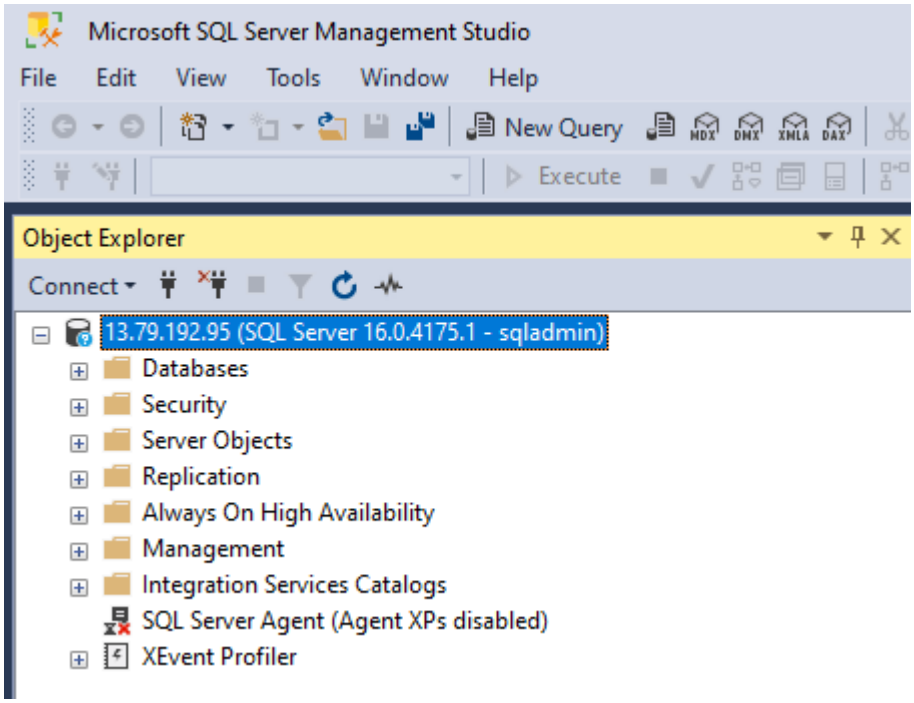
6. Then move to review and create page to create your virtual machine. It might take some time to launch the VM.



7. Once the VM is launched copy its public IP address and open Azure Data Studio or SQL Server Management Studio based on your preference.
8. Then enter in the Server write the Pubic ID address of your VM and in the authentication type choose SQL Login. Enter the username and password click on Connect.



9. Once your SQL Server is connected you will see these objects in the explorer.
10. Now, one thing that you will note is that since we are using Microsoft SQL Server as an installation and not the platform as a service, you will see options such as Replication, Always on High Availability Management, and Integration Services. So, all of this is coming because this is a full-fledged version of Microsoft SQL Server.
11. You can use this SQL Server and fire up some queries.



12. Once you are done then you can delete your resources.