



Developing a Virtual Machine

Cloud Essentials (Lovely Professional University)



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Developing a Virtual Machine: A Comprehensive Guide



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INTRODUCTION

A Virtual Machine (VM) in Microsoft Azure is an on-demand, scalable computing resource offered through Azure's cloud infrastructure. It allows users to run applications, host websites, or simulate various operating environments without the need for physical hardware. Azure VMs are highly customizable, enabling users to choose their operating system, resource allocation (CPU, memory, and storage), and networking configurations.

Microsoft Azure's virtual machines are integral to its Infrastructure as a Service (IaaS) offerings, designed to support diverse workloads, from simple development and testing scenarios to complex, high-performance computing tasks. The key benefits of Azure VMs include cost efficiency, high availability, and integration with other Azure services, making them versatile tools for modern cloud-based operations.

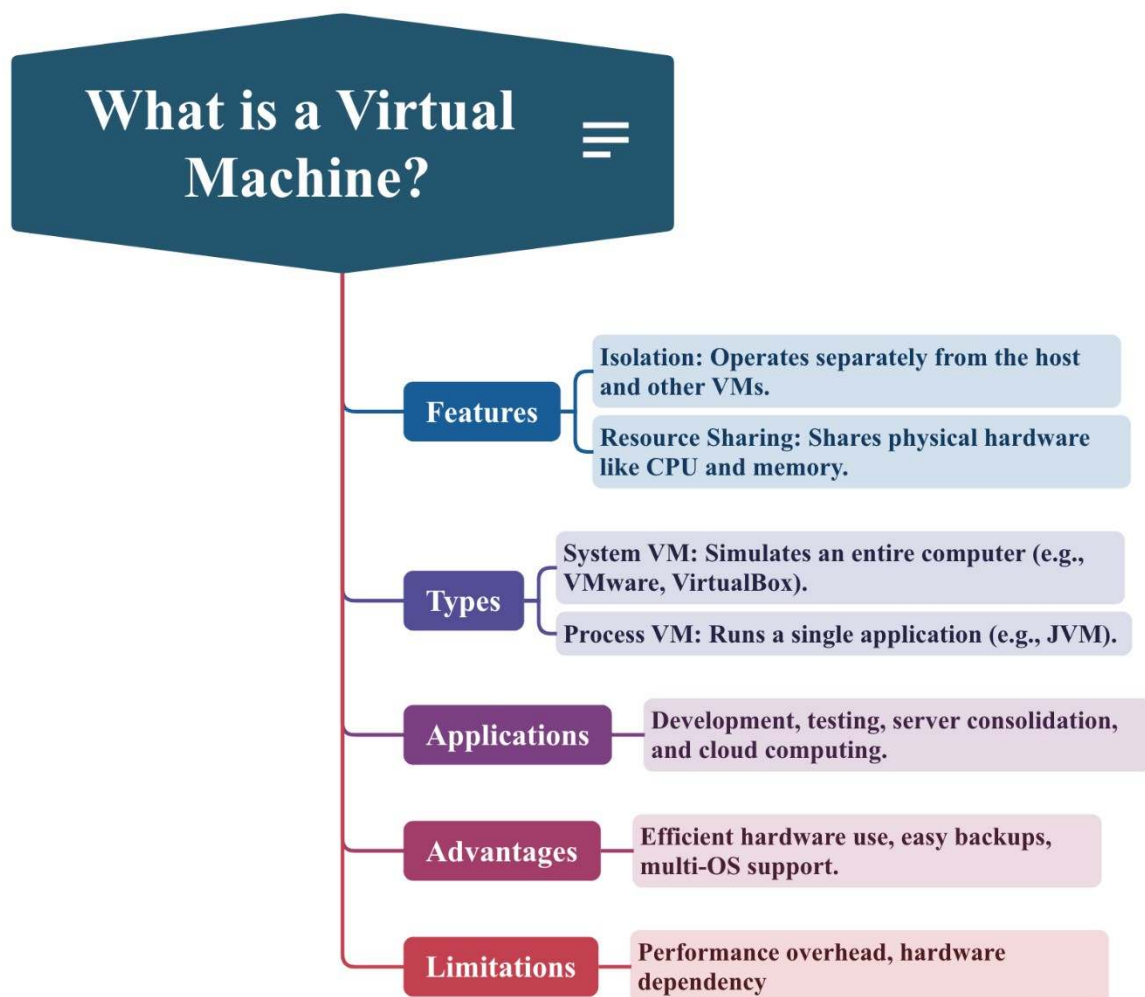


Figure 1: Virtual Machine

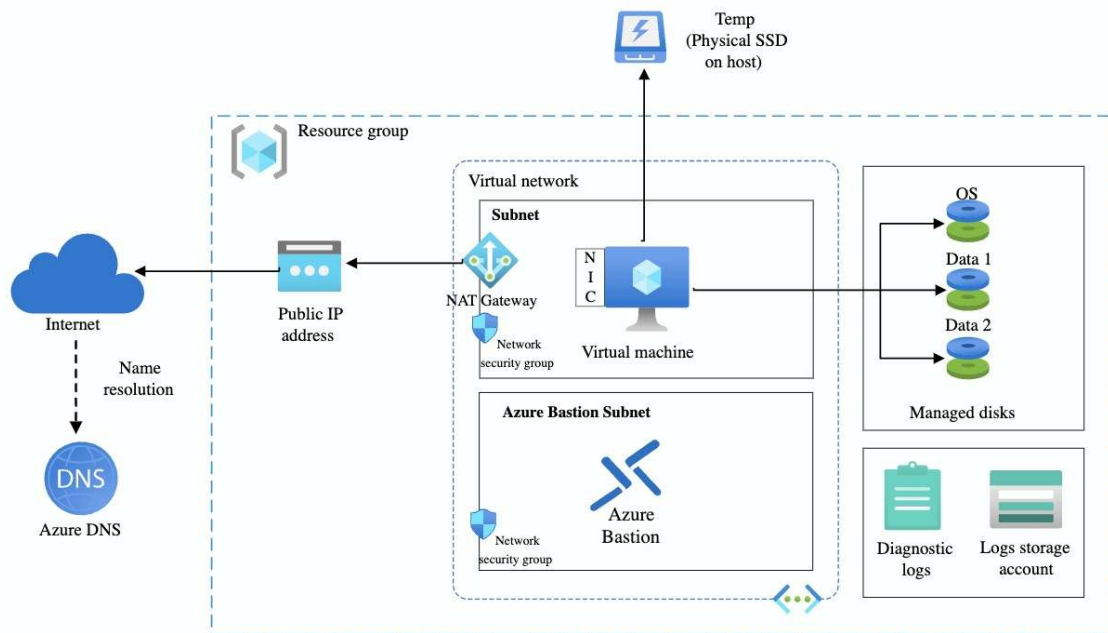


Figure 2: how to work virtual machine in azure

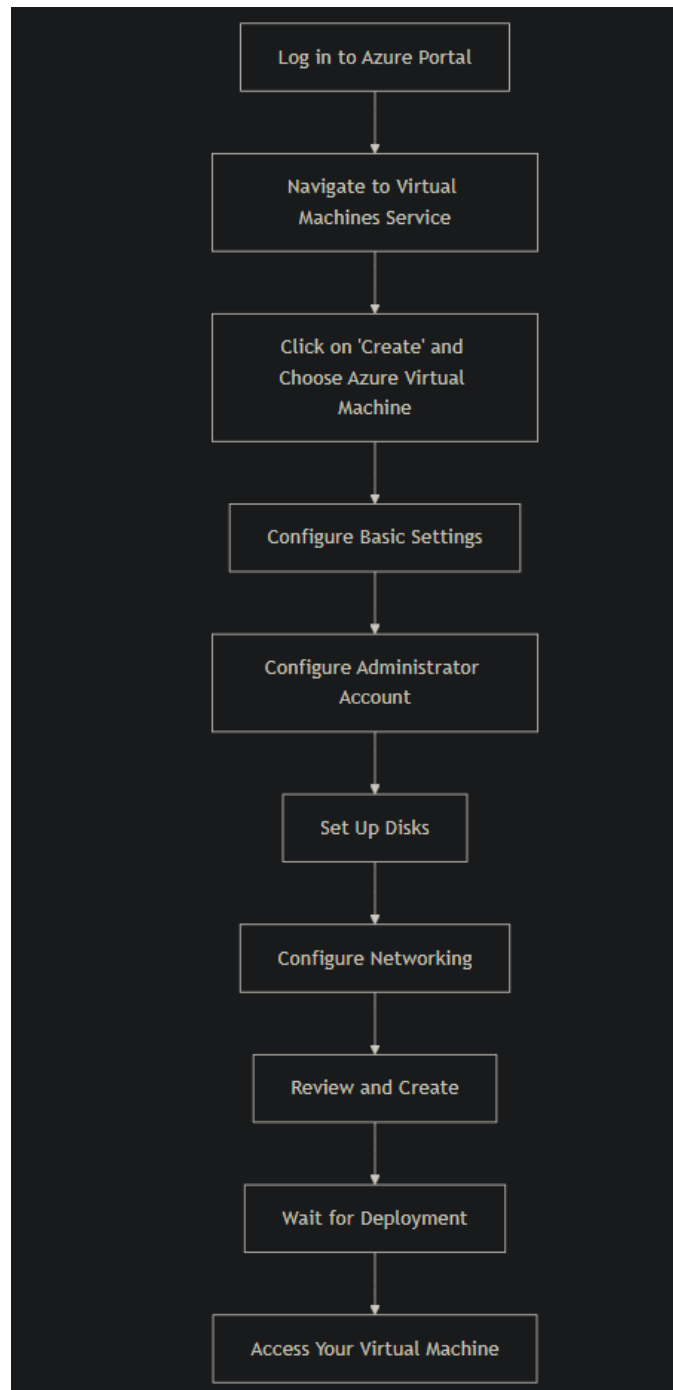
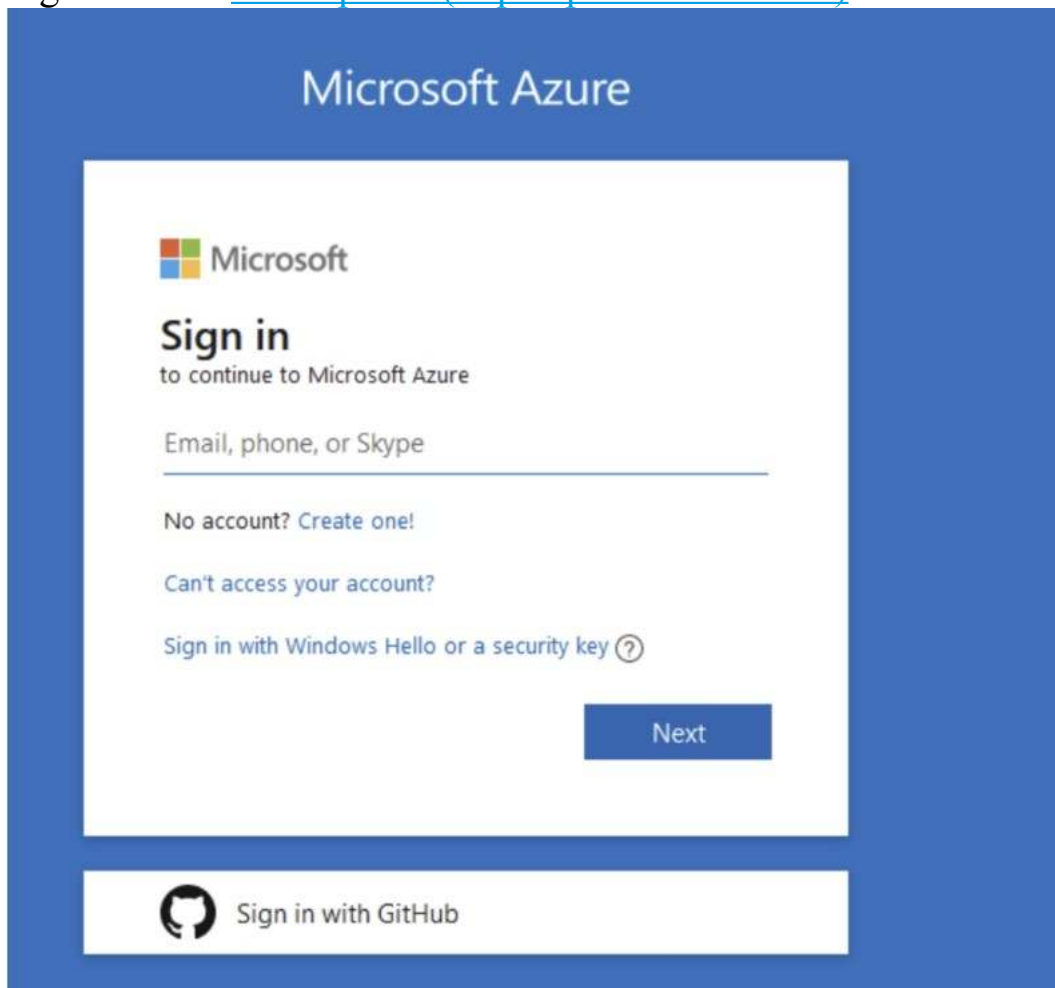


Figure 3: Flow Chart of Creating VM

How to Create a Virtual Machine

1. Sign in to the [Azure portal \(https://portal.azure.com\)](https://portal.azure.com).



1. Enter *virtual machines* in the search.
2. Under **Services**, select **Virtual machines**.
3. In the **Virtual machines** page, select **Create** and then **Azure virtual machine**. The **Create a virtual machine** page opens.
4. Under **Instance details**, enter *myVM* for the **Virtual machine name** and choose *Windows Server 2022 Datacenter: Azure Edition - x64 Gen 2* for the **Image**. Leave the other defaults.

Instance details

Virtual machine name * ⓘ	<input type="text" value="myVM"/>
Region * ⓘ	<input type="text" value="(US) West US 3"/>
Availability options ⓘ	<input type="text" value="No infrastructure redundancy required"/>
Security type ⓘ	<input type="text" value="Trusted launch virtual machines"/> Configure security features
Image * ⓘ	<input type="text" value="Windows Server 2022 Datacenter: Azure Edition - x64 Gen2"/> See all images Configure VM generation
VM architecture ⓘ	<input type="radio"/> Arm64 <input checked="" type="radio"/> x64 <i>i</i> Arm64 is not supported with the selected image.

Note

Some users will now see the option to create VMs in multiple zones. To learn more about this new capability, see [Create virtual machines in an availability zone](#).

Availability zone * ⓘ	<input type="text" value="Zones 1"/>
	<i>🔔</i> You can now select multiple zones. Selecting multiple zones will create one VM per zone.

- Under **Administrator account**, provide a username, such as *azureuser* and a password. The password must be at least 12 characters long and meet the [defined complexity requirements](#).

Administrator account	
Username * ⓘ	<input type="text" value="azureuser"/>
Password * ⓘ	<input type="password" value="....."/>
Confirm password * ⓘ	<input type="password" value="....."/>

- Under **Inbound port rules**, choose **Allow selected ports** and then select **RDP (3389)** and **HTTP (80)** from the drop-down.

Inbound port rules

Select which virtual machine network ports are accessible from the public internet. You can specify more limited or granular network access on the Networking tab.

Public inbound ports * ⓘ

☐ None

☒ Allow selected ports

Select inbound ports *

RDP (3389)



This will allow all IP addresses to access your virtual machine. This is only recommended for testing. Use the Advanced controls in the Networking tab to create rules to limit inbound traffic to known IP addresses.

7. Leave the remaining defaults and then select the **Review + create** button at the bottom of the page.

Licensing

Save up to 49% with a license you already own using Azure Hybrid Benefit. [Learn more](#) ⓘ

Would you like to use an existing
Windows Server license? * ⓘ

☐

[Review Azure hybrid benefit compliance](#)

Review + create

< Previous

Next : Disks >

8. After validation runs, select the **Create** button at the bottom of the

page.

[Home](#) > [Create a resource](#) >

Create a virtual machine ...

✓ Validation passed

Basics

Subscription	myAzureSubscription
Resource group	myresourcegroup
Virtual machine name	myVM
Region	West US 3
Availability options	No infrastructure redundancy required
Security type	Trusted launch virtual machines
Enable secure boot	Yes
Enable vTPM	Yes
Integrity monitoring	No
Image	Windows Server 2022 Datacenter: Azure Edition - Gen2
VM architecture	x64
Size	Standard B2ms (2 vcpus, 8 GiB memory)
Username	azureuser

Create

< Previous

Next >

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9. After deployment is complete, select **Go to resource**.

Next steps

[Setup auto-shutdown](#) Recommended

[Monitor VM health, performance and network dependencies](#) Recommended

[Run a script inside the virtual machine](#) Recommended


Go to resource

Create another VM


1. Enter *virtual machines* in the search.
2. Under **Services**, select **Virtual machines**.
3. In the **Virtual machines** page, select **Create** and then **Azure virtual machine**. The **Create a virtual machine** page opens.

4. Under **Instance details**, enter *myVM* for the **Virtual machine name** and choose *Windows Server 2022 Datacenter: Azure Edition - x64 Gen 2* for the **Image**. Leave the other defaults.

Instance details

Virtual machine name * ⓘ	<input type="text" value="myVM"/>
Region * ⓘ	<input type="text" value="(US) West US 3"/>
Availability options ⓘ	<input type="text" value="No infrastructure redundancy required"/>
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5. Under **Administrator account**, provide a username, such as *azureuser* and a password. The password must be at least 12 characters long and meet the [defined complexity requirements](#).

Administrator account

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Password * ⓘ	<input type="password" value="....."/>
Confirm password * ⓘ	<input type="password" value="....."/>

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RDP (3389) ▼

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page.

[Home](#) > [Create a resource](#) >

Create a virtual machine ...

✓ Validation passed

Basics

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Virtual machine name	myVM
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Create

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Next steps

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[Monitor VM health, performance and network dependencies](#) Recommended

[Run a script inside the virtual machine](#) Recommended

Go to resource

Create another VM

Advantages and Disadvantages of Azure Virtual Machines

Advantages:

1. You can easily increase or decrease resources as needed (scalable).
2. Allows you to run multiple operating systems and custom setups (flexible).
3. Accessible from Azure's global network of data centers.
4. You only pay for what you use, making it cost-efficient.
5. Integrates well with other Azure services like backup and monitoring.
6. Provides options for fault tolerance and disaster recovery (high availability).

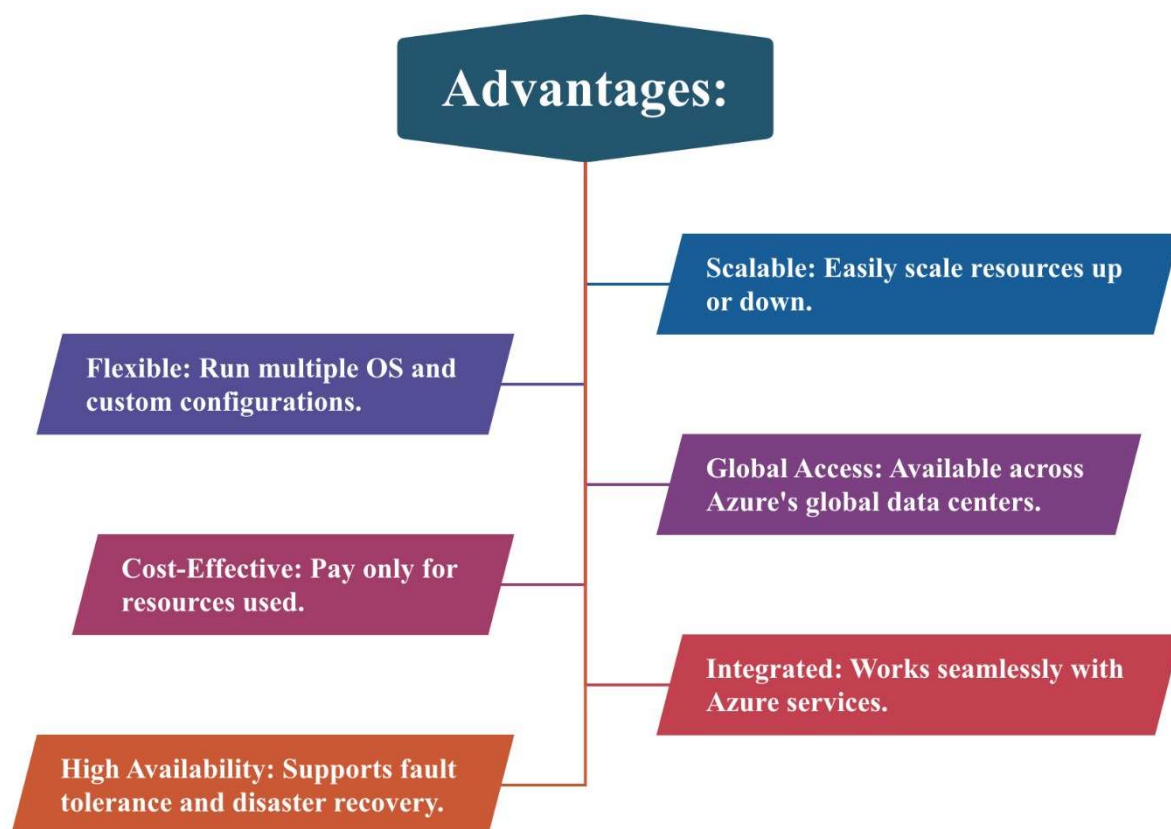


Figure 3: Advantages

Disadvantages:

1. Long-term use may become expensive.
2. Performance depends on the VM size and shared infrastructure.
3. Managing and optimizing VMs can be complex without expertise.
4. Users are responsible for security updates and patches.
5. Some advanced hardware options may not be available in all regions.

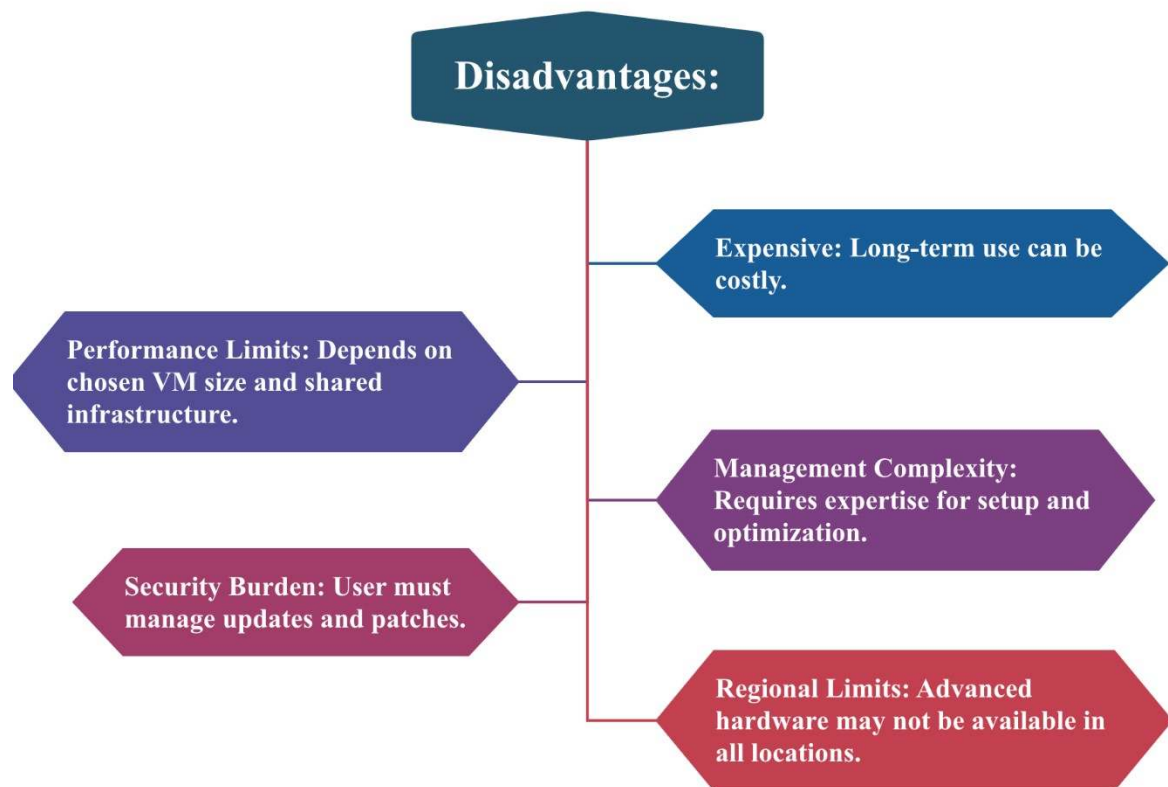


Figure 4: Disadvantages

Literature Review in Tabled Form

Author(s)	Year	Title	Objective	Methodology	Key Findings
Smith et al.	2020	Virtual Machines in Cloud Computing	To analyze the role of VMs in cloud services	Comparative analysis	VMs enhance scalability, flexibility, and resource utilization in cloud environments.
Johnson & Clark	2019	Cost Efficiency of Azure VMs	Assess cost savings using Azure VMs	Case studies	Azure VMs reduce upfront costs with pay-as-you-go models but can escalate with long-term use.
Lee and Wong	2021	Virtual Machine Performance Optimization	Evaluate performance strategies for VMs	Experimental setup with real workloads	Optimization techniques like right-sizing improve performance and reduce costs.
Ahmed et al.	2018	Security Challenges in Virtual Environments	Identify security risks in virtual machines	Threat modeling and analysis	VMs are vulnerable to misconfigurations, requiring strict access controls and patch management.
Patel and Kumar	2022	Hybrid Cloud Solutions with Virtual Machines	Explore hybrid cloud solutions with VMs	Simulation and surveys	Hybrid models with VMs enhance flexibility for organizations transitioning to the cloud.

Key Security Considerations for Virtual Machines in Microsoft Azure

🔒 **Access Control and Authentication:** Configuring strong authentication methods (e.g., SSH keys or passwords) and utilizing Role-Based Access Control (RBAC) ensures that only authorized users can access and manage the Virtual Machines (VMs) in Azure, thereby preventing unauthorized access.

🏢 **Network Security:** By using Network Security Groups (NSGs) and configuring strict inbound and outbound traffic rules, as well as deploying VMs within isolated virtual networks (VNETs), cloud security is enhanced, reducing the risk of malicious traffic and unauthorized access.

🏢 **Data Encryption and Backup:** Azure provides encryption for both data at rest and in transit, ensuring that sensitive information is secure. Additionally, backup solutions like Azure Backup help protect VM data against accidental loss or corruption, ensuring business continuity and disaster recovery.

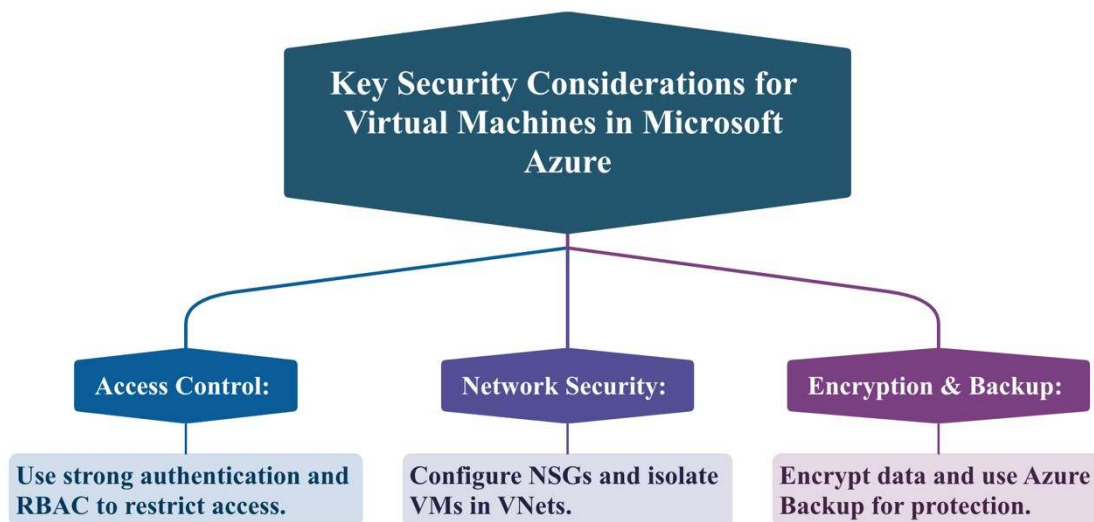


Figure 5: Key Security Considerations for Virtual Machines in Microsoft Azure

References

- [1] O. Haffner, E. Kučera and M. Moravčík, "Sales Prediction of Svijany Slovakia, Ltd. Using Microsoft Azure Machine Learning and ARIMA," *2020 Cybernetics & Informatics (K&I)*, Velke Karlovice, Czech Republic, 2020, pp. 1-9, doi: 10.1109/KI48306.2020.9039875.
- [2] S. D. BhavaniPeri, A. Ravi and M. Supriya, "Design and Implementation of a Real-time IoT Solution for Smart Meter Data Analysis in Microsoft Azure," *2024 15th International Conference on Computing*

Communication and Networking Technologies (ICCCNT), Kamand, India, 2024, pp. 1-5, doi: 10.1109/ICCCNT61001.2024.10725804.

[3] R. Aljamal, F. Jubair and A. El-Mousa, "Analyzing the Cost-Effectiveness of Running HPC Applications on Microsoft Azure Virtual Machines," *2021 IEEE Jordan International Joint Conference on Electrical Engineering and Information Technology (JEEIT)*, Amman, Jordan, 2021, pp. 78-82, doi: 10.1109/JEEIT53412.2021.9634127.

[4] Subbarao, D., Raju, B., Anjum, F. *et al.* Microsoft Azure active directory for next level authentication to provide a seamless single sign-on experience. *Appl Nanosci* 13, 1655–1664 (2023). <https://doi.org/10.1007/s13204-021-02021-0>