

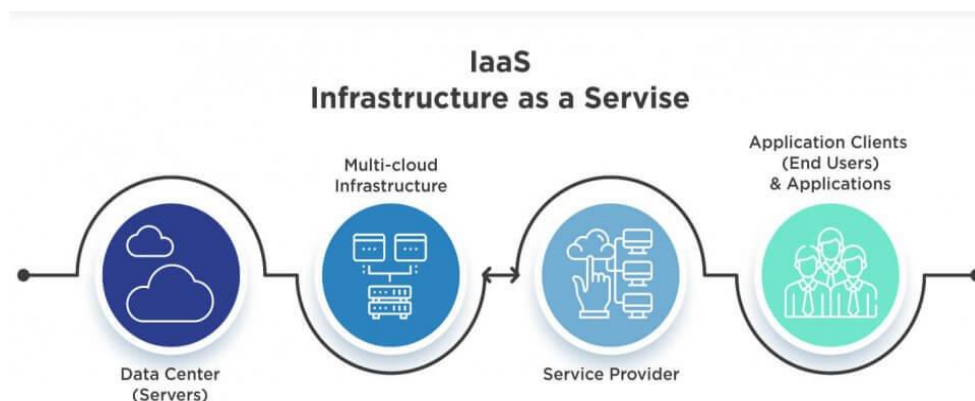
Experiment No. 4

Aim: To study and Implement Infrastructure as a Service using AWS/Microsoft Azure.

Requirements: Windows/Mac/Linux O.S, AWS/Azure account and Remmina for Linux.

Theory:

Infrastructure as a service: IaaS provides businesses with ready-to-use IT infrastructure: development environment, private networks, secure data storage, instruments for software development and testing, functionality monitoring, etc. The enterprises don't need to build and secure their own IT infrastructure — they fully power the development process with third-party servers and cloud backup storage.



Examples of IaaS:

Amazon Web Services: a public cloud that offers subscribers access to virtual servers for product deployment, Cloud storage, tools for development, testing, and analytics. The application provides a ready-to-use environment to develop and test the product and offers the full cloud infrastructure for its deployment and maintenance.

Microsoft Azure: the combination of IaaS and platform as a service, the software offers 100+ services for software development, administration, and deployment, provides tools for working with innovative technologies (big data, machine learning, Internet of Things), etc.

IBM Infrastructure: IBM uses its in-house services to store the data of infrastructure users, enabling remote data access via Cloud computing. IBM servers support AI, block chain, and the Internet of Things. The infrastructure also provides Cloud storage and virtual development environments, enabled on the subscription basis.

Google Cloud Infrastructure: the large network of international servers that provides users access to remote Cloud data centres. Companies can store their information in Asia, Europe, and Latin America, which minimizes the risk of a security breach.

Implementation:

1. Creating Virtual Machine in Azure:

i) Basics

The screenshot shows the 'Create a virtual machine' page in the Microsoft Azure portal, specifically the 'Basics' tab. The left sidebar shows the 'Virtual machines' section with a 'Create' button and a 'Switch to classic' link. The main content area is titled 'Create a virtual machine' and contains the following fields and options:

- Subscription:** Azure for Students
- Resource group:** CCL
- Instance details:**
 - Virtual machine name:** adnan
 - Region:** (Asia Pacific) Central India
 - Availability options:** No infrastructure redundancy required
 - Security type:** Standard
 - Image:** Windows 10 Pro, version 20H2 - Gen2
 - Azure Spot instance:** ☐
 - Size:** Standard_DS2_v3 - 2 vcpus, 8 GiB memory (₹5,522.27/month)
- Administrator account:**
 - Username:** adnan
 - Password:** [masked]
 - Confirm password:** [masked]
- 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

At the bottom, there are buttons for 'Review + create', '< Previous', and 'Next: Disks >'.

ii) Disks

The screenshot shows the 'Create a virtual machine' page in the Microsoft Azure portal, specifically the 'Disks' tab. The left sidebar is the same as in the previous screenshot. The main content area is titled 'Create a virtual machine' and contains the following fields and options:

- Basics** | **Disks** | Networking | Management | Advanced | Tags | Review + create
- OS disk type:** Premium SSD (locally-redundant storage)
- Delete with VM:** ☒
- Encryption at host:** ☐
- Encryption type:** (Default) Encryption at rest with a platform-managed key
- Enable Ultra Disk compatibility:** ☐
- Data disks for adnan:** You can add and configure additional data disks for your virtual machine or attach existing disks. This VM also comes with a temporary disk.
- Table:**

LUN	Name	Size (GiB)	Disk type	Host caching	Delete with VM
- Buttons:** Create and attach a new disk, Attach an existing disk
- Advanced:** [collapsed]

At the bottom, there are buttons for 'Review + create', '< Previous', and 'Next: Networking >'.

iii) Network

Activities Google Chrome Mar 20 12:52

(1) WhatsApp Create a virtual machine - x Microsoft Azure Sponsor: x

portal.azure.com/#create/Microsoft.VirtualMachine

Microsoft Azure Search resources, services, and docs (G+)

adnanali1331@hotmail... DEFAULT DIRECTORY

Home > Virtual machines >

Virtual machines

Default Directory

+ Create Switch to classic

Filter for any field...

Name ↑ Type ↓

No virtual machines to display

Create a virtual machine that runs Linux or Windows. Select an image from the marketplace or use your own customized image.

Learn more about Windows virtual machines

Learn more about Linux virtual machines

Create a virtual machine

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 CCL-vnet
Create new

Subnet default: (10.0.0.0/24)
Manage subnet configuration

Public IP [new] adnan-ip
Create new

NIC network security group
☐ None
☒ Basic
☐ Advanced

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.

Delete public IP and NIC when VM is deleted ☒

Accelerated networking ☒

Load balancing

Review + create < Previous Next: Management >

iv) Management

Activities Google Chrome Mar 20 12:53

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Filter for any field...

Name ↑ Type ↓

No virtual machines to display

Create a virtual machine that runs Linux or Windows. Select an image from the marketplace or use your own customized image.

Learn more about Windows virtual machines

Learn more about Linux virtual machines

Create a virtual machine

Your subscription is protected by Azure Security Center basic plan.

Monitoring

Boot diagnostics
☒ Enable with managed storage account (recommended)
☐ Enable with custom storage account
☐ Disable

Enable OS guest diagnostics

Identity

System assigned managed identity

Azure AD

Login with Azure AD
RBAC role assignment of Virtual Machine Administrator Login or Virtual Machine User Login is required when using Azure AD login. Learn more

Auto-shutdown

Enable auto-shutdown ☒

Shutdown time 7:00:00 PM

Time zone [UTC Coordinated Universal Time]

Notification before shutdown ☒

Email adnanali1331@hotmail.com

Site Recovery

Enable Disaster Recovery

Guest OS updates

Review + create < Previous Next: Advanced >

v) Tags

The screenshot shows the 'Create a virtual machine' wizard in the Microsoft Azure portal. The 'Tags' tab is selected, showing a table for adding tags. The table has three columns: Name, Value, and Resource. Two tags are already added: 'ccl' with value 'testing' and resource '12 selected'. A note explains that tags are name/value pairs for categorizing resources and consolidated billing. The 'Review + create' button is visible at the bottom.

Name	Value	Resource
ccl	testing	12 selected
		12 selected

vi) Creating

The screenshot shows the 'Create a virtual machine' wizard in the Microsoft Azure portal, now at the 'Review + create' tab. A green 'Validation passed' banner is at the top. The 'Review + create' tab is selected. The 'PRODUCT DETAILS' section shows '1 X Standard D2s v3 by Microsoft' with a price of '7,5648 INR/hr'. The 'TERMS' section includes a disclaimer about legal terms and privacy. A warning message states: '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.' The 'Basics' section shows the subscription as 'Azure for Students', resource group 'CCL', virtual machine name 'adnan', region 'Central India', availability options 'No infrastructure redundancy required', security type 'Standard', image 'Windows 10 Pro, version 20H2 - Gen2', and size 'Standard D2s v3 (2 vcpus, 8 GiB memory)'. The 'Create' button is visible at the bottom.

PRODUCT DETAILS

1 X Standard D2s v3 by Microsoft
Subscription credits apply
7,5648 INR/hr
Pricing for other VM sizes

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

Subscription	Azure for Students
Resource group	CCL
Virtual machine name	adnan
Region	Central India
Availability options	No infrastructure redundancy required
Security type	Standard
Image	Windows 10 Pro, version 20H2 - Gen2
Size	Standard D2s v3 (2 vcpus, 8 GiB memory)

vii) Deployment complete

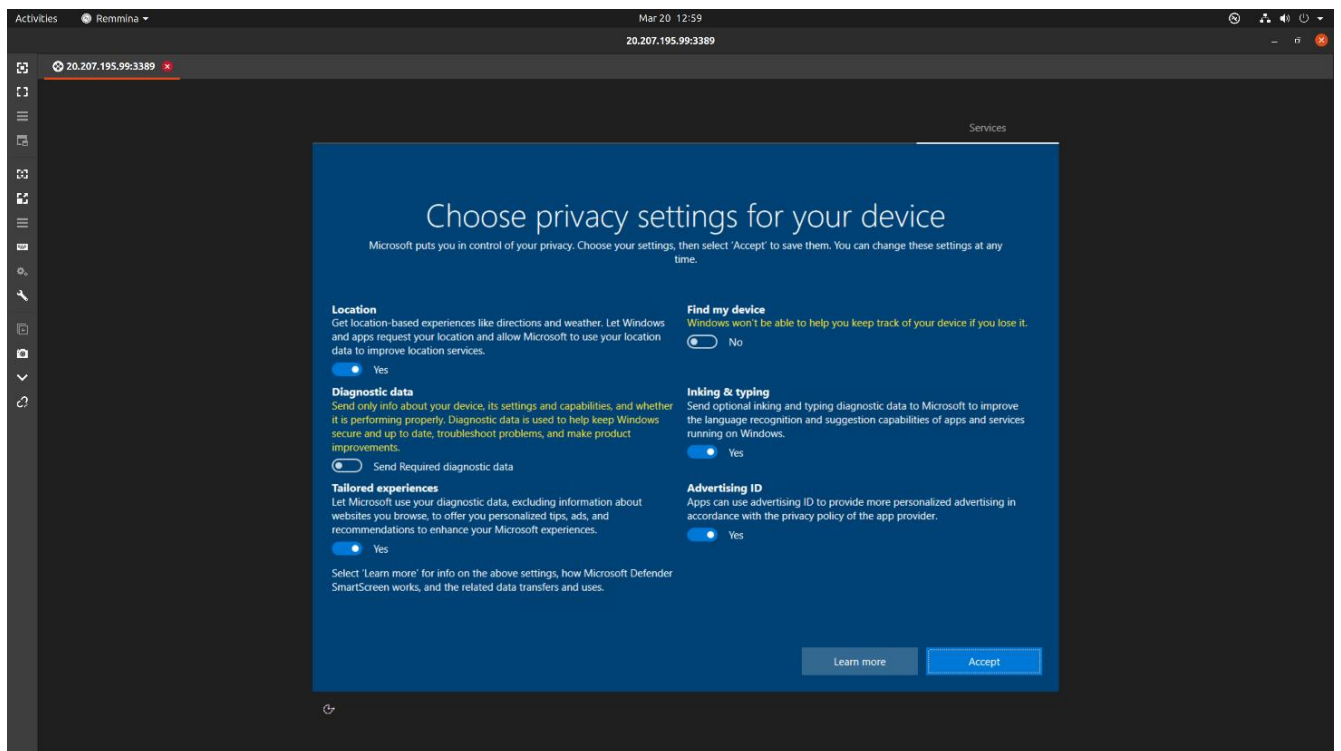
The screenshot shows the Microsoft Azure portal interface. The main heading is "CreateVm-MicrosoftWindowsDesktop.Windows-10-20h2--20220320125023 | Overview". A green checkmark icon indicates "Your deployment is complete". The deployment details show the name "CreateVm-MicrosoftWindowsDesktop.Windows-10-20h2--20220320125023", subscription "Azure for Students", and resource group "CCL". A notification box in the top right corner states "Deployment succeeded" for the deployment "CreateVm-MicrosoftWindowsDesktop.Windows-10-20h2--20220320125023" to resource group "CCL". The "Next steps" section includes links for "Setup auto-shutdown", "Monitor VM health, performance and network dependencies", and "Run a script inside the virtual machine". A sidebar on the right contains links for "Cost Management", "Microsoft Defender for Cloud", "Free Microsoft tutorials", and "Work with an expert".

2) RDP connection:

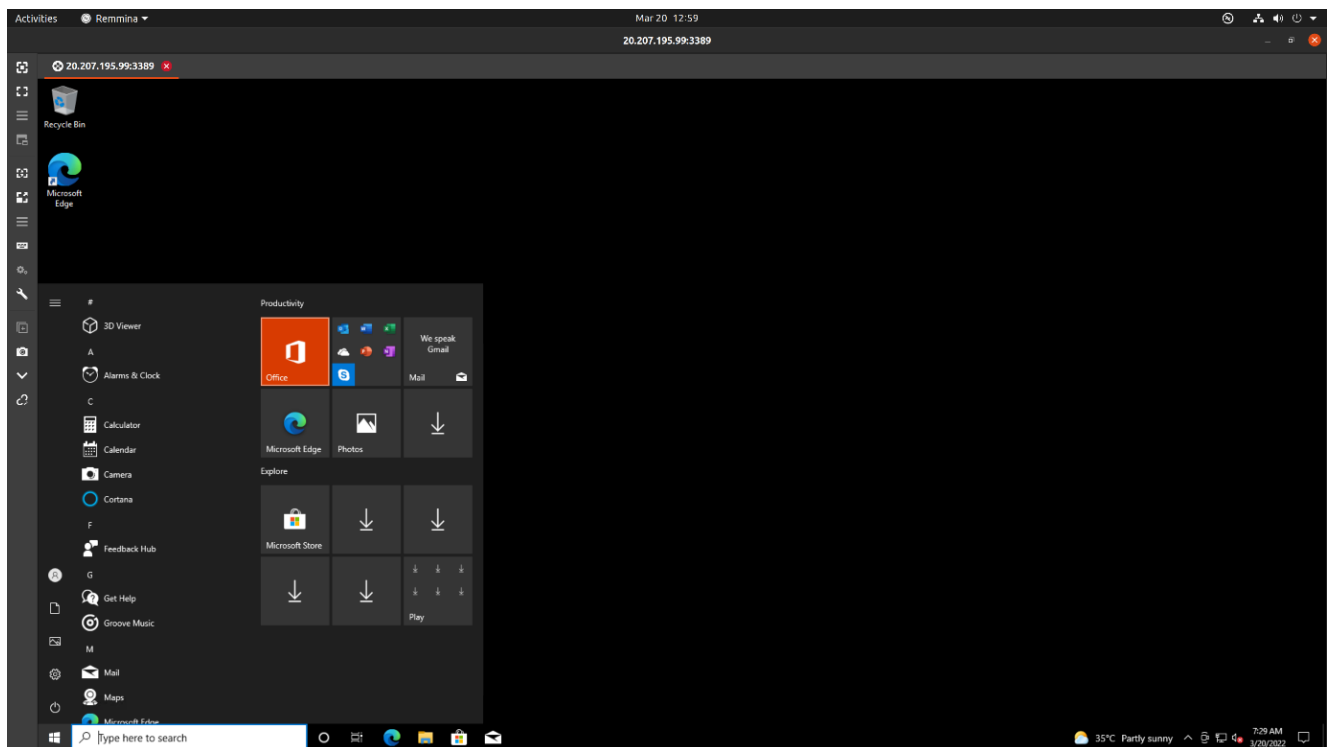
i) Configuring and downloading RDP file

The screenshot shows the Microsoft Azure portal interface for a virtual machine named "adnan | Connect". The "Connect" tab is selected in the left sidebar. The main content area shows the "Connect with RDP" section, which includes a warning to "enable just-in-time access on this VM". The "IP address" field is set to "Public IP address (20.207.195.99)" and the "Port number" is "3389". A "Download RDP File" button is visible. Below this, there are links for "Can't connect?", "Test your connection", "Troubleshoot RDP connectivity issues", and "Feedback on connections".

ii) Connecting through Remmina



3) Result:



Conclusion: We have successfully implemented infrastructure as a service using Azure.