

# Azure Cloud Infrastructure Deployment and Management

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## Introduction

This document provides a comprehensive, step-by-step technical guide to deploying and managing an Azure Cloud infrastructure over a four-week cadence using the Azure Portal exclusively. All tasks are described with portal navigation, screenshots reference, and best-practice callouts.

# Azure Cloud Infrastructure Deployment and Management

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## Prerequisites

- **Azure Subscription:** Owner or Contributor role with portal access
  - **Browser:** Modern browser (Edge, Chrome) with access to <https://portal.azure.com>
  - **Permissions:** Ability to create resource groups, VMs, VNets, storage accounts, and configure Azure AD in the portal.
  - **Tools (optional):** Azure Architecture Diagrams tool (Visio or Draw.io)
- 

## Naming Conventions & Tagging

To ensure consistency and ease of management, adopt the following pattern for all resources:

Element	Pattern	Example
Resource Group	<env>-rg-<app>-<region>	prod-rg-webapp-weu
Virtual Network	<env>-vnet-<app>-<region>	prod-vnet-webapp-weu
Subnet	<env>-subnet-<role>-<cidr>	prod-subnet-web-10-0-1
Network SG	<env>-nsg-<app>-<region>	prod-nsg-webapp-weu
VM	<env>-vm-<role>-<index>	prod-vm-web-01
Storage Account	<env>st<app><uniquestring>	prodstweb001

**Tags:** Always include Environment, Project, Owner, and CostCenter when creating resources.

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# Azure Cloud Infrastructure Deployment and Management

## Week 1: Azure Fundamentals & Setup

### Azure Concepts Overview

- **Cloud Models:** Public, Private, Hybrid, Community
- **Service Models:** IaaS, PaaS, SaaS
- **Key Benefits:** Cost-efficiency, scalability, reliability, security, innovation acceleration

### Subscription Setup (Portal)

1. Sign in at <https://portal.azure.com>.
2. Click on **Subscriptions** in the left-hand menu.
3. Select or create a subscription. Review billing profile and role assignments under **Access control (IAM)**.
4. Add users or groups as needed with Owner/Contributor roles.

### Resource Group Creation (Portal)

1. In the Azure Portal menu, select **Resource groups**.
2. Click + **Create**.
3. Under **Basics**, choose:
  - **Subscription:** Your Azure subscription
  - **Resource group:** <env>-rg-<app>-<region>
  - **Region:** e.g., *West Europe*
4. Under **Tags**, add Environment=Production, Project=WebApp, Owner=Alice, CostCenter=12345.
5. Click **Review + create**, then **Create**.

**Best Practice:** Group resources that share a lifecycle and apply RBAC at the group level. □cite□turn0file0□

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# Azure Cloud Infrastructure Deployment and Management

## RG Components

Microsoft Azure

Search resources, services, and docs (G+/)

Copilot

S21510778EG@std.acu...  
ARAB OPEN UNIVERSITY - AOU

Home >

RG-CloudGraduationProject

Resource group

Search

Create Manage view Delete resource group Refresh Export to CSV Open query Assign tags Move Delete Export template

Overview

Activity log

Access control (IAM)

Tags

Resource visualizer

Events

Settings

Deployments

Security

Deployment stacks

Policies

Properties

Locks

Cost Management

Cost analysis

Cost alerts (preview)

Budgets

Advisor recommendations

Monitoring

Automation

Help

Essentials

Subscription (move): Azure for Students

Subscription ID: b077ec8d-f214-4b50-983d-7fe640d6e457

Deployments: 1 Failed, 12 Succeeded

Location: West Europe

Tags (edit): Add tags

Resources Recommendations (7)

Filter for any field... Type equals all Location equals all Add filter

Showing 1 to 16 of 16 records. Show hidden types No grouping List view

Name	Type	Location
cujwhmz5ib5we (privatelink.blob.core.windows.net/cujwhmz5ib5we)	Virtual network link	Global
infrastructurestrg25549	Storage account	West Europe
privatelink.blob.core.windows.net	Private DNS zone	Global
storage-endpoint	Private endpoint	West Europe
storage-endpoint.nic.578e3d81-715d-4386-88fe-d037c21ef262	Network Interface	West Europe
vault346	Recovery Services vault	West Europe
Windows10-InfrastructureHost	Virtual machine	West Europe
Windows10-InfrastructureHost-ip	Public IP address	West Europe
Windows10-InfrastructureHost-nsg	Network security group	West Europe
Windows10-InfrastructureHost-vnet	Virtual network	West Europe
windows10-infrastructurehost670_z2	Network Interface	West Europe
Windows10-InfrastructureHost_OsDisk_1_dc81d11522744e278a8bc343d4756dbe	Disk	West Europe
WindowsServer2019-VM	Virtual machine	West Europe
WindowsServer2019-VM-ip	Public IP address	West Europe
windowsserver2019-vm945_z2	Network Interface	West Europe
WindowsServer2019-VM_OsDisk_1_2902kd0f801a46f9961d55f586ebb37c	Disk	West Europe

< Previous Page 1 of 1 Next >

Give feedback

# Azure Cloud Infrastructure Deployment and Management

## Week 2: Deploy and Manage Azure Resources

### Virtual Machine Deployment (Portal)

1. In the portal menu, go to **Virtual machines** > + **Create** > **Azure virtual machine**.
2. Under **Basics**, configure:
  - **Subscription and Resource group**: select the one created in Week 1.
  - **Virtual machine name**: <env>-vm-<role>-<index> (e.g., prod-vm-web-01).
  - **Region**: same as RG.
  - **Image**: e.g., *Ubuntu LTS*.
  - **Size**: click **See all sizes** and pick appropriate SKU (e.g., *Standard\_B2s*).
3. Under **Administrator account**, choose SSH public key or password.
4. Under **Networking**, select:
  - **Virtual network**: <env>-vnet-<app>-<region> (or **Create new**).
  - **Subnet**: <env>-subnet-<role>-<cidr>.
  - **Public inbound ports**: select SSH (22) or RDP (3389).
  - **NIC network security group**: choose basic, then allow HTTP/HTTPS if needed.
5. Under **Management**, enable **Boot diagnostics**, **Auto-shutdown**, and **Backup** if desired.
6. Click **Review + create**, then **Create**.

**Tip:** Immediately configure Managed Disks and enable automated backups after VM creation.

### Network Configuration (Portal)

#### Create Virtual Network & Subnet

1. Navigate to **Virtual networks** > + **Create**.
2. Under **Basics**, set:
  - **Name**: <env>-vnet-<app>-<region>.
  - **Address space**: 10.0.0.0/16.
  - **Subscription and Resource group**.
  - **Region**.

# Azure Cloud Infrastructure Deployment and Management

3. Under **IP Addresses**, click **+ Add subnet**:
  - **Subnet name**: <env>-subnet-<role>-<cidr>.
  - **Subnet address range**: e.g., 10.0.1.0/24.
4. Click **Review + create**, then **Create**.

## Configure Network Security Group (NSG)

1. Go to **Network security groups > + Create**.
2. Under **Basics**, set:
  - **Name**: <env>-nsg-<app>-<region>.
  - **Subscription, Resource group, Region**.
3. After creation, open the NSG and select **Inbound security rules > + Add**.
  - **Source**: Any
  - **Source port ranges**: \*
  - **Destination**: Any
  - **Destination port ranges**: e.g., 80 for HTTP
  - **Protocol**: TCP
  - **Action**: Allow
  - **Priority**: 100
  - **Name**: Allow-HTTP
4. Associate NSG with the VM NIC or subnet under **Network interfaces**.

**Best Practice:** Use NSGs to segment traffic; monitor flow logs with Azure Network Watcher. ☐cite☐turn0file0☐

## Azure Active Directory Configuration (Portal)

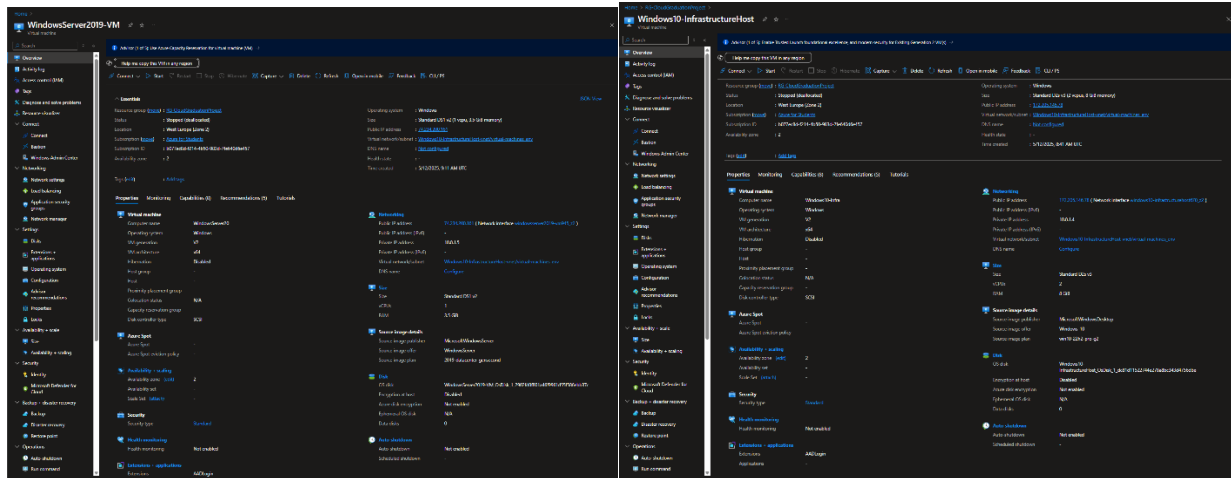
1. In the portal menu, select **Azure Active Directory**.
  2. Under **Users**, click **+ New user**:
    - Fill in **Name, User name, Profile**.
  3. Under **Groups**, click **+ New group**:
    - **Group type**: Security.
    - **Group name**: e.g., WebAppAdmins.
  4. To assign roles, go to **Subscriptions**, select your subscription, then **Access control (IAM) > Add role assignment**.
    - **Role**: e.g., Contributor.
    - **Assign access to**: User, group, or service principal.
  5. Select the group or user and click **Save**.
-

# Azure Cloud Infrastructure Deployment and Management

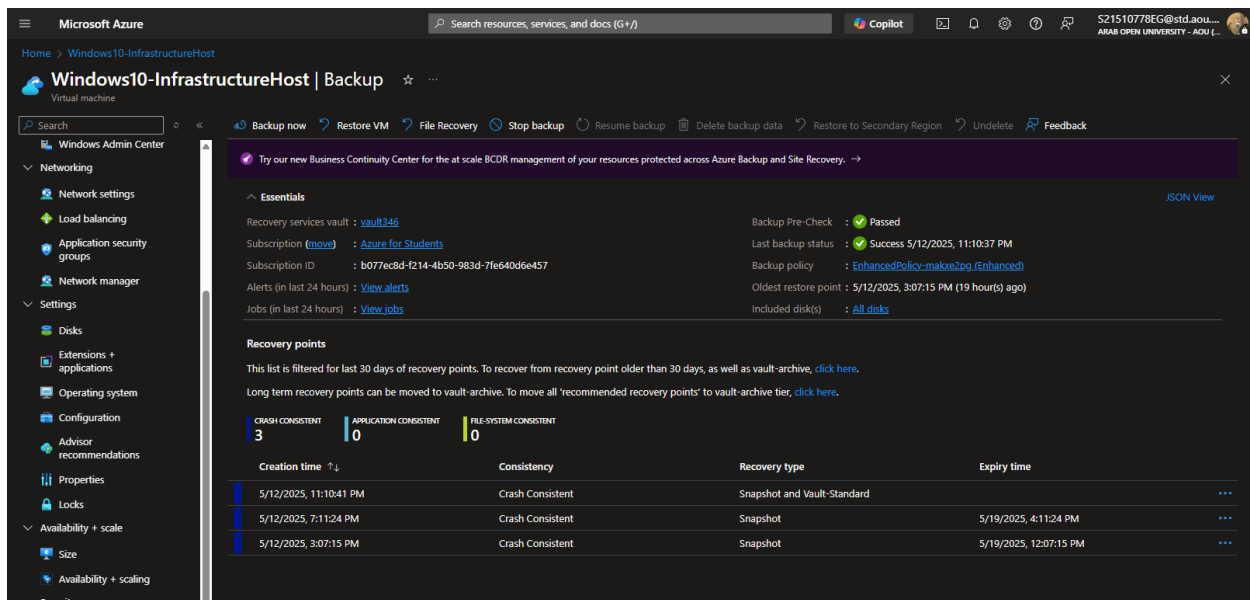
## Virtual Machine Deployment

### Server VM

### Host VM



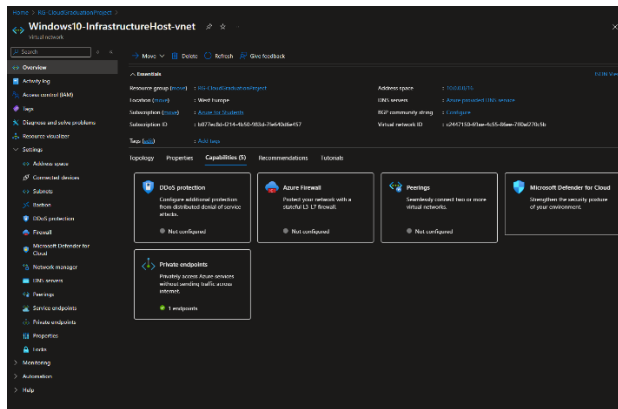
### Host VM backup



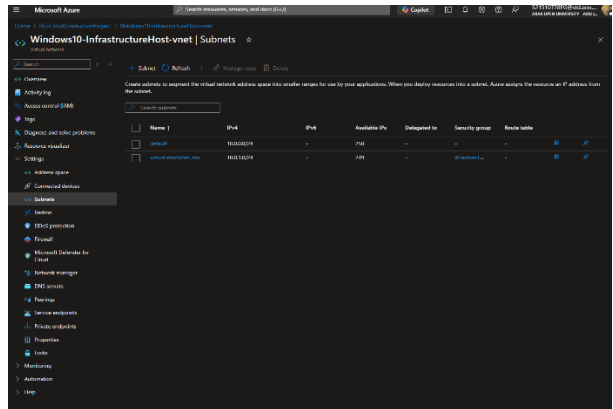
# Azure Cloud Infrastructure Deployment and Management

## Network Configuration

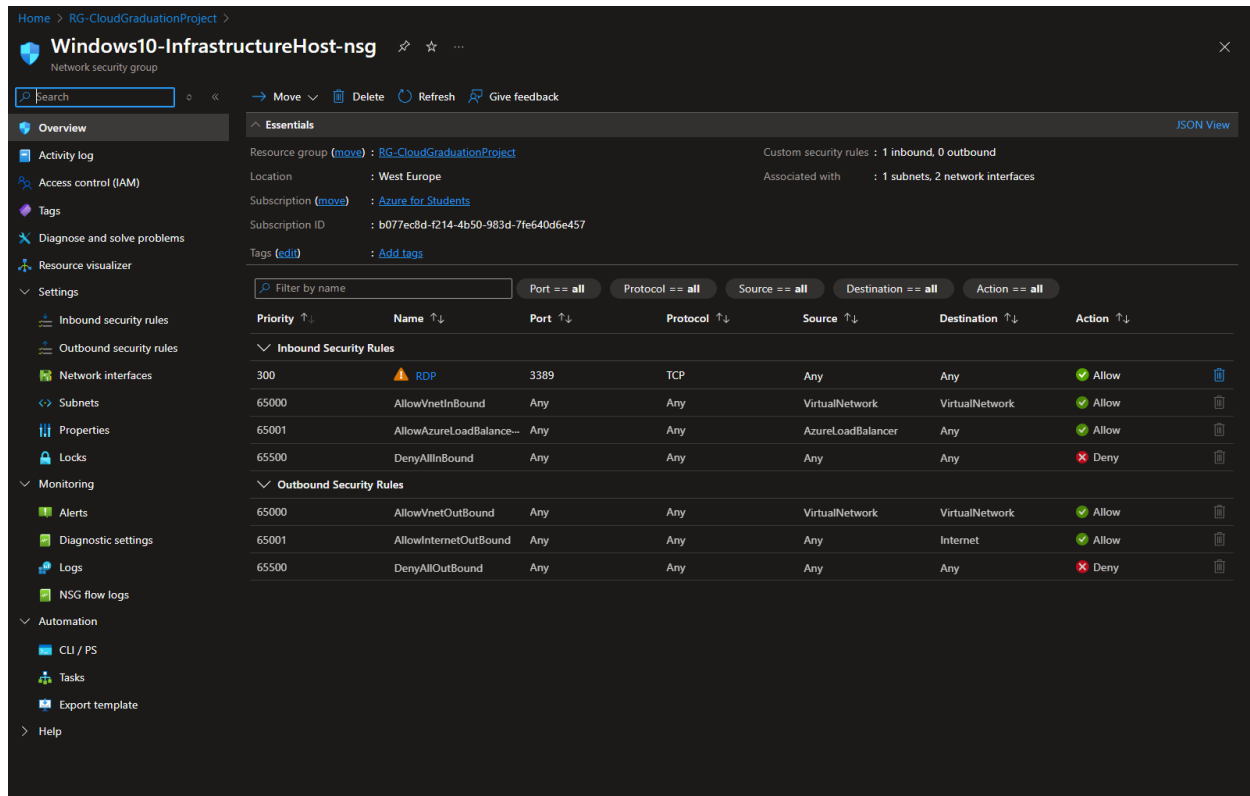
### VNET



### VNET Subnets



### NSG





# Azure Cloud Infrastructure Deployment and Management

## Week 3: Implement Storage Solutions

### Storage Account Provisioning (Portal)

1. Navigate to **Storage accounts** > **+ Create**.
2. Under **Basics**, configure:
  - **Subscription and Resource group**.
  - **Storage account name**: <env>st<app><unique>.
  - **Location**: same region.
  - **Performance**: Standard.
  - **Replication**: Geo-redundant (GRS).
3. Under **Advanced**, enable **Soft delete** and **Secure transfer required**.
4. Under **Networking**, choose **Private endpoint** or **Public endpoint (default)**.
5. Click **Review + create**, then **Create**.

**Tip:** Use private endpoints for production to restrict network exposure.

☐ cite ☐ turn off file ☐

### Blob Storage Configuration (Portal)

1. Open the created storage account and go to **Containers** > **+ Container**.
  - **Name**: e.g., logs-container.
  - **Public access level**: Private (no anonymous access).
2. Click **Create**.
3. To change access tier, select a blob, then **Change tier** > choose Hot/Cool/Archive.

# Azure Cloud Infrastructure Deployment and Management

## Backup Solutions (Portal)

### Recovery Services Vault Setup

1. Go to **Recovery Services vaults** > + **Create**.
2. Under **Basics**, set:
  - **Name:** <env>-rsv-<app>.
  - **Subscription, Resource group, Region.**
3. Click **Review + create**, then **Create**.

### Configure Backup

1. Open the vault and click **Backup** > + **Backup**.
2. **Where is your workload running?:** Azure.
3. **What do you want to back up?:** Azure Virtual Machine / File Shares / SQL.
4. Click **Backup goal**, select VMs, then **Start discovery**.
5. After discovery, under **Backup items**, select VMs and click **Backup**.
6. Choose or create a **Backup policy** (schedule, retention), then **Enable backup**.

**Best Practice:** Test restore regularly and document RTO/RPO objectives. □cite□turn0file0□

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# Azure Cloud Infrastructure Deployment and Management

## Storage Account & Blob

### storage account

The screenshot displays the Azure portal interface for a storage account named **infrastructurestrg25549**. The left sidebar shows the navigation menu with categories like Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, Events, Storage browser, Storage Mover, Partner solutions, Resource visualizer, Data storage, Containers, File shares, Queues, Tables, Security + networking, Networking, Front Door and CDN, Access keys, Shared access signature, Encryption, Microsoft Defender for Cloud, Data management, Storage Actions, Redundancy, Data protection, Object replication, and Blob inventory.

The main content area is divided into several sections:

- Essentials**: Provides key information about the storage account.
  - Resource group: [RG-CloudGraduationProject](#)
  - Location: **westeurope**
  - Primary/Secondary Location: **Primary: West Europe, Secondary: North Europe**
  - Subscription: [Azure for Students](#)
  - Subscription ID: **b077ec8d-f214-4b50-983d-7fe640d6e457**
  - Disk state: **Primary: Available, Secondary: Available**
  - Tags: [Add tags](#)
  - Performance: **Standard**
  - Replication: **Read-access geo-redundant storage (RA-GRS)**
  - Account kind: **StorageV2 (general purpose v2)**
  - Provisioning state: **Succeeded**
  - Created: **5/12/2025, 1:00:37 PM**
- Properties**: A tabbed interface showing various settings.
  - Blob service**:
    - Hierarchical namespace: **Disabled**
    - Default access tier: **Cool**
    - Blob anonymous access: **Disabled**
    - Blob soft delete: **Enabled (3 days)**
    - Container soft delete: **Enabled (3 days)**
    - Versioning: **Disabled**
    - Change feed: **Disabled**
    - NFS v3: **Disabled**
    - Allow cross-tenant replication: **Disabled**
    - Storage tasks assignments: **None**
  - File service**:
    - Large file share: **Enabled**
    - Identity-based access: **Not configured**
    - Default share-level permissions: **Disabled**
    - Soft delete: **Disabled**
  - Queue service**:
    - CMK support: **Disabled**
  - Table service**:
    - CMK support: **Disabled**
  - Security**:
    - Require secure transfer for REST API operations: **Enabled**
    - Storage account key access: **Enabled**
    - Minimum TLS version: **Version 1.2**
    - Infrastructure encryption: **Disabled**
  - Networking**:
    - Allow access from: **All networks**
    - Private endpoint connections: **1**
    - Network routing: **Internet routing**
    - Access for trusted Microsoft services: **Yes**
    - Endpoint type: **Standard**

# Azure Cloud Infrastructure Deployment and Management

## Blob container content

The screenshot shows the 'storage-containerblob' container page in the Microsoft Azure portal. The left sidebar contains navigation options: Overview, Diagnose and solve problems, Access Control (IAM), Settings, Shared access tokens, Access policy, Properties, and Metadata. The main area displays the container's contents, including a search bar, a table of blobs, and a 'Only show active blobs' filter.

Name	Last modified	Access tier	Blob type	Size	Lease state
Azure Administrator Associate (AZ-104).pdf	5/12/2025, 1:05:52 PM	Cool (inferred)	Block blob	6.98 MiB	Available
Azure Administrator Associate session 1-4.pdf	5/12/2025, 1:05:40 PM	Cool (inferred)	Block blob	4.18 MiB	Available
Azure Cloud Solution Admin & Architect - Detailed Syllabus_V3.pdf	5/12/2025, 1:04:47 PM	Cool (inferred)	Block blob	372.08 KiB	Available
Azure Cloud Solution Admin & Architect - Project - final.pdf	5/12/2025, 1:04:22 PM	Cool (inferred)	Block blob	24.18 KiB	Available
Azure Data Fundamentals.pdf	5/12/2025, 1:05:08 PM	Cool (inferred)	Block blob	2.59 MiB	Available
Azure Fundamentals.pdf	5/12/2025, 1:05:37 PM	Cool (inferred)	Block blob	3.78 MiB	Available
Module 1 Deploy Active Directory services .pdf	5/12/2025, 1:05:04 PM	Cool (inferred)	Block blob	1.61 MiB	Available
Module 2 Manage directory objects .pdf	5/12/2025, 1:05:13 PM	Cool (inferred)	Block blob	881.46 KiB	Available
Module 3 Advanced AD DS infrastructure management.pdf	5/12/2025, 1:05:14 PM	Cool (inferred)	Block blob	753.74 KiB	Available

## Blob container within the storage account

The screenshot shows the 'storage-containerblob' container page within the 'infrastructurestrg25549' storage account. The left sidebar contains navigation options: Overview, Activity log, Tags, Diagnose and solve problems, Access Control (IAM), Data migration, and Events. The main area displays the container's contents, including a search bar, a table of containers, and a 'Only show active containers' filter.

Name	Last modified	Anonymous access level	Lease state
blobs	5/12/2025, 1:00:58 PM	Private	Available
storage-containerblob	5/12/2025, 1:03:58 PM	Private	Available

## storage endpoint blb

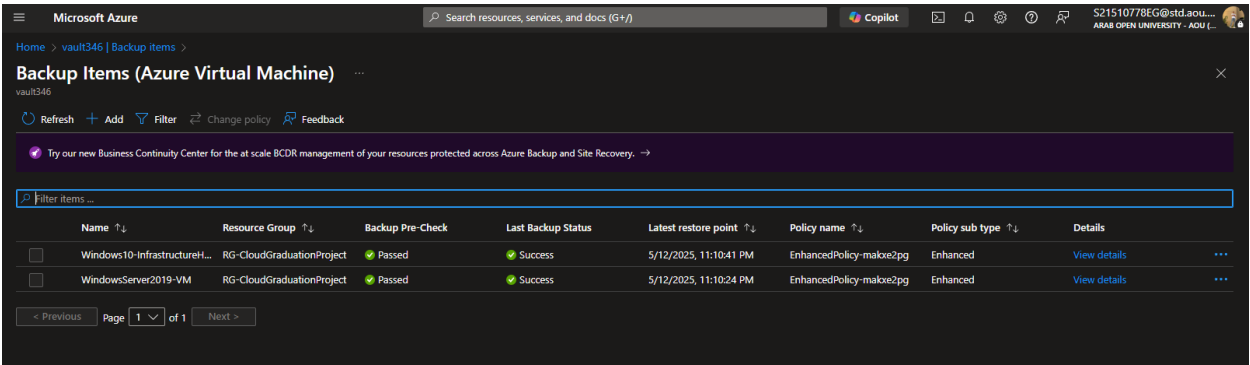
The screenshot shows the 'storage-endpoint' resource page in the Microsoft Azure portal. The left sidebar contains navigation options: Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, Resource visualizer, Settings, Monitoring, Automation, and Help. The main area displays the resource's properties, including a search bar, a table of properties, and a 'JSON View' link.

Property	Value
Resource group	RG-CloudGraduationProject
Location	West Europe
Subscription	Azure for Students
Subscription ID	b077ec8d-f214-4b50-983d-7fe640de457
Provisioning state	Succeeded
Tags	Add tags
Virtual network/subnet	Windows10-InfrastructureHost-vnet/default
Network interface	storage-endpoint-nic-578e3d81-715d-4386-88fe-d037c21ef262
Private link resource	infrastructurestrg25549
Target sub-resource	blob
Connection status	Approved
Request/Response	Auto-Approved

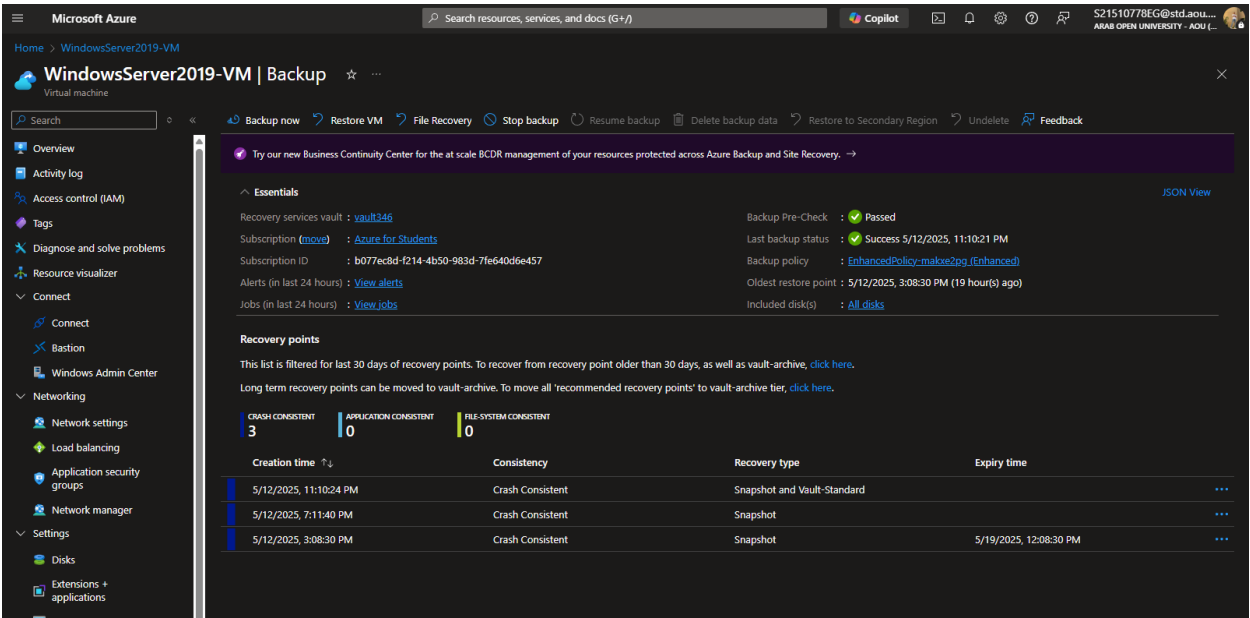
# Azure Cloud Infrastructure Deployment and Management

## Backup Solutions

### Backed up items in backup caul



## Server Backup



# Azure Cloud Infrastructure Deployment and Management

## Week 4: Final Integration & Testing

### Connectivity Verification

- Under each VM's **Networking** blade, verify assigned subnet and NSG.
- Use **Cloud Shell** > **Bash** (in portal) to run `ping <storageaccount>.blob.core.windows.net.`
- In **Azure Monitor**, review **Network Watcher** connectivity checks.

### Identity & Access Validation

- Test login with a non-admin user to ensure RBAC works as expected.
- Under **Azure Active Directory** > **Sign-in logs**, validate access patterns.

### Backup & Restore Simulations

- In **Recovery Services vault**, select a VM backup > **Restore VM**.
- Follow the restore wizard to recover to a new resource group or overwrite existing.
- Confirm restored VM is operational.

### Documentation & Presentation

- Create architecture diagrams in Visio/Draw.io and export as PNG.
- Assemble a PowerPoint summarizing:
  1. Objectives & scope
  2. Architecture overview
  3. Deployment highlights
  4. Testing results
  5. Next steps and recommendations
- Upload all artifacts to a shared repository (e.g., Azure DevOps Wiki).

# Azure Cloud Infrastructure Deployment and Management

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## Appendices

### ARM/Bicep Snippets

```
resource rg 'Microsoft.Resources/resourceGroups@2021-04-01' = {  
  name: 'prod-rg-webapp-weu'  
  location: 'westeurope'  
}
```

### Glossary

- **VNet:** Virtual Network
  - **NSG:** Network Security Group
  - **SKU:** Pricing tier of Azure resources
- 

## Note:

**This Document is made for the Graduation Project from round 2 at DEPI (Digital Egypt Pioneers Initiative)**

**Under the Supervision of our mentor Eng. Omar Hussein**

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- **Mohamed Ayman Mostafa Awad**
- **Abdullah Ahmed Metwaly**

*End of Document*