

Provisioning for Azure Cost Optimization & Monitoring Project



STEP 0: Problem Background

Company “X” is an engineering company that has offices in both the US East & West Coast. They currently host all their data and applications in a single East coast data center and are constantly worried about both cost and resiliency. Below is how their current servers are configured.

Server(s):	Purpose: Windows/Linux Server Environment: Physical Servers Operating System: Windows Operating System License: DataCenter Servers: 10 Procs per server: 2 Core(s) per proc: 8 Cores RAM: 256 GB Optimize By: CPU GPU: None Usage: These are the servers where all your engineering workloads happen. Currently they all are being leveraged at regular capacity.
Server(s):	Purpose: Web App Environment: Physical Servers Operating System: Windows Operating System License: DataCenter Servers: 3 Procs per server: 1 Core(s) per proc: 8 Cores RAM: 64 GB

	<p>Optimize By: CPU</p> <p>GPU: None</p> <p>Usage: These are the web app servers for your company. Currently they all are being leveraged at regular capacity.</p>
Server(s):	<p>Source: Database Server</p> <p>Database: Microsoft SQL Server</p> <p>License: Enterprise</p> <p>Environment: Physical Servers</p> <p>Operating System: Windows</p> <p>Operating System License: Datacenter</p> <p>Servers: 3</p> <p>Procs per server: 1</p> <p>Cores per proc: 16 Cores</p> <p>RAM: 64 GB</p> <p>Optimize By: CPU</p> <p>Usage: These three servers are running Microsoft SQL Server and provide the database for your engineering company. It is critical that they are always running.</p> <p>Destination</p> <p>Service: SQL Database</p> <p>Purchase Model: vCore</p> <p>Service Tier: Business Critical</p> <p>Instance Cores: 2</p> <p>SQL Server Storage: 5</p> <p>SQL Server backup: 0</p>
Storage	<p>Purpose: Storage</p> <p>Type: Local Disk / SAN</p> <p>Disk Type: HDD</p> <p>Capacity: 1 TB</p> <p>Back-Up: None currently</p> <p>Archive: None</p>

Networking	Amount of network bandwidth you currently consume in your on-premises environment: 1 GB
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STEP 1: Assessing the On-Premises Environment & Generating Total Cost of Ownership (TCO) Report

Purpose: To identify the Azure services needed to ensure Company “X”’s business continuity in the cloud.

Current Environment/ Background Make a list of all current on-premises servers and services.	<p>There are 10 Windows VM’s which are used for engineering purposes. There are 3 web apps servers which host the front end of the company. There are 3 database servers. There is a storage which is also used to store data.</p>
Matching Azure Services Match the list of on-premises servers and services to the corresponding Azure ones.	<p>Make a list of all servers and services you would create on Azure and explain why you chose each.</p> <ul style="list-style-type: none">❑ 1. Engineering Workload VMs (10 Windows VMs)<ul style="list-style-type: none">• Service: Azure Virtual Machines• Configuration:<ul style="list-style-type: none">○ OS: Windows Server (Standard)○ Size: E32as_v6○ RAM: 256 GB per VM to match on-prem capacity.2. Web App Servers (3 Web Apps)<ul style="list-style-type: none">• Service: Azure App Services• Configuration:<ul style="list-style-type: none">○ OS: Windows Server (Standard).○ Size: Plan based on CPU optimization (e.g., Standard or Premium App Service Plan).• Reason: Azure App Services simplify management, scaling, and deployment of web apps. This removes the need for separate VM management for web hosting.3. Database Servers (3 SQL Servers)<ul style="list-style-type: none">• Service: Azure SQL Database• Configuration:<ul style="list-style-type: none">○ Purchase Model: vCore.○ Service Tier: Business Critical.○ Instance Cores: 2 cores per server.○ SQL Server Storage: 5 GB.• Reason: Azure SQL Database provides high availability, disaster recovery, and automated maintenance, meeting the critical uptime needs of databases.4. Storage Solution<ul style="list-style-type: none">• Service: Azure Blob Storage• Configuration:

- Disk Type: HDD for standard storage.
- Capacity: 1 TB.
- **Reason:** Replaces on-prem storage with Azure's scalable storage solution. Supports data storage and integrates with other Azure services.

Hint:

- For VM's and Web Apps: The operating system license is always Standard and Virtualization is always Hyper-V.
- For databases: The purchase model is vCore, the Service Tier is Business Critical, and no SQL Server Backup is needed.
- For networking: The defaults of 200 GB for outbound bandwidth are used.

Screenshot 1

Submit the screenshot for each of the above configurations from Azure TCO. VM and Web Apps Server screenshot should be submitted here.

The screenshot displays two configurations in the Azure TCO calculator:

- WordPress Webserver:**
 - Workload: Windows/Linux Server
 - Environment: Physical Servers
 - Operating system: Windows
 - Operating System License: Datacenter
 - Servers: 10 (1 - 9999)
 - Procs per server: 2 (1 - 4)
 - Core(s) per proc: 8 (1 - 8)
 - RAM (GB): 256 (1 - 448)
 - Optimize by: CPU
 - GPU: None
 - Windows Server 2008/2008 R2: ☒
- WebApp Webserver:**
 - Workload: Web App
 - Environment: Physical Servers
 - Operating system: Windows
 - Operating System License: Datacenter
 - Servers: 3 (1 - 9999)
 - Procs per server: 1 (1 - 4)
 - Core(s) per proc: 8 (1 - 8)
 - RAM (GB): 64 (1 - 448)
 - Optimize by: CPU
 - Auto scaling: ☒

At the bottom, there is a button labeled "Add server workload".

Screenshot 2

Submit the screenshot for each of the above configurations from Azure TCO. Database screenshot should be submitted here.

The screenshot displays the configuration for Microsoft SQL 2019 in the Azure TCO calculator:

- Source:**
 - Database: Microsoft SQL Server
 - License: Enterprise
 - Environment: Physical Servers
 - Operating system: Windows
 - Operating System License: Datacenter
 - Servers: 3 (1 - 9999)
 - Procs per server: 1 (1 - 4)
 - Core(s) per proc: 8 (1 - 8)
 - RAM (GB): 64 (1 - 448)
 - Optimize by: CPU
 - SQL Server 2008/2008 R2: ☒
- Destination:**
 - Service: SQL Database
 - Purchase Model: vCore
 - Service Tier: Hyperscale
 - Instance cores: 2
 - SQL Server storage: 40 GB (40 - 100000)
 - SQL Server backup: 0 GB (0 - 5000000)

Screenshot 3

Submit the screenshot for each of the above configurations from Azure TCO. [Storage configuration](#) screenshot should be submitted here.

Storage

Enter the details of your on-premises storage infrastructure. After adding storage, select the storage type and enter the remaining details.

Storage Server

Storage type ⓘ

Local Disk/SAN

Disk type ⓘ

HDD

Capacity ⓘ

1

TB

(1 - 5000)

Backup ⓘ

0

TB

(0 - 5000)

Archive ⓘ

0

TB

(0 - 5000)

[Add storage](#)

Screenshot 4

Submit the screenshot for each of the above configurations from Azure TCO. [Networking configuration](#) screenshot should be submitted here.

Networking

Enter the amount of network bandwidth you currently consume in your on-premises environment.

Outbound bandwidth ⓘ

1

GB

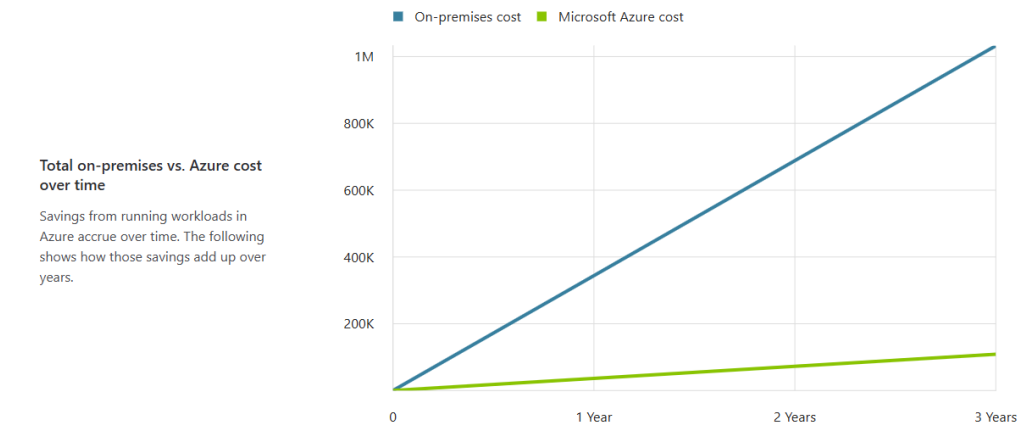
(1 - 2000000)

Destination Region

Sweden Central

Screenshot 5

Once the TCO Report is generated, submit a screenshot of the price comparison graph (line graph) here.



Screenshot 6

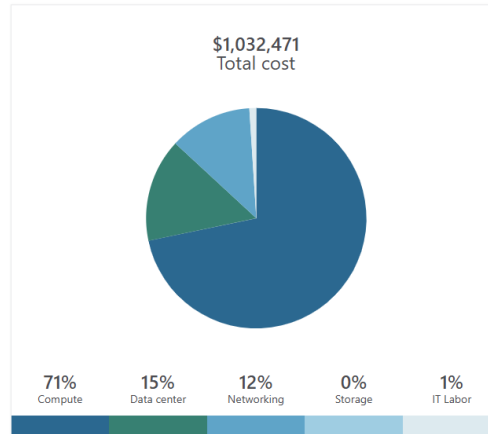
Once the TCO Report is generated, submit a screenshot of the price comparison graph (pie chart) here.

Screenshot 7

Once the TCO Report is generated, submit a screenshot of the price comparison chart (tabular format) here.

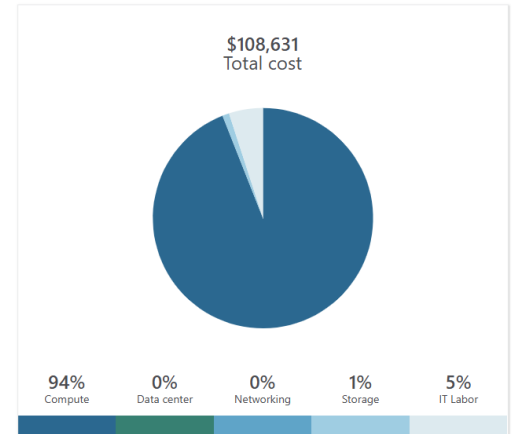
Total on-premises over 3 year(s)

TCO of on-premises environments tends to be driven by compute and data center costs.



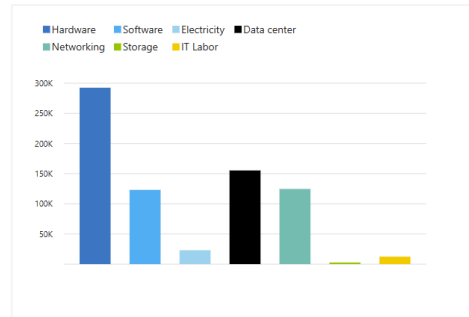
Total Azure cost over 3 year(s)

In Azure, certain cost categories decrease or go away completely.



Total on-premises cost breakdown

In Azure, several of the cost categories from the on-premises environment are consolidated and decrease with the efficiency that comes with the cloud.

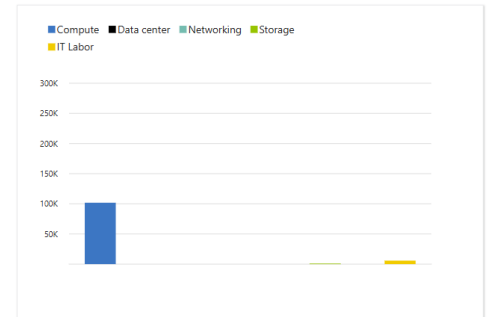


\$1,032,471

Cost over 3 year(s)

Total Azure cost breakdown

In Azure, several of the cost categories from the on-premises environment are consolidated and decrease with the efficiency that comes with the cloud.



\$108,631

Cost over 3 year(s)

Explanation 1

Explain the breakdown of the costs and show your understanding of how on-prem costs versus Azure compare

Category	On-Premises Cost	Azure Cost	Difference	Reason
Compute	\$737,402.40	\$101,808.00	\$635,594.40 saved	Azure eliminates physical server expenses.
Hardware	\$292,534.40	\$0.00	\$292,534.40 saved	No hardware purchase in Azure.
Software	\$123,100.00	\$0.00	\$123,100.00 saved	Many licenses are included in Azure plans.
Electricity	\$23,040.00	\$0.00	\$23,040.00 saved	Azure handles power costs for its data centers.
Database	\$298,728.00	Included	\$298,728.00 saved	Databases are managed in Azure plans.
Data Center	\$155,304.84	\$0.00	\$155,304.84 saved	No physical space needed in Azure.
Networking	\$124,697.52	\$0.00	\$124,697.52 saved	Azure includes basic networking costs.
Storage	\$2,662.40	\$1,009.44	\$1,652.96 saved	Azure storage is cheaper and scalable.
IT Labor	\$12,403.50	\$5,814.00	\$6,589.50 saved	Fewer staff needed with Azure's managed services.

Comparison of On-Premises and Azure Costs

On-Premises

- **Higher Costs:** Total on-prem costs amount to \$1,032,471.00. This reflects significant investment in hardware, physical space, electricity, and labor.
- **Complexity:** Requires extensive in-house IT teams for deployment, monitoring, and maintenance. Scaling infrastructure often results in additional hardware procurement and setup delays.
- **Capital Expenditure (CapEx):** Upfront costs for hardware, licenses, and data center space dominate, requiring long-term investments.

Azure

- **Lower Costs:** Total Azure costs are \$108,631.00, significantly lower than on-premises, reflecting savings in hardware, networking, electricity, and data center maintenance.
- **Simplicity and Scalability:** Azure provides a more flexible model, allowing businesses to scale workloads up or down based on demand without upfront hardware investment.
- **Operational Expenditure (OpEx):** Pay-as-you-go pricing eliminates the need for heavy upfront investments, offering better budget control.

	Total Costs <ul style="list-style-type: none"> • On-Premises Total: \$1,032,471.00 • Azure Total: \$108,631.00 • Total Savings: \$923,840.00 (~89.5% lower with Azure)
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STEP 2: Azure Pricing Calculator Cost Estimates

Purpose: You want to only move the engineering workloads (so just your VM's) to Azure first to try and understand how Azure cloud works. In addition, this will also help you demonstrate to your CIO that by doing that small migration your company can achieve resiliency. You want to provide precise monthly costs to your CIO.

Use the Azure Pricing Calculator to submit the following screenshots.

Note: *If you are using Udacity Cloud Labs, you will be allowed to create a few VM sizes only. Visit [this link](#) to see all possible VM sizes and go through the classroom instructions for more details.*

Task 1	<p>Matching Azure Services: Match the list of on-premises servers and services to the corresponding Azure ones.</p> <p>Here is the VM configuration you will pick.</p> <ul style="list-style-type: none"> • 5 VM's will be in US East Coast, and 5 will be in US West Coast. • Choose the instance you want to create in both the regions from the possible VM sizes mentioned in the classroom. • Compute Option will be pay-as-you-go; so, there are no upfront costs. • The default of 730 hours is selected.
Screenshot 1 Submit the screenshot for each of the above configurations from the Azure	

Pricing Calculator. Submit the US East Coast monthly costs here.

Virtual Machines

Get \$200 credit plus free monthly amounts of popular services for 12 months—including Virtual Machines. [See free amounts](#) ×

Region:

East US ▼

Operating system:

Windows ▼

Type:

(OS Only) ▼

Tier:

Standard ▼

Category:

All ▼

Instance Series:

Bs-series ▼

INSTANCE: ([Need help finding the right VM?](#))

[816ms: 16 Cores, 64 GB RAM, 128 GB Temporary storage, \\$0.730/hour](#) ▼

1 Virtual machines ×

730

Hours ▼

Savings Options

Explore pricing models to help optimize your Azure costs.

[Learn more](#)

Compute (B16ms)

☒ Pay as you go

Savings plan ⓘ

- ☐ 1 year savings plan (~33% discount)
☐ 3 year savings plan (~55% discount)

Reservations ⓘ

- ☐ 1 year reserved (~42% discount)
☐ 3 year reserved (~62% discount)

\$2,430.90

Average per month
(\$0.00 charged upfront)

OS (Windows)

- ☒ License included
☐ Azure Hybrid Benefit

\$233.60

Average per month
(\$0.00 charged upfront)

= \$2,664.50

Average per month
(\$0.00 charged upfront)

Screenshot 2

Submit the screenshot for each of the above configurations from the Azure Pricing Calculator. Submit the US West Coast monthly costs here.

Screenshot 3

Submit the screenshot for total cost per month for both US East and West Coasts.

Virtual Machines

5 B16ms (16 Cores, 64 GB RAM) x 730 Hours (Pay as...)

Upfront: \$0.00

Monthly: \$2,664.50

Virtual Machines

Get \$200 credit plus free monthly amounts of popular services for 12 months—including Virtual Machines. [See free amounts](#)

Region:

West US 2

Operating system:

Windows

Type:

(OS Only)

Tier:

Standard

Category:

All

Instance Series:

Bs-series

INSTANCE: [\(Need help finding the right VM?\)](#)

B16ms: 16 Cores, 64 GB RAM, 128 GB Temporary storage, \$0.730/hour

5

x

730

Hours

Virtual machines

Savings Options

Explore pricing models to help optimize your Azure costs.

Learn more

Compute (B16ms)

Pay as you go

Savings plan

Reservations

\$2,430.90

Average per month

(\$0.00 charged upfront)

OS (Windows)

License included

Azure Hybrid Benefit

\$233.60

Average per month

(\$0.00 charged upfront)

=

\$2,664.50

Average per month

(\$0.00 charged upfront)

Your Estimate

Virtual Machines

5 B16ms (16 Cores, 64 GB RAM) x 730 Hours (Pay as...)

Upfront: \$0.00

Monthly: \$2,664.50

Virtual Machines

5 B16ms (16 Cores, 64 GB RAM) x 730 Hours (Pay as...)

Upfront: \$0.00

Monthly: \$2,664.50

Support

SUPPORT:

Basic (Included)

\$0.00

Select your program/offer

LICENSING PROGRAM:

Microsoft Customer Agreement (MCA)

[Log in](#) to see your Azure agreement pricing.

Show Dev/Test Pricing

Estimated upfront cost

\$0.00

Estimated monthly cost

\$5,329.00

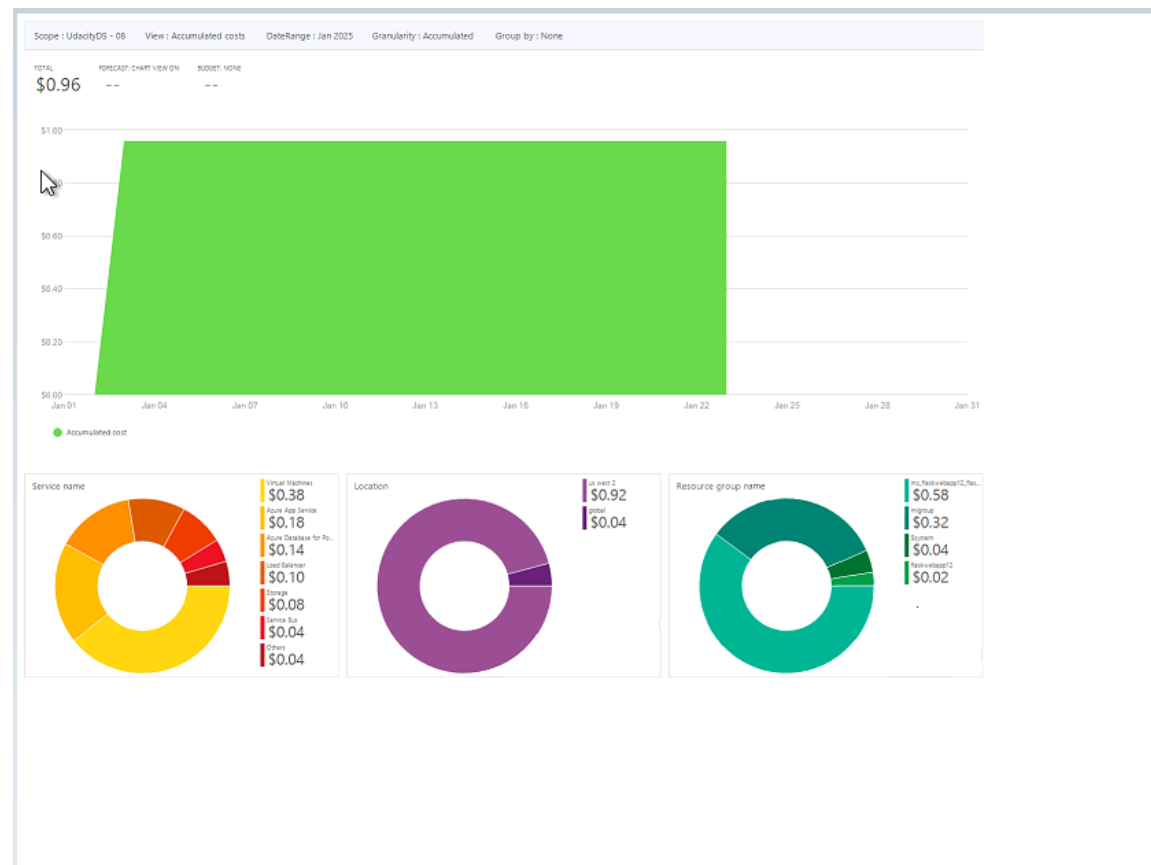
Explanation 1

Explain how resilience is built in by moving to Azure

- **High Availability (HA):** Deploying VMs in both US East Coast and US West Coast ensures resilience against regional failures.
- **Disaster Recovery:** Azure's geo-replication and cross-region failover protect data and services during outages.
- **Load Balancing:** Traffic is distributed across VMs in both regions, ensuring consistent performance.
- **Availability Zones:** Each region supports zones, minimizing downtime from hardware or data center failures.
- **Scalability:** Azure auto-scales VMs across both regions to handle demand spikes.
- **Proactive Monitoring:** Azure Monitor detects and resolves potential issues before they impact services.
- **Guaranteed Uptime:** With VMs in two regions, Azure ensures maximum resilience backed by strong SLAs.

STEP 3: Azure Cost Management + Billing

Background	You have now configured your Azure Production Workload environment and been using Azure for a few days. You have now been tasked by your CIO to present some metrics on how the costs are being billed within Azure and also what other functionalities Azure has in regards to cost management, which were not previously available.
Question 1 Submit the explanation	What is the purpose of Azure Cost Mgmt + billing Dashboard?
Explanation 1	The Azure Cost Management + Billing Dashboard provides visibility into Azure spending, helping monitor, analyze, and optimize costs. It enables budget tracking, identifies underutilized resources for cost savings, and forecasts future expenses. Additionally, it consolidates costs across subscriptions, offers custom reporting, and integrates with tools like Azure Advisor to enforce cost efficiency and accountability.
Screenshot 2 Submit the screenshot for main Cost Mgmt + Billing Dashboard.	Hint: Navigate to the Cost Management Section on the left and then click “Cost Analysis” to reach this dashboard. Students need to submit the main screenshot of the Billing dashboard



Explanation 2

Explain the key components of the screenshot submitted. An explanation to be provided for Scope and Area dropdown from the screenshot submitted.

- **Hint:** Make sure the right time period is selected to see the data.
- **Scope Dropdown:** Filters cost data by **subscription**, **resource group**, or **management group** to define the level of analysis.
- **Area Dropdown:** Focuses on specific insights like **cost by resource**, **service**, or **location** for detailed breakdowns.
- **Graphs/Charts:** Visualize spending trends and patterns over time based on the selected scope and area.
- **Filters:** Refine data by date, service type, or resource tags for targeted analysis.

Screenshot 3

Submit the screenshot for breakdown of costs by Service

Hint: Navigate to Cost Management Section on the left, and then click "Cost Analysis" to reach this dashboard. These pie charts are under the above graph submitted.

<p>Name and Location.</p>	 <p>The screenshot displays three donut charts representing cost breakdowns in Azure. The 'Service name' chart shows costs for Virtual Machines (\$0.38), Azure App Service (\$0.18), Azure Database for MySQL (\$0.14), Load Balancer (\$0.10), and Storage (\$0.08). The 'Location' chart shows costs for 'us west 2' (\$0.92) and 'global' (\$0.04). The 'Resource group name' chart shows costs for 'mc_flaskwebapp...' (\$0.58), 'migroup' (\$0.32), '\$system' (\$0.04), and 'flaskwebapp12' (\$0.02).</p>
<p>Explanation 3</p> <p>Explain the key components of the screenshot submitted.</p>	<p>Cost by Service Name: The left side donut chart shows the percentage of total costs attributed to each Azure service (e.g., VMs, app services, database, loadbalancer, Storage).</p> <p>Cost by Location: Displays cost distribution across Azure regions (e.g., US West 2, global).</p>
<p>Screenshot 4</p> <p>Submit the screenshot for breakdown of costs by Service Name and Location.</p>	<p>Hint: Navigate to Cost Management Section on the left and then click “Cost Alert” to reach this wizard. Next, click on “Add button” on top left under this tab. This is Part 1 of the wizard (of the 2-part process).</p>  <p>This screenshot is identical to the one in the first row, showing the same three donut charts for Service name, Location, and Resource group name with their respective cost values.</p>

Create budget ...

Budget

groups to have your budget monitor with more granularity as needed.

Scope  UdacityDS - 08

Filters  Add filter

Budget Details

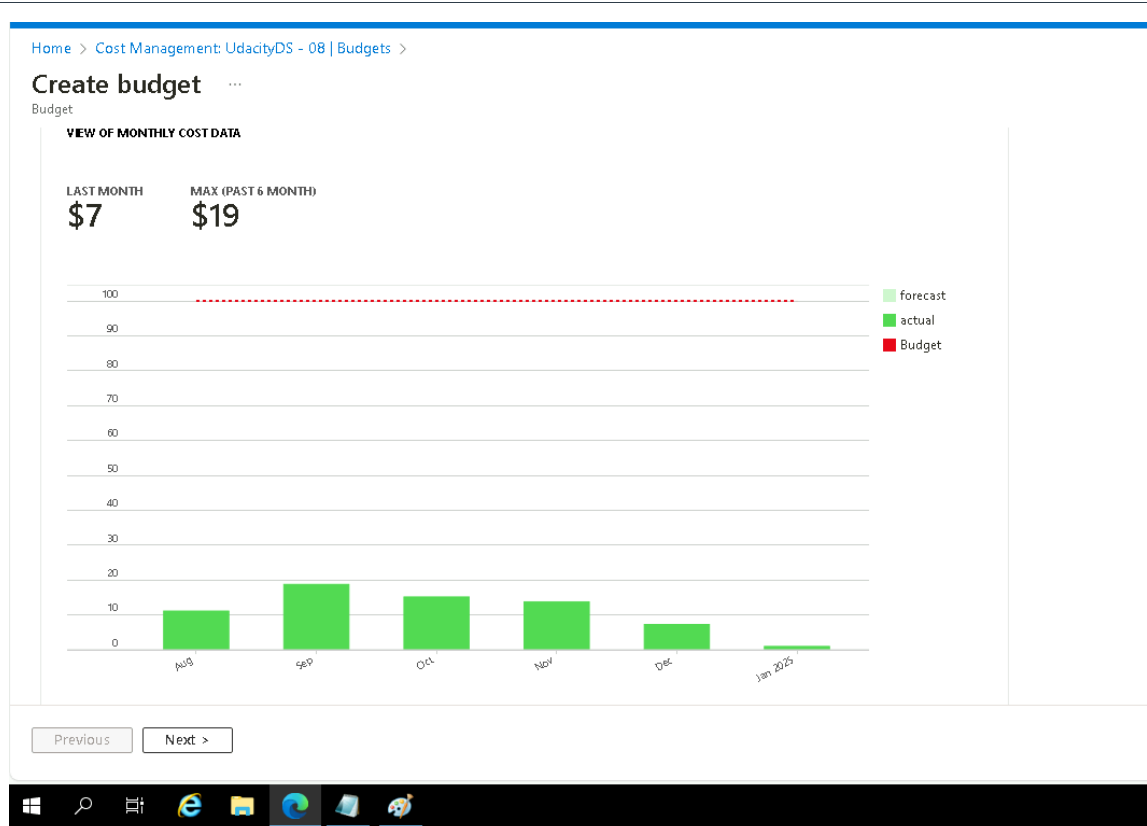
Give your budget a unique name. Select the time window it analyzes during each evaluation period, its expiration date and the amount.

Name	<input type="text" value="MonthlyBudget"/>		
Reset period ⓘ	<input type="text" value="Monthly"/>		
Creation date ⓘ	<input type="text" value="2025"/>	<input type="text" value="January"/>	<input type="text" value="1"/>
Expiration date ⓘ	<input type="text" value="2026"/>	<input type="text" value="December"/>	<input type="text" value="31"/>

Budget Amount

Give your budget amount threshold

Amount *	<input type="text" value="100"/>
----------	----------------------------------



Explanation 4

Explain the key components of the screenshot submitted.

1. Budgets can be used for cost controlling and it can be scoped
2. Budgets are used completely depending upon their resource requirement
3. Email can be triggered whenever the threshold limit is crossed
4. There are options to create monthly, quarterly or annual budget and for setting maximum threshold for the org

Screenshot 5

Submit the screenshot for breakdown of costs by Service Name and Location

Hint: This is Part 2 of the wizard (of the 2-part process).

[Home](#) > [Cost Management: UdacityDS - 08 | Budgets](#) >

Create budget ...

Budget

Type	% of budget	Amount	Action group
Actual	75	75	None
Select type	Enter %	-	None

[Manage action group](#) ⓘ

* Alert recipients (email)

Alert recipients (email)

arunprakashpj@gmail.com



example@email.com

It is recommended to add `azure-noreply@microsoft.com` to your email allow list to ensure alert mails do not go to your spam folder.

Language preference

Select your preferred language for receiving the alert email for all recipients provided above. Default is the language associated to your enrollment.

[Previous](#)

[Create](#)

Explanation 5

Explain the key components of the screenshot submitted.

1. Alerts can be set here. In the given screen shot, the threshold limit is set as 70% for the alert
2. Once the threshold is crossed, email will be triggered towards the specified account
3. Thus the above screenshot covers the scenario of setting Budget conditions and the alerts triggering based on that

Screenshot 6

Submit the screenshot for breakdown of costs by Service

Covered ALREADY above

Name and Location.	
Explanation 6 Explain the key components of the screenshot submitted.	Covered ALREADY above
Explanation 7 Explain the summarized highlights of this part of the project, Azure Cost Mgmt + Billing	<ul style="list-style-type: none"> • Cost Breakdown: Tracks spending by services (e.g., VMs, Storage) and regions. • Budget Alerts: Monitors costs and prevents overages with notifications. • Optimization: Identifies underutilized resources to reduce expenses. • Forecasting: Predicts future costs for better planning. • Custom Reports: Generates tailored reports for stakeholders.

STEP 4: Azure Policy to create and enforce policies

Background

You have now configured your Azure Production Workload environment and been using Azure for a few days. You realize that many infrastructure administrators are creating VM sizes without doing proper due diligence, thus having a direct impact on cost.

You now decide to leverage Azure Policy features to ensure that appropriate controls are put in place.

Screenshots 1 through 5

Submit the screenshots for Azure Policy steps.

Hint: Navigate to and select the built-in Azure policy “Allowed virtual machine size SKUs;” then follow the wizard steps. Submit a screenshot for every single step of the wizard so that any mistakes in the final step can be caught by your reviewer.

Very important note:

1. Due to lab restrictions, while you go through the wizard, you will not be allowed to create the policy in the final step. Please submit all screenshots though
2. So for the Part 2 of this project to be submitted, a successful policy has already been created in the lab for you, which can be used to test the VM creation scenario. Please ensure to double check which VM series is allowed to be created in the lab and ensure that you do not use the same series for passing this part of the project

Step 1:

[Home](#) > [Policy](#) | Definitions >

Allowed virtual machine size SKUs

Policy definition

[Assign policy](#) [Edit definition](#) [Duplicate definition](#) [Select version \(preview\)](#) [Delete definition](#)

Essentials

Name	: Allowed virtual machine size SKUs	Definition location	: --
Version (preview)	: 1.0.1	Definition ID	: /providers/Microsoft.Authorization/policyDefinitions/cccc23c7-8427-4f53-ad12-b6a63eb452b3
Description	: This policy enables you to specify a set of virtual machine size SKUs that your organization can deploy.	Type	: Built-in
Available Effects	: Deny	Mode	: Indexed
Category	: Compute		

Definition Assignments (0) Parameters (1)

```
1 {
2   "properties": {
3     "displayName": "Allowed virtual machine size SKUs",
4     "policyType": "BuiltIn",
5     "mode": "Indexed",
6     "description": "This policy enables you to specify a set of virtual machine size SKUs that your organization can deploy.",
7     "metadata": {
8       "version": "1.0.1",
9       "category": "Compute"
10    },
11    "version": "1.0.1",
12    "parameters": {
13      "listOfAllowedSKUs": {
14        "type": "Array",
15        "metadata": {
16          "description": "The list of size SKUs that can be specified for virtual machines.",
17          "displayName": "Allowed Size SKUs",
18          "strongType": "VMSize"
19        }
20      }
21    },
22    "policyRule": {
23      "if": {
```

Step 2:

Assign policy ...

Basics Parameters Remediation Non-compliance messages Review + create

Scope

Scope * ...
[Learn more about setting the scope](#)

Exclusions ...

Resource selectors [\(Expand\)](#) Using resource selectors, you can further refine this assignment's applicability by targeting specific subsets of resources. Expand to learn more.

Basics

Policy definition * ...

Version (preview) * ...

Overrides [\(Expand\)](#) Using overrides, you can change the effects or referenced versions of definitions for all or a subset of resources evaluated by this assignment. Expand to learn more.

Assignment name *

Description

Policy enforcement ☒ Enabled

[Previous](#) [Next](#) [Review + create](#)

Step 3

[Home](#) > [Policy | Definitions](#) > [Allowed virtual machine size SKUs](#) >

Assign policy ...

Basics

Parameters

Remediation

Non-compliance messages

Review + create

 Search by parameter name

☒ Only show parameters that need input or review

Azure VM SKU * ⓘ

Standard_B1s 

Previous

Next

Review + create

Step 4:

[Home](#) > [Policy | Definitions](#) > [Allowed virtual machine size SKUs](#) >

Assign policy ...

Basics

Parameters

Remediation

Non-compliance messages

Review + create

By default, this assignment will only take effect on newly created resources. Existing resources can be updated via a remediation task after the policy is assigned. For deployIfNotExists policies, the remediation task will deploy the specified template. For modify policies, the remediation task will edit tags on the existing resources.

Managed Identity

Policies with the deployIfNotExists and modify effect types need the ability to deploy resources and edit tags on existing resources respectively. To do this, choose between an existing user assigned managed identity or creating a system assigned managed identity. [Learn more about Managed Identity.](#)

Create a Managed Identity ⓘ

☐

Permissions

ⓘ This policy does not contain any role definitions. Policies must specify role definitions in order to create the correct role assignments for the managed identity.

Previous

Next

Review + create

Step 5:

Assign policy ...

[Basics](#) [Parameters](#) [Remediation](#) [Non-compliance messages](#) [Review + create](#)

Non-compliance messages help users understand why a resource is not compliant with the policy. The message will be displayed when a resource is denied and in the evaluation details of any non-compliant resource.

Non-compliance message

Only B1s is allowed

[Previous](#)

[Next](#)

[Review + create](#)

[Home](#) > [Policy | Definitions](#) > [Allowed virtual machine size SKUs](#) >

Assign policy ...

Basics

Parameters

Remediation

Non-compliance messages

Review + create

Basics

Scope	arunprakashjothimani-test
Exclusions	--
Policy definition	Allowed virtual machine size SKUs
Assignment name	Allowed virtual machine size SKUs
Version (preview)	1.0.*
Description	--
Policy enforcement	Enabled
Assigned by	Arun Prakash Jothimani

Advanced

Resource selectors	No selectors associated with this assignment.
Overrides	No overrides associated with this assignment.

Parameters

Allowed Size SKUs	["standard_b1s"]
-------------------	------------------

Remediation

Create a Managed Identity	No managed identity associated with this assignment.
---------------------------	--

Non-compliance messages

Default non-compliance message	Only B1s is allowed
--------------------------------	---------------------

Previous

Next

Create

Screenshot 6

Explain through screenshots what happens

Once the Azure policy creation is complete, try to create a VM which is of a “NOT ALLOWED” size.

Hint: pick any size; it doesn't matter as long as it's not in the allowed list in Azure policy you just created.

when you create a VM which is in violation with the policy you just created.

Once you go through the wizard, in the final step you will see the following screenshot, which needs to be submitted.

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

Create a virtual machine

[Help me create a low cost VM](#) [Help me create a VM optimized for high availability](#) [Help me choose the right VM size for my workload](#)

☐ Azure-selected zone (Preview)
Let Azure assign the best zone for your needs

Availability zone * ☐ Zone 1
☒ You can now select multiple zones. Selecting multiple zones will create one VM per zone. [Learn more](#)

Security type ☐ Standard

Image * ☐ Ubuntu Server 24.04 LTS - x64 Gen2
[See all images](#) | [Configure VM generation](#)
☒ This image is compatible with additional security features. [Click here to swap to the Trusted launch security type.](#)

VM architecture ☐ Arm64 ☒ x64

Run with Azure Spot discount ☐

Size * ☐ Standard_B1s - 1 vcpu, 1 GiB memory (SEK 67.46/month)
[See all sizes](#)
☒ Item(s) availability based on policy assignment(s) for the selected scope.
Only B1s is allowed (Policy details)

Enable Hibernation ☐
☒ Hibernation is not supported by the size that you have selected. Choose a size that is compatible with Hibernation to enable this feature. [Learn more](#)

Administrator account

Authentication type ☒ SSH public key

[< Previous](#) [Next : Disks >](#) [Review + create](#)

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

Select a VM size

[vCPUs : All](#) [RAM \(GiB\) : All](#) [Display cost : Monthly](#) [Add filter](#)

Showing 937 VM sizes. | Subscription: arunprakashgottimani-test | Region: North Europe | Current size: Standard_DS1_v2 | Image: Ubuntu Server 24.04 LTS | [Learn more about VM sizes](#)

VM Size ↑	Type ↑	vCPUs ↑	RAM (GiB) ↑	Data disks ↑	Max IOPS ↑	Local storage (GiB) ↑	Premium disk ↑	Cost/month ↑
Most used by Azure users	The most used sizes by users in Azure							
B1s	General purpose	1	1	2	320	4 (SCS)	Supported	SEK 67.46
B-Series	Ideal for workloads that do not need continuous full CPU performance							
B1s	General purpose	1	1	2	320	4 (SCS)	Supported	SEK 67.46
Blocked by Policy	Your organization has Azure Policies in place that restrict these sizes.							

Explanation 1

Explain the summarized highlights of

Only virtual machine of size StandardB1s are allowed. As the policy “Allowed virtual machine size SKUs” assigned on the particular subscription, its not even showing other size virtual machines as options to select. We have only option which is the virtual machine of size B1s

<p>this part of the project, Azure Policy.</p>	<p>In this part of the project, I focused on configuring Azure Policy to restrict and control which virtual machine (VM) sizes can be provisioned within the environment.</p> <p>The steps involved the following key actions:</p> <ol style="list-style-type: none"> 1. Navigating to the Built-In Policy: I started by selecting the built-in "Allowed virtual machine size SKUs" policy in Azure. This policy ensures that only specific VM sizes are allowed for creation in the environment, which helps maintain compliance with organizational or regulatory standards. 2. Following the Policy Wizard: I proceeded through the policy wizard, where I selected the scope (subscription or resource group), defined the allowed VM sizes, and assigned the policy to the appropriate resources. I also enabled policy enforcement. 3. In Parameters ->I gave Standard_B1s as Azure VM SKU as only allowed VMs to be displayed in the specified scope 4. I gave a Non compliance message as "Only B1s is allowed". Thus whenever people tried doing something different than expected, the non compliance message will appear. 5. Testing: When I try creating a new VM in the specified scope, the only visible B1s I can see is Standard_B1s. Thus people can configure only the allowed machines.
--	--

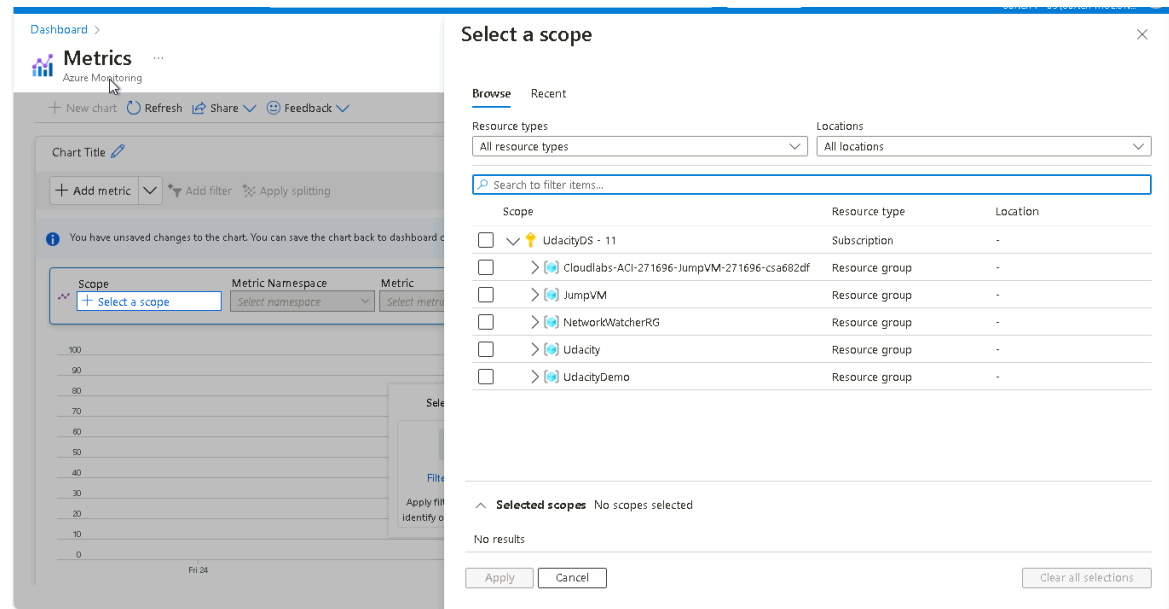
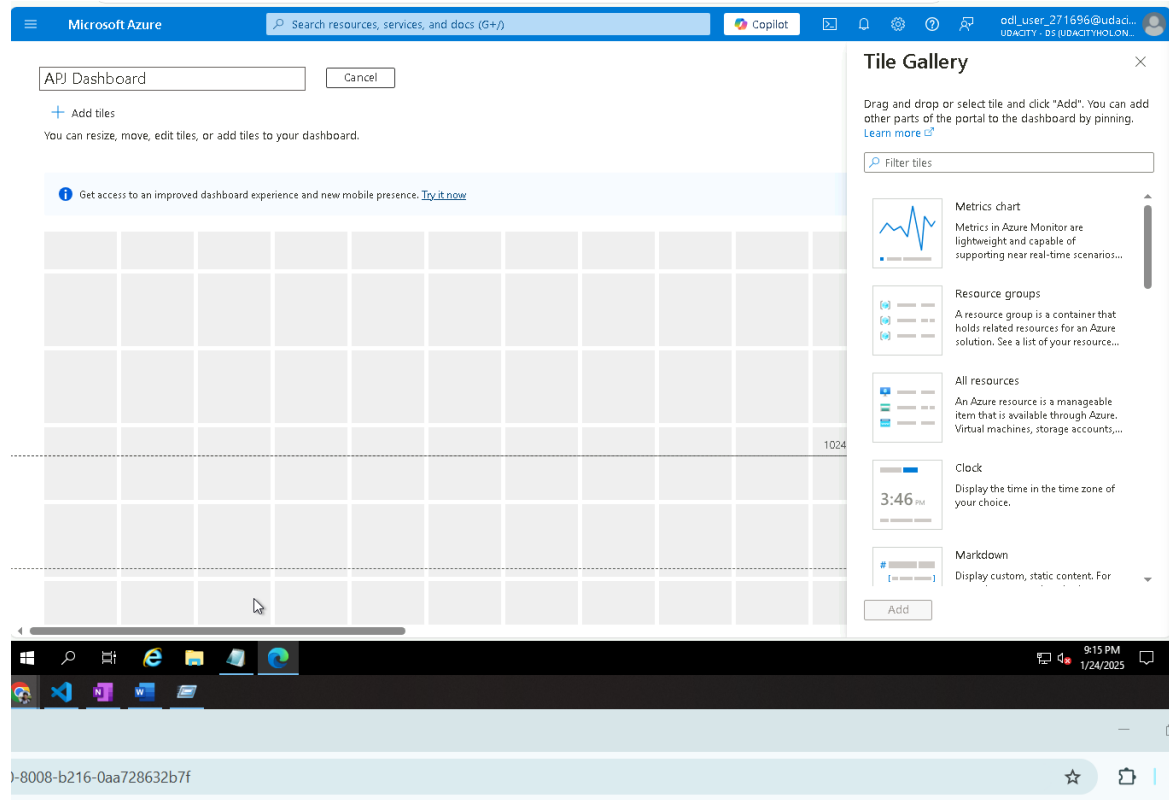
STEP 5: Azure Dashboards

<p>Background</p>	<p>Azure Dashboards are a one stop shop to monitor</p> <ul style="list-style-type: none"> ● Your logs ● Your infrastructure ● Your applications
<p>Task 1</p>	<p>You need to create an Azure dashboard that will pull in a few widgets: Percentage CPU, All Resources, Resource Groups & Avg CPU Credits Consumed. Submit the screenshots and explain the key components of the Dashboard. Be sure to include a screenshot of the final Dashboard.</p>

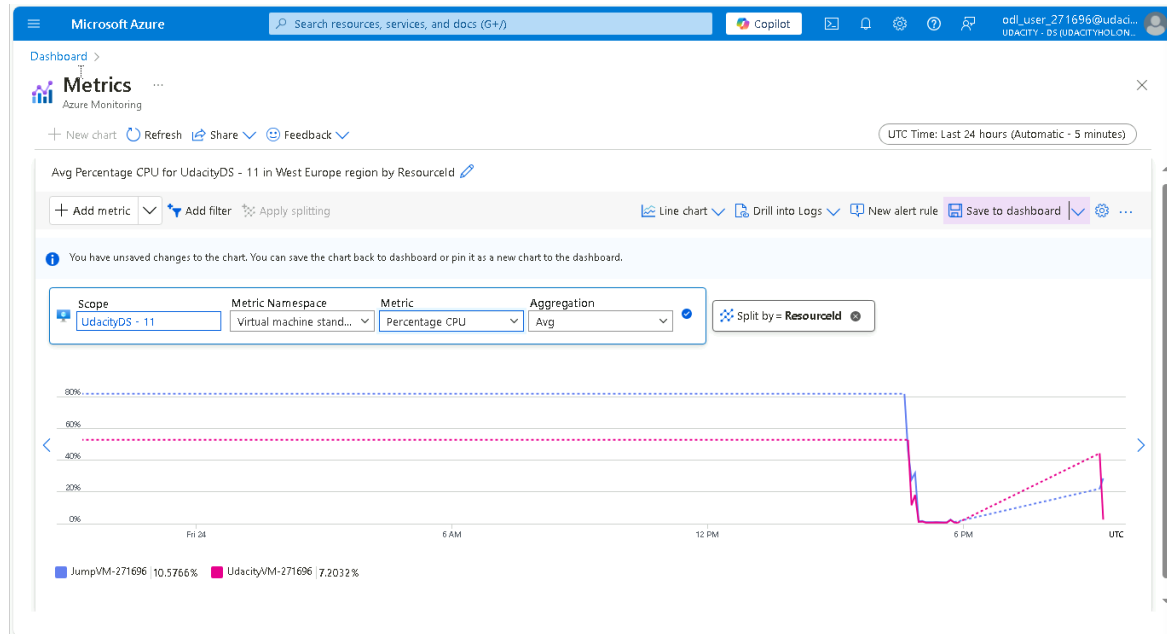
Screenshots1 through 3

You will submit the screenshots for Overview tab.

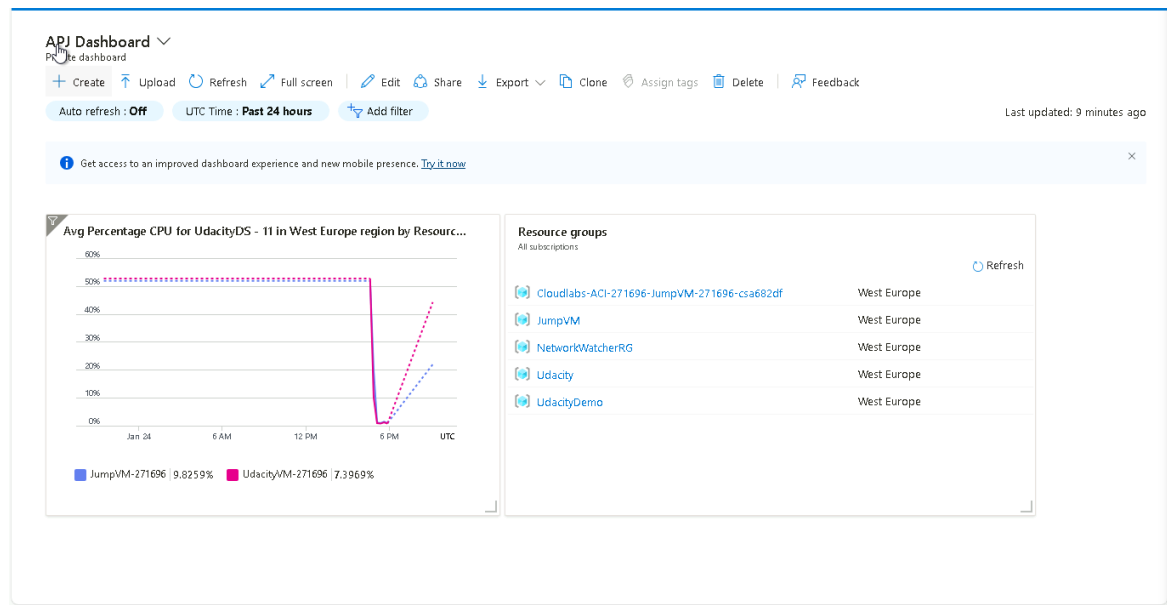
Step 1:



Step 2:



Step 3 (Final Output):



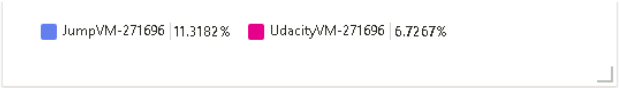
APJ Dashboard








Private dashboard

[+](#) Create [↑](#) Upload [↻](#) Refresh [↗](#) Full screen | [✎](#) Edit [🔗](#) Share [↓](#) Export [📄](#) Clone [🏷️](#) Assign tags [🗑️](#) Delete | [🗣️](#) Feedback

Auto refresh : **Off** UTC Time : **Past 24 hours** [+🔍](#) Add filter

[📘](#) Get access to an improved dashboard experience and new mobile presence. [Try it now](#)



All resources		
All subscriptions		
		↻ Refresh
 c2716964cymipzoijdud	Container instances	West Europe
 default-NSG	Network security group	West Europe
 JumpVM-271696	Virtual machine	West Europe
 JumpVM-271696-osdisk	Disk	West Europe
 jumpvm-nic	Network Interface	West Europe
 jumpvm-nsg	Network security group	West Europe
 jumpvm-pip	Public IP address	West Europe
		See more...

STEP 6: Azure Monitor – Metrics

Task 1

You need to navigate to Azure Monitor > Metrics screen and create a Percentage CPU as a metric and submit screenshot of the graph generated and pin to dashboard.

Screenshots 1 through 3

You will submit the screenshots for Monitor | Metrics screen as you are setting up

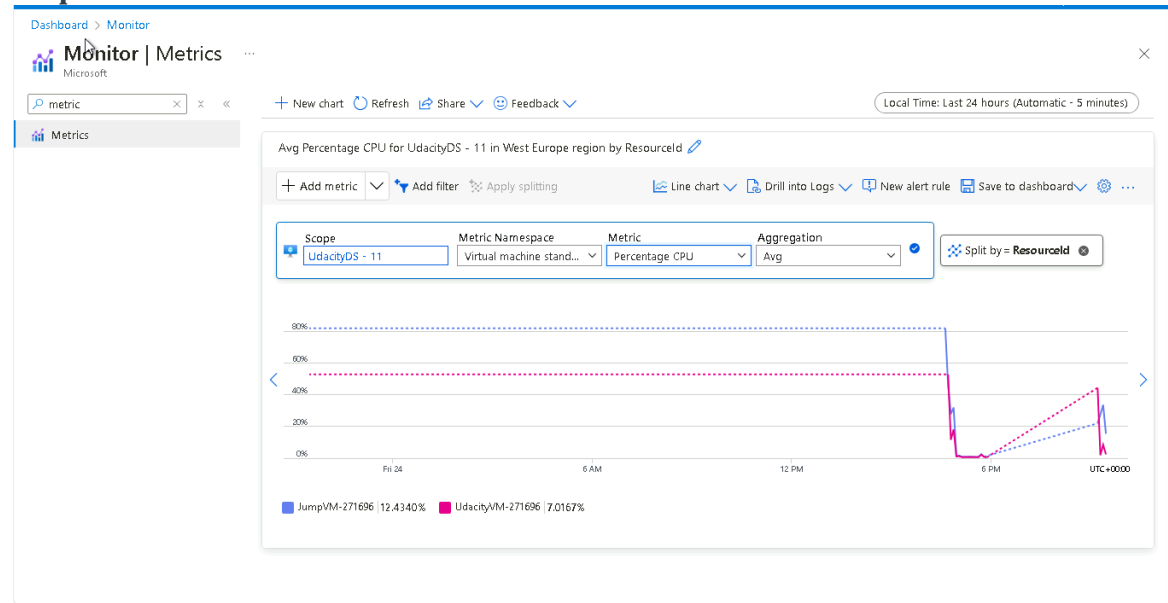
Step 1:

The screenshot shows the 'Select a scope' dialog box in the Azure Monitor interface. The 'Browse' tab is active, showing a list of resource types and locations. The 'Resource types' dropdown is set to 'All resource types', and the 'Locations' dropdown is set to 'All locations'. A search bar is present with the text 'Search to filter items...'. Below the search bar, a table lists available scopes:

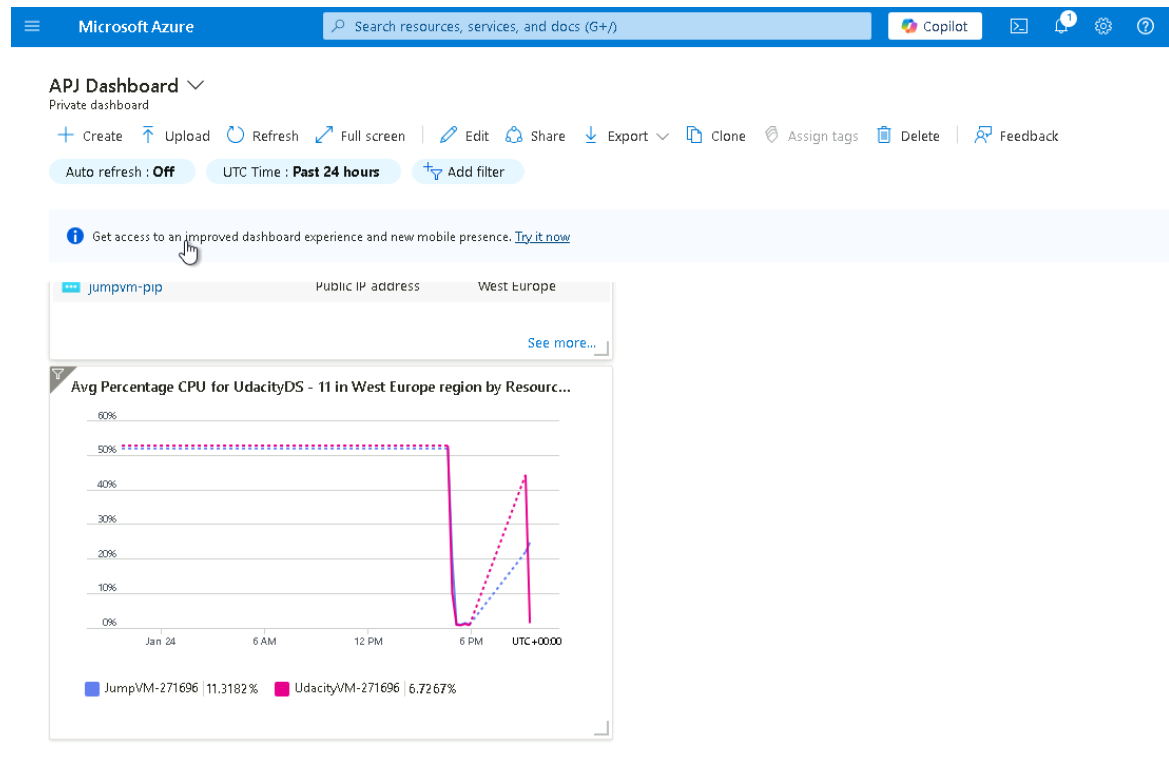
Scope	Resource type	Location
<input type="checkbox"/> UdacityDS - 11	Subscription	-
<input type="checkbox"/> > Cloudlabs-ACI-271696-JumpVM-271696-csa682df	Resource group	-
<input type="checkbox"/> > JumpVM	Resource group	-
<input type="checkbox"/> > NetworkWatcherRG	Resource group	-
<input type="checkbox"/> > Udacity	Resource group	-
<input type="checkbox"/> > UdacityDemo	Resource group	-

At the bottom, it says 'Selected scopes: No scopes selected' and 'No results'. There are 'Apply' and 'Cancel' buttons, and a 'Clear all selections' button.

Step 2:



Step 3:



Screenshot 4

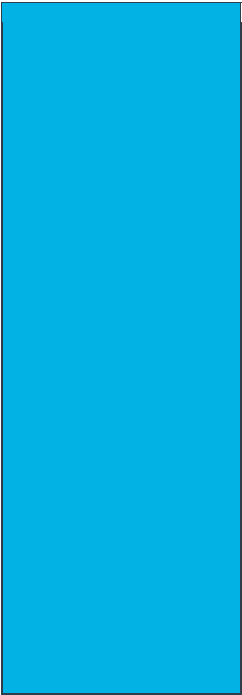
Now that Azure Metrics Monitor is configured, please set an alert for that metric. The alert is whenever the Avg % CPU is greater than 0.3; then the alert will be triggered.

The screenshot shows the "Create an alert rule" page in the Microsoft Azure portal. The page has a navigation bar with "Home > Monitor | Alerts >". The main heading is "Create an alert rule". Below the heading, there are tabs for "Scope", "Condition", "Actions", "Details", "Tags", and "Review + create". The "Scope" tab is currently selected.

The "Scope" section contains the text: "Create an alert rule to identify and address issues when important conditions are found in your monitoring data. [Learn more](#)". Below this, there is a "+ Select scope" button. The "Scope" section also displays a table with the following data:

Resource	Hierarchy
All virtual machines (West Europe)	UdacityDS - 11

At the bottom of the page, there are three buttons: "Review + create", "Previous", and "Next: Condition >".



Microsoft Azure

Search resources, services, and docs (G+)

Copilot

odl_user_271696@udac...
UBACITY - DS (IDACIT)HOLON

Home > Monitor | Alerts >

Create an alert rule

Aggregation type ⓘ

Average

Value is ⓘ

Greater than

Threshold * ⓘ

0.3

%

Split by dimensions

Use dimensions to monitor specific time series and provide context to the fired alert. [About monitoring multiple time series](#)

Dimension name

Operator

Dimension values

Include all future ...

Select dimension

=

0 selected

Add custom value

When to evaluate

Check every ⓘ

1 minute

Lookback period ⓘ

5 minutes

+ Add condition

Review + create

Previous

Next: Actions >

Preview

\$0.20 USD/month

Whenever the average Percentage CPU is greater than 0.3%

Preview time range : Over the last 6 hours

Time series : JumpVM-271696; Aggregate

Time	Percentage CPU (Avg)
4 PM	~80%
5 PM	~13.09%
6 PM	~1%
7 PM	~1%
8 PM	~1%
UTC+00:00	~1%

Percentage CPU (Avg), jumpvm-271696 | 13.09%

Create an alert rule

Scope Condition Actions Details Tags Review + create

Product details

Metric alert rule

1 Condition

[Terms of use](#) | [Privacy statement](#)

Total pricing

0.20 USD/month

[Pricing](#)

Scope

Resource

📍 UdacityDS - 11 > 🌐 All virtual machines (West Europe)

Condition

Signal name

Percentage CPU

Operator

Greater than

Aggregation type

Average

Threshold value

0.3

Lookback period

5 minutes

Check every

1 minute

Details

Create

Previous

Microsoft Azure

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

Copilot

odl_user_271696@udac...
UDACITY - DS (UDACITYTHOLON)

Home > Monitor

Monitor | Alerts

Microsoft

Search

View as timeline (preview) | + Create | Alert rules | Action groups | Alert processing rules | Prometheus rule groups | ...

Overview
Activity log
Alerts
Metrics
Logs
Change Analysis
Service health
Workbooks
Investigator (preview)
Insights
Applications
Virtual Machines
Storage accounts
Containers
Networks
Azure Cosmos DB

New: We value your feedback! Please take a moment to complete a [short survey](#). Your insights will help us improve our services.

Subscription: d681f4bb-8cf6-4784-af46-d2dc7c063e48

Time range: Part 30 days

Add filter

More (2)

Total alerts	Critical	Error	Warning	Informational	Verbose	No grouping
2	0	0	0	2	0	

Name ↑↓	Severity ↑↓	Affected resource ↑↓	Alert condition ↑↓	User response ↑↓	Fire time ↑↓	
<input type="checkbox"/> max pod	3 - Informational	udacity-cluster	Fired	New	1/6/2025, 12:03 PM	...
<input type="checkbox"/> max pod	3 - Informational	udacity-cluster	Fired	New	1/6/2025, 11:54 AM	...

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

odl_user_271696@udact...
UDACTY - DS (UDACTYHOLON...

Home > Monitor

Monitor | Alerts

Search

View as timeline (preview)

Overview

Activity log

Alerts

Metrics

Logs

Change Analysis

Service health

Workbooks

Investigator (preview)

Insights

Applications

Virtual Machines

Storage accounts

Containers

Networks

New! We value your feedback! Please

Search

Total alerts 2 Critical 0

Name ↑

max pod

max pod

max pod

Metrics alert details

Copy link Go to alert rule

Investigate (preview)

Summary History

General details

Severity 3 - Informational Fired time 1/6/2025, 12:03 PM Affected resource udacty-cluster Monitor service Platform Alert condition Fired User response New

The target resource udacty-cluster has been moved or deleted.

Why did this alert fire?

The average kube_pod_status_phase crossed the threshold of 30 and reached 35.

Value (when alert fired) 35 Threshold 30 Deviation 5

STEP 7: Azure Monitor – Log Analytics

Task 1

You need to create a Log Analytics workspace and submit step-by-step screenshots.

Screenshots 1 through 4

You will submit the screenshots for Log Analytics workspace creation screens.

Step 1:

Create Log Analytics workspace

Basics Tags Review + Create

A Log Analytics workspace is the basic management unit of Azure Monitor Logs. There are specific considerations you should take when creating a new Log Analytics workspace. [Learn more](#)

With Azure Monitor Logs you can easily store, retain, and query data collected from your monitored resources in Azure and other environments for valuable insights. A Log Analytics workspace is the logical storage unit where your log data is collected and stored.

Project details

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

Subscription * UdactyDS - 11

Resource group * JumpVM

Create new

Instance details

Name * apjVM

Region * West Europe

Review + Create Previous Next : Tags >

Step 2:

Microsoft Azure

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

Copilot

odi_user_27
UDACITY - DS (U

[Home](#) > [Log Analytics workspaces](#) >

Create Log Analytics workspace

Basics **Tags** Review + Create

Tags are name/value pairs that enable you to categorize resources and view consolidated billing by applying the same tag to multiple resources and resource groups. [Learn more](#)

Name ○

Value ○

:

Review + Create

« Previous

Next : Review + Create >

Step 3:

Microsoft Azure

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

Copilot


odi_user_271696@udac...
UDACITY - DS (UDACITYHOLON...

[Home](#) > [Log Analytics workspaces](#) >

Create Log Analytics workspace

Validation passed

Basics Tags **Review + Create**

 **Log Analytics workspace**
by Microsoft

Basics

Subscription

Resource group

Name

Region

UdacityDS - 11

JumpVM

apjVM

West Europe

Pricing

Pricing tier

Pay-as-you-go (Per GB 2018)

The cost of your workspace depends on the volume of data ingested and how long it is retained. Regional pricing details are available on the [Azure Monitor pricing page](#). You can change to a different pricing tier after the workspace is created. [Learn more](#) about Log Analytics pricing models.

Tags

None

Create

« Previous

[Download a template for automation](#)

Step 4:

Home >

Microsoft.LogAnalyticsOMS | Overview

Deployment

Search

Delete

Cancel

Redeploy

Download

Refresh

Overview

Inputs

Outputs

Template

Deployment is in progress

Deployment name : Microsoft.LogAnalyticsOMS

Subscription : UdacityDS - 11

Resource group : JumpVM

Start time : 1/24/2025, 9:42:43 PM

Correlation ID : 3feb045c-d886-422f-b3b7-b599f592f...

Deployment details

Resource	Type	Status	Operation details
apjVM	Log Analytics workspace	Created	Operation details

Give feedback

Tell us about your experience with deployment

Microsoft Defender for Cloud

Secure your apps and infrastructure

Go to Microsoft Defender for Cloud >

Free Microsoft tutorials

Start learning today >

Work with an expert

Azure experts are service provider partners who can help manage your assets on Azure and be your first line of support.

Find an Azure expert >

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

odl_user_271696@udad...
UDACITY - DS (UDACITYHOLON...

Home > Microsoft.LogAnalyticsOMS | Overview >

apjVM
Log Analytics workspace

Search

Delete

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Logs

Settings

Classic

Monitoring

Automation

Help

The Log Analytics agents (MMA,OMS) used to collect logs from virtual machines and servers will no longer be supported from August 31, 2024. Plan to migrate to Azure Monitor Agent before this date. [Learn more about migrating to Azure Monitor Agent](#)

JSON View

Essentials

Resource group (move) : jumpvm

Status : Active

Location : West Europe

Subscription (move) : UdacityDS - 11

Subscription ID : d681f4bb-8cf6-4784-af46-d2dc7c063e48

Tags (edit) : [Add tags](#)

Workspace Name : apjVM

Workspace ID : 640f46f4-15f5-4829-9781-9279b775326a

Pricing tier : Pay-as-you-go

Access control mode : Use resource or workspace permissions

Operational issues : [OK](#)

Get Started

Recommendations

Get started with Log Analytics

Log Analytics collects data from a variety of sources and uses a powerful query language to give you insights into the operation of your applications and resources. Use Azure Monitor to access the complete set of tools for monitoring all of your Azure resources.

1

Connect a data source

Select one or more data sources to connect to the workspace

[Azure virtual machines \(VMs\)](#)

2

Configure monitoring solutions

Add monitoring solutions that provide insights for applications and services in your environment

3

Monitor workspace health

Create alerts to proactively detect any issue that arise in your workspace

Internet Explorer

STEP 8: Azure Insights

Background

Azure Insights can only be created once you have the Log Analytics workspace completed.

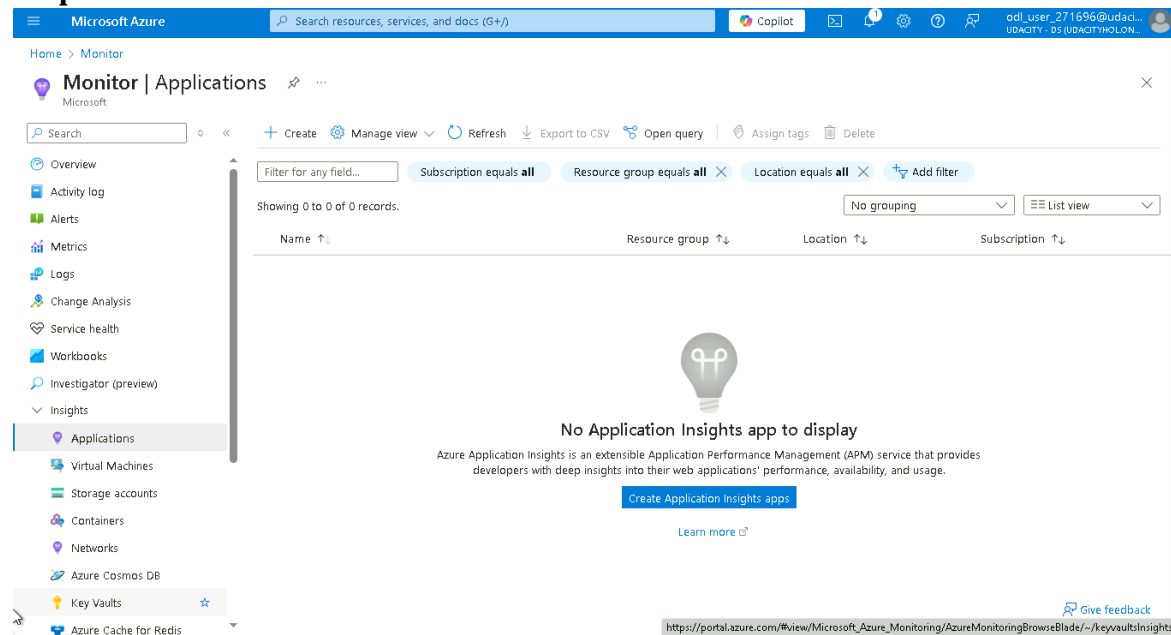
Screenshots1 through 6

You will submit the screenshots for the Monitor | Metrics screen as you are setting up.

Hint 1: Navigate to Insights > Applications and then click Add button

Hint 2: The Log Analytics workspace you created before will be used here

Step 1:



Step 2:

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

edl_user_271696@udac...
UDACITY - DS (UDACITYHOLON...

Home > Monitor | Applications >

Application Insights

Monitor web app performance and usage

Create an Application Insights resource to monitor your live web application. With Application Insights, you have full observability into your application across all components and dependencies of your complex distributed architecture. It includes powerful analytics tools to help you diagnose issues and to understand what users actually do with your app. It's designed to help you continuously improve performance and usability. It works for apps on a wide variety of platforms including .NET, Node.js and Java EE, hosted on-premises, hybrid, or any public cloud. [Learn More](#)

PROJECT DETAILS

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

Subscription * ⓘ

UdacityDS - 11

Resource Group * ⓘ

JumpVM

[Create new](#)

INSTANCE DETAILS

Name * ⓘ

apjInstance

✓

Region * ⓘ

(Europe) West Europe

WORKSPACE DETAILS

Subscription * ⓘ

UdacityDS - 11

Log Analytics Workspace * ⓘ

apjVM [westeurope]

Review + create

« Previous

Next : Tags >

9:46 PM

Step 3:

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

edl_user_271696@udac...
UDACITY - DS (UDACITYHOLON...

Home > Monitor | Applications >

Application Insights

Monitor web app performance and usage

Basics

Tags

Review + create

Tags are name/value pairs that enable you to categorize resources and view consolidated billing by applying the same tag to multiple resources and resource groups. [Learn More](#)

Name ⓘ

Value ⓘ

:

Review + create

« Previous

Next : Review + create >

Step 4:

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

edl_user.271696@udac...
UDACITY - DS [UDACITYHOLON...

Home > Monitor | Applications >

Application Insights

Monitor web app performance and usage

Validation passed

Basics Tags **Review + create**

SUMMARY

Application Insights
by Microsoft

Subscription: UdacityDS - 11
Resource Group: JumpVM
Name: apjinstance
Region: West Europe
Workspace: apjVM [westeurope]

Create Previous Download a template for automation

Start

Windows taskbar: 9:46 PM 1/24/2025

Step 5:

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

edl_user.271696@udac...
UDACITY - DS [UDACITYHOLON...

Home >

Microsoft.AppInsights | Overview

Deployment

Search

Delete Cancel Redeploy Download Refresh

Overview

Inputs

Outputs

Template

Deployment is in progress

Deployment name: Microsoft.AppInsights
Subscription: UdacityDS - 11
Resource group: JumpVM

Start time: 1/24/2025, 9:47:12 PM
Correlation ID: 769bb5b4-193c-4760-9bd6-02a05f6c...

Deployment details

Resource	Type	Status	Operation details
There are no resources to display.			

Give feedback

Tell us about your experience with deployment

Deployment is in progress...
Deployment to resource group 'JumpVM' is in progress.

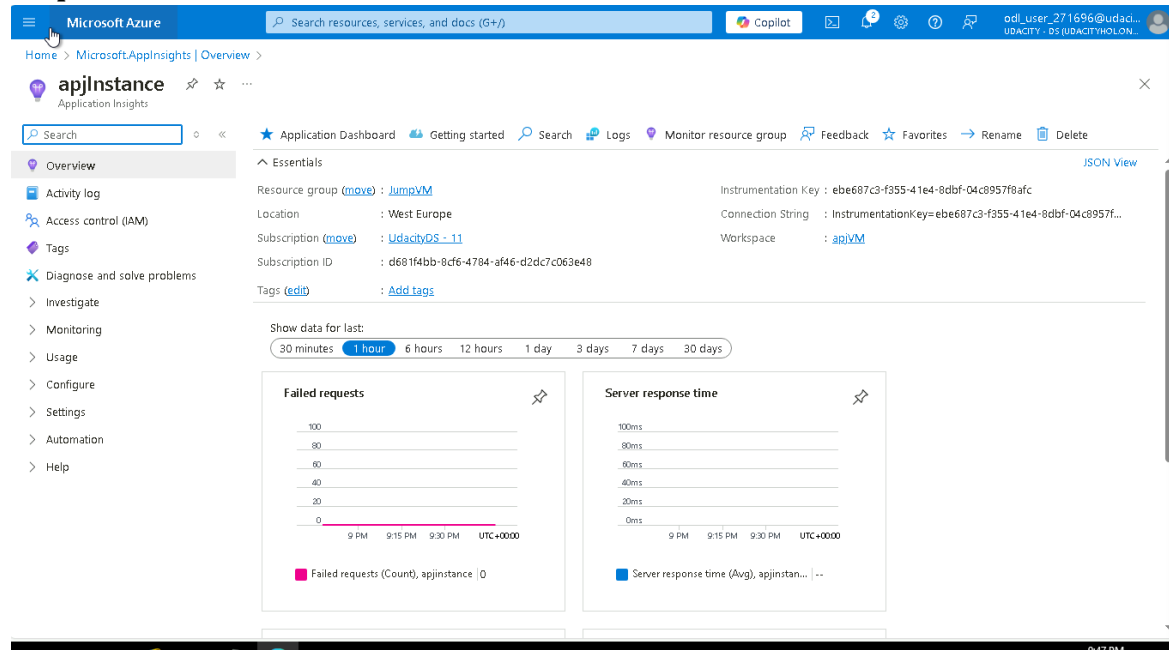
Microsoft Defender for Cloud
Secure your apps and infrastructure
[Go to Microsoft Defender for Cloud >](#)

Free Microsoft tutorials
[Start learning today >](#)

Work with an expert
Azure experts are service provider partners who can help manage your assets on Azure and be your first line of support.
[Find an Azure expert >](#)

Windows taskbar: 9:47 PM 1/24/2025

Step 6: Click “Go to resource”



Screenshots 7 through 12

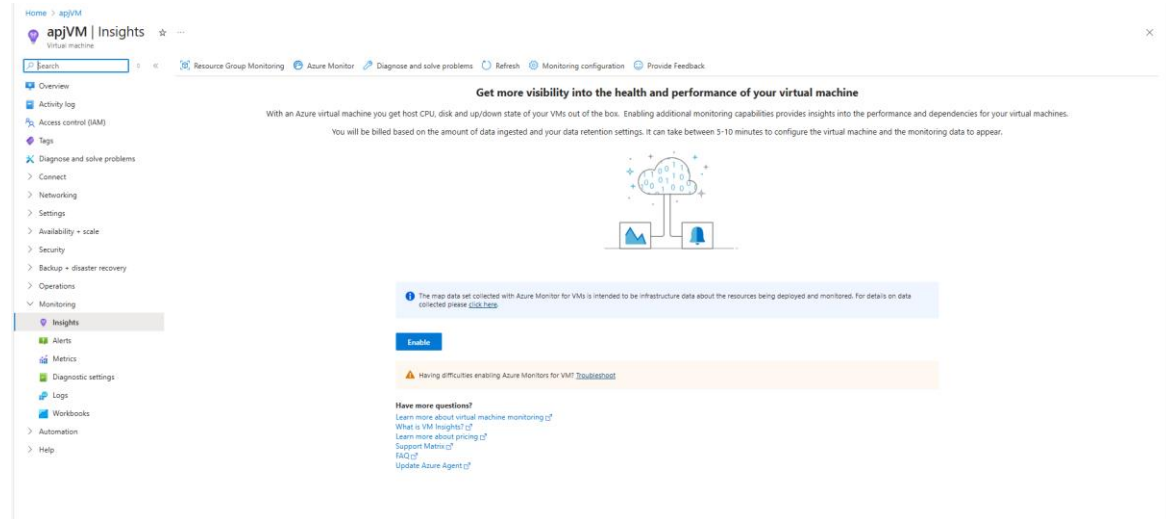
You will submit screenshots of you enabling the VM.

Hint 1: So now that you have created Azure Insights for the Resource group, you need to go to Virtual Machines tab and actually enable it for the VM itself.

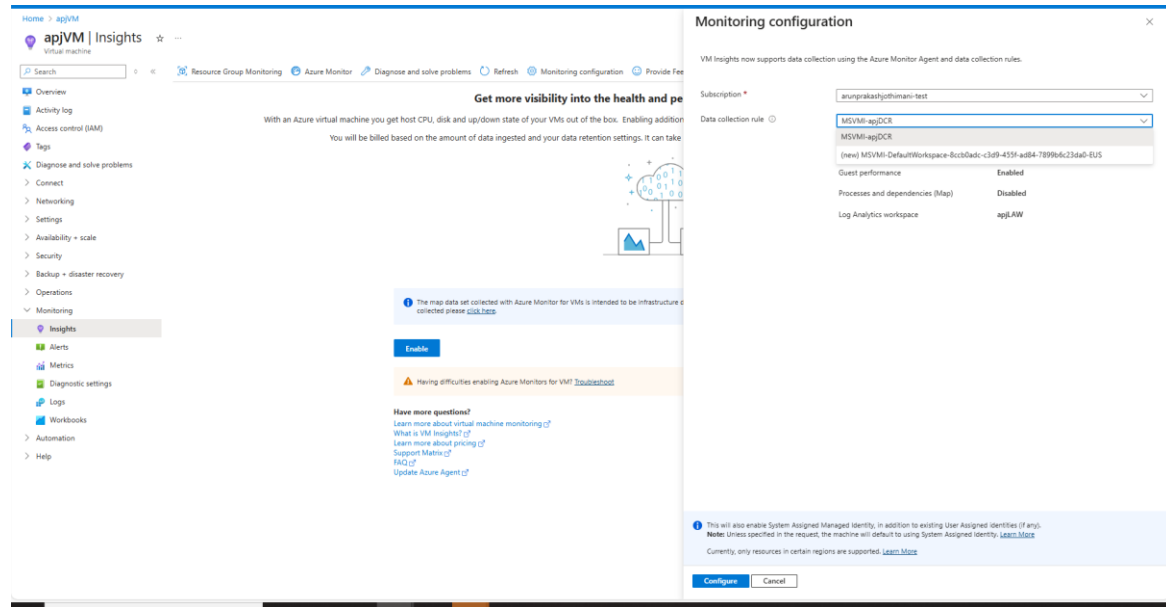
Hint 2: The key is to select the Log Analytics workspace which you created above in STEP 7: Azure Monitor – Log Analytics.

Step 7:

Note: My vm got shutdown so I have to create a new VM, LogAnalytics workspace and enable Insights fresh. Everywhere I have added my shortname apj for reference



Step 8:



Step 9:

Home > apjVM | Insights

Virtual machine

Search

Resource Group Monitoring Azure Monitor Diagnose and solve problems Refresh Monitoring configuration Provide Feedback

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Connect

Networking

Settings

Availability + scale

Security

Backup + disaster recovery

Operations

Monitoring

Insights

Alerts

Metrics

Diagnostic settings

Logs

Workbooks

Automation

Help

Get more visibility into the health and performance

With an Azure virtual machine you get host CPU, disk and up/down state of your VMs out of the box. Enabling additional monitoring features gives you more visibility into the health and performance of your VMs. You will be billed based on the amount of data ingested and your data retention settings. It can take up to 15 minutes for the data to be available in the Azure Monitor.

The map data set collected with Azure Monitor for VMs is intended to be infrastructure data. It is not intended to be used for security or compliance purposes. For more information, see the [Azure Monitor for VMs documentation](#).

Enable

Having difficulties enabling Azure Monitor for VMs? [Troubleshoot](#)

Have more questions?

Learn more about virtual machine monitoring

What is VM Insights?

Learn more about pricing

Support Matrix

FAQ

Update Azure Agent

MSVM: appDCR1

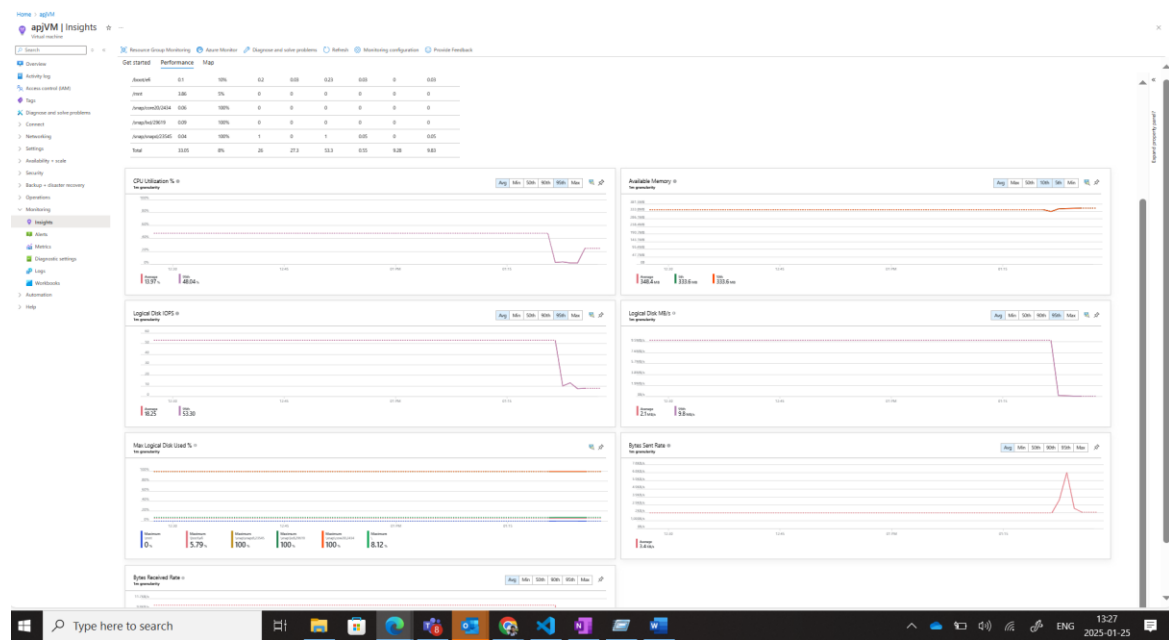
Guest performance Enabled

Processes and dependencies (Map) Enabled

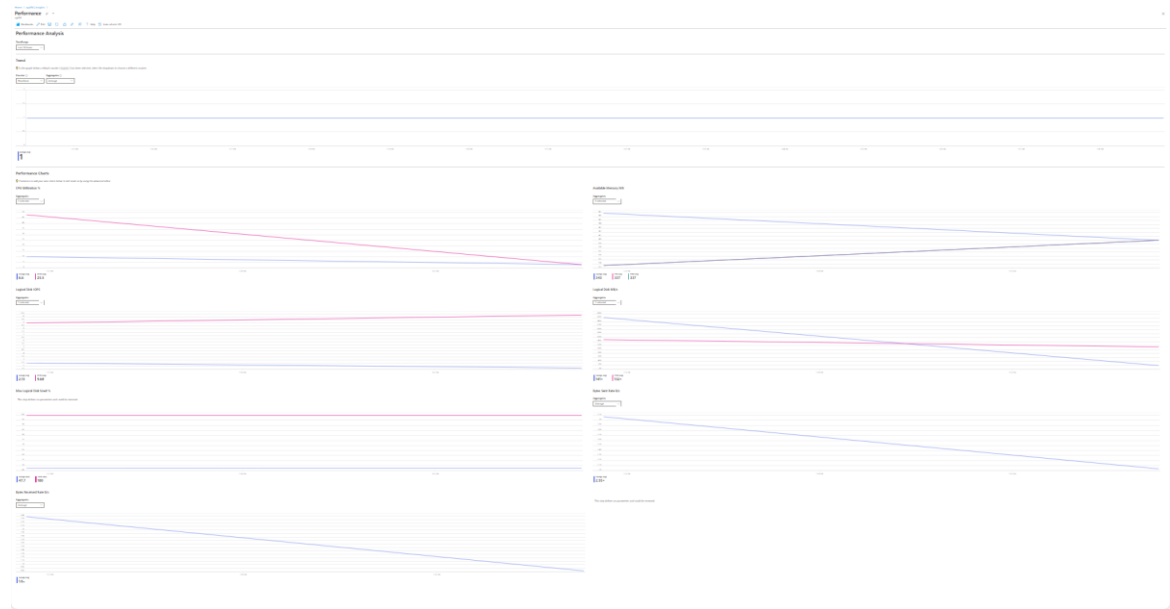
Log Analytics workspace appLAW

Save Cancel

Step 10:



Step 11:



Step 12:

Home > appVM > Insights > Connections Overview > appVM

appVM | Insights

Search

Resource Group Monitoring Azure Monitor Diagnose and solve problems Refresh Monitoring configuration Provide feedback

Get started Performance Map

Time range: Last 30 minutes as of 25 Jan 15:32

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Connect

Networking

Settings

Availability + scale

Security

Backup + disaster recovery

Operations

Monitoring

Insights

Alerts

Metrics

Diagnostic settings

Logs

Workbooks

Automation

Help

appVM

7 Processes

less

AzureMetadata.py (Py...

telegraf

microsoft-dependenc...

MetricsExtension

python3.8-minimal

appVM Machine Summary

Properties Log Events Alerts Connections Changes

Quick links

Connection details

Fully Qualified Domain Name

appVM

Operating System

Linux 5.15.0-1078-azure Ubuntu 20.04.6 LTS

IPv4 Addresses

10.0.1.4/24

Health

Machine properties

Azure VM properties

STEP 9: Azure Monitor – Smart Alerts





Task 1	<p>Navigate to Setup Alert & Actions under Azure Monitor >Overview.</p> <p>The condition name should be CPU units consumed and its value should be greater than 0.3.</p>
Screenshots 1 through 8 You will submit step-by-step screenshots for creating a Setup Alert & Actions.	Step 1:

Create an alert rule ...

Scope Condition Actions Details Tags Review + create

Create an alert rule to identify and address issues when important conditions are found in your monitoring data. [Learn more](#)

+ Select scope

Resource	Hierarchy			
 apjVM	 arunprakashjot...	>	 arun-rg	

Review + create

Previous

Next: Condition >

Step 2:

[Home](#) > [apjVM](#) | Alerts >

Create an alert rule

Scope **Condition** Actions Details Tags Review + create

Configure when the alert rule should trigger by selecting a signal and defining its logic.

Signal name * [See all signals](#)

Alert logic

i We have set the condition configuration automatically based on popular settings for this metric. Please review and make changes as needed.

Threshold type ☒ Static ☐ Dynamic

Aggregation type

Value is

Threshold * %

When to evaluate

Check every



Select a signal

Signal type : All Signal source : All

Signal name

Signal source

Metrics

Percentage CPU Platform metrics

Step 3:

[Home](#) > [apjVM](#) | Alerts >

Create an alert rule

Scope **Condition** Actions Details Tags Review + create

Configure when the alert rule should trigger by selecting a signal and defining its logic.

Signal name * [See all signals](#)

Alert logic

i We have set the condition configuration automatically based on popular settings for this metric. Please review and make changes as needed.

Threshold type ☒ Static ☐ Dynamic

Aggregation type

Value is

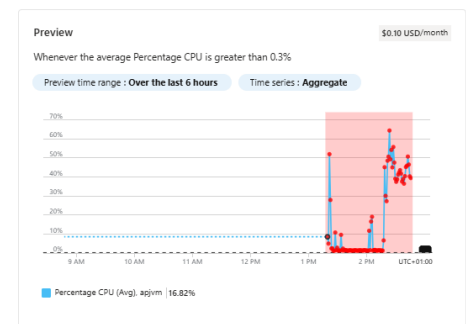
Threshold * %

When to evaluate

Check every

Lookback period

+ Add condition



[Review + create](#) [Previous](#) [Next: Actions >](#)

Step 4:

[Home](#) > [apjVM | Alerts](#) >

Create an alert rule ...

[Scope](#) [Condition](#) [Actions](#) [Details](#) [Tags](#) [Review + create](#)

An action group is a set of actions that can be applied to an alert rule. [Learn more](#)

Select actions

- ☐ Use quick actions (preview)
Select one or more of the quick actions.
- ☐ Use action groups
Add an existing action group or create a new one.
- ☒ None

[Review + create](#)

[Previous](#)

[Next: Details >](#)

Step 5:

[Home](#) > [apjVM | Alerts](#) >

Create an alert rule ...

[Scope](#) [Condition](#) [Actions](#) [Details](#) [Tags](#) [Review + create](#)

Project details

Select the subscription and resource group in which to save the alert rule.

Subscription * ⓘ

arunprakashjothimani-test

Resource group * ⓘ

arun-rg

[Create new](#)

Alert rule details

Severity * ⓘ

3 - Informational

Alert rule name * ⓘ

CPUAlert

Alert rule description ⓘ

^ Advanced options

Settings

Enable upon creation ⓘ

☒

Automatically resolve alerts ⓘ

☒

Review + create

Previous

Next: Tags >

[Home](#) > [apjVM | Alerts](#) >

Create an alert rule ...

[Scope](#) [Condition](#) [Actions](#) [Details](#) [Tags](#) [Review + create](#)

Tags are name and value pairs that enable you to categorize resources and view consolidated billing by applying the same tag to multiple resources and resource groups. [Learn more about using tags](#)

Note that if you later change resource settings on other tabs, your tags will be automatically updated.

Name ⓘ

Value ⓘ

:

[Review + create](#)

[Previous](#)

[Next: Review + create >](#)

Step 6 (Summary after above steps):

[Home](#) > [apjVM](#) | Alerts >

Create an alert rule ...

[Scope](#) [Condition](#) [Actions](#) [Details](#) [Tags](#) [Review + create](#)

Product details

Metric alert rule	Total pricing
1 Condition	0.10 USD/month
Terms of use Privacy statement	Pricing

Scope

Resource  arunprakashjothimani-test >  arun-rg >  apjVM

Condition


Signal name	Percentage CPU
Operator	Greater than
Aggregation type	Average
Threshold value	0.3
Lookback period	1 minute
Check every	1 minute

Details

Project details

Subscription	arunprakashjothimani-test
Resource group	arun-rg
Region	global

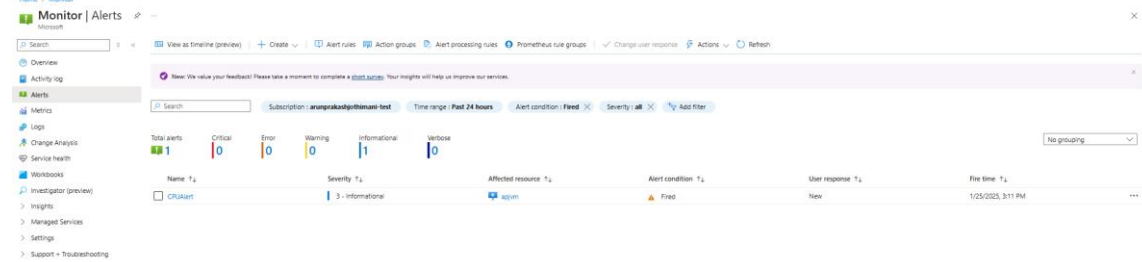
Alert rule details

Alert rule name	CPUAlert
Alert rule description	
Severity	 3 - Informational
Enable upon creation	<input checked="" type="checkbox"/>
Automatically resolve alerts	<input checked="" type="checkbox"/>

Create

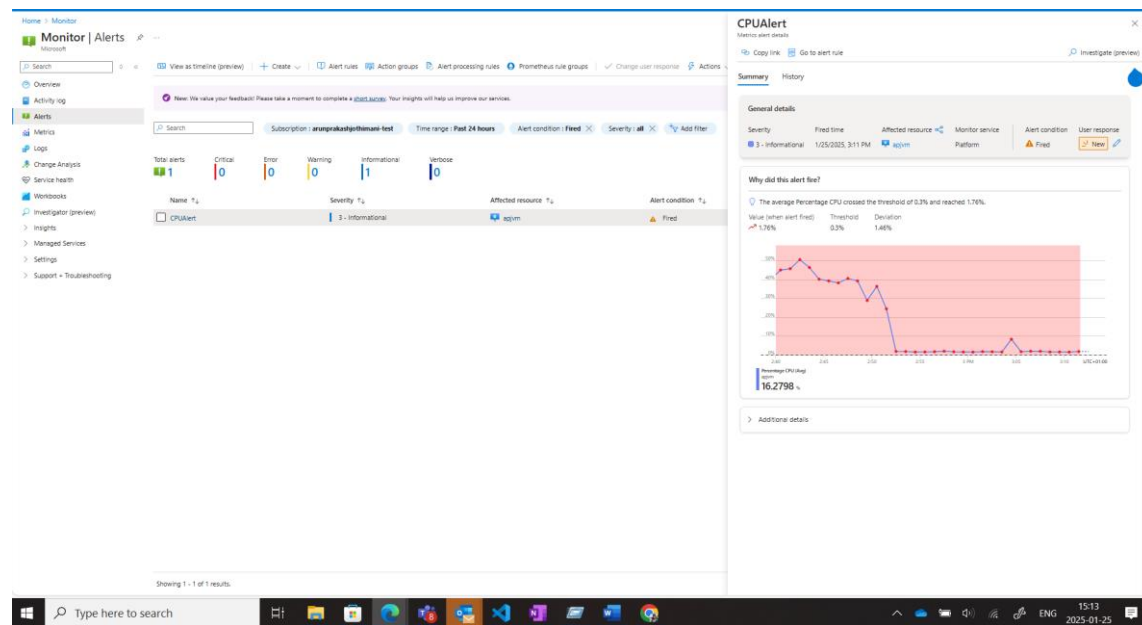
Previous

Step 7 (Screenshot post-creation of the alert):

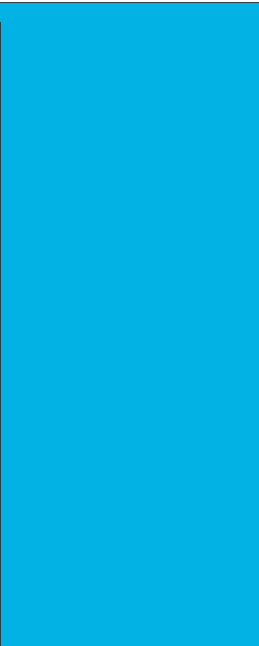


The screenshot shows the Azure Monitor Alerts page. The left sidebar contains navigation links: Overview, Activity log, Alerts (selected), Metrics, Logs, Change Analysis, Service health, Workbooks, Investigator (preview), Insights, Managed Services, Settings, and Support + Troubleshooting. The main area displays a table of alerts. The table has columns for Name, Severity, Affected resource, Alert condition, User response, and Fire time. One alert is listed: CPUAlert with a severity of 3 - Informational, affected resource of eqvm, alert condition of Fired, user response of None, and fire time of 1/25/2025, 3:11 PM. The table also shows counts for Total alerts (1), Critical (0), Error (0), Warning (0), Informational (1), and Verbose (0).

Step 8 (If you had any alerts, they would be submitted here):

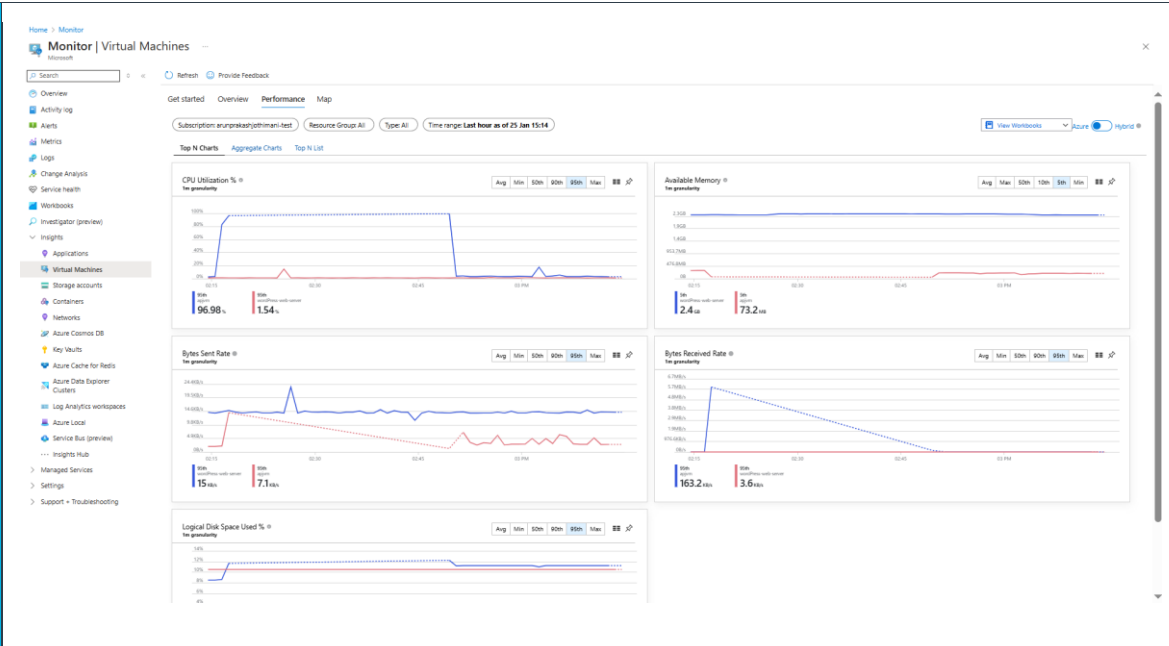


The screenshot shows the Azure Monitor Alerts page with a detailed view of a CPUAlert. The left sidebar is the same as in Step 7. The main area displays the details of the CPUAlert. The table shows the alert is named CPUAlert, has a severity of 3 - Informational, affected resource of eqvm, alert condition of Fired, user response of None, and fire time of 1/25/2025, 3:11 PM. The table also shows counts for Total alerts (1), Critical (0), Error (0), Warning (0), Informational (1), and Verbose (0). The right sidebar shows the details of the alert, including a graph of the average percentage CPU over time. The graph shows a peak in CPU usage around 1/25/2025, 3:11 PM, reaching a value of 16.2798%.



Explanation 1

Explain the purpose of Azure Dashboards, Azure Monitor and alerts



Azure Dashboards:

- Centralized view to monitor logs, infrastructure, and applications.
- Customizable with widgets for metrics like CPU usage, resource groups, and more.

Azure Monitor:

- Comprehensive tool for tracking performance and health of Azure resources.
- Collects and analyzes logs and metrics for insights.

Azure Alerts:

- Automated notifications for resource conditions (e.g., high CPU usage).
- Helps ensure proactive response to potential issues.

STEP 10: Autoscale In-Out Based on Number of Users per CPU Core

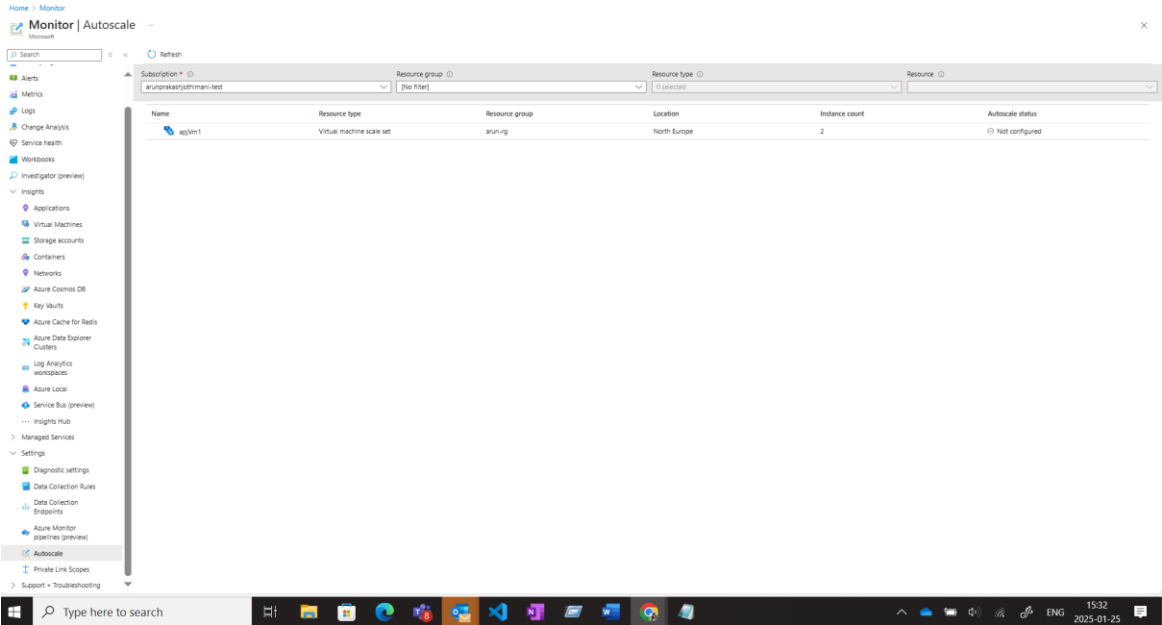
Task 1

The lab will have a Virtual Machine Scale set already created. Navigate to Azure Monitor > Settings > Autoscale. You will create an Autoscale rule as part of this project.

Screenshots 1-5

You will submit step-by-step screenshots for creating an autoscale rule under Azure Monitor.

Step 1 (Browse to Monitor > Autoscale):



Step 2 (Select the option for Custom autoscale and within that Scale based on metric and then click “Add Rule”):

Home > Monitor | Autoscale >

Autoscale setting


apiVm1 (Virtual machine scale set)


Save Discard Refresh Logs Feedback

Configure Scale-In Policy Predictive charts Run history JSON Notify Diagnostic settings

Autoscale is a built-in feature that helps applications perform their best when demand changes. You can choose to scale your resource manually to a specific instance count, or via a custom Autoscale policy that scales based on metric(s) thresholds, or schedule instance count which scales during designated time windows. Autoscale enables your resource to be performant and cost effective by adding and removing instances based on demand. [Learn more about Azure Autoscale](#) or [view the how-to video](#).

Choose how to scale your resource

**Manual scale**
Maintain a fixed instance count

**Custom autoscale**
Scale on any schedule, based on any metrics or predictively

Custom autoscale

Autoscale setting name *

apiVm1-Autoscale-582

Resource group

arun-rg

Predictive autoscale

Mode Disabled

Pre-launch setup of instances (minutes) 0

☒ Enable Forecast only or Predictive autoscale. [Learn more about Predictive autoscale.](#)

Default * Auto created default scale condition

Delete warning

The very last or default recurrence rule cannot be deleted. Instead, you can disable autoscale to turn off autoscale.

Scale mode

☒ Scale based on a metric ☐ Scale to a specific instance count

Rules

Scale is based on metric trigger rules but no rule(s) is defined: click [Add a rule](#) to create a rule. For example: 'Add a rule that increases instance count by 1 when CPU Percentage is above 70%'. If no rules is defined, the resource will be set to default instance count.

Instance limits

Minimum * 0 2 Maximum * 0 2 Default * 0 2

Schedule

This scale condition is executed when none of the other scale condition(s) match

+ Add a scale condition

Step 3 (Create the scale rule. The key part on this screen is that Percentage CPU metric is selected):

Scale rule



Metric source

Current resource (apjVm1)



Resource type

Virtual machine scale sets



Resource

apjVm1



Criteria

Metric namespace *

Virtual Machine Host



Metric name

Percentage CPU



1 minute time grain

Dimension Name

Operator

Dimension Values

Add

VMName

=



All values



If you select multiple values for a dimension, autoscale will aggregate the metric across the selected values, not evaluate the metric for each values individually.



Percentage CPU (Average)

1.64 %

☐ Enable metric divide by instance count ⓘ

Operator *

Greater than



Metric threshold to trigger scale action * ⓘ

70

%

Duration (minutes) * ⓘ

10

Time grain (minutes) ⓘ

1

Time grain statistic * ⓘ

Average



Time aggregation * ⓘ

Average



Action

Operation *

Increase count by



Cool down (minutes) * ⓘ

5

instance count *

1



Add

15:37

Scale mode

Rules

☒ Scale based on a metric

☐ Scale to a specific instance count

It is recommended to have at least one scale in rule. To create new rules, click [Add a rule](#)

Scale out

When

apjVm1

(Average) Percentage CPU > 70

Increase count by 1

+ Add a rule

Step 4 (Once scale rule is created, submit the summary screenshot):

[Home](#) > [Monitor](#) | [Autoscale](#) >

Autoscale setting

apjVm1 (Virtual machine scale set)

Save Discard Refresh Logs Feedback

[Configure](#) [Scale-In Policy](#) [Predictive charts](#) [Run history](#) [JSON](#) [Notify](#) [Diagnostic settings](#)

Autoscale is a built-in feature that helps applications perform their best when demand changes. You can choose to scale your resource manually to a specific instance count, or via a custom Autoscale policy that scales based on metric(s) thresholds, or schedule instance count which scales during designated time windows. Autoscale enables your resource to be performant and cost effective by adding and removing instances based on demand. [Learn more about Azure Autoscale](#) or [view the how-to video](#).

Choose how to scale your resource

Manual scale ☐
Maintain a fixed instance count

Custom autoscale ☒
Scale on any schedule, based on any metrics or predictively

Custom autoscale

Autoscale setting name	apjVm1-Autoscale-582		
Resource group	arun-rg		
Instance count ⓘ	2		
Predictive autoscale	Mode <input type="text" value="Disabled"/>	Pre-launch setup of instances (minutes) ⓘ	<input type="text"/>
Enable Forecast only or Predictive autoscale. Learn more about Predictive autoscale .			

Default* Auto created default scale condition

Delete warning
 The very last or default recurrence rule cannot be deleted. Instead, you can disable autoscale to turn off autoscale.

Scale mode
☒ Scale based on a metric ☐ Scale to a specific instance count

Rules
 It is recommended to have at least one scale in rule. To create new rules, click [Add a rule](#)

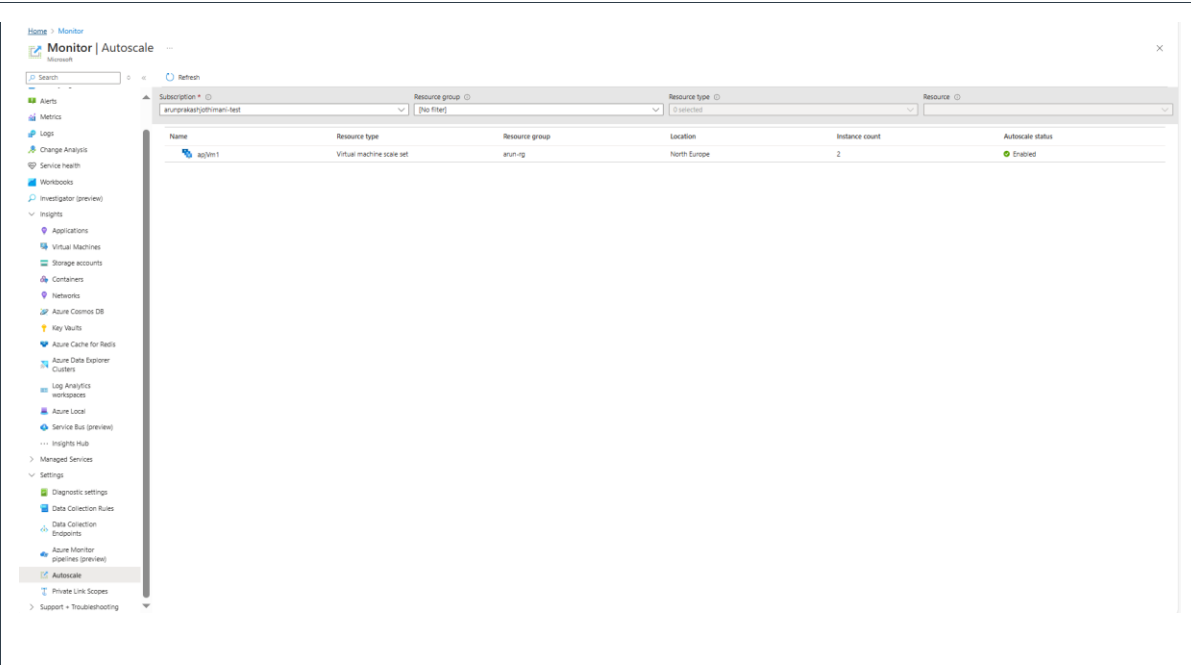
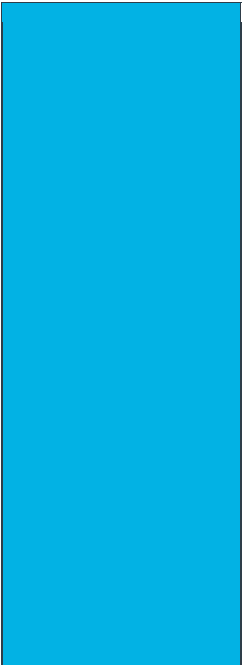
Scale out
When apjVm1 (Average) Percentage CPU > 70 Increase count by 1
[+ Add a rule](#)

Instance limits
Minimum * ⓘ Maximum * ⓘ Default * ⓘ

Schedule
This scale condition is executed when none of the other scale condition(s) match

[+ Add a scale condition](#)

Step 5 (Screenshot for “Autoscale Enabled”):



**Explanation
1**

Explain the key details of autoscale screenshots you have submitted.

Autoscaling Configuration:
Autoscaling can be configured using either manual or custom auto-scaling options. In this setup, we have opted for the *custom auto-scale* option.
Two scale modes are available:

- **Scale based on a metric**
- **Scale to a specific instance count**

We have chosen the *Scale based on a metric* mode. It is highly recommended to define at least one scaling rule when selecting this option.
For this configuration, the metric threshold to trigger the scale action is set at **70%**.
Key configurations include:

- **Metric Name:** Percentage of CPU usage
- **Duration:** 10 minutes
- **Time Aggregation:** Average
- **Time Grain Static:** Average
- **Time Grain Duration:** 1 minute

Regarding instance limits:

- **Default VM Count:** 2 VMs
- **Minimum VM Count for Scaling In:** 2 VMs
- **Maximum VM Count for Scaling Out:** 2 VMs

This setup ensures efficient scaling based on system load, maintaining optimal performance.