

Provisioning for Azure

Cost Optimization & Monitoring Project

Project Starter Template



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

	<p>Operating System License: DataCenter</p> <p>Servers: 3</p> <p>Procs per server: 1</p> <p>Core(s) per proc: 8 Cores</p> <p>RAM: 64 GB</p> <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>

	SQL Server backup: 0
Storage	Purpose: Storage Type: Local Disk / SAN Disk Type: HDD Capacity: 1 TB Back-Up: None currently Archive: None
Networking	Amount of network bandwidth you currently consume in your on-premises environment: 1 GB

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.</p> <p>There are 3 web apps servers which host the front end of the company.</p> <p>There are 3 database servers.</p> <p>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.	<ol style="list-style-type: none">1. There are 10 Windows VM's = Azure Virtual Machines (VMs). It provides the ability to create and manages virtual machines in the cloud, provides replicate VM function, scale resources up or down as needed.2. There are 3 web apps servers = Azure App Service. Azure App Service: Azure App Service is a fully managed platform for building, deploying, and scaling web apps. It supports multiple programming languages and frameworks, making it suitable for hosting the front end of the company's web apps.3. There are 3 database servers = Azure SQL Database. Azure SQL Database is a managed relational database service that provides a highly available and scalable platform for hosting databases. It offers features like automatic backups, high availability, and built-in security. Migration DB is the useful function.

4. There is a storage = Azure Storage Account. It provides different storage options, such as Blob storage, File storage, and Queue storage, to store and retrieve data.

Screenshot 1

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

Servers

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

^ Servers

Workload ⓘ	Environment ⓘ	Operating system ⓘ	Operating System License ⓘ	Servers ⓘ	Procs per server ⓘ
Windows/Linux Server	Physical Servers	Windows	Datacenter	10 (1 - 9999)	2 (1 - 4)
Core(s) per proc ⓘ	RAM (GB) ⓘ	Optimize by ⓘ	GPU ⓘ	Windows Server 2008/2008 R2 ⓘ	
8 (1 - 8)	256 (1 - 448)	CPU	None	<input checked="" type="checkbox"/>	

^ WebApp

Workload ⓘ	Environment ⓘ	Operating system ⓘ	Operating System License ⓘ	Servers ⓘ	Procs per server ⓘ
Web App	Physical Servers	Windows	Standard	3 (1 - 9999)	1 (1 - 4)
Core(s) per proc ⓘ	RAM (GB) ⓘ	Optimize by ⓘ	Auto scaling ⓘ		
8 (1 - 8)	64 (1 - 448)	CPU	<input checked="" type="checkbox"/>		

Screenshot 2

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

Databases

Enter the details of your on-premises database infrastructure. After adding a database, enter the details of your on-premises database infrastructure in the Source section. In the Destination section, select the Azure service you would like to use.

^ Database 1

Source

Database ⓘ	License ⓘ	Environment ⓘ	Operating system ⓘ	Operating System License ⓘ	Servers ⓘ
Microsoft SQL Server	Enterprise	Physical Servers	Windows	Datacenter	3 (1 - 9999)
Procs per server ⓘ	Core(s) per proc ⓘ	RAM (GB) ⓘ	Optimize by ⓘ	SQL Server 2008/2008 R2 ⓘ	
1 (1 - 4)	8 (1 - 8)	64 (1 - 448)	CPU	<input checked="" type="checkbox"/>	

Destination

Service ⓘ	Purchase Model ⓘ	Service Tier ⓘ	Instance cores ⓘ	SQL Server storage ⓘ	SQL Server backup ⓘ
SQL Database	vCore	Business Critical	2	5 GB (5 - 4000)	0 GB (0 - 5000000)

Screenshot 3

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

Storage

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

^ Storage 1

Storage type ⓘ	Disk type ⓘ	Capacity ⓘ	Backup ⓘ	Archive ⓘ
Local Disk/SAN	HDD	1 TB (1 - 5000)	1 TB (0 - 5000)	1 TB (0 - 5000)

+ Add storage

screenshot should be submitted here.

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

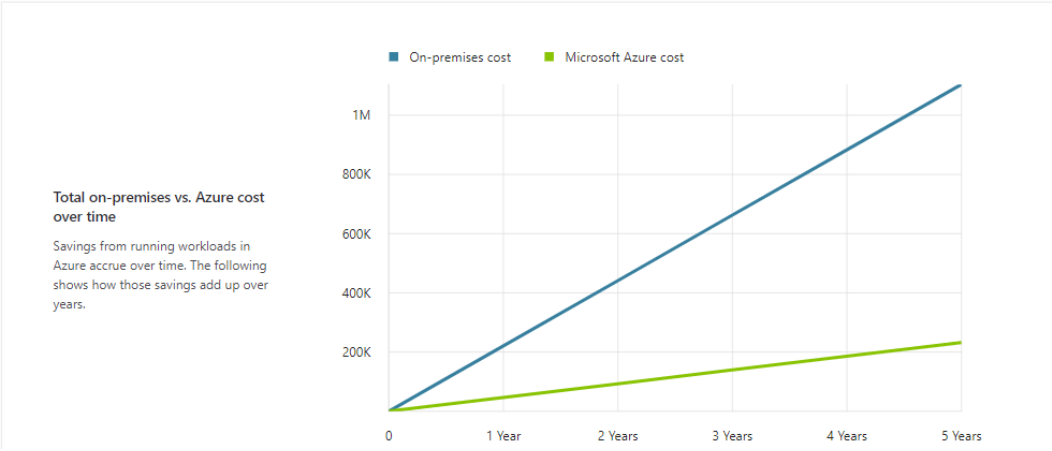
East US

Next

Screenshot 5

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

Over 5 year(s) with Microsoft Azure, your estimated cost savings could be as much as **\$871,406**

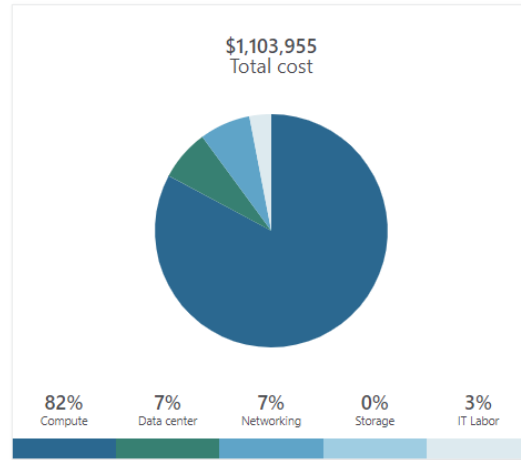


Screenshot 6

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

Total on-premises over 5 year(s)

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

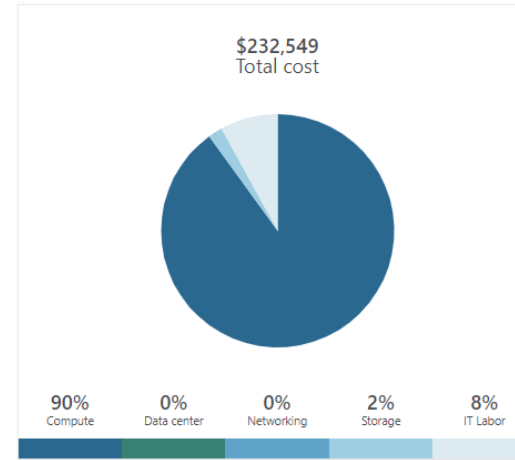


Total on-premises cost breakdown

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

Total Azure cost over 5 year(s)

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



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.

Screenshot 7

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

On-premises cost breakdown summary

Category	Cost
Compute	\$904,385.75
Hardware	\$365,668.00
Software	\$103,663.75
Electricity	\$51,222.00
Database	\$383,832.00
Data Center	\$81,333.80
Networking	\$80,968.72
Storage	\$467.20
IT Labor	\$36,800.00
Total	\$1,103,955.00

Azure cost breakdown summary

Category	Cost
Compute	\$209,202.00
Data Center	\$0.00
Networking	\$0.00
Storage	\$4,179.91
IT Labor	\$19,167.05
Total	\$232,549.00

Explanation 1

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

Hardware Costs: On-premises infrastructure requires upfront investment in purchasing servers, networking equipment, storage devices, and other hardware components. These costs can be significant and contribute to the overall on-premises expenses. In Azure, hardware costs are included in the pricing model, and you only pay for the resources you use, eliminating the need for upfront hardware investments.

versus Azure
compare

Software Costs: On-premises infrastructure often requires purchasing licenses for operating systems, databases, middleware, and other software components. These costs can add up, especially for large-scale deployments. In Azure, the cost of software licenses is included in the pricing, reducing the need for separate software purchases.

Maintenance Costs: On-premises infrastructure requires ongoing maintenance, including hardware repairs, software updates, security patches, and system administration. These maintenance activities can be time-consuming and require dedicated IT staff. In Azure, Microsoft takes care of the infrastructure maintenance, reducing the maintenance burden on your organization.

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

Matching Azure Services: Match the list of on-premises servers and services to the corresponding Azure ones.

Here is the VM configuration you will pick.

- 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

5 DS2 v2 (2 vCPUs, 7 GB RAM) x 730 Hours (Pay as ...)

Upfront: \$0.00

Monthly: \$960.76

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:
Dsv2-series

INSTANCE: [\(Need help finding the right VM?\)](#)
DS2 v2: 2 vCPUs, 7 GB RAM, 14 GB Temporary storage, \$0.252/hour

5
Virtual machines

x

730
Hours

Savings Options

Explore pricing models to help optimize your Azure costs. [Learn more](#)

Compute (DS2 v2)
☒ Pay as you go

OS (Windows)
☒ License included
☐ Azure Hybrid Benefit

Screenshot 2

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

Virtual Machines

5 DS2 v2 (2 vCPUs, 7 GB RAM) x 730 Hours (Pay as ...)

Upfront: \$0.00

Monthly: \$960.76

Virtual Machines

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

Region:
West US

Operating system:
Windows

Type:
(OS Only)

Tier:
Standard

Category:
All

Instance Series:
Dsv2-series

INSTANCE: [\(Need help finding the right VM?\)](#)
DS2 v2: 2 vCPUs, 7 GB RAM, 14 GB Temporary storage, \$0.252/hour

5
Virtual machines

x

730
Hours

Savings Options

Explore pricing models to help optimize your Azure costs. [Learn more](#)

Compute (DS2 v2)
☒ Pay as you go

OS (Windows)
☒ License included
☐ Azure Hybrid Benefit

Screenshot 3

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

Your Estimate

Resource	Configuration	Upfront	Monthly
Virtual Machines	5 DS2 v2 (2 vCPUs, 7 GB RAM) x 730 Hours (Pay as you go)	\$0.00	\$960.76
Virtual Machines	5 DS2 v2 (2 vCPUs, 7 GB RAM) x 730 Hours (Pay as you go)	\$0.00	\$919.80

Support

SUPPORT: Included ⓘ \$0.00

Select your program/offer

LICENSING PROGRAM: Microsoft Customer Agreement (MCA) ⓘ Selected billing profile: None selected (change)

☐ Show Dev/Test Pricing ⓘ

Estimated upfront cost \$0.00

Estimated monthly cost \$1,880.56

Explanation 1

Explain how resilience is built in by moving to Azure

- 1) **High Availability:** Azure ensures your apps stay accessible during failures. Deploy across regions for redundancy.
- 2) **Fault Tolerance:** Services withstand failures without downtime. Azure Storage replicates data for protection.
- 3) **Disaster Recovery:** Shield apps from disasters using Azure Site Recovery for failover and Azure Backup for data protection.
- 4) **Load Balancing:** Optimize app performance with Azure Load Balancer and Application Gateway for traffic distribution and failover.
- 5) **Auto Scaling:** Automatically adjust resources as needed for peak or low demand, ensuring cost-efficient performance.
- 6) **Monitoring and Alerting:** Proactively detect issues with Azure Monitor. Set alerts for rapid response and maintain app health.
- 7) **Security and Compliance:** Azure offers robust security, including encryption, access control, and compliance with standards.

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

What is the purpose of Azure Cost Mgmt + billing Dashboard?

Submit the explanation

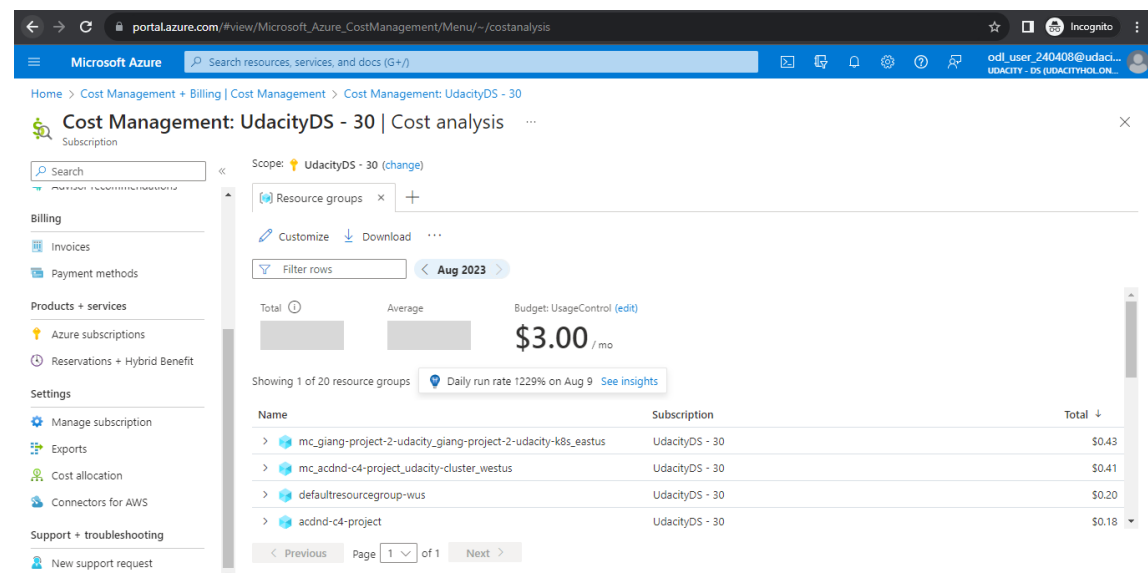
Explanation 1

The purpose of the Azure Cost Management + Billing Dashboard is to provide users and organizations with a comprehensive tool to monitor, manage, and optimize their spending and usage on Microsoft Azure services. It offers insights and controls related to the financial aspects of running workloads in the Azure cloud

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.

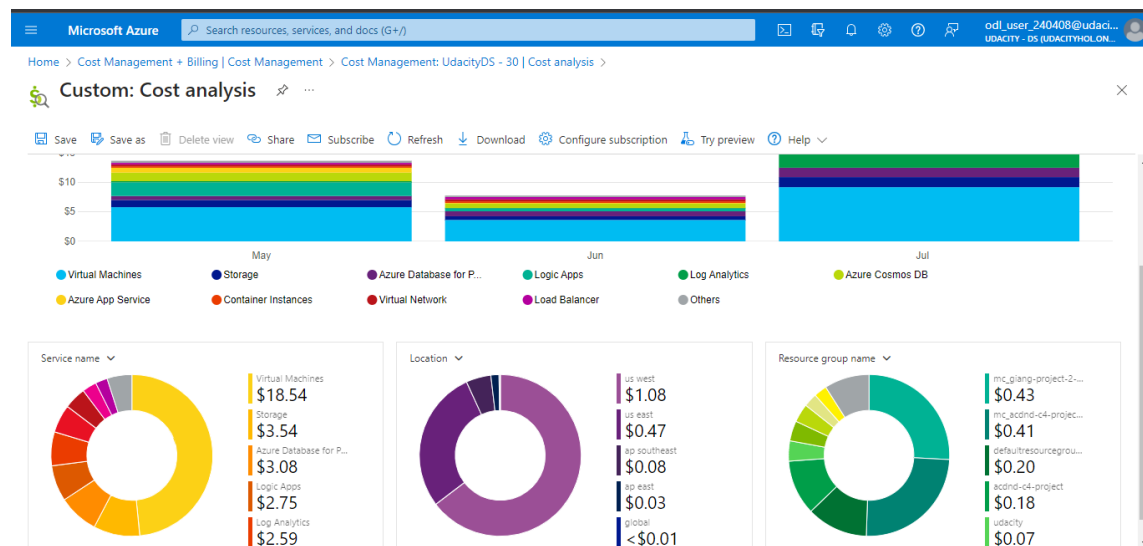
Hint: Make sure the right time period is selected to see the data.

Effectively manage and monitor costs associated with resources. It provides a structured approach to organizing resources, allocating costs, and gaining insights into resource usage patterns.

Screenshot 3

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

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.



Explanation 3

This allows to track spending at a granular level and identify areas where cost optimization can be achieved. Generate reports, set up budgets, and apply cost management practices specific to each service name and location combination.

Explain the key components of the screenshot submitted.

Screenshot 4

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

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).

The screenshot displays the Microsoft Azure portal's Cost Management section. The left-hand navigation pane shows the 'Cost alerts' tab selected. The main content area is titled 'Cost Management: UdacityDS - 30 | Cost alerts'. It features a search bar, a '+ Add' button, and a list of active alerts. A notification banner at the top right states 'Alert rule was created' and 'Alert rule Udat-lab was successfully created'. Below the alerts list, a detailed view of a specific alert is shown, including its description, current cost, and last update time.

Name	Date	Scope
Actual > 80%	7/25/2023, 9:37:26 PM	UdacityDS - 30 (subscription)
Budget alerts	Period July 2023	Email sent to: example.expample@email.com

Explanation 4

Explain the key components of the screenshot submitted.

A page cost alert is a feature that allows to set up notifications when Azure spending reaches a certain threshold. It helps to stay informed about the costs and take proactive actions to manage and control spending.

Screenshot 5

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

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

The screenshot shows the 'Alert rules' page in the Azure portal. The breadcrumb trail is: Home > Cost Management + Billing | Cost Management > Cost Management: UdacityDS - 30 | Cost analysis > Custom: Cost analysis > Configuration. The page title is 'Alert rules' with a sub-header 'Cost management'. The scope is 'UdacityDS - 30'. There are buttons for '+ Add', 'Refresh', 'Delete', and 'Help'. A table lists the alert rules:

<input type="checkbox"/>	Name ↓	Status ↓	Condition	Action	Scope
<input type="checkbox"/>	Daily anomaly by resou	Active	Anomaly detected	Email 1 other	UdacityDS - 30
<input type="checkbox"/>	Udat-lab	Active	Anomaly detected	Email me	UdacityDS - 30

Explanation 5

Explain the key components of the screenshot submitted.

Alert rules provide support for proactively monitoring and managing costs in the Azure cloud. Alert rules allow to set up notifications based on specific cost or usage thresholds. This helps you stay informed about any unexpected spikes in spending or usage, allowing to take immediate action.

Screenshot 6

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

The screenshot shows the 'Advisor recommendations' page in the Azure portal. The breadcrumb trail is: Subscription > Cost Management: UdacityDS - 13 | Advisor recommendations. The page title is 'Cost Management: UdacityDS - 13 | Advisor recommendations'. The left sidebar shows the navigation menu with 'Advisor recommendations' selected. The main content area shows a message: 'Your recommendations have been loaded'. Below this, there are filters: 'Recommendation Status equals Active', 'Resource Group equals All', and 'Type equals All'. There is also a filter for 'Commitments equals 3 years, 30 days'. A large blue icon representing a document with a checkmark is displayed. Below the icon, it says: 'You are following all of our cost recommendations for the selected subscriptions and resources. See list of cost recommendations'. At the bottom, it says: 'Recommendations are powered by Azure Advisor. View all recommendations in Advisor >'. There is a button 'Are these recommendations helpful?'.

Name	Scope	Reset period	Creation date	Expiration date	Budget	Forecasted	Evaluated
resourceBudgetAlert	0173e877-ea67-406...	Monthly	8/1/2022	7/31/2024	\$30.00	○	\$14.97
Exercise	0173e877-ea67-406...	Monthly	8/1/2022	7/31/2024	\$60.00	○	\$14.97
Project2-Budget	0173e877-ea67-406...	Monthly	9/1/2022	8/31/2024	\$50.00	○	\$0.00
udacityvm222	0173e877-ea67-406...	Monthly	1/1/2023	12/31/2024	\$20.00	○	\$0.00
Baobudget	0173e877-ea67-406...	Monthly	4/1/2023	3/31/2025	\$55.00	\$33.79	\$14.97
UdacityDS13-Monthl...	0173e877-ea67-406...	Monthly	4/1/2023	3/31/2025	\$35.00	○	\$0.00
QuarterlyBudget	0173e877-ea67-406...	Quarterly	4/1/2023	3/31/2025	\$100.00	○	\$0.00
anmt28Budget	0173e877-ea67-406...	Monthly	5/1/2023	4/30/2025	\$15.00	○	\$0.00
HungND-CostFor-Se...	0173e877-ea67-406...	Monthly	7/1/2023	6/30/2025	\$50.00	○	\$14.97

Explanation 6

Explain the key components of the screenshot submitted.

Budgets in Azure Cost Management provide valuable support for keeping track of spending and ensuring that you stay within your budget. It helps make informed decisions about resource allocation and cost optimization in Azure environment.

Explanation 7

Explain the summarized highlights of this part of the project, Azure Cost Mgmt + Billing

Providing multiple screenshots of the Azure TCO (Total Cost of Ownership) Calculator. These screenshots should show the steps took to create a cost estimate and compare the costs between on-premises and cloud-based solutions. Make sure to explain the details in the screenshots to demonstrate familiarity with the TCO.

STEP 4: Azure Policy to create and enforce policies

Background	<p>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.</p> <p>You now decide to leverage Azure Policy features to ensure that appropriate controls are put in place.</p>
Screenshots 1 through 5 Submit the screenshots for Azure Policy steps.	<p>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.</p> <p><u>Very important note:</u></p> <ol style="list-style-type: none">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 though2. 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:

Microsoft Azure

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

odl_user_240423@udaci...
UDACITY - DS (UDACITYHOLON...)

[Dashboard >](#)

Policy

Search

Compliance state change events are now available at the management group level! Use event-based architecture to react to notifications with an Azure Function, Logic App, or any other supported event handler. Learn more <https://aka.ms/policyPlusEventGrid>

Overview

Getting started

Compliance

Remediation

Events

Authoring

Definitions

Assignments

Exemptions

Overall resource compliance

60%

3 out of 5

Resources by compliance state

3 - Compliant

2 - Non-compliant

5

Non-compliant initiatives

0

out of 0

LEARN MORE

Learn about Policy

Onboarding tutorial

Non-compliant policies

1

out of 2

Name	Scope	Compliance state	Resource compli...	Non-Compliant Resour...	Non-compliant policies
arch798-240423-PolicyDefi...	UdacityDS - 13	Non-compliant	50% (2 out of 4)	2	1
UdacityCommon policy defi...	Cloud DevOps and Cl...	Compliant	100% (3 out of 3)	0	0

View all

Step 2:

Microsoft Azure

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

odl_user_240423@udaci...
UDACITY - DS (UDACITYHOLON...)

[Dashboard >](#) [Policy | Compliance >](#)

Assign policy

Basics

Advanced

Parameters

Remediation

Non-compliance messages

Review + create

Scope

Learn more about setting the scope *

UdacityDS - 13/Udacity

Exclusions

Optionally select resources to exclude from the policy assignment.

Basics

Policy definition *

Allowed virtual machine size SKUs

Assignment name *

Allowed virtual machine size SKUs

Description

Review + create

Cancel

Previous

Next

Step 3

portal.azure.com/#view/Microsoft_Azure_Policy/CreateAssignmentBladeV2/assignMode~/1/assignmentScope~/null

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

Dashboard > Policy | Compliance >

Assign policy

Basics Advanced **Parameters** Remediation Non-compliance messages Review + create

Search by parameter n... ☒ Only show parameters that need input or review

Allowed Size SKUs * ⓘ

792 selected

- ☒ Select all
- ☒ Basic_A0
- ☒ Basic_A1
- ☒ Basic_A2
- ☒ Basic_A3
- ☒ Basic_A4
- ☒ Standard_A0

Review + create Cancel Previous Next

Step 4:

portal.azure.com/#view/Microsoft_Azure_Policy/PolicyMenuBlade/~:/Compliance

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

Home > Policy

Policy | Compliance

Assign policy Assign initiative Refresh

Overview Getting started **Compliance** Remediation Events

Authoring Definitions Assignments Exemptions

Search

UdacityDS - 13 All definition types All compliance states Filter by name or ID...

Overall resource compliance ⓘ

20%
1 out of 5

Resources by compliance state ⓘ

1 - Compliant
4 - Non-compliant

Non-compliant initiatives ⓘ

0
out of 0

Non-compliant policies ⓘ

2
out of 4

Name	Scope	Compliance state	Resource compli...	Non-Compliant R...	Non-compliant p...
arch798-240423-PolicyDefinition	UdacityDS - 13	Non-compliant	50% (2 out of 4)	2	1
Audit virtual machines without disaster reco...	UdacityDS - 13	Non-compliant	0% (0 out of 2)	2	1
UdacityCommon policy definition	Cloud DevOps and C...	Compliant	100% (3 out of 3)	0	0
Allowed virtual machine size SKUs	UdacityDS - 13/Udac...	Compliant	100% (0 out of 0)	0	0

Step 5:

Screenshot 6

Explain through screenshots what happens when you create a VM which is in violation with the policy you just created.

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.

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

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

Home > Policy | Compliance >

Allowed virtual machine size SKUs

Policy compliance

View definition | Edit assignment | Assign to another scope | Delete assignment | Create remediation task | Create exemption

Essentials

Name : Allowed virtual machine size SKUs | Scope : UdacityDS - 13/Udacity
Description : My Lab Uda request | Excluded scopes : 0
Assignment ID : /subscriptions/0173e877-ea67-406c-b540-ed9828abafea/resourcegroups/udacity/pro... | Definition : Allowed virtual machine size SKUs

Selected Scopes (1 selected subscription)

Compliance state: Not started | Overall resource compliance: 100% | Resources by compliance state: 0 - Compliant, 0 - Non-compliant

Details: Effect Type Deny, Parent Initiative <<NONE>>

Resource compliance | Events

Filter by resource name or ID... | Non-compliant | All resource types | All locations

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

Home >

CreateVm-canonical.0001-com-ubuntu-server-focal-2-20230819093911 | Overview

Deployment

Search | Delete | Cancel | Redeploy | Download | Refresh

Overview

Inputs | Outputs | Template

✓ Your deployment is complete

Deployment name: CreateVm-canonical.0001-com-ubuntu-server-f... | Start time: 8/19/2023, 9:41:06 AM
Subscription: UdacityDS - 13 | Correlation ID: c9cdf2e8-0508-4353-910c-a88e
Resource group: Udacity

Deployment details

Next steps

Setup auto-shutdown Recommended
Monitor VM health, performance and network dependencies Recommended
Run a script inside the virtual machine Recommended

Go to resource | Create another VM

Give feedback | Tell us about your experience with deployment

Deployment succeeded

Deployment 'CreateVm-canonical.0001-com-ubuntu-server-focal-2-20230819093911' to resource group 'Udacity' was successful.

Go to resource | Pin to dashboard

Cost Management

Get notified to stay within your budget and prevent unexpected charges on your bill. Set up cost alerts >

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 Azure environment.

<p>Explanation 1</p> <p>Explain the summarized highlights of this part of the project, Azure Policy.</p>	<p>Using Azure Policy to enforce allowed virtual machine size SKUs, it can ensure that only the approved sizes are used, which helps in controlling costs, optimizing resource allocation, and maintaining consistency across your Azure environment.</p>
---	---

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>

Screenshots 1 through 3

You will submit the screenshots for Overview tab.

Step 1:

The screenshot shows the Microsoft Azure My Dashboard. The top navigation bar includes the Microsoft Azure logo, a search bar, and user information. The dashboard title is "My Dashboard" with a dropdown arrow. Below the title, there are action buttons: Create, Upload, Refresh, Full screen, Edit, Share, Export, Clone, Assign tags, Delete, and Feedback. A status bar indicates "Last updated: 2 minutes ago".

The main content area is divided into two sections. On the left, there is a list of resources with columns for resource name and type. The resources listed are:

Resource Name	Type
UdacityVM-240423	Virtual machine
c240423fm3q673zvpous	Container instances
default-NSG	Network security gr...
JumpVM-240423	Virtual machine
JumpVM-240423-osdisk	Disk
jumpvm-nic	Network interface
jumpvm-nsg	Network security gr...
jumpvm-pip	Public IP address
NetworkWatcher_eastus	Network Watcher
storage240423	Storage account
UdacityDemo-240423	Virtual machine scal...
udacitydemo-pip	Public IP address
udacitydemo-vnet	Virtual network

On the right, there is a "Quickstarts + tutorials" section with a "Create DevOps Starter" button. Below this, there are three quickstart options:

- Windows Virtual Machines: Provision Windows Server, SQL Server, SharePoint VMs
- Linux Virtual Machines: Provision Ubuntu, Red Hat, CentOS, SUSE, CoreOS VMs
- App Service: Create Web Apps using .NET, Java, Node.js, Python, PHP
- Functions: Process events with a serverless code architecture

Step 2:

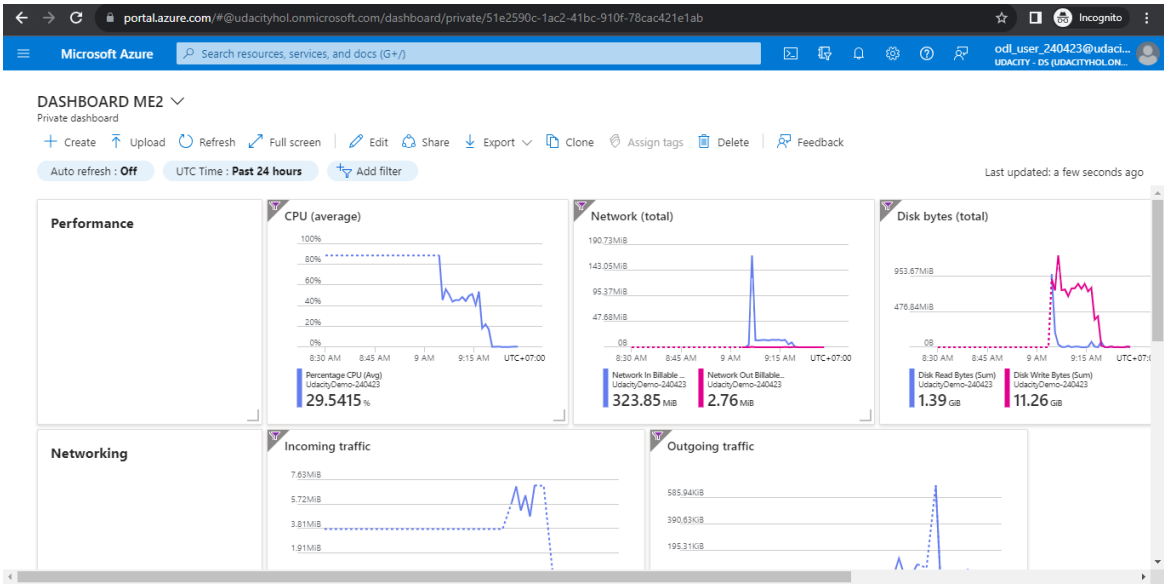
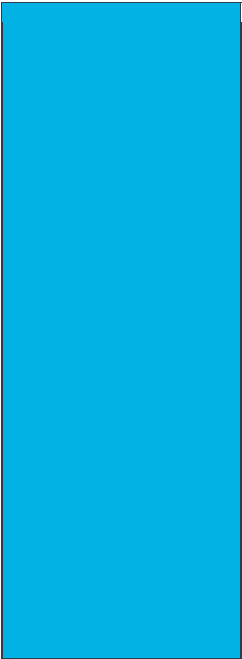
The screenshot shows the Microsoft Azure portal with a "Create a dashboard" dialog box open. The dialog box has a title "Create a dashboard" and a subtitle "summary view of all your azure resources". It contains a grid of dashboard templates, including "SQL database health" and "VM scale set".

The "VM scale set" template is selected, and a "Create a VM scale set dashboard" dialog box is open over it. This dialog box has the following fields:

- Dashboard name: DASHBOARD ME2
- Select scope: Subscription (UdacityDS - 13)
- Select resource: UdacityDemo-240423

At the bottom of the dialog box, there are "Submit" and "Cancel" buttons.

Step 3 (Final Output):



STEP 6: Azure Monitor – Metrics

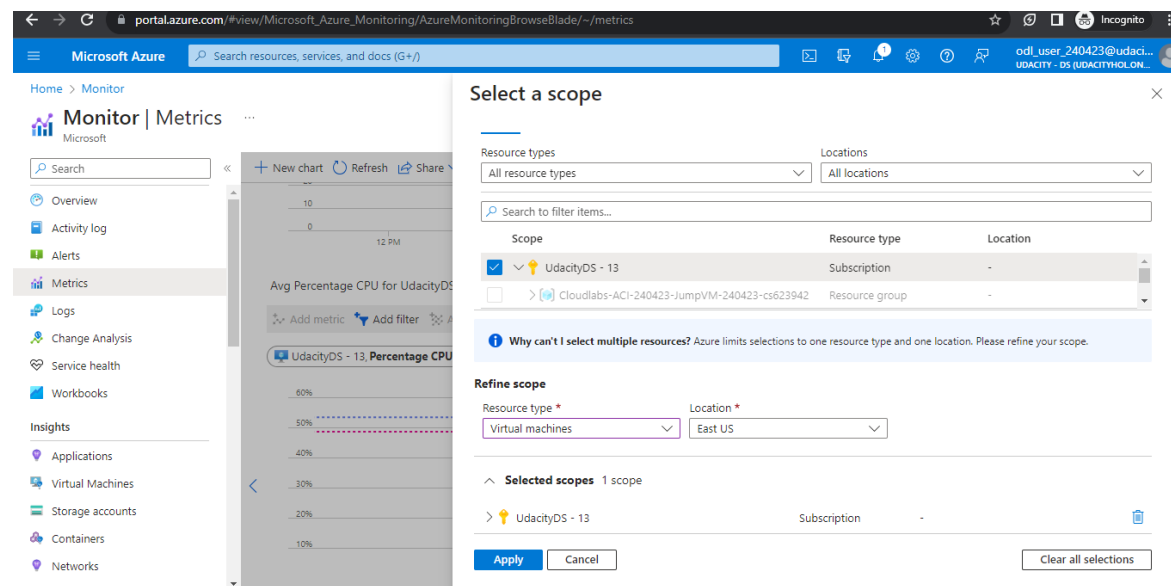
Task 1

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.

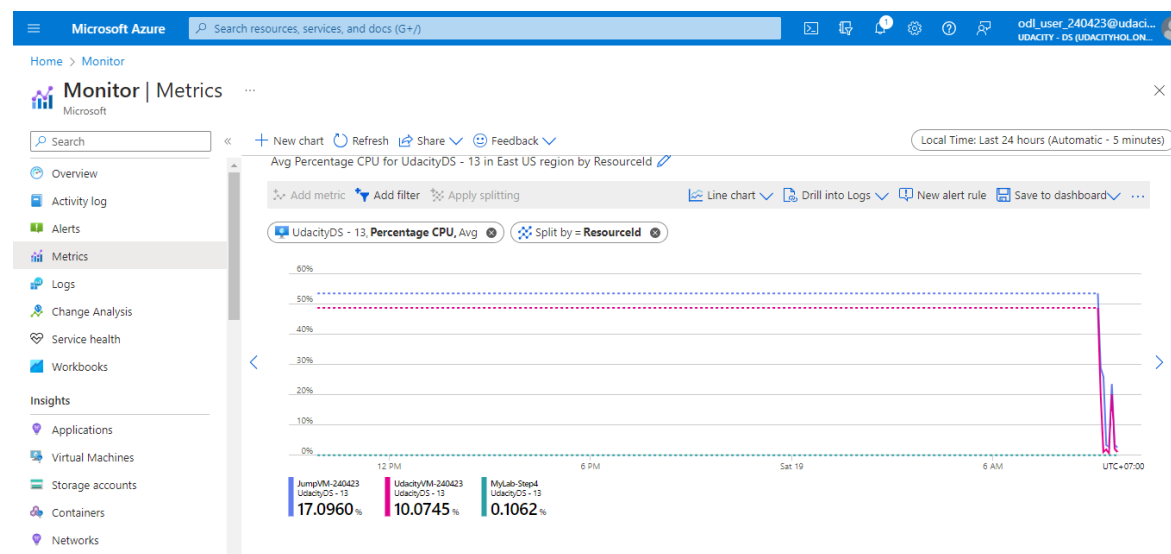
Screenshots 1 through 3

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

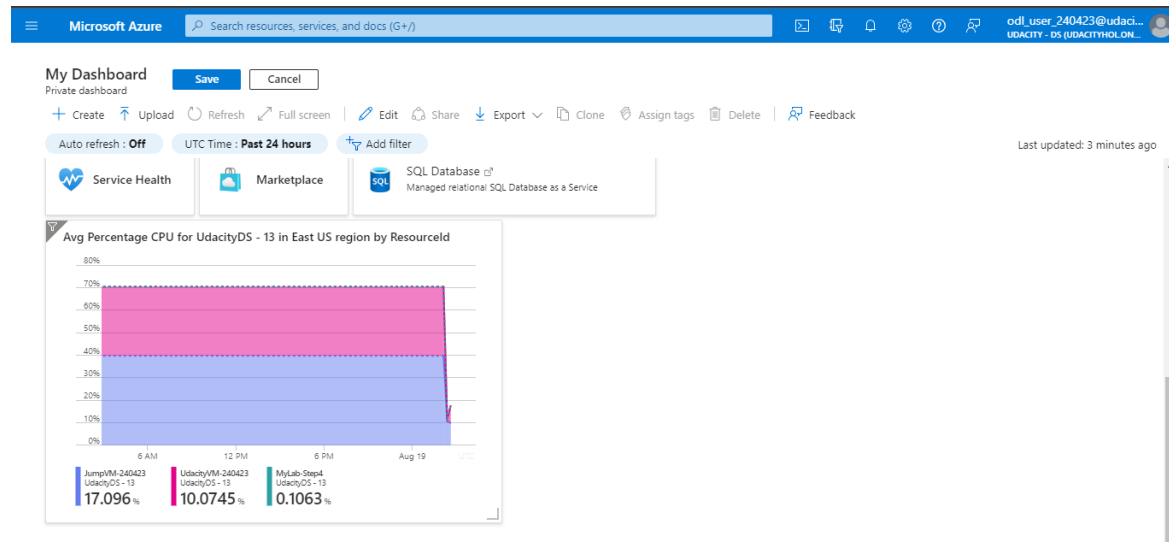
Step 1:



Step 2:

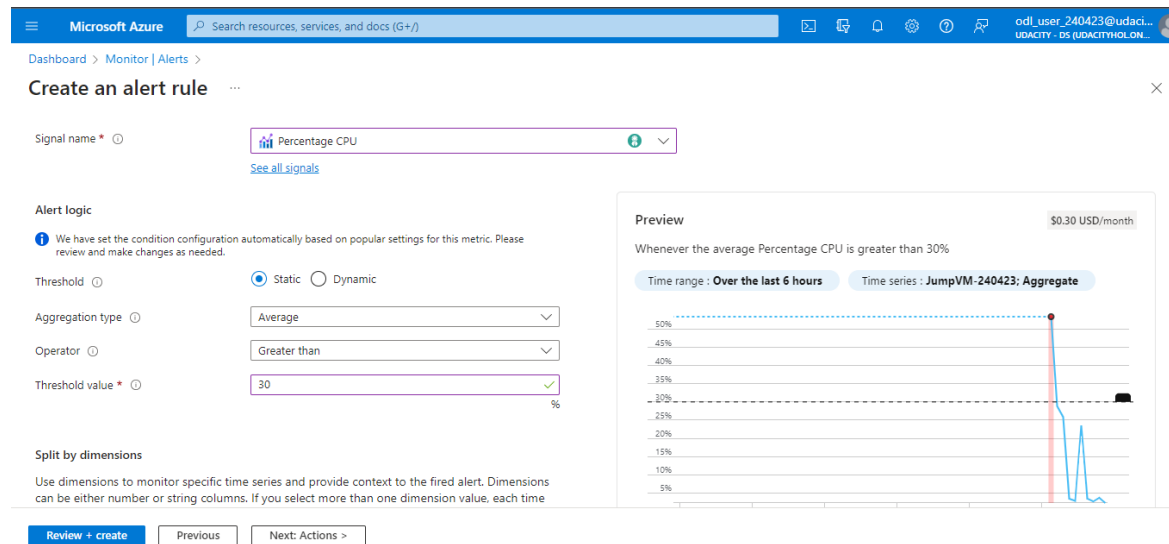


Step 3:



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.



Microsoft Azure

Search resources, services, and docs (G+)

odl_user_240423@udaci...
UDACITY - DS (UDACITYHOLON...

Dashboard > Monitor | Alerts >

Create an alert rule ...

Scope

Condition

Actions

Details

Tags

Review + create

Metric alert rule

1 Condition

Terms of use | Privacy statement

Total pricing

Variable

Pricing

Scope

Resource

UdacityDS - 13 > All virtual machines (East US)

Condition

Signal name

Operator

Aggregation type

Threshold value

Lookback period

Check every

Percentage CPU

Greater than

Average

30

5 minutes

1 minute

Create

Previous

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:

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

Microsoft Azure

Search resources, services, and docs (G+)

odl_user_240423@udaci...
UDACITY - DS (UDACITYHOLON...

Dashboard > Log Analytics workspaces >

Create Log Analytics workspace ...

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 * ⓘ

UdacityDS - 13

Resource group * ⓘ

Udacity

Create new

Instance details

Name * ⓘ

NEW-WORKSPACE

Region * ⓘ

East US

Review + Create

Previous

Next : Tags >

Step 2:

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

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

Dashboard > Log Analytics workspaces >

Create Log Analytics workspace

Validation passed

Basics Tags Review + Create

Log Analytics workspace
by Microsoft

Basics

Subscription	UdacityDS - 13
Resource group	Udacity
Name	NEW-WORKSPACE
Region	East US

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.

Create < Previous Download a template for automation

Step 3:

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

Dashboard >

Microsoft.LogAnalyticsOMS | Overview

Deployment

Search « Delete Cancel Redeploy Download Refresh

Overview Inputs Outputs Template

Your deployment is complete

Deployment name : Microsoft.LogAnalyticsOMS	Start time : 8/19/2023, 10:00:37 AM
Subscription : UdacityDS - 13	Correlation ID : f6937692-8f06-4163-934e-96056c6112...
Resource group : Udacity	

> Deployment details

Next steps

[Go to resource](#)

Give feedback

[Tell us about your experience with deployment](#)

Cost management
Get notified to stay within your budget and prevent unexpected charges on your bill.
[Set up cost alerts >](#)

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Work with an expert
Azure experts are service provider partners

Step 4:

Microsoft Azure

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

Dashboard > Microsoft.LogAnalyticsOMS | Overview > NEW-WORKSPACE

NEW-WORKSPACE | Agents

Log Analytics workspace

Search

Settings

Tables

Agents

Usage and estimated costs

Data export

Network isolation

Linked storage accounts

Properties

Locks

Classic

Legacy agents management

Legacy activity log connector

Legacy storage account logs

Legacy computer groups

Log Analytics agent instructions

Download agent

Download an agent for your operating system, then install and configure it using the keys for your workspace ID. You'll need the Workspace ID and Key to install the agent.

Download Windows Agent (64 bit)

Download Windows Agent (32 bit)

Workspace ID

1bc18329-332d-47d9-ab00-3766a0021350

Primary key

prbbQcfZ8RMt9cB63z9aWDypntQCBEO8Rv9CJN...

Regenerate

Secondary key

+REtbvFABCIIVQ6i1R4pMQGHvCLmLU+ufQ3G...

Regenerate

Log Analytics Gateway

If you have machines with no internet connectivity to Log Analytics workspace, download the Log Analytics Gateway to act as a proxy.

Learn more about Log Analytics Gateway

Download Log Analytics Gateway

STEP 8: Azure Insights

Background

Screenshots
1 through 6

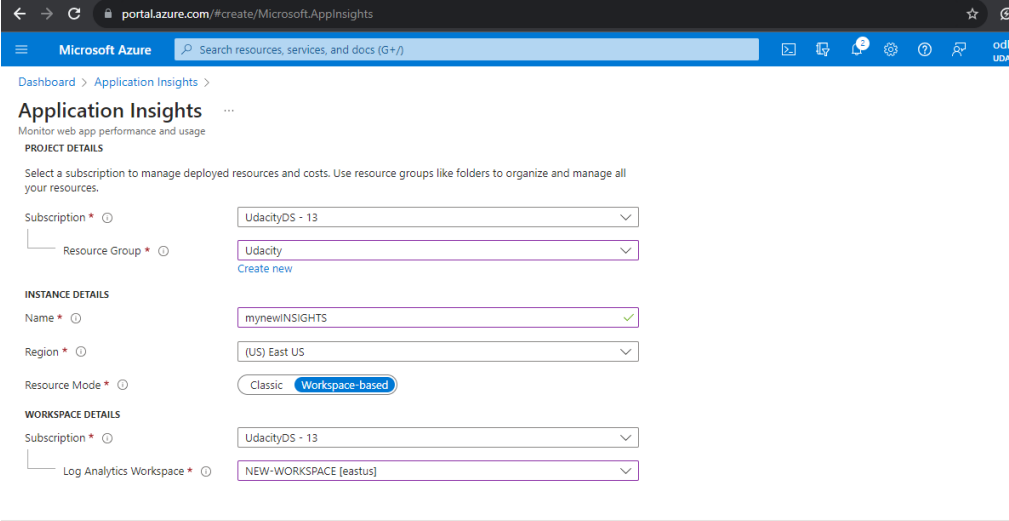
You will submit the screenshots for the Monitor | Metrics screen as you are setting up.

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

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:

[Dashboard](#) > [Application Insights](#) >


Application Insights

Monitor web app performance and usage

 Validation passed

[Basics](#) [Tags](#) [Review + create](#)

SUMMARY

 **Application Insights**
by Microsoft

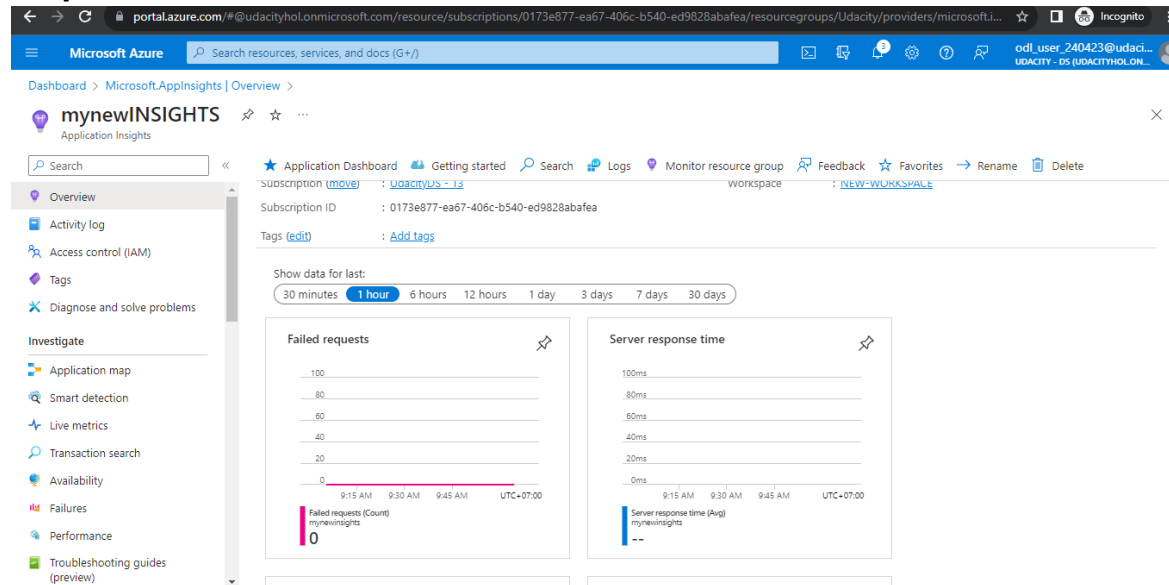
Subscription	UdacityDS - 13
Resource Group	Udacity
Name	mynewINSIGHTS
Region	East US
Workspace	NEW-WORKSPACE [eastus]

Step 3:

Step 4:

Step 5:

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:

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

Home > Resource groups > Udacity > UdacityVM-240423

UdacityVM-240423 | Insights

Virtual machine

Search


- Configuration management (Preview)
- Policies
- Run command
- Monitoring
 - Insights
 - Alerts
 - Metrics
 - Diagnostic settings
 - Logs
 - Connection monitor (classic)
 - Workbooks
- Automation
 - Tasks (preview)

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

Get more visibility into the health and performance of your virtual machine

With an Azure virtual machine you get host CPU, disk and up/down state of your VMs out of the box. Enabling additional monitoring capabilities provides insights into the performance and dependencies for your virtual machines.

You will be billed based on the amount of data ingested and your data retention settings. It can take between 5-10 minutes to configure the virtual machine and the monitoring data to appear.



i The map data set collected with Azure Monitor for VMs is intended to be infrastructure data about the resources being deployed and monitored. For details on data collected please [click here](#).

Step 8:

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

Home > Resource groups > Udacity > UdacityVM-240423

UdacityVM-240423 | Insights

Virtual machine

Search

- Configuration management (Preview)
- Policies
- Run command
- Monitoring
 - Insights
 - Alerts
 - Metrics
 - Diagnostic settings
 - Logs
 - Connection monitor (classic)
 - Workbooks
- Automation
 - Tasks (preview)

Resource Group Monitoring

Monitoring configuration

Enable insights using

☒ Azure Monitor agent (Recommended)
☐ Log Analytics agent

Subscription * UdacityDS - 13

Data collection rule (new) MSVMI-DefaultWorkspace-0173e877-ea67-406c-b540-ed9828abafea...
[Create New](#)

MSVMI-DefaultWorkspace-0173e877-ea67-406c-b540-ed9828abafea-EUS

Guest performance	Enabled
Processes and dependencies (Map)	Disabled
Log Analytics workspace	DefaultWorkspace-0173e877-ea67-406c-b540-ed9828abafea-EUS

i This will also enable System Assigned Managed Identity, in addition to existing User Assigned identities (if any).
Note: Unless specified in the request, the machine will default to using System Assigned Identity. [Learn More](#)
Currently, only resources in certain regions are supported. [Learn More](#)

[Configure](#) [Cancel](#)

Step 9:

portal.azure.com/#view/Microsoft_Azure_Monitoring/AzureMonitoringBrowseBlade/~-/overview

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

Home > Monitor | Overview

The Log Analytics agents, used by VM Insights, won't be supported as of August 31, 2024. Plan to migrate to VM Insights on Azure Monitor agent prior to this date.

- Application Insights**
Monitor your app's availability, performance, errors, and usage.
[View](#) [More](#)
- Container Insights**
Gain visibility into the performance and health of your controllers, nodes, and containers.
[View](#) [More](#)
- VM Insights**
Monitor the health, performance, and dependencies of your VMs and VM scale sets.
[View](#) [More](#)
- Network Insights**
View the health and metrics for all deployed network resources.
[View](#) [More](#)

Detection, triage, and diagnosis
Visualize, analyze, and respond to monitoring data and events. [Learn more about monitoring](#)

- Metrics**
Create charts to monitor and investigate
- Alerts**
Get notified and respond using alerts and
- Logs**
Analyze and diagnose issues with logs

Step 10:

Home > Monitor | Virtual Machines

Refresh Provide Feedback

Filter by name... Subscription: UdacityDS - 13 Resource group: All resource groups Type: All types

Location: All locations Group by: Subscription, Resource group

Monitored (0) **Not monitored (4)** Workspace configuration Other onboarding options

Name	Monitor Coverage	Workspace
UdacityDS - 13	4 of 4	
jumpvm	1 of 1	
JumpVM-240423	Cannot enable - Virtual machine is not running (Why?)	defaultworkspace-0173e877-ea67-406c-b...
udacity	2 of 2	
MyLab-Step4	Not enabled Enable	defaultworkspace-0173e877-ea67-406c-b...
UdacityVM-240423	Not enabled Enable	defaultworkspace-0173e877-ea67-406c-b...
udacitydemo	1 of 1	

Step 11:

The screenshot shows the Azure Monitor 'Virtual Machines' page. On the left is a navigation pane with options like Overview, Activity log, Alerts, Metrics, Logs, Change Analysis, Service health, Workbooks, Insights, Applications, Virtual Machines (selected), Storage accounts, Containers, and Networks. The main area is titled 'Monitor | Virtual Machines' and includes a search bar, 'Refresh', and 'Provide Feedback' buttons. Below these are tabs for 'Monitored (0)' and 'Not monitored'. A list of VMs is shown, including 'UdacityDS - 13', 'jumpvm', 'JumpVM-240423', 'udacity', 'MyLab-Step4', 'UdacityVM-240423', and 'udacitydemo'. On the right, the 'Azure Monitor Insights Onboarding' panel is displayed, featuring a cloud icon with binary code and a bell. It contains text about getting more visibility into VM health and performance, a note about billing, and an 'Enable' button. A small notification at the top right says '*** Initializing deployment... Initializing template deployment to resource group 'udacity'.'

Step 12:

The screenshot shows the Azure Monitor 'Applications' page. The navigation pane on the left is similar to the previous step, with 'Applications' selected. The main area is titled 'Monitor | Applications' and includes a search bar and buttons for '+ Create', 'Manage view', 'Refresh', 'Export to CSV', 'Open query', 'Assign tags', and 'Delete'. Below these are filter buttons: 'Subscription equals all', 'Resource group equals all', and 'Location equals all'. A table shows one record for 'mynewINSIGHTS' in the 'Udacity' resource group, located in 'East US', under the 'UdacityDS - 13' subscription. The table has columns for Name, Resource group, Location, and Subscription. At the bottom, there are pagination controls showing 'Page 1 of 1' and a 'Give feedback' link.

STEP 9: Azure Monitor – Smart Alerts

Task 1

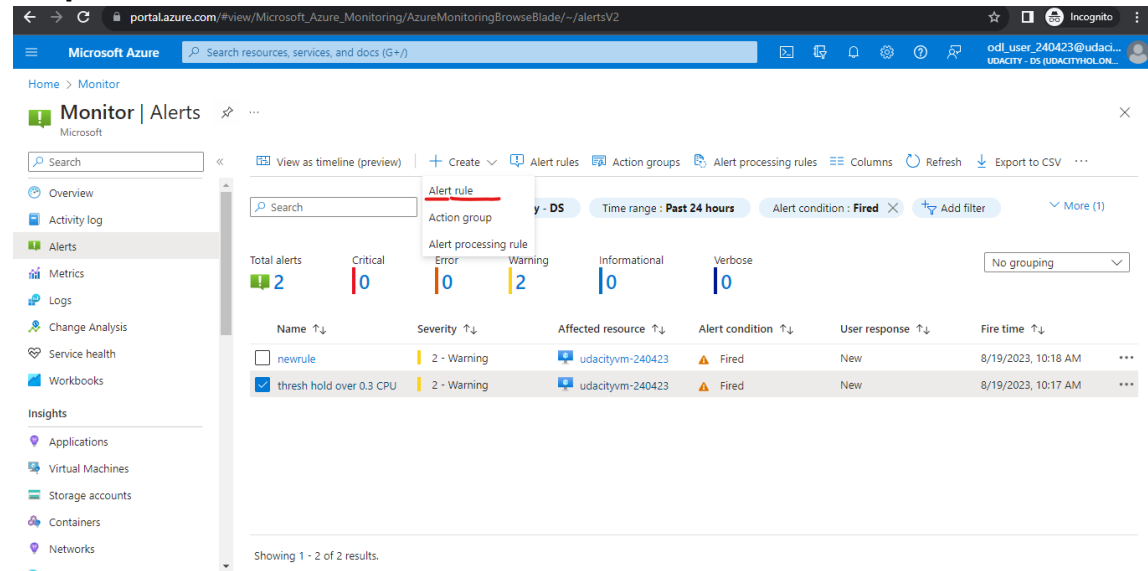
Navigate to Setup Alert & Actions under Azure Monitor >Overview.

The condition name should be CPU units consumed and its value should be greater than 0.3.

Screenshots 1 through 8

You will submit step-by-step screenshots for creating a Setup Alert & Actions.

Step 1:



The screenshot shows the Azure Monitor Alerts page. The left sidebar contains navigation links for Overview, Activity log, Alerts, Metrics, Logs, Change Analysis, Service health, Workbooks, and Insights. The main area displays a table of alerts. The 'Alert rule' dropdown menu is open, showing options like 'Alert rule', 'Action group', and 'Alert processing rule'. The table below shows two alerts: 'newrule' and 'thresh hold over 0.3 CPU', both with a severity of 'Warning' and a status of 'Fired'.

Name	Severity	Affected resource	Alert condition	User response	Fire time
newrule	Warning	udacityvm-240423	Fired	New	8/19/2023, 10:18 AM
thresh hold over 0.3 CPU	Warning	udacityvm-240423	Fired	New	8/19/2023, 10:17 AM

Step 2:

portal.azure.com/#view/Microsoft_Azure_Monitoring/CreateAlertRuleBlade/scopes~//%5B%5D/signals~//%5B%5D

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

Home > Monitor | Alerts >

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.

+ Select scope

Resource	Hierarchy
No resource selected yet	

Review + create Previous Next: Condition >

Select a resource

Browse Recent

Resource types All resource types Locations All locations

Search to filter items...

Resource	Resource type	Location
<input checked="" type="checkbox"/> UdacityDS - 13	Subscription	-
<input type="checkbox"/> > Cloudlabs-ACI-240423-JumpVM-240423-cs623942	Resource group	-

Metric and Log signals might not be available if the scope includes multiple resources.

Refine scope

Resource type Select a resource type Location Select a location

Selected resources 1 scope

> UdacityDS - 13 Subscription -

Step 3:

portal.azure.com/#view/Microsoft_Azure_Monitoring/CreateAlertRuleBlade/scopes~//%5B%5D/signals~//%5B%5D

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

Home > Monitor | 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](#)

Event status *

Current resource status *

Previous resource status *

Reason type *

Review + create Previous Next: Actions >

Step 4:

portal.azure.com/#view/Microsoft_Azure_Monitoring/CreateAlertRuleBlade/scopes-/%5B%5D/signals-/%5B%5D

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

Home > Monitor | 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 action groups + Create action group

Action group name

No action group selected yet

Select action groups

Select up to five action groups to attach to this rule.

Subscription UdacityDS - 13

Search

Action group name ↑↓	Resource group ↑↓	Contains actions	Location ↑↓
<input checked="" type="checkbox"/> Application Insights Smart Detection	udacity	2 Email Azure Resource...	Global

Review + create Previous Next: Details > Select

Step 5:

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

Home > Monitor | 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 action groups + Create action group

Action group name	Contains actions
Application Insights Smart Detection	2 Email Azure Resource Manager Roles

Custom properties

Add your own properties to the alert rule. These will be sent with the alert payload.

Name	Value

portal.azure.com/#view/Microsoft_Azure_Monitoring/CreateAlertRuleBlade/scopes~/%5B%5D/signals~/%5B%5D

Microsoft AzureSearch resources, services, and docs (G+)

Home > Monitor | Alerts >

Create an alert rule...

ScopeConditionActionsDetailsTagsReview + create

Project details

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

Subscription ⓘUdacityDS - 13

Resource group * ⓘUdacity
Create new

Alert rule details

Alert rule name * ⓘnew smart rule ✓

Alert rule description ⓘ

Advanced options

Review + createPreviousNext: Tags >

Step 6 (Summary after above steps):

portal.azure.com/#view/Microsoft_Azure_Monitoring/CreateAlertRuleBlade/scopes~/%5B%5D/signals~/%5B%5D

Microsoft AzureSearch resources, services, and docs (G+)

Home > Monitor | Alerts >

Create an alert rule...

ScopeConditionActionsDetailsTagsReview + create

Project details

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

Subscription ⓘUdacityDS - 13

Resource group * ⓘUdacity
Create new

Alert rule details

Alert rule name * ⓘnew smart rule ✓

Alert rule description ⓘ

Advanced options

Review + createPreviousNext: Tags >

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, and Insights. The main area displays a summary of alerts: Total alerts: 2, Critical: 0, Error: 0, Warning: 2, Informational: 0, Verbose: 0. Below this is a table of alerts:

Name	Severity	Affected resource	Alert condition	User response	Fire time
<input type="checkbox"/> newrule	2 - Warning	udacityvm-240423	Fired	New	8/19/2023, 10:18 AM
<input checked="" type="checkbox"/> thresh hold over 0.3 CPU	2 - Warning	udacityvm-240423	Fired	New	8/19/2023, 10:17 AM

Showing 1 - 2 of 2 results.

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

The screenshot shows the Azure Monitor Alerts page after the alert 'newrule' has been created. The summary now shows: Total alerts: 1, Critical: 0, Error: 0, Warning: 1, Informational: 0, Verbose: 0. The table of alerts is as follows:

Name	Severity	Affected resource	Alert condition	User response	Fire time
<input checked="" type="checkbox"/> newrule	2 - Warning	udacityvm-240423	Fired	New	8/19/2023, 10:18 AM

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

Explanation 1

Explain the purpose of Azure Dashboards,

Azure Monitor is a comprehensive monitoring solution that collects and analyzes data from various sources, including Azure resources, applications, and external services. Azure Dashboards allow to create customized dashboards that provide a consolidated view of your Azure resources. Add various widgets to

Azure Monitor and alerts

dashboard, such as charts, metrics, and logs, to monitor the health and performance of resources.

Alerts in Azure Monitor allow to set up notifications based on specific conditions or thresholds.

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

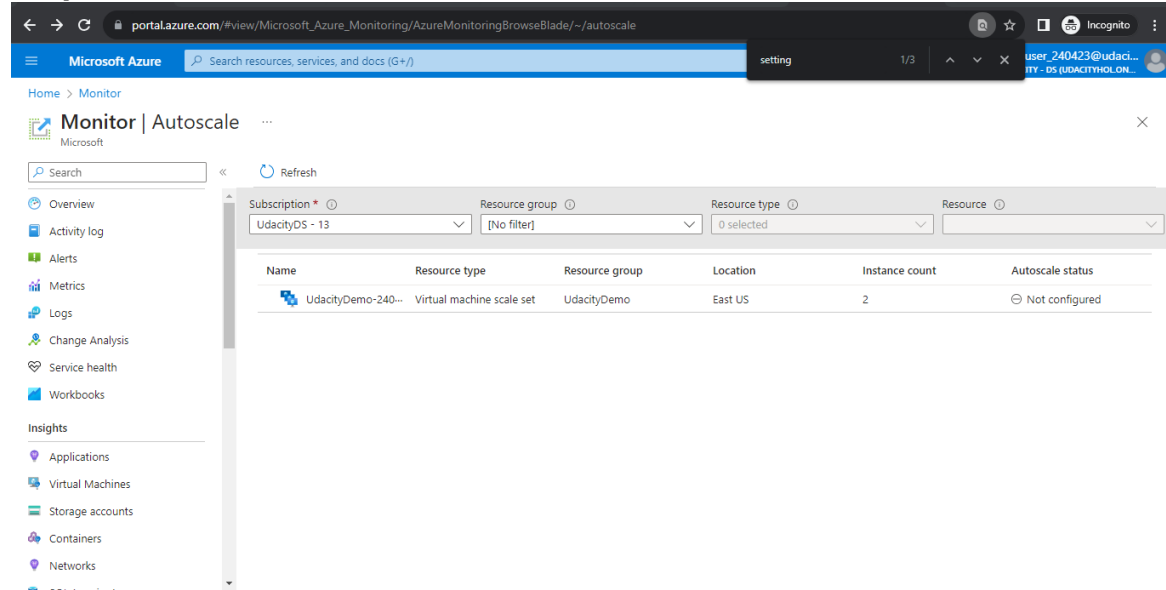
Task 1

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):



The screenshot shows the Azure portal interface for the Autoscale section. The breadcrumb navigation at the top indicates the path: Home > Monitor > Autoscale. The left sidebar contains a search bar and a list of navigation options: Overview, Activity log, Alerts, Metrics, Logs, Change Analysis, Service health, Workbooks, and Insights. The main content area displays a table of Virtual Machine Scale sets. The table has columns for Name, Resource type, Resource group, Location, Instance count, and Autoscale status. One scale set is listed: 'UdacityDemo-240...' with resource type 'Virtual machine scale set', resource group 'UdacityDemo', location 'East US', and an instance count of 2. The Autoscale status is 'Not configured'.

Name	Resource type	Resource group	Location	Instance count	Autoscale status
UdacityDemo-240...	Virtual machine scale set	UdacityDemo	East US	2	Not configured

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

UdacityDemo-240423 (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

Custom autoscale

Autoscale setting name * UdacityDemo-240423-Autoscale-896

Resource group UdacityDemo

Predictive autoscale Mode Disabled Pre-launch setup of instances (minutes) 0

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

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

portal.azure.com/#view/Microsoft_Azure_Monitoring/AutoScaleSettingsBlade/resourceId/%2Fsubscriptions%2F0173e877-ea67-406c-b540-ed9828abafea%2F... Incognito

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

setting 1/3

Home > Monitor | Autoscale >

Autoscale setting

UdacityDemo-240423 (Virtual machine scale set)

Save Discard Refresh Logs Feedback

Profile 1

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 one. Example: 'Add a rule that increases instance count by 1 when CPU Percentage is above 80%'. 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.**

Instance limits Minimum * 1 Maximum * 2 Default * 1

Schedule ☒ Specify start/end dates ☐ Repeat specific days

Timezone (UTC+00:00) Coordinated Universal Time

Start date 08/20/2023 12:00:00 AM

End date 08/20/2023 11:59:00 PM

[+ Add a scale condition](#)

Scale rule

Metric source Current resource (UdacityDemo-240423)

Resource type Virtual machine scale sets Resource UdacityDemo-240423

☒ 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.

80% 60% 40% 20% 0%

10:25 AM 10:30 AM UTC+07:00

Add

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

Profile 1

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 UdacityDemo-240423 (Average) Percentage CPU > 70 Increase count by 1

+ Add a rule

Instance limits

Minimum * ⓘ

Maximum * ⓘ

Default * ⓘ

1 ✓

2 ✓

1 ✓

Schedule

☒ Specify start/end dates ☐ Repeat specific days

Timezone

(UTC+00:00) Coordinated Universal Time

Start date

08/20/2023 12:00:00 AM

Step 5 (Screenshot for “Autoscale Enabled”):

Microsoft Azure

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

odl_user_240423@udaci...
UDACITY - DS (UDACITYHOL.DNL)

Home > Monitor

Monitor | Autoscale

Search

Refresh

Managed Services

Managed Prometheus

Azure Managed Grafana

Azure Monitor SCOM managed instance

Settings

D diagnostic settings

Data Collection Rules

Data Collection Endpoints

Autoscale

Private Link Scopes

Support + Troubleshooting

Advisor recommendations

New support request

Subscription * ⓘ

Resource group ⓘ

Resource type ⓘ

Resource ⓘ

UdacityDS - 13

[No filter]

0 selected

Name	Resource type	Resource group	Location	Instance count	Autoscale status
UdacityDemo-240...	Virtual machine scale set	UdacityDemo	East US	2	Enabled

Explanation
1

Explain the key details of autoscale screenshots you have submitted.

Auto Scaling in Azure Monitor allows you to automatically adjust the capacity of your Azure resources based on predefined rules and metrics, in this sample rule which bases one CPU metric. It helps you optimize resource utilization and ensure that your applications can handle varying workloads efficiently.

