

# Provisioning for Azure Cost Optimization & Monitoring Project Project Starter Template

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

	<p><b>Servers:</b> 3</p> <p><b>Procs per server:</b> 1</p> <p><b>Core(s) per proc:</b> 8 Cores</p> <p><b>RAM:</b> 64 GB</p> <p><b>Optimize By:</b> CPU</p> <p><b>GPU:</b> None</p> <p><b>Usage:</b> These are the web app servers for your company. Currently they all are being leveraged at regular capacity.</p>
Server(s):	<p><b>Source:</b> Database Server</p> <p><b>Database:</b> Microsoft SQL Server</p> <p><b>License:</b> Enterprise</p> <p><b>Environment:</b> Physical Servers</p> <p><b>Operating System:</b> Windows</p> <p><b>Operating System License:</b> Datacenter</p> <p><b>Servers:</b> 3</p> <p><b>Procs per server:</b> 1</p> <p><b>Cores per proc:</b> 16 Cores</p> <p><b>RAM:</b> 64 GB</p> <p><b>Optimize By:</b> CPU</p> <p><b>Usage:</b> 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><b>Destination</b></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	<b>Purpose:</b> Storage <b>Type:</b> Local Disk / SAN <b>Disk Type:</b> HDD <b>Capacity:</b> 1 TB <b>Back-Up:</b> None currently <b>Archive:</b> 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.

<b>Current Environment/ Background</b>  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>
<b>Matching Azure Services</b>  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"><li>- Azure Virtual Machine for Windows Server(CPU: 8Core, RAM: 16GB, OS license: Standard, Virtualization: Hyper-V) x10</li><li>- Azure Virtual Machine for Web App Server(CPU: 8Core, RAM: 16GB, OS license: Standard, Virtualization: Hyper-V) x3</li><li>- Azure Virtual Machine for MS SQL Server(CPU: 16Core, RAM: 64GB, Purchase model: vCore, Service Tier: Business Critical, SQL Server Backup: No ) x3</li><li>- Azure Storage(HDD: 1TB, Backup/Archive: No) x1</li><li>- Azure Network(Outbound Bandwidth: 1GB) x1</li></ul>

## Screenshot 1

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

### サーバー

オンプレミスのサーバー インフラの詳細を入力します。ワークロードの追加後、ワークロードの種類を選択して残りの詳細を入力します。

Windows Server

ワークロード ⓘ  
Windows/Linux: ▼

Environment ページ ⓘ  
Virtual Machin ▼

オペレーティングシステム ⓘ  
Windows ▼

オペレーティングシステムのライセンス ⓘ  
標準 ▼

VM ⓘ  
10  
(1 - 9999)

仮想化 ⓘ  
Hyper-V ▼

コア ⓘ  
8  
(1 - 32)

RAM (GB) ⓘ  
256  
(1 - 448)

最適化の方法 ⓘ  
CPU ▼

Windows Server 2008/2008 R2

Web App Server

ワークロード ⓘ  
Web App ▼

Environment ページ ⓘ  
Virtual Machin ▼

オペレーティングシステム ⓘ  
Windows ▼

オペレーティングシステムのライセンス ⓘ  
標準 ▼

VM ⓘ  
3  
(1 - 9999)

仮想化 ⓘ  
Hyper-V ▼

コア ⓘ  
8  
(1 - 32)

RAM (GB) ⓘ  
64  
(1 - 448)

最適化の方法 ⓘ  
CPU ▼

自動スケーリング

## Screenshot 2

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

### データベース

オンプレミスのデータベース インフラの詳細を入力します。データベースの追加後、オンプレミスのデータベース インフラの詳細を [ソース] セクションに入力します。[移行先] セクションで、使用する Azure サービスを選択します。

MS SQL Server

移行元

データベース ⓘ  
Microsoft SQL ▼

ライセンス ⓘ  
Enterprise ▼

Environment ページ ⓘ  
Virtual Machin ▼

オペレーティング システム ⓘ  
Windows ▼

オペレーティング システムのライセンス ⓘ  
Datacenter ▼

VM ⓘ  
3  
(1 - 9999)  
仮想化 ⓘ  
Hyper-V ▼

コア ⓘ  
16  
(1 - 32)

RAM (GB) ⓘ  
64  
(1 - 448)

最適化の方法 ⓘ  
CPU ▼

SQL Server 2008/2008 R2

移行先

サービス ⓘ  
SQL Database ▼

購入モデル ⓘ  
vCore ▼

サービス レベル ⓘ  
ビジネス クリ ▼

インスタンス コア ⓘ  
2 ▼

SQL Server のストレージ ⓘ  
5  
GB ▼  
(5 - 4000)

SQL Server のバックアップ ⓘ  
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.

### ストレージ

オンプレミスのストレージ インフラの詳細を入力します。ストレージの追加後、ストレージの種類を選択して残りの詳細を入力します。

Storage

ストレージの種類 ⓘ  
ローカル ディ ▼

ディスクの種類 ⓘ  
HDD ▼

容量 ⓘ  
1  
TB ▼  
(1 - 5000)

Backup ⓘ  
0  
TB ▼  
(0 - 5000)

アーカイブ ⓘ  
0  
TB ▼  
(0 - 5000)

## Screenshot 4

Submit the screenshot for each of the above configurations from Azure TCO.

### ネットワークの種類

オンプレミス環境で現在使用しているネットワーク帯域幅の量を入力します。

アウトバウンド帯域幅 ⓘ

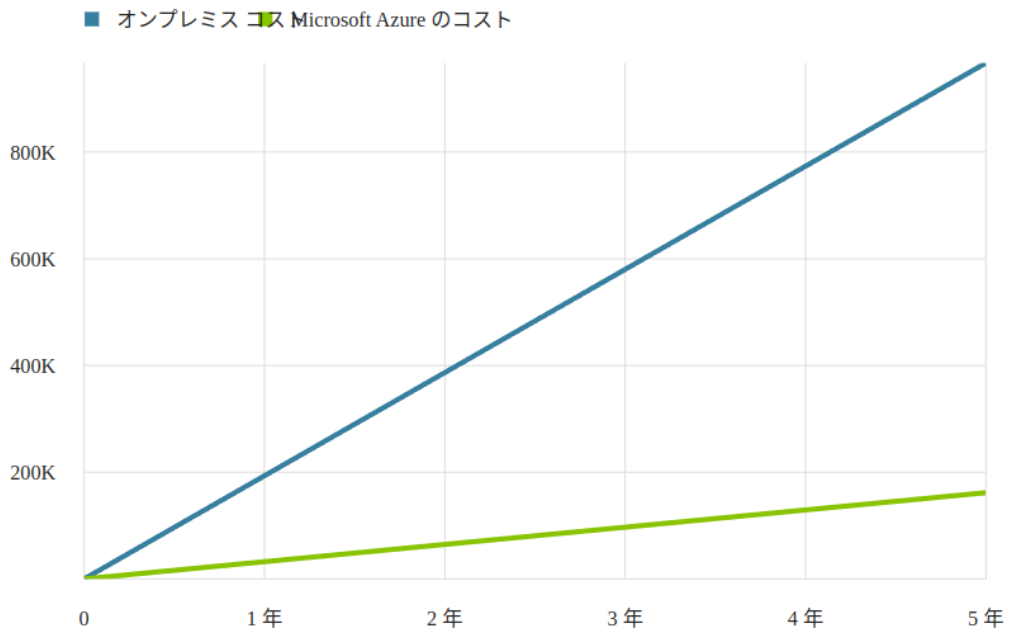
宛先リージョン  
米国東部 ▼

1  
GB ▼  
(1 - 2000000)

Networking configuration screenshot should be submitted here.

### Screenshot 5

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

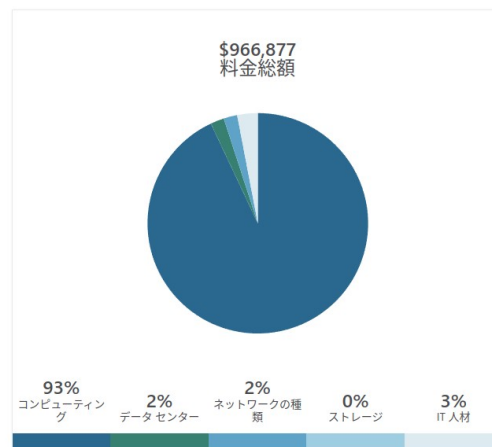


### Screenshot 6

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

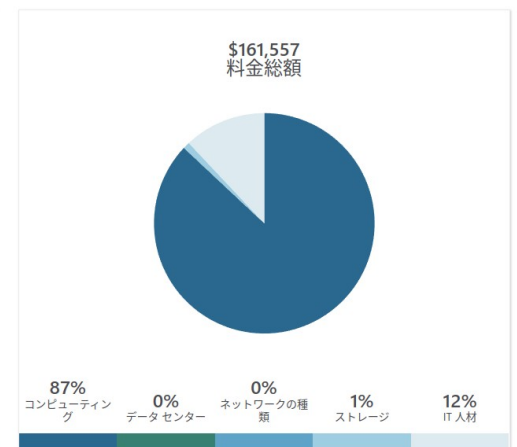
#### 5 年間のオンプレミス コストの合計

オンプレミス環境の総保有コストは、コンピューティング コストとデータ センター コストによって増加しがちです。



#### 5 年間の Azure コストの合計

Azure では、特定のコスト カテゴリが減少するか、完全になくなります。



Screenshot 7

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

\$966,877

5 年間でかかるコスト

\$161,557

5 年間でかかるコスト

オンプレミス コストの内訳概要		Azure コストの内訳概要	
カテゴリ	コスト	カテゴリ	コスト
コンピューティング	\$902,606.95	コンピューティング	\$140,962.80
ハードウェア	\$85,254.00	データ センター	\$0.00
ソフトウェア	\$11,338.75	ネットワークの種類	\$0.00
電力	\$12,891.00	ストレージ	\$1,427.40
仮想化	\$25,459.20	IT 人材	\$19,167.05
データベース	\$767,664.00		
データ センター	\$16,624.85		
ネットワークの種類	\$16,671.25		
ストレージ	\$307.20		
IT 人材	\$30,667.05		
合計	\$966,877.00	合計	\$161,557.00

Explanation 1

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

In the case of on-premise, there are computing costs including hardware, data center costs, network construction costs, storage costs, and IT personnel costs. On the other hand, with Azure, only slightly more expensive computing costs (excluding hardware!), storage costs, and IT personnel costs are incurred. and storage costs, and IT human resource costs. In total, Azure is more cost-effective.

## 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: East US

5 B16ms (16 個のコア、64 GB RAM) x 730 時間 (従...

前払い: \$0.00

月払い: \$2,664.50

East US

リージョン: East US

オペレーティング システム: Windows

タイプ: (OS のみ)

レベル: 標準

カテゴリ: 汎用

インスタンス シリーズ: Bs シリーズ

インスタンス: [適切な VM の検索に関するヘルプが必要ですか?](#)  
B16ms: 16 コア数、64 GB の RAM、128 GB の一時ストレージ, \$0.730...

5

×

730 時間

Virtual Machines

割引のオプション

Azure コストの最適化に役立つ価格モデルをご確認ください。

詳細情報

コンピューティング (B16ms)

☒ 従量課金制

節約プラン ⓘ  
☐ 1 年節約プラン (約 33% の割引)  
☐ 3 年節約プラン (約 55% の割引)

予約インスタンス ⓘ  
☐ 1 年予約 (約 42% の割引)  
☐ 3 年予約 (約 62% の割引)

\$2,430.90  
1 か月あたりの平均  
(\$0.00 の前払い料金)

OS (Windows)

☒ ライセンス込み  
☐ Azure ハイブリッド特典

\$233.60  
1 か月あたりの平均  
(\$0.00 の前払い料金)

\$2,664.50  
1 か月あたりの平均  
(\$0.00 の前払い料金)

Managed Disks

\$0.00

ストレージ トランザクション

\$0.00

帯域幅

\$0.00

前払いコスト

\$0.00

月額料金

\$2,664.50

## 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: West US

5 B16ms (16 個のコア、64 GB RAM) x 730 時間 (従...

前払い: \$0.00

月払い: \$3,131.70

West US

リージョン:

West US

オペレーティング システム:

Windows

タイプ:

(OS のみ)

レベル:

標準

カテゴリ:

汎用

インスタンス シリーズ:

Bs シリーズ

インスタンス: [適切な VM の検索に関するヘルプが必要ですか?](#)

B16ms: 16 コア数、64 GB の RAM、128 GB の一時ストレージ, \$0.858...

5

 × 

730 時間

Virtual Machines

割引のオプション

Azure コストの最適化に役立つ価格モデルをご確認ください。

詳細情報

コンピューティング (B16ms)

☒ 従量課金制

節約プラン ⓘ

☐ 1 年節約プラン (約 21% の割引)

☐ 3 年節約プラン (約 48% の割引)

予約インスタンス ⓘ

☐ 1 年予約 (約 42% の割引)

☐ 3 年予約 (約 62% の割引)

\$2,898.10

1 か月あたりの平均 (\$0.00 の前払い料金)

OS (Windows)

☒ ライセンス込み

☐ Azure ハイブリッド特典

\$233.60

1 か月あたりの平均 (\$0.00 の前払い料金)

=

\$3,131.70

1 か月あたりの平均 (\$0.00 の前払い料金)

Managed Disks

\$0.00

ストレージ トランザクション

\$0.00

帯域幅

\$0.00

前払いコスト

\$0.00

月額料金

\$3,131.70

### Screenshot 3

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

Virtual Machines: East US	5 B16ms (16 個のコア、64 GB RAM) x 730 時間 (従...	前払い: \$0.00	月払い: \$2,664.50
Virtual Machines: West US	5 B16ms (16 個のコア、64 GB RAM) x 730 時間 (従...	前払い: \$0.00	月払い: \$3,131.70
サポート			
サポート:			
無償			\$0.00
プログラムおよびオファーを選択			
ライセンス プログラム:			
Microsoft Customer Agreement (MCA)		ログインして、Azure 契約の価格を確認します。	
<input type="checkbox"/> 開発/テスト価格を表示			
前払いコストの見積もり			\$0.00
月額料金の見積もり			\$5,796.20

### Explanation 1

Explain how resilience is built in by moving to Azure

Moving to Azure can enhance resilience in multiple ways.

Firstly, Azure offers high availability features such as availability sets and availability zones, which distribute resources across fault domains to ensure continuous operation even in the face of hardware or software failures.

Secondly, Azure provides disaster recovery options like Azure Site Recovery and Azure Backup, enabling replication of applications and data to a secondary Azure region for failover in case of primary site failure.

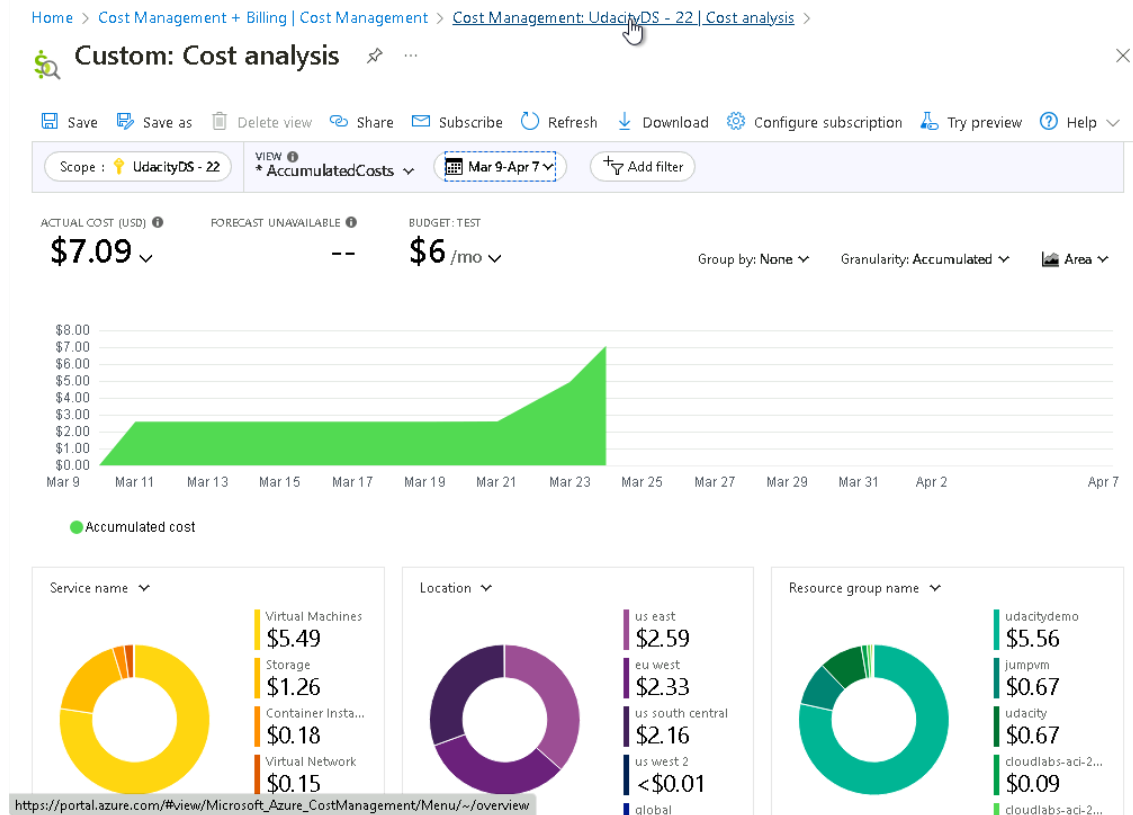
Lastly, Azure's scalability features, such as Virtual Machine Scale Sets and App Service, allow for automatic scaling of resources based on demand, ensuring that applications can handle increased traffic or workload without performance degradation.

## STEP 3: Azure Cost Management + Billing

<b>Background</b>	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.
<b>Question 1</b>  Submit the explanation	What is the purpose of Azure Cost Mgmt + billing Dashboard?
<b>Explanation 1</b>	The purpose of the Azure Cost Management + Billing Dashboard is to provide insights and control over the costs associated with your Azure resources. It allows you to monitor and analyze your usage and spending patterns, helping you optimize costs and stay within budget.

## Screenshot 2

Submit the screenshot for main Cost Mgmt + Billing Dashboard.

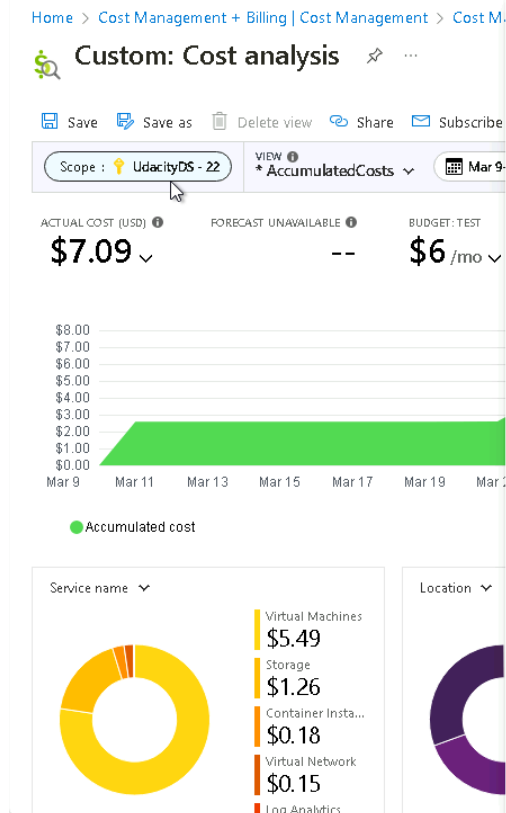


## Explanation 2

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

Key components:

- Actual cost (USD): This component displays the actual cost incurred in USD for the selected time period.
- FORECAST UNAVAILABLE: This component indicates that the forecast for future costs is currently unavailable.
- BUDGE: The budget component allows you to set a specific spending limit or budget for your Azure resources and services.
- Area chart: This component shows the accumulated cost of all resources in last 30 days.
- Pie chart: This component shows the accumulated cost per service type, location, and resource group.



## Select scope

Cost Management and Billing

Scopes are levels in the resource hierarchy where you manage and control access to one or more resources. Select a scope to see a filtered roll-up of all resources, products, and services. [Learn more](#)

Udacity - DS (udacityhol.onmicrosoft.com)

Current directory - [Switch directories](#)

Search to filter items...

Root management group

☒ Only show subscriptions selected in the global filter. [Change filter](#)

Select

Cancel

With the “Scope” dropdown, we can choose the level of hierarchy for our report.

Home > Cost Management + Billing | Cost Management > Cost Management: UdacityDS - 22 | Cost analysis >



## Custom: Cost analysis



Save Save as Delete view Share Subscribe Refresh Download Configure subscription Try preview Help

Scope: UdacityDS - 22

VIEW  
\* AccumulatedCosts

Mar 9-Apr 7

Add filter

ACTUAL COST (USD)

\$7.09

FORECAST UNAVAILABLE

--

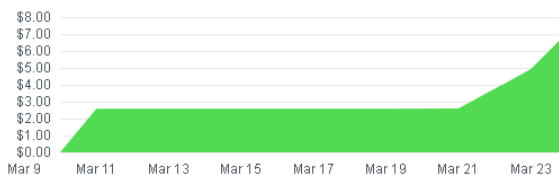
BUDGET: TEST

\$6 /mo

Group by: None

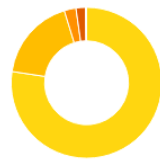
Granularity: Accumulated

Area



- Area
- Line
- Column (stacked)
- Column (grouped)
- Table

Service name



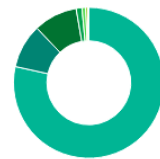
Virtual Machines  
\$5.49  
Storage  
\$1.26  
Container Insta...  
\$0.18  
Virtual Network  
\$0.15  
Log Analytics

Location



us east  
\$2.59  
eu west  
\$2.33  
us south central  
\$2.16  
us west 2  
<\$0.01  
global

Resource group name



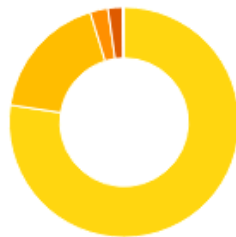
udacitydemo  
\$5.56  
jumpvm  
\$0.67  
udacity  
\$0.67  
cloudlabs-aci-2...  
\$0.09  
cloudlabs-aci-2...

With the "Area" dropdown we can change the style of the top graph.

### Screenshot 3

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

Service name



Virtual Machines  
\$5.49  
Storage  
\$1.26  
Container Insta...  
\$0.18  
Virtual Network  
\$0.15  
Log Analytics  
\$0.01

Location



us east  
\$2.59  
eu west  
\$2.33  
us south central  
\$2.16  
us west 2  
<\$0.01  
global  
<\$0.01

### Explanation 3

Explain the key

The pie charts on the left and right provide insights into the cost distribution based on resource type and region, respectively. The left pie chart reveals that virtual machines account for the majority of our expenses, indicating



components of the screenshot submitted.	that they are the most costly resource type we are utilizing. On the other hand, the right pie chart highlights that our highest expenses are associated with resources located in the us east region.
<b>Screenshot 4</b>  Submit the screenshot for breakdown of costs by Service Name and Location.	Same as Screenshot 3
<b>Explanation 4</b>  Explain the key components of the screenshot submitted.	Same as Explanation 3
<b>Screenshot 5</b>  Submit the screenshot for breakdown of costs by Service Name and Location	Same as Screenshot 3
<b>Explanation 5</b>  Explain the key components	Same as Explanation 3

of the screenshot submitted.	
<b>Screenshot 6</b>  Submit the screenshot for breakdown of costs by Service Name and Location.	Same as Screenshot 3
<b>Explanation 6</b>  Explain the key components of the screenshot submitted.	Same as Explanation 3
<b>Explanation 7</b>  Explain the summarized highlights of this part of the project, Azure Cost Mgmt + Billing	<p>Azure Cost Management + Billing is a comprehensive tool provided by Azure to help users evaluate and manage their costs effectively. It serves as a one-stop location for users to monitor and analyze their cloud costs.</p> <p>The main purpose of Azure Cost Management + Billing is to provide transparency and visibility into the costs associated with Azure resources. It allows users to track and analyze their spending patterns, identify cost-saving opportunities, and optimize resource allocation.</p> <p>By using Azure Cost Management + Billing, users can:</p> <p>Monitor Costs: The dashboard provides a consolidated view of cost-related information, including cost breakdown by resource, service, and subscription. It helps users understand how their spending is distributed and identify areas where costs can be optimized.</p>

**Budgeting and Forecasting:** Users can set up budgets and receive alerts when their spending exceeds the defined thresholds. This feature helps users stay within their budget and avoid unexpected cost overruns.

**Cost Analysis:** Azure Cost Management + Billing offers powerful analytics capabilities to analyze cost trends over time. Users can generate reports, visualize cost data, and gain insights into cost drivers. This information enables users to make informed decisions and optimize their resource usage.

**Cost Optimization Recommendations:** The tool provides recommendations for cost optimization based on usage patterns and historical data. Users can leverage these recommendations to identify opportunities for cost savings and implement necessary changes.

**Resource Tagging:** Azure Cost Management + Billing supports resource tagging, which allows users to categorize and organize their resources. This feature helps in cost allocation, tracking, and reporting.

Overall, Azure Cost Management + Billing is a valuable tool for managing and optimizing costs in Azure. It provides users with the necessary insights and controls to effectively monitor, analyze, and optimize their cloud spending.

## STEP 4: Azure Policy to create and enforce policies

<b>Background</b>	<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>
<b>Screenshots 1 through 5</b>  Submit the screenshots for Azure Policy steps.	<p><b>Hint:</b> 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><b><u>Very important note:</u></b></p> <ol style="list-style-type: none"><li>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</li><li>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</li></ol> <p><b>Step 1:</b></p>

# Allowed virtual machine size SKUs

Policy definition

 Assign policy  Edit definition  Duplicate definition  Delete definition

^ Essentials

Name	Definition location
Allowed virtual machine size SKUs	--
Description	Definition ID
This policy enables you to specify a set of virtual machine size SKUs th...	/providers/Microsoft.Authorization/policyDefinitions/cccc23c7-8427-4f5...
Available Effects	Type
Deny	Built-in
Category	Mode
Compute	Indexed

**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 yo
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": {
```

## Step 2:

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

### Allowed virtual machine size SKUs ...

Assign policy

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

#### Scope

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



Launch scope selector

#### 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

Policy enforcement ⓘ

Review + create

Cancel

Previous

Next

### Step 3

[Home](#) >

## Allowed virtual machine size SKUs

Assign policy

**Basics** Advanced Parameters Remediation Non-compliance

#### Scope

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

#### 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

Policy enforcement ⓘ

[Review + create](#)

[Cancel](#)

[Previous](#)

[Next](#)

[Select](#)

[Cancel](#)

[Clear All Selections](#)

### Scope

×

Subscription

UdacityDS - 22

Resource Group

Udacity-20240407

## Step 4:

[Home](#) >

### Allowed virtual machine size SKUs ...

Assign policy



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

Search by para...

☒ Only show parameters that need input or review

Allowed Size SKUs \* ⓘ

5 selected

☒ Select all

☒ Basic\_A0

☐ Basic\_A1

☐ Basic\_A2

☒ Basic\_A3

☐ Basic\_A4

☒ Standard\_A0

☐ Standard\_A1

☒ Standard\_A1\_v2

☒ Standard\_A2

☐ Standard\_A2\_v2

Review + create

Cancel

Previous

Next



Step 5:

[Home](#) >

Allowed virtual machine size SKUs ...

Assign policy


Basics   Advanced   Parameters   Remediation   Non-compliance messages   Review + create

Basics


Scope	UdacityDS - 22/Udacity-20240407
Exclusions	--
Policy definition	Allowed virtual machine size SKUs
Assignment name	Allowed virtual machine size SKUs
Description	--
Policy enforcement	Enabled
Assigned by	ODL_User 257135

Advanced

Resource selectors (preview)

 No selectors associated with this assignment.

Overrides (preview)

 No overrides associated with this assignment.

Parameters

listOfAllowedSKUs   basic\_a0,basic\_a3,standard\_a0,standard\_a1\_v2,stand...

[Create](#)   [Cancel](#)   [Previous](#)   [Next](#)

Create

## Screenshot 6

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

Home > Create a virtual machine

You can now select multiple zones. Selecting multiple zones will create one VM per zone. [Learn more](#)

Security type ☐ Trusted launch virtual machines [Configure security features](#)

Image \* ☐ Ubuntu Server 20.04 LTS - x64 Gen2 [See all images](#) | [Configure VM generation](#)

VM architecture ☐ Arm64 ☒ x64

Run with Azure Spot discount ☐

Size \*  [See all sizes](#)

**Item(s) availability based on policy assignment(s) for the selected scope.**  
Allowed virtual machine size SKUs ([Policy details](#))  
arch798-257195-PolicyDefinition ([Policy details](#))  
udacitydedicatedsubscriptionGroup1/Microsoft.Authorization/891f056473974f7289c7b312 ([Policy details](#))

**The value must not be empty.**

Enable Hibernation (preview) ☐

**Hibernate does not currently support Trusted launch and Confidential virtual machines for Linux images. [Learn more](#)**

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

## Explanation 1

Explain the summarized highlights of this part of the project, Azure Policy.

Azure Policy is a powerful tool that allows administrators to set controls on how infrastructure is created in Azure. It helps ensure compliance and governance by enforcing rules and regulations. By using Azure Policy, you can define and enforce specific requirements for resources, such as virtual machines, storage accounts, and more.

The purpose of Azure Policy is to provide centralized control over cost management and resource deployment. It helps organizations maintain consistency and security by enforcing specific policies across their Azure environment. With Azure Policy, you can prevent the creation of resources that don't comply with your organization's standards, ensuring that only approved resources are deployed.

By setting up Azure Policy, administrators can effectively manage costs by controlling resource usage and preventing unnecessary spending. It allows you to define policies related to cost optimization, such as limiting the size or type of virtual machines that can be deployed. This helps ensure that

	<p>resources are provisioned efficiently and cost-effectively.</p> <p>Overall, Azure Policy is a crucial component of cost optimization and governance in Azure. It provides administrators with the ability to set appropriate controls on resource creation, ensuring cost management and compliance with organizational standards.</p>
--	---


## STEP 5: Azure Dashboards

<b>Background</b>	<p>Azure Dashboards are a one stop shop to monitor</p> <ul style="list-style-type: none"> <li>● Your logs</li> <li>● Your infrastructure</li> <li>● Your applications</li> </ul>
<b>Task 1</b>	<p>You need to create an Azure dashboard that will pull in a few widgets: Percentage CPU, All Resources, Resource Groups &amp; 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:

**My Dashboard (2)**   
Private dashboard

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

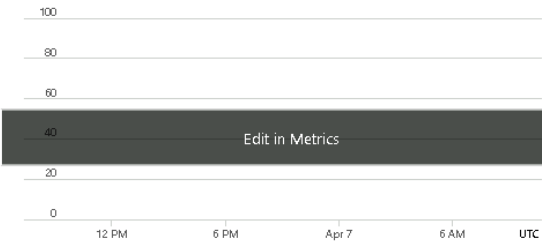
Auto refresh : **Off** UTC Time : **Past 24 hours** [+ Add filter](#) Last updated: 3 minutes ago

**All resources**  
All subscriptions [Refresh](#)

	<a href="#">c257135nelagp3eb3kke</a>	Container instances
	<a href="#">default-NSG</a>	Network security group
	<a href="#">JumpVM-257135</a>	Virtual machine
	<a href="#">JumpVM-257135-osdisk</a>	Disk
	<a href="#">jumpvm-nic</a>	Network Interface

[See more...](#)

**Metrics chart**








100  
80  
60  
40  
20  
0

12 PM 6 PM Apr 7 6 AM UTC

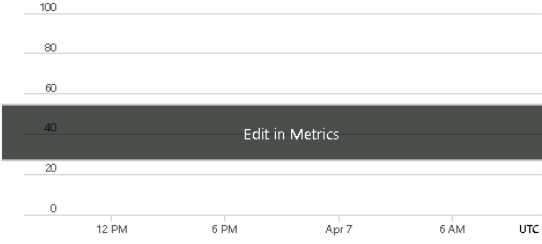
Edit in Metrics

**Resource groups**  
All subscriptions [Refresh](#)

	<a href="#">Udacity-20240407</a>	East US
	<a href="#">Cloudlabs-ACI-257135-JumpVM-257135...</a>	South Central US
	<a href="#">Udacity</a>	South Central US
	<a href="#">JumpVM</a>	South Central US
	<a href="#">NetworkWatcherRG</a>	South Central US

[See more...](#)

**Metrics chart**



100  
80  
60  
40  
20  
0

12 PM 6 PM Apr 7 6 AM UTC

Edit in Metrics

Step 2:

Dashboard >

Metrics

Azure Monitoring

+ New chart

Refresh

Chart Title

Add metric

Scope

VM-20240407

100

90

80

70

60

50

40

30

20

10

0

12 PM

Select a scope

Browse

Recent

Resource types

All resource types

Locations

All locations

Search to filter items...

Scope	Resource type	Location
<input type="checkbox"/> UdacityDS - 22	Subscription	-
<input type="checkbox"/> Udacity-20240407	Resource group	-
<input type="checkbox"/> loganalytics	Log Analytics workspace	East US
<input checked="" type="checkbox"/> VM-20240407	Virtual machine	East US
<input type="checkbox"/> VM-20240407-ip	Public IP address	East US
<input type="checkbox"/> vm-20240407749_z1	Network interface	East US
<input type="checkbox"/> VM-20240407_OsDisk_1_5524d11a8ad94e539827...	Disk	East US

Why can't I select multiple resources?

You must select items of the same resource type and location. To select resources of a different resource type or location, please first uncheck your current selection.

Selected scopes

1 virtual machine

VM-20240407

Virtual machine

East US

Apply

Cancel

Clear all selections



+ New chart Refresh Share Feedback

UTC Time: Last 24 hours (Automatic - 15 minutes)

Avg CPU Credits Consumed for VM-20240407

Add metric Add filter Apply splitting Line chart Drill into Logs New alert rule Save to dashboard

You have unsaved changes to the chart. You can save the chart back to dashboard or pin it as a new chart to the dashboard.

Scope	Metric Namespace	Metric	Aggregation
VM-20240407	Virtual Machine Host	CPU Credits Consumed	Avg



CPU Credits Consumed (Avg)  
VM-20240407

0

### Step 3 (Final Output):

#### My Dashboard (2) ▾

Private dashboard



Create



Upload



Refresh



Full screen



Edit



Share



Export ▾



Clone



Assign tags



Delete



Auto refresh : **Off**

UTC Time : **Past 24 hours**

Add filter

Last updated: 48 minutes ago

#### All resources

All subscriptions

Refresh



c257135nelagp3eb3kke

Container instances



default-NSG

Network security group



JumpVM-257135

Virtual machine



JumpVM-257135-osdisk

Disk



jumpvm-nic

Network Interface

[See more...](#)

#### Resource groups

All subscriptions

Refresh



Udacity-20240407

East US



Cloudlabs-ACI-257135-JumpVM-257135-...

South Central US



Udacity

South Central US



JumpVM

South Central US

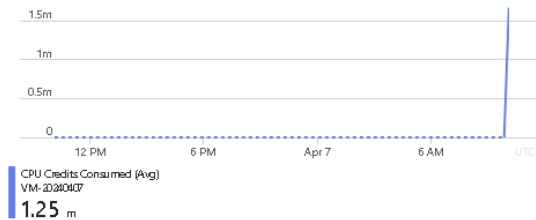


NetworkWatcherRG

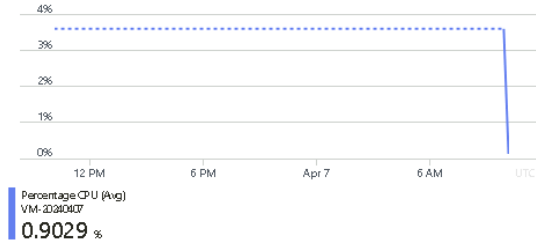
South Central US

[See more...](#)

#### Avg CPU Credits Consumed for VM-20240407



#### Avg Percentage CPU for VM-20240407



## STEP 6: Azure Monitor – Metrics

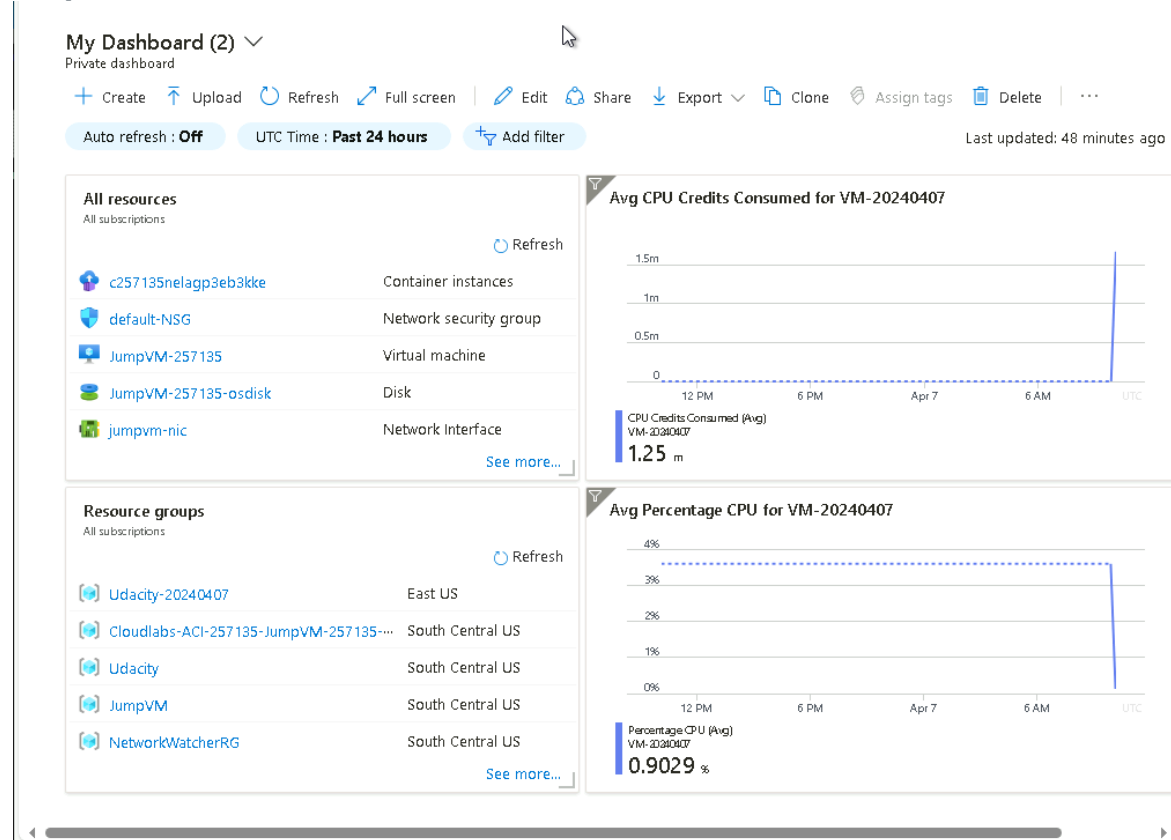
### Task 1

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:





## 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.

Dashboard > Metrics >

### 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 \*

Percentage CPU

[See all signals](#)

#### Alert logic

Threshold

☒ Static ☐ Dynamic

Aggregation type

Average

Operator

Greater than

Threshold value \*

0.3

Please match the numeric format

#### When to evaluate

Check every

5 minutes

Lookback period

5 minutes

Review + create

Previous

Next: Actions >

Dashboard > Metrics >

### Create an alert rule

Check every

5 minutes

Lookback period

5 minutes

#### Preview

\$0.10 USD/month

Whenever the average Percentage CPU is greater than 0.3%

Time range : Over the last 6 hours

Time series : Aggregate



+ Add condition

Review + create

Previous

Next: Actions >

## 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

0.10 USD/month

[Pricing](#)

### Scope

Resource

UdacityDS - 22 > Udacity-20240407 > VM-20240407

### Condition

Signal name

Percentage CPU

Operator

Greater than

Aggregation type

Average

Threshold value

0.3

Lookback period

5 minutes

Check every

5 minutes

### Details

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:

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

### Create Log Analytics workspace ...

**Basics** Tags Review + Create

**i** 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 \* ⓘ

Resource group \* ⓘ  [Create new](#)

#### Instance details

Name \* ⓘ  ✓

Region \* ⓘ

**Review + Create**

« Previous

Next : Tags >

Review + Create

Step 2:


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

Create Log Analytics workspace ...



✔ Validation passed

Basics   Tags   Review + Create

 **Log Analytics workspace**  
by Microsoft

Basics

Subscription	UdacityDS - 22
Resource group	Udacity-20240407
Name	loganalytics
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. [Learn more](#) about Log Analytics pricing models.

Tags

None

Create


« Previous

[Download a template for automation](#)

Create

Step 3:

[Home](#) >



### Microsoft.LogAnalyticsOMS | Overview

Deployment

Delete

Cancel

Redeploy

Download

Overview

Inputs

Outputs

Template

✓ Deployment succeeded

Deployment 'Microsoft.LogAnalyticsOMS' to resource group 'Udacity-20240407' was successful.

Go to resource

Pin to dashboard

✓ Your deployment is complete

Deployment name : Microsoft.LogAnalyticsOMS

Subscription : UdacityDS - 22

Resource group : Udacity-20240407

Start time : 4/7/2024, 9:43:33 AM

Correlation ID : 452b6702-d111-4b7e-b2ba-9fb0943d167b


> Deployment details

< Next steps

Go to resource

Give feedback

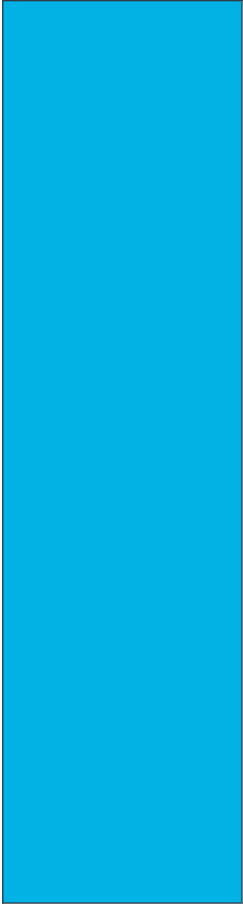
[Tell us about your experience with deployment](#)



Cost management

Get notified to stay within your budget and prevent unexpected charges on your bill.

[Set up cost alerts >](#)



**Step 4:**

 Delete

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Logs

Settings

Tables

Agents

Usage and estimated costs

Data export

Network isolation

Linked storage accounts


Properties

Locks

Classic

Legacy agents management

Legacy activity log connector

 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](#)

Essentials

[JSON View](#)Resource group [\(move\)](#)  
[udacity-20240407](#)Status  
ActiveLocation  
East USSubscription [\(move\)](#)  
[UdacityDS - 22](#)Subscription ID  
935af078-1669-488b-ae1c-5792c0fdb75dTags [\(edit\)](#)  
[Add tags](#)Workspace Name  
loganalyticsWorkspace ID  
b4e05647-824d-45e5-abfb-7d3eb3794112Pricing tier  
Pay-as-you-goAccess control mode  
Use resource or workspace permissions

Operational issues

[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**2** Configure monitoring solutions

## STEP 8: Azure Insights

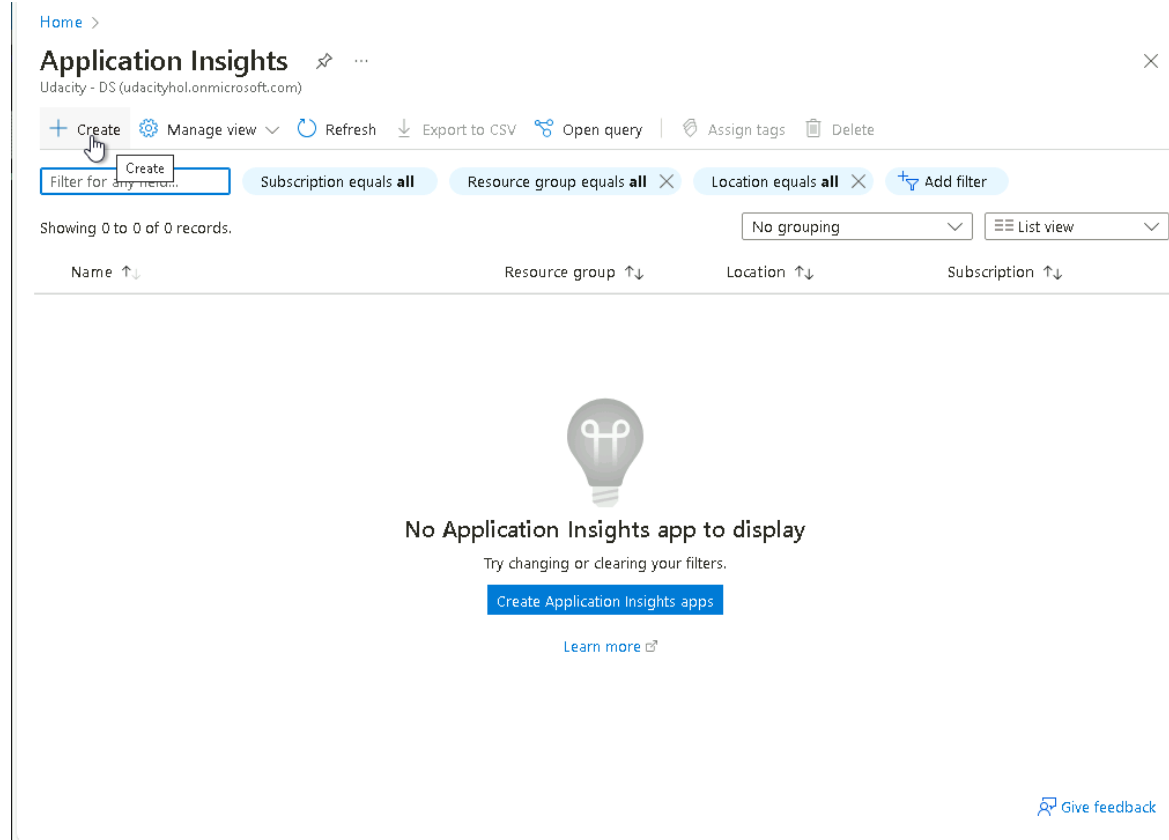
### Background

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

### Screenshots 1 through 6

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

#### Step 1:



The screenshot shows the Azure Application Insights interface. At the top, there's a breadcrumb "Home >". The main heading is "Application Insights" with a star icon and a menu icon. Below it, the text "Udacity - DS (udacityhol.onmicrosoft.com)" is visible. A toolbar contains buttons: "+ Create" (highlighted with a red box and a red arrow), "Manage view" (with a gear icon), "Refresh" (with a circular arrow icon), "Export to CSV" (with a download icon), "Open query" (with a link icon), "Assign tags" (with a tag icon), and "Delete" (with a trash icon). Below the toolbar, there's a filter bar with "Filter for any metric..." (highlighted with a red box), "Subscription equals all", "Resource group equals all" (with a close icon), "Location equals all" (with a close icon), and "Add filter" (with a plus icon). The status bar shows "Showing 0 to 0 of 0 records." and two dropdowns: "No grouping" and "List view". Below the status bar, there are four column headers: "Name" (with up/down arrows), "Resource group" (with up/down arrows), "Location" (with up/down arrows), and "Subscription" (with up/down arrows). The main content area is empty, displaying a lightbulb icon and the text "No Application Insights app to display". Below this, it says "Try changing or clearing your filters." and there's a blue button "Create Application Insights apps". At the bottom right, there's a link "Learn more" with an external link icon. In the bottom right corner of the interface, there's a "Give feedback" link with a speech bubble icon.



## Step 2:

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

### Application Insights

Monitor web app performance and usage

**Basics** Tags Review + create

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 - 22
Resource Group *	Udacity-20240407

[Create new](#)

#### INSTANCE DETAILS

Name *	VM-insights
Region *	(US) East US

#### WORKSPACE DETAILS

Subscription *	UdacityDS - 22
Log Analytics Workspace *	(new) DefaultWorkspace-935af078-1669-488b-ae1c-5792c0fdb75d-EUS [...]

Review + create

« Previous

Next : Tags >

Review + create

Step 3:

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

# Application Insights

Monitor web app performance and usage



✔ Validation passed

Basics   Tags   Review + create

SUMMARY



**Application Insights**  
by Microsoft

Subscription	UdacityDS - 22
Resource Group	Udacity-20240407
Name	VM-insights
Region	East US
Workspace	DefaultWorkspace-935af078-1669-488b-ae1c-5792c0fdb75d-EUS [eastus]

Create  
Create

« Previous

[Download a template for automation](#)

## Step 4: Click "Go to resource"

Home >

### Microsoft.AppInsights | Overview

Deployment

Search

Delete Cancel Redeploy Download Refresh

- Overview
- Inputs
- Outputs
- Template

✓ Your deployment is complete

Deployment name : Microsoft.AppInsights  
Subscription : [UdacityDS - 22](#)  
Resource group : [Udacity-20240407](#)  
Start time : 4/7/2024, 10:20:31 AM  
Correlation ID : 36c0c412-05ab-442e-a338-c137eed70b7


> 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 >](#)

## Screenshots 7 through 12

You will  
submit  
screenshots  
of you  
enabling the  
VM.

### Step 7:

Home > Virtual machines >

**VM-20240407** Virtual machine

Search

Connect Start Restart Stop Hibernate (preview) Capture Delete

Run command

Updates

Health monitoring

Configuration management

Policies

Inventory

Change tracking

Monitoring

Insights

Alerts

Metrics

Diagnostic settings

Logs

Workbooks

Automation

Tasks (preview)

Export template

Essentials

Resource group [\(move\)](#)  
[Udacity-20240407](#)

Status  
Running

Location  
East US (Zone 1)

Subscription [\(move\)](#)  
[UdacityDS - 22](#)

Subscription ID  
935af078-1669-488b-ae1c-5792c0fdb75d

Availability zone  
1

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

Operating system  
Linux (ubuntu 20.04)

Size  
Standard B4ms (4 vcpus, 16 GiB memory)

Public IP address  
[172.174.254.143](#)

Virtual network/subnet  
[VM-20240407-vnet/default](#)

DNS name  
[Not configured](#)

Health state  
-

[JSON View](#)

Properties Monitoring Capabilities (7) Recommendations Tutorials

**Virtual machine**

Computer name  
VM-20240407

Operating system  
Linux (ubuntu 20.04)

Image publisher  
canonical

<https://portal.azure.com/#@udacityhol.onmicrosoft.com/re...>

Step 8:

Home > Virtual machines > VM-20240407

VM-20240407 | Insights

Virtual machine

Search

Resource Group Monitoring Azure Monitor Diagnose and solve problems Refresh

Run command

Updates

Health monitoring

Configuration management

Policies

Inventory

Change tracking

Monitoring

Insights

Alerts

Metrics

Diagnostic settings

Logs

Workbooks

Automation


Tasks (preview)

Export template

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.



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](#).

Enable

Having difficulties enabling Azure Monitors for VM? [Troubleshoot](#)

<https://aka.ms/vminsights/ui/links/mapOverview>

Step 9:

Home > Virtual machines

VM-20240

Virtual machine

Search

Run command

Updates

Health monitoring

Configuration manager

Policies

Inventory

Change tracking

Monitoring

Insights

Alerts

Metrics

Diagnostic settings

Logs

Workbooks

Automation

Tasks (preview)

Export template

Help

Monitoring configuration

VM Insights now supports data collection using the Azure Monitor Agent and data collection rules.

Subscription \*

UdacityDS - 22

Data collection rule ⓘ

(new) MSVMI-DefaultWorkspace-935af078-1669-488b-ae1c-5792c0fdb75...

Create New

MSVMI-DefaultWorkspace-935af078-1669-488b-ae1c-5792c0fdb75d-EUS

Guest performance

Enabled

Processes and dependencies (Map)

Disabled

Log Analytics workspace

DefaultWorkspace-935af078-1669-488b-ae1c-5792c0fdb75d-EUS

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 10:

Home > Virtual machines > VM-20240407

### VM-20240407 | Insights

Virtual machine

Search

Resource Group Monitoring Azure Monitor Diagnose and solve problems Refresh

Restore point

Operations

- Auto-shutdown
- Run command
- Updates
- Health monitoring
- Configuration management
- Policies
- Inventory
- Change tracking


Monitoring

- Insights
- Alerts
- Metrics
- Diagnostic settings
- Logs
- Workbooks

#### 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.

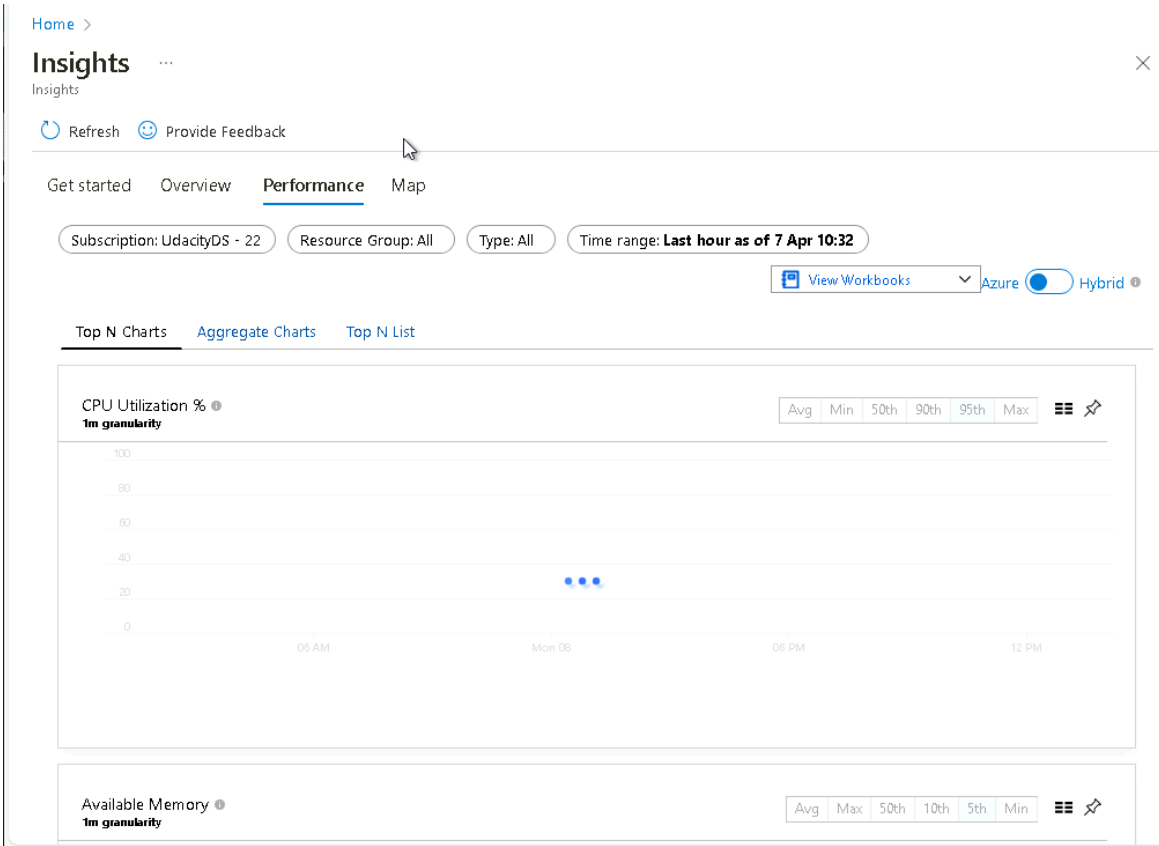


The map data set collected with Azure Monitor for VMs is intended to be infrastructure data about the resources being deployed and monitored. For details on data collected please [click here](#).

Enable

https://portal.azure.com/#@udacityhol.onmicrosoft.com/resource/subscriptions/935af078-1669-488b-ae1c-5792c0fdb75d/resourceGroups/Udacity-20240407/providers/Microsoft.Co...

Step 11:







# 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:

Home > Monitor

**Monitor | Alerts** Microsoft

Search

View as timeline (preview) | + Create | Alert rules | Action groups

Overview

Activity log

Alerts

Metrics

Logs

Change Analysis

Service health

Workbooks

Insights

Applications

Virtual Machines

Storage accounts

Containers

Networks

SQL (preview)

Azure Cosmos DB

Key Vaults

Azure Cache for Redis

New: View alerts visualized on a timeline (preview)

Alert rule

Action group

Alert rule

Alert processing rule

Search

Add filter

More (4)

Total alerts: 1 Critical: 0 Error: 0 Warning: 0 Informational: 1 Verbose: 0

No grouping

Name	Severity	Affected resource	Alert condition	User response
CPU overload	3 - Informational	vm-20240407	Fired	New

Showing 1 - 1 of 1 results.

Give feedback

Step 2:

Home > Monitor | Alerts

Create an alert rule

Scope

Condition

Create an alert rule to monitor

+ Select scope

Resource

No resource selected yet

Select a resource

Browse

Recent

Resource types

Locations

All resource types

All locations

Search to filter items...

Resource	Resource type	Location
<input type="checkbox"/> Udacity-20240407	Resource group	-
<input type="checkbox"/> Application Insights Smart Detection	Action group	Global
<input type="checkbox"/> CPU overload	Metric alert rule	Global
<input type="checkbox"/> Failure Anomalies - VM-insights	Smart alert rule	Global
<input type="checkbox"/> loganalytics	Log Analytics workspace	East US
<input checked="" type="checkbox"/> VM-20240407	Virtual machine	East US
<input type="checkbox"/> VM-20240407-ip	Public IP address	East US
<input type="checkbox"/> VM-20240407-nsg	Network security group	East US
<input type="checkbox"/> VM-20240407-vnet	Virtual network	East US
<input type="checkbox"/> vm-20240407749_z1	Network interface	East US

Selected resources

1 virtual machine

VM-20240407

Virtual machine

East US

Review + create

Apply

Cancel

Clear all selections

Step 3:

Home > Monitor | Alerts

Create an alert

Scope

Condition

Configure when the alert is triggered

Signal name \* ⓘ

Select a signal

Cpu

Signal type : All

Signal source : All

Signal name	Signal source
Log search	
Log Analytics (example query)	Log Analytics (example query)
Total number of credits consumed by the Virtual Machine. Only available on B-series burstable VMs	
CPU Credits Consumed	Platform metrics
CPU Credits Remaining	Platform metrics
Percentage CPU	Platform metrics

Review + create

Apply

Cancel

## Step 4:

[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 \* ⓘ

 CPU Credits Consumed ▼

[See all signals](#)

#### Alert logic

Threshold ⓘ

☒ Static ☐ Dynamic

Aggregation type ⓘ

Average ▼

Operator ⓘ

Greater than ▼

Unit ⓘ

Count ▼

Threshold value \* ⓘ

0.3 ✓

#### When to evaluate

Check every ⓘ

1 minute ▼

Lookback period ⓘ

5 minutes ▼

[Review + create](#)

[Previous](#)

[Next: Actions >](#)

Step 5:

[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 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

Action groups

Action group name	Contains actions	
<a href="#">Application Insights Smart Detection</a>	2 Email Azure Resource Manager Roles	<a href="#">X</a>

[Manage action groups](#)

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

Step 6 (Summary after above steps):

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

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

0.10 USD/month

[Pricing](#)

Scope

Resource

📌

UdacityDS - 22 > 

🔗

Udacity-20240407 > 

🖥️

VM-20240407

Condition

Signal name

Operator

Aggregation type

Threshold value

Lookback period

Check every

CPU Credits Consumed

Greater than

Average

0.3

5 minutes

1 minute

Actions

Create

Previous

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

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

Explanation 1

Explain the

Azure Dashboards, Azure Monitor, and alerts are important tools in Azure that help monitor and manage your resources effectively. Let's break down each of these tools and understand their purpose:

purpose of  
Azure  
Dashboards,  
Azure Monitor  
and alerts

**Azure Dashboards:** Azure Dashboards allow you to create customized dashboards to monitor and visualize the performance and health of your Azure resources in a single view. You can add various widgets to the dashboard, such as charts, graphs, and metrics, to track the important metrics and key performance indicators (KPIs) of your resources. With Azure Dashboards, you can have a centralized view of your resources' status, which helps in monitoring and troubleshooting.

**Azure Monitor:** Azure Monitor is a comprehensive monitoring solution that provides insights into the performance and availability of your applications and resources in Azure. It collects data from various sources, such as Azure resources, operating systems, and custom applications, and provides a unified view of the health and performance of your entire environment. Azure Monitor helps you identify and diagnose issues, optimize resource utilization, and ensure the overall reliability of your applications.

**Alerts:** Azure Monitor Alerts allow you to set up proactive notifications based on specific conditions or thresholds. You can define alert rules to monitor metrics, logs, or events and trigger actions when the conditions are met. For example, you can set up an alert to notify you when the CPU usage of a virtual machine exceeds a certain threshold. Alerts can be configured to send notifications via email, SMS, or even trigger automated actions like running a script or scaling resources. By using alerts, you can stay informed about critical events and take timely actions to resolve issues.

In summary, Azure Dashboards provide a centralized view of your resources, Azure Monitor helps monitor and diagnose the performance of your applications and resources, and alerts enable proactive notifications and actions based on specific conditions. These tools work together to ensure effective monitoring, troubleshooting, and optimization of your Azure environment.



## 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 Monitor Autoscale settings page. The left sidebar contains a search bar and a list of navigation options: Log Analytics workspaces, Azure Stack HCI, Service Bus (preview), Insights Hub, Managed Services, Managed Prometheus, Azure Managed Grafana, Azure Monitor SCOM managed instance, Settings (Diagnostic settings, Data Collection Rules, Data Collection Endpoints, Autoscale, Private Link Scopes), and Support + Troubleshooting (Advisor recommendations, New support request). The main content area is titled 'Monitor | Autoscale' and includes a search bar, a refresh button, and a table of autoscale rules. The table has columns for Name, Resource type, Resource group, Location, and Instance count. One rule is listed: 'UdacityDem...' with Resource type 'Virtual machine scal...', Resource group 'UdacityDemo', Location 'South Central US', and Instance count '2'.

Name	Resource type	Resource group	Location	Instance count
UdacityDem...	Virtual machine scal...	UdacityDemo	South Central US	2

## 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-257135 (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

#### Manual scale

Override condition

Instance count ⓘ 2

## Autoscale setting ...

UdacityDemo-257135 (Virtual machine scale set)

[Save](#) [Discard](#) [Refresh](#) [Logs](#) [Feedback](#)

Autoscale setting name \* UdacityDemo-257135-Autoscale-808

Resource group Udacity-20240407

Predictive autoscale

Mode Disabled

Pre-launch setup of instances (minutes)

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

Default\* Auto created default scale condition

Delete warning

**i** 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 \* 

2

Maximum \* 

2

Default \* 

2

Schedule

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

[+ Add a scale condition](#)<https://portal.azure.com/#>

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

Home > Monitor | Autoscale >

### Autoscale setting

UdacityDemo-257135 (Virtual machine scale set)

Save Discard Refresh Logs Feedback

Autoscale setting name \* UdacityDemo-257135

Resource group UdacityDemo

Predictive autoscale Mode Disabled

☒ Enable Forecast only

**Default\*** Auto created default scale condition

Delete warning

**Scale mode**

☒ Scale based on a rule

**Rules**

**Instance limits**

Minimum \* 2

**Schedule**

**Scale rule**

Metric namespace \* Virtual Machine Host

Metric name Percentage CPU

1 minute time grain

Dimension Name VMName

Operator =

Dimension Values All values

Add

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)

0.38 %

☐ 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

Add

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

## Autoscale setting ...

UdacityDemo-257135 (Virtual machine scale set)

 Save  Discard  Refresh  Logs  Feedback


Autoscale setting name \*


Resource group

Predictive autoscale

Mode

Pre-launch setup of instances (minutes)

 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 UdacityDemo-257135 (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**

## Step 5 (Screenshot for “Autoscale Enabled”):

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

### Autoscale setting

UdacityDemo-257135 (Virtual machine scale set)

[Save](#) [Discard](#) [Refresh](#) [Logs](#) [Feedback](#)

Custom autoscale

Autoscale setting name \*

UdacityDemo-257135-Autoscale-553

Resource group

Udacity-20240407

Predictive autoscale

Mode

Enabled

Pre-launch setup of instances (minutes)

Enabled

Disabled

Forecast only

Enabled

autotask. [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 UdacityDemo-257135 (Average) Percentage CPU > 70 Increase count by 1

**Explanation  
1**

Explain the key details of autoscale screenshots you have submitted.

The VMSS had a manual scale set to 2. So the scale set was always running with 2 Vms.

We then updated it to a custom autoscale.

We added a new rule to increase the VM count by 1 if the average CPU percentage is greater than 70%.