

Lab 7

CST8912\_011

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Submitted to :

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# Analyze the cost-effectiveness of competing architectural solution proposals

## Introduction & Purpose

### Introduction:

Cloud provider provides a variety of cloud services in a variety of cloud service models: IaaS, PaaS, and SaaS. When businesses migrate to the cloud, they must choose which model is best suited to their needs and is the most cost-effective. This course is designed to assist Cloud Architects in identifying their current cloud expenditures and providing greater awareness of the costs associated with each deployment model as well as each aspect of a cloud deployment.

Optimizing cloud costs begins with knowing your current cloud expenditures. This course introduces you to the tools built into the cloud Portal that can help you understand the total overall expenditures in cloud as well as break down those costs by area: Compute, Network, Storage, Identity, and App/Cloud Services.

The remainder of the course drills down on specific costs associated with each area of cloud identifies the costs associated with each service and provides very clear and concise methods for reducing cloud expenditures. Many of the cost savings methods will require minimal changes to your cloud deployment and will take just minutes to implement while other cost savings methods may take a shift in your cloud strategy, such as moving from IaaS to PaaS.

### Purpose:

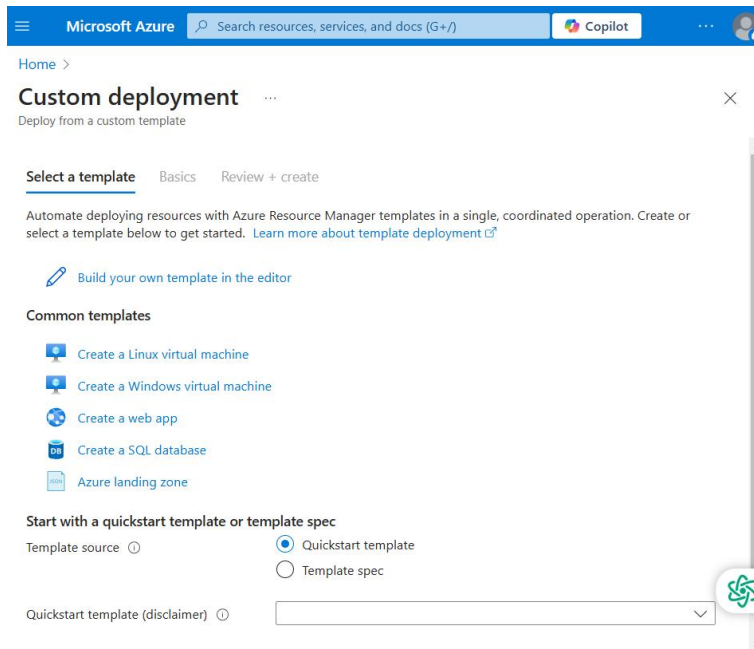
In this lab you will explore azure functionality that would provide insight into performance and configuration of Azure resources, focusing in particular on Azure virtual machines. To accomplish this, you intend to examine the capabilities of Azure Monitor, including Log Analytics.

## Steps covered in the lab

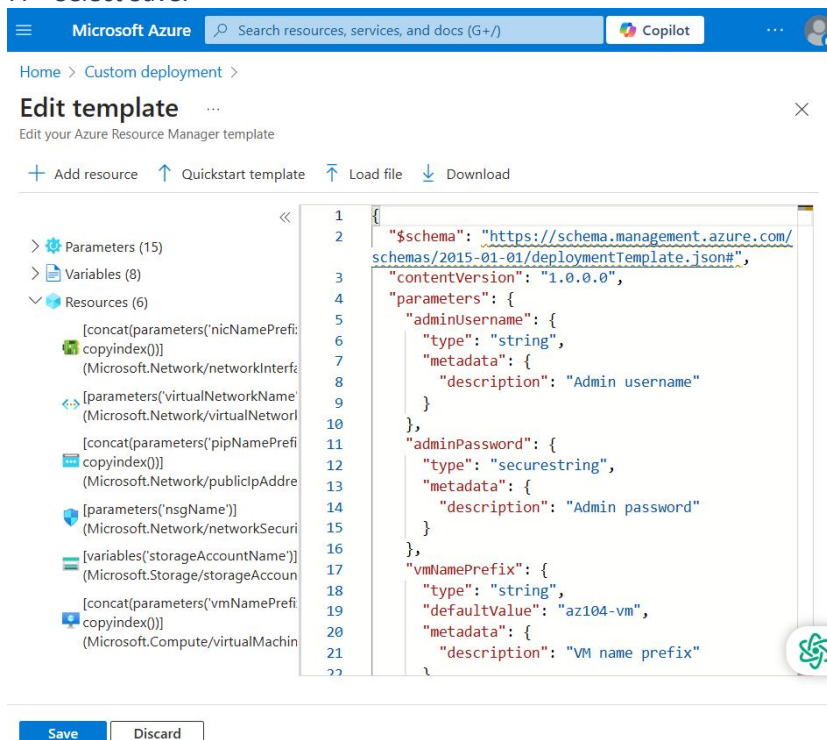
### Task 1: Use a template to provision an infrastructure

In this task, you will deploy a virtual machine that will be used to test monitoring scenarios.

1. Download the \Allfiles\Lab11\az104-11-vm-template.json lab files to your computer.
2. Sign in to the Azure portal - <https://portal.azure.com>.
3. From the Azure portal, search for and select Deploy a custom template.



4. On the custom deployment page, select Build your own template in the editor.
5. On the edit template page, select Load file.
6. Locate and select the \\Allfiles\\Labs11\\az104-11-vm-template.json file and select Open.
7. Select Save.



8. Use the following information to complete the custom deployment fields, leaving all other fields with their default values:

Setting	Value
Subscription	Your Azure subscription

Resource group	CST8912 (If necessary, select Create new)
Region	Canada Central
Username	localadmin
Password	Provide a complex password

9. Select Review + Create, then select Create.

Home >

## Custom deployment

Deploy from a custom template

New! Deployment Stacks let you manage the lifecycle of your deployments. Try it now →

**Customized template** 6 resources

Edit template Edit parameters Visualize

**Project details**

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

Subscription \* Azure for Students

Resource group \* (New) CST8912

Create new

**Instance details**

Region \* Canada Central

Admin Username \* localadmin

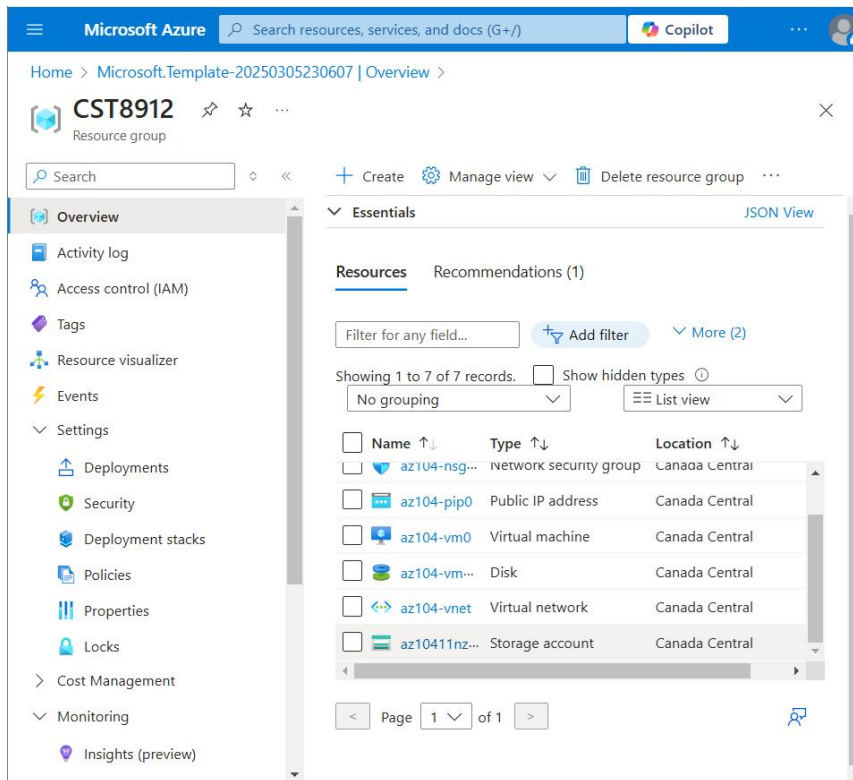
Admin Password \*

Vm Name Prefix az104-vm

Previous Next Review + create

10. Wait for the deployment to finish, then click Go to resource group.

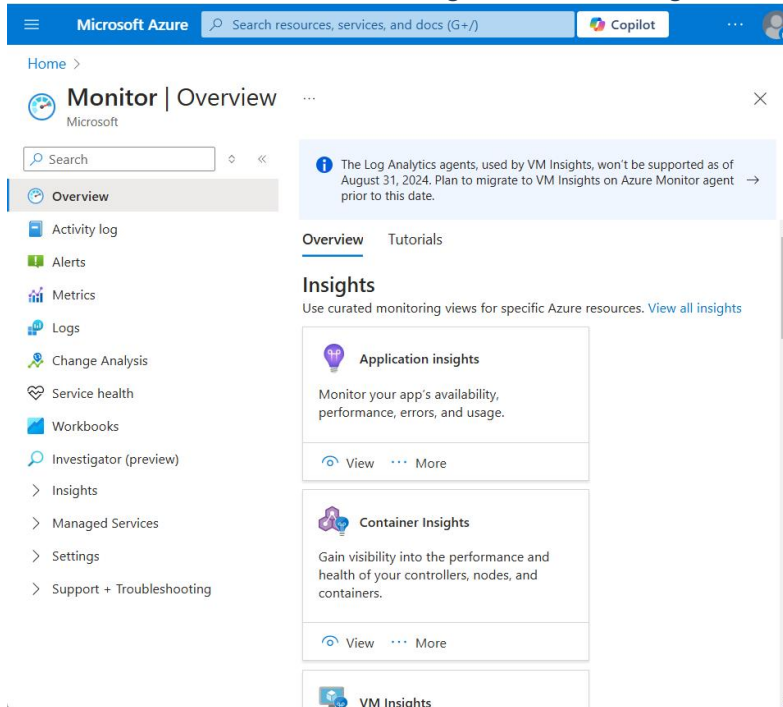
11. Review what resources were deployed. There should be one virtual network with one virtual machine.



12. Configure Azure Monitor for virtual machines (this will be used in the last task)

13. In the portal, search for and select Monitor.

14. Take a minute to review all the insights, detection, triage, and diagnosis tools that are available.



15. Select View in the VM Insights box, and then select Configure Insights.

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

Home > Monitor

## Monitor | Virtual Machines

Search Refresh Provide Feedback

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

VM insights monitors the performance and health of your virtual machines and virtual machine scale sets, including their running processes and dependencies on other resources. It can help deliver predictable performance and availability of vital applications by identifying performance bottlenecks and network issues. [Learn more](#)

**Enable VM Insights**  
Implement complete monitoring of your Azure and hybrid virtual machine environment. [Learn more](#)

[Configure Insights](#)

[Analyze data](#)

16. Select your virtual machine, and then Enable (twice).

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


## Azure Monitor

Insights Onboarding

### 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.



**Enable**

<https://aka.ms/vminsights/ui/links/mapOverview> onitors for VM? [Troubleshoot](#)

17. Take the defaults for subscription and data collection rules, then select Configure.

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

Monitoring configuration

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

Subscription \*

Azure for Students

Data collection rule ⓘ

(new) MSVMI-DefaultWorkspace-22f60889-0ad3-47d4-9d41-7d026e7ff990-EUS

Create New

MSVMI-DefaultWorkspace-22f60889-0ad3-47d4-9d41-7d026e7ff990-EUS

Guest performance	Enabled
Processes and dependencies (Map)	Disabled
Log Analytics workspace	DefaultWorkspace-22f60889-0ad3-47d4-9d41-7d026e7ff990-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

<https://portal.azure.com/?ref=techblog#>

18. It will take a few minutes for the virtual machine agent to install and configure, proceed to the next step.

## Task 2: Create an alert

In this task, you create an alert for when a virtual machine is deleted.

19. Continue on the Monitor page , select Alerts.

20. Select Create + and select Alert rule.

Microsoft Azure | Monitor | Alerts

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

Alert rule

Action group

Alert processing rule

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

Name, Severity, Affected resource

21. Select the box for the resource group, then select Apply. This alert will apply to any virtual machines in the resource group. Alternatively, you could just specify one particular machine.

Microsoft Azure | Select a resource

Subscription: All subscriptions, Resource types: All resource types, Locations: All locations

Search to filter items...

Resource	Resource type	Location
AVD-Prod	Subscription	-
<input checked="" type="checkbox"/> Azure for Students	Subscription	-

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

Azure for Students, Subscription, -

Apply, Cancel, Clear all selections

22. Select the Condition tab and then select the See all signals link.
23. Search for and select Delete Virtual Machine (Virtual Machines). Notice the other built-in signals.



Select Apply

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

### Select a signal ✕

✕ Signal type : All Signal source : All

Signal name	Signal source
Activity log	
Delete Virtual Hub proxy (Virtual Hub Proxy)	Administrative
Delete Virtual Machine (Virtual Machines)	Administrative
Delete Virtual Machine and Virtual Machine scale sets in a Azure Fleet resource ...	Administrative
Delete Virtual Machine Associated Network Security Group (Virtual Machine Ass...	Administrative
Delete Virtual Machine Extension (Virtual Machine Extensions)	Administrative
Delete Virtual Machine Image (Virtual Machine Image)	Administrative
Delete Virtual Machine in a Virtual Machine Scale Set (Virtual Machine in Scale S...	Administrative
Delete virtual machine pools. (Virtual Machine Pools)	Administrative
Delete Virtual Machine run command (Virtual Machine RunCommands)	Administrative

24. In the Alert logic area (scroll down), review the Event level selections. Leave the default of All selected.
25. Review the Status selections. Leave the default of All selected.

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

Home > Monitor | Alerts >

Create an alert rule

No data available

activityLogHistoryBarSeries

7 PM

[View events in Azure Monitor - Activity Log](#)

Alert logic

Event Level ⓘ

Status ⓘ

Event initiated by ⓘ

All selected

All selected

\* (All services and users)

[Add event initiator](#)

Condition preview

Whenever the Activity Log has an event with Category='Administrative', Signal name='Delete Virtual Machine (Virtual Machines)'

Review + create

Previous

Next: Actions >

26. Leave the Create an alert rule pane open for the next task.

### Task 3: Configure action group notifications

In this task, if the alert is triggered send an email notification to the operations team.

- Continue working on your alert. Select Next: Actions, and then select Create action group.
- On the Basics tab, enter the following values for each setting.

Setting	Value
Project details	
Subscription	your subscription
Resource group	CST8912
Region	Global (default)
Instance details	
Action group name	Alert the operations team (must be unique in the resource group)
Display name	AlertOpsTeam

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

Home > Monitor | Alerts > Create an alert rule >

## Create action group

Basics Notifications Actions Tags Review + create

An action group invokes a defined set of notifications and actions when an alert is triggered. [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 ⓘ Azure for Students

Resource group \* ⓘ CST8912 [Create new](#)

Region \* Global

**Instance details**

Action group name \* ⓘ Alert the operations team ✓

Display name \* ⓘ AlertOpsTeam ✓  
The display name is limited to 12 characters

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

3. Select Next: Notifications and enter the following values for each setting.

Setting	Value
Notification type	Select Email/SMS message/Push/Voice
Name	VM was deleted

4. Select Email, and in the Email box, enter your email address, and then select OK.

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

Home > Monitor | Alerts > Create an alert rule >

## Create action group

Basics **Notifications** Actions Tags Review + create

Add or edit Email/SMS message/Push/Voice action

Choose how to get notified

**Notification type** ⓘ Email/SMS message/Push/Voice

☒ Email  
Email \* ⓘ yuntian.du93@gmail.com ✓

☐ SMS (Carrier charges may apply)  
Country code 1  
Phone number

☐ Azure mobile app notification  
Azure account email ⓘ

☐ Voice  
Country code 1  
Phone number

Enable the common alert schema. [Learn more](#)

Yes No



[Review + create](#) [OK](#)

Home > Monitor | Alerts > Create an alert rule >

## Create action group

Basics **Notifications** Actions Tags Review + create

Choose how to get notified when the action group is triggered. This step is optional.

Notification type ⓘ	Name ⓘ	Selected ⓘ
Email/SMS message/Push/Voice ▼	VM was deleted ✓	Email  
▼		

Review + create

Previous

Next: Actions >

5. Once the action group is created move to the Next: Details tab and enter the following values for each setting.

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="#">Alert the operations team</a>	1 Email 
<a href="#">Manage action groups</a>	

Review + create

Previous

Next: Details >

Setting	Value
Alert rule name	VM was deleted
Alert rule description	A VM in your resource group was deleted

The screenshot shows the 'Create an alert rule' wizard in the Microsoft Azure portal, specifically the 'Details' tab. The wizard is titled 'Create an alert rule' with a close button (X) in the top right corner. Below the title are tabs for 'Scope', 'Condition', 'Actions', 'Details' (selected), 'Tags', and 'Review + create'. The 'Project details' section asks to 'Select the subscription and resource group in which to save the alert rule.' It includes a 'Subscription' dropdown set to 'Azure for Students', a 'Resource group' dropdown set to 'CST8912' with a 'Create new' link below it, and a 'Region' dropdown set to 'Global'. The 'Alert rule details' section includes an 'Alert rule name' field with 'VM was deleted' and a green checkmark, and an 'Alert rule description' field with 'A VM in your resource group was deleted' and a green dot. Below this is a collapsed 'Advanced options' section. At the bottom are three buttons: 'Review + create' (blue), 'Previous', and 'Next: Tags >'.

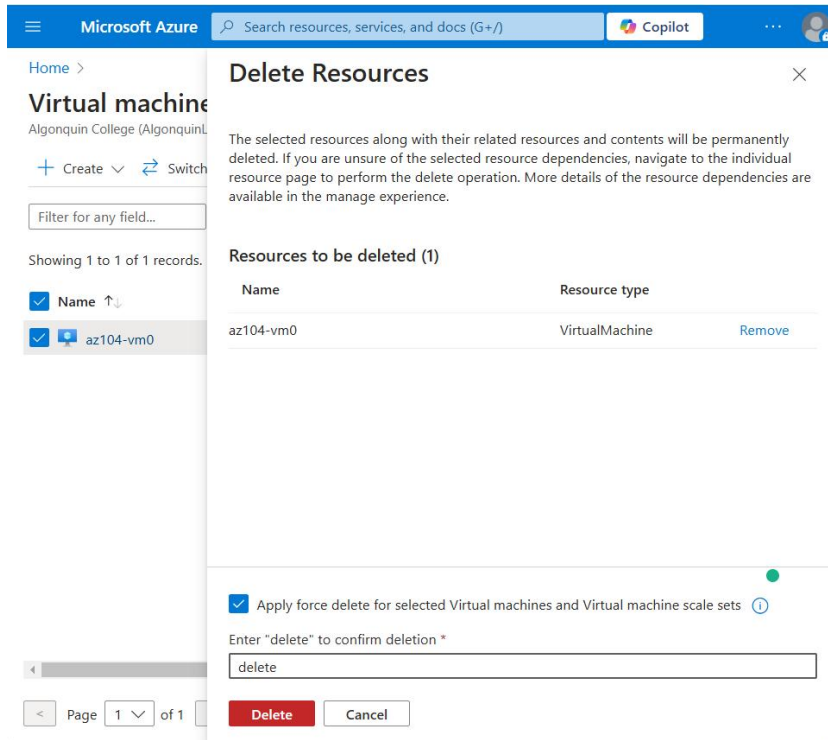
6. Select Review + create to validate your input, then select Create.

#### Task 4: Trigger an alert and confirm it is working

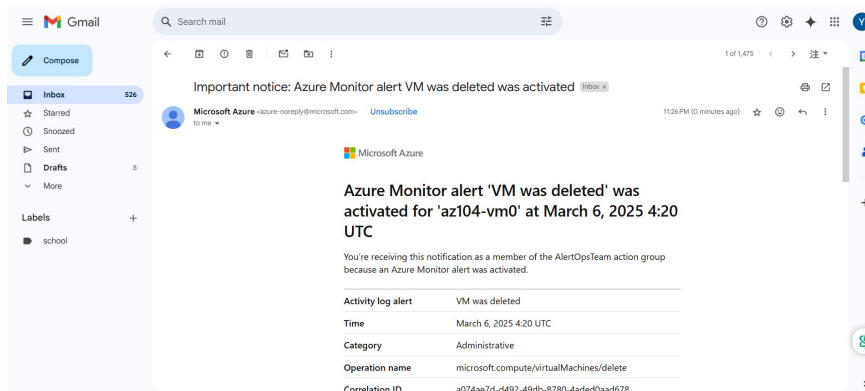
In this task, you trigger the alert and confirm a notification is sent.

Note: If you delete the virtual machine before the alert rule deploys, the alert rule might not be triggered.

7. In the portal, search for and select Virtual machines.
8. Check the box for the az104-vm0 virtual machine.
9. Select Delete from the menu bar.
10. Check the box for Apply force delete. Enter delete to confirm and then select Delete.



11. In the title bar, select the Notifications icon and wait until vm0 is successfully deleted.
12. You should receive a notification email that reads, Important notice: Azure Monitor alert VM was deleted was activated... If not, open your email program and look for an email from azure-noreply@microsoft.com.
13. Screenshot of alert email.



14. On the Azure portal resource menu, select Monitor, and then select Alerts in the menu on the left.
15. You should have verbose alerts that were generated by deleting vm0.

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

Home > Monitor

## Monitor | Alerts

Microsoft

Search

View as timeline (preview) Create Alert rules

Overview

Activity log

**Alerts**

Metrics

Logs

Change Analysis

Service health

Workbooks

Investigator (preview)

Insights

Managed Services

Settings

Support + Troubleshooting

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

Search Add filter More (4)

Total alerts Critical Error Warning Informational Verbose

3 0 0 0 0 3

No grouping

Name ↑↓	Severity ↑↓	Affected resource ↑↓
<input type="checkbox"/> VM was deleted	4 - Verbose	az104-vm0
<input type="checkbox"/> VM was deleted	4 - Verbose	az104-vm0
<input type="checkbox"/> VM was deleted	4 - Verbose	az104-vm0

Showing 1 - 3 of 3 results. Give feedback

16. Note: It can take a few minutes for the alert email to be sent and for the alerts to be updated in the portal. If you don't want to wait, continue to the next task and then return.
17. Select the name of one of the alerts (For example, VM was deleted). An Alert details pane appears that shows more details about the event.

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

VM was deleted

Activity log alert details

Copy link

Go to alert rule

Investigate (preview)

Summary

History

General details

Severity	Fired time	Affected resource	Monitor service	Alert condition	User response
4 - Verbose	3/5/2025, 11:26 PM	az104-vm0	ActivityLog Administrative	Fired	New

The target resource az104-vm0 has been moved or deleted.

Why did this alert fire?

The following event occurred: microsoft.compute/virtualMachines/delete

Event level	Category	Initiated by
Informational	Administrative	du000086@algonquinlive.cc

Additional details

### Task 5: Configure an alert processing rule

1. In this task, you create an alert rule to suppress notifications during a maintenance period.
2. Continue in the Alerts blade, select Alert processing rules and then + Create.
3. Select your resource group, then select Apply.

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

Select a scope

Browse

You may only choose items from the same subscription.

Subscription

Resource types

All subscriptions

All resource types

Search to filter items...

Scope	Resource type	Location
<input type="checkbox"/> > AVD-Prod	Subscription	-
<input checked="" type="checkbox"/> > Azure for Students	Subscription	-

Selected scopes 1 scope

> Azure for Students

Subscription

-

Apply

Cancel

Clear all selections



4. Select Next: Rule settings, then select Suppress notifications.
5. Select Next: Scheduling.
6. By default, the rule works all the time, unless you disable it or configure a schedule. You are going to define a rule to suppress notifications during overnight maintenance. Enter these settings for the scheduling of the alert processing rule:

Setting	Value
Apply the rule	At a specific time
Start	Enter today's date at 10 pm.
End	Enter tomorrow's date at 7 am.
Time zone	Select the local timezone.

Screenshot of the scheduling section of an alert processing rule

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

Home > Monitor | Alerts >

## Create an alert processing rule

Scope Rule settings **Scheduling** Details Tags Review + create

Define when you'd like to apply this rule.

**Apply the rule**

☐ Always

☒ At a specific time

☐ Recurring

**Start** 03/06/2025 10:00 PM

**End** 03/07/2025 7:00 AM

**Time zone** (UTC-05:00) Eastern Time (US & Canada)

**Preview** From 03/06/2025 at 10:00 PM to 03/07/2025 at 12:00 AM (UTC-05:00 Eastern Time US & Canada)

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

7. Select Next: Details and enter these settings:

Setting	Value
Resource group	CST8912
Rule name	Planned Maintenance
Description	Suppress notifications during planned maintenance.

8. Select Review + create to validate your input, then select Create.

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

Home > Monitor | Alerts >

## Create an alert processing rule

Scope Rule settings Scheduling **Details** Tags Review + create

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

**Project details**

Subscription ① Azure for Students

Resource group \* ① CST8912 [Create new](#)

**Alert processing rule details**

Rule name \* ① Planned Maintenance ✓

Description ① Suppress notifications during planned maintenance. ●

Enable rule upon creation ☒

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

### Task 6: Use Azure Monitor log queries

In this task, you will use Azure Monitor to query the data captured from the virtual machine.

9. In the Azure portal, search for and select Monitor blade, click Logs.

10. If necessary close the splash screen.

11. Select a scope, your resource group. Select Apply.

Home > Monitor

Monitor | Logs

Search

Overview Activity log Alerts Metrics **Logs** Change Analysis Service health Workbooks Investigator (preview) Insights Managed Services Settings Support + Troubleshooting

New Query 1

DataProcessing-LB Select scope Run

1. Type your query here or click one of the...

No data from this might help  
• No logs are or learn more  
• The resource

**Select a scope**

Browse Recent

You may only choose items from the same resource type.

Subscription	Resource group	Resource types	Locations
All subscriptions	All resource groups	All resource types	All locations

Search to filter items...

Scope	Resource type	Location
<input type="checkbox"/> Azure for Students	Subscription	-
<input checked="" type="checkbox"/> CST8912	Resource group	-
<input type="checkbox"/> DefaultResourceGroup-EUS	Resource group	-
<input type="checkbox"/> AWD-Prod	Subscription	-

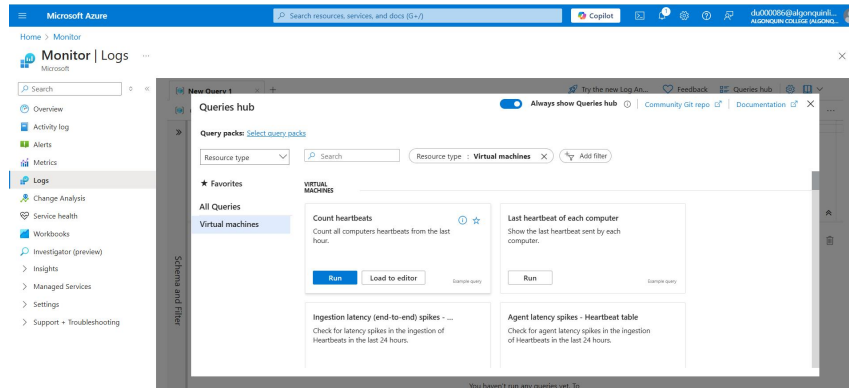
Selected scopes 1 scope

CST8912 Resource group

[Apply](#) [Cancel](#) [Clear all selections](#)

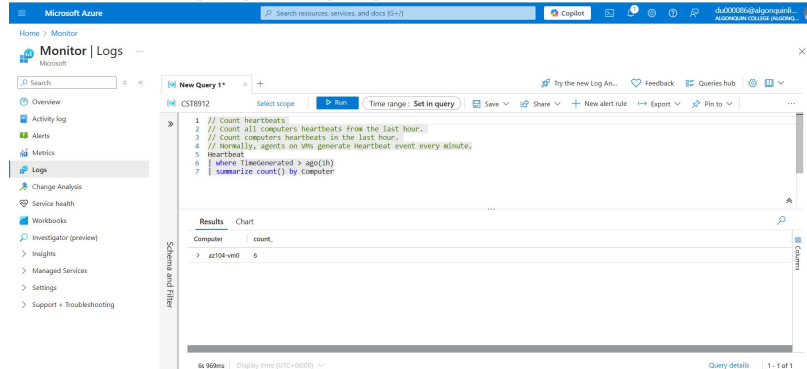
12. In the Queries tab, select Virtual machines (left pane).

13. Review the queries that are available. Run (hover over the query) the Count heartbeats query.



14. You should receive a heartbeat count for when the virtual machine was running.

15. Review the query. This query uses the heartbeat table.



16. Replace the query with this one, and then click Run. Review the resulting chart.

InsightsMetrics

| where TimeGenerated > ago(1h)

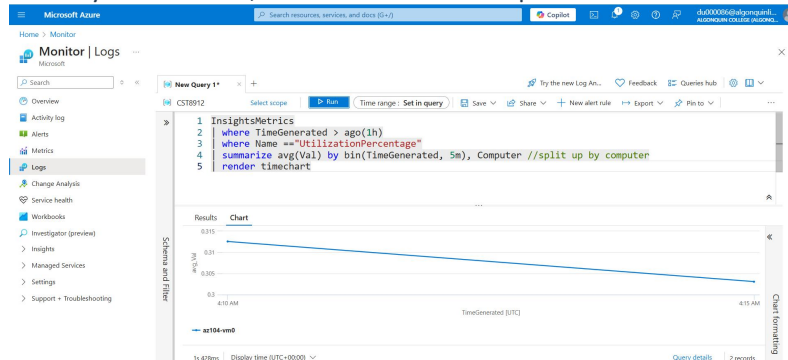
| where Name == "UtilizationPercentage"

| summarize avg(Val) by bin(TimeGenerated, 5m), Computer //split up by computer

| render

timechart

17. As you have time, review and run other queries.



18. Clean up the resources and document all the steps in the lab report

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

Home >

CST8912

Resource group

Search

Overview

Activity log

Access control (IAM)

Tags

Resource visualizer

Events

Settings

Deployments

Security

Deployment stacks

Policies

Properties

Locks

Cost Management

Monitoring

Insights (preview)

Delete a resource group

The following resource group and all its dependent resources will be permanently deleted.

Resource group to be deleted

CST8912

Dependent resources to be deleted (9)

All dependent resources, including hidden types, are shown

Name	Resource type
Alert the operations team	Action group
az104-nic0	Network interface
az104-nsg01	Network security group
az104-pip0	Public IP address
az104-vm0_disk1_6ba235c2b03f4624875c897c	Disk
az104-vnet	Virtual network
az10411nz7i6jk3audww	Storage account

Enter resource group name to confirm deletion \*

CST8912

Delete

Cancel

## References

None.