

# COST AND RESOURCE MONITORING WITH ZABBIX

PART 1 OF UPGRADING OUR IT PROGRAM NOC

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HONORS PROJECT FALL 2024

NOS 231-A INSTRUCTOR: SCOTT NEAL



**DURHAM TECH**

# OVERVIEW

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## Primary Goal:

- Monitor Expense of On-Premise Domains and Cloud Azure Resource Use and Costs

## Tasks:

- Communicate, Monitor, Analyze All Our Domain's and Azure Resource Usages and Costs
- Report and Visualize Metrics Using Zabbix Dashboards
- Automating the Zabbix Alert System

# BACKGROUND INFO & KEY TERMS

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- NOC – Network Operations Center.
  - We currently are developing a Network and Security Operations Center for our IT Program to monitor our equipment and networks.
  - Monitoring is the first step in this project.
- Zabbix – Highly versatile monitoring software.
- VM – Virtual Machine. Completely virtual computer/server with no physical hardware.
- Microsoft Azure – Cloud based infrastructure for creating and using virtual resources for a price.



# PROJECT SCOPE

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## Objective-

- Create a Comprehensive Monitoring System for our NOC using Zabbix for both On-Premise and Cloud Domains in 5 Phases

## Goal-

- Identify and Reduce Any Inefficiencies in Azure Service Costs and Resource Usages showing its potential as an additional resource

## Key Focus-

- Daily monitoring of Internal Systems and Generated Usage and Cost Metrics of Our Azure Cloud Test Resources

# PROJECT SCOPE – THE 5 PHASES

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**Phase 1:** Creating Zabbix server on our network and Azure Resources in the Cloud and installing the Zabbix agents on hosts

**Phase 2:** Connecting and Configuring Communication between Zabbix, Our On-Premise Network, and Azure

**Phase 3:** Basic Expense, Resource Allocation, and Usage Monitoring

**Phase 4:** Data Analysis of Resource Usage and Cost with Reporting and Visualization

**Phase 5:** Configuring and Testing Automated Alerts for Cost and Performance Discrepancies

# P1-CREATING ZABBIX SERVER AND AZURE CLOUD RESOURCES





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1. Need to create a Virtual Machine (VM) for the Zabbix server On-Premise
  1. I used one of our IT Program datacenter servers to create/host Zabbix monitoring system.
  2. Created Web-based Dashboard for managing Zabbix and monitored equipment (hosts) and resources
  3. Install reporting software (agents) onto hosts to be able to monitor them
2. Create Account and resources to monitor in Microsoft Azure Cloud
  1. Azure Account, Virtual machine, Virtual Network, IP addresses, Storage
  2. Costs Money (\$\$) so must properly use these resources!!!
















# AZURE RESOURCES


[Home](#) >


 **Honors\_Project\_ZBX**   


Resource group


 


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


 Overview


 Activity log


 Access control (IAM)


 Tags


 Resource visualizer


 Events


 Settings

 Cost Management

 Monitoring

 Automation

 Help

 Essentials

[JSON View](#)

Subscription ([move](#)) : [Azure subscription 1](#)

Deployments : [1 Succeeded](#)


Subscription ID : [xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx](#)


Location : East US


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


Resources


Recommendations (1)


Type equals **all** 


Location equals **all** 


 Add filter


Showing 1 to 6 of 6 records. ☐ Show hidden types 


☐ Name 


☐  TestVMWinSVR


☐  TestVMWinSVR-ip

☐  TestVMWinSVR-nsg

☐  TestVMWinSVR-vnet

☐  testvmwinsvr39

☐  TestVMWinSVR\_OsDisk\_1\_

Type 

Virtual machine


Public IP address

Network security group

Virtual network

Network Interface

Disk

Location 

East US


East US


East US


East US


East US


East US
















No grouping 

List view 

# AZURE VM RESOURCES

TestVMWinSVR  
Virtual machine

Search

Overview

Activity log

Access control (IAM)

Tags

Diagnose and solve problems

Connect

Networking

Settings

Availability + scale

Security

Backup + disaster recovery

Operations

Monitoring

Automation

Help

Advisor (1 of 1): Enable Trusted Launch foundational excellence, and modern security for Existing Generation 2 VM(s) →

Help me copy this VM in any region

Connect ▾ Start ↺ Restart □ Stop ⌚ Hibernate 📷 Capture ▾ 🗑 Delete ↻ Refresh 📱 Open in mobile 🗨 Feedback 📄 CLI / PS

Essentials

Resource group (move) : [Honors Project ZBX](#)

Status : Stopped (deallocated)

Location : East US

Subscription (move) : [Azure subscription 1](#)

Subscription ID :

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

Properties

Monitoring

Capabilities (8)

Recommendations (1)

Tutorials

Virtual machine

Computer name : TestVMWinSVR

Operating system : Windows

VM generation : V2

VM architecture : x64

Hibernation : Disabled

Host group : -

Host : -

Proximity placement group : -

Colocation status : N/A

Capacity reservation group : -

Networking

Public IP address : [40.71.](#) ( Network interface [testvmwinsvr39](#) )

Public IP address (IPv6) : -

Private IP address : 10.0.0.4

Private IP address (IPv6) : -

Virtual network/subnet : [TestVMWinSVR-vnet/default](#)

DNS name : [Configure](#)

Size

Size : Standard B2s

vCPUs : 2

8



# ZABBIX SERVER VM

Ubuntu\_Zabbix

ACTIONS

Summary

Monitor

Configure

Permissions


Datastores

Networks

Snapshots

Updates

Guest OS



LAUNCH REMOTE CONSOLE

LAUNCH WEB CONSOLE

Virtual Machine Details

Power Status

Powered On

Guest OS

Ubuntu Linux (64-bit)

VMware Tools

Running, version:12421 (Guest Managed)

DNS Name (1)

ubuntuzabbix

IP Addresses (2)

10.16.  
fe80::

Encryption

Not encrypted

Capacity and Usage

Last updated at 12:06 PM

CPU

670 MHz used

2 CPUs allocated

Memory

2.56 GB used

16 GB allocated

Storage

313.74 GB used

463.74 GB allocated

VIEW STATS

VM Hardware

CPU

2 CPU(s), 909 MHz used

Memory

16 GB, 3 GB memory active

Hard disk 1

150 GB | Thick Provision Lazy Zeroed  
SAS-

PCI Devices

No PCI devices

Related Objects

Host

192.168.

Networks

Net

Storage

## P2-CONNECTING AND CONFIGURING COMMUNICATION BETWEEN ZABBIX, OUR ON-PREMISE NETWORK AND AZURE

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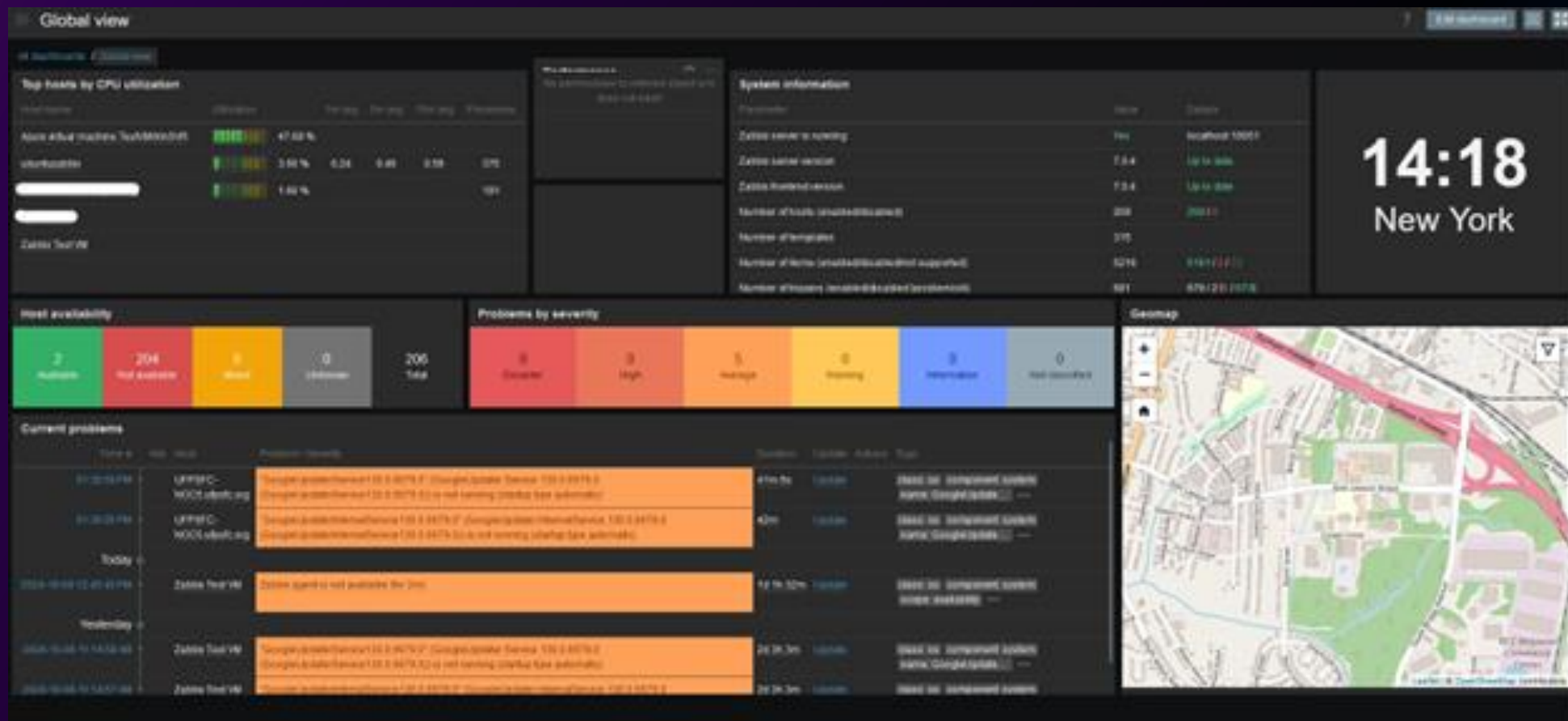
- Had to install and configure a custom Zabbix template to talk to Azure
- Configure Azure to talk to Zabbix
  - Create user and Authenticator keys for Zabbix
  - Configure user roles and access
  - Create Firewall port rules to allow communications in and out of our network
  - Run Zabbix Agents to test communication with Zabbix server for monitoring hosts.
- Hardest part of entire project-
  - so many communication errors due to single mistyped authentication key

# P3-BASIC EXPENSE, RESOURCE ALLOCATION, AND USAGE MONITORING

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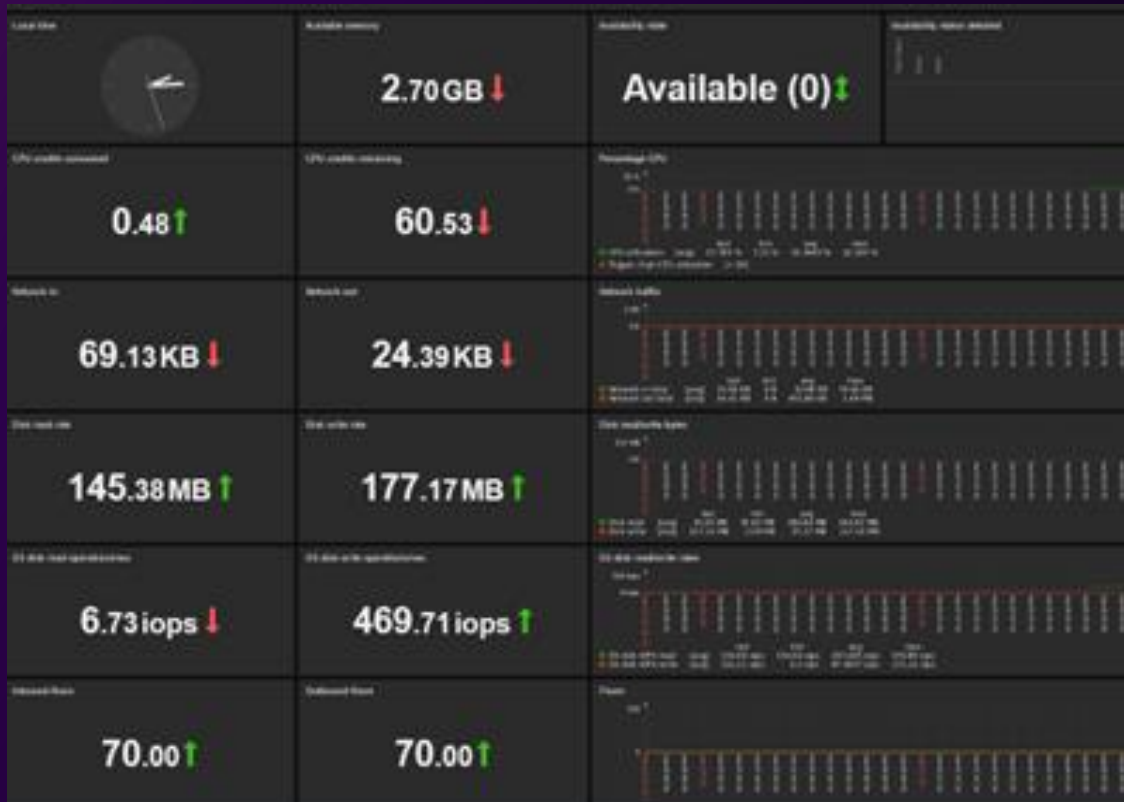
- Make sure all devices are properly connected and communicating
- Make sure metrics are reported accurately and are current from all hosts
- Create baselines of usage and operation for all hosts
- Set budget and cost alerts in Azure for acceptable usage
  - Budget of \$40 per month for testing
  - Alerts set at 25%, 50%, 75%, 90%, and 100%
  - At 100% I configured a total deallocation of all Azure resources to halt spending.

# ZABBIX MAIN DASHBOARD



# ZABBIX – AZURE VM MONITORING DASHBOARD CREATING A BASELINE

Starting data



Finished baseline



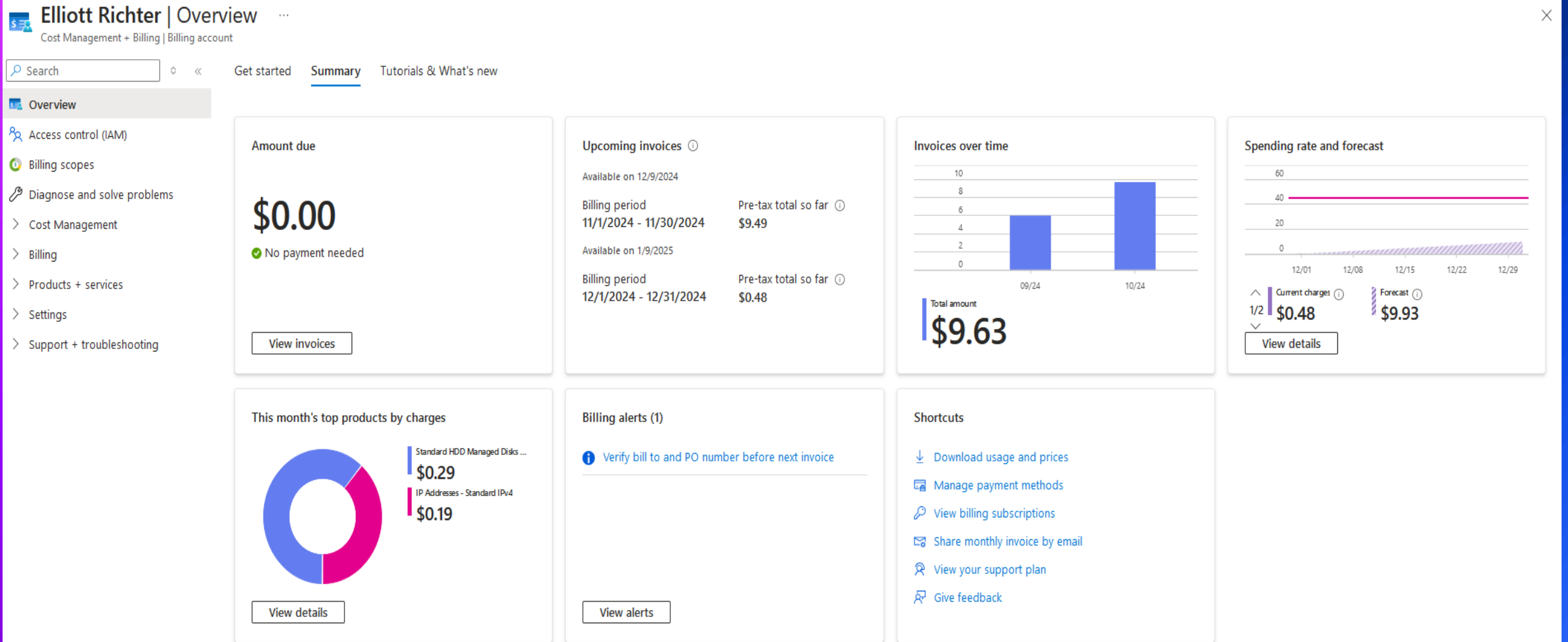


# P4-DATA ANALYSIS OF RESOURCE USAGE AND COST WITH REPORTING AND VISUALIZATION

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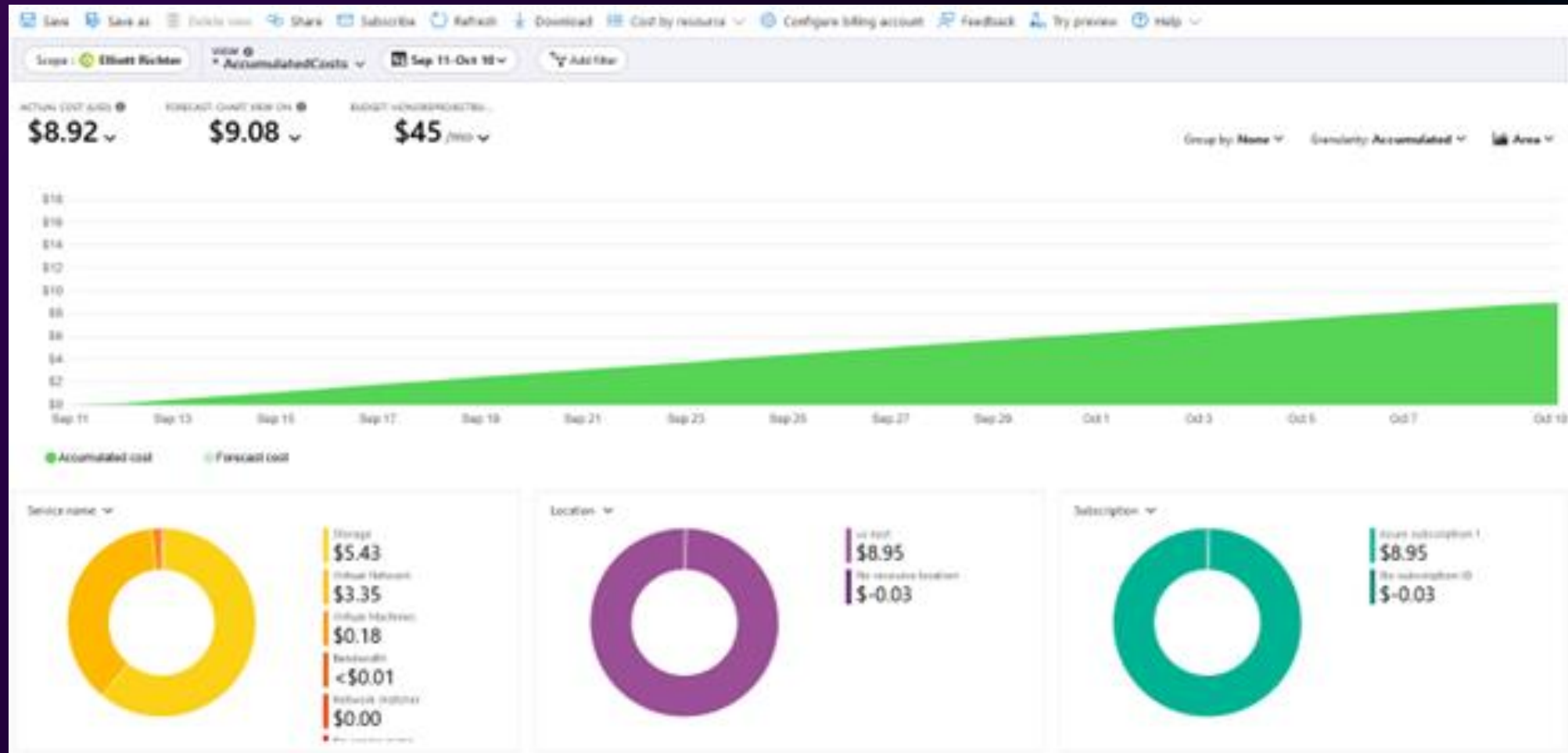
- Create Custom dashboard on Zabbix to display all metrics from on-premise network and Azure.
- Create baselines of usage and operation for all hosts
- Set budget and cost alerts in Azure for acceptable usage
  - Budget of \$20 per month for testing
  - Alerts set at 25%, 50%, 75%, 90%, and 100%
- Create reports to identify underutilized resource consumption and wasteful spending
- De-allocate resources or switch to a cheaper option

# AZURE COST MANAGEMENT

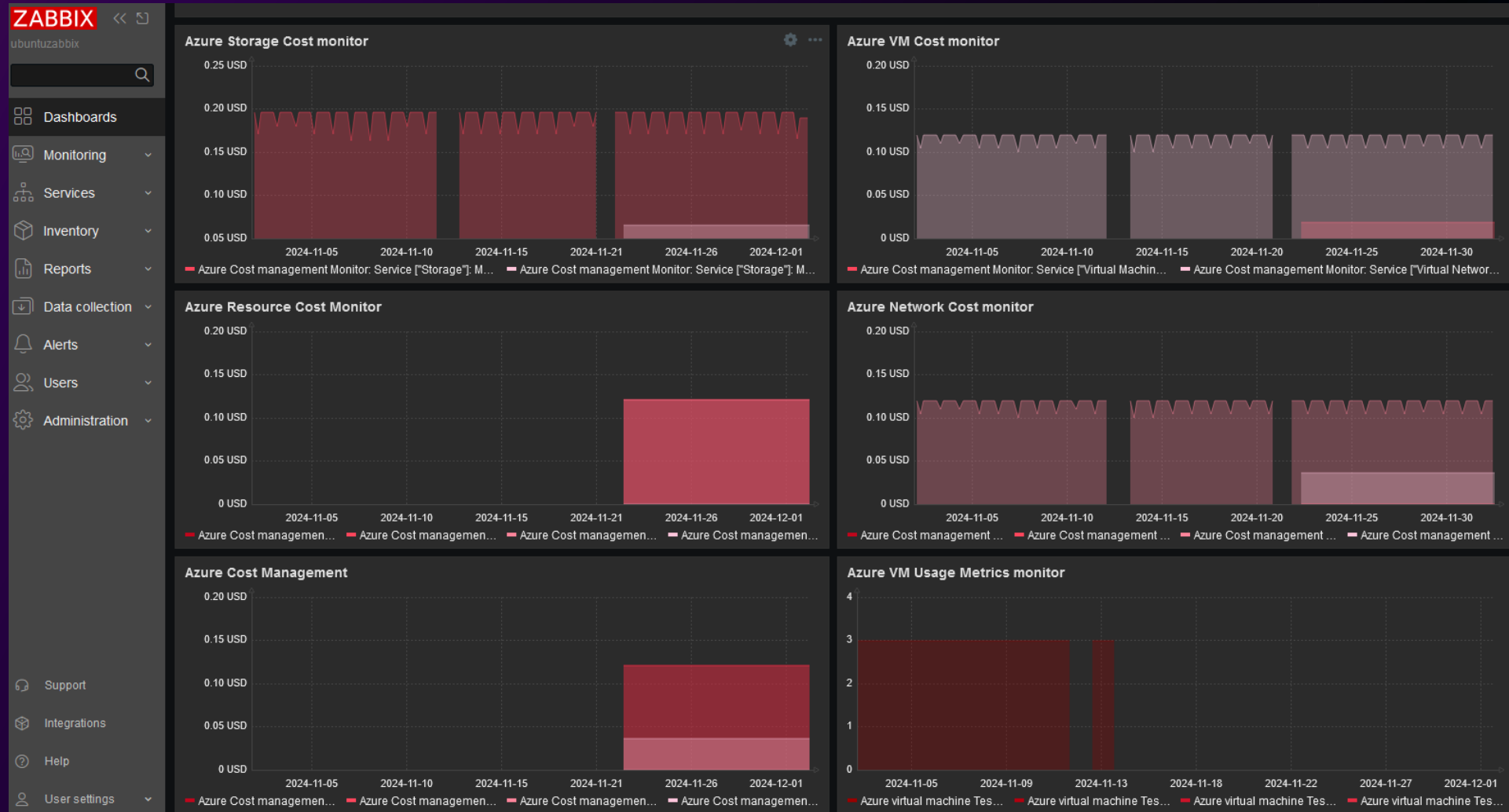




# SEPTEMBER COST ANALYSIS AND BUDGET



# ZABBIX - AZURE COST MONITOR DASHBOARD



# P5-AUTOMATING ZABBIX ALERT SYSTEM

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- Set notifications for discrepancies between cost and usage
- Triggers (alerts) activate when metrics are outside set ranges.
- Triggers are configured to notify key personnel by:
  - Email alerts
  - Text alerts
  - Direct Alerts/Notification Pop-ups in Zabbix Dashboard
- Once notified, corrective actions can take place to fix issues.

# CHALLENGES AND ERRORS

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- **Challenges Faced:**
  - Integrating Zabbix with Azure Cost Management API
  - Configuring correct permissions and API access
- **Errors Overcome:**
  - Authentication errors (Invalid client secrets, permissions issues)
  - Configuration issues with data collection

# REFERENCES

- ZABBIX -

[HTTPS://WWW.ZABBIX.COM/](https://www.zabbix.com/)

- MICROSOFT AZURE -

[HTTPS://AZURE.MICROSOFT.COM/EN-US/](https://azure.microsoft.com/en-us/)

- ZABBIX GITHUB -

[HTTPS://GITHUB.COM/ZABBIX/ZABBIX](https://github.com/zabbix/zabbix)

- ZABBIX AZURE MONITORING TEMPLATE -

[HTTPS://GIT.ZABBIX.COM/PROJECTS/ZBX/REPOS/ZABBIX/BROWSE/TEMPLATES/CLOUD/AZURE\\_HTTP](https://git.zabbix.com/projects/zbx/repos/zabbix/browse/templates/cloud/azure_http)

- ZABBIX AZURE GUIDE -

[HTTPS://WWW.ZABBIX.COM/INTEGRATIONS/AZURE](https://www.zabbix.com/integrations/azure)

- AZURE DEPLOYMENT GUIDE -

[HTTPS://WWW.ZABBIX.COM/MANUALS/AZURE\\_DEPLOYMENT\\_GUIDE](https://www.zabbix.com/manuals/azure_deployment_guide)

# CONCLUSION / Q & A

THANK YOU FOR YOUR TIME  
AND HAVE A GREAT DAY!

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