COST AND RESOURCE MONITORING WITH ZABBIX

PART 1 OF UPGRADING OUR IT PROGRAM NOC

ELLIOTT RICHTER

HONORS PROJECT FALL 2024

NOS 231-A INSTRUCTOR: SCOTT NEAL

OVERVIEW

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

- 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

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

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

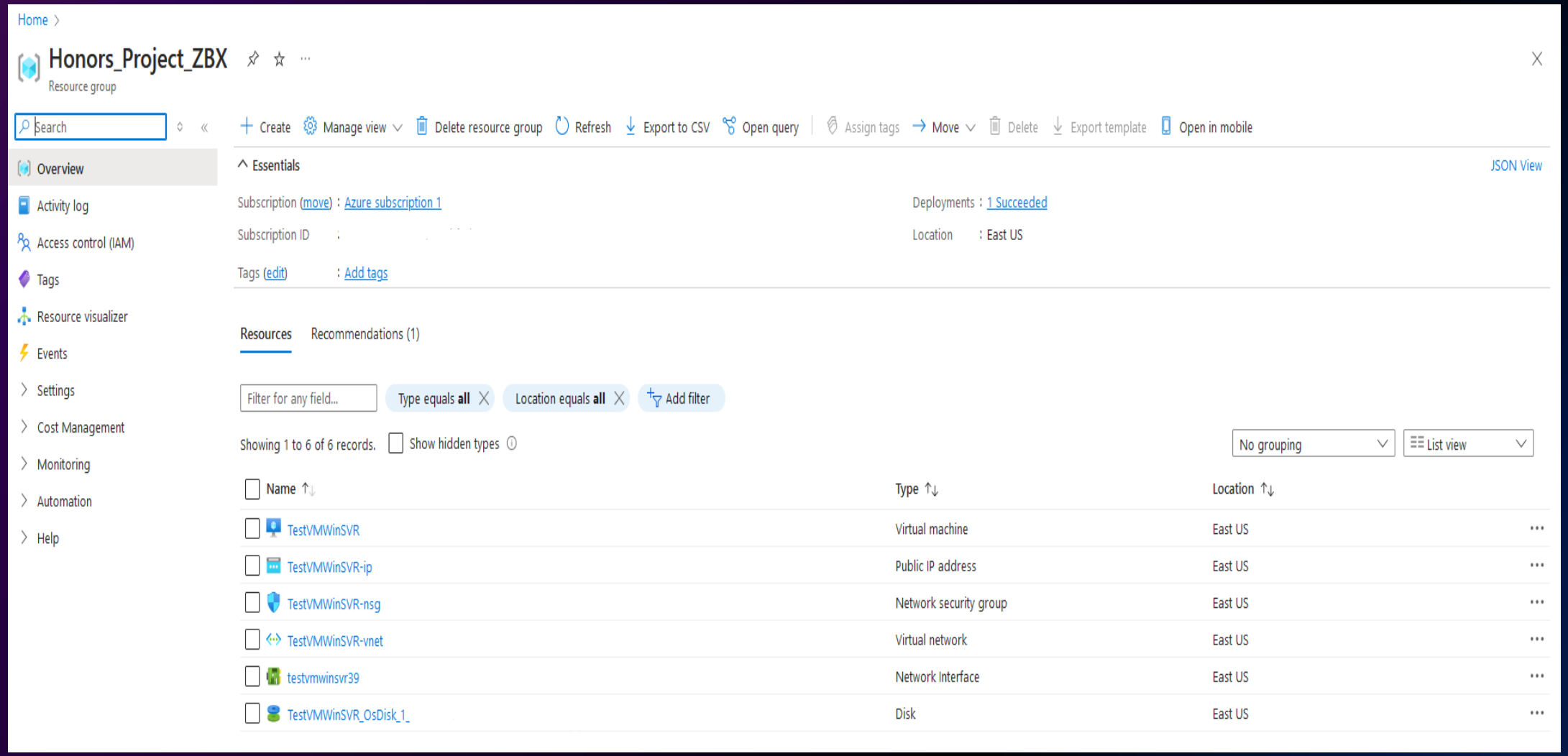
Phase 4: Data Analysis of Resource Usage and Cost with Reporting and Visualization

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

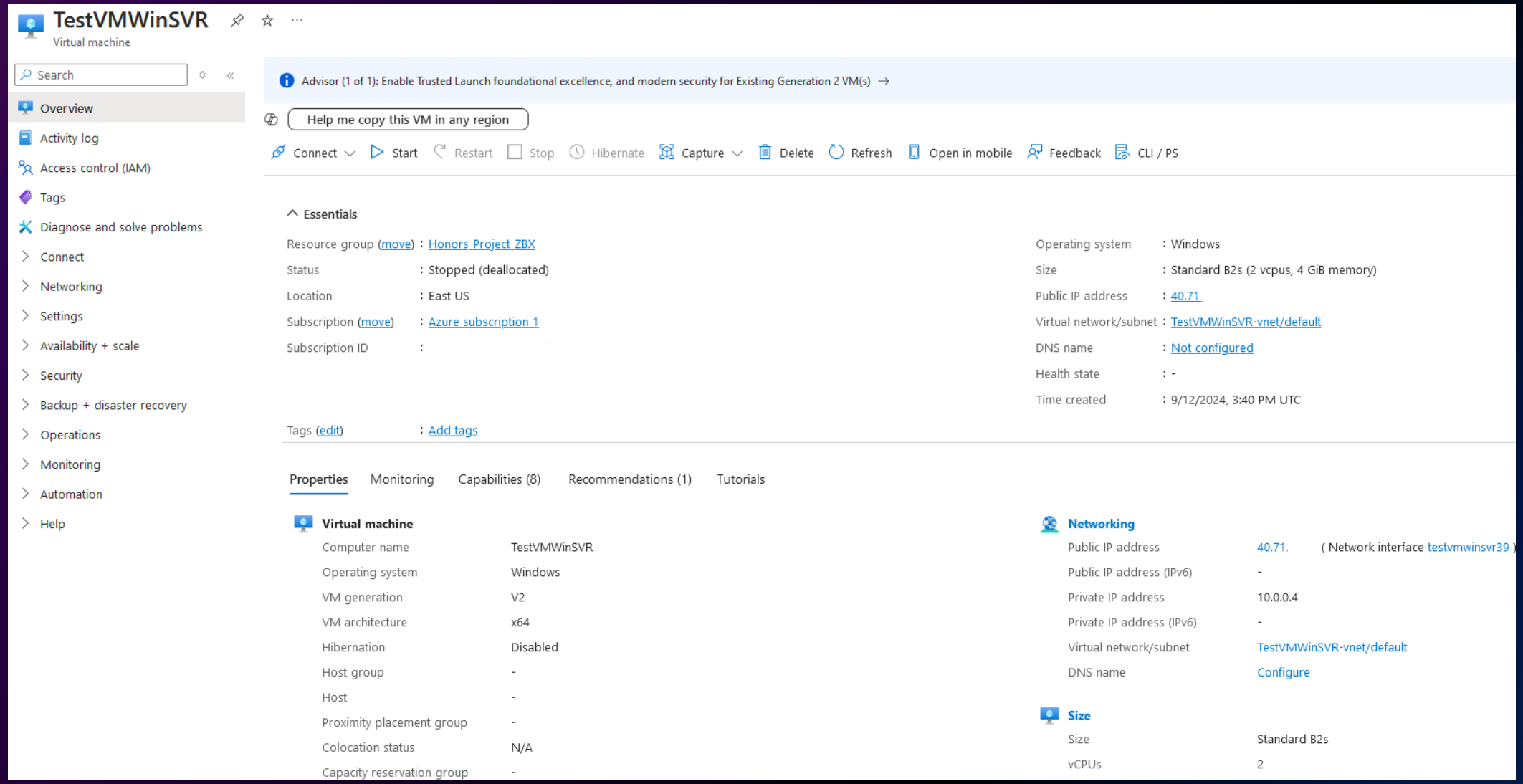
P1-CREATING ZABBIX SERVER AND AZURE CLOUD RESOURCES

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



AZURE VM RESOURCES



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

ACTIONS

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

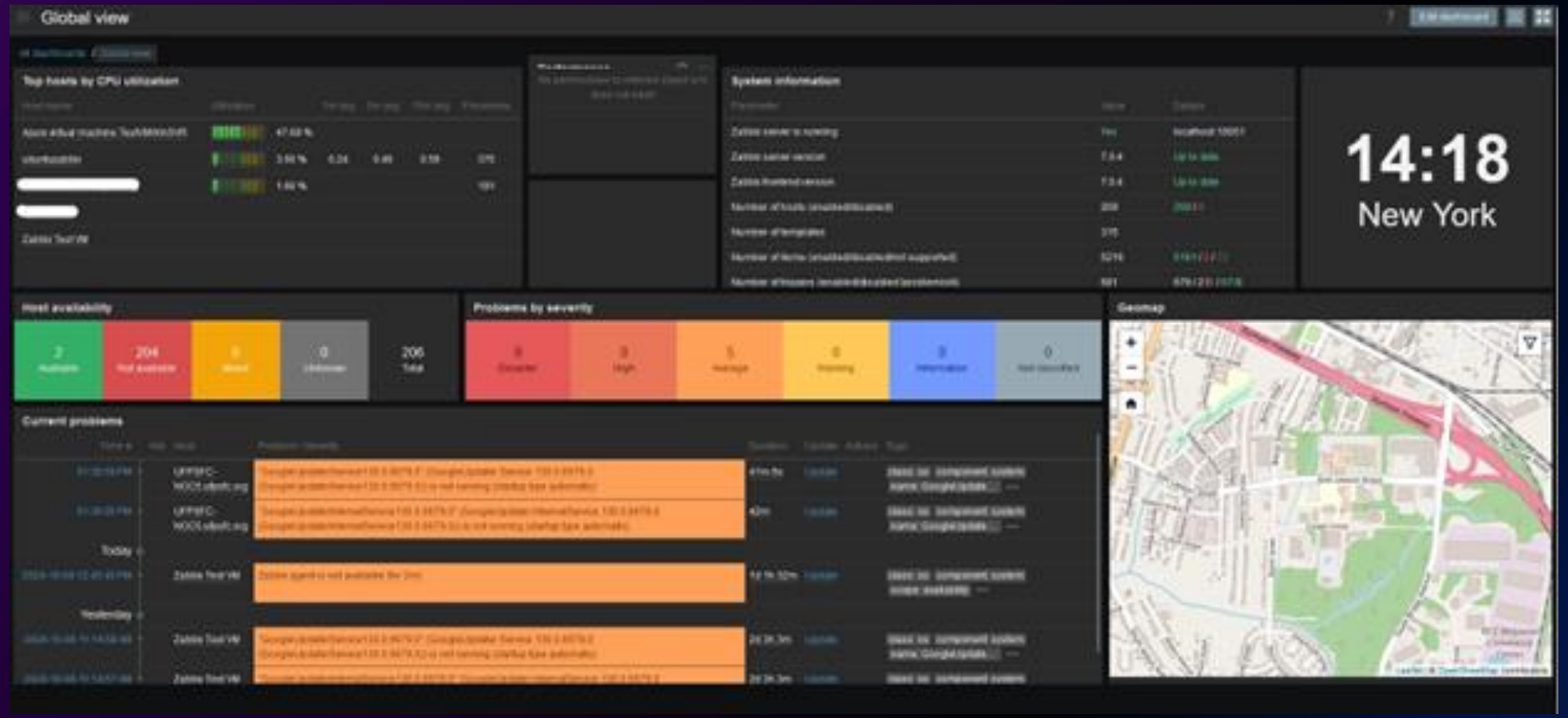
P2-CONNECTING AND CONFIGURING COMMUNICATION BETWEEN ZABBIX, OUR ON-PREMISE NETWORK AND AZURE

- 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

- 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

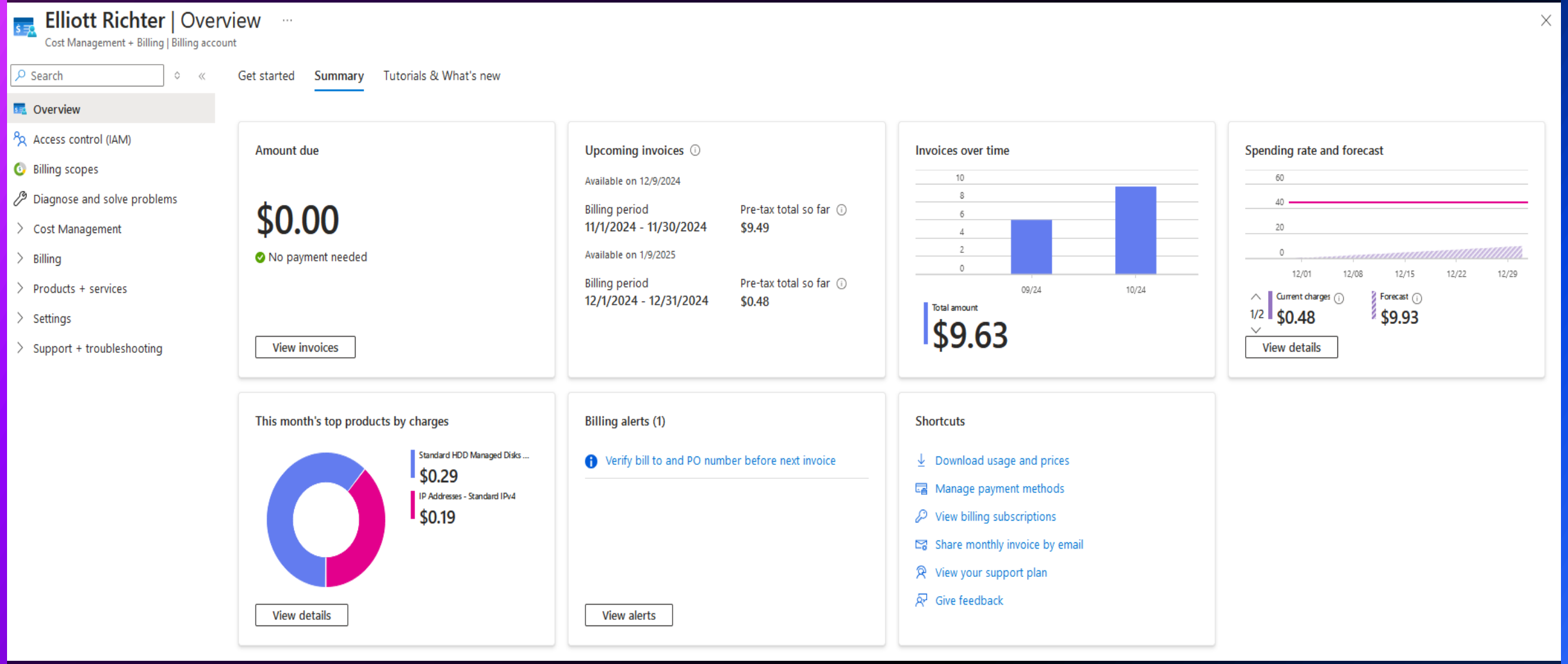
Starting data

Finished baseline

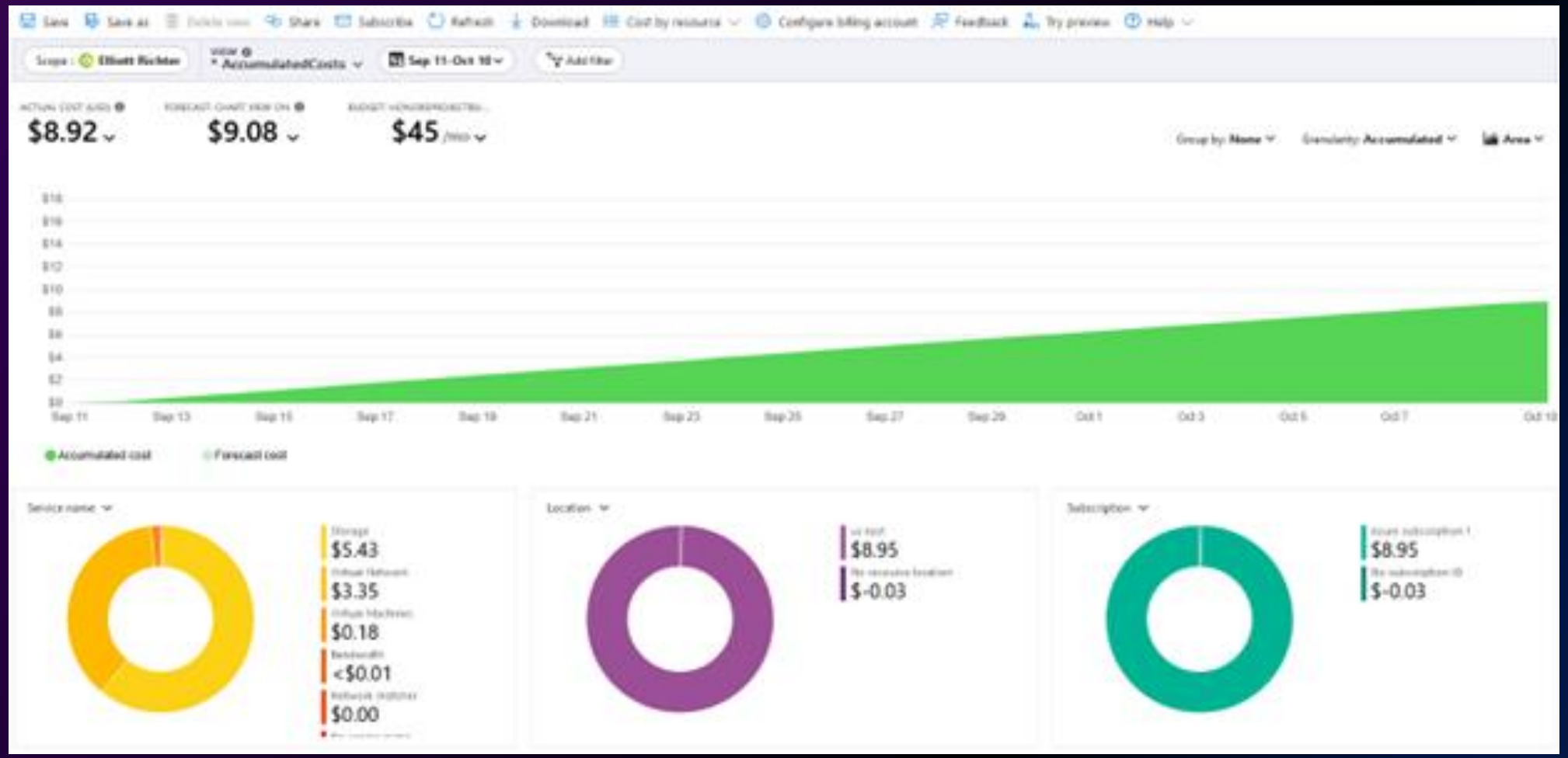
P4-DATA ANALYSIS OF RESOURCE USAGE AND COST WITH REPORTING AND VISUALIZATION

- 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

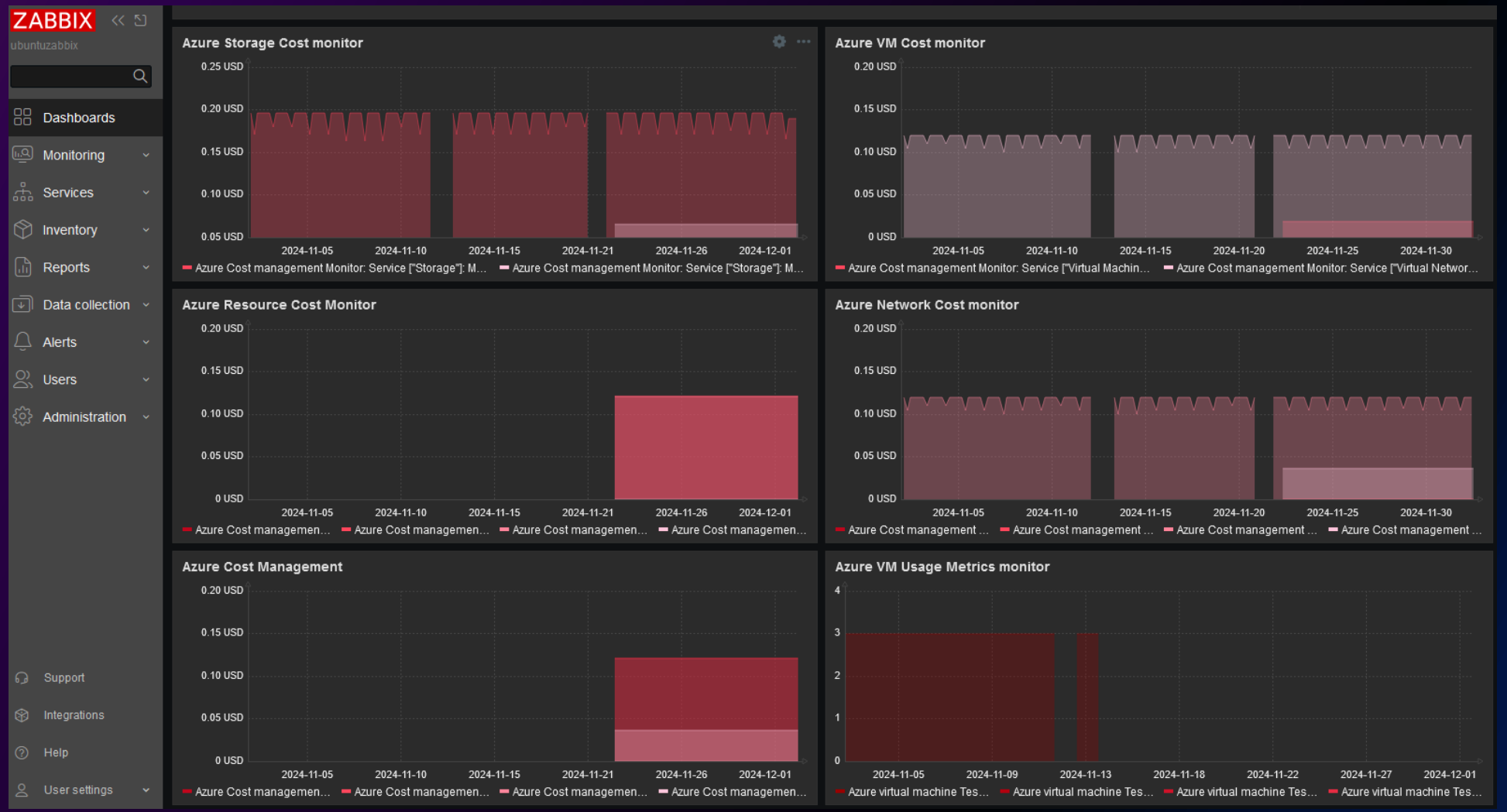
AZURE COST MANAGEMENT



SEPTEMBER COST ANALYSIS AND BUDGET



ZABBIX – AZURE COST MONITOR DASHBOARD



P5-AUTOMATING ZABBIX ALERT SYSTEM

- 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

- **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/
- MICROSOFT AZURE – HTTPS://AZURE.MICROSOFT.COM/EN-US/
- ZABBIX GITHUB – HTTPS://GITHUB.COM/ZABBIX/ZABBIX
- ZABBIX AZURE MONITORING TEMPLATE – HTTPS://GIT.ZABBIX.COM/PROJECTS/ZBX/REPOS/ZABBIX/BROWSE/TEMPLATES/CLOUD/AZURE_HTTP
- ZABBIX AZURE GUIDE- HTTPS://WWW.ZABBIX.COM/INTEGRATIONS/AZURE
- AZURE DEPLOYMENT GUIDE – HTTPS://WWW.ZABBIX.COM/MANUALS/AZURE_DEPLOYMENT_GUIDE

CONCLUSION / Q & A

THANK YOU FOR YOUR TIME AND HAVE A GREAT DAY!

ELLIOTT RICHTER – NOS 231-A FA2024 INS- SCOTT NEAL

CLOUD & NETWORK ADMINISTRATOR/IT SERVICE & SUPPORT STUDENT

RICHTERELLIOTT3 @GMAIL.COM