SECTION BREAKDOWN

Describing Cost Management in Azure

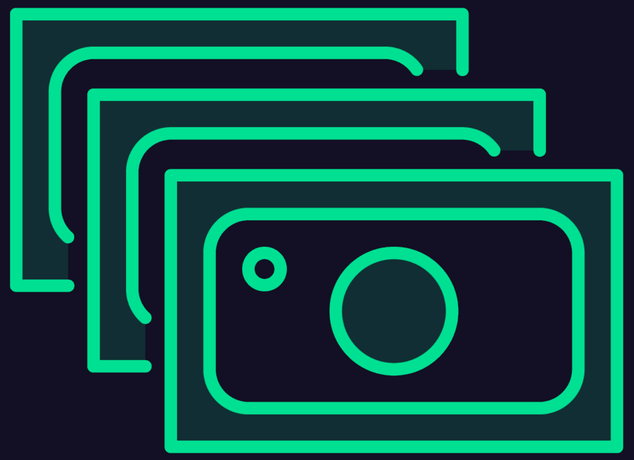
- Defining Cost Management
- Subscriptions
- Factors that Influence Cost
- Azure Pricing Calculator
- Azure TCO
- Cost Management Tools
- Azure Budgets & Reservations
- Azure Cost Allocation
- Best Practices

Mike Boorman
Training Architect

Defining Cost Management in Azure

Mike Boorman
Training Architect

What is Cost Management?



- Set of financial tools available to anyone with access to a billing account, subscription, resource group, or management group.

- The processes involved in planning, evaluating, and controlling the budget of a project or business.

- In Azure, it involves understanding and controlling where and how resources are being used and billed.

Why Cost Management in Azure Matters

Unmonitored cloud expenses can lead to significant **unplanned** costs.

Cost management ensures:

- **Predictable** monthly bills
- **Efficient** use of resources
- **Reduction** of waste
- **Improved** financial forecasting

Azure Cost Management Tools

Azure offers several tools for cost management:

Azure CMB

Azure Cost Management and Billing allows viewing, analyzing, and optimizing costs.

Azure Advisor

Provides personalized best practices to reduce costs.

Azure Budgets

Set budgets and creates alerts to monitor spending.

Comprehensive Cost Management

Subscriptions in Cost Management

Mike Boorman
Training Architect

What are Subscriptions?

Subscriptions in Azure

An agreement with Microsoft enabling access to its cloud services.

A boundary that delineates resource usage, access, and billing.

How Subscriptions Relate to Cost Management

Subscriptions = Running Tabs

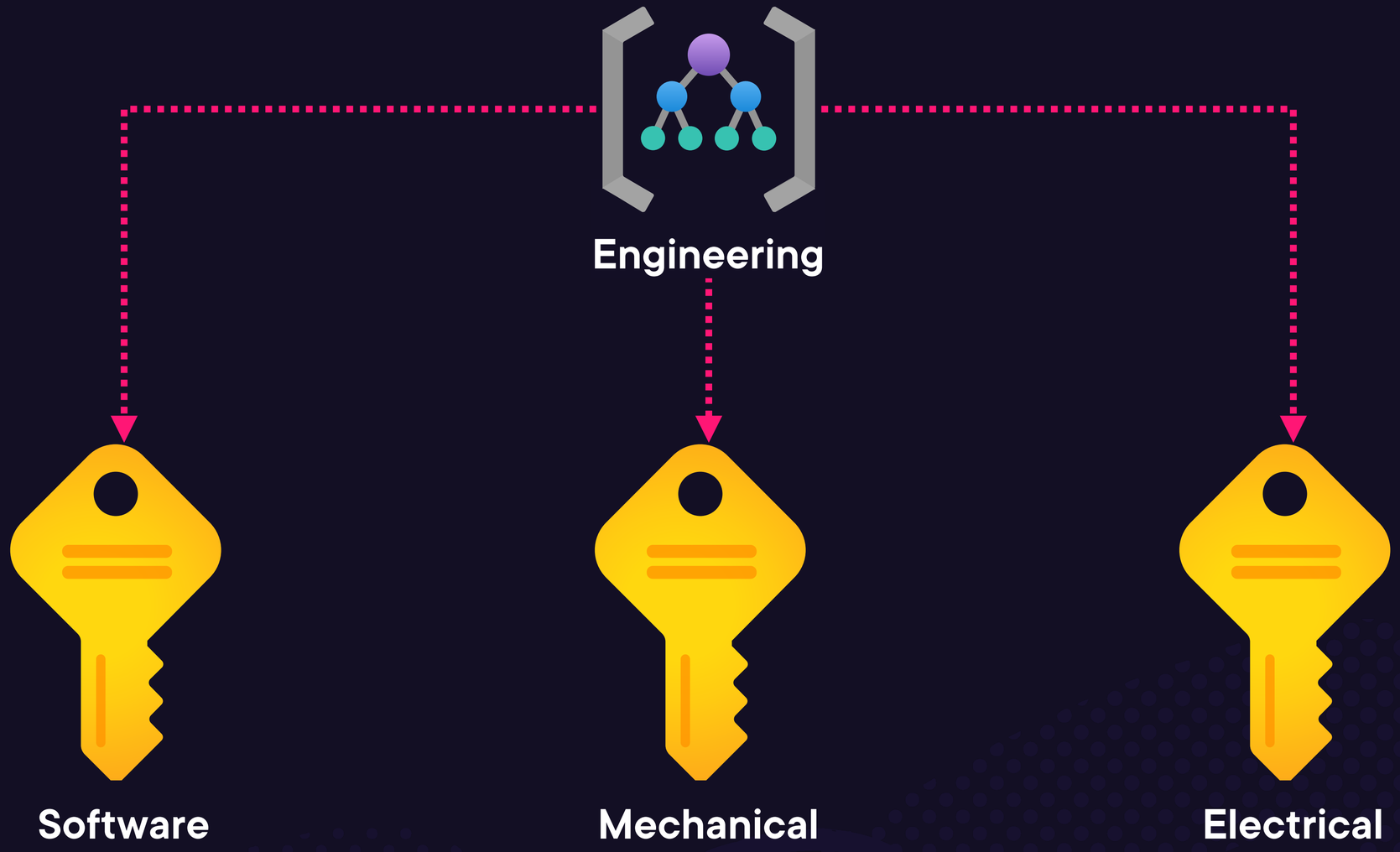
Every Azure service consumed is billed to its associated subscription.

At the end of the billing cycle (variable), the “tab” is due.

Subscriptions in Cost Management

Azure Hierarchy Review

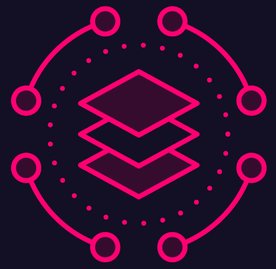
Using Subscriptions to Manage Costs



Subscription Offers

Pay-As-You Go - Pay for what is used without upfront costs.

Enterprise Agreement - Commit to a certain level of usage in exchange for discounted rates.



Azure Dev/Test - Discounted rates for development and testing environments, excluding production workloads.

Free Account - Includes a limited number of free services for a limited time and continuously free up to a usage threshold.

Subscription Pricing Models

Reserved Instances - Discounts offered by committing to certain services for one or three years.

Spot Pricing - Use spare capacity at a discounted rate but can be preempted by Azure at any time.

Hybrid Use Benefits - On-premises Windows Server licenses can offer savings when migrating to Azure.

Bringing It All Together

Subscriptions, and their various components, are intricately tied to cost management.

By understanding the different **offers** and their **cost structures**, organizations can make informed decisions, effectively manage their cloud expenses, and optimize their cloud investments.

Factors That Influence Cost

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Training Architect

Resource Types

Virtual Machines - Billed based on compute, memory, storage, OS, and time.

Storage - Billed based on type (blob, file, disk, etc.) and redundancy.

Data Transfers - Inbound data is usually free, outbound often costs.

Databases - Billed based on transactions and/or dedicated resources.

Location/Region

Azure is a global cloud offering

Variation can be influenced by:

- Local **regulations**
- **Energy** costs
- **Demand** within region or data center

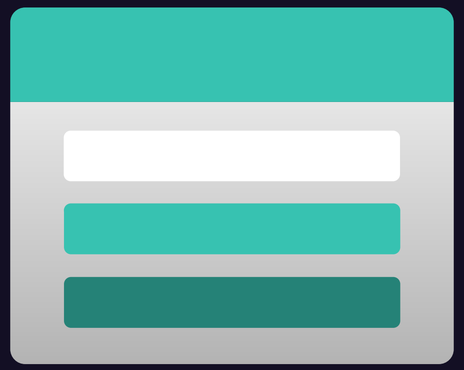
Consider deploying to lower cost regions but always consider latency and data residency.

Factors That Influence Cost

Service Tiers

Virtual Machines

Basic vs Standard
Optimization
(GP, Memory, GPU)
Std HDD, Std SSD, Prem SSD



Storage Accounts

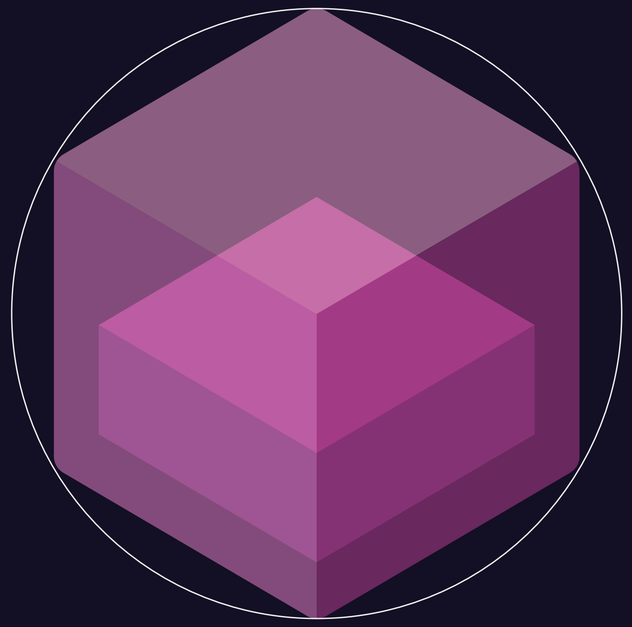
Blob (Std vs Prem)
Files (Prem, Hot, Cold)
Data Lake (Std vs Prem)
HDD vs SSD (Std, Prem, Ultra)

Databases

Single vs Elastic Pool
vCore vs DTU
GP, BC, Hyper
Provisioned vs Serverless

Tier selection is a balance between cost and functionality. Requirements matter!

Reserved Instances



Commitment = Savings

Certain Azure services for a duration (1 or 3 years) in exchange for discounted rates.

Significant savings compared to pay-as-you-go pricing.

Requires upfront commitment, so assess your long-term needs carefully.

Predictable, steady-state workloads are prime candidates for reserved instances.

Azure Hybrid Benefit

Harness On-Premise Benefits

Azure Hybrid Benefit allows leveraging existing on-prem licenses (Windows Server, etc.).

Different support tiers come at different costs.

Add-ons, extensions, or third-party services may have separate costs.

Cloud resource cost involves many factors.

Know the context of cost-saving measures.

Commit where it makes sense.

Leverage the tools available to forecast.

Azure Pricing Calculator

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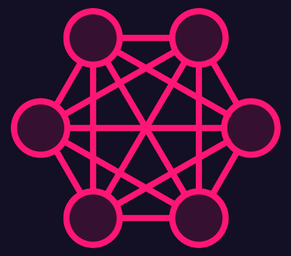
Training Architect

Azure Pricing Calculator

Forecasting Your Cloud Expenditures

Explanation of what the Azure Pricing Calculator is.

The importance of accurate cost estimation for cloud services.



Brief mention of the tool's role in financial planning and cost optimization.

Azure Pricing Calculator

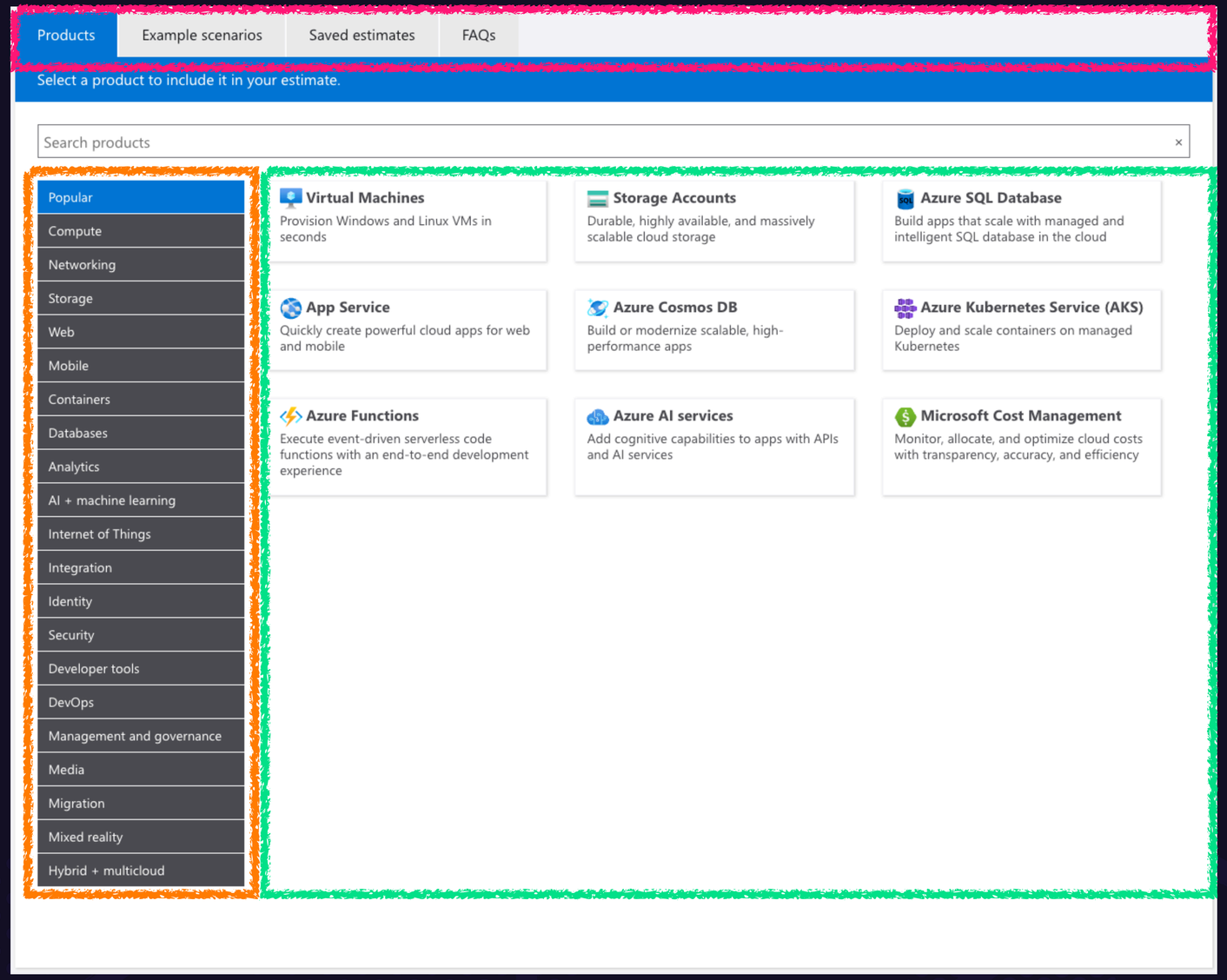
Your First Step to Cost Prediction

Exploring the Interface

Product tools

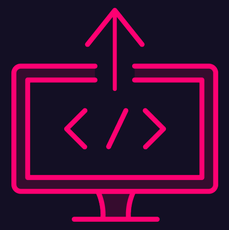
Product Categories

Product Picker



Azure Pricing Calculator

Building Your Azure Financial Plan



Consider the type and scale of your deployment requirements and input them into the calculator.

Experiment with flexible requirements (tiers, instance types).

Be aware of your hard requirements (regions, data transfer needs).

Azure Pricing Calculator

Deciphering the Calculator's Output

Cost Breakdown

Monthly Cost Estimate

Other Costs

Azure Pricing Calculator

Deciphering the Calculator's Output

Cost categories

Visualization

Time Period

Monthly Cost Estimate

Other Costs

Azure Pricing Calculator

Deciphering the Calculator's Output

Cost Breakdown

Fixed vs Variable

Peak Costs

Reservations

Discount

Other Costs

Azure Pricing Calculator

Deciphering the Calculator's Output

Cost Breakdown

Monthly Cost Estimate

Data Transfer

Bundled Pricing

Licensing

Support

Add-ons

Azure Pricing Calculator

Refining Your Financial Forecast

- Export results to formats that can be integrated into financial tools and/or shared.
- Adjust various parameters to discover cost-saving (scaling, regions, instances, etc).
- Use the estimate in larger cost management strategy.
- Set budget, monitor costs, and continually optimize.

Azure Pricing Calculator

Common Mistakes

Overestimating resource needs

Forgetting data transfer costs

Ignoring price variations by region

Not factoring in (or assuming) discounts

Azure Pricing Calculator

Tips for More Accurate Estimates

- Regularly update usage patterns.
- Factor in growth.
- Use Azure’s pricing examples.
- Stay up to date with pricing changes.

Using the Pricing Calculator

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Training Architect

Demo

- Navigate to the Azure Pricing Calculator
- Build out several resources
- Call out components

Summary

- Azure Pricing Calculator is great for estimating what your cloud costs could look like.
- An excellent way to explore the question, “What if I deployed a…”
- Should not be taken as a quote for costs.

Azure Total Cost of Ownership Calculator

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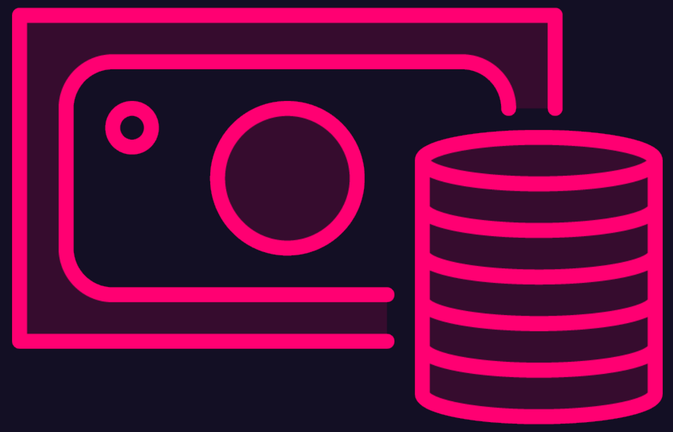
Understanding Azure TCO Calculator



The Financial Cost of the Cloud

The TCO Calculator is a tool provided by Microsoft to help businesses determine the cost benefits of migrating to Azure by comparing the costs of their on-premises infrastructure with Azure's services

Understanding Azure TCO Calculator

The Financial Cost of the Cloud

Provide a comprehensive cost estimate that considers not just direct costs, but also indirect costs such as labor, utilities, and licensing.

Understanding Azure TCO Calculator

The Financial Cost of the Cloud

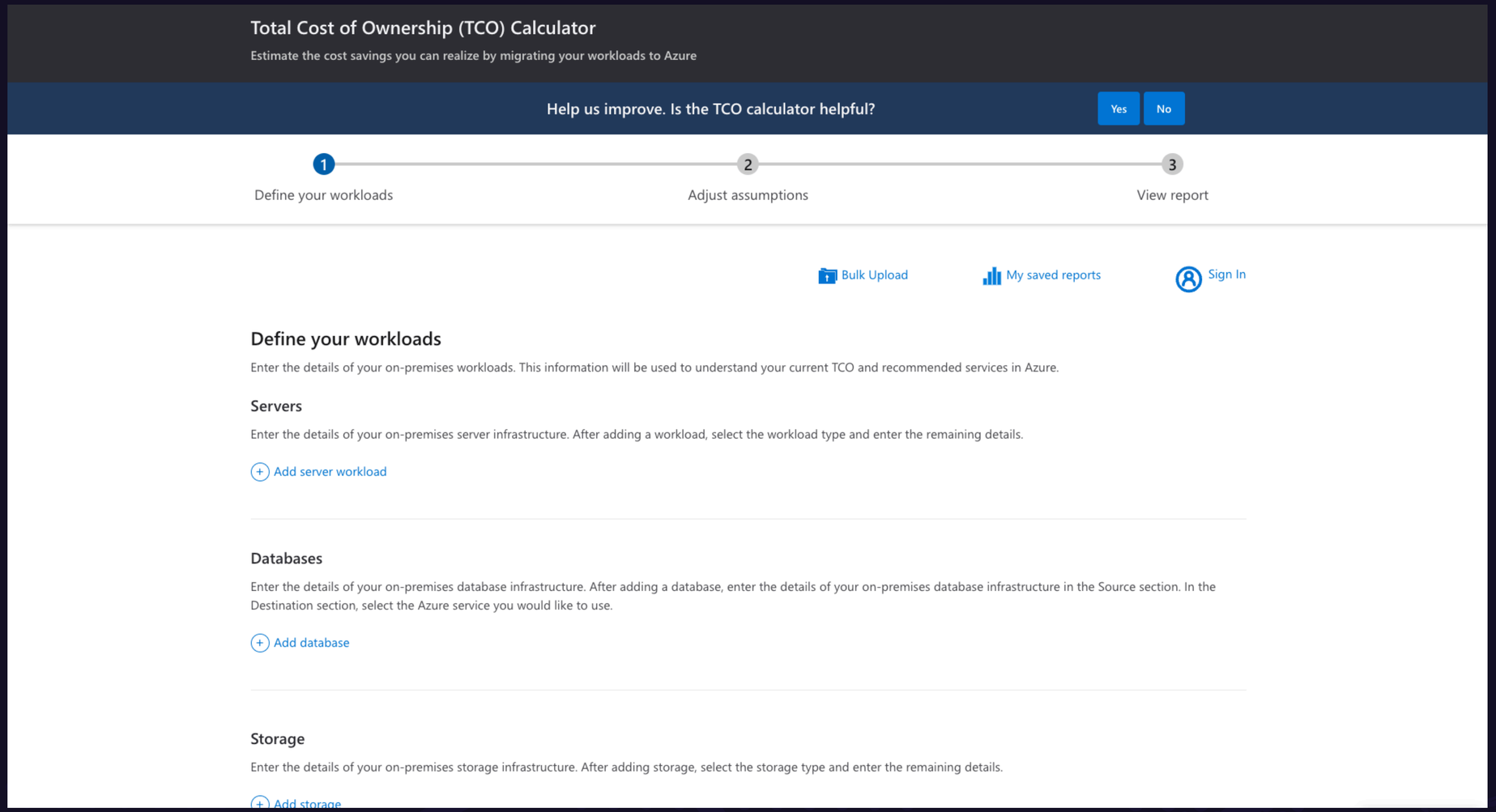
Develop a complete financial picture by factoring in potential downtime costs, scalability benefits, and the opportunity costs of keeping infrastructure on-premises.

Azure Total Cost of Ownership (TCO) Calculator

How the TCO Calculator Works

Input

Create a workload that resembles your on-premises environment as closely as possible.

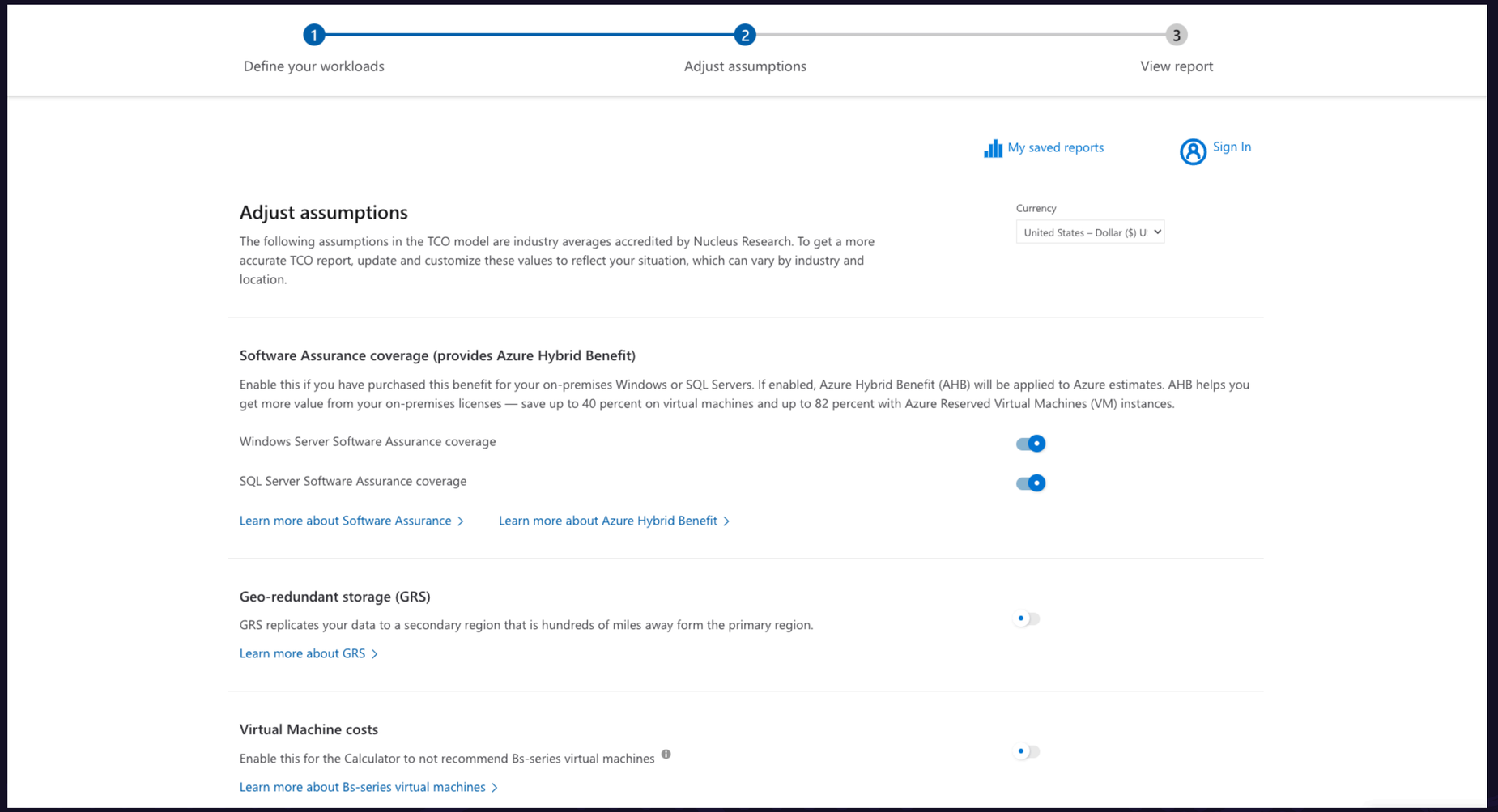


Azure Total Cost of Ownership (TCO) Calculator

How the TCO Calculator Works

Adjust

Configure your potential cloud resources with region, discounts, reservations, and other ways to save.

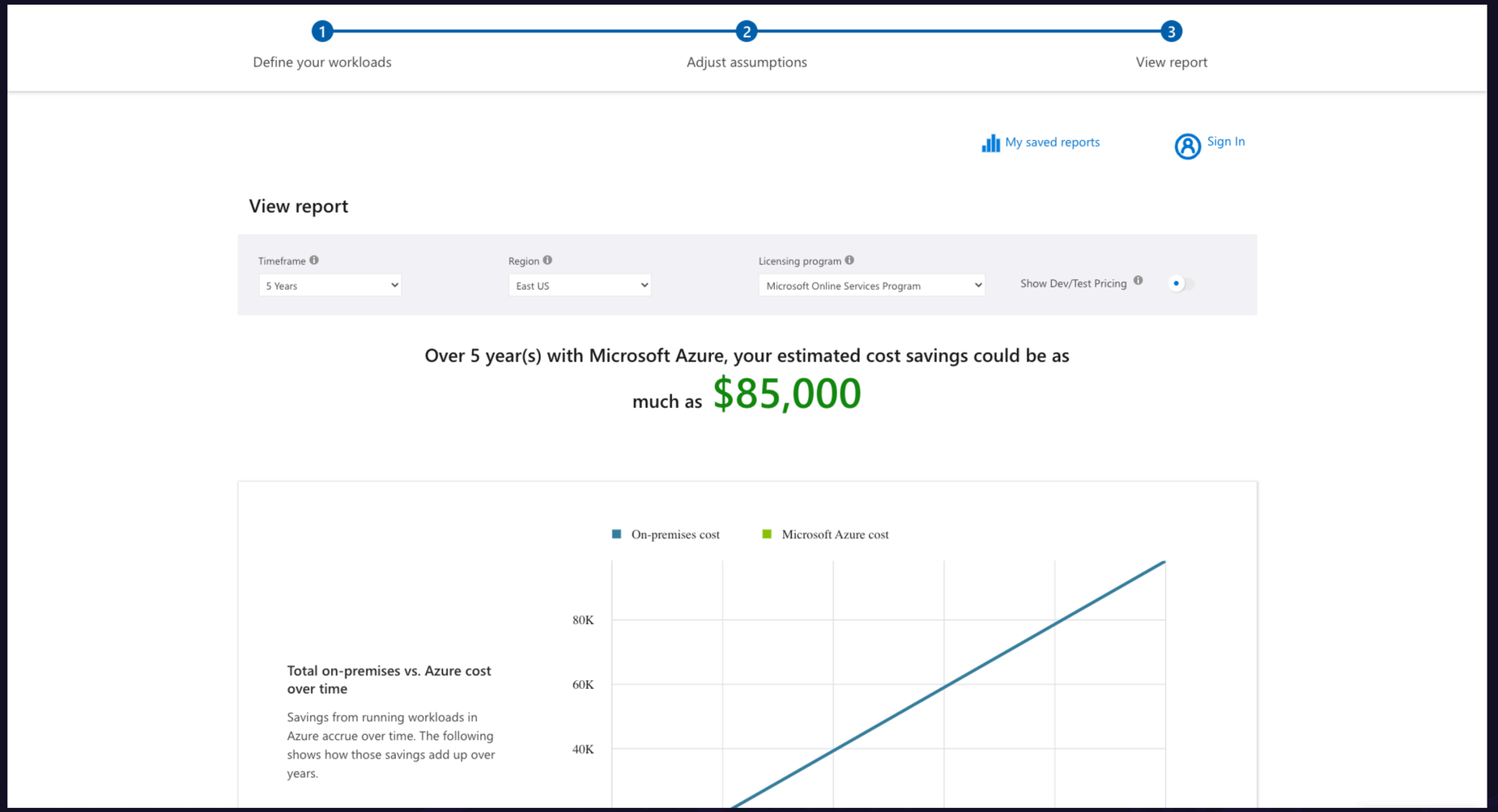


Azure Total Cost of Ownership (TCO) Calculator

How the TCO Calculator Works

Assess

View the report to see what is predicts and how it lines up with your own predictions and data.

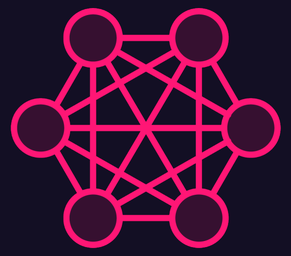


Azure Total Cost of Ownership (TCO) Calculator

What You Need Before Starting

Accurate data gathering

Leveraging inventory tools and methods



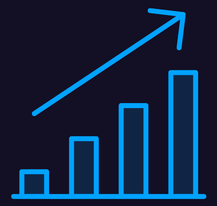
Ensuring accurate assessments.

Azure Total Cost of Ownership (TCO) Calculator

Common Pitfalls

Incomplete inventory

Ancillary Costs



Overlooking growth

Licensing oversights

Cost Management Tools

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Training Architect

Azure Cost Management and Billing

Comprehensive Dashboard

Azure Cost Management and Billing provides a set of tools that help users monitor, allocate, and optimize costs in Azure.

Cost Management Components

Cost Analysis - breaks down costs to understand spending patterns

Budgets - Set spending limits and monitor expenditures against the set thresholds.

Cost Alerts - Be notified when spending exceeds predefined limits.

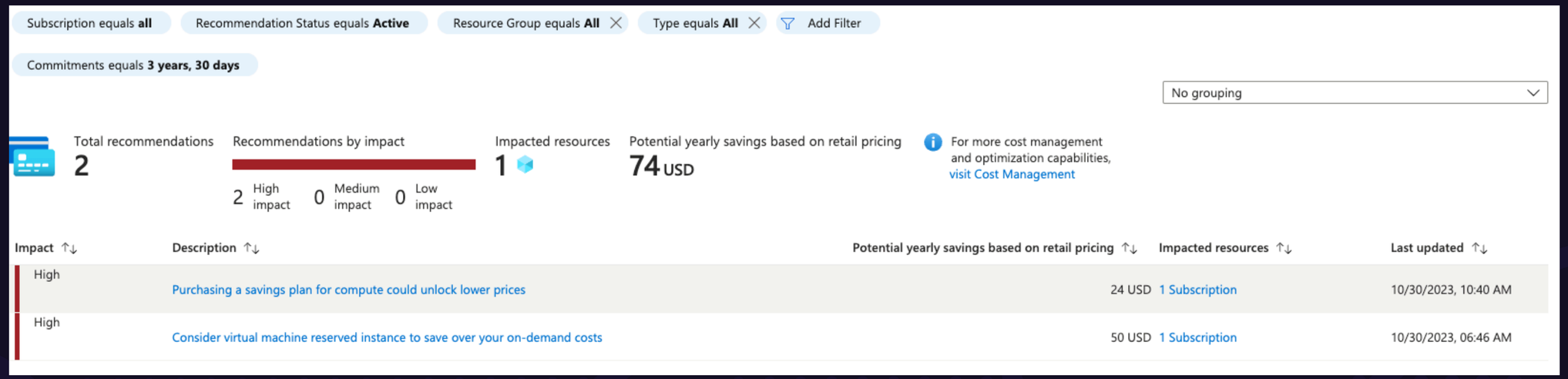
Cost Management Tools

Azure Advisor

Analyzes your deployed services and usage patterns to provide personalized recommendations.

Offers suggestions specifically for reducing costs, such as identifying idle resources or recommending reserved instances.

Provides recommendations for security, reliability, operational excellence, and performance.



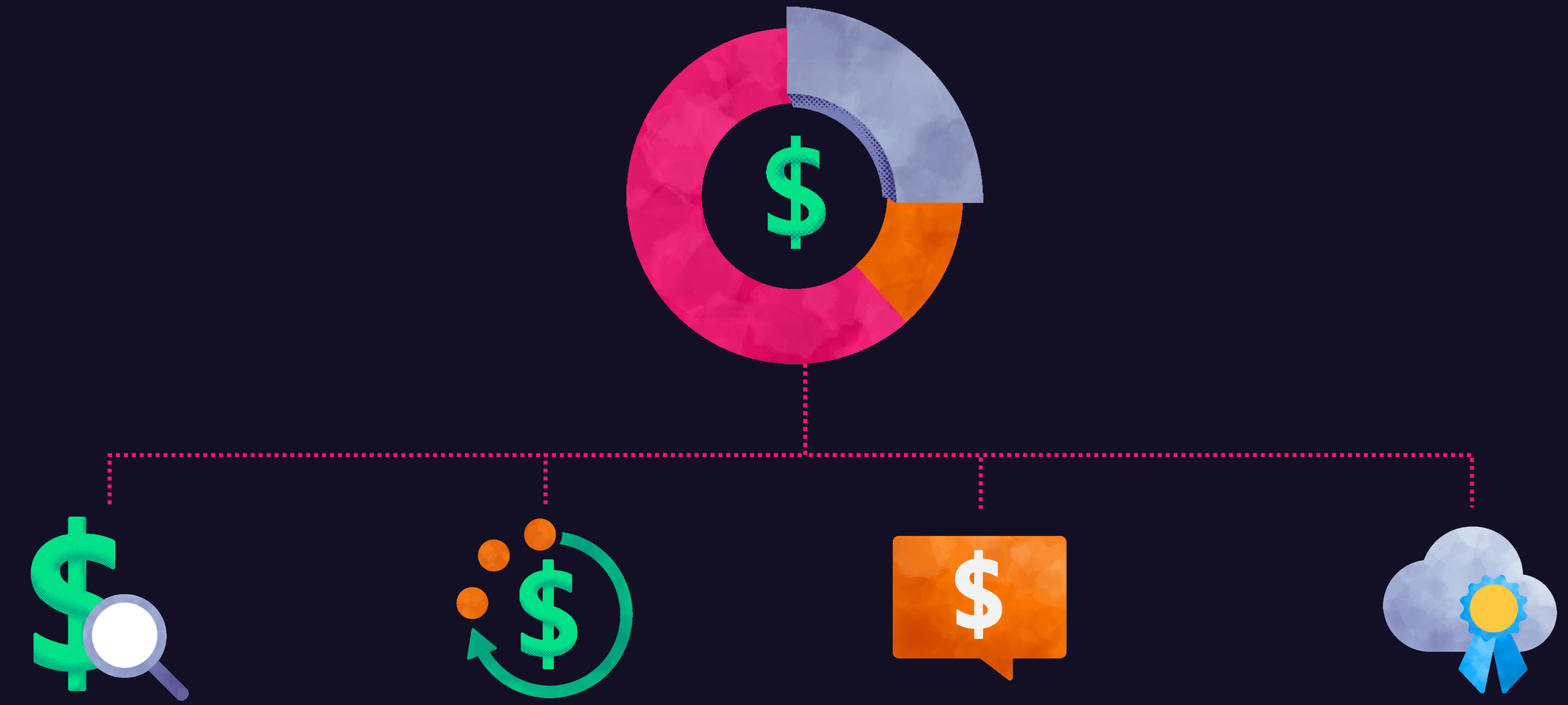
Azure Billing within Cost Management

Track Your Costs

Azure Billing within Cost Management allows you to see where your costs are coming from using the various logical groupings within Azure.

Cost Management Tools

A Suite Designed for a Sweet Deal



Azure Budgets and Reservations

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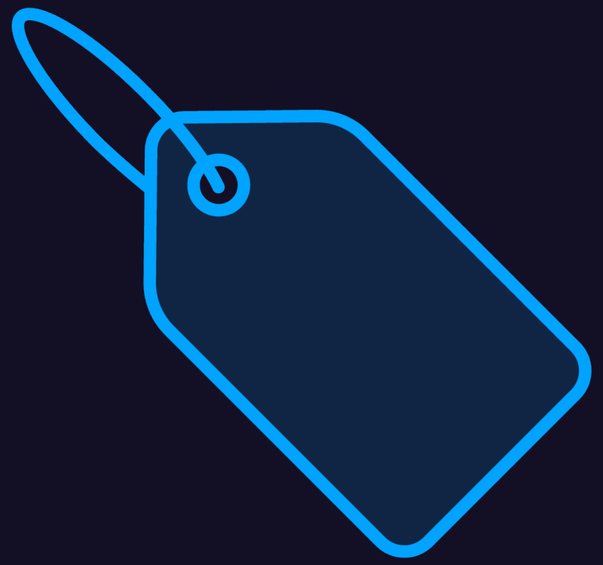
Training Architect

Key to Cost Management Success

Effective cost management ensures optimal utilization of resources and financial efficiency.

Budgets and Reservations are two key ways to mitigate cost sprawl and provide cost efficiency, respectively.

Tagging in Cost Management



Organizing Resources for Effective Cost Management

Name/value pairs applied to Azure resources.

Use tags to categorize resources by purpose, owner, environment, or other criteria.

Tags allow filtering of resources in cost analysis reports.

Setting Up and Managing Azure Budgets

Proactively Monitor and Control Azure Spending

Set spending limits before deploying to take a proactive approach to managing your costs.

You can set budgets at various levels, depending on where you want to set specific limits: subscription, resource group, and even down to the resource level.

Budget Alerts and Actions

Staying Ahead of Your Cloud Expenses

Alert Criteria: 70% of the budget

Notification Channels: email, Azure portal, or other integration (like Slack)

Automated Actions: Azure Logic Apps can be triggered to perform actions on alert (e.g., shut down a VM, scale in a Web App)

Understanding Azure Reservations

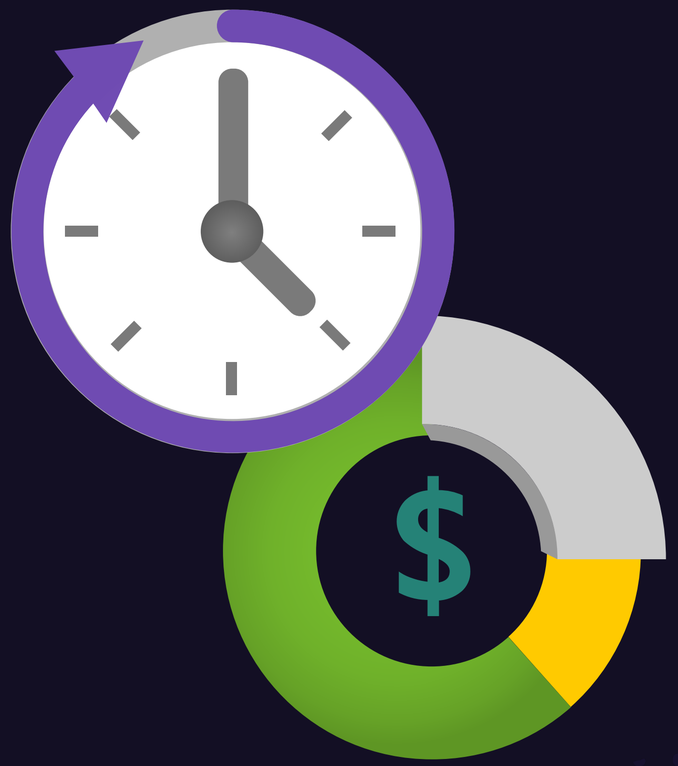
Committing to Azure for Savings

Prepaying for one or three years of specific Azure resources.

Significant cost savings compared to pay-as-you-go pricing.

Can be applied to VMs, SQL databases, Cosmos DB, and more.

Managing and Optimizing Azure Reservations



Maximizing Return on Azure Investments

Monitor your reservation with Azure Cost Management.

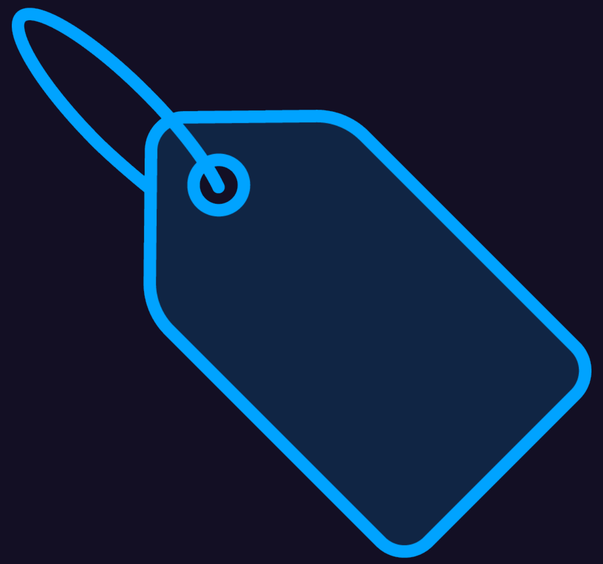
Modify reservations based on evolving needs.

Review and adjust based on newly discovered usage patterns.

Azure Cost Allocation and Recommendations

Mike Boorman
Training Architect

Tagging Resources for Cost Allocation



Organizing Your Azure Resources

Name/value pairs assigned to Azure resources.

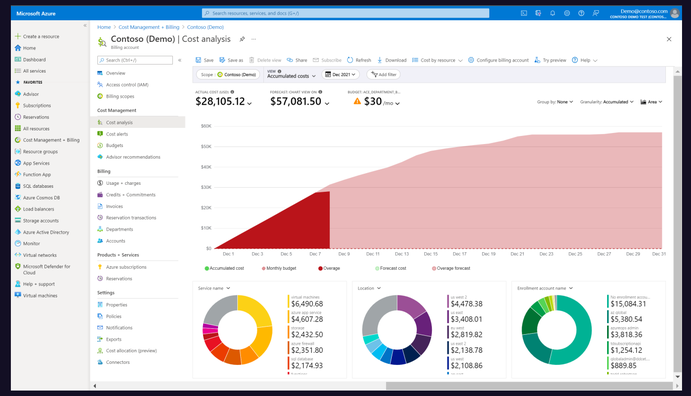
Use tags to **categorize resources** by purpose, owner, environment, or even project.

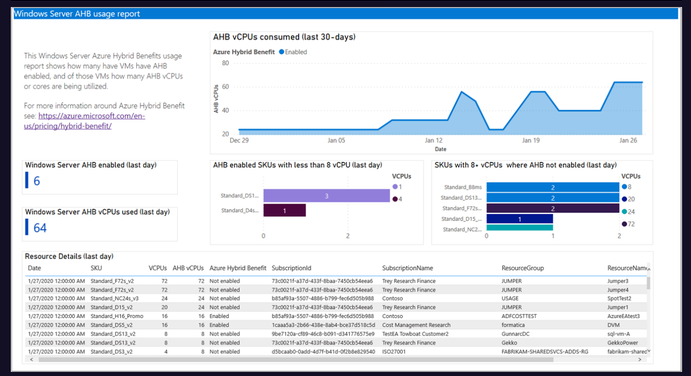
Tags allow **filtering of resources** in cost analysis reports.

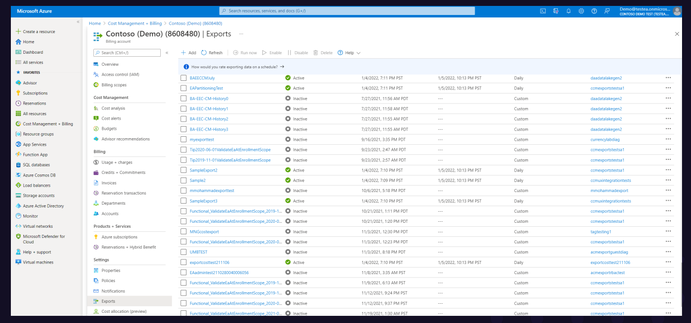
Consistent tagging strategy across resources assists accurate cost allocation.

Azure Cost Allocation and Recommendations

Cost Allocation Reports







** Images courtesy of Microsoft*

Gaining Insights into Your Azure Expenditure

Detailed breakdowns of Azure costs based on specific criteria.

Reports can use various **visuals** like pie charts and cost trend lines.

Use Power BI for additional data manipulation and even export to other tools.

Useful for showing and managing cost accountability **across resource spaces.**

Overview of Azure Advisor

Overview of Azure Advisor

Personalized Cloud Consultant

Tool that provides personalized best practices to optimize Azure deployments.

Four areas of recommendation: Cost, Security, Reliability, and Performance.

Continuously analyzes resource configurations and usage telemetry.

FREE

FREE

FREE

Implementing Cost-Saving Recommendations

Optimizing Your Azure Financials

Identifies idle **resources**, suggests reserved instances, and more.

Provides actionable **steps** to resolve potential issues and/or implement new efficiencies.

Continuously analyzes resource configurations and usage telemetry.

The Synergy of Tags and Advisor

Tags

- Granular categorization
- Consistent framework
- Extensive flexibility

+

Advisor

- Real-time recommendations
- Holistic view
- Tailored advice

Informed decision-making

Automated workflows

Continuous refinement

Best Practices

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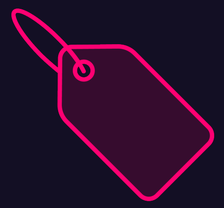
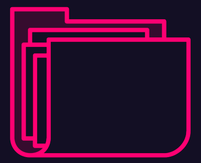
Training Architect

Best Practices

Organizing Azure Resources



Assign tags to resources for categorization and metadata.

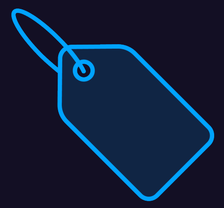


Tags facilitate organization, identification, and management of resources.

Assist in cost tracking and analysis.

Best Practices

Effective Tagging Strategies



Consistency in Tagging

Tagging for Cost Management

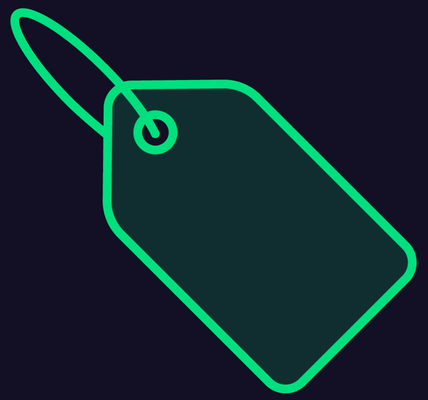
Regular Review and Cleanup

Best Practices

Maximizing the Benefits of Tags

Integration with Azure Tools

Azure Cost Management
Azure Policy



Effective Tagging

Project
Department/Owner

Exam Tips: Cost Management in Azure

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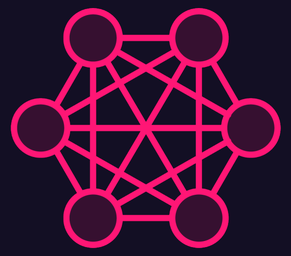
Defining Cost Management in Azure

Cost Management in Azure is understanding and controlling where and how resources are being used and billed.

Unmonitored cloud expenses can lead to significant unplanned costs.



Azure offers several tools for cost management that include: Azure Cost Management & Billing, Azure Advisor, and Azure Budgets.

Exam Tips: Cost Management in Azure

Subscriptions in Cost Management

An agreement with Microsoft enabling access to its cloud services.
A boundary that delineates resource usage, access, and billing.

Every Azure service consumed is billed to its associated subscription.

Azure Hierarchy includes Management Groups to help manage subscriptions.

Multiple types of subscription offers to fit spending budgets and patterns.

Pricing models to help conserve cost when applicable.

Exam Tips: Cost Management in Azure

Factors that Influence Cost

Resource Type

Location

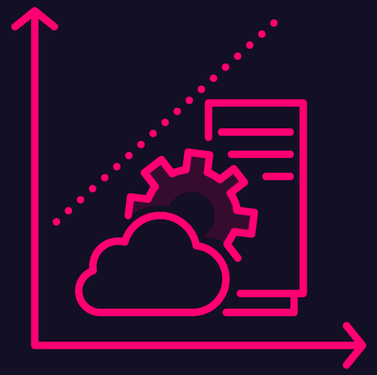
Service Tier

Hybrid Benefit

Reserved Instance

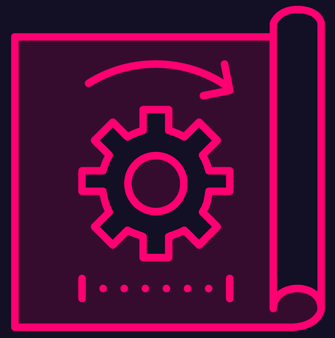
Azure Pricing Calculator

Used to estimate cost of Azure resources and services.



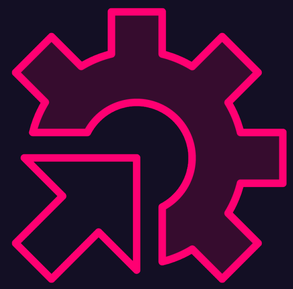
Forecast

Calculate estimates as a baseline from which your Azure costs will likely grow.



Plan

Plan your deployment by exploring the different options for resources.



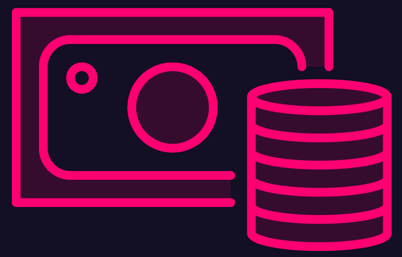
Refine

Adjust by using Azure Pricing Calculator regularly.

Exam Tips: Cost Management in Azure

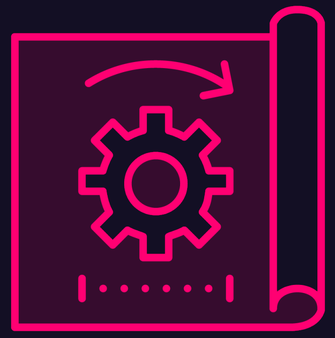
Azure Total Cost of Ownership (TCO) Calculator

The financial cost of the Cloud: assessing when it makes sense.



Full Assessment

Provide a comprehensive cost estimate of direct and indirects costs.



Plan

Plan your deployment by assessing the biggest cost picture possible.

Prioritize

Make adjustments to prioritize deployments and migrations.

Exam Tips: Cost Management in Azure

Cost Management Tools

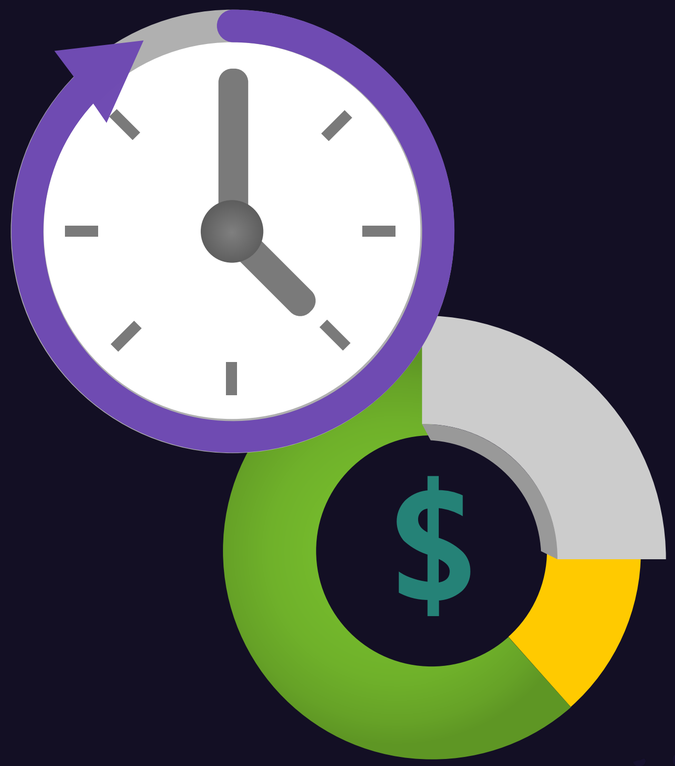
Cost Analysis

Budgets

Cost Alerting

Advisor

Azure Budgets and Reservations



Maximizing Return on Azure Investments

Monitor your reservation with Azure Cost Management.

Modify reservations based on evolving needs.

Review and adjust based on newly discovered usage patterns.

Azure Cost Allocation and Recommendations

Tags	+	Advisor
Granular categorization		Real-time recommendations
Consistent framework		Holistic view
Extensive flexibility		Tailored advice

Informed decision-making

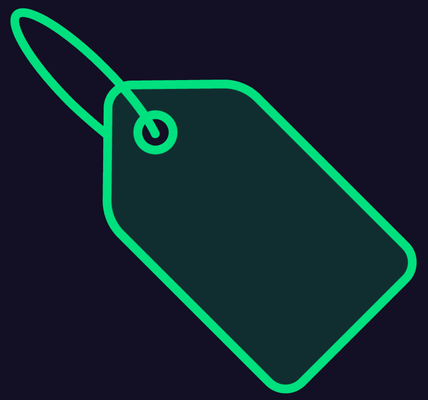
Automated workflows

Continuous refinement

Best Practices

Integration with Azure Tools

Azure Cost Management
Azure Policy



Effective Tagging

Project
Department/Owner

Defining Governance and Compliance

Mike Boorman
Training Architect

Governance in Azure

Structuring Azure Environments

The decision-making model around how Azure resources are managed and accessed.

Involves implementing policies and initiatives to enforce organizational requirements.

Applied to the various organizational groupings in Azure.

Compliance in Azure

Regulatory and Organizational Adherence

Ensuring Azure services and operations **meet** required **trust commitments** and adhere to regulations.

Regulations are usually internationally, regionally, or industry-based.

Balancing Structure and Adherence in Azure

Governance as a Foundation

Provides the framework and boundaries for operating within Azure.

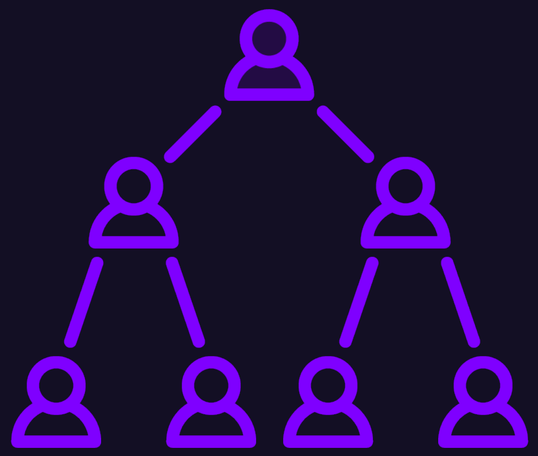
Compliance as a Checkpoint

Ensures that services and products meet external and internal standards.

Revisiting Azure Hierarchy

Mike Boorman
Training Architect

Azure Hierarchy in Governance and Compliance



Effective Organization Promotes Effective Governance

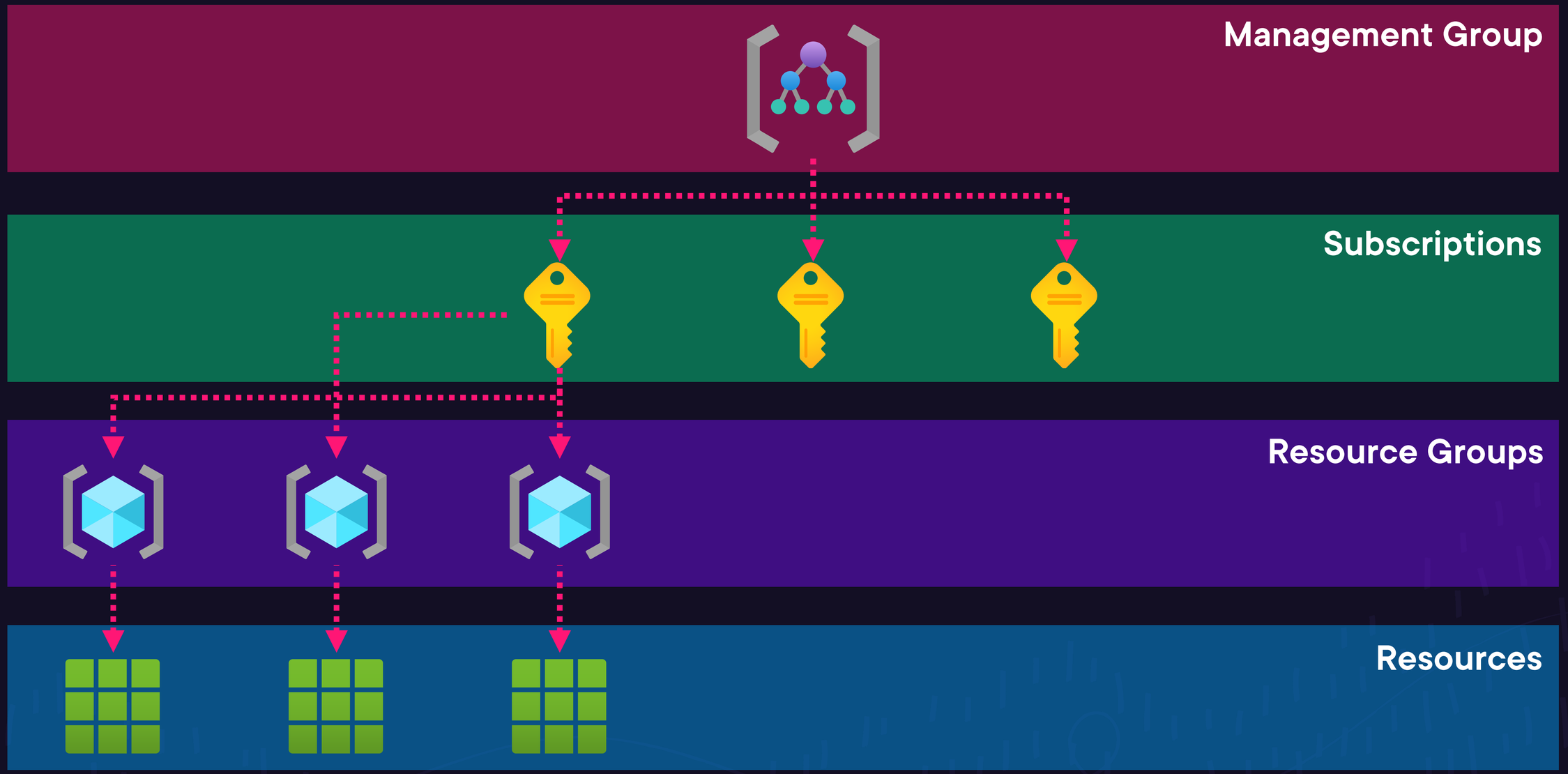
Provides granular control over resources

Maintains an organized structure

Layered approach to governance

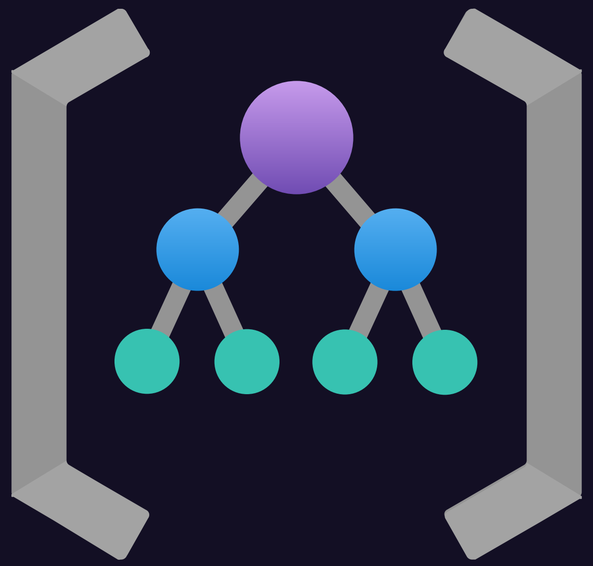
Revisiting Azure Hierarchy

Hierarchy Structure Recap



Revisiting Azure Hierarchy

Inheriting Governance



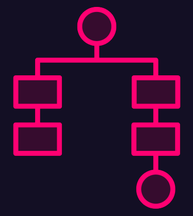
The tenant Root level is for organization-wide application.

The Management Group level is for broad level application.

- By default applies to all Subscriptions in the Management Group.
- By default applies to all Resource Groups in the Subscriptions.
- By default applies to all Resources in the Resource Groups.

The Subscription level is often for department, customer, or project level application.

Hierarchy Principles



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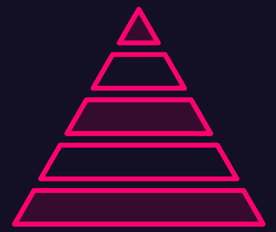


Resources inherit what is applied at higher levels.

Target regulatory compliance that refers to environments.

Azure Policy

Mike Boorman
Training Architect

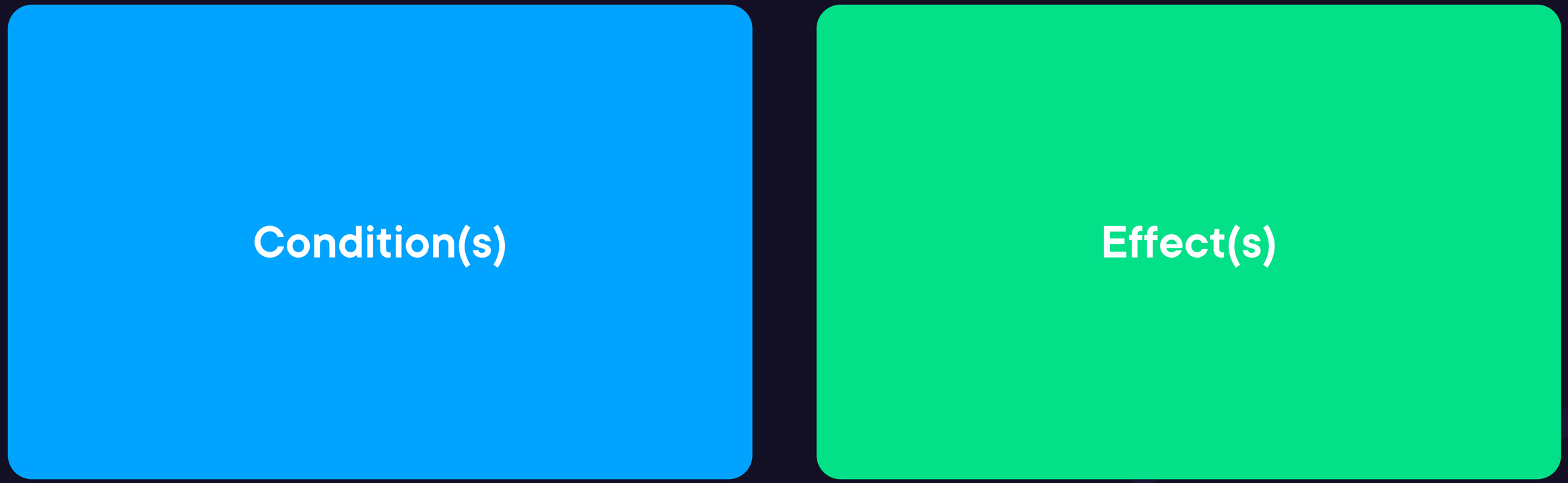
Azure Policy

The Backbone of Compliance and Governance

Azure service that enables the creation, assignment, and management of policies to enforce rules and effects over Azure resources and services.

Azure Policy

Anatomy of a Policy



Azure Policy

Anatomy of a Policy

Parameters that define what the policy is performing.

Assignment that defines where the policy is performing.

Effect(s)

Azure Policy

Anatomy of a Policy

Condition(s)

Audit

Enforce

Azure Policy

Anatomy of a Policy


```
{
  "properties": {
    "displayName": "Audit virtual machines without disaster recovery configured",
    "policyType": "BuiltIn",
    "mode": "All",
    "description": "Audit virtual machines which do not have disaster recovery configured. To learn more about disaster recovery, visit https://aka.ms/asr-doc.",
    "metadata": {
      "category": "Compute",
      "version": "1.0.0"
    },
    "parameters": {
     "policyRule": {
      "if": {
        "field": "type",
        "in": [
          "Microsoft.Compute/virtualMachines",
          "Microsoft.ClassicCompute/virtualMachines"
        ]
      },
      "then": {
        "effect": "auditIfNotExists",
        "details": {
          "type": "Microsoft.Resources/links",
          "existenceCondition": {
            "field": "name",
            "like": "ASR-Protect-*"
          }
        }
      }
    }
  },
  "id": "/providers/Microsoft.Authorization/policyDefinitions/0015ea4d-51ff-4ce3-8d8c-f3f8f0179a56",
  "type": "Microsoft.Authorization/policyDefinitions",
  "name": "0015ea4d-51ff-4ce3-8d8c-f3f8f0179a56"
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```


Without Azure Policy there is no governance or compliance in Azure.


```
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  "type": "Microsoft.Authorization/policyDefinitions",
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}
```


Restricting Resource Access with Resource Locks

Mike Boorman
Training Architect

Preventing Unintended Changes

Reducing the “Oops”

Resource locks are used to prevent accidental deletion or modification of critical Azure resources.

Resource Lock Types

Read-Only: Allows viewing of a resource but not modification.

Delete: Prevents the resource from being deleted but allows modifications.

Resource Scopes

Subscriptions

Resource Groups

Individual Resources

Applying Resource Locks

Can be implemented using:

- Azure Portal
- Azure CLI
- Azure PowerShell

Resource Read-Only vs Delete Differences

Use Read-Only locks for resources where changes could be disruptive (like production databases).

Use Delete locks for resources that should not be deleted but may need regular updates (like a virtual network).

Locks applied at any level are inherited by all resources within that scope.

Resource Lock in Practice

Scenarios:

- Protecting production environments
- Maintenance windows

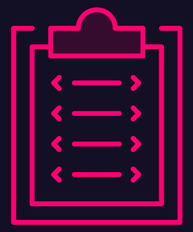
Impact on Operations:

- Deployment considerations
- Disaster recovery

Managing Resource Locks with Policies and Automation

Integration with Azure Policies

Automated Lock Management



Audit and Compliance

Publishing Governance and Compliance

Mike Boorman
Training Architect

Tracking and Reporting for Compliance

Robust reporting helps to ensure governance and meet compliance requirements.

Compliance status, resource utilization, and audit logs are all **reports relevant to governance**.

Knowing Azure's reporting capabilities for governance and compliance **is half the battle**!

Essential Tools for Governance Reporting

Azure Monitor - collect, analyze, and act on telemetry data.

Azure Activity Log - audit operation and changes in/to Azure resources.

Azure Security Center - provide unified security management

Azure Policy - enforcement and reporting of enforcement

Publishing Governance and Compliance

A Unified Data Governance Service

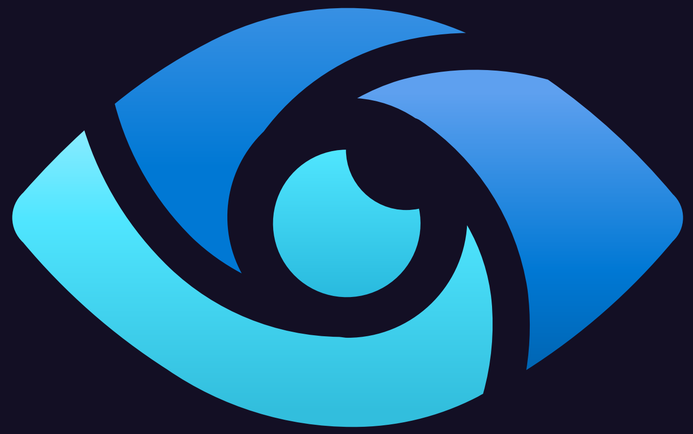
Publishing Governance and Compliance

A Unified Data Governance Service

Microsoft Purview

Microsoft Purview

Mike Boorman
Training Architect



What is Microsoft Purview?

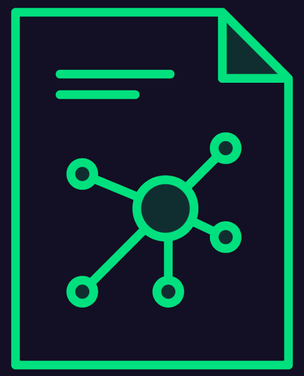
A comprehensive data governance solution that extends across all data sources, whether on Azure, other cloud environments, or on-premises.

Provides visibility, data discovery, and governance.

Microsoft Purview

Centralizing Data Governance and Discovery

Data Discovery and Classification



Data Mapping and Cataloging

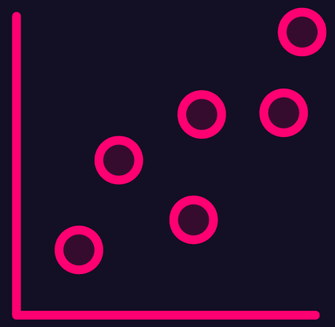
Data Lineage

Microsoft Purview

Ensuring Regulatory Adherence

Compliance Tools

Risk Assessment



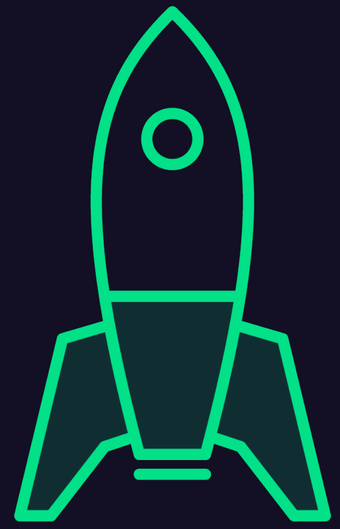
Reporting and Insights

Microsoft Purview

Integration and Extensibility

Seamless Integration

Integrates a wide range of data sources across cloud ecosystems and platforms.



Leveraging AI and Automation

Data discovery and governance capabilities enhanced with AI and ML.

Securing Resources with Microsoft Defender for Cloud

Mike Boorman
Training Architect

What Is Microsoft Defender for Cloud?

Assess, evaluate, and actualize

Major public cloud providers

Extend into private datacenters

What Is Microsoft Defender for Cloud?

Real-World Application

Unified Management of Security Posturing

Connect Clouds

Azure, AWS, GCP, private

Evaluate Status

Security posture

Take Action

Recommend and remediate

Security Posture

OBSERVATION

Visibility and accessibility

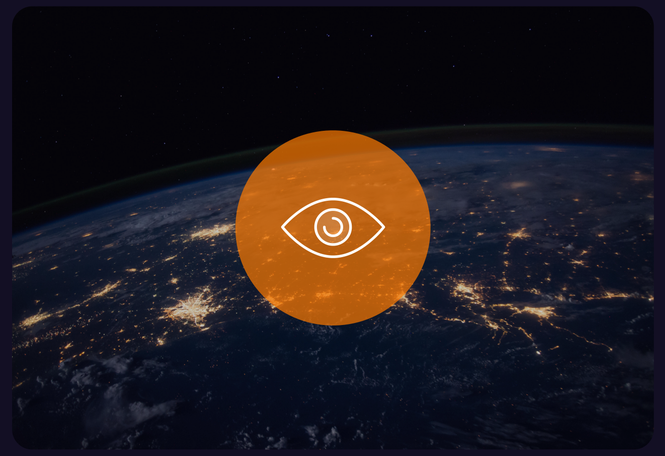
REMEDIATION

Point-in-time and continuous

EVALUATION

Auditing and alerting

Cloud Security Posture Management



Visibility

Security requires being seen.

Assessment

Security requires being evaluated.

Recommendations

Security requires being changed.

Securing Resources with Microsoft Defender for Cloud

Cloud Workload Protection

Monitoring

Security requires diligence.

Alerting

Security requires rapid notice.

Remediation

Security requires action.

Seeing the Broad Picture

CSPM	VS	CWPP
Connect your resources		Inspect your resources
Evaluate against best practice		Evaluate cost
Comply with industry requirements		Point-in-time remediation
Initiate plan for alignment		Real-time assessment

Seeing the Broad Picture

CSPM

- Connect your resources
- Evaluate against best practice
- Comply with industry requirements
- Initiate plan for alignment

+

CWPP

- Inspect your resources
- Evaluate cost
- Point-in-time remediation
- Real-time assessment

Securing Resources with Microsoft Defender for Cloud

A Multi-Cloud CSPM and CWP Platform

Connected Platforms

Multiple clouds connected together along with privately-owned datacenters.

Unified Security

Security capabilities that span similar products across platform types.

Consistent Action

Alerting and remediation both point-in-time and real-time.

Three Vital Needs When Securing Environments

1. **Assess**
   Evaluate, report, and recommend.
2. **Secure**
   Align to requirements.
3. **Protect**
   Observe, alert, and remediate.

Three Vital Needs When Securing Environments

Assess Evaluate, report, and recommend.

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Align to requirements.

Protect
Observe, alert, and remediate.

Four Features of Microsoft Defender for Cloud

Assess and Strengthen

See your assets and know what their current posture is.

Manage Compliance

Compare your posture to industry standards.

Enable Threat Protection

Use tools to send critical information from resources.

Detect Vulnerabilities

Automated response to security issues that arise.

Understanding Governance Reports in Purview and Defender for Cloud

Mike Boorman
Training Architect

Demo

- Explore Microsoft Purview interface
- Explore Microsoft Defender for Cloud

Summary

- Microsoft Purview provides oversight and insight into your environment.
- Microsoft Defender for Cloud provides comprehensive monitoring, response, and recommendations for your environments.

Exam Tips: Governance and Compliance in Azure

Mike Boorman
Training Architect

Defining Governance and Compliance

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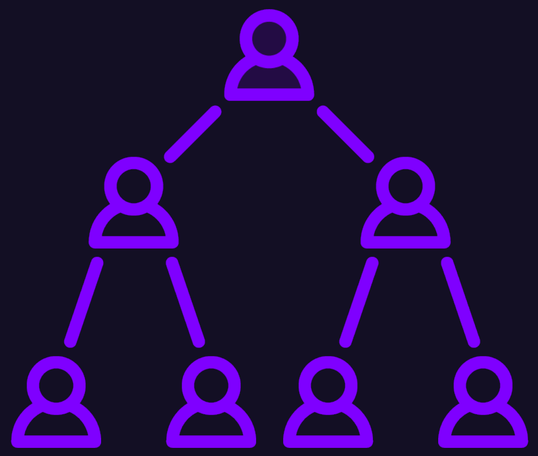

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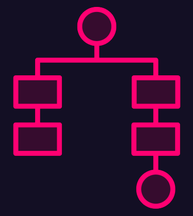

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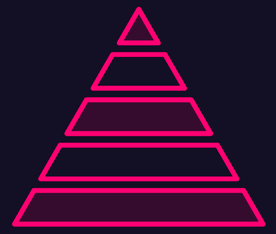

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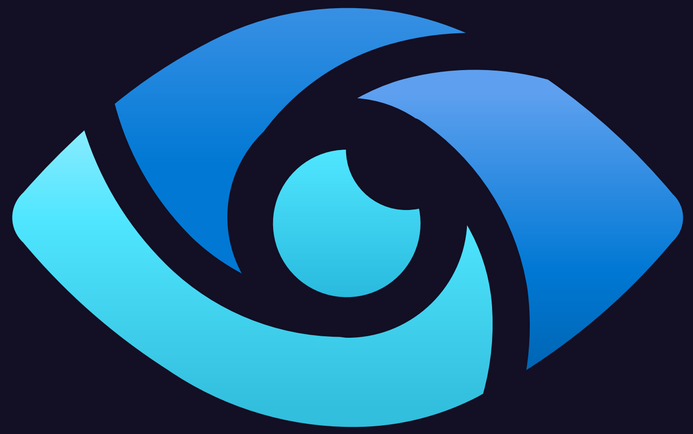

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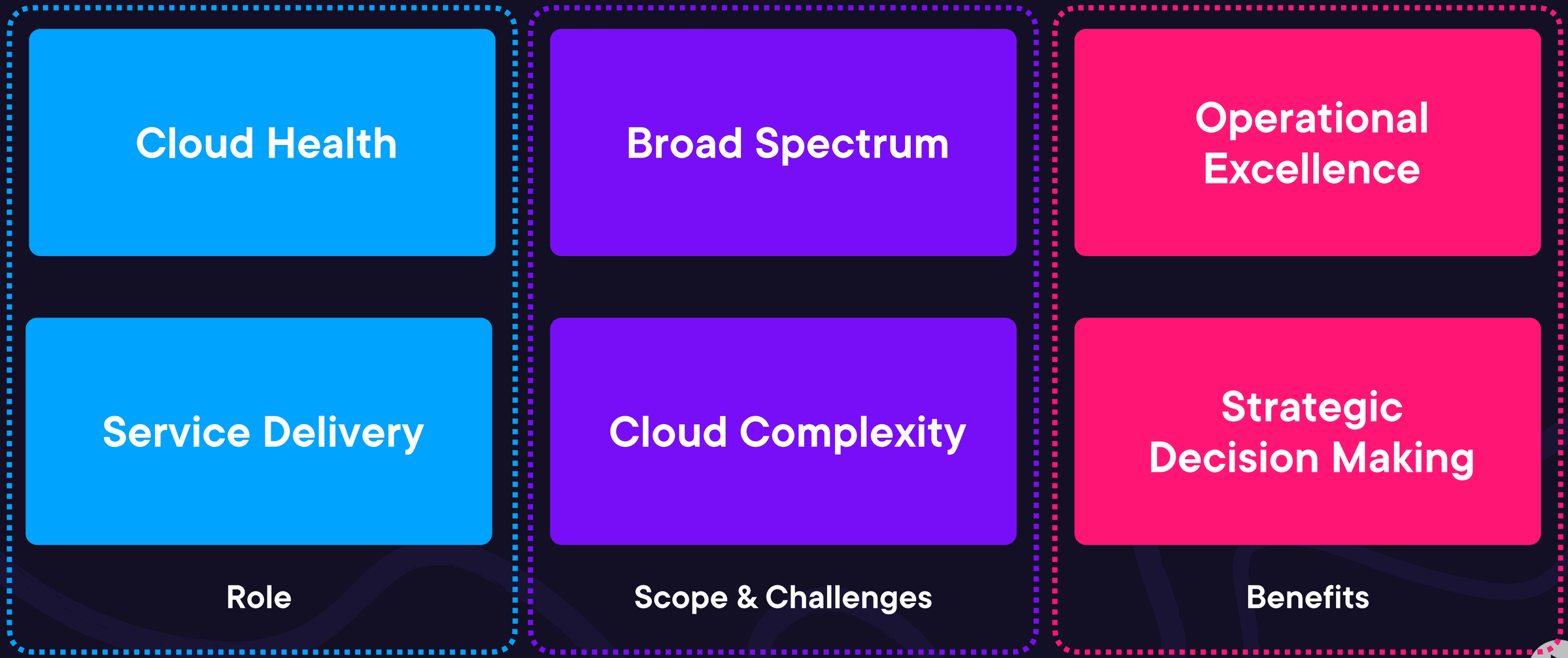
Automated response to security issues that arise.

Monitoring and Management in Azure

Mike Boorman
Training Architect

Fundamentals of Monitoring and Management in Azure



Approaches to Monitoring in Azure

Proactive

Anticipating and addressing issues before they become problematic.

Reactive

Responding to issues after they have occurred.

Effective Resource Management Strategies

- **Structured Approach**
- **Policy and Compliance**

Resource Organization and Governance

- **Reduce Manual Tasks**
- **Consistent Management**

Automation and Efficiency

- **Continous Monitoring**
- **Integrated Security**

Compliance and Security Management

The Significance of Monitoring and Management in Azure

A Robust Azure Environment

An integrated approach to monitoring and management, combined with proactive strategies and responsive actions, is necessary for a robust and reliable cloud environment.

Continuous learning and adaptation is also necessary as both threats and tools evolve.

Azure Automation

Mike Boorman
Training Architect

Azure Automation is...

A set of tools to automate complex and repetitive tasks.

Capable of integrating with Azure and non-Azure tooling.

Automating Security Management

Azure Automation can...

- Perform automated security response
- Enforce policy
- Report configuration sprawl
- Implement desired state configuration

Azure Automation

Compliance Monitoring and Reporting

Automated Compliance Checks

Perform regular compliance checks for adherance to regulatory standards and internal policies.

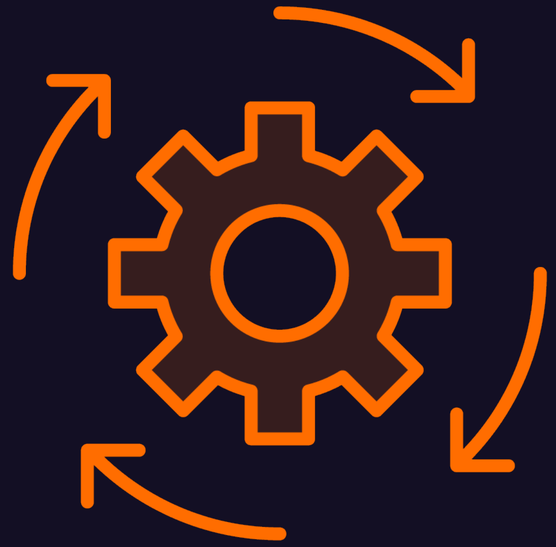
Reporting Automation

Automatically generate and distribute compliance reports for increased transparency.

Azure Automation

Enhancing Governance with Automated Workflows

Resource Lifecycle Management



Workflow Standardization

The Impact of Azure Automation on Governance

Optimizing Governance in the Cloud

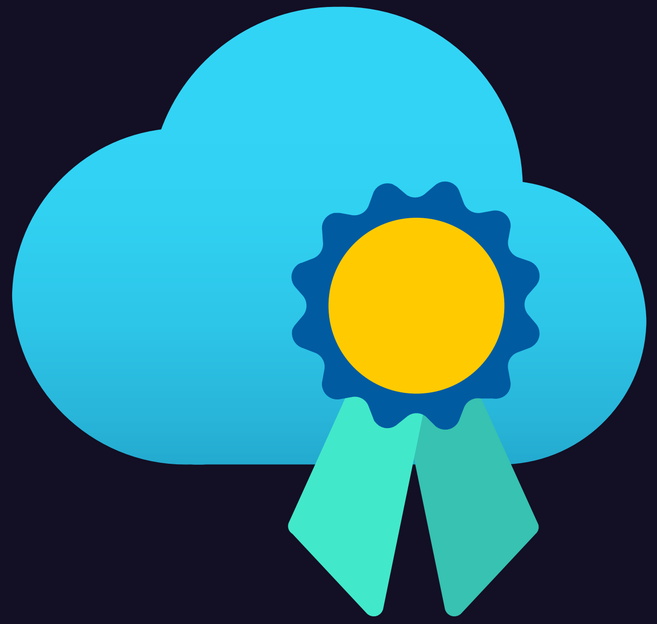
- Automated patching enhances security management.
- Automated reporting aids in governance.
- Automated security response mitigates threats.
- Standardized workflows provide consistent approach.

Azure Advisor

Mike Boorman
Training Architect

Azure Advisor

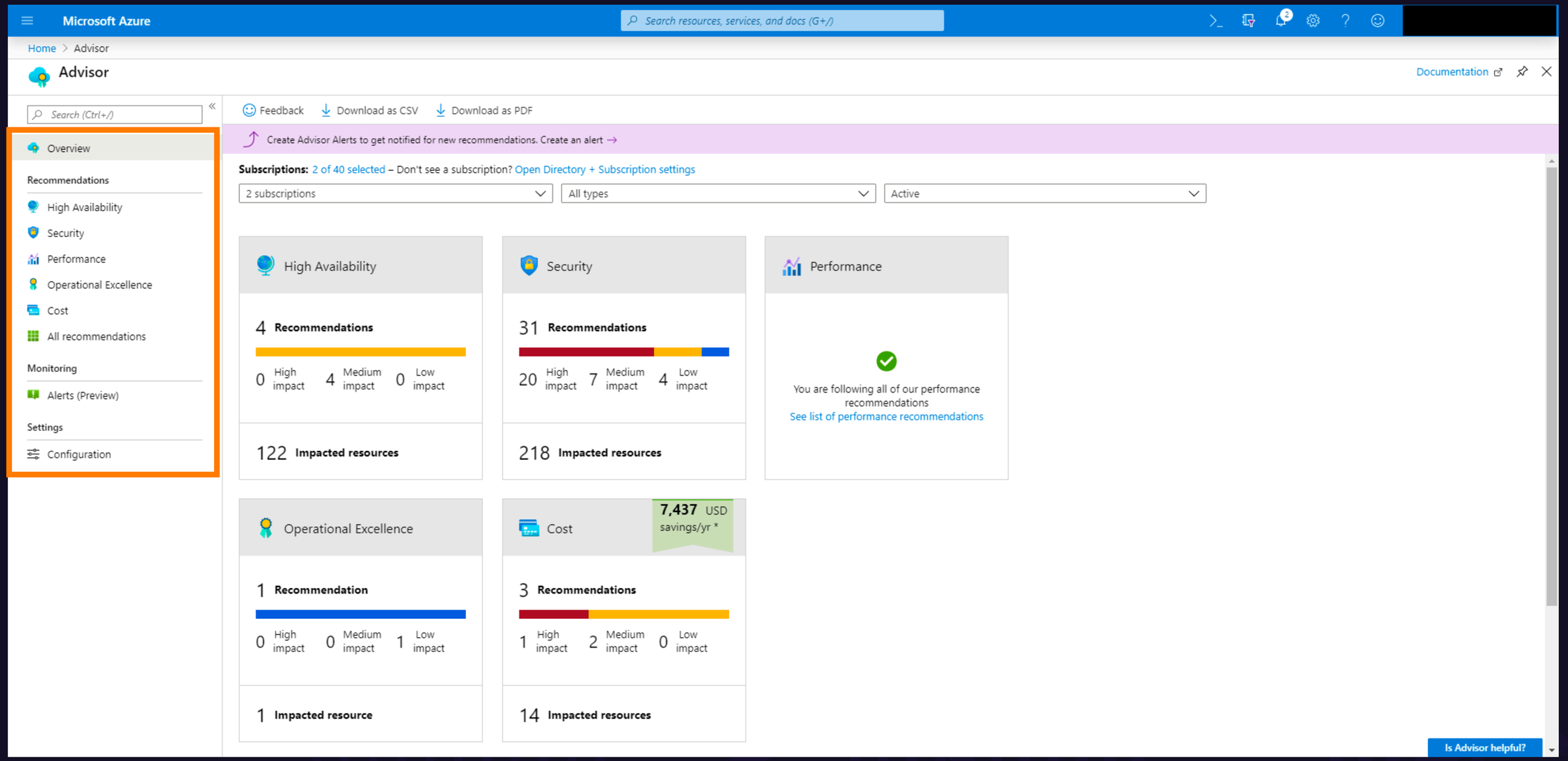
Want Some Free Advice?



Personalized Cloud Consultant

- Provides guidance around best practices
- Offers suggestions on cost optimization
- Recommends performance improvements
- Brings attention to possible reliability concerns
- Notifies of potential security vulnerabilities

Azure Advisor



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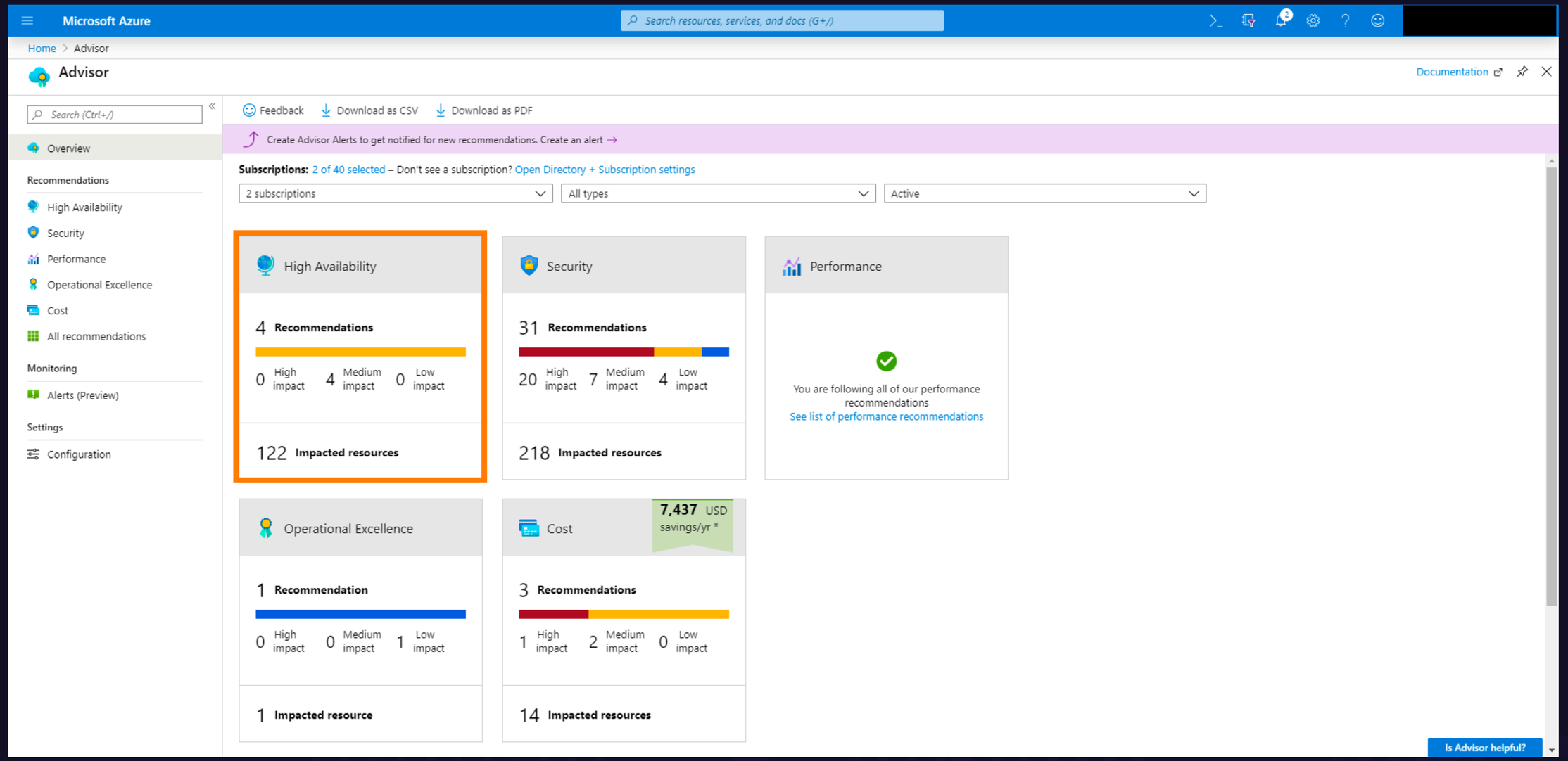

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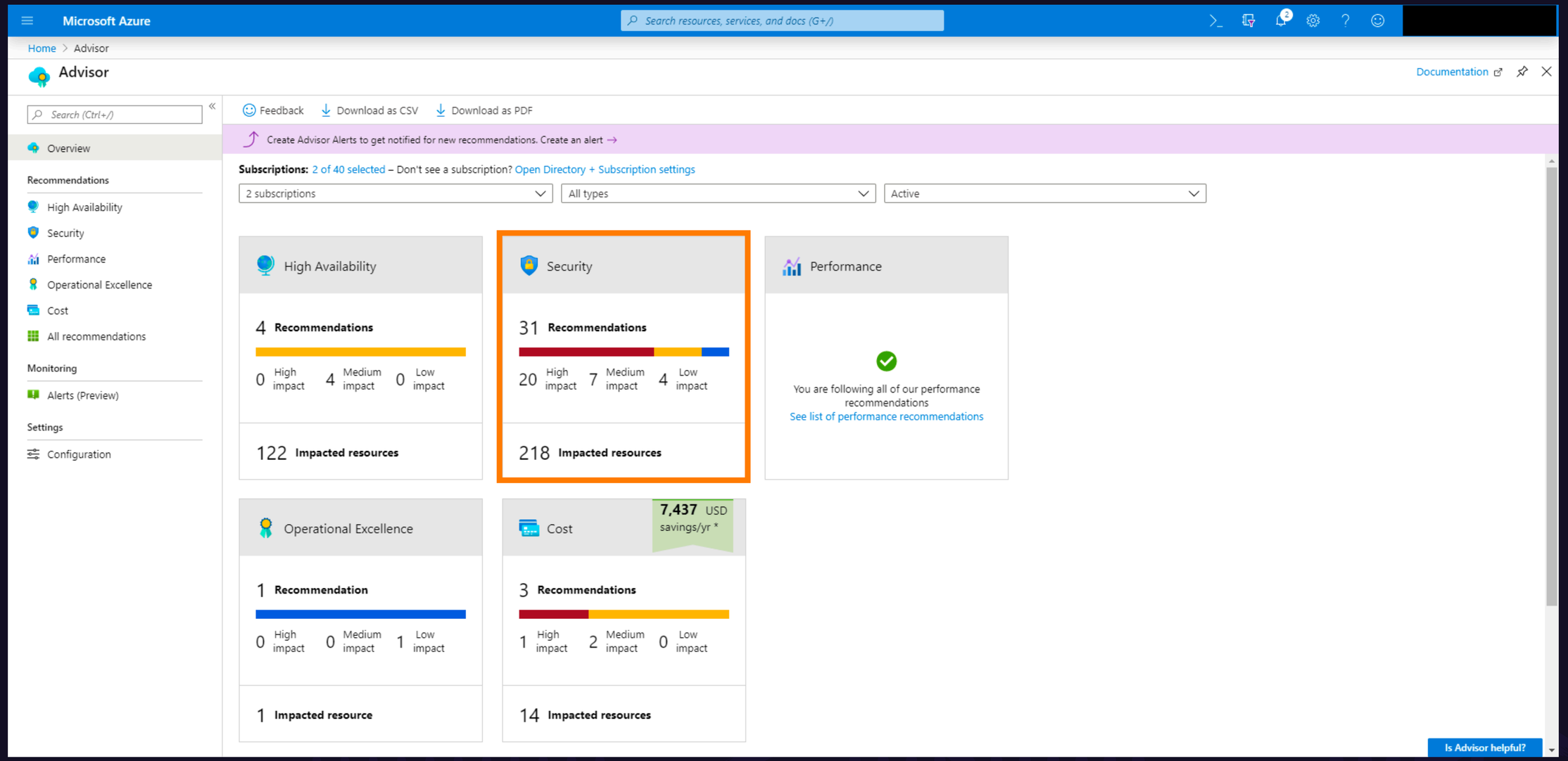

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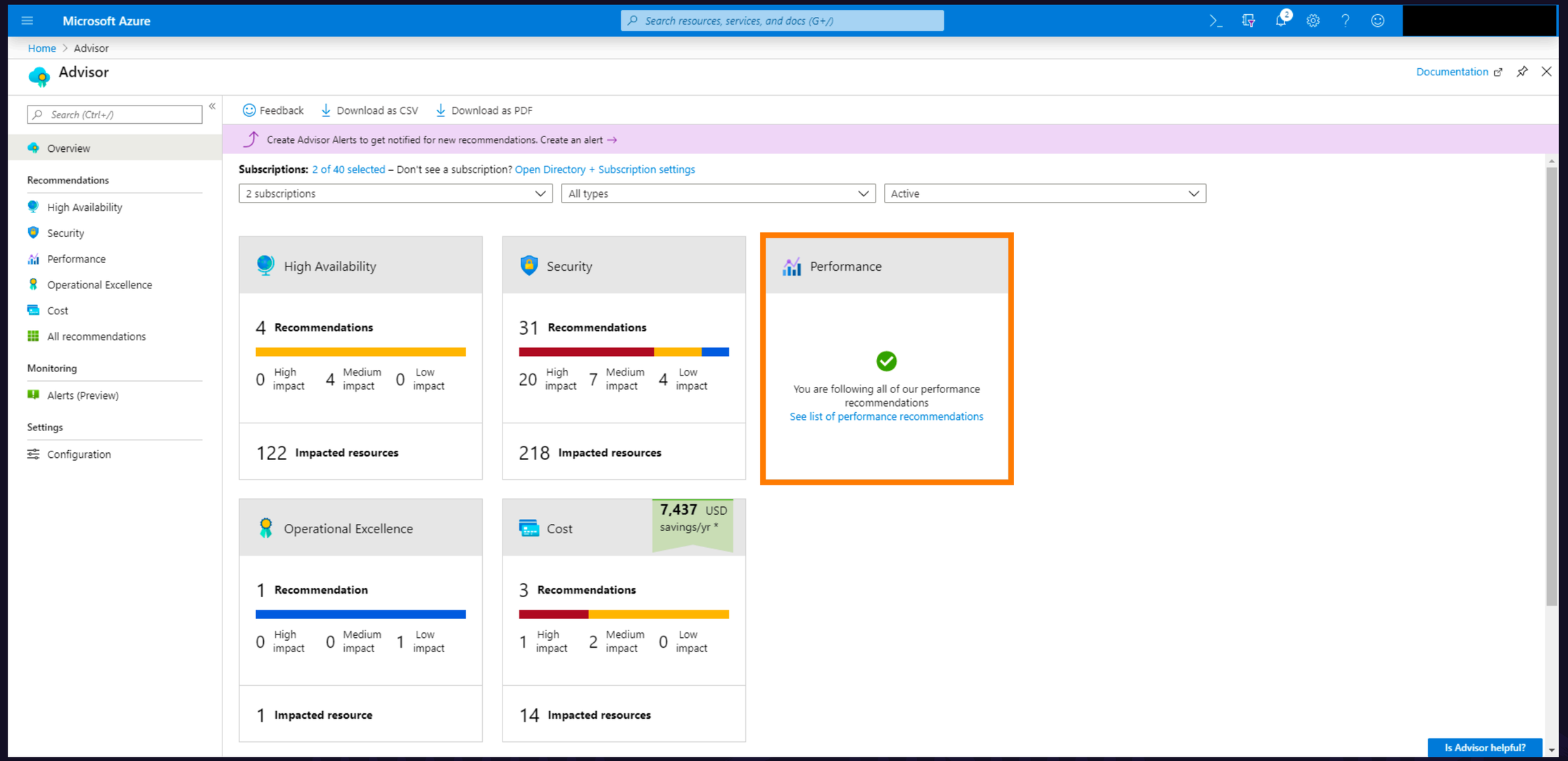

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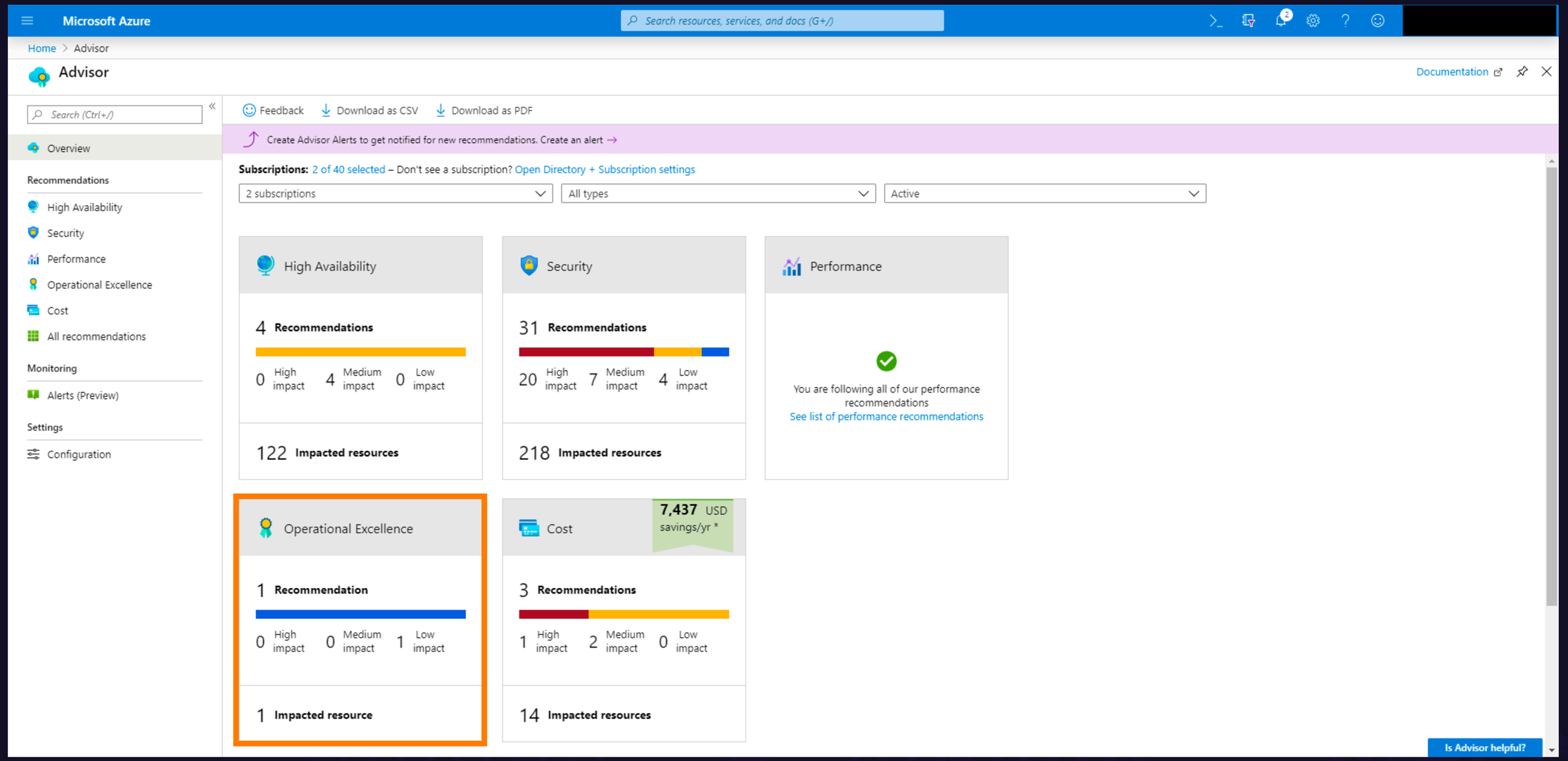

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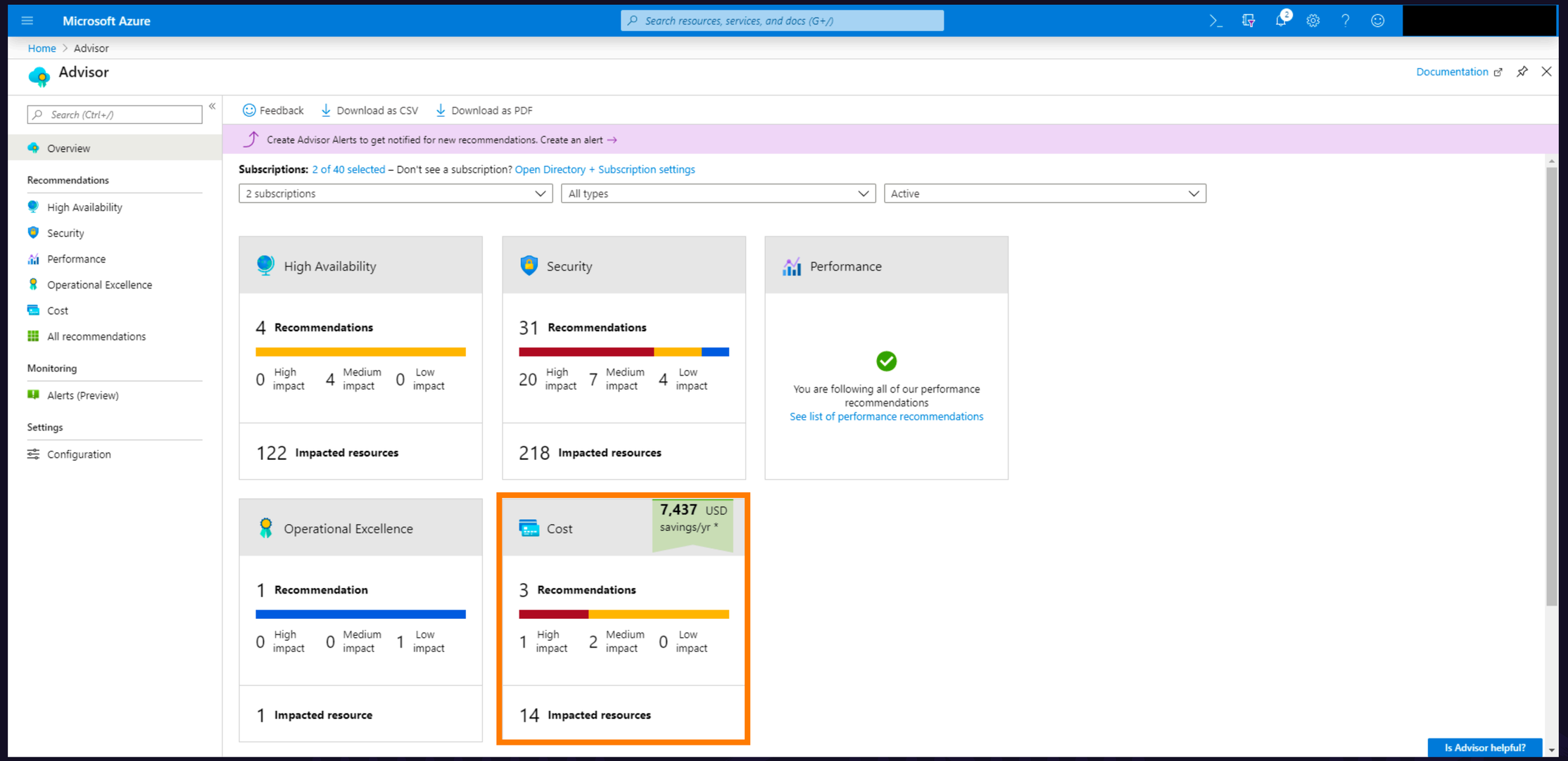

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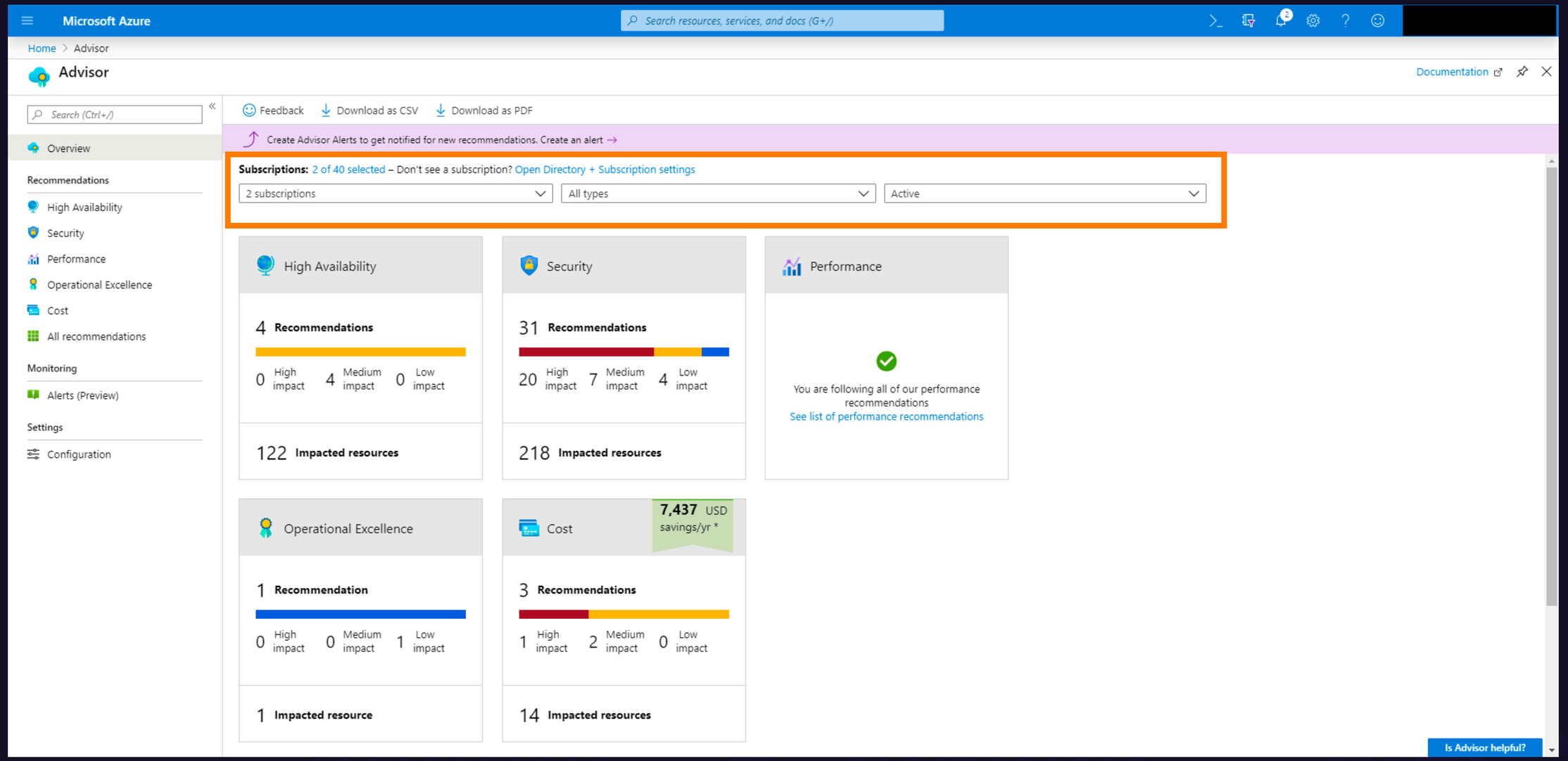

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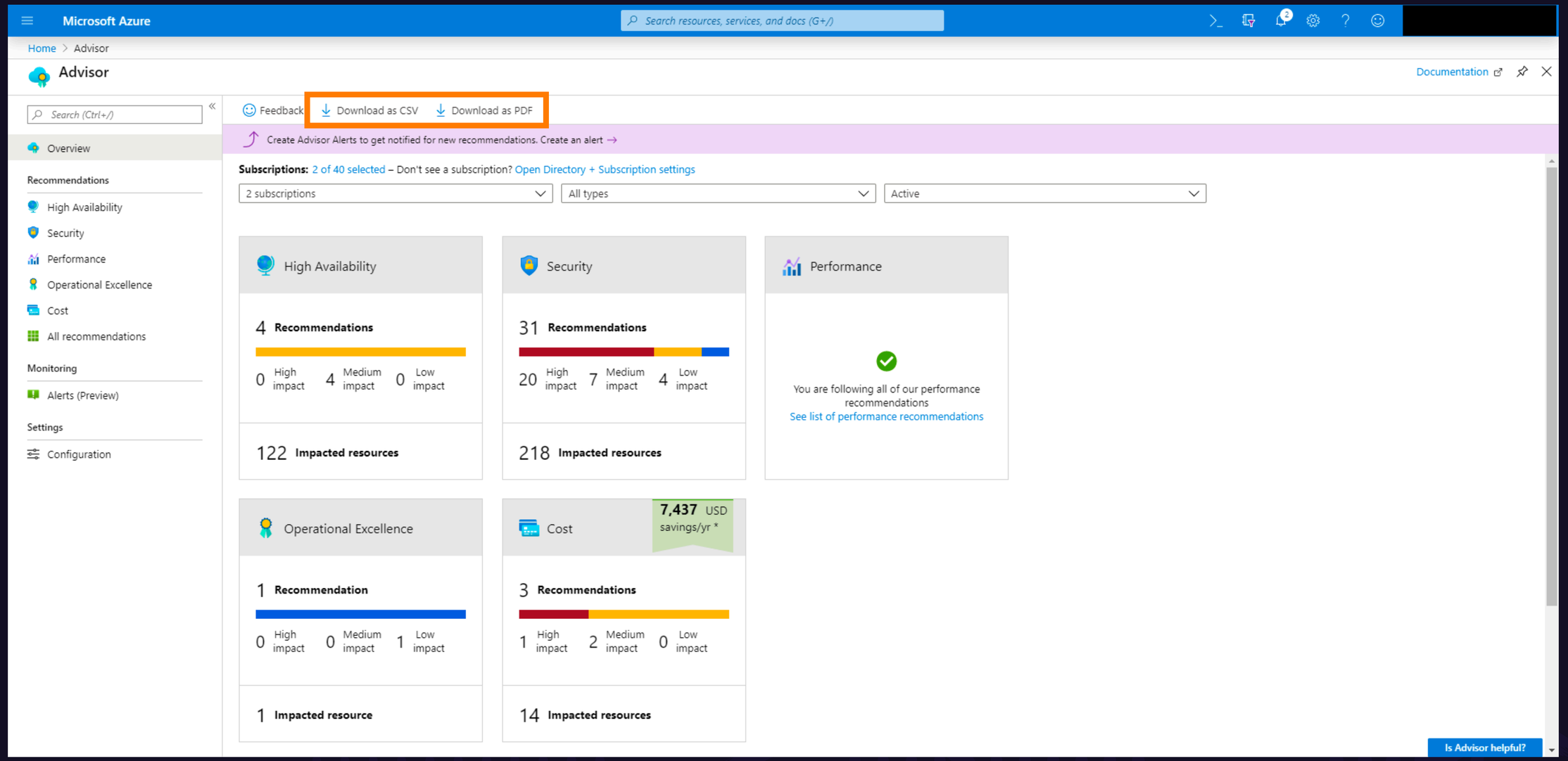


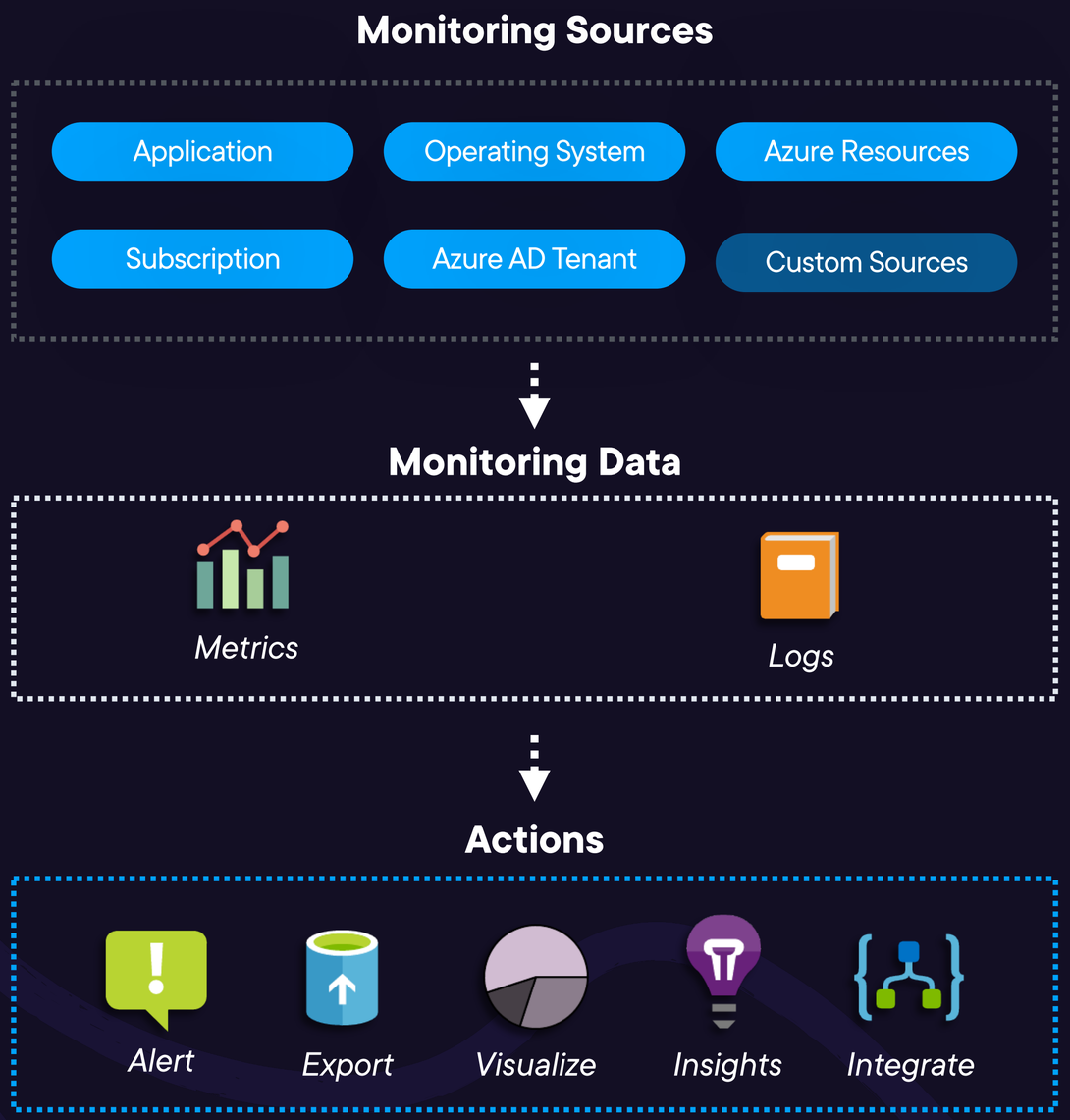
Azure Advisor

Azure Monitor Overview

Mike Boorman
Training Architect

Azure Monitor Overview

Integrated and Centralized Monitoring



Proactive Monitoring and Response

Monitor Everything

Centralized management interface for monitoring workloads anywhere.

Respond

Various capabilities support acting on monitoring information in many ways.

Understand the Big Picture

Monitoring from code through to the platform provides holistic insights.

Azure Monitor Overview

Real-World Application and Integration

Metrics Explorer

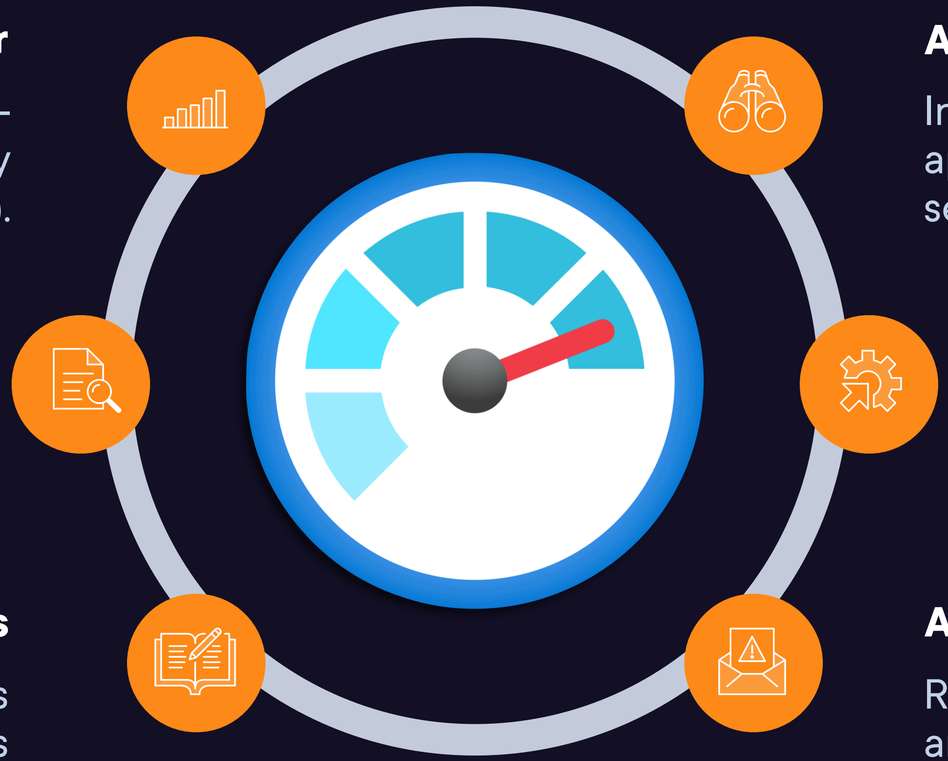
View and graph small, time-based data (e.g., CPU or memory utilization).

Azure Monitor Logs

Analyze and explore verbose logging information. Can be queried with Kusto Query Language.

Activity Logs

Logs of REST API write actions performed on Azure resources (retained for 90 days by default).



Application Insights

Intelligent analytics of applications (both client and server side).

Monitoring Insights

Resource-specific monitoring solutions (e.g., Azure Monitor for Containers).

Alerts and Action Groups

Respond to monitoring data with an alert management system, including automation.

Log Analytics

Mike Boorman
Training Architect

Definition and Purpose

What is Azure Log Analytics?

- A tool within Azure Monitor.

- It collects and analyzes telemetry data (like event logs, performance data) from cloud and on-premises environments.

- IT operations, troubleshooting, and monitoring performance metrics.

Log Analytics

Data Collection

Source from Azure resources and services (VM, storage, database, logs)

Gather event logs, performance metric, applications logs, error logs

Agent-based or Agentless collection depending on the source

Data consolidation and storage via Log Analytics Workspaces

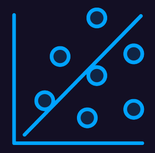
Configurable to specific sources, frequency, retention, etc.

Log Analytics

Query Language - Kusto Query Language (KQL)

Designed to be easy to read and understand

Perform complex data analysis tasks



Analyze both real-time and historical data

Create custom dashboards with visualizations

Log Analytics

Integration with Azure Services

Log Analytics

Integration with Azure Services

Log Analytics

Integration with Azure Services

Log Analytics

Workspaces in Azure Log Analytics

Fundamental Container

Data Segregation and Management

Customization and Scalability

- Can be customized in terms of data retention policies.
- Scalable and can handle varying volumes of data.
- Can be adjusted accordingly, without impacting existing configurations and data.

Azure Monitor Alerting

Mike Boorman
Training Architect

Azure Monitor Alerts and Alerting

- Alerts are mechanisms for automatically notifying users or triggering actions based on specified metrics or log data conditions in Azure resources.
- Alerting is the process of running those mechanisms as intended.
- Enables proactive management of health and performance.

Azure Monitor Alerting

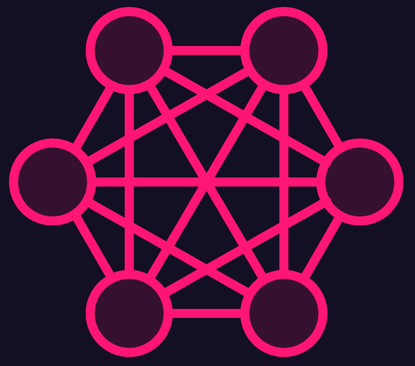
Types of Alerts in Azure Monitor

Metric

Alert on real-time metrics for Azure services.

Log

Trigger based on the results of a log query run at regular intervals.



Activity

Alert on Azure subscription-level events.

Components of an Azure Monitor Alert

Target Resource

Threshold (Conditions)

Severity Level

Signal (Criteria)

Action Group

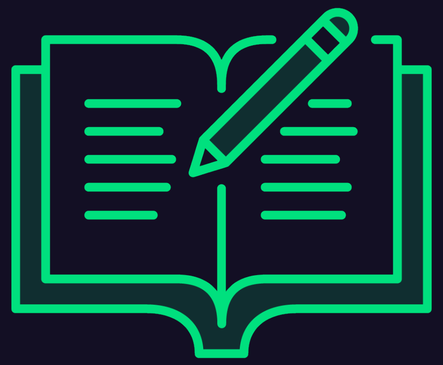
Alert Rule State

Azure Monitor Alerting

Action Groups

Definition

A collection of actions to be executed when the alert is triggered.



Example

Actions can include sending an email, triggering an Azure Function, or calling a webhook.

Application Insights

Mike Boorman
Training Architect

Azure Monitor Application Insights

- Feature of Azure Monitor that is directed toward application performance management and monitoring.
- Provides insights into performance, availability, and usage of web applications.

Application Insights

Core Features

Telemetry Data Collection

Page views, user sessions, performance metrics

Analytics Tools

KQL, application map, user flows, live stream metrics, more

Application Insights

Integration with Applications

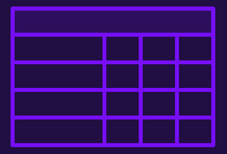
SDKs

Web

Desktop

Mobile

Performance



Real-time monitoring

Live Metrics Stream

Application Insights

Proactive Diagnostics and Alerts

Automated Alerting

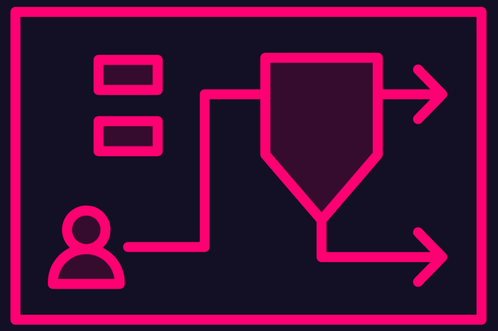
Create alerts for performance and availability.

Smart Detection Feature

Automatic identification of performance anomalies.

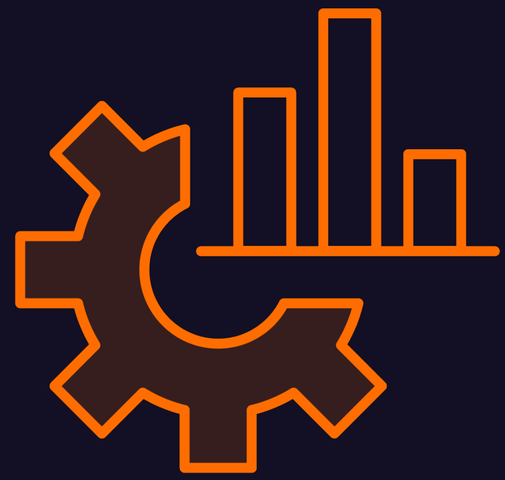
Application Insights

Visualizations and Reporting



Interactive Dashboards

Visualizing telemetry data and application performance.



Analytics Integration

Leverage Power BI for reporting and analysis.

Azure Service Health

Mike Boorman
Training Architect

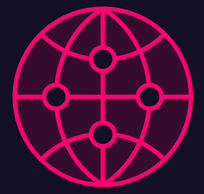
Azure Service Health

Definition Drop

Health Tracking in Azure

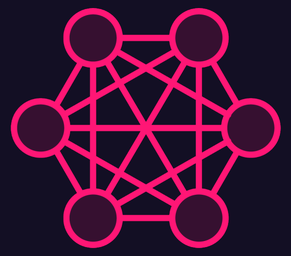
- Personalized health dashboard
- Real-time
- Historical

Key Features of Azure Service Health



Azure Status: global health of Azure services.

Service Health: personalized alerts and guidance.



Resource Health: deeper look into individual resource health.

Azure Service Health Alerts

Proactive Incident and Maintenance Notifications

- Incidents
- Maintenance
- Advisories
- Stay informed to respond quickly

Integrating Azure Service Health with Other Services

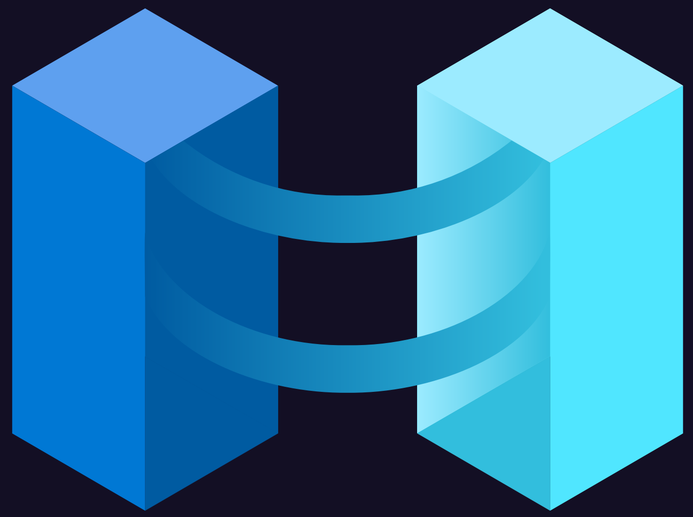
Enhanced Monitoring and Response

Azure Service Health

Integrating Azure Service Health with Other Services

Expanding Management with Azure Arc

Mike Boorman
Training Architect



Extending Azure Management

- Multi-cloud
- On-premises
- Hybrid
- Edge

Core Components and Features of Azure Arc

Servers: Windows and Linux operating systems, physical and virtual

Kubernetes: clusters running just about anywhere

Azure data services: cloud, on-premises, hybrid, and edge

SQL Server: extend Azure services to SQL servers, even outside Azure

Virtual Machines: provisioning and management

Benefits of Azure Arc

Unified Management

- Consistent management and governance across all infrastructures.
- Flexibility in deploying Azure services anywhere.

Expanding Management with Azure Arc

Use Cases of Azure Arc

Managing servers across on-premises and multi-cloud.

Implementing Azure data services in a hybrid environment.

Exam Tips: Monitoring and Management in Azure

Mike Boorman
Training Architect

@pluralsight | www.pluralsight.com

Monitoring and Management in Azure

A Robust Azure Environment

An integrated approach to monitoring and management, combined with proactive strategies and responsive actions, is necessary for a robust and reliable cloud environment.

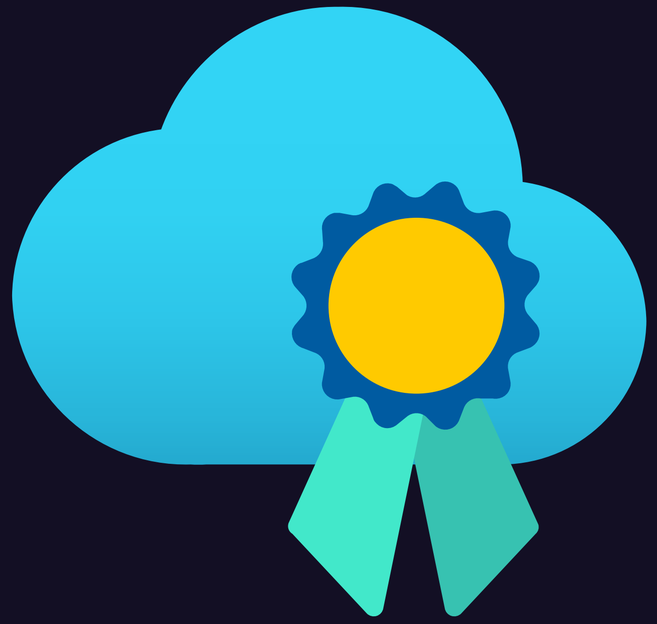
Continuous learning and adaptation is also necessary as both threats and tools evolve.

Azure Automation

Optimizing Governance in the Cloud

- Automated patching enhances security management.
- Automated reporting aids in governance.
- Automated security response mitigates threats.
- Standardized workflows provide consistent approach.

Azure Advisor



Personalized Cloud Consultant

- Provides guidance around best practices
- Offers suggestions on cost optimization
- Recommends performance improvements
- Brings attention to possible reliability concerns
- Notifies of potential security vulnerabilities

Azure Monitor Overview

Log Analytics

What is Azure Log Analytics?

- A tool within Azure Monitor.

- It collects and analyzes telemetry data (like event logs, performance data) from cloud and on-premises environments.

- IT operations, troubleshooting, and monitoring performance metrics.

Azure Monitor Alerting

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Exam Tips: Monitoring and Management in Azure

Application Insights

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Azure Service Health

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Azure Service Health

Proactive Incident and Maintenance Notifications

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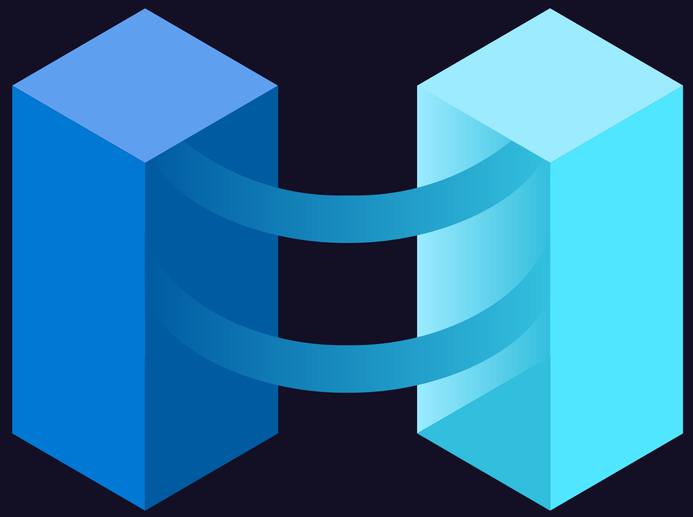
- Maintenance
- Advisories
- Stay informed to respond quickly

Expanding Management with Azure Arc



Extending Azure Management

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- On-premises
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Expanding Management with Azure Arc

Unified Management

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Revisiting Defense in Depth

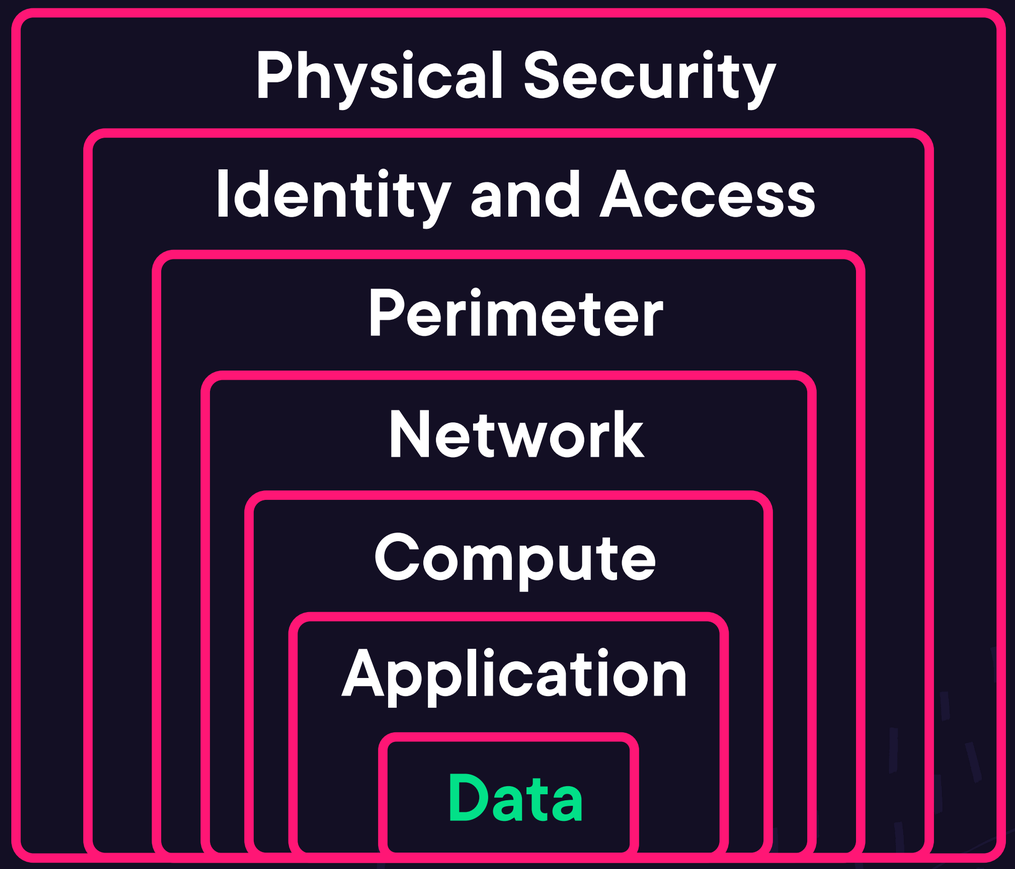
Mike Boorman
Training Architect

Overview

OBJECTIVE: mitigate unauthorized data access

METHOD: layered defense

If one layer is breached, other layers can still stop attacks



Castle Example

Multiple layers to protect the king

Revisiting Defense in Depth

Governance, Compliance, and Monitoring Example

Captain of the Guard that patrols and checks everything.

Revisiting Defense in Depth

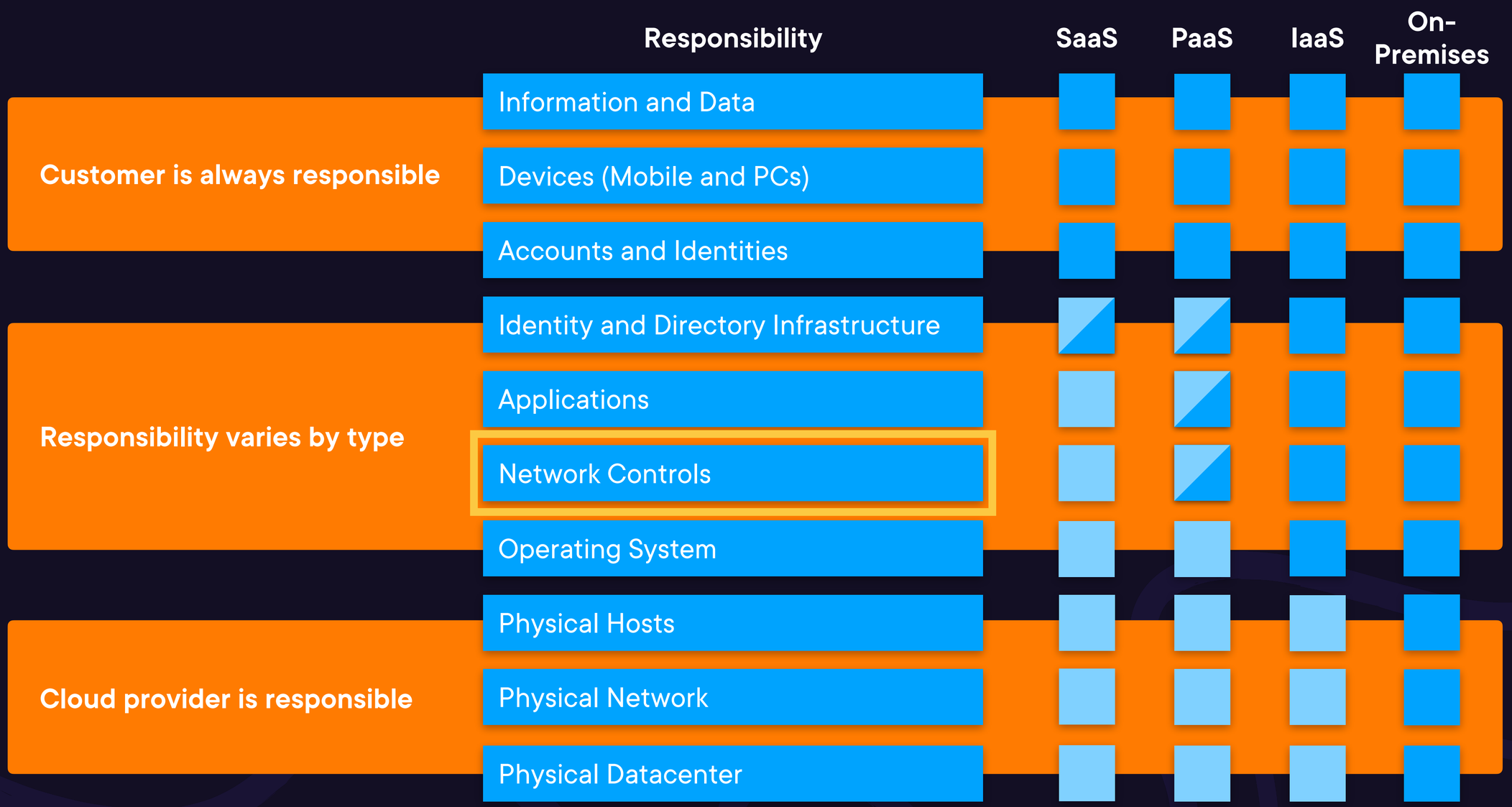
Understanding Defense in Depth Layers

Revisiting Defense in Depth

Understanding Defense in Depth Layers

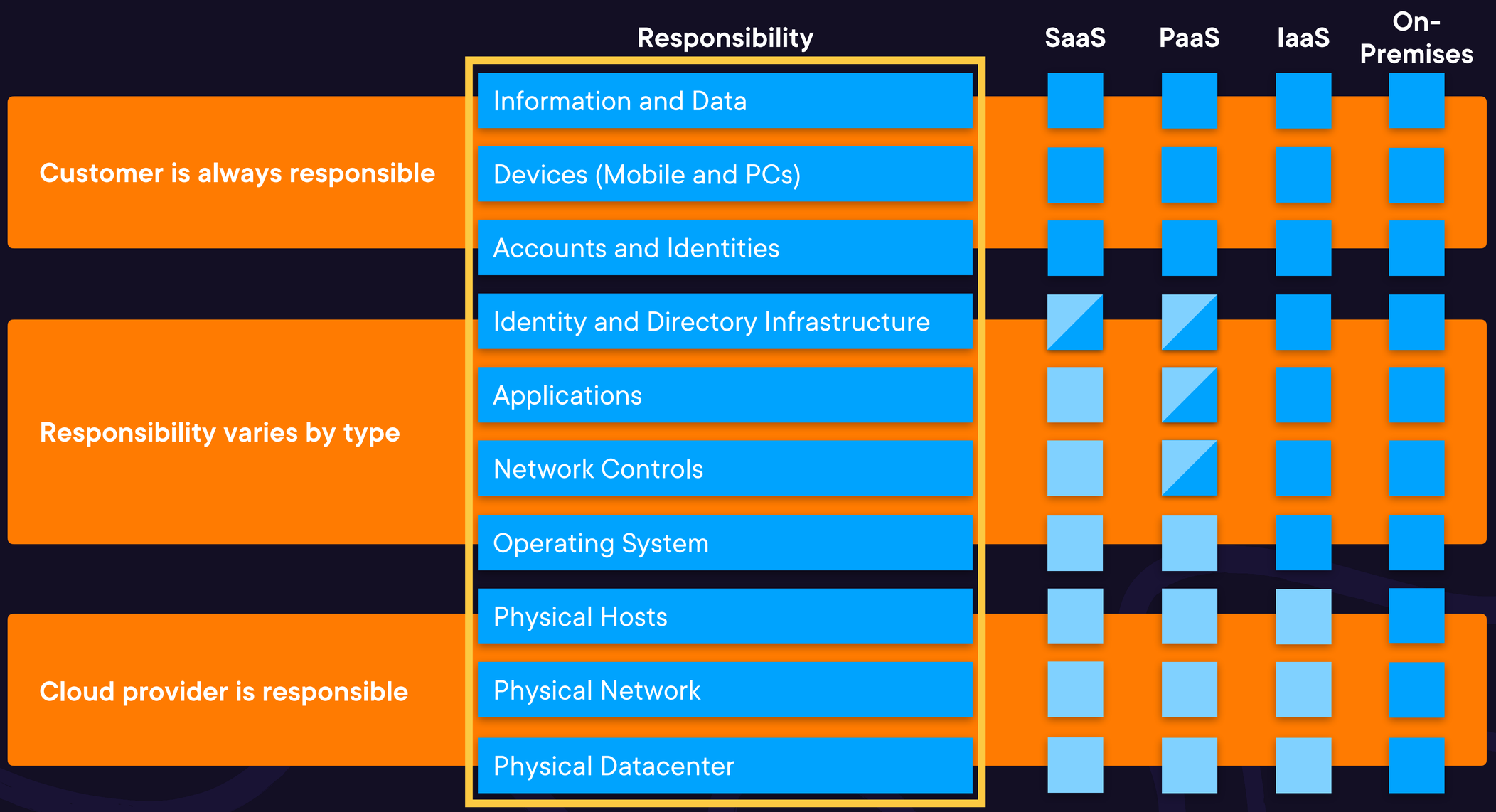
Revisiting Defense in Depth

Understanding Defense in Depth Layers



Revisiting Defense in Depth

Understanding Defense in Depth Layers



Summary

At the governance, compliance, and monitoring levels, layered defense is considered across the entire environment.

Understand the governance tools available and know what compliance standards you are held to.

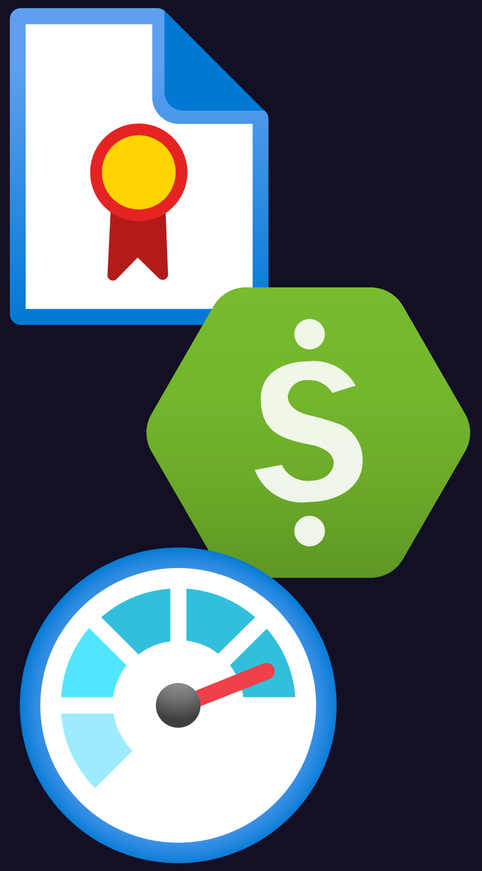
Defense in depth applies at every level of your environment and governance and compliance is how you apply it.

Course Summary

Mike Boorman
Azure Training Architect

Course Summary

What Did We Learn?



Cost Management

Many cost management tools available including: Azure Cost Management and Billing, Azure Budgets, Azure Reservations, Azure Pricing Calculator, and Azure TCO.

Governance and Compliance

Azure Policy is at the core of governance and compliance and should be integrated into other Azure services/tools.

Monitoring and Security Management

Azure Monitor is fundamental to monitoring and security and should be used in conjunction with other tools like: Log Analytics, Application Insights, and Service Health.

Next Steps

Continue your AZ-900 preparation!

AZ-900: Foundational Cloud Concepts

AZ-900: Identify, Deployment, and Management

AZ-900: Azure Architecture and Services

Course Summary

Get in Touch!

Submit feedback

Join the community!

Onwards!

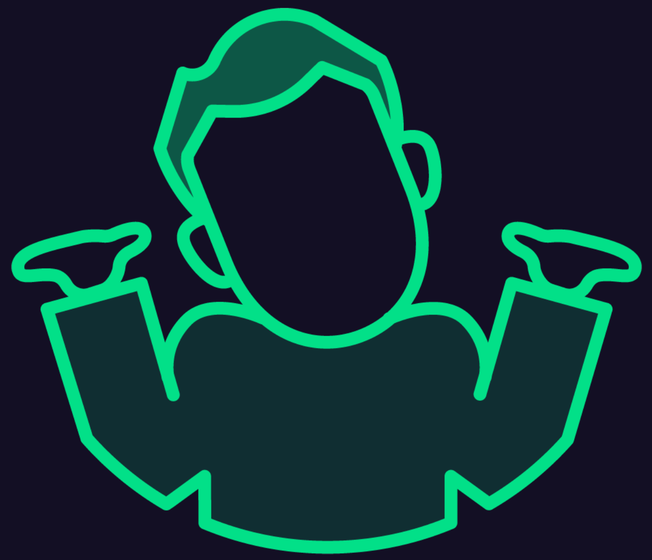
See you in the next AZ-900 prep course!

Best of luck on your AZ-900 exam!

Exam and Course Overview

Mike Boorman
Azure Training Architect

AZ-900 Exam Overview



Why are we here?

Who Is the AZ-900 Exam For?

Starting point for a career in Azure

"Start Here" location to become an Azure guru!

Entry-level Azure exam

Prove knowledge of cloud concepts and Azure services

For both IT experts and business leaders

Course Overview

Cost Management, Governance and Compliance, Monitoring and Security Management

What each of these means and how they are accomplished in Azure.

Describe the tools used for each concept.

Launching point for pursuing specific areas of Azure.