Cloud Computing

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Designing Infrastructure Solutions on Azure

Cloud

Design for Cost Optimization

Learning Objectives

By the end of this lesson, you will be able to:

◉ Recommend a solution for cost management

◉ Recommend a solution for cost reporting

◉ Recommend solutions to minimize costs

◉ List the key principles for cost management

A Day in the Life of an Azure Architect

You are working as a Director – Cloud Engineering in an organization. You are responsible for identifying and managing costs for your organization. As a part of monthly review meeting, you have been asked to report on the services with the highest cost.

- You have noticed that, though the cost of computes is low, there is significant cost getting incurred on the networking due to the large amount of egress data from the VMs. You need to recommend a solution to analyze the cost by services.

- Also, to minimize the cost, you're looking for a solution that will inform you when expenditure, based on usage or cost, hits or exceeds the amount indicated in the budget's alert condition.

To achieve all of the above, along with some additional features, we would be learning a few concepts in this lesson that will help you find a solution for the above scenario.

Recommend a Solution for Cost Management and Cost Reporting

Azure Cost Management

Today's businesses are operating in a complex cloud environment:

Running millions of cloud resources

Microsoft Azure

Google Cloud Platform

amazon web services™

Running on multi-cloud environments

Running across business units and projects

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Azure Cost Management

Microsoft's Azure cost management and billing is a set of tools that allows the user to evaluate, manage, and optimize the costs of the workloads.

- Users only pay for what they use with Azure products and services.

- Without effective analysis and monitoring, workload expenses can skyrocket due to the ease with which businesses can deploy more resources.

Azure Cost Management

Cost management displays organizational cost and usage patterns. It shows usage-based costs consumed by Azure services and third-party marketplace offerings.
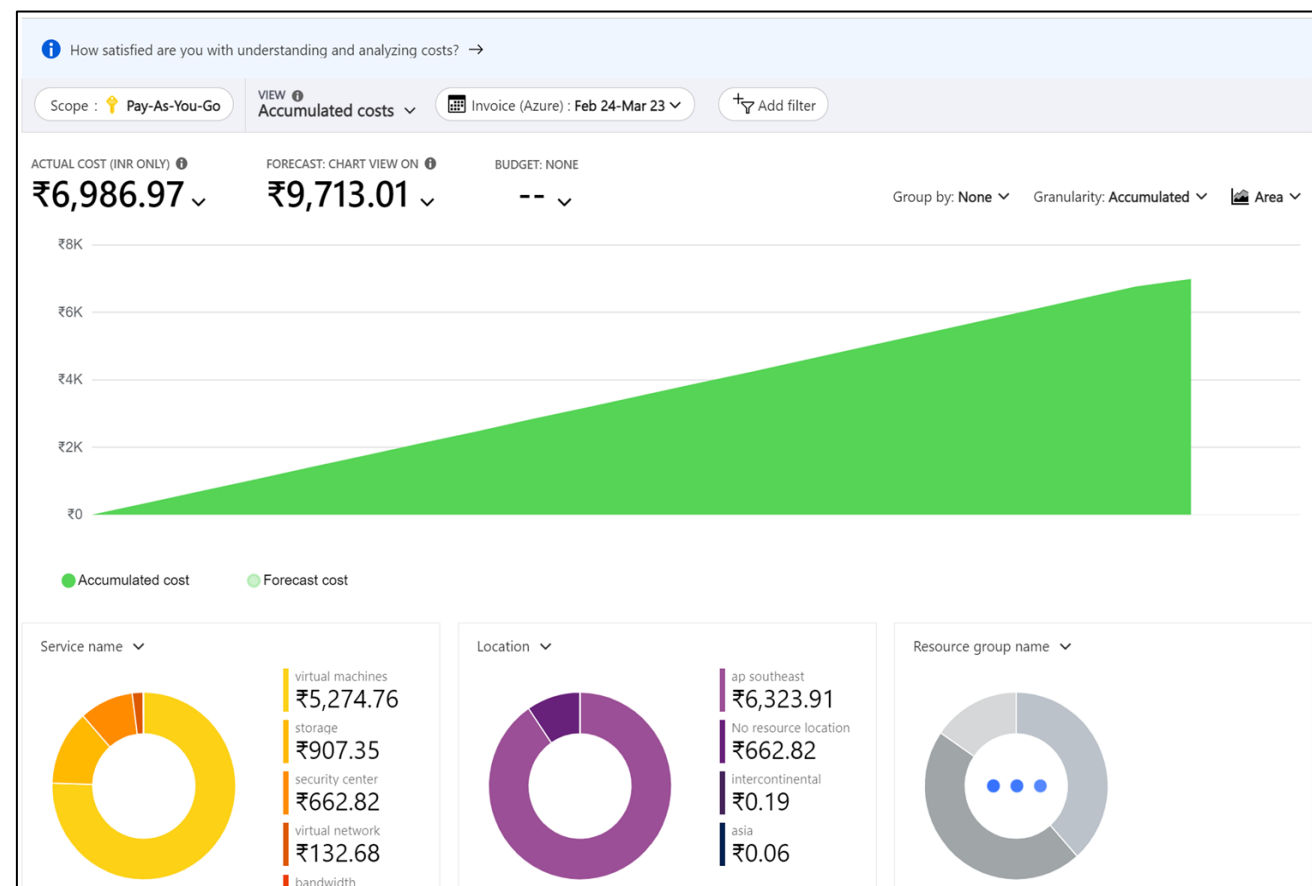
Organizations can:

- Conduct cost analysis

- Create a budget

- Review recommendations

- Export the data

Optimize with Azure Cost Management

Organizations must address the cost management issues before investing in cloud computing resources. To successfully implement cost management and optimize costs, the organization must:

- Ensure they have the right tools for success

- Be accountable for the expenses

- Develop a strategy to optimize spending

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Optimize with Azure Cost Management

Organizations must align the following groups to successfully manage costs:

Finance

Managers

App teams

- Users approve budget requests across the company based on cloud spending projections.

- Users pay the corresponding bill and assign charges to other teams to ensure responsibility.

Optimize with Azure Cost Management

Finance

Managers

App teams

Decision-makers of the organization need to understand cloud expenditure to get the greatest returns.

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Optimize with Azure Cost Management

Finance

Managers

App teams

- Engineers who handle cloud resources regularly create services to meet the needs of the organization.

- App teams require flexibility to deliver the maximum value within their budget constraints.

Cost Design Principles

Key principles for cost management are:

🔍	Visibility
👤	Accountability
⚙️	Optimization
🔄	Iteration
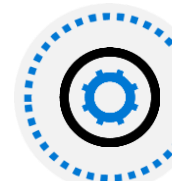
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Visibility

Cost management, when properly structured, assists organizations in informing people about the Azure costs for which they are responsible, as well as the money they spend.

- Azure provides features that allow users to see where their money is going.

- Users should utilize these tools to their best.

Visibility

Azure provides tools that assist users in identifying underutilized resources, eliminating waste, and maximizing cost-cutting potential.
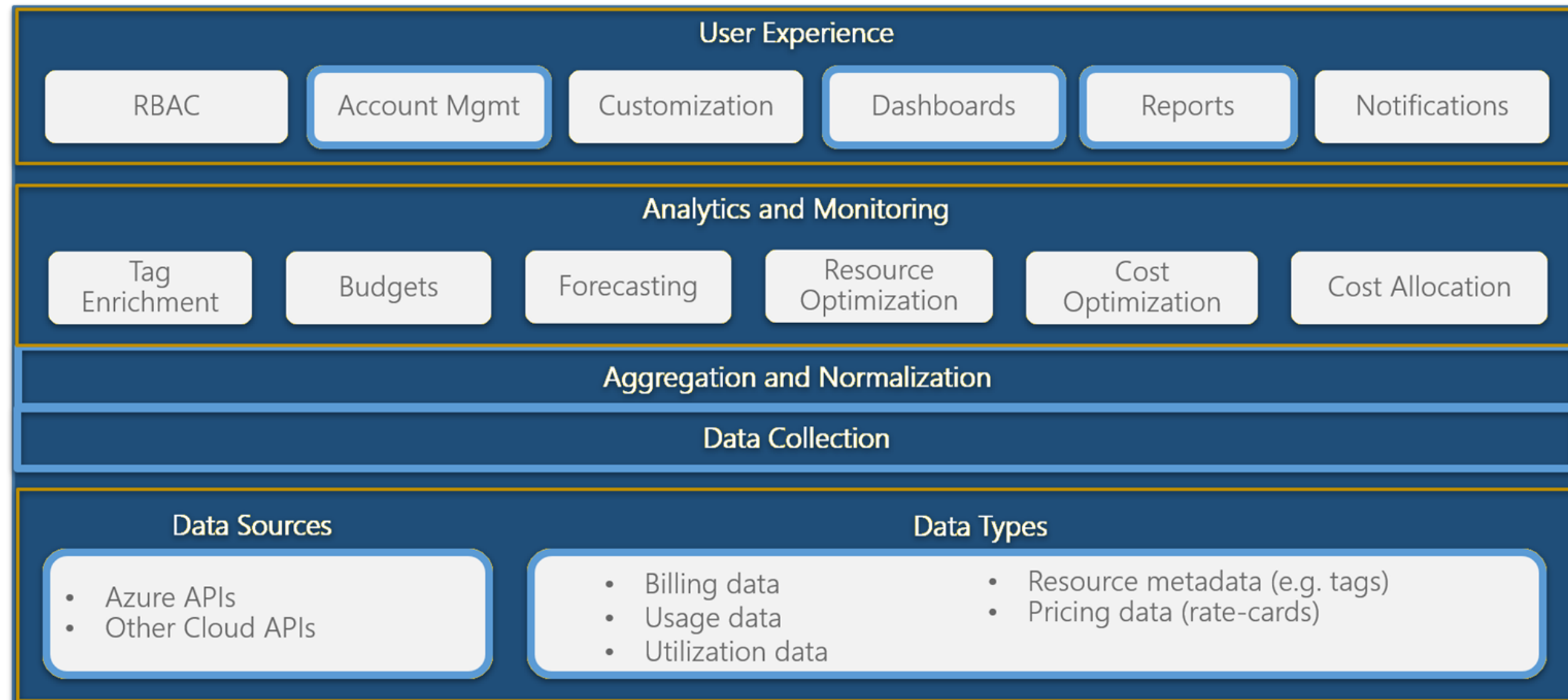
Accountability

Organizations can implement accountability by:

- Extending visibility to stakeholders
- Making stakeholders aware of the costs
- Making stakeholders accountable
- Setting clear budgets
- Setting alerts (be notified of any anomalies)

Optimization

Optimization means taking measures to cut costs. Organizations should make the most of it based on the information acquired through cost visibility and planning.

Optimization is not a one-time effort

Cloud is a constantly changing place with new projects, new applications, and changing loads.

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Optimization

Optimization can be of two types:

Resource optimization

- Correct families and sizes
- Correct resource or service types

Cost optimization

- When to buy more or less reserved instances

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Design with Cost in Mind

The common questions for cost analysis include:
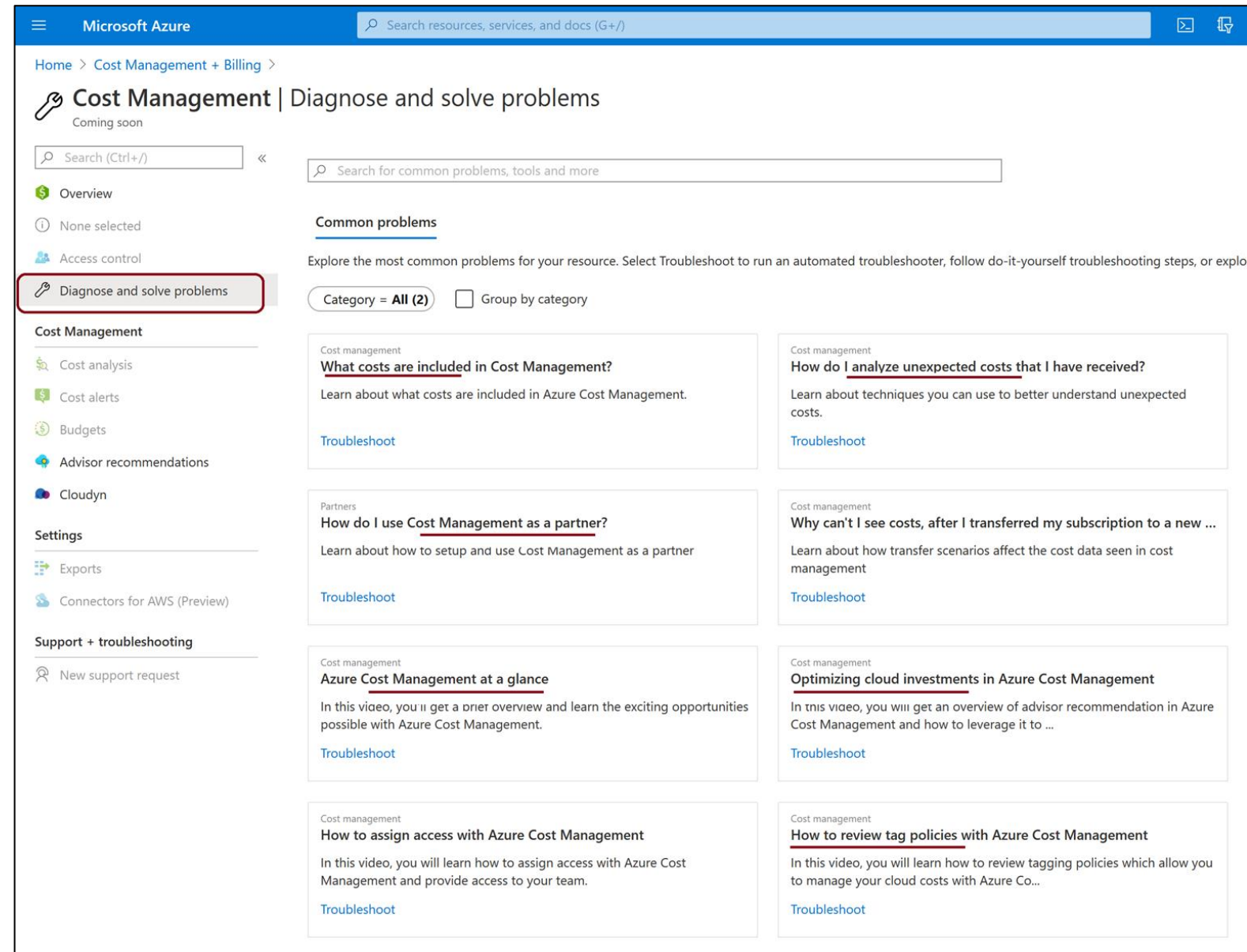
- Cost estimation for the current month
- Anomaly investigation
- Invoice reconciliation
- Internal chargeback

Recommend Solutions to Minimize Costs

Plan and Estimate Azure Cost

Azure provides tools to assist users in the assessment process. Before deploying cloud resources, organizations must assess the following items:

The Azure offer that best meets user needs

The resources users plan to use

The estimation of their cost

View Cost Breakdown by Azure Service

1 Review invoiced charges in Cost Analysis

View Cost Breakdown by Azure Service

2

View cost breakdown by Azure resource
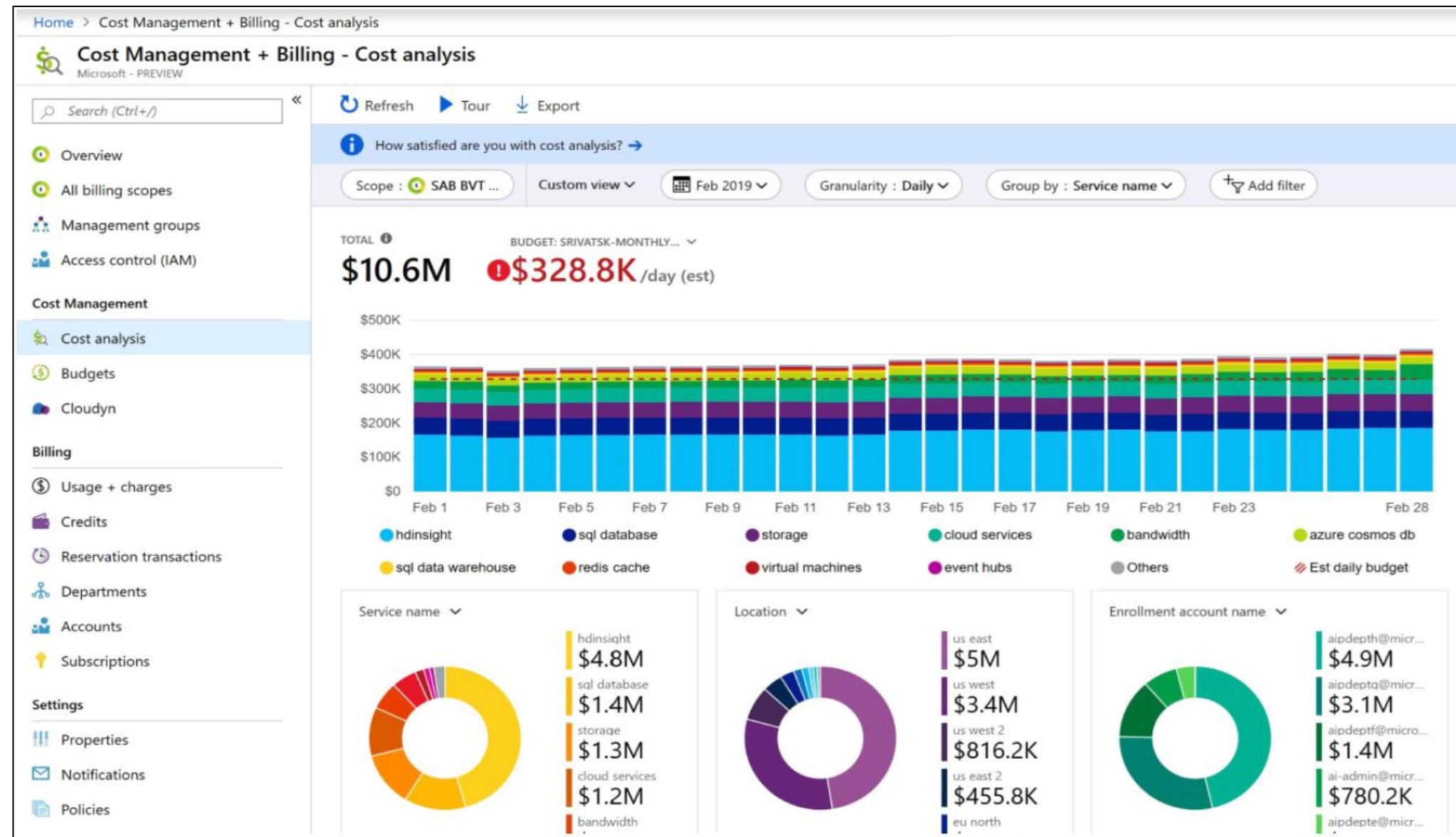
View Cost Breakdown by Azure Service

3

View cost breakdown by selected dimensions
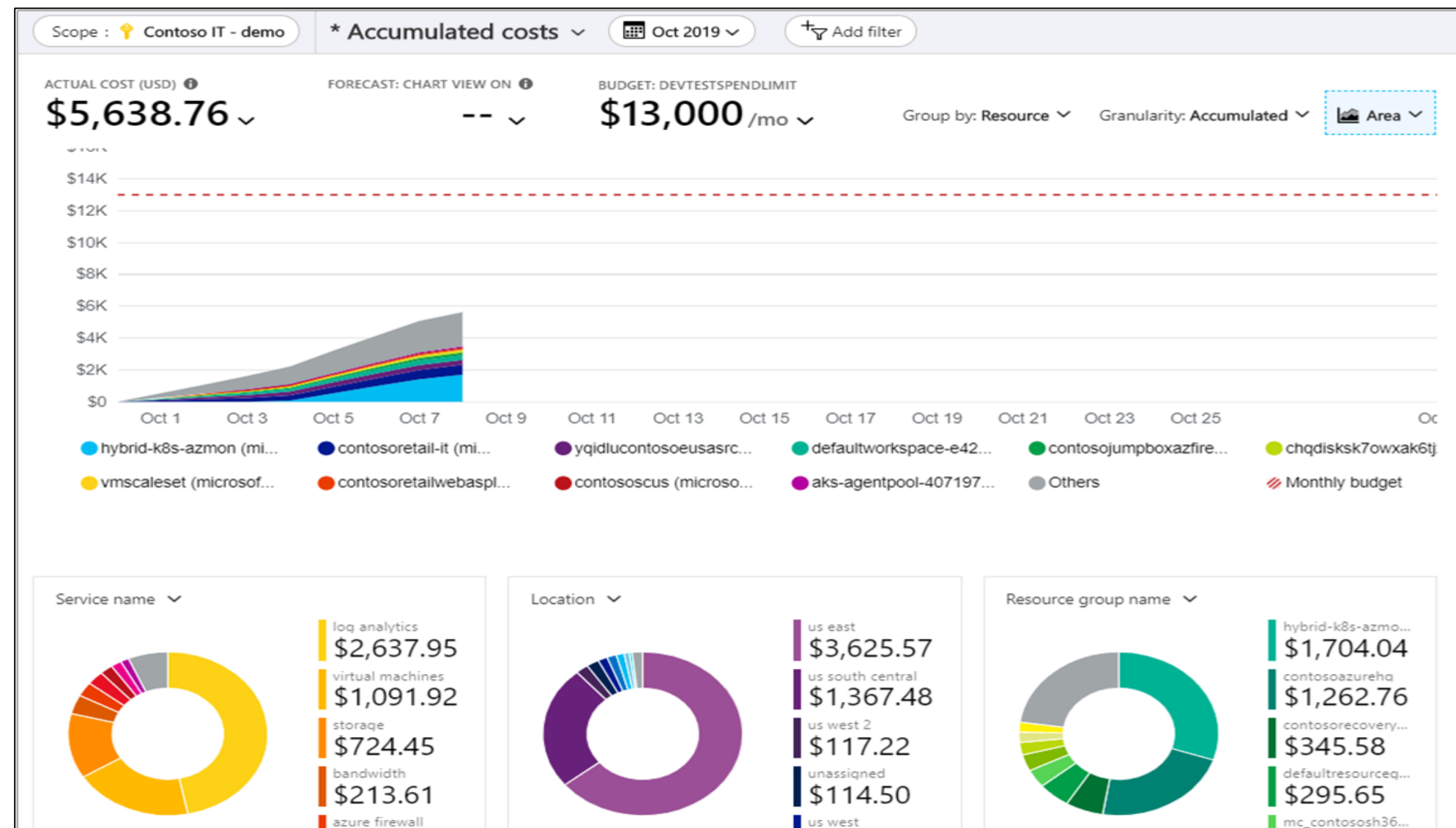
View Costs by Day or Month

Monthly or Daily: Cost Management + Billing > Cost Management > Cost Analysis

View Reservation Charges

The reservation charges are shown as an actual cost or an amortized cost.

Actual Cost

The purchase as it appears on the bill

ACTUAL COST ⓘ

$1.6M ⌃

Actual cost ⓘ

Amortized cost ⓘ

Amortized Cost

Amortized cost over the duration of the reservation term

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View Reservation Charges

It is important to track utilization after purchasing a reservation.
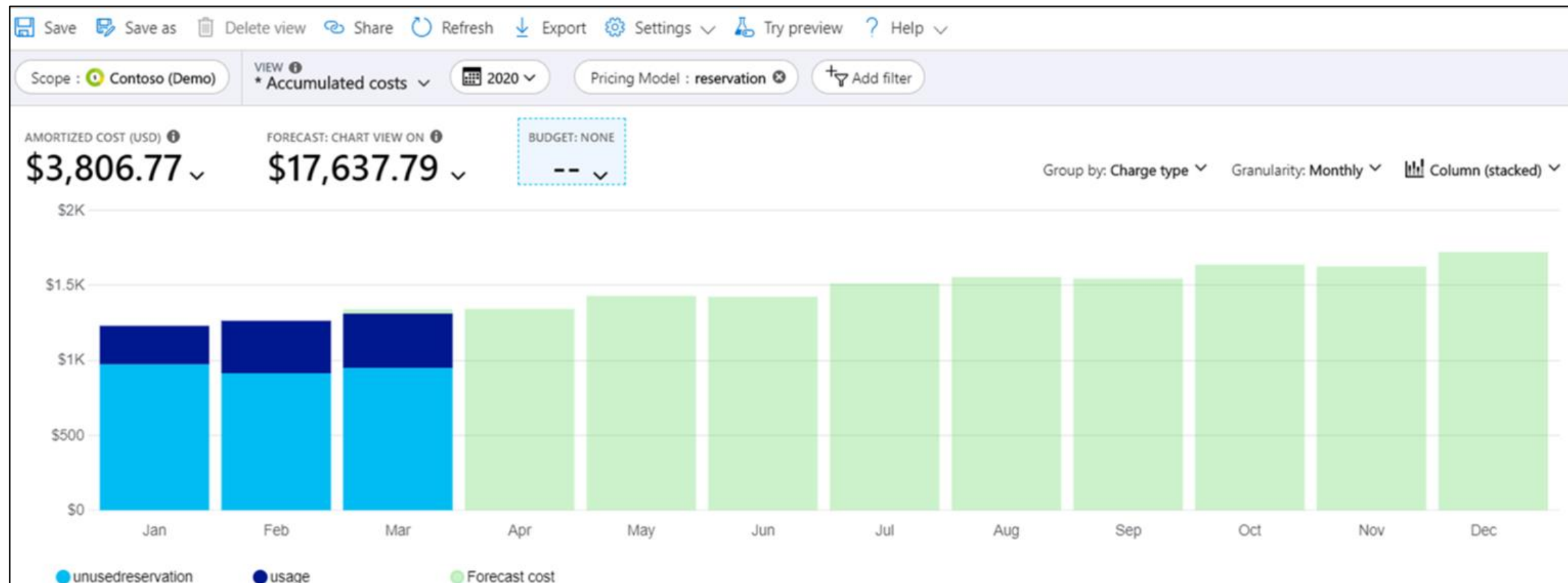
View Cost for a Specific Tag

Tag support is for usage reported after the tag has been applied to the resource.
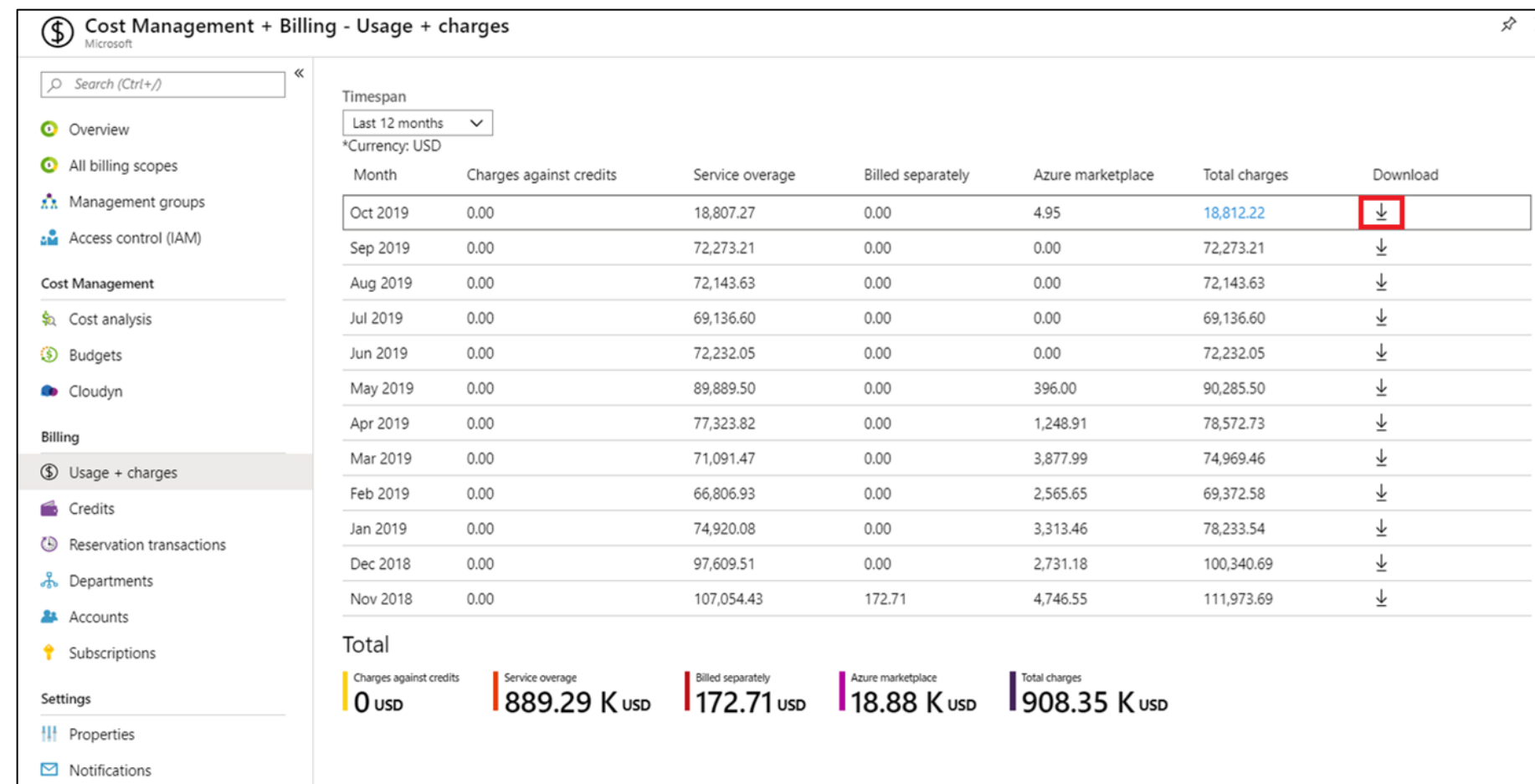

- Cost Management + Billing > Cost Management > Cost Analysis
- Select Group by, for the tag

Download Usage Details

In the Azure portal, navigate to Cost Management + Billing > Billing > Usage + charges

Select the line item to download from and click the download symbol

View Monthly EA Cost Breakdown

Follow the steps to view the monthly EA cost breakdown:

Timespan

Last 12 months

*Currency: USD

Month	Charges against credits	Service overage	Billed separately	Azure marketplace	Total charges	Download
Oct 2019	0.00	18,807.27	0.00	4.95	18,812.22	↓
Sep 2019	0.00	72,273.21	0.00	0.00	72,273.21	↓
Aug 2019	0.00	72,143.63	0.00	0.00	72,143.63	↓
Jul 2019	0.00	69,136.60	0.00	0.00	69,136.60	↓
Jun 2019	0.00	72,232.05	0.00	0.00	72,232.05	↓
May 2019	0.00	89,889.50	0.00	396.00	90,285.50	↓
Apr 2019	0.00	77,323.82	0.00	1,248.91	78,572.73	↓
Mar 2019	0.00	71,091.47	0.00	3,877.99	74,969.46	↓
Feb 2019	0.00	66,806.93	0.00	2,565.65	69,372.58	↓
Jan 2019	0.00	74,920.08	0.00	3,313.46	78,233.54	↓
Dec 2018	0.00	97,609.51	0.00	2,731.18	100,340.69	↓
Nov 2018	0.00	107,054.43	172.71	4,746.55	111,973.69	↓

Total

Charges against credits	Service overage	Billed separately	Azure marketplace	Total charges
0 USD	889.29 K USD	172.71 USD	18.88 K USD	908.35 K USD

- Navigate to Cost Management + Billing > Overview
- Click Breakdown

View Monthly EA Cost Breakdown

Follow the steps to view enrollment monthly cost by term:
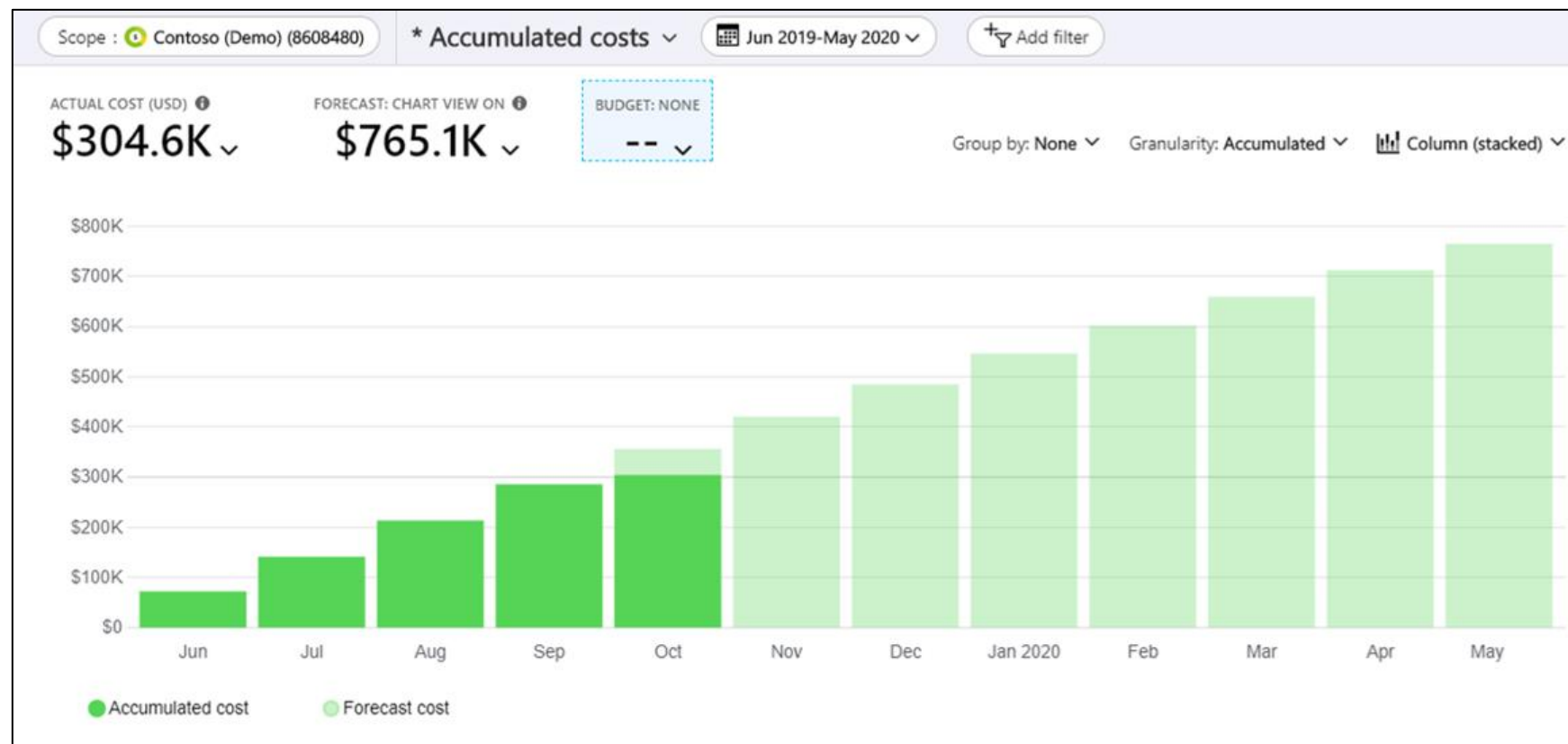
- Navigate to Cost Management + Billing > Cost Management > Cost analysis
- Select enrollment and set the enrollment term

View Monthly EA Cost Breakdown

Follow the steps to view EA enrollment accumulated costs:
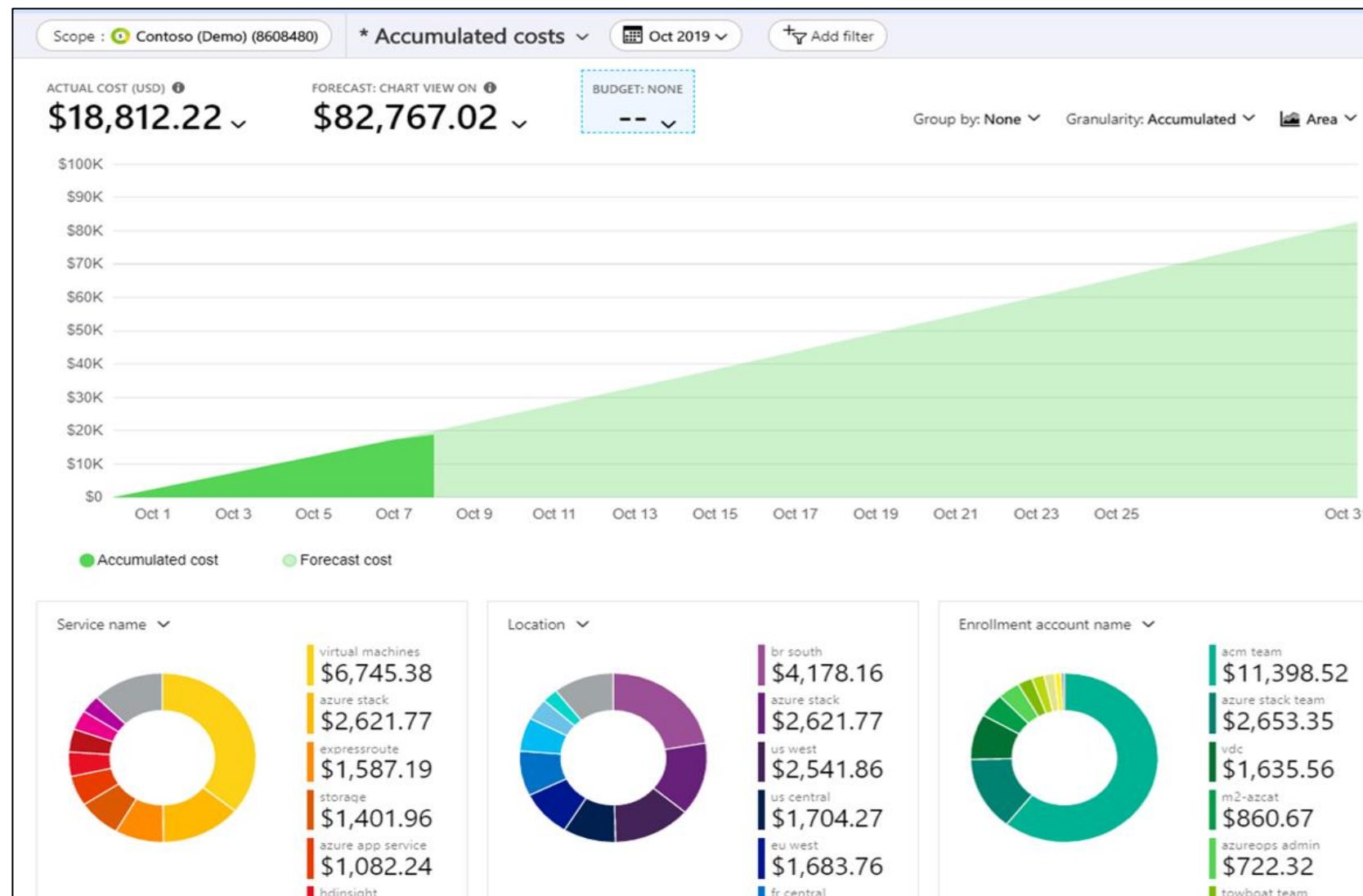
- Navigate to Cost Management + Billing > Cost Management > Cost Analysis
- Select the enrollment and then view the current accumulated costs

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Checklist: Design for Cost
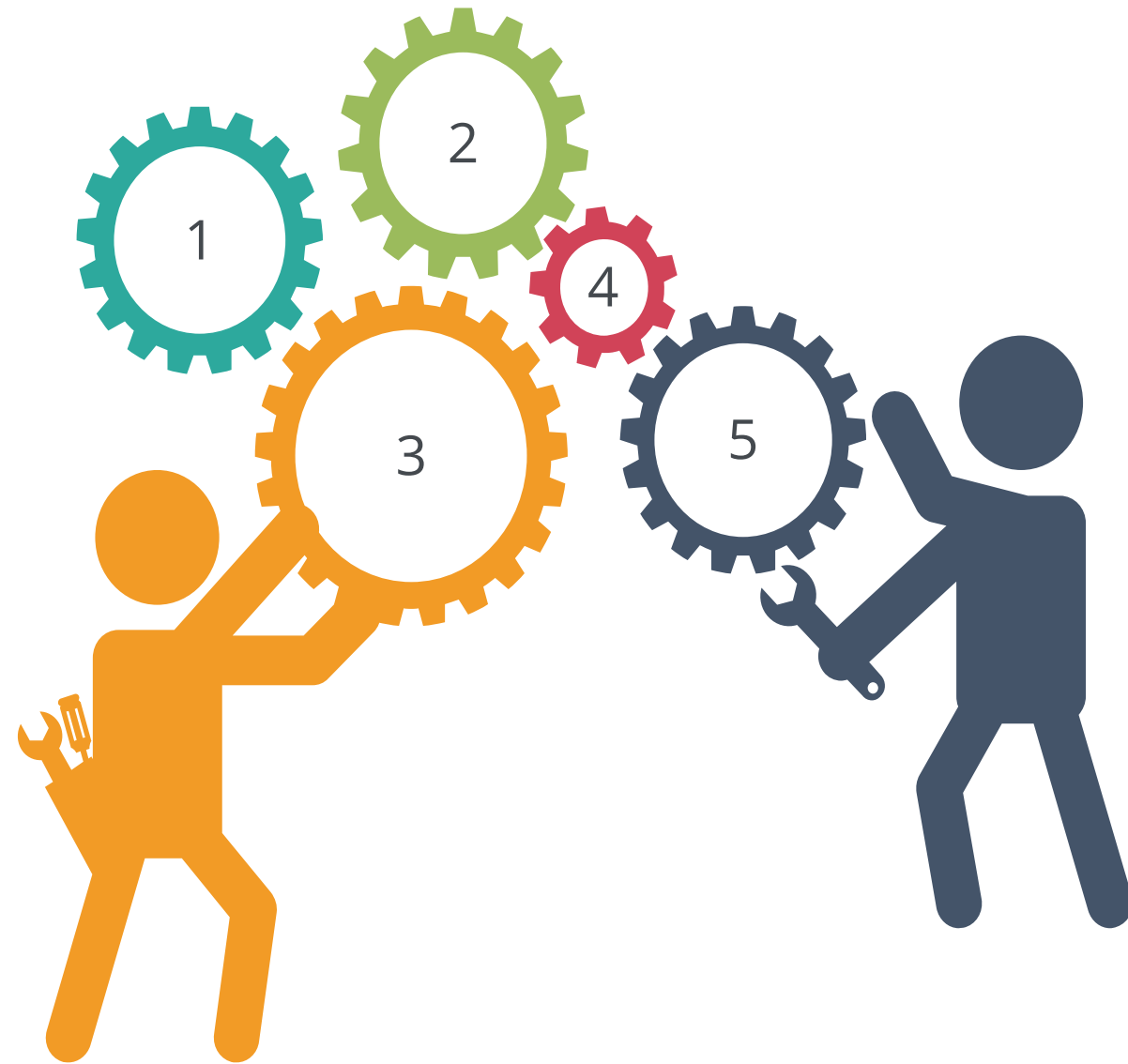
Cost model

Capture clear requirements

Estimate the initial cost

Define policies for the cost constraints defined by the organization

Identify shared assets

Plan a governance strategy

Checklist: Design for Cost

Architecture

Use proof-of-concept deployments

Compare consumption-based pricing with pre-provisioned cost

Choose managed services when possible

Choose a subscription that is appropriate for the workload

Check the cost of resources in various Azure geographic regions

Choose the right resources to handle the performance

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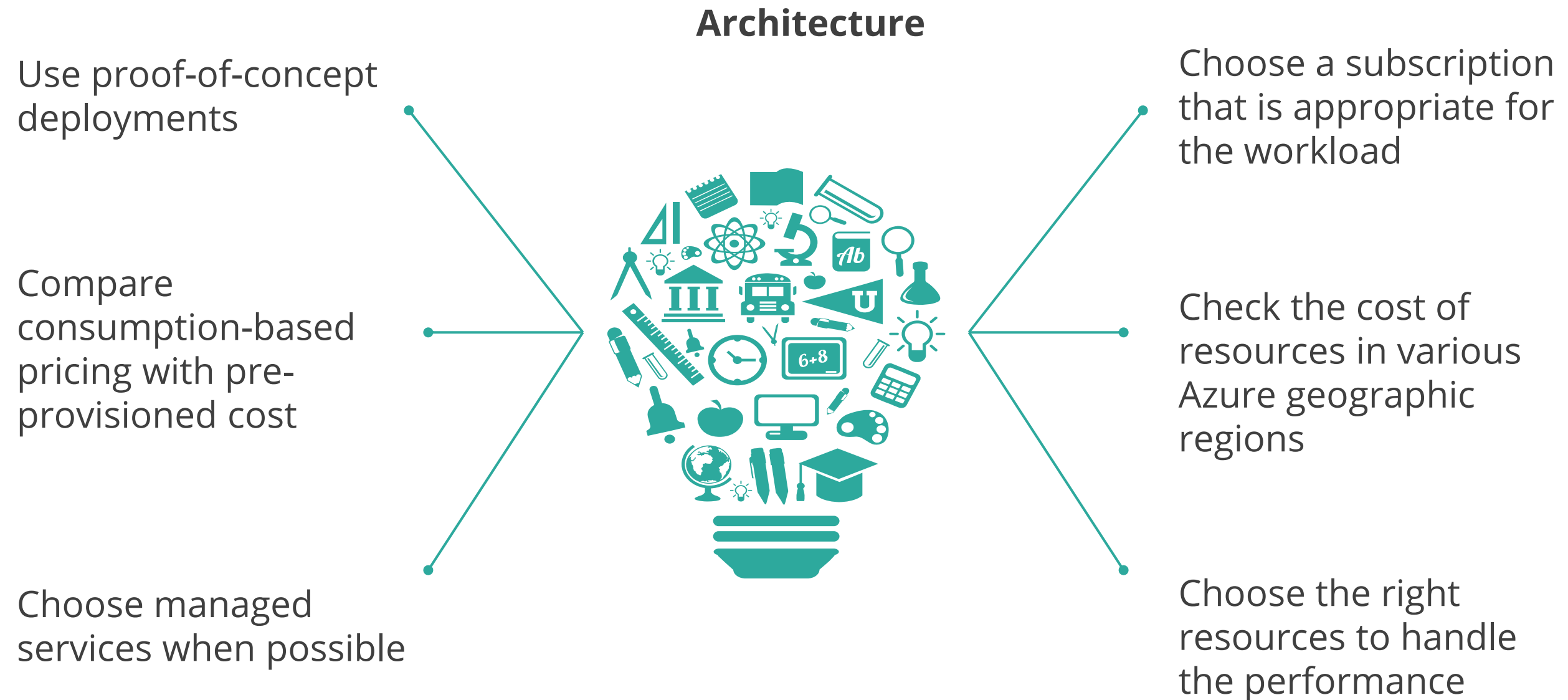
Checklist: Optimize Cost

Use the following checklist to optimize cost:

Review underutilized resources	Use discount prices
Continuously act on the cost reviews	Have a scale-in and scale-out policy
Use reserved instances on long running workloads	Reevaluate design choices

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Checklist: Optimize Cost

Use the following checklist to optimize cost:

Choose the right storage tier	Optimize data transfer
Choose the right data store	Reduce load on servers
Choose Spot VMs for low priority workloads	Use managed services

Cost Trade-Offs

As users design the workload, they must consider the trade-offs between cost optimization and other aspects of design, such as security, scalability, resilience, and operability.

Cost versus reliability

The cost of high-availability components may exceed the acceptable downtime. If it exceeds the cost of downtime, users can save by using Azure platform-managed replication and recovering data from the backup storage.

Cost versus performance efficiency

Factors impacting performance:

- Fixed or consumption-based provisioning
- Azure regions
- Caching
- Batch or real-time processing

Cost Trade-Offs

An optimal design is not synonymous with a low-cost design. Low cost may incur additional risk.

Cost versus security

An increase in the security of the workload will increase costs.

Cost versus operation excellence

Investment in system monitoring and automation might increase the cost initially, but over time, it will reduce cost.

Provision with Optimization

Best practices for optimizing spending:

💡 Cut out waste

💡 Azure Advisor

💡 Select proper VM sizes

💡 Use purchase discounts

Assisted Practice

Generate Report on Spend   **Duration: 10 Min.**

Problem Statement:

As an Azure Architect, you've been asked to provide your company with an Azure cost solution that can track cloud spending and make recommendations.

Steps to generate a report on spend are:

1. Go to the Azure portal
2. Search for and select Cost Management + Billing
3. Generate report on spend

Unassisted Practice

Billing Alerts   **Duration: 10 Min.**

Problem Statement:

As an Azure Architect, you've been asked to provide your organization with an Azure cost solution that will inform you when expenditure, based on usage or cost, hits or exceeds the amount indicated in the budget's alert condition.

Unassisted Practice: Guidelines
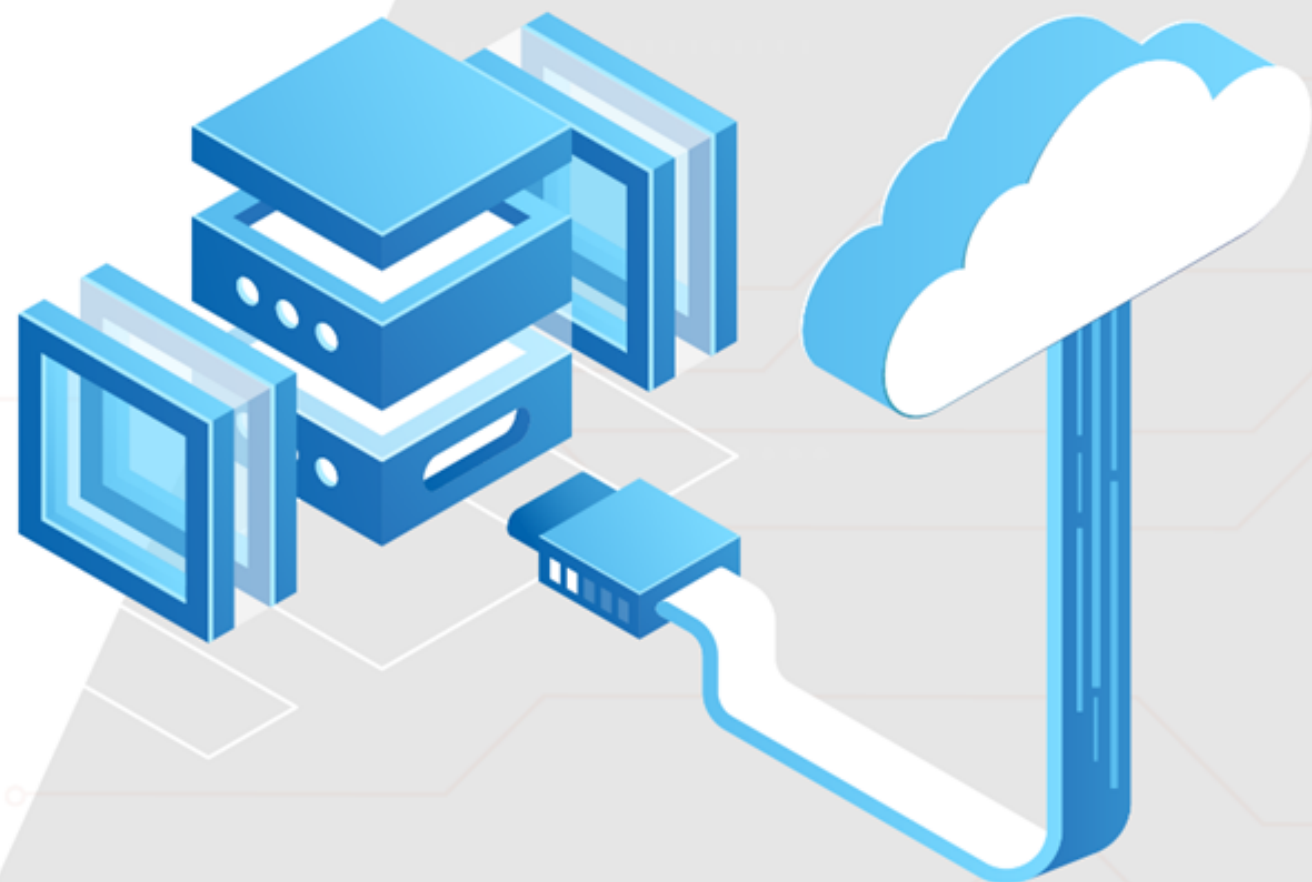
Steps to view billing alerts are:

1. Go to the Azure portal
2. Search for and select a subscription
3. View cost alerts

Key Takeaways

◉ Cost management and billing is a set of tools that allows the user to evaluate, manage, and optimize the costs of the workloads.

◉ Organizations must align finance, managers, and app teams to manage costs successfully.

◉ Azure provides tools to assist users in the assessment process before deploying cloud resources.

◉ After purchasing a reservation, it is important to track utilization.

Thank you

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