Technical White Paper: **2022**

Cloud Financial Management for Users of VMware Tanzu CloudHealth

Table of contents

About this white paper

This white paper is an accompanying piece to the Building a Successful Cloud Financial Management Practice white paper. We'll share how cloud financial management best practices across visibility, optimization, governance and automation, and business integration can be implemented using Tanzu CloudHealth®. This white paper is suitable for IT operations and finance professionals who are tasked with optimizing and governing cloud costs, as well as engineering teams and IT leadership who are trying to promote a culture of financial awareness and accountability.

Note: The examples included in this white paper are not an inclusive list and are merely a collection of commonly used reports and functionality among our customer base.

What is cloud financial management?

Cloud financial management (CFM)—sometimes known as FinOps or cloud cost management—is a function that helps organizations align and develop financial goals, drive a cost-conscious culture through best practices, establish guardrails to meet financial targets, and gain greater business efficiencies. However, cloud financial management isn't a one-time exercise; it's a continuous process. With the ever-changing nature of cloud, the goal of CFM is to continuously optimize and align cloud investments to strategic business initiatives.

Cloud financial management best practices

A CFM function has four phases of maturity: visibility, optimization, governance and automation, and business integration. These phases follow a logical flow to help your business implement best practices and instill a culture of financial awareness and accountability.

Improving cloud visibility

Visibility into cost is the initial phase of CFM, where organizations are looking to understand their cloud spend by team, department or application; forecast based on historical data; and make budgets more accurate and predictable. Taking these visibility improvements a step further, many organizations perform chargeback and showback to map actual charges by line of business or groupings as specified for cost and billing validation.

Consumption tracking

The first step within CFM is developing a consistent tagging strategy to better identify and allocate spend and usage. As part of this, your organization must first determine what use cases the tags are to represent; for example, do you need tags by product line, cost center, environment and so forth. It's important for users (or administrators) who launch new assets to add the appropriate tags. As a best practice, your organization should develop tagging guidelines to ensure consistency in terms of naming conventions, capitalization, abbreviations and so on. For example, are you standardizing tags to have [lob name]_ [environment] (e.g., ch_prod)? Owner versus owner? Production versus prod? Once all lines of business agree to adhere to the tagging guidelines and tag their assets appropriately, tags can then be used to filter, search and allocate assets in reports.

Tanzu CloudHealth takes tagging a step further with Perspectives, which are dynamic business groups defined by tag key-value pairs, naming conventions, accounts, services and/or any metadata within your cloud environment. The most common Perspectives include product, team, owner, environment, business unit, function and cost center. Each Perspective contains groups; for example, the environment Perspective might include groups for production, development, test and staging. Assets can only belong to one group within a Perspective; for example, the same asset would not be in the production environment group and the development environment group.

On the other hand, assets can belong to a group within different Perspectives; for example, an asset can be in the production environment group and the engineering cost center. Perspectives are pervasive throughout the platform and are available as filters in reporting, policies and recommendations.

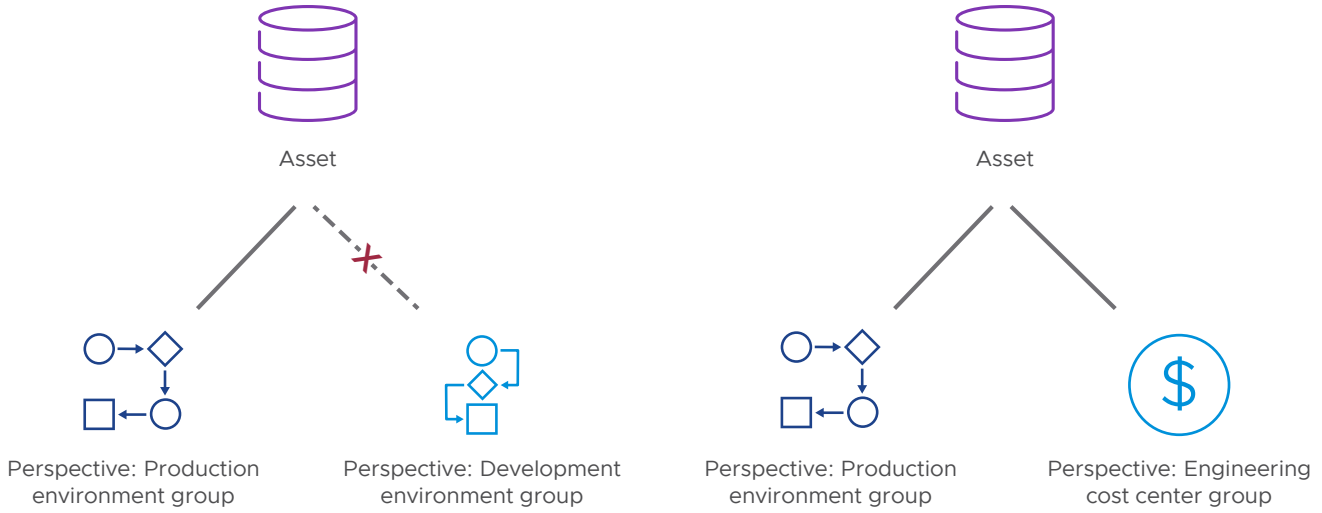

Figure 1: An asset can only belong to one group within a Perspective, but it can also belong to a group within a different Perspective.

Once your tagging strategy is in place and Perspectives have been created, you can use reports and dashboards to analyze your data and identify trends. As an example, the Multi-Cloud Cost History Report allows you to view your cost across service items, such as compute, storage and networking, and also allows you to use Perspectives to uniquely showback exactly how your business is making use of your infrastructure collectively in Amazon Web Services (AWS), Microsoft Azure, Google Cloud Platform (GCP), and your own data centers.

The Multi-Cloud Cost History Report is an example of an interactive report in Tanzu CloudHealth that can be used to correlate data sets for analysis and reporting against business objectives. Interactive reporting allows you to create visual (bar charts, line charts, pie charts) and tabular reports by selecting different measures, dimensions, Perspectives and groups, or some combination of these to plot against each other.

Both executive and management teams use interactive reports to evaluate cloud infrastructure events, trends and projections to improve cost and performance optimization. The example in Figure 2 shows the monthly cloud cost history and that the business is consistently spending the most money on AWS. Within interactive reports, you can track month-over-month growth and leverage archive data for year-over-year trends. Under the Options tab, you can select to view deltas as a percent change over time or forecast spend based on a select time interval. By comparing month-over-month spend as a dollar or percentage variance, your business can use these numbers for input into forecast models and month-end reporting.

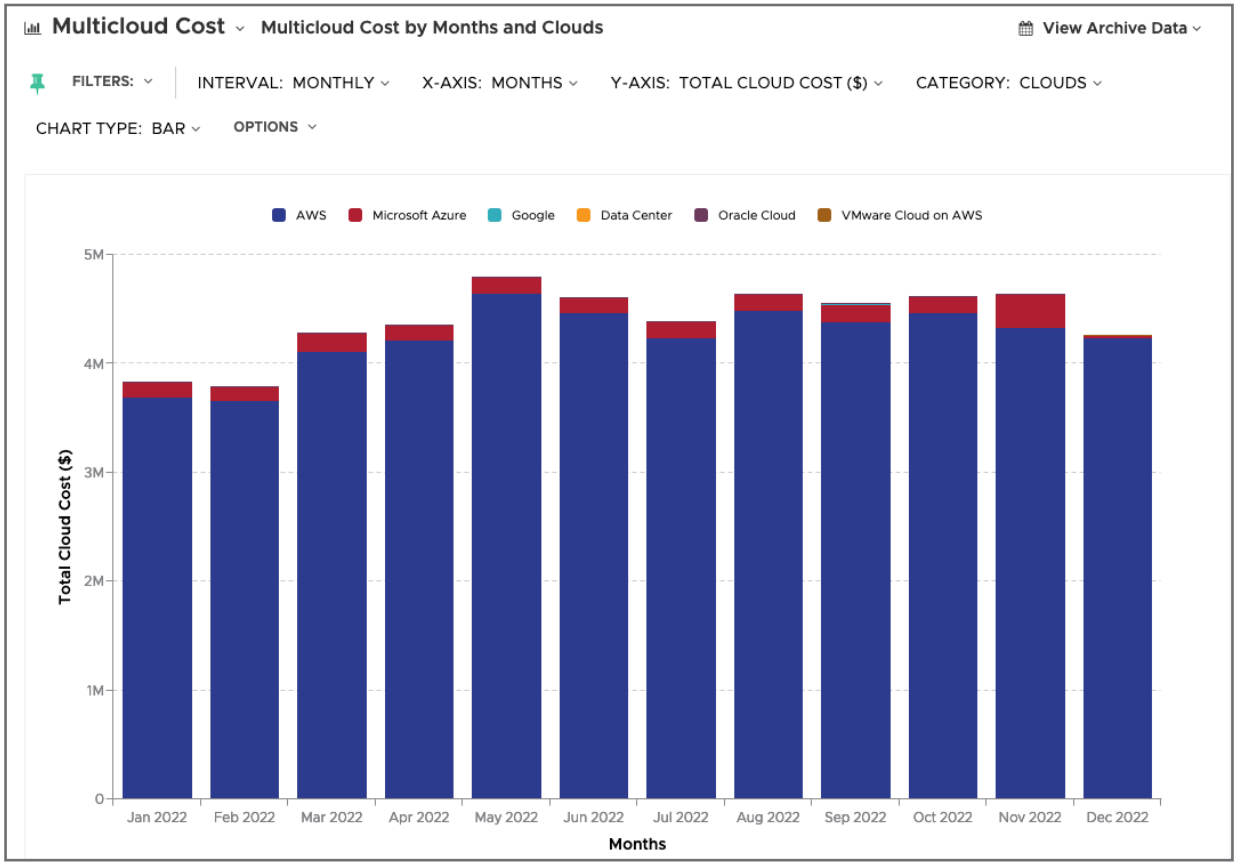

Figure 2: This Multi-Cloud Cost History Report shows that this business consistently spends the most money on AWS month over month.

Budget monitoring

Budgets define your expected cloud spend by team, department or application on a month-by-month basis. They also allow you to easily compare your budget with actual costs and account for any variance as the year progresses. With Tanzu CloudHealth, you can configure budgets across clouds with a single import/export of budget data. Tanzu CloudHealth also supports non-calendar fiscal years, amortization, rollover and the option to view budgets by custom data intervals and Perspective groups. Whether you use a static budget or one that allows for rollover, the platform can support your adherence to your budget.

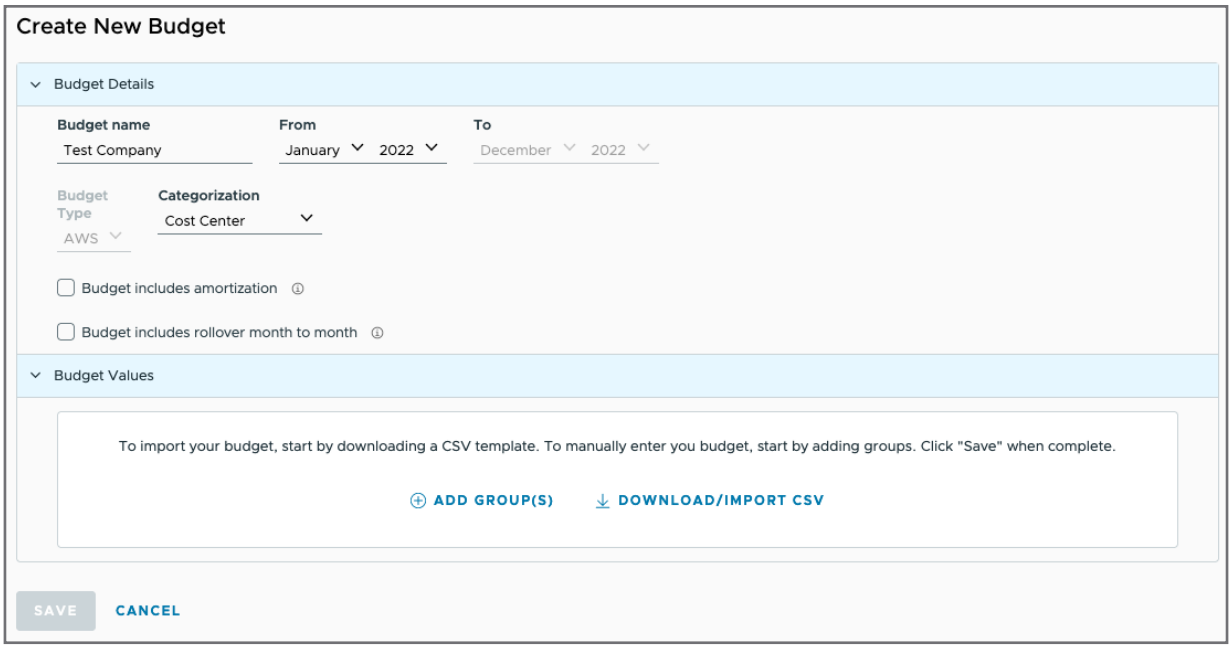

Figure 3: Creating a new budget in Tanzu CloudHealth.

By incorporating rollover into the budget, organizations can adjust the budget to align with business changes. For some organizations, managing rollover can be challenging, which is why a Budget vs. Actual Report that shows variance is a useful tool to depict the accuracy of the budget. Once the books are closed for the previous month, analyzing month-over-month variances is vital to accurately adjust future forecasts and make more strategic business decisions. Similar reporting should be created for cost center owners to subscribe to on a monthly basis, or used for monthly reporting by the finance team.

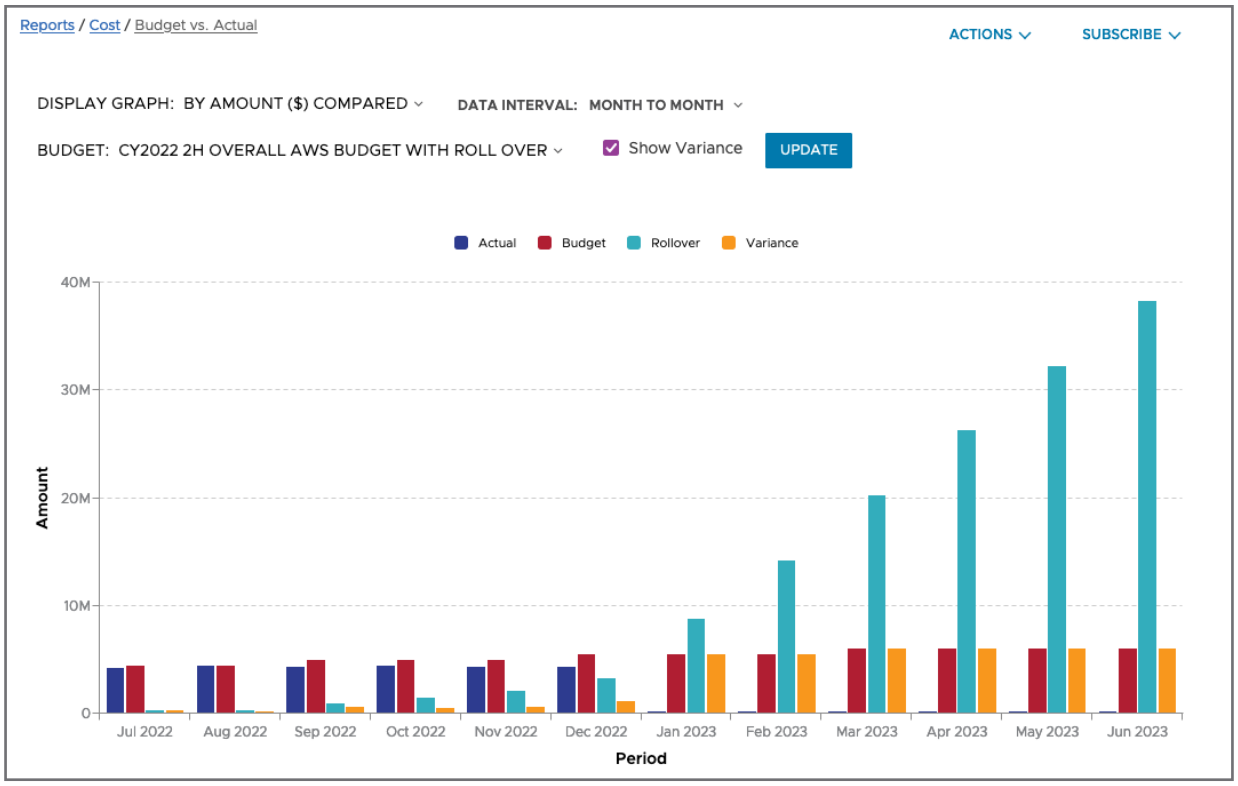

Figure 4: The Budget vs. Actual Report shows month-over-month variances.

Once you have configured budgets, you can create policies to monitor costs and notify you when your costs are projected to exceed—or have already exceeded—your expected budget for the month. Budget policies allow you to stay on top of your spend and act quickly before costs grow and become unmanageable. See the Setting governance policies and automating repeatable tasks section for details about policies.

Amortization

A routine finance and accounting practice, amortization is the process of tying the expense of an asset to the revenue it generates, or reporting asset depreciation in financial statements. In a cloud environment, amortization focuses on fees for services and discounts as opposed to cost for physical equipment. There are two common ways that organizations seek to amortize costs:

- Amortized cost by owner and services – In this case, organizations look to see who the consumption of a service can be attributed to.
- Amortized cost by instances and reservation type – Organizations who take advantage of cloud provider pricing discounts will likely want to spread the upfront cost of the discount (e.g., reservation) purchase throughout the one- or three-year term rather than accounting for it in the month when the purchase was made. Additionally, you likely want to understand which departments actually got the benefit of the reservation, and chargeback appropriately based on benefit and usage.

Amortization can be difficult to track and calculate manually without a solution that can pull in your cost and usage data. By combining Perspectives with amortized cost reports, you're able to allocate amortized costs by department, business unit, cost center, owner and more.

Let's dive into the Amortization Report for AWS in Tanzu CloudHealth. This report should be subscribed to on a monthly basis, and cost centers should be charged back the amortization based on who used the service to accurately identify trends in spend. Figure 5 shows a comparison of the Amazon Elastic Compute Cloud (EC2) compute cost for the Prod - 100009 cost center with and without the inclusion of the amortized cost.

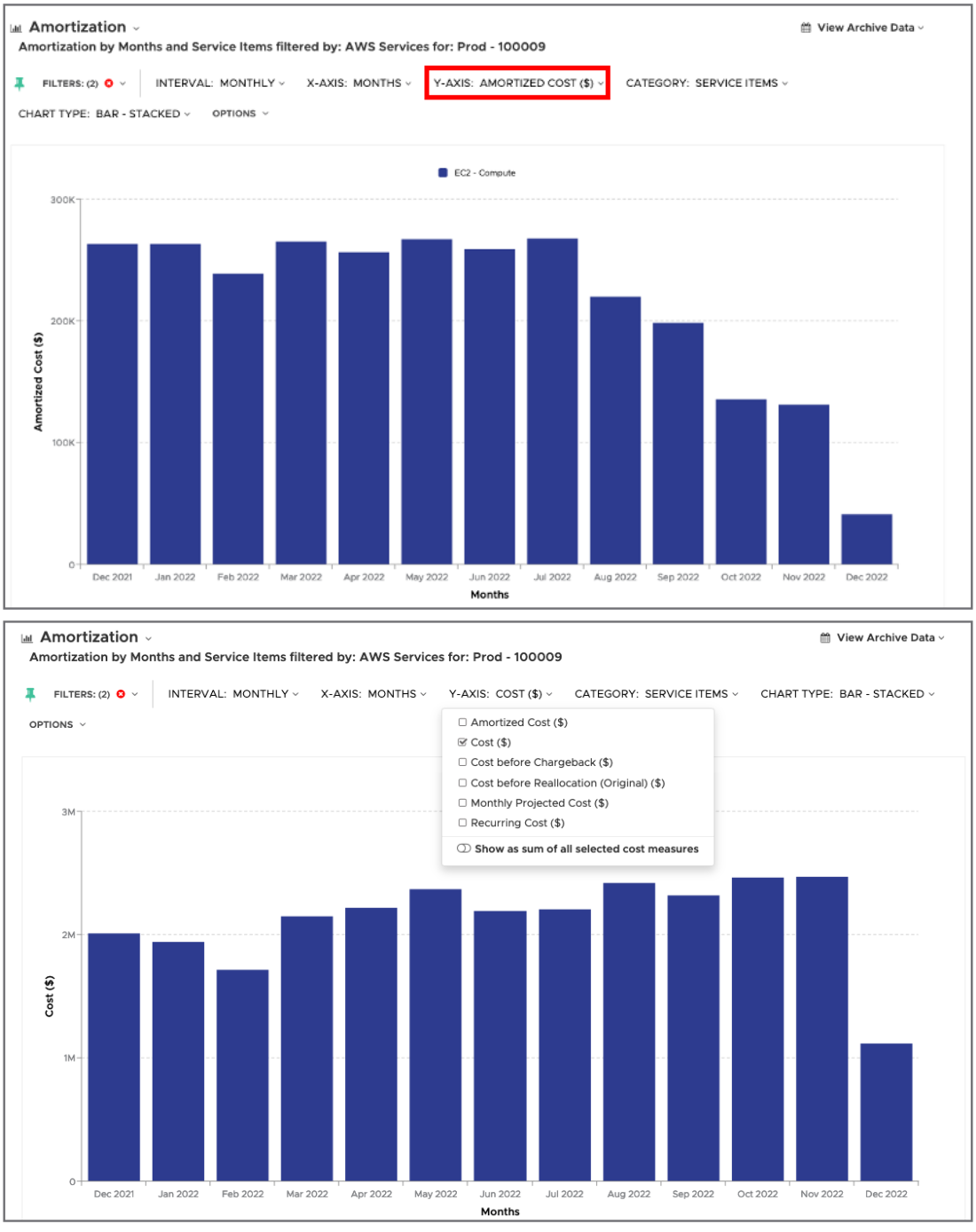

Figure 5: The Amortization Report allows for the comparison of EC2 compute costs for a cost center with and without the inclusion of the amortized cost.

Optimizing your cloud spend

Organizations with scaling public and multi-cloud footprints often seek areas where cloud spend can be optimized. Three effective ways to achieve this are by rightsizing infrastructure, terminating any assets running and in an idle state (zombies), and taking advantage of cloud provider pricing discounts.

Rightsizing infrastructure

Rightsizing is the process of analyzing the utilization and performance metrics of your infrastructure, determining whether or not they're running efficiently, deciding what actions you should take to improve efficiency, and then modifying the infrastructure as needed (upgrading, downgrading, terminating).

The Tanzu CloudHealth platform supports rightsizing across Amazon EC2 instances, Amazon Elastic Block Store (EBS) volumes, Amazon Relational Database Service (RDS), Azure Virtual Machines, Azure SQL Databases, Google Compute Engine (GCE) instances, and data center machines. The rightsizing recommendations from Tanzu CloudHealth are based on utilization and performance metrics (e.g., CPU, memory, disk, network) that can be ingested into the platform via an API, integration partners (e.g., Datadog), or the Tanzu CloudHealth Agent. Once the metrics are available, you have the power to set performance analysis thresholds specific to your applications and can take advantage of advanced filtering capabilities by dynamic business groupings, regions and more.

As an example, let's dive into rightsizing for Azure SQL Databases. Within the Tanzu CloudHealth Rightsizing Report, you can create your custom efficiency target based on maximum and average metrics. For Azure SQL Databases, the report is based on database transaction units (DTU), database size, and capacity. If you're unsure where to start with rightsizing, start your analysis by Perspective group or tag to identify the area with the most waste and the most potential for savings in your infrastructure. In Figure 6, if we filter by the cht_env tag, we can see that the testing group is the most inefficient, with a $6,539.97 savings opportunity out of the total projected monthly savings of $18,015.24 across all environments.

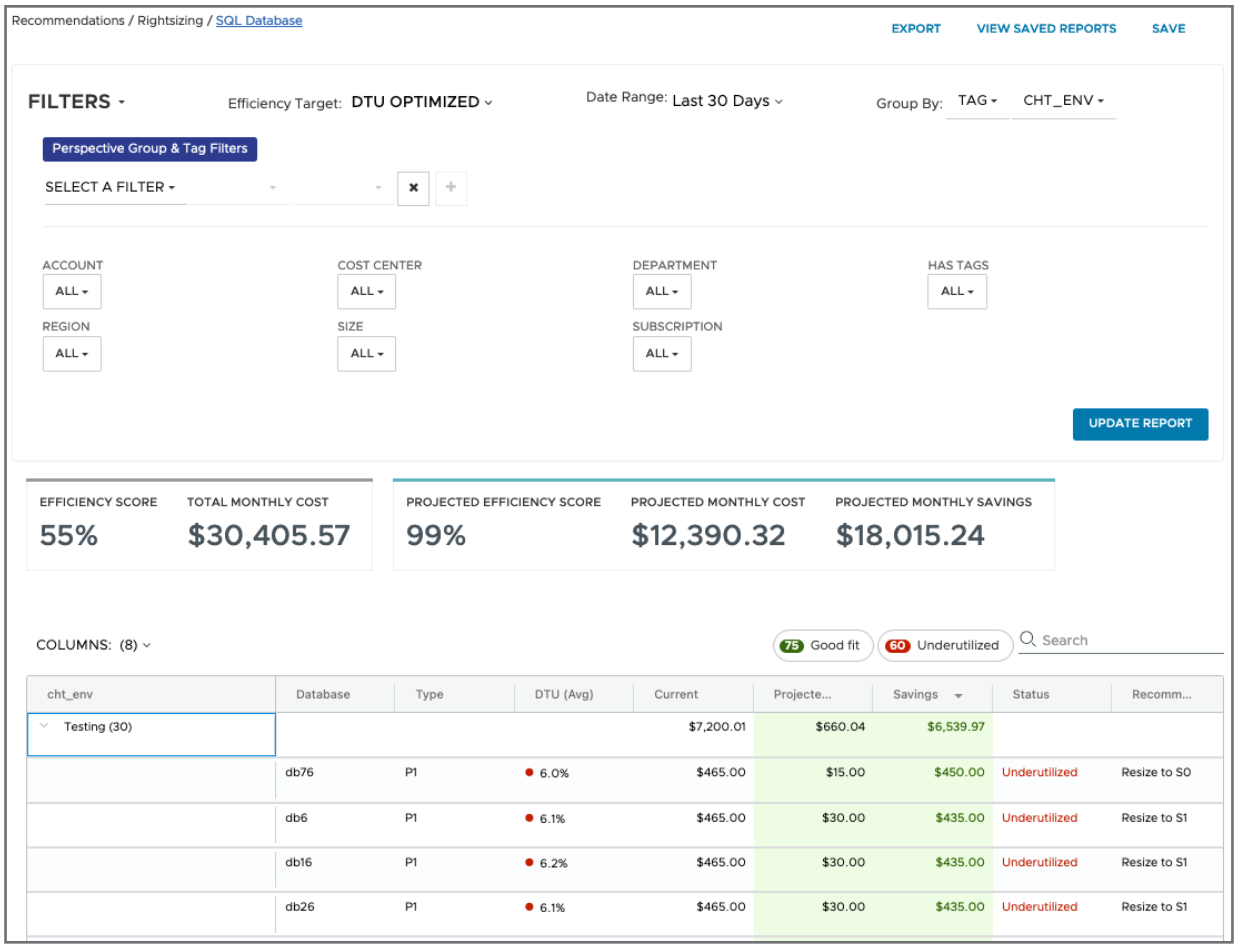

Figure 6: The Rightsizing Report identifies areas with the most waste and the most potential for savings.

The report displays an efficiency score that is calculated as the total percentage of resources that are a good fit. Resources that are not deemed a good fit are labeled as underutilized or over target. You can increase your efficiency score by rightsizing resources that are outside of your efficiency target. Tanzu CloudHealth will provide up to three recommendation options, with the lowest cost option within your efficiency target marked as your best fit. It is important to note that Tanzu CloudHealth will only make a recommendation to resize a resource when a less expensive size is available that can still handle the workload.

The platform provides same-family or cross-family rightsizing recommendations based on the metrics gathered for each resource. Additionally, the reports will also calculate the potential savings you can achieve if you were to act on the provided recommendations, so you can see the financial impact of making a change. Based on the recommendations and savings provided, you can make the decision to rightsize the resource. This report can be used to gather and report on key performance indicators (KPIs), including the rightsizing savings, the efficiency score, and the percent of your infrastructure that is underutilized.

Terminating zombies

Zombie assets are assets that incur costs but are not being used. In other words, they're wasted assets that can be terminated to reduce spend. Zombie assets come in many forms, such as compute infrastructure, databases, unattached storage volumes, disassociated IPs, and more. Within the Tanzu CloudHealth platform, zombies can be identified in several ways, such as with the Health Check Pulse Report, through the rightsizing recommendations, or through governance policies.

Figure 7 shows the use of the Health Check Pulse Report to identify zombies in an Azure environment. An extremely popular report among executives and department leaders, the Health Check Pulse Report provides a 360-degree view of potential opportunities to improve optimization and governance across your Azure environment for the given month. For zombies, focus on the Immediate Monthly Savings section, which can identify the cost of unattached Azure disks, unused virtual network gateways, unused IP addresses, and so on. If you were to use the rightsizing recommendations or policy engine to identify zombies, you would then filter by groups or tags to identify the area with the most waste.

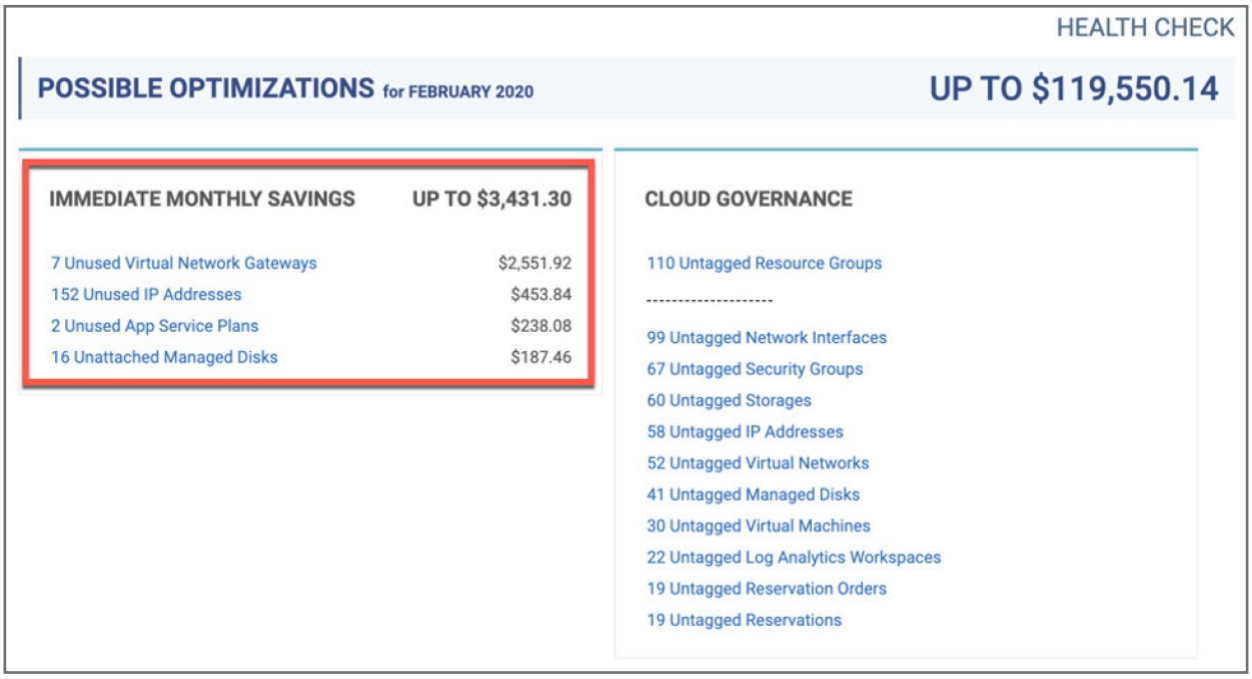

Figure 7: To identify zombie assets, focus on the Immediate Monthly Savings section of the Health Check Pulse Report.

Discount management

The leading public cloud providers offer a variety of discount programs in exchange for upfront commitments. Some examples of these discounts are Reservations, Committed Use Discounts, and Savings Plans, and these flexible pricing models can offer up to 80 percent savings compared to consuming infrastructure on demand.

Let's take a deeper dive into AWS' discount programs. AWS was the first cloud provider to the reservation market, starting in 2009 with Standard Reservations, followed by Convertible Reservations in 2016. Convertible Reservations were the first move by AWS to provide customers with greater flexibility for their commitments, allowing users to exchange them to meet their workload requirements. Recently, AWS released their next iteration of flexible pricing with AWS Savings Plans. As a newer entrant to the market, Savings Plans are causing some confusion among organizations who wonder if they should invest in Reservations, Savings Plans, or both. For the foreseeable future, Reservations are not going away, meaning it's critical to proactively manage both investments for organizations that have existing Reservations and are planning to purchase Savings Plans. If EC2 usage qualifies for both a Reservation and a Savings Plan, AWS will prioritize the Reservation first.

Tanzu CloudHealth provides visibility into your EC2 instance utilization, how savings are applied by Reserved Instances (RIs) and Savings Plans, what your discount coverage type is, and where you have waste. For our customers, it's all about understanding the benefits of the discount programs and helping them apply it to their custom discount structures. The platform provides a suite of functionality that can be used to build your investment strategy, model purchases, and continuously manage those purchases to maximize the return on your investment and eliminate waste. With the EC2 Convertible RI Exchanger, users can make sure their Convertible Reservations are fully optimized and exchanged before making additional commitments via Savings Plans.

Figure 8 shows an EC2 Instance Usage Report in which you can visualize your instance usage by discount coverage type. As you can see, the instance coverage ratio is 44 percent for Compute Savings Plans, 44 percent for Convertible RIs, and 11 percent of EC2 instances running on demand. Customers use Tanzu CloudHealth functionality to report on KPIs, such as percentage of RIs in comparison to total EC2 usage, inventory of discounts, hourly compute cost by coverage type, and more. As a best practice to maximize your savings potential, we recommend running less than 30 percent of your infrastructure on demand, with the remaining 70 percent covered by Reservations, Savings Plans, or Spot.

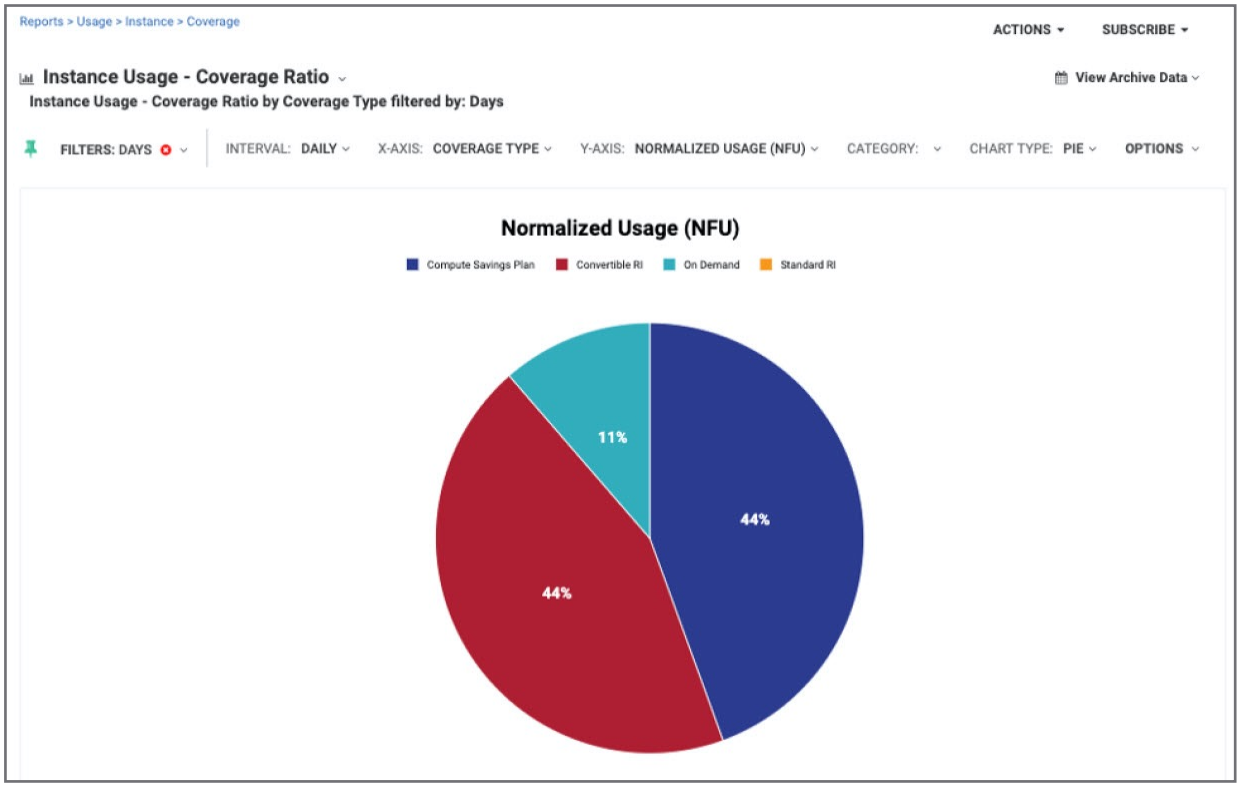

Figure 8: The EC2 Instance Usage Report visualizes instance usage by discount coverage type.

Setting governance policies and automating repeatable tasks

Governance is the process of defining best practices and then getting notified (or taking action) when infrastructure is out of compliance or has drifted. Tanzu CloudHealth policies give you a simple and effective way to eliminate noise, and focus on key indicators that help you maintain centralized governance across your environment. Policies consist of a set of rules that enable you to govern various aspects of your cloud infrastructure, such as cost, security, performance, configuration and usage.

At the core of each Tanzu CloudHealth policy is a rule that monitors for one or more conditions (e.g., cost, configuration, etc.) and, optionally, responds with an action. Using policies and automation, you can create custom rules to identify cost savings opportunities, monitor your budget, identify cost variances, and more. There are two primary ways that companies take action on governance policies:

- Guidelines – Guideline policies will communicate a risk boundary via an alert that informs the user of the best practice but will not take action to prevent or correct the action.
- Guardrails – Guardrail policies will both communicate and take action to correct a violated best practice (e.g., terminating zombie infrastructure).

For many organizations, the governance and automation phase progresses iteratively by first defining best practices, then implementing guideline policies, followed slowly by adding guardrail automation to as much of their environment as possible, freeing up employee time for more strategic tasks.

Policies can be evaluated at the frequency you define (hourly, daily, weekly, monthly), and you can also scope the policy to specific Perspective groups. With governance policies, time savings is a KPI, so build workflows that automate manual and error-prone tasks, and reclaim employee time for more strategic or business-critical projects. In this white paper, we share the most common financial management and cost optimization policies implemented by our customers.

Unexpected cost increase

When overall costs in your cloud environment increase suddenly, it could be a leading indicator of a larger problem. One best practice is to set a policy to alert you if your total cloud bill increases by more than a certain percentage within a specified time interval; for example, 20 percent over the course of one week. Additionally, you can create this policy based on the service items you spend the most money on, such as Amazon EC2, Azure Virtual Machines, Google Cloud SQL, and Azure storage accounts, and further narrow the scope of the policies using Perspectives.

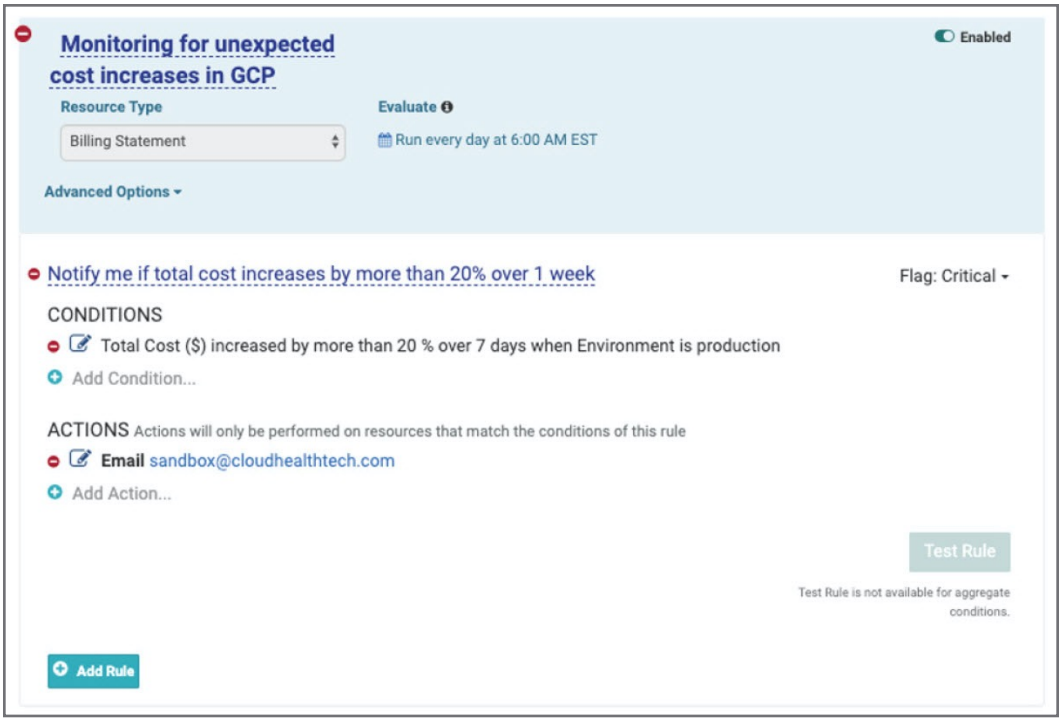

Figure 9: This sample policy alerts on unexpected cost increases in GCP of 20 percent or more over the course of one week.

Expiring reservations

Reservations were mentioned in the Optimizing your cloud spend section as a great savings opportunity. You can leverage the Tanzu CloudHealth policy engine to notify you of reservations that are expiring so that you have enough time to do a rightsizing analysis and determine which new ones should be purchased.

The sample policy in Figure 10 shows there are multiple rules for expiring reservations. A high alert will be triggered if an RI will expire in 30 days, whereas a critical alert will be sent if an RI will expire within the 7 days.

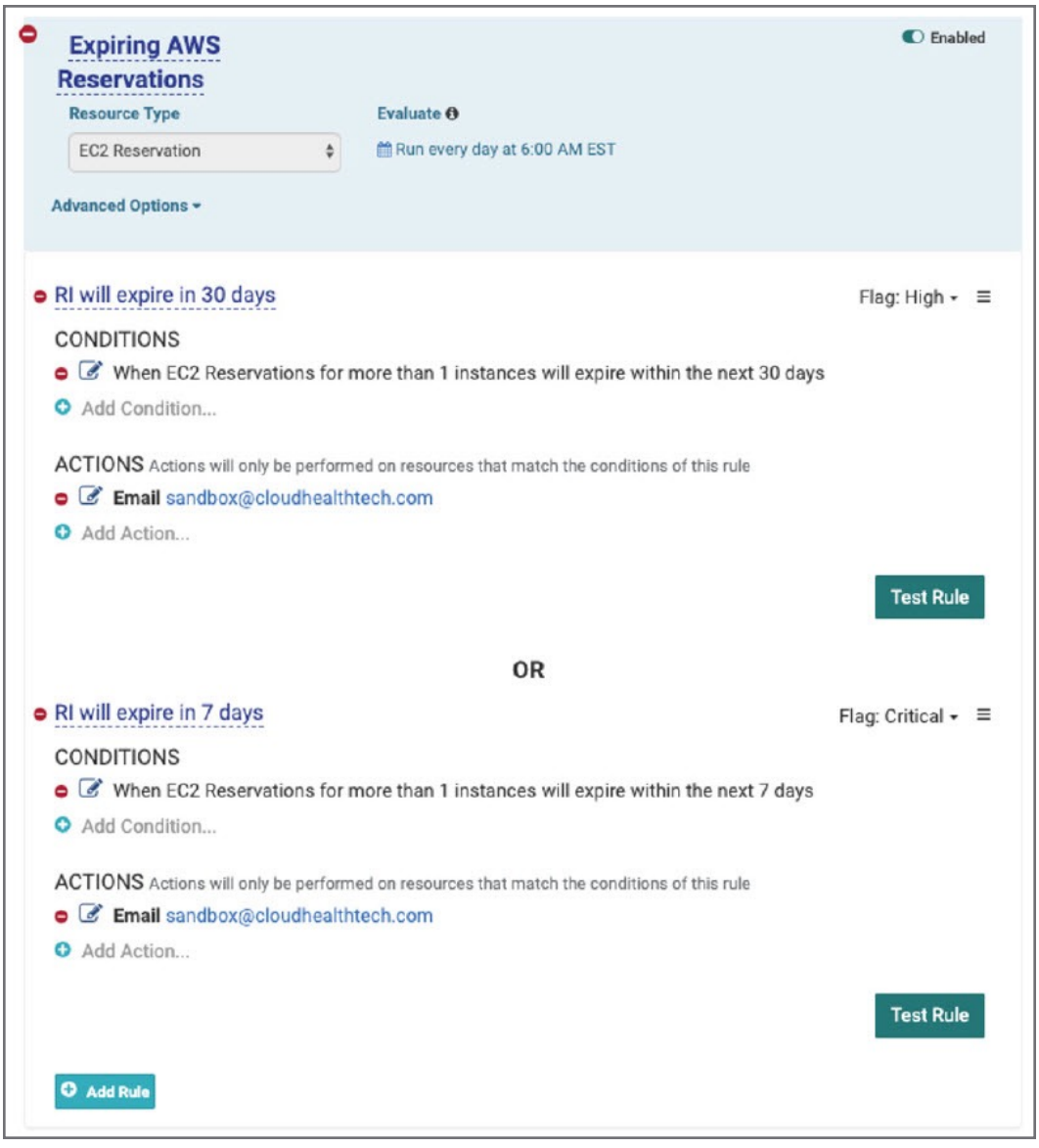

Figure 10: This sample policy shows multiple rules set for expiring reservations.

Lights on/lights off

A more advanced use case for governance is the automated shutdown of non-production infrastructure on weekends and/or weeknights. Cloud providers will continue to bill for services as long as they are running. For example, Microsoft will bill for an Azure Virtual Machine (VM) that is in a running state unless it is stopped and deallocated. For VMs running 24x7, Microsoft will bill for 672–744 hours per VM, depending on the month. If a VM is turned off between 5 PM and 9 AM on weekdays and stopped weekends and holidays, then total billable hours per month would range from 152–184 hours per VM, saving you 488–592 VM hours per month. This is an extreme example as having flexible workweeks and global teams means you can't just power down VMs outside of normal working hours. However, outside of production, you'll likely find many VMs that do not need to truly run 24x7x365. The most cost-efficient environments dynamically stop and start VMs based on a set schedule.

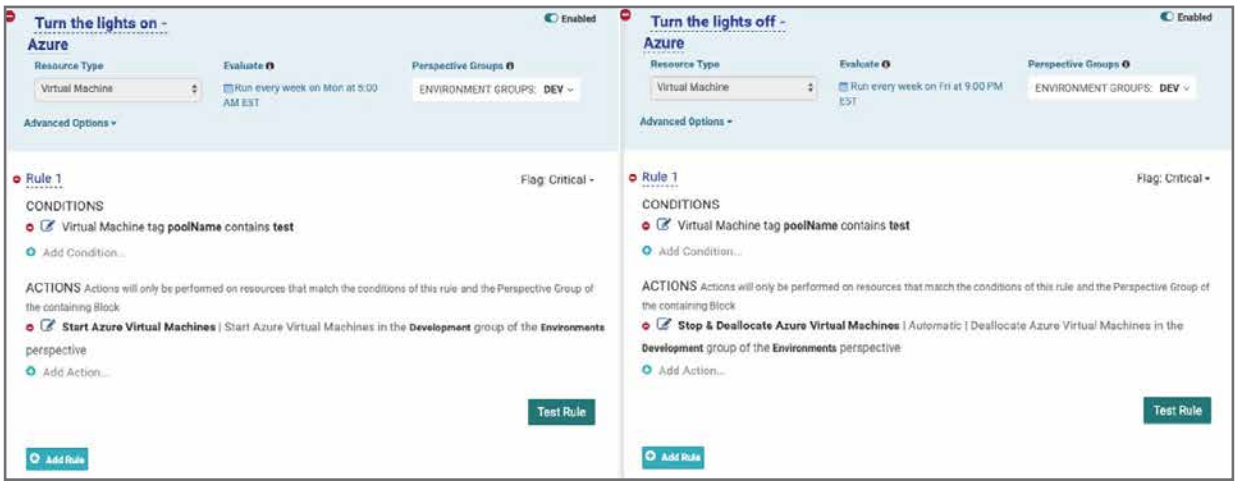

Figure 11: This sample policy shows Azure VMs being stopped or started based on a set schedule.

Driving collaboration with business integration

The ultimate goal of cloud financial management is to have cloud costs fully integrated into finance systems to enable chargeback/showback, and report on cost of goods sold (COGS) to drive accountability and improve gross margins. To achieve this, organizations must drive a change in behavior and development across teams or lines of business. Some of our customers have referred to this as driving a culture of cost consciousness. This behavior can be influenced or driven through gamification among teams, the availability of integrations and APIs, and metric alignment.

Gamification and dashboards

Many organizations have driven a cost-centric culture by gamifying optimization among teams or lines of business. These organizations will share custom reports and dashboards from Tanzu CloudHealth to track where teams are in terms of adhering to budget, utilizing reservations, and so forth. In some cases, they use the data from Tanzu CloudHealth to create their own leaderboards within their offices. For gamification purposes, a vice president or director may have a custom Tanzu CloudHealth dashboard delivered to them the last Friday of every month to see the progress teams have made throughout the month.

For example, one customer created a Confluence page with links to saved Tanzu CloudHealth reports to serve that purpose. The customer has engineering teams all over the world that previously were able to choose their own technologies: databases they select, the language they program in, which cloud providers they use, and so forth. The organization's rapid growth resulted in the loss of cost control. The customer uses the Confluence page to show all the teams how much they are spending compared to the other teams.

With Tanzu CloudHealth, users can easily create and subscribe to custom reports and dashboards. Reports and dashboards can be quickly shared on an ad hoc basis, or they can be subscribed out to a user or group for periodic delivery. Additionally, Perspectives allow reports and dashboards to be customized to ensure proper business context for the target audience (finance, operations, development), so the data shared is relevant and actionable. All reports can be saved and then subscribed to for delivery at the frequency of a user's choosing. For example, a report can be delivered daily, weekly on Monday and Tuesday, or on the 15th day of the month. These subscriptions will include a link to the interactive report in Tanzu CloudHealth, a PNG of the chart, and a CSV of the underlying data.

Figure 12 shows a sample custom dashboard in which an engineering team is analyzing their AWS cloud spend by project and owner, respectively. On the left, they can see that the department is spending the most money on the Tour project. On the right, they can identify the individuals driving the most spend; in this case, Madolyn and Peter are consistently the top spenders. This is a way for this engineering team to gamify among project teams and owners to hold each other accountable for their cloud spend.

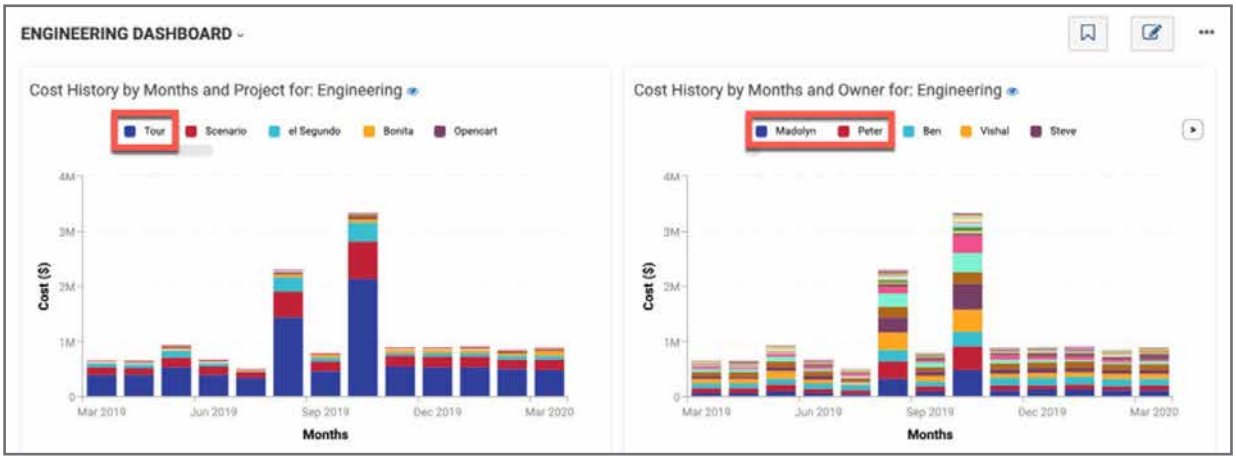

Figure 12: This sample custom dashboard analyzes AWS cloud spend by project and owner.

Integrations and APIs

Tanzu CloudHealth is designed to leverage your existing toolset across performance management, configuration management, and security management to support your business needs. For example, Tanzu CloudHealth ingests the usage and performance data from VMware Aria Operations™ for Applications (formerly VMware Tanzu® Observability™) to help you understand how your cloud assets are being allocated and utilized, and make informed rightsizing decisions for EC2 instances and Azure VMs. Another example is leveraging third-party tools, such as Slack, for communicating policy alerts. Policies in Tanzu CloudHealth can send an email to a user, and if you enable Slack to send emails to a channel, you can receive policy alerts in Slack.

Additionally, the Tanzu CloudHealth API provides programmatic access to functionalities in the Tanzu CloudHealth platform using REST-based arguments and JSON-formatted responses. The APIs allow you to leverage and extend the functionality of Tanzu CloudHealth. For example, you could export data via APIs to ingest into a third-party billing system.

Using Tanzu CloudHealth APIs, customers can initiate requests to view, create or modify data within the Tanzu CloudHealth platform. These requests can come from any source, including a service request management system.

For example, Yelp found it increasingly difficult to manage Perspectives due to changes in their organizational structure. After creating two Perspectives, only 80 percent of their costs were covered, and they had a goal to get to 95 percent of assets allocated. The team decided to use Terraform and the Tanzu CloudHealth Perspectives API to create their hierarchical organizations and minimize the burden of asset allocation.

Tanzu CloudHealth provides several API capabilities, such as:

- The Account API for provisioning accounts within the tool
- The Tagging API for tagging assets within Tanzu CloudHealth
- The Perspectives API for automated provisioning of Tanzu CloudHealth rules-based, dynamic grouping capabilities

To learn more about the Tanzu CloudHealth API, view documentation at apidocs.cloudhealthtech.com.

Aligning metrics

When organizations use Tanzu CloudHealth, business units and departments are better aligned and can make decisions faster. This allows customers to drive consistent best practices throughout the organization for increased productivity and improved collaboration.

With all of the information in the platform available at your fingertips, you can align financial management metrics to business metrics, such as gross margins and COGS. To understand the split between your COGS and OpEx environments, a Perspective can help allocate your cost and usage to these two environments to monitor the trends of your spend, as well as use these in profit and loss calculations. It's recommended to have regular check-ins with key stakeholders from finance, operations and engineering to keep cloud spend aligned to short- and long-term business goals. This is a perfect example of how a cloud center of excellence can align cloud investments to strategic business initiatives.

Let's dive into how one customer aligned cloud spend to their business. Segment, a customer data platform, had a declining gross margin and an increase in COGS as a result of their infrastructure being pushed to the limit by large customers. In a board meeting, they identified that every metric was on track except for gross margin.

The team had never spent time looking at cost efficiency and, as a result, they kicked off a project to remediate this issue. Because Segment used auto-scaling, their spend was dynamic day to day and hour to hour, meaning they needed quick visibility into cost spikes. The Segment team scheduled a recurring meeting with stakeholders from engineering, finance and analytics to manage the project as it went along. The team relied on a daily cost report to determine how they create their goals, using Tanzu CloudHealth and Tableau to combine cloud spend with business metrics.

They discovered that the cost per million of API calls was a critical driver of their cloud spend. Once that was identified, they were able to use that to understand the cost of a customer to the business. As a result of this project, they were able to get their gross margins back on track.

Conclusion

Effective cloud financial management doesn't have to be complicated. Tanzu CloudHealth helps you implement best practices across visibility, optimization, governance and automation, and business integration, so you can promote a culture of financial awareness and accountability across your organization.

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