

Using VMware Cost Insight

VMware Cost Insight services



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Using VMware Cost Insight

The Cost Insight service gives you visibility into the cost of your private and public cloud infrastructure. You can track, manage, and plan your expenses across both types of cloud accounts.

This chapter includes the following topics:

- [Why Cost Insight](#)
- [Viewing Your Cloud Costs](#)
- [Performing the Cost Analysis of your Private and Public Cloud Data](#)
- [Cost Savings Overview](#)
- [Adding Public and Private Clouds](#)
- [About Groups](#)
- [Configuring Cost Settings](#)
- [Troubleshooting Cost Insight](#)

Why Cost Insight

Being an enterprise IT administrator and developer, you might want to precisely attribute costs to applications and Line of Business (LoB) teams. So, to map your investments to the strategic business priorities and to ensure cost accountability, you must clearly understand your costs and the key drivers of these expenses.

Scenario 1: Public Cloud Users

To obtain a quick value in terms of application development, you might have chosen to use Public cloud.

Over a period, you might think:

- Am I using the resources and costs effectively?
- Do I have cost transparency?
- Can I substantiate and validate the expenses?
- Can I optimize the resources and identify cost saving opportunities?
- Do I have to migrate the existing setup into a different cloud?

Scenario 2: Private Cloud Users

If you are using a private cloud, you might have invested on several instances for which you might lose track of its expenses and utilization over a period.

Over a period, you might think:

- How do I track my expenses?
- Who is accountable for these expenses?
- How do I make optimal use of these infrastructure?
- How do I reduce cost?
- Can I consider other clouds to save cost?
- How do I showback my expenses?

In addition, you might also face several challenges.

Challenges in Public Cloud Cost management

- How do I group individual expenses from each team into a single channel for combined visibility?
- How do I analyze the expenses to get clarity based on ownership?
- How do I make business decisions that benefits both organization and individual teams?
- How do I save cost?

Challenges in Private Cloud Cost management

- How do I calculate the total cost expenditure?
- How do I convert total expense into monthly expense?
- How do I allocate or distribute resources (VMs/Hosts) that are providing consumer services?
- How do I aggregate expense based on ownership of resources?

VMware Cost Insight is built with key features to address these private and public cloud challenges and to enable granular visibility into public and private cloud costs, so IT leaders can map investments to strategic IT priorities.

Viewing Your Cloud Costs

Using the specific tabs on the Cost Insight Dashboard page, you can view your AWS, Azure, and Private Cloud account expenses. VMware Cloud services can display the expenses based on several predefined dimensions or categories such as usage, regions, and services.

By default, if you have set up Private Cloud, you see the Private Cloud dashboard. If not, you see the AWS dashboard, otherwise you see the Azure dashboard. If you have configured all three account types in Cost Insight, you see the Private Cloud dashboard, by default.

Viewing Your AWS Expenses

After you set up one or more AWS cloud accounts, VMware Cloud services collects expense data from your AWS bills. You can view these AWS expense details on the AWS Dashboard in Cost Insight.

Note If you are viewing the expense information on a day past 15th of a month, you see the current month data. If you are viewing expense before 15th (dates between 01 and 15), you see the previous month data.

You can view the AWS expense summary, which also includes the total savings opportunities for 30 days.

You can see the daily expense based on usage with additional charges or discounts such as tax, fees, discounts, or refunds. You can hover the mouse on each bar of the graph to see the actual expense values.

Additionally, Cost Insight can categorize expense information based on services, regions and daily AWS EC2 (On-Demand and Reserved Instances) usage.

You also see the potential savings you can achieve from each individual AWS account, if applicable.

You can click on any of widgets to navigate to the Cost Analysis page directly to view the specific expense details.

Note AWS generates the bill by the end of first day of the month. If you try to view your expenses on the first day of the month, your expense may not be up-to-date. You can view your complete expenses starting from the second day of the month onwards.

Viewing Your Azure Expenses

After you add an Azure cloud account, you can view your Azure expense details on the Azure Dashboard. VMware Cloud services pull the data from your Azure bills for display in the Cost Insight service.

Note If you are viewing the expense information on a day past 15th of a month, you see the current month data. If you are viewing expense before 15th (dates between 01 and 15), you see the previous month data.

On the Azure dashboard, you see the monthly expense, total number of accounts and virtual machines.

You can see the daily expense based on cost center with additional charges or discounts such as tax, fees, discounts, or refunds. You can hover the mouse on each bar of the graph to see the actual expense values.

Additionally, Cost Insight can categorize expense information based on services, regions, and daily Azure virtual machine usage.

You can click on any of widgets to navigate to the Cost Analysis page directly to view the specific expense details.

Viewing Your Private Cloud Expenses

After you set up a data collector and a vCenter Server, VMware Cloud services collects data from the vCenter Server. You can view these private cloud expense details on the Private Cloud Dashboard in Cost Insight.

The initial process takes around 40 minutes to collect and upload data into VMware Cloud services. The later data collection happens at default intervals. The following table lists the jobs and their default interval for data collection.

Jobs	Default Interval in Minutes	Description
Inventory	NA	Runs immediately after an inventory update
Tags	360	Runs every 6 hours
Storage	720	Runs every 12 hours
Usage Statistics	1440	Runs every 24 hours

Once the data collection process completes, you get a detailed list of all your private cloud accounts and vCenter Server clusters with their expenses.

On the Private Cloud dashboard, you see the monthly expense, total number of accounts and virtual machines. You can compare:

- the allocated memory and the utilized memory of top ten clusters
- the capacity and utilization of data centers
- the expense of cost drivers
- the allocated vCPUs and cores.

Note If you are viewing the expense information on a day past 15th of a month, you see the current month data. If you are viewing expense before 15th (dates between 01 and 15), you see the previous month data.

You can click on any of widgets to navigate to the Cost Analysis page directly to view the specific expense details.

For information about how the private cloud expenses are calculated, see [About Cost Drivers](#).

About Cost Drivers

Cost Drivers are the aspects that contributes to the private cloud expense of your business operations. To provide a granular cost visibility and to track accurate expenses of virtual machines in a private cloud, Cost Insight has identified key cost drivers.

Cost Insight maintains the reference costs for each of these cost drivers based on the industry standards.

These reference cost enables Cost Insight to calculate the cost of your setup. However, the cost of your cloud based on reference cost might not be accurate to your actual cost. For example, you might have received some special discounts during a bulk purchase or you might have an ELA with VMware that might not match the socket based pricing available in the reference database. To get accurate costs, you can modify the reference cost of cost drivers in Cost Insight, which overrides the values in reference database. Based on your inputs, Cost Insight recalculates the total amount of private cloud expenses.

After you add a private cloud, Cost Insight automatically discovers one or more vCenter Servers that are part of your private cloud. In addition, it also retrieves the inventory details from each vCenter Server. The details include:

- Associated clusters: Count and names
- ESXi hosts: Count, model, configuration, and other host machine details.
- Data stores: Count, storage, type, capacity
- VMs: Count, OS type, tags, configuration, utilization

Based on these configuration and utilization of inventory, and the available reference cost, Cost Insight calculates the estimated monthly cost of each cost driver.

The total cost of your private cloud is the sum of all these cost driver expenses.

Calculating Server Hardware Cost

The Server Hardware Cost is the amortized cost of all servers present in the vCenter Server of your private cloud setup. You can track the total expenses related to server hardware and reduce it to a monthly amortized value.

By default, Cost Insight lists all server models in your configured vCenter Server and assigns the market rate for each server from the reference database. Cost Insight allows you to edit these values based on your actual batch purchase. You can add one or more batches for each server model. The total number of servers in all the batches must match the sum of servers in the vCenter Server for that specific model.

Cost Insight uses a depreciation method over a period to compute amortized monthly cost of Server Hardware. Cost Insight supports two types of yearly depreciation methods and depreciation period from two to seven years.

For more information, see [Configuring the Depreciation Methods](#).

Calculating Storage Cost

Cost Insight calculates storage cost at the level of a datastore based on tag category information collected from vCenter Server.

For example, assume that you have create a tag category named Storage_tiers in the vCenter Server. Then, you create tags named Gold, Silver, and Bronze and assign cost to each tag and assign them to the datastores. Cost Insight discovers the datastores automatically and groups them based on tags.

Tags	Reference Cost (\$ per month Per GB)	Datstores
Gold	0.3	34
Silver	0.2	78
Bronze	0.1	100

Cost Insight groups the datstores based on the assigned tags and calculates the storage cost of each tag category according to the assigned values.

By default, the monthly storage reference cost in Cost Insight is set to \$ 0.1 per GB per month. Cost Insight calculates the storage costs automatically by multiplying the reference cost by the volume of the datstores. However, you can change these rates or switch to datastore profiles.

Storage Cost = estimated cost * datastore volume

: 1TB SAN disk costs \$5K (standard rate in market) Monthly cost after depreciation for 5 years = 5000/50 = \$100 per TB per month Which is \$0.1 per GB/month Note: The storage cost does not include the vSAN expense.

Assumptions

- 1TB SAN disk costs \$5K (standard rate in market)
- Monthly cost after depreciation for 5 years = 5000/50 = \$100 per TB per month

which is \$0.1 per GB/month

Note The storage cost does not include the vSAN expense.

Calculating License Cost

The License cost is the total cost of all licenses present in the vCenter Server. You can track your expense on licenses including Operating System and VMware licenses.

Cost Insight estimates the license cost based on several components:

- license type (ELA or per-socket)
- server operating system running on each virtual machine
- desktop licensing cost
- number of sockets in the physical server

The Enterprise License Agreement (ELA) cost is the total licensing cost of an operating system type. Note that for the cost allocation purposes, ELA costs are divided between physical servers based on the number of sockets on each server.

Here is the current cost of Windows server according to the industry standards.

Windows server 2016 edition	Licensing model	Price
Datacenter	Core-based	\$6155

Standard	Core-based	\$882
Essentials	Server license	\$501

Based on these current market values, Cost Insight calculates the reference cost for the Standard edition of Windows operating system as \$9 per socket.

Price for 16 cores is \$882
 Amortized cost over 2 years (per month cost) = $(882 / 24) = 36.75$
 Price per socket per month = $(36.75 / 4) = 9$,
 assuming 4 cores per socket, like Intel i7.

Similarly, the reference cost of VMware licensing is set to \$22 in Cost Insight.

vSphere on-prem licensing cost is \$776
 Amortizing cost over 3 years = $(776 / 36)$ is \$22 (approx.)

Cost Insight calculates the monthly cost of operating system based on the number of sockets from Windows, Red Hat, SUSE and other operating systems. For example, if you have 10 sockets for Windows at the cost of \$ 9 per socket, then the total operating system cost will be \$90.

The desktop licensing cost is the cost of each operating system on a virtual machine. These costs are applied directly on the virtual machines and do not contribute to fully loaded cost of the server.

The cost of the physical server (ESXi host) depends on the number of sockets in the host. The socket count is calculated based on the Guest Operating System (GOS) running on the virtual machines for each ESXi host.

Example: Example

Assume that there are three ESXi hosts, Host_1, Host_2 and Host_3 with 5 virtual machines and 5 sockets for each host. Virtual machines on Host_1 are running with Windows operating system, virtual machines on Host_2 are running with Linux operating system and virtual machines on Host_3 are running both windows and Linux operating system. The total number of sockets will be as follows: Windows Sockets: 5 (from Host_1) + 5 (from Host_3) =10 Linux Sockets: 5 (from Host_2) + 5 (from Host_3) =10

Calculating Maintenance Cost

The maintenance cost is the cost you incur to maintain your server hardware and operating systems. You can track your total expense with hardware and operating system vendors.

Cost Insight allows you to define the expenses on maintenance as a percentage value of hardware and ELA license procurement cost.

- The hardware maintenance cost is the small percentage of the Server Hardware cost. For example, assume that the total cost (NOT monthly cost) of all the groups in server hardware is \$1200. If the Hardware Maintenance is set to 10%, the yearly maintenance cost will be 120, i.e. \$10 per month. The maintenance cost of each server is computed and attributed to fully loaded cost of the server.

- Operating System maintenance cost is the small percentage of the Windows server licensing cost. For example, if the Windows server licensing cost is 100\$ and operating system maintenance is set to 10%, then the cost will be \$10. The Windows server type operating systems on the virtual machines adds this maintenance cost as part of their fully loaded cost.

Calculating Labor Cost

The labor cost is the sum of expense that is incurred on employees who maintain the datacenters. You can track all expenses spent on human resources to manage the datacenters.

Cost Insight can estimate the cost spent on labor to manage server, VMs and operating systems.

For example, Cost Insight calculates the number of hours required to manage the physical servers and virtual machines by using the following ratios:

- admin hours to physical servers
- admin hours to operating system instances
- admin hours to virtual machines

The resulting value is multiplied with the hourly rate based on the region and total number of hours per month.

$\text{Labor Cost} = \text{Total number of hours} * \text{Hourly rate} * \text{number of hours per month}$

Note that the hourly rate is not only the salary, but includes the fully loaded cost. The fully loaded cost of each distinct physical server is the sum of all relevant cost driver cost after applying a depreciation method.

However, you can modify or override the values by providing total monthly costs for each labor category like physical server, virtualization and operating system administration. You can also specify the hours per server and hourly rates or enter the total labor cost directly.

The labor cost contains three sections named Servers, Virtual Infrastructure and Operating System. Each section has two methods to set the cost, either based on hourly rates or the monthly labor hours. If you enter the cost based on the hourly rates, the calculation is done based on the hours of labor and labor hourly rate. Total server labor cost is equally distributed among all servers and added to their fully loaded cost.

Note Virtual Infrastructure and operating system cost will be the Direct VM cost.

Reference Calculation	Value
Salary - Yearly	60000
Salary Monthly	5000
Total no. of Hours in a Month	160
Salary - Per Hour	31.25
No. of VMs Managed	2000
Monthly hours of labor spent per VM	0.04
Monthly hours of labor spent per server	0.08

Calculating Network Costs

The Network Cost is the expense spent on network connections. You can track all expenses related to network.

Cost Insight allows you to track network expense based on different types of NICs attached to the ESX server.

Network cost is distributed based on the capacity of the NIC card. The 0-1 Gigabit NIC cards are considered under the 1GB NIC category and 1-10GB NIC cards are considered under the 10GB NIC category. For example, if one server is having three 1GB NICs and other one is having one 10GB NIC and if the price for 1GB is \$50 and 10GB is 100\$, the total network cost will be $150+100=\$250$.

If you enter the cost manually as \$100 for one server with three 1GB NICs and one 10GB NIC card, then the \$100 is distributed among both of the servers in the ratio based on the capacity and number of cards in respective servers.

The network cost for a physical server is estimated based on the price per network port and the number of ports on the host. Cost Insight collects the price per network from the reference database and categorizes between the port types (1 GB and 10 GB network ports).

You can enter the total monthly network cost directly into Cost Insight, instead of providing cost per network port.

Calculating Facilities Cost

The facilities cost includes the real estate costs, such as the rent or cost of data center buildings and racks, power and cooling costs, and associated facility management labor cost.

Cost Insight encapsulates all facility related costs into the rent cost per rack unit, except the power cost. Hence, Cost Insight calculates the facilities cost based on monthly:

- the operational cost for each rack
- the power and cooling system cost for each kilowatt per hour (kWh)

The reference database maintains these monthly costs for each rack and for each kWh. Alternatively, you can enter the total facility costs directly into Cost Insight.

Operational Monthly Cost

By default, Cost Insight provides the reference operational monthly cost as \$50 per rack unit, based on the Uptime Institute's costing model. Uptime Institute is an American professional services organization focused on improving the performance, efficiency, and reliability of business critical infrastructure through innovation, collaboration, and independent certifications.

The uptime Institute cost model for on-premises use two components:

- Power consumption by each rack or the kw component by desired level of functionality: \$23,000/kw of redundant UPS (with assumption of Tier III datacenter)
- Real estate or the computer room component: \$300/sq. ft. added in all cases

Assumptions

- Tier III data center with a 15 years useful life
- Standard rack occupies 28 Sq. Ft.
- Standard rack uses 10 kW of power
- Standard rack consist of 42 rack units
- Standard overhead on 42 rack units is about 30%. So, actual rack consists of 28 rack unit per unit

```
Standard monthly rack cost
= (cost of kw * power usage + real estate * rack area)/ (no. of yrs * no. of months in a yr)
= ($23,000 *10 + 300 * 28)/(15*12)
= 1400 (apprx.)
Actual monthly cost per rack (considering overhead)
= Standard monthly rack cost / actual no. of racks
= 1400 /28
= $50
```

Power and Cooling Monthly Cost of a Datacenter

Based on the Average Retail Price of Electricity in the US as published by EIA.gov, Cost Insight is configured with the reference power and cooling monthly cost as \$ 0.08 per kWh.

The average cents per kWh for commercial segment in December 2013 was about 10.62. On an average basis over the years, Cost Insight considers as 8 Cents.

Monthly cost of power and cooling for a datacenter = Actual kWh consumed by each ESXi host * average price of electricity.

The kWh details are obtained from ESXi server directly.

Performing the Cost Analysis of your Private and Public Cloud Data

Once you add a private or public cloud account into VMware Cloud services, you can filter the details based on different criteria to analyse your expense.

By default, if you have set up Private Cloud, you see the Private Cloud data. If not, you see the AWS data, otherwise you see the Azure data. If you have configured all three account types in Cost Insight, you see the Private Cloud data, by default.

You can add filters for groups, tags, and cloud account types to see the expense data for the specific filter. Based on the filters, you can also modify the parameters for X and Y axis. You can download the data in PNG, CSV or Excel format and also view data in different graph types.

By default, you see the expense of the current month. You can filter these data for the previous month and the last three months.

Note If you are viewing the expense information on a day past 15th of a month, you see the current month data. If you are viewing expense before 15th (dates between 01 and 15), you see the previous month data.

As of now, last three months and twelve months data is available for public cloud accounts only.

For more information about how to use the Cost Analysis page to filter data, click the **Getting Started** option on the top right corner of the page and watch the video.

Using **Save as Report**, you can schedule a report to share your latest or up-to-date data at regular intervals (daily or monthly) to the specific recipients. Also, export the report to the CSV format and save the report for future use. You can see all your saved reports under **Manage Reports**.

Cost Savings Overview

Based on your resource availability and your cost configurations, Cost Insight provides the potential cost saving opportunities of your private and public cloud accounts.

Cost Insight indicates the amount of provisioned capacity that you can reclaim and provision to other objects in your environment without causing stress or performance degradation.

You can see the virtual machines or the instances that are categorized based on the current state (Recommendation types). You can click on each state or type to see the details of the instances or virtual machine details, month to date expense, recommendations to delete or power-off that saves your expense, and also provides the potential saving you can achieve by performing the recommended action. You can also export the report to a CSV file.

Adding Public and Private Clouds

VMware Cloud services supports public and private clouds. You can add AWS and Azure public cloud accounts and also vCenter Server private cloud accounts.

For information about adding cloud accounts, see [VMware Discovery documentation](#).

Working with AWS Accounts in VMware Cloud Services

When you add your AWS public cloud account to VMware Cloud services, you establish a connection that allows information about your AWS resources and billing to be shared, analyzed, and updated in VMware Cloud services.

The AWS accounts you create in VMware Discovery can be opened in other VMware Cloud services such as VMware Cost Insight and VMware Network Insight. If you are working with VMware Cost Insight, and you want to view billing information, you must add both an AWS master account and an AWS linked account. VMware Cloud services collect cost information from the master account, and inventory information from the linked accounts.

There are two ways to add an AWS account in VMware Discovery.

- Use an IAM role to set up an AWS account in VMware Discovery when you want more security in your organization. The IAM role account can only be used across services within the same organization in which you created the account.
- Use an IAM user to set up an AWS account.

How Do I Create an AWS Account with an IAM Role in AWS

Amazon Resource Names (ARNs) uniquely identify AWS resources. You use an ARN to specify a resource unambiguously across all AWS, such as in IAM policies.

Creating an account with an IAM role provides additional security for your organization. VMware Cloud services provides a unique ID that you input when you set up the role, and that is organization-specific. You can use the account across all the services in the organization, but you cannot use it for services in another organization.

During this procedure, you work with both VMware Discovery and AWS simultaneously to create a policy and a new IAM role in AWS. You might find it easier to follow the procedure if you open VMware Discovery and AWS in two different tabs of the same browser. This way you can switch between the two applications and copy the required values from one application to another.

Procedure

- 1 Log in to the AWS Console as a user with permissions to create an IAM role.
- 2 Select **Services > IAM**.
- 3 Select **Policies**, and click **Create Policy**.
- 4 Click the **JSON** tab.
- 5 Copy the policy provided in Discovery into the space provided in the **JSON** tab.
- 6 In the AWS Console, select **Roles** and click **Create role**.
- 7 On the Create Role page, click **Another AWS account**, and select the **Options** check box.
The Account ID and the External ID are provided in Discovery.
- 8 Copy the Account ID from Discovery to the Account ID text box in AWS.
- 9 Copy the External ID from Discovery to the External ID text box in AWS, and click **Next: Permissions**.
- 10 Search for the policy you created, select the check box next to the policy, and click **Next: Review**.
- 11 On the Create role page, enter a name and a description for the role, and click **Create Role**.
- 12 Select the role, and view the summary information.
The Role ARN is displayed at the top of the page.
- 13 Copy the value of the ARN.
You need the Role ARN to set up an AWS account in Discovery.

14 In Discovery, paste the ARN in the **IAM Role ARN** text box, and click **Validate**.

15 Click **Next**, and then click **Finish**.

How Do I Add an AWS IAM User Account in Cost Insight

If you have access to your AWS security credentials and S3 bucket details, you can add your AWS public cloud account in VMware Cloud services to view the billing data.

Prerequisites

- Ensure that you have the AWS credentials such as access key ID and secret key associated with your AWS account available. See [How Do I Create AWS Security Credentials](#)
- Ensure that your AWS account has all the following required permissions:
 - **AmazonEC2ReadOnlyAccess** to collect data on Amazon Elastic Block Store (EBS) blocks and computes.
 - **AmazonVPCReadOnlyAccess** to collect data on a Virtual Private Cloud (VPC)
 - **CloudWatchLogsReadOnlyAccess** to collect metrics from AWS
 - **AmazonS3ReadOnlyAccess** to collect data on S3 buckets
 - **DescribeReportDefinitions** to define the parameters for the AWS Cost and Usage Report.
- [Create an Amazon S3 Bucket and Configure Billing](#).
- [Create and Configure the AWS Cost and Usage Report](#).

Procedure

- 1 Sign in to Cost Insight.
- 2 Navigate to **Manage > Cloud Accounts**, and click **Add New**.
- 3 Select **Amazon Web Services**.
- 4 Do one of the following:
 - If you have already added the AWS account in VMware Discovery, click **Select** next the account information on the Use an Existing Account page.
 - If you are adding a new AWS account in Cost Insight, click **Add New** on the Use an Existing Account page.
- 5 Select **IAM User**, and click **Next**.
- 6 Enter your access key ID and your secret access key, and click **Validate** to verify your credentials.
- 7 Enter additional account details like a nickname, description and add the owners and tags.
- 8 To collect your billing details from AWS to Cost Insight, enter the S3 bucket name that you created in AWS.
- 9 Enter the name of the AWS Cost and Usage Report.
- 10 Enter the report prefix that you provided during the report creation.

11 Click **Save**.

How Do I Create AWS Security Credentials

You create AWS security credentials when you set up your AWS account with an IAM user in AWS. You need these security credentials to set up your AWS account in VMware Discovery.

AWS security credentials consist of the access key ID and secret key associated with your AWS account. If you did not make a note of these credentials when you set up your account, you can create new credentials.

For more information on AWS security credentials, see

http://docs.aws.amazon.com/IAM/latest/UserGuide/id_credentials_access-keys.html.

Procedure

- 1 Sign in to your AWS account at <https://console.aws.amazon.com>.
- 2 Click **Services > IAM**.
- 3 Select **Create Individual IAM Users**.
- 4 Click **Manage Users** and select a user with administrative permissions whose credentials you want to generate.
- 5 Select **Security credentials** and click **Create access key**.

If there are already two pairs of security credentials, delete one. AWS only allows two.

- 6 Download the CSV file that contains your credentials, or click **Show** to display the secret access key and copy the credentials.

Do not delete these security credentials in AWS. They are the identifier that allows AWS and VMware Cloud services to share data.

Create an Amazon S3 Bucket and Configure Billing

You must create an Amazon S3 bucket to store your billing data and configure the billing to view the data in the reports.

For more information on working with Amazon S3 buckets, see

<https://docs.aws.amazon.com/AmazonS3/latest/user-guide/create-configure-bucket.html>.

Prerequisites

Ensure that your AWS account has the **AmazonS3ReadOnlyAccess** permission to collect data on S3 buckets.

Procedure

- 1 Log in to the [AWS console](#), and navigate to **Services > S3**.
- 2 Select **Create Bucket**.
- 3 Enter a valid DNS-compliant bucket name, click **Create** and then click **Next**.
- 4 Use the default values for additional settings or configure the bucket based on your preferences.

- 5 Click your account name on the top menu, and select **My Account**.
The Billing Management Console opens in a new tab.
- 6 Click **Preferences** in the left column, and perform the following steps:
 - a Select **Receive Billing Reports**.
 - b Click the **Sample Policy** link, and copy the policy content to the clipboard.
 - c Click **Close**.
- 7 Click **Services > S3**.
- 8 In the S3 Management Console, select the name of the bucket you created, and perform the following steps:
 - a Click the **Permissions** tab, and then click the **Bucket Policy** tab.
 - b Paste the sample policy text into the Bucket Policy Editor.
 - c Click **Save**.
- 9 Click your account name, select **My Account > Preferences**, and perform the following steps:
 - a In the Billing Management Console, click **Verify**.
 - b Under **Report**, select the following options:
 - **Cost allocation report**
 - **Detailed billing report with resources and tags**
 - **Needed for EC2 Usage Reports**
 - c Click **Save Preferences**.

Create and Configure the AWS Cost and Usage Report

You must create and configure the AWS Cost and Usage report to track your AWS usage and get your estimated charges associated with the AWS account. This report helps you to get cost details based on different parameters in Cost Analysis.

Prerequisites

[Create an Amazon S3 Bucket and Configure Billing.](#)

Procedure

- 1 Log in to the [AWS console](#) as an administrator, and navigate to the Billing & Cost Management Dashboard.
- 2 From the left navigation pane, select **Reports** and click **Create Report**.

- 3 On the Select Content page,
 - a Enter a unique report name. For example, **vmw-cost-insight**.
You use this name in Cost Insight while adding an AWS account.
 - b Select **Hourly** and select **Resource IDs**.
 - c Click **Next**.
- 4 On the Select Delivery Options page,
 - a Enter the name of the AWS S3 bucket that you have created and click **Verify**.
 - b Enter a unique prefix for the report. For example, **vmw-ci**.
 - c Select **GZIP** compression
 - d Click **Next**.
- 5 Review your configurations on the Report Content page and click **Review and Complete**.
The value for the Report path is the combination of prefix and report name (prefix/reportname).
For example, **vmw-ci/vmw-cost-insight**.
- 6 Activate the tags to appear in Cost Insight.
 - a Go to the **Billing** services on AWS console.
 - b Select **Cost Allocation Tags**.
 - c Select the tags that you want to appear in the bill.
 - d Click **Activate** to consume the tags in Cost Insight.

AWS takes up to 24 hours to start delivering reports to your S3 bucket. AWS updates the Cost and Usage report at least once a day.

Working with Azure Accounts in VMware Cloud Services

You can add two kinds of Azure public cloud accounts in VMware Cloud services. An individual account which contains inventory data with minimal resources and billing, and an Enterprise account which contains inventory data with extensive resources and billing.

You add an Azure account with VMware Discovery because you do not need to generate or display billing information. You set up an Azure Enterprise account with VMware Cost Insight because billing and cost data is important features of this kind of account.

How Do I Add an Azure Account

You add an Azure account to VMware Cloud services with VMware Discovery because you do not need to generate or display billing information.

Before you add your Azure account, refer to this check list to identify the tasks you must perform to set up your account before you add it to VMware Cloud services.

To	Do this
<input checked="" type="checkbox"/> Make sure that your account has been set up correctly.	<p>VMware Cloud services set the scope of an Azure account on an application-by-application basis. Your account must be set up with a Microsoft Active Directory application and have the required permissions set for it. For more information, see https://docs.microsoft.com/en-us/azure/azure-resource-manager/resource-group-create-service-principal-portal.</p> <p>You can check your account at https://account.azure.com/Home/Index. To view the details of your subscription, click Account Center and select the name of your Azure individual account. To see the services and resources set up in your account, click Portal.</p>
<input checked="" type="checkbox"/> Collect Keys and IDs	<p>To add your Azure account to VMware Cloud services, you need the following keys and IDs.</p> <ul style="list-style-type: none"> ■ Subscription ID. Allows you access to your Azure subscriptions. ■ Client Application ID. Provides access to Microsoft Active Directory in your Azure individual account. ■ Client Application Secret Key. The unique secret key generated to pair with your Client Application ID. ■ Tenant ID. The authorization endpoint for the Active Directory applications you create in your Azure account. <p>For information about how to collect these keys and IDs, see Locate Your Azure Account Credentials.</p>
<input checked="" type="checkbox"/> Add your Azure account to VMware Cloud services.	<p>Establish a connection between your Azure account and VMware Cloud services. See, Add an Azure Account.</p>

Locate Your Azure Account Credentials

You need the security credentials associated with your Azure account to add the account to VMware Cloud service. These include your Subscription ID, Tenant ID, Client Application ID, and Client Application Secret Key. You can locate these credentials in your Azure account.

Procedure

- 1 Sign in to your Azure account at <https://account.azure.com>, open the Billing page, and make a note of your Subscription ID.

The Subscription ID is a combination of 32 alphanumeric characters.
- 2 Perform the following steps to locate your Tenant ID.
 - a In the upper right of the Azure portal, click the **Help** icon.
 - b Click **Show diagnostics**.

The PortalDiagnostics JSON file is downloaded.
 - c Open the JSON file and scan for the tenants block to find the 32-digit Tenant ID.

- 3 Perform the following steps to find your Client Application ID.
 - a On the navigation bar of the Azure account portal, select **Azure Active Directory**.
 - b Click **App Registrations**.
 - c Look for your application in the list of registered applications. The Client Application ID is located in the right column.
- 4 Perform the following to generate a Client Application Secret Key.
 - a In the Display Name column, click the name of your application.
 - b Click **All settings**.
 - c On the Settings page, select **Keys** under the API Access section.
 - d Enter a description and an expiration for your application.
 - e Click **Save**.

The value of the Client Application Secret Key is displayed.

Add an Azure Account

When you add your individual Azure account to VMware Cloud services, you can view its resources in VMware Discovery.

Procedure

- 1 Access VMware Discovery.
 - If you are adding a cloud account for the first time, the list of account types you can add is displayed.
 - If you have already added a cloud account, select **Manage > Cloud Accounts**, and click **Add New**.
- 2 Select **Microsoft Azure**.
- 3 Enter the security credentials and application information for your Azure account, and click **Validate**.
- 4 To help you identify this account, enter a nickname, and click **Add**.

To see the resources in your account and use filtering to display specific resources, click **Resources** in the left column.

You can view Azure resources on the Summary page. To edit the account, click **Manage > Cloud Account**, and click the account nickname.

How Do I Add an Azure Enterprise Account

You add an Azure Enterprise account to VMware Cloud services with VMware Cost Insight so that you can view billing and cost data.

Refer to this check list to identify the tasks you must perform to set up your Azure account and collect the required credentials before you add it to VMware Cloud services.

To	Do this
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Make sure that your account has been set up correctly. 	<p>VMware Cloud services set the scope of an Azure account on an application-by-application basis. Your account must be set up with a Microsoft Active Directory application and have the required permissions set for it. For more information, see https://docs.microsoft.com/en-us/azure/azure-resource-manager/resource-group-create-service-principal-portal.</p> <p>You can check your account at https://account.azure.com/Home/Index. To view the details of your subscription, click Account Center and select the name of your Azure individual account. To see the services and resources set up in your account, click Portal.</p>
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Collect Keys and IDs 	<p>To add your Azure EA account to VMware Cloud services, you need the following keys and IDs.</p> <ul style="list-style-type: none"> ■ Enrollment ID. Indicates the master account used for Enterprise billing. ■ API Access Key. Allows access to the Azure Billing API. <p>For information about how to collect these keys and IDs, see, Locate Azure Enterprise Credentials.</p>
<ul style="list-style-type: none"> <input checked="" type="checkbox"/> Add your Azure Enterprise account to VMware Cloud services. 	<p>Establish a connection between your Azure account and VMware Cloud services. See, Add an Azure Enterprise Account.</p>

Locate Azure Enterprise Credentials

You need the Enrollment ID and API access key associated with your Azure Enterprise account to add the account to VMware Cloud service. You can locate these credentials in your Azure Enterprise account.

The Enrollment ID and API access key are available only to your account's enterprise administrator, the top-level administrator of your Azure Enterprise account.

Procedure

- 1 Log in to your Azure Enterprise account at <https://ea.azure.com>.
- 2 Locate your Enrollment ID.
 - a Click the **Enrollment** tab, then click **Manage**.
 - b Locate the Enrollment Number in the list of enrollment details.
 - c Copy the Enrollment Number and save it for later use.
- 3 Generate an API access key.
 - a Under the **Enrollment** tab, click **Reports**.
 - b Click **Download Usage**.
 - c Click **API Access Key**.
 - d Click the key icon in the **Primary Key** text box to generate the API access key.
 - e Copy the entire API access key string into a text file, and save the file.

Add an Azure Enterprise Account

You add an Azure Enterprise account in VMware Cost Insight.

Prerequisites

Make sure that your Azure Enterprise account has been set up correctly, and you have your Enrollment ID and API access key available. See [How Do I Add an Azure Enterprise Account](#).

Procedure

- 1 In VMware Cost Insight, click **Manage > Cloud Accounts**, and click **Add New**.
- 2 Click **Microsoft Azure**.
- 3 Enter your credentials for your Azure Enterprise account, and click **Validate**.
- 4 To help you identify this account, enter a nickname, and click **Add**.

Working with vCenter Accounts in VMware Cloud Services

You can add one or more vCenter private cloud accounts, each of which contains one or more vCenter Servers to VMware Cloud services. These accounts allow you to retrieve information about your infrastructure inventory.

Before you add your account, refer to this check list to ensure that your vCenter environment is set up correctly, and that you have collected the security credentials required to add the account to VMware Cloud services.

Do this

- Verify that your vCenter Server meets certain requirements.
 - Must be version 5.5 or later
 - Must have 4 vCPU, 8 GB RAM, and 80 GB of storage available.
 - Has outbound Internet access without any corporate firewall blocks. For example, on port 443, HTTPS.

- Verify that the vSphere Web Client is installed in your environment.

- Create an administrative user with the correct permissions to access your vCenter Server private cloud account from VMware Cloud services.

- If your vCenter Server private network does not use DHCP, you must gather certain information before you deploy a data collector and set up your private cloud account with VMware Cloud services.
 - Without this information, VMware's network cannot connect with your network to finish the configuration process.
 - Default Gateway
 - Domain Name
 - Domain Name Servers
 - Domain Search Path
 - Network IP Address
 - Network 1 Netmask

Do this

Ensure you have the vCenter user role and privileges correctly configured.

The role should be a vCenter server read-only role, with the following privileges selected:

- Profile-driven storage
 - Profile-driven storage update
 - Profile-driven storage view
- Storage views
 - Configure service
 - View

Download and deploy a data collector

The first time you add a private cloud account to VMware Cloud services, you are prompted to add a data collector. For more information, see [Deploy a Data Collector for a vCenter Server Cloud Account](#).

Deploy a Data Collector for a vCenter Server Cloud Account

The first time you add a private cloud account, VMware Discovery prompts you to add a data collector.

You can deploy as many data collectors as you want, one for each vCenter Server. To link your vCenter Servers to the same private cloud and gather information from them all, give each vCenter Server the same private cloud name.

You can also deploy a data collector in VMware Cost Insight and VMware Network Insight. The data collector that you download for use in VMware Network Insight is different from the data collector you deploy in VMware Cost Insight and VMware Discovery.

Procedure

1 Sign in to VMware Discovery and click **Manage > Data Collectors**.

You can also perform this step in VMware Cost Insight.

2 Click **Add New**.

3 Click **Download**.

4 Navigate to your vSphere Web Client data center, click the name of your vCenter cluster, and select **Deploy OVF Template**.

5 In the Deploy OVF Template form, perform the following actions.

a Click **Select template**, then **URL**. Paste in the path to the OVA data collector file you downloaded. Click **Next**.

If you have already installed a data collector to your vCenter and are reinstalling it, click **Local file** and then **Next**.

If you see a warning message that informs you that the specified Photon operating system is not support, click **Yes** and proceed.

b Click **Select name and location**, then enter the name of your OVA file. Select the cluster where you want to install the data collector, and click **Next**.

- c Click **Select a resource** and the cluster where you want to run the data collector, and then click **Next**.
- d Review the details of your data collector deployment. Notice the **Size on disk** text box. The location where you deploy the data collector in the following steps must have enough space available. Click **Next**.
- e **Accept** the License Agreement. Click **Next**.
- f Click **Select storage** and select a datastore from the list with enough free space for the OVA file. Click **Next**.
- g Click **Select networks** and select a destination network, and then click **Next**.
- h Click **Customize template** and enter the required information. Do not click **Next**.
 - For **Name of the Remote Data Collector**, use the name of the OVA file.
 - For **Root User Password**, choose a unique password. It does not need to match the vCenter password.
- i Return to VMware Cloud services and collect the token key provided by VMware Discovery on the Setup a Data Collector Virtual Appliance form. Click **Copy** to copy the key.
- j When you see the Copied message, return to the vCenter **Customize template** form and paste the token key into the **VMware Cloud Services One-Time Token** text box. Do not click **Next**.
- k Click **Networking Properties**. If you use DHCP in your vCenter network, do not enter any information. If you do not use DHCP, then you must provide information for each setting. Click **Next**.
- l Click **Ready to complete** and review your configuration data. Click **Finish**.

The data collector is installed into your vSphere Web Client.

- 6 Return to the vSphere Web Client to run the data collector.

When you run the OVA file in the vSphere Web Client, the data collector works with the vCenter Server to push data to the VMware Cloud services.

- 7 If the data collector is not running when you return to your vSphere Web Client, click the **green arrow** at the top of your page.
- 8 To verify that your data collector is running, look under the **VMs** tab at the list of your virtual machines to ensure it is **Powered On**.
- 9 In VMware Discovery, wait for a connection to be made with your vSphere Web Client, and click **Next**.

It might take several minutes until a connection is made.

- 10 To upgrade an existing data collector, you must reboot the remote data collector VA.

Delete a Data Collector

If you no longer need a data collector and want to free up space, you can delete it from the vCenter Server.

Procedure

- 1 Log in to the vCenter Server as an administrator.
- 2 Navigate to the data collector that you have deployed.
- 3 Right-click the data collector virtual machine and select **All vCenter Actions > Delete from Disk**.
- 4 Click **OK**.

Add a vCenter Account

When you have deployed a data collector, you can add one or more private cloud accounts in VMware Cloud services.

Procedure

- 1 Sign in to VMware Discovery.
 - If you are adding a cloud account for the first time, the list of cloud account types is displayed.
 - If you have already added a cloud account, select **Manage > Cloud Accounts**, and click **Add New**.
- 2 Click **vCenter**.
- 3 Select the name of the data collector you deployed to the vCenter Server.
- 4 Enter the fully qualified domain name for your vCenter Server.
- 5 Enter the user name and password you used to access the vCenter Server.
- 6 To help you identify this account, enter a nickname, and then click **Add**.
You can view vCenter resources on the Summary page.
- 7 To edit the account, click **Manage > Cloud Accounts** and click the account nickname.

About Groups

A group is a set of resources (Compute, Storage and Network) that are categorized based on different properties like, account types, instance type, region, resource type, tags.

You can perform cost analysis and review the cost saving opportunities based on these groups. The group expense value is the sum of virtual machine expenses and other services. For example, if the group is created as "Account: valentina-acc" then the expense will comprise not only of EC2 instances but also other services like S3 and relevant taxes as applicable.

Configuring Cost Settings

You can configure the depreciation preference for the Server Hardware cost driver and also configure resource utilization parameters of private cloud and AWS to calculate the accurate cost and improve the efficiency of your environment.

Cost Insight analyzes the resources and the performance of your virtual environment. Based on the values you define, Cost Insight can identify reclamation opportunities and can provide recommendations to reduce wastage of resources and cost.

You can also define an expense threshold for AWS and Azure so that Cost Insight can notify users about the spike in expense with comparison with the previous day.

About Alerts and Notifications

To monitor your increase public cloud expenses, you can set a threshold value.

When you exceed the configured expense percentage, Cost Insight sends an email notification to a set of defined recipients with the details, which includes cloud account and type, current expense and the spike value when compared with the previous day.

Configuring the Depreciation Methods

To compute the amortized cost of the Server Hardware cost driver, you can configure the depreciation method and the depreciation period. Cost Insight supports two yearly depreciation methods and you can set the depreciation period from two to seven years.

Note Cost Insight calculates the yearly depreciation values and then divides the value by 12 to arrive at the monthly depreciation.

Method	Calculation
Straight line	Yearly straight line depreciation = [(original cost - accumulated depreciation) / number of remaining depreciation years]
Max of Double or Straight	<p>Yearly max of Double or Straight = Maximum (yearly depreciation of double declining balance method, yearly depreciation of straight line method)</p> <p>Yearly depreciation of double declining method = [(original cost - accumulated depreciation) * depreciation rate].</p> <p>Depreciation rate = 2 / number of depreciation years.</p>
	<p>Note Double declining depreciation for the last year = original cost - accumulated depreciation</p>

Example: Example for Straight Line Depreciation Method

Year	Original Cost	Accumulated Depreciation	Straight Line Depreciation Cost
Year 1	10000	0	$[(10000-0)/5] = 2000$
Year 2	10000	2000	$[(10000-2000)/4] = 2000$
Year 3	10000	4000	$[(10000-2000)/3] = 2000$
Year 4	10000	6000	$[(10000-2000)/2] = 2000$
Year 5	10000	8000	$[(10000-2000)/1] = 2000$

Example: Example for Max of Double and Straight Line Depreciation Method

Year	Original Cost	Depreciation Rate	Accumulated Depreciation	Straight Line Depreciation Cost
Year 1	10000	0.4	0	$Maximum([(10000-0)*0.4], [(10000-0)/5])$ $= Maximum(4000, 2000) = 4000$ which is 333.33 per month.
Year 2	10000	0.4	4000	$Maximum([(10000-4000)*0.4], [(10000-4000)/4])$ $= Maximum(2400, 1500) = 2400$ which is 200 per month.
Year 3	10000	0.4	6400	$Maximum([(10000-6400)*0.4], [(10000-6400)/3])$ $= Maximum(1440, 1200) = 1440$ which is 120 per month.
Year 4	10000	0.4	7840	$Maximum([(10000-7840)*0.4], [(10000-7840)/2])$ $= Maximum(864, 1080) = 1080$ which is 90 per month.
Year 5	10000	0.4	8920	$Maximum([(10000-8920)*0.4], [(10000-8920)/1])$ $= Maximum(432, 1080) = 1080$ which is 90 per month.

Troubleshooting Cost Insight

You can troubleshoot common problems that might occur while working with Cost Insight.

Individual Resource Cost is not Displayed in Cost Analysis

Cost Insight does not display the cost of individual resources.

Problem

After you add a filter on the Cost Analysis page, when you select an individual resource from the table, you do not see the cost of the selected resource.

Cause

You have added the payee account, but not the associated linked accounts into Cost Insight.

Solution

- ◆ Add the linked accounts explicitly into Cost Insight, similar to the payee account.

vCenter Server Storage Synchronization Failure

Cost Insight does not collect data because of failure in vCenter Server the cost calculation process.

Problem

- You see the storage cost calculation failure message in the **Status** column on the **Cost Insight > Manage > Cloud Accounts** page for the **Manage** account type.
- The vCenter Server storage service might fail and cause storage profiles to not appear in Cost Insight.

Cause

This problem might occur in one of the following situations.

- The Web Services for Management (WS-Management) are not running on the vCenter Server.
- The Profile-driven Storage service is not running in vCenter Server.
- The vCenter Server Web services and profile driven services are not running under the same LocalSystem or domain account.

Solution

- ◆ To resolve this problem, perform the applicable step out of the following solutions.
 - Start the Web Services for Management on vCenter Server.
 - Start the Profile-driven Storage service for Management on vCenter Server.
 - Verify that the vCenter Server Web services and profile driven services are running under the same account name (LocalSystem or domain account).
 - If the services are already running, restart the services.
 - Ensure that the vCenter Server user that you are adding to Cost Insight is **administrator@vsphere.local**.

The Data Collector is inactive

The data collector you have added into Cost Insight is inactive.

Problem

The status of a data collector on the **Manage > Data Collector** page is inactive.

Cause

This problem might occur in one of the following situations.

- The network connection is incorrect.
- The data collector is switched off.

Solution

- ◆ To resolve this problem, perform the applicable step out of the following solutions.
 - Log in to the data collector and ensure that the network connection exists.
 - Verify that the data collector is on and running.

Data Collection Fails After vCenter Server Upgrade

After upgrading vCenter Server, the data collection fails.

Problem

After you upgrade your vCenter Server to a latest version, the data collection fails.

Cause

The vCenter Server certificate has changed.

Solution

- ◆ Edit the vCenter Server and accept the new certificate.

Unable to Establish Internet Connection During SSH

When you attempt to connect to a virtual machine during SSH, you see the error messages related to internet connection.

Problem

After you download the .OVA file and generate the One-Time Key (OTK), when you access the virtual machine by using SSH, you see the internet issue messages.

Cause

This problem might occur in one of the following situations.

- Invalid OTK

- No internet connection
- Network connection issues

Solution

- ◆ To resolve this problem, perform the applicable step out of the following solutions.
 - Regenerate a new OTK.
 - Verify the internet and network connections.
 - Collect the following details and contact VMware Support.
 - Poxylid from /usr/local/bin/proxy.properties.
 - Installation logs from /opt/vmware/var/log/firstboot
 - Handshake logs from /data1/proxylogs/va-remote-proxy.0.log

AWS Cost is not Displayed

Cost Insight does not display your AWS cost information.

Problem

Though you have added your AWS account into Cost Insight, you do not see the related cost information.

Cause

This problem might occur in one of the following situations:

- You have not configured the S3 bucket correctly.
- You have not enabled the Detailed Billing in AWS.
- You have the linked account, without adding the paying account.
- You have added the account recently.
- You have not set the required permissions.

Solution

- ◆ To resolve this problem, perform the applicable step out of the following solutions.
 - Configure the S3 bucket.
 - Add the payee account into Cost Insight.
 - Set the required permissions.