

# Building Clarity in Cloud Storage Cost

## Factors and considerations for TCO

September 2022

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### White Paper

#### Abstract

Modern storage architectures offer as many choices for features as they do for deployment strategies and variations. Cost remains a high priority for decision making when choosing what to use and where to use it. This paper will outline and highlight common, and also not obvious or advertised costs that can be incurred using cloud-based storage as well as what APEX Data Storage Services can do to reduce them.

Dell Technologies

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## Executive summary

### Overview

Taking advantage of cloud-based resources to accelerate business requirements is attractive to many IT administrators with its ease of use and seemingly infinite capacity. And, cloud services can be relatively easy to acquire. However, understanding the cost of cloud services can be potentially complicated and arcane. With any infrastructure no matter where it is located, there are costs involved - whether it is access fees or time spent training, operating, and managing the resources. IT administrators who manage cloud services need a clear understanding of the cost drivers that impact their spending on cloud services. While as-a-Service infrastructure typically comes at a premium to traditional on-premises 'buy to own' infrastructure, the cost drivers for cloud services can be a source of confusion and surprise. This paper outlines various total cost of ownership factors in operating enterprise infrastructure at scale. The goal is to elucidate areas of cost that may not be readily apparent when using cloud storage resources and provide for consideration of alternative options that may be more financially effective overall.

### Revisions

Date	Description
September 2022	Initial release

### We value your feedback

Dell Technologies and the authors of this document welcome your feedback on this document. Contact the Dell Technologies team by [email](#).

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## Cloud resources, cost, and opportunities

### The Cloud

The NIST definition of cloud computing lists five essential characteristics: on-demand self-service, broad network access, resource pooling, rapid elasticity or expansion, and measured service.

<https://csrc.nist.gov/publications/detail/sp/800-145/final>

This broad definition could apply to different industries (oil/gas, farm/supermarkets, shipping logistics) as these are characteristics of business that can be made more efficient to provide products or services at scale. A notable difference is that with cloud computing many of the resources being “created” are virtual. It isn’t an oil pipe or a gallon of milk, it is a virtual machine, virtual router, logical aggregate of many disks, etc. The software running on top of the infrastructure can provision new resources rapidly with a few clicks of a mouse button or via automation. The provisioning of cloud services can be extremely agile and flexible. However, with that acceleration the ability to monitor and control becomes critically important in cost planning to avoid complications, like a runaway bill.

Per the Flexera 2022 State of the Cloud report, “For the sixth year in a row, optimizing the existing use of cloud is the top initiative for all respondents...” (Flexera, 2022)

<https://info.flexera.com/CM-REPORT-State-of-the-Cloud>

Whether using a private cloud, a public cloud, or a hybrid cloud, resource tracking and planning is a critical task in ensuring resources are efficiently used with minimal unexpected cost overruns. Luckily there are many tools available from major cloud vendors and 3<sup>rd</sup> parties to closely monitor this information and help reduce the chances of runaway utilization.

As reported by Flexera, respondents reported that almost a third of their cloud services spend was wasted and unproductive. Through careful planning, consistent observation, operational alignment, and prompt action, companies can better ensure the productive use of cloud resources.

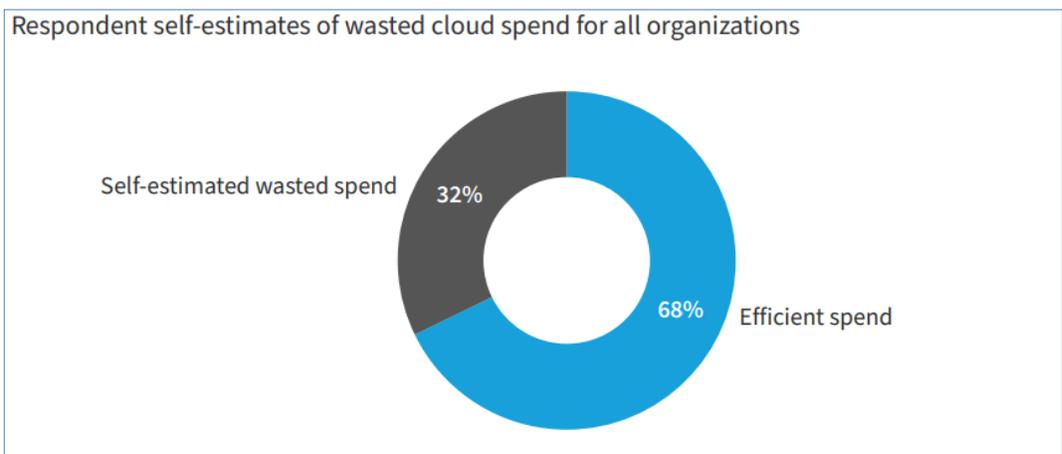


Figure 1 - Source: [Flexera 2022 State of the Cloud Report](#) - by Flexera is licensed under [CC BY 4.0](#)

## The Cost of Storage

When deciding to deploy new or existing workloads into the cloud, it is important to consider the storage requirements of the workload, as storage is a major cost element of cloud operations.

With so many different protocols, types of storage, and other options, making a choice can be challenging without the use of analysis and planning tools which take into account many factors regarding the workload, the integration needs, and the characteristics of storage available.

When looking at general storage cost factors for public cloud providers, the bill usually boils down to these major items:

- Capacity in GB – how much storage you are using
- IOPS/Performance – how fast you need the storage to be
- Data access/transfer – how much data is moved in/out/around the cloud

For each type of storage — file, block, or object — the first cost driver is determined by geographic location. That is, the price per GB can vary from region to region. Often data needs to be close to the compute resources creating and accessing it, so the location of storage resources may be limited. If data needs to be accessible from multiple availability zones within a region, that can also increase the cost. Other factors influence storage costs, such as the total capacity, access frequency, tiering, and the underlying storage technology (e.g., SSD versus HDD).

Performance of the storage resources is the next cost factor in pricing. Solid State Drives (SSDs) provide greater performance at a higher cost for workloads that require low latency access. Whereas hard drives (HDDs) provide greater capacity for throughput-focused workloads. Beyond that, many cloud providers offer a broad portfolio of performance options that can add cost to storage services, e.g., variable IOPS. Also, additional speed beyond the baseline is charged per additional IOP per volume per month.

Finally, the third cost driver of storage services is the need to access and move data from a starting location to the environment where a workload is running and perhaps even back again. Often, this storage network traffic is an unexpected source of costs for an IT administrator. Generally, uploading data to cloud storage is free, as are data transfers between the resources inside one region or between services. However, there are exceptions that need careful attention.

For example, with the AWS Storage Gateway there is no charge for data ingress from the gateway appliance to the AWS Storage Gateway Service, but from the service to file, block, or tape there is currently a \$0.01 charge per GB (Amazon Web Services, 2022).

The most significant costs can be for data that needs to be transferred from the cloud provider to back on-premises or between different regions or even in-between clouds. This data transfer out or egress from the cloud is charged based on the amount transferred with lower rates being used as the capacity moved increases.

Companies are trending to a hybrid approach as their cloud strategy, from Flexera's The State of the Cloud report, "Most respondents use multiple public and private clouds" (Flexera, 2002) for reasons such as diversification, redundancy, availability, and mobility.

## Operational Complications

This need to flexibly transfer data between clouds is becoming more critical to a successful cloud strategy. Comprehensive cost planning needs to include where the data is created, where it is aggregated, where it is processed and exported, and where the underlying storage is going to be.

Even after understanding all the cost drivers when selecting a cloud storage service, there are additional operational challenges that can drive additional costs.

For new cloud administrators, common mistakes can lead to unexpected and unnecessary cost overruns. The public cloud makes it easy to provision and scale storage resources; however, it is easy to lose track and control of the massive count of cloud resources like storage volumes. This can easily lead to greater costs for storage resources that are not used efficiently or perhaps even not used at all.

There are many analysis tools available from cloud providers and other cloud 3<sup>rd</sup> party partners that can help predict the cost of using cloud resources given certain scenarios. However, there remains some frequent challenges that can disrupt the best of plans.

### **Stale, unused, or orphaned resources**

Remembering to remove or delete resources that can no longer be used due to changing requirements seems simple enough; however, managing storage resources at scale can be a significant challenge.

For example, if VMs are deployed by default with storage attached, all it takes is one wrong flag setting and the storage does not get automatically removed if the VM is deleted.

Or, developers who keep multiple copies of data as a standard practice. Strict standards and reporting tools are necessary to keep the inevitable sprawl to a minimum.

### **Misconfigured storage**

Avoid using storage services that are overpowered for the needs of workloads. Having a good understanding of workload requirements enables IT administrators to choose the appropriate storage performance levels.

### **Over-provisioned storage resources**

Cloud storage capacity for some configuration types is charged when volumes are created. All the capacity is available upfront and is billed upon whether or not the volume is actually being written to. Again, without reliable predictive models for capacity planning, this “thick” provisioning can lead to vast underutilization of storage and premium prices being billed for what should be cheaper storage.

## Choices and Alternatives

Numerous cost challenges with cloud storage services can be better managed by the features and pricing model available with Dell APEX Data Storage Services.

APEX Data Storage Services is an as-a-Service portfolio of scalable and elastic storage resources designed for OpEx treatment<sup>1</sup>. Like the public cloud, this service enables IT administrators to focus on outcomes, not infrastructure; however, APEX Data Storage Services includes a simple cost model that provides storage resources for traditional use cases with connectivity, monitoring, automation, and cost control.

**APEX Data Storage Services**  
Focus on outcomes, not infrastructure

**SIMPLICITY**  
Remove complexity to deliver more value to your organization

**AGILITY**  
Manage unpredictability by responding dynamically to changing business needs

**CONTROL**  
Reduce risk with flexible storage services that enable a true hybrid cloud strategy

APEX Data Services enables an IT administrator to:

- Optimize for simplicity by eliminating many complex forecasting, procurement and migration responsibilities so IT staff can focus on more value-added activities.
- Increase agility by scaling capacity up and down based on workload requirements so you can deliver resources to your customers as needed and align your expenses with actual usage.
- Control your data to help meet data localization, regulatory and audit requirements and enable a hybrid cloud or cloud consumption strategy – enabling you to become a service provider for your organization.

In addition to utilizing Dell-owned infrastructure, which reduces the administrative burden, APEX Data Storage Service also has the colocation facility deployment option which removes even more responsibilities from day-to-day operations. This deployment configuration eliminates the need to worry about data center headaches such as space, heating, power, cooling, etc. creating an even more appealing TCO scenario.

<sup>1</sup> [OpEx treatment is subject to customer internal accounting review and policies](#)

## Cost model, buffer, and on demand usage

APEX Data Storage Services is a Storage as-a-Service subscription whose bill rate is determined by the following attributes:

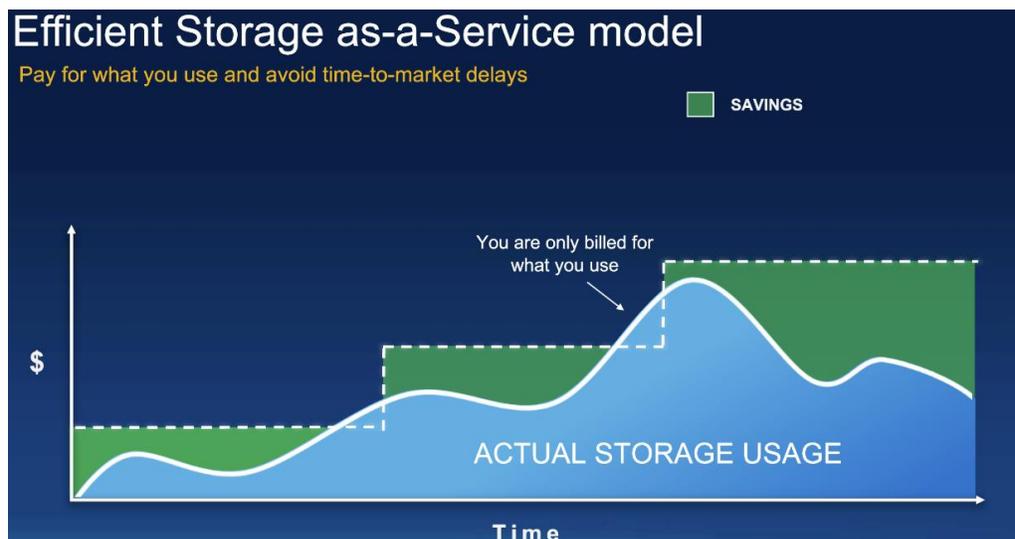
- Service Type: Block or File
- Performance Tier: Performance-optimized, Balanced, Capacity-Optimized
- Base Capacity: Committed Storage Capacity
- Subscription Term: 1 or 3 Years
- Location: On-premises or Dell-managed Colocation Facility
- Management Framework: Dell-managed or Customer-managed

These attributes are defined during the ordering process which results in a rate card that is valid for the entire term of the subscription. APEX Data Storage Services enables IT administrators to focus on starting small to closely match their current storage needs, but with capacity expansions that can be easily and quickly deployed as storage needs grow. As capacity needs grow, the IT administrator can then commit to larger base capacities, which will result in lower bill rates as defined in the rate card. This approach eases the requirement for very strict capacity planning and overprovisioning.

The service also includes buffer capacity above and beyond the base capacity to account for any spikes in utilization. The buffer capacity in the storage system is at least 25% of the base capacity. For example, if the base capacity is 100TB, then the buffer will be at least 25TB and the resulting total capacity of 125TB.

While the entire base capacity is billed every month, the offer bills for on-demand usage capacity only for the time periods within the month where the capacity is actually used (currently measured hourly). A key element of the bill rate is that the base capacity and the on-demand usage are billed at the same rate.

The ability to scale up capacity, smooth out spikes in demand, and scale down at end of subscription, if necessary, can provide the flexibility to continue to keep costs in check over long periods of time.



## The Best of Both Worlds

APEX Data Storage Services offers flexibility compared to cloud storage providers in being able to serve traditional storage capacity needs on-prem and connectivity possibilities to connect to public cloud resources or other private datacenters if and when necessary. When workloads and storage are placed together either on-prem or within a shared colocation facility the burden of planning, tracking, and managing egress charges can be alleviated.

Although public cloud storage providers have a known advertised rate, associated fees for egress or other data mobility operations within the cloud can increase the cost.

With its known rate card, no ingress fees, no egress fees, no charges for network bandwidth, same bill rate for on-demand usage of buffer capacity, APEX Data Storage Services offers cost simplicity and the best of on-prem and cloud together.



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