ESG Economic Validation

Dell EMC ECS

Economic Benefit Analysis of On-premises Object Storage versus Public Cloud

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Contents

Introduction 3
A Paradigm Shift to Massive Scale with Object Storage 4
Driving Down the Cost Curve with Object Storage 4
Realities of Public Cloud Economics 6
Factors Driving the On- versus Off-premises Decision 6
Key Economic Considerations 6
Other Considerations 7
The Bottom Line 8
The Bigger Truth 9
Who Should Consider ECS? 10

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Introduction

The advent of public cloud services initiated a wave of technological disruption, the impacts of which have been felt throughout the enterprise IT industry. The ability for IT to offload the headaches and daily firefighting of supporting the infrastructure to someone else is an enticing proposition. The rising interest level in public cloud services is understandable given a low cost entry point and IT infrastructure that is already deployed and available for access to various resources.

These factors, along with the economies of scale promoted by public cloud service providers, have led to a perception that the public cloud is by nature less expensive than on-premises infrastructure. In a recent survey, 41% of IT professionals currently responsible for or familiar with their organization's on-premises infrastructure and public cloud usage cited more predictable and/or lower overall costs as cloud deployment expectations. Interestingly, more than one in five organizations that have moved a workload back on-premises from a public cloud service cited cost as the reason for repatriation.[1]

Even though this study shows an interest in public cloud to reduce costs, for some workloads, cloud is clearly not the best deployment model. Many factors should be considered in addition to cost, as new technologies can alter the on-premises versus off-premises cost paradigm.

- The physical separation between on- and off-premises sites presents a natural barrier to data mobility, limiting the speed at which data can move back and forth. This WAN latency introduced by cloud services limits application effectiveness while simultaneously increasing data costs and making them less predictable, as cloud providers can add per transaction charges in addition to the cost of network bandwidth.

- Innovations in storage technology over the past few years have brought a significant improvement in performance and a reduction in the cost of capacity, with technologies such as solid-state, software-defined storage (SDS), and object storage. With built-in management, many organizations are now able to host their own on-premises storage solution at a lower overall cost than public cloud offerings.

- A recent rise in business intelligence and analytics workloads is fueling data growth. This growth can significantly eat up capacity and increase the time data sets are likely to remain active. This, in turn, increases the amount of WAN activity required for cloud-based content, as data sets typically thought of as cold or stagnant are serving a greater number of transactions than anticipated.

ESG recently conducted a study investigating Dell EMC's ECS. The analysis revealed that on-premises storage can provide a 59.5% or greater cost advantage over a leading public cloud services provider while reducing data access latency. This analysis was performed using conservative assumptions and considerations, suggesting that more aggressive configurations may yield even greater savings. The details on the savings delivered by ECS are thoroughly discussed throughout this report.

ECS is a massively scalable, highly efficient, global object storage solution. With its software-based design, ECS is able to leverage industry-standard (and lower-cost) hardware to provide flexible deployment methodologies through a software-only solution, an appliance form factor, and Dell EMC hosted dedicated solutions. ECS is designed to provide all the low-cost, ease-of-use, and scalability benefits provided by public cloud storage without the enterprise security risks and concerns. The benefits of object storage technology have spurred an increase in interest and adoption across the industry of late.

[1] Source: ESG Master Survey Results, *Tipping Point: Striking the Hybrid Cloud Balance*, October 2018.

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A Paradigm Shift to Massive Scale with Object Storage

At the heart of this desire to investigate lower-cost data center designs, is the ever-present challenge of managing, storing, and archiving the explosion of unstructured data. In ESG's 2019 IT spending intentions research study, IT leaders were asked how complex their IT environment is relative to two years ago, and 66% responded that their environment was either more complex (45%), or significantly more complex (21%). When asked to indicate the reasons for the increase in complexity, nearly one-third cited higher data volumes.[2] In a separate study, ESG surveyed storage decision makers responsible for their organizations' data storage environments. When asked to identify their organization's biggest storage challenge, the rapid growth of data was the third most common response (26%). In addition, the remaining top-five storage challenges—hardware costs, data protection, data placement, and running out of physical space—are often driven by data growth, rendering the impacts of data growth to be even more significant.[3]

While this growth is primarily tied to existing applications and workloads, new, emerging cloud-native application workloads are expected to have the greatest impact on capacity demands. This is largely due to the need for business intelligence and big data analytics to decipher meaning from all of the data captured. As demands for analytics insights increase, it will become essential to provide a highly performing infrastructure that supports timely decision-making.

Data growth on its own is no longer a standalone challenge; it will forever be tied to an increased demand for accessibility. This is one of the primary drivers in organizations looking for alternatives to the public cloud, such as on-premises object storage.

Driving Down the Cost Curve with Object Storage

Object storage architectures offer an alternative to the hierarchical tree structure of file systems. They store data in flat address spaces, offering unique identifiers to the applications for access to content. While this architectural difference may seem small to the end-user, the scalability provided by this efficiency translates into substantial total cost of ownership (TCO) savings. Built upon an object storage architecture, Dell EMC's ECS offers a number of advantages that significantly reduce the cost of storing, protecting, and accessing high volumes of data.

- ECS is designed to store and keep active, massive, multi-petabyte, unstructured data in a single pool of storage.
- ECS provides a global namespace with strong consistency, which enables ECS' customers to store NFS file data on a globally distributed object infrastructure, eliminating cloud gateways.
- ECS' software-defined storage (SDS) architecture offers the ability to leverage industry-standard or commodity hardware to dramatically reduce the capital cost of storage infrastructure.
- ECS' software solution enables customers to repurpose their hardware and choose different software-defined solution (SDS) vendors if needed, so that they won't be locked into working with a certain storage vendor.
- ECS has the ability to mix and match different hardware types as well as to integrate new hardware into the storage pool, eliminating costly and disruptive data migrations.
- ECS provides automatic resiliency across nodes and geographically diverse sites via failure tolerance, triple mirroring, and erasure coding.

[2] Source: ESG Master Survey Results, *2019 Technology Spending Intentions Survey*, to be published February 2019.
[3] Source: ESG Research Report, *2017 General Storage Trends*, November 2017. Unless otherwise stated, all ESG research references and charts in this Economic Validation have been taken from this research report.

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- ECS storage is highly efficient, with accelerated garbage collection methods and low metadata overhead.
- ECS supports multiple unstructured storage-based protocols, such as File (SMB/NFSv3), REST APIs, S3, HDFS, and OpenStack Swift.
- ECS provides customers more control of their data assets with enterprise class object, file, and HDFS storage in a secure and compliant system. These capabilities will reduce storage overhead and improve efficiency.
- ECS can be placed in data centers close to the point of data creation and consumption, decreasing WAN traffic and bandwidth consumption while reducing latency associated with data access calls made across the WAN.

As part of the general storage industry trends research study mentioned previously, ESG investigated multiple storage technologies, including object storage. When storage leaders that were familiar with object technology were asked why their organization deployed or considered on-premises object storage, the most-cited responses included higher levels of security (31%), higher resiliency (30%), and simplified management of unstructured storage (26%).

These benefits align directly with the challenges generated by data growth. If budgets were unlimited, businesses could simply continue to scale their existing traditional storage systems uninhibited, adding hardware, personnel, and data center space to accommodate growth. If data could be instantly moved from one location to the next without experiencing latency or incurring a cost per transaction, then moving massive data sets to and from the cloud based on need would be feasible. Budgets, however, are finite, and latency is not going away any time soon.

Shifting to an on-premises object storage architecture designed to meet the needs for data growth, resilience, and security is attractive to many organizations. In the ESG study, nearly one in four storage leaders familiar with object storage indicated that they considered/deployed object storage to support multi-site protection schemes, and 22% required a solution that reduced the cost per capacity of storage (see Figure 1).

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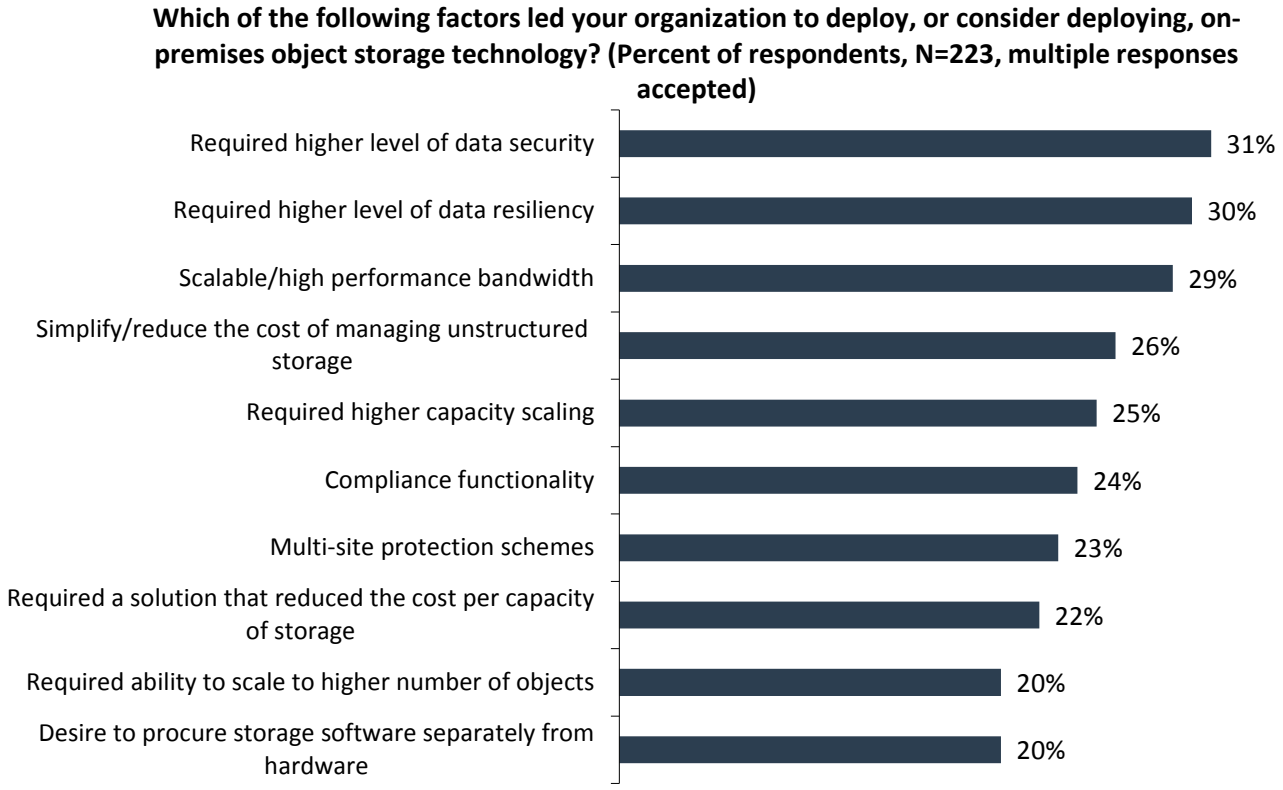
Figure 1. Factors Leading to Deployment/Consideration of On-premises Object Storage Technology



Source: Enterprise Strategy Group

Organizations leveraging object storage have enjoyed significant benefits, increasing its positive user perception. ESG asked storage leaders familiar with object storage what impact they expected it to have on their existing NAS footprint. In response, 51% expected object storage to significantly reduce (43%), or completely replace (8%) NAS in the next three years.

Realities of Public Cloud Economics

In addition to the latency issues across the WAN discussed previously, the cost and complexity of migrating or moving data cross the WAN adds an element of permanence to architecture design decisions. Once a workload moves to the cloud, it is difficult to shift it back to local resources if demands change. If data size or access rates increase or a data set simply experiences more activity than previously estimated, the costs of off-premises storage can increase suddenly and significantly, with the workload locked into a specific cloud provider. Compounding the more direct cost drivers are other considerations for cloud storage, such as pricing differences across data centers and regions, levels of support, service level requirements, and data protection requirements. These are critical concerns to be addressed when evaluating off-premises services.

Factors Driving the On- versus Off-premises Decision

Key Economic Considerations

There are a number of quantifiable economic factors that influence the decision about whether to implement storage on-premises or off-premises. ESG identified the following elements as most significant:

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- **Capacity utilization**—Since cloud service providers price storage by capacity, monthly costs increase with capacity utilized. On-premises object storage provides organizations with economies of scale that can reduce the cost of storage. As hardware evolves, higher capacity hard drives will further drive costs down.
- **Number of active data centers**—More sites drive more efficiency with ECS. For example, when organizations move from two to three active sites using ECS, the raw storage required to serve a given usable capacity drops by approximately 25%.
- **Asset life**—The amortized cost of storage drops as the asset life is extended. For primary storage, a three-year asset life is considered standard, while organizations frequently assign an asset life of four, or even five, years for object/archive storage.
- **Performance and bandwidth fees—**Cloud service providers include factors such as performance and bandwidth to determine the cost of their storage. Storage to serve an active production workflow can be as much as four times the cost for the same capacity of cold archive storage.

Why This Matters

In a recent ESG research survey, 29% of respondents cited business process improvement as one of the most important considerations for justifying IT investments, while 25% cited return on investment, and 23% cited a reduction in capital expenditures.[4] On-premises object storage makes it easy for IT to match storage media costs with both data value and the frequency of data access, reducing capital expenditures (CapEx), improving business processes, reducing operational expenditures (OpEx) through increased efficiency, and increasing return on investment.

While public cloud storage offloads storage management and administration to reduce OpEx costs, Dell EMC ECS eliminates data access expenses, i.e., users don't pay for every "put" and "get," which very nearly offsets those savings. When the overall cost of storage is taken into account, Dell EMC ECS comes out solidly ahead.

Other Considerations

Economic factors, while very important, are only one aspect to be considered. Numerous other considerations will influence the on-premises versus off-premises decision.

- **Ownership/reduced lock-in**—The organization owns the infrastructure and is not beholden to a service provider, who might choose to increase prices.
- **Security**—If the storage infrastructure lives inside an organization's data center, there are no concerns about data discovery requests that might go directly to a cloud provider.
- **Agility—**Should new workloads need to access the data in storage, the location of those workloads and the class of storage on which the data resides are critical factors.
- **Rack utilization—**While not a concern with public cloud storage, partially populated racks cost more per square foot to host in a traditional data center and will have an impact on overall TCO.
- **Misperception of cloud pricing**—While public cloud infrastructure-as-a-service (IaaS) prices have been declining over the past five years and are expected to do so over the next five years, major cloud storage providers have

[4] Source: ESG Master Survey Results, *2019 Technology Spending Intentions Survey*, to be published February 2019.

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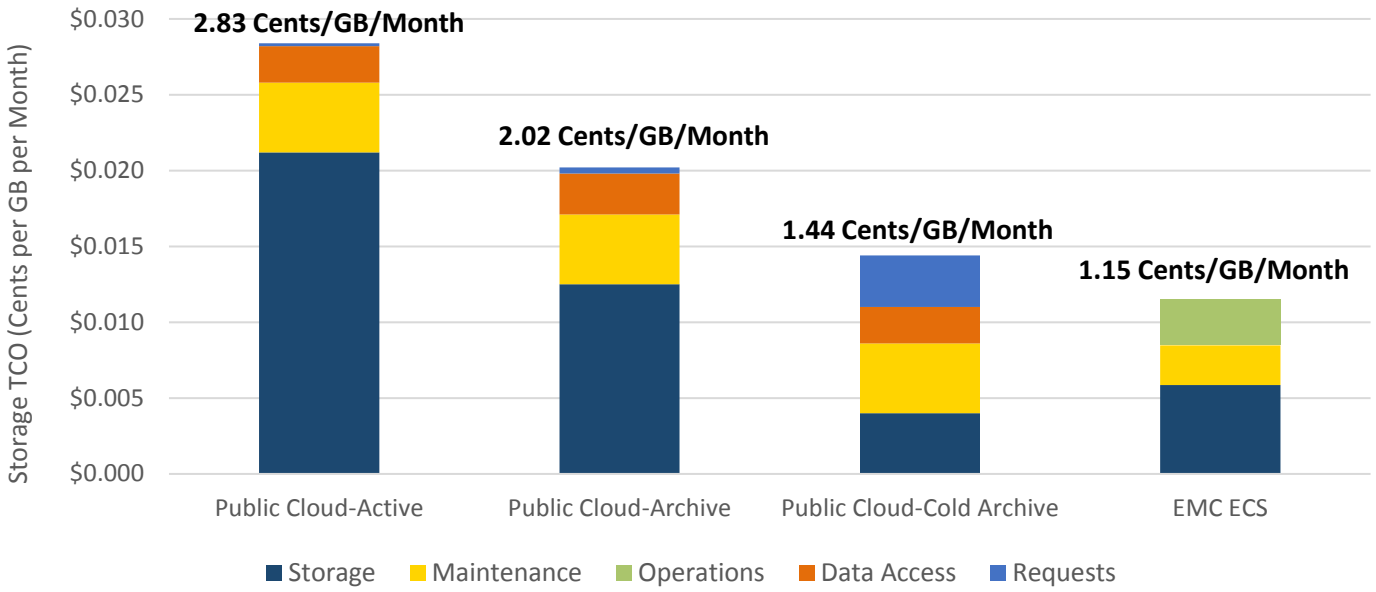
not changed the pricing of their most popular tiers in 18 months. Dell EMC can sell ECS to customers using a utility model, based only on what they use. As the cost of the underlying hardware drops, so does the cost of capacity.

The Bottom Line

ESG validated an economic model used by Dell EMC to compare the TCO of a leading cloud storage provider to the TCO of Dell EMC ECS to determine which factors have the most relevance when weighing on-premises storage against cloud storage. The model uses a simple yet detailed formula to calculate the cost of on-premises object storage: the upfront investment added to the total operating expenses, divided by the number of gigabytes utilized, divided by the number of months of utilization. This calculation yields the cost expressed as cents per gigabyte per month, which provides a clear comparison to public cloud storage provider costs. ESG examined the model in detail and found it to be a fair and complete representation of the costs associated with public cloud storage and Dell EMC ECS.

ESG's analysis was based on an enterprise with a requirement to store 3,100 TBs of data with a four-year asset life and a requirement to retrieve 3% of that data for processing per month, or approximately 95 TB, with an average object size of 0.5 MB. The cloud service provider was priced using a standard access model to accommodate modern applications and Internet of Things (IoT) data. As seen in Figure 2, Dell EMC ECS was able to satisfy these requirements at 1.15 cents per GB per month, 59.5% lower than the cost of the public cloud storage provider. As Figure 2 also shows, the cost of ECS in an active archive configuration was also lower than the public cloud storage provider's archive and cold archive offerings.

Figure 2. Expected Savings Through Deployment of Dell EMC ECS versus Public Cloud Storage over Four Years



Source: Enterprise Strategy Group

A number of considerations influenced these results, detailed in Table 1. Some, like the number of active data centers, only affected the cost of one solution, while others such as asset life, affected both.

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Table 1. Economic Model Analysis: Public Cloud versus Dell EMC ECS

Assumptions and Considerations	Selection	Impact
Number of active data centers	Three active data centers	25% lower raw storage capacity required with better access and availability.
Asset life	Four years	Dell EMC reports that customers typically deploy ECS with a five-year planned asset life, which would amortize ECS costs further.
Data egress	3% (95TB) per Month	Cloud service providers charge for data that traverses the Internet. To change providers, *ALL* of the hosted data must be extracted.
Cloud service provider region	East coast	The cost of space and power varies in different regions, which affects service provider rates. ESG selected the lowest cost option.

The Bigger Truth

There is a common misconception among IT managers that the public cloud is always the best option for reducing cost and improving return on investment. While the agility and cost-effectiveness of the public cloud is great for modest and transient application workloads, an ESG audit of a Dell EMC total cost of ownership model has confirmed that Dell EMC ECS on-premises object storage in a customer-owned or hosted colocation facility is a more cost-effective solution for existing and emerging workloads at scale. While collecting, protecting, and using data is important, developing a data-centric IT architecture is invaluable. In this context, "data-centric" refers to an architecture where data is the primary and permanent asset, and applications are transient. In the data-centric architecture, the data has precedence over the implementation of any given application; systems and architectures need to be optimized for this new era of data consumption.

The agility of the public cloud is well suited for ramping up new services and transient workloads, but over time as the data set grows, the costs for storage-intensive workloads can increase very rapidly. As applications and workloads continue to move to the public cloud, a growing number of IT managers struggle to justify alarmingly high monthly public cloud storage bills. Monthly bills of tens of thousands of dollars are common. ESG recently spoke with an IT manager at a Fortune 500 company that is trying to reduce a monthly public cloud bill of more than $500,000; for that company, moving the data off the cloud and back in-house presents a bitter pill to swallow, thanks to data egress fees.

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Who Should Consider ECS?

Table 2. Economic Model Analysis: Key Attributes for Considering ECS

Attribute	Who Should Consider ECS?
Asset life	Organizations that keep and use their assets for three or more years
Capacity	Organizations that need 400TB or more of data storage
Monthly data access	Organizations that need to access 1% or more of their data per month

Your mileage will vary depending on a number of factors, including the nature of your applications, which public cloud provider and purchasing model you're considering, and data center/colocation costs. The level of savings will vary, but if you're consolidating workloads and data at scale, then ESG is confident that the economic benefits described here will hold true.

If your organization is using a public cloud storage service, check your bill. You should definitely consider the economic benefits of on-premises object storage. If you're considering implementing new workloads or hosting IoT data off-premises, use the lessons learned here to compare the costs of hosting that data on your own on-premises object storage to the costs of renting storage in the public cloud. If you'd like to learn more about the model that was used in this report and the economic implications for your business, contact Dell EMC. To learn more about ECS, visit www.emc.com/ECS.

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