Economic Value Audit

Dell EMC Elastic Cloud Storage

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

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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 research study investigating IT spending intentions, ESG polled 633 IT decision makers. When these IT leaders were asked to identify which measures their organizations would take to reduce or otherwise contain IT expenditures over the next 12 months, the most commonly identified measure was the increased use of public cloud computing as an alternative to in-house infrastructure. Its rank as the most-cited response in 2016 represents a seven-year journey up from the number nine overall spot in 2009.¹

Even though the study shows an increase in public cloud interest to reduce costs, other studies have suggested that, for some workloads, cloud is not the best deployment model. Many factors should be considered 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 has 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 Elastic Cloud Storage (ECS) technology. The analysis revealed that on-premises storage can provide a 48% or greater cost advantage over a leading public cloud services provider. 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.

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 IT spending intentions research study, mentioned previously, IT leaders were also asked to identify their organization’s most important IT priority over the next 12 months. In this study, managing data growth ranked third overall, behind cyber-security and business intelligence/data analytics. In a separate but related study, ESG surveyed 373 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 most common response. In addition, the remaining top-five storage challenges—hardware, data protection, and staffing costs, and data migration—are often driven by data growth, rendering the impacts of data growth to be even more significant.2

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 choosing different software-defined solution (SDS) vendors if needed so that customers won’t be locked in a certain storage vendor anymore.
- 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.

2 Source: ESG Research Report, 2015 Data Storage Market Trends, October 2015. Unless otherwise stated, all ESG research references and charts in this Economic Value Audit have been taken from this research report.

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• 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.

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 object storage, the top responses were the reduction in capital expenditures (49%) and simplified management of unstructured data (48%).

These top two 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, continually 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 being charged 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 object storage architecture designed to meet the needs for data growth, accessibility, and cost control is attractive to many organizations. In the ESG study, one in six storage leaders familiar with object storage indicated that they considered/deployed object storage as the foundation for on-premises cloud storage, and one in nine indicated the use of object storage as a repository for BI/analytics workloads (Figure 1).

Figure 1. Factors Responsible for Deployment/Consideration of Object Storage Technology

To the best of your knowledge, which of the following factors are responsible for your organization’s initial deployment or consideration of object storage technology? (Percent of respondents, N=305)

- Reduction in capital expenditures: 13% (49%)
- Simplified management of unstructured data: 15% (48%)
- Reduction in operational expenditures: 12% (46%)
- Foundation for cloud-based storage solution: 17% (45%)
- Total cost of ownership (TCO): 13% (44%)
- Repository for data collected as part of BI/analytics...: 11% (42%)
- Improved regulatory compliance: 10% (41%)
- Repository for archived data: 8% (39%)
- Don’t know: 1% (1%)

Source: Enterprise Strategy Group, 2016

Organizations leveraging object storage have enjoyed significant benefits, increasing the positive user perception of object storage. ESG asked storage leaders familiar with object storage what impact they expected object storage to have on their existing NAS footprint. In response, 25% expected object storage to completely replace NAS in the next three years, with an additional 45% expecting it to significantly reduce their NAS footprint over that same time period.
Realities of Public Cloud Economics

In addition to the latency issues across the WAN discussed above, the cost and complexity of migrating or moving data across 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, level 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 versus off-premises. ESG identified the following elements as most significant:

- **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 cost as much as four times the cost for the same capacity of cold archive storage.

Why This Matters

In a recent ESG research survey, 35% of respondents cited return on investment as one of the most important considerations for justifying IT investments, while 32% cited business process improvement, and 19% cited a reduction in capital expenditures. 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 Elastic Cloud Storage 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 Elastic Cloud Storage 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 of 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 not changed 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 Elastic Cloud Storage 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 2,800 TBs of data with a four-year asset life and a requirement to retrieve 3% of that data for processing per month, or approximately 85 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 Elastic Cloud Storage was able to satisfy these requirements at 1.38 cents per GB per month, 47.8% 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.
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.

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

<table>
<thead>
<tr>
<th>Assumptions and Considerations</th>
<th>Selection</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of active data centers</td>
<td>Three active data centers</td>
<td>25% lower raw storage capacity required with better access and availability.</td>
</tr>
<tr>
<td>Asset Life</td>
<td>Four Years</td>
<td>Dell EMC reports that customers typically deploy ECS with a five-year planned asset life, which would amortize ECS costs further.</td>
</tr>
<tr>
<td>Data Egress</td>
<td>3% (85TB) per Month</td>
<td>Cloud service providers charge for data that traverses the internet. To change providers, ALL of the hosted data must be extracted.</td>
</tr>
<tr>
<td>Cloud Service Provider Region</td>
<td>East Coast</td>
<td>The cost of space and power varies in different regions, which affects service provider rates. ESG selected the lowest cost option.</td>
</tr>
</tbody>
</table>
The Bigger Truth

Respondents to ESG’s 2016 annual IT spending intentions survey selected “increasing the use of cloud computing services” and “purchasing new technologies with improved ROI” as two of the IT cost containment measures that they expected to take this year, making them the two most-cited responses (see Figure 3).4

Figure 3. Top Five IT Cost Containment Measures

Which of the following measures – if any – is your organization taking to reduce or otherwise contain IT expenditures over the next 12 months?
(Percent of respondents, N=633, multiple responses accepted)

<table>
<thead>
<tr>
<th>Measure</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase use of cloud computing services as alternative to in-house applications and/or infrastructure</td>
<td>32%</td>
</tr>
<tr>
<td>Purchase new technologies with improved ROI</td>
<td>30%</td>
</tr>
<tr>
<td>Renegotiate contracts</td>
<td>27%</td>
</tr>
<tr>
<td>Increase IT outsourcing</td>
<td>23%</td>
</tr>
<tr>
<td>Freeze hiring</td>
<td>22%</td>
</tr>
</tbody>
</table>

Source: Enterprise Strategy Group, 2016

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 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.

The agility of the public cloud is well suited for ramping up new services and transient workloads, but over time 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.

Who Should Consider ECS?

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

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Who Should Consider ECS?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asset life</td>
<td>Organizations that sweat their assets for three or more years</td>
</tr>
<tr>
<td>Capacity</td>
<td>Organizations that need 400TB or more of data storage</td>
</tr>
<tr>
<td>Monthly data access</td>
<td>Organizations that need to access 1% or more of their data per month</td>
</tr>
<tr>
<td>Object size—particularly important for cold archive use cases because the cost of gets and puts is high</td>
<td>Organizations with an average object size smaller than 1MB</td>
</tr>
</tbody>
</table>

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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