

# Is a Hyperconverged Infrastructure Cost-Competitive with the Cloud?

An Evaluator Group TCO Analysis Comparing AWS and HPE SimpliVity 380

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The Cloud, once a radical idea in IT, is now mainstream. Whether it's email, backup or file sharing, most consumers probably use a cloud service or two. Similarly, most IT professionals are familiar with cloud service providers such as Amazon, Google and Microsoft Azure, and many companies have moved at least some of their information technology processes into the cloud. In fact, the cloud has become so popular it's easy to assume that running IT applications on-premises is not cost competitive with a cloud-based service. In this report Evaluator Group will test the validity of that assumption with a TCO (Total Cost of Ownership) model analyzing a hyperconverged appliance solution from HPE and a comparable cloud service from Amazon Web Services (AWS).

## Total Cost of Ownership

TCO is a calculation designed to expose the true costs associated with a specific system or piece of capital equipment, since the "sticker price" often understates the actual cost of implementation incurred by the business. This is especially true for IT systems, given the level of complexity of traditional infrastructures.

Many of the costs associated with IT equipment can be overlooked, including things like design and evaluation, installation, integration with existing systems and training. In addition to capital expenses (CAPEX), operating expenses (OPEX) need to be included in TCO as well, especially the personnel or administrative overhead required to keep the system running and to expand and upgrade it throughout a given lifespan.

TCO models are often used to support capital purchases, but also to help managers make strategic decisions such as whether to run a certain business process in-house or to out-source it. IT processes are good candidates for this "build or buy" decision since most applications can be run on servers in a public cloud just like they can in the company data center.

## The Cloud Assumption

Everyone from CIOs to consumers hears about the benefits of the cloud on a regular basis. Truly ubiquitous, it's easy to assume that the cloud is fundamentally less expensive than running on-site infrastructure. Part of this thinking may be due to the economics of the "web-scale" data centers that cloud providers run, but probably more to the complexity of setting up and running traditional servers, storage and networking. Many of the companies using cloud services have no doubt run cost calculations of their own and at some point found it to be the right decision. And with the trend towards leaner staffing and lower levels of expertise in IT organizations, the "cloud assumption" would seem to be further supported. But this assumption may no longer be accurate.

The cloud assumption has historically been based on a comparison with legacy infrastructures that consist of separate systems for each IT function, such as compute and storage, even data protection. Given the cost realities, many companies found the idea of running applications in the cloud very appealing and the option to pay for them on a monthly basis certainly simplified the decision process. But what about hyperconverged systems?

## Hyperconverged Infrastructures

These solutions combine storage and compute components with a hypervisor and management software to create a comprehensive compute solution. Some vendors go even further to include features such as data protection and built-in data efficiency. Hyperconverged Infrastructures (HCIs) appeal to companies for many of the same reasons the cloud does. They are easy to set up and run and easy to use, providing operational agility and greatly simplifying the overall infrastructure, compared with traditional IT solutions.

HCIs change the traditional TCO calculations that have been used to justify cloud decisions. Specifically:

- Hyperconvergence greatly simplifies the design process
- The “plug and play” format means very little implementation is required
- Internal integration with hypervisor management lowers operating complexity
- VM-level focus simplifies storage-related tasks in virtualization environments
- Scale-out architectures are designed for cost-effective, incremental growth

While the trend in IT organizations is toward lower staffing and expertise levels, the emergence of hyperconverged infrastructures fundamentally changes the TCO economics. This begs the question, “Is the cloud assumption still valid?” For this reason, Evaluator Group compiled the following information on the total costs associated with the HPE SimpliVity hyperconverged infrastructure and a comparable infrastructure running in Amazon Web Services.

## Hyperconverged vs. Cloud TCO Model

For this comparison we used an HPE SimpliVity 380 hyperconverged infrastructure appliance and Amazon’s EC2 cloud compute service. To make these systems highly available, we chose an N+1 configuration for the HCI cluster, with “N” being the number of active HPE SimpliVity “nodes” (each

supporting 103 VMs), and one redundant node. It should be noted that Amazon offers a 99.9% availability for the EC2 service used in this comparison, which is significantly lower than the availability that can be achieved with the HPE SimpliVity system.

The baseline configuration in this model was a three-node cluster, supporting 206 VMs (2 data nodes x 103 VMs/node), as shown in Figure 1. Costs for VM counts of 309, 412 and 515 are also calculated in the model corresponding to four-, five- and six-node HPE SimpliVity clusters. However, this could certainly be extended since upgrading these hyperconverged systems with new nodes is easy to do and doesn't require downtime or data migration. And, as shown below, the economics of these systems get stronger as they are scaled.

We assumed a 3-year period for the infrastructure, a typical IT capital equipment lifespan, and all one-time costs were calculated based on a 36-month simple amortization. Leasing is also an option for many companies, allowing them to turn the capital expenditure into a monthly expense, although it's not included in this model.

For the baseline comparison with the HPE SimpliVity solution we chose Amazon's "3-year All Upfront, Reserved" pricing. In the model, the substantial upfront fee of this option is amortized into 36 monthly increments, similar to the hardware costs in the HPE SimpliVity hyperconverged infrastructure. It should be noted that this is the lowest cost option for AWS. Amazon also offers 1-year and "on-demand" options, which are significantly more expensive on a per-VM basis (Figure 1).

## Amazon Web Services

AWS offers Elastic Compute Cloud (EC2) web services on a per-VM basis, so we priced configurations starting at 206 VM instances and then in increments of 103 VMs. The following list shows the specific component charges for the baseline 206-VM AWS infrastructure, based on a configuration created on the AWS website in May 2017.

### Amazon EC2 Service (US-East)

- Compute – "M3.medium" instance, 1 vCPU, 3.7GB memory, 100% utilized
- EBS Volumes – For each instance, 100GB of "General Purpose SSD" storage was chosen
- EBS IOPS – for each instance, we chose 300 IOPS for this 100GB of storage
- EBS Snapshots – for each instance, a 10% daily change was chosen
- AWS Data Transfer In – we estimated 1 TB of data per month imported into AWS, per 103 EC2 instances

- AWS Data Transfer Out – we estimated 3 TB of data per month exported out of AWS, per 103 EC2 instances
- VPC Peering Data Transfer – we estimated 6 TB of data per month transferred between EC2 instances within AWS, per 103 ECS instances
- AWS Support – we chose Business Support for all AWS services

The total monthly cost for this 206-VM infrastructure was \$10,907 or \$52.95 per VM. (Figure 1)

## HPE SimpliVity 380

The HPE SimpliVity calculations include CAPEX costs for hardware, software and maintenance, plus OPEX costs associated with data center overhead and administration. The following list shows these specific components of the total cost of a three-node cluster.

- HPE SimpliVity 380 acquisition price – the list price, less a standard discount, for three HPE SimpliVity 380 nodes required for a 2+1 configuration.
- HPE SimpliVity 380 maintenance – the discounted, 3-year maintenance cost for these nodes
- vSphere licenses – the 3-year cost of a hypervisor license for each 2-CPU node, assuming a 10% discount off list
- vSphere support – the discounted cost of hypervisor support for licenses required for a given configuration
- Power, cooling and rack space – the 3-year data center facility cost assuming \$100 per node, per month

## Administrative Support

Perhaps the largest component of total operating expenses is the cost of administering the infrastructure. For this model, we used the following calculation for personnel required to run each HPE SimpliVity 380 node:

Hourly cost of fully burdened employee (\$150,000 per year = \$75/hour) \* hours required to manage each node (1 hour per week) \* 52 weeks \* 3 years.

The total monthly cost for this HPE SimpliVity cluster is \$9,784 or \$47.50 per VM, 10% less than the comparable AWS price. The chart in Figure 1 shows the 3-year costs for the HPE SimpliVity solution and the AWS infrastructure described above. It also shows the costs for AWS pricing based on shorter timeframes which, again, are significantly higher.

### HPE SimpliVity vs. AWS per VM Cost at 206 VMs

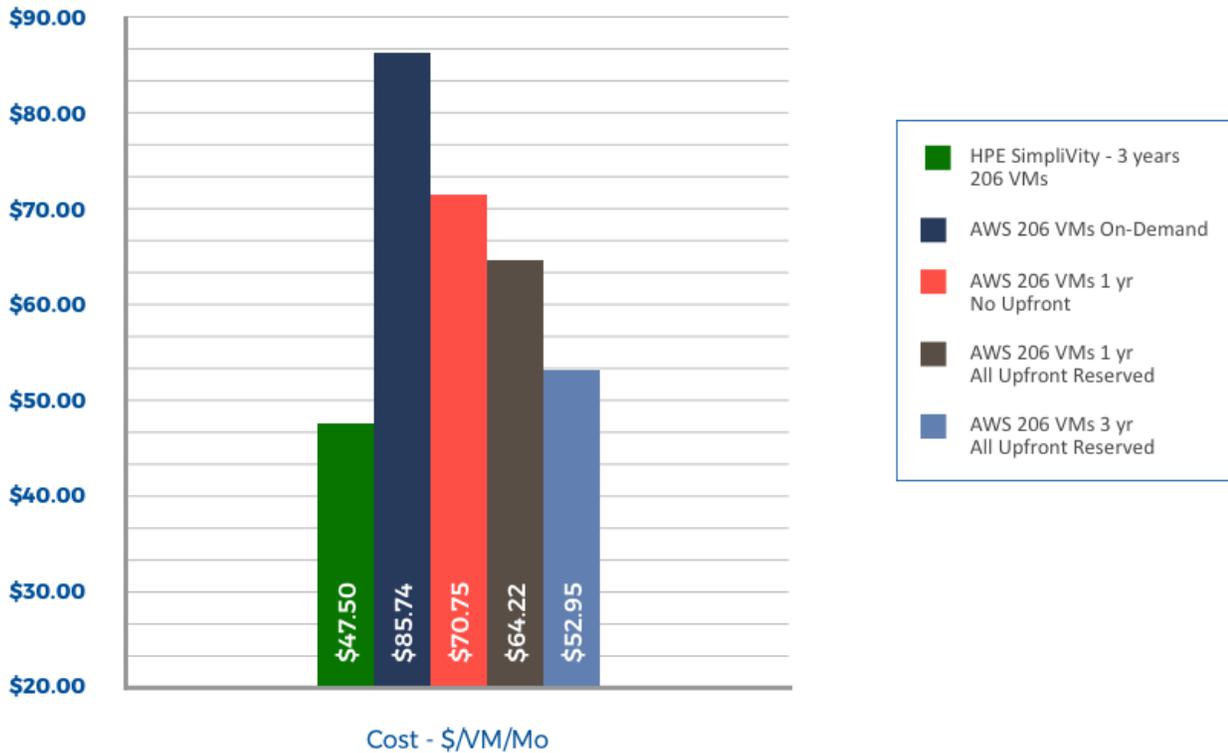


Figure 1

### Scaling the Infrastructure

Expansion of this hyperconverged infrastructure involves adding nodes to the cluster. Given the N+1 configuration, each additional node increases the VM count by 103, effectively distributing the cost of the redundant “+1” node across more data nodes. This improves the economics of the system. In comparison, the AWS infrastructure is essentially unchanged on a per-VM basis.

The graph in Figure 2 shows the widening differential between the monthly cost per VM on HPE SimpliVity 380 and AWS, as the infrastructure scales from 206 to 515 VMs (two to five nodes). This

differential would fluctuate somewhat as the number of redundant nodes increases, but the HPE SimpliVity system is still less expensive than the cloud solution at all levels of scale.

## HPE SimpliVity per VM Cost Decline Comparison at 3 Years

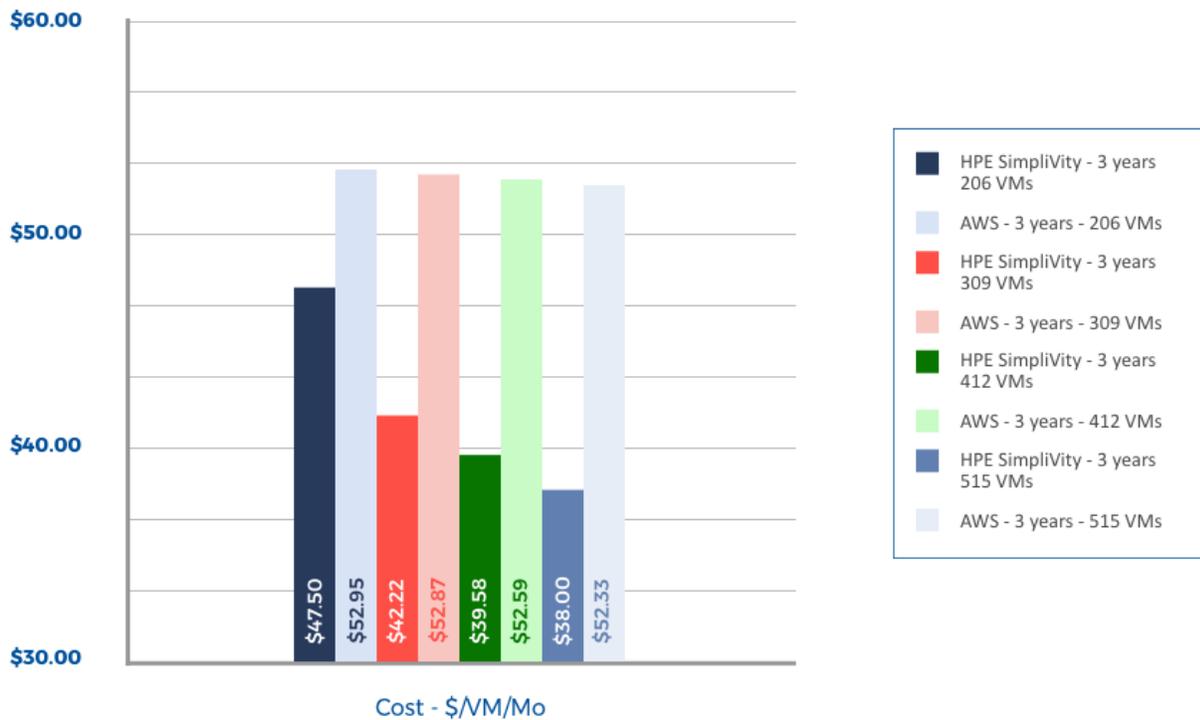


Figure 2

## Why Hyperconverged TCOs are Lower

As mentioned above, hyperconverged solutions, like HPE SimpliVity, change the TCO calculations historically used in IT decision making. By simplifying the physical infrastructure, using non-proprietary hardware and reducing or eliminating many of the tasks typically associated with implementing hardware and software, they lower total costs, both capital expenditures and operating expenses.

### Capital Expenditures

Hyperconverged systems combine storage and server functions, potentially reducing the overall cost by reducing the number of physical systems that must be purchased. Systems like the HPE SimpliVity 380 also eliminate the cost and complexity of implementing a complete infrastructure for virtualized

workloads using open systems components. The “design” process consists of selecting enough nodes to support the expected VM count and configuring those nodes to fit the expected workloads. There’s no long, involved installation phase; in fact, most hyperconverged appliance solutions can be deployed in less than an hour with very little need to “integrate” the cluster with existing systems. Expanding the system is simple as well, just add nodes to provide the required resources and the cluster re-balances itself.

As a comprehensive solution storage services and management software, and in some cases built-in data protection, come pre-installed as part of the package. These services typically include storage efficiency features such as inline deduplication, which when integrated into the base product can provide significant reduction in the amount of storage consumed. Related to efficiency is the way scale-out topologies can expand incrementally, improving capacity utilization and further reducing CAPEX.

### Operating Expenses

Management of the hyperconverged cluster is usually integrated into the hypervisor, allowing an administrator to handle more VMs than is possible with a traditional shared storage infrastructure. Hyperconverged solutions, like HPE SimpliVity, are designed with VM-centric management, the ability to provision storage and create management policies for each VM rather than for each storage volume. This further simplifies the day-to-day “care and feeding” of the system making the infrastructure manageable by employees without specific storage skills.

When more resources are required many hyperconverged systems support non-disruptive expansion, eliminating what has typically been a complex process. All these factors add up to an infrastructure that can be managed by fewer people, and those with less IT expertise. This is one of the most significant differences between the TCO of an HPE SimpliVity cluster and a traditional infrastructure of separate elements for compute, storage and data protection.

### Cumulative Costs

As mentioned earlier, TCO models are also used for strategic decisions, such as whether to put new or existing IT infrastructure into the cloud. Part of this strategy discussion involves the long-term, cumulative costs of different options. Sometimes expressing costs incrementally, on a per-VM basis as in this model, can minimize the impact of each alternative. In these instances, a cumulative cost calculation is often useful, such as the graph in Figure 3.

This graph shows that the AWS options are \$970K to \$1.57M, when the cost of 515 VMs are added for the entire 36-month period. However, the HPE SimpliVity solution is only \$704K, 27% to 55% less when totaled over that same timeframe. What would seem to be a modest per-VM cost differential can extrapolate out to hundreds of thousands of dollars in a few years.

## Cumulative Costs for 515 VMs

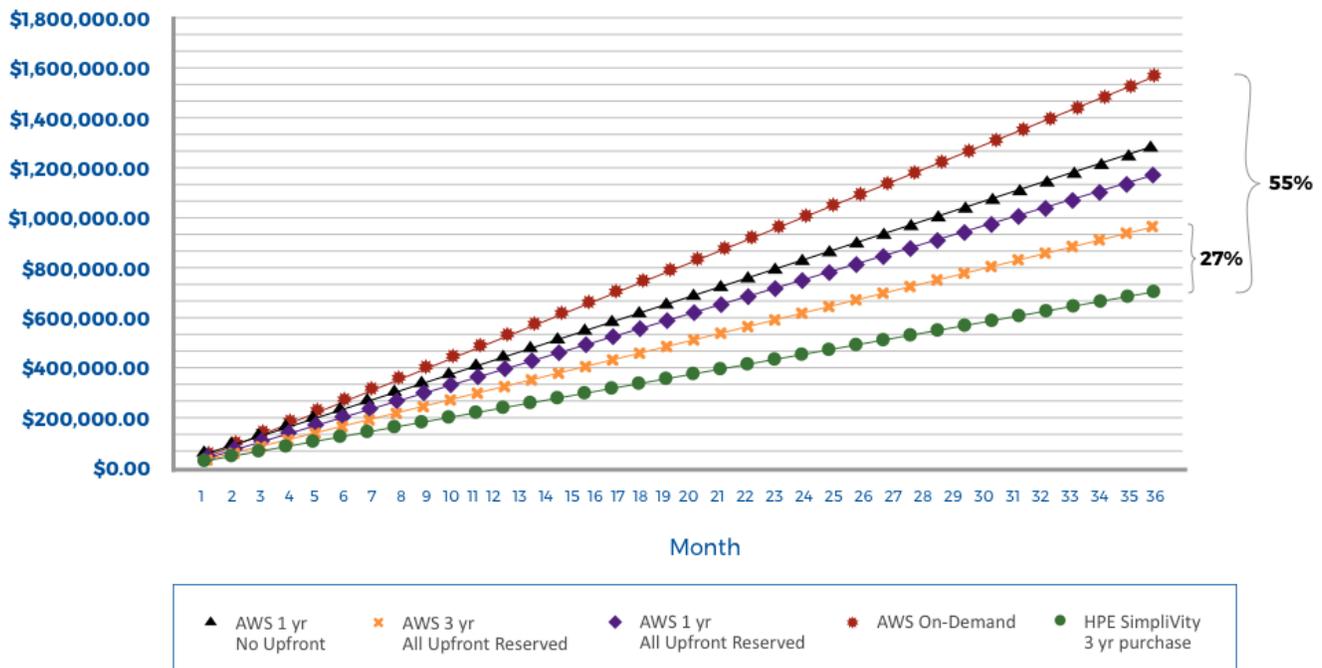


Figure 3

## Summary / Conclusion

The Cloud, once a novel idea in IT, is now an accepted, mainstream alternative. This fact has contributed to the assumption that the cloud *must* be less expensive than an in-house infrastructure. For many companies the justification for choosing the cloud has been the high cost of implementing traditional servers and storage components, and operating them over time. Often, a cost calculation has been used to make this comparison and support the “cloud assumption”.

In this report Evaluator Group shows that assumption is no longer valid, based on a Total Cost of Ownership model that compares HPE SimpliVity 380 hyperconverged infrastructure with a solution from AWS that’s designed to support the same number of compute instances. Due to its comprehensive, low-cost hardware architecture and advanced efficiency and management features, an HCI can cost significantly less than a comparable cloud solution. And, that cost differential gets better with larger systems and longer timeframes.

## About HPE

Hewlett Packard Enterprise (HPE) is a technology company with a comprehensive portfolio spanning from cloud to the data center to workplace applications. HPE hyperconverged technology and services help customers around the world make IT more efficient, productive and secure.

In 2017, HPE acquired SimpliVity and now offers HPE SimpliVity hyperconverged systems, complete hardware-software solutions that are designed, built and supported by HPE. HPE SimpliVity hyperconverged technology lets organizations simplify IT. The infrastructure combines compute, storage services and networking in a single 2U appliance, and incorporates all of the traditional IT functions: WAN optimization, unified global VM-centric management, data protection, cloud integration, deduplication, built-in backup, caching, and scale-out capabilities. Inline deduplication, compression and optimization are applied to all data at inception, reducing resource consumption (storage and CPU) while increasing application performance.

HPE SimpliVity 380 is a turnkey hyperconverged solution built on an HPE ProLiant DL380 compute platform. Systems can be clustered to form a shared resource pool that delivers high availability, mobility and efficient scaling of performance and capacity.

## About Evaluator Group

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