



***Knight Point Systems
CSP Profiling Methodology***

Amazon Web Services vs. Horizon[®]

February 2016



Comparing Cloud Services



Every Cloud Service Provider (CSP) and every Cloud Service is different. Some CSPs focus on being price competitive and providing self-service, others focus on providing very secure resources, while still others focus on customer interactions and value-add services. **The CSP that represents the best business value to you will depend on your unique needs.**

Comparing CSPs in an “apples to apples” way is extremely difficult. Oftentimes, customers just end up comparing prices and go with the cheapest, hoping it’ll “just work out”. While a practical approach, comparing on price alone can be misleading when not considered in tandem with the other factors that make up a cloud service. Through our experience working in the cloud, **KPS has developed a methodology to create “CSP Profiles”, which can be used to make better decisions on which cloud is right for you.** The CSP Profile considers five (5) key factors:

- **Performance** – How well does the cloud service perform compared to others?
How well does it perform at scale?
- **Price** – How much will it cost to use the cloud service for the functions I need?
How much will it cost to use the cloud service for the functions I want?
- **Security** – How secure is the service?
- **Functionality** – What functionality does a cloud service provide? How do those functions align with what you need to do? How easy is it to use the cloud service?
- **Service Level** – What level of services do you get with a particular cloud service? Are there any guarantees?



CSPs For Comparison



In the comparison that follows, KPS has selected 4 IaaS Cloud options to analyze and review:

Amazon Web Services (AWS): The AWS EC2 and S3 services are the standard IaaS options available to customers. EC2 includes compute instances and “Elastic Block Storage” (EBS), while S3 offers cheaper, longer term storage. AWS IaaS options are also available in the “GovCloud” region, which is FedRAMP compliant and has an interim DoD PA at SRG Level 4. The “GovCloud” region is for Federal customer use only.

KPS Horizon® Clouds: Each of the Horizon® cloud options are built on KPS’s **Cloudseed®** technology and architecture, and are accessed through KPS’s **Zeus** tool, which provides visibility into all of your clouds.

- **Horizon® Public Cloud** – Knight Point’s standard cloud service available to both commercial and federal entities.
- **Horizon® Federal Community Cloud** – Intended for use by Federal customers only, this cloud meets all FedRAMP and DoD PA / SRG Level 5 standards and is currently in the process of receiving the official “compliance” stamp for both.
- **Horizon® On-Premise Private Cloud** – Intended for those wanting a private cloud that makes use of a already available hardware, facilities, or other resources

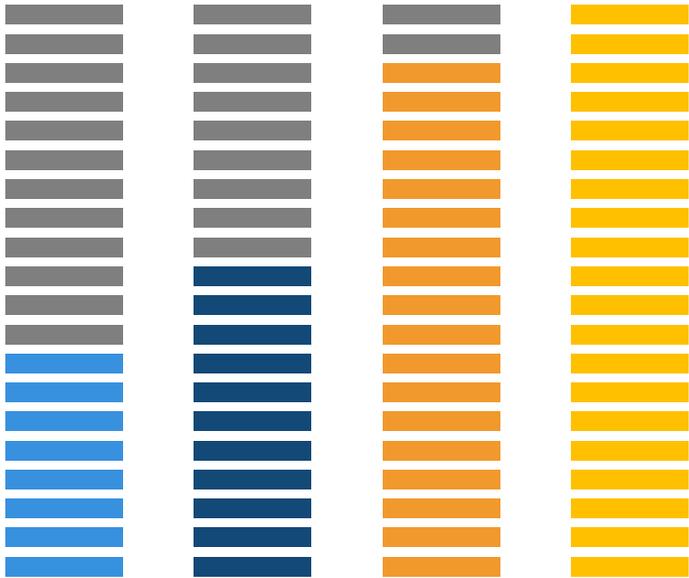


Performance

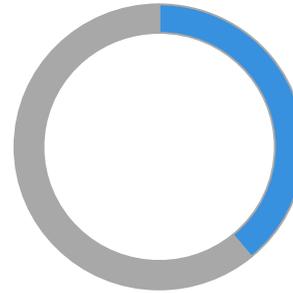
The performance characteristics of your cloud are driven by its underlying architecture. CSPs architect their cloud for specific strategic reasons – oftentimes to target specific customer segments, with specific workload needs. For this reason, cloud performance is a key factor for a vendor's CSP Profile.

Overall Unix Benchmark Index Scores

620.2 859.4 1377.9 1580.9

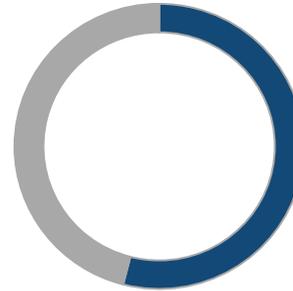


Provider	Configuration
Azure	1 vCPU 1.75 Gb RAM 30 Gb Disk
Google	1 vCPU 4 Gb RAM 10 Gb Disk
Horizon®	1 vCPU 1 Gb RAM 10 Gb Disk
AWS	1 vCPU 1 Gb RAM 8 Gb Disk



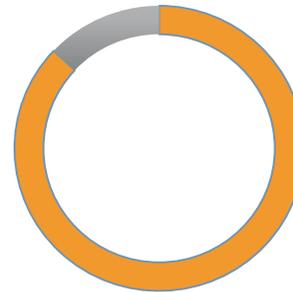
39%

At the smallest VM sizes, Microsoft Azure benchmarks at 39% the performance of AWS



54%

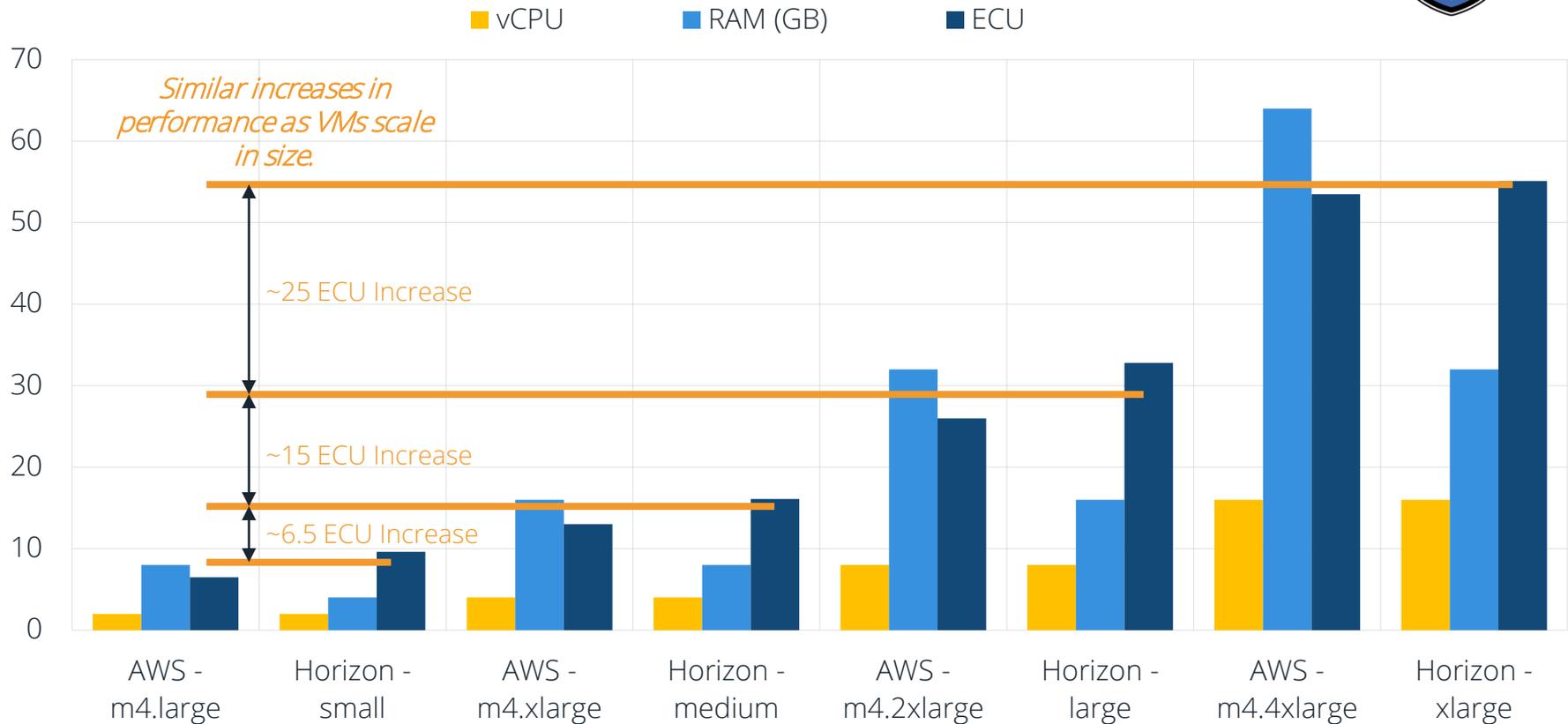
At the smallest VM sizes, Google Compute Engine benchmarks at 54% the performance of AWS



87%

At the smallest VM sizes, Horizon's® Cloudseed® architecture benchmarks at 87% the performance of AWS

*Tests were conducted across small size VMs over the course of 1 month.



As VM resource usage scales up and down, AWS VMs and Horizon[®] VMs using the CloudSeed[®] architecture scale in performance at approximately the same rate. In the graph above, performance is measured in “ECU”. According to AWS: “One EC2 Compute Unit (ECU) provides the equivalent CPU capacity of a 1.0-1.2 GHz 2007 Opteron or 2007 Xeon processor.”



Security

The more CSPs limit a customer's "access and use" of the cloud for the sake of security, the higher the price, and the narrower the "functionality". For some customers with secure computing needs, the savings from a "pay as you go" model justifies the price tag. In either case, Security should be a prime consideration for any customer looking to utilize the cloud and is a key factor in determining a vendor's CSP Profile.

Security features are intended to prevent unauthorized access to your accounts, management interfaces, Virtual Machines, and data. These features can involve anything from having standard processes and procedures in place, to implementing highly technical data encryption techniques, to simply restricting access based on role permissions.

Security Features	 AWS EC2 & S3	 Horizon[®] Public	 Horizon[®] Private	 Horizon[®] Federal
FedRAMP Compliant	(GovCloud Only)	✗	✗	(In Progress)
DoD Provisional Authority	(Interim Level 4 - GovCloud Only)	✗	✗	(Level 5 In Progress)
Data-at-Rest Encryption	(Customer Responsibility)	(VM by VM Basis)	✓	✓
LAN-to-LAN IPSec Tunnels	✓	✓	(Customer Responsibility)	✓
VPN Client into Tenant	✗	✓	(Customer Responsibility)	✓
Client Cert (CAC/PIV) Login to Portal	✗	✗	(Customer Responsibility)	✓
Multiple User Roles / Permission Levels	✓	✓	✓	✓



Service Level

CSP Service Levels are broken into two categories: Support Service Levels and Cloud Uptime Levels. Support Service Levels refer to a CSP's response time to inquiries and help requests and often take the form of formal support SLAs. The Cloud Uptime Levels refer to the expected availability of the cloud, along with any incentives or disincentives for not meeting that availability, and often come in the form of availability SLAs. Both of these are extremely important to establishing the CSP Profile.



AWS Service Levels



EC2 Uptime

99.0 - 99.5: 10% Credit
<99.0: 30% Credit

S3 Uptime

99.0 - 99.9: 10% Credit
<99.0: 25% Credit

01

Basic

- 24/7 Access to customer service and technical support for system health issues that are detected by AWS
- Access to technical FAQs, best practice guides, the AWS Service Health Dashboard, and the AWS Developer Forums

Free

02

Developer

- 1:1 support for any AWS question, enabling customers to leverage AWS Technical Support Engineers via email during local business hours to help configure, operate, and maintain core AWS services and features

\$49.95
Per Month

03

Business

- 1 Hour Response time, 24/7 via email, chat, or phone
- AWS Trusted Advisor best practice suggestions to improve customer solution
- 3rd Party Software support for OS, web servers, databases, storage, FTP, and email

\$100 or 10%
Per Month*

04

Enterprise

- Critical Response time of 15 minutes
- Dedicated Technical Account Manager for periodic business reviews on infrastructure planning, report metrics, launches, and solutions architecting

\$15K or 10%
Per Month*

*Pricing on these service levels are the greater of either option, and can be subject to scale discounts.



Horizon[®] Service Levels



Cloud Uptime

99.0 - 99.9: 10% Credit
<99.0: 30% Credit

KPS Datacenter Uptime

99.99: 10% Credit

01

Response Time:
Best Effort

Silver

- 24/7 Access to customer service and technical support via email and customer portal
- Access to technical FAQs, best practice guides,
- Ongoing Zeus feature request support

\$1.5K
Per Month

02

Response Time:
Within 1 business day

Gold

- All Silver Support functions and...
- Priority Zeus Feature Request Support
- Basic 3rd party vendor support for select software and hardware vendors
- Individual support for all "how to" questions on Horizon Cloud Management Suite (HCMS) tools

\$5K
Per Month

03

Response Time:
Within 1 hour

Platinum

- All Gold Support functions and...
- Dedicated Business and Technical POCs
- Ongoing Support and business analysis to optimize and plan cloud architecture to reduce costs
- Highest Priority feature request support for HCMS tools

\$15K
Per Month

The Difference between "Managed Services" and "Support Levels":

In cloud services, "Support Levels" typically refer to standard support included with any type of offering. This kind of support includes general technical help, inquiries, "how-to" help, basic requests, and is most often done through a "subscription" style plan. "Managed Service Levels" refers to specific system administration tasks where levels 1-3 refer to management of the infrastructure, OS/DB/MW, and application layers of the architecture stack, respectively. For CSP Profiling, Managed Services are considered part of the "Managed Functions" analysis.



Functionality

CSPs build their offerings around allowing customers to accomplish specific tasks. In some cases the task is simple – e.g. store 1 Gb of photos. In others, it is very complicated – e.g. provide an integrated platform to build out an enterprise DevOps O&M model. Whether complicated or simple, customers need to evaluate whether or not that task provides value to them in the short and long term, as well as how easily users can do it.

“DIY Functions” refer to those functions that are configured, setup, or used by the customer without any engagement with the CSP or other CSP-offered services. DIY Functions are best utilized by users who have the prior experience and/or know-how to execute tasks with that function easily and correctly.

DIY Functions	 AWS EC2 & S3	 Horizon® Public	 Horizon® Private	 Horizon® Federal
Create & Manage VMs of set sizes	✓	✓	✓	✓
Auto-scale and Load Balance VMs	✓	✗	✗	✗
IPv4 and IPv6 IP Allocation to VMs	✗	✓	Customer Dependent	✓
Create IPsec LAN-to-LAN Tunnels	✓	✗	✗	✗
Apply CSP-maintained OS images	✓	✓	Customer Dependent	✓
Customize VMs with A-la-carte resources	✗	✓	✓	✓
Utilize CSP-owned/managed OS Licensing	✓	✓	Customer Dependent	✓
Managed and Create VMs in other Clouds	✗	✓	✓	✓
Snapshot Creation and Management	✓	✓	✓	✓
Console Access to Created VMs	✗	✓	✓	✓
Management of Security Groups / FW Rules	✓	✗	✗	✗
Self-Service New User/Tenant Creation	✓	✗	✗	✗

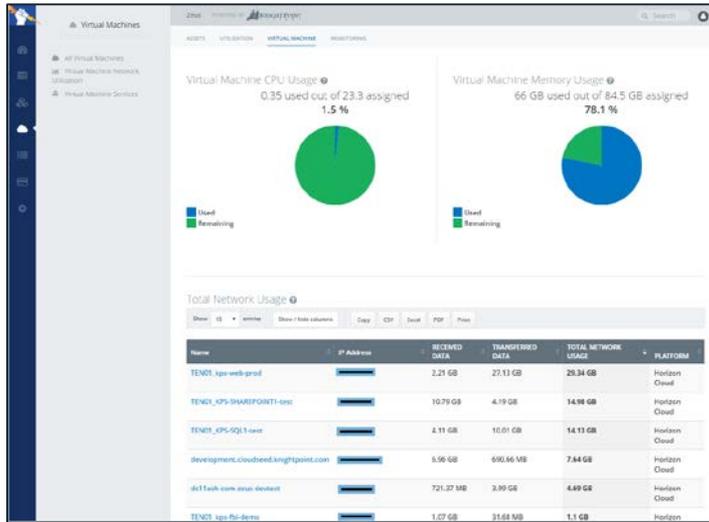
“Managed Functions” refer to those functions that require engagement with the CSP or other CSP offerings. These functions are often performed by the CSP on behalf of the customer, so that customers can make use of the CSP’s knowledge-base and expertise.

Managed Functions	 AWS EC2 & S3	 Horizon® Public	 Horizon® Private	 Horizon® Federal
	Common Levels of “Managed Services”			
Snapshot/Backup/DR Management	✗	✓	✓	✓
Full VM Resource Management*	✗	✓	✓	✓
Full OS Management (aaS)	✗	✓	✓	✓
Full Database Software Management (aaS)	✗	✓	✓	✓
Full Middleware Management (aaS)	✗	✓	✓	✓
Managed Services in Other Clouds	✗	✓	✓	✓
Monitoring Service – Alerts / Notifications	✓	✓	✓	✓
Monitoring Service – Triage	✗	✓	✓	✓
Monitoring Service - Remediation	✗	✓	✓	✓
LAN-to-LAN IPSec Tunnels	(Only DIY)	✓	✓	✓

*Full VM Resource Management includes managed auto-scaling and load balancing as well as (de)provisioning of machines as requested and/or needed.



Ease of Use

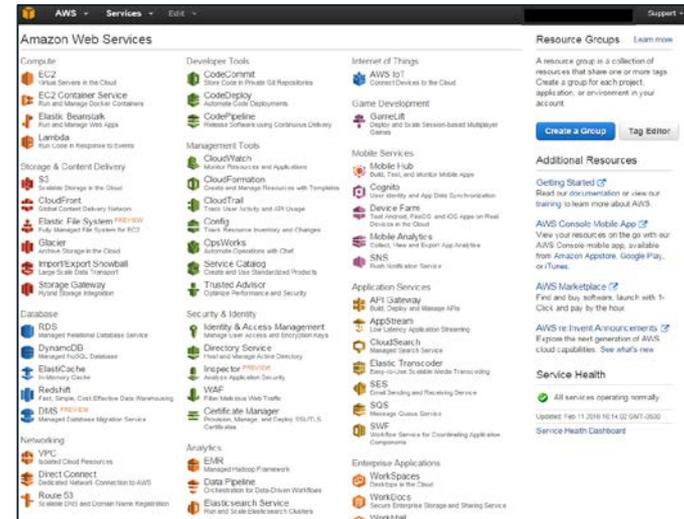


Zeus

Zeus focuses on IaaS service from an “asset” perspective. Zeus enables you to see, manage, and manipulate infrastructure (resource) assets across all off-prem clouds (Horizon® or others – including AWS), as well as on-prem clouds (Horizon® private clouds). Further, for the more business-minded users, Zeus has an easy-to-use billing page that aggregates your bills across clouds. Zeus gives previously unseen levels of visibility into your environments, and is developed on a “user request” model, giving customers the ability to drive the future of what Zeus needs to be and do.

AWS Service Portal

Over years of refinement, the AWS portal serves as a “one stop shop” for the engagement of AWS services. It is very easy to quickly access and use a service if you know what you need. The quantity of available services provides great options for customers, though can make it hard for inexperienced users to locate and use the DIY Function they want. The AWS Billing page continues to serve as the standard for displaying cloud billing information in a convenient, and efficient way.





Price

Estimating the price of a cloud is extremely difficult. Even with the right tools to benchmark systems, you can never guarantee exactly how the system will be used over time. Cloud Service Providers know that it is difficult to estimate usage, and use it as a defense against direct comparison. For this reason, price should be considered only after all other factors. The Horizon[®] price model eases this burden by allowing customers to “pay for performance” wherever possible. Know what you want to get done in the Cloud, and do it.



Sample Compute Pricing



\$27K

\$/Month

KPS Federal Cloud
Hourly Units

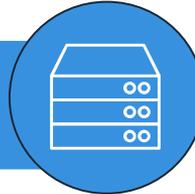


Pricing includes costs associated with FedRAMP and DoD PA package maintenance, and continuous monitoring.

\$25K

\$/Month

KPS Private Cloud
Monthly Units



Does not include customer facilities and power costs.

\$23K

\$/Month

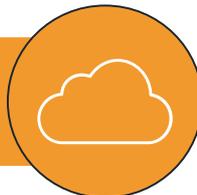
KPS Public Cloud
Hourly Units



\$19K

\$/Month

AWS
Hourly Units



VM sizing limitations inhibit ability to get to exact compute amounts desired.

Sample Requirements:

668 vCPU

1.7 TB RAM

For all Provisioned
VMs and Storage

For these compute resources, Amazon's monthly pricing is cheapest, followed by the KPS Public Cloud, a KPS On-Prem Private Cloud, and lastly the KPS Federal Community Cloud.



720 Hours
Assumed per Month



100% Utilization
Assumed per Month



Sample Storage Pricing



\$13K

\$/Month

KPS Federal Cloud
Monthly Units

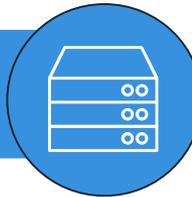


Pricing includes the cost of "instant" triple storage redundancy based on Cloudseed® cloud architecture.

\$20K

\$/Month

KPS Private Cloud
Monthly Units



Pricing includes the cost of "instant" triple storage redundancy based on Cloudseed® cloud architecture. Does not include customer facilities and power costs.

\$8K

\$/Month

KPS Public Cloud
Monthly Units

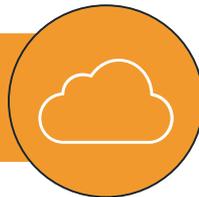


Pricing includes the cost of "instant" triple storage redundancy based on Cloudseed® cloud architecture.

\$7K

\$/Month

AWS
Monthly Units



Price includes "eventual" double redundancy based on AWS description.

Sample Requirements:

55 TB

5.5K IOPS

For all Provisioned
VMs and Storage

For resources of this combined capacity and performance, Amazon's monthly pricing is cheapest, followed by the KPS Public Cloud, the KPS Federal Community Cloud, and lastly a KPS On-Prem Private Cloud.



Provisioned IOPS
Assumed for AWS



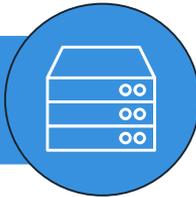
Triple Redundancy
Assumed for KPS Clouds

\$0.1K KPS Federal Cloud
\$/Month Monthly Units



KPS's "pay for performance" model results in low data transfer costs based solely on desired bandwidth.

\$0K KPS Private Cloud
\$/Month Monthly Units



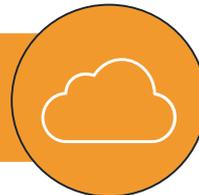
KPS does not charge for data transfer costs to/from on-premise private clouds.

\$0.1K KPS Public Cloud
\$/Month Monthly Units



KPS's "pay for performance" model results in low data transfer costs based solely on desired bandwidth.

\$1.4K AWS
\$/Month Monthly Units



Pricing is based on total data transferred in a monthly cycle.

Sample Requirements:

16.2 TB
In & Out
For entire
environment

For data transfer capacity, a KPS On-Prem Private Cloud is cheapest, followed by the KPS Public Cloud and KPS Federal Community Cloud, and lastly Amazon.



AWS Data In
Assumed to be free



AWS Data Out
Assumed standard out



Sample Managed Services



\$33K

KPS Federal Cloud
Monthly Units

\$/Month

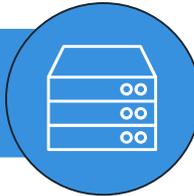


KPS utilizes its internal service delivery / operations team to manage and maintain VMs for the customer 24/7.

\$35K

KPS Private Cloud
Monthly Units

\$/Month



KPS also owns and maintains physical equipment, and conducts tech refreshes automatically at no additional cost to the customer

\$33K

KPS Public Cloud
Monthly Units

\$/Month



KPS utilizes its internal service delivery / operations team to manage and maintain VMs for the customer 24/7.

\$42K

AWS
Hourly Professional Services

\$/Month



Integrators can be contracted for professional services with AWS, but, in turn, minimally add a small pass-through percentage (3-4%) on top of AWS's other IaaS resource prices.

Sample Requirements:

110 VMs

Level 2

OS and Resource
Management

Horizon® Managed Services take advantage of KPS' internal operations team. AWS usually requires FTEs, but through Horizon®, KPS offers managed services for AWS instances purchased through Zeus.



3 FTEs
Assumed for Integrator



4% Pass-Through
Assumed for Integrator



Total Sample Pricing



+24.8%

Higher in price than baseline (plus customer responsibilities)



+14.0%

Higher in price than the baseline



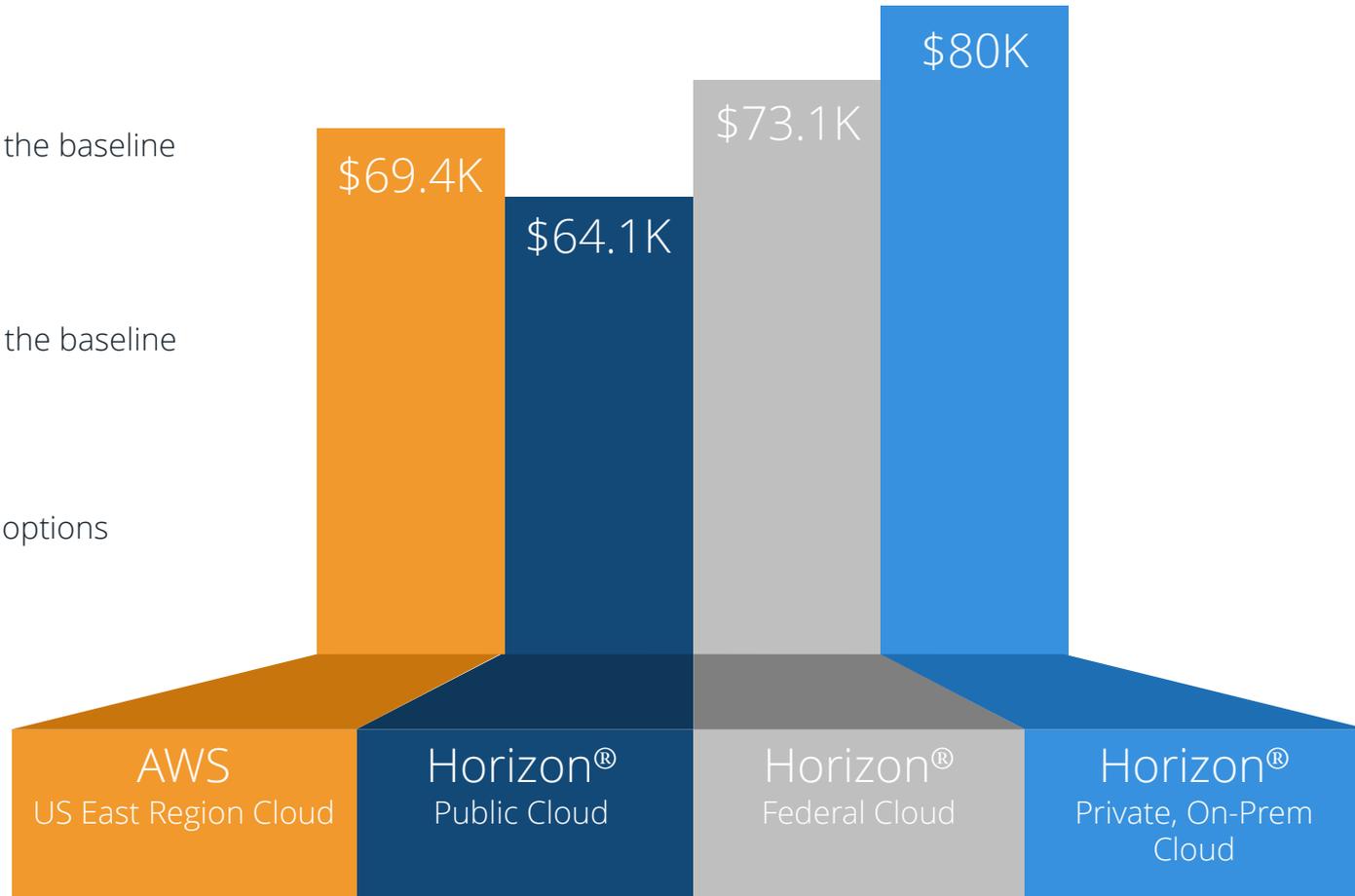
+8.3%

Higher in price than the baseline



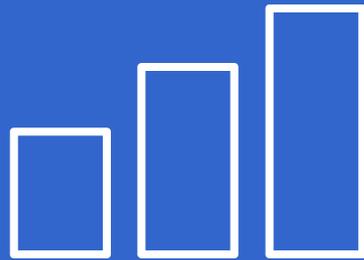
Baseline

Lowest pricing of all options



Discounting the Cloud

All clouds offer discounts for reserved instances and longer contract terms. Horizon® cloud pricing represents "List" pricing from which discounts can be applied to make offerings more price-competitive based on your specific cloud needs!



Summary

Using the information gathered on CSPs and their various cloud services, customers can establish a CSP Profile that gives a visual representation of the overall cloud service. This can help set expectations and serves as an easy way to visually compare CSPs and their cloud service offerings, without having to rely on the “Apples to Apples” method that often times falls short of fully describing a cloud service’s value.

The final CSP Profiles take shape when we rank CSPs from best to worst (relatively) in each of the major categories reviewed. Through the use of CSP Profiling, customers are able to pick the handful of factors that matter to them, and ensure they get the best fit for them.

The methodology outlined here explains CSP profiling at a high level, but through much more in-depth profiling, KPS has found clear expectation standards across industries. This, combined with KPS' methodology for knowing if the cloud is "right for you", helps customers make the transition to cloud computing seamlessly. To request more information please email info@knightpoint.com or visit our cloud microsite: www.whatsyourhorizon.com.

