

# CloudHarmony Performance Benchmark: Select High-Performing Public Cloud to Increase Economic Benefits



## White Paper

### What You Will Learn

Even small differences in cloud performance can affect costs, customer satisfaction, and time to market.

This white paper, intended for enterprises evaluating public cloud services, summarizes the results of an independent comparison of public cloud service performance conducted by CloudHarmony in March 2011:

- Forty-four tests measured performance for CPU-intensive tasks, disk I/O, memory I/O, interpreted-language programming, and encryption and encoding.
- The tests compared the performance of a cloud compute instance to a baseline compute instance operating on Intel Xeon 5500-series processors.
- The Savvis Symphony Virtual Private Data Center (VPDC) performed at or near the top of the CloudHarmony benchmark in all five categories. The service platform consists of Cisco UCS® B200 M2 Blade Servers using two Intel Xeon 5570 4-core 2.93-Ghz processors and 96 GB RAM

### In the Cloud, Performance Matters

Organizations of all sizes are moving some or all of their business computing to the cloud, attracted by favorable economics. One benefit is that usage-based billing lowers costs compared to purchasing infrastructure that sometimes sits idle. But not all clouds are equal, and the extent of the savings depends upon infrastructure performance. That is, the more work the cloud platform can do in a unit of time, the lower the costs.

In addition, even tiny performance increases can stimulate incremental sales on eCommerce sites. Examples reported by Microsoft include:<sup>1</sup>

- Bing found that a two-second slowdown in search results decreased revenue per user by 4.3 percent

- Google reported that a 400-millisecond delay in presenting search results, less than the blink of an eye, reduced the number of searches per user by .59 percent
- AOL observed that users who experience the fastest page loads view 50 percent more pages per visit than those who experience the slowest page loads
- When Shopzilla accelerated page load times from approximately seven to two seconds, revenue increased by 7–12 percent
- AutoAnything, a web-based supplier of auto accessories and parts, measured customer satisfaction before and after improving web performance for page loads from 14 to seven seconds. Customers were 29 percent more likely to buy on their first visit, and 38 percent more likely to return to the site

### CloudHarmony Benchmark: Empirical Comparison of Public Cloud Performance

Savvis, a leading global provider of cloud infrastructure for enterprises, asked CloudHarmony to conduct a benchmark comparing the performance of leading public cloud providers. CloudHarmony, which is not affiliated with or funded by any cloud provider, tested the following services:

- Savvis Symphony Virtual Private Data Center (VPDC)
- Amazon EC2
- IBM SmartCloud Enterprise
- Terremark vCloud Express
- OpSource Cloud
- Rackspace
- BlueLock
- GoGrid
- SoftLayer

1. Microsoft Tech-Ed, May 2011

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After assessing 44 performance metrics, including both synthetic and real-world performance testing, CloudHarmony aggregated the results into five performance categories:

- CPU, relevant to compute-intensive tasks such as Monte Carlo simulations used in the financial services industry
- Memory I/O, relevant to caching systems and memory stores
- Disk I/O, relevant to database and web server
- Interpreted language processing, relevant to development in the cloud
- Encryption and encoding, relevant to security and privacy protection

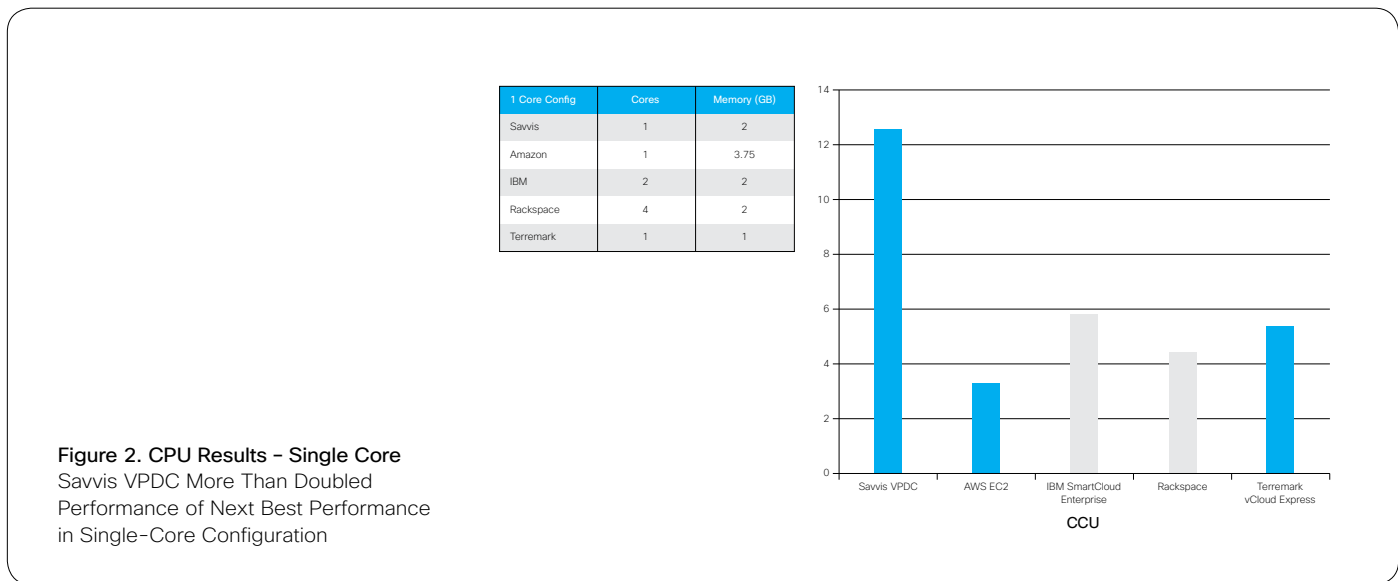
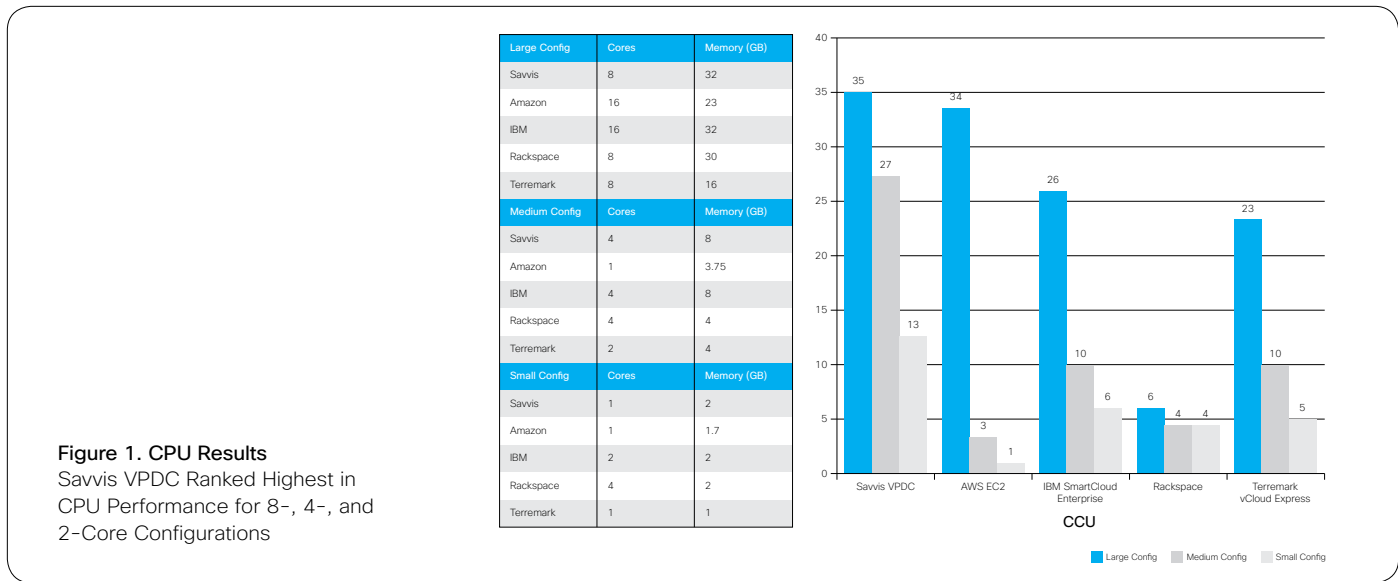
The tests revealed how much better or worse the compute instance performance compared to a baseline compute instance. If a baseline score is 100, then a compute instance earning an aggregate result of 125 is 25 percent faster than the baseline. An instance earning an aggregate score of 75 is 25 percent slower.

## CPU Results

What benchmark measured:	Based on the Amazon EC2 Compute Unit (ECU), the CloudHarmony Compute Unit (CCU) compiles 19 different CPU benchmarks
Most relevant for:	Compute-intensive tasks such as big-data analysis, email routing, and multi-threaded applications
Business impact:	Lower computing costs and faster application response times
Baseline:	Intel Xeon Processor 1.2 GHz 2007 [Verifying model #]
See company comparisons for CPU results in Figures 1 and 2.	

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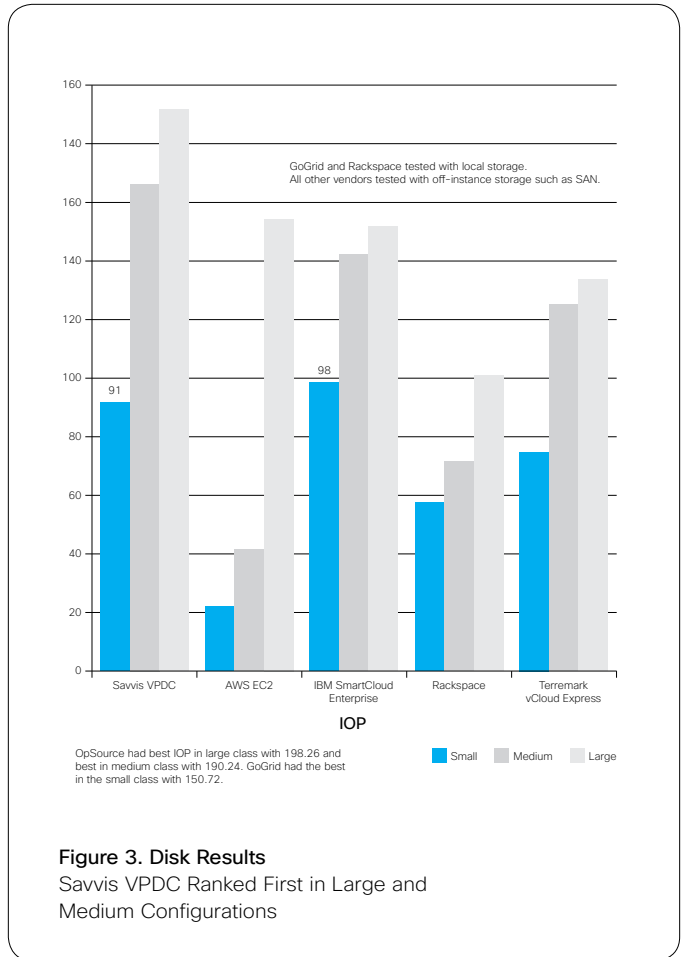
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## Disk I/O Results

- What it measures: How fast compute instances read from and write to disk
- Most relevant to: Database and web server workloads
- Business impact: Lower computing costs because of faster execution; faster project completion
- Baseline (100 points): Dual-processor Intel Xeon Processor E5506 2.13 GHz, with eight cores total and four 15,000 RPM SAS drives in a RAID 1+0 configuration

See how each cloud provider ranked in disk results in Figure 3.



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## Memory I/O Results

What it measures: How fast the cloud server reads and writes data to memory

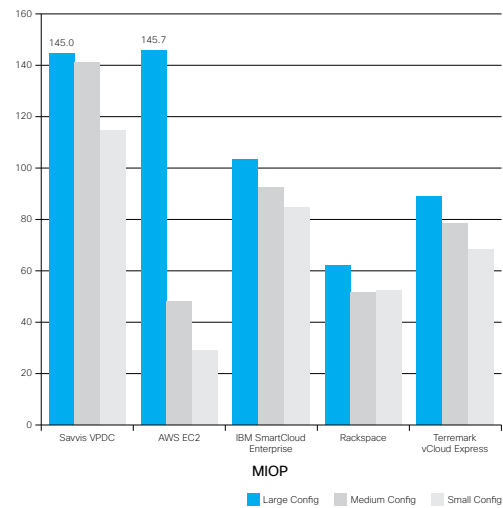
Most relevant to: Caching systems and memory-based data stores

Business impact: Faster application response time

Baseline (100 points): Dual Intel Xeon Server 5504 Quad-Core with 2.00 GHz processors and 48 GB DDR3 ECC RAM

See how each cloud provider ranked in memory results in Figure 4.

Large Config	Cores	Memory (GB)
Savvis	8	16
Amazon	16	23
IBM	16	32
Rackspace	8	30
Terremark	8	16
Medium Config	Cores	Memory (GB)
Savvis	4	8
Amazon	1	3.75
IBM	4	8
Rackspace	4	4
Terremark	4	8
Small Config	Cores	Memory (GB)
Savvis	1	2
Amazon	1	1.7
IBM	2	2
Rackspace	4	2
Terremark	1	1



**Figure 4. Memory Results**  
Savvis Outperformed Other Services for Memory I/O in 4-Core and Single-Core Configurations, Tying for 8-Core Configuration

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## Interpreted Language Programming Results

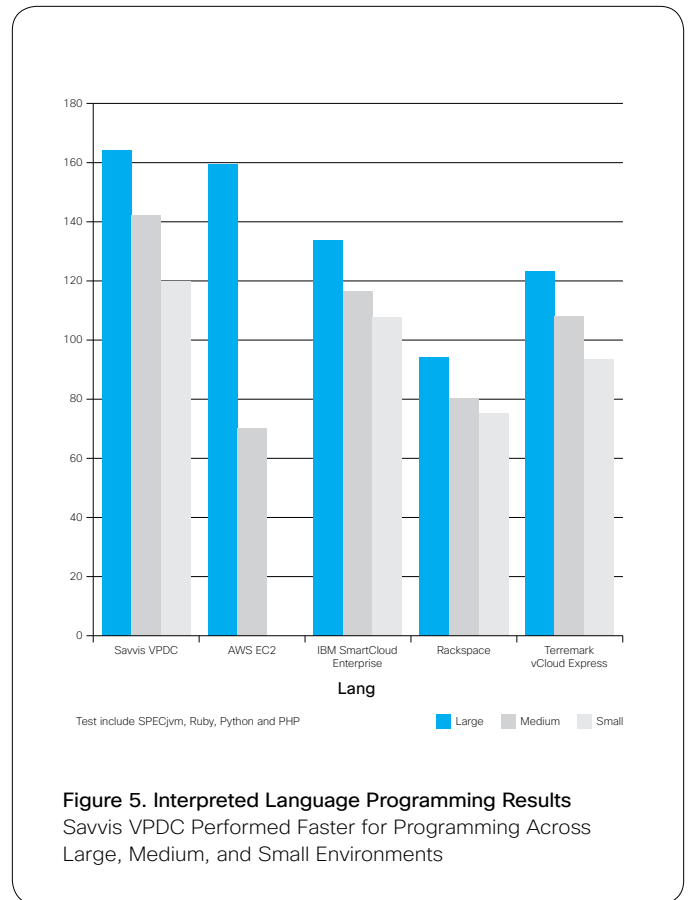
What it measures: Performance of four languages commonly used to develop server-side software applications, including Java, Ruby, Python, and PHP

Most relevant to: Software development

Business impact: Faster time to market, more time for quality testing

Baseline (100 points): Dual-processor Intel Xeon Processor E5506 2.13 GHz (8 cores total) with four 15,000 RPM SAS drives configured in hardware-managed RAID 1+0

Figure 5 displays each cloud provider's results in interpreted language programming.



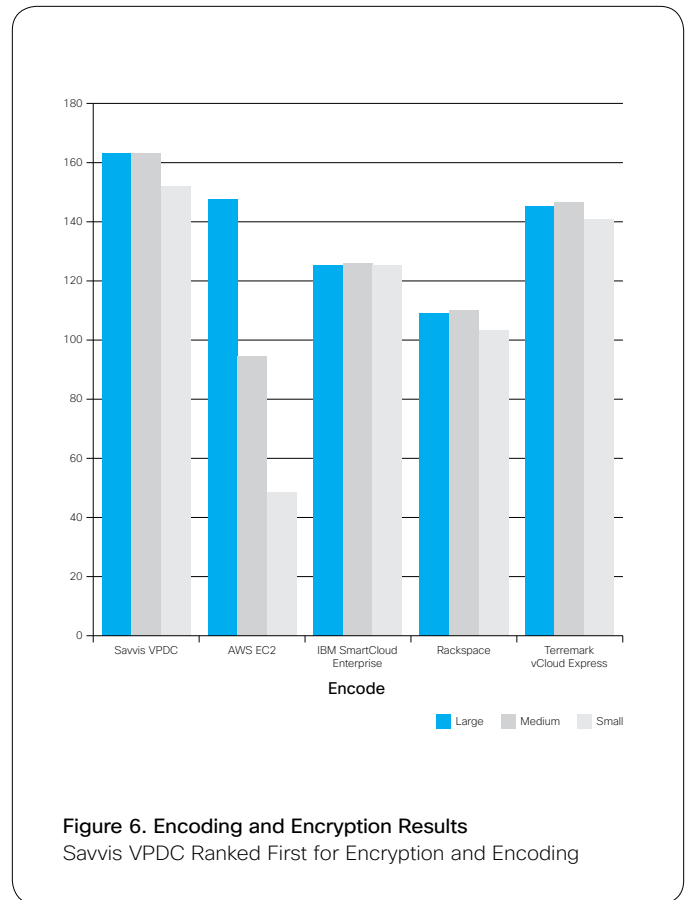
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## Encoding and Encryption Results

What it measures:	Speed of encoding and encryption
Most relevant to:	Storing sensitive information in the cloud, including intellectual property, healthcare records, and financial information
Business impact:	Secure access and compliance with privacy requirements
Baseline (100 points):	Dual Intel Xeon Server E5504 Quad-Core 2.00 GHz processors with 48 GB DDR3 ECC RAM

Figure 6 illustrates each company's encoding and encryption results.



**Figure 6. Encoding and Encryption Results**  
Savvis VPDC Ranked First for Encryption and Encoding

## About the Savvis Symphony VPDC Infrastructure: Built on Cisco Unified Computing System™

Savvis Symphony VPDC is one of the industry's first enterprise-class virtual private data center solutions, providing multi-tiered security and service and network profiles. The service is built on Cisco® UCS B200 M2 Blade Servers featuring dual Intel Xeon 5570 4-core 2.93-Ghz processors and 96 GB RAM.

### Conclusion

Introduced in 2010, The Savvis Symphony VPDC performed at or near the top of all five test categories: CPU, disk I/O, memory I/O, interpreted-language programming, and encryption and encoding. Therefore, organizations that use

the Savvis Symphony VPDC to extend or replace their own data centers stand to gain the most in terms of cost savings, incremental revenue from a faster customer experience, and first-to-market advantage.

### For More Information

To learn more about Savvis cloud services, visit: [www.savvis.com/cloud](http://www.savvis.com/cloud)

To learn more about the Cisco Unified Data Center solutions at the foundation of the Savvis Symphony VPDC, visit: [www.cisco.com/go/udc](http://www.cisco.com/go/udc)

To read the full benchmark report, call Savvis: 1-800-SAVVIS1.

## Appendix: Benchmark Summary

	CPU	Memory	Disk	Encryption	Language
Unit	CCU	MIOP	IOP	Encode	Lang
Baseline Config	Amazon EC2 ECU	Dual Intel E5504 Quad core 2.00 GHz processors and 48 GB DDR3 ECC ram	Dual Intel E5506 2.13 GHz (8 cores) with 4X15K RPM SAS drives with hardware RAID 1+0	Dual Intel E5504 Quad core 2.00 GHz processors and 48 GB DDR3 ECC ram	Dual Intel E5506 2.13 GHz (8 cores) with 4X15K RPM SAS drives with hardware RAID 1+0
Test	19	7	7	7	4
Test Names	c-ray, crafty, dcraw, espeak, geekbench, graphics-magick, hmmmer, john-the-ripper-(blowfisj, des, md5) mafft, nero2d, openss, opstone-(svd, svsp, vsp), sudokut, tscp, unixbench	CacheBench, Geekbench, hdparm, RAMspeed, Redis Benchmark Stream, Unixbench	Blogbench, Bonnie++, Dbench, Flexible IO Tester, hdparm buffered disk reads, IOzone, Threaded I/O Tester	Monkey Audio Encoding WAV To FLAC, WAV To MP3, WAV To Ogg, WAV To WavPack, FFmpeg AVI to NTSC VCD, GnuPG	SPECjvm, Ruby, Python, PHP

