
pazugo
Your Guide in the Virtual World

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Executive Overview

The Cloud represents a sea change in IT infrastructure management yet quantifying the impact in any given organization can be challenging. The decision to use cloud has become mission-critical in many organizations as they hope to benefit from increased scale and reduced cost. Scale is no longer a function of buying massive amounts of physical servers. IT organizations now have the power of delivering Return on Investment (ROI) and reducing Total Cost of Ownership (TCO) all while increasing scale.

Determining when, how and why one should move to the cloud can be daunting. Having an accurate measure of performance is critical. Measuring performance is achieved by benchmarks and sifting through detail is a critical step not only in choosing cloud but determining how to consume cloud.Benchmark testing is an effective tool in evaluating technologies and can add substance around technology decisions. The Pazugo team conducted benchmark tests that capture the results of Joyent's cloud platform.

The Approach

Amazon's ™ EC2 is a well-known cloud platform with established terms for cloud compute. Given the maturity of the platform and a well-established methodology created by CloudHarmony ™, Joyent and Pazugo decided to use the same metrics and techniques to determine how well Joyent SmartMachines compared to other cloud platforms. The approach involved comparing the performance of operating systems such as Linux and Windows. The Pazugo team goal was to benchmark CPU, Memory and Disk IO for each of the respective operating systems.

Basis for Benchmark

The objectives of the benchmark tests were to compare Joyent's cloud platform against other platforms included in a study conducted by CloudHarmony ™. CloudHarmony is an independent organization focused on producing benchmarks and performance data to measure and compare cloud providers. As such, CloudHarmony conducted a study using the Phoronix Test Suite. Phoronix uses tens of different core applications from areas such as data compression, media encoding, cryptography, graphics rendering, scientific computation, database query processing and web serving.

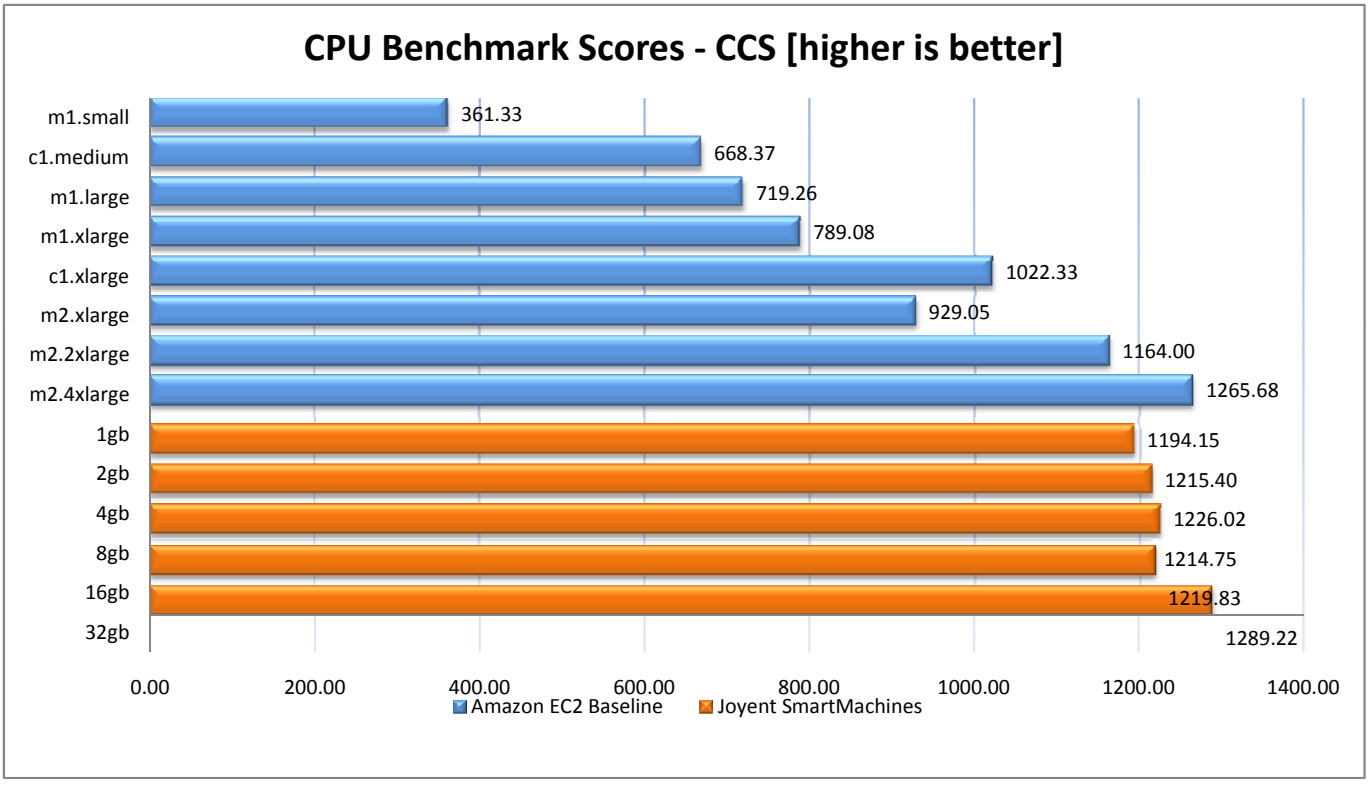
CPU Benchmarks

A critical component in understanding cloud platforms is compute power. Compute power is a function of 1 or more CPU's with many cores. To assess compute power in one cloud platform against another there needed to be a systematic way to assess relative performance. The methodology used by CloudHarmony involved taking the results of the Phoronix test suite and creating the concept of a CloudHarmony Compute Unit (CCU) and a CPU Comparison Score (CCS).

A CCU is calculated by running these core applications across 4 Amazon zones. A baseline is produced by taking the highest average score from each of applications running in an Amazon zone. A CCU is calculated by taking a ratio of a given instance's score against the average. Taking an aggregation of the scores as a composite number produces a CCS. The idea is that a CCS is a representation of how well instances performs against Amazon's best instance. Higher scores are better.

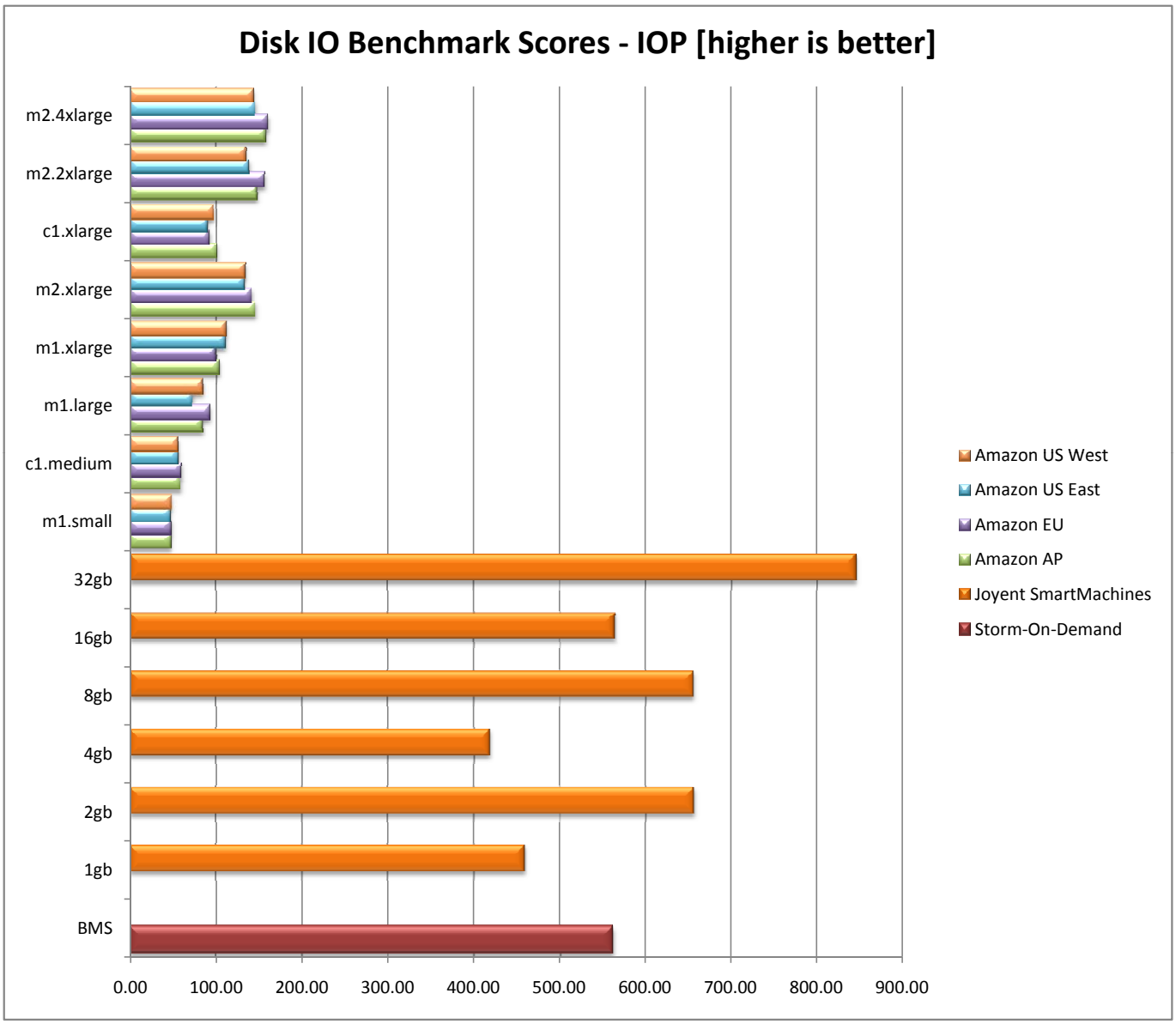
CPU Benchmark Summary

As indicated in the graph below, Joyent's CCS score for its small instance, a 1GB SmartMachine, is greater than 5X of Amazon's equivalent small instance. Also note that Joyent's 1GB SmartMachine is comparable to Amazon's instance (mx2.4xlarge).



IO Benchmarks

Cloud platforms don't stand on CPU alone. IO can affect performance and it is a component piece of an overall cloud architecture. The study further defined a base line for Disk IO based on Storm On Demand's (SOD) bare metal offering. SOD is a spin-off of a dedicated hosting provider LiquidWeb, which offers shared and bare-metal cloud servers ranging from 2-48GB. Again Phoronix was used on SOD's servers. The Pazugo team compared both Joyent and Amazon serves to the SOD server baseline. The basic metric of performance for Disk IO is Input/Outputs per second (IOPS). IOPS are a measure of how fast you can write and read to storage. As indicated by the graph below Joyent clearly outperforms on all equivalently sized SmartMachines.



Cost Per Work Load & Performance

In today's environment, the cost of hardware can be misleading. Choosing the right cloud environment is fundamentally about cost. The question is the cost of what? Whether considering the cost of scale or ROI, an accurate measure is critical. Cost per workload is a measure of how much work can get done for a given set of resources and at what price. Typically the cloud industry focuses on hypervisor efficiency. The hypervisor that is able to achieve the most work on a smaller footprint wins. However these benchmark results force us to think about the efficiency of a cloud environment without a hypervisor. In a nutshell, an Open Solaris based system can achieve more work on a smaller footprint because of the burst capability and ZFS. Said another way, the more workloads you run on a shared system, the lower the cost of each workload and, ultimately the greater the overall ROI (assuming each workload delivers a positive ROI). As the results suggest, in some cases the Joyent 1GB SmartMachine outperforms instances on other cloud platforms with more physical resources. Joyent's platform posted higher CCU scores on average inferring that more work gets done with less.

Connecting the dots

The vast majority of cloud bound applications are spiky in nature. In the 1990's capacity planning was a must to ensure that applications did not outgrow their physical environments. Web applications require a performance heavy platform, one that scales as needed. The cloud changes how we plan and offers a suite of new capability to applications.

The benchmark results demonstrate that Joyent considerably outperforms the baselines established by CloudHarmony. In some cases, Joyent's Open Solaris based cloud platform outperforms thebaseline by up to 14 times. While some of the numbers can be attributed to the burst capabilities of Open Solaris, still the resulting advantage is hard to ignore. Further, on equivalently sized instances, a cloud consumer will spend less for the same or better performance on average.