RICK'S CLOUD

2016 SELF SERVICE CLOUD COMPARISON

ABSTRACT

To keep up with the increasing speed of business, more companies are replacing IT infrastructures with cloud-based services. However, choosing the right cloud provider is critical to achieving the cost savings and agility that the cloud can deliver. New players, new use cases and evolving standards all impact the choice of a cloud provider. This white paper reviews real data taken from computed scenarios to assist buyers seeking cloud services. The following review will help buyers understand how their workloads might perform, under certain conditions, across multiple cloud-computing platforms – and at what costs.

EXECUTIVE SUMMARY

Flexibility and agility are the order of the day in IT, and that's a key reason why cloud services have grown in popularity.

Cloud computing is not an entirely new idea – in some form or another, it dates back to the earliest days of computing. However, relying on a cloud provider to activate the IT spigot, rather than on your own internally hosted infrastructure, reverses decades of IT practices. Cloud computing is now an essential part of the IT mainstream – proven and here to stay. The question has shifted from "Can a cloud enhance my business strategy?" to "Which cloud best fits my business strategy?" to, even more importantly, "What cloud provider should I choose to support my strategy?"

Choosing a cloud provider is no easy task. The industry is still in its infancy, and new players constantly appear, offering a full range of XaaS options – that is, X = S (Software), I (Infrastructure), P (Platform), St (Storage). New industry-use cases are emerging across public, private, hybrid and custom cloud deployments. Performance benchmarks are evolving, as are standards and regulations for compliance and security.

In the end, however, the most important element in choosing a cloud provider can be summed up in one word: you. Very simply, the right cloud provider for your enterprise is the one that can best support your business strategy. In the following report, we have chosen to focus on the ability of five well-known providers to execute identical real world workloads under controlled circumstances. While every application has slightly different requirements, we hope these results offer a valid comparison of lthe leading cloud providers in the market place. Performance isn't everything, but it is certainly a key consideration when it comes time to choose a cloud provider with the resources and focus that are right for you and your company.

TESTING OVERVIEW

We tested NaviSite's NaviCloud Director and its VMWare-based cloud platform, Amazon AWS, Microsoft Azure, RackSpace'sOpenStack cloud platform, and Google Cloud. We used identical benchmarking tests on virtual servers to compare how the cloud platforms stacked up against each other; these tests were designed to replicate real world scenarios to determine how hard each platform could be pushed before it would fail. In testing multitenant, visualized platforms, sharing virtualized resources not only saves costs, but also provides the potential for performance impacts and, as such, there are many differences in the ways that cloud providers can maximinze the costs and benefits of that multitenancy. How many workloads are running on this shared cloud environment? If most of the tenants were retail e-commerce companies and it was Black Friday, we could assume that there would be higher than normal loads in that period. Virtualization helps cloud providers manage these resources, making sure workloads get properly allocated and that performance is minimally impacted. However, when the perfect storm hits, enterprises still need to know how the cloud provider manages capacity, what they are getting, and at what cost.

In our testing, we focused on the CPU, memory and disk, but because of the many other variables, we used additional tools to determine overall performance. For our tests, we set up the workloads and environments to ensure the tests were identical for each provider. We used an Ubuntu version 14:04 image for our tests and performed no optimization of the Apache, Magento 2, MySql or the operating system layer. The underlying resources and installation of the OS were as close to identical as possible; the load-testing mechanism was created in a unitary mode for every destination. Docker containers were used to make every configuration encapsulate the application in an identical fashion for all of the cloud provider configurations. Docker containers wrap up a piece of software in a complete filesystem that contains everything it needs to run: code, runtime, system tools, system libraries – anything you can install on a server. This guarantees that it will always run the same, regardless of the environment. Consistency was essential for our tests, so the configuration of our Magento e-commerce application – including the application itself, database and configuration, and all system llibraries – was identical in all cloud providers. Load-testing and monitoring was also essential for our tests, so we used two well-known industry solutions: New Relic, to measure the CPU, Memory, Disk and application performance and LoadStorm,a fast-growing cloud platform for load-testing to simulate real world user-load scenarios.

THE WORKLOAD

Our testing platform comprised a Magento 2 e-commerce application (Magento is an e-commerce platform used by small, medium and large companies). Olympus, Sierra Nevada, Nike, Easton, Inkcartridges.com, franklin, RosettaStone, Blook, Radio Flyer, Precor, Flor, Fun4kids.com and Oneida are just several of the thousands of companies using Magento to power their e-commerce systems. We used a standard Magento test configuration and built virtual user scripts using LoadStorm to simulate a real world test. Our virtual users browsed, searched and placed items into checkout; each user was on the system for approximately four minutes. At 12 requests per second we could support 10,000 users per day; at 126 requests per second we could support 105,000 users per day – or 3.1 million users per month. (The script is approx 2.5 minutes in length. It goes over seven pages from home until checkout. Loading occurred in nine steps of 50 virtual users, starting with 50 simultaneous users until 500 users. The test maintained the maximum load for 24 minutes; all tests lasted for 60 minutes.)

TESTING METHODOLOGY

The first baseline test was configured with entry level configurations of the CPU, Memory and Disks that were similar among the providers. We ran the tests multiple times over several weeks to ensure each cloud provider had consistent results. Once we were confident with our testing setup, we started a series of 60 minute tests and sent virtual users simultaneously to all providers, starting at 0 and stepping to 500 concurrent users over the 60 minute testing period. After our official baseline test, we increased resources on all cloud providers and reran the same virtual user load-testing and the New Relic monitoring that we set up for our baseline test, to evaluate how much better they performed with these additional resources.

DATA

We captured a large amount of data during our two official live tests. We have 109 pages of documentation for each test and each provider, giving us 1090 pages of summary data that include charts and over 655,350 rows of excel data.

TEST

We decided to **test the ability of these five well-known cloud providers** to see how they performed at a technical level, based on a workload level provided from controlled circumstances.

1. NaviSite's NaviCloud Director and VMWare-based cloud platform
2. Amazon AWS
3. Microsoft Azure
4. RackSpace Cloud and their OpenStack platform
5. Google Cloud

TEST OUTCOME: BASELINE
Azure and NaviCloud were the only two cloud providers that could pass the baseline test without crashing

The baseline test started with 0 virtual users and ramped to 500 concurrent users, and it lasted 60 minutes. **Azure and NaviSite performed the best and were the only cloud providers that completed the entire test.** We had thought all of the providers would have failed using the low baseline configuration; however, the test results showed there were significant performance advantages with Azure and NaviSite. It is important to note that Azure did have a slight hiccup and stopped responding 19 minutes and 250 virtual users into the test, but it recovered in less than 30 seconds and completed the entire test without any other issues; so in this test I would say **NaviSite was the winner.**

However, **Google crashed** 9 minutes and 150 concurrent users into the test, **AWS crashed** 16 mins and 250 concurrent users into the test, and **RackSpace crashed** 28 mins and 400 concurrent users into the test.

TEST OUTCOME: INCREASED RESOURCES
Azure and NaviSite passed the Test with flying colors

After our official baseline test, we increased resources on all cloud providers and re-ran the same virtual user loads to evaluate how much better they performed with these additional resources. The increased resources test was similar to the baseline test, starting with 0 virtual users and ramping to 500 concurrent users. The test length was 60 minutes.

All of the cloud providers completed the Increased Resources Test successfully. Again, **Azure was the strongest cloud provider in all of the test results, and NaviSite was second** in all results, except for the average response time, in which it was .3ms slower than RackSpace.

GRAPHS COMPRISING SUMMARY DATA
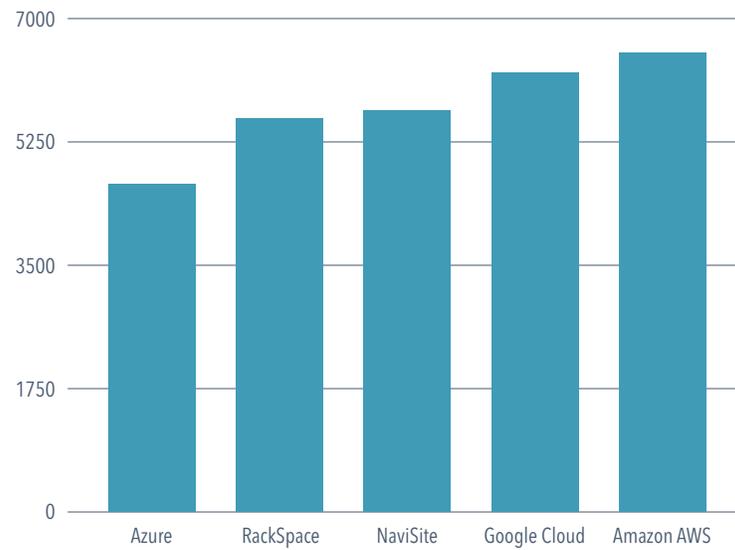## FROM LOADSTORM INCREASED RESOURCES TEST
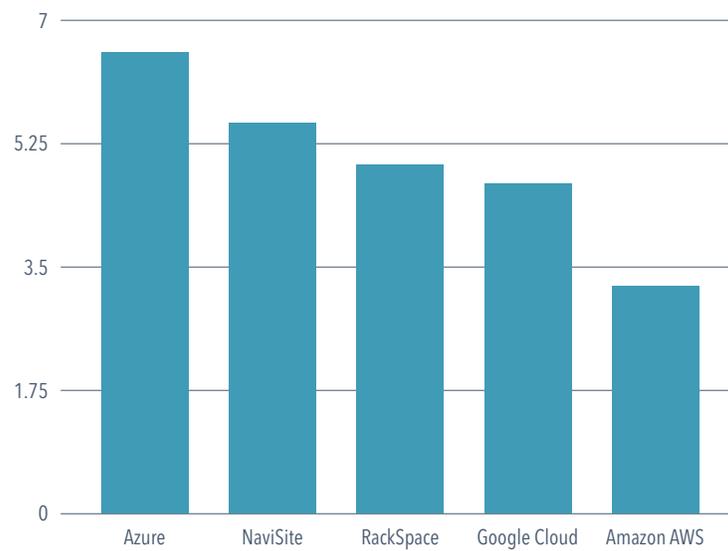
REQUESTS PER SECOND
Higher Numbers Are Better

PEAK RPS
AVERAGE RPS

500

375

250

125

0

Azure   NaviSite   RackSpace   Google Cloud   Amazon AWS
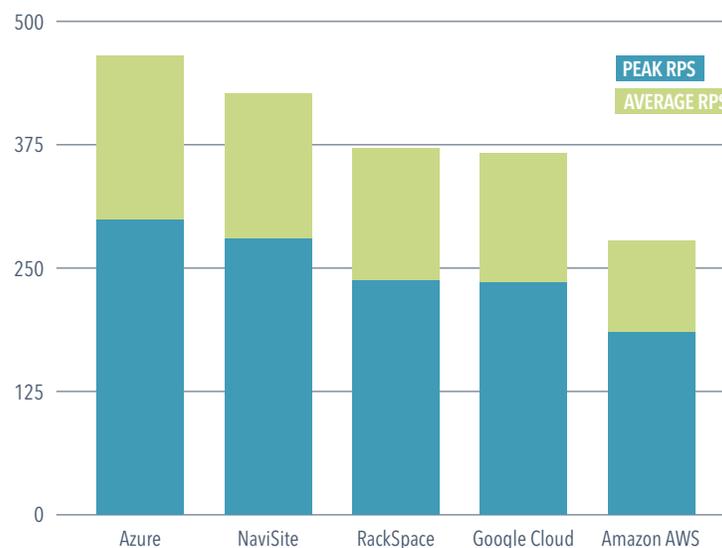
AVERAGE RESPONE TIMES (ms)
Lower Numbers Are Better

| | Azure | RackSpace | NaviSite | Google Cloud | Amazon AWS |

TOTAL DATA TRANSFERRED (bytes in billions)
Higher Numbers Are Better

| | Azure | NaviSite | RackSpace | Google Cloud | Amazon AWS |

THROUGHPUT (in millions)
Higher Numbers Are Better

PEAK THROUGHPUT (kB/s)
AVERAGE THROUGHPUT (kB/s)

| | Azure | NaviSite | RackSpace | Google Cloud | Amazon AWS |

(Y-axis: 7, 5.25, 3.5, 1.75, 0)

ERROR %
Lower Numbers Are Better

| | Azure | RackSpace | NaviSite | Google Cloud | Amazon AWS |

(Y-axis: 40%, 30%, 20%, 10%, 0%)
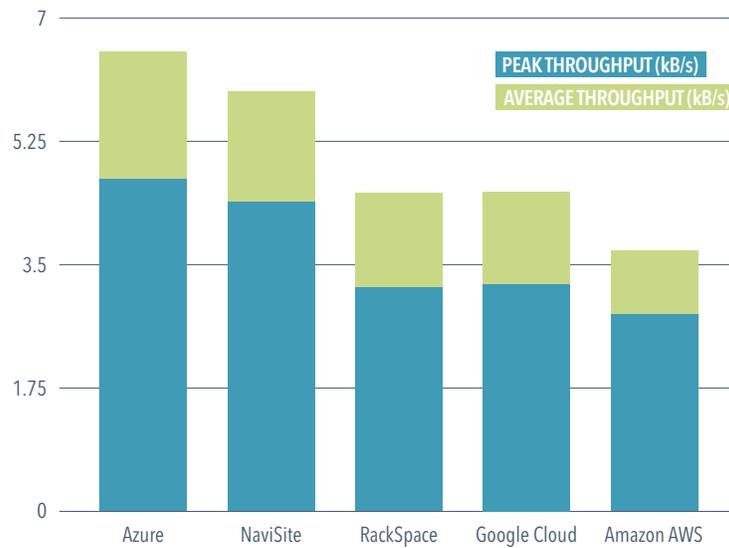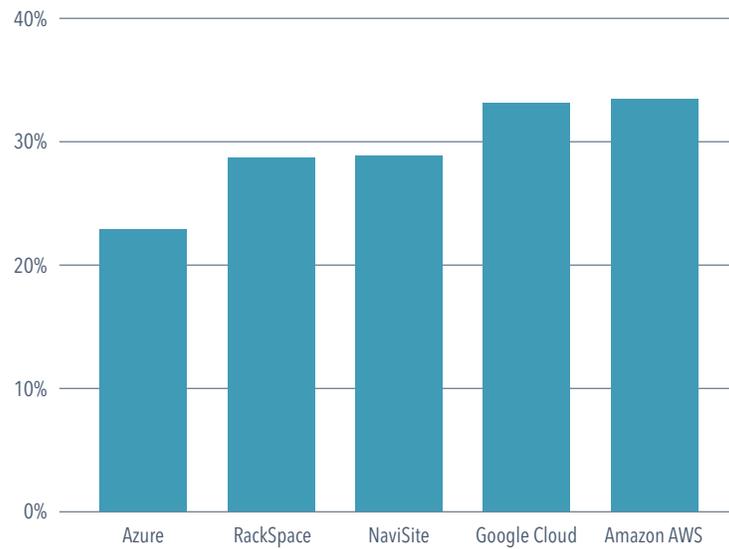
*RackSpace was 2nd only during the 19 minutes before it crashed.

Looking at all the data, all cloud providers completed
the test successfully, but the ranking was clear:

OVERALL PERFORMANCE:

1ST PLACE
Microsoft Azure (Best Overall Performance)

2ND PLACE
NaviSite's NaviCloud Director (Best Value, Performance and Cost)

3RD PLACE
RackSpace Cloud and their OpenStack platform

4TH PLACE
Google Cloud (The one to watch, lowest cost with solid performance)

5TH PLACE
Amazon AWS

For more information on the test results, performance graphs, and configurations used for each provider, please email contact@rickscloud.com and we will share more detailed information.

ABOUT RICK BLAISDELL

Rick Blaisdell, president of Rick's Cloud, is an experienced CTO who creates technical strategies that reduce IT operational costs and improve efficiencies. He has 20 years of experience in developing products and businesses, as well as hi-tech experience with Fortune 500 companies. He develops innovative technology strategies using his particular expertise in cloud computing, Software as a Service, virtualization, software development, cloud architecture, product development, strategic planning, business strategy, project management, business process improvement, technical leadership, large scale web architecture, and enterprise architecture. He can be found at contact@rickscloud.com