

## RESEARCH NOTE

# BENCHMARKING AVAILABILITY AND RELIABILITY IN THE CLOUD: AMAZON WEB SERVICES



### THE BOTTOM LINE

Companies are increasingly moving applications to the public cloud to take advantage of lower initial and ongoing cost and reduce capital expenditures. However, high-profile efforts to spread fear, uncertainty, and doubt about the reliability of cloud infrastructure and availability of applications run in the cloud — particularly on Amazon Web Services (AWS) — have given some decision makers pause. To better understand the actual reliability of cloud infrastructure and the availability of applications run in the cloud as it directly compares to the availability and reliability of running workloads on-premise, Nucleus surveyed 198 AWS customers that reported moving existing workloads from on-premise to the cloud using AWS. Analysts found customers were able to reduce unplanned downtime by 32 percent and reduce planned downtime by 29 percent.

In the past decade, many organizations have moved all or part of their application footprint to the cloud, to take advantage of the inherent economies of scale, lower capital expenditure requirements, and other ROI advantages (Nucleus Research *m108 – Cloud delivers 1.7 times more ROI*, September 2012). Since its launch in 2006, Amazon has grown its cloud business – Amazon Web Services – to serve hundreds of thousands of customers in more than 190 countries, including startups (such as Pinterest, Dropbox and Dropcam) and large enterprise clients (such as Pfizer, General Electric, Merck, Shell and Unilever).

However, Nucleus has also seen resistance to the public cloud based on purported perceptions of low application availability and infrastructure reliability compared to traditional on-premise computing. Naturally, those supporting the on-premise argument have been quick to broadcast reports of highly visible service disruptions of leading cloud vendors such as Google, Salesforce.com, and AWS. However, although data on service disruptions for cloud providers is readily available, comparable hard data is rarely, if ever, available to support anti-cloud claims that on-premise infrastructure delivers more reliability and availability than public clouds.

This raises the natural question: How does the availability and reliability of infrastructure

and applications deployed in public clouds compare to those deployed on-premise? To answer this complex question, Nucleus conducted a benchmark study of 198 AWS customers in August 2013 asking about the largest workload each company had moved from an on-premise deployment to AWS. To ensure a fair comparison, all companies included in the study had:

- Moved an existing on-premise application completely to AWS.
- A monthly spend of at least \$10,000 on AWS.

Nucleus asked the customers for data primarily about the largest workload each company had fully moved from on-premise to AWS, including the type of workload and size of implementation, planned and unplanned downtime experiences before and after AWS, employee resources for application support before and after AWS, and other reasons for moving their application from on-premise to AWS.

## **SURVEY PARTICIPANT PROFILE**

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The 198 AWS customers included in the study included small, medium, and large organizations and was fairly distributed, with 36 percent reporting revenues of less than \$10 million, 25 percent reporting \$10 and \$50 million in revenue, 24 percent reporting between \$50 million and \$1 billion in revenue, and 16 percent reporting more than \$1 billion.

Nucleus found there were four predominant reasons why customers chose to move their applications from on-premise to AWS:

- Redundancy and backup. Customers recognized that they needed more redundancy and reliability than their internal data center could support.
- Provisioning speed. A number of customers cited IT's inability to keep up with the demand for new application infrastructure as a key reason for moving to the cloud.
- Agility. Companies positioned for growth, or those with fairly cyclical computing demands, wanted the flexibility of usage that the cloud supports.
- Lower capital expense. Many customers pointed to limits on capital expense budgets and the need to shift from capital expenditures to operational expenses as a motivation to move to AWS.

Customers were running three major types of application workloads on AWS:

- Fifty percent were running Web, mobile, and social applications
- Twenty-three percent were running business or enterprise applications
- Sixteen percent were running big data or high-performance computing (HPC) applications.

The volume of data stored on AWS was fairly distributed among respondents as well, with the majority of respondents storing between 1 terabyte and 100 terabytes of data. Multiple respondents reported workloads greater than 1 PB.

## KEY FINDINGS

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Nucleus looked at two key measures of application performance:

- Application availability is the amount of overall time the application is expected to be operational, accounting for planned downtime for software upgrades, tuning, maintenance and support
- Infrastructure reliability is the amount of time the application is operational without unexpected outages or downtime due to the underlying infrastructure such as hardware failure, installation, replacement, power outages and other issues

### APPLICATION RELIABILITY

Nucleus found that the average AWS customer was able to increase application availability by 29 percent compared to on-premise deployments. Additionally, when Nucleus asked customers about the number of hours a planned maintenance event required for resolution and found AWS customers were able to reduce the actual time of that maintenance window by 34 percent.

Customers moving workloads from on premise environments to AWS were able to increase application availability by 29 percent and reduce maintenance hours by 34 percent.

Nucleus also found that 53 percent of AWS customers surveyed reported completely eliminating planned downtime requirements after moving workloads from their environment to AWS.

It is important to note that AWS customers often reported that any planned downtime on AWS did not lead to actual service interruptions, since any software or processing instances could simply be migrated to a different domain while the existing domain was being maintained. In contrast, obviously, in on-premise data center environments, companies had to either purchase redundant equipment for support during maintenance windows or schedule downtime during periods where lack of availability would have limited disruption.

### INFRASTRUCTURE RELIABILITY

In addition to less scheduled downtime, Nucleus found AWS customers were able to increase reliability by reducing unplanned downtime. The average AWS customer was able to reduce the unplanned downtime by 32 percent. Additionally, unexpected

downtime events were resolved more quickly in AWS than previously when the applications were running on-premise, enabling customers to reduce the hours devoted to issue resolution by 26 percent.

Customers moving workloads from on premise environments to AWS were able to reduce unplanned downtime by 32 percent and time to resolve unscheduled downtime by 26 percent.

The number of customers reporting incidents of unplanned downtime due to infrastructure failure decreased 64 percent after applications were migrated from on-premise infrastructure to AWS.

### **SUPPORT AND RESOURCES**

Another significant savings area for customers moving to the cloud is often reduced internal IT resources needed to support and repair applications, allowing organizations to focus scarce resources on projects with greater business and customer impact. Nucleus found the same was true of AWS customers. The AWS customers surveyed reported a 67 percent reduction in the number of employee hours needed to support and repair applications after moving workloads from on premise environments to AWS.

AWS customers typically reinvested the saved time in development of new products and services, and creating and supporting new applications.

### **CONCLUSION**

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In addition to the flexibility, economies of scale, and financial benefits of the cloud, Nucleus's benchmarking effort shows that migrating existing workloads from on premise environments to AWS offers customers significant infrastructure reliability and application availability benefits. Although cloud service providers' outages are often highly publicized, private data center outages are not. Our data shows customers can gain significant benefits in availability and reliability simply by moving to a cloud service provider such as AWS.