

A GLANCE THROUGH AWS

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Problem Formulation

- There are times when one is limited by the capabilities of a desktop or laptop.
- Suppose a data scientist has a large dataset that they would like to do some analysis on. The scientist proceeds to try and load the entire dataset into memory and an error occurs.
- The error resulted because the available RAM was exhausted.
- one possible solution could be to upgrade the RAM of the computer. Besides having to make an investment in more RAM, there are limits to how far some computers can be upgraded.
- The potential solution explored is to use a virtual machine in the cloud (AWS) with more RAM and CPU.
- The cloud computing has emerged to overcome the limitations of local / traditional computing.

History of Cloud Computing

- It was a gradual evolution that started in the 1950s with mainframe computing
 - large-scale mainframe became available in corporations and academia, accessible via clients (terminal computers)
- Around 1970, the concept of virtual machines (VMs) was created.
 - Using virtualization software like VMware, it became possible to execute one or more operating systems simultaneously in an isolated environment.
- In the 1990s, telecommunications companies started offering virtualized private network connections and the term Cloud was already in commercial use in the early 1990s by referring to the largest ATM networks.
- By the turn of the 21st century, cloud computing solutions had started to appear on the market
- One of the first providers of the cloud computing platforms was Salesforce.com, which in the year 1999 introduced the concept of enterprise applications by delivering it from a simple website.
- The next provider was Amazon where it launched the Amazon Web Service in the year 2002.
- Then Google Docs came in the year 2006 which brought the cloud computing to the forefront of the public consciousness.
- In 2009 the Microsoft's entry into cloud computing with the launch of Windows Azure, becoming the major players jumping on to cloud computing

Cloud - On the basis of type of services offered

- Infrastructure as a Service (IaaS): Using the principles of cloud computing, services related to hardware are offered. These include storage services or virtual servers.
- Platform as a Service (PaaS): Development platform on the cloud is offered by them.
 - Eg: AWS Elastic Beanstalk
- Software as a Service (SaaS): Complete software services are offered on the cloud. Software application can be accessed by the users hosted by the cloud vendor on the basis of paying as per use.
 - Eg: workmail, workdoc etc

Compute

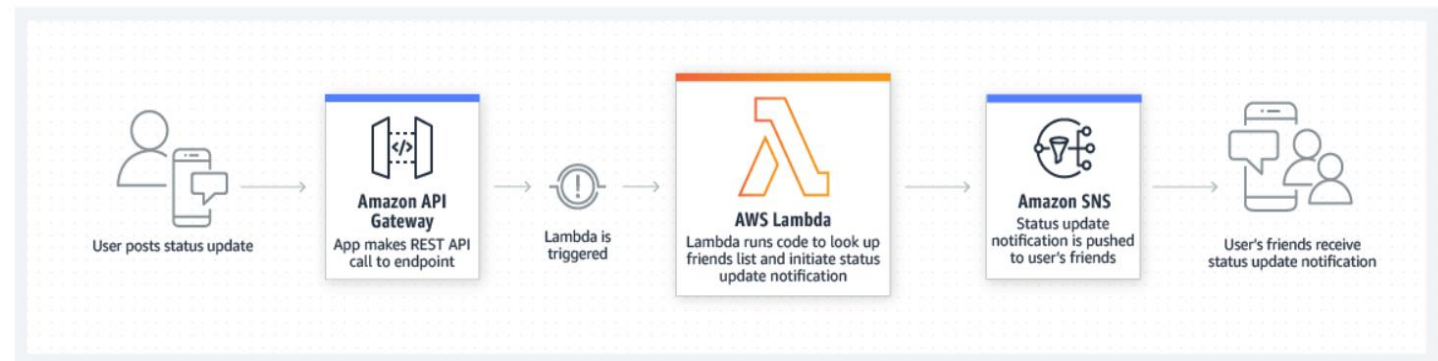
- Compute refers to applications and workloads that require a great deal of computation, necessitating sufficient resources to handle these computation demands in an efficient manner.
- The term compute (Amazon EC2) is frequently encountered in the server (AWS Lambda) and data center (AWS Batch)
- Jobs that can run without end user interaction, or can be scheduled to run as resources permit, are called batch jobs. Batch processing is for those frequently used programs that can be executed with minimal human interaction
- Serverless computing is a cloud-computing execution model in which the cloud provider acts as the server

Amazon EC2 Profile



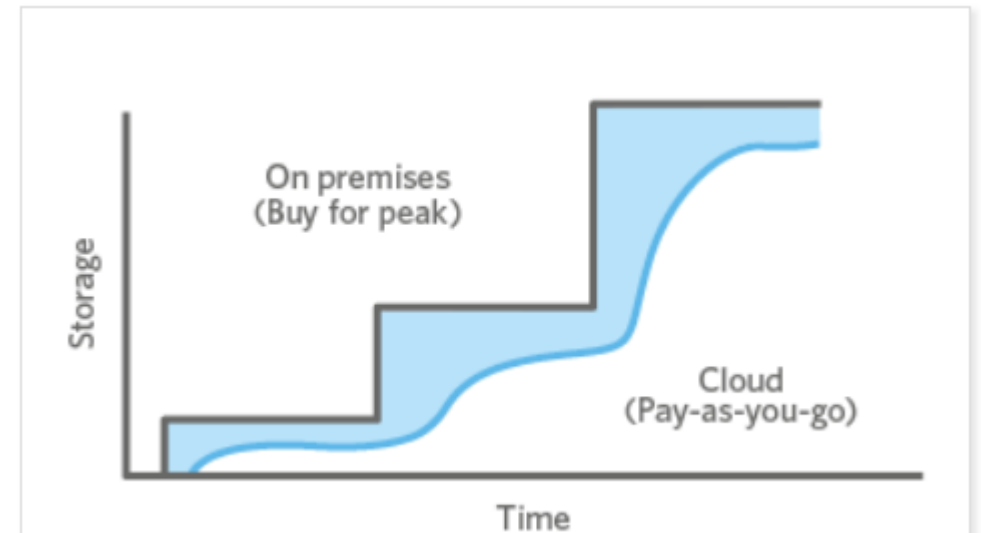
- 1.7 GHz x86 processor
- 1.7 GB of RAM
- 160 GB disk
- 250 Mb/second network
- Your own fully-controllable firewall

Mobile Backends



Storage

- Object Storage
 - Amazon Simple Storage Service (Amazon S3) is an object storage service
 - customers of all sizes and industries can use it to store and protect any amount of data for a range of use cases, such as websites, mobile applications, backup and restore, archive, enterprise applications, IoT devices, and big data analytics
- File Storage
 - Some applications need to access shared files and require a file system.
 - Amazon Elastic File System (Amazon EFS) provides a simple, scalable, elastic file system for Linux-based workloads
- Block Storage
 - Other enterprise applications like databases or ERP systems often require dedicated, low latency storage for each host.
 - Amazon Elastic Block Store (EBS) is a Block-based cloud storage solutions



Data Bases

- Relational Database
 - Amazon Relational Database Service (Amazon RDS)
- No SQL database
 - Key-Value :- Amazon DynamoDB
 - Document :- DynamoDB and MongoDB
 - Graph :- Amazon Neptune
 - In-memory :- Amazon ElastiCache
 - Search :- Amazon Elasticsearch Service (Amazon ES)
- Data Warehousing
 - Amazon Redshift
- Data Migration Service
 - AWS Database Migration Service helps you migrate databases to AWS quickly and securely.
 - homogenous migrations such as Oracle to Oracle
 - heterogeneous migrations between different database platforms, such as Oracle or Microsoft SQL Server to Amazon Aurora.

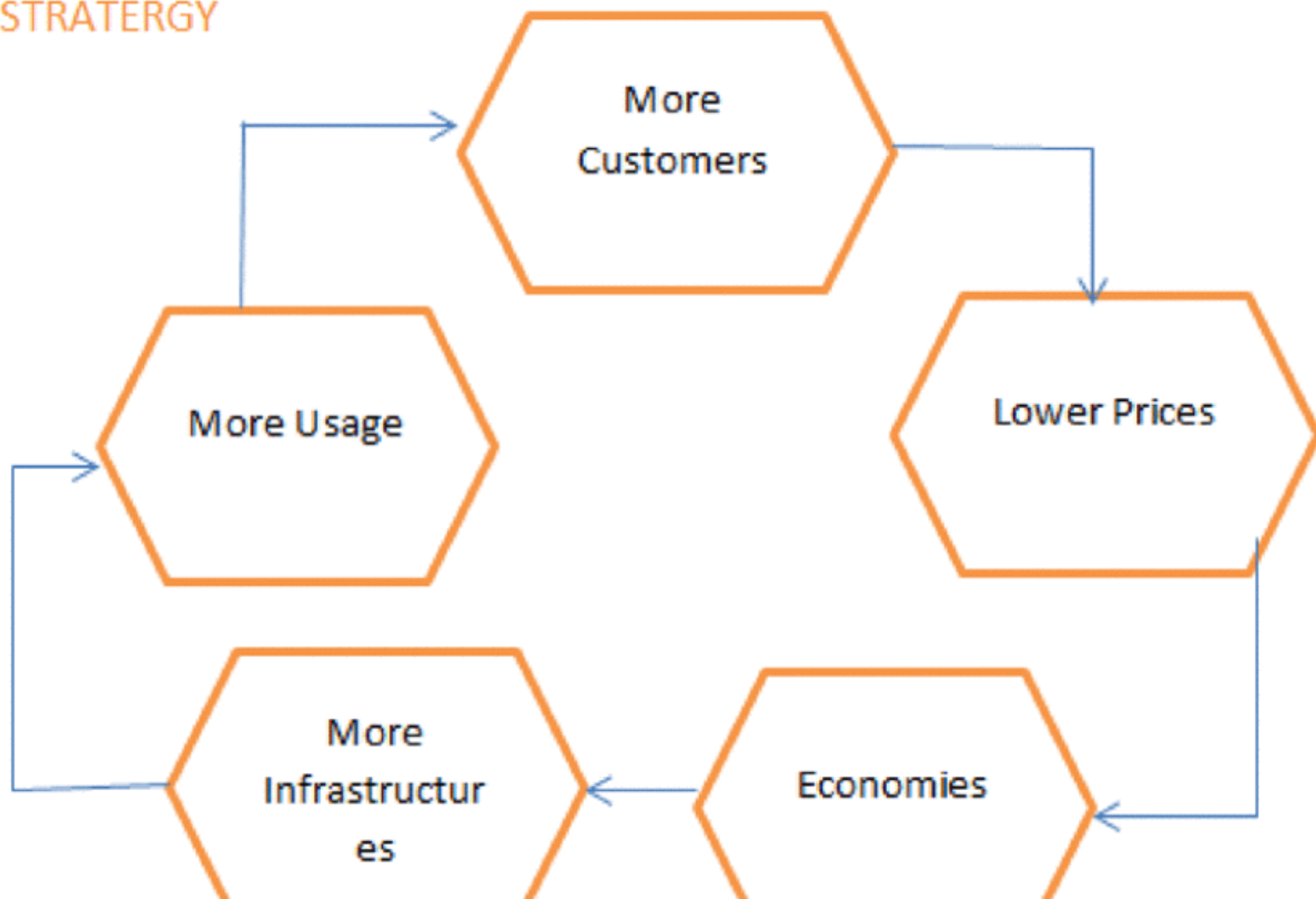
Business Productivity

- Alexa
 - Alexa is a cloud based voice service
- Amazon Chime
 - Amazon Chime is a communications service that transforms online meetings with a secure, easy-to-use application
 - You can use Amazon Chime for online meetings, video conferencing, calls, chat, and to share content, both inside and outside your organization.
- Amazon WorkDocs
 - is a fully managed, secure enterprise storage and sharing service
 - Users can comment on files, send them to others for feedback, and upload new versions without having to resort to emailing multiple versions of their files as attachments.
- Amazon WorkMail
 - is a secure, managed business email and calendar service with support for existing desktop and mobile email client applications.

Network Security

- Secure Network Architecture
- Secure Access Points
- Transmission Protection
- Amazon Corporate Segregation
- Fault Tolerant Design
- Network monitoring and Protection

AMAZON'S STRATEGY



Netflix Case Study

- Did you know that the company Blockbuster LLC had the opportunity to buy Netflix for \$50 million in 2000? Did you know that Netflix made \$8.83 billion revenue in 2016? One would wonder how come a company which was worth \$50 million in 2000 is now worth around \$87 billion. You would guess it had a continual surprising growth over 17 years straight.

But did you know that Netflix was a victim of a major database corruption in 2008?

Netflix Case Study contd...

- Online content provider Netflix can support seamless global service by using Amazon Web Services (AWS).
- AWS enables Netflix to quickly deploy thousands of servers and terabytes of storage within minutes.
- Users can stream Netflix shows and movies from anywhere in the world, including on the web, on tablets, or on mobile devices such as iPhones.
- Migration to AWS started at 2008, completed 2016
- No more data centers

Netflix's Growth and migration

- In 2008, Netflix was running relational databases in its own data centres when disaster struck. A data centre failure shut the entire service down and stopped DVD shipments for three days.
- The company's owners faced a choice: turn Netflix into a world-class data centre operations company or move the service to the public cloud.
- Netflix was growing fast. The thousands of videos and tens of millions of customers was already generating an enormous quantity of data. The company would struggle to rack the servers in their own data centres fast enough to handle the ever-growing volumes, but the cloud would let them add thousands of virtual servers and petabytes of storage within minutes.
- A migration to the cloud was the clear choice. They soon became a poster child customer for Amazon Web Services (AWS), choosing the company for its scale and broad set of services and features.
- The move would require a complete rearchitecting of the company's traditional infrastructure though. They could have forklifted all of their monolithic enterprise systems out of the data centre and dropped them into AWS, but this would only have brought all of their old data centre problems to the cloud. Instead, they chose to rebuild the Netflix technology in AWS and fundamentally change the way that the company operated.

Netflix's Growth and migration contd..

- This made the infrastructure much more agile by breaking aspects of the service up into multiple microservice, managed by their own small teams who understood how their service worked and interacted with other systems.
- This provides clear, specific insights that make it easier to change the service, which leads to smaller and faster deployments. It also allows them to isolate services to understand the various performance profiles, patterns and securities in each microservice, and move away from any individual piece that's causing a problem.
- In its 20-year history, Netflix has grown from a DVD rental website with 30 employees to a global streaming service with over 5,000 titles, 130 million subscribers and \$11 billion annual revenue that has drastically transformed the entertainment industry.
- At the Consumer Electronics Show in January 2016, Netflix CEO Reed Hastings launched the service in more than 130 countries.

Netflix's Benefit

- It took Netflix seven years to complete the migration to the cloud. In 2016, the last remaining data centres used by the streaming service were shut down. In its place was a new cloud infrastructure running all of Netflix's computing and storage needs, from customer information to recommendation algorithms.
- The migration improved Netflix's scalability and service availability and the velocity by which the company could release new content, features, interfaces and interactions. It also freed up the capacity of engineers, cut the costs of streaming, drastically improved availability and added the experience and expertise of AWS.

Limitation of Cloud computing

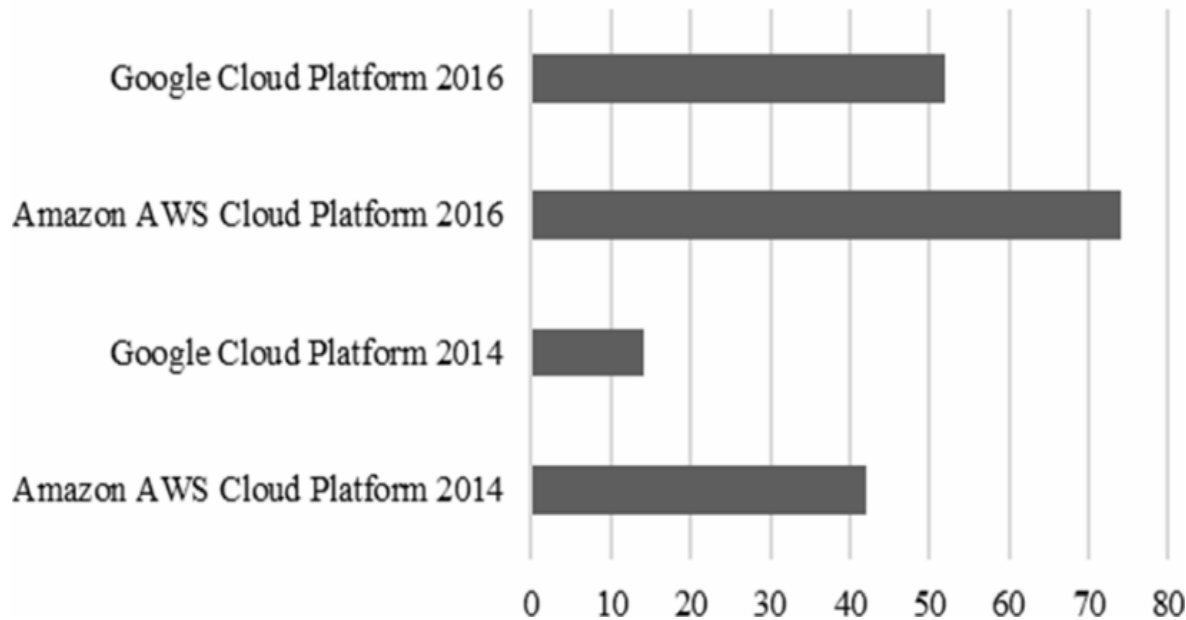
- **Multicasting Services**

- Multicast is a method of sending Internet Protocol (IP) datagrams to a group of interested receivers in a single transmission
- IP broadcasting and multicasting in the cloud is not going to work.
- The documentations of AWS and GCP state that IP broadcast and multicast are not supported.

Comparison – AWS vs GCP

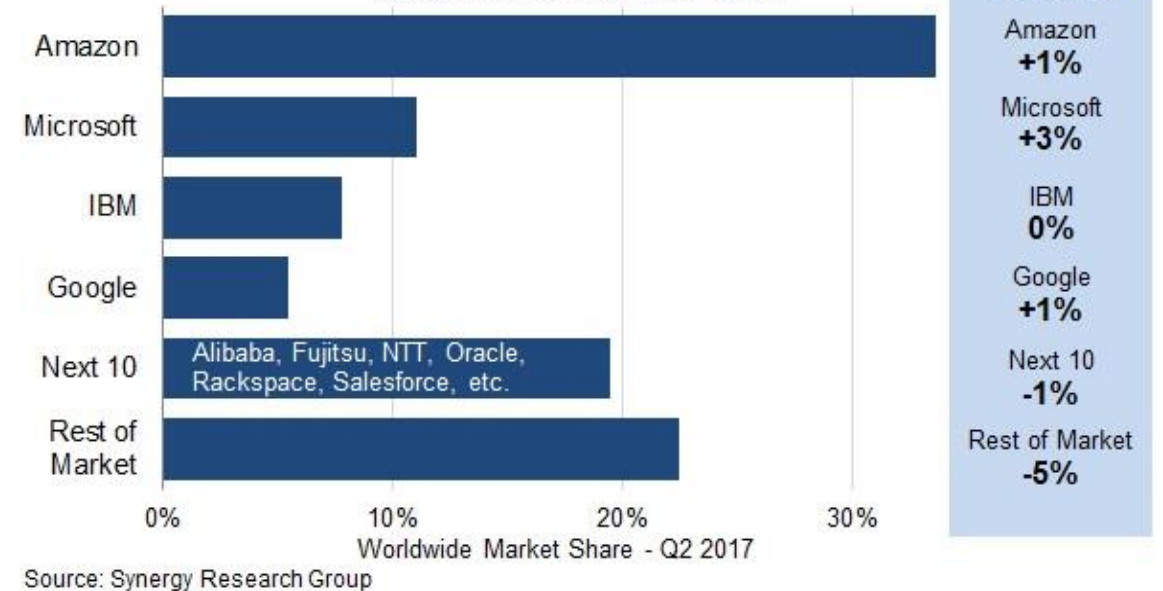
Services Offered

NUMBER OF OFFERED SERVICES BY CLOUD PLATFORMS



Market share

Cloud Infrastructure Services - Q2 2017
Market Share & Revenue Growth
(IaaS, PaaS, Hosted Private Cloud)



Conclusion

- Cloud computing has become a part of everyday life.
- Trade capital expense for variable expense – Instead of having to invest heavily in data centers and servers before you know how you're going to use them, you can pay only when you consume computing resources, and pay only for how much you consume.
- Benefit from massive economies of scale –can achieve a lower variable cost than you can get on your own. Because usage from hundreds of thousands of customers is aggregated in the cloud, providers such as AWS can achieve higher economies of scale, which translates into lower pay as-you-go prices.
- Increase speed and agility –new IT resources are only a click away. This results in a dramatic increase in agility for the organization, since the cost and time it takes to experiment and develop is significantly lower.
- Stop guessing about capacity
- Stop spending money running and maintaining data centers
- Go global in minutes

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Thank You!