STRATOSCALE

THE CIO'S GUIDE TO COMPETING IN A REAL-TIME, ALWAYS-ON WORLD

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CONTENT

INTRODUCTION

The demands on IT infrastructure are growing, driven by the exponential growth in mission-critical data generated by businesses on a daily basis. Business software applications no longer just support businesses — they are now integral to core business processes and strategic planning. The big data that they generate are used to track metrics, build and validate predictive models, personalize real-time user experiences, and mine for deep business insights.

It is clear, therefore, that the standard enterprise data center operational model – with capacity planning once every two quarters for the next six months and budget approvals once a year – can no longer meet the dynamic needs of 21st century businesses. Today's companies know that one of the keys to success is creating a data-centric business culture that can and does move fast.

In Gartner's 2017 CIO Agenda Report, IT leaders are urged to start thinking in terms of a digital ecosystem, which they define as "an interdependent group of actors (enterprises, people, things) sharing standardized digital platforms to achieve a mutually beneficial purpose." The report stresses the need for IT departments to adopt an external mindset; specifically, to build an infrastructure of interoperability that extends beyond their in-house resources.

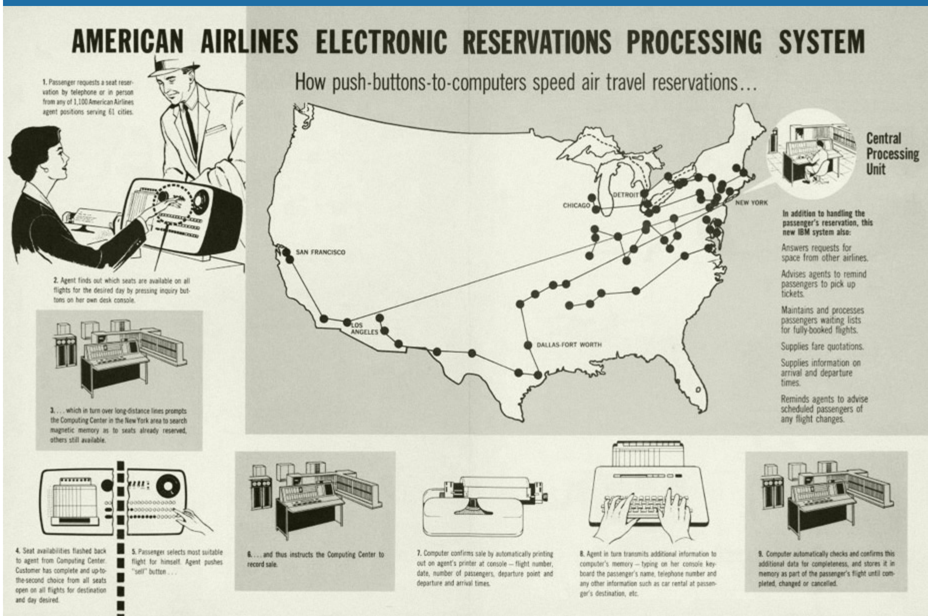
The 2,600 CIOs surveyed for the report represent approximately $292 billion in IT spending. When they were asked to indicate the top three IT technology areas on which their company or business unit would be spending the most in the coming year, cloud services and solutions were close to the top of the list — second only to business intelligence/analytics. The trend was even more prominent among the top performers.

This white paper explores how cloud-based virtual data centers can play a major role in helping IT departments provide the scalability and agility that businesses need to compete successfully in our real-time, always-on world.

THE 'OLD' ENTERPRISE IT

THE EMERGENCE OF THE CENTRALIZED IT DEPARTMENT

In 1960, American Airlines, working with IBM, launched the Sabre ® passenger reservations system, automating one of its key business areas. The idea of a data processing system that could create and manage airline seat reservations and instantly make that data available electronically to any agent at any location opened the door to enterprise-scale data centers.[1]



Source: http://siliconangle.com

Over the next three decades, in parallel with the shift from mainframes to servers, the centralized IT department evolved. Typically, a number of specialized teams were responsible for meeting all the software, storage, backup, and networking needs of the organization:

- Infrastructure - virtualization, email, directory services, databases
- Network - physical network infrastructure, security, firewalls
- Storage - both native and virtual
- Applications - development, deployment, customer service

A TEAM MADE OF SILOS

These IT specialist teams, however, typically work in separate silos, creating an organizational structure that is expensive to scale and prone to inter-team miscommunication and poor coordination. In order to overcome these organizational challenges and facilitate IT best practices, standards such as ITIL (Information Technology Infrastructure Library) have evolved that focus on aligning IT services with the needs of business.

However, IT is traditionally perceived as slow to react to business needs. Change management, for example, is cumbersome: raising and recording change requests, assessing impact (cost-benefit, risk assessment), developing the business case and obtaining approval, plus, managing and coordinating change implementation.

In addition, traditional data centers are heavily bound by physical limitations, making expansion a major undertaking. Storage expansion, for example, requires more hardware, and filling the same square footage with additional hardware means it will be more difficult to maintain, such as providing adequate cooling. Similarly, co-locating multiple data centers places a heavy burden on the networking layer.

THE PUBLIC CLOUD REVOLUTION

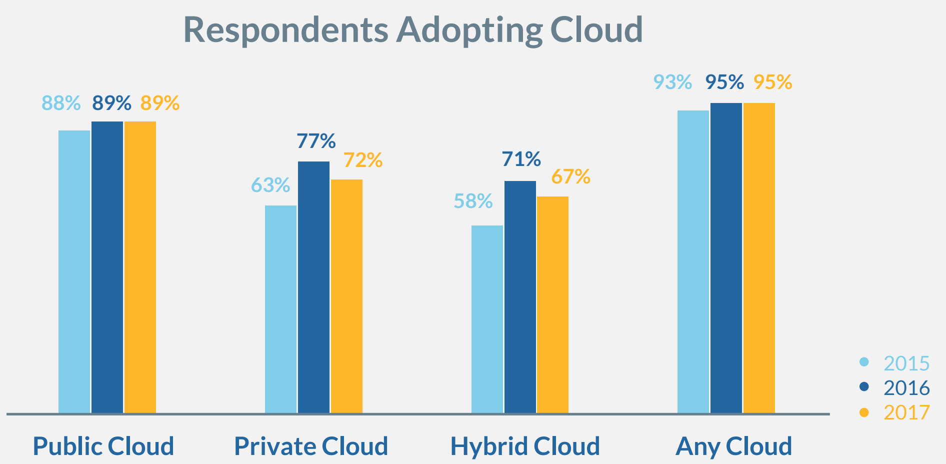
With the growth in internet bandwidth, in the 1990s, cloud computing started to become a reality. Client-server architectures morphed into mass consumer applications such as webmail, with the web browser becoming the thinnest client imaginable and all the data being processed and stored by remote computing resources in multiple locations. The launch of Salesforce.com in 1999 was an important cloud computing milestone, pioneering the concept of delivering web-based enterprise applications online and as-a-service. [2]

But the cloud computing paradigm shift for IT really began with Amazon Web Services' launch in March 2006 of S3 (Simple Storage Service). Amazon (at the time, about as far as you can get from a traditional enterprise IT player) introduced a fundamental new way of delivering infrastructure services and, in so doing, set the stage for a new era of computing.

Suddenly provisioning storage was about two orders of magnitude less expensive than paying for multi-data center redundant storage. And all that was required was a credit card -- no proposal for financial approval, no RFP, no vendor selection process, no vendor negotiation, no data center space needed be found. Individuals or companies could just sign up and start working. Storage came first, but compute was to follow shortly and, in 2010, Netflix was the first to publicly make the decision to go 100% cloud.[3]

CLOUD IS THE NEW ENTERPRISE NORM

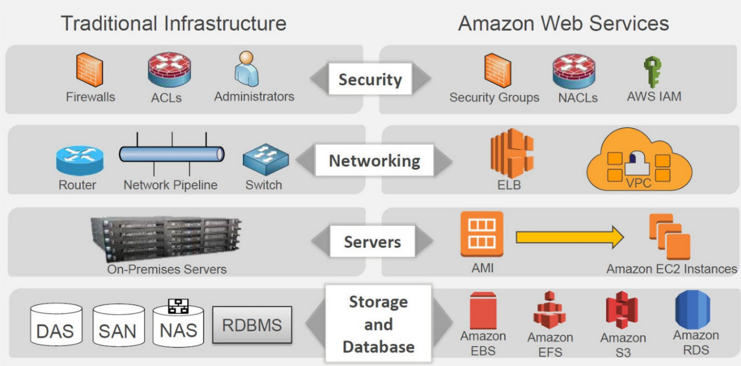
A survey conducted January 2017[5] among 1,002 IT professionals shows us clearly that the cloud – in all its different flavors – has been adopted almost universally by enterprises of all sizes:



Source: RightScale 2017 State of the Cloud Report

There is a growing list of prominent companies that are 100% cloud-based, including companies in highly regulated industries such as financial services. One of the largest financial firms in the world, Capital One, revealed their migration to Amazon Web Services in October 2015. Other enterprise-level customers making a similar journey include Adobe, Airbnb, BMW Auto, General Electric, Harvard Medical School, Outback Steakhouse, SoundCloud, and countless others.[9]

Today AWS is still the dominant player in the public cloud market, with other major players including Microsoft (Azure), Google (Cloud Platform), IBM (SoftLayer), VMware, Rackspace, etc. All layers of the IT stack are covered:



Source: https://www.infoq.com

- **Infrastructure-as-a-Service** delivers on-demand virtual machines, networks, and storage. (The following diagram shows how traditional IT infrastructures map to public cloud services, using AWS as an example.)
- **Platform-as-a-Service** delivers on-demand databases, caches, workflow engines, and application containers
- **Software-as-a-Service** delivers on-demand business functionality

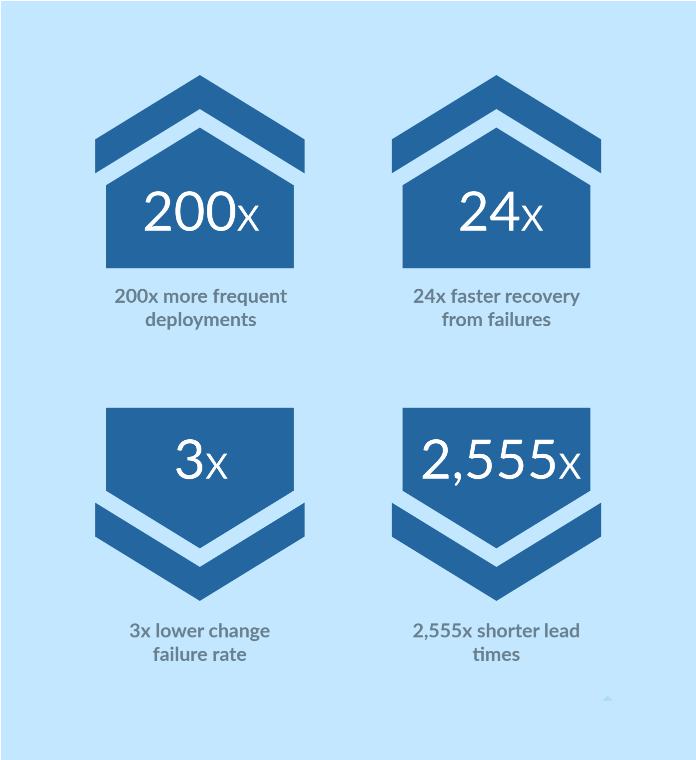
At every level, providers allow customers to consume services based on demand, pay for them based on consumption, and offload responsibility for their management to the provider. [4]

CLOUD COMPUTING AND AGILITY

The 21st-century business environment is forcing companies to shift their focus from stability and efficiency to agility and innovation. Thus, the other side of the cloud computing coin is a fundamental change in how features and applications are developed and deployed. Development and operations silos are being broken down in order to shorten work cycles, increase delivery frequency, and adopt an attitude of continual adaptation and experimentation.[4]

Welcome to the world of DevOps, in which development and operations are combined so that configuration of the infrastructure is part and parcel of the code itself. Instead of doing development on one machine and deployment somewhere else, the machine becomes part of the application.[6] According to the 2016 State of DevOps survey conducted among close to 5,000 IT professionals around the globe, organizations that have adopted a DevOps culture and toolset report dramatically more frequent deployments and faster failure recoveries, as well as remarkably lower change failure rates and shorter lead times.

Not surprisingly, then, many cloud providers support their customers' DevOps needs, offering a set of platform-as-a-service tools that are fine-tuned to their cloud platform. Cloud computing and DevOps are interlocking parts of a strategy for transforming IT into a business adaptability enabler. "If cloud is an instrument, then DevOps is the musician that plays it."[4]



TRUSTED ADVISOR

Most of our daily activities, including core business processes, are now totally dependent on digital technology. With this level of dependence, IT cannot afford to fail at providing a compelling platform for today's adaptive business. Customers (internal and external) expect seamless quality across all three dimensions: functionality, operability, and deliverability. With cloud services, IT departments can shift the focus from commodity work to adding real, business-specific value.[4]

Public clouds may seem to be pulling businesses away from internal IT departments. But in fact cloud computing and DevOps offer IT departments an opportunity for transformation -- moving from being perceived as inhibiting business growth to becoming a partner that plays a critical role in understanding business needs and enhancing business deliverables. IT can and should advise on:

DISCOVERY:

Understanding business needs

ANALYSIS:

Why can't we fulfill those needs?
Why are we losing our users' trust?
How can we close the gaps?
Where are we slow?

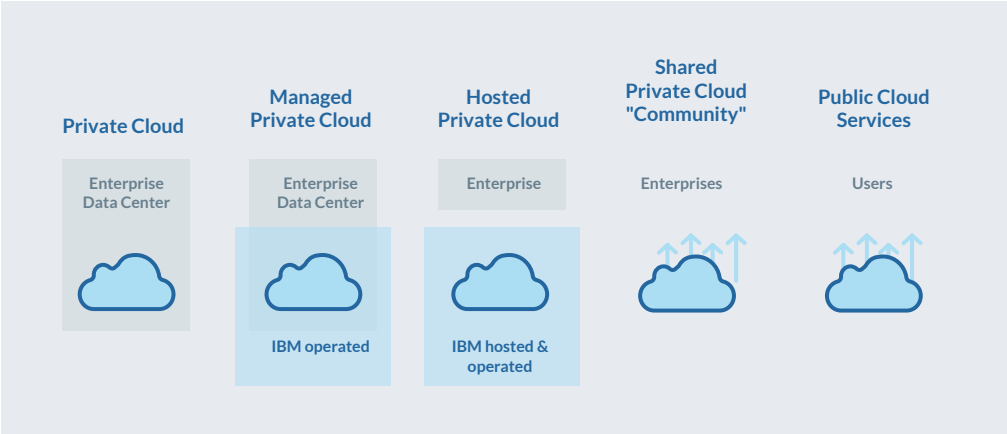
IMPLEMENTATION:

What's the first step towards getting from here to there?
In general, how can we make sure that IT is agile enough to keep up?

REAL-LIFE USE CASE: ENABLING A HYBRID CLOUD

BACKGROUND

Cloud deployments fall along a spectrum, from a private cloud contained solely within an enterprise data center to public cloud services that are available to any and all users.



A hybrid cloud refers to any number of combinations of cloud deployments: public cloud service + on-premise private cloud on-premises; multi-cloud provided by different providers; or even a combination of a cloud and traditional IT. In fact, the most frequent use case of a hybrid cloud setup is existing systems on a traditional IT infrastructure combined with a public cloud service.[7]

The main scenarios in which hybrid cloud deployment adds business value[8]:

- Capacity expansion without Opex: When the incremental cost of adding on-premises capacity is high, a hybrid approach is a viable alternative
- Dev/test: Dev/test workloads are highly elastic. Placing these workloads on a hosted cloud allows you to scale capacity to match demand and pay only for what is used. Another benefit is the ability to tailor the infrastructure to the workload
- Planned temporary/seasonal need: Similar to the elasticity benefits that hybrid deployment brings to the dev/test scenario, many businesses have known bursts of capacity requirements that are temporary or seasonal
- Network optimization: Hosted cloud provides the opportunity to shift the heavy lifting of the network off-premises and, in the process, improve the availability, scalability and reliability of the connection by leveraging the provider's network investment. This scenario also supports the ability to expand seamlessly into multiple geographic markets

RAPID DEVELOPMENT ENVIRONMENT

The following is a real-life scenario of how an IT department can initiate, lead, and manage a hybrid cloud deployment in order to support the business' dynamic IT requirements.

The R&D department has approached IT with a time-sensitive project that has just been closed with a customer. Traditionally, IT has been really slow to react to development needs; so much so that engineering groups have gone around IT and developed their own Shadow IT with public cloud providers. Unfortunately, however, there have been some data leaks as a result and resources have been compromised due to developers leaving resources unprotected in the public cloud. After conducting a number of lengthy exploratory meetings, IT and the engineering group have agreed upon and produced a set of requirements.

REQUIREMENTS

R1 - Engineers must be completely self-sufficient and able to deploy their own environments without having to rely on IT.
R2 - Each environment will require 50 virtual machines.
R3 - Each developer will be allocated his or her own dedicated environment (there are 200 developers on the team). A dedicated network environment is not required.
R4 - A developer will deploy his or her environment on average 2-3 times a day. This will be the responsibility of the developers themselves.
R5 - Lead time. Developers need to be able to start deploying in 2 weeks from today.
R6 - Maximum length of the project: 6 months.
R7 - Development environments must be accessible from local resources on the corporate LAN. Traffic will be initiated from LAN to the Development Environment and not in reverse.
R8 - Development environments must comply with corporate OPSEC policies and be protected from outside threats.
R9 - Infrastructure (user management, network, connectivity, security) will not be the responsibility of the developers.

CHALLENGES

After receiving the requirements from R&D, the IT department has come up with the following points:

1. IT does not have the capability to provide a self-service environment for users at the current time. Currently the lead time for a request for a virtual machine is 12-24 hours from the time the request is logged. Implementing a self-service solution in-house would take at least 9-12 months.
2. The total amount of resources needed for this project would require an immediate growth of 200% of all central IT resources (compute, storage, network).
3. The lead time for procuring the needed expansion is 4-6 months (with proper budget approval and financial processes).
4. It is not clear how the the additional hardware would be used after the project is complete.

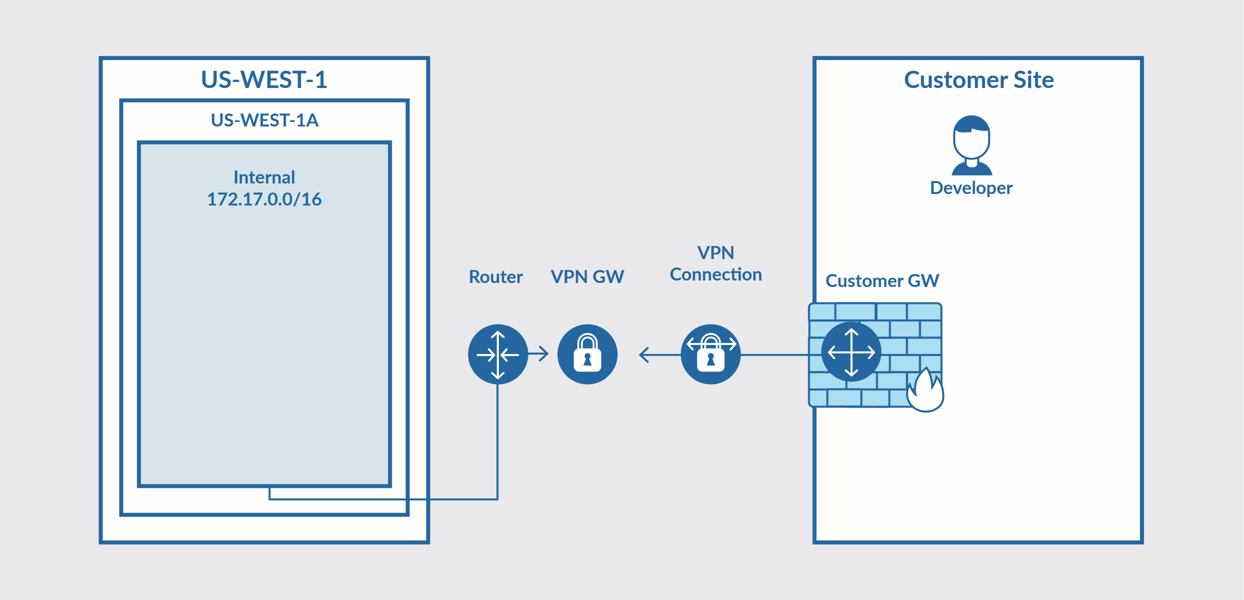
CONCLUSIONS

After a number of intense sessions and deliberations, the IT team has agreed on the following:

1. It is not financially viable to host this project in-house due to the challenges outlined above.
2. The IT team has significant cloud expertise in-house and the correct professional relationship with a major cloud provider (AWS) to ensure the success of the project.
3. The resources can be secured per company policies by extending the corporate network to a VPC in AWS -- connected and secured through the corporate firewall via VPN.
4. IT can manage the underlying infrastructure, allowing the developers to focus on creating the software.

IMPLEMENTATION

The project was fast tracked through all steps of the corporate approval process, with the following plan for execution.



1. Create a VPC in AWS us-west-1 region within the next two weeks. This will satisfy **R4**.
2. The network that will be used in the VPC will be in the 172.17.0.0/16 range, which is not currently in use in the corporate network. This will satisfy the requirements **R2, R3** and part of **R9**.
3. A VPN connection will be set up between the VPC and the corporate network. Appropriate firewall rules will ensure that all traffic from the corporate network will be allowed to the VPC, and only return traffic initiated from the corporate network to the cloud will be allowed back into the network. This will satisfy **R7** and **R8**.
4. All traffic will be routed directly through the VPN connection and corporate firewall. No traffic will be allowed out directly to the internet. This will satisfy **R8**.

5. IT will provision a unique user for each developer and provide them with just enough rights and permissions to provision and configure instances on their own. This will satisfy **R1** and part of **R9**.
6. IT will prepare a hardened AMI image that will be used for all deployments. All users will only be allowed to deploy from this image. This will be enforced with an IAM role. This will satisfy **R4**.
7. All the instances will be decommissioned at the end of the project. This will satisfy **R6**.

USE CASE SUMMARY AND TAKEAWAYS

The IT department of this company identified a real need that existed in the organization. They were not able to fulfill the business requirements for this project for a number of reasons: the current technology was not available in-house and implementing such a model would take too long — way beyond the time constraints presented by the teams.

By acting as a trusted advisor to R&D, they were able not only to provide a solution that enabled the development teams to achieve what they wanted, but also to make sure that corporate regulations were met and adhered to. Even though IT does not actually own the physical infrastructure for the project, they provided the expertise to help the development teams focus on the important matters at hand and not have to worry about areas of responsibility about which they have no knowledge and no time to learn about.

The other issue was cost. If IT purchased all the equipment required it would have incurred a huge CapEx spend for the company. It also would have left the company with a large amount of equipment they would have no real need for after 6 months. By making use of the cloud, the underlying infrastructure was managed and used for only the time needed. It became an operating expenditure without having to commit resources and funds for an extended period of time.

EXECUTIVE SUMMARY

At the speed that technology and business practices are changing today – and which will become even more dynamic in the future – a traditional enterprise IT solution, with its inherently finite resources, can only take a company to a certain level.

In addition, many enterprise IT departments suffer from a silo-ed organizational structure that makes the process long, arduous and expensive to deploy and maintain business-critical applications.

Cloud providers such as AWS, Google, and Azure provide a much larger scale, and support the agile development practices, such as DevOps, that allow IT to become business enablers rather than business constrainers. Although their resources are not infinite either, it will take a lot longer to hit a resource limit vs. your own data center.

Hybrid deployments, which combine traditional IT resources with cloud resources, offer the best of both worlds.

In a 2015 survey conducted by Dell and Penn Schoen Berland among 1,050 IT decision-makers around the globe, the enterprise trend towards hybrid cloud solutions is overwhelming:

- 9 out of 10 believe that hybrid cloud is essential to the future-ready enterprise
- 89% say that the ability to burst to public cloud is critical when demand increases
- 62% say that hybrid cloud usage will increase (vs. 17% for on-site data centers and 16% for public cloud)
- 47% say that hybrid cloud will be the optimum solution vs. on-site data centers or public cloud.

According to IDC, the public cloud computing market will double over the next four years, climbing from around $70 billion in 2015 to more than $141 billion by 2019. There is a growing ecosystem of vendors and consultants who work closely with their enterprise customers to identify the gaps that can best be closed by cloud deployments and **help them navigate their journey into the hybrid cloud.**

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ABOUT STRATOSCALE SYMPHONY

Stratoscale is the cloud infrastructure company, providing comprehensive cloud infrastructure software solutions for service providers, enterprise IT and development teams. The company's comprehensive cloud data center software, Stratoscale Symphony, can be deployed in minutes on commodity x86 servers, providing an Amazon Web Services (AWS) experience with the ability to augment aging VMware infrastructure. Stratoscale was named a "Cool Vendor in Servers and Virtualization" by Gartner and is backed by over $70M from leading investors including: Battery Ventures, Bessemer Venture Partners, Cisco, Intel, Qualcomm Ventures, SanDisk and Leslie Ventures.

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