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New Cisco Data Center Innovations

ENABLE BUSINESSES
to Be HYBRID CLOUD–READY

WHITE PAPER

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ABOUT THE AUTHOR

Zeus Kerravala is the founder and principal analyst with ZK Research. Kerravala provides tactical advice and strategic guidance to help his clients in both the current business climate and the long term. He delivers research and insight to the following constituents: end-user IT and network managers; vendors of IT hardware, software and services; and members of the financial community looking to invest in the companies that he covers.

INTRODUCTION: THE CLOUD ERA HAS ARRIVED

Cloud computing has been on the road map of most CIOs for the better part of the last decade. The cloud is the next major evolutionary step for computing and will redefine IT. Decades ago, the mainframe era gave rise to computing as a business resource. This phase lasted about 20 years and led to the client/server era. Then organizations began to locate more employees in branch offices, giving rise to Internet computing. Now the industry finds itself in the midst of another major transformation—the shift to cloud computing.

The initial wave of cloud computing began as a result of organizations purchasing applications using a software-as-a-service (SaaS) model; but over the past few years, platform-as-a-service (PaaS) and infrastructure-as-a-service (IaaS) solutions have seen rapid growth as well. ZK Research estimates that the size of the global cloud market will exceed US$134 billion globally by 2020 (Exhibit 1).

The growth of the cloud is linked to the digitization plans underway today. Digital organizations need an agile IT foundation to rapidly build and deploy new services, making the cloud the right computing model for today's business environment.

Each major compute transition dramatically altered IT, and the cloud will be no different. As businesses shift to a cloud-first model, IT will be impacted in the following ways (Exhibit 2):
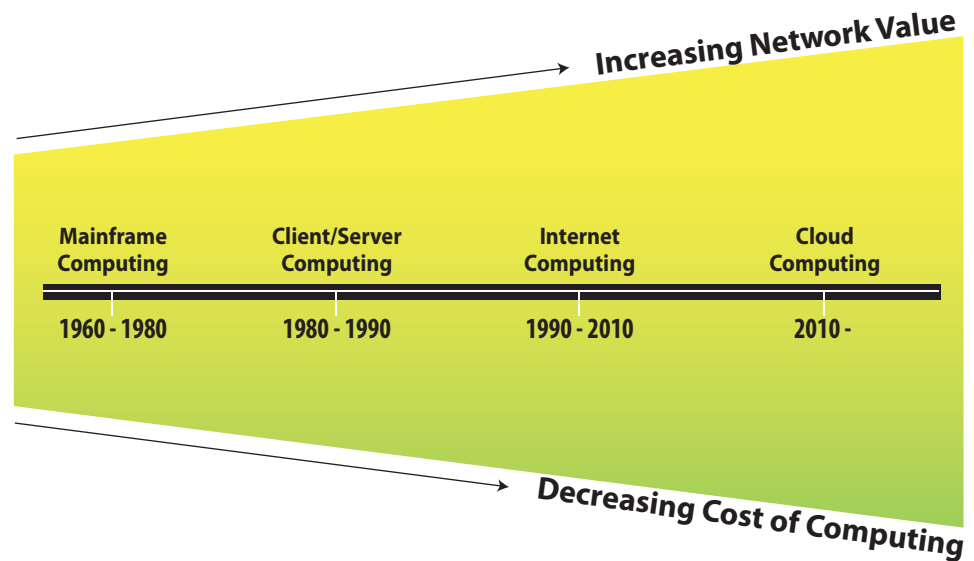
The cost of computing will be dramatically reduced. The cost of computing has fallen precipitously since the birth of cloud computing. This has allowed organizations to cost effectively deploy more compute capabilities in more places. This is one of the main reasons the cloud-first vision is quickly becoming a reality.

Exhibit 1: Cloud Services Continue to Skyrocket
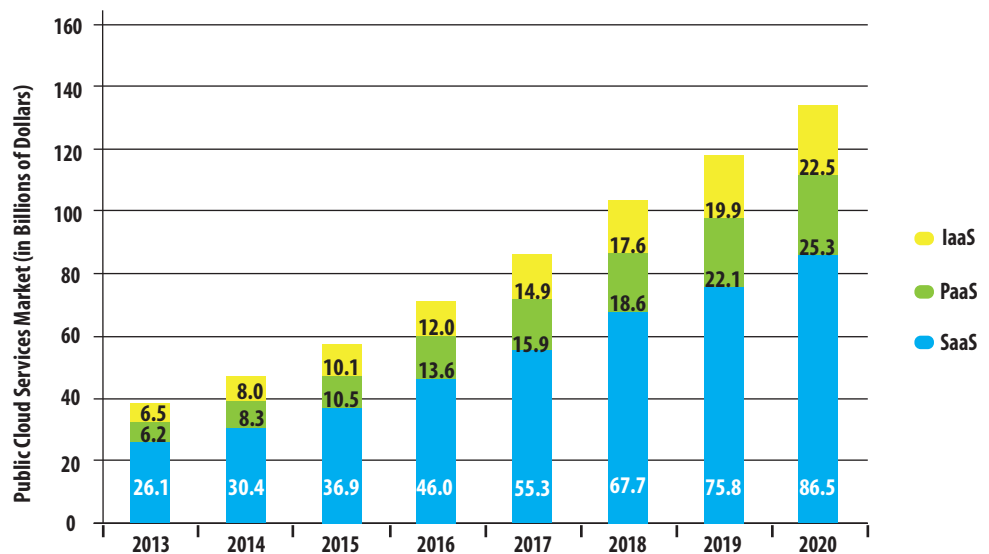
ZK Research 2016 Global Cloud Forecast

Exhibit 2: The Cloud Redefines IT as Network Centric

Increasing Network Value

Mainframe Computing	Client/Server Computing	Internet Computing	Cloud Computing
1960 - 1980	1980 - 1990	1990 - 2010	2010 -

Decreasing Cost of Computing

ZK Research, 2016

The strategic value of the network will rise. Over the years, computing has become more reliant on connectivity. Never has this been truer than with cloud computing. In fact, cloud computing is the most network-centric computing model to date, and an organization's ultimate success or failure with the cloud can be determined by its network strategy.

The interdependency of the network and computing is tighter with each successive wave. Over time, the relationship between storage, servers and the network has grown increasingly stronger. With cloud computing, the network is the best way to manage, secure and orchestrate cloud resources.

IT management is becoming more software driven. The number of workloads and traffic patterns is increasing, and they are becoming more complex to manage. IT's ability to effectively integrate software and centrally manage the infrastructure and workloads—whether bare metal, virtual or container based—will become more critical than ever.

However, no single cloud provider can meet the diverse needs of an organization. Almost every company will adopt a hybrid cloud strategy that involves several public cloud providers as well as on-premises infrastructure. The ZK Research 2015 Network Purchase Intention Study revealed that 84% of organizations plan to deploy hybrid clouds. Hybrid cloud environments introduce new complexities to IT that did not exist with legacy computing models. Meeting these new demands

requires new levels of performance, scale and security from the data center network. If organizations are to successfully adopt a hybrid cloud strategy, the network must now evolve.

SECTION II: HYBRID CLOUD DEPLOYMENTS INCREASE IT COMPLEXITY

About a decade ago, organizations were experimenting with cloud services and using them for non–mission-critical applications such as secondary backups as a replacement for tape drives. Since then, cloud services have matured, and businesses are not only accepting of the cloud—it's their preferred method of delivering applications and services today.

However, no single cloud provider can meet all of an organization's demands. Almost all organizations will choose to use multiple cloud providers, with most of them complementing public services with a premises-based cloud for a hybrid deployment.

With traditional, on-premises IT infrastructure, most businesses try to reduce the number of vendors they use. However, with the cloud, the opposite is true. A hybrid cloud strategy will become the norm for the following reasons:

Protects against failure: Having your cloud provider fail or go out of business can be catastrophic. If a cloud provider fails, businesses will need to move data and workloads quickly. Having multiple cloud providers in place can streamline the process, as all of the contractual issues will already have been worked out.

Faster time to market of new services: In the cloud industry, feature leadership will ebb and flow over time. Businesses can ensure they always have the latest features by utilizing multiple cloud providers.

Geographic diversity: This has two benefits. The first is being able to meet data sovereignty requirements. Using cloud providers in different countries lets businesses store data in the country of their choosing. The other benefit is that organizations can mirror deployments across multiple geographies.

Faster analytics: Using multiple cloud providers enables businesses to shorten the time needed to gather the data, analyze it and make decisions.

One of the biggest drawbacks of moving to a hybrid cloud—particularly one composed of multiple cloud providers—is that it is very difficult to move workloads and data between clouds. This task is difficult to accomplish with a single workload or a small amount of data and is impossible to do at scale without a common policy model across the infrastructure and users.

Cloud services have matured, and businesses are not only accepting of the cloud—it's their preferred method of delivering applications and services today.

Historically, it has been very difficult to secure the cloud, and doing so remains the top barrier to broader cloud adoption.

Most of the major public cloud providers have built their solutions on closed systems to effectively lock a customer into the solution, so trying to create some custom "middleware" between the cloud applications can be very difficult.

Also, while the majority of organizations want to build a private cloud, building a scalable foundation on which to grow the cloud requires new types of infrastructure that was purpose built for the unique needs of the cloud. For example, new container-based applications give rise to microservices. The move to microservices can increase the number of endpoints by 20x, driving new scalability and performance requirements for switches. Also, IP-based storage and hyper-converged infrastructure effectively turn the network into a "bus," increasing reliability and scale requirements.

Historically, it has been very difficult to secure the cloud, and doing so remains the top barrier to broader cloud adoption. According to the ZK Research 2015 Cloud Computing Survey, 72% of respondents view security as the top inhibitor to broader cloud adoption. The network-centric nature of the cloud changes the very essence of security. Instead of being based on best-of-breed technologies located at several points in the network, security needs to be pervasive and leverage network flows.

Also, cloud services—particularly public ones—create a significant blind spot for organizations, as monitoring performance and troubleshooting problems across cloud platforms are difficult tasks. IT organizations need end-to-end visibility that spans from the private data center to public clouds to manage the end-user experience and maximize return on investment.

Additionally, creating sustainable competitive advantage in the digital era requires having the ability to gather data and perform analytics to gain new insights. The disparate nature of multiple clouds makes it difficult for organizations to make cloud-driven data useful.

SECTION III: CISCO DATA CENTER ARCHITECTURE LEADS TO THE SIMPLER, SECURE CLOUD

Cisco—the market leader in data center networking technology—recently announced a comprehensive enterprise architecture to deliver consistent, policy-based automation across on-premises data centers, public clouds and hybrid environments. The architecture is supported by new products enabled by next-generation silicon, software and hyperconverged infrastructure solutions.

Customers that leverage the new architecture will be able to modernize their IT infrastructure, align spending with business priorities and shift to a self-service model to meet the new demands created by DevOps and application developers.

The new innovations include the following products.

Application-Centric Cloud Management

Cisco recently acquired CliQr, a vendor that provides application-defined cloud management. In a hybrid cloud environment, organizations need the ability to manage multiple clouds as one single entity. CliQr provides application-centric life-cycle management of workloads.

The combination of CliQr and ACI automates IT tasks and accelerates data center application deployments.

The CliQr cloud-management platform, CloudCenter, combines a cloud-agnostic application profile with a cloud orchestrator, which deploys the application and underlying infrastructure. CloudCenter comprises the following components:

CloudCenter Manager is a centralized portal that enables administrators to quickly model, deploy and manage applications. It also gives users visibility into and governance control of applications, clouds and users.

CloudCenter Application Profile is a user-defined model of an application's deployment and management requirements. Each application profile is created with a visual, drag-and-drop topology modeler using a library of out-of-box or customized services, images and containers.

CloudCenter Orchestrator is a cloud-specific, multitenant orchestration tier that is transparent to users and is installed in a cloud environment. It securely deploys both the infrastructure and the application and manages the deployment including run-time policies.

With CliQr CloudCenter, there is no cloud-specific scripting, writing orchestration workflows or modifying application code—unlike other cloud-management solutions that are not application defined. Also, there is no cloud lock-in or dependency.

CloudCenter manages cloud deployments across the full life cycle and is designed to provide DevOps and application developers with self-service, on-demand deployment while minimizing the need to understand the nuances of underlying cloud technology.

Combined with Cisco's Application Centric Infrastructure (ACI) and Unified Computing System (UCS) platforms, the CliQr platform creates a unique solution that capitalizes on application dependencies, requirements and policies to automate and optimize the end-to-end provisioning of on-premises, public and hybrid cloud scenarios. The combination of CliQr and ACI automates IT tasks and accelerates data center application deployments.

CliQr ACI delivers a "single pane of glass," in which end users can create application profiles that enable single-click automation of compute, storage and ACI network configuration settings, along with deploying the application on any type of cloud. Other benefits include the following:

Faster deployment and management of new and existing applications into any cloud or data center

Streamlined deployment and management of application workloads in hybrid environments including cross-environment release management, DevOps, high availability, disaster recovery, capacity augmentation and bursting

Consistent application-centric policy-based application deployment and management across different types of clouds

Performance benchmarking to identify the optimal on-premises or public cloud location to run an application

Seamless deployment of applications across data centers, private clouds and public clouds with a single mouse click, and management from a single pane of glass; organizations use the same application policy profile from on-premises to public-cloud environments with support for OpenStack, Amazon Web Services and Microsoft Azure (Exhibit 3)

Cloud-Optimized Data Center Network Infrastructure

The foundation of Cisco's Data Center architecture is a new line of Nexus 9000 switches, built on Cisco's new cloud-scale custom ASICs. The Nexus switches offer 25/50/100 Gbps at the cost and density of competitive 10/40 Gbps network products. This gives the new Nexus switches an increase of 2.5x to 10x in bandwidth over merchant silicon products at the same price points.

The new Nexus line of switches offers customers the following benefits:

Improved price/performance: The Cisco Nexus 9200 series and Nexus 9300EX switches can deliver 25/50/100 Gbps speeds at the cost of 10/40 Gbps.

High-density network: The Cisco Nexus 9500 offers an upgrade path to high-density 100 Gbps infrastructure with the existing chassis.

Programmable network: The portfolio of switches includes consistent RESTFUL APIs and comprehensive self-service DevOps automation tools supporting programmable networks and fabrics.

End-to-end visibility: NetFlow offers data center–wide visibility in real time to enable better business insights, pervasive security and capacity planning.

Better application performance: Adaptive traffic congestion control improves application completion time by more than 50%.

Data center–specific innovation: The NX-OS operating system for the data center is continually advancing with innovations designed to improve traffic control, operational flexibility, visibility and security for the modern data center.

Exhibit 3: Cisco and CliQr Provide Multi-Cloud Orchestration
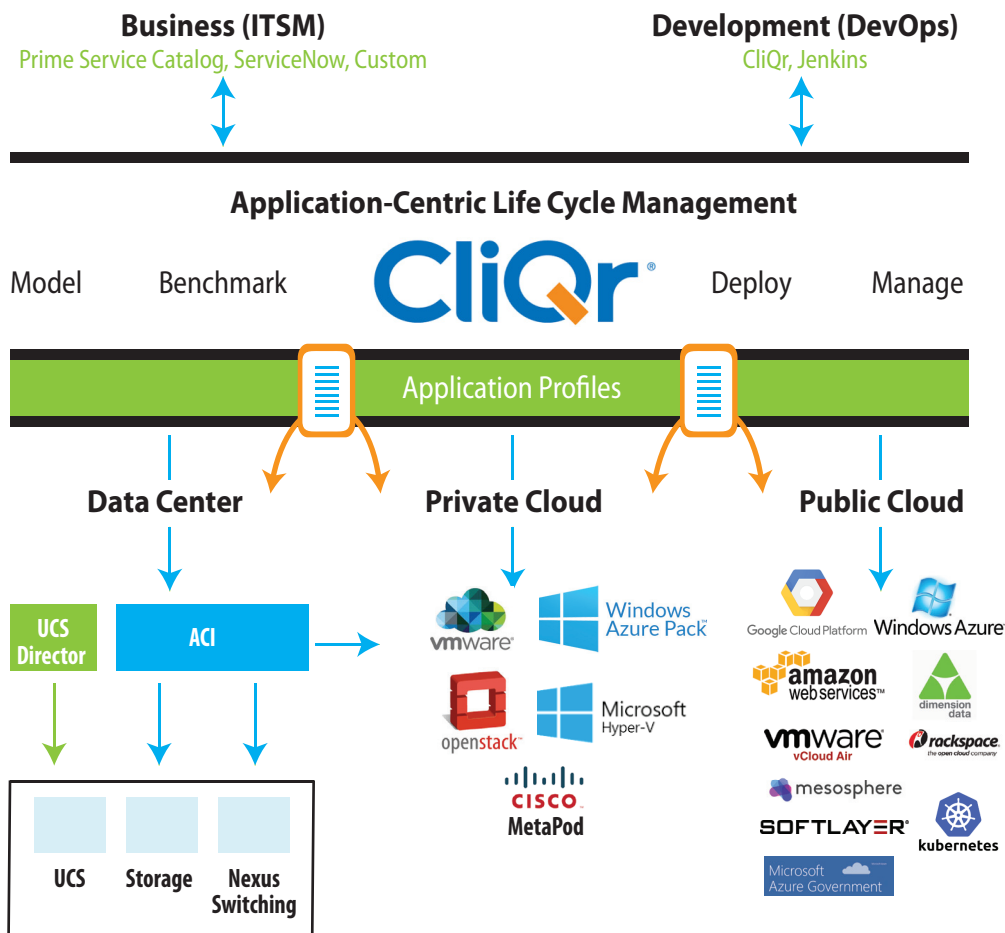
Cisco and ZK Research, 2016

Hyperconverged Infrastructure

Hyperconvergence is an infrastructure technology that tightly integrates compute, storage, networking and virtualization resources that are controlled through software. Its value proposition is rapid deployment and simplified management.

The Cisco Data Center architecture includes the new HyperFlex System, a next-generation hyperconverged infrastructure (HCI) product. HyperFlex offers the following benefits:

Plug-and-play deployment: HyperFlex can be configured in minutes and offers flexible scaling of capacity and compute.

Enhanced data services: These include rapid cloning, snapshotting with continuous de-duplication and compression for up to an 80% increase in usable storage capacity.

Cloud computing brings a much higher level of agility to IT infrastructure and applications than traditional, monolithic deployment models.

High performance: HyperFlex's increased performance enables it to be used with a wide variety of enterprise applications.

Customers that choose to leverage Cisco's Data Center architecture will realize the following benefits:

Futureproofed data center: Application architectures will continue to evolve away from monolithic designs to container-based microservices. As this happens and customers continue to deploy cloud more aggressively, the Cisco data center architecture and related products enable businesses to on-board new applications and scale current ones while protecting existing investments.

Automation capabilities: The architecture enables consumers of IT infrastructure, such as DevOps and application developers, to self-provision so the IT staff can focus on more strategic tasks as opposed to performing mundane provisioning tasks. A unified, policy-driven model across Cisco's network, storage and compute platforms can automate up to 80% of the tasks performed by the IT staff manually.

Cloud choice: Businesses can dynamically choose any data center—public or private—on which to run applications today. Currently, IT teams must make decisions between on-premises and public cloud. Cisco's Data Center architecture eliminates the need for this choice by combining the scale and flexibility of a public cloud with the visibility and control of the on-premises data center.

SECTION IV: CONCLUSION AND RECOMMENDATIONS

The digital business era is driving companies to be more agile. Cloud computing brings a much higher level of agility to IT infrastructure and applications than traditional, monolithic deployment models. However, no single cloud provider can meet all of an enterprise's needs. Because of this, almost every business will leverage the benefits of a hybrid deployment in which multiple public clouds and on-premises data centers will need to coexist.

A hybrid cloud environment offers businesses the most choices regarding where to run applications or workloads and where to store content—but it also has the highest level of complexity, as each cloud must be managed independently. For organizations to fully leverage the cloud, they must overcome this complexity. To help IT leaders take this evolutionary step, ZK Research makes the following recommendations:

Automate as many processes as possible. The ZK Research 2015 Network Purchase Intention Study revealed that 83% of IT budgets is used to maintain the status quo. Much of this cost

comes from IT operations performing mundane, repetitive tasks. Organizations should strive to automate as many processes as they can to reduce the amount of resources required to run the data center and allocate more budget to innovation. This is critical to success in the digital era.

Implement a common policy model. A successful hybrid cloud deployment that leverages multiple cloud providers is highly dependent on the management and orchestration layer. It's critical to choose a vendor that enables a common policy to be used to manage the data and workloads between private and public cloud environments. A common policy, like the one CliQr offers, is the only scalable way to manage a hybrid cloud environment and maximize the benefits of the cloud.

Realign the IT staff to be optimized for cloud. Historically, IT departments have been aligned by technology such as storage, servers and networking. In the digital era, IT departments must tear down these silos and work more collaboratively. Securing and optimizing a hybrid cloud environment involves all IT sub-departments working together to meet the needs of DevOps, application developers and other IT infrastructure consumers.

Take an architectural approach to the data center. Building a cloud strategy based on multiple vendors requires IT to write custom code or manually integrate systems. The overhead involved is very high and leaves the business open to security breaches and performance problems. An end-to-end architecture can simplify deployments, provide unparalleled visibility into performance and offer the best security. Cisco's Data Center architecture offers this as well as excellent long-term investment protection.

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