



JOURNEY INTO THE CLOUD

Cloud computing promises to revolutionize enterprise IT and drive unprecedented levels of efficiency and flexibility. And there's nothing nebulous about the potential business benefits.

Economic conditions have indelibly altered the bottom line at many enterprises. In the current climate, IT infrastructure characteristics can make or break a business, heightening requirements to minimize cost and risk while scaling up or down nimbly as demand rises and falls. For CIOs, this translates into a continual need to maximize IT efficiency and flexibility because, after all, your business can only act or react as fast as your IT systems do.

With the emergence of standards-based architectures, virtualization, and ubiquitous, high-speed connectivity, cloud computing is primed to offer exactly these benefits—and IT leaders are paying attention. Although achieving the full advantages promised by cloud services is a journey that may take a few years to complete, taking the first steps now can significantly advance both enterprise efficiency and competitive advantage.

UNDERSTANDING THE CLOUD

Cloud computing has been much discussed and often misunderstood. Dell defines a cloud in terms of three key characteristics:

- **Flexible costs:** Cloud computing incurs variable operational costs on a pay-per-use basis, without up-front infrastructure capital costs.
- **Elastic scalability:** Infrastructure capacity is highly elastic (either up or down), differentiating clouds from traditional hosting services providers.
- **Geographic and hardware independence:** The underlying hardware can be located virtually anywhere, with the applications and services abstracted from that hardware.

Cloud computing drives efficiency through virtualization and economies of scale. Just as virtualization

can help maximize utilization of IT resources, control operational costs, and automate management in enterprise data centers, it also enables hyper-scale cloud services providers to achieve massive levels of scalability—helping to reduce labor costs and optimize their infrastructures in ways that enable them to offer pay-as-you-go services in a cost-effective way.

Ultimately, however, the cloud is not about technology—it is about making IT efficient and responsive to the business. Fundamentally, cloud computing is disruptive to the traditional IT infrastructure model in that it enables various categories of IT to be delivered entirely as a service, without the traditional levels of hardware, software, and people investment.

DEFINING CLOUD SERVICES AND IMPLEMENTATION MODELS

Cloud services can be implemented as either a *private cloud* or a *public cloud*. A private cloud is an instance of the service dedicated to a specific enterprise, in which the data can remain on-site; this model avoids external dependencies on service levels and enables CIOs to maintain control over security, auditing, and data, but typically requires a large scale to be an economically viable option. A public cloud leverages a third-party instance in a multi-tenant environment, offering minimal up-front requirements along with costs and capacity that scale with usage—but with the perceived loss of some control.

Cloud services fall into three categories of usage:

- **Software as a service (SaaS):** SaaS provides complete applications using a pay-as-you-go model, typically running on massively scalable, multi-tenant platforms in shared environments.

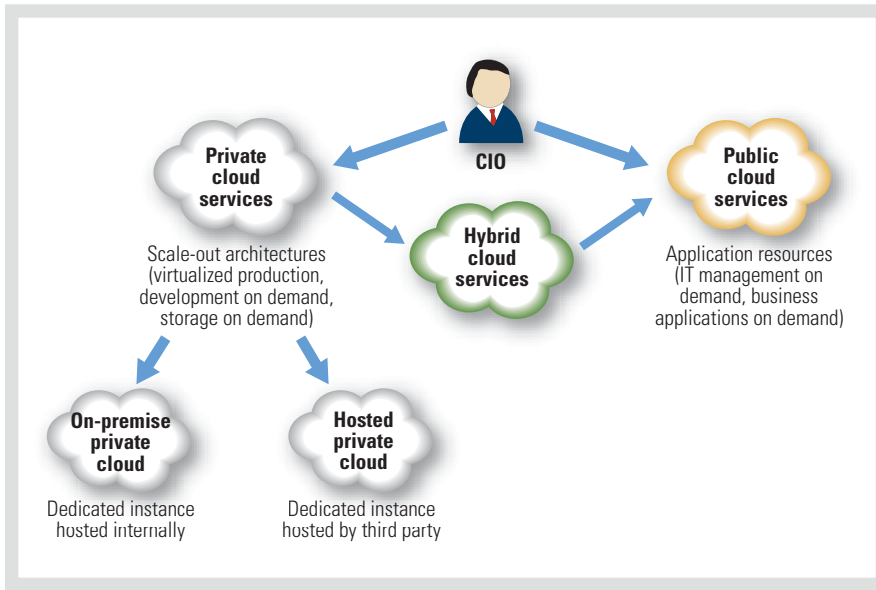


Figure 1. Hybrid cloud services offer the advantages of both private and public clouds

Salesforce.com, for example, offers customer relationship management (CRM) software using this model.

- **Infrastructure as a service (IaaS):** IaaS offers on-demand computing resources such as servers, databases, and storage capacity as well as infrastructure solutions such as archiving and disaster recovery. In this category, for example, Amazon's Simple Storage Service (S3) and Elastic Compute Cloud (EC2) offer storage and compute capacity, respectively.
- **Platform as a service (PaaS):** PaaS offers application development and production environments, enabling developers to write multi-tenant applications using on-demand processor and memory capacity. The Microsoft Azure™ Services Platform, for example, offers this type of service for .NET development.

The appropriate approach is specific to the nature of an individual enterprise—including its business environment, its economic pressures, and its risk profile. Large enterprises may be able to take advantage of their own economies of scale and be primarily concerned about security, data latency, data volumes, and

regulatory considerations. As a result, they may opt to build services on an internal private cloud that offers greater control over service levels, security, and auditing than a public cloud can provide. On a smaller scale, public cloud services enable organizations to pay as they go without a large up-front investment.

MAXIMIZING FLEXIBILITY AND TCO WITH A HYBRID APPROACH

In some instances, the choice between private and public cloud services may be clear-cut. But the trade-offs inherent to each of these models can also present a difficult decision, requiring CIOs to balance multiple strategic, practical, and

economic considerations. What if you could have the best of both worlds—a service that, for example, enabled your organization to retain direct local control over critical data while still letting you take advantage of the economies of scale available through a public cloud for services that are not mission critical?

Hybrid cloud services offer exactly this type of flexibility. With this model, CIOs can choose not just private or public services, but also a single service that spans both realms to help maximize the advantages of each (see Figure 1). Enterprise e-mail systems offer a prime example of the benefits of hybrid cloud services. Because e-mail is critical to most organizations, e-mail continuity is a paramount concern. However, the traditional approach of implementing a second physical mirror of the primary e-mail system can significantly burden total cost of ownership (TCO), given the low utilization of that secondary system. In this scenario, hybrid cloud services promise an ideal solution. By linking an on-premise e-mail infrastructure with a public cloud service for continuity, organizations can help reduce IT TCO while still meeting their security and regulatory requirements (see Figure 2). The same would be true of enterprise e-mail archiving requirements.

MAKING THE PASSAGE

The journey toward cloud computing will vary depending on the specific business needs, competencies, and resources of

PLOTTING YOUR COURSE

Organizations can start on the journey toward peak enterprise efficiency with an action plan based on the following steps:

- **Virtualize everything:** The baseline for cloud economies is virtualization—it is the core competency and starting point.
- **Leverage software as a service for IT management:** Using SaaS management tools can help reduce infrastructure total cost of ownership and build experience with cloud services.
- **Add incremental services:** Once the virtualized infrastructure is in place, layering in other incremental cloud services helps complete the transition.

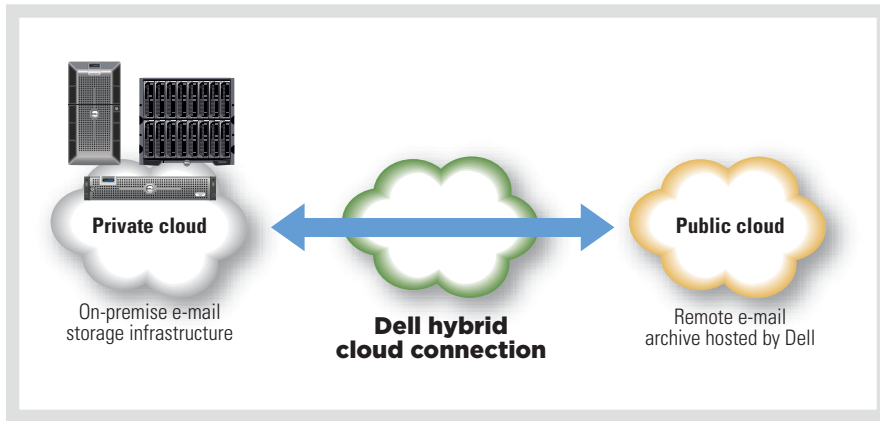


Figure 2. Enterprise-class hybrid cloud services offer a flexible, scalable approach to e-mail storage

your organization. For enterprises struggling with data center efficiency and capacity issues, it may make sense to start at the infrastructure level and begin pursuing large virtualization efficiencies through consolidation and standardization. Those with increasing costs stemming from their storage and archiving systems may want to begin there—first by optimizing the resources in place, and then by investigating cloud storage for archiving and disaster recovery.

In each scenario, however, the best practices that have historically applied

in other areas continue to apply here: first rationalize, then optimize, then revolutionize. In the context of cloud services, after choosing a starting point—be it business applications, business data, management, or the infrastructure itself—your first step should be to rationalize that area and establish a baseline (see Figure 3). Only then can you decide how to move forward and how quickly you can proceed. For more information, see the “Plotting your course” and “Assessing the alternatives” sidebars in this article.

As organizations move toward cloud computing, they typically evolve through three phases (see Figure 4). In most cases, virtualization provides the first step toward cloud computing, offering flexible resource pools that can help reduce costs, increase business agility, and enable the creation of private cloud infrastructure. In this first phase, the organization implements a virtualized infrastructure to support low-risk test and development functions, allowing the IT team to build knowledge and confidence in the technology and learn how to thrive in a hyper-efficient, hyper-responsive environment. The team then leverages core virtualization hypervisors and management tools to consolidate production servers and help reduce capital expenses. In the second phase, organizations accelerate and expand use of virtualization to more workloads—including mission-critical production applications—to help reduce operating expenses. A more sophisticated virtualized infrastructure provides operational management of large virtualized server, storage, and network farms.

In the final phase, the organization interconnects its data centers to create a

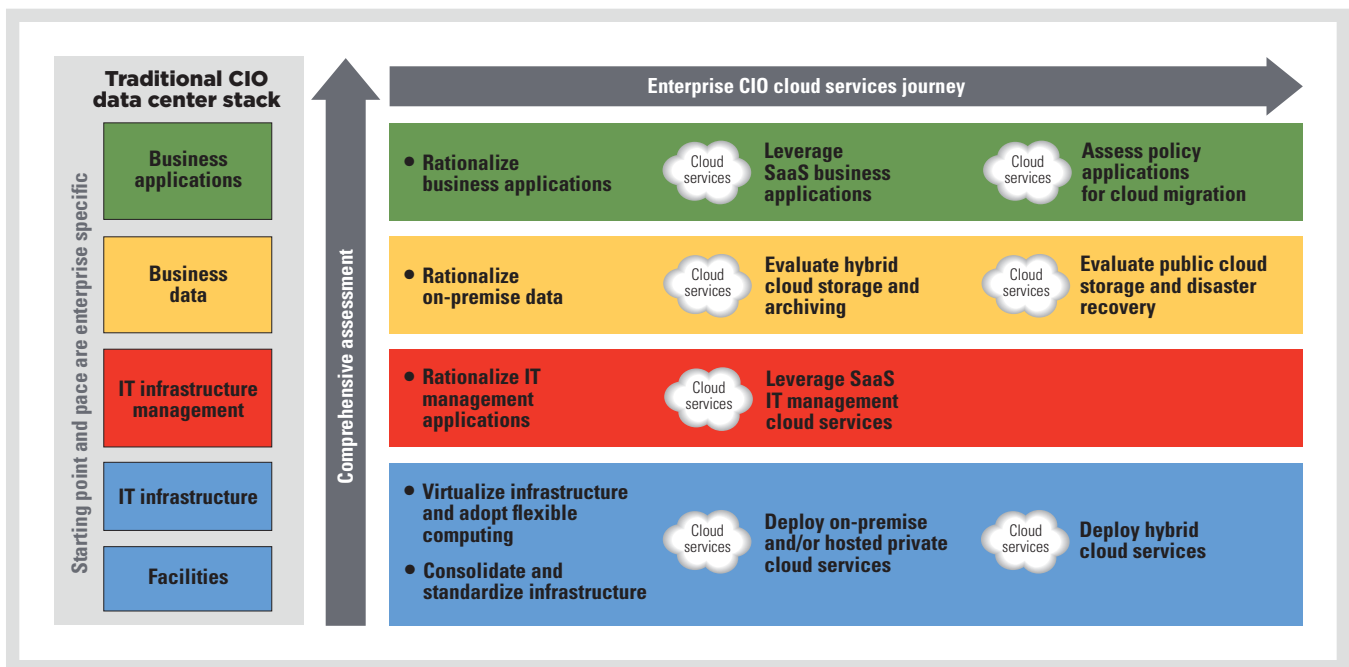


Figure 3. Standardization and rationalization provide a starting point for the cloud services journey

ASSESSING THE ALTERNATIVES

IT organizations can make the move toward cloud computing from virtually any starting point—from standardizing hardware through x86 migrations, to implementing virtualization technology for the first time, to deploying SaaS-based IT management. The variety of cloud computing models enables CIOs to adopt the most suitable approach for their particular organization:

- **Cloud computing infrastructure solutions:** Stores services and data in shared, dynamically scalable resource pools using virtualization and/or scale-out application environments
- **Cloud software-as-a-service IT management (public cloud):** Delivers IT management services over the public Internet; can scale without user intervention and is typically billed by usage
- **Cloud infrastructure as a service (hybrid cloud):** Combines internal IT systems with public cloud services, enabling use of excess capacity without up-front investment

- **Cloud infrastructure as a service (private cloud):** Enables IT to be delivered as a service behind the organization's firewall for internal use

To help CIOs accelerate cloud computing initiatives, Dell has developed a streamlined optimization approach to migration and cloud service life cycle management. Designed to put together workflows, tasks, and processes specific to the needs and environments of individual organizations, customized Dell™ cloud computing services offer the tools and resources to rapidly implement virtualization and provide a foundation for cloud computing and services with minimal risk. Dell also provides a software portal for operational control of migration through automation and deep visibility into every level of workload migration, which can be customized to meet specific requirements and can scale to manage large environments.

single resource pool and private cloud. At this point, the IT team could also push some applications to compatible public clouds when appropriate for specific use cases, which can help balance peak or unpredictable demand. The resulting hybrid infrastructure provides true on-demand computing in an environment designed for maximum flexibility.

ENABLING THE EFFICIENT ENTERPRISE

Why are business and technology strategists so excited about the cloud? Beyond the breakthrough scalability of this approach, cloud services help create significant cost and business model advantages—helping enterprises to reduce capital and operational expenses, enabling rapid scale-up and scale-down capacity to enhance business agility while minimizing up-front risk, and enabling resources to shift from simply keeping the data center running to pursuing business goals at the strategic level. Whatever path you choose, the potential advantages are

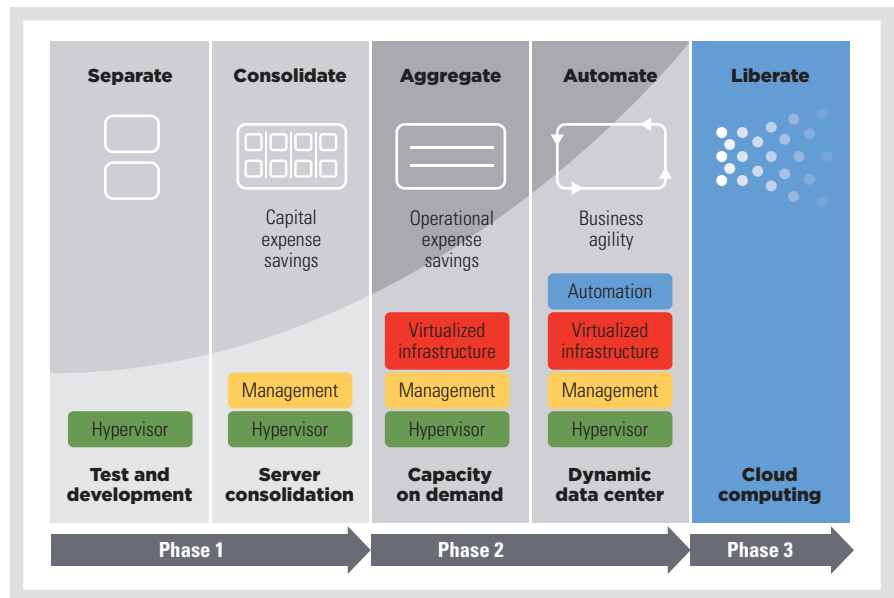


Figure 4. Virtualization clears the way to cloud computing in three key phases

simply too great to ignore. By starting on your journey now, you can not only realize the benefits of standardization and virtualization, but also begin to move toward the ultimate goal of a truly responsive IT infrastructure—the sky's the limit. [u](#)

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