START small, grow tall: why cloud now

Business white paper

The cloud is the hottest thing in computing today, and enterprises are eagerly seeking to adopt it. They realize that cloud computing holds the promise of curing today's "data center sprawl," with its colossal complexity, considerable costs, and substantial capital investment. For their part, service providers see the cloud as a catalyst for revenue growth. Executives and leaders look forward to the day when information technology will be delivered as a pure service throughout the organization, metered, ubiquitous, and available on demand much like electricity or water.

But the reality is that the cloud isn't yet so mature or capable that it's ready to replace traditional IT. Companies face a number of obstacles to cloud adoption. Among them: differences between business and IT executives about the pace of adoption; differing stages of maturity within the cloud adoption continuum; and the need to avoid compromising the cloud's benefits with scattershot, uncoordinated adoption. As you'll see, without a proper goal and a clear plan to get there, organizations risk re-infecting their IT environments with complexity and sprawl that are every bit as counterproductive as the data center problems the cloud was meant to correct.

The problems hidden in the cloud

In many organizations, the business side of the house is already embracing the cloud. They've been quick to recognize how they can use the cloud to speed innovation, accelerate business processes, and reduce time to revenue. They're demanding expanded cloud access, and in some cases actually opting for "guerilla adoption," moving data and apps to public cloud services informally, without first obtaining the blessing of the CIO or the IT department.

Virtual machines, real concerns
However, the IT departments of enterprises and service providers have been slower to adopt cloud solutions because of concerns—often well-founded— about security, management, and efficiency. Security becomes an issue when business processes can hopscotch from one virtual machine to another, and when mission-critical applications are dependent on data feeds from what many CIOs perceive as an all-too-evanescent cloud environment. Management comes in for similar scrutiny as administrators ponder the prospects of managing private and public clouds with traditional in-house IT environments. Faced with cloud computing, IT professionals worry about application robustness, security, and agility. They agonize over the potential for fragmentation and inefficiency stemming from piecemeal and ad hoc adoption of cloud "puzzle pieces." And in particular, they lament the lack of a comprehensive, integrated cloud solution.

CIOs know the cloud can help them accomplish their business goals. The question is how to accomplish those goals while improving manageability, ensuring security, and maintaining—or, preferably, accelerating—business performance?

While business wants to press forward and go full steam ahead for cloud adoption, IT wants to proceed more slowly. This disconnect translates into less control by IT, or lower levels of innovation by the business—or both. The problem is most evident in the service provider community, for whom the lack of a cloud presence translates directly into lost revenue opportunities.

Different companies, different speeds
Partially as a result of issues like these, organizations are evolving to the cloud at markedly different speeds; that is, they have varying degrees of "cloud maturity." Today the best measure of that maturity is the degree of virtualization within an enterprise or a company. An organization just beginning to adopt virtualization is, in general, not ready for a private cloud. At the same time, one that has already virtualized significant parts of its infrastructure is likely the most prepared for a private cloud environment—and perhaps a hybrid cloud is not far off.

Yet, data from analysts such as Gartner, as well as informal conversations with CIOs and IT professionals, reveal that many companies have yet to fully adopt virtualization, let alone move to a private cloud. In 2010, even organizations that had adopted virtualization were running only about 30 percent of workloads on virtualized servers.[1] Other authorities predict that by 2014 this figure will reach only 50 percent or so[2]. Clearly, cloud adoption is still in its infancy.

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[1] Thomas Bittman, "Q&A: Six Misconceptions About Server Virtualization," Gartner, 29 July 2010.

[2] IDC, Server Workloads Forecast and Analysis Study, 2009–2014, August 2010.

Cloud sprawl

In addition to the difference in perception between the business and IT, and the difference in the pace of adoption, there are the problems engendered by virtualization itself. Like a virtual version of Newton's third law, each benefit of a virtual environment can, if not controlled, have an opposite effect, as shown in the table below.

It's known as virtual sprawl: the ability to spawn multiple virtual machines from a single physical one, which can lead to fast, flexible provisioning—but also to enormous complexity. The virtualized infrastructure's elasticity and better use of physical assets are counterbalanced by increased management and security burdens, by poor visibility and splintered control.

A concomitant concern is that many organizations approach cloud computing in a fragmented and piecemeal fashion. Today there are hundreds, if not thousands, of vendors delivering cloud solutions. It's tempting to adopt these solutions piecemeal, in response to an immediate need. Or to pick up a cloud appliance here, a virtual tool there, thinking that it furthers the path to the cloud. Or to allow one part of the company to convert workloads to the cloud, but fail to make this ability available to all. By adopting such solutions without an overall strategy and an endgame in sight, an organization can foster a kind of "cloud sprawl" that adds to virtual sprawl and leads to the same complexity, security issues, and management costs it seeks to escape.

Start small, grow tall...but think big

So what's the best route to the cloud? The immediate goal, of course, is making use of Internet-based technology, with shared pools of services, including metering or chargeback. The cloud needs to be self-service; it needs to be automated. But these individual attributes by themselves are available in a variety of private, public, and hybrid clouds, and can be cobbled together today with components procured mostly off the shelf.

Experience, however, shows it's best not to think in terms of separate cloud environments and individual ad hoc pieces—a fragmented, disjointed approach that actually adds to security problems and management complexity. In the final analysis, the businesses that profit most from the cloud will be those that approach it with a unified services view and who strive toward management of all services—from public, private, or hybrid clouds—under a single umbrella, with support for the broadest possible set of applications.

Use a step-by-step approach

Even an organization starting from zero can start moving toward the cloud today. At HP, our experience has been that the more successful cloud projects—those that are provisioned and operational in the shortest time—result from a holistic, systematic approach to their creation. It's a step-by-step approach: a company might begin by standardizing, consolidating, and virtualizing its infrastructure to

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[3] IDC, Enterprise Panel Survey, November 2010.
[4] Goldman Sachs Equity Research, January 2011.

Virtualization offers	Which provides	But can result in
Multiple virtual machines (VMs) per physical server	Better utilization of physical assets; reduced capital costs	Virtual sprawl; greater management complexity
Multiple applications on each server; shared storage	More efficient hardware utilization	Applications that are more complex to deploy and control; greater risk from a single point of hardware or hypervisor failure
Multiple vendors (VMware, Microsoft®, Citrix, etc.)	Freedom of choice; no vendor lock-in	No management standards or common tools
Easily added or moved applications, servers, and storage	More flexibility; easier scaling	Complex, interrelated dependencies that change often, are impossible to track manually, and are tricky to troubleshoot
Automated provisioning and management	Faster response to business changes	More changes that are easy to make, but difficult to control and troubleshoot
High mobility (e.g., vMotion or Live Migration)	Instant, seamless failover	More complex discovery; security issues; "where's my data now?"

Figure 1. Using modular building blocks and a step-by-step approach is the best route to a fully automated cloud solution.
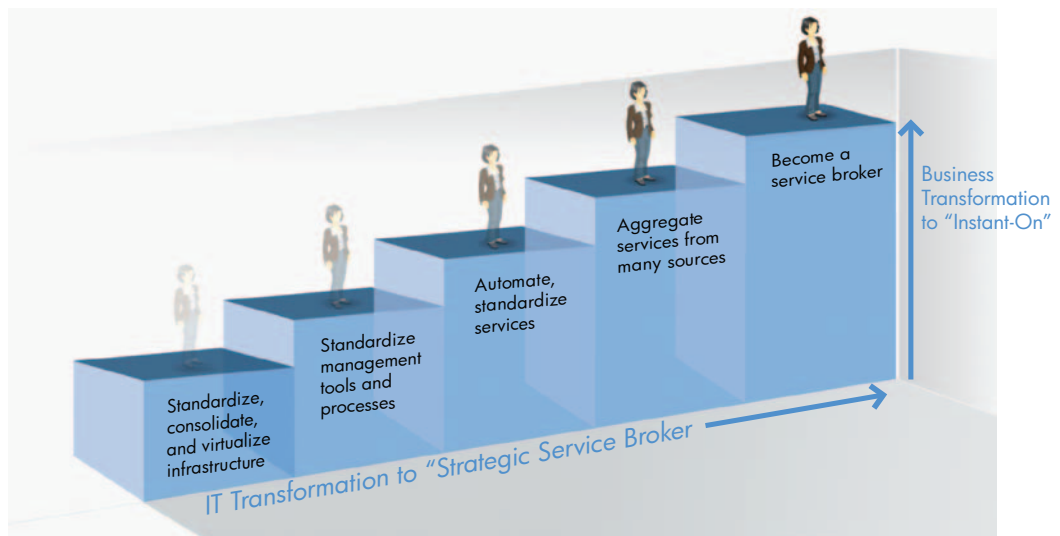
eliminate high-cost islands and silos. The next step is working to standardize management tools and processes, then automating and standardizing services to create low-cost pools of assets. As the transformation to the cloud continues, the organization might begin to aggregate services from many sources—and perhaps even become a service broker itself.

Instead of "rip and replace," the systematic approach will actually accelerate time to application value, providing the simplest way to transform a data center with workload-optimized systems that include common lifecycle management, single-button updates, and scaling to any size. The goal, and the transformation to it, will be more achievable by the use of modular building blocks that can add the next layer of capabilities without the need to abandon the previous one. Such a systematic approach dovetails perfectly with HP's concept of a Converged Infrastructure.

Keep the goal in view

The important thing is to keep the ultimate goal in mind: a fully automated cloud-based environment, the "data center of the future," which depends on low-cost, pooled, on-premises or third-party computing assets from private, public, or hybrid cloud sources, which can also deliver IT as a service. It's important

to have a solution provide a unified delivery across cloud and traditional IT environments; support for all types of clouds; a variety of applications, hypervisors, and operating systems; automated lifecycle management; and plenty of scalability to meet unpredictable business demands. Plus, to be anything more than an R&D plaything, the cloud needs to be highly robust and boast end-to-end security.

Meet HP CloudSystem

All these attributes are available today with HP CloudSystem. This cloud solution delivers all of the requirements of the cloud, yet is fully open— that is, it supports heterogeneous capabilities and private, public, and hybrid models, all in one integrated system. HP CloudSystem provides self-service delivery, security, metering, and chargeback. Moreover, it is highly flexible, offering capabilities to add instant scalability, mission-critical availability, optimization for business applications, and integration with an organization's existing IT infrastructure. HP CloudSystem is the world's first cloud offering that enables businesses to build, package, and provision cloud services for their users through a unified service catalog, without having to know, or care, whether those services are being sourced from CloudSystem's own "on-premises" assets or from the public domain.

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Figure 2. All the desirable elements of the data center of the future are available in HP CloudSystem.
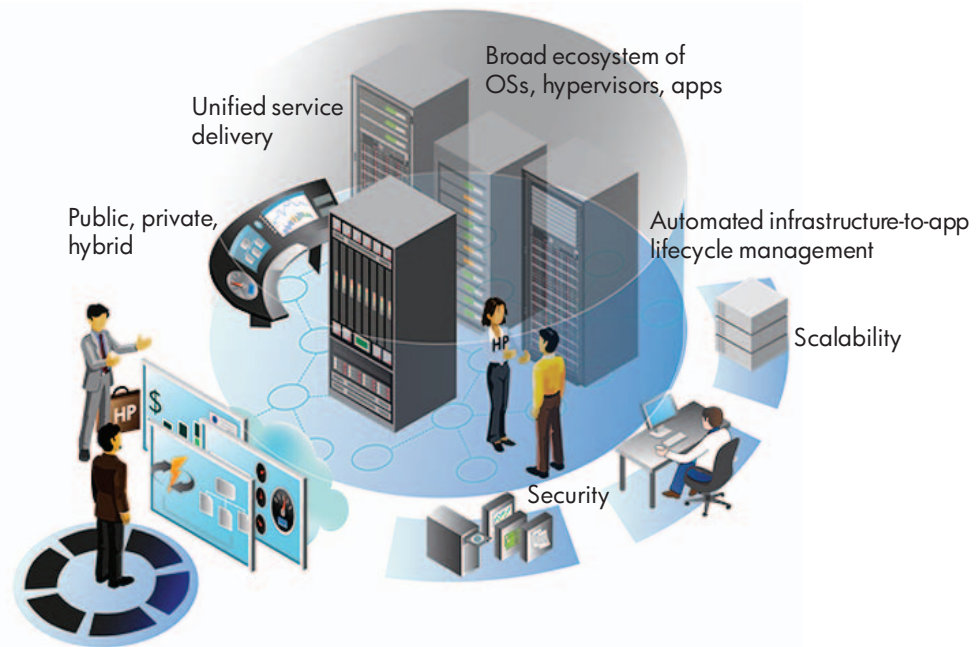
Three flexible offerings

Three HP CloudSystem offerings provide a range of services for all organizations as well as an avenue for growth and expansion:

- **HP CloudSystem Matrix:** a private cloud that provides infrastructure as a service (IaaS), as well as basic application deployment and monitoring. This is a great entry-level cloud solution for businesses that want to set up their own private cloud.
- **HP CloudSystem Enterprise:** a private or hybrid cloud solution that provides a single services view along with advanced lifecycle management. This robust offering can be expanded for a wide range of uses, including mission-critical applications.
- **HP CloudSystem Service Provider:** a public or hosted private cloud designed for service providers to provide a public cloud infrastructure as a service and software as a service (SaaS), including aggregation and management of those services.

Each of these offerings is available as a small, medium, or large configuration, and each can be expanded with additional hardware and software from HP or third parties, imbuing all offerings with almost limitless gradations and making CloudSystem suitable for virtually any desired variety or scale of cloud services.

Unified management and security

HP CloudSystem's offering can be further extended by advanced governance, management, and security solutions to successfully leverage public, private, and hybrid clouds. HP identified key critical capabilities required and developed solutions based on hardware, software, and services to address them. It starts with a service portfolio governance—the processes of governing, publishing, and managing the entire enterprise portfolio. For applications developers, having to deal with the challenge of today's composite cloud applications, HP offers its Application Lifecycle Management suite. For the operations management team, HP Business Service Management and the leading ArcSight Security and Information Enterprise Threats and Risks management platform secure the service until the application is retired. Finally, application data can be visualized and protected across heterogeneous storage infrastructure.

Policy-based resource allocation and provisioning
HP CloudSystem's intelligent resource management automates the optimal allocation of private and public cloud resources to help ensure that cost, performance, and compliance goals are achievable, based on each organization's defined business policies. And once optimal resources are identified, HP CloudSystem not only provisions the raw infrastructure but also automates the complete application lifecycle—provisioning, customization and configuration, ongoing patch management, and ultimate retirement—saving days to weeks over the provisioning approaches used in traditional environments today.

Time-saving tools with Cloud Maps
One of the reasons why IT has been slow to adopt cloud technologies is the difficulty of customizing them for an organization and deploying key applications. Working with major ISVs such as SAP, Oracle, and Microsoft, HP has created Cloud Maps that accelerate and automate the deployment of the application, the infrastructure, indeed the entire lifecycle.

Put simply, Cloud Maps are best practice definitions of infrastructure and application configurations. They can tell you how many virtual machines the application will require, and define the exact hardware needed: what kind of physical resources, how many servers, how many database services, how many Web

servers, and what kind of software is on each of those nodes. They can be imported directly into a CloudSystem to get you started quickly.

Use of existing infrastructures
HP CloudSystem is integrated by design to make the most of HP servers, storage, and networking. But, it is not limited to these technologies. In fact, HP CloudSystem is a heterogeneous, multi-hypervisor, multi-OS infrastructure that can take advantage of an organization's existing IT environment, including storage by EMC; networking by Cisco, Brocade, or Alcatel-Lucent; and x86 servers from IBM or Dell. It supports Windows®, Linux, and HP-UX, as well as virtual machines from VMware, Microsoft, and HP. Under the CloudSystem umbrella, the legacy environment is supported and managed from the same single pane of glass as the rest of the system, so administrators can see a cloud with an application such as Microsoft Exchange without caring what hardware it's running on. The entire environment is managed the same way, from the same interface. The result is comprehensive automation, sophisticated orchestration, and substantially less complexity.

Success in the cloud? It's here.

HP CloudSystem has already achieved remarkable success in helping businesses wield the cloud to their advantage. Here are a few examples:
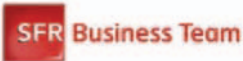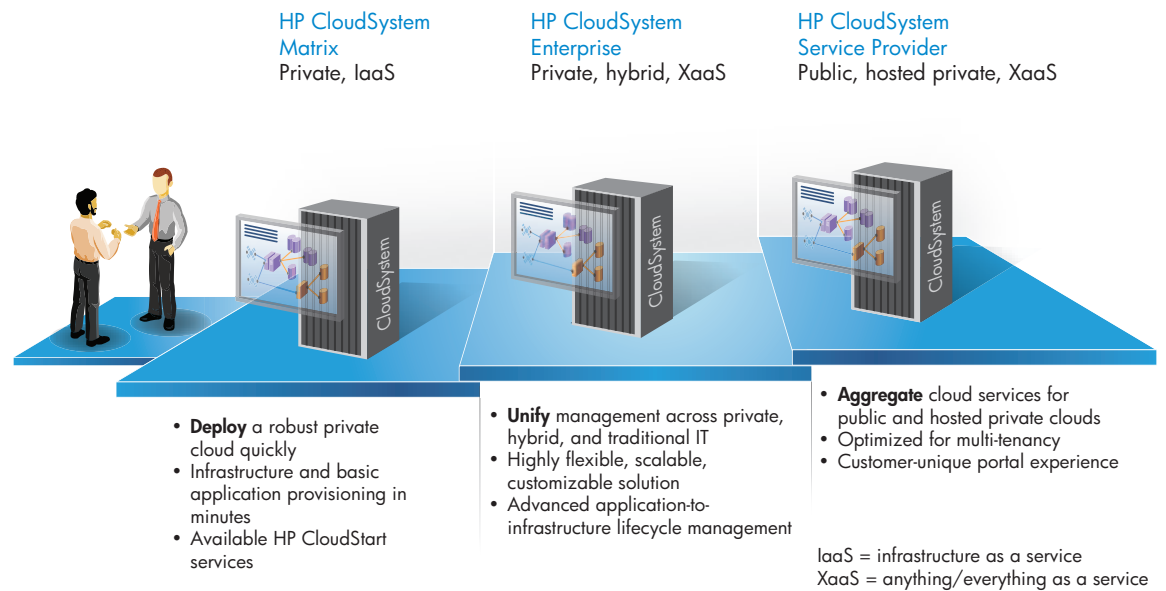
Mahindra	Mahindra created a shared services environment using HP CloudSystem Matrix to enable nimble deployment of application platforms for different R&D needs.
SFR Business Team	SFR quickly brought to market a complete Infrastructure as a Service (IaaS) platform based on HP CloudSystem Service Provider.
HOSTWORKS	Using HP CloudSystem Matrix, Hostworks created a highly resilient shared services facility to accommodate its customer base load. Hostworks can now implement a common virtualized infrastructure that scales quickly to deliver new programs.
FICO	Using a private cloud transformation based on HP CloudSystem Matrix, FICO created a global product development center of excellence.

HP CloudSystem
Matrix
Private, IaaS

HP CloudSystem
Enterprise
Private, hybrid, XaaS

HP CloudSystem
Service Provider
Public, hosted private, XaaS

- **Deploy** a robust private cloud quickly
- Infrastructure and basic application provisioning in minutes
- Available HP CloudStart services

- **Unify** management across private, hybrid, and traditional IT
- Highly flexible, scalable, customizable solution
- Advanced application-to-infrastructure lifecycle management

- **Aggregate** cloud services for public and hosted private clouds
- Optimized for multi-tenancy
- Customer-unique portal experience

IaaS = infrastructure as a service
XaaS = anything/everything as a service

The fast-track secret to success in the cloud: HP Services

We believe that most enterprises are likely to reach a hybrid cloud model in the long term, and that the mix across internal, private, and public sourcing will evolve over time. That is why we recommend starting with a solid strategy covering all the different options. For the surest route to a successful cloud strategy and implementation, we encourage clients to engage HP Services to help align business and operational needs to their cloud strategy, while speeding the path to the cloud.

Start with a holistic view and strategy
Through **HP Cloud Discovery Workshop**, HP helps clients gain clarity on cloud concepts, identify the cloud initiatives that can work for their business, discuss how a Converged Infrastructure and HP CloudSystem can lay the foundation for the cloud, and subsequently draw actionable steps. During this one-day workshop, senior HP consultants using highly visual displays cover topics such as cloud concepts, architecture, service portfolio, management, financials, governance, and more.

Build a private cloud in 30 days
Delivering a working private cloud service quickly and affordably is crucial; otherwise, IT risks the possibility that business stakeholders will deploy "shadow IT" services through the public cloud. **HP CloudStart** helps avoid this scenario with speedy implementation (within 30 days after installation and startup) of the first private cloud services based on HP CloudSystem Matrix. HP experts provide a series of workshops to shape and define the best CloudSystem Matrix configuration, develop up to four compute services, and provide service definitions and specifications for those compute services. Clients also receive full automation design, implementation, and testing of the four compute services, so they quickly become production-ready consumable services.

In tandem with HP CloudSystem Matrix, HP CloudStart provides the core features of a public cloud service, including:

- Web-based self-service menus

- Ability to activate a service in minutes

- Flexibility to scale or cancel a service at any time

- Behind-the-scenes IT service management

- Real-time access to consumption and chargeback reports

Take a total solution view for support needs

One of the biggest advantages of deploying HP CloudSystem is the simplicity it brings to key design and technology decisions. Similarly, the support experience for an integrated hardware, software, and management solution should be simple and straightforward, not siloed and complex.

HP Solution Support experts accessed through 35 global "solution" call centers provide a single point of contact across HP and multivendor solutions. Through a single point of accountability for server, storage, software, and networking, clients can get support for the entire CloudSystem environment—from the cloud portal down to the infrastructure, eliminating finger-pointing and providing faster time to resolution.

Prepare staff and the organization for greater adoption

Cloud computing requires an operating environment that is more service-centric than traditional IT. Clients who are considering HP CloudSystem technologies should also consider what people and process investments are needed to manage the change to the cloud, and how to prepare their organizations for it. HP Cloud Computing Curriculum and HP CloudSystem courses from **HP Education Services** help teach your employees how best to manage, monitor, and use cloud technology. With award-winning online or face-to-face courses from HP Education Services, clients can get their teams up to speed with the hottest HP cloud and Converged Infrastructure technologies and cloud computing concepts.

Summing up

Cloud computing is well on its way to being the key element in the IT arsenal and the single, most important enabler of the data center of the future. In order to assure the cloud doesn't introduce more problems than it solves, however, it needs to be well grounded: its implementation must make IT management simpler, not more complex; render security better, not worse; and make sure costs and business objectives are aligned, not skewed. With an HP CloudSystem offering, along with a programmatic, step-by-step approach and a clear goal that ultimately provides a unified view of all types of cloud computing, you can meet your cloud objectives—and do so more easily, more quickly, and at a lower cost.

For more information about HP CloudSystem, see: **www.hp.com/go/cloudsystem**

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