Private cloud: management pre-requisites

Business white paper

Executive summary

By implementing a private cloud computing environment, your IT organization can deliver services to the business with greater speed and agility—without the risks associated with public cloud options. This paper, targeted at chief information officers and director-level IT professionals, explores key considerations for moving toward a public cloud computing model.

Looking at clouds from both sides

Cloud computing is a solution to a problem. The problem is a lack of business agility where organizations struggle against IT complexity and resource constraints to effectively scale up and respond to changing market conditions. The solution is on-demand computing resources that can be accessed over the Internet quickly, without the need for lengthy IT projects, and without upfront capital expenditures.

Unfortunately, many IT organizations are about as fond of the solution as they are of the problem.

It's hard to argue with the fact that most IT organizations find it hard to change course and scale up to meet the ever-changing requirements of the business. This has a lot to do with the traditional build-to-order model that most IT organizations follow for delivering services. Requiring dedicated infrastructure and always involving the complexity of traditional IT silos, these services take a long time to implement, are expensive to build, and require tremendous resources to manage. Under this model, IT must police projects to conserve resources. In the end, IT feels like the perpetual bad guy—more often telling the business what it can't do instead of what it can.

In this context, business frustration is understandable—and the lure of the cloud is almost inevitable. Looking for ways to circumvent the IT roadblock, many lines of business (LOBs) are now procuring cloud services on their own. After all, cloud computing professes to do what IT has long promised—namely deliver more for less and act as a business enabler rather than a business obstacle. The issue, however, is that the cloud solution often leads to shadow IT—uncontrolled purchasing, dangerous security breaches, and poor service quality brought on by a lack of IT governance. From a business and IT perspective, this is no solution at all.

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More chaos, faster

Cloud computing borrows its metaphor from the traditional cloud diagrams used to depict the Internet.

In these diagrams, numbers of network nodes, servers, or terminals are shown connecting to one another by way of the cloud/Internet.

The cloud computing phenomenon can be seen as the fulfillment of this original vision—where computing resource providers deliver resources over the Internet to anyone who wants to acquire them. This is the model most people have in mind when they talk about cloud computing. It is also a model that makes many IT organizations apprehensive.

Consider the example of a business unit that identifies a great new opportunity to attract new customers and gain an advantage on the competition. Rather than go through all the red tape required to work with IT and meet its objectives, it uses the corporate credit card to buy some public cloud capacity. In a few weeks it has an application up and running and is happy with the results. Unfortunately, the business unit has linked the unsanctioned public cloud application to a customer database in the corporate data center. This exposes the company to several risks. For example, a security breach on the public cloud could expose customer data, resulting in stock devaluation and significant fines. Alternatively, the public cloud application could generate inefficient SQL queries against the corporate database, creating access issues that impact the performance of other applications. Or worse still, it could provide a conduit for a hacker to gain access to resources behind the firewall.

The point is that while cloud computing may reduce costs and increase agility in relation to the infrastructure issue, it also increases IT complexity and the speed of deployment by orders of magnitude. This makes IT governance and clear IT management processes more important than ever before. Yet by providing only the container—with no way of managing what you put inside it—most cloud offerings today make it exceedingly difficult for the internal IT organization to ensure quality and manage operations. This is hard enough to do in a closed IT environment. With cloud computing—where the rule of the day is more chaos, faster—IT needs to find a way to put clear management processes and controls in place so that it can mitigate risk and ensure high levels of service.

Some privacy, please?

This is why many businesses right now are gravitating toward the idea of a private cloud. Think of the prevailing cloud computing model as the public cloud. This is where infrastructure services are delivered over the Internet to anybody who wants them. Private cloud computing is different. According to Gartner, it "is a style of computing where scalable and elastic IT-enabled capabilities are delivered as a service to internal customers using Internet technologies."[1] The key word here is internal. For both the business and IT, the idea is to have the best of both worlds: agility and security, low cost and high levels of service, business speed and IT governance.

A private cloud essentially mimics the public cloud but on a closed, internal network. This allows organizations to sidestep the pitfalls of public cloud computing—such as a lack of security, governance, and reliability. Private clouds give IT the confidence to adhere to service level agreements because IT can better control processes. They also play a major role in helping IT reorient itself to the delivery of services rather than technology—which is something that IT has been promising for some time now.

Private cloud, however, is not a magic bullet that will automatically slay all the demons that currently vex IT organizations everywhere. More appropriately, it should be seen as a wake-up call for IT to reorient itself to the delivery of services rather than technology. This, after all, has been the promised trajectory for IT for years now. The business wants IT to act as a fully engaged business partner delivering services that will help the business execute on strategic objectives. Moving toward a private cloud demonstrates a definitive step in this direction.

[1] Thomas J Bittman, Gartner, Inc. "Q&A: The Many Aspects of Private Cloud Computing," October 22, 2009.

Key considerations for building a private cloud

Private cloud computing is about enabling a new delivery/consumption model within the enterprise—one that moves away from the build-to-order paradigm to one that's focused on demand, supply, and delivery. Here, IT meets the demand by making available a wide variety of standardized services that can be ordered through a catalog hosted on a customer portal. This requires IT to think ahead of time about the types of services LOBs will most require. While this approach limits opportunities for configuration and customization, it enables IT to deliver services on a greatly accelerated schedule that is measured in minutes and hours rather than weeks and months.

The supply side of the equation focuses on a centralized infrastructure of available resources—both physical and virtual—that can be provisioned out on demand. These resources include servers, network, storage, and development platforms—as well as the applications and software components required to support the services delivered. In the context of a private cloud model, all of this requires intelligent resource management capabilities and automated provisioning to make the supply scalable and elastic.

Once an end user places an order for IT services, automated processes kick in to orchestrate the provisioning of the service and all required resources. Based on clearly defined standards and following a lifecycle approach to development, these services are all tested for quality and performance ahead of time and can be activated quickly from the catalog. From there, IT should be able to execute all the metering, billing, service health monitoring, and SLA reporting required to support consistently high-quality services at the enterprise level.

None of this means that the traditional build-to-order model will go away completely. For the foreseeable future, there will remain a need for custom-built system implementations that do not entirely fit the cloud vision. However, moving toward the private cloud capabilities will make IT more agile and responsive to business needs. It will also help breed familiarity with the cloud model in general—giving IT the experience it needs as computing moves increasingly toward the use of

public cloud resources. Many organizations, in fact, see the private cloud model as a stepping stone toward offering their own cloud computing resources on the open market.
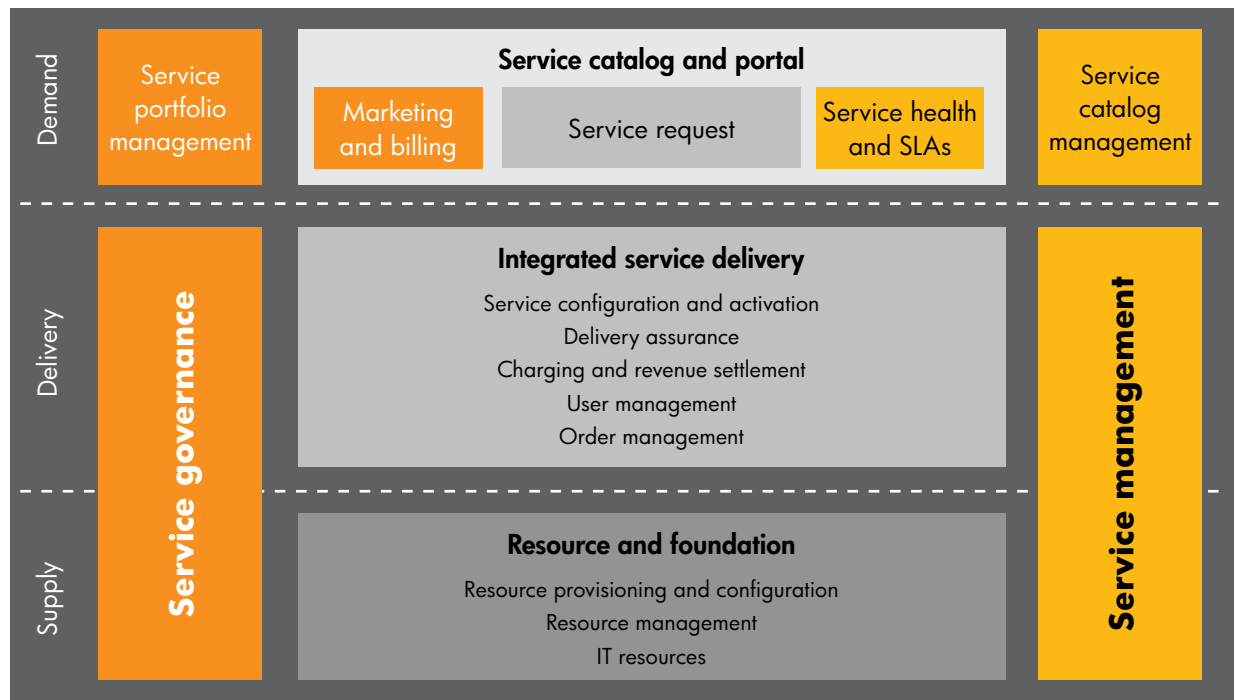
Before any of this can take place, however, IT needs to follow through on some fundamental reforms. Again, these reforms have been on the table for years. The specter of cloud computing—and all the competitive pressures that come with it—only makes them more immediate.

The following discusses some the areas that IT needs to focus on in order to build an effective private cloud.

Standardization

As is the case with all self-service-driven, mass-consumption products, standardization is the first step toward building an effective private cloud. It's also the first step toward the effective delivery of IT services in general—regardless of private or public cloud delivery models. IT has understood this fact for years, but obstacles have always stood in the way. From organizational inertia and complications to mergers and acquisitions to internal turf wars and the persistence of vendor relationships—these obstacles have served as a justification for maintaining the status quo.

Figure 1
The HP reference architecture for private cloud computing

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Today, organizations are at an inflection point where these justifications no longer hold sway. Change is simply inevitable. Without standardizing, organizations that depend on IT to execute their processes and interact with customers cannot expect to compete effectively and will be gradually pushed out of the market.

Standardization enables the sharing of services—which is the point of cloud computing. If an IT organization building a private cloud delivers a particular application several different ways, this would make it next to impossible for users to consume the services that the application supports. Standards for private cloud computing need to focus on the domains of infrastructure, platform, and applications—each delivered as its own service. Infrastructure services, for example, deliver converged pools of standard server, storage, and network resources. Platform services deliver standardized core software that is pre-loaded and ready to run business applications. Application services, finally, deliver the applications themselves that support the ultimate business services that users see and for which the organization pays.

To standardize means much more than settling on a single vendor. It also means developing a standard set of policies and processes and adhering to them over the long term. Many companies use existing frameworks such as ITIL v3 as a starting point, adding and modifying best practices as internal requirements dictate. In the end, the most important factor is to maintain consistency across the end-to-end application lifecycle—which extends from development and deployment to operations, maintenance, and retirement. Alone, the benefits of such standardization can help increase the efficiency and productivity of both IT and business users. It can also drive down IT costs by reducing complexity throughout the IT organization. More importantly, standardization sets the groundwork that enables greater advantages through automation and a consistent approach to managing business services.

Consolidated system management
Cloud computing is made possible in large part by advances in virtualization technology where virtual instances of server space are made available to users on demand. This emphasis on virtualization, however, often leads to a de-emphasis on the physical components that underpin any cloud environment.

Organizations planning to implement a private cloud need to overcome this bias because private clouds deliver business services that draw from multiple, composite applications that depend on a variety of virtual or physical resources within the IT infrastructure. Thus to manage a private cloud, organizations need to approach the issue of provisioning in an end-to-end manner that accounts for the management of both physical and virtual assets.

Provisioning business services in the context of a private cloud involves a long list of tasks including finding capacity, allocating infrastructure, deploying the operating system and application components, and monitoring usage for chargeback purposes. These tasks, of course, need to be done with the least amount of effort. This is where automation comes into play.

The simple reality is that in a fast-moving, real-time private cloud computing environment, manual processes don't work. They only barely work for traditional physical environments. The speed and agility required for cloud computing will push these manual processes—as well as the business—to the breaking point. Yet at the same time, IT still needs to manage the physical assets that underpin the cloud. Operating systems still require patching and applications still need to be upgraded. In fact, in a virtualized environment characterized by the *"More chaos, faster"* section, keeping on top of such duties is more important than ever before. This is why IT needs a centralized, integrated, automated set of tools for managing physical, virtual, and cloud environments in a uniform manner.

Service level management
The hype around cloud computing may lead some to believe that the fundamentals of IT resource management are a thing of the past—but nothing could be further from the truth. This is especially true for private clouds where IT takes on responsibility for delivering all aspects of the service with the aim of increasing business agility and reducing cost through improved efficiency.

The basic fact is that cloud computing forces IT to move from a reactive, tool-centric model of managing resources to a proactive model aided by automation. Teams of IT staff members looking at screens and responding to alerts—each from the limited perspective of their own domain—can no longer suffice. Instead, IT needs a holistic approach to monitoring and managing resources where IT systems can monitor conditions and respond automatically based on predefined parameters. This, for example, can allow IT to flex up or flex down to meet business service demand in real time.

Ultimately, it is such automated resource management capabilities that give IT the confidence to adhere to service level agreements. Across the critical areas of availability, capacity, and performance, IT has the ability to respond flexibly to constantly maintain the agreed-upon class of service. In the end, this also helps to engender a relationship of trust with the business, which sees a mature, competent IT organization acting on an ongoing basis in the best interest of the business.

Cloud application lifecycle
What does it mean to develop applications and services for cloud computing? Two considerations are primary: application performance and the pace of change. On the performance side of the equation, organizations need to make sure that whatever they deploy will work sufficiently with the virtualization technology they use. In addition, applications and services also need to run effectively in a web-based context. By itself, this is not a particularly new concern as organizations have been deploying applications over the Internet for years. It needs to be noted, however, that cloud computing in no way frees the development team from the requirement of solid development practices. Cloud computing, in fact, only makes the requirement more important—because the margin for error is greater and the potential for errors to reverberate in unpredictable ways can be catastrophic.

By far, the bigger concern here is the accelerating pace of change. Cloud computing makes everything faster—and IT must do whatever it can to keep pace. Just as automated tools for provisioning and resource management play a role in helping IT manage demand in a cloud context, so can automated tools for application development. The key is to take an application lifecycle approach that feeds all new development and change-related activities into a clear workflow.

Even though applications can be deployed with a push of a button, for example, the actual deployment must be approved. For major changes, IT will want to consider the potential ramifications. Minor changes that come in under an easily recognizable threat threshold can be approved in an automated fashion. Once approved and executed, changes need to be thoroughly tested on the basis of quality, performance, load, and functionality. Automated testing tools can ensure that all testing gets done according to established policies while minimizing the potential for human error. Perhaps even more importantly, such automation alleviates demand on IT and enables it to keep pace with the speed of change in a cloud computing environment.

Security, compliance, change, and configuration

In many respects, security for private clouds is similar to security for traditional computing models based on physical assets. In both cases, companies need to make sure that all provisioned assets—servers, new applications, OS patches, and the like—adhere to established IT security policies. The main difference for private cloud computing is the speed of change. Manual security processes may have worked in physical environments (albeit poorly), but they simply can't keep pace with virtualized environments.

This means that IT needs to automate security for the private cloud model. The goal is less about building an impenetrable firewall and more about ensuring access to resources by the right people, at the right levels, at the right times. To that end, newly provisioned virtual machines should automatically inherit the appropriate security and identity management configurations in a way that integrates with the existing security infrastructure. These machines, in turn, should be automatically incorporated into a centralized monitoring environment that covers the end-to-end IT infrastructure, including both physical and virtual assets. This helps ensure hardened systems that enable IT to respond to security vulnerabilities as they occur.

In a similar vein, organizations need to automatically bring virtual assets into existing processes to manage change and configuration in a way that ensures high levels of availability and performance. The same is true for compliance—whether the focus is complying with internal policies, licensing contracts, or government regulations.

Here again, this has as much to do with foundational IT management practices as it does with the unique circumstances of cloud computing. Consistent, enterprise-wide processes for key IT management tasks are an absolute necessity for managing a private cloud. The added layer of abstraction introduced by virtualization technology—as well as the speed with which virtual assets come and go—only makes consistent IT processes backed by centralized visibility into the infrastructure more important than ever before.

Building a private cloud with HP

HP Software and Solutions can help your organization succeed in a world moving to the new cloud computing paradigm. With the HP Cloud Service Automation (HP CSA) solution you can build a private cloud computing environment that enables you to deliver services faster while providing the highest levels of quality and security. Key advantages of working with HP include the following:

- **Fast time to value:** HP CSA is based on the most mature set of IT management tools available on the market today—much of which has been in use by companies around the world for more than a decade. With HP CSA, your organization will be up and running quickly with a private cloud computing environment—one that will enable you to deliver services in timespans that measure hours rather than months.

- **Scalability and heterogeneity:** HP CSA is environment independent. It can run in any IT infrastructure using any network, storage, server, hardware, or virtualization platform. It can also scale to meet any level of demand for the IT services you deliver. This means that you won't outgrow your public cloud, but rather it will grow with you.

- **End-to-end integrated cloud functionality:** HP CSA is the only integrated cloud solution available on the market today. While other solutions require a multivendor approach, HP offers one-stop shopping that includes a mature, proven, and integrated set of software solutions along with the hardware and services (described below) to support the entire lifecycle of your cloud initiative.

- **Testing-as-a-service:** HP delivers a proven testing-as-a-service offering for the private cloud applications you build and deploy. A highly available, consumable, pay-as-you-go model gives you testing flexibility. It also lowers the cost of entry to full-service testing options while enabling the highest quality applications possible.

HP's approach to private cloud computing is backed by real-world successes with customers all over the world. For example, HP worked with a government agency in the United States to build a cloud-based test environment. This agency has been able to reduce the time required to provision and deliver test environments for QA from six months to just 24 hours. HP also worked with a global bank in Europe to build a private cloud. As a result, this bank reduced the time to provision a server from eight man hours to zero—saving more than 12,000 man hours in all. It also reduced service delivery times from five months to just two hours and helped the bank save approximately $750,000 in capital expense through the use of virtualization technology.

Workshops and services for private cloud success

To help your organization fully realize the business promise of private cloud computing, HP offers a series of targeted workshops that focus on key areas of concern such as change management, process re-engineering, and virtualization technologies. These include the following:

- **Cloud discovery workshop**—which focuses on the components required to run a private cloud, building consensus for your vision, reviewing key opportunities, and understanding the implications for the business and IT

- **Cloud roadmap service**—which focuses on the development of a strategic cloud architecture, conducting a gap analysis, and generating a multi-year roadmap for cloud adoption

- **Cloud design service**—which focuses on architectural analysis and validation, generating a detailed design, creating a bill of materials, and implementing a plan

- **Cloud security service**—which focuses on analyzing the 15 domains of cloud security, enabling security, control, maturity, and compliance, and building a security and compliance remediation roadmap

Next steps

To learn more about how HP can help you realize the benefits of private cloud computing or to move forward with your initiative today, call your HP representative or start your journey by visiting HP at one of the following online locations:

- For more information on HP CSA:
  www.hp.com/go/CSA

- For more information on private cloud services:
  www.hp.com/go/cloudconsulting

- For more information on consolidated monitoring:
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