

EMC PERSPECTIVE



**Private Cloud Means Business:  
Costs Down and Agility Up**

### What is private cloud?

Private cloud is a more efficient and flexible way to organize, manage, deliver, and consume IT services. See page 3.

Benefits range from cost to business performance to IT performance. Most significantly, private cloud is a platform for business agility. See page 5.

Private cloud offers the benefits of public cloud services without the major drawbacks. See page 9.

Large corporations are working on many of the components of private cloud. See page 10.

The journey to private cloud is challenging, but with a good roadmap you can proceed with confidence. See page 11.

Find your scenario and identify your likely next steps. See page 12.

Now is the time to coordinate your efforts, commit to building your private cloud, and reap the rewards. See page 15.

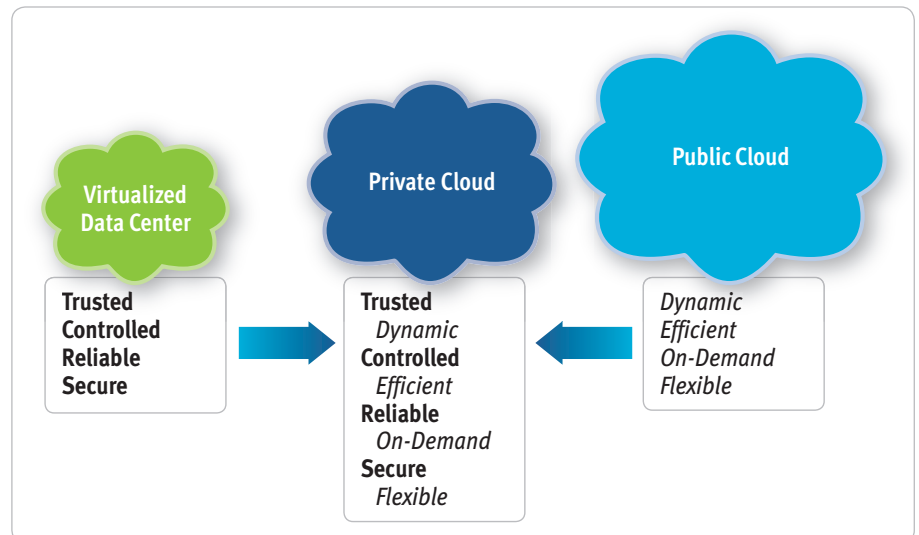
## Overview

Private cloud is a new and better way to organize and manage information technology resources and services—and a new and better way for a business to consume them and put them to work. Instead of filling predefined and limited roles, IT resources form a flexible pool that business people and processes can draw upon precisely when and as needed.

What does that mean for a business? In a word—agility. What if you could more rapidly access and analyze information and make decisions? Innovate and launch new business capabilities faster? Scale business operations up or down as needed? Tap into new information and expertise—both inside the company and in the marketplace—on demand? And do all this while safeguarding sensitive information and other business assets? That would add up to genuine **business agility**. People often talk about agility in abstract, “holy grail” terms. Private cloud fosters agility in these concrete, pragmatic, and powerful ways. If your business enjoyed such agility, if its information technology were catalyst rather than constraint, how might you operate, manage, and compete differently?

When one says “cloud computing,” people think of widely publicized services offered by Amazon, Google, Microsoft, and Salesforce.com. This is the “public” cloud, where you can rent computing and storage capacity, as well as a growing array of business applications and services, accessed via the Internet. The prices are attractive, and the services are available on-demand. But the risks around information security and systems reliability, plus the impractical (indeed, herculean) task of retrofitting business applications to function in the public cloud, prevent established organizations from running their important business systems there.

### Private cloud



A “private” cloud puts the same approach to organizing resources and provisioning services (including legacy systems) to work inside a company’s firewall and security infrastructure. It yields much the same benefits—cost reduction, asset utilization, information availability, rapid deployment of new services, and business agility—as the public cloud, but without the major drawbacks and risks. Meantime, a private cloud can also serve as a gateway to the public cloud, enabling a business to make use of the growing array of services available there, while keeping business-critical information systems “inside.”

We called private cloud “new” because the capabilities, both technical and managerial, to execute this approach have only recently come together. However, major components of private cloud (in particular data center consolidation and “virtualization,” together with standardized “Web services” interfaces among systems) have been around for years. And astute IT organizations have been implementing them. You probably don’t call it “private cloud” yet, but your company is very likely moving in this direction and seeking the business benefits.

These benefits are by no means automatic, but they are very much worth pursuing. The questions for today are whether your migration toward private cloud is piecemeal or purposeful, whether you have the foresight to anticipate how all the components can come together, and whether you can reap the business benefits early and often along the way.

### Adding up to business agility

- Rapid information access, analysis, decisions
- + Rapid business innovation
- + Rapid deployment of business capabilities
- + Rapid scaling of business operations up and down
- + Facile collaboration and access to resources
- + Security, compliance, business continuity

= BUSINESS AGILITY

## What is cloud computing?

The term cloud was first applied to telecommunications networks and the Internet because they were drawn on technology diagrams as clouds, signifying areas where information was moving and being processed, but the average person needn't be concerned about exactly how that happens. And that's a central feature of cloud computing—the customer asks for and receives information or other resources without needing to know where they reside or how the services in the cloud fulfill the request.

A widely adopted, formal definition comes from the National Institute of Standards and Technology:

“Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.”

That's quite a mouthful. The most important thing to note is that the cloud is not a set of technologies; rather, it's a model for delivering, managing, and consuming information technology resources and services.

It's useful to break down the definition of cloud computing into how resources are configured and what that enables you to do. Resources in a cloud (which, by the way, can also include information/databases, productivity tools, and other software) have three basic characteristics:

- **Pooled.** All the resources in the cloud are organized and managed as a common shared pool. Pooling usually begins with servers and storage, which set the scene for data and applications. This, of course, demands common methods for structuring, connecting, and accessing the resources.
- **Virtualized.** All the resources in the pool are packaged in electronic “shipping containers.” Each contains not only the resource itself, but also the business rules governing its access, use, and management.
- **Networked.** All these modular resources are accessible over a network using standard interfaces that enable them to be combined in “lego” fashion. In more technical terms, they are available as “Web services.”

## Cloud characteristics and advantages

Consistent configuration of resources yields multiple benefits

Pooled

Virtualized

Networked



Efficiency

Flexibility

Accessibility

Reliability

Security

Automation

Optimization

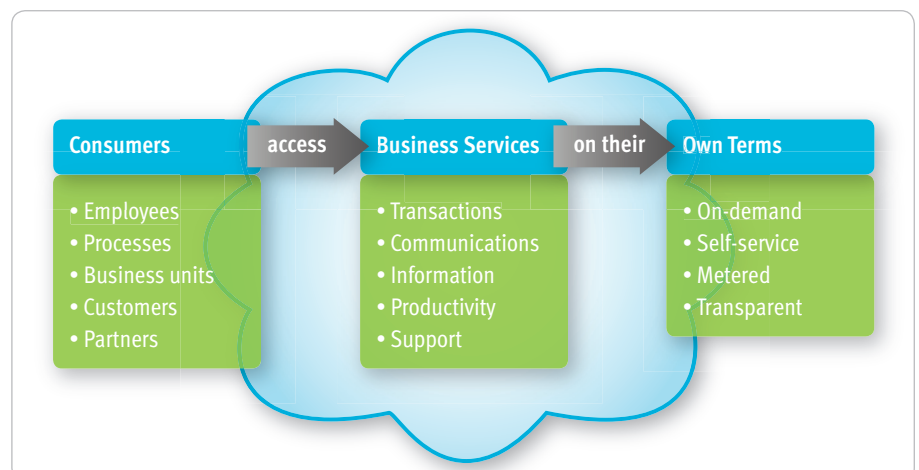
What does this configuration enable you to do? It profoundly changes how information and technology resources are managed and provisioned to the business:

- **Efficiency.** A cloud's resources have device and location independence. Instead of a server dedicated to each application, virtualized resources may reside anywhere (and neither programmer nor user need be concerned with where). That enables greater economies of scale and higher utilization rates with a smaller, consolidated hardware base.
- **Flexibility.** This happens two ways. Resources of all kinds, software and hardware alike, can be assembled into new configurations, new information systems, new business capabilities with unprecedented speed. And technology resources can be scaled up to handle peaks in business activity, then scaled back. In other words, resources can be diverted to "where the business action is" as never before.
- **Accessibility.** A much broader array of information, applications, technology services, and business services are potentially available to business people, processes, and organizations, usually through a standard browser interface.
- **Reliability.** A cloud can have as much redundancy as the business requires and can channel resources to backup and recovery when needed—without need for parallel hardware configurations.
- **Security.** Assets can be protected not just by the perimeter firewall and information encryption, but also at the local level by including business rules in the virtual containers, especially for the most sensitive information.
- **Automation.** A cloud's resource management software acts as an automated "traffic cop," dynamically determining what goes where and how resources are put to use. That means less day-to-day effort for IT staff and more consistent decisions about how resources are utilized.
- **Optimization.** Because a cloud is managed as a whole, one can come a lot closer to optimizing its resources as a whole—getting the best mix of capabilities, performance, and cost for the business as a whole.

Cloud computing also enables fundamental changes in how technology resources are consumed by the business. Activity in a cloud is measured and **metered**, so customers of cloud-based services can be charged on a pay-per-use basis. That also gives customers **visibility** into their actual usage levels and thus better understanding of their costs. Most importantly, they can access cloud services **on-demand** and often via **self-service**. Resources are available when and where the customer wants them. With the help of well-defined services, simple interfaces, and automated provisioning, customers can find and use services on their own (or with minimal intervention and assistance from IT staff).

We've stressed the notion of services. With a private cloud, you can change the unit of consumption itself. Instead of consuming and being charged for basic technology resources (e.g., servers, CPU cycles, gigabytes of storage, and bandwidth), business people and processes can consume relevant and easy-to-understand **business services** (e.g., business transactions, e-mail, and information analyses). IT has long tried to define, deliver, and charge for its offerings in more business-oriented terms. A private cloud provides the platform for doing so consistently.

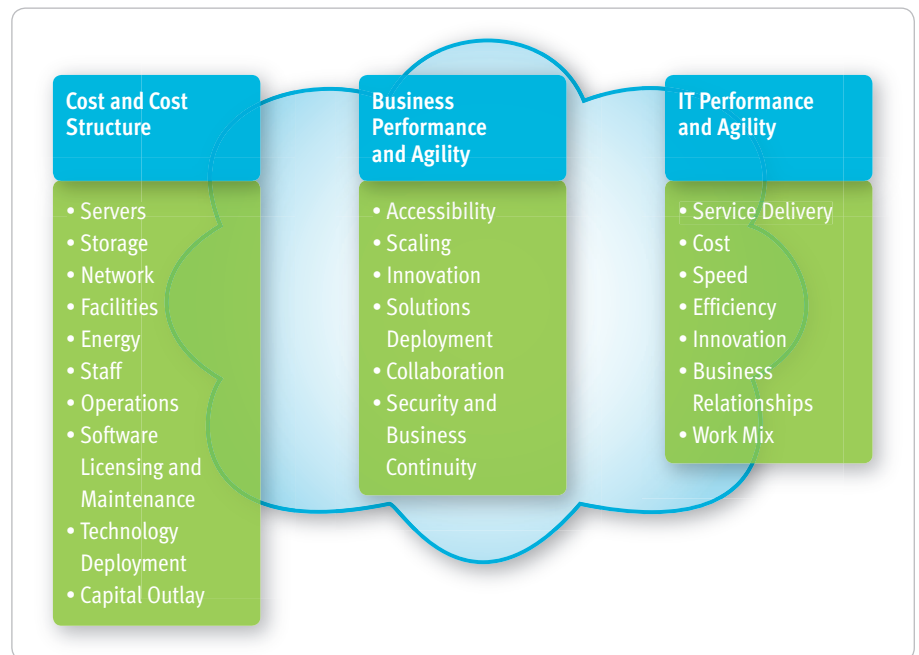
### Consumer view of the cloud



## Array of benefits

We've already listed many of the basic advantages of cloud computing. Now let's explore what they mean for a business. We group the benefits into three categories: cost, business performance, and IT performance.

### Benefits of the cloud approach

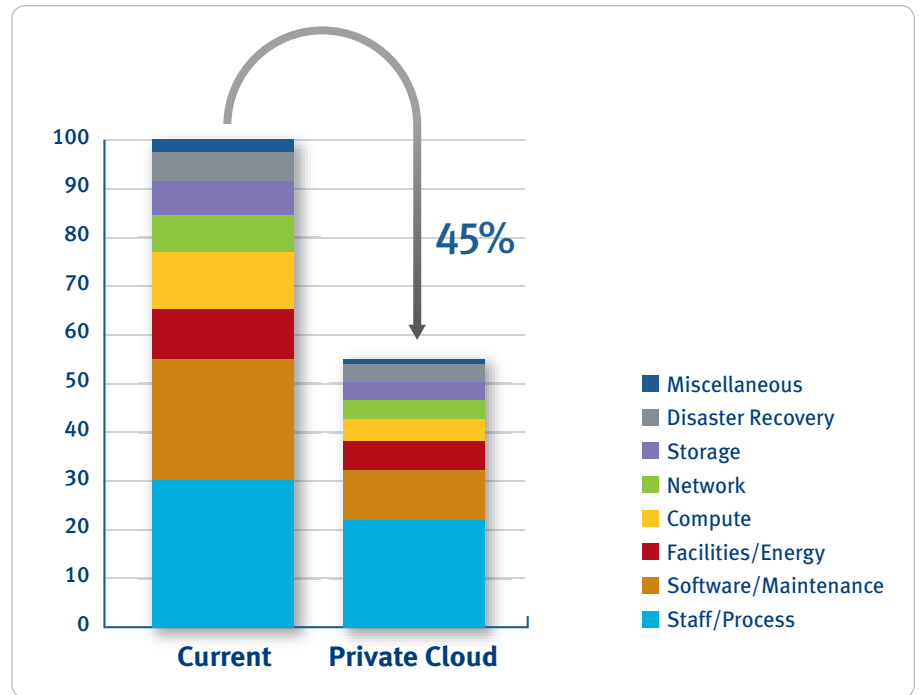


**Cost and cost structure.** This includes not only direct cost reduction, but also cost avoidance and improving cost structure. Much of the short-term cost reduction comes through consolidation of hardware and virtualization of digital assets. Companies can see overall reductions of 40 percent in data center costs, including a 30 percent reduction in power consumption and cooling costs. This smaller carbon footprint is the foundation for “green” IT. Data centers have traditionally been overbuilt to handle peak capacity requirements, with as little as 10-15 percent of capacity regularly used. Virtualization enables you to size the data center closer to average capacity, not the worst case. And when things get busy, resources are automatically channeled to the most important business activities.

Since large companies are still in the process of consolidating, virtualizing, and automating technology resource management, they have yet to appreciate the ongoing cost reduction that a fully implemented private cloud delivers. These operational efficiencies—including flexible, dynamic, “zero touch” resource management processes—can yield a 30 percent cost reduction.

By pooling and centrally managing assets, a private cloud delivers economies of scale, better resource utilization, reductions in capital outlay, ongoing operational efficiencies, and the conversion of fixed costs to variable (whenever you tap into the public cloud and pay only for services consumed).

## Representative cost benefits



**Business performance and agility.** Private cloud can enable all of a company's technology-dependent business processes to operate more efficiently, with faster cycle time and at lower cost. Benefits include:

- **Expanded access to information and applications.** Employees can quickly gather information for analysis and decision making, and they can access information and applications securely from wherever they happen to be working. Individual productivity rises.
- **Rapid scaling of business operations up and down.** If you're closing the monthly books, reaching a seasonal peak of business activity, or finding that a marketing promotion is unexpectedly successful, your computing capacity and information systems can automatically scale to cover increasing (then receding) demand.
- **Rapid business innovation.** You can assemble the technology and information infrastructure for any business initiative or experiment on-demand. That means faster time-to-market or "fast fail" of innovations that aren't going to pan out. One company calls this "private cloud in a box"—servers, storage, browser interface, and management software instantly available for any development and test effort.
- **Rapid deployment of new business capabilities.** When an innovation proves successful, or for any business change initiative, the information and technology components can be quickly assembled, scaled up, and integrated with related business applications. We see reductions of over 70 percent in the technology deployment time, effort, and cost associated with business initiatives.

- **Expanded coordination and collaboration.** Within a business, its people, organizations, processes, and information systems are better able to connect and work together. For multinational corporations, private cloud can facilitate the globalization of operations and infrastructure. Outside the business, a private cloud is a platform for more seamless collaboration with customers and business partners, as well as for access to public cloud services and other business capabilities in the marketplace.
- **Better compliance, security, and continuity.** The virtualized and automatically managed environment of a private cloud enables better compliance with information management and privacy regulations (because duplication is reduced and the rules for information access and use are packaged into the virtual containers), more secure remote access to corporate information and systems (because sensitive assets don't reside on mobile devices), and faster and more reliable backup and recovery of information systems (because backup locations are flexible and resources are diverted as needed to recovery operations).

As we suggested in the introduction, if you step back a moment and consider these business capabilities collectively, you have the very definition of **business agility**.

### On the road to private cloud

A global financial services institution is on the road to private cloud in pursuit of a variety of business goals:

- Improving cost structures and reducing expenses
- Extending already-industry-leading, web-based services to customers
- Increasing business agility by speeding the time-to-adoption for all technology-based initiatives
- Improving the delivery of IT services, business transparency into IT work and costs, and working relationships between IT and the many business units it serves

The company has over 100,000 employees and operates around the world in retail and commercial banking and insurance. Its technology infrastructure is correspondingly large—10 data centers, over 10,000 servers, and over 4 PB of data under management. Its technology delivery and management situation was typical for a very large organization—too much IT budget spent on maintaining today's operations and too much time and effort going into provisioning new solutions. Benchmarks showed that the company was lagging not only in IT efficiency, but also in business reporting and transparency. The lines of business perceived that they were getting too little value and service for the IT cost incurred.

The company's program to improve the business performance and value of IT had three main thrusts:

- **Physical infrastructure.** Data center consolidation, virtualization, and automation are yielding significant efficiency and cost benefits: 40 percent improvement in storage utilization, 80 percent improvement in provisioning time, 40 percent cost reduction in cabling, and 30 percent less power consumption.
- **Service delivery.** IT is redefining its work through a services catalog and enabling self-service access to many services. The lines of business are seeing dramatic improvements in solution provisioning time, in some cases from months to hours.
- **Management.** IT governance has been centralized and IT resources aligned with major business processes.

The goal is to leverage private cloud to enable the business to consume and capitalize on IT more effectively—an organizational as well as technological transformation. So important steps on the road are workshops bringing together business, IT, HR, and risk/compliance stakeholders, plus a variety of subject matter experts, to discuss and develop revised approaches to governance, security, technology services, systems access, and data mobility.

The company is well on its way to virtualizing 80 percent of its IT resources and managing them through a private cloud, and the financial benefits provide ongoing momentum to the program.

**IT performance and agility.** The process and cost-performance benefits we've just described also apply to the work of the IT organization. IT can collaborate and innovate better, develop and deploy applications faster, and provision technology and services more efficiently and flexibly.

That translates into better service to the business. Technology needs can be filled faster, employees can have more choice in the devices and software they use, IT services can be structured for ease of consumption (and self-service is often the easiest), and the costs and performance of IT can be more transparent to the business (especially when the business pays for services as consumed).

With private cloud, IT's work mix changes dramatically. Less time and effort go into commodity activities in the data center (because the virtualized environment is more automated and dynamically self-adjusting) and help desk (because employees increasingly manage their technology and serve themselves). So more time and effort are available for business innovation and improvement projects. In addition to meeting individual business needs as they arise, IT is much better able to look across the computing environment and optimize its performance and cost on behalf of the business at large.

Here's another way to look at the benefits we've described: the private cloud approach dramatically reduces (and sometimes even eliminates) some basic and longstanding business tradeoffs. You can have both scale and flexibility. You can have both low cost and speed-to-results. You can optimize on more dimensions of performance simultaneously. The private cloud approach makes IT less of a business constraint and more of a business catalyst. It's simply the right model for businesses today.

#### **When scalability is key**

The Federal government is encouraging major medical institutions to adopt electronic medical records methods and technology quickly. The carrots include \$44B in available stimulus money and regional support services; the sticks include a series of deadlines (and as the largest medical insurer in the country, the government has clout). For large medical institutions, this poses an implementation dilemma. The goal is to have the entire institution, including its affiliated physicians, behave as an integrated clinical entity. But individual and small-group-practice physicians, often with their own offices, may have little motivation to invest in or adopt new technology. As the manager of clinical applications at Beth Israel Deaconess Medical Center (BIDMC) in Boston, Massachusetts, said, "We didn't want to spend \$1 million building an infrastructure to support 400 physicians but only have 100 show up."

The answer for BIDMC—and for any organization that faces the prospect of wide variations in business volume—lies in private cloud. BIDMC put together a virtual and scalable server and storage infrastructure, hosting an integrated physician practice management and electronic health records application package, and accessible via secure web connections from physicians' offices. From the physicians' standpoint, they simply open their web-connected tablet PCs and use the system.

Scalability proved key, even early on in the rollout of BIDMC's private cloud. As physicians started using the cloud's services, storage needs trended higher than anticipated, and then the package vendor released a major upgrade that doubled the memory and storage required by parts of the application. Both demands were met by the dynamic and flexible architecture of the cloud, with minimal effort and added expense.

The government is pushing hard to improve the quality and efficiency of medical care through information sharing, while still protecting that information and patients' privacy rights. A private cloud, configured to share resources securely, is the right platform for medical information systems today and tomorrow.

### The security question

Security and compliance consistently rank as CIOs' top concerns with cloud computing, and they're valid—even disqualifying—concerns for the public cloud. But a private cloud, in contrast, presents the opportunity to strengthen security and compliance by building them into the definitions and management of specific data and other assets, not just bolting them on through the perimeter defenses of firewalls. All of your current security infrastructure—including firewalls, encryption, and passwords—remains at work in a private cloud. You can also embed the rules for access, use, location, and management of assets into their virtual containers. And you can do so at your own pace, starting with the most sensitive information and applications. With private cloud, security and compliance are not problems, but areas of opportunity.

## Private versus public cloud

The public cloud consists of a fast-growing array of third-party services accessed via the Internet. With very large players like Google offering services, the scale is enormous and the unit cost potentially very low. A small business can source its entire technology infrastructure and most of its business applications in the public cloud, and any smart startup today relies heavily on the cloud. Why reinvent the wheel? However, for a large and established corporation, with a suite of business-specific legacy applications and responsibility for a lot of important information, relying heavily on the public cloud is infeasible. Gartner Group explains: “For most IT services, cloud services do not exist, are not proven, do not meet service-level requirements, do not meet regulatory or legal requirements, are not secure enough, or all of the above.” [Thomas J. Bittman, “Private Cloud Computing: The Steppingstone to the Cloud,” 1 June 2009, p. 5.]

With the public cloud, you lose transparency and therefore lose control. By law, your company remains ultimately responsible for its sensitive information, but you may not know where your data's being stored (that alone violates some national data protection statutes), how exactly it's being protected, or what other unnamed providers are part of a public cloud service behind the scenes. Cloud services neither perform to specific service-level agreements, nor provide adequate audit trails of activity. In a sense, they're “too turnkey,” and it's foolhardy to trust what you cannot see.

Then there's another roadblock. Existing applications need to be retrofitted to run in the cloud—a large and impractical task in most enterprises. And the large public cloud service providers don't make it easy; everything has to be done their way.

We're not saying to disregard the public cloud. It's expanding and improving all the time, and it may be the best source for selected (especially new) business applications and services. But it's not the platform for large enterprise IT—that's simply the nature of the beast at its current stage of maturity. IT executives are well aware of these drawbacks, and when polled are understandably wary of relying on the public cloud.

A private cloud is a different story. It combines the flexibility and cost advantages of a cloud with management control over service delivery and security. It offers a sensible migration path for existing applications—virtualize and revamp the ones you want at your own pace. It preserves your investments in infrastructure, applications, and information, while putting all of these resources to much more efficient, effective, and agile business use.

The ideal will be to combine the best of both worlds—access to innovative and on-demand services in the public cloud with the management control of a private one. Such a hybrid or “federated” approach could provide the ultimate in flexibility, a dynamic combination of internal and external resources. In this model, a private cloud serves as the gateway and control mechanism for public cloud services—another reason why private cloud is the place to start for an established enterprise.

### What not to put in the cloud

The power and business value of a private cloud grow, sometimes exponentially, as more resources are included. But that doesn't mean all resources should go in the cloud. There are three exceptions:

- Self-contained and highly specialized business applications, such as realtime manufacturing control systems and analytical trading systems in financial services. These tend to be complex “workhorse” systems within specific business functions, and the value of pooling these resources is limited. They may regularly connect to the cloud for up-to-date information, but that's as a customer of cloud services, not a resource managed in the cloud.
- Applications and databases that must absolutely be “walled off” from the rest of the computing environment for legal or regulatory reasons, such as local privacy laws. Companies tend to segregate such resources physically to be safe. However, with the help of state-of-the-art virtualization management methods, you can probably put more of these sensitive assets in a private cloud than you assume.
- Applications that have been written, and their performance optimized, with specific systems architectures in mind. This is a temporary impediment, and you may choose to treat the entire application as one virtual container for purposes of including it in the purview of cloud management and begin updating its interfaces. Over time, you may choose to retrofit such applications to join the pool and run as part of the cloud, but you don't have to do so right away.

### Private cloud to the desktop

How far can the resources provisioned and managed by a private cloud extend? Potentially, all the way to the desktop—except that it's not just a desktop PC anymore; it's whatever device (PC, laptop, PDA) an employee happens to be using wherever he or she happens to be working (office, home, on the road).

One of the things that can be packaged in a virtual container is the individual user's customized interface to corporate systems, including both the "look and feel" of a preferred computing experience, and information about the individual's identity and permissions to see and use specific resources in the cloud. In other words, the user experience becomes portable. When the cloud extends to the desktop:

- The individual enjoys much the same experience regardless of location or device, thus unprecedented flexibility and productivity wherever work takes place.
- Devices (even public ones) can be securely segmented, with the work environment in one partition and one's personal computing environment elsewhere.
- Devices that the company supplies can be simple and inexpensive "thin clients" because functionality and most processing occur not in the local device but in the cloud. The life spans of devices increase, and their acquisition, maintenance, and management costs go down dramatically.

This kind of triple win—employee experience, secure access, management and cost efficiency—is what private cloud is all about.

### You've already begun

Don't think of private cloud as new technology (though it does incorporate exciting recent technological developments). Rather, think of it as a better way to organize and manage the technology resources you have. And don't think of the migration to private cloud as a whole new set of activities or a massive implementation project. Rather, it's the overall coordination mechanism for a variety of technology improvement initiatives that you probably need, have under way, or in some cases have completed.

Take a moment to gauge your ambitions and progress in these seven areas:

- Consolidating servers, storage, networks, and other technology resources
- Virtualizing technology resources, including information and applications
- Organizing and provisioning IT offerings as business services
- Structuring and managing IT as a shared services organization
- Automating technology resource and security management
- Building standard interfaces with compatible service providers
- Making effective use of selected public cloud services

Odds are, you've made much (but perhaps uneven) progress, but still have work to do. Some resources are consolidated and virtualized, but others aren't. Business-critical (or "tier 1") applications may still be off limits. You still have silos (they're just bigger silos) of IT services and organizations. As a result, it's still a struggle to manage, let alone optimize, the computing environment as a whole. And you collaborate externally and make use of outside services, but mostly in ad hoc fashion.

Private cloud is a natural extension of all these improvement initiatives, and a private cloud roadmap can be the means of integrating these efforts and amplifying their business benefits. You've already done much of the preliminary work. Private cloud is the right approach for accelerating and finishing the job.

## Journey to private cloud

You want to capitalize on what you've already accomplished. You also need to be realistic about the work that lies ahead. To realize the compelling business benefits of private cloud, you need a good roadmap, and you need to keep it up to date. It's your guide to dividing, prioritizing, and connecting your efforts—and to maximizing the benefits at every stage of the journey. Without a good roadmap, your efforts will be piecemeal and poorly coordinated; you'll be retracing your steps and diluting and delaying your business benefits.

Private cloud represents a more productive way for technology services to be provided, consumed, and managed. For example, technology assets may be defined and packaged differently, through methods like metadata management and virtualization. IT's work may be structured and provisioned differently, as a catalog of business services. Business people may consume many services differently, using a self-service browser interface, and pay for them differently, if you implement pay-by-use for selected services. And IT and the business can manage the technology environment and its services differently, with greater transparency into business performance and value.

### Is it a cloud?

As private cloud takes hold as both a technical architecture and a business proposition, technology and service providers are apt to slap the label "private cloud" on whatever they offer, and some corporate IT organizations may use the term to lend some panache to their infrastructure improvement projects. But to realize the business benefits, you have to understand and implement private cloud as a set of complementary techniques:

- Virtualization is central to private cloud, but it's only part of the story. A highly consolidated and virtualized data center does not constitute a cloud.
- Automated controls are essential to operating as a cloud. They dynamically assign and continuously monitor the physical and virtual resources, thus providing both efficiency and visibility (so you can, for example, implement pay-by-use where you choose).
- Web-based interfaces are essential for rapid configuration of resources and easy access to them, including letting individuals and applications serve themselves.
- If a private cloud is to serve as an agile business platform, it has to encompass a variety of business resources, including information, applications, productivity tools, and user interfaces.

In short, it isn't a private cloud until you learn to operate and manage it as a cloud, automate and optimize its overall performance, and incorporate all the technology-based resources that benefit from being pooled, virtualized, and networked for easy access. You won't build your cloud all at once, but you should keep in mind what the destination looks like, and you should anticipate how the business value of your private cloud accelerates as these pieces come together.

As with any transformational change in how organizations work and work together, the journey to private cloud can seem daunting. Success is all about recognizing what needs to be done, breaking the effort into the right pieces, discovering their interdependencies, anticipating how they'll fit together to yield the desired benefits, and executing with purpose. A few of the pieces may be complicated on their own, but the real complexity lies in orchestrating the overall journey with the business objectives always firmly in sight.

The challenges and obstacles on the journey to private cloud may therefore have less to do with technology than with staff capabilities and business-IT relationships. Do you have the people and skills both to accomplish the changes and to manage in new ways after they're accomplished? Do business units and their managers trust IT enough to relinquish some of their traditional local control over specific assets (applications, servers, and staff) in return for greater control over how IT services are consumed? As you think about your organization's journey to private cloud, and the challenges along the way, ask the following four basic questions:

- What's our current state?
- What bases will we need to cover?
- Who needs to be on board?
- Where do we need help?

**What's our current state?** Each situation is, of course, different. But companies tend to fall into one of three scenarios:

1. **Still siloed.** Many IT resources and groups are attached to local business units and struggle to work together even where the units are interrelated. Consolidation and virtualization have barely begun.
2. **Partly virtualized but stalled.** These companies have started the straightforward parts of consolidation and virtualization (i.e., servers and storage), and gained some cost benefits and other “low-hanging fruit.” But progress has slowed or stopped, usually because other resources (often data) aren't in order, people are reluctant to virtualize applications, or they simply don't know what to do next.
3. **Virtualized but not optimized.** Half or more of IT resources are virtualized, and significant cost benefits have been realized. But other business benefits—access, flexibility, innovation, security, collaboration—aren't being realized because the company has not learned to integrate, automate, and manage the computing environment as a whole.

In scenario 1, the challenge is to get started, prove the concept, and gain some momentum. One way to start is with a simple configuration that helps business innovations get off the ground—earlier, we called it “private cloud in a box.” Find an unmet business need—someplace where an existing business process falls short and people are frustrated—and fill it with a simple cloud-based business service. The key factor here is leadership. The business needs a champion, someone with the vision and influence to start the process of capturing the benefits of private cloud.

In scenario 2, the challenge is to get programmatic, and the missing ingredient is often a roadmap. The business needs to commit to taking the private cloud approach to scale, and to making virtualization of technology resources the default, not the exception. If you're stalled over security concerns, it's time to be specific about how you'll use virtualization to increase your security, compliance, and business continuity capabilities. The most important actions in scenario 2 include establishing criteria for migrating resources to the cloud, making sure that you have excellent tools and methods for operating the virtual environment (and know how to use them), and establishing a program management office (PMO) to orchestrate the rest of your journey.

In scenario 3, we have a largely virtualized computing environment, but not yet a private cloud. The company that has gotten this far is very capable in managing its technology. The next step may be to back up a bit and rationalize and simplify the entire portfolio—hardware, applications, data, services, and customer segments. Make sure that you've virtualized the right resources, and that they can operate together optimally. Another step is to refocus on managing what technology does for the business. How can we improve the experience business people have when they consume IT services? What could the business do differently and better, and what new products and services could it launch, if it could rapidly reconfigure and assemble its technology resources? How can we monitor and optimize the across-the-board business performance of our IT resources, and how much can we automate that process? Develop a comprehensive dashboard for monitoring and managing your private cloud.

#### Private cloud survey

At a recent EMC customer meeting, representatives of a wide variety of corporate IT organizations responded to a survey on virtualization and private cloud. Highlights include:

- Companies are building the foundation for private cloud. Eighty percent listed virtualization, consolidation, or automation as their #1 approach to dealing with cost and performance pressures on IT. And 40 percent are virtualizing even their mission-critical, or “tier 1,” business applications.
- They are not yet operating their virtualized environments as private clouds. The areas where respondents most often cite the need for help are proof-of-concept and making the business case for private cloud.
- The barriers most often cited are organizational (including potential resistance from line-of-business executives and corporate risk officers) and financial (lack of current funding).
- The drivers of movement to private cloud are clear—70 percent of respondents listed both reducing costs and increasing agility.

These last two points together reveal the lack of roadmaps with clearly delineated costs and benefits. Lack of funding shouldn't be a barrier to initiatives that dramatically reduce costs. With the right roadmap, the journey to private cloud should be self-funding.

### **Standardize, streamline, simplify**

Hill Air Force Base in Utah is methodically migrating from an inflexible, proprietary, and expensive mainframe environment to a more open, dynamic, and cost-effective private cloud. The basic goal is “improving the business experience”—quicker results, reliable service, and efficient use of resources. IT leaders at Hill AFB shared some key lessons they’re learning along the way:

- **Walk before you run.** They established a foundation by consolidating data centers, applications, and servers across the base.
- **A cloud means more than server and storage virtualization.** It incorporates automated controls, elements of self-service, and transparency into what users and applications are really consuming what resources.
- **Put business continuity and disaster recovery in your cloud.** The cloud can dynamically and cost-effectively handle backup and recovery, as well as replication and deduplication of information, subject to specific business rules.
- **Standardize, streamline, simplify.** Don’t just consolidate and reconfigure. Take the opportunity to simplify systems, processes, and tools at every step of the way.

How does IT leadership at Hill AFB know this program is succeeding? Performance and reliability improvements are clear. And IT’s customers are becoming part of the process and asking for more.

**What bases will we need to cover?** Each journey is different depending on goals, capabilities, and scenario. But there are some basic components common to all private cloud journeys. Evaluate how far you’ve come and your capabilities to move forward in each of these areas:

- **Business objectives**—in terms of cost, business performance, and IT performance
- **Governance, program management, and stakeholder management**—to guide the effort
- **Cost and performance benchmarks**—the baseline for measuring progress
- **Consolidation and virtualization**—the physical and logical simplification and reorganization of resources
- **Web services interfaces**—the means of accessing, connecting, and rapidly configuring resources
- **Applications and data rationalization**—the opportunity to eliminate duplication, embed controls, and determine what to move to the cloud when
- **IT services catalog**—the business-side packaging of what IT does
- **Management controls**—for security, compliance, business continuity, automation, and optimization of the computing environment

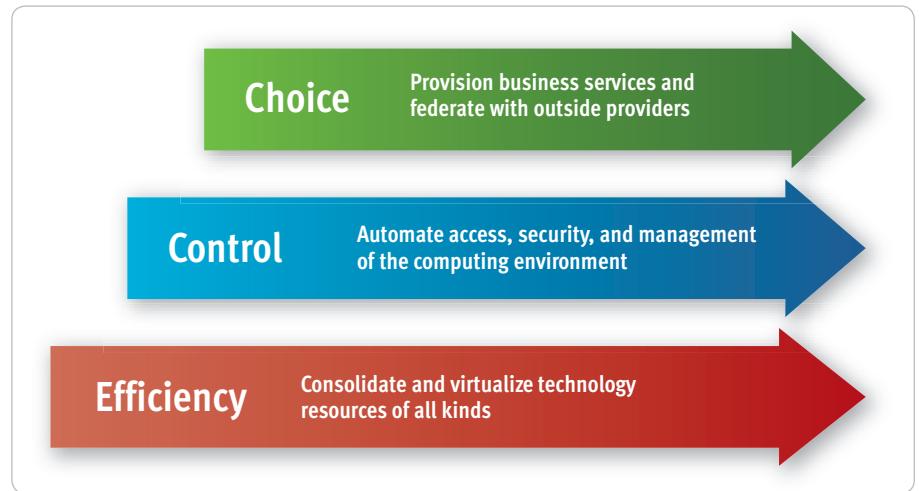
**Who needs to be on board?** A private cloud serves the entire enterprise. It capitalizes on the “network effect”—the more “nodes” (people, processes, resources) participating, the faster the aggregate value grows. That means there are a variety of stakeholders across the business. As the ultimate caretakers of the company’s basic resources, the CEO and executive team must know, care, and shape how the business computes. The CFO and other finance executives have special interest in the investment and financial return of a private cloud. The corporate risk/compliance officer must understand and approve changes to information and systems protection methods (and should appreciate private cloud as an opportunity to improve them). Business managers must cede direct control of some resources and lead their organizations in consuming IT services more effectively. IT managers and staff may be in for difficult changes to their work and roles, and it helps if IT leadership can inspire them to learn and adapt.

Outside providers may also need to adjust how they work with the company and charge for technology licenses and services. One of the biggest impediments can be legacy licensing models that charge by the server or computer, rather than by the “seat” or by usage. Be wary of vendors who are fighting a rearguard action against cloud computing in hopes of keeping customers locked into their proprietary technologies.

As in any ambitious and ongoing business program, you need to keep track of the important stakeholders and their attitudes, keep them informed, incorporate them with sufficient frequency, and educate and coach as needed. The PMO should orchestrate stakeholder relations as well as implementation projects.

**Where do we need help?** No enterprise is ever universally equipped or ready for change. So an important success factor is being objective and dispassionate about what your organization can do and where it can use some assistance. Then be clever about how you fill capability gaps—through hiring, staff development, and outside services. With private cloud, many businesses need help upfront—benchmarking their performance, proving the concept, demonstrating a business case, educating stakeholders, figuring out how private cloud should play and benefit the business. Others have made the case and commitment but need technical expertise in reconfiguring resources, management expertise in putting new tools to work, or organizational expertise breaking through business-as-usual and facilitating changes in IT and business operations and attitudes. Pretty much everyone can use assistance from experienced practitioners both in setting business objectives and in drawing and periodically reviewing their roadmaps.

## Summarizing the journey



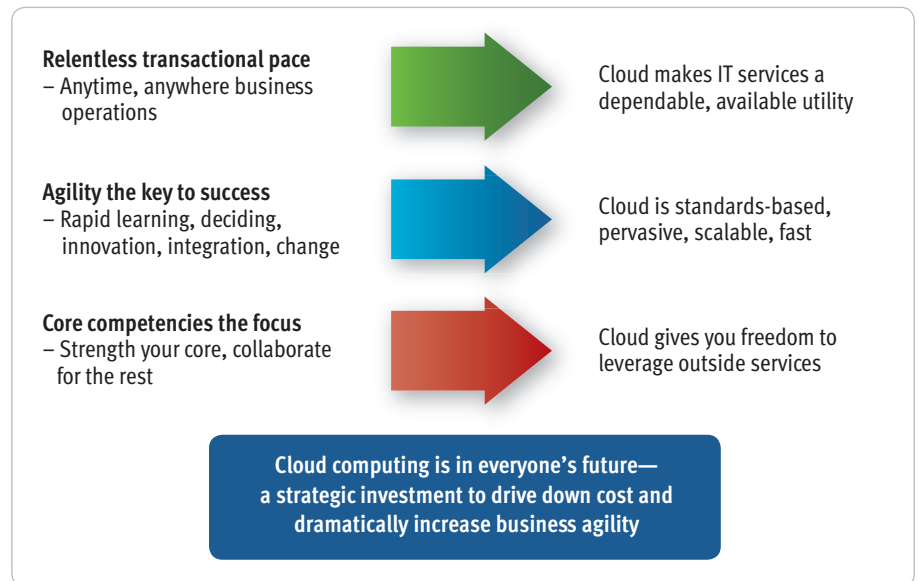
A successful journey to private cloud is really about anticipation, and your roadmap documents what you anticipate: steps to take; their sequence and interdependencies and iterations; stakeholders and how to incorporate them; likely obstacles and how to remove them; and the pragmatics of staffing, funding, timetables, and milestones. The remainder of your journey to private cloud will likely be challenging, but well worth the effort. With a good roadmap, you can proceed with confidence.

That raises an important question: What happens near journey's end? If you really want to put private cloud to work for the business, you need a second form of anticipation. How will the business operate, manage, and compete differently with a private cloud at its service? We've said that private cloud is a means of reducing, even removing, business constraints. What can you do differently as a business if you can scale processes, interactions, and transactions up and down at will? If you can launch the technical environment for a new business initiative—or a new business—in a matter of days or perhaps hours? If you can tap into new information, expertise, and business services—and incorporate them into your business processes—whenever they help the cause?

Take it yet another step: As you do things differently, and information technology is no longer the constraining factor, what will the new constraint be? Perhaps the capabilities of your staff? How will you deal with that constraint? What can you do now by way of staff development so that, as your private cloud gains shape and capability, people are already prepared to exploit it?

Your answers to these questions will, of course, not be precise. But we encourage you to envision in terms of specific business processes and objectives. Start with the items at the top of today's strategic agenda. How might both your business challenges and their solutions be reshaped if you enjoyed the capabilities of a private cloud?

## Business drivers of private cloud



## Today's decision point

The Internet has been with us for quite a while now and has transformed how people connect, communicate, learn, shop, and conduct their lives. As with other transformational technologies—from the telephone to mainframe computers, personal computers, and mobile devices—it takes businesses and other large organizations a while to really figure out how to incorporate the technologies, how to put them to use, and how to reap the large-scale benefits. Corporations to date have treated the Internet as a tool for communication, information access, and customer interaction. But the Internet is not just a technological tool available to all—it's an architecture available to all. It's an architecture that leverages the principles of modularity and connectability to deliver both scale and flexibility, both speed-to-results and cost-effectiveness as never before. Companies are learning to put this architecture to work inside their businesses as well as in their marketplace connections. Smart companies are doing so aggressively. They are configuring their private clouds.

If you haven't started to plan, experiment, and implement your private cloud, now is the time. As we emerge from the 2007-2009 recession, most companies have some catching up and reinvesting to do, including in their information technology capabilities. Do you patch a few cracks and put a fresh coat of paint on a conventional, fragmented, and inefficient computing environment that underserves the business? Or do you seize the opportunity to configure your private cloud—and thereby give real business purpose to your technology improvements, remove technological constraints, and unleash new forms of business agility?

### About EMC Consulting

As part of EMC Corporation, the world's leading developer and provider of information infrastructure technology and solutions, EMC Consulting provides strategic guidance and technology expertise to help organizations exploit information to its maximum potential. With worldwide expertise across organizations' business, applications, and infrastructure, as well as deep industry understanding, EMC Consulting guides and delivers revolutionary thinking to help clients realize their ambitions in an information economy. EMC Consulting drives execution for its clients, including more than half of the Global Fortune 500 companies, to transform information into actionable strategies and tangible business results. More information about EMC Consulting can be found at [www.EMC.com/consulting](http://www.EMC.com/consulting).



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