Cloud success builds on efficiency gains of virtualization, but requires a shift of focus to agility, scalability, and IT service delivery.

Even with significant use of virtualization, developers, users, and business executives circumvent central IT to procure their own technology solutions. Private cloud enables IT to maintain control and better support critical business initiatives. At the same time, it allows IT to get out of the way so IT customers work at their own speed.

Enterprises do need to be aware that a private or hybrid cloud changes how the IT infrastructure is managed. Workloads are deployed in shared resource pools. Scalability is achieved by dynamically managing resources. And self-service access requires more standardization and automation. Fortunately, these differences from a physical or consolidated virtual environment drive the additional benefit of improved IT operating efficiency.

However, with so many cloud options available, it’s difficult to determine what strategy, architecture, and specific solutions are best for your enterprise.

This paper, the first in a series of four, offers practical advice for cutting through the clutter and getting started with a private or hybrid cloud strategy that successfully builds on your current data center. Part of the work involves planning. The remaining effort is hands-on.

Key activities highlighted in this first paper include:

- Setting cloud goals based on business objectives
- Adopting a portfolio view of your infrastructure
- Targeting workloads for private or hybrid cloud
- Evaluating cloud computing models
- Deploying a proof of concept (POC) based on a standard architecture
FROM VIRTUALIZATION TO PRIVATE CLOUD

Virtualization delivers significant cost savings through resource consolidation and improved operational efficiency. Virtualization-related cost benefits, however, don’t directly address the business need for more agile IT.

Even though the typical enterprise IT organization has significantly expanded its use of virtualization, developers, users, and business executives are frustrated by the lack of IT responsiveness. Consequently, they are circumventing central IT to procure their own technology solutions. Some are drawn to the pay-per-use utility nature of third-party cloud services. Others are looking for fast access to applications that enable business objectives. Unfortunately, they are creating a shadow IT infrastructure that weakens IT governance and reduces control of critical business assets. Shadow IT can actually drive up IT costs over time.

Now, IT organizations can both improve agility and maintain control by deploying private or hybrid cloud solutions that offer the same or better service as third-party cloud providers. Private cloud enhances speed by giving business users self-service, on-demand access to IT services. It increases agility by enabling IT to deploy, scale, and redeploy resources on an as-needed basis.

Moreover, when cloud services are designed to meet specific business needs, private cloud can offer business-optimized services that surpass generic or commodity services from third-party public cloud providers. Private cloud allows IT to better support critical business initiatives while getting out of the way to let IT customers work at their own speed.

However, a private or hybrid cloud differs from physical or consolidated virtual environments in several key respects. It’s built using shared resource pools. It runs under the assumption that resource levels will change and workloads may move. It requires more standardization and automation. And services are delivered and consumed as a utility, which differs from physical and virtual environments.

The differences drive the additional benefit of improved IT operating efficiency. IT management is under continual pressure to reduce costs. Fortunately new cloud models build on the cost savings of virtualization and further improve computing resource utilization. Higher levels of standardization and automation needed to offer self-service provisioning improve administrator efficiency. And scale-out and redundant architectures found with scalable resource pools improve service levels and reduce service incident resolution time.

To yield business agility benefits, a cloud initiative must shift the focus from an inward IT resource and virtualization perspective to a client-centered service perspective. But to yield IT efficiency benefits, a cloud initiative must also enable ongoing delivery of cloud services at a level of quality and consistency that builds user confidence and drives adoption of more efficient cloud resource models.

It takes time to make the transition from virtualization to private cloud. It requires multiple steps and several key transitional activities. But a study of more than 30 companies that have deployed private cloud reveals common success factors and key activities that you can follow to get your private cloud right the first time.
OVERVIEW - CUT THROUGH THE CLUTTER

A confusing array of cloud strategies and enabling technologies have been introduced in the past 12 to 36 months. Some solutions are focused on enabling fast access and utility type pay-per-use billing for raw computing resources. Others are designed to optimize application development activities or offer massive scalability at run time. Still others eliminate the need to manage traditional applications and infrastructure with software that is hosted and managed by the software vendor. A range of hybrid approaches that mix key elements of these strategies with internal and external computing resources also put new tools in the IT architect’s tool box.

With so many technologies, options, and divergent definitions, it’s no wonder that many IT organizations get distracted by the cloud clutter. Similar terms are frequently used to describe very different solutions and features. Solutions may work as promised in one environment but not meet expectations in another. Most new solutions have successful use cases and enthusiastic advocates.

The clutter creates risk for your cloud initiatives. Unless your project team makes the right choices, they may end up building something that doesn’t meet the unique needs of your business. Or they may build the right solution, but deploy it in a way that limits adoption. Either outcome reduces IT funders’ and users’ confidence in IT and perpetuates shadow IT procurement practices.

How do you cut through the clutter and steer your private cloud efforts in the right direction? Key activities at the beginning of your virtualization to private cloud transformation are critical for getting it right the first time. Start with planning efforts that include:

- **Cloud goals based on business objectives.** To ensure business outcomes, include key stakeholders – developers, funders, and users – in early efforts to define private cloud goals. Establish clear objectives and success criteria in business terms.

- **A portfolio view of your infrastructure.** Understand the key attributes of current workloads, scope the mix of heterogeneity of current environments, and examine how requirements change as you progress from development through test/QA to production.

- **Targeting of workloads for private or hybrid cloud.** Take a pass at identifying workloads that are not a good fit. Prioritize the rest to identify the best place to start for private or hybrid environments.

Then move beyond planning. Get hands-on with two critical activities:

- **Evaluate cloud computing models.** Evaluate different models in the context of your objectives. Be sure to consider agility, service quality, cost, and security and compliance.

- **Deploy a proof of concept based on a standard architecture.** Deploy vendor solutions in house and determine how higher levels of automation and standardization integrate with your existing infrastructure, processes, and skill sets.

Together these five activities focus your team, minimize distractions, and accelerate progress toward cloud deployment objectives. The end result is a clear definition of success that suits your organization and a POC that sets the stage for broader adoption of private cloud computing.

The rest of this paper provides detail for these key activities.
SET CLOUD GOALS BASED ON BUSINESS OBJECTIVES

People who purchase shadow IT services enjoy being able to quickly access technology resources without extensive project planning. They often ask why central IT can’t deliver things as quickly and easily as external service providers. Now, private cloud solutions can deliver fast access to centrally managed IT services.

Users who want “fast” don’t necessarily want access to an unconfigured server instance with raw memory, storage, and network connectivity. They would rather request and receive a fully configured environment so they can be productive immediately. When developers want access to a fully configured LAMP stack or access to a working Hadoop environment, they would prefer not to spend hours on the complex setup and configuration required to transform an unconfigured server instance. Users want access to a specific application that comes preconfigured with middleware and other storage and memory that is fit for purpose for the task at hand.

Although virtualization technology provides a foundation for private cloud deployments, taking a bottom-up approach and building the private cloud as an extension of virtualized environments is the wrong approach. A technology-up approach emphasizes the commodity nature of raw computing resources. But if all you are offering is the same commodity services that are available from third-party providers, you miss the opportunity to differentiate IT’s value add and miss the opportunity to drive your business forward.

A more business-focused approach for a private cloud is to offer a fully configured service designed to meet specific user needs. Private cloud should give authorized users the ability to select from a service catalog, deploy it, use it, and then abandon it when no longer needed.

Building a private cloud designed specifically for your enterprise has to start with a business discussion. If your infrastructure group is starting a cloud project without developers on the team, stop them. Round out the team with developer, users, and, more importantly, externally facing product, marketing, and sales managers. Engage a mix of stakeholders in a discussion about how cloud can accelerate business processes or transform business offerings.

Consider the following questions at the level of detail that makes sense for your situation:

- **Business objectives.** Look for opportunities where IT agility and speed can transform business value. What gives your business competitive advantage? Where does technology drive opportunity, but is limited by having IT in the critical path? What new things can IT do to help the business? Take time with these questions. The answers may not be obvious.

- **Constraints.** What limitations does your unique situation impose? Limitations may include cost constraints, security considerations such as Payment Card Industry (PCI) compliance, legislation such as Health Insurance Portability and Accountability Act (HIPPA), existing IT skill sets, application life-cycle requirements for test and QA processes and environments, and the need to work across data centers in multiple geographies.

1 http://wiki.apache.org/hadoop/GettingStartedWithHadoop
• **Expected benefits.** How will the enterprise benefit if you succeed? How will you measure cloud success? What are the intangible benefits such as beating competitors to market or allowing developers to get resources quickly and without a detailed project plan?

• **Communication.** How will you communicate your cloud plan? How will you gauge progress and communicate success? What business value will you have added?

ADOPT A PORTFOLIO VIEW OF YOUR INFRASTRUCTURE

Not all workloads are suitable for a virtualized environment. Likewise, not all workloads are a good fit for private cloud. As you move ahead, you’ll most likely be managing a mix of physical, virtual, and cloud resources either at internal or external locations.

As a result, you will allocate a portion of the data center as a pool of shared, virtualized, and scalable resources. Many IT executives plan to put 30 to 50 percent or more of existing workloads in their private cloud environment. However, private cloud resources are managed along with physical servers and mainframes, static virtualized resources, and external resources used in a hybrid cloud approach. To put it in real-estate terms, building the cloud-centric data center of the future will be a remodel, not a tear-down.

Instead of thinking about each environment separately, get the organization to take a portfolio view of the overall mix. A portfolio view allows IT managers to understand the strengths, weaknesses, and best use case for each environment.

To transition from a server or IT asset view to a portfolio view, create a table that highlights key elements of different computing environments. The options should include cloud and noncloud environments, as well as resources sourced internally and from third-party providers. Each environment has different attributes that determine which types of workloads are a best fit. Elements of the portfolio view should include:

• **Basic attributes.** Summarize unit cost, level of agility and scalability, and target service quality. Highlight the ideal use cases for each environment.

• **Location.** Where do the resources within each environment reside? Do you have multiple data centers? Are there requirements or constraints that limit where workloads can be deployed?

• **Lifecycle phase.** Highlight requirements for different application lifecycle phases. Environment-specific requirements may vary for development, test, or production.

Once you have clear objectives and a basic portfolio view of the infrastructure, then you can evaluate existing workloads to determine which are a good fit for your private cloud.
TARGET WORKLOADS FOR PRIVATE OR HYBRID CLOUD

Assess your current workloads to create a snapshot that identifies the ones that are a good fit for private or hybrid cloud environments. You will use this snapshot to set long-term objectives for the percentage of overall workloads targeted for private cloud. In the short term, you will use it to identify workloads for initial cloud deployment.

Use the step-by-step activities below to assess the unique resource and performance attributes of existing workloads:

1. Create a snapshot list of existing workloads.
   - Review existing disaster recovery plans, which typically include a comprehensive list of applications that are critical to the business.
   - Examine the organization’s formal virtualization plan, which probably includes a detailed list of software and hardware assets that were collected to identify candidates for virtualization and consolidation.
   - Check other sources, such as software license compliance lists, service catalogs, and service level agreements (SLAs) that might include asset inventory data.

2. For each workload, add details about specific attributes that describe the type of workload, including:
   - **Business objective** – those workloads directly related to cloud objectives
   - **Resource requirements** – expected normal and peak load
   - **Usage stability** – stability and predictability of usage
   - **Performance (end user or subsystem)** – minimum and optimal requirements
   - **Service level requirements** – existing agreements and commitments
   - **Critical dependencies** – including subsystems and points of integration
   - **Heterogeneity** – multitier or cross-platform architectures
   - **System management requirements** – monitoring, metering, and support
   - **Security and compliance** – workloads that are in scope for regulations
   - **Standard configuration** – special system requirements

Note: The second paper in this series presents a formal approach for designing new, business-optimized private cloud services.

As your deployment evolves, revise your filter criteria regarding what types of workloads are good fit for the private cloud environment.
3. Rule out workloads that are a bad fit. Look for obvious limitations. Some workloads, for example, may require batch processing on a mainframe that is not part of the cloud environment. Some may require dedicated physical resources for performance.

4. Prioritize remaining workloads. Create a basic filter based on these attributes and apply it to the remaining items on the list. Note that some workloads may be suitable for a hybrid model where workloads are deployed in a public cloud for some limited duration, or where one tier of a multitier environment may be deployed in the public cloud.

As your deployment evolves, you may need to revise your filter criteria regarding what types of workloads are good fit for the private cloud environment.

EVALUATE CLOUD COMPUTING MODELS

Consider hybrid computing models that utilize internal and external cloud resources. A hybrid model may include features that allow deployment and movement of workloads from private cloud to external public cloud service providers and back. Note that private cloud may include resource pools hosted by external service providers.

The considerations listed below help in selecting the appropriate model. Not all considerations may apply to your enterprise. You can, however, use the list to guide your evaluation.

• **Service quality, including both uptime and performance.** Answer key questions about quality, such whether or not you need an SLA guarantee or a contractual SLA with penalties. Be aware that many external providers may not offer such agreements.

• **Scalability.** Determine if you truly need infinite (or near infinite) scalability. If scalability requirements are high, you may have to turn to a public cloud provider. Identify variable usage, such as peaks during holiday shopping seasons or financial reporting periods. If those peaks are somewhat predictable, private cloud might be a good option.

• **Cost accounting.** Consider all aspects of the fixed and hidden costs associated with various models. There may be supporting services or crucial system dependencies supplied by internal IT groups that enable public cloud services. Don’t forget to consider the value of IT governance and security before making this decision.

• **Security and compliance.** Hard limitations related to security and compliance may rule out some options. Risk tolerance and business criticality of workloads vary considerably among companies.

• **Heterogeneous workloads.** Although virtualization abstracts applications from underlying resources, some cloud solutions work only with specific virtualization technologies. Others are optimized for specific programming languages. These constraints may rule out some platforms that are limited to a specific technology.

• **Application lifecycle requirements.** Requirements may vary as a new application moves through development to test to production. Consider orchestration, configuration control, and workflow. Also consider runtime services such as monitoring, access management, and security.

• **Application dependencies.** Do you need to modify or rewrite existing applications to get scalability benefits of cloud resource pools? Applications that are not written for cloud environments may need modification to utilize scalability features.

Document any assumptions or tradeoffs you make so you can test and verify them during the next step.
DEPLOY A POC BASED ON A STANDARD ARCHITECTURE

The overall goal of a proof of concept (POC) is to demonstrate success with a working reference implementation. To get there, you must test the assumptions you made during your evaluation.

A cloud POC is like an agile development project in which the team starts working with clear objective, gains experience, and then course corrects as needed. The POC typically involves multiple iterations and adjustments based on actual cloud solutions. Even with effective planning, don’t start with the expectation that you can develop a detailed list of requirements at the beginning of the project.

The POC effort creates a great opportunity to develop and enforce a standard reference architecture, or to reintroduce previous attempts to standardize infrastructure and configurations. By standardizing at this stage, you reduce the number of configurations you have to manage in your cloud environment.

Take a concurrent top-down/bottom-up approach in preparing for your POC. From the top of the organization, find an executive sponsor responsible for business objectives linked to the cloud strategy. From the bottom, identify key users and specify an acceptance test to verify performance and service levels as well as the success criteria you need to meet or exceed.

Suitable use cases for a private cloud POC may include:

- **Lighthouse application.** Choose an application for which POC results will be meaningful to the organization. Business-critical applications, however, may not be the best choice. Success with a high-visibility application will promote broader adoption and acceptance of cloud solutions as you move forward with the rollout.

- **Lifecycle phase.** Start with a standard development or test environment in the cloud. Giving developers fast access to nonproduction environments meets a specific need and helps build confidence before you move to production.

- **Variable usage.** Consider starting with a workload that has scalability requirements that highlight the unique capabilities of a cloud. The POC should be set up in a nonproduction test bed to allow for experimentation that yields as much learning as possible about how the workload and cloud technology operate.

- **Resource intensive.** Start with workloads that consume scarce people resources. They may be workloads with high business priority. Or alternatively, they might be workloads that steal scarce resources from priority projects.

At the conclusion of the POC, your team will have gained the working knowledge needed to scale to broader deployments. Your executive sponsor and users should have the confidence to expand their use of your private cloud deployment.
CONCLUSION

The dual benefits of improved business agility and higher IT operating efficiency create a compelling case for pursuing a private or hybrid cloud strategy. However, you can’t make a successful transition from virtualization to private cloud overnight. It takes time, and it takes a step-by-step approach.

Fortunately, transitioning from a virtualized data center to offering private or hybrid cloud services is achievable and can be implemented in steps. By following the guidance in this paper, you can ensure your cloud solution meets the needs of your business. You can evaluate various cloud approaches and identify workloads that best fit your specific cloud strategy. And you can deploy a successful proof of concept that demonstrates the value and feasibility of your cloud initiative.

The completion of key activities in this paper lays the groundwork for activities recommended in the next paper in the series, “Design cloud services, not systems.” The next paper provides the knowledge and insight you need to design new business-optimized cloud services, offer self-service access, and build user confidence through integrated and automated deployment of cloud services.

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