

The Road Map From Virtualization to Cloud Computing

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Enterprises of all sizes virtualize to consolidate and reduce costs, but this is only the beginning. Many organizations are expressing an interest in expanding virtualization to improve automation and operational expenses, building private clouds for speed, extending into a hybrid cloud and perhaps even migrating to the public cloud for maximum flexibility, and to optimize capital expense. There are several stages in the road map, and each should be planned strategically, rather than one step at a time.

Key Findings

- Virtualization should not be seen as just a consolidation or cost-savings project, but also as the beginning of a road map that provides an on-ramp to cloud computing.
- Most organizations will implement a hybrid of on-premises and public cloud-based computing infrastructures.

Recommendations

- Enterprises pursuing virtualization should have an overall strategic plan for cloud computing and a road map for the future, and should plan proactively.
- Enterprises must focus on management and process change to manage virtual resources, and to manage the speed that virtualization enables, to avoid virtualization sprawl.
- Private clouds should be designed with interoperability and hybrid cloud computing in mind.

ANALYSIS

Most enterprises tend to enter into virtualization efforts with a primary goal to save money. However, virtualization is really an entry point to a much longer evolution that will lead to private and public cloud computing, thus changing technology architectures, management tools, operational processes, customer relationships, funding models — nearly everything along the way. Some enterprises will pursue this road map in react mode, dealing with changes and problems as they appear, and investing in changes that may be tactically fine, but are strategically dead ends. A strategic plan with a proactive understanding of the road ahead is critical to maximizing ROI.

This is not just a theoretical issue. Enterprises that have pursued virtualization as strictly a consolidation exercise soon discovered their processes could not keep up with the speed and flexibility that virtualization introduced — resulting in higher, not lower costs — and virtual machine (VM) sprawl. Enterprises that pursue private cloud computing without considering the future requirement of hybrid cloud and service provider interoperability will find themselves with limited flexibility, or tied to a small set of service providers.

The Path to Cloud Computing Occurs in Stages

The path from simple virtualization to cloud computing occurs in five somewhat distinct stages, each driven by different requirements, generating different benefits and requiring a different effort. But these stages need to be seen as evolutionary steps in a longer road map, rather than as completely independent and tactical projects. Enterprises should have their own living, strategic plans in place that plan ahead for these stages. These areas need to be considered at the very beginning and throughout the process:

- Management tooling: To deal with virtualized resources, pools and even across data centers
- Operational processes: To handle speed/agility
- IT/customer relationship: Working together on service requirements, leveraging speed, with IT becoming a service provider and the trusted broker of all IT services (internal and external)
- Standardization: Increasing automation potential, and ensuring interoperability with external cloud-based offerings (technology architecture matters)
- Funding: Gradually moving from project-based to metered usage to “show-back” and perhaps full chargeback

Stage 1: Server Virtualization

Enterprises usually start virtualization as a consolidation effort. The focus tends to be on reducing capital expenses (server hardware), reducing energy costs and perhaps avoiding or delaying a data center build-out or move. In this stage, most organizations are simply happy to reduce their server counts and drive consolidation density. Selection criteria tend to focus on technologies that enable consolidation inexpensively, and perhaps enabling basic management of the VMs in the same way that servers are monitored and managed — relatively statically.

What’s needed at this stage: Enterprises at this stage usually don’t have a strategy beyond basic consolidation; they should now make the effort to understand the new capabilities that virtualization enables, and determine how to leverage them. Often, disaster recovery is a starting point for using VMs for something other than server consolidation. Enterprises also need to focus on (perhaps extensive) management tooling changes, ensuring that VMs are as manageable as physical devices. At this stage, enterprises also start the conversation with their customers about sharing resources — something many customers will reject unless they see some fundamental benefits (such as lower costs, faster deployments or new capabilities, such as disaster recovery).

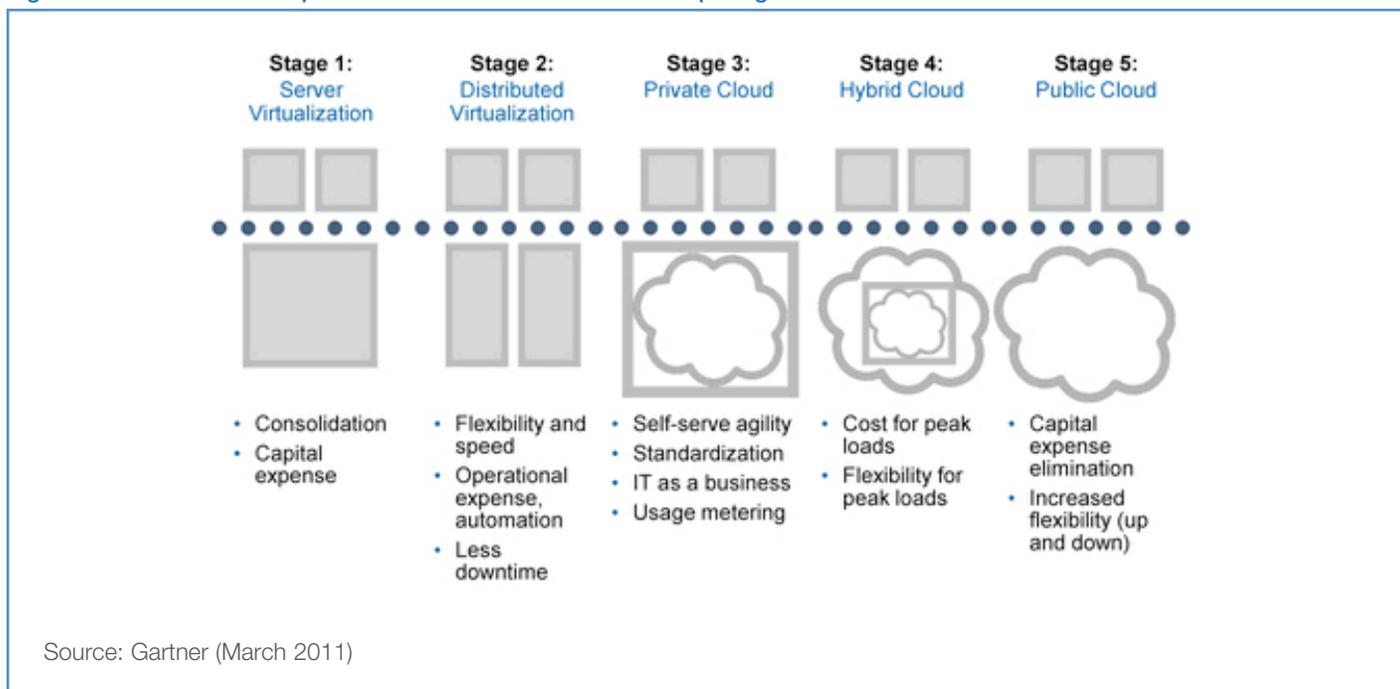
In addition, virtualization encapsulates and abstracts applications from the infrastructure. While this is a useful way to extend the life of old applications, it may not be the appropriate method to evolve newer applications. Many applications will benefit from leveraging platform-as-a-service (PaaS) capabilities that will be enabled in private and public cloud architectures (e.g., Appistry CloudIQ Engine, Google App Engine and Force.com). Enterprises should evaluate applications for future architecture choices before simply putting them in VMs.

Stage 2: Distributed Virtualization

Once enterprises start down the virtualization path, and start to achieve capital expense improvements, the next focus tends to be on operational improvements, flexibility, speed and managing downtime more efficiently. VMs enable a foundation that can be used for basic automation tools, rapid provisioning and cloning, and server reprovisioning and rapid restart. Enterprises at this stage start to think more about the agility benefits of virtualization, and start to deal with their resources as a pool. Technologies like live migration become the norm for managing planned downtime, and even to rebalance server utilization through automation tools that drive live migrations.

What’s needed at this stage: Processes need to fundamentally change to handle the speed that virtualization enables (e.g., provisioning up to 30 times faster and movement among physical servers). Enterprises that do not virtualization-enable their management tools and processes will find themselves dealing with VM sprawl and a rapid increase in storage requirements, leading to unhealthy virtualized environments. Standards are needed to increase automation. However, enterprises also need to look beyond virtualization, and should build a strategy for how they can leverage process change, standardization and automation to meet certain requirements even faster — and without manual intervention (see Figure 1).

Figure 1. Gartner Road Map: From Virtualization to Cloud Computing



Stage 3: Private Cloud

Once processes are designed for speed and standards are in place to enable broad automation, the enterprise is ready to look at introducing self-service offerings based on the virtualization architecture. Most organizations start a private cloud based on very specific use cases — development/test, standard Web servers and raw computing capabilities. These are workloads that tend to have a short life span, or are very peaky in their workload requirements. However, private clouds inevitably grow to encompass broader service requirements.

What's needed at this stage: The private cloud requires a good understanding of customer (and service) requirements. Fundamentally, the business-IT relationship needs to change at this point in terms of defining service needs and funding. Political, cultural and business processes may make a full chargeback model difficult to adopt quickly; however, the private cloud requires usage metering and perhaps some form of show-back to at least report back to the business how services are being used and who is using them. Self-service introduces a whole new set of issues from a process, management and security perspective, and organizations starting on this path need to ensure that they are evolving their systems to handle self-service. Enterprises starting down the private cloud path also need to design with the hybrid cloud in mind — interoperability to enable the potential, in the future, to overdraft workloads to the public cloud, at least at provisioning time.

Stage 4: Hybrid Cloud

Private clouds will not be the final destination for most enterprises. The self-service interface and abstraction introduced by private clouds should enable IT organizations to leverage external public cloud services when they make sense (cost, security, service levels, etc.) — without affecting users. Hybrid cloud will give enterprises

the outlet they need to avoid acquiring assets to meet peak loads, further reducing their capital expenses and increasing their flexibility to deal with radically peaky requirements (for example, leveraging external, public cloud services for development and test when the private cloud service nears full-capacity usage). In addition, maintaining a private (and perhaps on-premises) footprint allows an enterprise to have a fallback in case of problems with an external, public cloud provider. During the next decade, most private cloud deployments will evolve to become hybrid cloud deployments, and many will maintain hybrid clouds long term.

What's needed at this stage: The key to hybrid cloud computing is interoperability on a technology, management, service and even funding level. Standards are critical — from a technology and interface standpoint (e.g., VM formats, APIs for management and SLAs). Service providers should be chosen that have excellent interoperability and a low barrier to entry and exit, and that meet service and security requirements. As much as possible, limited, exclusive or proprietary relationships should be avoided, giving the enterprise more flexibility as the use of the public cloud grows.

Stage 5: Public Cloud

Virtualization is certainly not required before enterprises use public cloud services. In fact, some enterprises will test the waters with cloud computing in the public cloud first, and use their lessons to build private clouds. Also, not all services will move to the public cloud — many will stay in a private or hybrid mode. However, virtualization enables a stepping-stone path from internal virtualization, private cloud and hybrid cloud and, potentially, the full migration of a service to the public cloud — especially as public cloud services mature to meet specific service requirements (at the right cost). We will likely see a lot more holistic migrations for midmarket businesses, and for specific services in large enterprises that are best-served in the public cloud.

What's needed at this stage: Managing cloudsourcing requires new expertise in managing relationships with multiple cloud providers. Many smaller enterprises will turn to the emerging category of cloud services brokers (much like today's system integrators but, over time, will include an increasing amount of automated brokering). Larger enterprises will want to form a dynamic sourcing team responsible for centrally managing cloud provider relationships.

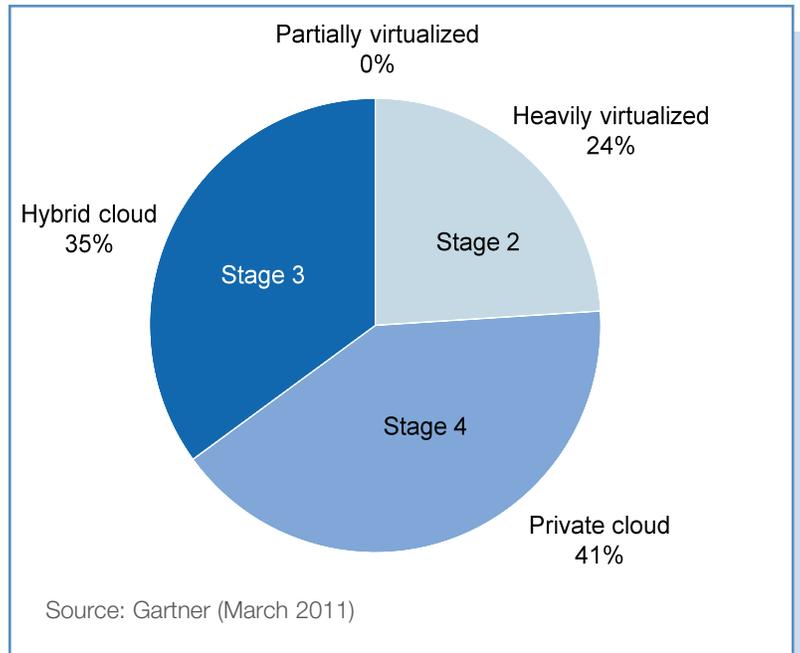
Enterprise Intentions on the Road Map

At Gartner's Data Center Conference in December 2010, 55 attendees responded to a poll asking, "By 2015, how would you describe your virtualization progress (choose the one most applicable)?" While this was a small poll in a break-out session, the responses match what we have been hearing from our clients for the past six months or so (see Figure 2).

A total of 24% of the respondents plan to be heavily virtualized (Stage 2) by 2015, 41% intend to have a private cloud in place (Stage 4), and 35% intend to leverage hybrid cloud computing (Stage 3) by 2015.

Analysis: This poll matches other, larger Gartner polls on interest in private cloud computing, but the really interesting data point was the large degree of interest in hybrid cloud computing. Few organizations today have a hybrid cloud deployment in place. Yet, a large percentage of companies believe it is in their near future. This implies that many large enterprises will design their private clouds for future, public cloud interoperability. Since few real standards exist, this will be a challenge today for enterprises starting down the private cloud path.

Figure 2. Interest in Pursuing Private Cloud Computing



Bottom Line

Virtualization projects are moving at lightning speed in most enterprises. Two-thirds of large enterprises are planning to deploy private clouds in the next few years. Hybrid cloud computing is next. Vendors are scrambling to get a stake in these megatrends. Choices early in the road map matter. Make choices that give you the maximum flexibility as you invest in IT redesign. A great starting point is a living strategic plan that puts projects in the right perspective, and keeps an eye on the next stage or two. Especially in an era of rapidly evolving IT, a proactive plan will ensure a maximum ROI and a minimum of dead ends.