A Modernized Software Environment for Developing, Deploying and Operating Cloud Applications

Transitioning to Platform as a Service Shortens Time to Market, Improves Infrastructure Flexibility and Reduces IT Costs
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Executive Overview

IT leaders are increasingly expected to do far more than simply manage the infrastructure—an increasingly large portion of their time and energy is devoted to strategic initiatives. One area of focus is the enterprise application development function, and it’s not hard to see why. Once considered simply necessary utilities, business services are now increasingly viewed as powerful tools for enhancing productivity and driving competitive differentiation.

That shift puts significant pressure on developers and their managers to deliver business solutions, faster and faster, with more and more capability. At the same time, IT—like every part of the enterprise—must carefully control costs, particularly headcount. Software development is without a doubt moving to the cloud, but in the meantime, legacy applications represent a massive investment that must continue to be leveraged until there is a compelling reason to upgrade or decommission them.

The optimum solution is to modernize the application platform. This transformation enables developers to create and roll out innovative services in a fraction of the time previously required. A modernized application platform increases infrastructure resource utilization, engineering resource utilization, enhances security and avoids outages that compromise availability.

Despite the obvious benefits, many organizations are reluctant to start down this path—the task just appears too daunting. However, VMware has a proven methodology known as Build-Deploy-Run (see Figure 3) that provides an orderly and cost-effective process for modernizing the application environment and the software development lifecycle. Enterprises that have traveled this road find that they are achieving the benefits described earlier, and more importantly, have positioned themselves to take full advantage of the industry’s inevitable shift to cloud computing.

The goal of this white paper is to help executives better understand the issues and options available today so that they can confidently make the decisions required to move their organizations forward in this challenging climate.
Business Mandates Drive the IT Agenda

In the modern enterprise, executive leaders are ratcheting up their expectations for the corporate IT department. Once regarded as a tactical resource and cost center, the IT infrastructure is increasingly viewed as a strategic resource and innovation enabler. A recent Gartner study of enterprise CIOs identified the top three business strategies for today’s IT departments:

- Increase enterprise growth
- Attract and retain new customers
- Reduce enterprise costs

As the IT department reorients to a more strategic role, the traditional “keep the lights on” mandate has been replaced by initiatives that align with the organization’s business goals and deliver tangible business value. The shift in emphasis from tactical to strategic has profound implications for the entire IT department, from the CIO and director level to system administrators and network managers. This white paper focuses on how this change impacts a core capability within IT operations, namely, cloud application development and the software development lifecycle.

1 From “Amplifying the Enterprise: The 2012 CIO Agenda, January 1, 2012,” by Mark McDonald and Dave Aron. Study based upon 2,335 CIO respondents, representing USD $321B in CIO IT budgets and covering 37 industries in 45 countries.
Top Challenges for Enterprise Application Development

The same Gartner study cited earlier identified the top three strategies driving the corporate IT function. These strategies make a convincing case for reevaluating the people, processes and technology involved in delivering IT services.

Shorten Time to Market

Line-of-business managers are under incredible pressure to shorten the time to market for new applications as a way to grow revenues and attract and retain new customers. Internal business users are demanding faster access to the services they need to compete effectively in the marketplace. The traditional approach—submit a request to IT and wait weeks or months for resources to be procured and provisioned—simply cannot meet the needs of these users. A more flexible and responsive infrastructure and streamlined, optimized workflows are becoming table stakes in today’s fast-moving marketplace.

Reduce the Cost of IT

As corporate budgets continue to tighten with no end in sight, it becomes even more important to reduce operating costs and maximize the value of human resources. IT managers are concerned that many of their most valuable people—in particular, highly trained professionals in development, quality assurance and systems engineering—are spending more and more time on low-value tasks such as tactical support and resource provisioning. A modernized development environment can reduce the need for these routine tasks and allow these staff members to devote more time on high-value strategic initiatives.

Increase Infrastructure Flexibility

Most IT executives agree that application development is moving toward the cloud, but the question is when. Even if that transition happens sooner rather than later, there is still a large number of legacy applications that cannot be made cloud-ready and therefore must be supported—sometimes for years to come. Recent studies have shown that most IT groups are choosing to modernize their application platforms based on lightweight development frameworks—as well as runtime environments—and virtualizing key applications as an evolutionary step on the path to a private or hybrid cloud deployment.
Modernizing Application Development

The Business Case for Modernizing the Application Platform

Development platforms that have served organizations well for a decade and more are nearing the end of their useful life. These legacy environments—along with outdated development processes—hamper the IT group’s ability to meet the evolving demands of its users. A modernized application development environment offers substantial business value benefits, including shorter time to market, enhanced business agility, increased resource utilization, operational efficiency and readiness for the cloud.

Developers Build, Deploy and Run Innovative Services with Lightweight Frameworks

The modernization initiative starts with the deployment of lightweight frameworks that enable the development of high-volume web applications, next-generation service integration and elastic, horizontally-scalable applications. Developers leverage the power of these modern application frameworks to create applications that provide a rich, modern user experience across a range of platforms, browsers and personal devices—even leverage social media and cloud services. They can access data in a wide range of structured and unstructured formats, and integrate applications using proven enterprise application integration (EAI) patterns including batch processing.

Deploying a lightweight framework has short- and long-term payoffs. Developers can more easily support the enterprise’s legacy applications, extending their useful life and leveraging investments in software development. When business users identify needed new services—needs that are in most cases immediate—software groups respond faster, with fewer resources and better compliance to the users’ specifications. Looking down the road, deploying a lightweight framework positions the enterprise well for cloud initiatives. In sum, this shift enables developers to build innovative new applications in a familiar and productive way while retaining choice in where to run those applications, whether inside the datacenter or private, hybrid or public clouds.

Software-defined Data Center (SDDC) Increases Resource Utilization, Boosts Availability and Enhances Security

In an effort to improve service and manage costs, many enterprises are transforming their IT departments into internal service providers by adopting the concept of platform as a service (PaaS). Over a wide range of applications, the PaaS approach delivers solid benefits including lower operating expenses, fewer service outages and simplified regulatory compliance.

For many organizations, the ideal environment for PaaS is the software-defined data center (SDDC) model. VMware’s unique software-defined approach moves beyond traditional IT complexity and rigidity by liberating data center services from the constraints of specialized hardware. The SDDC is a new logical container that provides all the infrastructure services necessary to make workloads operational in minutes. SDDCs provide computing, networking, storage and security resources from a pool of physical assets that includes servers, security devices, routers and storage systems. The beauty of the SDDC approach is that it supports both legacy enterprise applications and new services written for the cloud. This level of flexibility allows enterprises to avoid the time and expense of rewriting legacy software for the cloud while empowering an entirely new generation of cloud-ready services (see “Why a Software-defined Data Center?” for more information).
EXHIBIT 1

The software-defined data center (SDDC) helps IT deliver a strategic advantage to the business by providing the same benefits for IT as a whole that virtualization delivered for computing and memory. The SDDC creates a single container that abstracts the entire infrastructure environment and removes hardware dependencies. The overall implications of this architectural shift are profound. No less than seamless portability of the full portfolio of datacenter services from one physical infrastructure to another—either local or remote. Other important benefits of the SDDC include:

- **Resiliency**—Achieves unprecedented resiliency at minimum cost by virtue of a software-based architecture that compensates for failing hardware
- **Platform Unification**—Flexibly supports all workloads with a unified platform optimized for the entire datacenter fabric
- **Adaptability**—Provides maximum throughput, agility and efficiency via a self-programmable infrastructure that dynamically configures and reconfigures the environment according to changing application demands
- **Automation**—Minimizes staff time managing cloud-scale operations with a management framework that features built-in intelligence to eliminate complex and brittle management scripts
- **Standardization**—Eliminates unnecessary complexity by implementing a homogeneous infrastructure delivered across pools of standard x86 hardware

Learn more about the software-defined data center by visiting: www.vmware.com/au/solutions/datacenter/software-defined-datacenter/index.html
Streamlined Provisioning Accelerates Time to Market, Increases Business Responsiveness and Improves Service Quality

The business needs the ability to respond quickly to changing marketplace conditions and emerging opportunities—a need that is driving IT groups to implement an agile environment that can flexibly expand and contract quickly and efficiently. A good place to start is the software development environment, the first step in the process of creating new revenue-generating services and internal productivity-enhancing applications. An agile and efficient development process translates into shorter time to market and better ability to respond to changing requirements. In short, creating efficiency and agility in the development environment makes the entire enterprise more efficient and agile.

Provisioning is one aspect of the development workflow that is ripe for improvement. When developers or QA engineers require a new computing platform, they must often wait weeks—in some cases months—for that service order to be fulfilled. This delay usually lengthens the timeline linearly—three weeks waiting for computing resources to start coding or testing a new application adds three weeks to the time to market. A typical development cycle requires many build cycles and QA tests, multiplying the effect of this provisioning delay. Streamlining resource deployment shortens the overall development cycle and pays dividends to the corporate bottom line. It greatly reduces the amount of engineering and development resources needed to support the developer community and allows the developers to spend more time writing code and creating services rather than working on trying to get an application environment to work in.

Streamlining provisioning has another somewhat surprising benefit: an increase in the quality of custom applications and services. When developers can easily and quickly provision resources, they turn out prototypes faster. Rapid prototyping drives an iterative process in which business users can interact with prototype applications much sooner and provide valuable feedback to improve service quality and functionality. This early and intense involvement by the stakeholders themselves helps align new services with requirements and realize the intended benefits with increasing regularity².

² For a more detailed discussion, see the VMware white paper “Automated Provisioning and Deployment: Enable growth, improve service quality and free up IT resources for innovation and process improvement,” http://www.vmware.com/files/pdf/services/VMware-Auto-Provisioning-Whitestar.pdf
Automated Provisioning: A Case Study

While every case is unique, it’s instructive to look at a representative case study to understand the potential benefits of automated provisioning. These data are taken from an actual VMware deployment in a major financial services enterprise (we’ll call it Company X).

Figure 1 shows the legacy provisioning process used by Company X over the last five years. The process starts when a developer or QA engineer submits a service order to Systems Engineering (step 1). The complete end-to-end process requires 13 discrete steps and takes about two weeks on average. When development cycles lasted a year or more, this amount of lead time had little impact on the overall time to market.

Today, the entire process moves much faster. Modern software methodologies and tools have streamlined the development process dramatically. Software engineers have the benefit of frameworks and integrated development environments to streamline the coding process. Coding practices have also improved—developers now leverage modularization, reusable code, automated code generation and collaboration to speed up the process and eliminating errors that require costly rework. Company X’s guidelines for application development estimate that the typical large project—defined as a major revenue-generating service—requires an average development time of 36 weeks, while a small project can be completed in just 12 weeks. In this fast-paced environment, any time shaved off the provisioning process can make a substantial difference in time to market—and provide a competitive advantage.

For the reasons discussed earlier, Company X decided to implement an automated provisioning system—a decision that has paid dividends for their developers. Now resource requests can bypass five steps of the legacy process (the grayed boxes in Figure 2), reducing the provisioning time from two full weeks to just 72 hours—a 70 percent improvement. The company benefits from reduced development costs, increased productivity, faster response to changing requirements and—most importantly—shorter time to market. In the first year of the new process, Company X realized an aggregate gain in time to market of more than 70 weeks, which represents more than $2 million in opportunity value. The new system also eliminated about 1,200 hours of lost developer time, the equivalent annual productivity of one full-time developer.

![Figure 1. Legacy Provisioning Process for Company X](image-url)
Figure 2. Automated Provisioning Process for Company X
Implementing a Modernized Development Environment

The benefits of modernizing the development platform are compelling for most organizations—but how do you get there? The current software infrastructure represents an enormous investment by the IT organization in the people, processes and technology needed for application development. In addition, legacy workflow processes and financial governance controls are firmly embedded in the corporate culture, making them extremely difficult to even define precisely, let alone change. The prospect of taking on this challenge makes many organizations reluctant to modernize, fearing that the benefits are just not worth the cost or the headaches.

A disciplined, modular approach based on the Build-Deploy-Run methodology is a viable solution (see Figure 3). This modular approach addresses every part of the end-to-end software development process, identifying the changes needed to move to a modernized application environment with the least expense and disruption.

**Figure 3.** The Build-Deploy-Run Methodology

**Build: Developing and Testing Portable, Cloud-ready Applications**

The desired outcome of the Build module is to design a platform and workflow that enables the organization's software development team to create and test portable, cloud-ready applications that meet—or even exceed—the requirements of business users and are delivered on time, on budget.

The Build process starts by taking a comprehensive inventory of existing applications and mapping them to business functions. Once there is a deep understanding of the application environment and structure, the next step is to create a detailed portfolio outlining all application services and defining the service levels required for each. Armed with this information, the IT team can define an organizational strategy for managing service lifecycles and institute processes and procedures for application lifecycle management.
With processes and procedures in place, the focus shifts to choosing the right technologies to transform the legacy development platform into a modernized cloud-based environment. While the specific details of the implementation vary from enterprise to enterprise, the overall process includes:

1. Virtualize existing applications—where possible and practical—and move them into pools of private cloud infrastructure.
2. Implement a lightweight development framework as a starting point for developing cloud-ready applications.
3. Deploy a lightweight runtime environment that offers proven, cost-effective performance.

The benefits of modernization begin to accrue immediately as developers start churning out lightweight, portable applications in a fraction of the time required for the legacy environment. The shorter time to market is achieved by implementing consistent development processes and building a reusable common repository of proven and tested code that developers can reuse. As a result of self-provisioning—a capability made possible by virtualized container technology—the infrastructure engineering staff spends less time rolling out development and QA environments, time that can be redirected to more strategic initiatives.

Continuing the Build process, the application data layer is revamped into an agile data fabric that supports the demands of the next generation of cloud-ready applications. Centralizing database management eliminates sprawl and simplifies the environment. It also enables fast and accurate synchronization between development, QA and production databases—avoiding the production problems that can arise when applications are developed or tested using outdated or unrepresentative data samples. In production environments, a scalable data caching layer ensures that applications can scale as needed to accommodate increased traffic. Finally the messaging infrastructure is evaluated to determine if it is ready for the demands of the cloud. If not, the IT team must replace it with a cloud-ready messaging system.

**Deploy: Optimizing Internal and External Resources**

Once a new application passes all the QA tests, it must be deployed. In the Deploy module, the deployment process is carefully examined from the perspective of platform resources—in other words, scalability—and operating costs. The emergence of commercial cloud services offers IT groups a new and powerful tool that enables scaling, with little capital investment.

The Deploy module starts by evaluating the capacity of the existing environment to determine its ability to handle the demands of the business now and in the future. A thorough examination of the service catalog pinpoints applications that can be moved to an external provider to lower operating costs and free up internal capacity for legacy applications that cannot easily be made cloud-ready. This knowledge empowers the infrastructure team to move applications between external and internal platforms to match demand to capacity and avoid service interruptions.

**Run: Managing the Production Process**

The last aspect of modernizing the application environment—one that is frequently overlooked—is planning for the day-to-day operations, in other words, managing the production process. The goal of the Run module is to develop a detailed plan for managing the organization’s applications in production—a process that spans a number of domains and touches every aspect of the application lifecycle management methodology. From an organizational viewpoint, the core infrastructure management is integrated with the application management tiers, enabling IT managers to make decisions about service delivery based on real-time analytics of overall application performance.

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3 From “Lightweight Application Development Systems Ride the Cloud,”
The Run module starts with a thorough examination of the business processes and procedures to determine how the infrastructure team will manage demand. A typical best practice for managing production resources is just-in-time provisioning. The philosophy behind this approach is to run the production environment as “hot” as possible without affecting application performance, driving utilization rates higher and minimizing cost. However, just-in-time provisioning requires careful monitoring so that additional resources can be procured as application demand approaches full capacity. Real-time analytics meets this need, allowing systems engineering and operations staff to make accurate predictions about capacity in order to meet the demand. For example, bursts in capacity requirements for end-of-year processing can often be met by contracting additional public-cloud resources, whereas increased demand resulting from a corporate merger may call for additional capital investment.

Financial management is another critical outcome of the Run module, involving not only the approval and budgeting processes but also generating and circulating periodic and on-demand reports to the organization’s management. Reporting is particularly important in PaaS deployments that use a pay-by-use consumption model. Finally, the IT team needs to embrace a philosophy of continuous optimization of the enterprise’s internal application hosting environment and rigorous evaluation of the performance of third-party providers.
Start Your Modernization Initiative Now

In a business world where first-movers enjoy a competitive advantage and IT is central to every business decision, enterprises must have an integrated business-IT strategy—one that includes a modernized application development environment. An IT strategy created independently of the business will not meet expectations. At best, it is a mismatch or ill-timed; at worst, it is an investment with a negative ROI that results in missed market opportunities and lost revenue. However, bringing the business and IT worlds together can be challenging, because each has its own language, challenges and expectations. Bridging the gap—that’s where VMware Accelerate comes in.

VMware Accelerate helps senior executives in both the business and IT organizations understand how IT transformation can drive business transformation. Combining the talents of some of the best solution architects and business solution strategists in the industry, Accelerate has the experience and expertise to guide your enterprise to a modernized application environment—and many other value-added outcomes. Learn more about VMware Accelerate at www.vmware.com/go/accelerate or call your VMware representative today.
Next Steps

On-demand services can scale in parallel with the organization’s adoption of cloud. If the enterprise deploys cloud initially to a limited set of workloads, the service catalog can be limited to that set of services. Alternatively, IT might choose to supplement the cloud service catalog with external cloud services while it builds out a private cloud.

Regardless of the approach, once an organization has decided to implement on-demand services, a number of steps are necessary.

Establish Prerequisites

Before jumping ahead with on-demand services, a needs and readiness assessment will evaluate the current capability level of enablers (e.g., automated provisioning and deployment, IT financial management for cloud) and organizational demand for the new solution. The scale of current cloud solutions needs to be evaluated, particularly in regards to existing private cloud capacity and the anticipated need for external resources.

Determine Degree of Change Needed

The design and engineering phase needs to move in parallel with the business and organizational roadmap. Non-technology changes should be addressed in significant detail, for both IT and non-IT staff. The initial pilot population should be selected and used as a test bed group for the initial service catalog offerings and self-service portal.

Prepare the Organization for Change

Last, an internal messaging and communication plan needs to be in place, to both convey the basic information of the system (e.g., location in the intranet, services offered) as well as the benefits and advantages to build excitement and demand. This should be driven top-down (e.g., through executive communication and announcements) as well as bottom-up (e.g., through advocacy by the pilot user group).
Why VMware for IT Transformation?

The move to the cloud is a foregone conclusion for many organizations today, but the path forward is often unclear. What is the current state of my infrastructure? How do we begin to move forward? What are the right technology choices for implementing our cloud? Most importantly, who can help us achieve our goals?

VMware has built some of the largest and most successful public and private clouds in the world. Now VMware is using that experience to bring to market a complete solution that includes a full suite of software products as well as the services you need to gain the maximum benefit from cloud computing. This combination of software and expertise, delivered via services and education to customers of all sizes across all industries, is unique to VMware and its global ecosystem of partners.

To learn more about the VMware cloud solution, visit www.vmware.com/cloud