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A new way of computing for the enterprise

Accelerate your cloud strategy
Cloud computing has become a new fixture in the enterprise IT landscape. Just a few years ago, you might have described cloud-based IT services as unstable or insecure—a playground for startups or non-critical business applications. Today, these services meet the speed and capability requirements of large businesses and enterprise IT organizations. Cloud computing enables on-demand, pay-per-use access to an elastic pool of services and resources that can be provisioned quickly and scaled up or down in an instant. What could be better for the business?

There’s just one catch: This model allows business users to consume external public and managed services that were once available only from the IT organization. In fact, in many companies, the business is adopting cloud services 2.5 times faster than IT. And as people embrace mobile applications and smart devices, we are seeing an explosion of new products, business models, and service delivery methods.

Figure 1.

Cloud is fundamentally changing IT

What enterprise IT needs is a new approach to manage processes and applications that are distributed across a mix of environments. How do you make services immediately available, easy to use, and accessible on mobile platforms while also preventing the IT bypass and unintended effects on the overall IT infrastructure? HP has a comprehensive plan to help you get to this new style of IT:

• Portfolio management: Develop and maintain a hybrid delivery strategy. This provides a business and technology decision framework to support the process for deciding which applications and services to build or consume and the preferred mode for deliver—across traditional IT or from private, managed, or public cloud services.

• Application transformation: Incorporate an agile development approach. Improve the ability of IT to make quick updates and maintain the quality of applications and services across internal and cloud platforms.

• Operations flexibility: Enforce a loose-coupling approach toward application and service workloads deployed across cloud environments that provides portability and supports open standards. This lessens the need for developers to code to proprietary platform APIs and helps maintain flexibility and portability.

Figure 2. Managing modern hybrid delivery from a composite application perspective, where continuously delivered services will span public, managed, and private cloud services in addition to traditional resources

The new reality: hybrid delivery

 Builders, brokers, architects, and custodians

On one hand, the potential pitfalls of cloud services and the need to address those risks increase the value of IT expertise. On the other, they highlight shortcomings in traditional IT procedures that you will have to overcome. These new demands for hybrid delivery will transform IT organizations into builders of in-house cloud delivery systems and brokers of third-party cloud services, as well as architects and custodians of traditional IT environments. The new you will have to be a jack of all trades.

The key tenets of cloud computing are flexible, self-service-based business and infrastructure services delivered on demand, with utility capabilities—scalable, reliable, and measurable service-level agreements (SLAs)—that can support the needs of modern, natively composite applications. Most cloud offerings today are not able to consistently offer all these tenets, but they deliver some and aspire to deliver the other capabilities over time.

While much of the focus in the cloud market has been on infrastructure services for compute and storage, much of the innovation being driven by enterprises stems from a desire to build and consume applications in a manner that leverages cloud services.

Traditionally, enterprises have bought application stacks from a single vendor or integrated best-of-breed applications from multiple vendors to deliver a solution. With the emergence of software as a service (SaaS) solutions and single-function applications, the way enterprises view applications and the way independent software vendors are starting to deliver applications is dramatically changing.

A modern cloud-based application now is constructed as a service deployed inside pools of application containers. Integration between these services now can be done at the container layer (as calls or web-services), between corporations (as web-services), or assembled inside the browser (as mashups).

As an IT leader, you will have to decide what to build internally, which services to consume externally, and how to transform legacy applications and business processes to take advantage of a hybrid delivery model. Regardless of whether you are building or buying services, you must continue to manage and secure them to deliver the service levels required by the enterprise. If you transform successfully, you will reap the benefits the business expects from the cloud. It’s a huge opportunity if you do it well.

Figure 3. Enterprises will employ a hybrid delivery strategy to best balance the selection and management of internal and external resources to unlock the value of cloud services.
A comprehensive approach

Addressing the need for cloud computing standards
It’s an unavoidable fact that not all clouds are created equal. On the surface, many cloud services seem to provide similar capabilities, but they have different levels of openness to integration, security, and lifecycle management. Moving to cloud services should not require you to adopt new tools and processes that are incompatible with core competencies and best practices of enterprise IT. That kind of limitation forces you to choose between non-optimal choices: Commit to a single proprietary cloud environment and integrate deeply, or use only basic services.

At HP, we see a pressing need for standards to support cloud computing. These standards need to provide a framework for a cloud operating system that will support enterprise use cases for development, deployment, management, and security—through the application and service lifecycle and across multiple cloud environments. For this reason, HP has decided to leverage the OpenStack® Project as a foundational component for a common cloud resource, management, and security abstraction layer called HP Converged Cloud.

OpenStack is a collection of open source technologies that provides a massively scalable open source cloud computing platform. HP has extended the standard set of OpenStack services to include enterprise-level capabilities for application lifecycle management, continuous deployment, management, and security while supporting easier migration, cloud-bursting, better security audits, and the large ecosystem of compatible tools and services that work across cloud providers who support OpenStack.

A fundamental part of the HP Converged Cloud solution, HP Cloud OS will provide an abstraction layer that exposes a computing mesh in a standardized manner—regardless of the makeup of the physical compute infrastructure—in addition to providing ubiquitous access to HP and third-party solutions for cloud management, security, application lifecycle management, and information management. HP Cloud OS will offer the capability to define and model an application and associate the application with a set of policies—such as usage (development, test, staging, or production), data sensitivity, performance characteristics, and security policies—at deployment time to supported traditional IT and cloud environments.

The powerful combination of these elements allows the HP Converged Cloud solution to make smart decisions on workload placement policies, such as selecting the appropriate delivery model available based on the combination of the required usage, data sensitivity, and performance characteristics.
From concept to cloud computing

**HP Converged Cloud use cases**

Let’s consider a couple of real-world use cases. Imagine you want to deploy cloud services to support application development and testing. The reason could be to lower costs or to access elastic capacity management and to provide a better foundation for increasing flexibility with automated lab management. Automated lab management has existed for years on physical and virtual infrastructure, and HP has seen enterprises release applications faster with up to 50% fewer failures when using automation to support the application development and operations lifecycle.²

Based on this previous experience, many IT shops also want to automate cloud environments. But often the use of cloud environments still requires specific knowledge at deployment time, as well as a detailed understanding of the target cloud environments. A manual approach for a development and test (dev/test) cloud can introduce errors that increase business risk across hybrid cloud deployments—for example, consider a scenario in which public cloud services might be used for development and a private cloud or hybrid deployment across private and public clouds for production.

With the HP approach, it is possible to model the application in context of the service lifecycle across development and production environments. This means your development team can focus on what they do best. They can develop applications, test against production environment characteristics, and directly deploy to the production environment in a continuous delivery approach.

The HP Converged Cloud solution provides the following capabilities:

- Template- and model-based approaches to application and service development and deployment, with the ability to bind management and security capabilities to service models at deployment time in order to enable common capabilities across hybrid cloud environments
- Portability across private and public cloud environments, which may include heterogeneous infrastructures, management, and security tools
- Efficient delivery and management of the application release, whether the infrastructure resources are on-premises, in the public cloud, or in a hybrid environment across public and private clouds
- Role-based, predictive, and real-time performance and risk insights across heterogeneous systems, networks, and cloud environments

**Figure 5.** HP Converged Cloud solutions provide a portable, model-driven service lifecycle with support for your current and future state business and technology strategy.

Now, what if you wanted to be able to use cloud services to increase IT productivity? Let’s consider scenarios in which the infrastructure could dynamically burst to add more testing capacity instead of you having to schedule the testing of an application (as is often done to manage capacity). With the HP approach to cloud services, this will be possible. We can automate the provisioning and testing process so that we can burst to any private or public cloud environment. And when you’re done, the entire system could be torn down and the test results handed over to the developer. Just imagine the flexibility you’ll gain.

You’ll also likely want to use the cloud for production applications, and a common issue in this case is getting consistent management and security services across private and public clouds. Once again, HP has an answer. With HP Converged Management and Security, you can have specific configurations that bind and enforce management and security policy at deployment time. Application monitoring and management can then span multiple environments as needed.

Figure 6. HP Continuous Delivery Automation connects application lifecycle management to operations management and security to support continuous delivery across the service lifecycle with visibility into KPI- and KRI-based performance insights.

The role of OpenStack in HP Converged Cloud

HP Cloud OS, powered by OpenStack, accelerates cloud delivery and workload portability

When HP defined the key technical and business requirements for the HP Converged Cloud architecture we focused on enabling it to provide an open and standards-based cloud platform that would support private, public, and hybrid cloud strategies. The reason for this is that while it is common for enterprises to have a standard solution at one level of the cloud architecture—such as the operating system, virtual machine, database, or even networking layers—it is most likely that an enterprise will work with heterogeneous services and across multiple delivery models as it defines a cloud services strategy. This means the HP Converged Cloud had to be designed to be pluggable in terms of using HP solutions or any third-party products at every layer of a cloud solution.

By leveraging OpenStack as the foundational technology of the HP Converged Cloud architecture, we are able to provide you with a flexible solution that enables access to a common set of cloud capabilities to HP extensions for converged infrastructure, and to higher-level solutions for management, security, and information. This approach enables developers and third parties to continue to leverage the standard OpenStack plug-in extension model so they can meet the needs of any enterprise. OpenStack is also hardware-agnostic. It provides architectural consistency across private and public clouds, it supports a diverse set of hypervisors, block storage systems, and network implementations, and it provides an open set of APIs to allow “above the stack” value-added services.

In addition, OpenStack enjoys a large and active community, which made it the obvious choice to leverage as it is quickly becoming the de facto open cloud platform for the enterprise. The OpenStack project is backed by an independent foundation and global community with more than 7000 members representing 850 unique organizations across 88 countries. It is the fastest-growing open source project ever, and the code is made available under the Apache 2.0 license.
HP Cloud OS is a common, extensible cloud platform that provides single-pane-of-glass consistency to help you develop, deploy, and manage elastic applications and services across private, public, and managed clouds. HP Cloud OS is based on multi-layered abstractions and is open at all layers of the solution stack to enable full programmability of the enterprise data center. HP Cloud OS is underpinned by OpenStack, a community-developed, open source cloud operating system that controls and orchestrates large pools of compute, storage, and networking resources across your data center, using a dashboard that balances administrative controls with web-based user self-provisioning of IT resources.

**Figure 7.** HP Cloud OS provides the ability to quickly install a standard OpenStack deployment in a few easy steps. It includes extensions to accelerate cloud service delivery, and it leverages HP Converged Infrastructure services.

HP Cloud OS primary solution layers:

1. **Infrastructure layer:** This layer supports multiple cloud models from traditional IT infrastructure with a mix of operating systems, application servers, and hypervisors pools to private, public, and hybrid clouds with support for stateless cloud bursting and workload portability.

2. **OpenStack® distribution by HP:** This is an optimized and enterprise-ready version of the OpenStack distribution. The distribution exposes standard OpenStack APIs (Nova, Cinder, Keystone, and Quantum) and can run without HP or any third-party extensions on generic hardware (storage, server, networks).

3. **HP Converged Infrastructure Extension Services:** These are standard OpenStack plugins (for Nova, Cinder, Keystone, and Quantum) that provide differentiated capabilities for HP Converged Infrastructure that is part of or supporting a cloud environment.

4. **Cloud services layer:** These are services running on Cloud OS to provide access to enhanced capabilities, such as topology, resource pooling, and hybrid infrastructure management. One example is that the base services expose a Topology API, based on the TOSCA document standard, that supports the modeling of infrastructure services independently from the cloud environment where they could be deployed. These models can be reused, and they provide additional speed for updating cloud services.

5. **Cloud OS Installer:** Every part of HP Cloud OS can be separately installed, installed in parts, or installed as one integrated solution. The installer enables simplified, repeatable installation, configuration, and upgradeability of the OpenStack cloud platform and HP Cloud OS services. It supports the provisioning, consumption and de-provisioning of virtualized, scale-out infrastructure resources. The installer can be driven through a set RESTful APIs and interfaces.

**Simplifying enterprise deployments of OpenStack-based clouds**

If you’re like many other enterprises, your staff does not have the time, expertise, or resources to assemble and maintain an OpenStack-based cloud platform by taking multiple packages and installing, configuring, debugging, and upgrading them from Openstack.org. HP Cloud OS removes this burden. It takes this installation from a process that requires more than 250 manual configuration steps down to a four-step automated installation.

With HP Cloud OS delivering a common cloud architecture for HP Converged Cloud solutions, your enterprise is able to plan your cloud development and adoption knowing you can leverage a common set of capabilities and technologies across your current and future requirements.
Accelerate your cloud journey

IT innovation and business value
Wherever you are on the road to cloud computing, better collaboration between business and IT leaders will help you use cloud services as a strategic driver of IT innovation and business value.

HP is working hard to drive much-needed standards across the industry and incorporate these standards into our Converged Infrastructure, Converged Management, and Security and Converged Cloud offerings. In addition, HP will continue to deliver open and extensible solutions that support the application and cloud service lifecycle across our portfolio of hardware, software, and services. We understand the need to balance business and technical requirements in blended IT delivery models. Our goal is to help you bring the right mix of private, managed, and public cloud environments into your business and IT strategy.

For more information
To read more about the HP Converged Cloud Architecture, go to [hp.com/go/cloud](http://hp.com/go/cloud).

To find out how HP can help evolve your IT strategy to include cloud services, please contact your HP representative or visit [hp.com/go/cloud](http://hp.com/go/cloud).