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HP CloudSystem

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The cloud is today's technical darling. By moving applications to the cloud, organizations can eliminate capital expenditures, reduce operating costs, and deploy applications rapidly. Compute, storage, and network capacity can be provisioned as needed; and a company pays only for what it uses. We have described one of the leading cloud providers in our article Amazon Availability Zones.[1]

However, given all of the obvious advantages of cloud computing, companies are slow in moving to the cloud. Serious issues remain concerning security, availability, and governance - the control required to conform to corporate policies. Nevertheless, a recent study by Forrester Research, Inc., found that employees of many companies are moving some applications and data to the cloud without management or IT department approval. Forrester indicates that such surreptitious use of the cloud is five times greater than what IT thinks.

There are three fundamental types of clouds – private, public, and hybrid. A private cloud is owned and operated by a company for its own purposes. A public cloud is provided by a cloud service provider for use by any of its subscribers on a pay-for-usage basis. A hybrid cloud is a private cloud that can reach into a public cloud for additional capacity or services.

Many of the advantages of cloud computing can be achieved by a company with its own private cloud, thus addressing the concerns surrounding public cloud computing. In fact, if a company (as many are) is well on its way to using virtualization to consolidate its data-center assets, it is not a great step forward to extend its infrastructure to its own private cloud.

HP CloudSystem

The HP CloudSystem allows companies to convert their current IT assets into a private cloud. It is not a prepackaged system. Rather, HP CloudSystem focuses on hardware, software, and consulting services to provide an efficient path to cloud computing. It combines servers, storage, networking, and security with an approach to automate the lifecycle of applications and infrastructure from provisioning through management to termination.

Furthermore, the HP CloudSystem supports hybrid- and public cloud systems. Once a degree of comfort has been achieved with its private cloud, a company can extend it into a hybrid cloud to take advantage of additional capacity and services in one or more public clouds. An HP CloudSystem can also be configured as a public cloud to support service providers who wish to move to a cloud offering.

HP CloudSystem includes three levels to meet different business needs – HP CloudSystem Matrix, HP CloudSystem Enterprise, and HP CloudSystem Service Provider.

[1] Amazon Availability Zones, *Availability Digest*; November 2011.

HP CloudSystem Matrix

HP CloudSystem Matrix implements a private cloud. It provides an IaaS (Infrastructure as a Service) implementation in which computing resources can be dynamically assigned to applications on as-needed basis. HP CloudSystem Matrix forms the underpinning upon which HP's other cloud services are built.

Though based on HP's BladeSystem, HP CloudSystem Matrix is a highly heterogeneous, multi-hypervisor, multi-OS infrastructure that can take advantage of an organization's current IT assets. It supports not only HP Integrity and Proliant servers but also x86 servers from Dell and IBM. Supported storage area networks (SANs) include HP products (XP, EVA, 3PAR) and EMC storage. Networking by HP, Cisco, Brocade, and Alcatel-Lucent is supported. On the software side, Windows, Linux, and HP-UX are supported as well as VMware, Microsoft's HyperV, and HP Integrity Virtual Machine hypervisors.

Security- and compliance-monitoring spanning applications and virtual- and physical infrastructure are provided by ArcSight.

An application is defined by a template called a "Cloud Map." It specifies the resources that an application needs, the relationships among the resources, and any policies that pertain to the provisioning of these resources for the application. Cloud Maps, described later, are provided for many popular applications such as those from Microsoft and SAP.

To run an application, all one needs to do is to specify the application template. HP CloudSystem will search for the required resources and will assign them to the application. An application instance can be provisioned and running within a few minutes. If later on the application requires more resources, it will be assigned those additional resources. When the resources are no longer needed, they will be returned to the resource pool. The use of resources by an application is metered and can be charged back to the using organization within the company.

Should there be a failure of a resource, such as a server or a storage device, failed resources can be reallocated to operational resources with a single click via recovery scripts that have been preprepared and tested.

A self-service infrastructure portal acts as a single pane of glass to monitor and to manage HP CloudSystem. It provides the means for:

- initial application provisioning and deployment.
- auto-provisioning to allocate additional temporary resources needed by an application.
- infrastructure monitoring and management.
- application monitoring and management over the application's lifecycle, from provisioning to termination.
- end-to-end security.
- uptime assurance with single-click recovery.

HP CloudSystem Enterprise

HP CloudSystem Enterprise extends HP CloudSystem Matrix to the public cloud. HP CloudSystem Enterprise supports IaaS, PaaS (Platform as a Service), and SaaS (Software as a Service) functionality.

HP CloudSystem Enterprise can "burst" private cloud services to one or more public clouds according to policies set forth in an application's Cloud Map. Multiple resource pools can be organized hierarchically and can be managed according to corporate policies. Public cloud services may be called upon, for instance, to provision additional compute, storage, or networking capacity on an as-needed basis. Another use for bursting into a public cloud might be to distribute application services on a geographical basis so that local communities of users can be served with higher qualities of service.

The self-service portal provides a single-service view of all environments – private clouds, public clouds, and the company's traditional IT environment. An enhanced application/infrastructure lifecycle management facility is provided.

HP CloudSystem Service Provider

HP CloudSystem Service Provider builds upon HP CloudSystem Enterprise and supports service providers who are providing applications to their users as Software as a Service. HP CloudSystem Service Provider can play the role of a public cloud or of a hosted private cloud for service providers.

The system portal aggregates and manages all of the services being provided by HP CloudSystem Service Provider. In addition, unique customer portals are available to give each hosted service provider its own look-and-feel.

HP CloudSystem Service Provider comes with a sampling of prepackaged services, including Microsoft Exchange, Microsoft SharePoint, HP Virtual Room, HP Audio Conference, and Business Voice Services.

Cloud Bursting

Cloud bursting is the act of reaching out into other clouds for additional capacity or service offerings. HP CloudSystem bursting supports both local and public bursting.

Local bursting allows workload and services to be sent to other private clouds managed by a company. Local bursting is used if the application contains highly sensitive data or if company policies prohibit the use of a public cloud for security or compliance reasons.

Public bursting allows applications running in a private cloud to reach out to public clouds to manage uneven service demands or to access other functionality. These services are typically available to a company on a pay-for-what-you-use basis. Public bursting is subject to company policies in the same way that private cloud applications are managed.

Also supported is dual bursting, in which services may be invoked in other private clouds as well as in public clouds. Bursting may either be automatic or may require approval before workload distribution proceeds. All cloud services in a bursting environment are managed by a single management portal by HP CloudSystem.

In order for a public cloud to participate in CloudSystem bursting, HP must have developed a CloudSystem bursting connector for that cloud. The bursting connector passes provision and service requests to the public cloud. It translates CloudSystem calls into calls that the cloud provider understands and converts the cloud's responses to CloudSystem format. HP is in the process of creating bursting connectors for its CloudAgile bursting partners who provide cloud services.

Major Components

HP CloudSystem comprises three major components – HP BladeSystems, the Matrix Operating Environment, and HP Cloud Service Automation software.

HP BladeSystem

HP CloudSystem runs in an HP BladeSystem. It also can include most x86 servers and SAN storage from HP or EMC.

If a company has already migrated to HP BladeSystems, those systems can be expanded easily to a private, public, or hybrid cloud.

Matrix Operating Environment

The Matrix Operating Environment (MOE) is a common management platform that automates infrastructure management, including server, storage, and network resources and core business security- and regulatory policies. It enables rapid provisioning of complex infrastructure services and the adjustment of these services to meet changing business demands by enabling in minutes the rapid design, provisioning, and modification of a complex infrastructure.

MOE is based on HP Insight Dynamics for real-time provisioning and on HP Insight Control for lifecycle management, power management, and health monitoring. MOE provides the following functionality:

- *Provisioning* infrastructure in minutes from predefined Cloud Maps for each application.
- *Optimization* by measuring every five minutes key parameters such as CPU and network utilization and power draw, creating best-fit consolidation scenarios.
- *Capacity planning* by simulating placement of application workloads on a continuing basis to improve server utilization.
- *Automated failover* in minutes using recovery scenarios that have been tested and that can be activated with a single click.
- *Configuration management* for all HP and non-HP resources, with on-demand movement of server profiles from one blade to another.

HP Cloud Service Automation

HP Cloud Service Automation (CSA) provides automation tools to deploy and manage cloud computing applications in heterogeneous and extensible cloud-computing environments. It ensures service levels through application lifecycle management, patch management, service governance, and compliance. CSA can grow and shrink allocated resources across private and public clouds to meet service-level requirements; and it delivers security, governance, and compliance across applications and across physical- and virtual infrastructures

CSA has four main parts:

Intelligent Resource Management automates provisioning and metering of resources against incoming workloads based on business policies, cost, and performance goals.

Advanced Application Deployment Management manages dynamic cloud applications, including planning, auditing, provisioning, maintenance, and incident response.

Advanced Configuration Management facilitates rapid troubleshooting, capacity planning, service level management, and service quality.

Single View Portal Service is a common service designed for heterogeneous environments for one-stop lifecycle management from provisioning to retirement.

Cloud Maps

Cloud Maps are predefined templates that define the resources needed by an application and the policies that control the deployment of the application. They allow HP CloudSystem to quickly and easily provision and deploy an application.

A Cloud Map consists of tested components, including templates for hardware and software configuration, sizers to guide capacity and performance planning, workflows and scripts for automated installation, and reference white papers to aid in the customization of specific implementations.

HP CloudSystem provides predefined Cloud Maps for many popular applications, such as those from Citrix, Ericsson, FS Networks, IBM Software, McAfee, Microsoft, Novell, OpenText, Oracle, PTC, QAD, Red Hat, SAP, SAS, Symantic, TIBCO, Trend Micro, and Word Press.

CloudSystem Services

HP provides many services to help its customers define and implement their clouds.

HP CloudStart

HP CloudStart is a fixed price, fixed scope HP Services solution to start delivering services from a private cloud in thirty days. Based on HP CloudSystem Matrix, CloudStart provides all services required to set up a cloud-service catalog for up to four services. The resulting cloud is integrated with the enterprise environment and includes chargeback, backup and security. It is delivered as an out-of-the-box, configured and tested cloud ready for deployment.

HP Cloud Discovery Workshop

The HP Cloud Discovery Workshop focuses on key success factors and components required to develop a cloud solution. During the course of the workshop, a consensus for the company's cloud strategy is developed.

The Workshop covers cloud concepts, cloud architectures, and key technologies. It guides the client in developing management policies for proper governance of the cloud and explores the financing options available to the customer.

HP Cloud Consulting Services for CloudSystem

HP Cloud Consulting Services provide roadmap, design, and implementation services.

HP CloudSystem Matrix Conversion Service

The HP CloudSystem Matrix Conversion Service provides services to upgrade a company's current BladeSystem to an automated private cloud environment.

HP Solution Support for CloudSystem

HP Solution Support for CloudSystem supports a company for its entire multivendor CloudSystem environment, from its infrastructure to its cloud portal. Support is available from 35 global solution centers.

HP Education Services for CloudSystem and Cloud Computing

HP Education Services provides online or face-to-face training courses for cloud topics.

HP Cloud Solutions Lab

Located in Houston, Texas, the HP Cloud Solutions Lab is a dedicated lab available on a 24x7 basis. It offers expertise in every aspect of cloud architecture, including applications, automation, infrastructure, security, and more.

HP CloudAssure

With HP CloudAssure, experts provide ongoing visibility into a company's cloud services. Networks, operating systems, and Web applications are scanned for security flaws. Bandwidth, connectivity, and scalability are tested to ensure the quality of the end-user experience. Availability testing and monitoring of Web-based applications keeps them responsive to customers. Costs are optimized by providing resource and end-user performance metrics to right-size the resources required by an application.

Summary

HP CloudSystem is a customized approach for a company to build private, public, and hybrid clouds to meet its specific purposes. Based on HP BladeSystem technology, an HP CloudSystem can support a wide range of heterogeneous server, storage, networking, operating system, and hypervisor resources that can be managed as a unified environment.

HP provides a wide range of software facilities and services to ease a company's entry into the world of clouds. This includes HP CloudStart, in which HP will design and deliver an initial cloud system ready for deployment by a company in thirty days.