BACHELOR OF COMPUTER APPLICATIONS

SEMESTER 6

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CLOUD COMPUTING

Unit 9

Discovery of Private and Hybrid Clouds

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1. INTRODUCTION

Many business executives are interested in cloud computing, admired by its attractive public cloud services but on an internal basis. They are interested in investing in the cloud, but they require only private services because of the threatening privacy and security issues. One more reason to go for private is they already invested enough in their own traditional system; they just want to consume the cloud service by accepting it privately. For this reason, most companies have hybrid services like private and public services and their own data centres. In this unit, we are going to focus on the role of private clouds and how this can be cycled with public clouds. We are also going to discuss the various services provided by the vendor when the companies implement this strategy and how the data can be hidden privately with the virtual private network with public cloud services.

1.1 Objectives

After reading this unit, you should be able to,

- *Explain the need for privacy in cloud computing.*
- *Examining the economics of the private cloud*
- *Elaborate about the up-key vendors.*

2. DEFINING A PRIVATE CLOUD

There is confusion in understanding the concept of a private cloud. It is defined as "When we say private cloud, we mean a highly virtualised cloud data centre located inside your company's firewall". It may also be a private space dedicated to your company within a cloud vendor data centre designed to handle your company's workloads".

Characteristics of private cloud

- It allows computing capability and services to the internal users in a self-service manner.
- Supports automation of business and calculates cost only for the service which has been consumed.
- Supports a well-managed atmosphere.
- Resources optimisation
- Specific workloads will be supported.
- Supports self-service-based provisioning for software and hardware resources.

The above description sounds similar to the public cloud, but the main difference between the private and public cloud is that it controls the service management and controls the overall environment, respectively. You may have a question now: when the public and private clouds are similar, what is the point of getting service as IaaS or SaaS? Below are the reasons why companies prefer private clouds to public clouds.

- Your organisation has a huge, well-run data centre with a lot of spare capacity. It would be more expensive to use a public cloud even if you must add new software to transform that data centre into a cloud.
- Your organisation offers IT services to a large ecosystem of partners as part of your core business. Therefore, a private cloud could be a revenue source.
- Your company's data is its lifeblood. You feel that to keep control, you must keep your information behind your own firewall.
- You need to keep your data centre running in accordance with the rules of governance and compliance.

- You have critical performance requirements, meaning you need 99.9999 per cent availability. Therefore, a private cloud may be your only option. This higher level of service is more expensive but is a business requirement.

The Benefits of the Private Cloud are:

- Security and compliance
- Customization
- Hybrid integration
- Cost
- Efficient and control

Private clouds combine the access control, security, and resource customisation of on-premises infrastructure with many of the advantages of cloud computing, such as elasticity, scalability, and ease of service delivery.

The challenges of Private Cloud:

- Up-front costs
- Capacity utilisation
- Scalability

Because the private cloud is a simpler (or the only option) to satisfy their regulatory compliance standards, many businesses prefer it to the public cloud (cloud computing services offered via infrastructure shared by several customers).

Private clouds can differ in the way that they are hosted and managed, providing different functions depending on the needs of the enterprise:

- Virtual Private Cloud
- Hosted Private Cloud
- Managed Private Cloud

Utilising computing resources that are provided to clients via the internet is known as cloud-enabling technology.

Cloud Enabling Technologies:

1. Virtualization
2. Management Software
3. Automation

Role of the Private Cloud in the Enterprise:

- The private cloud initially promised the same scalability, elasticity, and manageability as public clouds.
- But with the security and control over on-premises data centre environments required by private clouds, it is not possible with public clouds.
- The promise seemed unjustified for many years, and many private clouds ran in public cloud environments, making them not private, or they failed to deliver any cloud benefits. But things have changed these days.
- Private clouds have become the prime part of a hybrid IT or a multi-cloud environment.

Hybrid IT Future:

With hybrid cloud solutions, the private cloud leverages the benefits of the public cloud, including rapid deployment, scalability, ease of use and elasticity.

Hybrid Clouds can also offer additional capabilities, including greater control, increased performance, predictable cost, tighter security, and flexible management options.

Public cloud providers stepped up to play the private cloud game. Virtual private clouds were an early offering.

Virtual private clouds finally delivered the cloud characteristics that enterprises desired, but they were only private because their network settings were logically behind the corporate firewall.

3. COMPARING PUBLIC, PRIVATE AND HYBRID

By this time, you may be clear about the private and public cloud services, but still these are a little confusing since cloud companies are now offering private versions of their public clouds. Some companies that only offered private cloud technologies are now offering public versions of those same capabilities. We are also going to discuss the hybrid approaches in this section.

Going Public

When or on the situation an organisation decides to go for the public cloud is listed below

- When lots of people use your standardised workload for applications. Email is the best example.
- You need to test and develop application code.
- You have SaaS (Software as a Service) applications from a vendor who has a well-implemented security strategy.
- You need incremental capacity (to add computer capacity for peak times).
- When an organisation concentrates on collaboration projects.
- Involved in ad-hoc software development project using a PaaS (Platform as a Service) contribution.

However, many organisations, especially IT-based ones, are concerned about privacy and security as reliable factors. But this can be overcome with legal and governance support.

On the other hand, when an organisation wants to go for a private cloud.

- Your business is your data and your applications, where you need full control over your data and its security.
- When your role is part of a sensitive business where you need to confirm data security and privacy issues, Private clouds will be the correct choice to meet those requirements.
- Your company is large enough that you have the economies of scale to run a next-generation cloud data centre efficiently and effectively.

Multitenancy:

Since multiple organisations share a public cloud, multiple organisations will sometimes be using the same physical server at the same time. This is called multitenancy.

Multitenancy is when multiple customers of a cloud provider are accessing the same server.

Data from two different companies could be stored on the same server, or processes from two different applications could be running on the same server.

Let us see the characteristics of the Public Cloud:

1. On-demand computing and self-service provisioning
2. Resource pooling
3. Scalability and rapid elasticity
4. Pay-per-use pricing.
5. Measured service.
6. Resiliency and availability
7. Security
8. Broad network access.

Benefits of Public Cloud Computing:

1. Access to new technologies
2. Virtually unlimited scalability
3. Flexibility
4. Analytics

Challenges of Public Cloud:

Below, we've included some of the most typical roadblocks that businesses encounter when expanding their cloud operations. Organisations can start to close security gaps where they are present by recognising these issues and the ways they can appear.

- Runaway costs
- Scarce cloud expertise
- Limited controls

Hybrid cloud

A hybrid cloud is the combination of one or more public and private clouds. A hybrid cloud is typically offered in either one of the following ways.

- Vendor has a private cloud and forms a partnership with a public cloud provider.
- Public cloud provider forms a partnership with a vendor that provides private cloud platforms.

In a hybrid cloud computing environment, the organisation itself provides and manages some resources locally, and the remaining other resources are provided externally.

For example, an organisation might use a public cloud service, say Amazon S3 (Amazon Simple Storage Service), for archived data but continue to maintain internal storage to operate customer data. Thus, the hybrid cloud supports the business by providing the advantages of scalability and effectiveness in cost as provided by the public cloud computing environment. Also offers support in non-exposing mission-critical applications and data to third-party vulnerabilities. This type of hybrid cloud is also called "hybrid IT".

Public Clouds in Hybrid Environments:

- Nowadays, enterprises are adopting fewer public/private-only cloud distributions and more hybrid environment solutions.
- This provides each environment's advantage to minimise the disadvantages of another.
- For example, an enterprise running all workloads on one virtual cluster.
- And that cluster would be running at total capacity, leading to poor response times and inundation of calls or tickets to operations teams from upset application owners.
- This situation could be solved by rolling out another virtual cluster and automating the workload balance between the 2.

SELF-ASSESSMENT QUESTIONS – 1

1. Private cloud allows internal users computing capability and services in a self-service manner. [True/False]
2. _____ is the best example of standardised workload applications.
3. Hybrid cloud is the combination of _____ and _____clouds.
4. _____ cloud supports the utmost scalability and effectiveness for a business.

4. THE UP KEY VENDORS

In this section, we are going to discuss a few vendors who offer private and hybrid strategies. This may provide insight into what's available. The companies we include are IBM, HP, EMC, Unisys, Computer Sciences Corporation, Accenture, VMware, CA, Platform, Rackspace, 3Tera, and Eucalyptus.

A cloud service vendor is a third-party company offering a cloud-based platform, infrastructure, application, or storage services.

This is much like a homeowner who would pay for a utility such as electricity or gas. Companies typically have to pay only for cloud services they use, as business demands require.

In addition to the pay-per-use business model, cloud service providers offer a wide range of advantages to businesses. Businesses can benefit from scalability and flexibility because they are not restricted by the physical limitations of on-premises servers, the dependability of multiple data centres with multiple redundancies, customisation because servers can be configured to your preferences, and responsive load balancing that can quickly adapt to changing demands.

When you have decided to make the move to cloud computing, your next step is to **select a Cloud Service Provider.**

Some things to consider:

- Provider's Business and Processes
- Administration support
- Technical capabilities and processes
- Security practices

4.1 Services led technology companies

All the following vendors are delivering private cloud offerings via an ecosystem of partners. These services offered by companies are based on their property. For example, "IBM is focused on specialised software and best practices services, whereas EMC is focused on virtualisation and the impact of the cloud on storage requirements. HP, on the other hand, is very focused on implementation services".

IBM

IBM has already done a lot of private and hybrid cloud implementations. IBM has created a centralised cloud computing organisation with the goal of creating offerings that include software, hardware, and services. IBM expects a lot of demand for solutions to manage the interface between public and private clouds. A key element of the IBM private and hybrid cloud strategy is to offer solutions based on varying customer-driven workloads. These solutions are organised together as IBM Smart Business Cloud. IBM's private and public cloud strategies offer solutions based on varying customer-centric workloads. As of August 2009, several categories of workload solutions are available for private cloud implementations, including the IBM Smart Analytics System. The following workloads are currently available:

Development and test: Many organisations have a lot of variation in the demand for test and development resources, making these types of workloads a very practical first step for companies looking to improve data centre and IT efficiency and cost-effectiveness. This offering is a private cloud implementation that provides customers with a self-service portal to develop and test on their own. This same service can be implemented inside a customer's firewall. IBM also has a public cloud offering for this area.

Desktop and devices: End-user connections to desktops and mobile devices are another workload type that IBM has identified as a requirement for private clouds. Companies want

their users to access applications from anywhere (at any time) by using thin clients or other Internet-connected devices. This cloud service provides the technology infrastructure for these user environments.

Infrastructure storage: IBM is offering access to storage on demand in various ways. Customers can install the IBM Smart Business Storage Cloud behind the firewall in the data centre. Customers can also buy hardware with the virtual image of hardware and software required for additional storage. IBM also has an option for customers to buy on-demand storage on the IBM public cloud.

Infrastructure compute: This offering is IBM's version of computing power on demand. This extensive enterprise offering has shared virtual images on the IBM cloud. IBM has partnered with Amazon and Google to add its middleware Software as a Service model in the Amazon and Google cloud environments.

Hewlett-Packard

Based on customer engagement experiences, HP has put a particular emphasis on helping customers who want to create hybrid cloud environments. The company is leveraging its extensive services teams to help educate and lead its customers down an appropriate path to the cloud. EDS has significant experience with vertical market-managed services, and HP will leverage this knowledge and intellectual property (IP) in its evolving cloud strategy.

HP's teams of business and IT consultants and engineers get involved with the design and implementation of many different types of cloud environments. For example, HP's Infrastructure Design Service will help you design computing, storage, data centres, and Infrastructure as a Service implementation. Other teams provide management consulting, business technology optimisation, and testing services.

While companies can easily incorporate CRM software as a service implementation into their IT environment, large-scale adoption of cloud computing requires IT to adopt a services focus; HP is designing some of its consulting services with this in mind. In addition, HP has expanded its cloud environment consulting teams to help companies focus on the quality of service delivered across all business lines.

EMC

EMC has developed a shared vision for the private cloud along with its key partners like VMware, Cisco, and AT&T. This group sees lots of opportunities to provide technology and services to companies looking for a better approach to managing IT infrastructure. Although some companies may use private clouds as an entry point and then transition to public clouds, EMC sees the private cloud as much more than just a staging ground for public clouds. EMC and partners want to help you create a flexible set of IT resources by federating your private clouds with external infrastructures provided by third-party providers.

Not surprisingly, EMC's contribution is concentrated on providing storage, backup, archiving, and security to support the data centres in a private cloud environment. When all IT resources (servers, network, and storage) are pooled in the virtualised data centre model, many things need to change. Storage must be designed and managed differently. For example, many EMC products require a dedicated pair of servers, and this requirement won't fly in a virtualised environment. New tools and processes are required to plan and manage IT resources and ensure information security. For example, your company can use EMC's Atmos cloud storage service to build a scalable internal storage cloud and then tie it to an external cloud storage service. Cisco brings the network and capability of building a scalable network to the mix.

4.2 System Integrators Companies

There is no one answer to the best way to gain data centre efficiency and leverage cloud benefits such as elasticity and self-service. Clouds don't come in boxes, so you'll need to work with providers and consultants. This is why companies like IBM and HP lead cloud service engagements with their own internal services teams.

Unisys

Unisys, a veteran computing company, has focused its cloud strategy on security. Its primary offering is Unisys Secure Cloud Solution, which is a hosted managed cloud service. Unisys intends to have a version of this available by the end of the year that will be called Cloud-in-a-box. The objective is to make it easier for you to create your own private cloud. The company also intends to offer a hybrid cloud service in 2010. This offering will enable you to have your own private cloud and combine that with hosted cloud services from Unisys.

Accenture offers what it calls its Cloud Computing Suite, which includes the following services:

- Accenture Cloud Computing Accelerator
- Accenture Cloud Opportunity Assessment Tool
- Accenture Cloud Computing Data Processing Solution

Accenture

Accenture is leveraging its experience with managed services and hosting to move into the cloud market. It is also partnering with many software and hardware providers (including EMC, Microsoft, and HP) to provide cloud solutions for its customers.

Savvis Inc.

Savvis is primarily an outsourced infrastructure service provider for enterprises. Over the past several years, the company has begun providing private cloud solutions for its customers. The company is leveraging its 29 data centres to create cloud services, such as providing virtual lab services for developers and a platform for independent software vendors (ISVs) to offer their SaaS applications. In addition, the company is offering a hybrid cloud service where customers can establish a private cloud environment without one of the Savvis data centres.

4.3 Technology Enabler Companies

We put these companies together because their cloud offerings are focused on hardware and/or software technology and less on implementation services. For the most part, they have one or more of the key technology components required to build a cloud. Partnership relationships are understandably very important to these companies to make sure that customers get the most value from the technology they provide.

VMware

VMware's cloud strategy and technology road map is focused on private clouds and providing a way to bridge external clouds through private clouds. With virtualisation as the key underpinning technology enabling cloud infrastructures, VMware has identified three key building blocks for the private cloud:

- The cloud operating system

- Service level management
- Federation and standards

VMware provides the cloud operating system for private clouds through its software solution called vSphere. The company refers to this solution as a cloud operating system because it manages the data centre infrastructure components (CPUs, storage, and networking), just as a computer operating system (like Linux or Windows) manages the components of a computer. vSphere has two main components:

- Infrastructure services that transform server, storage, and network hardware into a shared resource
- Application services that provide built-in service level controls

CA

CA is well-positioned to help companies manage the mediation layer between private and public clouds. CA expects that your company will want to take advantage of public cloud services for a portion of your workload but needs to manage these public services in connection with private cloud implementations.

CA's strategy is to provide services that help you understand where specific workloads are running (public versus private cloud) and where they should be running for optimal performance and productivity gains. CA can help your company understand and manage the security and provision requirements between private and public cloud workloads. In addition, CA expects to offer its cloud services to service providers as well as directly to businesses but doesn't plan to be a provider of public clouds like Google or Amazon. CA has a lot of infrastructure management software that can be applied to cloud environments. Several of CA's products have been adapted to support VMware's private cloud operating system, vSphere:

- Spectrum Infrastructure Manager
- eHealth Performance Manager
- Spectrum Automation Manager

Rackspace is an enterprise-hosting provider with the majority of its customer base in the cloud. The company has three core products that all deliver computing as a service:

- Rackspace Managed Hosting

- Rackspace Cloud
- Rackspace Email and Apps

Rackspace Cloud focuses on hosting Web sites for its customers. It provides storage space, bandwidth usage, and compute cycles. It also has a service for companies that want to gradually move their whole operation into the cloud.

3Tera

3Tera's AppLogic is a grid operating system (supporting platform) designed to support cloud computing. It supports middleware and Web applications under this operating system. Therefore, AppLogic is used by 3Tera partners to help virtualise software, which makes for easier management in a cloud environment. AppLogic works by allowing an application to be put into a "container" as though it were a business service. In this way, an application designed for use in a traditional data centre can act as though it were designed for the cloud.

SELF-ASSESSMENT QUESTIONS – 2

7. _____ The company is focused on virtualisation and the impact of the cloud on storage requirements.
8. _____ has put a special emphasis on helping customers who want to create hybrid cloud environments.
9. VMware provides the cloud operating system for private clouds through its software solution called_____.
10. ISV stands for_____.

5. SUMMARY

Let us recapitulate what we have discussed so far in this unit.

- When we say private cloud, we mean a highly virtualised cloud data centre located inside your company's firewall.
- You may be clear about the private and public cloud services, but these are still a little confusing since cloud companies are now offering private versions of their public clouds.
- A hybrid cloud is the combination of one or more public and private clouds.
- The factors involved in assessing the economies of the private cloud.
- The companies that have private hybrid clouds include IBM, HP, EMC, Unisys, Computer Sciences Corporation, Accenture, VMware, CA, Platform, Rackspace, 3Tera, and Eucalyptus.

6. TERMINAL QUESTIONS

1. Discuss the need for privacy in cloud computing.
2. Compare and discuss public, private, and hybrid clouds.
3. How to examine the economies of the private cloud.
4. List and explain the up-key vendors of cloud service.

7. ANSWERS

Self-Assessment Questions

1. True
2. Email.
3. Private & public
4. Hybrid
5. Cost of your data centre
6. d. All the above
7. EMC
8. HP
9. vSphere
10. Independent software vendors.

Terminal Questions

1. Assume that you are a service provider for the retailer who is managing their digital cards. Where you need to use the public cloud service through which the user can provide information to you. But once you receive the information from that retailer, you have to keep that data safe; for details, refer to section 9.2.
2. By this time, you may be clear about the private and public cloud services, but still, these are a little confusing since cloud companies are now offering private versions of their public clouds. For details, refer to section 9.3.
3. First, you need to understand the cost of your data centre and IT operations; for more details, refer to section 9.4.
4. IBM, HP, EMC, Unisys, Computer Sciences Corporation, Accenture, VMware, CA, Platform, Rackspace, 3Tera, and Eucalyptus are the few vendors in the market; for details, refer to section 9.5.

8. REFERENCES

E-References:

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