ISSN:0975-9646

The Next Generation of Cloud Computing on Information Technology

G.C.Priya, R.Parameswari, G.Gayathri
Dept. of Computer Applications
Saveetha Engineering College
Anna University, Tamil Nadu, India.

Abstract-Cloud computing is a new, important IT delivery model that provides infrastructure and computer resources as a service. This new paradigm, the next phase in the evolution of distributed computing, enables enterprises to transform IT by implementing private clouds. It leverages the power of sharing and enables increased utilization rates of IT resources, more rapid and efficient delivery of IT services, faster time to market and reduced IT capital and operating expenditures. This paper describes how organizations can successfully implement this new IT delivery model using a phased approach that starts with cloud management software. In addition, this paper highlights Platform computing that is on the forefront of cloud computing. It underlines the fact that, "Cloud is built, not bought."

Keywords – SaaS, PaaS, IaaS, HIaaS, VMware, Cloud computing.

1. INTRODUCTION

Over years since business computing began, there have been two major trends: first there was mainframe computing, followed by client-server. Now we have a new paradigm. Cloud computing is the third generation IT model and the next phase in the evolution of distributed computing and the data center. Whatever the model, IT departments have always been challenged to quickly and cost- effectively deliver IT resources to support user applications.

Client-server architecture greatly increased IT's ability to implement a dependable computing Infrastructure that supported diverse lines of business and their applications.

However, client-server came with a price. It has contributed to server sprawl, skyrocketing capital and operating expenditures and complex data centers that are difficult to manage and reconfigure quickly to address to changing demands. Servers dedicated to individual applications are usually underutilized due to fluctuating application workload demands. The IT technology stacks on these servers are often customized, requiring individual attention by IT administrators. To provision a business request for a new application, one or more new servers complete with management software have to be procured and deployed, often resulting in weeks or months of delay.

For last decade, distributed computing architectures such as clusters and grids have provided business users with access to share and scalable IT infrastructure with high resource utilization. While primarily deployed to handle technical and scientific applications – often called high performance computing (HPC) applications – the lessons learned from implementing clusters and grids are relevant to general business applications. Specifically, the knowledge gained over the last decade can contribute directly to the new cloud computing model – a new paradigm in which sharing benefits both end users and IT.

Like software that has evolved from a proprietary, centralized model to an open, distributed structure, cloud computing is also a rapidly evolving trend that will have a profound impact on the way IT is delivered to business users. Cloud computing is the logical next step in the evolution of the data center from mainframe to client-server and now to clouds.

In the context of the enterprise, Cloud computing is an IT delivery model that offers large-scale, shared infrastructure and computing resources as a service through self-service pay-per-use access. Although it leverages recently developed technology, cloud computing is a business, not a technical trend.

2. CLOUD COMPUTING NEEDS

2.1 Business needs are straining IT

- Business dependency on IT continues to grow
- Business and IT are becoming one
- As business dependency grows, so do the IT resources necessary to run the business
- Many organizations have built massive, overly complex, underutilized and rigid IT infrastructure
- Why we are seeing some IT initiatives
- Data centre consolidation, application rationalization and virtualization
- These efforts aren't enough to stem the tide; revealing some harsh realities

IT is too expensive, rigid and complex

- Owning and operating IT is an expensive and time consuming proposition
- Many data centres are out of power/ space
- Complex infrastructures decrease the ability to respond to business needs
- Install new applications, provision additional capacity and secure their environment
- Limits business agility and growth
- Business units are forced to go outside their IT organizations to meet their needs
- IT organizations have more work than personnel can reasonably manage
- Many data centers house extraneous, infrastructure that has nothing to do with the organization's core business

2.2 FEATURES OF CLOUD COMPUTING

Cloud computing has several key features are infrastructure sharing, scalability, self-service and pay-per-use.

Infrastructure sharing: Today's enterprise data centres are characterized by fluctuating resource demands from a variety

of users. Cloud computing enables dynamic sharing of these resources so that demands can be met cost effectively.

Scalability: To handle ever increasing workload demands and support the entire enterprise, cloud computing must have the flexibility to significantly scale IT resources. Scalability and flexibility allow the cloud provider to fulfil or at least come close, to the promise of unlimited IT services on demand.

Self service: Cloud computing provides customers with access to IT resources through service based offerings. The details of IT resources and their setup are transparent to the users.

Pay-per-use: Because of cloud resources can be added and removed according to workload

demand, users pay for only what they use and are not charged when their service demands decrease.

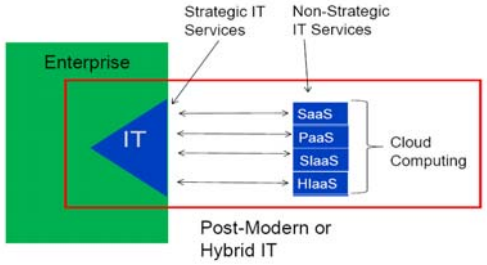

FIGURE 1: ECONOMICS OF IT

2.3 Definition of Cloud Computing

The set of disciplines, technologies and business models used to deliver IT capabilities (software, platforms and hardware) as an on-demand, scalable, elastic service.

Other common cloud computing definitions include:

• **Public cloud:** An IT capability as a service that providers offer to consumers via the public Internet.

• **Private cloud:** An IT capability as a service that providers offer to a select group of customers.

Internal cloud: An IT capability as a service that an IT organization to its own business (subset of private cloud).

External cloud: An IT capability as a service offered to a business that is not hosted by its own IT organization.

• **Hybrid cloud**: IT capabilities that are spread between internal and external clouds

While there are many roads to cloud computing from existing client-server infrastructures, there are at least three major paths as follows:

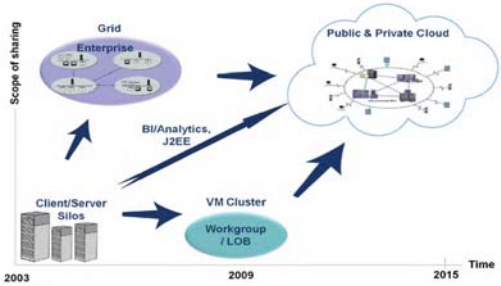

FIGURE 2: PATHS OF CLOUD COMPUTING

VM to cloud - For users already running applications hosted on VMs (virtual machines), their virtual servers can be brought together to form a VM cluster. As VM clusters proliferate, automatic resource allocation is required to manage the virtual machines within a VM cluster in order to handle load balancing across the clusters and for self-service access to resources. This approach leads to implement a private cloud run by the organization's internal IT department.

Grid to cloud - Some organizations are already running grids. These are distributed systems managed by IT staff and shared by technical applications that are typically compute or data intensive.VM technologies are not used in grids because each application can easily consume all of the resources on a server. Also, many servers are often harnessed together to run a parallel application. By deploying cloud management software, grids can be generalized to support more types of applications. Incorporating VM technologies and provisioning products allows IT to transform an enterprise grid into a private cloud.

Desktop to cloud - Public clouds are another option. This approach allows users to access applications hosted in cloud computing centers run by external service providers directly from their desktops or other client devices

An organization may choose any of these paths, or even several at the same time for different applications or parts of its business. To ensure success, the adoption of cloud computing should follow sequence of evolutionary steps rather than an overnight revolution. Progress is driven by the requirements of specific applications for business process automation.

2.4 CHARACTERISTICS OF CLOUD COMPUTING

Elastic and Scalable

• Consumers can rapidly provision and de- provision IT services

• Cloud service appears infinitely scalable to the consumer

On Demand, Self Service

• Consumer has the ability to consume cloud services as the need arises

• Self-service increases IT agility to match the pace of business

Consumption-based pricing model

• Vendors charge customers based on amount of the service consumed (finely granular basis).

• Customers pay for only the IT services they use, thereby increasing time to Return on Inverestment (ROI).

Shared Infrastructure

•Vendors leverage the infrastructure to service multiple consumers

•Multi-tenancy is vital to driving down infrastructure costs

Virtualized and Dynamic

• Virtualization creates a dynamic environment for quick resource provisioning and better resource management

• From the consumer point-of-view, the details of the infrastructure are abstracted away

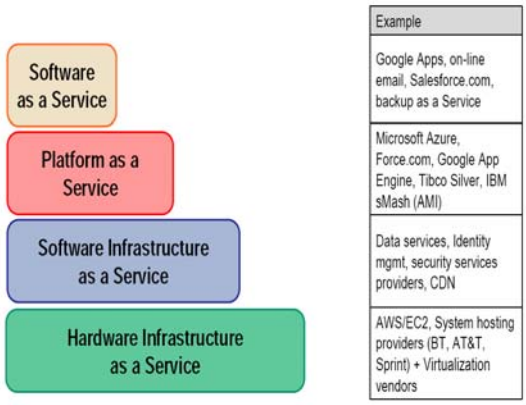

Figure 3: Cloud Tier Architecture

3. Enterprise Cloud Computing

3.1 Cloud Management Software

The hardware components are apparent: servers, storage and networking. All of which exist in today's data centers. What does not exist and this is the key to a successful cloud deployment is the software layer that creates a shared computing infrastructure from physical and virtual resources in order to deliver cloud computing services upon request. This new layer is called cloud management software.

3.2 Platform Computing – Platform ISF

Founded in 1992, Platform Computing has been a leader in management software for distributed clusters, grids and HPC workloads deployed at enterprises. Over the years Platform has developed the skills and technologies required to efficiently provision and share heterogeneous hardware resources as well as orchestrate application processes.

As the global leader in management software for grid computing, Platform has accumulated extensive technology and expertise in enterprise IT infrastructure sharing and workload scheduling. Both are key capabilities for the adoption of private clouds. Platform is also experienced in deploying multi-thousand node compute environments that leverage both physical and virtual resources, clusters and grids. For over a decade, these deployments have been in production with increasing scale in leading enterprises across numerous industries such as financial services, manufacturing, high tech, government, education, energy, telecommunications and healthcare.

Platform ISF : is the leading end-to-end private cloud management software. Platform ISF creates a shared computing infrastructure from physical and virtual resources to deliver application environments according to workload-aware and resource-aware policies.

Platform ISF consists of three layers:

Resource integration: This foundation layer of Platform ISF integrates distributed and Heterogeneous IT resources to form a shared system. Resource integration is the opposite of server virtualization – instead of creating multiple VMs on one physical serve shared computer out of many heterogeneous servers, storage devices and interconnects. All major industry standard hardware, operating systems (including Linux and Windows) and VM hypervisors (Including VMware ESX, Xen, Citrix XenServer, Microsoft Hyper-V and Red Hat KVM) are supported. The resource integration layer also uses provisioning tools to set up application environments on demand. It integrates with many 3 including directory services, security and monitoring and alert. Its extensible framework of resource and management adaptors enables IT to fit Platform ISF into the environment. These layers can transparently its private cloud management environment.

Allocation engine: Once a pool of shared resources is formed, a set of site is configured in the allocation engine layer to ensure that applications receive the required resources. The policies also make certain that the organization the quota constraints applicable to business groups sharing the cloud are reinforced. The allocation engine matches IT resource supplies to their demands based on resource policies. This private cloud "brain resource integration; allocation engine; and service delivery: server, this capability creates one including Linux and Windows) and VM hypervisors XenServer, Microsoft Hyper-V and Red Hat KVM) are supported. rd party tools for various systems management tasks out their existing data center systems integrate resources from external providers while maintaining site-specific sharing policies organization's resource sharing priorities are applied and that resource-aware and application brain" is critical for IT agility.

Service delivery : This top layer of Platform ISF provides interfaces to users and applications as well as supporting the lifecycle of cloud service management. A self-service portal enables users to request and obtain physical servers and VMs in minutes instead of days or weeks. Platform ISF has a set of APIs that can be called by applications, middleware and workload managers to request and return resources without human intervention. Templates can be configured for simple and complex N-tier business applications to automate their lifecycle management. Platform ISF allows for the starting of all the components of an N-tier application, the adding or removal of a resource and monitoring and failure recovery. Platform ISF supports middleware such as J2EE, SOA, CEP and BPM and workload schedulers such as AutoSys and Platform LSF. No change to the application supported by this software is needed cloud computing should be transparent to users and applications. The service offerings can be structured as: complete application environments (e.g., application packages, CPU, memory, storage and networking); as bare metal servers with an operating system installed; or as virtual machines. SLAs can be associated with each service offering.

Platform ISF collects all resource usage data and provides reports and billing information. Alternatively, the cloud administrator may choose to feed the usage data into site-specific reporting and chargeback tools. As a general-purpose, end-to-end private cloud management platform, Platform ISF is highly configurable and can run in diverse operating and application environments. Platform ISF aggregates heterogeneous resources across data centers and dynamically provisions them to a diverse collection of applications with fluctuating resource demands.

4. CLOUD COMPUTING BENEFITS

- Simplifies and Optimizes IT
- Reduce complexity by abstracting infrastructure
- Enables IT to offload non-essential IT processes; refocuses staff on driving core business value
- Allows IT organizations to defer capital costs
- Cloud services enable act as a release value for data centers that are power and space constrained, deferring new data center construction
- Converts capital expenses into operational expenses
- On demand, self-service models increase IT agility
- Using the cloud, IT organizations can quickly provision IT resources whenever business demands, especially for short-term IT resource needs
- Cloud computing vendors employ highly skilled IT professionals
- Cloud computing business models require providers to hire, train and retain highly skilled employees to ensure service quality
- Enables Faster ROI through better resource management
- IT organizations pay for only the IT services they use, enabling better resource tracking, predictable costs, budget forecasting and faster ROI
- As cloud computing trust increases, IT organizations will use cloud services as a disaster recovery option
- Rather than using a co-location facility or a new data center, IT organizations will backup data to the cloud
- Public and externally facing private clouds can more easily support a mobile workforce
- Ubiquitous access to external IT services better support mobile workforce than internally hosted IT services accessed via Virtual Private Network (VPN)

4.1 Cloud Computing Futures

4.1.1 Technology and Vendor Trends

- Competition will increase, prices will decrease
- Cloud enablers (E.g. VMware) bringing a deluge of vendors to IaaS
- Product stratification (vCloud Express, ATMOS storage)
- Rise of enterprise grade clouds
- Announcements soon on customer-driven enterprise cloud requirements
- Hybrid and federated clouds
- To compete, cloud vendors will federate best-in-class cloud services
- Increase in private clouds
- Both from public clouds (e.g. VPCs) and completely private entities
- Standardization
- Cloud brokers
- Aggregate and vet providers, limit liability, predict cloud capacity
- Negotiable and programmatically readable SLAs
- Some vendors already negotiate
- Integration with enterprise management vendors
- Blur the lines between internal and external clouds

5. CONCLUSION

Cloud computing is coming. IT is finally catching up with the rest of the Internet by extending the enterprise outside of the traditional data center walls. Although cloud computing is transforming traditional IT, it is still immature. Lack of clarity, risk management and questionable long-term return on investment are creating consumer trepidation and obstructing cloud acceptance. Like any technology, comprehension is vital to creating a competitive advantage. The best organizations will use cloud computing's unique business model, elasticity and scalability to streamline IT operations, offload lesser-value IT processes and focus on driving core business value.

REFERENCES

[1] Cloud Computing by Michael Miller
[2] http://www.salesforce.com
[3] http://www.aws.amazon.com/ec2
[4] Charlemagne building, Room Alcide de Gasperi(2010) Future of Cloud Computing. A symposium held in Brussels on January 26, 2010.

G.C.Priya, is working as a Assistant Professor in the Department of Computer Applications since 2008 and doing her research on Security in Cloud Computing

R.Parameswari, is working as a Assistant Professor in the Department of Computer Applications since 2008 and doing her research on Mobile in Cloud Computing

G.Gayathri, is working as a Assistant Professor in the Department of Computer Applications since 2007 and doing her research on Fraudulent Detection in Cloud Computing