Nadar Saraswathi College of Engineering & Technology

NSCET E-LEARNING PRESENTATION

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Nadar Saraswathi College of Engineering & Technology

COMPUTER SCIENCE AND ENGINEERING

IV YEAR / VII SEMESTER

CS8791 CLOUD COMPUTING

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UNIT II

CLOUD ENABLING TECHNOLOGIES

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INTRODUCTION TO SOA

- ✓ Enterprise wide transformation poses significant challenges for process, people and technology
- ✓ Early identification of challenges and defining a mitigated approach achieves a smooth transformation challenges include resistance to change by people and organization

INTRODUCTION TO SOA

- ✓ Factor include role and responsibilities, management skills development and discipline and cultural shifts
- ✓ Creating awareness in organization for the need to drive such a transformation in the best interests of business.
- ✓ challenges include dealing with infrastructure complexity- heterogenous hardwares and varying versions of s/w across disparate environments

INTRODUCTION TO SOA

- ✓ Service Management is one of the similarities between cloud infrastructure and SOA approaches.
- ✓ Developing an integrated service management approaches for both the application services and infrastructure services together will drive efficiency in IT operations by improving resource utilization and improving service levels
- ✓ Such an integrated service management can move IT towards to an end-to-end service-oriented environment.
- ✓ This will enable business agility by better aligning IT with the Business

Enterprise Infrastructure and SOA

SOA makes IT applications into composite applications.

- Instead of traditional monolithic applications, composite applications are created, composed of many services often developed and deployed independently by separate development teams on different schedules.
- By adhering to common standards and interfaces, development of new composite applications and extension of existing applications is made easier through reuse of existing services and rapid integration of new service

Cloud and SOA

SOA journey to infrastructure

- The path to transformation consists of a long journey with a staged approaches, leading to the ultimate goal of a serviceoriented enterprise.
- Multiple islands of disparate infrastructures in today's environment need to be consolidated to gain control, reduce cost and become operationally efficient.

SOA journey to infrastructure

- The next step is to introduce virtualized infrastructure to improve utilization levels and allowing dynamic flexibility to move resources and capacity to meet fluctuating workload demands.
- Service orientation is achieved by building capabilities on the top of virtualized and automated infrastructure.
- In Service orientation state- infrastructure is provided and utilized as a service, rather than in piecemeal.
- Cloud computing will help to further the service orientation paradigm, to meet the scaling demands of future state of business.

Topic

Cloud and SOA

Components

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➢SOA binds how you will both deliver and leverage cloud based services. Cloud computing relies on serviceorientation to loosely-couple applications to underlying infrastructure model for using web services

➢ It uses web services to compose complex, customizable, distributed applications and encapsulate legacy systems

Infrastructure Technologies

▪Cloud infrastructure is based on virtualization- dynamic systems that enable the definition and delivery of resources on demand.

- Current technologies can deliver hundreds of virtual servers on small cluster of physical servers, enabling flexibility and high availability

SOA Defined

SOA is an approach to architecture that is intended to promote flexibility through encapsulation and loose coupling. SOA is defined by what a service is. Services are defined by the following characteristics

- Explicit, implementation-independent interfaces
- Loosely bound
- Invoked through communication protocol
- stress location transparency and interoperability
- encapsulate reusable business functions

SOA Life Cycle

- SOA lifecycle resembles “traditional” application lifecycle, but introduces new terminology.
- SOA in terms of life cycle requires a start in the SOA model Phase by gathering business requirement and designing their business processes.
- Once they have been optimized the business processes, they implement it by combining new and existing services. These assets are then deployed into a secure and integrated environment for integrating people, processes and information

Topic

Service-oriented Computing

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•Service orientation is a design paradigm comprised of specific set of design principles. Its most important feature is its reliance of the separation of concerns design philosophy.

• Separation of concern (SoC) is based on the simple fact that a problem becomes easier to approach if it is divided into small units and handled separately

•Example of SoC

•SOA based Cloud Infrastructure

•Steps Enterprises that intend to harness cloud computing must consider the following steps

- Analysis and Strategy
- Planning
- Implementation
- Value-driven

➢Architecture Cloud Infrastructure has many service components. Services can be divided into four domains

- Application Services
- Information Services
- Common IT services
- Infrastructure Services

SOA and Cloud Infrastructure

- SOA-based cloud computing model builds on the IT and internet models.
- It is in essence a service-oriented architecture

Virtualization

• Virtualization technology is one of the fundamental components of cloud computing, especially in regard to infrastructure-based services. Virtualization allows the creation of a secure, customizable, and isolated execution environment for running applications, even if they are untrusted, without affecting other users' applications. The basis of this technology is the ability of a computer program—or a combination of software and hardware—to emulate an executing environment separate from the one that hosts such programs.

Virtualization

For example, we can run Windows OS on top of a virtual machine, which itself is running on Linux OS. Virtualization provides a great opportunity to build elastically scalable systems that can provision additional capability with minimum costs.

It has gained renewed interest recently due to the following major causes:

• Increased performance and computing capacity. Nowadays, the average end-user desktop PC is powerful enough to meet almost all the needs of everyday computing, with extra capacity that is rarely used. Almost all these PCs have resources enough to host a virtual machine manager and execute a virtual machine with by far acceptable performance. The same consideration applies to the high-end side of the PC market, where supercomputers can provide immense compute power that can accommodate the execution of hundreds or thousands of virtual machines

• Underutilized hardware and software resources. Hardware and software underutilization is occurring due to (1) increased performance and computing capacity, and (2) the effect of limited or sporadic use of resources. If we consider the IT infrastructure of an enterprise, many computers are only partially utilized whereas they could be used without interruption on a 24/7/365 basis. They are only used during work hours, remaining completely unused overnight. Using these resources for other purposes after hours could improve the efficiency of the IT infrastructure. To transparently provide such a service, it would be necessary to deploy a completely separate environment, which can be achieved through virtualization.

•Lack of space. The continuous need for additional capacity, whether storage or compute power, makes data centers grow quickly. Companies such as Google and Microsoft expand their infrastructures by building data centers as large as football fields that are able to host thousands of nodes. Although this is viable for IT giants, in most cases enterprises cannot afford to build another data center to accommodate additional resource capacity. This has led to the diffusion of a technique called server consolidation.

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• Greening initiatives. Recently, companies are increasingly looking for ways to reduce the amount of energy they consume and to reduce their carbon footprint. Data centers are one of the major power consumers; they contribute consistently to the impact that a company has on the environment. Maintaining a data center operation not only involves keeping servers on, but a great deal of energy is also consumed in keeping them cool. Infrastructures for cooling have a significant impact on the carbon footprint of a data center. Hence, reducing the number of servers through server consolidation will definitely reduce the impact of cooling and power consumption of a data center

• Rise of administrative costs. Power consumption and cooling costs have now become higher than the cost of IT equipment. Moreover, the increased demand for additional capacity, which translates into more servers in a data center, is also responsible for a significant increment in administrative costs. Computers—in particular, servers—do not operate all on their own, but they require care and feeding from system administrators. Common system administration tasks include hardware monitoring, defective hardware replacement, server setup and updates, server resources monitoring, and backups. These are labor-intensive operations, and the higher the number of servers that have to be managed, the higher the administrative costs.

•Characteristics of virtualized environments (Advantages of Virtualization)

• Virtualization is a broad concept that refers to the creation of a virtual version of something, whether hardware, a software environment, storage, or a network. In a virtualized environment there are three major components: guest, host, and virtualization layer. The guest represents the system component that interacts with the virtualization layer rather than with the host, as would normally happen. The host represents the original environment where the guest is supposed to be managed. The virtualization layer is responsible for recreating the same or a different environment where the guest will operate

•Increased security The ability to control the execution of a guest in a completely transparent manner opens new possibilities for delivering a secure, controlled execution environment. The virtual machine represents an emulated environment in which the guest is executed. All the operations of the guest are generally performed against the virtual machine, which then translates and applies them to the host. Moreover, sensitive information that is contained in the host can be naturally hidden without the need to install complex security policies. By default, the file system exposed by the virtual computer is completely separated from the one of the host machine.

•Managed execution. In particular, sharing, aggregation, emulation, and isolation are the most relevant features

•Sharing - Virtualization allows the creation of a separate computing environments within the same host. In this way it is possible to fully exploit the capabilities of a powerful guest, which would otherwise be underutilized. Aggregation - Not only is it possible to share physical resource among several guests, but virtualization also allows aggregation, which is the opposite process. A group of separate hosts can be tied together and represented to guests as a single virtual host. Emulation - Guest programs are executed within an environment that is controlled by the virtualization layer, which ultimately is a program.

•Performance tuning - It becomes easier to control the performance of the guest by finely tuning the properties of the resources exposed through the virtual environment. This capability provides a means to effectively implement a quality-of-service (QoS) infrastructure that more easily fulfills the service-level agreement (SLA) established for the guest. Ex- we can expose to a guest operating system only a fraction of the memory of the host machine or set the maximum frequency of the processor of the virtual machine.

•Network Virtualization

•Internal Network Virtualization: It refers to the management and monitoring of a computer network as a single managerial entity from a single software-based administrator's console.

•External Network Virtualization: Combine many networks, or parts of networks into a virtual unit. External Network Virtualization involves and actual physical device that caters to your network.

•Storage Virtualization

• In this type of virtualization, multiple network storage resources are present as a single storage device for easier and more efficient management of these resources. It provides various advantages as follows: □Improved storage management in a heterogeneous IT environment □Easy updates, better availability □Reduced downtime □Better storage utilization □Automated management

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•Block virtualization It works before the file system exists. It replaces controllers and takes over at the disk level. File virtualization The server that uses the storage must have software installed on it in order to enable filelevel usage.

•Memory Virtualization 6 Dr. Neeraj Kumar Pandey It introduces a way to decouple memory from the server to provide a shared, distributed or networked function. It enhances performance by providing greater memory capacity without any addition to the main memory. That's why a portion of the disk drive serves as an extension of the main memory.

•Software Virtualization

•It provides the ability to the main computer to run and create one or more virtual environments. It is used to enable a complete computer system in order to allow a guest OS to run. For instance letting Linux to run as a guest that is natively running a Microsoft Windows OS (or vice versa, running Windows as a guest on Linux) Types: □Operating system □Application virtualization □Service virtualization

•Data Virtualization

•Without any technical details, you can easily manipulate data and know how it is formatted or where it is physically located. It decreases the data errors and workload.

•Desktop virtualization 10

•It provides the work convenience and security. As one can access remotely, you are able to work from any location and on any PC. It provides a lot of flexibility for employees to work from home or on the go. It also protects confidential data from being lost or stolen by keeping it safe on central servers.