CLOUD COMPUTING HANDBOOK

B.TECH IV YEAR I SEMESTER 2012
Course Objectives:

The major objectives of this course are:

- It attempts to present cloud computing in a way that anyone can understand. We do include technical material, but we do so in a way that allows managers and technical people alike to understand what exactly cloud computing is and what it is not.
- We try to clear up the confusion about current buzzwords such as PaaS, SaaS, etc., and let you all see how and why the technology has evolved to become “the cloud” as we know and use it today.
- The beauty and advantage of this course is that at the end in the last units students are practically involved in preparing various case studies.

Course Outcomes:

Through this course we try to understand the following benefits or outcomes of Cloud Computing:

- Reduces implementation and maintenance costs
- Increases mobility for a global workforce
- How to provide Flexible and scalable infrastructures
- Quick time to market
- IT department transformation (focus on innovation vs. maintenance and implementation)
- “Greening” of the data center
- Increased availability of high-performance applications to small/medium-sized businesses
- Last but not the least the case studies will help us to understand more of practice of cloud computing in the market.
UNIT I:

Introductory concepts and overview: Distributed systems-parallel computing architectures: vector processing, symmetric multi processing and massively parallel processing systems-high performance cluster computing-grid computing-service oriented architecture overview-virtualization.

Objectives:

In this unit

- We will describe Distributed systems in detail and also various parallel computing architectures like vector processing, symmetric multi processing and massively parallel processing systems
- Also we will understand high performance cluster computing-grid computing
- We discuss some of the features involved in Service oriented architecture, its overview and also will give a detail about virtualization.

Lesson Plan:

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<td>5</td>
<td>Service oriented architecture overview-virtualization</td>
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Important Questions:

1. Give a brief description about Grid Computing?
2. What is SOA? Explain the various principles of SOA?

Assignment Questions:

1. What is distributed computing? Explain the various technologies used in Distributed Computing?
2. What are the major differences between SMP and MMP?
3. How to define HPCC? What are its various advantages?
4. Give a brief description about Grid Computing?
5. What is SOA? Explain the various principles of SOA?

CASE STUDY:

1. Prepare a report on various distributed computing technologies and also gather the information on how each technology differ from the other and submit.
UNIT II:

Overview of cloud computing: Meaning of the terms cloud and cloud computing—cloud based service offerings-grid computing vs cloud computing—benefits of cloud model—limitations—legal issues—key characteristics of cloud computing—challenges for the cloud—The evolution of cloud computing.

Objectives:

In this unit we try to understand

- What cloud computing is, its characteristics, and the challenges it will face in the future. The biggest challenges that companies will face as they move into the cloud are secure data storage, high-speed access to the Internet, and standardization.
- Storing large amounts of data in centralized locations while preserving user privacy, security, identity, and their application-specific preferences raises many concerns about data protection.
- These concerns, in turn, lead to questions about the legal framework that should be implemented for a cloud-oriented environment.
- The evolution of cloud computing, including hardware, software, and server virtualization.

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<td>legal issues—key characteristics of cloud computing</td>
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<td>challenges for the cloud</td>
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<td>The evolution of cloud computing</td>
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Important Questions:

1. Define the term Cloud? Also give a brief about how various steps lead to Cloud Computing?

2. Give the major differences between Grid and Cloud Computing?

Assignment Questions:

1. Define the term Cloud? Also give a brief about how various steps lead to Cloud Computing?

2. Give the major differences between Grid and Cloud Computing?

3. What are the various Cloud models? Give a brief about various characteristics of CC?

4. What the various challenges for the cloud?

5. Give a brief about evolution of cloud computing?

CASE STUDY:

1. How can companies more some of their processes to the cloud considering their profits, costs, and revenues?

   Remember the 3 main services offered by the cloud: IaaS, Paas, and SaaS. These could be offered on a Private cloud or a Public one. For each of the following examples:

   A. Blackboard

   B. Commercial Bank

   Which of these services make more sense? On what type of the cloud. What could be the benefits gained? What costs could occur?
UNIT III:

Web services delivered from the cloud: Infrastructure as a service-Platform-as-a-service-software-as-a-service. Building cloud networks: Evolution from the MSP model to cloud computing and software-as-service-The cloud data center-SOA as step toward cloud computing –Basic approach to a data center based SOA.

Objectives:

In this unit we will discuss

- The advent of web-based services delivered from the cloud, including Infrastructure-as-a-Service (IaaS), Platform-as-a-Service (PaaS), and Software-as-a-Service (SaaS).
- We provide some basic exposure to where the technology is today, and we give you a feel for where it will likely be in the not too distant future.
- The basic approach to service-oriented architecture (SOA) as it applies to data center design, how companies can build highly automated private cloud networks that can be managed from a single point, and how server and storage virtualization is used across distributed computing resources.
- What it takes to build a cloud network, the evolution from the managed service provider model to cloud computing and SaaS and from single-purpose architectures to multipurpose architectures, the concept and design of data center virtualization, the role and importance of collaboration,
- SOA as an intermediate step and the basic approach to data center-based SOA, and lastly, the role of open source software in data centers and where and how it is used in the cloud architecture.

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<td>Infrastructure as a service, Platform-as-a-service and Software-as-a-service</td>
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<td>Basic approach to a data center based SOA</td>
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Important Questions:

1. Define the terms IaaS, Saas and PaaS?
2. Give a brief about the relation between cloud and SOA?

Assignment Questions:

1. What is delivery of services? Explain the process?
2. Define the terms IaaS, Saas and PaaS? Explain briefly with an example each service model?
3. Give a brief about the relation between cloud and SOA? How the principles of SOA are implemented in Cloud Computing?
4. Explain the evolution from the MSP model to cloud computing
5. Give a detail about the basic approach to a data center based SOA?

CASE STUDY:

Prepare a report on

1. Cloud Computing: The Need for Portability and Interoperability
UNIT IV:


Objectives:

In this unit

- We will try to understand the importance and relevance of federation, presence, identity, and privacy in cloud computing and the latest challenges, solutions, and potential future for each in the cloud.
- Building a seamless federated communications capability in a cloud environment, one that is capable of supporting people, devices, information feeds, documents, application interfaces, and other entities, depends on the architecture that is implemented.
- The solution chosen must be able to find such entities, determine their purpose, and request presence data so that others can interact with them in real time. This process is known as discovery.
- The extension of virtualization and virtual machines into the cloud is affecting enterprise security because the traditional enterprise network perimeter is evaporating.

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<td>Privacy and its relation to cloud based information system</td>
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<td>Security in the cloud: Cloud security challenges-software –as-a-service security</td>
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Important Questions:

1. What is Federation in cloud? Explain the four-levels of Federation? Also give a brief about the Future of Federation?

2. Explain the following:
   a. The Interrelation of Identity, Presence, and Location in the Cloud
   b. Federated Identity Management
   c. Cloud and SaaS Identity Management

Assignment Questions:

1. What is Federation in cloud? Explain the four-levels of Federation? Also give a brief about the Future of Federation?

2. Explain the following:
   a. The Interrelation of Identity, Presence, and Location in the Cloud
   b. Federated Identity Management
   c. Cloud and SaaS Identity Management

3. What is Compliance-as-a-Service (CaaS)? And explain the various Privacy Risks and the Cloud?

4. What are the Cloud Security Challenges?

5. Explain briefly about Secure Software Development Life Cycle?

CASE STUDY:

Prepare a report on:

1. Choosing an Online backup service in cloud?
UNIT V:


Objectives:

In this unit

- We introduce some of the more common standards in cloud computing. Most current standards evolved from necessity, as individuals took a chance on new innovation.
- As these innovative techniques became acceptable to users and implementers, more support for the technique ensued.
- At some point, the innovation began to be considered a “standard,” and groups formalized protocols or rules for using it.
- We discuss the Open Cloud Consortium and the Distributed Management Task Force as examples of cloud-related working groups.
- Innovation leading to success in cloud services depends ultimately on acceptance of the application by the user community.

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<td>The distributed management task force</td>
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<td>standards for application developers, standards for messaging –standards for security</td>
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Important Questions:

1. What is The Distributed Management Task Force? Explain its various features?
2. What are various Standards for Application Developers?

Assignment Questions:

1. What is OCC?
2. What is The Distributed Management Task Force? Explain its various features?
3. What are various Standards for Application Developers?
4. Give a brief about various standards of messaging?
5. What are the common security standards for cloud?

CASE STUDY:

Prepare a report on Security features for the following

1. IBM smart Cloud
2. Rackspace cloud.
UNIT VI:
End user access to cloud computing youtube-zimbra-facebook-Zoho-DimDim Collaboration. Mobile Internet Devices and the cloud: Smartphone-mobile operating systems for smart phones-Mobile Platform virtualization-Collaboration applications for mobile platforms-Future trends.

Objectives:

In this unit

- We present some of the applications that are gaining acceptance among end users. We look at some of the most popular SaaS offerings for consumers and provide an overview of their benefits and
- Why, in our opinion, they are helping to evolve our common understanding of what collaboration and mobility will ultimately mean in our daily lives.
- We examine five particularly successful SaaS offerings, YouTube, Zimbra, Facebook, Zoho, and DimDim, looking at them from the user perspective and the developer/implementer perspective.
- This dual perspective should give you a clear understanding of how such offerings are transforming our concept of computing by making much traditional desktop-type software available from the cloud.

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Important Questions:

1. Explain the process of End user access to cloud computing?
2. What is Mobile Platform virtualization?

Assignment Questions:

1. Explain the process of End user access to cloud computing
2. Give a detail about YouTube and Facebook?
3. Explain Mobile Platform virtualization?
4. What is VMWare?

CASE STUDY:

Submit a report on some smartphone applications for the following areas:

1. Personal
2. Medical
3. Health & Fitness
4. Education
5. Business
6. Military
UNIT VII:

Virtualization: Adding guest operating system. Cloud computing case studies1: Amazon EC2-Amazon simple DB-Amazon S3-Amazon cloud Front-Amazon SQS

Objectives:

In this Unit

- We provide a virtualization practicum that guides you through a step-by-step process for building a virtualized computing infrastructure using open source software.
- The beauty of virtualization solutions is that you can run multiple operating systems simultaneously on a single computer. So that you could really understand how powerful that capability is, we show you how to do it for yourself.

Also the student would have to gather the information and prepare case studies on:

- How to download and install the Amazon EC2, how to install and configure it, and how to add a virtual operating environment on top of your existing operating system.
- In learning the basics of using the Amazon EC2, you will also gain knowledge about what virtualization is and how it can be used.

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<td>Cloud computing case studies1: Amazon EC2-Amazon simple DB</td>
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Important Questions:

1. Define the term Virtualization?
2. Explain the process of Adding guest operating system?

Assignment Questions:

1. Define the term Virtualization?
2. Explain the process of Adding guest operating system?

CASE STUDY:

The unit itself has involved with a case study so submit a report on the following:

1. Amazon EC2
2. Amazon simple DB
3. Amazon S3
4. Amazon cloud Front
5. Amazon SQS
UNIT VIII:


Objectives:

In this Unit the student would have to gather the information and prepare case studies on:

- Google App Engine its web toolkit
- Microsoft Azure Services platform details and Windows live-Exchange online-SharePoint services
- And also Microsoft dynamic CRM-salesforce.com CRM-AppExchange.

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<td>Microsoft Azure Services platform-Windows live- Exchange online</td>
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<td>SharePoint services-Microsoft dynamic CRM</td>
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<td>salesforce.com CRM-AppExchange</td>
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CASE STUDY:

The unit itself has involved with a case study so submit a report on the following:

1. Google App Engine
2. Google web toolkit
3. Microsoft Azure Services platform
4. Windows live-Exchange online
5. SharePoint services
6. Microsoft dynamic CRM
7. salesforce.com