

BTCOC702 - Cloud Computing

[Lecture: 3 Periods/Week

End Semester Examination: 60 Marks

CA: 20 Marks

MSE: 20 Marks

Prerequisites: Discrete Mathematics, Computer Networks

Course Objectives:

1. To understand the concepts of Cloud Computing.
2. To learn Taxonomy of Virtualization Techniques.
3. To learn Cloud Computing Architecture.
4. To acquire knowledge on Aneka Cloud Application Platform.
5. To learn Industry Cloud Platforms.

Course Outcomes:

At the end of this course student will:

- CO1) Understand the concept of virtualization and how this has enabled the development of Cloud Computing
- CO2) Know the fundamentals of cloud, cloud Architectures and types of services in cloud
- CO3) Understand scaling, cloud security and disaster management
- CO4) Design different Applications in cloud
- CO5) Explore some important cloud computing driven commercial systems

UNIT 1

Introduction to Cloud: Cloud Computing at a Glance, the Vision of Cloud Computing, Defining a Cloud, a Closer Look, Cloud Computing Reference Model. Characteristics and Benefits, Challenges Ahead, Historical Developments. **Virtualization:** Introduction, Characteristics of Virtualized Environment, Taxonomy of Virtualization Techniques, Virtualization and Cloud computing, Pros and Cons of Virtualization, Technology Examples- VMware and Microsoft Hyper-V.

UNIT 2

Cloud Computing Architecture: Introduction, Cloud Reference Model, Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Interoperability and Standards, Scalability and Fault Tolerance.

UNIT 3

Defining the Clouds for Enterprise: Storage as a service, Database as a service, Process as a service, Information as a service, Integration as a service and Testing as a service. Scaling a cloud infrastructure -Capacity Planning, Cloud Scale.

UNIT 4

Aneka: Cloud Application Platform Framework Overview, Anatomy of the Aneka Container, From the Ground Up: Platform Abstraction Layer, Fabric Services, Foundation Services, Application Services, Building Aneka Clouds, Infrastructure Organization, Logical Organization, Private Cloud Deployment Mode, Public Cloud Deployment Mode, Hybrid Cloud Deployment Mode, Cloud Programming and Management, Aneka SDK, Management Tools.

UNIT 5

Cloud Applications: Scientific Applications – Health care, Geoscience and Biology. Business and Consumer Applications- CRM and ERP, Social Networking, Media Applications and Multiplayer Online Gaming.

Cloud Platforms in Industry: Amazon Web Services- Compute Services, Storage Services, Communication Services and Additional Services. Google AppEngine-Architecture and Core Concepts, Application Life-Cycle, cost model. Microsoft Azure- Azure Core Concepts.

Learning Resource

Text Books

1. Mastering Cloud Computing by Raj Kumar Buyya, Christian Vecchiola, and S.Thamarai Selvi from TMH 2013.
2. George Reese Cloud Application Architectures, First Edition, O'Reilly Media 2009.

References

1. Cloud Computing and SOA Convergence in Your Enterprise *A Step-by-Step Guide* by
2. David S. Linthicum from Pearson 2010.
3. Cloud Computing 2nd Edition by Dr. Kumar Saurabh from Wiley India 2012.
4. Cloud Computing – web based Applications that change the way you work and collaborate Online – Micheal Miller. Pearson Education.

NPTEL Course:

1. Cloud Computing, Prof. Soumya Kanti Ghosh, Department of Computer Science and Engineering, IIT Kharagpur

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List of Experiments:

(Pl. Note: List of Experiments should be as per theory covered in the class based on Cloud Environments.

Following list can be used as a reference.)

1. Sketch out and analyze architecture of Moodle cloud portal and moodle cloud site and create different entities dynamically.
2. Create a scenario in wordpress for Social Marketing, Search engine and Sharing Tools.
3. Working in Cloud9 to demonstrate different language.
4. Working in Codenvy to demonstrate Provisioning and Scaling of a website.
5. Implement and configure Google App Engine to deploy Python Program application.
6. Installation and configuration of virtual machine with guest OS.
7. Demonstrate the use of map and reduce tasks.
8. Implementation of SOAP Web services in C#/JAVA Applications.
9. Categorize Amazon Web Service (AWS) and implement its various cloud entities using its Cloud Toolbox support.
10. Implement and use sample cloud services with the help of Microsoft Azure.
11. Design and analyze architecture of Aneka / Eucalyptus / KVM identify different entities to understand the structure of it.
12. Make and perform scenario to pause and resume the simulation in Aneka / Eucalyptus entity, and create simulation entities dynamically.
13. Organize a case in Aneka / Eucalyptus for simulation entities in run-time using a its toolkit support and manage virtual cloud.