

Course Title: Cloud Computing

Course No: CSC 458

Credit Hours: 3

Nature of the course: Theory + Lab

Full Marks: 60+20+20

Pass Marks: 28+8+8

Course Description: This course gives an introduction to cloud computing and its techniques. The topics covered include; introduction to cloud computing, cloud architecture, cloud service models, Service Oriented Architectures, security in cloud computing, disaster management in clouds.

Goal: Cloud computing has become a great solution for providing a flexible, on-demand, and dynamically scalable computing infrastructure for many applications. Cloud computing also presents a significant technology trends, and it is already obvious that it is reshaping information technology processes and the IT marketplace. Thus objective of this course is to introduce the aspects of cloud computing issues.

Course Content:

Unit1: Introduction

(10 Hrs)

Defining the Cloud, The Emergence of Cloud Computing, Cloud-Based Services, Grid Computing or Cloud Computing, Components of Cloud Computing, Virtualization, Cloud Computing Deployment Models (Types): Public, Private, Hybrid, Benefits of Using a Cloud Model, Legal Issues in Using Cloud Models, Characteristics of Cloud Computing, Evolution of Cloud Computing, Challenges for the Cloud computing, Grid Computing, Distributed Computing in Grid and Cloud.

Unit 2: Cloud Service Models

(15 Hrs)

Communication-as-a-Service (CaaS): Advantages of CaaS, Fully Integrated, Enterprise-Class Unified Communications, Infrastructure-as-a-Service (IaaS): Modern On-Demand Computing, Amazon's Elastic Cloud, Amazon EC2 Service Characteristics, Monitoring-as-a-Service (MaaS), Protection Against Internal and External Threats, Platform-as-a-Service (PaaS): The Traditional On-Premises Model, The New Cloud Model, Key Characteristics of PaaS, Software-as-a-Service (SaaS): SaaS Implementation Issues, Key Characteristics of SaaS, Benefits of the SaaS Model, Jericho Cloud Cube Model.

Unit 3: Building Cloud Networks

(9 Hrs)

Evolution from Managed service providers (MSP) to Cloud Computing, Single Purpose architectures to multi-purpose architectures, Data center virtualization, Cloud data center, Service Oriented Architectures (SOA), Combining and SOA, Characterizing SOA, Open Source Software in data centers, Open Source Software in Cloud Computing: Web Presence (Apache, Jetty, Zend Framework), Database Tier (MySQL, PostgreSQL), Application Tier (Zope, Plone, AJAX, Apache Struts), System and Network Management Tier.

Unit 4 : Security in Cloud Computing

(11 Hrs)

Cloud Security Challenges, Software-as-a-Service Security: Security management, Risk Management, Security Monitoring and Incident Response, Security Architecture Design, Vulnerability Assessment, Data Privacy and Security, Data Control, Application Security, Virtual Machine Security, Network Intrusion Detection, Implementing Network Detection in the Cloud, Host Intrusion Detection, Disaster Recovery, Disaster Recovery Planning, Disasters in cloud, Disaster management.

Lab work:

As a part of lab work, the students are highly encouraged

- To simulate the concept of virtualization using virtualization programs/systems.
- To understand and practice examples of cloud services and applications.
- To understand and implement distributed storage and security issues in cloud computing.

Recommended Books:

Cloud Computing: Implementation Management and Security, John W. Rittinghouse and James F. Ransome (Recommended for Unit 1, 2, 3 4)

Cloud Application architecture, George Reese (Recommended for Unit 4)

Cloud Computing for Dummies, Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper (Recommended for Unit 3)

Handbook of cloud computing, Borko Furht, Armando Escalante (Recommended for Unit 1)

Cloud Computing and SOA Convergence in your Enterprise, a step by step guide, David S. Linthicum (Recommended for Unit 1, 2, 3)