

CSE423:VIRTUALIZATION AND CLOUD COMPUTING

L:2 T:0 P:1 Credits:3

Course Outcomes: Through this course students should be able to

CO1 :: explain the fundamentals of virtualization, distributed computing, and various computing paradigms used in modern computing environments

CO2 :: analyze cloud computing concepts, deployment models, service models, cloud migration strategies, and interoperability challenges.

CO3 :: examine cloud architecture principles, workload distribution, capacity planning, cloud bursting, disk provisioning, Service-Oriented Architecture (SOA), Service Level Agreements (SLAs), and cloud economics

CO4 :: describe AWS cloud infrastructure, service categories, Identity and Access Management (IAM), shared responsibility model, and cloud security practices

CO5 :: evaluate AWS compute services, including Amazon EC2, managed compute services, container services, pricing models, and cost optimization techniques

CO6 :: assess AWS storage and database services by selecting appropriate storage technologies and comparing Amazon EBS, S3, EFS, Glacier, RDS, DynamoDB, Aurora, and Redshift based on organizational requirements.

Unit I

Virtualization : Fundamentals of virtualization, x86 virtualization, Types of virtualization, VLAN ,VSAN and their benefits

Overview of Distributed computing : Parallel and Distributed Systems, Parallel Computing, Parallel Computer Architecture, Distributed Systems, comparison of different computing paradigms

Unit II

Introduction to Cloud Computing : Deployment models, Service models, Characteristics, NIST model and Cloud cube model

Cloud Migration : The Seven-Step Migration model, virtual machine migration, Cloud Middleware, Data Migration and Streaming, Interoperability

Unit III

Cloud Architecture : Cloud computing stack, Workload distribution, Capacity planning, Cloud bursting, Disk provisioning, Service-Oriented Architecture (SOA), Service Level Agreements (SLAs)

Cloud Economics : Laws of cloudonomics, Cost estimation, Economic Strategy

Unit IV

AWS Fundamentals : AWS Cloud infrastructure, AWS service categories, AWS Management Console, Shared Responsibility Model, Identity and Access Management (IAM), AWS account Security

Unit V

AWS Compute Services : Overview of compute services, Amazon EC2, EC2 pricing and cost optimization, managed compute services, and container services

Unit VI

AWS Storage and Database Services : Amazon Elastic Block Store (EBS), AWS S3, AWS EFS, AWS S3 Glacier, Storage Technology Selection, Amazon RDS, Amazon DynamoDB, Amazon Redshift, Amazon Aurora

List of Practicals / Experiments:

Practical 1

- . Install VMware Workstation and create a Virtual Machine and Configure VM resources (CPU, RAM, Storage). Configure NAT, Bridged and Host-only Networking.

Practical 2

- Create Snapshots, Clone and Restore Virtual Machines.

Practical 3

- Understanding AWS resources, availability zones and Edge locations

Practical 4

- Create an EC2 instance with Amazon Machine Image (AMI).

Practical 5

- Establishing connection with remote VMs through RDP client

Practical 6

- Create an S3 bucket with proper configurations

Practical 7

- Create a static website for Cloud deployment.

Practical 8

- To calculate the services bill on AWS price calculator.

Text Books:

1. MASTERING CLOUD COMPUTING by RAJKUMAR BUYYA, CHRISTIAN VECCHIOLA, S. THAMARAI SELVI, MCGRAW HILL EDUCATION
2. CLOUD COMPUTING (FUNDAMENTALS, INDUSTRY APPROACH AND TRENDS) by RISHABH SHARMA, WILEY

References:

1. DISTRIBUTED SYSTEMS: PRINCIPLES AND PARADIGMS by ANDREW S. TANENBAUM & MAARTEN VAN STEEN, PEARSON
2. CLOUD COMPUTING: CONCEPTS, TECHNOLOGY & ARCHITECTURE by THOMAS ERL, PEARSON