

STELLA MARIS COLLEGE (AUTONOMOUS), CHENNAI – 600 086

BACHELOR OF COMPUTER APPLICATIONS

SYLLABUS

(Effective from the academic year 2019-2020)

CLOUD COMPUTING

CODE:19CS/MC/CC65

CREDITS: 5

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TOTAL TEACHING HOURS:78

OBJECTIVES OF THE COURSE

- To introduce the concept of Cloud Computing, Parallel and Distributed Computing
- To enable students to learn about Virtualization and the Cloud Architecture
- To give a detailed overview on Resource Pooling, Scaling, Capacity Planning and Load Balancing in the Cloud
- To familiarize concepts on Cloud Security, Service Oriented Architecture (SOA) and Cloud-based Storage
- To give a better understanding on the above said concepts through case studies on various cloud platforms

COURSE LEARNING OUTCOMES

On successful completion of the course, students will be able to

- Gain insights about cloud, parallel and distributed computing
- Define virtualization and the architecture of cloud computing
- Understand the need for resource pooling, scaling, capacity planning and load balancing along with their roles in the cloud
- Interpret on securing and storing data over the cloud
- Build a simple application and host it using cloud

Unit 1

(15 Hours)

1.1 Introduction

Cloud Computing at a Glance – The Vision of Cloud Computing - Defining a Cloud - A Closer Look – The Cloud Computing Reference Model - Characteristics and Benefits - Challenges Ahead – Historical Developments - Distributed Systems - Virtualization - Web 2.0 - Service-oriented Computing - Utility-oriented Computing - Building Cloud Computing Environments - Application Development – Infrastructure and System Development – Computing Platforms and Technologies

1.2 Principles of Parallel and Distributed Computing

Eras of Computing - Parallel vs. Distributed Computing – Elements of Parallel Computing - Elements of Distributed Computing – Technologies for Distributed Computing

Unit 2 (15 Hours)

2.1 Virtualization

Introduction – Characteristics of Virtualized Environments – Taxonomy of Virtualization Techniques – Virtualization and Cloud Computing - Pros and Cons of Virtualization

2.2 Cloud Computing Architecture

Introduction – The Cloud Reference Model – Types of Clouds – Economics of the Cloud – Open Challenges

2.3 Practical Demonstration

Virtualization in Cloud - Infrastructure as a Service - Software as a Service

Unit 3 (20 Hours)

3.1 Resource Pooling, Sharing and Provisioning

Resource Pooling - Commoditization of the Data Center - Standardization, Automation and Optimization – Resource Sharing – Resource Provisioning

3.2 Scaling in the Cloud

What is Scaling – Scaling in Traditional Computing – Scaling in Cloud Computing – Foundation of Cloud Scaling – Scalable Application – Scaling Strategies in Cloud – Auto Scaling in Cloud – Types of Scaling – Horizontal Scaling is more Cloud-Native Approach – Performance and Scalability – The Resource Contention Problem – Cloud Bursting: a scenario of flexible scaling – Scalability is a business concern

3.3 Capacity Planning

What is Capacity Planning – Capacity Planning in Computing- Capacity Planning in Cloud Computing - Cloud Capacity: Consumers' View vs. Providers' View – Capacity Planning Then and Now – Approaches for Maintaining Sufficient Capacity – Role of Auto-Scaling in Capacity Planning - Capacity and Performance: Two Important System Attributes – Steps for Capacity Planning

3.4 Load Balancing

Load Balancing – Importance of Load Balancing in Cloud Computing – How Load Balancing is done in Cloud – Goals of Load Balancing – Categories of Load Balancing – Parameters for Consideration – Load Balancing Algorithms – The Persistence Issue – Application Delivery Controller

Unit 4 (18 Hours)

4.1 Understanding Cloud Security

Securing the Cloud – Securing Data – Establishing Identity and Presence

4.2 SOA and Moving Applications to the Cloud

Introducing Service Oriented Architecture – Defining SOA Communications - Applications in the Clouds – Applications and Cloud APIs

4.3 Working with Cloud-based Storage

Measuring the Digital Universe – Provisioning Cloud Storage – Exploring Cloud Backup Solutions – Cloud Storage Interoperability

Unit 5 (10 Hours)

5.1 Case Studies

Google Web Service – Amazon Web Service – Microsoft Cloud Service

BOOKS FOR STUDY

Bhowmik, Sandeep. *Cloud Computing*. Cambridge University Press, 2017.. (Unit 3)

Buyya, Rajkumar, Christian Vecchiola, and S. Thamarai Selvi. *Mastering cloud computing: foundations and applications programming*. Elsevier, 2013. (Units 1 & 2)

Sosinsky, Barrie. *Cloud Computing Bible*. John Wiley & Sons, 2011. (Units 4 & 5)

BOOKS FOR REFERENCE

Kavis, Michael J. "Architecting the cloud: design decisions for cloud computing service models

Marinescu, Dan C. *Cloud computing: theory and practice*. Morgan Kaufmann, 2017 (SaaS, PaaS, and IaaS)." *Hoboken, NJ: Wiley*.(2014)

WEB RESOURCES

<https://aws.amazon.com/what-is-cloud-computing/>

<https://azure.microsoft.com/en-in/overview/what-is-cloud-computing/>

<https://www.salesforce.com/what-is-cloud-computing/>

<https://cloud.google.com/docs/>

<https://www.ibm.com/cloud/learn/what-is-cloud-computing>

PATTERN OF ASSESSMENT

Continuous Assessment Test: **Total Marks: 50** **Duration: 90 minutes**

Section A - $10 \times 1 = 10$ marks (Answer all the questions)
(5 Multiple choice questions and 5 Fill in the Blanks)

Section B - $5 \times 2 = 10$ marks (Answer all the questions)

Section C - $4 \times 5 = 20$ marks (4 out of 5)

Section D - $1 \times 10 = 10$ marks (1 out of 2)

Other Components: **Total Marks: 50**

Component 1 – Unit 5.1

Component 2 – Hosting a simple application in Cloud

End-Semester Examination: **Total Marks : 100** **Duration : 3 hours**

Section A - $20 \times 1 = 20$ marks (Answer all the questions)
(10 Multiple choice questions and 10 Fill-in the Blanks)

Section B - $5 \times 2 = 10$ marks (Answer all the questions)

Section C - $8 \times 5 = 40$ marks (8 out of 10)

Section D - $3 \times 10 = 30$ marks (3 out of 5)

(Units 2.3 and 5.1 – Not included for End Semester Examinations)