Distributed & Cloud Computing
MIE 211

Semester: Third **Full Marks: 100**

Credit Hour: 4 **Internal: 40**

Final Exam: 60

General Objectives;

* Visualize the concept of Cloud and Distributed Computing.

* Conceptualize the importance of cloud computing with data centers, security and cloud applications

Specific Objectives;

Specific objectives of this course are;

* to make the student realize the advanced topics on cloud computing and virtualized data centers.
* to emphases on virtual resource management, data center networking and cloud computing applications.
* to familiarize the students with the techniques of RPC, Transaction Control and Distributed system Security.
* to make understand the students about various cloud computing projects.

COURSE CONTENT

Unit 1: Introduction. **10 Hrs**

Understanding distributed system and its goals, Hardware, Software concepts and design issues of distributed system, Concepts of cloud computing, Cloud Architecture, SAAS, PAAS, IAAS and others, Organizational Scenarios of Clouds, Types of Clouds: Private, Public & Hybrid, Comparing the various cloud architectures, Benefits and Limitations of Clouds, Challenges of Cloud Computing.

Unit 2: System Models of Distributed System **5 Hrs**

Introduction, Architectural Models; Software Layers, System Architectures, Variations on client/server Model. Fundamental Model; Interaction Model, Failure Model.

Unit 3: Distributed Objects and Remote Invocation. **10 Hrs**

Introduction, Communication between remote objects, Remote Procedure call, Events and notification, Java RMI case study.

Unit 4: Distributed File System. **7 Hrs**

Introduction, File Service Architecture, Sun Network File system, The Andrew File System.

Unit 5: Introduction to Cloud Technologies. 8 Hrs

Study of Hypervisors, Compare SOAP and REST, Web services: SOAP and REST, SOAP versus REST, AJAX: asynchronous 'rich' interfaces, Mashups: user interface services, Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization, Multi-entity support, Multi-schema approach, Multi-tenance using cloud data stores, Data access control for enterprise applications.

Unit 6: Data in the Cloud. 5 Hrs

Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo, Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Introduction to cloud development, Example/Application of Mapreduce, Features and comparisons among GFS,HDFS etc, Map-Reduce model.

Unit 7: Cloud Security Fundamentals. 7 Hrs

Vulnerability assessment tool for cloud, Privacy and Security in cloud, Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution, Environments and Communications, Micro-architectures; Identity Management and Access control-Identity management, Access control, Autonomic Security, Virtualization security management- virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud.

Unit 8: Issues in Cloud Computing. 8 Hrs

Implementing real time application over cloud platform, Issues in Intercloud, environments: QOS Issues in Cloud, Dependability, data migration, streaming in Cloud, Quality of Service (QoS) monitoring in a Cloud computing environment, 8.4 Cloud Middleware, Mobile Cloud Computing, Inter Cloud issues: A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud.

References

1. Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper (Wiley India Edition)
2. Enterprise Cloud Computing by Gautam Shroff,Cambridge
3. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India
4. Distributed operating system, A.S. Tanenbaum, Pearson Education.
5. Distributed systems (Concepts & Design), G. Coulouris, J. Dollimore, Tim Kindberg, Pearson Education.
6. Google Apps by Scott Granneman,Pearson
7. Cloud Security & Privacy by Tim Malhar, S.Kumaraswammy, S.Latif (SPD,O'REILLY)
8. Cloud Computing : A Practical Approach, Antohy T Velte, et.al McGraw Hill,
9. Cloud Computing Bible by Barrie Sosinsky, Wiley India
10. Stefano Ferretti et.al.,‖QoS–aware Clouds", 2010 IEEE 3rd International Conference on Cloud Computing
11. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011, ISBN: 0470887990.