Prasad V. Potluri Siddhartha Institute of Technology, Kanuru, Vijayawada.

1/2 M.Tech. SECOND SEMESTER

CSCS2T5D **DISTRIBUTED SYSTEMS** **Credits: 4**

ELECTIVE – I

Lecture: 4 periods/week **Internal assessment: 30 marks**

Tutorial: 1 period /week **Semester end examination: 70 marks**

Objectives:

At the end of this course the students should be able:

1. To understand basic concepts of distributes systems, their goals, types and architectures.
2. To understand the process handling and various communication techniques in distributed systems
3. To understand various naming techniques used in Distributed systems
4. To know various clock synchronization techniques used in distributed systems
5. To know various techniques for handling replication and fault tolerance
6. Understand various security mechanisms of distributed systems
7. Understand the object based systems and file systems of Distributed system
8. Understand the web based and coordination based systems of distributed systems.

Learning Outcomes:

By the end of this course every student will:

1. Describe the architecture needed for different distributed systems
2. Handle various processes and techniques needed for communication in distributed systems
3. Apply a naming technique for a distributed system
4. Apply various clock synchronization techniques for a distributed system
5. Apply techniques to avoid replication and handle fault tolerance
6. Apply a security mechanism for a distributed system
7. Distinguish between various file based and object based systems of distributed systems
8. Distinguish between web based and coordination based systems

UNIT-I

Introduction Of Distributed System: Goals, Types of Distributed systems.

Architectures: Architectural Styles, System architectures, Self management in distributed systems.

UNIT-II

Processes: Threads, Virtualization, Clients, Servers, Code Migration, Software Agents.

Communication: Fundamentals, Remote Procedure Call, Message Oriented Communication, Stream-Oriented Communication, Multicast Communication.

UNIT-III

Naming: Names, Identifiers and Addresses, Flat Naming, Structured Naming, Attribute-Based Naming

UNIT-IV

Synchronization: Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning of nodes, Election Algorithms.

UNIT-V

Consistency and Replication: Introduction, Data-Centric Consistency Models, Client Centric Consistency Models, Replica Management, Consistency Protocols, Examples.

Fault Tolerance: Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery.

UNIT-VI

Security: Introduction, Secure channels, Access Control, Security Management

UNIT-VII

Distributed Object-Based Systems: Architecture, Object servers, Binding Clients to Objects, Parameter passing, CORBA, Synchronization, Entity Consistency, Replicated invocations, Fault tolerant CORBA & Java, Security for Remote objects.

Distributed File Systems: Architectures, Processes, RPCs in NFS, RPC subsystem, Naming in NFS, Semantics of File Sharing, Sharing Files in CODA, Replication in peer to Peer and Grid based systems, Handling Byzantine failures, Security in NFS, Decentralized Authentication.

UNIT-VIII

Distributed Web Based Systems: Architecture, Client process, Server process, HTTP, Web proxy caching, Replication.

Distributed Coordination Based Systems: Architectures, Processes, Content Based routing, Composite events, Matching Events, Synchronization, Static Approaches, Dynamic Replication, Reliable publish subscribe communication, Fault tolerance and Security in Shared Data spaces

Learning Resources

Text Book:

Distributed Systems – Principles and Paradigms, Andrew S. Tanenbaum, Maarten Van Steen, 2/e, PHI.

Reference Books:

1. Distributed Systems Concepts and Design, George Couloris, Jean Dollimore, Tim Kindberg, Gordan Blair, 4/e, PEARSON.
2. Distributed Operating Systems Concepts and Design, Pradeep K. Sinha, PHI.