

3/3 MCA First Semester

CA5T5F

DISTRIBUTED SYSTEMS

Credits : 4

Lecture Hours : 4 periods / week

Internal assessment : 30 Marks

Semester and Examination: 70 Marks

Course Description:

This course will familiarize the students with distributed computing environment. To make the students understand the issues involved in designing distributed algorithms and importance of synchronization & mutual exclusion in distributed transactions. And finally it introduces the students with best examples in distributed file systems like Sun Network and Coda file Systems.

Course Objectives:

- Students are expected to understand the concepts of distributed systems.
- It is expected that the learners understand the complexity of distributed systems environment.
- Students are able to implement name spaces for entities involved in distributed systems.
- Realize the importance of synchronization, consistency and fault tolerance.

Unit I:

Characterization of Distributed Systems:- Introduction, Examples of distributed systems, Resource sharing and the Web, Challenges. **System models:-** Introduction, Architectural models, Fundamental models.

Unit II:

Networking and Internetworking:- Introduction, Types of network, Network principles, Internet protocols, Network case studies: Ethernet, wireless LAN and ATM.

Unit III:

Interprocess communication:- Introduction, The API for the Internet protocols, External data representation and marshalling, Client-server communication, Group communication, Case study: Interprocess communication in UNIX.

Unit IV:

Distributed Objects and Remote Invocation:- Introduction, Communication between distributed objects, , Remote procedure call, Events and notifications, Java RMI case study.

Unit V:

Distributed File Systems:- Introduction, File service architecture, Sun Network file system, The Andrew File System, Recent advances. **Name Services:-** Introduction, Name services and the Domain Name System, Directory and discovery services, Case study of the Global Name Service, Case study of the X.300 Directory Service.

Unit VI:

Time and Global States:- Introduction, Clocks, events and process states, Synchronizing physical clocks, Logical time and logical clocks, Global states, Distributed debugging. **Coordination and Agreement:-** Introduction, Distributed mutual exclusion, Elections, Multicast communication, Consensus and related problems.

Unit VII:

Transactions and Concurrency Control: - Introduction, Transactions, Nested transactions, Locks, Optimistic concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

Unit VIII:

Distributed Transactions:- Introduction, Flat and nested distributed transactions, Atomic commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. **Replication:-** Introduction, system model and group communication, fault- tolerant services, Highly available services, Transactions with replicated data.

Learning Resources

Text Books:

1. Distributed Systems – Concepts and Design, George Coulouris, Jean Dollimore, Tim Tim Kindberg and , 5th edition, Published by Addison wesley, may 2011.

Reference Books:

1. Distributed Systems – Principles & Paradigms, Andrew S. TenenBaum, Marten Van Steen, Pearson Education.