DEPARTMENT OF COMPUTER SCIENCE

Gopinath Bordoloi Nagar, Gauhati University

Guwahati-781014, Assam, India

LESSON PLAN

Subject Name : **Distributed System**

Paper Code : **CSC3026/INF3026** **Session:** **2021-2022**

Program Name : **M.Sc. (CS/IT)** **Semester:** **THIRD**

Faculty Name : **Dwipen Laskar**

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Detailed Lesson Plan

UNIT-I (Introduction to Distributed Systems)

Lecture No	Topics to be Covered
1	Definition of a distributed system. Characteristics of distributed and centralized systems, Design issue and challenges, Advantages and Disadvantages of Distributed System
2	Types of transparency issues, Concurrency Control, openness, and scalability, Hardware concepts- multiprocessors, homogeneous & heterogeneous systems, middleware, issues in distributed Operating systems
3	Inherent limitations of distributed systems, System models: Fundamental model, Architectural model, Interaction model
4	System architectures- The client-server model and its variations, Application layering, Client-Server architectures.

UNIT-II (Synchronization)

5	Needs of clock synchronization, External and Internal clock synchronization, Global Clock
6	Logical and Physical Clock Synchronization, Logical and vector clocks, Happened Before Relationship,
7	Lamport's logical clock synchronization algorithm, Limitations of Lamport's Clock, Vector clock synchronization
8	Partial Ordering of Events , Causal Order of messages, Birman-Schiper-Stephension protocol
9	Global state, Chandy Lamport snapshot algorithm, Termination detection, Haung's Termination Detection Algorithm

UNIT-III (Distributed Mutual Exclusions)

10	Definition of Distributed ME, Critical Section, Requirements of Mutual Exclusion algorithms
11	Performance measurement metrics for Distributed ME algorithms, Classification of mutual exclusion algorithm- Token based algorithms, Non-token based algorithm, Quorum Based
12	Central Server Algorithm, Complexities of CS Algorithm, Lamport's timestamp algorithm

13	Ricart-Agrawala Algorithm, Maekawa's Voting algorithm, Complexities of CS Algorithm, Merits and Demerits
14	Election algorithms- Bully algorithm, Ring algorithm, Lelang-Chang-Robert Algorithms

UNIT-IV (Distributed Scheduling and Deadlock detection)

15	Distributed scheduler, issues in distributed load distribution,
16	Basic conditions of deadlocks, Resource and communication deadlock, Strategies of deadlock handling, Necessary conditions of deadlock
17	Deadlock detection algorithms (Centralized, Distributed , Hierarchical), HO Ramamurthy (One and Two Phase Algorithm)
18	Distributed Deadlock Algorithm-Path Pushing Algorithm, Edge Chasing Algorithm

UNIT-V (Agreement Protocols and Inter-process Communication)

19	System models, classification of agreement problems (Byzantine, Consensus, Interactive), Relations among Agreement Protocols
20	Solutions to the Byzantine agreement problem-Upper bound on number of faulty processors, Treatment of Impossibility Results, Lamport's-Shostak-Pease Algorith,
21	Inter-process Communications, Remote Object Invocation , Request Reply Protocol, Remote Procedure Call- basic RPC operation, parameter passing, examples.

UNIT-VI (Naming)

22	Naming entities- names, identifiers & addresses, name resolution, Name space implementation, the Domain Name System

UNIT-VII (Distributed Transaction Processing)

23	Distributed transactions- ACID properties, flat and nested transactions, Failure Recovery in Distributed System-Classification of failures, Backward and Forward Failure Recovery
24	concurrency control in distributed transactions, Introduction, reasons for replication, object replication, consistency models
25	Backward Failure Recovery: Operation based recovery and State based recovery
26	Recovery in Concurrent System: Orphan messages and Domino effects, Lost messages, Problem of Livelock

UNIT-VIII (Distributed File Systems)

27	Introduction: characteristics of file systems, distributed file system requirements, File service architecture, Services provided by DFS
28	File accessing models, Architecture of DFS, Advantages and Disadvantages,
29	Distributed Shared Memory, Advantages and disadvantages of DSM, Algorithms for Implementing DSM
30	Central Server algorithm, Migration Algorithm, Read Replication algorithm, Full-Replication Algorithm

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