

TCS1025 ADVANCED OPERATING SYSTEM CONCEPTS

Module 1 [6 periods]

Overview, Functions of an Operating System, Design Approaches, Types of Advanced Operating Systems. Synchronization Mechanisms, Concept of a Process, Concurrent Processes, Critical Section Problem, Other Critical Section Problems, Language Mechanisms for Synchronization, Axiomatic Verification of Parallel Algorithms.

Module 2 [5 periods]

Process Deadlocks, Models of Deadlock, Models of Resources, A graph theoretic model of a System State, Necessary and Sufficient conditions for a Deadlock, Systems with Single unit requests, Systems with only consumable resources, Systems with reusable resources.

Module 3 [6 lectures]

Distributed Operating Systems, Introduction, System Architecture Types, Issues in Distributed Operating Systems, Communication Networks, Communication Primitives,

Module 4 [4 lectures]

Limitations of a distributed system, Lamport's logical clocks, Vector Clocks, Causal ordering of messages, Global state, Cuts of a distributed Computation, Termination detection.

Module 5 [8 lectures]

Distributed Mutual Exclusion, Classification of Mutual Exclusion Algorithms, Preliminaries, Non token based algorithms, Lamport's algorithm, Token based algorithms, Suzuki Kasami's Broadcast algorithm, Singhal's heuristic algorithm, Raymond's tree based algorithm, Comparative performance analysis.

Module 6 [8 lectures]

Distributed Deadlock Detection, Preliminaries, Deadlock handling strategies, Issues with deadlock detection and resolution, Control organizations, Centralized, distributed and hierarchical algorithms

Module 7 [6 lectures]

Distributed File Systems Mechanisms for building distributed file systems, Design issues, Distributed Shared Memory, Architecture, Algorithms for Implementing DSM, Memory Coherence and Coherence Protocols, Design Issues

Text Book

M. Singhal, N. Shivaratri, Advanced Concepts in Operating Systems, Tata McGraw- Hill, 2008.

Reference Books

W. Stallings, Operating Systems - Internals and Design Principles, Prentice Hall, 2008.

W. Stallings, Operating Systems, Macmillian Publishing, 2008.