

GUJARAT TECHNOLOGICAL UNIVERSITY

Computer Engineering (Software Engineering) Distributed Systems SUBJECT CODE: 3710213

Type of course: Elective

Prerequisite: Operating System, Computer Network, Data Structures and Algorithms

Rationale: This subject will give introduction to traditional and distributed computing system. Students will be introduced to various issues in design of distributed system. They will also learn how to mitigate those risks and attacks.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
			ESE(E)	PA (M)	PA (V)	PA (I)		
3	0	2	4	70	30	30	20	150

Content:

Sr. No	Content	Total Hrs	% Weightage
1	Introduction to DS: Introduction to Distributed Systems, Distributed system models, Design issues in DS	3	8%
2	Communication in Distributed System: Inter process communication: Message passing model, Remote procedure call and implementation issues, Point to point and Group communication, Client Server model & its implementation, Socket programming, Case Studies: SUN RPC, DEC RPC	7	15%
3	Synchronization in distributed systems: Introduction, Temporal ordering of events, Clock synchronization, mutual exclusion, Deadlock in distributed systems, Election algorithms	8	15%
4	Remote Method Invocation: Introduction, Java RMI Architecture, API for Java RMI, Client Callback, Stub downloading	3	8%
5	Common Object Request Broker Architecture: Introduction, Interface, Inter-ORB Protocol, Object server and object client, Naming service, Object service,	4	10%
6	Processes and processors in distributed systems: Threads, system model, processor allocation, scheduling in distributed systems: Load balancing and sharing approach, fault tolerance, Real time distributed systems, Process migration and related issues	8	15%

7	Distributed File Systems: Introduction, features & goal of distributed file system, file models, file accessing models, file sharing semantics, file caching scheme, file replication, fault tolerance, trends in distributed file system, case study- HDFS.	8	15%
8	Distributed Shared Memory: Introduction, general architecture of DSM systems, design and implementation issues of DSM, granularity, structure of shared memory space, consistency models, replacement strategy, thrashing	5	10%
9	Advanced Topics: Simple Object Access Protocol, Distributed Computing Paradigm (Message queue system, mobile agent, object spaces)	2	4%

Reference Books :

1. “Distributed Computing – Principles and Applications”, M. L. Liu, Pearson.
2. “Distributed Operating Systems Concepts and Design” , Pradeep K Sinha, PHI
3. “Distributed Systems Concepts and Design “ George Colouris, Jean Dollimore, Tim Kindberg, Pearson

Course Outcome:

After learning the course the students should be able to:

- Understand the difference between traditional client server architecture and distributed architecture
- Understand the importance and issues of distributed system
- Implement socket programming, RMI and CORBA

List of Experiments:

1. Write a Program to implement Concurrent Echo Client Server Application.
2. Write a Program to implement Concurrent Day Time Server Application.
3. Write a program to solve Producer-Consumer Problem using thread.
4. Write a program to implement Calculator using Socket in java.
5. Implement RPC Programming.
6. Implementation of Server that adds given two values by the clients using Java RMI.
7. Write a program to create CORBA based client server application
8. Implementing Bully Election algorithm for synchronization
9. Implementing Ring Election algorithm for synchronization
10. Write a Program to Increment a Counter in Shared Memory.