GUJARAT TECHNOLOGICAL UNIVERSITY

COMPUTER ENGINEERING (SOFTWARE ENGINEERING) (02)

DISTRIBUTED OPERATING SYSTEM

SUBJECT CODE: 2710213

SEMESTER: I

Type of course: Major Elective I

Prerequisite: Mathematical concepts: Random numbers, Number theory, finite fields

Rationale: At graduate level, student has studied subject Operating Systems. The work of Operating System is different in the distributed environment. Student should understand Message passing, RPC, Synchronization, Load Balancing. Migration of processes, Deadlock management etc in distributed environment. Some of the issues are research issues.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		Practical Marks				
				ESE (E)	PA (M)	PA (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2	2	5	70	30	20	10	20	0	150

Content:

Sr. No.	Topics	Teaching Hrs.	Module Weightage
1	Introduction to distributed Systems: Definition and goals, Hardware and Software concepts, Design issues	3	5
2	Communication in Distributed System: Computer Network and Layered protocols, Message passing and related issues, synchronization, Client Server model & its implementation	5	10
3	Remote procedure call and implementation issues, Stub generation, Case Studies: SUN RPC, DEC RPC	5	10
4	Synchronization in distributed systems: Clock synchronization and related algorithms, mutual exclusion, Deadlock in distributed systems	5	10
5	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	6	15
6	Resource Management : Load balancing and Load sharing approach	4	10
7	Process Management : Migration, Threads	4	10
8	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	5	10
9	Case study :Amoeba, Mach, Chorus and their comparison	3	10

Reference Books:

1. Distributed Operating Systems Concepts and Design, Pradeep K. Sinha, PHI

2. Distributed Operating Systems by Andrew S Tannebaum, PHI

Course Outcome:

After learning the course the students should be able to

1. Understand distributed systems
2. Know various types of transparencies which Distributed OS should provide
3. Understand and analyse Message passing models
4. Understand RPC and implement it using manual or automatic stub generation
5. Know various synchronization issues
6. Know, analyse various election algorithms
7. Implement threads
8. Know File systems
9. Compare various Distributed OS

List of Experiments:

1. Implement concurrent client-server application in LINUX.
2. Study of rpcgen protocol compiler.
3. Write a program to subtract two numbers using rpcgen utility under LINUX using command-line arguments.
4. Write a program to find minimum of two numbers using rpcgen utility under LINUX using command-line arguments.
5. Write a program to find length of given string using rpcgen utility under LINUX using command-line arguments
6. Write a program to find average of given numbers using rpcgen utility under LINUX using command-line arguments
7. Write a program to convert Fahrenheit to Celsius conversion using rpcgen utility under LINUX using command-line arguments
8. Write a program to implement stateful server.
9. Write a program to implement state-less server.
10. Write a program of simple calculator using Java RMI.
11. Write a program in Java to create thread safe counter using synchronized class methods.

Open Ended Problems:

Major Equipments: Computer/LINUX OS/Unix OS

List of Open Source Software/learning website:

www.cdk3.net/rmi/ed2/sunrpc.pdf

en.wikipedia.org/wiki/message_passing

www.cs.rpi.edu/~hollingd/netprog/notes/rpc/rpc.ppt
http://www.cs.rutgers.edu/~pxk/rutgers/notes/clocks/index.html