Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology
Fourth Year Bachelor of Engineering (Computer/IT)
(To be Proposed For: Academic Year 2020-21)

Subject Code: CT704A-N	Subject Title: Distributed Systems
Pre-requisite	Operating System, Database, Computer Networks

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
04	00	02	06	05	04	70	30	20	30	150

Course Objective:
This course aims to
- Understanding Remote Communication and Interprocess Communication
- Study about various distributed client server models
- Create awareness of the major technical challenges in distributed systems design and implementation
- Emerging trends in distributed computing
- Understanding Distributed Shared Memory and File System

Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	Concepts of Distributed Systems	6
2	Basic Network Communications	5
3	Inter process Communication	8
4	Remote Communication	6
5	Distributed System Synchronization	7
6	Distributed System Management	7
7	Distributed Shared Memory	7
8	Distributed File System	8
9	Security	5
10	Emerging Trends in Distributed System	5

Total hours (Theory): 64
Total hours (Lab): 32
Total hours: 96

Detailed Syllabus

No	Topic	Lecture (Hrs)	Weightage (%)
1	**Concepts of Distributed Systems** Introduction, Distributed computing models, Software concepts, Design issues in distributed systems, Client-server model, WWW	6	10
2	**Basic Network Communications** LAN and WAN technologies, Classification of Networks, Protocols for Network Systems, ATM, Protocols for Distributed systems-FLIP,VMTP	5	7
3	**Interprocess Communication** Message Passing and its features, IPC message format, IPC synchronization, Buffering, multi datagram messaging, process addressing techniques, failure handling, Formal Models for message passing systems, Group communication, Group Management, Message ordering.	8	13
4	**Remote Communication** Introduction, RPC basics, RPC implementation, RPC Communication and Other issues, Sun RPC, RMI basics, RMI Implementation, Java RMI	6	10
5	**Distributed System Synchronization** Introduction, Clock synchronization, Logical clocks and Global state, Mutual exclusion, Election algorithms: Bully algorithm, Ring algorithm, Leader election in rings, Deadlocks in Distributed systems.	7	11
6	**Distributed System Management** Resource management, Task management approach, Load balancing approach, Load sharing approach, Process Management, Process migration, threads, fault tolerance	7	11
7	**Distributed Shared Memory** DSM Concepts, Hardware DSM, Design issues in DSM systems, Implementation issues, Heterogeneous and other DSM systems	7	11
8	**Distributed File System** Introduction DFS, File Models, DFS Design, Semantics File Sharing, DFS Implementation	8	13
9	**Security** Introduction, Overview of Security techniques, Cryptographic algorithms, Digital signatures	5	7
10	**Emerging Trends in Distributed System** Introduction, Grid Computing, Service Oriented Architecture, Cloud Computing.	5	7
	Total	**64**	**100**

Instructional Method and Pedagogy:

- At the start of course, significance of the course, content delivery pattern, and other required details regarding subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which will be reflected in **Continuous Internal Assessment (CIA)** component in the examination scheme of the course.
- Assignments based on the course content will be given to the students and will be evaluated at regular interval evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures. **Practicals** shall be performed in the laboratory related to course contents.

Learning Outcome:

On successful completion of the course, the student will:

- On successful completion of the course, the student will be having the basic knowledge of Distributed Computing.
- Student will be able to understand Distributed Models.
- To know about interposes communication and remote communication.
- Student will be able to know distributed service oriented architecture.
- To know about emerging trends in distributed computing.
- Student will be able to know Distributed Shared Memory and File System.

e-Resources:

1. https://www.techopedia.com/definition/18909/distributed-system
2. http://gtu-info.com/Subject/180701/DS/Distributed_Systems
3. https://www.geeksforgeeks.org/

Text Books:

1. Distributed Computing, Sunita Mahajan and Seema Shah, Oxford University
2. Distributed systems concepts and design, George Coulouris,Jean Dollimore,Tim Kindberg, PEARSON
3. Distributed Operating Systems by P. K. Sinha, PHI

Reference Books:

4. Distributed Systems: Principles and Paradigms, Taunenbaum
5. Distributed Computing, Fundamentals, Simulations and Advanced topics, 2nd Edition, Hagit Attiya and Jennifer Welch, Wiley India
6. Distributed Systems: Concepts and Design, G. Coulouris, J. Dollimore, and T. Kindberg,
7. Java Network Programming & Distributed Computing by David Reilly, Michael Reilly

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List of experiments:

No	Name of Experiment
*	Demo Practical: Write a program to print "Hello world" using NetBeans /simple JAVA
1	Write a program to implement "Hello World!" using RMI
2	Write a program to implement Calculator using RMI
3	Write a program to calculate interest rate using RMI
4	Write a program to implement Time Service application using RMI
5	Write a program to implement "Hello World!" using RPC
6	Write a program to implement Arithmetic Server using RPC
7	Write a program to implement date service using RPC
8	Write a program to implement Echo server using RPC
9	Write a program to implement Chat server using RPC
10	Design a Distributed Application for performing arithmetic operations using Message passing Interface(MPI) for remote computation
11	Write a program to implement Echo SOCKET in JAVA
12	Write a program to find the length of string using THREAD in JAVA