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		Semester: EVEN

UNIT 1

INTRODUCTION

Introduction – Examples of Distributed Systems–Trends in Distributed Systems – Focus on resource sharing – Challenges. Case study: World Wide Web.


Objective: The student should be made to understand foundations of Distributed Systems

Session No	Topics to be covered	Text/Ref& Page No.	Teaching Method
1	Introduction	T1-Ch 1; pg: 1-2	BB/LCD
2	Examples of Distributed Systems	T1-Ch 1; pg: 3-7	BB/LCD
3	Trends in Distributed Systems	T1-Ch 1; pg: 8-13	BB/LCD
4	Focus on resource sharing	T1-Ch 1; pg: 14-15	BB/LCD
5	Challenges.	T1-Ch 1; pg: 16-25	BB/LCD
6	Challenges	T1-Ch 1; pg: 16-25	BB/LCD
7	Case study: World Wide Web	T1-Ch 1; pg: 26-33	BB/LCD
Content beyond syllabus covered (if any): Real time applications for distributed systems.			
Course Outcome 1: The students will be able to discuss basic concepts in Distributed Systems and The students will be able to discuss trends in Distributed Systems.			

UNIT II

COMMUNICATION IN DISTRIBUTED SYSTEM

System Model – Inter process Communication - the API for internet protocols – External data representation and Multicast communication. Network virtualization: Overlay networks. Case study: MPI Remote Method Invocation And Objects: Remote Invocation – Introduction - Request-reply protocols - Remote procedure call - Remote method invocation. Case study: Java RMI – Group communication - Publish-subscribe systems - Message queues - Shared memory approaches - Distributed objects - Case study: Enterprise Java Beans -from objects to components


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Objective: The student should be made to understand foundations of Distributed Systems

Session No	Topics to be covered	Text/Ref	Teaching Method
8	System Model, Inter process Communication the API for internet protocols	T1-Ch 2; pg: 37-75	BB/LCD
9	External data representation and Multicast communication.	T1-Ch 4; pg: 158-173	BB/LCD
10	Network virtualization: Overlay networks. Case study: MPI	T1-Ch 4; pg: 174-177	BB/LCD
11	Remote Method Invocation And Objects: Remote Invocation	T1-Ch 5; pg: 204-215	BB/LCD
12	Introduction - Request-reply protocols	T1-Ch 5; pg: 187-194	BB/LCD
13	Remote procedure call - Remote method invocation.	T1-Ch 5; pg: 195-203	BB/LCD
14	Case study: Java RMI Group communication	T1-Ch 5; pg: 217-224	BB/LCD
15	Publish-subscribe systems, Message queues	T1-Ch 6; pg: 242-262	BB/LCD
16	Shared memory approaches, Distributed objects	T1-Ch 6; pg: 262-273	BB/LCD
17	Case study: Enterprise Java Beans -from objects to components	T1-Ch 8; pg: 364-377	BB/LCD
Content beyond syllabus covered (if any): Case study: Remote procedure call – specific systems – DCE RPC ,Java RMI,SOAP			
Course Outcome 2: Apply network virtualization and Apply remote method invocation and objects.			
Internal Assessment I			

UNIT III PEER TO PEER SERVICES AND FILE SYSTEM

Peer-to-peer Systems – Introduction - Napster and its legacy - Peer-to-peer – Middleware – Routing overlays. Overlay case studies: Pastry, Tapestry- Distributed File Systems –Introduction – File service architecture – Andrew File system. File System: Features-File model -File accessing models - File sharing semantics Naming: Identifiers, Addresses, Name Resolution – Name Space Implementation – Name Caches – LDAP.

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Objective: To introduce the idea of peer to peer services and file system.


Session No	Topics to be covered	Text/ Ref	Teaching Method
18	Peer-to-peer Systems, Introduction	T1-Ch 10; pg: 422-427	BB/LCD
19	Napster and its legacy, Peer-to-peer Middleware	T1-Ch 10; pg: 428-432	BB/LCD
20	, Routing overlays.	T1-Ch 10; pg: 433-435	BB/LCD
21	Overlay case studies: Pastry, Tapestry	T1-Ch 10; pg: 436-448	BB/LCD
22	Distributed File Systems, Introduction	T1-Ch 12; pg: 522-529	BB/LCD
23	File service architecture, Andrew File system.	T1-Ch 12; pg: 530-536	BB/LCD
24	File System: Features-File model, File accessing models	T1-Ch 12; pg: 537-563	BB/LCD
25	File sharing semantics Naming: Identifiers,	T1-Ch 13; pg: 565-580	BB/LCD
26	Addresses, Name Resolution, Name Space Implementation	T1-Ch 13; pg: 589-591	BB/LCD
27	Name Caches, LDAP	T1-Ch 13; pg: 592-594	BB/LCD
Course Outcome 3: The student should be able to introduce the idea of peer to peer services and file system.			

UNIT IV

SYNCHRONIZATION AND REPLICATION

Introduction - Clocks, events and process states, Synchronizing physical clocks, Logical time and logical clocks - Global states, Coordination and Agreement – Introduction - Distributed mutual exclusion – Elections – Transactions and Concurrency Control– Transactions -Nested transactions – Locks – Optimistic concurrency control - Timestamp ordering – Atomic Commit protocols –Distributed deadlocks – Replication – Case study – Coda

Objective: To understand in detail the system level and support required for distributed system


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Session No	Topics to be covered	Text/ Ref	Teaching Method
28	Introduction - Clocks, events and process states,	T1-Ch 14; pg: 595-598	BB/LCD
29	Synchronizing physical clocks, Logical time and logical clocks	T1-Ch 14; pg: 599-609	BB/LCD
30	Global states, Coordination and Agreement	T1-Ch 14; pg: 610-619	BB/LCD
31	Introduction , Distributed mutual exclusion	T1-Ch 14; pg: 629 - 633	BB/LCD
32	Elections, Transactions and Concurrency Control	T1-Ch 16; pg: 679 - 676	BB/LCD
33	Transactions, Nested transactions, Locks	T1-Ch 16; pg: 679 - 692	BB/LCD
34	Optimistic concurrency control, Timestamp ordering	T1-Ch 16; pg: 693 - 717	BB/LCD
35	Atomic Commit protocols.	T1-Ch 17; pg: 731 - 739	BB/LCD
36	Distributed deadlocks, Replication, Case study, Coda	T1-Ch 17; pg: 751 - 760	BB/LCD
Content beyond syllabus covered (if any):			
Course Outcome 4: The students will be able to Understand in detail the system level and support required for distributed system			
Internal Assessment II			


UNIT V PROCESS & RESOURCE MANAGEMENT

Process Management: Process Migration: Features, Mechanism - Threads: Models, Issues, Implementation. Resource Management: Introduction- Features of Scheduling Algorithms –Task Assignment Approach – Load Balancing Approach – Load Sharing Approach.

Objective: To understand the issues involved in studying process and resource management

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Session No	Topics to be covered	Text/ Ref	Teaching Method
37	Process Management: Process Migration: Features, Mechanism	2-Ch.8;Pg.381 – 398 www.cs.iit.edu/~cs550/lectures/12_distrib_sys_proc_mgmt_migration.ppt http://vega.cs.kent.edu/~mikhail/classes/aos.f03/115migration.pdf	BB/LCD
38	Threads: Models, Issues	2-Ch.8;Pg.398 – 407 http://www.cs.vu.nl/~ast/books/mos2/sample-2.pdf http://www.e-reading.club/chapter.php/143358/125/Tanenbaum_-_Distributed_operating_systems.html	BB/LCD
39	Threads Implementation	2-Ch.8;Pg.407 – 410 cs.txstate.edu/~xc10/ad-os/4.Process.ppt http://grid.cs.gsu.edu/~cscskp/DistSystems/ch03.pdf	BB/LCD
40	Resource Management: Introduction- Features of Scheduling Algorithms	2-Ch.7;Pg.347 – 351 mazsola.iit.uni-miskolc.hu/DATA/research/tempus/discom/.../res_man.ppt http://www.b-u.ac.in/sde_book/distrib_computing.pdf	BB/LCD
41	Task Assignment Approach	2-Ch.7;Pg.351 – 355 mazsola.iit.uni-miskolc.hu/DATA/research/tempus/discom/res_man.ppt http://www.b-u.ac.in/sde_book/distrib_computing.pdf	BB/LCD
42	Load Balancing Approach - Algorithms	2-Ch.7;Pg.355 – 367 mazsola.iit.uni-	BB/LCD

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		miskolc.hu/DATA/ research/tempus/disco.../r es_man.ppt http://www.b-u.ac.in/sde_book/distrib_computing.pdf	
43	Load Balancing Approach - Issues	2-Ch.7;Pg.355 – 367 mazsola.iit.uni- miskolc.hu/DATA/ research/tempus/disco.../r es_man.ppt http://www.b-u.ac.in/sde_book/distrib_computing.pdf	BB/LCD
43	Load Sharing Approach.	2-Ch.7;Pg.367 – 371 mazsola.iit.uni- miskolc.hu/DATA/ research/tempus/disco.../r es_man.ppt http://www.b-u.ac.in/sde_book/distrib_computing.pdf	BB/LCD
44	Load Sharing Approach - Issues	2-Ch.7;Pg.367 – 371 mazsola.iit.uni- miskolc.hu/DATA/ research/tempus/disco.../r es_man.ppt http://www.b-u.ac.in/sde_book/distrib_computing.pdf	BB/LCD
45	Process Management: Process Migration: Features, Mechanism	2-Ch.8;Pg.381 – 398 www.cs.iit.edu/~cs550/lectures/12_distrib_sys_proc_mgmt_migration.ppt http://vega.cs.kent.edu/~mikhail/classes/aos.f03/15migration.pdf	BB/LCD
Model Exam			

TEXT BOOK:

1. George Coulouris, Jean Dollimore and Tim Kindberg, “Distributed Systems Concepts and Design”, Fifth Edition, Pearson Education, 2012.

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1. Pradeep K Sinha, "Distributed Operating Systems: Concepts and Design", Prentice Hall of India, 2007.
2. Tanenbaum A.S., Van Steen M., "Distributed Systems: Principles and Paradigms", Pearson Education, 2007.
3. Liu M.L., "Distributed Computing, Principles and Applications", Pearson Education, 2004.
4. Nancy A Lynch, "Distributed Algorithms", Morgan Kaufman Publishers, USA, 2003.

	Prepared by	Approved by
Signature		
Name	D. ASIR ANTONY GNANA SINGH	Mr. D. Venkatesan
Designation	Teaching Fellow, IT	Asst. Prof. & Head, IT/CSE