

GUJARAT TECHNOLOGICAL UNIVERSITY

COMPUTER ENGINEERING (SYSTEMS AND NETWORK SECURITY)

(56)

CLUSTER AND GRID COMPUTING

SUBJECT CODE: 2725604

SEMESTER: II

Type of course: Major Elective-II

Prerequisite: System Programming, Operating System

Rationale: This course covers general introductory concepts in the design and implementation of distributed systems, covering all the major branches such as Cloud Computing, Grid Computing, Cluster Computing, Supercomputing, and Many-core Computing. Complete coverage of modern distributed computing technology including clusters, the grid, service-oriented architecture, massively parallel processors and peer-to-peer networking. Includes case studies from the leading distributed computing vendors.

Teaching and Examination Scheme:

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

Contents:

Sr. No	Topic No.	Topics	Teach.H rs.	Weight (%)
Part 1	Grid Computing		14	40
	1	Introduction		
	2	Technologies and Architectures for Grid Computing		
	3	World Wide Grid Computing Activities, Organizations, and Projects		
	4	Web Services and the Service Oriented Architecture (SOA)		
	5	OGSA and WSRF		
	6	Globus Toolkit		
7	The Grid and the Database			
Part 2	Cluster Computing		21	60
	1	What is Cluster Computing?		
	2	Cluster Middlewear: An Introduction		
	3	Early Cluster Architecture and High Throughput Computing Clusters		

	4	Networking, Protocols & I/O for Clusters		
	5	Setting Up and Administering a Cluster		
	6	Cluster Technology for High Availability		
	7	Performance Models and Simulation		
	8	Process Scheduling		
	9	Load Sharing and Load Balancing		
	10	Distributed Shared Memory		
	11	Case Studies of Cluster Systems: Beowulf, COMPaS, NanOS and PARAM		

Reference Book(s):

1. Grid and Cluster Computing, Prabhu C.S.R, PHI Learning Private Limited
2. Distributed and Cloud Computing, First Edition, Geoffrey C. Fox , Kai Hwang , Jack J. Dongarra, Elsevier India Pvt. Ltd.-New Delhi
3. Distributed Systems: Principles and Paradigms, Second Edition, Andrew S. Tanenbaum, Maarten Van Steen, Person Education
4. High Performance Cluster Computing: Architectures and Systems, Vol. 1, Prentice Hall
5. In search of clusters (2nd ed.), Gregory F. Pfister, IBM, Austin, TX, Prentice-Hall

Course Outcomes:

Practical Work:

Using client-server architecture, write a multi-threaded server which returns results of mathematical functions such as \sqrt{x} , $\sin(x)$, $\cos(x)$, $\tan(x)$, etc. and a companion client to invoke these functionalities from a remote machine.

Open Ended Problem:

Based on theory taught/Study and analysis of Research Papers related to subject

Important Links:

<http://www.cloudbus.org/course>
<http://www.gridcomputing.com>
<http://www.buyya.com/cluster>

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.