



Department of Information Technology	LP: IT16009 Rev. No: 01
B.E/B.Tech/M.E/M.Tech : Information Technology Regulation: 2016 PG Specialisation : NA Sub. Code / Sub. Name : IT16009 Grid Computing Unit : I	Date: 03.12.2019

Unit Syllabus:

UNIT I INTRODUCTION

Parallel and Distributed Computing - Cluster Computing - Grid Computing Anatomy and Physiology of Grid - Web and Grid Services.

Objective:

To provide in-depth knowledge in computing techniques with grid as the platform.

Session No *	Topics to be covered	Ref	Teaching Aids
1	Parallel and Distributed Computing – Definition -Issues	R4, Ch. 1, Pg (2-5) Internet	BB/LCD
2	Cluster Computing – Types of Cluster Computing – Architecture - Issues	R4, Ch. 2, Pg (13-21) Internet	BB/LCD
3	Grid Computing Anatomy- Emergence of Virtual organization, Nature of Grid Architecture, Grid Architecture description	R2, Ch. 6, Pg(169-185)	BB/LCD
4	On the grid: need for inter-grid protocols, Relationship with other technologies	R2, Ch. 6, Pg(185-191)	BB/LCD
5	Physiology of Grid- Need for grid technologies, Background, Open Grid Services Architecture, Application Example	R2, Ch. 8, Pg(217-234)	BB/LCD
6	Technical details, Network protocol bindings, higher-level services	R2, Ch. 8, Pg(235-246)	BB/LCD
7	Web Services- SOAP, WSDL, UDDI, WS-Inspection, WS-Inspection and UDDI, WS Implementation, Web Service and grid	R4, Ch. 2.3, Pg(21-34) T1, Ch. 17.4, pg(221-225)	BB/LCD
8	Grid Web Services and Application Factories - Introduction	R2, Ch. 6, Pg(251-254)	BB/LCD
9	XCAT and Web Services, The application factory service	R2, Ch. 6, Pg(254-263)	BB/LCD

Content beyond syllabus covered (if any):

* Session duration: 50 minutes



Sub. Code / Sub. Name: IT16009 Grid Computing

Unit : II

Unit Syllabus:

UNIT II FRAMWORK

Architecture – Implementation of Grid Architecture – Grid Services OGSI, OGSA, WSRF –Grid Resource and Service Management –Resource Management Framework – Service Negotiation and Acquisition Protocol – Layers of Grid Computing – Building Reliable Services - Grid Monitoring – Sensors and Sensor Management - Grid Security – WS Security – GSI.

Objective:

To know the concepts pertaining to grid computing environment and also designing trusted grid computing system.

Session No *	Topics to be covered	Ref	Teaching Aids
10	Grid Architecture- Fabric layer, Connectivity layer, Resource layer, Collective layer and Applications	T1, Ch. 4.2, pg(47-54)	BB/LCD
11	Implementation of Grid Architecture- Globus Toolkit Version2, Open Grid Services Architecture	T1, Ch. 4.2, pg(54-60)	BB/LCD
12	Open Grid Services Infrastructure(OGSI)	T1, Ch. 17.5, pg(225-242)	BB/LCD
13	OGSA Services, Web Services Resource Framework(WSRF) – Introduction, WSRF and OGSI/GT3, WSRF and OGSA	T1, Ch. 17.6, pg(242-245) R2, Ch. 2.7, Pg(60-70)	BB/LCD
14	Resource management on the grid- Requirements, A generalized resource management framework	T1, Ch. 18, pg(260-274)	BB/LCD
15	Grid resource management systems- Service Negotiation and Acquisition Protocol	T1, Ch. 18, pg(274-282)	BB/LCD
16	Building Reliable Services - Principles of Reliable Systems- Layers of Grid Computing- Reliable output	T1, Ch. 19.1, pg(285-287) T1, Ch. 19.4, pg(307-315)	BB/LCD
17	Grid Monitoring, Sensors and Sensor Management	T1, Ch. 20.1, pg(319-326) T1, Ch. 20.3, pg(333-336)	BB/LCD
18	Grid Security - Grid security requirements, Emerging security technologies	T1, Ch. 21.1, pg(353-365) T1, Ch. 21.2, pg(365-374)	BB/LCD
19	WS-Security, GSI- An OGSA Security Reference Implementation	T1, Ch. 21.3, pg(371-381) T1, Ch. 21.4, pg(381-386)	BB/LCD

Content beyond syllabus covered (if any):

* Session duration: 50 mins



Sub. Code / Sub. Name: IT16009 Grid Computing

Unit : III

Unit Syllabus:

UNIT III DATA AND KNOWLEDGE GRID

Data Source – Collective Data Services - Data Management – Collective Data Management – Federation Services – Representing Knowledge – Processing Knowledge - Knowledge Oriented Grid.

Objective:

To understand various techniques to enhance the performance and scalability of data management and knowledge oriented grids.

Session No *	Topics to be covered	Ref	Teaching Aids
20	Data Management challenges-Data Sources, Data discovery movement and Replication, Data analysis and processing, Architectural approaches	T1, Ch. 22.3, Pg(400-405)	BB/LCD
21	Collective Data Source Services- Data Access-GridFTP as a File Access Service, Data Access and Integration. Managing Data sources- NeST, Storage Resource Managers	T1, Ch. 22.5, Pg(405-413)	BB/LCD
22	Collective Data Management Services- Data Transport Services, General Data Discovery Services, Workflow Management, Planning and Scheduling	T1, Ch. 22.6, Pg(413-417)	BB/LCD
23	Federation Services- Data Mediation, Replication Services for Location Transparency, Consistency Services	T1, Ch. 22.7, Pg(417-424)	BB/LCD
24	Knowledge for and on the grid- Knowledge in context, Definition of terms, Making knowledge explicit	T1, Ch. 23.2, Pg(432-437)	BB/LCD
25	Architectures for Knowledge-Oriented Grids, Representing Knowledge	T1, Ch. 23.3, Pg(438-440) T1, Ch. 23.4, Pg(440-442)	BB/LCD
26	Processing Knowledge- A semantic web for E-Science, Annotating resources with Metadata, Representing Ontologies	T1, Ch. 23.5, Pg(442-445)	BB/LCD
27	Knowledge Oriented Grids, - Knowledge Oriented Grid Case Studies- Service Discovery, Knowledge annotation , advice and guidance, Workflow composition	T1, Ch. 23.6, Pg(445-448) T1, Ch. 23.7, Pg(448-453)	BB/LCD
28	Knowledge Oriented Grid Case Studies- Data Integration and Collaborative Science	T1, Ch. 23.7, Pg(453-457)	BB/LCD

Content beyond syllabus covered (if any): CASE STUDY: The Earth System Grid

* Session duration: 50 mins



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Unit : IV

Unit Syllabus:

UNIT IV GRID MIDDLEWARE

List of Globally Available Toolkits – GT3 – Architecture Details – Grid Service Container – OGSi Implementation – Security Infrastructure - System Level Services – Hosting Environments Programming

Objective:

To understand the components of Globus Toolkit 3 Architecture and Security Infrastructures for the Grid.

Session No *	Topics to be covered	Ref	Teaching Aids
29	List of Globally Available Toolkits-GT3 Introduction	R3, Ch. 8.3, Pg(222-225) Internet	BB/LCD
30	GT3 Architecture Details- Grid Service Container - System Level Services	R4, Ch. 2.5, Pg(42-43) Internet	BB/LCD
31	Grid Service Container – Base Services-User Defined Services	R4, Ch. 2.5, Pg(43-50) Internet	BB/LCD
32	OGSI Implementation – Service locator –GridService portTypes –Factory portTypes -Notification portTypes	R4, Ch. 2.5, Pg(50-58) Internet	BB/LCD
33	OGSI Implementation – Service Group portTypes –Handle Resolver portTypes	R4, Ch. 2.5, Pg(50-58) Internet	BB/LCD
34	Security Infrastructure – TLS/SSL - SOAP Layer Security	R4, Ch. 2.5, Pg(43-44) Internet	BB/LCD
35	System Level Services –Administration Service-Logging Service-Management Service	R4, Ch. 2.5, Pg(44-45) Internet	BB/LCD
36	Hosting Environments Programming-Virtual Hosting Environments: Embedded-Standalone	Internet	BB/LCD
37	Hosting Environments Programming- Virtual Hosting Environments:Servlet-EJB	Internet	BB/LCD

Content beyond syllabus covered (if any):

* Session duration: 50 mins



Sub. Code / Sub. Name: IT16009 Grid Computing

Unit : V

Unit Syllabus:

UNIT V APPLICATIONS

Scientific – Medical – Bioinformatics – Federated Computing – ERM – Multiplayer Games - Collaborative Science – Grid Computing for SAS, Case Study.

Objective:

To nurture the students to apply Grid Technology for the market scenarios.

Session No *	Topics to be covered	Ref	Teaching Aids
38	Scientific Data Federation: The World-Wide Telescope – Hierarchical Architecture, Virtual Observatory and the Grid, Outreach using Virtual Observatory	T1, Ch. 7, Pg(91-108)	BB/LCD
39	Medical Data Federation: The biomedical Informatics Research Network- BIRN Test beds, BIRN Grid, Information Mediation	T1, Ch. 8, Pg(109-119)	BB/LCD
40	Bioinformatics- Motivation: Bioinformatics in Silico Experiments, Grid Architecture and Technologies	T1, Ch. 9, Pg(121-133)	BB/LCD
41	Federated Computing for High Energy Physics – Implementation, The Production Run	T1, Ch. 10, Pg(135-144)	BB/LCD
42	Enterprise Resource Management(ERM) – GlobeXplorer: Digital Image Ingest and analysis, University of Houston Campus Grid, White Rose Grid. Multiplayer Games-Design of the Butterfly Grid, The Globus toolkit and the Butterfly Grid	T1, Ch. 12, Pg(157-165) T1, Ch. 13, Pg(167-171)	BB/LCD
43	Collaborative Science: Astrophysics Requirements and Experiences- Numerical Relativity- Cactus: An application framework for the grid, Resource sharing and interacting with grid jobs, distributed computing and Data management	T1, Ch. 16, Pg(201-210)	BB/LCD
44	Grid Computing for SAS – Planning, Configuring and Managing Grid Environment,	R5, Ch. 1, Pg(03-08) R5, Ch. 3, Pg(11-33)	BB/LCD
45	Enabling SAS Applications to run on Grid, Case Study-SASGSUB	R5, Ch. 5, Pg(37-53) R5, Ch. 5, Pg(83-97)	BB/LCD
Content beyond syllabus covered (if any): Service Virtualization: Infrastructure and Applications			

* Session duration: 50 mins





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TEXT BOOK:

1. Ian Foster, Carl Kesselman, "The Grid 2: Blueprint for a New Computing Infrastructure", Elsevier Series, Second edition, 2006.

REFERENCES:

2. Srikumar Venugopal, Krishna Nadiminti, Hussein Gibbins and Rajkumar Buyya, "Designing a Resource Broker for Heterogeneous Grids, Software: Practice and Experience", Wiley Press, New York, USA, 2008.
3. Fran Berman, Geoffrey Fox, Anthony J.G. Hey, "Grid Computing: Making the Global Infrastructure a Reality", Wiley, 2003.
4. Maozhen Li, Mark Baker, "The Grid: Core Technologies", Wiley, 2005.
5. SAS Documentation, Grid Computing in SAS 9.3 second edition, 2012.

	Prepared by	Approved by
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Date	03.12.2019	03.12.2019
Remarks *:		
Remarks *:		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD