ITA6009	Cloud Computing	L	T	P	J	C
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Pre-requisite	**ITA5003**	**Syllabus version**				
		v. 1.0				

Course Objectives:

1. To learn recent computing paradigms
2. To introduce the concept of Virtualization and the secured cloud environment
3. To understand the concepts and programming models in parallel and distributed computing environment.
4. To set up a own cloud computing environment and provide various services to the users.

Expected Course Outcomes:

1. Explore the various service and deployment models in cloud computing
2. An ability to create VM, migrate and provide QOS to the committed users.
3. Analyze the core architectural concepts for scheduling the resource and job in Inter cloud computing to support scalability and fault tolerance.
4. Develop programs and implement for the parallel and distributed computing environment.
5. Explore the possible ways for providing secured cloud environment.
6. An ability to use tool and techniques for processing a large scale of data in high performance computing environment.
7. An ability to select the appropriate tools, open source cloud and APIs to set up a own cloud.
8. Design, implement and evaluate a cloud-based system, process, component, or program to meet desired needs.

Student Learning Outcomes (SLO)	**2,14, 17**

Module:1	**Introduction**	**6 hours**

Cloud models-Evolution of Cloud Computing –System Models for Distributed and Cloud Computing – NIST Cloud Computing Reference Architecture – On-demand Provisioning – Elasticity in Cloud – deployment models – service models-cloud service providers

Module:2	**Virtualization**	**6 hours**

Basics of Virtualization - Types of Virtualization - Implementation Levels of Virtualization - Virtualization Structures - Tools and Mechanisms – resource sharing and resource pooling - Desktop Virtualization – Server Virtualization.

Module:3	**Cloud Infrastructure**	**6 hours**

Architectural Design of Compute and Storage Clouds – Layered Cloud Architecture Development – Design Challenges - Inter Cloud Resource Management – Resource Provisioning and Platform Deployment – Global Exchange of Cloud Resources.

Module:4	**Programming Model**	**6 hours**

Parallel and Distributed Programming Paradigms – Map Reduce, Twister and Iterative Map

Reduce – Hadoop Library from Apache – Mapping Applications - Programming Support.		
Module:5	**Security in the Cloud**	**6 hours**
Security Overview – Cloud Security Challenges – Access control mechanisms – Security Governance – Risk Management – Security Monitoring – Security Architecture Design – Virtual Machine Security.		
Module:6	**Enterprise Cloud-Based High Performance Computing (HPC)**	**7 hours**
Overview of High Performance Computing (HPC) on Cloud-Enterprises HPC applications (high-performance grid computing, high-performance big data computing/analytics, high performance reasoning)-HPC Cloud vendor solutions: compute grids (Windows HPC, Hadoop, Platform Symphony ,Gridgain), data grids (Oracle coherence, IBM Object grid, Cassendra, HBase, Memcached, HPChardware (GPGPU, SSD, Infiniband, Non-blocking switches)		
Module:7	**Setting up own Cloud**	**6 hours**
cloud setup-How to build private cloud using open source tools-Understanding various cloud plugins-Setting up your own cloud environment-Autoprovisioning-Custom images-Integrating tools like Nagio-Integration of Public and Private cloud.		
Module:8	**Contemporary issues**	**2 hours**
Expert Talk		
	Total Lecture hours:	**45 hours**

Text Book

1.	Kai Hwang, Geoffrey C Fox, Jack G Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, 2012, 1st Edition, Morgan Kaufmann Publishers.

Reference Books

1.	Katarina Stanoevska-Slabeva, Thomas Wozniak, SantiRistol, Grid and Cloud Computing – A Business Perspective on Technology and Applications, 2010, Springer.
2.	John W.Rittinghouse and James F.Ransome, Cloud Computing: Implementation, Management, and Security", 2010, CRC Press.
3.	Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach, 2009, TMH.
4.	George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud O'Reilly, 2009.

Recommended by Board of Studies	05-03-2016		
Approved by Academic Council	40th	Date	18-03-2016