Birla Institute of Technology & Science, Pilani
Hyderabad Campus

INSTRUCTION DIVISION
FIRST SEMESTER 2016-2017
Course Handout Part II

Date: 01-08-2016

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : CS G527
Course Title : *Cloud Computing*
Instructor-in-Charge : Dr. Digambar Powar

Scope and Objective of the Course:
The primary objective of the course is to introduce the student to cloud computing from architectural and design perspectives. As such the emphasis of the course would be on the underlying infrastructure and architecture of clouds, techniques for enabling services and the quality of such services, as well as issues in designing clouds. Specific research issues in performance, security, and management would also be addressed. Programming on the cloud would be encouraged but not taught in class. Students are expected to learn and understand tools and techniques for using, designing, and implementing clouds and services via assignments and a term projects.

Textbooks:
1. Dinkar Sitaram and Geetha Manjunath. Moving to the Cloud. Syngress (Elsevier) Pub, 2011
2. Rajkumar Buyya, James Broburg & anderzej M.G, Cloud Computing – Principles and Paradigms. John Wiley Pub, 2011

Reference books
1. Rajkumar Buyya, Christian Vecchiola and S.Thamarai Selvi, "Mastering Cloud Computing", Mc Graw Hill Education, First edition, 2013.
2. Arshdeep Bahga and Vijay Madisetti, "Cloud Computing: A Hands-on Approach", Universities press (India), 2014.
3. Cloud security, a comprehensive guide to secure cloud computing, by Ronald L.Krutz et al, Wiley Publishers, 2010

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
01,02	To understand the motivation for Cloud Computing	Introduction to the course. Cloud and related technology. Networked and Distributed Computing – Models	T1 Ch 1. R1 Ch 1. Lecture slides

03-05	To understand the underlying (distributed) computing model	Computing Paradigms: Parallel computing, Supercomputing, etc., Distributed computing: Clusters, Grids. Introduction to Cloud Computing – Origins and Motivation. 3-4-5 rule of cloud computing	T1 Ch 1. T1 Ch 2. R1 Ch 2. Lecture slides
06	To understand cloud delivery model and deployment models. To understand how to architect a cloud to suit different requirements	Types of Clouds and Services Cloud Infrastructure and Deployment	T1 Ch 1. T2. Ch 1. T2. Ch 6. Lecture slides
07,08	To understand virtualization techniques at different levels of abstraction. To understand how to leverage and provision computing resources at different levels of abstraction	Introduction to Virtualization, types of Virtualization, practical aspects of Virtualization. Uses & Demerits of Virtualization. x86 Hardware Virtualization Who manages the resources for the SaaS, PaaS and IaaS models	T1 Ch 9. R1 Ch 3. Lecture slides
09,10	To understand the execution of applications on the cloud. To understand how to develop & deploy applications for the cloud and the relevant tools & technologies	Introduction to SaaS Pros and Cons of SaaS model Applications of SaaS, Traditional packaged Software Vs SaaS Examples of SaaS Case study	T1 Ch 4. T2 Ch 9. R1 Ch 10. Lecture slides
11-14	To understand how to deliver computing Infrastructure (e.g. processors, storage, network) as a Services	Introduction to IaaS IaaS examples Introduction to Amazon cloud services, Reference Model of AWS, AWS demo.	T1 Ch 2. Lecture slides
15,16	To understand cloud storage services	AWS Storage Services, AWS Database Services, AWS S3 demo.	T1 Ch 2. Lecture slides
17-19	To understand virtual machine provisioning and migrations techniques	Virtual Machine Provisioning and Manageability VM Provisioning Process VIRTUAL MACHINE MIGRATION SERVICES, Migrations Techniques VM Provisioning and Migration in action VM Life Cycle and VM Monitoring	T2 Ch 5
20,21	To understand how to architect a cloud to suit different requirements	Private Cloud Computing deployment (Eucalyptus) Eucalyptus architecture, Eucalyptus components	T2 Ch 5 www.eucalyptus.com

22,23	To understand platform as a service solutions in cloud	Introduction to PaaS PaaS examples Introduction Windows Azure, Drupal, Wolf Frameworks and Force.com PaaS	T1 Ch 3. Lecture slides
24,25	-do-	5 Principles of UI Design - AWS PaaS Introduction google app engine Google app engine demo	T1 Ch 3. Lecture slides
26,27	-do-	Hadoop components and importance of MapReduce Understanding MapReduce various logical steps. Exploring the word count java program in detail Summary of MapReduce facts	T1 Ch 3. T1 Ch 5. T2 Ch 14. Lecture slides
28,29	To understand cloud file system	Introduction to file system Distributed File System (DFS) Case study: GFS, HDFS MapReduce using HDFS	T1 Ch 3. T1 Ch 6. Lecture slides
30,31	To understand storage as a service using RAID levels.	Storage as Service (RAID) RAID 0, RAID 1, RAID 0/1, RAID 1/0, RAID 3, RAID 5, and RAID 6	Lecture slides
32,33	To understand multi-tenancy in cloud	Multi-Tenancy, 4 levels of multi tenancy Resource sharing, Data customization Multi-tenant models for cloud services	T1 Ch 6. Lecture slides
34,35	To understand cloud security issues and threat models	Introduction network security Introduction to cloud security Cloud security Issues, Cloud security threat Model, Top 5 cloud security threats	T1 Ch 7. T2 Ch 23. Lecture slides
36,37	To understand Service License Agreements (SLAs) in the cloud	Service License Agreements: Lifecycle and Management TRADITIONAL APPROACHES TO SLO MANAGEMENT –TYPES OF SLA's –LIFE CYCLE OF SLA, SLA MANAGEMENT IN CLOUD, AUTOMATED POLICY-BASED MANAGEMENT, Managing Clo	T1 Ch 8 T2 Ch 16 Lecture slides
38-40	To understand cloud databases	Cloud databases, NoSQL, Key/value stores (Azure tables) Column family stores Document stores (MongoDB) Graph databases	Lecture slides
41,42	To deploy a private using OpenStack or Eucalyptus	Private cloud deployment – OpenStack or Eucalyptus	https://www.openstack.org/ www.eucalyptus.com

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Test I	60min	15	9/9, 10.00--11 AM	Closed Book
Test II	60min	15	24/10, 10.00--11 AM	Closed Book
Assignments (Practical projects)	--	25		Open Book
Research-oriented activities (Seminars/ Presentations/ Research Summaries)	--	15		Open Book
Comprehensive	180min	30	03/12 FN	Closed Book

Chamber Consultation Hour: **To be announced in the class**

Notices: Notices regarding the course will be put up on the CSIS notice board and CMS

Make-up Policy: No makeup exam allowed without prior permission.

INSTRUCTOR-IN-CHARGE