

Subject Code : 2CS2010206	Subject Title: CLOUD COMPUTING
Pre-requisite :	-Basic knowledge of Computer Networks and Network protocol suits -Understanding of process and thread management

Course Objective:

The objectives of the course are :

- To provide an understanding of the basic concepts of parallel and distributed computing and their role in Cloud Computing.
- To study the concept of Virtualization and relevant technologies available in the market
- To understand the importance of Cloud computing for higher throughput
- To make aware about availability of various Cloud platforms
- To study different application of Cloud and Cloud management techniques

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory		Practical		Total
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	-	3	6	60	40	30	20	150

Subject Contents				
Sr. No	Topic	Total Hours	Weight (%)	
1	Overview of Distributed Computing: Computing, Traditional Utilities, Creation of the Internet, computing Paradigm Trends, Computing Paradigm Evolution, cloud computing: A New Paradigm, Differences and Similarities Among different types of computing. Introduction to Cloud Computing: Definition, Central Ideas Behind Cloud Computing, Properties and Characteristics of Cloud Computing, Benefits of Cloud Computing, Cloud Service and Deployment Models, Organizational Scenario of Cloud: Cloud Deployment Model, Cloud Architecture, Cloud Vocabulary, Challenges with Cloud Computing, Cloud Supporting Services, Management and Administration of Cloud Services.	8	15	
2	Virtualization Techniques: Virtualization Technology, Overview of X86 Virtualization, Types of virtualization, Virtualization products, Concept of VLAN and Benefits, Concept of SAN and Benefits, VM Migration, VM Consolidation and Management, Cloud Interoperability Standards. SLA with Cloud Service Providers: The concept of SLA, SLA Aspects and Requirements, Service Availability, Cloud Outages, Credit calculation for SLA Breaches, Sample SLA for Amazon, Rack space, Google, HP etc.	8	15	
3	Risk, Consequences and costs for cloud computing: Introducing Risks in cloud computing, Risk Assessment and Management, Risk of vendor lock-in, loss of control, not meeting regulatory compliance, resource scarcity or poor provisioning, Multi-tenant Environment, failure, supply chain, Inadequate SLA, malware and Internet attack, Management of Cloud Resources, Network Outage, Physical Infrastructure, Legal Risks due to Legislation, Risk with Software and Application Licensing, Security and compliance requirements for public cloud, Calculating total cost of ownership (TCO) for cloud computing, direct and indirect Cloud costs, Cost allocation in the cloud, Chargeback model for Allocation of Direct and indirect costs, Chargeback Methodology, cost, Billable Items, Atomic Unit, Pricing Model, Chargeback tools and solutions, maintaining Strategic Flexibility in a cloud.	8	15	
4	Application Architecture for cloud: Cloud Application Requirement, Architecture for Traditional versus Cloud Applications, Assumptions for Traditional and Cloud Applications, Recommendation for cloud Application Architecture, Fundamental Requirements for cloud application Architecture, Relevance and Use of Client-server Architecture for cloud Applications, Addressing Cloud Application Performance and Scalability, Service Oriented Architecture(SOA) for cloud Applications	8	15	

5	Introduction to Google App Engine: The Runtime Environment, The Static file servers, The Data store, The Services, Google Accounts, Task Queues and cron jobs, Developer tools, Administration console Creating an Application: Setting the SDK, Developing an application, Registering the application, deploying the Application, Uploading the Application. Handling Web Requests: The App Engine Architecture, Configuring the Frontend , How App Runs, Quotas and Limits	1 0	20
6	Data Store Entities: Entities, keys and Properties, Data Store API, Property values, Keys and Key Objects, Using Entities, Persistence API : Setting Up JPA , Entities and Keys , Entity Properties , Embedded Objects , Saving, Fetching, and Deleting Objects , Transactions in JPA , Queries and JPQL Relationships	1 0	20

Course Outcome:

At the end of this course, the student would be able to

- Understand the principals of Cloud computing
- Understand the concepts of virtualization
- Gain an exposure about Google App Engine for Java.
- Develop Web apps using Google App Engine Cloud PaaS.
- Aware about various services provided by Cloud Computing (SaaS, IaaS, HaaS etc...)
- Gain an exposure about various Cloud platforms available in the IT market

List of References:

1. Rishabh Sharma: Cloud Computing Fundamentals, Industry Approach and Trends: Wiley Publication.(ISBN: 978-81-265-5306-8)
2. Kailash Jayaswal, Jagannath Kallakurchi, Donald J Houde, Dr. Deven Shah : Cloud Computing :Black Book Dreamtech Publications(ISBN 978-93-5119-418-7)
3. Dan Sanderson: Programming Google App Engine: O'Reilly| Google Press: (ISBN-978-0-596-52272-8)
4. Cloud Computing: A practical approach by Anthony T. Vette – Tata McGraw Hill Education Private Limited (2009)
5. Rajkumar Buyya, Christian Vechhiola, S.Thamarai Selvi, "Mastering Cloud Computing ", McGraw Hill Education (India) Private Limited.

List of Experiments:

Note: The experiment list provided beneath is for reference only. The course teacher may Change/formulate it as per his/her methodology and requirement.

1. Develop a hello world program web application and deploy it on the Google app engine.
2. Develop a web application which displays the current date and time in a formatted way.
3. Develop a web application which is customized version of the practical no 2, which relates the clock with Google accounts. Each user will get different view based on the preferences and the user's time zone.
4. Develop a web application for task management. Create a form to enter summary, URL and description of task and a button to insert a task in the task list. Use JPA (Java Persistence API) for the persistence and Sends the selected to do to yourself via email as a reminder
5. Develop a simple Java web application for Google App Engine--a guestbook that lets users post messages to a public message board.
6. Create a book class as entity and make the object persistence using JPA. Demonstrate the saving, fetching and deleting objects operations.
7. Create an employee class as entity and makes the objects persistence using JPA. Demonstrate transaction processing in the data store using JPA.
8. JPA includes a SQL-like query language called JPQL, perform the practical no 6 with JPQL also.
9. Perform the practical no 7 with JPQL[list the employees having salary between a particular range]

Note: Internet connection is required for each practical except practical 1 and practical 2