UNIVERSITY OF MADRAS
MASTER OF COMPUTER APPLICATIONS (MCA) DEGREE PROGRAMME
SYLLABUS WITH EFFECT FROM 2023-2024

Title of the Paper	**Cloud Computing**		
Elective -V Theory	II Year & III Semester	Credit:3	535E3C

Objectives:

To introduce the cloud computing concepts and map reduce programming model.

To provide skills and knowledge about operations and management in cloud technologies so as to implement large scale systems.

To provide skills to design suitable cloud infrastructure that meets the business services and customer needs.

To provide Knowledge of different CPU, memory and I/O virtualization techniques that serve in offering software, computation and storage services on the cloud; Software Defined Networks (SDN) and Software Defined Storage (SDS); cloud storage technologies and relevant distributed file systems, NoSQL databases and object storage;

To introduce the variety of programming models and develop working experience in several of them.

Outcomes:

Understand the evolution, principles, and benefits of Cloud Computing in order to assess existing cloud infrastructures to choose an appropriate architecture that meets business needs.

Decide a suitable model to capture the business needs by interpreting different service delivery and deployment models.

Understand virtualization foundations to cater the needs of elasticity, portability and resilience by cloud service providers.

Infer architectural style, work flow of real-world applications and to implement the cloud applications using map reduce programming models.

Compare operation and economic models of various trending cloud platforms prevailing in IT industry.

Unit I: Foundations of cloud: Inception and need for cloud computing: Motivations from distributed computing predecessors - Evolution - Characteristics - Business Benefits – Challenges in cloud computing - Exploring the Cloud Computing Stack - Fundamental Cloud Architectures – Advanced Cloud Architectures - Specialized Cloud Architectures.

Unit II: Service Delivery and Deployment Models: Service Models (XaaS): Infrastructure as a Service (IaaS) - Platform as a Service (PaaS) - Software as a Service(SaaS) - Deployment

Models: Types of cloud - Public cloud - Private cloud - Hybrid cloud – Service level agreements - Types of SLA – Lifecycle of SLA- SLA Management

Unit III: Cloud Resource Virtualization: Virtualization as Foundation of Cloud – Understanding Hypervisors – Understanding Machine Image and Instances - Managing Instances – Virtual Machine Provisioning and Service Migrations Cloud Computing Applications and Paradigms: Existing Cloud Applications and Opportunities for New Applications - Architectural Styles for Cloud Applications - Workflows: Coordination of Multiple Activities - Coordination Based on a State Machine Model: The ZooKeeper - The MapReduce Programming Model - A Case Study: The Grep The Web Application

Unit IV: Resource Management and Scheduling in Cloud: Policies and Mechanisms for Resource Management – Stability of a Two-Level Resource Allocation Architecture-Feedback Control Based on Dynamic Thresholds - Coordination of Specialized Autonomic Performance Managers - A Utility-Based Model for Cloud-Based Web Services - Resource Bundling: Combinatorial Auctions for Cloud Resources – Scheduling Algorithms for Computing Clouds - Resource Management and Dynamic Application Scaling

Unit V: Cloud Platforms and Application Development: Comparing Amazon web services, Google AppEngine, Microsoft Azure from the perspective of architecture (Compute, Storage Communication) services and cost models. Cloud application development using third party APIs, Working with EC2 API – Google App Engine API - Facebook API, Twitter API. Advances is Cloud: Media Clouds - Security Clouds - Computing Clouds - Mobile Clouds – Federated Clouds – Hybrid Clouds

Recommended Texts:

1. Rajkumar Buyya, James Broberg, Andrzej, M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley, 1st Edition, 2013.

2. Sosinsk, Barrie, Cloud Computing Bible, John Wiley & Sons, 1st Edition, 2011.

Reference Books:

1. Marinescu, Dan C. Cloud Computing: Theory and Practice. Morgan Kaufmann, 2017.

2. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, Mc Graw Hill Education, 1st Edition, 2017.

3. Buyya, Rajkumar, Christian Vecchiola, and S. Thamarai Selvi. Mastering Cloud Computing: Foundations and Applications Programming, Tata Mcgraw Hill, 1st Edition, 2017.

Web References:
1. https://www.youtube.com/watch?v=-8O32k26RWA

Course Outcomes

On the successful completion of the course, students will be able to

CO1	Benefits of Cloud Computing in order to assess existing cloud infrastructures to choose an appropriate architecture that meets business needs.	K1-K6
CO2	Suitable model to capture the business needs by interpreting different service delivery.	K1-K6
CO3	Virtualization as Foundation of Cloud.	K1-K6
CO4	Resource Management and Scheduling in Cloud.	K1-K6
CO5	Cloud Platforms and Application Development: Comparing Amazon web services.	K1-K6

K1- Remember, K2- Understand, K3- Apply, K4- Analyze, K5 Evaluate, K6- Create

Mapping with Programme Outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	S	S	M	M	S	M	L	L	S	L
CO2	S	M	S	M	S	L	M	L	M	L
CO3	M	S	M	S	M	S	L	L	L	M
CO4	S	L	M	S	S	L	L	M	M	S
CO5	S	S	M	S	L	M	M	L	M	L

S- Strong; M-Medium; L-Low