INT363:CLOUD MICROSERVICES

L:2 T:0 P:2 Credits:3

Course Outcomes: Through this course students should be able to

CO1 :: learn the main concepts of cloud, its characteristics, advantages, key technologies and its various delivery and deployment models

CO2 :: explore how microservices differ from monolithic architectures

CO3 :: describe the role of containers and orchestration in deploying microservices

CO4 :: assess the economic impact of adopting microservices on cloud infrastructure and operational costs.

CO5 :: build a simple microservice using a cloud-native approach

CO6 :: analyze the issue of cloud such as security, energy efficiency and interoperability, and provide an insight into future prospects of computing in the cloud monitoring

Unit I

Cloud Computing Fundamentals- : Cloud Fundamentals, Cloud Service Components, Cloud Service, Deployment Models, Guiding principle with respect to utilization, SOA, Design and Implementation of Public and Private Cloud Environments Open Stack and AWS., Applications of Cloud Computing

Unit II

Evolution of Cloud Microservices : Application Architectures-Monolithic & Distributed, Microservice Fundamentals, Microservices Architecture, Domain-driven design (DDD) principles, Service boundaries and API gateway.

Unit III

Deploying Microservices : Containerization with Docker, Docker file and container image creation, Container orchestration, Overview of Kubernetes and its architecture, Deploying microservices, Continuous Integration (CI) principles

Unit IV

Economic Benefits of Microservices : Scalability advantages and cost implications, pricing models of major cloud providers (AWS, Azure, Google Cloud), compute, storage, network, and data transfer costs, cost monitoring and optimization tools.

Unit V

Cloud-Native Development : cloud-native architecture, loosely coupled services, Service Discovery, Load Balancing,Autoscaling,Data Management, the twelve-factor app methodology, serverless architectures, Case studies on Netflix, Amazon, Uber, etc.

Unit VI

Cloud Security : Security Issues in Cloud Computing, Shared Responsibility Architecture, Security by Design Principles Identity and Access Management, Cloud Security Layers Illustration, Cloud Network, Host and Data Security Concepts, Security Operations and Major Cloud Service Provider Tools, Security Compliance and Regulations, Interoperability Challenges, Monitoring and Performance Management, Future Trends and Innovations - Edge computing and AI

List of Practicals / Experiments:

List of practicals

- •Hands-on installation and configuration of essential tools for microservices
- •Spring Boot with Docker
- •Building a single master cluster
- •Pods with kubectl Commands
- •Compare Pricing Model (AWS, GCP, Azure).
- •Scaling, logging and monitoring
- •Building a secure Kubernetes Stack
- •Deploying a microservice based application

- •Understanding Unified Access Control: Identity and Access Management SSO.
- •Security implementation for microservices

Text Books:

1. MASTERING CLOUD-NATIVE MICROSERVICES by CHETAN WALIA, BPB PUBLICATIONS

References:

1. BUILDING MICROSERVICES by SAM NEWMAN, O'REILLY