Lab Exercise 1: Traditional Software vs Cloud Based Software

Cloud Platform: AWS

Step 1: Set up an AWS account and create a virtual machine instance.

Step 2: Install and configure a traditional software development environment on the virtual machine.

Step 3: Compare the development process and deployment options with cloud-based software development.

Step 4: Discuss the advantages and disadvantages of each approach.

Lab Exercise 2: Understanding Cloud Ecosystem (SaaS and PaaS)

Cloud Platform: Microsoft Azure

Step 1: Create an Azure account and explore the SaaS (Software as a Service) offerings.

Step 2: Deploy a SaaS application, such as Office 365 or Salesforce.

Step 3: Explore the PaaS (Platform as a Service) offerings and deploy a sample application using Azure App Service.

Step 4: Discuss the benefits and use cases of SaaS and PaaS.

Lab Exercise 3: Public vs Private Cloud Apps

Cloud Platform: Google Cloud Platform (GCP)

Step 1: Create a project in GCP and set up a public cloud environment.

Step 2: Deploy a sample application to the public cloud.

Step 3: Set up a private cloud environment using GCP's Anthos or a similar solution.

Step 4: Deploy the same application to the private cloud and compare the differences.

Lab Exercise 4: Building Scalable and Resilient Applications

Cloud Platform: AWS

Step 1: Create an AWS Elastic Load Balancer and configure it to distribute traffic to multiple instances.

Step 2: Set up auto-scaling groups to automatically add or remove instances based on demand.

Step 3: Deploy a sample application and test its scalability and resilience.

Step 4: Discuss the importance of fault tolerance and high availability in cloud applications.

Lab Exercise 5: Implementing Microservices

Cloud Platform: Docker and Kubernetes

Step 1: Set up a Docker environment and containerize microservices.

Step 2: Deploy a Kubernetes cluster and configure it to manage the microservices.

Step 3: Establish communication between client applications and microservices using Kubernetes services.

Step 4: Explore different microservices hosting platform options, such as AWS ECS or Google Kubernetes Engine.

Lab Exercise 6: Introduction to APIs

Cloud Platform: Amazon API Gateway

Step 1: Learn about the API economy and its impact on the public sector.

Step 2: Define an API strategy and design an API architecture.

Step 3: Develop APIs considering standards and best practices.

Step 4: Use Amazon API Gateway to create and manage APIs in the public cloud.

Lab Exercise 7: API Security

Cloud Platform: Azure API Management

Step 1: Implement request-based security for APIs, including authentication and authorization mechanisms.

Step 2: Explore Azure API Management and configure it to secure and manage APIs.

Step 3: Test the API security measures and discuss their importance in protecting sensitive data.

Lab Exercise 8: DevOps CI/CD Pipeline

Cloud Platform: GitHub CI/CD

Step 1: Set up a GitHub repository and configure a CI/CD pipeline for cloud applications.

Step 2: Define stages for build, test, and deployment processes.

Step 3: Integrate version control, build automation, and deployment to a cloud platform.

Step 4: Discuss the benefits of an automated CI/CD pipeline in cloud application development.

Lab Exercise 9: Infrastructure as Code (IaC) and Configuration Management

Cloud Platform: AWS CloudFormation

Step 1: Learn about Infrastructure as Code (IaC) concepts and its advantages.

Step 2: Use AWS CloudFormation to define and provision cloud resources.

Step 3: Practice configuration management to ensure consistent deployments.

Step 4: Discuss the benefits of IaC and configuration management in cloud environments.

Lab Exercise 10: Application Development Frameworks

Cloud Platform: Heroku

Step 1: Explore different cloud application development platforms, such as Heroku.

Step 2: Choose an application development framework and set up a project.

Step 3: Develop a sample application using the MVC architectural pattern.

Step 4: Test and deploy the application to the chosen cloud platform.

Step 5: Discuss framework selection considerations and best practices for cloud application development.