

Microservices with Java, Docker and Kubernetes

Course outline

Module 1: Introduction to Microservices

Module 1: Introduction to Microservices is an introductory course designed to provide an overview of the fundamentals of microservices architecture and its implementation with Java, Docker, and Kubernetes. This module will cover topics such as the benefits of microservices, the differences between monolithic and microservices architectures, and the basics of containerization and orchestration. Additionally, this module will provide an introduction to the tools and technologies used to build and deploy microservices, such as Java, Docker, and Kubernetes.

Lessons

- What are Microservices?
- Benefits of Microservices
- Microservices Architecture
- Design Principles for Microservices
- Introduction to Java for Microservices
- Introduction to Docker for Microservices
- Introduction to Kubernetes for Microservices
- Setting up a Development Environment for Microservices
- Building and Deploying Microservices
- Testing and Debugging Microservices
- Monitoring and Logging Microservices
- Security and Authentication for Microservices
- Scaling and Performance Tuning for Microservices
- Best Practices for Microservices

After completing this module, students will be able to:

- Understand the fundamentals of microservices architecture and its benefits.
- Develop a basic understanding of the Java programming language and its use in microservices.
- Utilize Docker and Kubernetes to deploy and manage microservices.
- Create a basic microservice application using Java, Docker, and Kubernetes.

Module 2: Designing Microservices Architecture

Module 2 of the Microservices with Java, Docker and Kubernetes course focuses on designing

microservices architecture. It covers topics such as the principles of microservices, the benefits of microservices, and the challenges of designing microservices architecture. It also provides an overview of the different types of microservices architectures, such as monolithic, layered, and event-driven architectures. Finally, it provides an introduction to Docker and Kubernetes, and how they can be used to deploy and manage microservices.

Lessons

- Introduction to Microservices Architecture
- Designing Microservices with Java
- Containerization with Docker
- Orchestration with Kubernetes
- Design Patterns for Microservices
- Service Discovery and Load Balancing
- API Gateways and Service Mesh
- Security and Authentication
- Monitoring and Logging
- Deployment Strategies for Microservices

After completing this module, students will be able to:

- Understand the fundamentals of microservices architecture and its components.
- Design and develop microservices using Java, Docker, and Kubernetes.
- Deploy and manage microservices using Docker and Kubernetes.
- Monitor and troubleshoot microservices using appropriate tools.

Module 3: Building Microservices with Java

Module 3 of the Microservices with Java, Docker and Kubernetes course focuses on building microservices with Java. It covers topics such as creating a microservice architecture, designing and implementing RESTful APIs, and deploying microservices to a Kubernetes cluster. Additionally, the module provides hands-on experience with Docker and Kubernetes, as well as best practices for developing and deploying microservices.

Lessons

- Introduction to Microservices Architecture
- Designing Microservices with Java
- Developing Microservices with Java
- Testing Microservices with Java
- Deploying Microservices with Docker and Kubernetes
- Managing Microservices with Kubernetes
- Securing Microservices with Java
- Monitoring Microservices with Java
- Troubleshooting Microservices with Java
- Optimizing Microservices with Java

After completing this module, students will be able to:

- Understand the fundamentals of microservices architecture and its benefits
- Develop and deploy microservices using Java, Docker, and Kubernetes
- Utilize best practices for designing and building microservices
- Monitor and troubleshoot microservices using appropriate tools and techniques

Module 4: Containerizing Microservices with Docker

Module 4 of the Microservices with Java, Docker and Kubernetes course focuses on containerizing microservices with Docker. It covers topics such as creating Docker images, running Docker containers, and deploying microservices to Kubernetes. It also covers topics such as configuring and managing Docker containers, and using Docker Compose to orchestrate multiple containers.

Lessons

- Introduction to Docker and Containerization
- Setting up Docker Containers
- Building Docker Images
- Deploying Docker Containers
- Managing Docker Containers
- Networking with Docker
- Orchestrating Containers with Kubernetes
- Securing Docker Containers
- Monitoring Docker Containers
- Troubleshooting Docker Containers

After completing this module, students will be able to:

- Understand the fundamentals of Docker and its components
- Create Docker images for microservices
- Deploy and manage microservices using Docker
- Utilize Docker Compose to orchestrate multiple containers

Module 5: Deploying Microservices with Kubernetes

Module 5 of the Microservices with Java, Docker and Kubernetes course covers the fundamentals of deploying microservices with Kubernetes. It covers topics such as setting up a Kubernetes cluster, deploying applications to Kubernetes, and scaling and managing applications. Additionally, it covers topics such as monitoring and logging, and troubleshooting.

Lessons

- Introduction to Kubernetes
- Setting up a Kubernetes Cluster
- Deploying Java Microservices with Kubernetes
- Configuring Kubernetes for Java Microservices
- Scaling Java Microservices with Kubernetes
- Monitoring Java Microservices with Kubernetes

- Troubleshooting Java Microservices with Kubernetes
- Securing Java Microservices with Kubernetes
- Automating Deployment of Java Microservices with Kubernetes
- Integrating Java Microservices with Kubernetes

After completing this module, students will be able to:

- Understand the fundamentals of Kubernetes and its components
- Create and manage Kubernetes clusters
- Deploy and manage microservices on Kubernetes
- Monitor and troubleshoot microservices running on Kubernetes

Module 6: Managing Microservices with Kubernetes

Module 6 of the Microservices with Java, Docker and Kubernetes course covers the fundamentals of managing microservices with Kubernetes. It covers topics such as setting up a Kubernetes cluster, deploying and managing applications, and scaling and monitoring applications. Additionally, it covers topics such as networking, security, and troubleshooting. This module provides a comprehensive overview of the Kubernetes platform and its capabilities.

Lessons

- Introduction to Kubernetes
- Setting up a Kubernetes Cluster
- Deploying Java Applications with Kubernetes
- Managing Containers with Kubernetes
- Scaling and Updating Applications with Kubernetes
- Monitoring and Logging with Kubernetes
- Securing Kubernetes Clusters
- Troubleshooting Kubernetes Clusters
- Integrating Kubernetes with CI/CD Pipelines
- Best Practices for Managing Microservices with Kubernetes

After completing this module, students will be able to:

- Understand the fundamentals of Kubernetes and its components
- Deploy and manage microservices on Kubernetes
- Utilize Kubernetes features such as autoscaling, rolling updates, and resource management
- Monitor and troubleshoot microservices running on Kubernetes

Module 7: Monitoring and Logging Microservices

Module 7 of the Microservices with Java, Docker and Kubernetes course covers the fundamentals of monitoring and logging microservices. It covers topics such as setting up monitoring and logging tools, understanding the importance of metrics and logs, and how to use them to troubleshoot and debug microservices. Additionally, the module provides an overview of the different types of monitoring and logging tools available and how to use them to gain insights into the performance of microservices.

Lessons

- Introduction to Monitoring and Logging Microservices
- Setting up Monitoring and Logging Tools for Microservices
- Collecting and Analyzing Logs from Microservices
- Automating Logging and Monitoring with Kubernetes
- Troubleshooting Microservices with Logging and Monitoring
- Best Practices for Monitoring and Logging Microservices
- Integrating Logging and Monitoring with Java
- Using Docker for Logging and Monitoring Microservices
- Security and Compliance Considerations for Logging and Monitoring Microservices
- Advanced Logging and Monitoring Techniques for Microservices

After completing this module, students will be able to:

- Understand the importance of monitoring and logging for microservices
- Implement monitoring and logging tools for microservices
- Analyze and interpret the data collected from monitoring and logging
- Troubleshoot and debug microservices using the data collected from monitoring and logging

Module 8: Securing Microservices

Module 8: Securing Microservices is a module in the Microservices with Java, Docker and Kubernetes course that focuses on the security aspects of microservices. It covers topics such as authentication, authorization, encryption, and secure communication. It also provides an overview of the security features of Docker and Kubernetes, and how to use them to secure microservices.

Lessons

- Introduction to Security for Microservices
- Authentication and Authorization for Microservices
- Securing Communication between Microservices
- Securing Data in Microservices
- Securing Containers and Kubernetes
- Securing Java Applications for Microservices
- Implementing Security Best Practices for Microservices
- Securing APIs for Microservices
- Securing Cloud-Native Applications
- Troubleshooting Security Issues in Microservices

After completing this module, students will be able to:

- Understand the security challenges associated with microservices and how to address them.
- Implement authentication and authorization for microservices using OAuth2 and JWT.
- Secure communication between microservices using TLS/SSL.
- Deploy and configure Kubernetes security policies to secure microservices.

Module 9: Testing Microservices

Module 9 of the Microservices with Java, Docker and Kubernetes course covers the fundamentals of testing microservices. It covers topics such as unit testing, integration testing, and end-to-end testing. It also covers how to use tools such as JUnit, Mockito, and Cucumber to create automated tests. Finally, it covers how to use Docker and Kubernetes to deploy and test microservices in a production environment.

Lessons

- Introduction to Testing Microservices
- Unit Testing with JUnit
- Integration Testing with Mockito
- Automated Testing with Cucumber
- Performance Testing with JMeter
- Security Testing with OWASP ZAP
- Testing in a Containerized Environment
- Testing in a Kubernetes Environment
- Best Practices for Testing Microservices

After completing this module, students will be able to:

- Understand the fundamentals of testing microservices
- Develop automated tests for microservices
- Utilize tools such as JUnit, Mockito, and Cucumber to create tests
- Deploy and monitor microservices using Kubernetes and Docker

Module 10: Scaling Microservices

Module 10: Scaling Microservices is a module in the Microservices with Java, Docker and Kubernetes course that covers the fundamentals of scaling microservices. It covers topics such as horizontal and vertical scaling, autoscaling, and load balancing. It also provides hands-on experience with Kubernetes and Docker to help students understand how to scale their microservices.

Lessons

- Introduction to Microservices
- Designing Microservices Architecture
- Building Microservices with Java
- Containerizing Microservices with Docker
- Deploying Microservices with Kubernetes
- Scaling Microservices with Kubernetes
- Monitoring and Logging Microservices
- Securing Microservices
- Testing Microservices
- Troubleshooting Microservices

After completing this module, students will be able to:

- Understand the principles of scaling microservices
- Implement strategies for scaling microservices
- Utilize Kubernetes to deploy and manage microservices
- Monitor and troubleshoot microservices performance in a distributed environment

Module 11: Troubleshooting Microservices

Module 11: Troubleshooting Microservices is a module in the Microservices with Java, Docker and Kubernetes course that focuses on troubleshooting and debugging microservices. It covers topics such as understanding the microservices architecture, identifying and resolving common issues, and using tools such as Docker and Kubernetes to troubleshoot and debug microservices. This module provides students with the skills and knowledge needed to effectively troubleshoot and debug microservices.

Lessons

- Identifying and Resolving Common Microservices Issues
- Debugging Microservices with Java
- Troubleshooting Docker Containers
- Kubernetes Troubleshooting Strategies
- Analyzing Logs for Microservices
- Monitoring and Alerting for Microservices
- Automating Troubleshooting with Scripts
- Performance Tuning for Microservices
- Security Troubleshooting for Microservices
- Troubleshooting Microservices in Production

After completing this module, students will be able to:

- Identify and diagnose common issues in microservices architectures.
- Utilize debugging tools to troubleshoot microservices.
- Implement strategies to improve the performance of microservices.
- Develop best practices for monitoring and logging microservices.

Module 12: Integrating Microservices with APIs

Module 12 of the Microservices with Java, Docker and Kubernetes course covers the integration of microservices with APIs. It covers topics such as API design, API gateways, API security, and API testing. It also provides hands-on experience with tools such as Swagger, Postman, and Kong. This module will help students understand how to design, develop, and deploy APIs for their microservices.

Lessons

- Introduction to Microservices and APIs
- Designing and Developing Microservices with Java
- Deploying Microservices with Docker and Kubernetes

- Securing Microservices with Authentication and Authorization
- Testing and Debugging Microservices
- Integrating Microservices with RESTful APIs
- Integrating Microservices with GraphQL APIs
- Integrating Microservices with Webhooks
- Monitoring and Troubleshooting Microservices
- Optimizing Microservices Performance

After completing this module, students will be able to:

- Understand the principles of microservices architecture and how to apply them to build distributed applications.
- Design and develop microservices using Java, Docker, and Kubernetes.
- Create and deploy APIs to integrate microservices with other applications.
- Monitor and troubleshoot microservices and APIs using appropriate tools.