# Complex Systems and DevOps: Deliverable 2

Date: November 25, 2024

#### Course Details

Course Name: Complex Systems and DevOps Course Code: 62582

Semester: Fall 2024

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#### Link to GitHub Project

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#### 1. Introduction

Project Scope and Objectives

#### Problem Statement and Solution Overview

Methodology

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- 2. Domain Analysis

User Stories and Requirements

System Architecture Overview

**Technical Stack Selection** 

Security Requirements

3. Technical Foundation

Framework Selection Rationale

Development Environment Setup

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# II. Implementation and DevOps Practices

4. Backend Development

**Quarkus Framework Implementation** 

REST API Design with Siren Hypermedia

**Database Integration** 

**Business Logic Implementation** 

Security Implementation

JWT Authentication

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Testing Strategy

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**OpenAPI** Documentation

5. Frontend Development

React Application Structure

TypeScript Integration

Vite Build Tool Implementation

State Management

Component Architecture

**Security Features** 

**Token Security Implementation** 

Package Management

6. DevOps Implementation

**Version Control Practices** 

Git Workflow

GitHub Integration

 ${\bf Continuous\ Integration/Continuous\ Deployment}$ 

GitHub Actions Configuration

**Build Server Setup** 

Testing Pipeline

Containerization

**Docker Implementation** 

**Container Registry** 

## **Cloud Deployment**

#### Google Cloud Setup

### **Netlify Frontend Deployment**

Monitoring and Maintenance A key principle in DevOps is the ability to act based on metrics. To do this we use Micrometer metrics, a common monitoring facade which is vendor neutral, alike SLF4J is for logging. We use the Prometheus format as Quarkus provides a convenient library for combining these, quarkus-micrometer-registry-prometheus. To display and view these metrics we use Dashbuilder which allows easy visualization of the metric data via a YML format. Quarkus also has minimal config library for this, named quarkus-dashbuilder.

We have also looked into setting up a centralized logging system, but due to time constraints were unable to implement it in time for the writing of this report.

Another clear improvement is monitoring if our frontend server is up or overloaded.

#### 7. Conclusion

**Project Outcomes** 

**Future Improvements** 

Lessons Learned