MSc Group C

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1 Introduction

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1.1 System Depiction

1.2 Tech-Stack Overview

Table 1: Weekly overview of tech choices.

Week	Topic	Tech Choices	Section
Week 01+02	Refactoring	GoLang, Echo	**2.1 Programming Language**
Week 03	Orchestrazation	Docker	**2.2 Orchestrazation**
Week 03	Deployment	DigitalOcean	**2.3 VPS**
Week 04	CI/CD	GitHub Actions	**3.1 CI/CD**
Week 06	Database	PostgreSQL	**2.4 Database**
Week 06	Monitoring	Prometheus, Grafana	**3.2 Monitoring**
Week 07	CI Static Analysis	golangci-lint, Dependabot	**3.1 CI/CD**
Week 07	Maintainability	SonarQube, CodeClimate	**2.5 Maintainability**
Week 08	Logging	Loki, Alloy, Grafana	**3.3 Logging**
Week 09	Scalability	Docker Swarm	**3.4 Scaling**
Week 10	Security	CodeQL, ???	**3.5 Security**

2 System perspective

2.1 Database (PostgreSQL)

Our setup includes two PostgreSQL databases: one for production and one for testing. Each runs on a separate, containerized droplet, with access restricted via a firewall to ensure security and isolation between environments (see Figure 1).

PostgreSQL was to replace the SQLite setup, due to strong SQL standards compliance [1], high community adoption [2], advanced features (e.g., JSON, HStore, Security) [3], [4].

2.1.1 Choice of Technology - Database

To replace our current SQLite setup, we compared leading relational databases based on the Stack Overflow 2024 Developer Survey [2]. Only open-source, self-hosted RDBMSs were considered—excluding NoSQL and cloud services.

Table 2: Comparison of RDBMSs. **Note**: Performance benchmarks are excluded due to license restrictions placed on benchmarking by licensing of proprietary DBMSs [5].

Database	**SQLite**	**PostgreSQL**	**MySQL**	**Oracle**	**SQL Server**	**MariaDB**
Popularity	33.1% [2]	49.7% [2]	40.3% [2]	10.1% [2]	25.3% [2]	17.2% [2]
License	Public-Domain [6]	Open-Source [7]	Open-Source & Proprietary [8]	Proprietary	Proprietary [9]	Open-Source [10]
Standards Compliance [11]	Low [1]	Compliant [1]	Limited [1]	*Unknown*	*Unknown*	Fork of MySQL; Assumed limited
Max Connections	1	500,000+ [4]	100,000+ [4]	*Unknown*	*Unknown*	200,000+ [4]
Horizontal Scaling	No	Yes [4]	Yes [4]	*Unknown*	*Unknown*	Yes [4]
Concurrency Handling	None	Excellent [4]	Moderate [4]	*Unknown*	*Unknown*	Strong [4]

MySQL was ruled out due to licensing issues and development concerns post-Oracle acquisition [12], [1].

3 Process perspective

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