

MSc Group C

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1 Introduction

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 1: 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] |

| Database | SQLite | PostgreSQL | MySQL | Oracle | SQL Server | MariaDB |
|----------------------------------|---------|---------------|--------------|----------------|----------------|--------------------------------|
| Standards Compliance [11] | Low [1] | Compliant [1] | Limited [1] | <i>Unknown</i> | <i>Unknown</i> | Fork of MySQL; Assumed limited |
| Max Connections | 1 | 500,000+ [4] | 100,000+ [4] | <i>Unknown</i> | <i>Unknown</i> | 200,000+ [4] |
| Horizontal Scaling | No | Yes [4] | Yes [4] | <i>Unknown</i> | <i>Unknown</i> | Yes [4] |
| Concurrency Handling | None | Excellent [4] | Moderate [4] | <i>Unknown</i> | <i>Unknown</i> | 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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