

**Applied research document**

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**Context** :

This design document defines the architecture of WiredSpace, explains technology choices, and provides C4 Model diagrams. It ensures clarity, consistency, and a shared understanding among developers and stakeholders.

# **Research Questions and Methodology**

## **Main Question:**

How can we optimize the performance and scalability of social media APIs using different backend frameworks?

### **Subquestions:**

1. What are the strengths and weaknesses of Spring Boot vs. ExpressJS in handling high API request loads?
2. Which framework offers better database efficiency and caching mechanisms for large-scale user interactions?
3. How does the choice of backend framework affect the security and data protection of social media applications?
4. What are the long-term maintainability and ecosystem benefits of Spring Boot vs. ExpressJS for a growing social media platform?

# **Research Methods:**

# **Question 1** (Performance of Spring Boot vs. ExpressJS for High API Load Handling)

* **Research strategy:** Lab Testing
* **Reason:** Controlled experiments will be conducted to compare request latency, response times, and throughput under high load conditions.

## **Question 2** (Database Efficiency and Caching in Large-Scale Applications)

* **Research strategy:** Case Study & Benchmarking
* **Reason:** A comparative analysis of database interactions, query execution times, and caching efficiency in both frameworks will be conducted using sample datasets.

## **Question 3** (Security & Data Protection in API-Driven Social Media Platforms)

* **Research strategy:** Workshop
* **Reason:** Security experts and developers will discuss best practices for authentication, authorization, and data encryption in both frameworks.

## **Question 4** (Long-Term Maintainability and Ecosystem Strength of Backend Frameworks)

* **Research strategy:** Library Research
* **Reason:** Reviewing documentation, community support, and real-world case studies will provide insights into the maintainability of each framework over time.