**Scholarship reference**  
B-SIREN

**Company (name and address)**  
**Siren**  
Sindice Italia Srl  
Viale Trento 115/117,  
38017 Mezzolombardo, Trento, Italy

**Type of Scholarship**  
Level 2

**Title of Scholarship**  
Complex graph queries in large, highly parallelized distributed systems

**Industrial Tutor (full name + email address)**  
Flavio Pompermaier – flavio.pompermaier@siren.io

**Academic Supervisor (full name + email address)**  
To be defined

**Short Description of Internship and Thesis Activities, and Expected Outcome:**

Project 2 focuses on developing a lightweight tracing methodology for **complex graph queries in large, highly parallelized distributed systems**. It aims to create a non-intrusive tracing solution that provides granular, thread-level information, aggregates data for a holistic view, and offers advanced visualization tools to map, analyze, and drill down into specific phases of query execution. The outcome will enhance performance analysis and debugging capabilities for complex graph queries without impacting system performance.

**Required Candidate Skills and Prerequisites:**

- **Java** (very good knowledge)
- **Docker**
- **Maven**
- **Elasticsearch**
- **Git**
- **Proficiency in English, both written and verbal**
- **Team collaboration** (ability to work with a distributed team)
Optional Skills:

- **Distributed Systems and parallel computing:**
  - Understanding of distributed systems concepts and architectures
  - Knowledge of parallel computing principles and multi-threading
  - Distributed computing frameworks (e.g., Apache Spark, Hadoop)
  - Big data technologies (e.g., Kafka, Cassandra, HBase)

- **Performance Analysis:**
  - **Tracing Tools:** Understanding the concepts and implementation of tracing tools such as OpenTelemetry, Jaeger or Zipkin. These tools are essential for monitoring and diagnosing the performance of distributed systems by tracking the flow of requests across services.
  - **Profiling Tools:** Knowledge of profiling tools like JProfiler, YourKit or VisualVM. These tools help in identifying performance bottlenecks in applications by analyzing memory usage, CPU consumption, and other critical metrics.

- **UI Technologies:**
  - Knowledge of modern UI frameworks such as Vue.js, Angular, or React for developing advanced visualization tools.

Additional Considerations:

- **Curiosity and Enthusiasm**
  - A keen interest in distributed systems and performance optimization
  - Enthusiasm for tackling challenging problems and learning new technologies

Once the selection process is concluded, the company expects to interview the candidates before proceeding.