Elia Gatti

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Summary

Master's Student and Dedicated Engineer committed to development and continuous growth. Driven to contribute across the stack, from scalable microservices to performance optimization. Eager to collaborate, learn rapidly, and deliver efficient solutions within a thriving team environment.

Work Experience

Dedagroup - Software Developer May 2024 - Sept 2024

- Worked on the development of the 'TEN' application, a web-based solution for treasury services, contributing to both backend and frontend development.
- Assisted in deploying the application on a Linux server, transitioning from a previous Windows-based setup.
- Contributed to creating and optimizing scripts to analyze legacy databases, improving system efficiency.
- **Technical Skills:** Java, Spring Framework, HTMX, SQL, Shell scripting.
- **Soft Skills:** Team collaboration, Problem-solving, Adaptability.

Projects

Crosstrack Italia - Flutter Application Link to Repo

- **Developed** a comprehensive, **cross-platform** mobile application using **Flutter** and **Dart** for motocross track discovery and management.
- Implemented core features including **map-based visualization** (OpenStreetMaps/Google Maps API), **user authentication**, and full track **management functionality** for owners.
- Utilized **Firebase** (Firestore, Authentication, Storage) for the backend and **Riverpod 2.0 (State Management)** with **Freezed** (Code Generation) for a streamlined, **responsive** solution.

MPEG-DASH Performance Analysis (Bachelor's thesis) Link to Repo

- Conducted in-depth **performance analysis** of the **MPEG-DASH protocol** using a comprehensive methodology across simulated and **real-world network conditions** (AWS integration).
- Designed and deployed a **Software-Defined Network (SDN) infrastructure** using **Mininet** and an OpenDayLight controller for flexible network simulation.
- **Implemented** a custom web server/client (Node.js/dash.js) to enable DASH streaming, capture essential performance metrics, and perform **data analysis** using **Python** (**Pandas**, NumPy).
- Prepared multimedia assets for testing via multi-resolution/bitrate video encoding using **Bash** (**FFmpeg**/x264).

P2P Key-Value Storage System Link to Repo

- **Engineered** a robust **Peer-to-Peer (P2P) Key-Value Storage System** using the **Akka framework** (v2.6) and Java 21, demonstrating expertise in distributed computing.
- Designed and implemented a high-availability solution ensuring **Sequential Consistency** and **concurrent operation** through **Quorum Consensus**. Enforced data reliability via configurable **data replication** across consecutive nodes.

MovieMatch Link to Repo

- **Developed** a **scalable**, **service-oriented web application** that provides movie search and personalized recommendations based on user genre preferences.
- **Engineered** a **15-service microservices architecture** using **Python/FastAPI** and deployed via **Docker Compose**, separating logic into Data, Adapter, Business Logic, and Process Centric layers.
- **Implemented** comprehensive features including movie details, trailer links, a Spotify playlist, **AI-generated trivia quizzes**, and streaming availability across major platforms (Netflix, Amazon Prime, Disney+, HBO Max).
- Designed and implemented a unified JSON response structure for API consistency, simplifying client-side error handling and data consumption.

GPU Computing: Sparse Matrix-Vector Multiplication (SpMV) Link to Repo

- **Developed and optimized 8 Sparse Matrix-Vector Multiplication (SpMV) kernels** for CPU and GPU, implemented in C/CUDA, to analyze parallel computing performance.
- **Engineered an advanced Hybrid Adaptive CUDA kernel** that dynamically classifies matrix rows and switches between thread-per-row (scalar) and warp-per-row (vector) strategies to maximize GPU utilization.
- **Implemented multiple optimizations** including Instruction-Level Parallelism (ILP) on CPU, and Value Blocked, Warp-per-Row, and Double Buffer techniques on GPU to enhance memory bandwidth and occupancy.
- **Benchmarked** all implementations on an NVIDIA A30 GPU and AMD EPYC CPU, measuring performance metrics such as Execution Time, Memory Bandwidth (GB/s), and Computational Performance (GFLOPS).

HPC Project: Parallel MST Implementation Link to Repo

- **Developed a scalable, high-performance hybrid parallel implementation** of Minimum Spanning Tree (MST) algorithms, utilizing MPI (distributed memory) and OpenMP (shared memory) for execution on HPC clusters.
- Engineered comprehensive tooling including automated graph generation, performance benchmarking, and a **PBS scheduler-enabled Makefile** for seamless job submission, monitoring, and cleanup on compute nodes.
- Executed detailed performance analysis against a serial reference implementation, measuring Speedup, Efficiency, and Scalability across cluster configurations up to 32 nodes.
- The architecture allows for flexible tuning of parallelism, supporting up to 32 MPI processes and 16 OpenMP threads per process.

Education

2024 - present	Master Computer Science at **University of Trento**	
2020 - 2024	Bachelor's Degree at **University of Trento**	(101/110)
2015	Liceo Scientifico Niccolò Tron	(74/100)

Skills

Languages Italian, English (B2)