Kasra Jamshidi

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Summary

Parallel & distributed systems expert. I specialize in developing efficient and scalable software for compute-intensive analytics on massive graphs.

Education

Simon Fraser University

PhD Computer Science - *Advised by Prof. Keval Vora* 2019-2023

BSc Hon Computer Science 2014-2019

Experience

Graduate Research Assistant @ Parallel & Distributed Computing Lab April 2019 - July 2023

- Designed and implemented Peregrine, a programmable parallel graph mining system that is **700x faster** than the previous state-of-the-art with **8x fewer CPUs**, while using **100x less memory**.
  - Maintain open-source project: https://github.com/pdclab/peregrine.
  - Performance scales nearly ideally with physical CPU cores (e.g., 48 cores lead to 41x speedup).
  - Custom lockfree aggregator.
  - Technologies: C++20, Make, Roaring, Bliss, Java, Scala, Akka, HDFS, Giraph.

- Built a distributed, fault tolerant stream processing system for an RDMA-enabled cluster. Solves analytics queries on massive, rapidly updating data, sustaining an average output throughput of **200M (3.5GB) records per second**.
  - Custom lockfree arena allocator to reduce context switches in critical path.
  - Custom Paxos implementation to take advantage of RDMA and provide Byzantine fault tolerance.
  - Asynchronous RDMA network layer implementation.
  - Technologies: Docker, C++23, Boost.ASIO, ZeroMQ, CMake, HotStuff, libcuckoo, HDFS, IBVerbs, catch2.

- Developed a runtime-agnostic query optimization framework that automatically improves graph mining execution speed by **10-34x** (saving **24 hours+** on some queries) with overhead in the milliseconds.
  - Accounts for low-level runtime traits to fix multiple different bottlenecks, uncovered via extensive profiling.
  - Scales to large patterns and large data graphs.
  - Proven correct with arbitrary aggregations.
  - Integrated and evaluated the framework in 4 existing graph mining systems.
  - Technologies: C++20, SymEngine, Rust, Differential Dataflow.

Founding Developer @ Polly Language Exchange/Lingvu January 2017 - March 2018

- Developed web chat app that pairs users seeking to learn each other's native languages.
  - Technologies: WebRTC, Angular2, NGINX, Lua, Redis, Phoenix/Elixir, PostgreSQL Geospatial, Vagrant.

Software Intern @ Nexedi Inc. June 2016 - January 2016

- Developed several React web applications, including implementing reverse-indexing and fuzzy full-text search.
- Wrote technical documentation and tutorials for new products, and assisted in demonstrations by the CEO.

Service

Technical Writer @ BC Children's Society 2018

- Drafted and edited funding proposals for new support initiatives, submitted to Ministry of Children and Families

President @ Computing Science Student Society 2019

- Organized week-long student networking trip to Silicon Valley
- Taught workshops on git and software development on Linux

Awards

Best Poster Award @ CS Research Day 2022
Anti-Vertex for Neighborhood Constraints

Clark Wilson LLP Grad Scholarship 2022

Best Poster Award @ CS Research Day 2020
Peregrine: A Pattern-Aware Graph Mining System

Shrum Major Entrance Scholarship 2014