

# Kasra Jamshidi

Vancouver BC, Canada · [contact@kjamsh.com](mailto:contact@kjamsh.com) · <https://kjamsh.com>

## Research Interests

Scalable Graph Systems, Graph Query Languages.  
Application-Aware Systems, Query Optimization.  
Distributed Systems, Byzantine Fault Tolerance.

## Education

Simon Fraser University  
**PhD Computer Science** - *Advised by Prof. Keval Vora* 2019-2024  
**BSc Hon Computer Science** 2014-2019

## Publications

### Contigra: Graph Mining with Containment Constraints

EuroSys '24

Joanna Che, Kasra Jamshidi, Keval Vora.  
European Conference on Computer Systems, April 2024.

### Scalable Byzantine Fault Tolerant Analytics without Replication

PPoPP '24

Kasra Jamshidi, Keval Vora.  
Symposium on Principles and Practice of Parallel Programming, March 2024.

### Accelerating Graph Mining Systems with Subgraph Morphing

EuroSys '23

Kasra Jamshidi, Guoqing Harry Xu, Keval Vora.  
European Conference on Computer Systems, May 2023.

### Anti-Vertex For Neighborhood Constraints In Subgraph Queries

GRADES-NDA '22

Kasra Jamshidi, Mugilan Mariappan, Keval Vora.  
ACM Workshop on Graph Data Management Experiences & Systems and Network Data Analytics, June 2022.

### A Deeper Dive Into Pattern-Aware Subgraph Exploration With Peregrine

OSR '21

Kasra Jamshidi, Keval Vora.  
SIGOPS Operating Systems Review 55, 1, June 2021.

### Peregrine: A Pattern-Aware Graph Mining System

EuroSys '20

Kasra Jamshidi, Rakesh Mahadasa, Keval Vora.  
European Conference on Computer Systems, April 2020.

## Experience

### Graduate Research Assistant @ SFU PDCL

April 2019 - Present

- 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.
- Built a distributed, fault tolerant stream processing system for an RDMA-enabled cluster using C++23. 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.
- 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.
  - Formally proven correct with arbitrary aggregations and practically scales to large patterns and data graphs.
  - Integrated and evaluated the framework in 4 existing graph mining systems.

## Undergraduate Research Assistant @ SFU PDCL

September 2018 - August 2019

- Developed a distributed graph mining model without the synchronization requirements of Arabesque (SOSP '15) and implemented a proof-of-concept using Java, Scala, and the Akka actor framework.
- Implemented the DualSIM (SIGMOD '16) disk-based pattern-matching algorithm in C++.

## Object Clustering Robot Swarms @ SFU Autonomy Lab

January 2018 - May 2019

- Simplified existing compute-free, communications-free robot design to be deterministic, resulting in cheaper robot swarms that finish object clustering tasks **2-3x faster**.
- Observed novel environmental manipulation method to further improve clustering speed by **5x**.

## 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 2017

- Developed various 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 & Other Activities

### Reviewing for Journals & Conferences:

EuroSys 20, 23, 24; ATC 20, 21, 22; OSDI 20, 21; PACT 20; ASPLOS 21, 22; ICS 21; SOSP 23; ICDCS 23; VLDB 24.

### Student Mentoring

- Joanna Che (MSc), *Graph Mining with Containment Constraints*.
- Rakesh Mahadasa (MSc), *Incremental Graph Mining*.
- Jeremy Schwartz (undergraduate), *Graph Pattern Generation*.
- Hao Henry Fang (undergraduate), *Pattern-Aware Graph Mining on Weighted Graphs*.
- Daniel Gomes Maia Filho (undergraduate), *Workload-Balancing in Incremental Graph Mining*.
- Richard Dong (undergraduate), *Parallel Frequent Subgraph Mining*.

### President of the Computing Science Student Society

- Organized week-long student trip to Silicon Valley for tours and networking events.
- Taught undergraduate workshops on git and Linux software development.

### Technical Writer at BC Children's Society

- Drafted and edited program and funding proposals to the Ministry of Children and Families for new initiatives to assist children and youth with support needs.
- Revised internal training and reference manuals.

## Honours & Awards

Best Poster Award - Anti-Vertex For Neighborhood Constraints	2022
SFU Computing Science Graduate Fellowship	2019, 2021, 2022, 2023
Clark Wilson LLP Graduate Scholarship	2022
Best Poster Award - Peregrine: A Pattern-Aware Graph Mining System	2020
SFU Vice President-Research Undergraduate Student Research Award	2018
Gordon M. Shrum Major Entrance Scholarship	2014