

GARVIT DEWAN

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EDUCATION

Indian Institute of Technology (IIT) Roorkee

Bachelor of Technology in Computer Science and Engineering

Jul 2016 - Jun 2020

GPA: **9.096/10**

INTERESTS

Parallel, Distributed & High Performance Computing | Programming Languages | Compilers | Linear Algebra

PUBLICATIONS

- G. Dewan and L. Jenkins, "Paving the way for Distributed Non-Blocking Algorithms and Data Structures in the Partitioned Global Address Space model," *2020 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, 2020, pp. 659-666. (Link)
- G. Dewan and L. Jenkins, "Scaling Shared-Memory Data Structures as Distributed Global-View Data Structures in the Partitioned Global Address Space model," *to be submitted*. (Link)

RESEARCH EXPERIENCE

Matrix Exponentials

May 2021 - Aug 2021

Google Summer of Code 2021 (Mentor)

Mentee: Prasanth Duvvuri; Co-mentor: Prof. Nikhil Padmanabhan

- Designed and implemented matrix exponentials in Chapel using Padé approximation, lazy computation and caching
- Time complexity: $O(15n^3)$; Extended the implementation to provide trigonometric functions on matrices
- Added functionality for the multiplication of a sparse matrix and a dense matrix in Chapel
- All work merged into the language, officially available as of Chapel v1.25

Native Distributed Linear Algebra Implementations

May 2020 - Sep 2020

Google Summer of Code 2020 (Mentor)

Mentee: Rahul Ghangas; Co-mentor: Louis Jenkins

- Extended Chapel's linear algebra module by providing distributed implementations of existing procedures
- Provided native, parallel implementations for procedures that depended on external libraries such as BLAS
- Improved existing native implementations of standard linear algebra functions to perform competitively to Cray-BLAS using loop tiling cache optimization
- All work merged into the language, officially available as of Chapel v1.23

Distributed Global-View Algorithms and Data Structures in PGAS

Jul 2019 - Apr 2020

Student Researcher, IIT Roorkee

Advisor: Prof. Pradumn K. Pandey

Award: Best Undergraduate Thesis 2020

- Designed and implemented Distributed Interlocked Hash Table in PGAS, scaled along with epoch-based manager
- Provided an approach to scale shared-memory data structures as distributed global-view data structures
- Distributed Map scaled in distributed memory on Cray-XC (≈ 1.4 billion ops/sec @ 64 nodes)
- Experimented distributed backup capabilities with checkpointing - data and function backup and restore
- Shared-memory concurrent map upto 200 times faster than Chapel's built-in map at 44 threads; merged into the language, to be released with Chapel v1.26

Concurrent-Safe Memory Reclamation Systems

May 2019 - Sep 2019

Google Summer of Code 2019 (Student)

Mentors: Louis Jenkins, Michael Ferguson

- Designed and implemented scalable distributed atomics for Chapel, enabling atomic operations on arbitrary objects

- Designed and implemented epoch-based reclamation in shared and distributed-memory
- Epoch-Based Manager scaled in distributed memory on Cray-XC; tested upto 64 nodes
- Contributed LockFreeQueue & Stack, Scalable Distributed Atomics, and Epoch-Based Manager, all officially available as of Chapel v1.20; Work published at *IPDPSW 2020*

WORK EXPERIENCE

Goldman Sachs

Jul 2020 - Present

Software Engineer, Engineering Division

- Working on internal alert management system used to manage apps in production; used by 8000 users
- Added workflow orchestration functionality with health restoration services and real-time updates
- Developed the effort tracking framework, which automatically logs user's activity on the system and actions in various applications to calculate effort spent; helped reduce firm's expenditure on support teams by 16%
- Designed and developed crawler workflows to systematically visit pages and trigger respective actions
- Developed the scheduled-job monitoring framework

Goldman Sachs

May 2019 - Jul 2019

Software Engineering Intern, Engineering Division

- Developed a lightweight alert management solution to be used in case of outage of the main application; reduced effective downtime to zero minutes

SKILLS

Programming: C, C++, Chapel, Java, Python, PHP, JavaScript

Libraries: Boost, MPI, OpenMP, UPC++

Software & Tools: AWS, CSS, Docker, Git, Kafka, Kubernetes, MongoDB, SQL

COURSEWORK INFORMATION

Algorithms, Data Structures, Discrete Mathematics, Linear Algebra, Switching Circuits, Computer Architecture and Microprocessors, Operating Systems, System Software, Software Engineering, Database Management Systems, Probability and Statistics, Computer Networks, Machine Learning, Theory of Computation, Principles of Programming Languages, Compiler Design, Mobile and Pervasive Computing, Information and Network Security

AWARDS & HONORS

- Winner of the Best B.Tech. Project (Undergraduate Thesis) Award 2020, awarded by the Dept. of Comp. Sc. and Engineering, IIT Roorkee
- Winner of the Technical Committee on Parallel Processing (TCPP) Award for IPDPS 2020, awarded by TCPP
- Selected for KVPY Fellowship Award 2016 (Organized by IISc, Bangalore) with an All India Rank of 68
- Secured top 0.2 percentile (amongst 200,000 candidates) in IIT-JEE Advanced 2016

RESPONSIBILITIES

- GS Women in Tech Mentor - Mentored four girl undergraduates in data structures and algorithms
- GS internship Mentor - Mentored a summer intern to migrate reporting database to data lake architecture
- Chief of R&D, Information Management Group, IIT Roorkee
- CS Dept. Mentor, IIT Roorkee - Guided six freshmen about academics, extracurricular and on-campus activities

EXTRA-CIRRICULAR

- National Service Scheme: Helped organize blood donation camps, guest lectures and off-campus literacy drives
- NIPP Blockchain Challenge 2018 finalist
- First prize winner at IIT-BHU Codefest 2017: Annual coding festival organized by CS Dept. at IIT-BHU
- Microsoft Code.Fun.Do Hackathon 2017 finalist