Hao Lu

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POST-DOCTORAL TRAINING

Oak Ridge National Laboratory Post-doctoral research associate
Mentor: Sudip K. Seal
Begin: April / 2017.
Research Focus:

- Parallel spatial data structures and graph algorithms
- Lead developer of DAPPER - Data Analysis Parallel Package Maker – a scalable HPC spatial indexing/querying library

EDUCATION

Ph. D. in Computer Science
Washington State University, Pullman, Washington
Graduation: Dec / 2016
Dissertation Title**:** *Scalable parallel algorithms and implementations for large-scale graph analyses.*
Advisor: Dr. Ananth Kalyanaraman

Bachelor of Science in Computer Science
Washington State University, Pullman, Washington
Graduation: Dec / 2011

RECOGNITIONS

- **2017 Champion:** DARPA HIVE Graph Challenge.
- **Top 5 Downloaded Article (August 2015 – Present):** Parallel Computing Journal, Elsevier
- **2016 Best Paper Finalist:** International Conference on Compilers, Architectures and Synthesis of Embedded Systems

PEER-REVIEWED PUBLICATIONS

- **Lu, Hao,** Seal, Sudip, Jonathan D. Poplawsky. **Scalable Proximity-Based Methods for Large-Scale Analysis of Atom Probe Data**. *IEEE International Conference on High Performance Computing, Data, and Analytics* (HiPC), pp. 235-244, 2018
- **Hao Lu**, Sudip K. Seal, Gregory Muzyn, Wei Guo and Jonathan D. Poplawsky. **Efficient, Parallel At-Scale Correlation Analysis for Atom Probe Tomography on Hybrid Architectures.** *IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, pp. 54-63, 2018
- Sayan Ghosh, Mahantesh Halappanavar, Antonino Tumeo, Ananth Kalyanaraman, **Hao Lu**, Daniel Chavarria-Miranda, Arif Khan, and Assefaw Gebremedhin. **Distributed Louvain algorithm for graph community detection.** *IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, pp. 885–895, 2018
- Mahantesh Halappanavar, **Hao Lu**, Ananth Kalyanaraman, Antonino Tumeo. **Scalable static and dynamic community detection using Grappolo.** *Proc. IEEE high Performance Extreme Computing (HPEC'17)* **2017 DARPA HIVE Graph Challenge Champion**
- **Hao Lu**, Sudip K. Seal, Wei Guo and Jonathan D. Poplawsky. **Spherical Region Queries on Multicore Architectures.** *Procs. Of the 7th workshop on Irregular Applications: Architectures and Algorithms (IA3'17), Supercomputing*, Article 9, 2017
- Karthi Durasisamy, **Hao Lu**, Partha Pande, Ananth Kalyanaraman. **Accelerating Graph Community Detection with Approximate Updates via an Energy-Efficent NoC.** *Proc. of Design Automation*

Conference (DAC), 2017

- **Hao Lu**, Mahantesh Halappanavar, Daniel Chavarria-Miranda, Assefaw Gebremedhin, Ajay Panyala, Ananth Kalyanaraman. **Algorithms for balanced graph colorings with applications in parallel computing.** *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, vol. 28, no. 5, pp. 1240-1256, May 1 2017
- Karthi Durasisamy, **Hao Lu**, Partha Pande, Ananth Kalyanaraman. **High performance and energy efficient Network-on-Chip architectures for graph analytics.** *ACM Transactions on Embedded Computing Systems (TECS*), 15(4), p.66, 2016
- Ananth Kalyanaraman, Mahantesh Halappanavar, Daniel Chavarria-Miranda, **Hao Lu**, Karthi Duraisamy, Partha Pande. **Fast uncovering of graph communities on a chip: Toward scalable community detection on multicore and manycore platforms.** *Foundations and Trends in Electronic Design Automation (FnTEDA)*, Paperback 118 pages. now Publishers, ISBN-10: 1680831321, 2016
- Karthi Duraisamy, **Hao Lu**, Partha Pande, Ananth Kalyanaraman**. High performance and energy efficient wireless NoC-enabled multicore architecture for graph analytics.** *Proc. International Conference on Compilers, Architectures and Synthesis of Embedded Systems (CASES)*, pp. 147-156, 2015 **Best Paper Finalist**
- **Hao Lu**, Mahantesh Halappanavar, Ananth Kalyanaraman. **Parallel heuristics for scalable community detection.** *Parallel Computing*, vol. 47, pp. 19-37, 2015, DOI: 10.1016/j.parco.2015.03.003 **Journal's Top Downloaded Article since August 2015**
- **Hao Lu**, Mahantesh Halappanavar, Daniel Chavarria-Miranda, Assefaw Gebremedhin, Ananth Kalyanaraman. **Balanced coloring for parallel computing applications.** *IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, pp. 7-16, 2015
- **Hao Lu**, Mahantesh Halappanavar, Ananth Kalyanaraman, Sutanay Choudhury. **Parallel heuristics for scalable community detection.** *Proc. International Workshop on Multithreaded Architectures and Applications (MTAAP)*, IPDPS Workshops, pp. 1375-1385, 2014

SOFTWARE PRODUCTS

- **Grappolo:** Parallel tool for community detection in graphs for multicore platforms. Open Source website: http://hpc.pnl.gov/people/hala/grappolo.html (a more comprehensive version https://github.com/luhowardmark/GrappoloTK)
- **Balanced Coloring software toolkit:** Parallel toolkit to generate 1-distance and partial 2-distance colorings https://github.com/luhowardmark/GrappoloTK
- **ADAPT:** Parallel Data analysis toolkit for Atom Probe Tomography (A sub library for DAPPER).

PROFESSIONAL EXPERIENCE/INVOLVEMENT

- Program Committee Member
  - *International Conference on High Performance Computing* (HiPC) (2019)
  - *Workshop on Graphs, Architectures, Programming, and Learning* (GrAPL) (2019)
  - *International Conference on High Performance Computing* (HiPC) (2018)
  - *International Parallel and Distributed Processing Symposium* (IPDPS) (2018)
- Peer-Reviewer
  - *International Conference on High Performance Computing* (HiPC) (2018)
  - *International Parallel and Distributed Processing Symposium* (IPDPS) (2018)
- Pacific Northwest National Lab internships (2014, 2015)
  - Working as a research assistant in high-performance group. Working under Dr. Daniel Chavarria and Dr. Mahantesh Halappanavar
- Visiting scholar at Purdue University (2013)
  - Working as a research assistant in Purdue University with Dr. Ananth Kalyanaraman.
- WSU School of Electrical Engineering and Computer Science
  - Research assistant in high-performance computational biology lab. (2012-2017)
  - Teaching assistant in Language and Automata class. (2011)
- Association of Computer Machinery (ACM)
  - Working as the vice chair in WSU chapter. In charge of tutoring sections. (2011)
- Blue Water Undergraduate Peta-scale Intern

Working as a research assistant. Design and implementation for
Suffix tree construction in parallel. Implementation in C with MPI Library. (2010)

- International Conference for High Performance Computing, Networking, Storage and Analysis (SC10)
  Worked as a conference student volunteer. (2010)

PAST ACADAMIC PROJECTS

- Parallel sparse matrix LU decomposition with minimum fill-in
  Studied nested dissection and finding improvement
- Parallel Modularity based graph clustering
  Design of algorithms, data structures and implementation in C++. Used MapReduce/ MPI for distribute memory model
- Activities recognition through smart phone sensors
  Design of raw data extraction and learning algorithms, implementation in R. Used naive Bayes and Expected Maximum as the fundamental design.
- Suffix tree construction in parallel
  Design of algorithms, data structures and implementation in C. Used MPI for distribute memory model
- Job scheduler for parallel computers
  Design of algorithms, data structures and implementation in C++. Used ideas of pooling and state machines.
- MTX 16-bits operation systems
  Design of drivers, file system, memory hierarchy, and implementation in C.
- Simplified C compiler
  Re-implement the grammar of C, parse tree construction and assembly generation. Support most of the C syntax
- Code parser and call graph generator for Visual Studio environment.
- Sharepoint web tournaments
  Design of matches scheduling and time scheduling algorithms and implementation of matches display. Implemented in C# under Sharepoint platform.

PROFESSIOANL MEMBERSHIPS

- **ACM**
- **IEEE**

References

References are available upon request.