Davood Mohajerani

 github.com/parallelistix
✉ mohajerani.d@gmail.com
⌨ parallelistix.github.io

I am a software developer/researcher in the field of high performance computing. I have experience in the design, implementation, and optimization of parallel algorithms on CPUs (Cilk/OpenMP) and GPUs (CUDA) for several problems in computational algebra (primarily used in solving systems of polynomial equations and cryptography).

As a team member, I focus on iterative development, effective (written and verbal) presentation of ideas, simplifying the workflow, and most importantly, maximizing the outcome within the time and budget constraints.

Interests

○ Performance portability, optimizing compilers, and automatic parallelization.
○ Design, implementation, and optimization of parallel algorithms for CPUs, GPUs, and accelerators.
○ Developing software tools for computational number theory and parallel arbitrary-precision integer arithmetic.

Education

2017-Present	**Ph.D. candidate in Computer Science**, University of Western Ontario, Canada
	Thesis: Parallel arbitrary-precision integer arithmetic on GPUs and multi-core CPUs
2015-2016	**M.Sc. in Computer Science**, University of Western Ontario, Canada
	Thesis: "FFT over Prime Fields of Large Characteristic and Their Implementation on GPUs"
2010-2015	**B.Sc. in Computer (Software) Engineering**, Isfahan University of Technology, Iran

Open Source Portfolio

2015-Present: Software developer and research assistant at Symbolic Computing Laboratory (ORCCA)
○ In progress: Author of a new library for parallel arbitrary-precision integer arithmetic on GPUs (CUDA).
○ In progress: Author of a new parallel algorithm for arbitrary-precision integer multiplication on GPUs (CUDA).
○ Maintainer of CUMODP (a CUDA library for modular arithmetic on GPUs).
○ Lead developer of KLARAPTOR (a tool for improving running time of CUDA kernels by estimating block dimensions).
○ The first parallel implementation of FFT over big prime fields on CPUs (Cilk), integrated in BPAS library.
○ The first parallel implementation of FFT over big prime fields on GPUs (CUDA), integrated in CUMODP library.
○ A new parallel implementation of 6-step FFT over small prime fields on CPUs (Cilk), integrated in BPAS library.
○ A new parallel univariate polynomial division on GPUs (CUDA).

Skills

Programming	C, C++, CUDA, PTX, Cilk, OpenMP, x86 Assembly, AVX/AVX2, Python, bash, Make
Libraries/API	LLVM (Pass Framework), NVIDIA CUPTI, GNU GMP, POSIX, NTL
Tools/DBMS	LaTeX, GDB, valgrind, perf, SQL
Miscellaneous	MATLAB, Maple, OpenGL, OpenCL, NumPy/SymPy, Verilog, Web development

Awards

○ "Distinguished Software Demonstration Award" for presenting CUMODP library in ACM ISSAC 2017 conference.
○ University of Western Ontario Graduate Research Scholarship (WGRS) for Ph.D. and M.Sc. in Computer Science.
○ Ranked among the top 1% in the Iranian university entrance exam in 2010 ($\sim$ 320,000 participants).

Publications

[1] S. Covanov, Davood Mohajerani, M. M. Maza, and L. Wang, "**Big Prime Field FFT on Multi-core Processors**," in *ISSAC 2019*.

[2] A. Brandt, Davood Mohajerani, M. M. Maza, J. Paudel, and L. Wang, "**KLARAPTOR: A Tool for Dynamically Finding Optimal Kernel Launch Parameters Targeting CUDA Programs**," *CoRR*, vol. abs/1911.02373, 2019.

[3] S. A. Haque, X. Li, F. Mansouri, M. M. Maza, Davood Mohajerani, and W. Pan, "**CUMODP: a CUDA library for modular polynomial computation**," *ACM Commun. Comput. Algebra*, vol. 51, no. 3, pp. 89–91, 2017.

[4] S. A. Haque, A. Hashemi, Davood Mohajerani, and M. M. Maza, "**Plain, and Somehow Sparse, Univariate Polynomial Division on Graphics Processing Units**," in *PASCO@ISSAC 2017*, ACM, 2017.

[5] L. Chen, S. Covanov, Davood Mohajerani, and M. M. Maza, "**Big Prime Field FFT on the GPU**," in *ISSAC 2017*, ACM, 2017. DOI: 10.1145/3087604.3087657.