Nader Al Awar

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More on my personal page, GitHub, and LinkedIn

Education
PhD | The University of Texas at Austin | Supervisor: Professor Milos Gligoric | Expected August 2024
Major: Electrical and Computer Engineering, **GPA**: 3.9
Relevant coursework: Multicore Computing, Parallel Computer Architecture, Computer Architecture, Compilers
Bachelor of Engineering | The American University of Beirut | June 2019
Major: Computer and Communications Engineering, **GPA**: 4.0

Academic and Work Experience
Graduate Research Assistant | The University of Texas at Austin | 2020 – Present
Projects:
- **PyKokkos:**
  - Designed and implemented a Python framework for writing parallel high-performance kernels
  - Developed and evaluated a framework for **lazy evaluation** and **kernel fusion**
  - Tested across different hardware, including **CPUs**, **NVIDIA GPUs**, and **AMD GPUs**
  - Open source and available as **part of the Kokkos GitHub organization** here (8 contributors, 80+ stars).
  - Implemented high performance scientific software and **machine learning algorithms**
- **C++ Header Substitution:**
  - Developed a framework for **improving C++ compilation speeds**
  - Replaces header file includes by **automatically generating forward declarations**
  - Implemented novel strategies for enabling forward declarations of class member functions
  - Evaluated performance with **Link-time optimization (LTO)**

Research Scientist | NVIDIA Research | June – August 2023
*Mentored by **Michael Garland** and **Andrei Alexandrescu**:*
- Built an **automated task scheduling** system for a task flow programming model based on CUDA
- Evaluated existing scheduling heuristics to assess their performance
- Implemented a system for mapping and reordering tasks **dynamically**
- Automatically generated task schedules that outperformed schedules manually written by an expert

Compiler Software Engineer | NVIDIA | June – August 2022
- Implemented a compiler analysis pass in **ptxas**, the NVIDIA ptx assembler, to enable better optimizations
- Evaluated the potential impact of the analysis pass through preliminary experimentation
- Built a control flow graph from an intermediate representation
- Benchmarked and optimized the control flow graph builder using real world examples
- Automatically verified the generated control flow graphs through an automated CI pipeline

Graduate Student Intern | Lawrence Livermore National Laboratory| June – August 2021
- Built a function-level JIT compiler from ClangJIT, a fork of Clang/LLVM that adds JIT to C++ (see here)
- Automatically enabled and disabled optimizations for individual functions to improve performance

Publications
1. *A Performance Portability Framework for Python*
   Nader Al Awar, Steven Zhu, George Biros, and Milos Gligoric
   International Conference on Supercomputing (**ICS**), 2021

2. *A Multi-GPU Python Solver for Low-Temperature Non-Equilibrium Plasmas*
   James Almgren-Bell, **Nader Al Awar**, Dilip Geethakrishnan, Milos Gligoric, and George Biros
   Symposium on Computer Architecture and High Performance Computing (**SBAC-PAD**), 2022
3. *Dynamic Generation of Python Bindings for HPC Kernels*
   Steven Zhu, **Nader Al Awar**, Mattan Erez, and Milos Gligoric
   Automated Software Engineering (**ASE**), 2021
4. *PyKokkos: Performance Portable Kernels in Python*
   Nader Al Awar, Neil Mehta, Steven Zhu, George Biros, and Milos Gligoric
   International Conference on Software Engineering, Tool Demonstrations Track (**ICSE Demo**), 2022
5. *Programming and execution models for parallel bounded exhaustive testing*
   Nader Al Awar, Kush Jain, Christopher J. Rossbach, and Milos Gligoric
   Object-Oriented Programming, Systems, Languages, and Applications (**OOPSLA**), 2021
6. *The Kokkos EcoSystem: Comprehensive Performance Portability For High Performance Computing*
   Christian Trott, Luc Berger-Vergiat, David Poliakoff, Sivasankaran Rajamanickam, Damien Lebrun-Grandie,
   Jonathan Madsen, **Nader Al Awar**, Milos Gligoric, Galen Shipman, and Geoff Womeldorff.
   Computing in Science and Engineering (**CISESI**), 2021

Skills

PROGRAMMING LANGUAGES - C++, Python, C
FRAMEWORKS - CUDA, OpenMP, LLVM, mpi4py, CMake
PLATFORMS - Linux, Windows

Languages
English (native), Arabic (native)