Sergei Shudler, PhD

Postdoctoral researcher and software engineer; specialized in parallel programming and performance analysis

6450 Double Eagle Dr.
Woodridge, IL 60517, USA
+1-224-703-7280
sergshu@gmail.com
sshudler.github.io

EXPERIENCE

Postdoctoral Researcher

Argonne National Laboratory

Aug 2018 – Ongoing | IL, USA

- Evaluates in-situ analysis and visualization techniques in extreme-scale scientific codes
- Investigates performance related issues in SENSEI, a general in-situ analysis framework
- Collaborates with 2 research teams

Graduate Researcher

Technical University of Darmstadt

Feb 2013 – July 2018 | Germany

- Investigated the applicability of machine learning for performance analysis of parallel programs
- Devised a practical method for deriving isoefficiency functions of real-world task-based applications
- Completed 2 projects (see Projects section below)
- Prepared MPI and multithreading exercises for graduate-level courses
- Presented in tutorials (VI-HPS Tuning Workshops) and conferences
- Collaborated with colleagues in Germany, Switzerland, and the US

Software Developer II

Paradigm Geophysical Ltd.

Nov 2011 – Nov 2013 | Israel

- Worked on an OpenGL-based 3D visualization system for seismic data
- Improved the responsiveness of the system and user experience by introducing a multithreaded data fetching mechanism
- Implemented a capability to correlate two instances of volumetric data
- Developed a functionality to display semi-transparent, floating text annotations within an OpenGL 3D scene; ported the code to Win32

3D Graphics Developer

Tiltan Systems Engineering Ltd

Nov 2009 – Oct 2011 | Israel

- Maintained the company's main 3D engine developed in C++ on top of DirectX; the engine was designed to support vast terrains
- Developed DirectX shaders in HLSL to render terrain-embedded geometric entities and 3D objects
- Implemented the shadow-map algorithm to display shadows cast by 3D objects

SUMMARY

- 7 publications in peer-reviewed conference and workshop proceedings
- 4 first-author papers
- 8 year of software development experience in various projects
- Excellent interpersonal and communication skills

SKILLS

Programming

C/C++ | Python | Matlab | Java | R | HLSL | GLSL | SQL | LaTeX | Fortran

APIs

MPI | OpenMP | pthreads | CUDA | OpenCL | OpenGL | Win32

Dev tools

UNIX tools | CMake | GDB | Git | SVN | TotalView | Visual Studio | Eclipse | OpenCV

Methodologies

Multithreading | Machine learning | Performance profiling | Data analytics

LEADERSHIP

- Administered yearly seminars focused on various topics in parallel computing
- Supervised 2 students (one bachelor and one master's student)
- Mentored junior developers and counseled them on complex technical issues

C++ Programmer

Israeli Air Force (IAF)

Jan 2004 – Aug 2009 Israel

- Worked on a distributed, Windows-based command & control system for operational units
- Developed a multithreaded communication (TCP/UDP) module to support application-level communication protocols on top of WinSockets
- Ported the entire code-base from Visual Studio 6 to Visual Studio 2005 enabling developers to use the .NET framework

PROJECTS

Scalability validation framework

Technical University of Darmstadt

Feb 2013 – July 2018 Germany

Designed a framework for continuous validation of performance expectations of HPC libraries. It allows users to uncover unexpected scalability bottlenecks and evaluate alternative implementations. As part of the framework, I developed a lightweight benchmarking platform for MPI collective operations. The framework was evaluated on different implementations of MPI, on OpenMP constructs, and on parallel sorting algorithms.
Paper: ICS'15

Task dependency profiler

Lawrence Livermore National Laboratory

Oct 2016 – Mar 2017 CA, USA

Developed a tool (over 3000 lines of code) that creates task dependency graphs from OpenMP code. For this project, I extended the LLVM OpenMP runtime to generate callbacks for loop chunks and did a partial evaluation of resource contention overhead at a chunk level.
Source code: github.com/sshudler/libtdg

Task replay engine

Technical University of Darmstadt

Feb 2013 – July 2018 Germany

Designed and developed a replay engine (over 1500 lines of code) for task dependency graphs. For the replay either the LLVM/OpenMP runtime or pthreads could be used. The purpose of this engine is to analyze resource overhead and contention.
Source code: github.com/sshudler/replay-engine
Paper: PPoPP'17

GPU-based denoising

SagivTech Ltd.

Apr 2011 – Nov 2011 Israel

Completed this project for SagivTech Ltd. that specializes in development of GPGPU algorithms for image and signal processing applications. I implemented an image denoising algorithm based on the Haar wavelet transform using OpenCL. The code uses OpenCV to load and display the image.
Source code: github.com/sshudler/DeNoising

EDUCATION

Ph.D. in Computer Science

Technical University of Darmstadt

Feb 2013 – June 2018 Germany

Thesis title: "Scalability Engineering for Parallel Programs Using Empirical Performance Models"
Thesis advisor: Prof. Felix Wolf

M.Sc. in Computer Science

Hebrew University of Jerusalem

Oct 2004 – Dec 2009 Israel

Thesis advisor: Prof. Amnon Barak

B.Sc. in Computer Science

Hebrew University of Jerusalem

Oct 2000 – Aug 2003 Israel

Top 15% of graduating class (magna cum laude)

LANGUAGES

English ●●●●●

Hebrew ●●●●●

Russian ●●●●○

German ●●○○○

SEL. PUBLICATIONS

ESPT'18 S. Shudler, J. Vrabec, F. Wolf: *Understanding the Scalability of Molecular Simulation using Empirical Performance Modeling*. ESPT, 2018 (in conjunction with SC'18)

EuroPar'17 P. Reisert, A. Calotoiu, S. Shudler, F. Wolf: *Following the Blind Seer—Creating Better Performance Models Using Less Information*. EuroPar, 2017

PPoPP'17 S. Shudler, A. Calotoiu, T. Hoefler, F. Wolf: *Isoefficiency in Practice: Configuring and Understanding the Performance of Task-based Applications*. PPoPP, 2017

ICS'15 S. Shudler, A. Calotoiu, T. Hoefler, A. Strube, F. Wolf: *Exascaling Your Library: Will Your Implementation Meet Your Expectations?*. ICS, 2015