Sergei Shudler

Senior software engineer and parallel programming researcher; specialized in performance analysis and tools

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EXPERIENCE

Postdoctoral Appointee

Argonne National Laboratory

Aug 2018 – Aug 2019 | Lemont, IL, USA

- Investigate in-situ analysis and visualization techniques in extreme-scale scientific applications
- Work on SENSEI, a generic in-situ analysis platform
- Develop an experimental accelerator support (OpenMP 4.5 offloading) for a data analysis and visualization framework VTK-m
- Build Singularity (similar to Docker) containers for easier adoption of in-situ software stack
- Collaborate with two research teams

Research Associate

Technical University of Darmstadt

Feb 2013 – July 2018 | Darmstadt, Germany

- Investigated the use of empirical modeling (machine learning / regression) for performance analysis of parallel programs
- Developed benchmarking suites and performance tools (see Projects section below)
- Devised a practical method for deriving isoefficiency functions of real-world task-based applications
- Prepared MPI and multithreading exercises for university 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 | Herzliya, Israel

- Worked on an OpenGL-based 3D visualization system for seismic data
- Improved the responsiveness of the system 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 a scene; ported the code to Win32

3D Graphics Developer

Tiltan Systems Engineering Ltd.

Nov 2009 – Oct 2011 | Petah-Tikva, 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

SUMMARY

- 8 years of software development experience in the industry
- 5 first-author papers in peer-reviewed conference and workshop proceedings
- Expert in high-performance computing and parallelism
- Excellent interpersonal and communication skills

SKILLS

Programming

C++ | C | Python | Java | Bash | Matlab | GLSL | Fortran

APIs / Frameworks

STL | MPI | OpenMP | pthreads | OpenCL | Pandas | NumPy | CUDA | OpenGL | Win32 | Linux | Docker

Dev tools

Git | Autotools | CMake | GDB | SVN | TotalView | Eclipse | Visual Studio

Methodologies

Multithreading | Performance profiling | Dist. programming | Data analysis

LEADERSHIP

- Administered biannual seminars in parallel computing
- Supervised 2 students (one bachelor and one masters student)
- Mentored junior developers and advised them on different issues

C++ Programmer

Israeli Air Force

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 code-base from Visual Studio 6 to Visual Studio 2005 allowing developers to use the .NET framework

PROJECTS

Scalability validation framework

Technical University of Darmstadt

Feb 2013 – July 2018 | Darmstadt, Germany

Designed a framework for continuous validation of performance expectations of HPC libraries. Allows users to uncover unexpected scalability bottlenecks and evaluate alternative implementations. As part of the framework, developed a lightweight benchmarking platform for MPI collective operations. The framework was evaluated on various use cases.
Papers: ICS'15, TPDS'19

Task dependency profiler

Lawrence Livermore National Laboratory

Oct 2016 – Mar 2017 | Livermore, CA, USA

Developed a tool that creates task dependency graphs from OpenMP code. 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 | Darmstadt, Germany

Designed and developed a replay engine for task dependency graphs. For the replay, either the LLVM/OpenMP runtime or pthreads can 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 | Ra'anana, Israel

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

EDUCATION

Dr.-Ing. (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" (magna cum laude)
Thesis advisor: Prof. Felix Wolf

M.Sc. in Computer Science

Hebrew University of Jerusalem

Oct 2004 – Dec 2009 | Israel

Thesis advisor: Prof. Amnon Barak
Final grade: 92

B.Sc. in Computer Science

Hebrew University of Jerusalem

Oct 2000 – Aug 2003 | Israel

Dean's list in the 2nd year
Final grade: 95 (magna cum laude)

LANGUAGES

English ●●●●●

Hebrew ●●●●●

Russian ●●●●○

German ●●○○○

SEL. PUBLICATIONS

EGPGV'19 S. Shudler, N. Ferrier, J. Insley, M. Papka, S. Patel, S. Rizzi: *Fast Mesh Validation in Combustion Simulations through In-Situ Visualization*, EGPGV, 2019.

TPDS'19 S. Shudler, Y. Berens, A. Calotoiu, T. Hoefler, A. Strube, F. Wolf: *Engineering Algorithms for Scalability through Continuous Validation of Performance Expectations*, TPDS, 2019.

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.