

Suren A. Chilingaryan, PhD

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Open-Source Projects:
<http://darksoft.org/projects>

I am an experienced software engineer and have interest in both algorithms and performance. Mastering hardware architectures and OS internals, I am able to grasp software systems as whole and pay attention to performance of critical components. Currently I work for various scientific projects helping to improve performance.

AREAS OF EXPERTISE

Engineering distributed data acquisition and control systems
Web-based data management and visualization
Architecting software libraries and applications
Performance analysis and software optimization techniques
Low-latency communication in heterogeneous systems
Automation of system management and administration
Technical writing

TECHNICAL SKILLS

Programming	C/C++, IPC, TCP/IP, CUDA/OpenCL, SSE/Altivec, OpenMP/NPTL
System Programming	POSIX, Linux Internals, PCI Drivers, DMA, GPUDirect/DirectGMA
Scientific Computing	MATLAB, ROOT, BLAS/LAPACK, MPI
Software Analysis	gdb, perf/operf, nvvp/nvprof, vtune, valgrind, systap, tcpdump
Web Technologies	HTTP, REST, HTML/CSS, XML/XSLT/Schema, JavaScript, SQL
Orchestration	Ansible, OpenShift, Docker, LibVirt/KVM, Infiniband, GlusterFS
Scripting	PHP, Ruby/Python + C-modules, perl, bash

EMPLOYMENT HISTORY

Since 2013	Data Processing and Performance Expert at Karlsruhe Institute of Technology. Participate in several projects aiming to build high-performance instrumentation for large-scale scientific experiments.
2007 – 2012	Post-Doctoral Researcher at Karlsruhe Institute of Technology. Worked in the domain of software optimization and data management.
2005 – 2007	Software Engineer at Yerevan Physics Institute. Implemented a distributed data acquisition system for particle detector networks.
2002 – 2005	Associate Researcher at Forschungszentrum Karlsruhe. Developed cross-platform middleware for high-bandwidth slow control systems.
2001 – 2002	Software Engineer at Yerevan Physics Institute. Developed software for neuro-acceleration PCI board and was managing IT infrastructure.

EDUCATION

July 2006	PhD degree in Computer Engineering “ <i>Data Exchange Solution for Distributed Data Acquisition Systems and its application for Cosmic Ray Monitor Networks</i> ” at National Academy of Science, Armenia
1996 – 2001	MSc in Mathematics “ <i>Data Processing using Neural Networks</i> ” at Moscow State University.

PERSONAL DATA

Nationality	Armenian, Russian Federation
Date of Birth	January 12, 1979
Languages	English, Armenian, Russian

Data acquisition and control systems for high-speed detectors and detector networks

- Evaluate possibility to use GPUs in L1 track trigger for the next upgrade of CMS experiment. The system is expected to distribute data from the FPGA-based electronics to multiple GPUs using GPUDirect and should accept or decline track candidate within 6 us.
- Responsible for the software stack of UFO (Ultra Fast X-ray tomography) project with objective to design a new type of synchrotron beamline aimed for high-speed 3D and time-resolved 4D imaging and enabling image-based feedback loops. Designed a scalable architecture for UFO control system combining readout, computation, and storage nodes using Infiniband fabric.
- Developed Linux driver platform for in-house PCIe-based electronics providing flexible register model with scripting support, modular scatter-gather DMA engines, and low-latency RDMA communication with GPUs. Maintain drivers for high-speed streaming camera, hot electron bolometer, etc.
- Maintain parts of slow control system for KATRIN (KARlsruhe TRItium Neutrino) experiment. Developed the middleware to interconnect subsystems based on different control platforms using OPC DA interface and Web Services.

Used technologies: C, POSIX, Linux Kernel Modules, DMA, GPUDirect/DirectGMA, Linux AIO, iSCSI/iSER, GlusterFS, Ruby/Python, LabVIEW, WinCC, OPC, Web Services, TCP/IP

Parallelization and optimization of data processing software

- Adapted a number of tomographic algorithms for GPUs and fine tuned for the several recent architectures from AMD and NVIDIA.
- Parallelized Matlab applications used in material sciences to measure strains in micro- and nano-scale materials and to track drying of liquid coatings.
- Optimized MRSES, a feature selection algorithm, to run on the IBM CELL platform.

Used technologies: C, POSIX, OpenMP, CUDA/OpenCL, IBM CELL SDK, SIMD (SSE/Altivec), MATLAB, Algorithms.

Data management

- Prepare highly-available and scalable cloud platform based on RedHat OpenShift to store experimental data and run web-based data services.
- Supervise development of web-based visualization platform for archives with large tomographic volumes.
- Developed a web platform to provide a uniform access and visualization for the large archives of time series data stored in the variety formats and storage engines. Maintain multiple installations used in meteorology, cosmic ray research, and a variety of slow control systems.

Used technologies: OpenShift, GlusterFS, PHP, JavaScript, WebGL, MSSQL, MySQL, ROOT

PREVIOUS POSITIONS AND OPEN-SOURCE PROJECTS

- Developed and maintain RusXMMS project providing library for automatic language/encoding detection and patches for popular Linux music players, FTP clients, etc.
- In 2005 – 2007 designed DAQ system for ASEC (Aragats Space Environmental Center) and SEVAN (Space Environmental Viewing and Analysis Network) cosmic ray detector networks. Wrote firmware for ARM microprocessors controlling operation of the detectors.
- In 2002 – 2005 researched OPC-based cross-platform data exchange solutions for slow-control systems. Wrote an *XMLBench* benchmarking suite to compare XML libraries assessing performance in parsing, XSD validation, DOM manipulations, and XML security.
- In 2001 – 2002 developed Linux driver for the SAND PCI neuro-acceleration board (developed at Forschungszentrum Karlsruhe) and built a training framework on top of it.