





Jonas Markussen

Software Engineer and PhD Candidate

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WORK EXPERIENCE

Senior Software Engineer Sep. 2018 —
Dolphin Interconnect Solutions

PhD Student Feb. 2015 —
Simula Research Laboratory
and University of Oslo

Initially collaborated with, and then later working for Dolphin Interconnect Solutions. Currently developing a framework for high-performance, distributed I/O, resource sharing, and composable architectures in PCIe clusters. Gained experience with PCIe, NTBs, high-speed interconnects, RDMA, distributed shared-memory architectures, NVMe, GPU programming, Nvidia GPUDirect, driver development and low-level kernel hacking.

- Implemented Linux KVM hypervisor support using VFIO mediated device drivers for passing through physically remote devices to a local VM.
- Contributed to the design, development and testing of the SmartIO extension to the SISI shared-memory API.
- Created a software library and userspace NVMe driver for developing distributed storage applications using SmartIO. Demonstrated concurrent, zero-copy and direct block-level access to NVMe drives from multiple GPUs in the cluster without involving CPU in the data path.
- Investigated performance issue with Intel IOMMUs and implemented support for PCIe peer-to-peer transfers for SmartIO devices.
- Developed various RDMA performance benchmarking tools.

Software Developer Aug. 2014 — Jan. 2015
Bridge Technologies

Gained experience with analysing IPTV and OTT digital video, network traffic analysis, PIM-SM multicasting, and working with embedded C++.

- Implemented a real-time MPEG transport stream parser for the VB288 content extractor using libpcap for live capturing multicast IPTV video.
- Implemented parser for MPEG-2 and MPEG-4/AVC video streams in order to extract and validate CEA608/708 closed captioning data and provide real-time event notifications.

Software Development Engineer Mar. 2011 — Aug. 2014
Fotoware

Worked mainly with the back-end of FotoWeb, a web-based image and video archiving system with full-text metadata search and workflows based on metadata tags. Gained experience working with Apache2, MongoDB, web caches, designing REST services from the ground up, and creating HTTP endpoints with C++ (FastCGI) and Python (Flask / mod_wsgi).

- Implemented a hierarchical metadata taxonomy tree that supported CRUD operations and assignment to assets of tens of thousands of metadata tags within milliseconds.
- Created a configurable workflow engine allowing users to create custom pipelines and workloads for processing assets based on metadata tags.
- Made a background job scheduler with support for webhooks and asynchronous message-passing as well as bulk file operations.
- Implemented both back-end and front-end for exporting assets to an external CMS and an access management UI for these exports.

PART-TIME JOBS

Java Programmer 2010 — 2011
Redimi

Worked part-time as a Java programmer for six months at a start-up company.

Help-Desk Operator 2010 — 2011
University Centre for IT (USIT)

Worked at the university IT help desk.

Teaching Assistant 2009 — 2011
University of Oslo

Teaching assistant and exam corrector.

EDUCATION

PhD, Informatics 2015 —
Computer Science
University of Oslo

MSc, Informatics 2010 — 2014
Programming and Networks
University of Oslo

BSc, Informatics 2006 — 2010
Computer Science
University of Oslo

SKILLS

Architecture – Linux kernel hacking, device drivers, microcontrollers, PCIe, KVM, virtual machines, memory and resource virtualization, shared-memory architectures, non-transparent bridges, NVMe, GPUDirect, CUDA, x86.

Cluster computing – distributed shared-memory applications, HPC, low-latency networking, RDMA, interconnection networks.

IP networking – routing protocols, transport protocols, TCP, multicasting, 802.11 WLAN family, MANETs, IoT, traffic engineering, libpcap, TCP congestion control, traffic analysis, AQMs.

Web technologies – HTTP, REST, Ajax, FastCGI, jQuery, SQL, HTML/CSS, MongoDB, Flask, Apache2, nginx, CDNs, caching.

SELECTED PUBLICATIONS

“Flexible device sharing in PCIe clusters using Device Lending”

Markussen et al., ACM ICPP Comp., Aug. 2018

“Device Lending in PCI Express networks”

Kristiansen et al., ACM NOSSDAV, May 2016

“Latency and fairness trade-off for thin streams using redundant data bundling in TCP”

Opstad et al., IEEE LCN, Oct. 2015