Jonas Markussen
R&D Systems Software Engineer

+47 408 62 630
jonassm@ifi.uio.no
jonasmarkussen
enfiskutensykkel

SOFTWARE ENGINEERING EXPERIENCE

Software Architect	2019 —
Senior Software Engineer	2018 — 2019

Dolphin Interconnect Solutions

Contributed to the SmartIO framework for high-performance, distributed I/O and resource sharing, in PCIe shared-memory clusters. Gained experience with PCIe, non-transparent bridging, cluster interconnects, RDMA, distributed shared-memory architectures, NVMe, GPU programming, Nvidia GPUDirect, driver development and Linux kernel hacking.

- Contributed to the design, implementation and evaluation of SmartIO.
- Created a distributed device driver for simultaneous sharing of a non-SR-IOV NVMe among multiple hosts in a cluster.
- Implemented Linux KVM hypervisor support using VFIO mediated device drivers for assigning remote physical devices to VMs (pass-through).
- Developed a storage framework based on SmartIO and GPUDirect, providing zero-copy raw block access to NVMes from multiple GPUs in the cluster without involving CPU in the data path.
- Developed various DMA and RDMA cluster benchmarking tools.

Software Developer 2014 — 2015

Bridgetech

Worked with online analysis of digital video over network. Got experience with video encoding, PIM-SM multicasting, MPEG streams, working with C++ in an embedded environment, and real-time network traffic analysis.

- Contributed to an MPEG transport stream parser for the VB288 content extractor using libpcap for live capturing IPTV (MPEG-DASH).
- Implemented a 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 (Web Back-end) 2013 — 2014

Fotoware

Worked mainly with 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).

- 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.

EDUCATION

PhD, Informatics	2015 —

University of Oslo
& Simula Research Laboratory
Doctorate degree in computer science.

MSc, Informatics	2010 — 2014

University of Oslo
& Simula Research Laboratory
Master's degree in computer science.

BSc, Informatics	2006 — 2010

University of Oslo
Bachelor's degree in computer science.

OTHER JOB EXPERIENCE

Front-end Web Developer	2011 — 2013

Fotoware

Java Programmer	2010 — 2011

Redimi

Teaching Assistant	2009 — 2011

University of Oslo

SKILLS

System architecture – Linux kernel hacking, device drivers, ATmega & STM32 microcontrollers, embedded, PCIe, KVM, virtual machines, memory and resource virtualization, memory architectures, non-transparent bridges, NVMe, GPUDirect, x86, ARM.

Cluster computing & HPC – distributed shared-memory applications, ultra low-latency networking, MPI, RDMA, interconnection networks, GPU programming (CUDA).

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

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

SELECTED PUBLICATIONS

- J. Markussen, L.B. Kristiansen, P. Halvorsen, H. Kielland-Gyrud, H.K. Stensland, C. Griwodz. "SmartIO: Zero-overhead Device Sharing through PCIe Networking". In: *ACM Transactions on Computer Systems*, vol. 38, no. 1–2 . 2021. DOI: 10.1145/3462545
- J. Markussen, L.B. Kristiansen, R.J. Borgli, H.K. Stensland, F. Seifert, M. Riegler, C. Griwodz, P. Halvorsen. "Flexible device compositions and dynamic resource sharing in PCIe interconnected clusters using Device Lending". In: *Cluster Computing*, vol. 23, no. 2 . 2020. DOI: 10.1007/s10586-019-02988-0
- J. Markussen, L.B. Kristiansen, H.K. Stensland, F. Seifert, C. Griwodz, P. Halvorsen. "Flexible Device Sharing in PCIe Clusters using Device Lending". In: *International Conference on Parallel Processing Companion* (ICPP'18) . 2018. DOI: 10.1145/3229710.3229759
- L.B. Kristiansen, J. Markussen, H.K. Stensland, M. Riegler, H. Kohmann, F. Seifert, R. Nordstrøm, C. Griwodz, P. Halvorsen. "Device Lending in PCI Express Networks". In: *ACM NOSSDAV*. 2016. DOI: 10.1145/2910642.2910650
- B.R. Opstad, J. Markussen, I. Ahmed, A. Petlund, C. Griwodz, P. Halvorsen. "Latency and fairness trade-off for thin streams using Redundant Data Bundling in TCP". In: *IEEE Local Computer Networks* (LCN'15) . 2015. DOI: 10.1109/LCN.2015.7366322