Jonas Markussen

Cluster Computing & Systems Software Specialist

+47 408 62 630
enfiskutensykkel@gmail.com
jonasmarkussen
enfiskutensykkel
0000-0003-3166-2480

Experience

Scientific R&D Manager 2023 —
Dolphin Interconnect Solutions

- Leading a newly established R&D team, continuing research and development of SmartIO as well as looking into CXL and next-gen PCIe.

Software Architect 2019 — 2023
Senior Software Engineer 2018 — 2019
Dolphin Interconnect Solutions

- Responsible for making the SmartIO device sharing solutions from my PhD part of Dolphin's standard product line.
- Implemented an NVMe device driver and block device interface on top of SmartIO, allowing multiple hosts in a PCIe cluster to share and simultaneously access NVMe devices without requiring virtualization.
- Developed multiple shared-memory and RDMA-based tools for benchmarking the performance of data transfers in Dolphin PCIe clusters.
- Contributed to two research papers on PCIe P2P and offloading a DPDK network card driver onto an FPGA and on a GPU respectively.

External PhD Student 2018 — 2022
PhD Student 2015 — 2018
Simula Research Laboratory

- Was a full-time PhD student until my scholarship ran out, and then completed the PhD on my own time while I worked for Dolphin.
- Designed, implemented, and evaluated the SmartIO framework for high-performance, distributed I/O by making it possible for host machines in a Dolphin PCIe shared-memory cluster to disaggregate and share their internal I/O resources (PCIe devices and memory resources).
- Extended SmartIO with Linux KVM hypervisor support using VFIO mediated device drivers, allowing physical devices to be assigned to VMs running on remote hosts in the cluster.
- Developed a CUDA/C++ library for SmartIO with GPUDirect support, and, as proof of concept, implemented a userspace NVMe driver that enable GPUs to initiate reading and writing from storage independently of CPUs (driver offloaded onto GPU), and moving data from remote NVMe devices anywhere in the cluster directly into GPU memory.
- Published 5 academic papers about SmartIO, including a paper in ACM TOCS, a flagship journal on distributed computer systems.

Software Developer (systems software) 2014 — 2015
Bridgetech

- Contributed to a solution using libpcap for live capturing OTT/IPTV traffic and parsing out MPEG transport streams sent over RTP.
- Implemented a parser for MPEG video streams to extract and validate closed captioning data and provide real-time event notifications in case of missing or corrupted data.

Software Development Engineer (web back-end) 2013 — 2014
Front-end Web Developer 2011 — 2013
Fotoware

Java Programmer (part-time) 2010 — 2011
Redimi

Education

PhD, Informatics 2015 — 2022
University of Oslo
& Simula Research Laboratory
Doctoral 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.

Skills & Expertise

</> Software Engineering
C, Python, C++, JavaScript, Bash, git, Docker, Gitlab CI/CD, PHP, Java.

Computer Architecture and Embedded Programming
Linux kernel hacking, PCIe device drivers, microcontrollers, virtual machines, memory and resource virtualization, PCIe NTBs, Linux KVM/VFIO, memory architectures, NVMe, CUDA/GPUDirect.

Distributed and Parallel Computing
Distributed systems, distributed shared-memory applications, cluster computing, high-performance computing, RDMA, GPU programming, ultra low-latency networking.

TCP/IP and Network Programming
Transport layer protocols, routing protocols, AQMs & traffic engineering, traffic analysis, libpcap, QoS, WLAN & MANETs, PIM-SM multicasting, REST API design, web applications & development, HTTP.

Selected Publications

- J. Markussen. "SmartIO: Device sharing and memory disaggregation in PCIe clusters using non-transparent bridging". *PhD thesis*. 2022. DOI: 10852/97351
- J. Markussen, L.B. Kristiansen, P. Halvorsen, H. Kielland-Gyrud, H.K. Stensland, C. Griwodz. "SmartIO: Zero-overhead Device Sharing through PCIe Networking". *ACM Transactions on Computer Systems (TOCS)*, vol. 38, no. 1–2. 2021. DOI: 10.1145/3462545

A list of publications can be found at
`https://dblp.org/pid/169/0395.html`