Jonas Markussen

R&D Systems Software Engineer

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

Experience

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

- Responsible for turning the SmartIO framework implementation from my PhD into a standard Dolphin product.
- 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.

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 allowing hosts in a Dolphin PCIe shared-memory cluster to share PCIe devices among themselves and disaggregate memory resources.
- Implemented Linux KVM hypervisor support for SmartIO using VFIO mediated device drivers, allowing remote physical devices to be assigned to VMs on different hosts in the cluster.
- Developed multiple shared-memory and RDMA-based benchmarking tools in order to measure the performance of data transfers.
- Identified performance bottlenecks in SmartIO through extensive experimentation, and implemented several optimizations that reduced the latency overhead of remote memory access to near-zero (<50 ns).
- Developed a CUDA/C++ library using GPUDirect and SmartIO that enable GPUs to initiate reading and writing from NVMes directly, moving data from storage into GPU memory directly (zero-copy data transfer) without involving the CPU.
- Published 5 academic papers based on my SmartIO work, including a paper in a flagship journal on distributed computer systems.

Software Developer 2014 — 2015
Bridgetech

- Contributed to an MPEG transport stream parser using libpcap for live capturing IPTV/MPEG-DASH traffic.
- Implemented a parser for MPEG-2 and MPEG-4/AVC video streams in order 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, CI/CD, PHP, Java.

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

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

Network Programming
Transport layer protocols, IP routing protocols, WLAN & MANET protocols, PIM-SM multicasting, QoS & AQMs, traffic engineering, libpcap, REST API design, HTTP.

Selected Publications

- J. Markussen. "SmartIO: Device sharing and memory disaggregation in PCIe cluster 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`