Jonas Markussen

R&D Systems Software Engineer

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Experience

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

- Turned the SmartIO framework implementation from my PhD into standard Dolphin product.
- Implemented an NVMe device driver and block device interface for Linux that makes it possible for multiple hosts in a PCIe shared-memory cluster to share and simultaneously access NVMe devices without requiring virtualization.

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

- Designed, implemented, and evaluated the SmartIO framework for distributed I/O and allowing hosts to sharing PCIe devices and disaggregate memory resources in Dolphin PCIe shared-memory clusters.
- 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 and conducted extensive evaluations to identify performance bottlenecks in Dolphin's PCIe cluster solutions, and implemented several optimizations for SmartIO that reduced latency overhead for remote memory access to near-zero (<50 nanoseconds).
- Developed a CUDA/C++ library using GPUDirect and SmartIO for allowing GPUs to initiate reading and writing from NVMes directly without involving CPUs, and transferring data directly from storage into GPU memory (zero-copy).
- Published 5 academic papers based on my SmartIO work, including a paper in ACM Transactions on Computer Systems, 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, 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`