PCI Express support for BeeGFS

In this master, you will add RDMA functionality to the global shared filesystem BeeGFS™ (ThinkParQ) when running over PCIe NTB interconnects from Dolphin Interconnect Solution.

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ThinkParQ's BeeGFS™ and BeeOND™ global shared filesystem is a popular shared namespace filesystem used in high-performance computing (HPC). This filesystem can be used on many network topologies over TCP/IP, but only on InfiniBand is it using remote direct memory access (RDMA) as the main transport method. The candidates (2) will add RDMA functionality on Dolphin Interconnect Solutions (DIS) PCIe non-transparent blocking (NTB) network by adding SuperSocket™ to BeeGFS, thereby reducing filesystems latency, increasing bandwidth, and increasing the high availability of the filesystem.

Students will also get Sponsored BeeGFS™training by ThinkParQ.

Goal

The main goal of this master thesis is to add SuperSocket™ functionality to ThinkParQs BeeGFS filesystem when using Dolphin's PCIe NTB Fabric and to compare the performance with InfiniBand.

Learning outcome

In this thesis, you will learn about state-of-the-art HPC interconnects and Global Shared Filesystems, as well as technologies heavily exploited in large-scale data centers. Specifically, you will learn about RDMA fundamentals and programming. You will collaborate with Simula's engineers as well as be able to interact with industry partners Dolphin Interconnect Solution and ThinkParQ.

Qualifications

HPC networks, TCP/IP programming, understanding of PCIe and the following courses (or equivalent):

- IN3230 – Computer Networks
- IN3000 – Operating Systems

Supervisors

- Håkon Kvale Stensland
- Masoud Hemmatpour
- Tore Heide Larsen

Collaboration partners

- Dolphin Interconnect Solution AS, Norway
- ThinkParQ GmbH, Germany

References

- About Dolphin
- Dolphin SuperSockets
- MXH930 PCIe NTB Host Adapter
- ThinkParQ products
- BeeGFS Documentation

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