

## PhD position in Unified PCIe IO

### Project Description

PCI Express (PCIe) is today widely used for static local IO expansion, and PCIe over cable is gaining momentum as a high-speed host-to-host network. However, it is currently not possible to integrate these services in a single hardware infrastructure, two separate PCIe networks are needed.

IO devices are typically statically assigned to a single root complex (host). Hot-add, device migration, device sharing and remote access are generally not supported. They can be accessed directly using the PCIe Non-Transparent Bridging (NTB) addressing techniques by any connected remote computer, but the required software structure, OS interfaces and implementations do not exist. As IO devices are normally owned by one compute node, IO data is normally relayed to remote servers through the host using traditional networking services. Operating system software necessitates this although PCIe NTB techniques enable IO devices to transfer data to a remote node directly, and therefore reduce latency and overhead.

The overall goal of this project is the development of a new framework for operating systems and virtualized applications that will enable flexible remote management (discover, address, access and use) of standard PCIe IO devices that should coexist with existing host-to-host network communication on a single PCIe fabric. The framework will enable standard PCIe IO devices to be dynamically added, re-allocated, used and in some cases shared by compute nodes in the network with no or an absolute minimum of changes to application and device-driver code. The project will be conducted in close collaboration with Dolphin Interconnect Solutions.

### Requirements

The candidates must have very good documented and proven knowledge in the area of system-oriented, experimental computer science (operating systems and protocols). Additionally, strong programming skills are required.

The internationally distributed nature of these projects, including partners from research and industry, requires the right candidate to have very good communication skills in English. Very good skills in scientific and popular presentation and writing will also be considered in employment decisions.

Please note that being admissible to the PhD program of the University of Oslo is a precondition for eligibility. Admission to the PhD program comprises a separate assessment of your grades achieved in bachelor courses, master courses and master thesis. The University of Oslo follows the grade system established by the Bologna Agreement.

### About Simula

Simula Research Laboratory AS is a publicly owned research institute located outside Oslo, Norway. It is a multi-cultural organization, employing about 130

individuals from 25 countries. Simula conducts ICT research in the fields of communication technology, scientific computing and software engineering. Simula's main objective is to generate new understanding and create vital knowledge about fundamental scientific challenges that are of genuine value for society. This is achieved through high quality research, education of graduate students, industry collaboration, technology transfer and commercialization.

### About Dolphin Interconnect Solutions

Dolphin Interconnect Solutions AS is a wholly-owned subsidiary of Dolphin Group ASA which is listed at Oslo Stock Exchange (OSE ticker:DOLP). Dolphin Interconnect Solutions is a global provider of ultra-low latency, high-bandwidth computer interconnect solutions for high speed embedded real-time systems, clustered databases, general networking, web services and industrial applications. Dolphin's current product range is utilizing PCI Express technology with innovative software solutions to maximize application performance.

### Simula Offers

- Excellent opportunities for doing high-quality research.
- Generous support for travels and equipment.
- Nice office facilities located close to the Oslo fjord and 10 minutes drive from the center of Oslo.
- An informal and inclusive working environment.
- Flexibility in choice of working tools and methods.
- Growth opportunity into advanced infrastructure development.
- A competitive salary.
- Simula strives to achieve a good balance between male and female employees, and women are particularly encouraged to apply.

### Application Requirements

Note that all attachments MUST be submitted in PDF format, and with the exception of the CV, combined into one single PDF-document in the order specified by the list below. To avoid misplacement, please make sure to include your last name in the file-names of all documents that you send us.

The application deadline is as soon as possible, but no later than 15 October 2014. Applications for the position will be reviewed on a rolling basis until the position is filled.

1. A cover-letter justifying why you are qualified.
2. CV (including a publication list if applicable).
3. Transcripts of master-level and bachelor-level courses.
4. Copy of master thesis.

### Contact

For more information about the position, the research group, Dolphin, etc., please see

- <http://mpg.ndlab.net> (The research group blog)
- <https://www.simula.no/departement/media> (The MEDIA Research group)
- <http://www.dolphinics.com> (Dolphin Interconnect Solutions)

For even more information, contact Håkon Kvale Stensland by email ([haakonks@ifi.uio.no](mailto:haakonks@ifi.uio.no)). Mark the email with "PCIe open PhD position".