

**Co-author declaration for the following joint paper:**

This declaration should describe the research contribution of the candidate, the main supervisor (where he/she is an associate author) and the other two most central authors (the corresponding author must be among them). If applicable, the contributions from other PhD candidates who has or intend to include the paper in a thesis should be described. Contributions from master students should be described.

**Authors:** Jonas Markussen, Lars Bjørlykke Kristiansen, Rune Johan Borgli, Håkon Kvale Stensland, Friedrich Seifert, Michael Riegler, Carsten Griwodz, Pål Halvorsen

**Title:** Flexible Device Compositions and Dynamic Resource Sharing in PCIe

**Interconnected Clusters using Device Lending**

**Journal:** *Cluster Computing*, volume 23, issue 2 (2020)

Jonas Markussen's independent contribution:

☒ First author ☒ Corresponding author ☐ Other

Markussen and Kristiansen developed the idea for a mechanism for detecting the guest-physical memory layout of a VM, and Markussen extended the MDEV implementation with support for this. He also extended the evaluation by designing and performing additional P2P and VM performance experiments, as well as conducting a new experiment with an I/O-heavy machine learning workload to demonstrate the improved performance. Markussen took the initiative to continue to investigate potential performance bottlenecks, and contributed to further improve the overall performance for both Device Lending and MDEV. Markussen wrote most of the text for this paper, and also implemented the GPU benchmarking programs used for the evaluation.

Lars Bjørlykke Kristiansen

☐ First author ☐ Main supervisor ☐ Corresponding author ☐ PhD candidate ☒ Other

Kristiansen contributed to the idea for the memory layout detection mechanism, and reviewed the manuscript several times.

Carsten Griwodz

☐ First author ☐ Main supervisor ☐ Corresponding author ☐ PhD candidate ☒ Other

Griwodz participated in the planning of the paper, and reviewed the paper and provided feedback and suggestions for improvements on parts of the text.

Pål Halvorsen

☐ First author ☐ Main supervisor ☐ Corresponding author ☐ PhD candidate ☒ Other

Halvorsen participated in the planning of the paper, and reviewed the paper several times and provided feedback and suggestions for improvements on all parts of the paper.

Håkon Kvale Stensland

☐ First author ☒ Main supervisor ☐ Corresponding author ☐ PhD candidate ☐ Other

Stensland participated in the planning of the paper, and provided feedback and review of the paper text.

Has this paper been, or will this paper be part of another doctoral degree thesis?

Yes: ☐ No: ☒



If yes, elaborate:

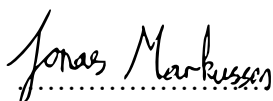
Contributions from master students:

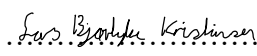
Do you verify that Jonas Markussen has contributed to this joint paper as described above?

Yes: ☒ No: ☐

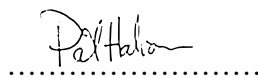
If no, specify:


**Co-author's signatures:**

  
.....  
Jonas Markussen

  
.....  
Lars B. Kristiansen

  
.....  
Carsten Griwodz

  
.....  
Pål Halvorsen

  
.....  
Håkon K. Stensland