Thesis B.Sc.

Thesis M.Sc.

IDP, HiWi, Guided Research

Using the IOMMU for safe and secure user space network drivers

Motivation

Commonly used user space network drivers such as DPDK or Snabb currently have effectively full access to the main memory via the unrestricted DMA capabilities of the PCIe device they are controlling. All modern server CPUs feature an IOMMU as part of their virtualization capabilities: it's required to pass PCIe devices through to virtual machines.

This IOMMU can be used to restrict the memory that can be accessed via DMA by a PCIe device. Goal of this thesis is to implement support for using the IOMMU via the `vfio-pci` driver in Linux for our driver ixy: `https://github.com/emmericp/ixy`.

Your Task

- Get familiar with the Linux vfio system
- Restrict the PCIe device to a well-defined subset of the address space
- Measure impacts on performance

Requirements

You should be a proficient Linux user in order to be able to complete this thesis successfully. Don't worry if you don't understand all of the words in the description above, but you should be able to grasp the problem statement with a little bit of research on your own.

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