



# Master Thesis

## Dynamic VM Network Scheduling

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### Context

Cloud computing or more precise Infrastructure as a Service (IaaS) offers flexible and on-demand virtual machines (VMs) to its users. Such VMs are deployed side by side on one shared hardware pool in a data centre. This resource sharing requires an encapsulation for each VM and an execution environment of VMs on the actual physical hardware.

One resource is the network interface of a server, which is used by all virtual machines in parallel. In a setup with KVM as a hypervisor and Open vSwitch for network virtualization the network sharing is best effort – a VM might wait a long time for using the network interface while another VM fully congests the bandwidth.

### Scope of the Thesis

To address the network sharing issue between multiple VMs on a server node, limiting the network bandwidth for each VM is a popular approach. However this may lead to unused resources if the server could provide more bandwidth but is not considering the actual current bandwidth usage. This thesis implements a dynamic network bandwidth scheduler. The resulting scheduler should identify the need of VMs and dynamically assign the network bandwidth limitation for each VM. The resulting software should be evaluated if a) it provides a better network throughput and b) single VMs cannot fully congest the bandwidth (e.g. caused by DOS attacks).

### Requirements and Comments

If this thesis achieves good progress and outcome, its results are to be integrated in the CACTOS research project (<http://www.cactosp7.eu>) which is released under an OpenSource license. For that reason, we appreciate if you are ready to OpenSource your results.

We focus on Linux based server operating systems in VMs and on hypervisor level. For that reason basic knowledge and experience with Linux systems is recommended (but no must).

If you are interested in this or similar theses, please contact Christopher Hauser either by mail or directly in his office.

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