Context
A virtual switch is an intelligent software program that provides the means for example, for VM communication. It has two functional parts, a data plane and a control plane. It can be used in a virtualisation software as well as inside a server. For example, Open vSwitch is being currently used in OpenStack cloud middleware. It has become necessary to consider the performance characteristics of a virtual switch while designing a cloud data centre to host high performance and resource demanding applications as the limitation of the switch performance influences the resource management. Specifically, when it comes to place and migrate VMs in the data centre based on the network resource usage by the applications, one needs to take the maximum achievable throughput by the virtual switch into account along with the CPU and memory resource demands. In order to determine the probability that a server with a specific virtual switch, is running out of it's capacity through hosting a specific number of VMs and is no longer suitable for placing a new VM, the capabilities of the virtual switch should be modeled. An initial network-aware VM placement algorithm has been described in [1]. The algorithm is initially designed as a VM overlay model and further enhanced to a virtual switch aware traffic model where the saturation bandwidth of the virtual switch inside a server has been determined and a cross-check has been made between the bandwidth demand and the maximum bandwidth capacity of the switch. The traffic model needs to be realised via simulation. A wide range of event-based simulators and emulators are available for the realisation such as NS3, Shadow, Cloonix, IMUNES, Netkit, OMNeT++.

Scope of the Thesis
At the beginning of the thesis, an in-depth analysis of event-based simulators and emulators needs to done in order to find the most suitable one. After the selection, the simulator/emulator will be used to design a virtual switch to realize the algorithm. The simulation with virtual switch properties must consider the performance measurements done in [1]. The ultimate goal of the thesis is to determine the performance of the virtual switch under different bandwidth load situations in order to integrate the virtual switch performance constraints into the VM placement algorithm.

Requirements and Comments
1. Knowledge on fundamentals of data-forwarding devices (switch, router etc.)
2. Good knowledge in C++

References