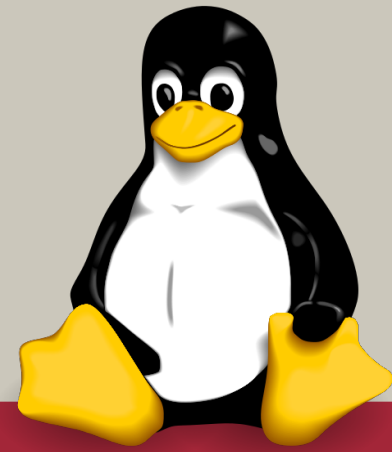




Master Thesis

Network Flow Modelling in Cloud Computing

2015-05-04

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. From a cloud provider's point of view, the VMs are black boxes since the services and applications inside the VM are defined by the customers. For cloud providers, the assignment of VMs to physical servers is hence arbitrary and random, leading to scenarios where a customer's VMs are placed "far away" from each other with high network latency, high noise level from other customers and low network throughput.

The VMs of a customer communicate with each other over the network, e.g. an application service in VM a continuously communicates with a database service in VM b of the very same customer. If the network traffic is analysed, these communication patterns can be extracted to build a network flow model of VMs. Although the VMs are black boxes for the cloud provider, this network flow model can be used to improve e.g. the placement of VMs.

Scope of the Thesis

This thesis first analyses the state of the art of network monitoring and network modelling. With the gained knowledge a system for network flow modelling will be created. Hardware will be provided to set up a cloud testbed, from which the network flow modelling software can be evaluated. The generated model should allow to differentiate different communication patterns (e.g. appl. to database, database replication, web servers to loadbalancer, ...) in order to conclude an optimal placement of VMs on physical servers in a cloud data centre.

Requirements and Comments

If this thesis achieves good progress and outcome, its results can be published as research paper and the software can be released under an OpenSource license on github.

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 required. Knowledge about computer networks are required.

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