Network utilization with SDN in on-demand application-specific networks

Ioannis Grafis
Ioannis.Grafis@os3.nl

Supervised by:
Marc X. Makkes
M.X.Makkes@uva.nl

System and Network Engineering
Universiteit van Amsterdam

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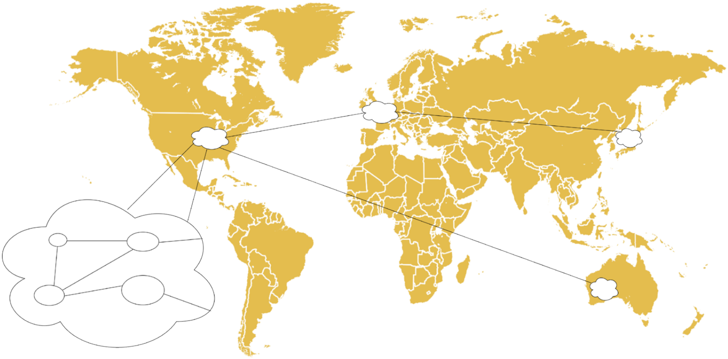
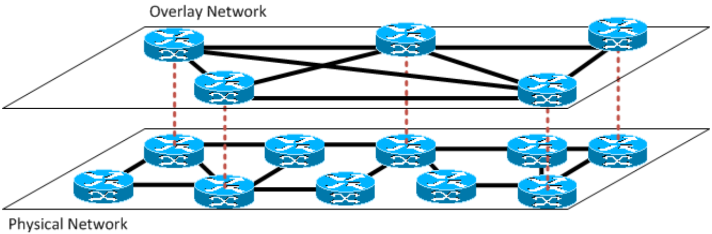
Internet factories

- Internet factories: Creating application-specific networks on-demand[1]
- Uses Infastructure-as-a-Service clouds
- Create, configure and modify the infastructure
- Second implementation Compute factory



Overlay networks

- A network built on top of one or more existing networks
- Add extra functionality



OSPF / SDN comparison

Open Shortest Path First (OSPF) :

- Mature protocol
- Widely used and supported
- Uses Dijkstra's algorithm
- Used by Compute factory

Software Defined Networking (SDN):

- Separation between control plane and data plane
- Centralized managment
- Programmability
- Routing granularity

Hypothesis

If the created overlay networks make use of SDN (OpenFlow), Compute factory's control loops that observe and modify the behavior can gain benefits.

Related work

- B4: Experience with a Globally-Deployed Software Defined WAN[2]
- MiceTrap: Scalable Traffic Engineering of Datacenter Mice Flows using OpenFlow[3]
- SDN Based Load Balancing Mechanism for Elephant Flow in Data Center Networks[4]

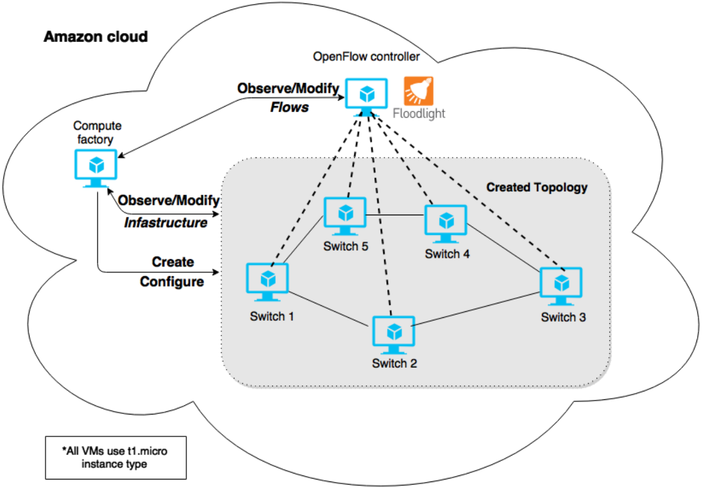
Differences from our case

- Virtual Machine migration
- Connection speed
- Dynamic infrastructure

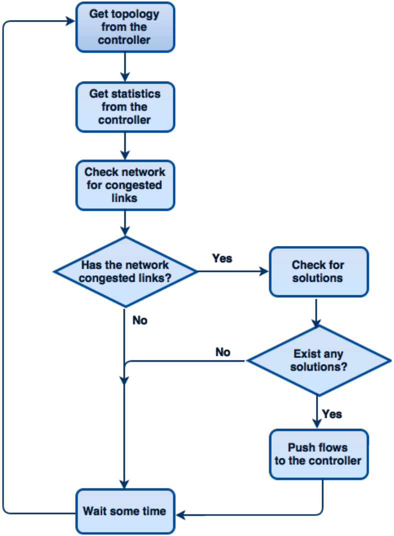
Elephants and Mice flows

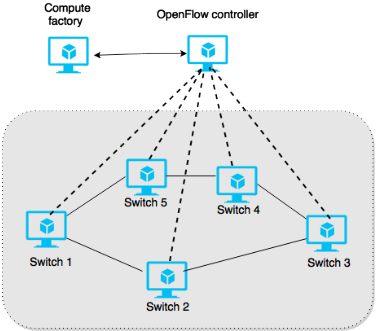
- Elephant flow: Long-lived flow with large data transfer
- Mice flow: Short-lived flow with small data transfer

Compute factory



Compute factory flow control loop





Scenarios

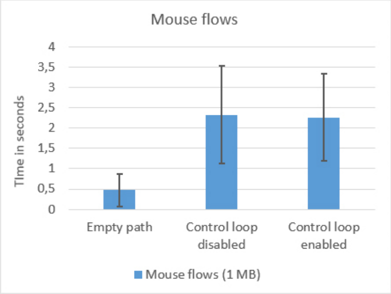
First
: Transfer sequential small and large file in empty path

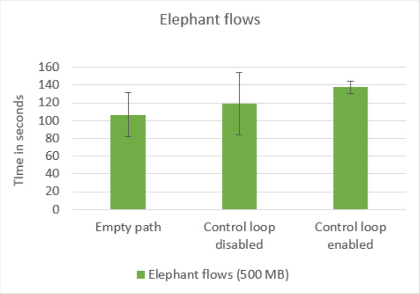
Second
: Transfer simultaneously small and large file with the Copmute factory control loop disabled

Third
: Transfer simultaneously small and large file with the Copmute factory control loop enabled

Scenario results

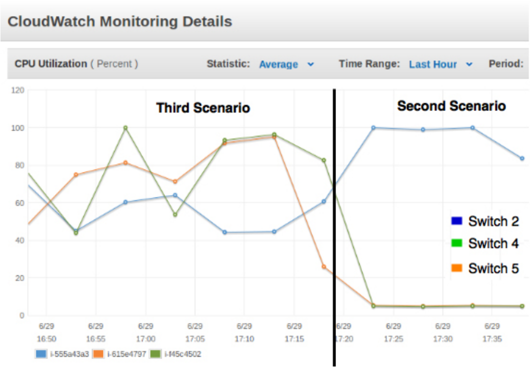
Total time transferring a file

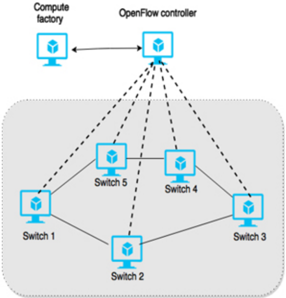




CPU utilization

CPU utilization in the intermediate switches





Conclusions

- Increase stability in data transfer
- Dicrease jitter
- Balance the CPU load in intermediate switches
- Not increase network utilization

Thank you

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