Demonstration of Sirius, a Multi-Cloud Network Virtualization Platform

Navtalk

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User-centric management of security and dependability in clouds of clouds
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Inter- and intra-cloud connections

User-centric management of security and dependability in clouds of clouds
Network hypervisor

Multi-Cloud Network Hypervisor

External Interfaces
Interfaces handler

Embedder
secure VNE

sNet config
sNet topology specifier & config
sNet topology data collector

vNet config
vNet topology specifier & config
vNet routing

Hypervisor core
virtual-substrate mapper
virtual-substrate handler
network monitoring
components isolation handler
packet-In handler
flows handler

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User-centric management of security and dependability in clouds of clouds
Virtualization: main techniques

- Secure & Dependable Virtual Network Embedding to allow arbitrary topologies
- Tunneling and edge-based address translation for arbitrary addressing and service models
Tenants host are uniquely identified
- Each container is connected to a specific switch and attached to a specific port
  \[ \text{hostID} = (\text{datapathID}, \text{port}) \]

Edge address translation
- We have network-wide visibility and control
- At the edge the host MAC is translated to an ephemeral MAC (eMAC) based on the hostID

ARP handling
- We emulate ARP functionality as we want unmodified hosts to use our platform

Flow table isolation
- Each tenant as a quota of forwarding table space per switch
- OpenFlow cache
One public and one private cloud
- Public cloud: Amazon EC2 in Germany (Frankfurt)
- Private cloud: our datacenter, located in Portugal (Lisbon)

In Amazon EC2 we use t2.medium as gateway VMs and t2.micro as normal VMs.

The private cloud is based on a rack of Dell R420, with 2 Intel Xeon E5520 quad-core, 2.2 GHz, and 32 GB RAM.

VirtualBox managed the VMs, which were configured with 1 CPU and 2GB RAM.

The VMs run Ubuntu with Docker (1.13.1) and OvS (2.5.0).

The containers were also based in Ubuntu.
#1 Time to create and destroy containers is relatively similar in private and public clouds.
#2 Grows linearly in either cloud (takes around one second to setup an additional container)
# Time to setup a virtual network

![Time to setup a virtual network chart]

**#1** The growth rate of flow setup is problematic – maybe optimizations needed  
**#2** Time for embedding grows very fast with the number of switches – heuristics for Sec&Dep VNE needed
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