SDN/NFV experiments on Grid’5000

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SDN experiments: methods and tools

- Simulators
- Single-node emulation: Mininet (using OpenVSwitch)
- Multi-node emulation (Emulab)
- Continent-scale testbeds
- Planetary-scale real deployments
Grid’5000 current offerings

- Focus on flexible reconfigurable infrastructure
  - High-level, multi-node emulation with Distem
  - Low-level, physical topologies with KaVLAN
  - Future plans: deployable switches
Distem: multi-node emulation for SDN

- Multi-purpose, distributed emulator
  - **Large-scale** (100s of physical nodes, 10000s of virtual nodes)
  - **CPU performance emulation** \(\sim\) HPC runtimes evaluation
  - **Network topologies emulation** using Linux TC/Netem + VXLAN

- Now supports **OpenVSwitch inside virtual nodes**
  - Soon: experiments with 100s of switches

- Also working on **Chameleon and CloudLab**
  - Work in progress to solve remaining issues
    - Including to deal with differences between testbeds
    - Talk at next GEFI meeting? :-)

http://distem.gforge.inria.fr/
SDN with KaVLAN

- **KaVLAN**: reconfiguration of network switches to provide L2 isolation
  - To protect the testbed from experiments
  - To protect experiments from the testbed
- Idea: build **topologies using several VLANs on multi-NIC nodes**
  - Physical machines, not VMs/containers
- Current status:
  - Prototype tool to handle VLAN assignment for a topology
  - Preliminary experiments:
    - Several OpenVSwitch nodes
    - DPDK for high-performance packet switching
Future plans: deployable switches

- Bare-metal / white-box / open networking switches:
  - e.g. Dell/Force10 S6000-ON (32x 40 Gbps)
  - Linux-powered switches
  - Customizable software stack (Dell’s OS10 based on Debian)
  - Reinstallable using ONIE (≈ PXE)

- Plan:
  - Add some of them in Grid’5000 (outside of the core infrastructure)
  - Enable users to reserve and reinstall them