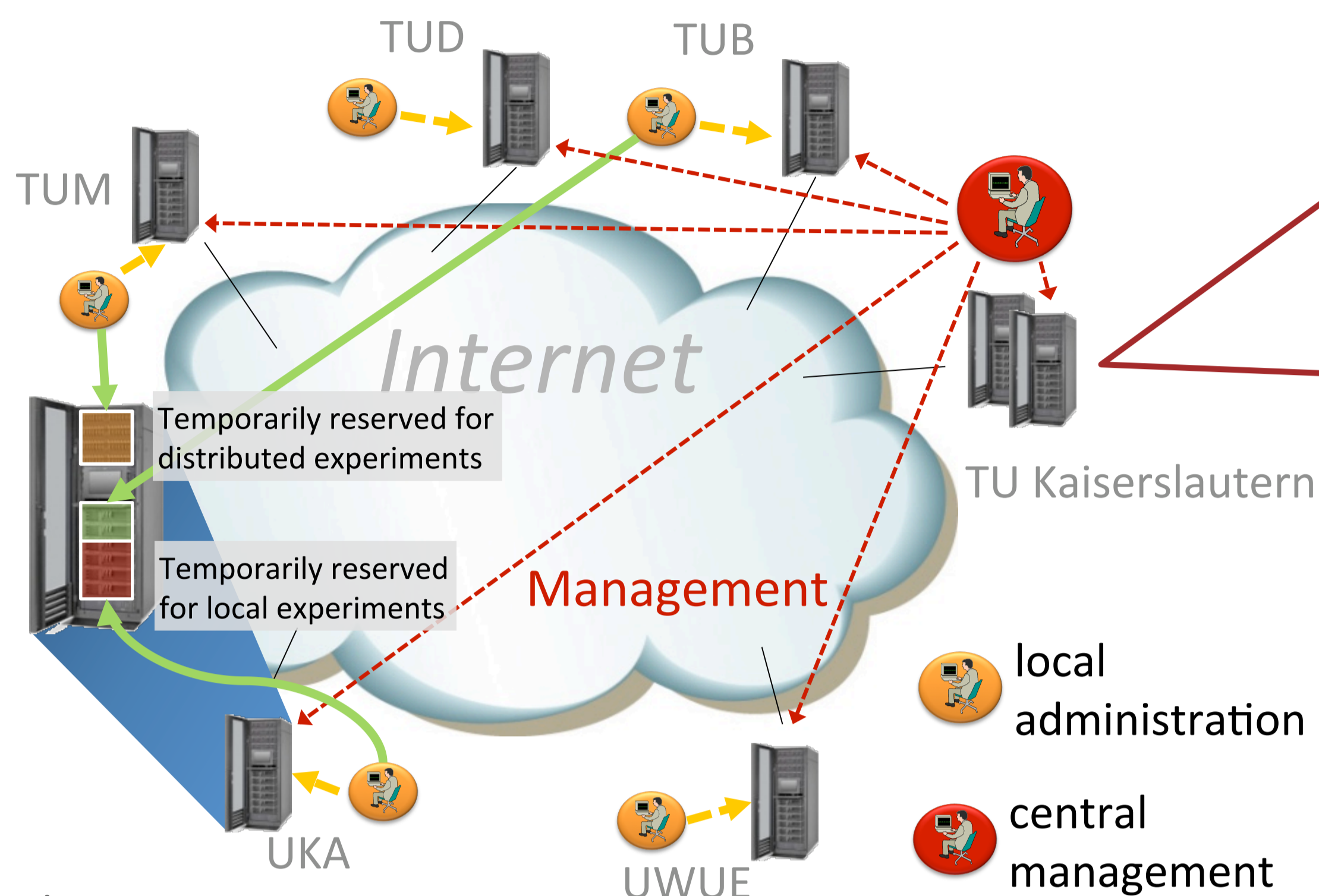


Experimental Facility Overview

- ▶ **Full resource control**
 - ▶ Resource reservation
 - ▶ Experiment isolation
 - ▶ Controllable environment
 - ▶ Experiment scalability
- ▶ **Simple experiment management**
 - ▶ Multiple experimentation interfaces
 - ▶ Easy graphical topology editor
 - ▶ Link emulation
 - ▶ Automatic setup of large experiments
- ▶ **Federation with other facilities**
 - ▶ Planet-Lab
 - ▶ Onelab
 - ▶ GENI/GpENI
 - ▶ Seattle
 - ▶ LDAP-based user management with role-based access control



Control Frameworks

ToMaTo

- ▶ Topology Management Tool
- ▶ Maximal access to virtual devices
- ▶ Flexible network configuration including link emulation



- ▶ Testbed based on Planet-Lab software
- ▶ Management through central website



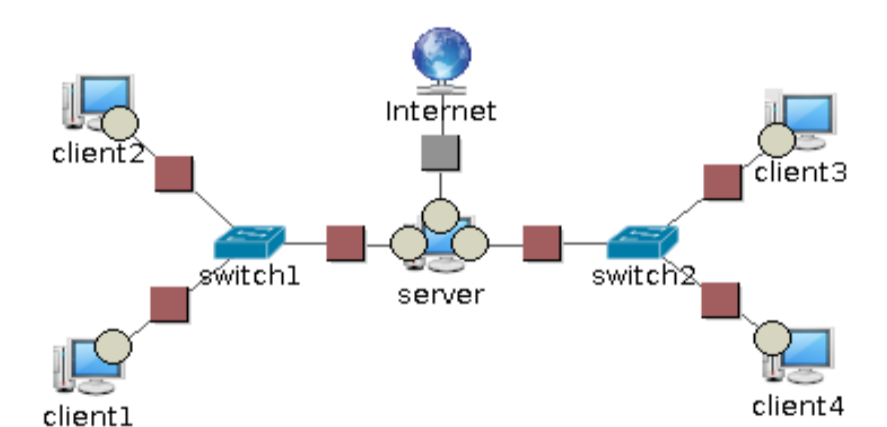
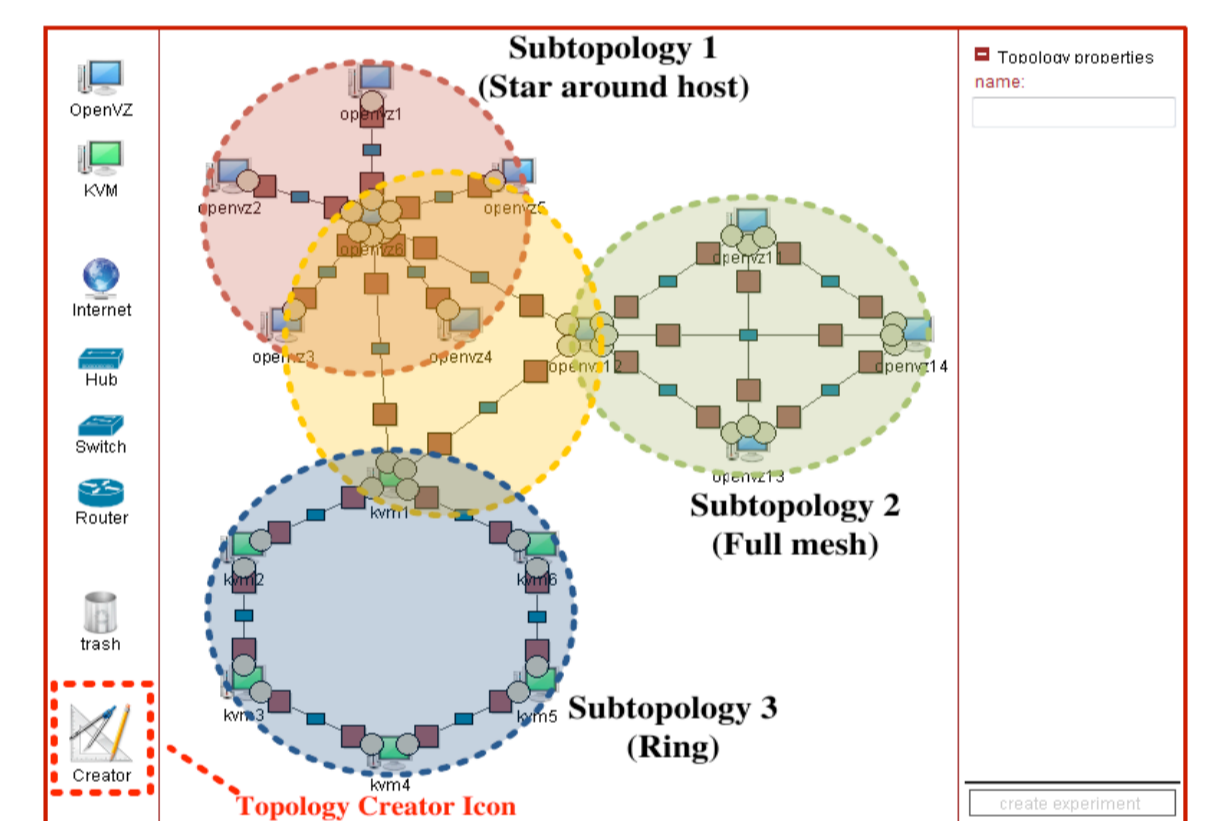
- ▶ Testbed for python code
- ▶ Management through central website



- ▶ Physical nodes can be booted with any PXE boot image
- ▶ Management through central website

Topology Management Tool

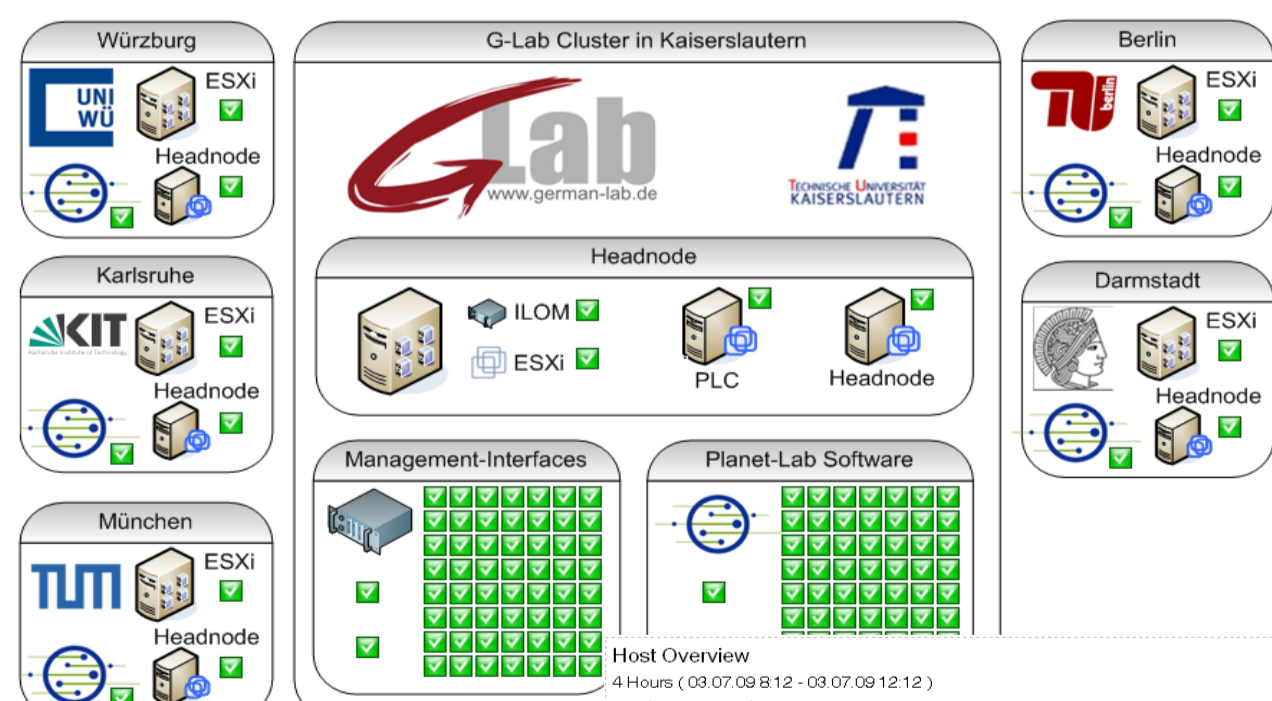
- ▶ **ToMaTo**
 - ▶ Distributed testbed software
 - ▶ Topology-oriented
- ▶ **Virtual devices**
 - ▶ Multiple virtualization technologies
 - ▶ Low resource consumption
 - ▶ Can run any x86 OS/software
 - ▶ Full access to virtual OS/hardware
 - ▶ Direct console access
- ▶ **Networking**
 - ▶ Openflow support
 - ▶ Access to the Internet
 - ▶ Connectors with hub/switch/router semantics
 - ▶ Virtual software routers
- ▶ **Link emulation**
 - ▶ Additional latency, packet loss and bandwidth limits
 - ▶ Intra-site connections are very good
 - ▶ Monitoring of inter-site connections
- ▶ **Usability**
 - ▶ Network auto-configuration
 - ▶ Easy graphical editor
 - ▶ Pre-defined templates
 - ▶ Topology creator for large topologies
 - ▶ Integrated packet tracing



Services

Support services

- ▶ Facility status page
- ▶ History of monitored data
- ▶ Trouble ticket system for efficient support



Collaboration services

- ▶ Mailing lists
- ▶ Wikis for documentation and information storage
- ▶ Webdav/File server for file/document exchange
- ▶ Source code repositories (Subversion and GIT)
- ▶ Trac project management (wiki, bug tracking, etc.)

Feature Comparison

Interface	Parallelism	Hardware access
 ToMaTo	++	++
 PLANETLAB	++	-
 Seattle Open peer-to-peer computing	+++	--
 Custom Images	--	+++