

Future Internet Research and Experimentation

Report on Onelab/2 Activities

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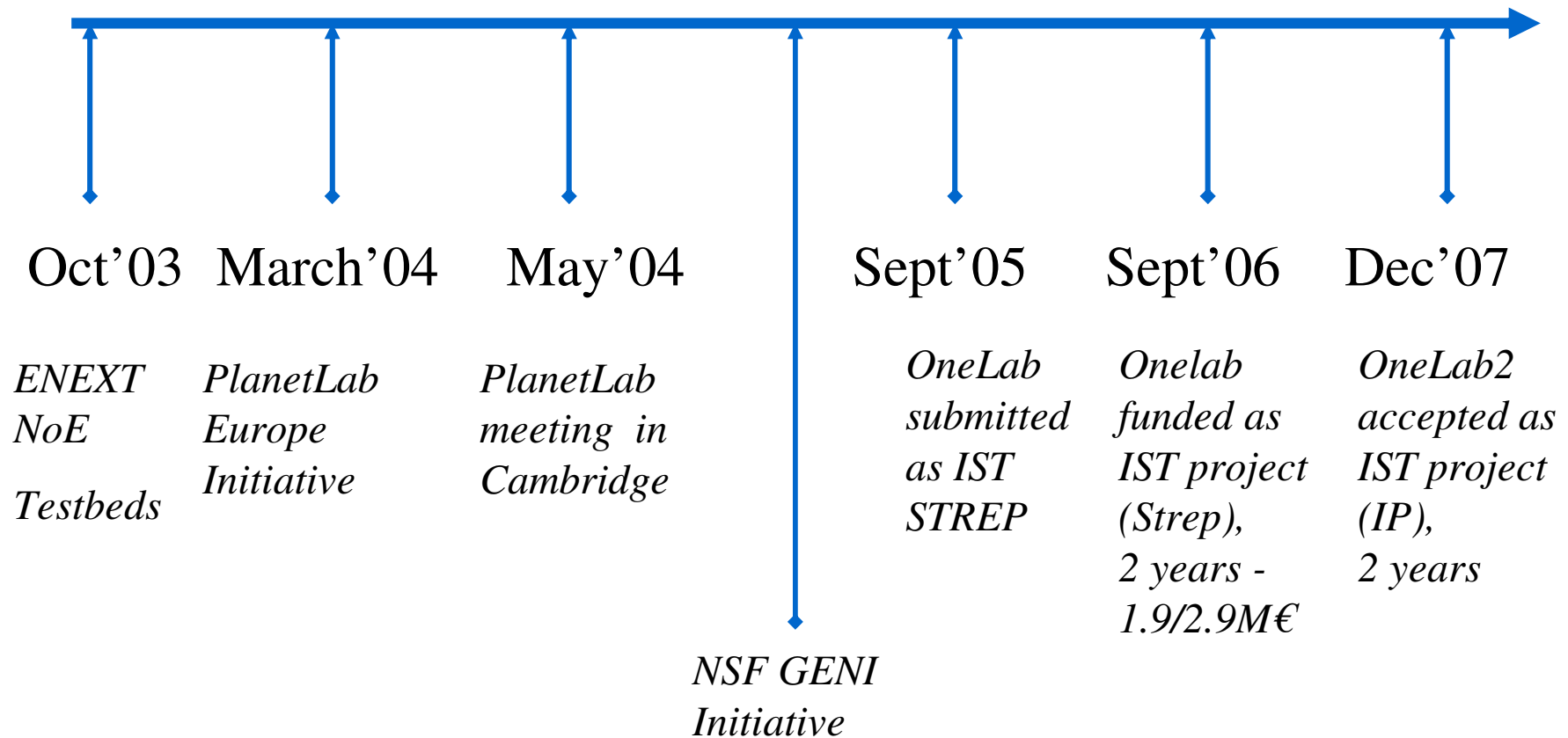


OneLab 1 & 2 Vision

OneLab2: An Open Federated Laboratory Supporting Network Research for the Future Internet

- **Develop and operate a large facility to support networking research and evaluate design solutions**
- **Supports current and emerging architectures**
- **Takes a pragmatic approach:**
 - Evaluates challenges and proposed solutions
 - Deploys incrementally
 - Supports the federation concept
 - Builds towards a long-term objective

OneLab History

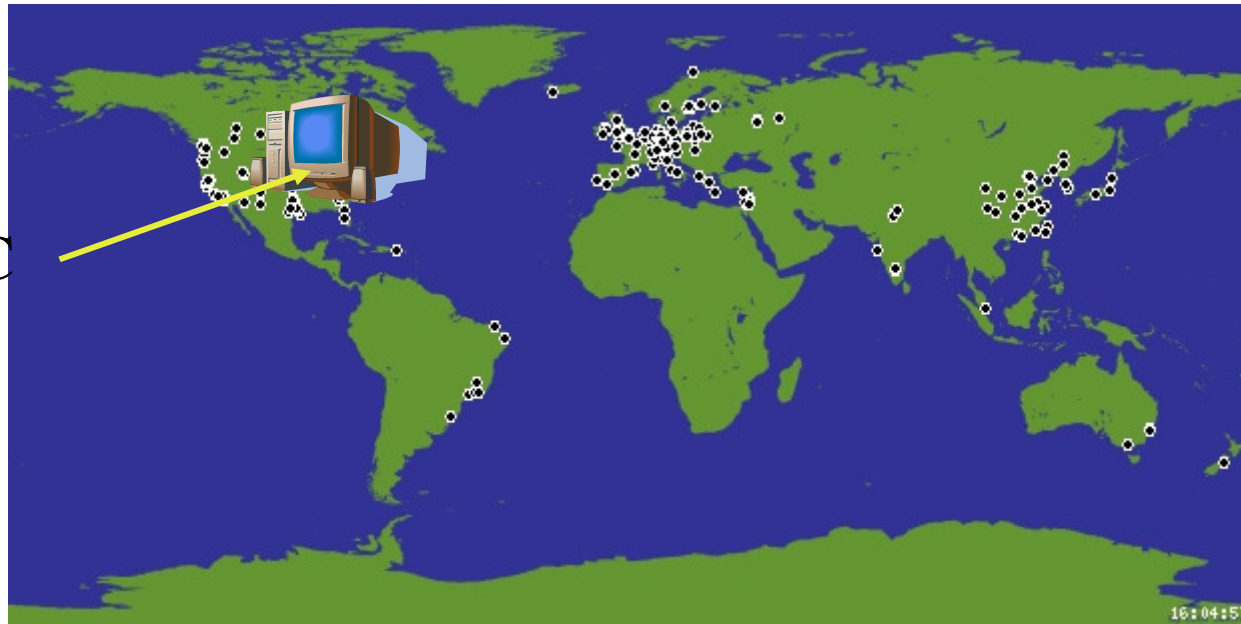


Onelab Design Principles

- Do not start from scratch
 - Too long to make the “utility function” high enough in the short-medium term
- Initialize with **existing** testbeds
 - PlanetLab (virtualization)
 - Extend, Deepen, Federate
- Assess the usefulness of what is provided regularly enabling a platform for research projects
- Include **tools** as they mature
 - Validation, integration
- Tight liaison with “Pilot” projects
- International exposition

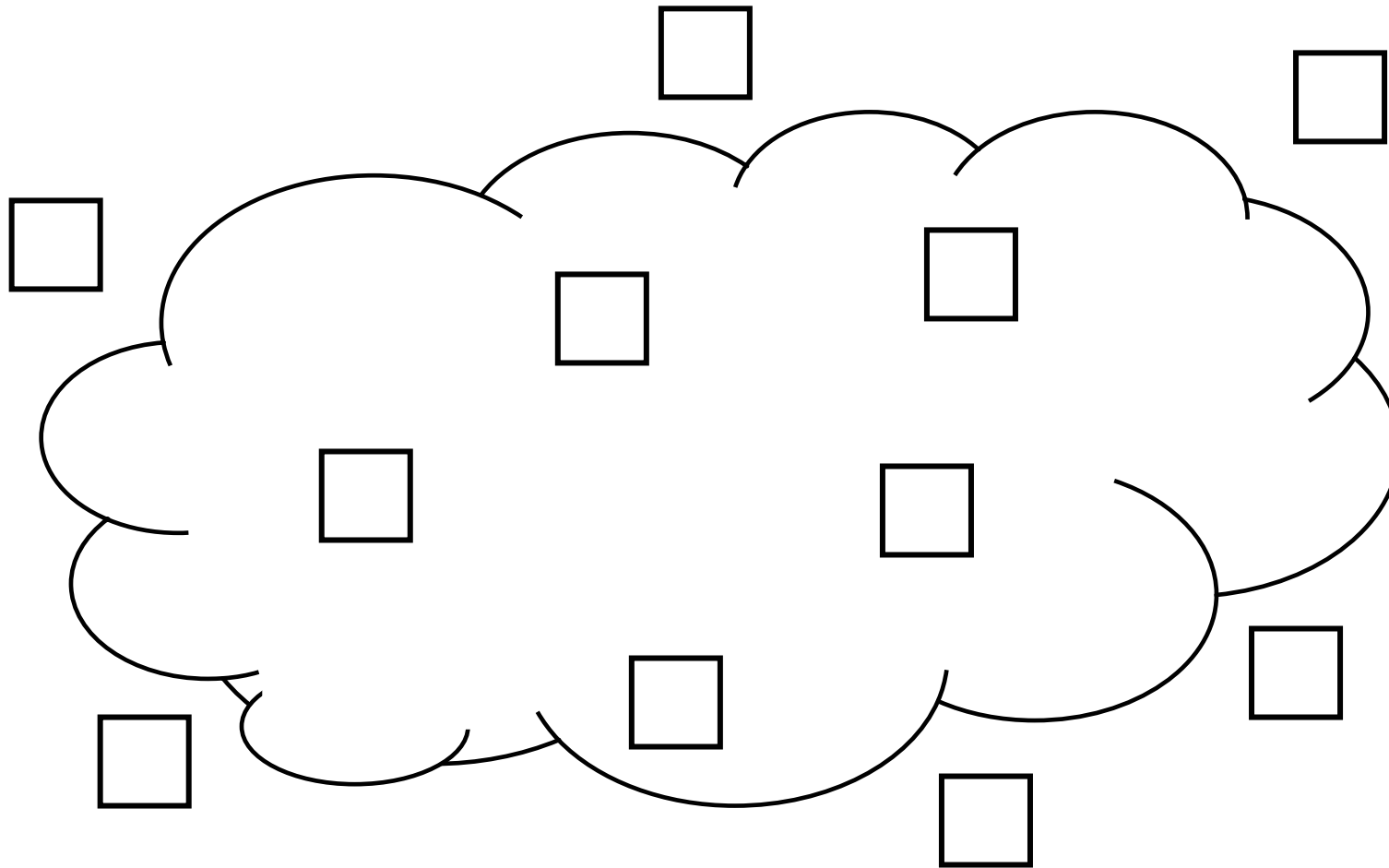
PlanetLab

Single PLC
located at
Princeton

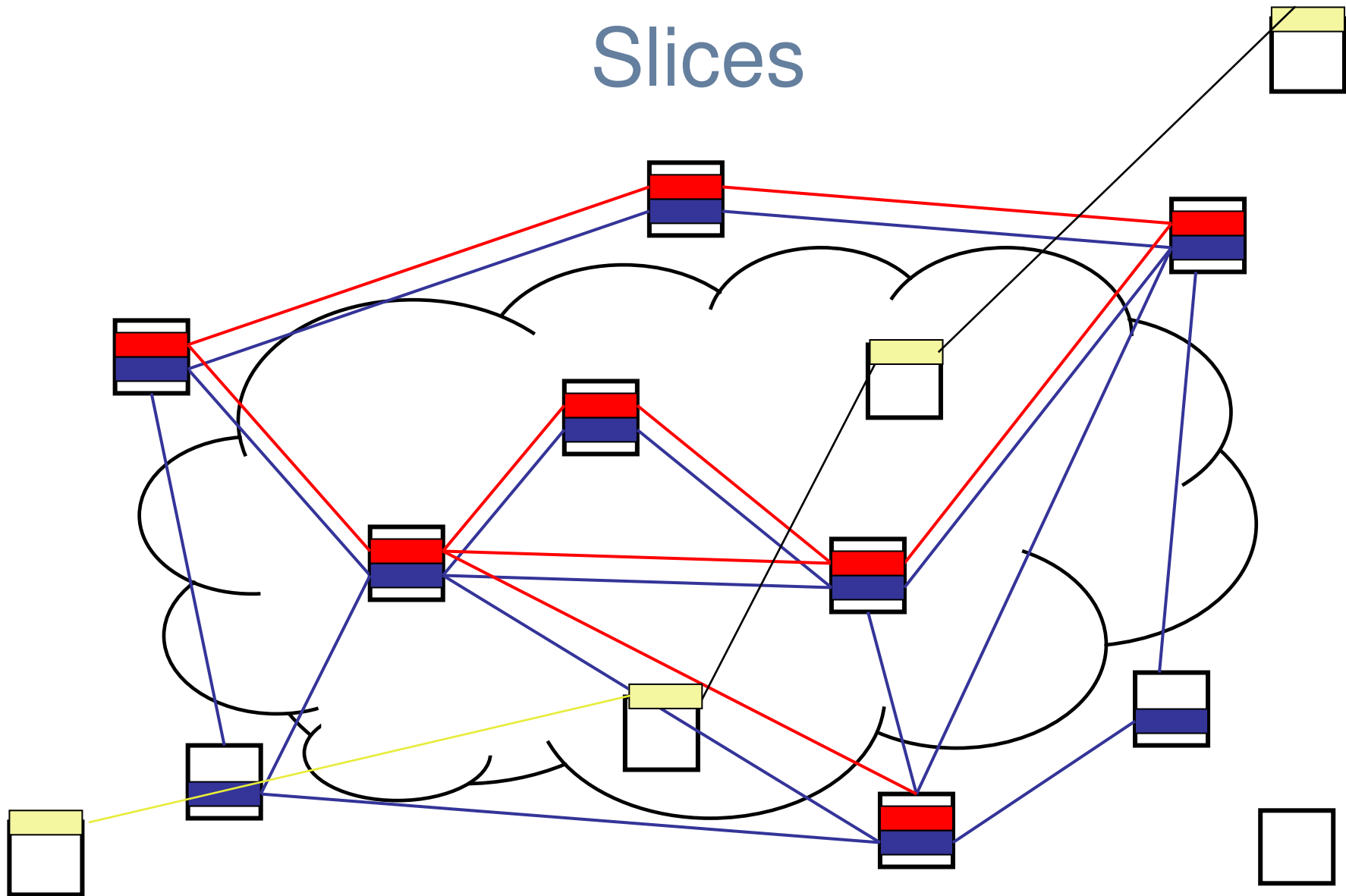


- 637 machines spanning 302 sites and 35 countries
nodes within a LAN-hop of $> 2M$ users
- Supports *distributed virtualization*
each of 350+ network services running in their own *slice*

Slices



Slices



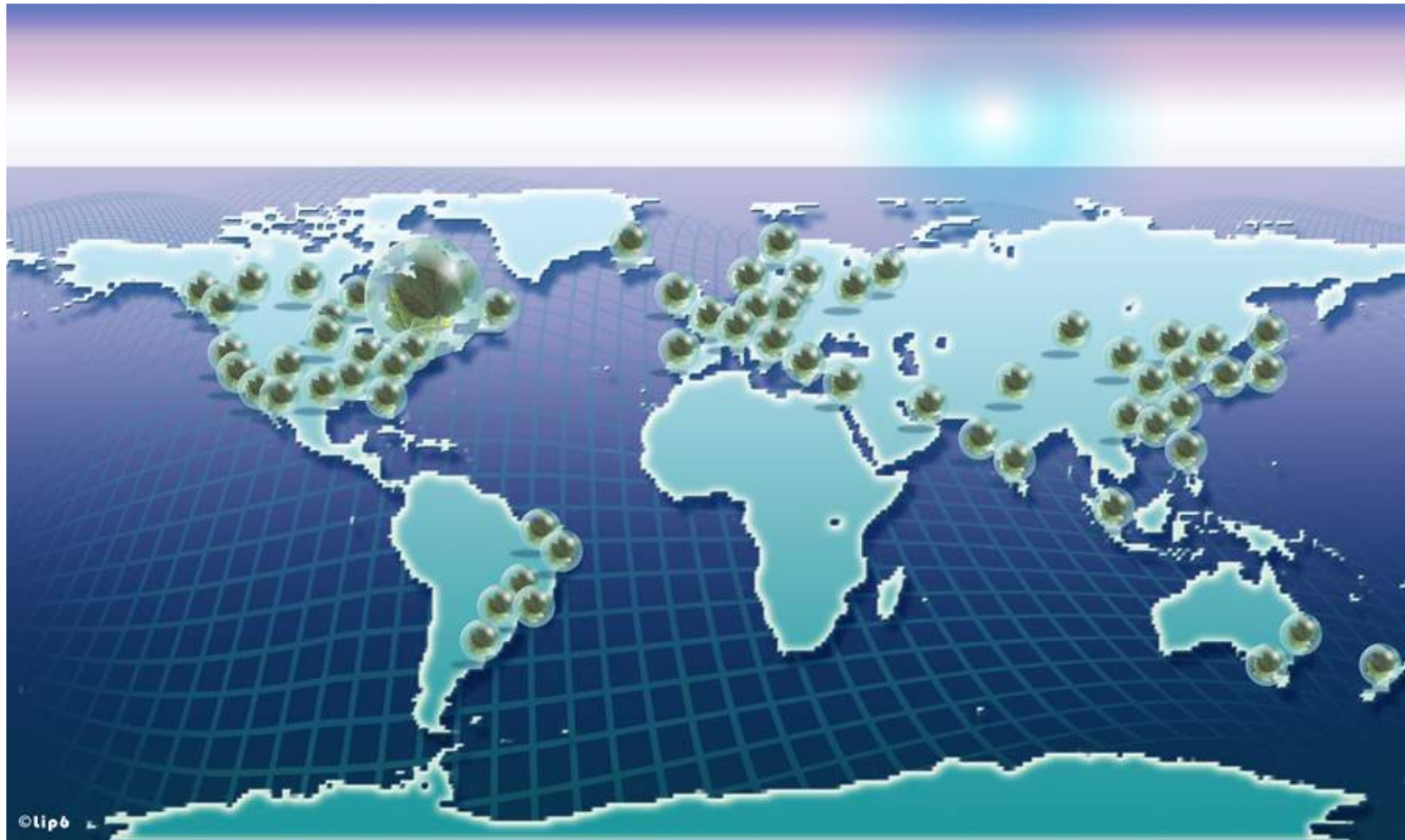
Progress on Extension

- Added wireless capabilities to the kernel
 - Support for WiFi and UMTS
 - part of mainstream PlanetLab-4.2
 - Includes *madwifi*, *iwlwifi*, *nozomi*, *ppp*, ...
- Integration of *dummynet*-capable boxes
 - OneLab-4.2 has builtin support for DummyBoxes, including seamless installation and boot
 - provides WiFi emulation among others
 - A generic data model underway for PlanetLab 4.x
 - support for generic nodes and links
 - suitable for dummynet-like boxes
 - and for VINI-like topologies

Progress on Deepening

- *CoMo* is now OneLab-aware, has better scripting
 - *CoMo* allows one to write scripts to track one's own packets as they pass measurement boxes within the network
- Deploying *traceroute@home*, a distributed topology-tracing system
 - Made fundamental improvements to traceroute to correct errors introduced by network load balancing (new tool: *Paris traceroute*)

Goal: Federate



Before:
a homogeneous system

Goal: Federate



PlanetLab is engaged in a federation trial with the OneLab Project. The plan is to migrate European nodes and slices to an independent EU authority.

OneLab Operation and research

- OneLab:
 - Research project
 - OneLab Private: private experimental PlanetLab for the project members
- PlanetLab Europe:
 - European PLC administered by OneLab (UPMC)
 - Production testbed for Europe
 - Federated with PLC in the USA at Princeton University
 - Ongoing migration for some EU-based PL sites

Progress on Federation

- Jointly developed PlanetLab v4 with Princeton
 - Allows PLCs (PlanetLab Centrals) to federate
 - Any user is offered the illusion of a global platform
 - And can thus create *slices* as if it was a single testbed
 - Through a single interface
- Paradigm
 - One-to-one peering (n-square trust relationship)
 - Each PLC has its own database (nodes, users, slices..)
 - And keeps data from other PLC's
 - Slice attributes (grant of resources) remains local: PLE decides how to use resources from its own nodes
- Running an embryonic PlanetLab Europe
 - Peering PLE-PLC operational for about a year

Developing the Vision

- OneLab should be developed as a multi-year facility
 - Onelab2 (9/08-9/10)
- Based on three pillars
 - Platform (development, operations)
 - Tools (monitoring)
 - Customers (users and research targets)
- Liaison with “pilot” projects
 - Haggie & ANA (SAC), PSIRP (Content), 4WARD (Future Internet)
- PlanetLab Europe (PLE) will grow over the years
 - Tools found mature are integrated from OneLab2 into PLE
- Cooperation with PlanetLab_US/ORBIT/VINI, PlanetLab Japan, FEDERICA, NICTA (Australia), Plans with GLabs

OneLab2 Innovations (partial list)

- **Provide embedded passive & active measurement technologies**
- **Support wireless integration and develop management tools**
- **Provide infrastructural support for large-scale data-centric networking research (CDN, Pub-Sub, Routing in a slice)**
- **Integrate Opportunistic Networking and DTN platforms through the SAC Gateway**
- **Establish methodology to compare networking experiments in non controllable environments**
- **Explore and implement resource management for a single domain and the federation, as well as incentives for sharing**
- **Of course: operations, integration and maintenance**

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OneLab

www.one-lab.org

PlanetLab Europe

www.planet-lab.eu

