An Ipv6 Lab (inside an Ipv6 Dept.)
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Ipv4 to Ipv6

Diagram showing connections between CS.UNIBO.IT, CESIA, 7206, GARR, and TINAC.
Traffic

BOLOGNA

6net-Italy border
Students: the natural testbed ;-)

- Real workload
- Synergy:
  - it is educative
  - they generate real day by day traffic
  - there is a positive competition to have services
- Best feature: we keep out the “ECDL generation” students from our networks.
Interesting Tools: 1 Prometeo

- deamons/inetd = proxies/prometeo
- shared cache
- dns cache
- dynamically uploadable modules
- and obviously: Ipv4/IPv6 compatibility and service conversion
- Prometeo-proxy is GPL software on Sourceforge
Prometeo

- Is a modular proxy that provides all the shared services needed by proxies (e.g. DNS caching)
- Services can be added/deleted/started/stopped/reloaded/reconfigured at RUN time. No need to restart prometeo.
- Proxy modules are dynamic libraries loaded.
- In other words each proxy service is a plug-in for prometeo.
Interesting Tools: 2 vish

- Programmable firewall.
- Used for authenticating users (on wireless/wired networks)
- Used @cs.unibo.it to provide public access services to students' laptops inside labs, or wireless access in classrooms, corridors, garden etc.
- GPL software on Sourceforge
Interesting Tools 3: dbind

- Dynamic DNS
- Laptop DNS registering (Ipv4/IPv6)
- Automagical DNS tables fill-in for large clusters
- GPL software on Sourceforge
Interesting Tools 4: VDE

- Virtual Distributed Ethernet
- Overlay level 2 network
- Ipv4, Ipv6 and Ipv8 compliant (provided it will runs on an Ethernet ;-)
- GPL software on Sourceforge, it should be included soon in Debian SID
VDE

- VDE is Ethernet compliant
- VDE is general,
  - it is a virtual infrastructure that gives connectivity to several kinds of software components: emulators/virtual machines, real operating systems and other connectivity tools.
- VDE is distributed.
- VDE does not need specifically administration privileges to run.
Square here is a mathematical notion, means virtual squared i.e. virtual elevated to the second power.

Something is virtual square (or squared) if it is virtual in the virtual world, and this concept can then be iterated (or applied in a recursive manner) to any order of virtuality. The basic step is from virtual to virtual square.

A virtual square world is created by virtual computers and virtual networks running on real computer and real networks and appear to the users as they were standard computer and networks.

Nowadays it is clear that a virtual world is also a meeting place, a mean to exchange information, to communicate.
Structure of VDE

- **vde_switch**
  - it is the virtual counterpart of a physical Ethernet switch (or hub).

- **vde_cable**
  - it is the virtual counterpart of a crossed cable.
  - it is composed by two *vde_plugs* and a “wire”
VDE: applications

- In Education
  - networking for VM
  - virtual networking (any topology)
  - virtual parallel/distributed systems
- For Security/Privacy
  - VPN/Untraceability
- For Mobility
  - user mobility/service mobility/process mobility
VDE clients

- Virtual Machines
  - qemu, bochs, uMPS, user-mode linux
- any application requiring tuntap (through an emulation layer)
- Slirp
- Ale4net
- UM-VIEWOS lwipV6 module
- A tuntap interface of the hosting operating system
  - (root access is required for this latter feature)
Example
What's next?

- Virtual LABS (freeoszoo.org)
- VIEWOS: a process with a view
  - Partial virtual machines: the semantics of each system call can be changed independently and in several different ways.
  - UM-VIEWOS is “user mode”, no root access required
  - Networking can be at process level or even at a finer degree of granularity.
  - UM-VIEWOS is GPL sw on Savannah. (first cvs release very very soon).
Thank you...

- This work is based on Free and Open Source Software. It would have been very hard, if not impossible, to do something similar based on proprietary solutions: requiring a host of non disclosure agreements, guarantees regarding access to interesting source code, possibly a promise to avoid integrating code owned by competitors, and the asking of permission to publish the research results.

- I feel that today Free and Open Source software is the key for authentic, open minded, long term research in computer science. Therefore I want to use the opportunity to thank the whole community that develops, debugs and broadcasts Free and Open Source Software and ideas.