New Node Types

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PlanetLab

- 800+ servers spanning 400+ sites and 40+ countries

- Intel x86z
- 1+GB RAM
- 100+GB Disk
- 1 Ethernet NIC
- Remote Management
At least 2 directions for new nodes types

• Scale up & down

• Diversify network hardware
  – Internal devices (PCI, …)
  – External devices
Scale UP & DOWN

- Intel x86
- 1+GB (flat) RAM
- 100+GB Disk
- 1 Ethernet Nic

- x86_64, i586, non-x86?
- NUMA, <100MB RAM
- <1GB disk
- Multi-homed Ethernet non-802.3

• How to capture (and expose) configuration diversity?
  • Rspec definition of the node’s hardware?
  • Bootmanager + BootImage changes?
  • NodeGroup Configuration? BootstrapFS? VserverRef?
Diversify Attached Network Hardware

- NetFPGA
- Network Processor IXP
- Openflow switch
- Anagran flowrouter
WUSTL PlanetLab SuperCharged Node

- Network Processor blades
  - dual IXP 2850 NPs
    - 3xRDRAM, 3xSRAM, TCAM
  - dual 10GE interfaces
  - 10x1GE IO interfaces
- General purpose blades
  - dual Xeons, 4xGigE, disk
- 10 Gb/s Ethernet switch
  - VLANs for traffic isolation
“Edge” Router

Home

or

livebox

or

freebox

Neighborhood/Community

+  

+  

wifi mesh
Diversify Attached Network Hardware

• Intel x86
• 1+GB (flat) RAM
• 100+GB Disk
• 1 Ethernet NIC

• x86_64, i586, non-x86?
• NUMA, <100MB RAM
• <100MB disk, flash
• Multi-homed
• network accelerators
• “attached” devices

• How to capture (and expose) configuration diversity?
• How to bootstrap, virtualize, manage, and monitor devices?
PlanetLab Management Architecture

Global Slice Management

Resource Controller

Auditing Archive

MyPLC

Nodes

Components

Attached Devices

NM

Virtualization SW

Substrate HW

node control

sensor data

Component Manager

Attached Device

Component Manager

Attached Device
How to…

• Capture (and expose) configuration diversity?
  – Multiple networks, non-802.3, …
• Bootstrap (bootmanager)
  – open box, black box (firmware blob), …
• Manage (component manager)
  – allocate resources,
• Monitor
  – availability, accountability, …
• Virtualize
  – Wifi, mesh, netfpga, …
• Scale (federate?)