EdgeNet: A Lightweight, Scalable Edge Cloud

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The Cloud as it is

EdgeNet: the Cloud as it will be
PlanetLab: The First Edge Cloud

- Peak: 1353 nodes at 717 sites worldwide
- Invented the concepts of a “slice” and “sliver”
- **Over 150 publications at top-5 venues in 5 years!**

- Container-based infrastructure
- Sliver: standard container at site
- Slice: network of containers
He's dead, Jim
What Killed It?

• Hardware cost: $800K/year just to maintain PL hardware
• Lack of central support
  – Maintaining distributed hardware infrastructures is expensive
  – $5K-$15K/site/year
• Lack of onsite support
  – Research boxes aren’t a local admin’s day job
  – Hardware replacement/installation are slow, networks reassigned...
• Custom software/control stack
  – Maintenance, documentation, training burden without value-add

**Bottom Line:** $10,000 site/year (PlanetLab); $50,000 site/year (GENI)
Four Big Takeaways

• CS Funding Agencies don’t do maintenance
  – Set up to fund 3-5 year projects, grad students
• Hardware is heinous
  – Breaks and needs fixing
  – Bulk of the cost of both onsite and centralized support
  – PlanetLab reached its maintenance limit
• Don’t write software unless you’re actually adding value
  – If industry-standard stuff works, use it
    • Free maintenance
    • Free tutorials/answers/educational material
• Be as cheap and easy as possible for local sites
Successful Infrastructures Live Off The Land

• Use local resources
• Spread by local action: software download and configuration
• Ex: Internet used *existing* computers, phone lines
• Ex: Web used *existing* Internet and services
  – FTP
  – Nine-line shell script was first web server!
“Hello, World” around the world in 5 minutes

Third-party tools
Copious documentation

~$0 per-site maintenance

zero-touch install
Hello, World, Around The World!
Add A Node in 1 Minute!

EdgeNet
EdgeNet Today
What’s Left to Build?

• Everything!
  – 150+ papers in top-five conferences in first five years of PlanetLab
  – Almost *all* about building services and utilities on/for PlanetLab

• We need the same thing!
  – *Tons* of things to do...
## Clouds, CloudLab, EdgeNet

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Thanks to Collaborators

https://www.edge-net.org
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