Next Generation Internet and Wireless Networking Research at WUSTL

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Why Research in Computer Networking?

- Networking is the "plumbing" of computing

- Almost all areas of computing are network-based.

  - Distributed computing
  - Distributed databases
  - Distributed storage
  - Robotics
  - Distributed Games

- Fast growing field

- All top computer companies are networking companies: Google, Facebook, eBay, Microsoft, Cisco, HP, Intel, …
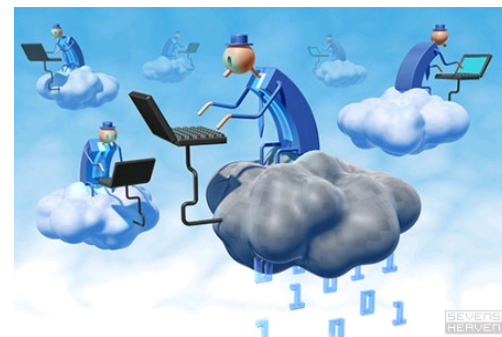
Clouds and Mobile Apps

q August 25, 2006: Amazon announced EC2
⇒ Birth of Cloud Computing in reality
(Prior theoretical concepts of computing as a utility)

q *Web Services To Drive Future Growth For Amazon* ($2B in 2012, $7B in 2019)
- Forbes, Aug 12, 2012

❑ June 29, 2007: Apple announced iPhone
⇒ Birth of Mobile Internet, Mobile Apps

➢ Almost all services are now mobile apps: Google, Facebook, Bank of America, …

➢ Almost all services need to be global (World is flat)
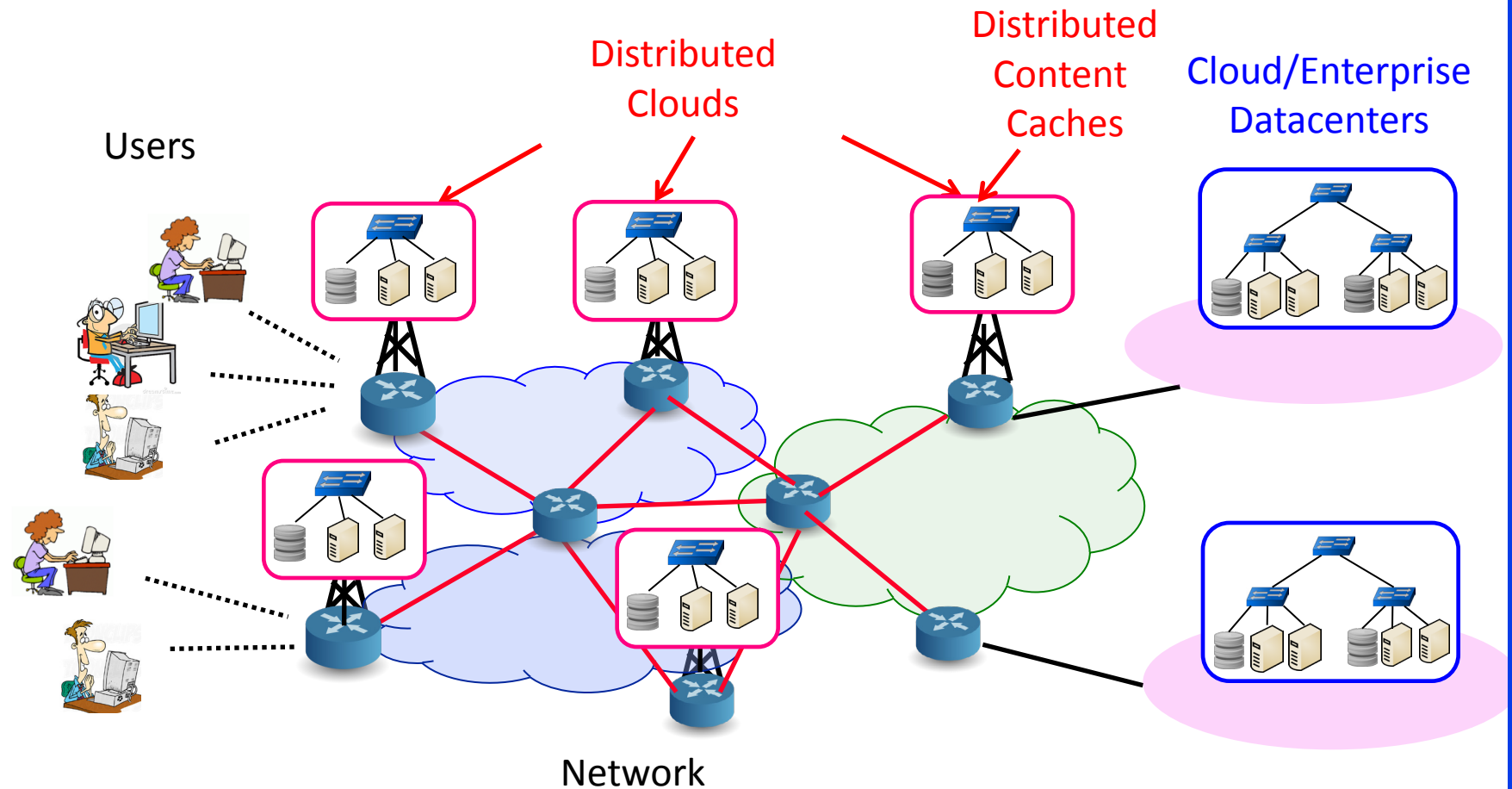
➢ Almost all services use cloud computing

Networks need to support efficient service setup and delivery

Current Issues in Networking

1. Virtualization
2. Networking issues for Datacenters and Clouds
3. Software defined networking
4. Internet of things
5. Mobile, Wireless, and Multimedia
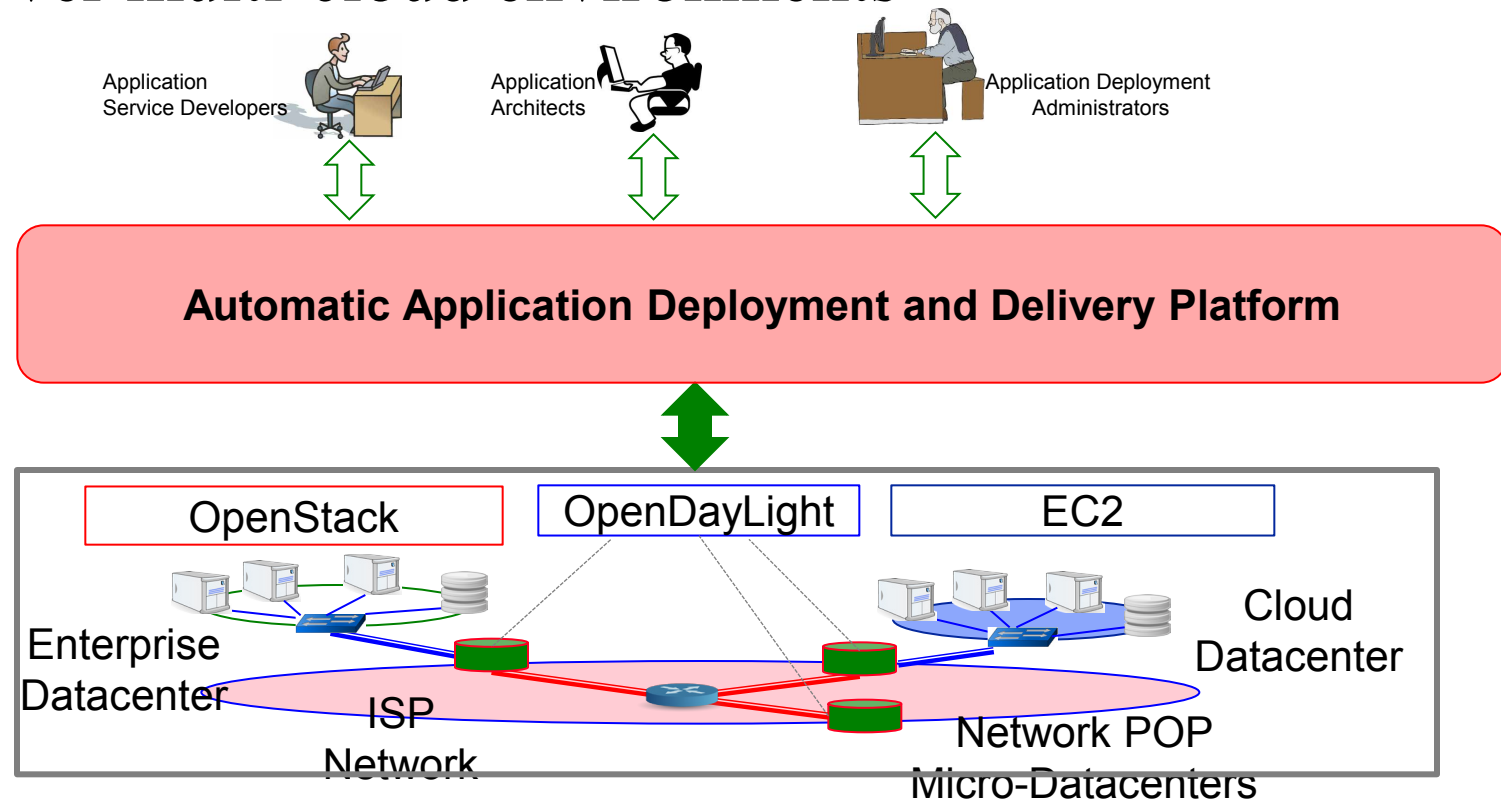6. Energy and Sustainability
7. Network Security

Trend: Content Distribution Networks (CDN) to Distributed Computation

Distributed Clouds

Distributed Content Caches

Cloud/Enterprise Datacenters

Users

Network

New Business Opportunities: Datacenters on Towers, Internet of Things

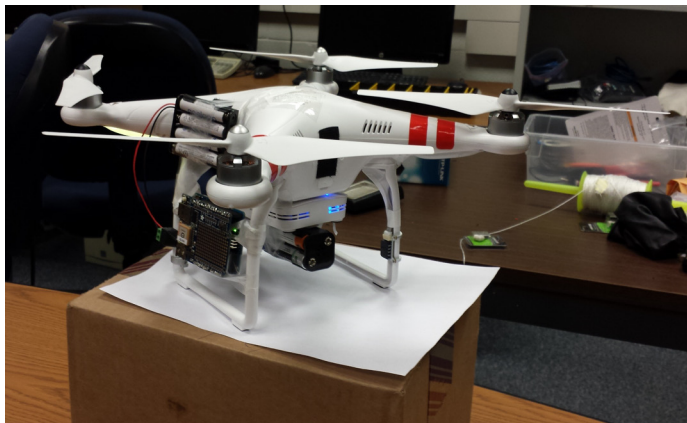# AppFabric: Platform for Delivering Next Generation Applications over Global multi-Cloud Environments

❑ AppFabric is a platform that allows global businesses to easily create, manage and control their applications over multi-cloud environments

Application Service Developers

Application Architects

Application Deployment Administrators

Automatic Application Deployment and Delivery Platform

OpenStack

OpenDayLight

EC2

Enterprise Datacenter

ISP Network

Cloud Datacenter

Network POP Micro-Datacenters

Communication using UAVs

❑ Ground communication infrastructure is often destroyed during natural disasters

Key Distinction of Our Research

❑ Goal: Impact to the real-world

❑ Research topics of interest to Industry

❑ Funded by industry partners:
Intel, Cisco, Broadcom, Boeing, …

❑ Impact real-world by participating in standards organizations and industry forums: ATM Forum, IEEE Standards, American National Standards Institute (ANSI), International Telecommunications Union (ITU), Internet Engineering Task Force (IETF), Internet Research Task Force (IRTF), WiMAX Forum

❑ Work on long term as well as short term research