Introductions
Who Is This Geek?

- Open Source Contributor
- Networking & Storage Geek
- Author and Consultant
- Client/Server Traditionalist
Who Is This Geek?

Something I've Learned:

A buzzword is just noise...

...until it gains mass and momentum.

Don't Ignore the Buzzwords!
Overview

Cloud Computing:

- We have not yet truly defined what it means—people still argue
- When we build it, will we know?
- Let's explore the possibilities
Overview

If We Seed The Cloud...

- What rain will fall?
- How can the fallout be used?
- What will change?
- What will remain the same?
“What's in a Name?
A rose by any other name would wither and die.”

— Alan Swann (Peter O'Toole),
My Favorite Year
What's in a Cloud?

Is “Cloud Computing” Just a Buzzword Looking for Meaning?

We've got this idea that we can create big pools of resources and share them out for fun and profit.

- Dynamic, virtualized resource pools
- Sufficient resources to meet peak demand
- Efficient/effective user identity management
- Mapping of users to allocated resources
- Magically make it all work without intervention
What's in a Cloud?

Is “Cloud Computing” Just a Buzzword Looking for Meaning?

We've got this idea that we can create big pools of resources and share them out for fun and profit.

- Who owns those resource pools?
- How much is enough?
- How are they accessed?
- How do we pay (or not) to use them?
- How are they managed?
- How are problems handled?
What's in a Cloud?

Is “Cloud Computing” Just a Buzzword Looking for Meaning?

Wikipedia says: “Cloud computing is Internet-based computing, whereby shared resources, software, and information are provided to computers and other devices on-demand, like a public utility.”

...and...

'A technical definition is "a computing capability that provides an abstraction between the computing resource and its underlying technical architecture (e.g., servers, storage, networks), enabling convenient, on-demand network access to a shared pool of configurable computing resources that can be rapidly provisioned and released with minimal management effort or service provider interaction."

(From the National Institute of Standards.)
What's in a Cloud?

Is “Cloud Computing” Just a Buzzword Looking for Meaning?

These definitions are solidly vague and firmly amorphous. A large percentage of the articles on Cloud Computing found when digging for information were arguments about what the term actually means and how it's all supposed to work.

Case in point: Are Private Clouds Hogwash?
Michael Neubarth, CIOzone, March 22, 2010

An article discussing blog posts about whether or not “private” clouds are real. It all depends on your definition.
What's in a Cloud?

Is “Cloud Computing” Just a Buzzword Looking for Meaning?

Flavors of Clouds:
- Storage Clouds
  - Dude, where's my stuff?
- Compute Clouds
  - Processing resources
- Platform Clouds
  - Virtual Machines
- Etc.

Choose your daemon.
What's in a Cloud?

Is “Cloud Computing” Just a Buzzword Looking for Meaning?

What's the business model?
Deus Ex Machina

Building Your Cloud
Making Clouds

How to build your cloud:

- Start with Raw Resources
  - Compute power
  - Data storage
  - Application engines
  - Database
- Provide a Virtualization Layer
  - Abstract the underlying physical layer
- Provide a Presentation Layer
  - Present the cloud to the end user
Making Clouds

How to build your cloud:

🌟 How much do you need?

🙏 Peak Capacity vs. Thin Provisioning
🙏 Redundancy vs. Costs

🌟 How to present it so users will use it

🙏 Custom interfaces
🙏 Standard interfaces
🙏 Familiarity
Making Clouds

How to build your cloud:

How will cloud services interact?
- Move data between cloud objects
- Share between storage and compute clouds
- Share data between applications

What about physical location?
- Place physical resources close to users to reduce latency
- Distribute resources to balance load and protect services
Making Clouds

How to build your cloud:

- Conceptual leaps in network infrastructure
  - Multicast
  - Anycast
  - Manycast

- Practical leaps in network infrastructure
  - Ipv6

Assign addresses to temporary, allocated resource objects within the cloud
Making Clouds

How to build your cloud:

How do you make true Quality of Service guarantees?
Making Clouds

Client side: How to access your cloud

From the client's perspective:  
*This is Client/Server Architecture*

- Doesn't matter that the server is “virtual”
- Doesn't matter that the server will go away when it's no longer in use

Client access is via the Internet

- Standard protocols  
- vs. Proprietary protocols and interfaces
Making Clouds

Client side: How to access your cloud

Client access is *via the Internet*

- Storage is relatively cheap
  - At the low end, $75/TB
  - Buy two, make RAID

- CPU power is relatively cheap
  - PCs are designed for peak load

- Bandwidth is relatively rare & expensive
  - Ouch!
Making Clouds

Client side: How to access your cloud

How do you make true Quality of Service guarantees?
Making Clouds

Client side: How to access your cloud

- Desktop PCs have lots of CPU horsepower, memory, I/O throughput, and storage capacity.
- Adding capacity is relatively cheap.

Q: Why do I need Cloud Storage, Cloud Apps, Cloud Processing?

A: **Ubiquitous Availability!**
Making Clouds

Client side: How to access your cloud

- Availability from Laptops and Tablets in teashops
- Availability from mobile phones
- Availability from mobile or remote devices
  - Cars?
  - Trucks?
  - Trains?
  - Solar ovens in the desert?
I've Looked at Clouds from Both Sides Now
Hey! You! Get Off Of My Cloud!

The most fascinating cloud conundrum (IMNSHO) is management of identities and rights.

Ten years ago, under contract, I designed a distributed authentication system.

Today we have OpenID, which is similar but not complete.

In the cloud, we may have multiple identities:
- Home, Work, 2\textsuperscript{nd} Life, etc.
Hey! You! Get Off Of My Cloud!

The most fascinating cloud conundrum (IMNSHO) is management of identities and rights.

Can I create Groups?

How do I share virtual resources?

When virtual cloud objects are created, how do we manage rights?

Which rights are appropriate to which objects × groups?
Practical Clouds


- Virtualize desktop resources
  - CPU
  - Storage
  - Etc.

- Pool spare resources
  - Leave enough for local expansion

- Share those resources back to enterprise users
Practical Clouds

Create your own clouds within the cloud

- Use available physical resources
  - Storage
  - Routing
  - Processing

- Bring the Abstraction and Presentation layers “in house”
  - A hybrid private cloud
Practical Clouds

Examples of Cloud Services in the Wild?

- Internet FAX services
  - Meet the basic definition
- Lala (acquired by Apple)
  - Virtualize your music itunes library
- PDF translators for my smartphone
  - Do I want them to have access to my PDFs?
- Virtualized Video games

...and I'm working on a couple of others.
The End
Questions?