



Cloud World
August 13th, 2009
San Francisco, CA

If Cloud Computing is the Answer... What is the question?

Low Tucker

VP and CTO, Cloud Computing
Sun Microsystems, Inc.

Cloud Computing Goes By Many Names

Software as a Service

Utility Computing

Grid Computing

Platform as a Service

Database as a Service

Application Hosting

Virtualization

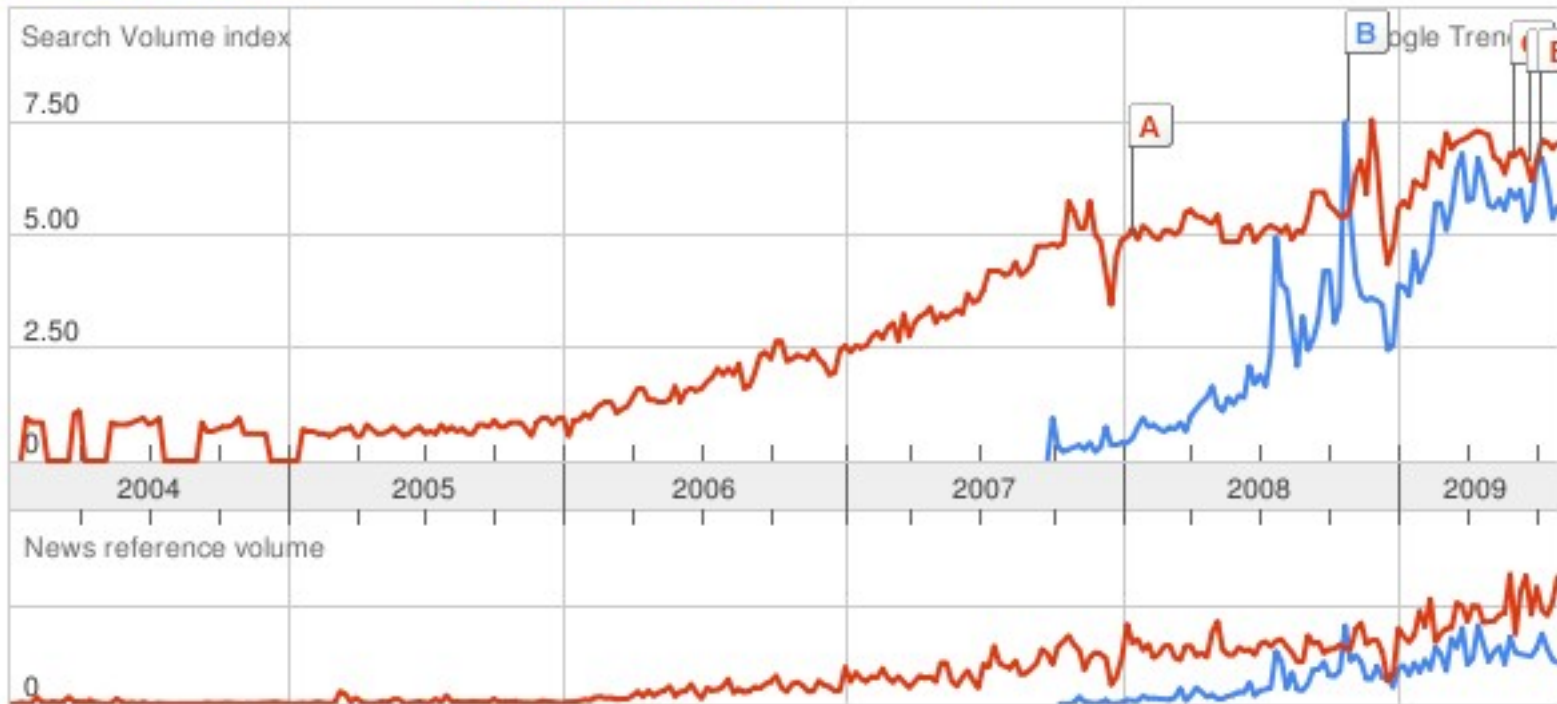
Infrastructure as a Service

Storage as a Service

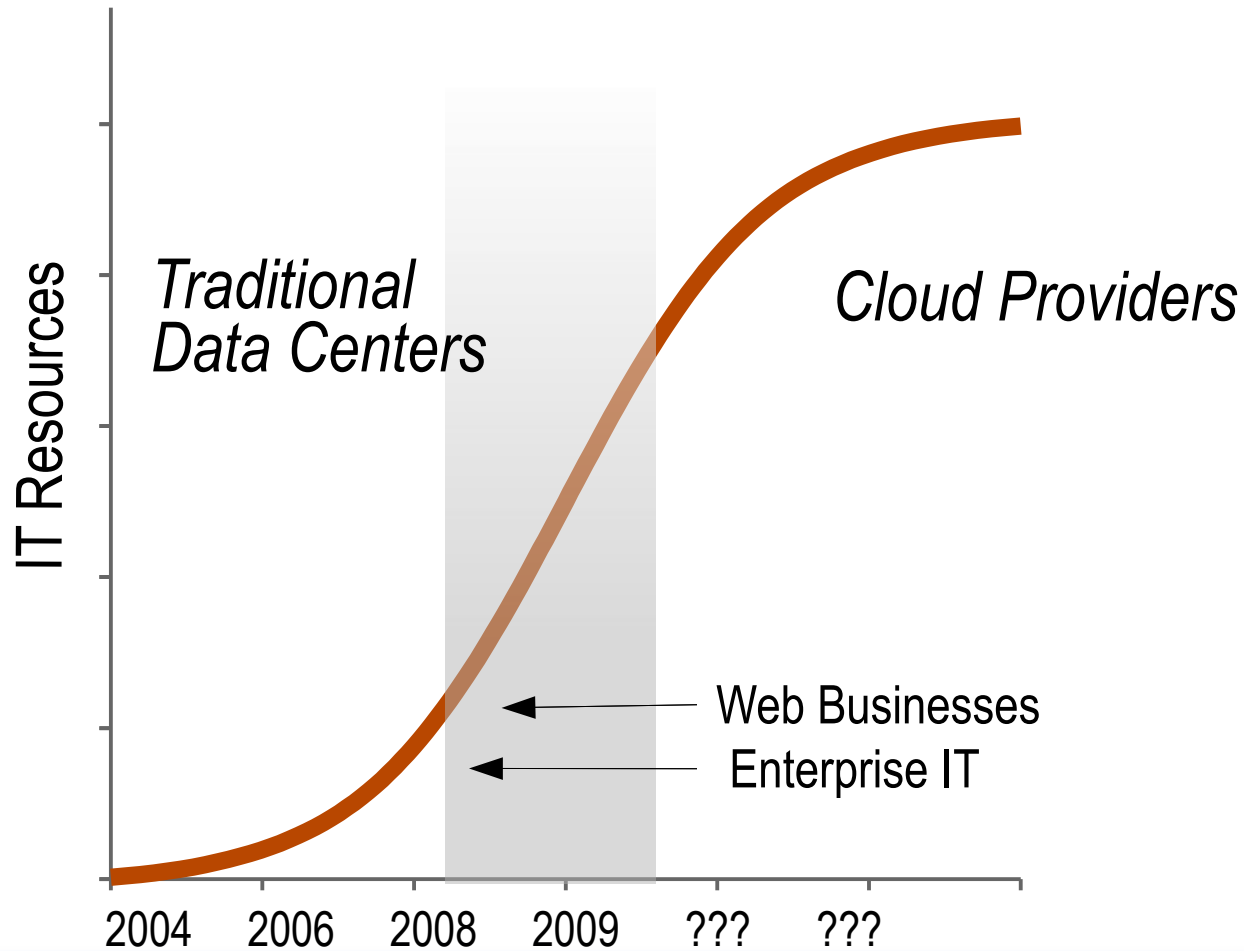
Popular Buzz Word

Google Trends: “cloud computing” vs “social networking”


cloud computing — 1.00 social networking — 2.85



Adoption curve of cloud computing?

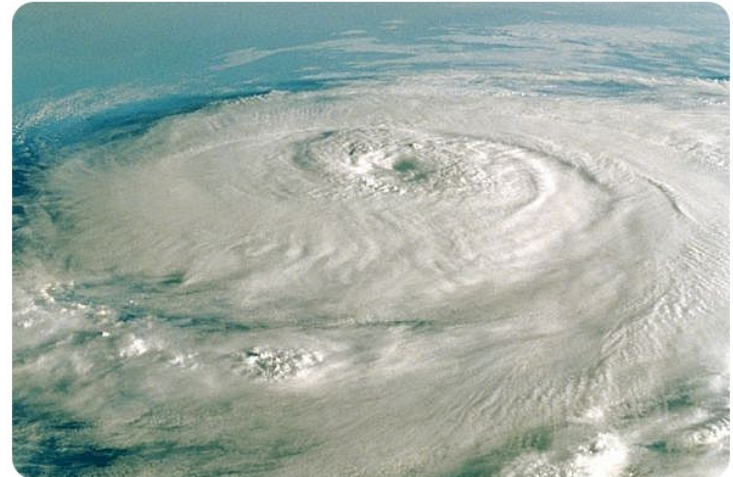


Lots to talk about

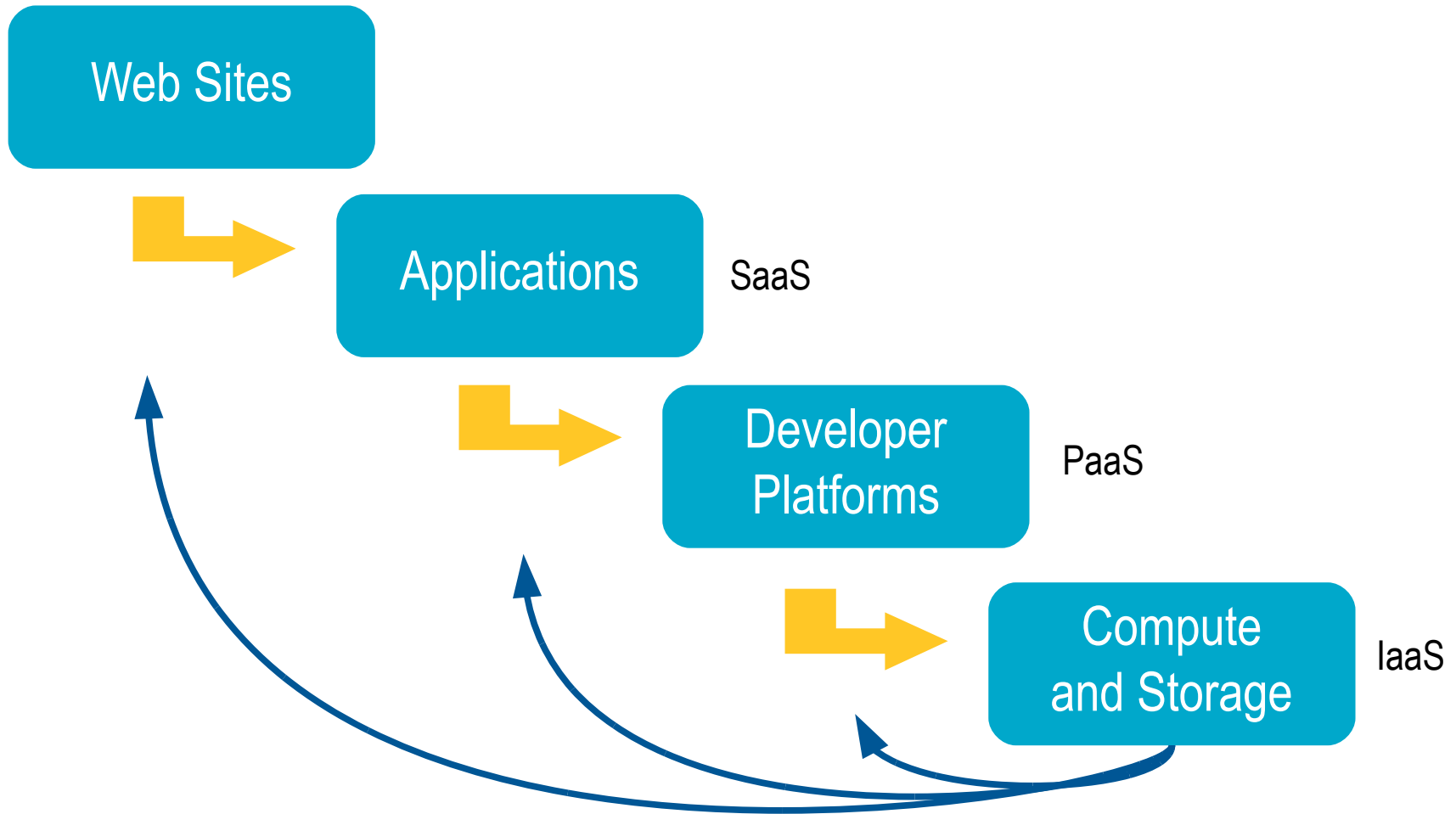
- 
- What are the primary technology drivers?
 - How might it benefit both startups and enterprise IT?
 - How does it change application delivery?
 - Thoughts on where it is going.

Perfect Storm Fueling Cloud Computing

- Growth of the Internet usage
 - > Broadband networking
 - > Mobile, location-aware, services
 - > Self-service
- Massive data – horizontal scale
 - > User-generated content, digital media
 - > Even more data ahead – environmental monitoring
- Moore's Law driving down cost of computing and storage
 - > Low cost 1U servers, +1 TB consumer disk drives
 - > Consumer devices: smart phones, netbooks, gaming consoles
 - > Enables new capabilities: speech, NLP, semantics

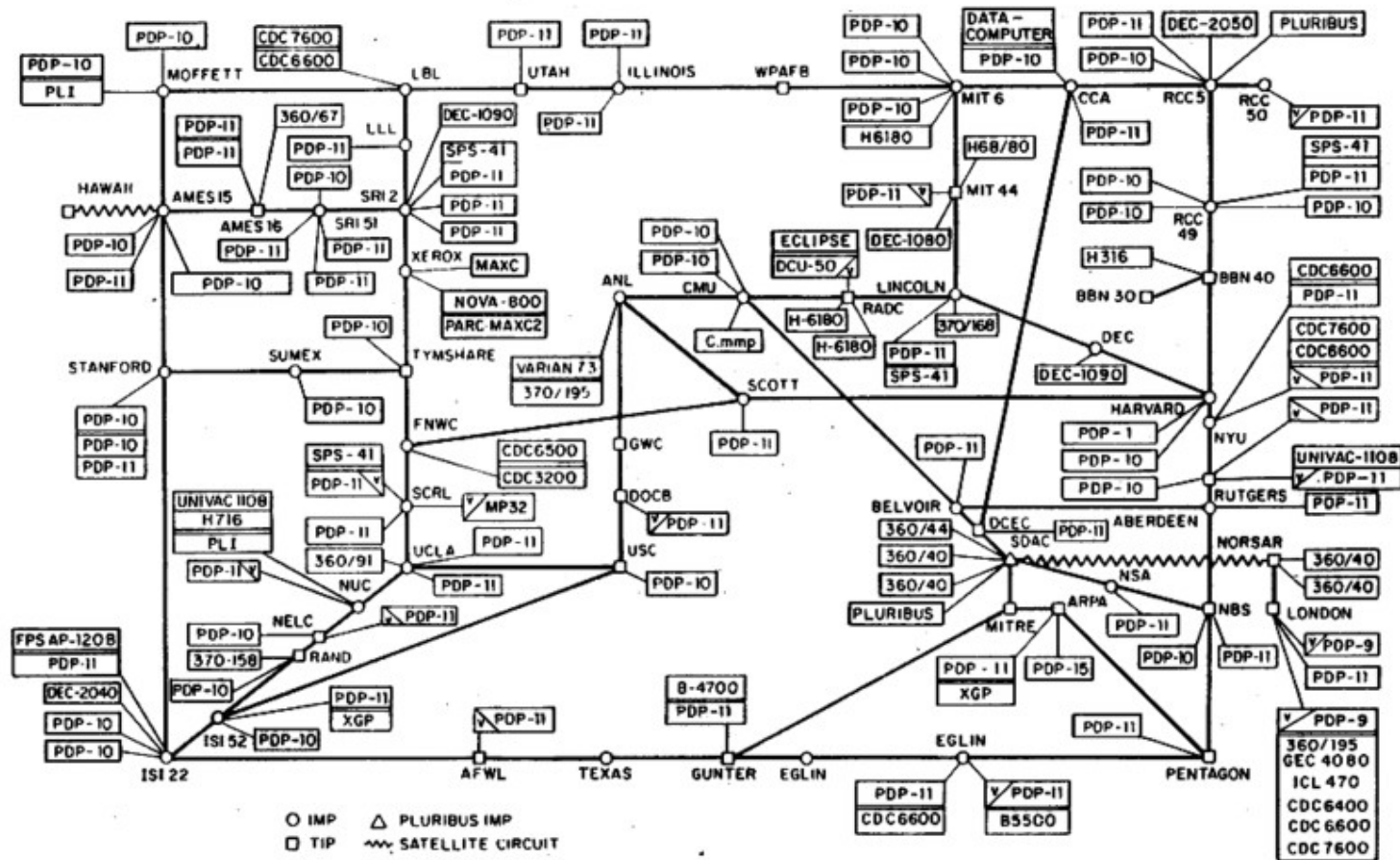


Natural Evolution of the Web



ARPANET, 1969-85

ARPANET LOGICAL MAP, MARCH 1977

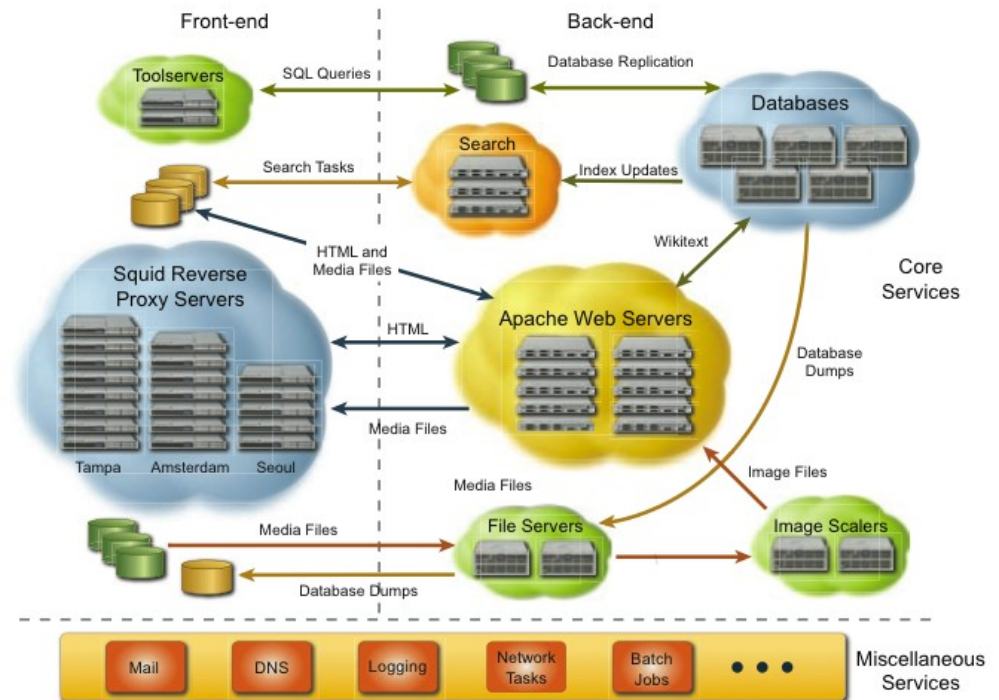


(PLEASE NOTE THAT WHILE THIS MAP SHOWS THE MOST POPULATION OF THE NETWORK ACCORDING TO THE BEST INFORMATION OBTAINABLE, NO CLAIM CAN BE MADE FOR ITS ACCURACY)

NAMES SHOWN ARE IMP NAMES, NOT NECESSARILY) HOST NAMES

Internet scale demands have driven new application design patterns

- Very large, horizontal scale systems built from commodity components
- Component failure must be handled gracefully
- Non-traditional, highly replicated data storage and caching solutions
- Applications built from cooperating set of services



Age of “Warehouse Scale” Machines



Google's data center on the Columbia river, Oregon

Thousands and Thousands of Commodity Parts Built
into a System to Essentially Serve a Single Application

Power and Cooling Major Drivers of Cost

Cloud service providers level the field

- Anyone can gain efficiencies of large scale
- Pay-as-you go, pay only for what you need
- Automation and programatic API control
- Scale up, scale down
- Better agility, faster response, more innovation




“Let me be very clear here:

I really don't want to operate datacenters anymore...

We'd rather spend our time giving our customers great service and writing great software rather than managing physical hardware.”

Don MacAskill, CEO, Smugmug

Impact on Enterprise IT

- 
- Strong interest in both Public and Private Clouds
 - Driven by cost saving and “consumer model” of the internet
 - Internal IT looks more like a service provider
 - > Higher degree of automated system administration
 - > Greater agility for business units through self-service
 - > Still responsible for IT policy, security, best practices
 - > Outsource many functions to public cloud providers
 - Service providers already responding
 - > Variations to meet business requirements
 - > Working to meet regulatory requirements

Real Ecosystem Emerging

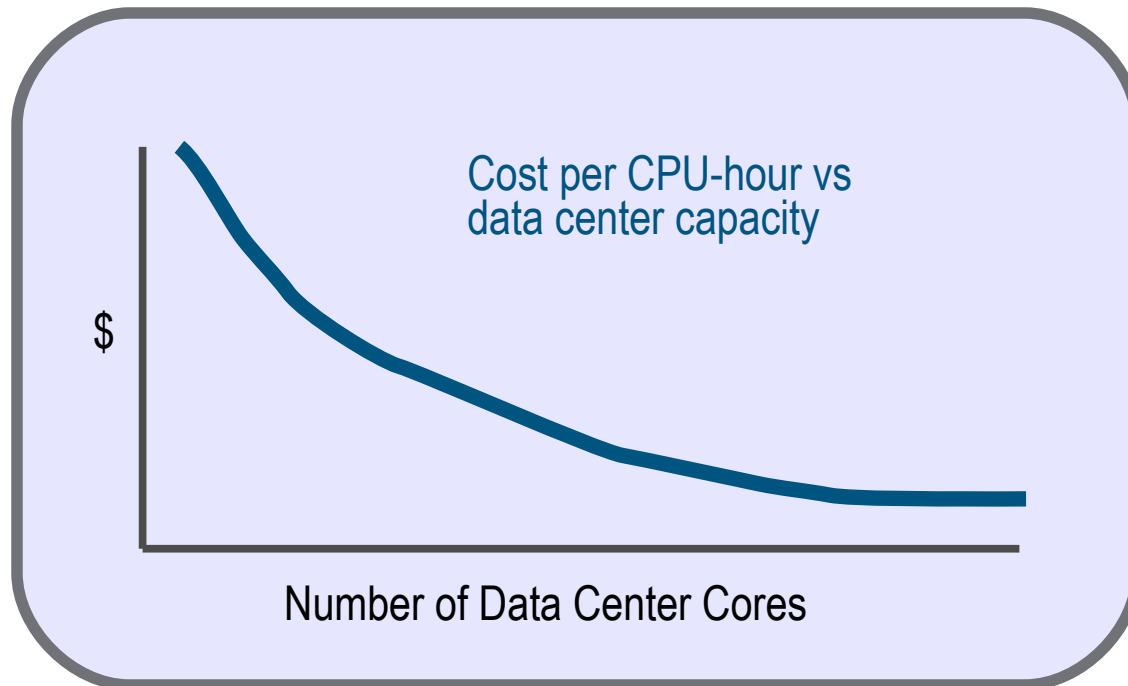


Case Study: Agile Analytics in the Cloud

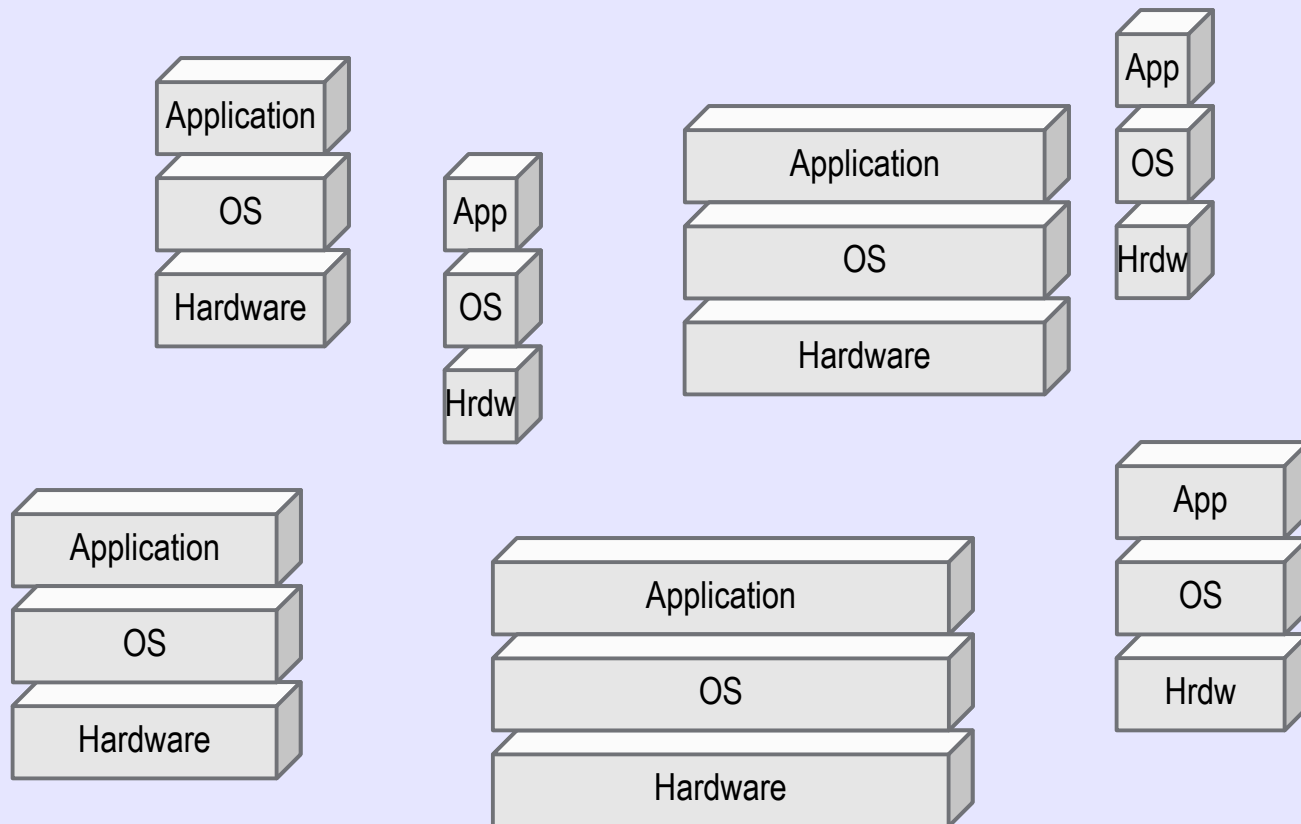
CloudWorld Session SC13



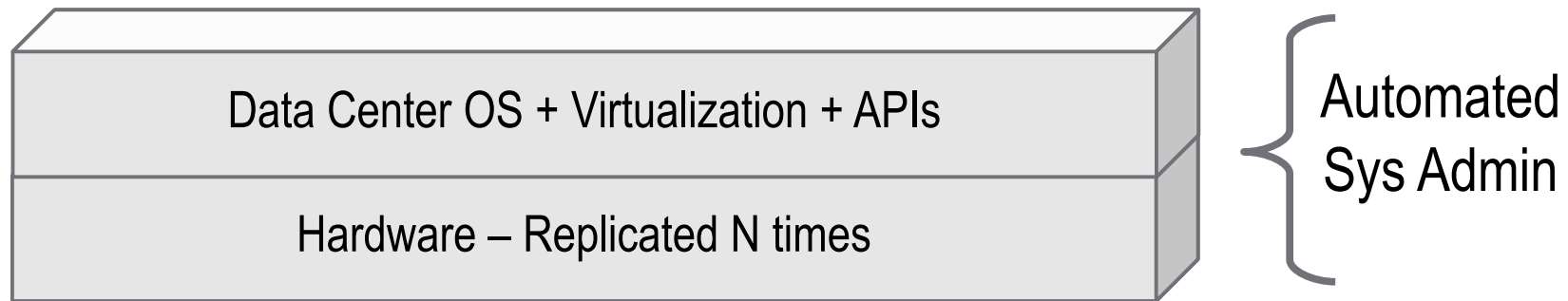
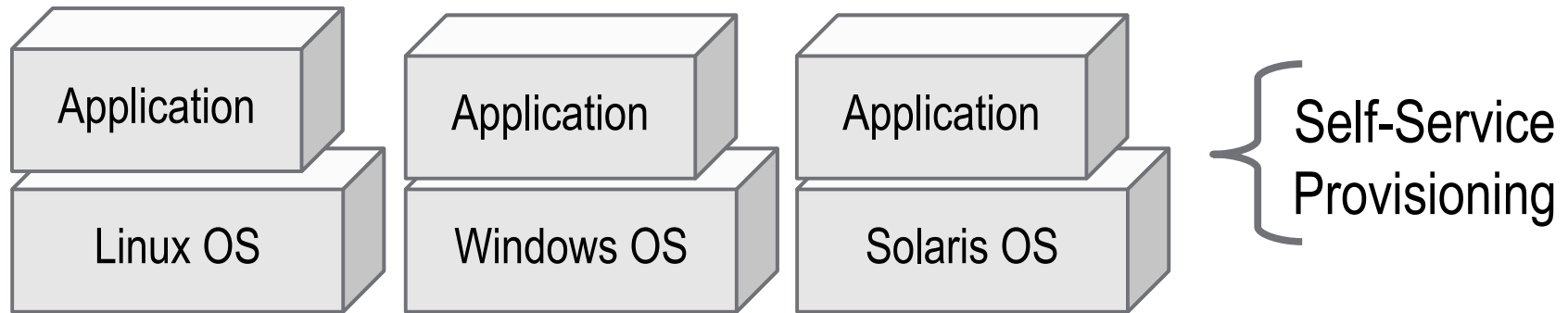
Taking advantage of scale in building a cloud computing service



Diversity conflicts with standardization and automation

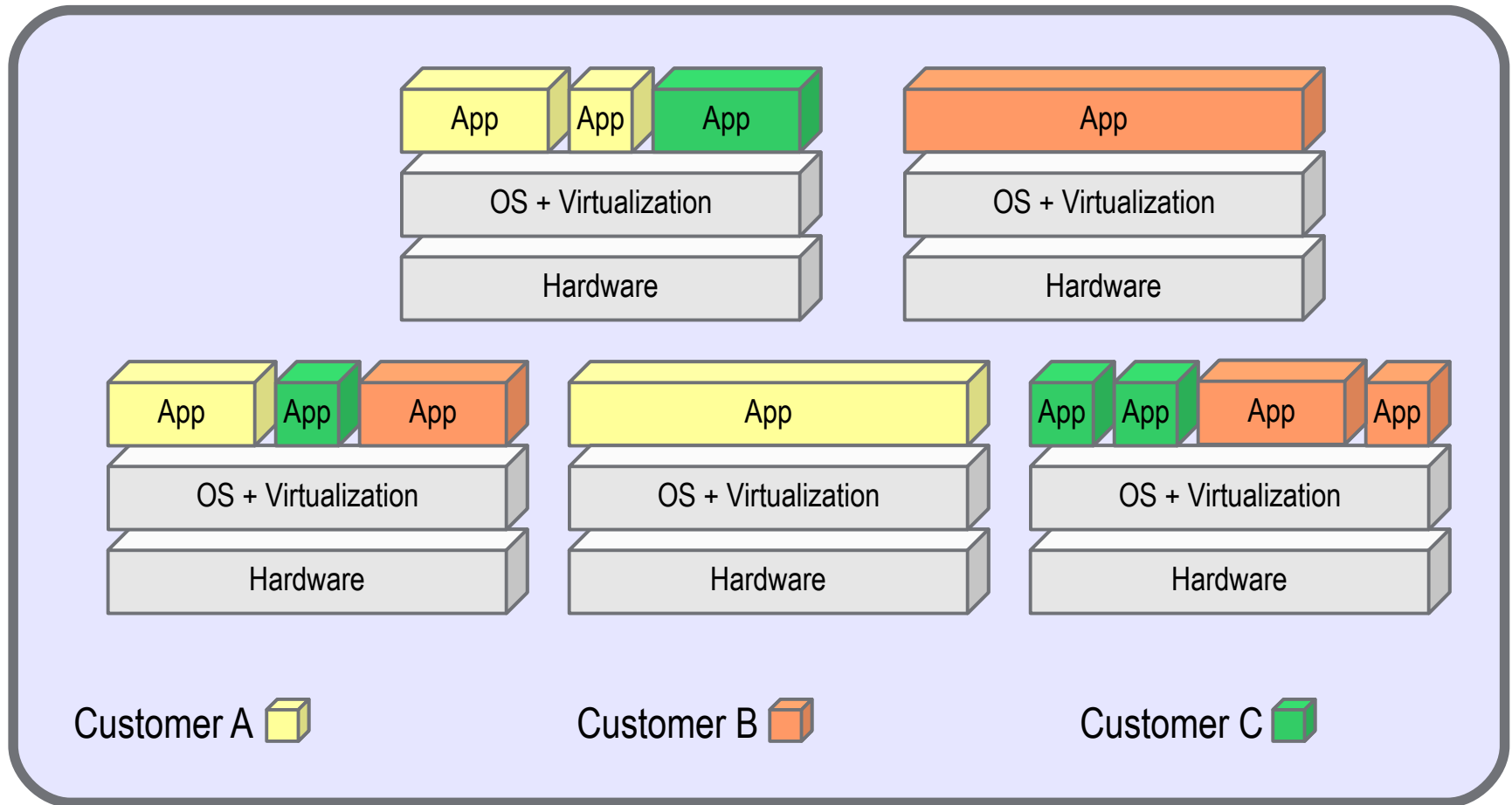


Separate Apps From Infrastructure

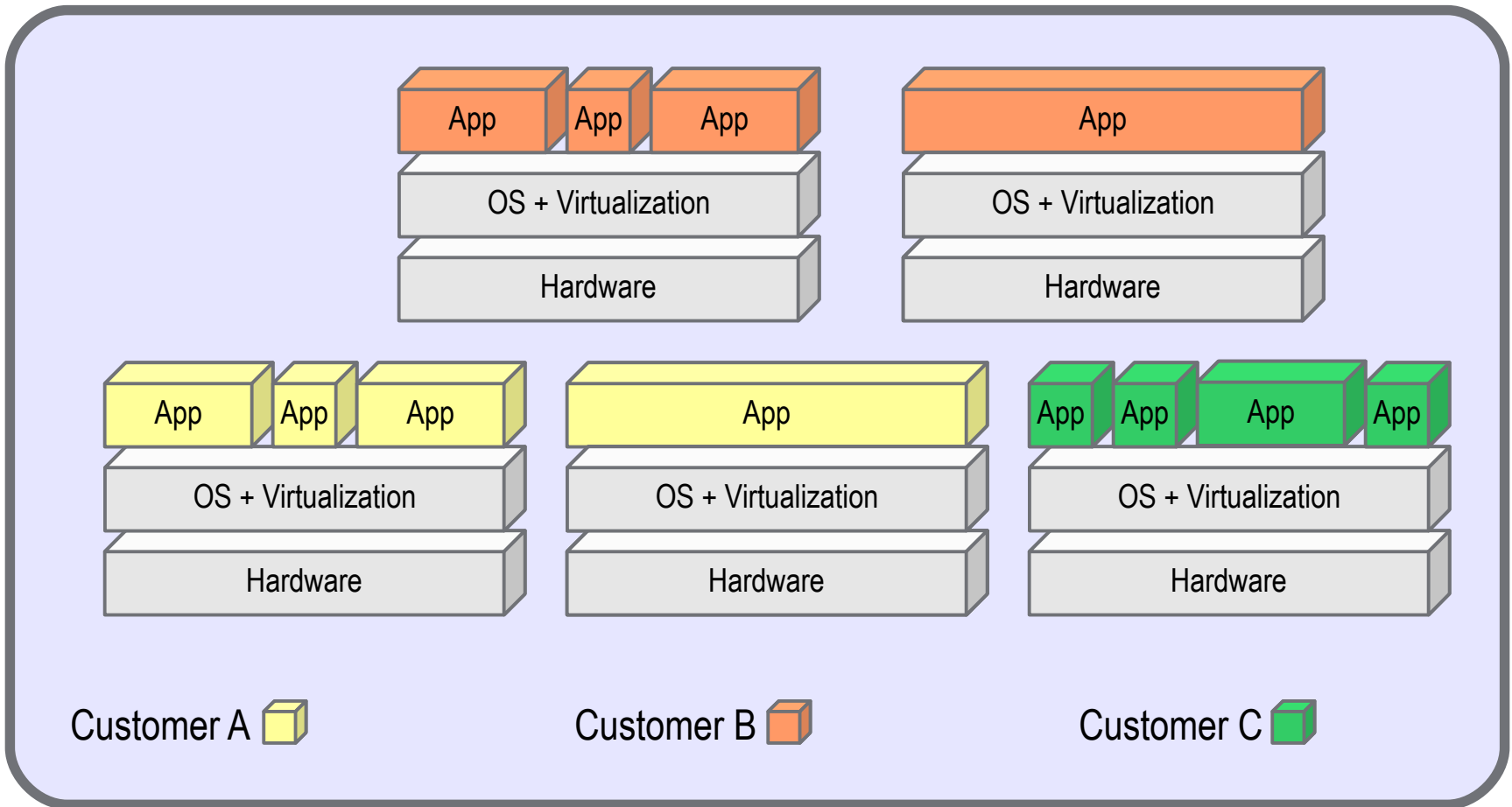


Easily quantified cost model for resource allocation

Customers Get Resources From a Nearly “infinite” Pool of Virtual Resources



Different allocation strategies can be designed to meet different requirements



Prediction: Specialization of Operating System

Application OS

- “Just-enough OS”: minimal set of features
- Linux, Windows, required by App
- Delivered with the Application

Data Center OS and Services

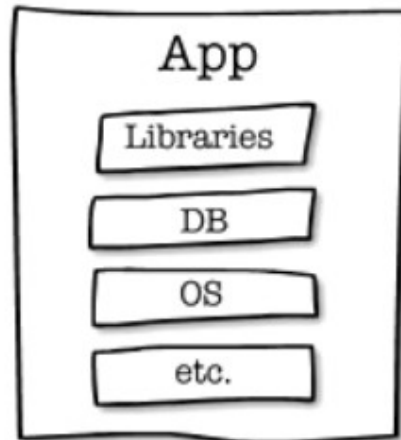
- Allocate virtual resources required by applications
- Data center services
- Optimizes for system utilization
- Transparent migration, fail-over, backup

Will this drive research into distributed, “cloud” OS?

Virtual Machine Images: pre-packaged with software stacks or full applications

Rethinking Application Delivery

- ✓ Self contained
- ✓ Self describing
- ✓ Deployment ready



<http://www.rpath.com/corp/rethinking>

EC2 AIM's
VMware Mkt
CohesiveFT
rPath

Amazon's AWS

Home > Resources > AWS Management Console BETA > Amazon EC2

Welcome, Lew Tucker | Settings | Sign Out

Amazon EC2 | Amazon Elastic MapReduce | Amazon CloudFront

Launch Instance Wizard [Cancel]

2900 Machine Images

CHOOSE AN AMI | CREATE KEY PAIR | CONFIGURE FIREWALL | LAUNCH

Choose an Amazon Machine Image (AMI) from one of the tabbed lists below by clicking its **Select** button.

Quick Start | My AMIs | **Community AMIs**

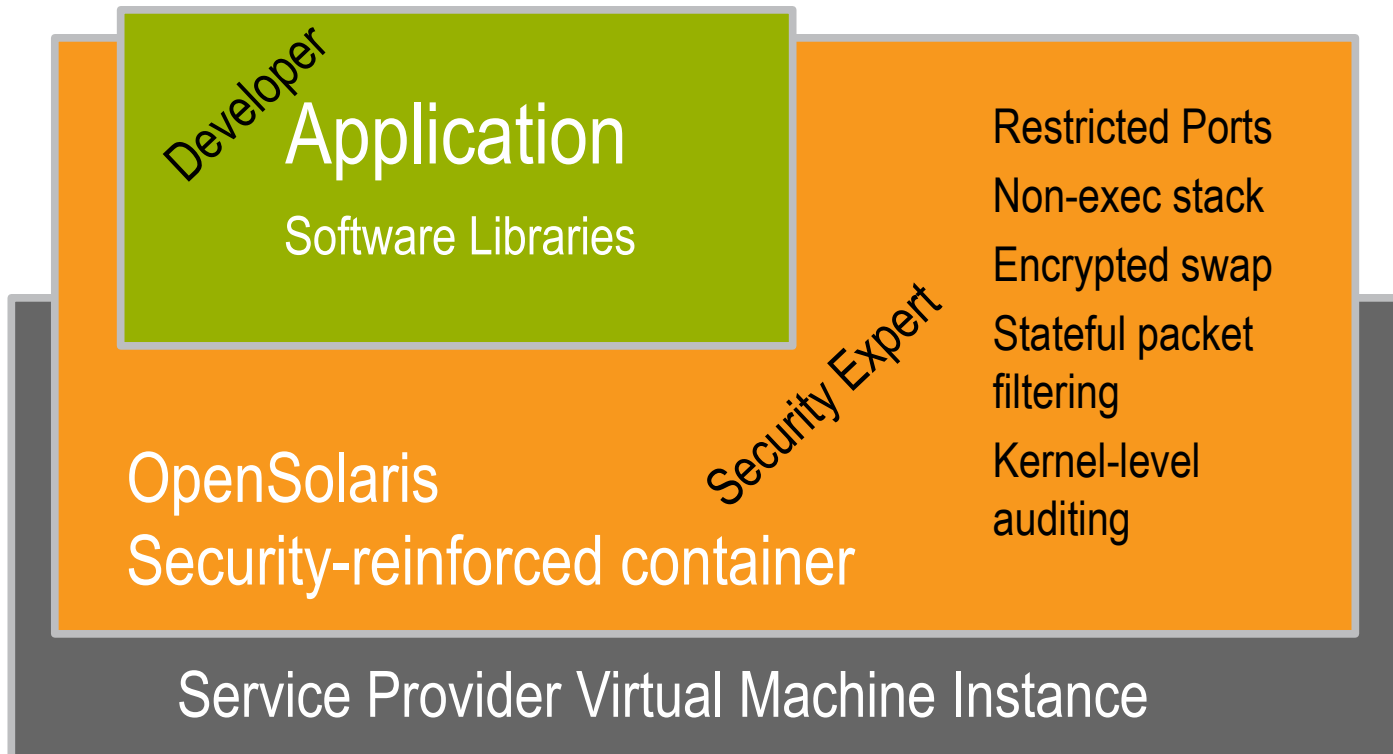
Viewing: All Images | All Platforms | 1 to 50 of 2893 AMIs

AMI ID	Manifest	Platform	Select
ami-0667806f	aws157-team/images/2009-04-01:01:47:07/debian-i386/debian-i386.manifest.xml	Debian	Select
ami-11ca2d78	aws-toolkit-for-eclipse-amis-us/tomcat-v1.0.0.manifest.xml	Other Linux	Select
ami-205fba49	ec2-public-images/fedora-core4-i386-base-v1.07.manifest.xml	Fedora	Select
ami-20b65349	ec2-public-images/fedora-core4-base.manifest.xml	Fedora	Select
ami-215fba48	ec2-public-images/fedora-core4-base-v1.07.manifest.xml	Fedora	Select
ami-225fba4b	ec2-public-images/fedora-core4-apache-mysql-v1.07.manifest.xml	Fedora	Select
ami-22b6534b	ec2-public-images/fedora-core4-mysql.manifest.xml	Fedora	Select
ami-235fba4a	ec2-public-images/getting-started-v1.07.manifest.xml	Other Linux	Select
ami-23b6534a	ec2-public-images/fedora-core4-apache.manifest.xml	Fedora	Select
ami-244aad4d	ec2-paid-ibm-images/informix-dynamic-server-express-32-bit.manifest.xml	Other Linux	Select
ami-2547a34c	ec2-public-images/fedora-8-x86_64-base-v1.08.manifest.xml	Fedora	Select
ami-255fba4c	ec2-public-images/fedora-core4-mysql-v1.07.manifest.xml	Fedora	Select

© 2008 - 2009, Amazon Web Services LLC or its affiliates. All right reserved. | Feedback | Support | Privacy Policy | Terms of Use | An amazon.com company

Hardening of Virtual Machine Containers: Immutable Service Containers

- Virtual Machine Images built and reviewed by security experts
- Built in tools and auditing capabilities



Sun Cloud - Virtual Data Center

Navigator

Virtual Data Centers

MediaWiki ↻

New Delete Save

All Categories

- MySQL
- LAMP VBOX
- Windows XP SP3

Network

OS

Work Area Administration

Virtual Data Center : MediaWiki (deployed)

Fit to Screen Zoom 100% Start All Stop All Copy Deploy

```

graph TD
    subgraph Servers
        W1[Webserver1- Apache-PHP]
        W2[Webserver2- Apache-PHP]
        W3[Webserver3- Apache-PHP]
        M1[Memcached1]
        M2[Memcached2]
        M3[Memcached3]
        T2[Tier2]
        T3[Tier3]
        M101[MySQL1]
        M102[MySQL2]
    end
    W1 <--> T2
    W2 <--> T2
    W3 <--> T2
    T2 <--> M1
    T2 <--> M2
    T2 <--> M3
    M1 <--> T3
    M2 <--> T3
    M3 <--> T3
    T3 <--> M101
    T3 <--> M102
    
```

Explosion of Apps

– AppExchange, Google Apps, iPhone

salesforce.com | Community | Developer Force Choose Your Language

Appexchange 820 Business Apps

salesforce.com Login or Register

Find Apps

Or Browse by Categories

Your Saved List

Sponsored Apps

Genius.com Marketing Automation, Demand Generation, Email Marketing Solution

Project Management Made Easy

9 Can't-Miss Solutions

LEARN MORE >>>

New to the AppExchange?

Begin Here

Want to develop on force.com?

Get started now >>

AppExchange Newsletter

TIPS, TRICKS & MORE

Sign Up Now >>>

Native Apps Most Popular New Apps Staff Picks

Secure, Reliable, Easy to use. Native apps are built and run 100% on Force.com's trusted cloud infrastructure.

Google App Engine

Visit the App Gallery

Introduction

- [What Is Google App Engine?](#)
- [Getting Started](#)

APIs

- [The Python Runtime](#)
- [Datastore API](#)
- [Images API](#)
- [Mail API](#)
- [Memcache API](#)
- [URL Fetch API](#)
- [Users API](#)

Featured Application

Giftag

Thomas Bohmbach, Curt Thompson, Nick Bauman, Gary Koelling, Steve Bendt - Nov 26, 2008

150,000 developers
50,000 apps

Make lists of things you want and share them with others

Demos

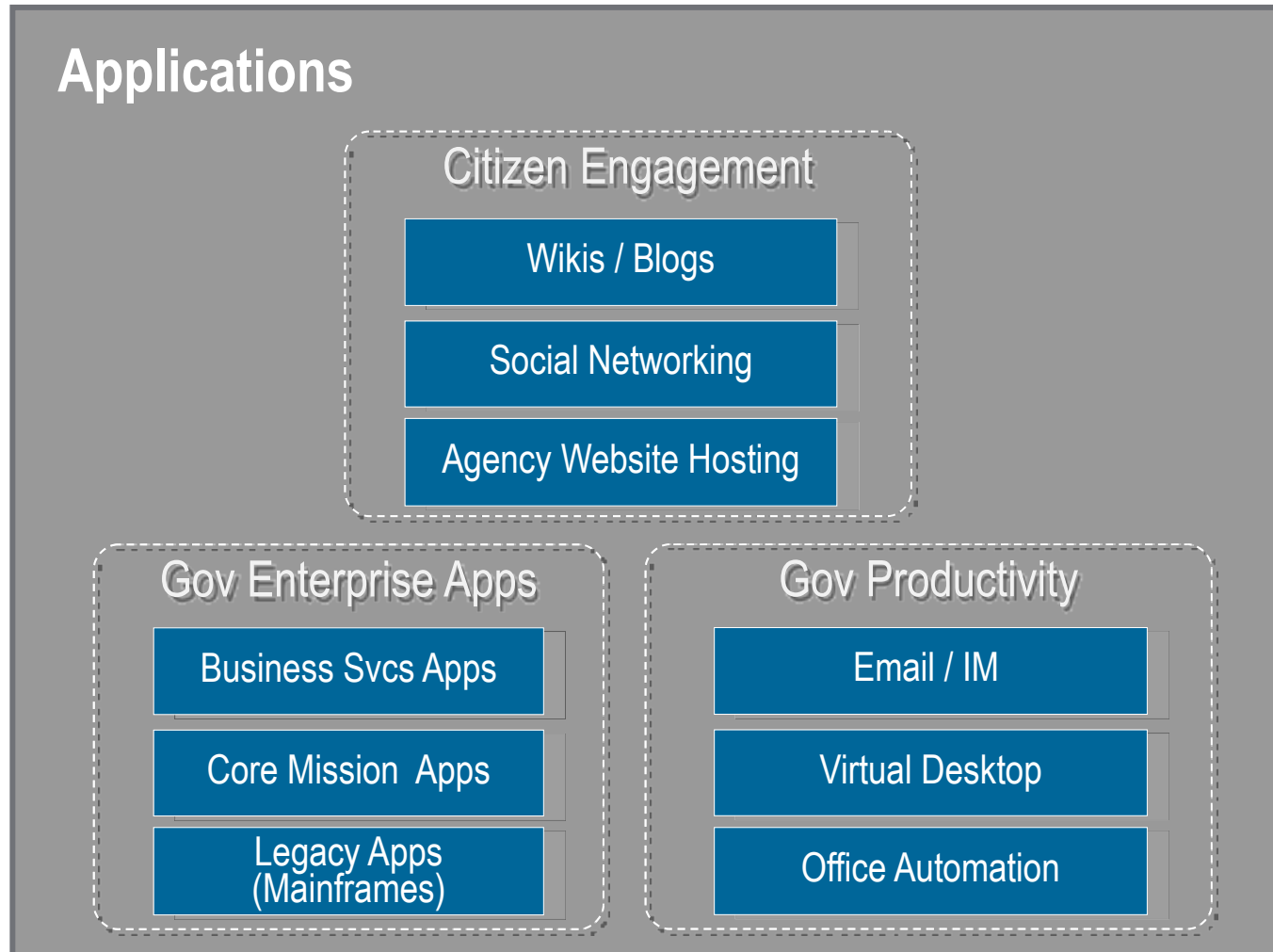
About Giftag

Giftag is the easy-to-use, open standards-based social shopping application that lets you make lists of things you want and share them with others.



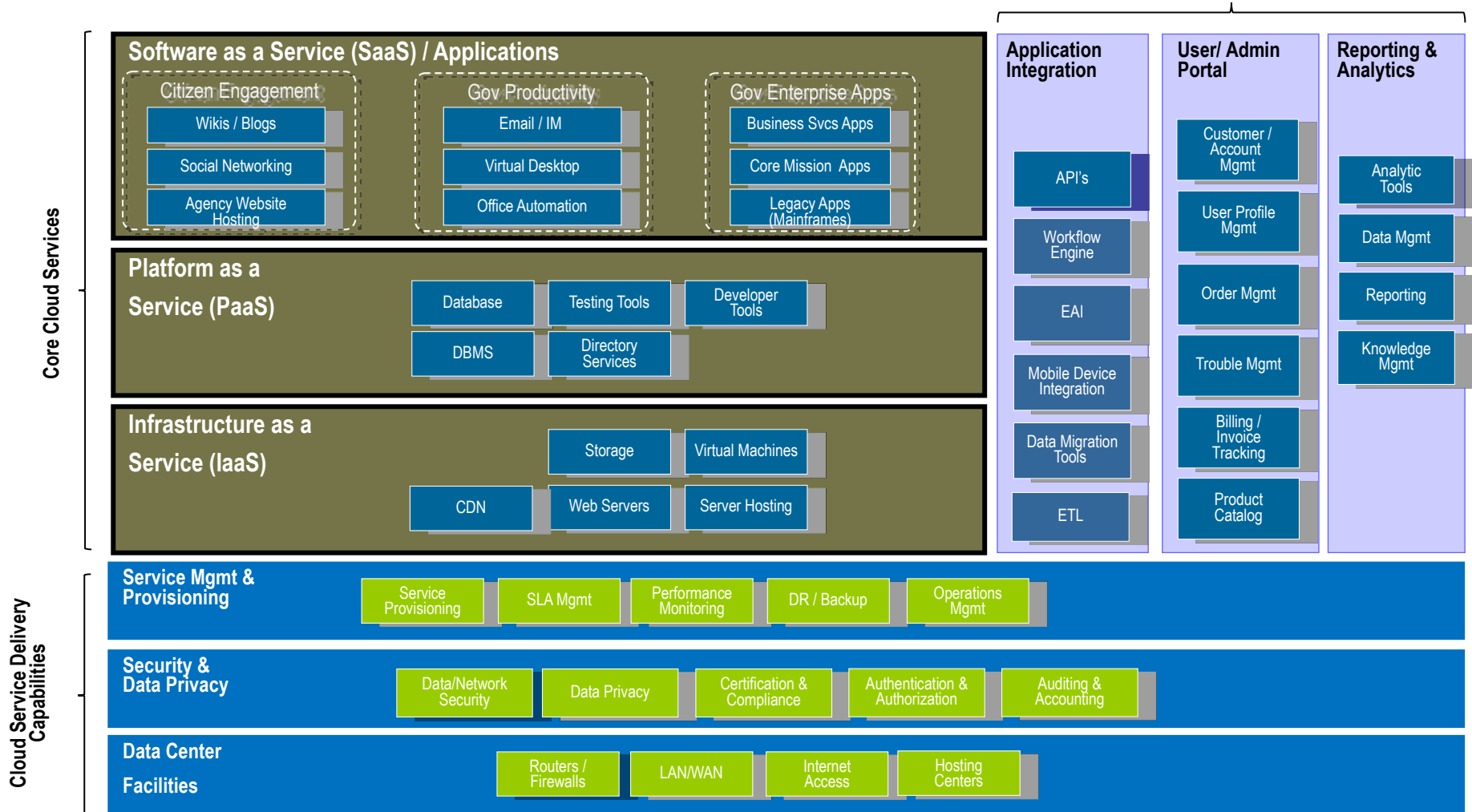
100,000 developers
65,000 Apps in store
1.5B downloads

US Government turning to the Cloud to modernize IT infrastructure to lower costs



GSA framework for cloud services

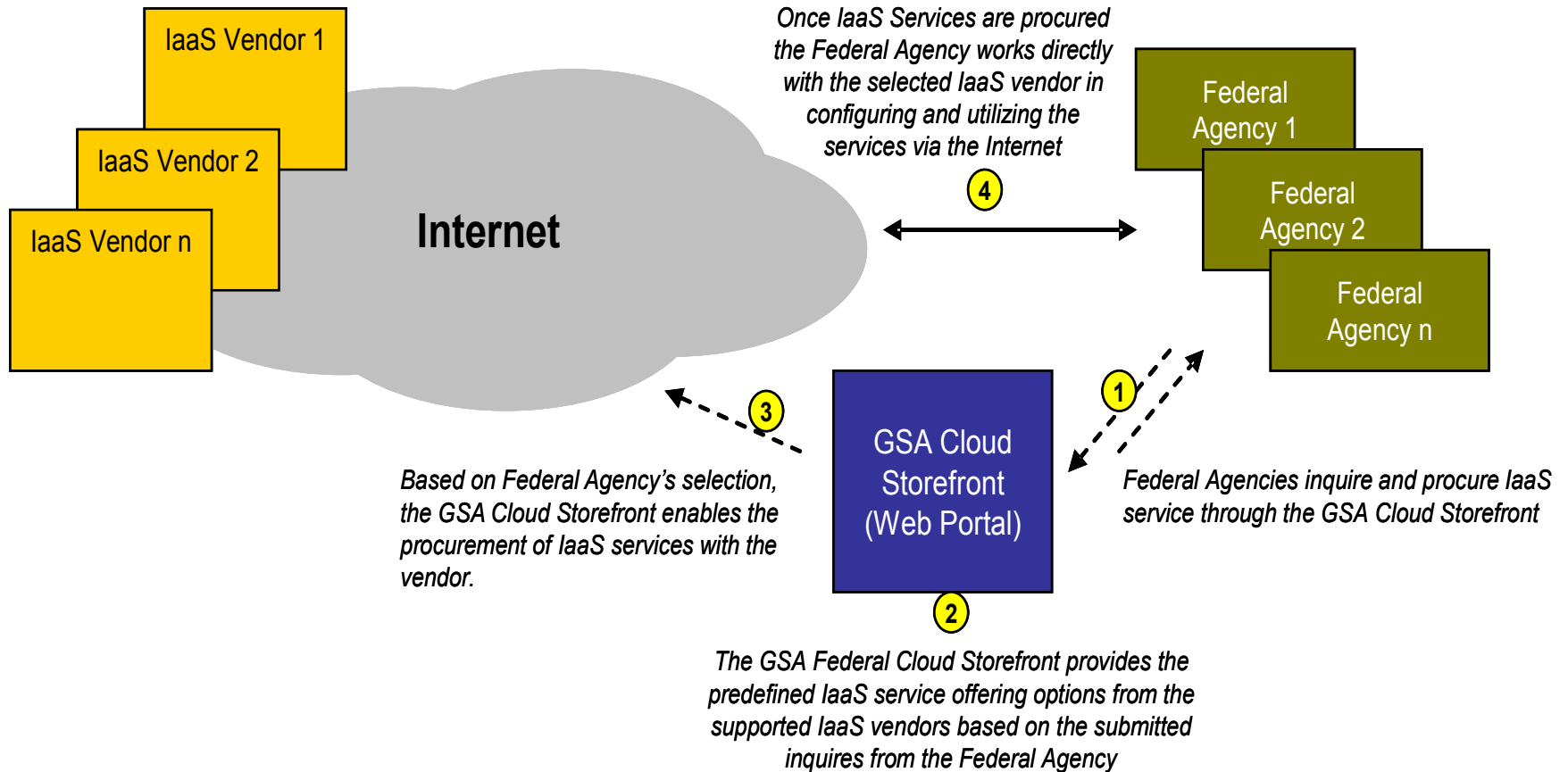
Cloud User Tools



GSA Cloud Computing Storefront

IaaS Providers

Government Agencies



Project to study global impact of cloud computing



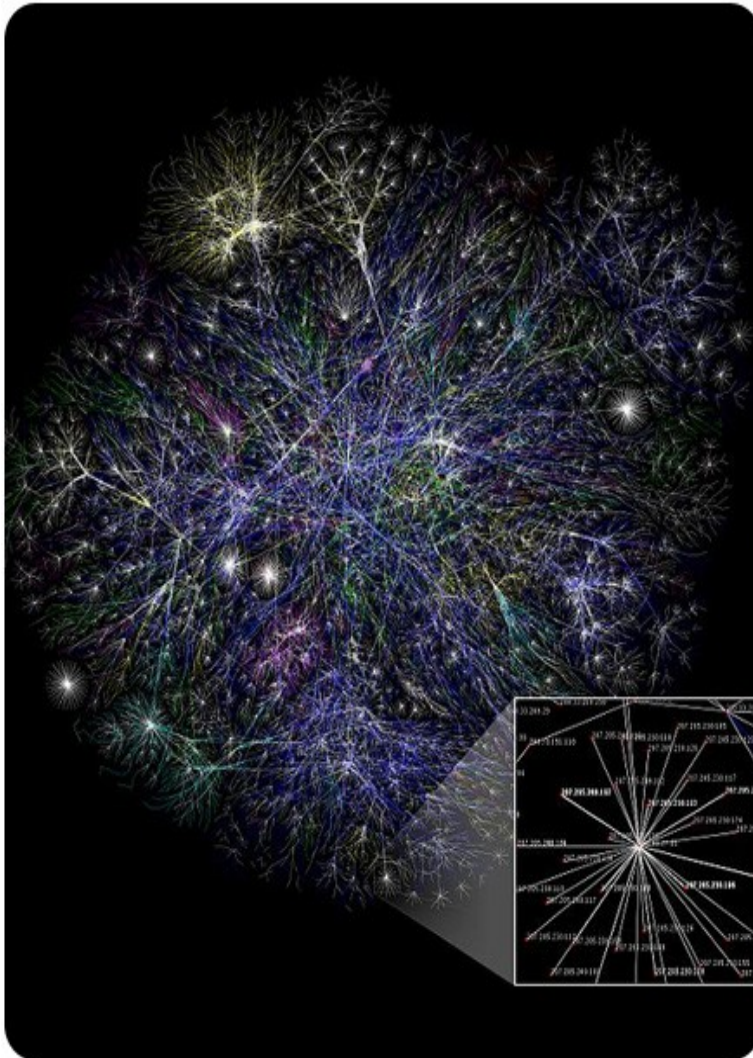
- For Individuals:
 - > Greater access to information and collaboration
- For Society:
 - > Developing nations may leap-frog traditional data centers
 - > Revolutionize education
- For Business and Economic Growth:
 - > Better decisions, better way to conduct business
 - > Lower barriers of entry
 - > Possibility of spurring job growth and new applications
- What will cloud computing look like in 2015?
- Who will it benefit?

Future: Applications will increasingly be responsible for self-provisioning

- Applications acquire/release resources:
 - > In response to increased demand
 - > Recover from failed components
 - > Minimize power, minimize cost, meet SLAs
- Allow PaaS providers to dynamically scale with their customer demand.
- Cloud service customers themselves may choose different management tools, policies
- Your data center becomes virtual and app centric
 - > let others manage the physical systems

Future: Global Cloud of Clouds

(a.k.a “InterCloud”)



- Inter-connected network of servers, storage, and applications
- Segmented into public and private clouds
 - > For security
 - > For predictability
 - > For regulatory compliance
- Unified and driven by a set of protocols, software API, and services
- Open to all



Cloud Computing is the Answer.

The only real question:
Will you be ready?



Cloud World
August 13th, 2009
San Francisco, CA

Lew Tucker

VP and CTO, Cloud Computing
Sun Microsystems, Inc.