Cloud Computing

Andy Bechtolsheim

Chairman & Co-founder, Arista Networks

November 12th, 2008

What is Cloud Computing?

The **Fifth Generation** of Computing (after Mainframe, Personal Computer, Client-Server Computing, and the web)

What is Cloud Computing?

The biggest thing since the web?

How big is Cloud Computing?

$42B

Estimated size of the cloud computing Infrastructure market in 2012, up from $16B in 2008, IDC October 2008

Projected Cloud Spending (IDC 2008)

Year	2008	2012	Growth
Cloud IT Spending	$16B	$42B	27%
Total IT Spending	$383B	$494B	7%
Total – Cloud Spend	$367B	$452B	4%
Cloud / Total Spend	4%	9%	

Cloud Spending is growing 6X faster than traditional IT spending

Worldwide IT Cloud Spending 2012

Storage; 13%
Server; 8%
App Dev; 9%
Apps; 52%
Software; 18%
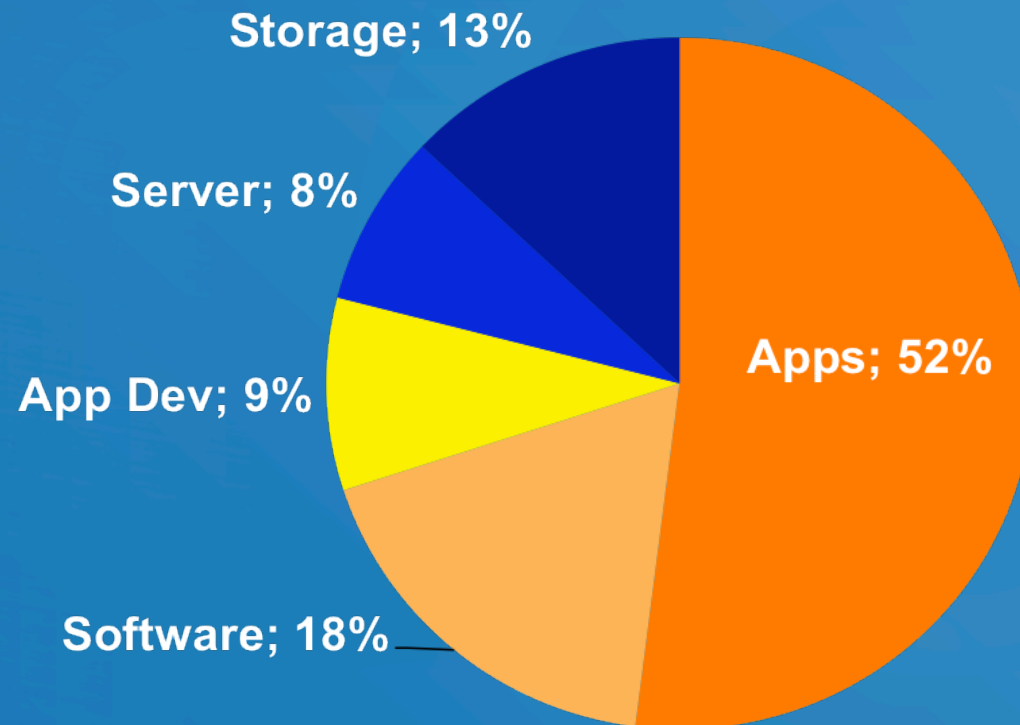
Source: IDC October 2008

What is Driving Cloud Computing?

Customer Perspective

- In one word: economics
- Faster, simpler, cheaper to use cloud apps
- No upfront capital required for servers and storage
- No ongoing operational expenses for running datacenter
- Applications can be accessed from anywhere, anytime

What is Driving Cloud Computing?

Vendor Perspective

- Easier for application vendors to reach new customers
- Lowest cost way of delivering and supporting applications
- Ability to use commodity server and storage hardware
- Ability to drive down data center operational cots
- In one word: economics

Quote of the Day

Over the long term, absent of other barriers, economics always win!

What are the Barriers to Cloud Computing?

Customer Perspective

- #1 Data Security
  - Many customers don't wish to trust their data to "the cloud"
  - Data must be locally retained for regulatory reasons

- #2 Latency
  - The cloud can be many milliseconds away
  - Not suitable for real-time applications

- #3 Application Availability
  - Cannot switch from existing legacy applications
  - Equivalent cloud applications do not exist

Not all applications work on public clouds

What are the Barriers to Cloud Computing?

Vendor Perspective

- #1 Service Level Agreements
  - What if something goes wrong?
  - What is the true cost of providing SLAs?

- #2 Business Models
  - SaaS/PaaS models are challenging
  - Much lower upfront revenue

- #3 Customer Lock-in
  - Customers want open/standard APIs
  - Need to continuously add value

Each applications is unique

The Private Enterprise Cloud

- Harness the advantages of clouds for the enterprise
  - Cost-effective datacenter infrastructure
  - Server and storage resource pools
- High Availability and Reliability in Software
  - Virtual application environment
  - Separation of processing and storage
- On-demand Application Deployment
  - Greatly increases server utilization
  - Prioritization based on business requirements

Private Cloud Architecture Elements

- Server Virtualization
  - Enable any app to run on any server anytime

- Highly Available Storage
  - Network block and file servers

- Low latency, high-bandwidth network
  - Enable application mobility in the cloud

- Pre-emptive application scheduler
  - Implements business rules and priorities

- Low-cost industry standard servers
  - Transcend hardware failures with software

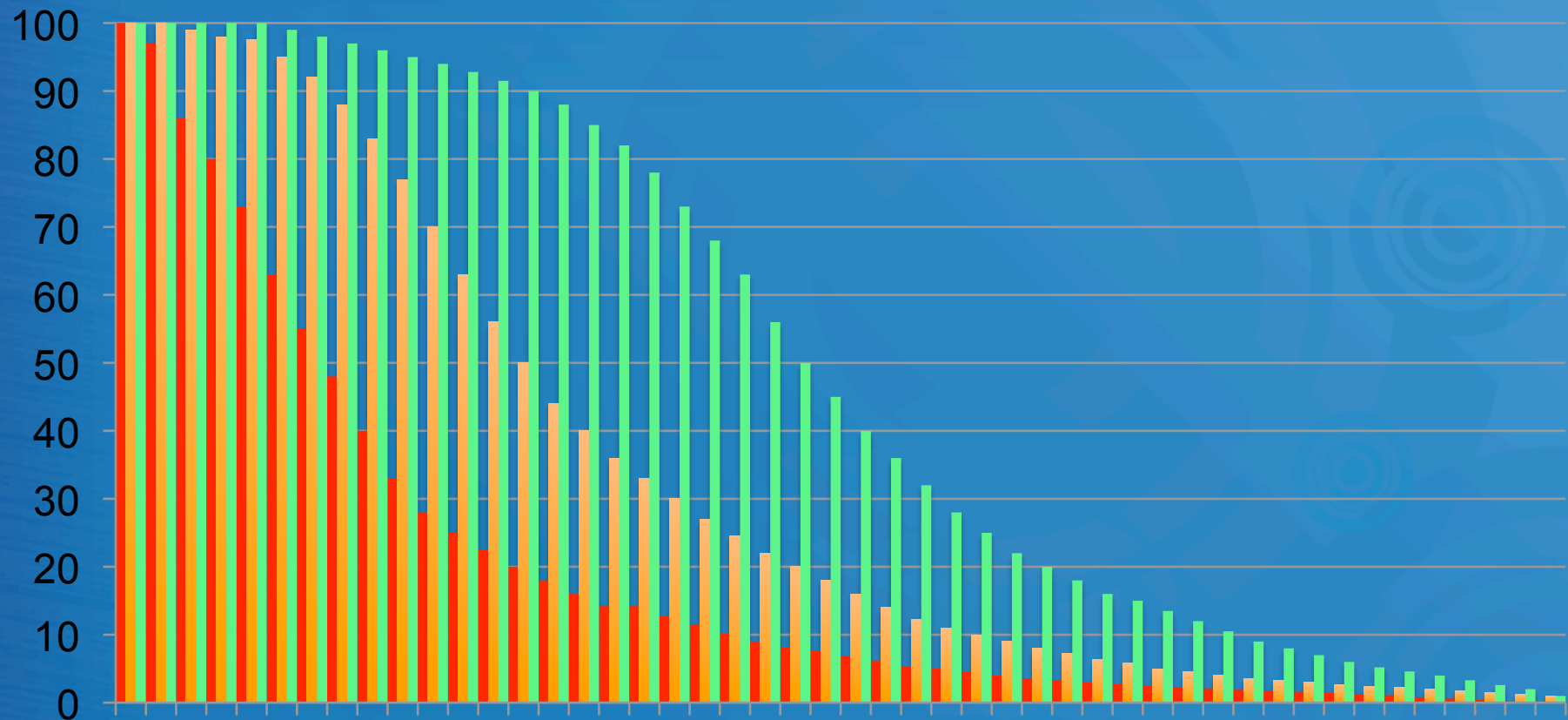# Traditional Enterprise Datacenter Utilization
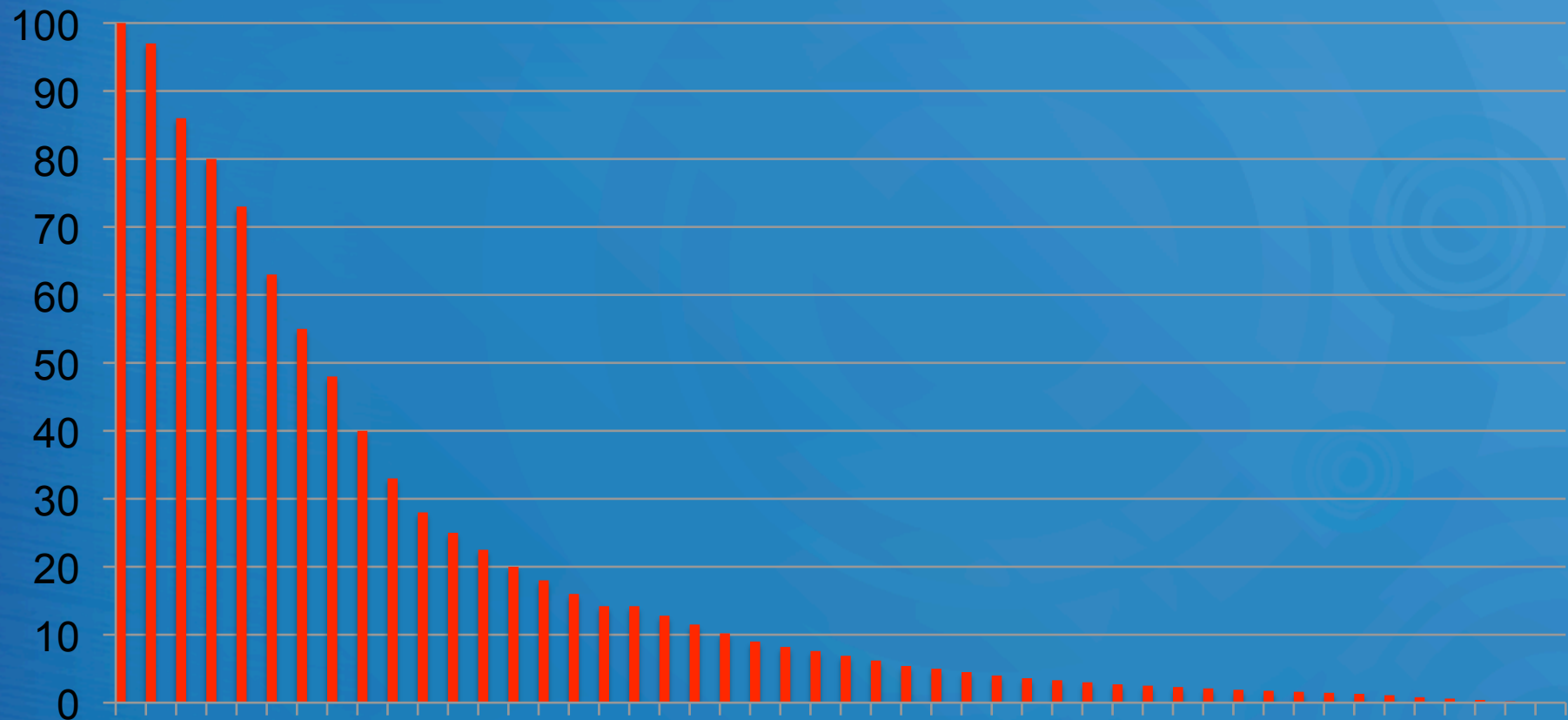
Traditional Enterprise Datacenter utilization is often below 20%

Virtualized Enterprise Datacenter Utilization
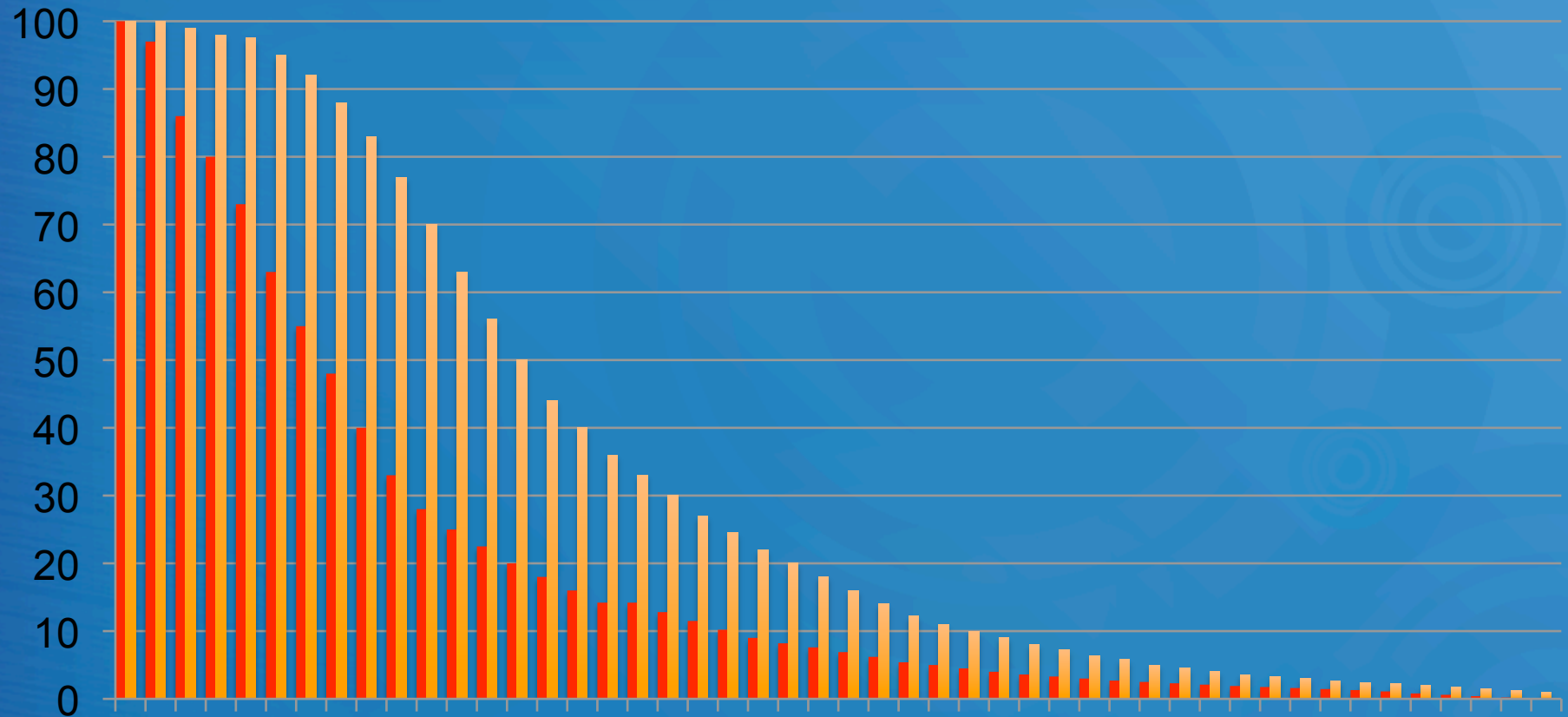
Virtualization significantly improves average server utilization

Cloud Enterprise Datacenter Utilization

Cloud computing further increases average server utilization

Enterprise Private Clouds

- Significantly improves average server utilization
    - Driving corresponding reductions in CAPEX and OPEX
- Allows the use of low-cost server and software hardware
    - Further reducing CAPEX
- Reduces power consumption
    - Further reducing OPEX
- Increases control over resource allocation
    - Scheduler implements business priorities
- Improves application and data availability
    - Consistent mechanisms to deal with HW failure

Cloud Computing Summary

- Move the application to "the cloud"
  - Decouple the user and datacenter location
- Software as a service business models
  - Google/Yahoo/Amazon/Facebook/etc
- Similar benefits with enterprise applications
  - Salesforce, Netsuite, SugarCRM
- Similar benefits for internally developed applications
  - Makes software easy to deploy across multiple sites

Conclusions (cont)

- Cloud Computing is the fastest growing part of IT
- Tremendous benefits to customers of all sizes
- Cloud services are simpler to acquire and scale up or down
- Key opportunity for application and infrastructure vendors
- Public clouds work great for some but not all applications
- Private clouds offer many benefits for internal applications
- Public and private clouds can be used in combination

Economic environment is accelerating adoption of cloud solutions