Cloud Developer Conference

Build Your Own
Highly Scalable Clouds

Ravi Gururaj

1 min Personal Introduction …

Education

La Martiniere For Boys

Penn Engineering

Wharton
University of Pennsylvania

Startups

uberworks™

SQA TECHNOLOGIES

VMLogix™

Investors

Bain Capital Ventures

TRILOGY

Exits

CITRIX

Network Commerce

NASDAQ

Employers

idt

intel

Dialogic

Present

VP – Products

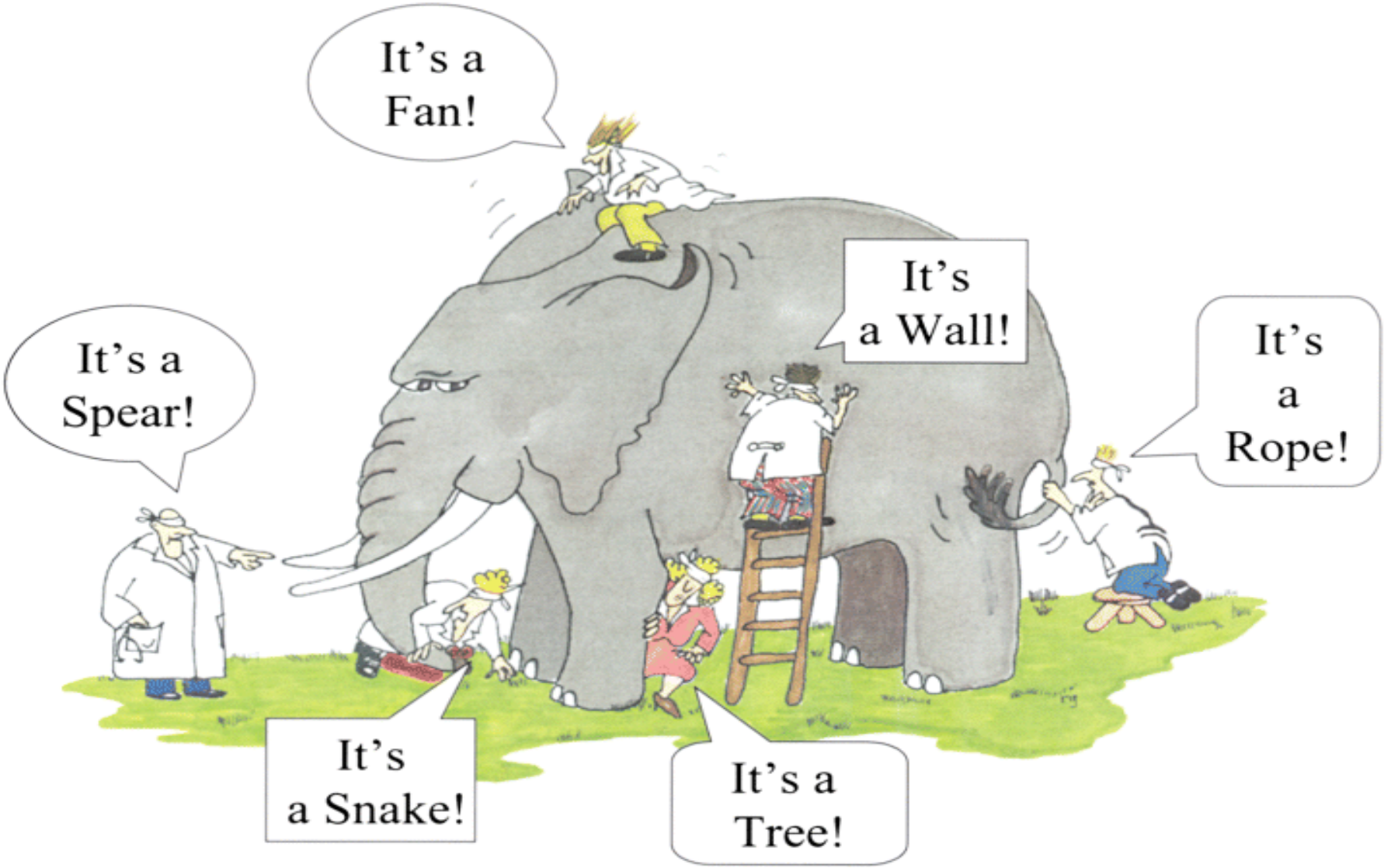
Citrix Cloud Platforms Group

Citrix CTO Office

CITRIX StartupAccelerator

What is Cloud Computing?

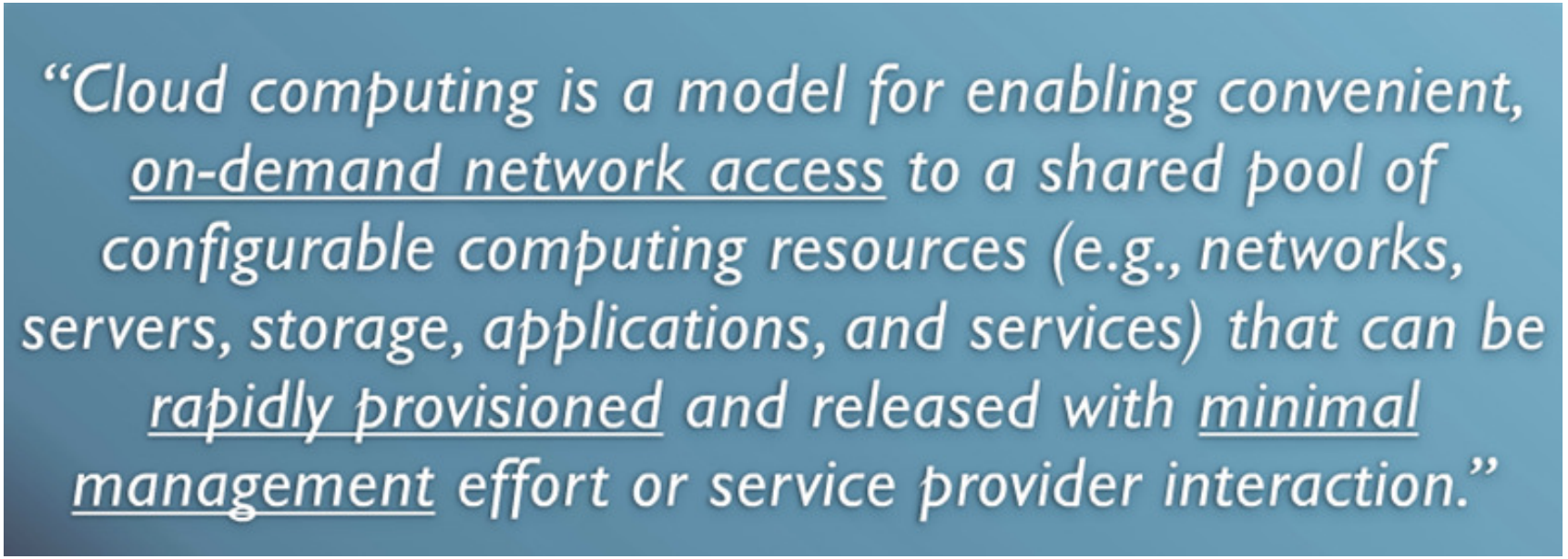
Seeking a definition seems futile …



Cloud touches everything …

Everything is embracing “Cloud” …

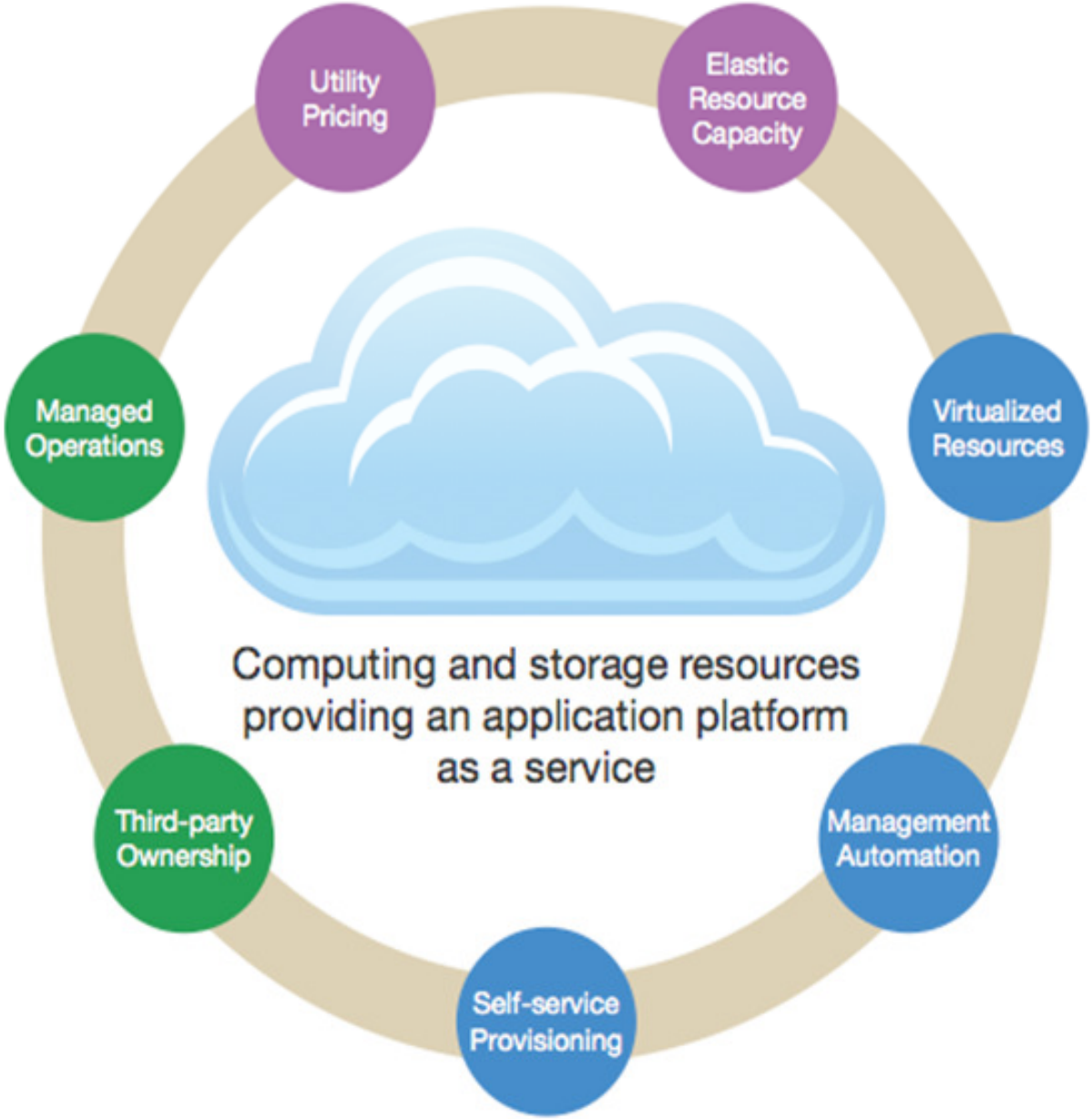
NIST definition …



Even this definition ignores ….

pay-as-you-go, cost efficiency, elasticity, resilience, performance and security.

Cloud Computing Value Elements



Why so much Cloud Hysteria?


FASTER!
BIGGER!
BETTER!
... and CHEAPER!!!

Faster …

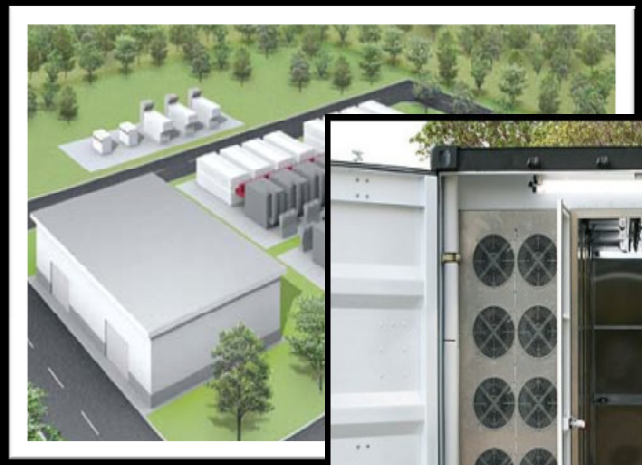
- Infrastructure on-demand in seconds.
- Provisioning via UI console or API - no phone calls.
- Snapshot and clone effortlessly. Repeat often.

Bigger …

"By 2014, the overall market for public cloud services will be worth more than $55 billion."

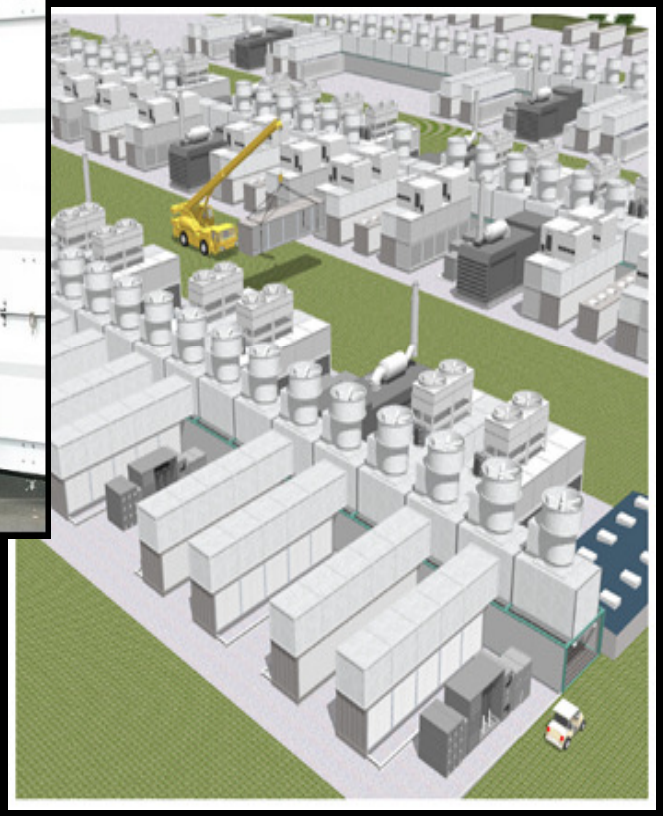
– IDC

Cloud Scale & Design …



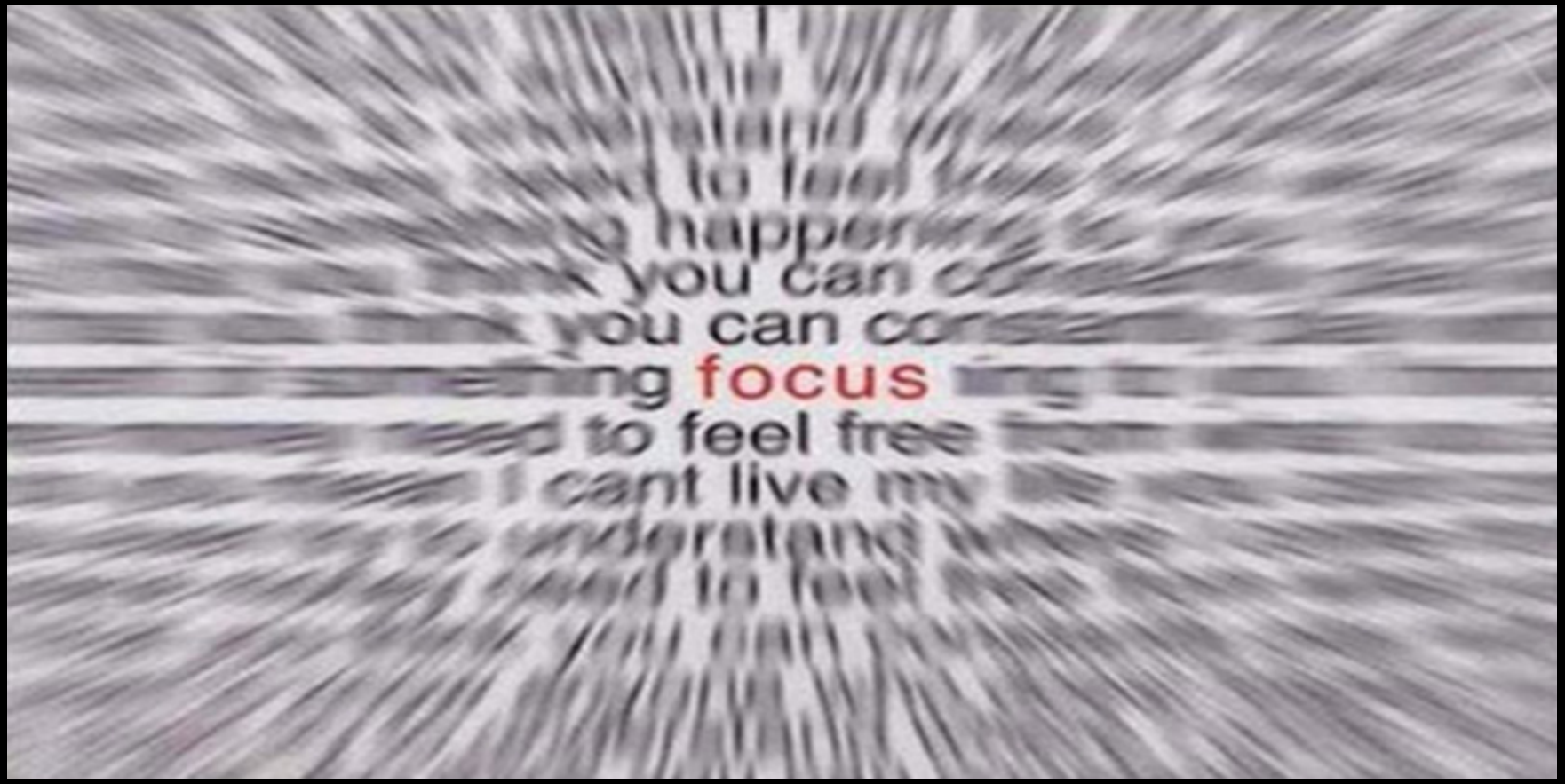
IIJ

Internet Initiative Japan



Autonomic, Self Healing, Massive Scale,
Extreme Automation, Totally Homogeneous

Better …

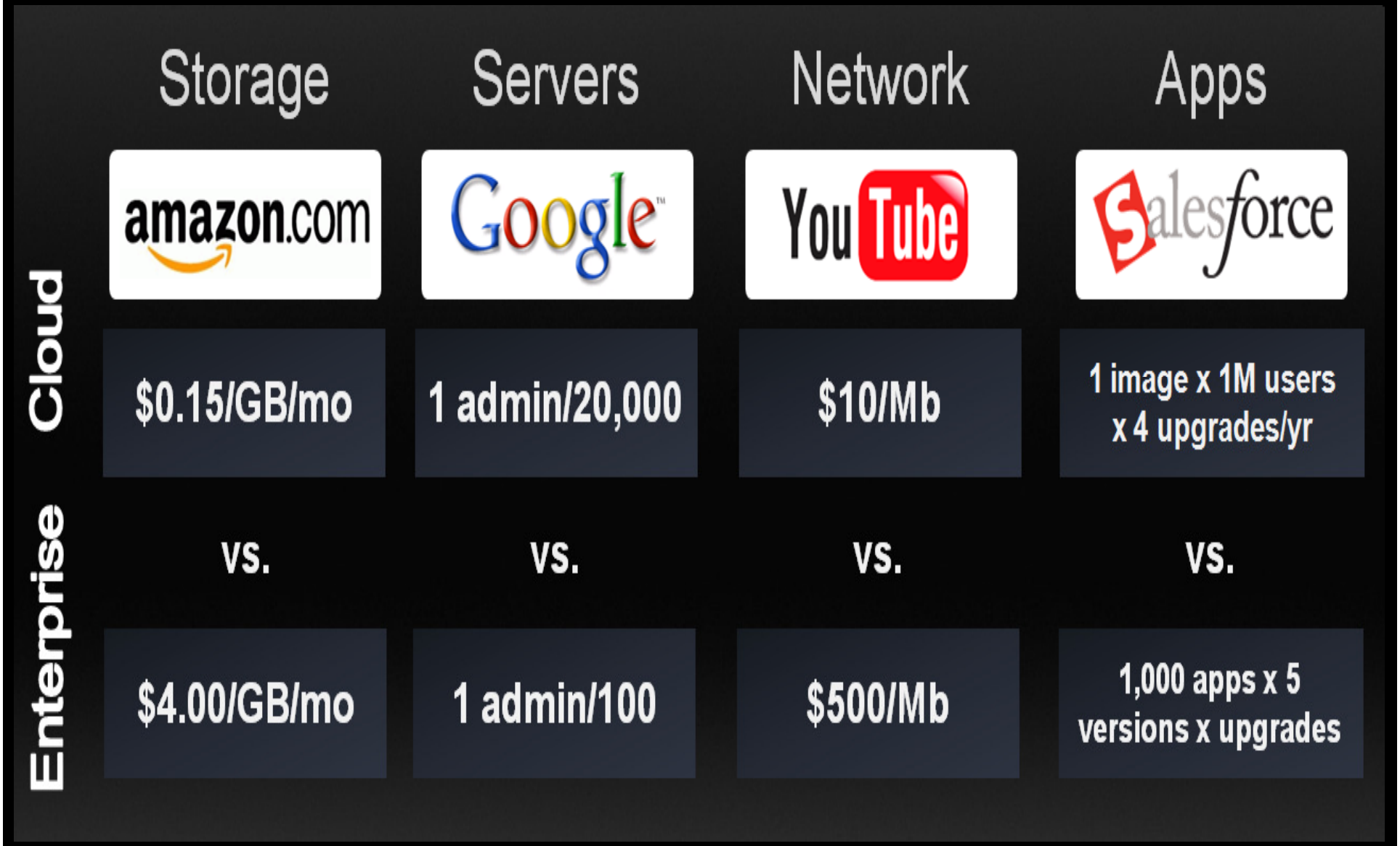


- Focus on core business.
- Infrastructure & scaffolding is managed by experts.

Cheaper …

- Reduced need for CapEx. OpEx not CapEx.
- Great overall utilization and greener IT.
- Barrier to entry is much lower.
- Disaster recovery is less expensive.

Cloud Economics …



“Bring Your Own”, “Follow Me”, “Always On”

BYO Device



One user, X devices, Corporate + Personal workspace co-exist.

BYO Identity

One identity, single sign-on, many applications.

BYO Network

Use any network, not just corporate securely.

BYO Apps

Seamlessly blend personal apps with corporate app store.

BYO Data

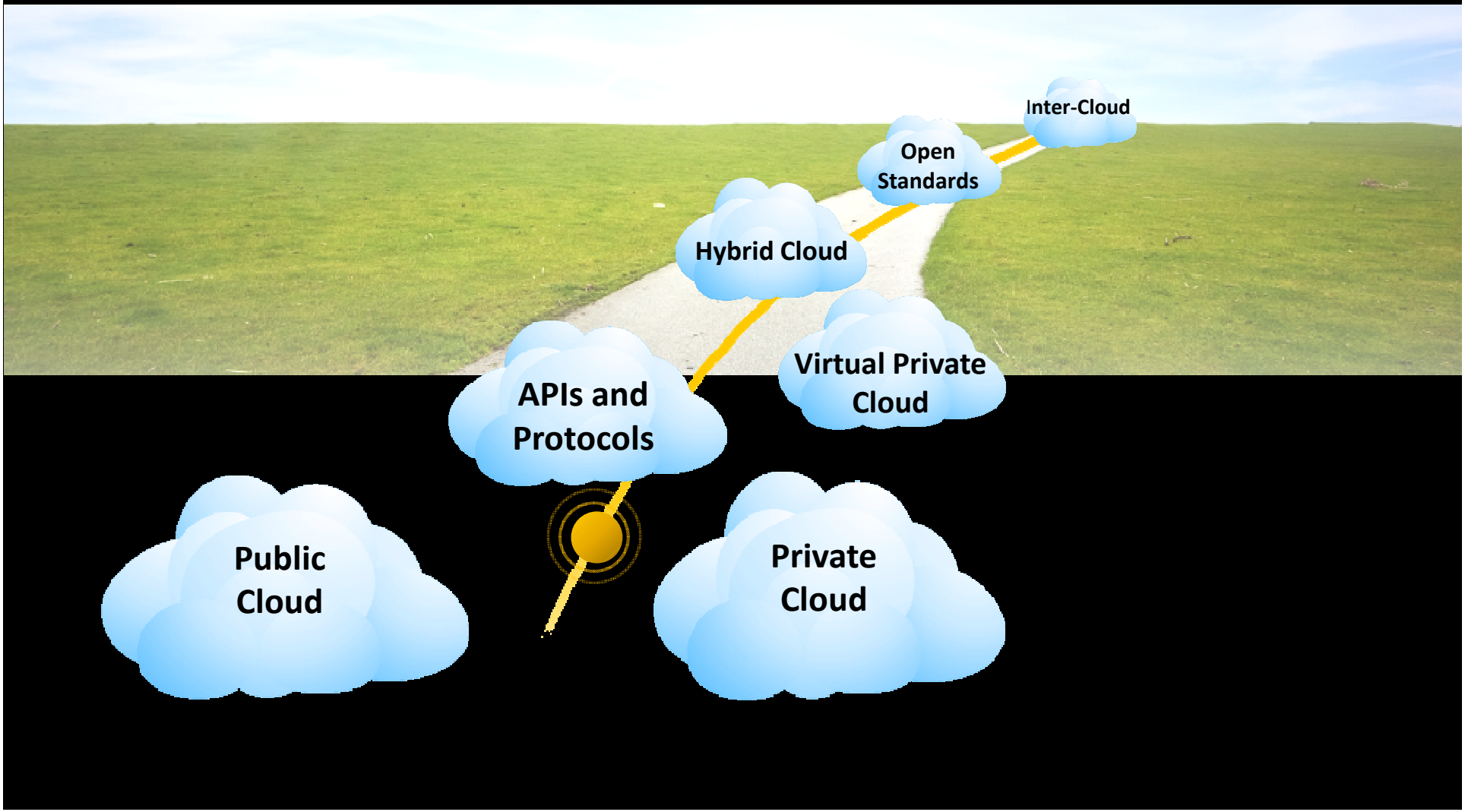
Create data once and access it anytime, everywhere.


Emerging Clouds

Business demands …

- **Give me 'more' for less**
  - Drive cost savings in existing vendor relationships
- **Keep up with the business growth**
  - Need to increase computing capacity
- **Innovation is not a choice**
  - Drive the business, not be a cost center
- **Drive customer intimacy**
  - New technologies like mobile to drive tighter customer intimacy

The Cloudy Road Ahead …

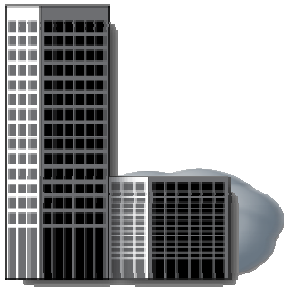
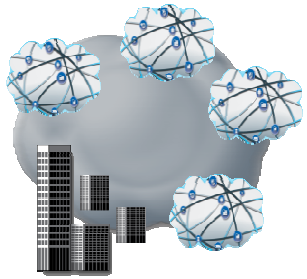
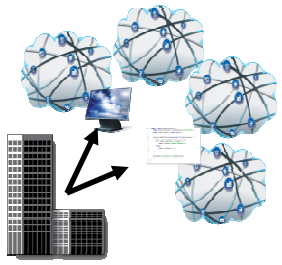


Cloud Deployment Models

Distinguishing between Ownership and Control

Ownership

Control

Internal Resources	External Resources
 All cloud resources owned by or dedicated to enterprise	 All cloud resources owned by providers; used by many customers
Private Cloud	**Public Cloud**
 Cloud definition/ governance controlled by enterprise	 Cloud definition/ governance controlled by provider

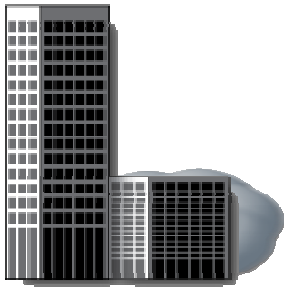
Enterprise Deployment Models

Ultimately These Distinctions Don't Matter

Ownership

Control

Internal Resources

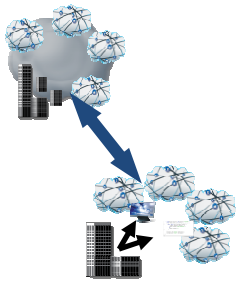


All cloud resources

External Resources

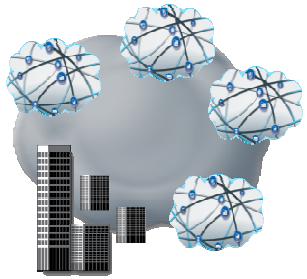
All cloud resources owned by providers; used by many customers

Hybrid Cloud



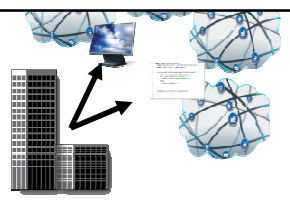
Interoperability and portability among Public and/or Private Cloud systems

Private



controlled by enterprise

Cloud



Cloud definition/ governance controlled by provider

Cloud Adpotion Hurdles

IT Infrastructure Today

Anchored on Trust & Control

Trusted

Controlled

Reliable

Secure

Cloud Computing

Targeting Agility and Efficiency

Flexible

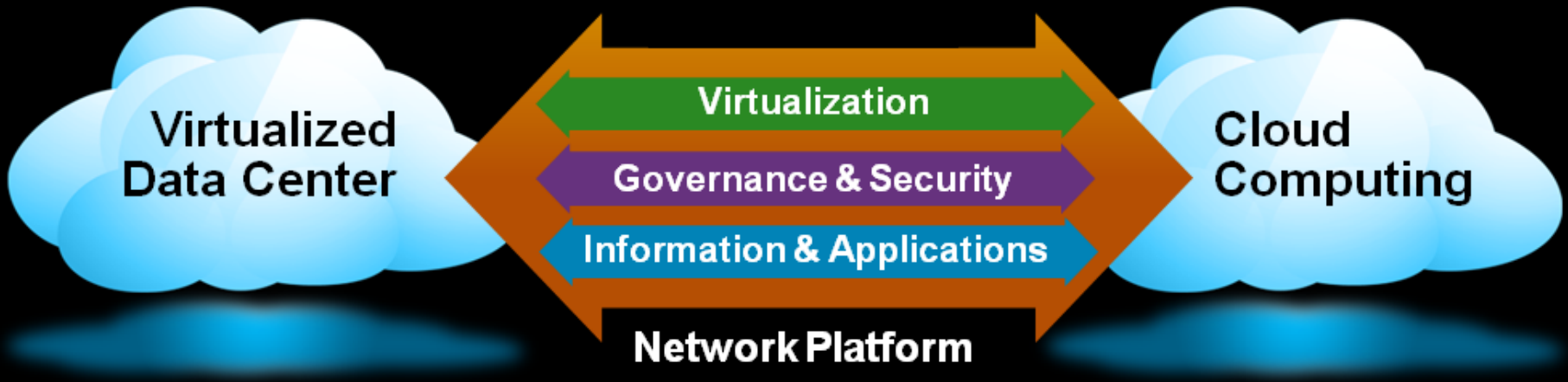
Dynamic

On-demand

Efficient

Trusted Cloud: The Best Of Both Worlds

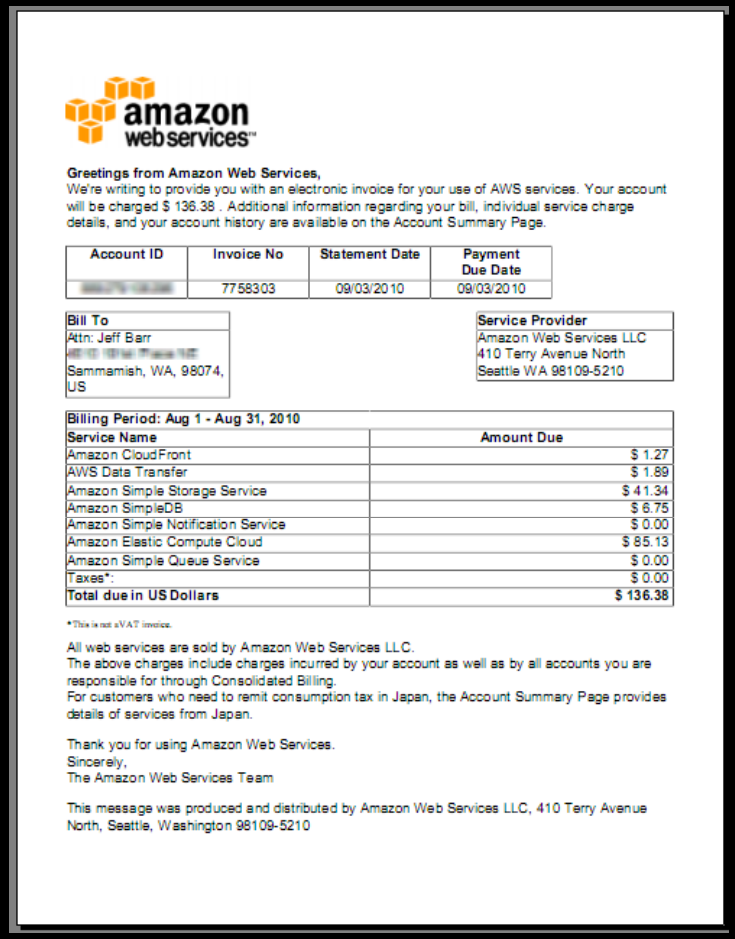
Trusted
Flexible
Control
Dynamic
Reliable
On-demand
Secure



Key to Broader Adoption of Cloud: Trust

Before the Economics of Cloud Computing Can be Considered, Organizations Require a Trusted Service Infrastructure

Economic & Operational Concerns



amazon web services™

Greetings from Amazon Web Services,
We're writing to provide you with an electronic invoice for your use of AWS services. Your account will be charged $ 136.38 . Additional information regarding your bill, individual service charge details, and your account history are available on the Account Summary Page.

Account ID	Invoice No	Statement Date	Payment Due Date
[redacted]	7758303	09/03/2010	09/03/2010

Bill To	Service Provider
Attn: Jeff Barr [redacted] Sammamish, WA, 98074, US	Amazon Web Services LLC 410 Terry Avenue North Seattle WA 98109-5210

Billing Period: Aug 1 - Aug 31, 2010	
Service Name	**Amount Due**
Amazon CloudFront	$ 1.27
AWS Data Transfer	$ 1.89
Amazon Simple Storage Service	$ 41.34
Amazon SimpleDB	$ 6.75
Amazon Simple Notification Service	$ 0.00
Amazon Elastic Compute Cloud	$ 85.13
Amazon Simple Queue Service	$ 0.00
Taxes*:	$ 0.00
Total due in US Dollars	**$ 136.38**

*This is not a VAT invoice.

All web services are sold by Amazon Web Services LLC.
The above charges include charges incurred by your account as well as by all accounts you are responsible for through Consolidated Billing.
For customers who need to remit consumption tax in Japan, the Account Summary Page provides details of services from Japan.

Thank you for using Amazon Web Services.
Sincerely,
The Amazon Web Services Team

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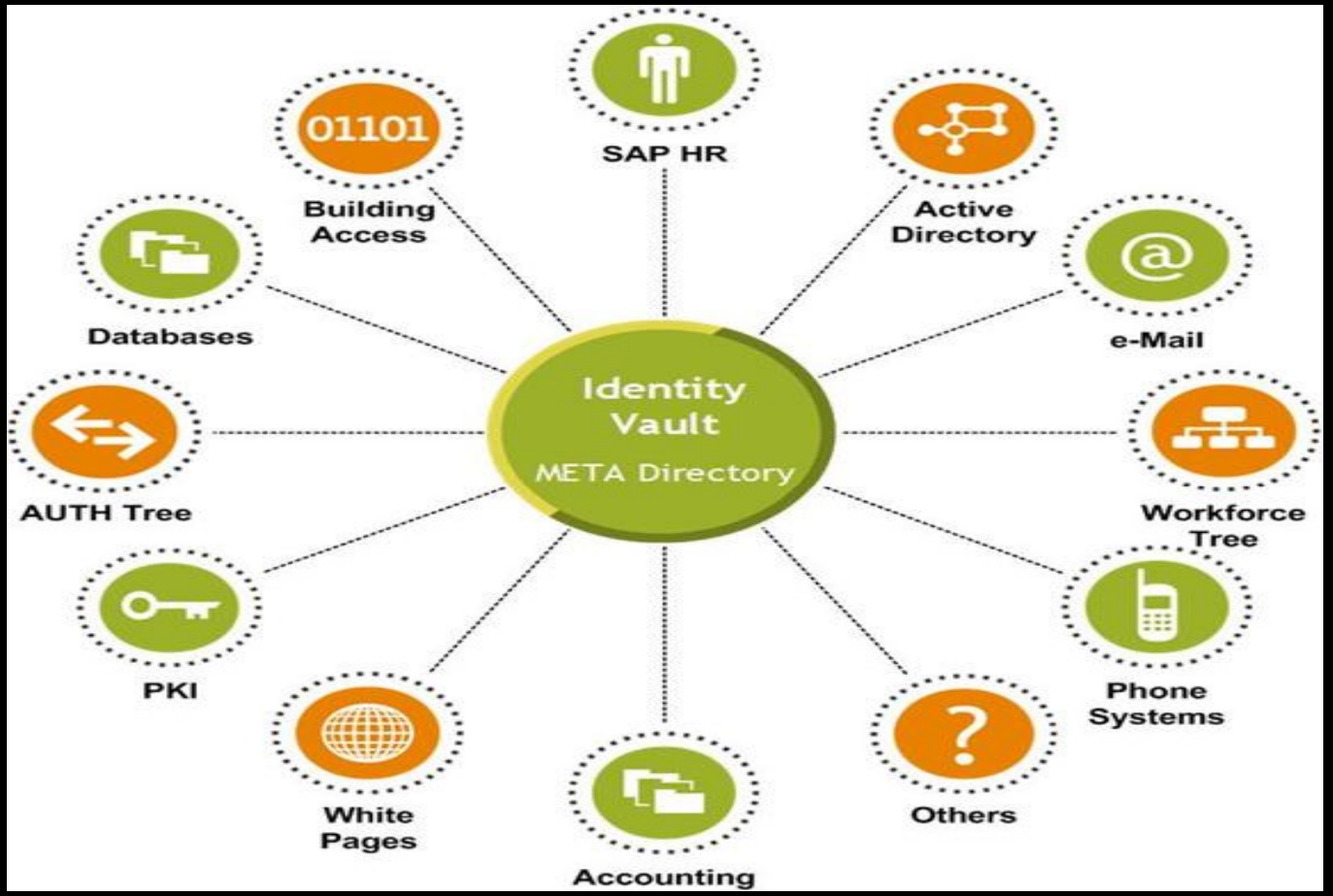
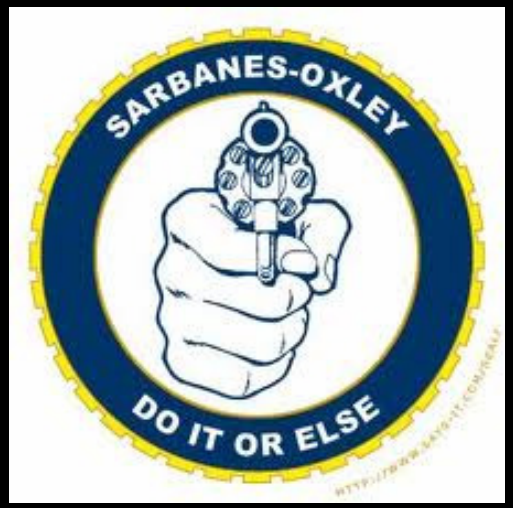
Entry, ongoing, exit, migration costs.
Lock-in, interoperability, SLA enforcement.

Security and ID Management Concerns

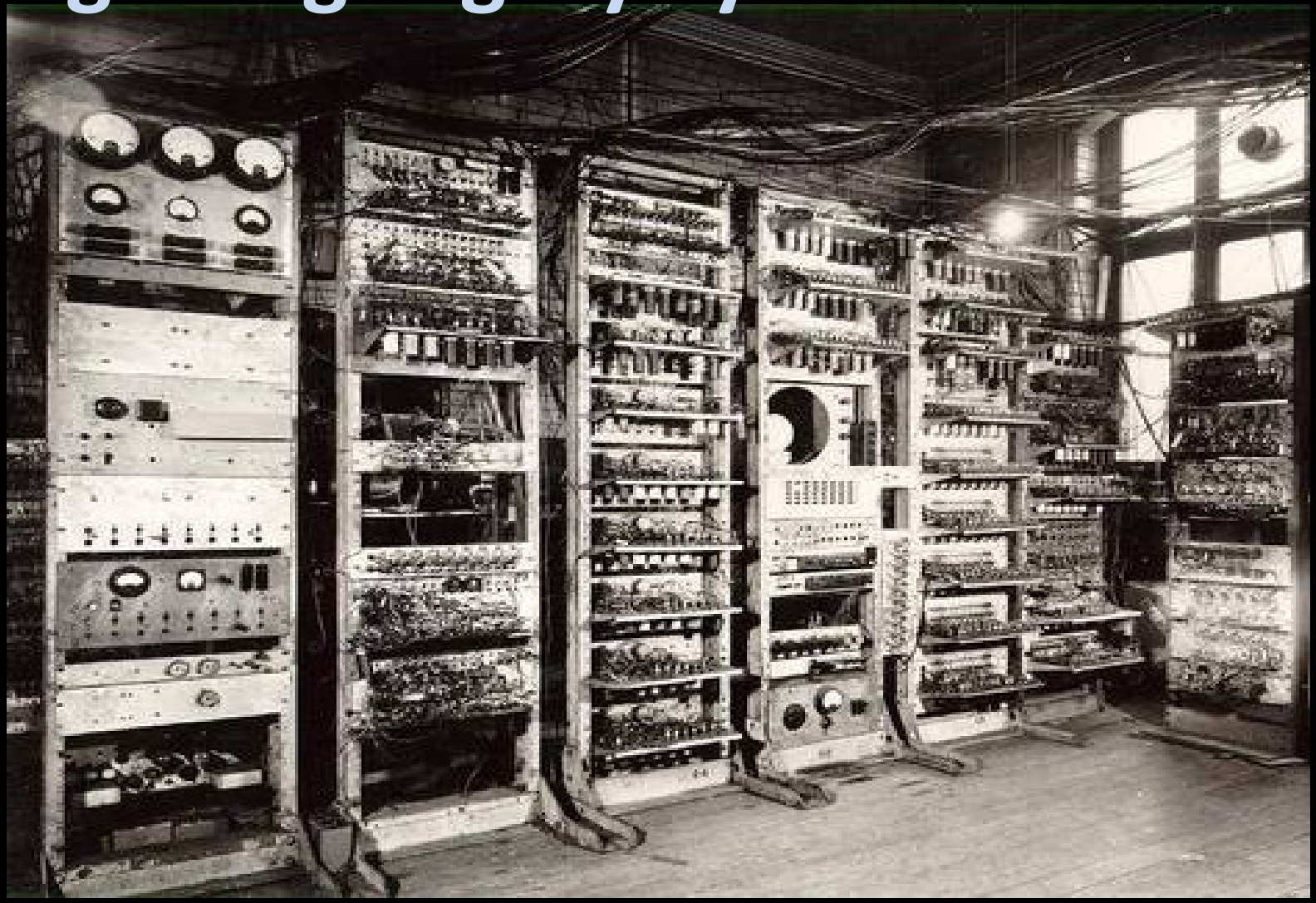


Cloud Portals, SaaS Apps, Multiple Devices and personal applications & data adds complexity.

Legal and Compliance Concerns



Migrating Legacy Systems



"5 billion lines of COBOL code written a year."

- Paul Daugherty, Accenture

Enterprise Use Cases

Enterprise Cloud Forays

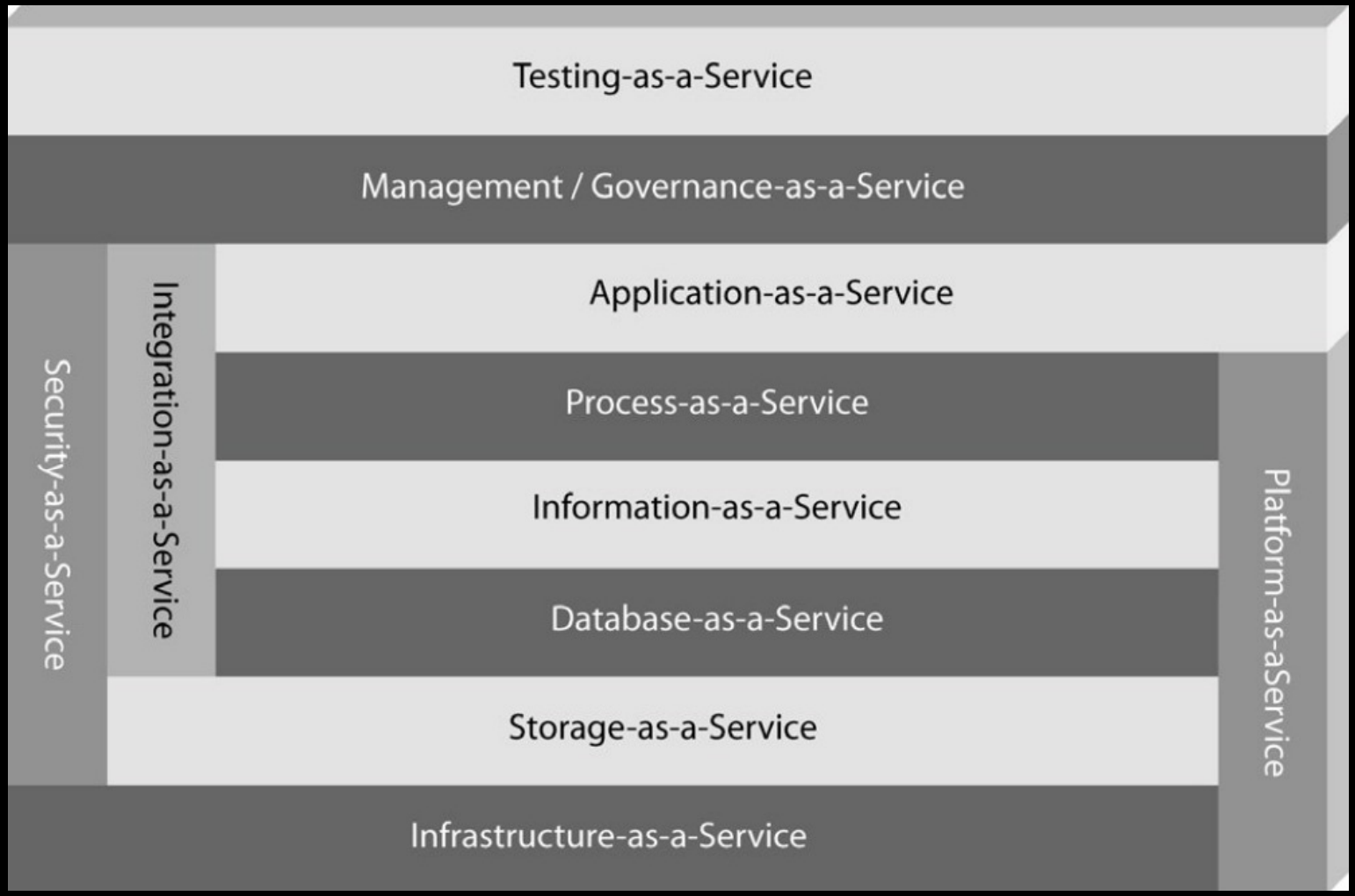


- Data, Data, Data
- Green IT
- QA & Dev Labs, Build Farms
- Business Analytics
- Consolidate DCs into private clouds
- New Organizations & Virtual Groups


Cloud
“___-as-a-Service”

Alphabet Soup of “As a Service”

“As a Service” Stack View



…. Desktop, Network, Communications, Collaboration, many more …

Infrastructure as a Service (IaaS)

Core Requirements for an IaaS Cloud

1. Automated management of physical infrastructure
2. On-demand provisioning of virtual infrastructure
    1. Virtual Machine
    2. Virtual Network
    3. Virtual Disk
3. API access to manage infrastructure
4. Multi-Site Scalability
5. Isolation of environments and Multi-tennancy

Building your own IaaS Cloud

Define target customer use cases

Determine a set of required functionality

Develop your technical architecture

Implement a test environment

Defining End User Use Cases

- Application Delivery
- Software Dev, Test and Maintenance
- SMB IT Services
- High Performance Computing
- Batch processing
- Media Distribution
- Disaster Recovery
- Scale testing

Determining Required Functionality

VM Features
• Resizing • High Availability • Cloning • Monitoring • Windows Support • Linux Support • Naming • Grouping • Security

Networking Features
• Dedicated user networks • Integrated Firewall • Integrated Load Balancing • IP Address Management • Multiple Guest Networks • VPN Termination • Intrusion Prevention

Storage Features
• Persistent Storage • Ephemeral Disk • Automated Disk Snapshots • Cloud Storage access • Disk Monitoring • Encryption

Determining Required Functionality

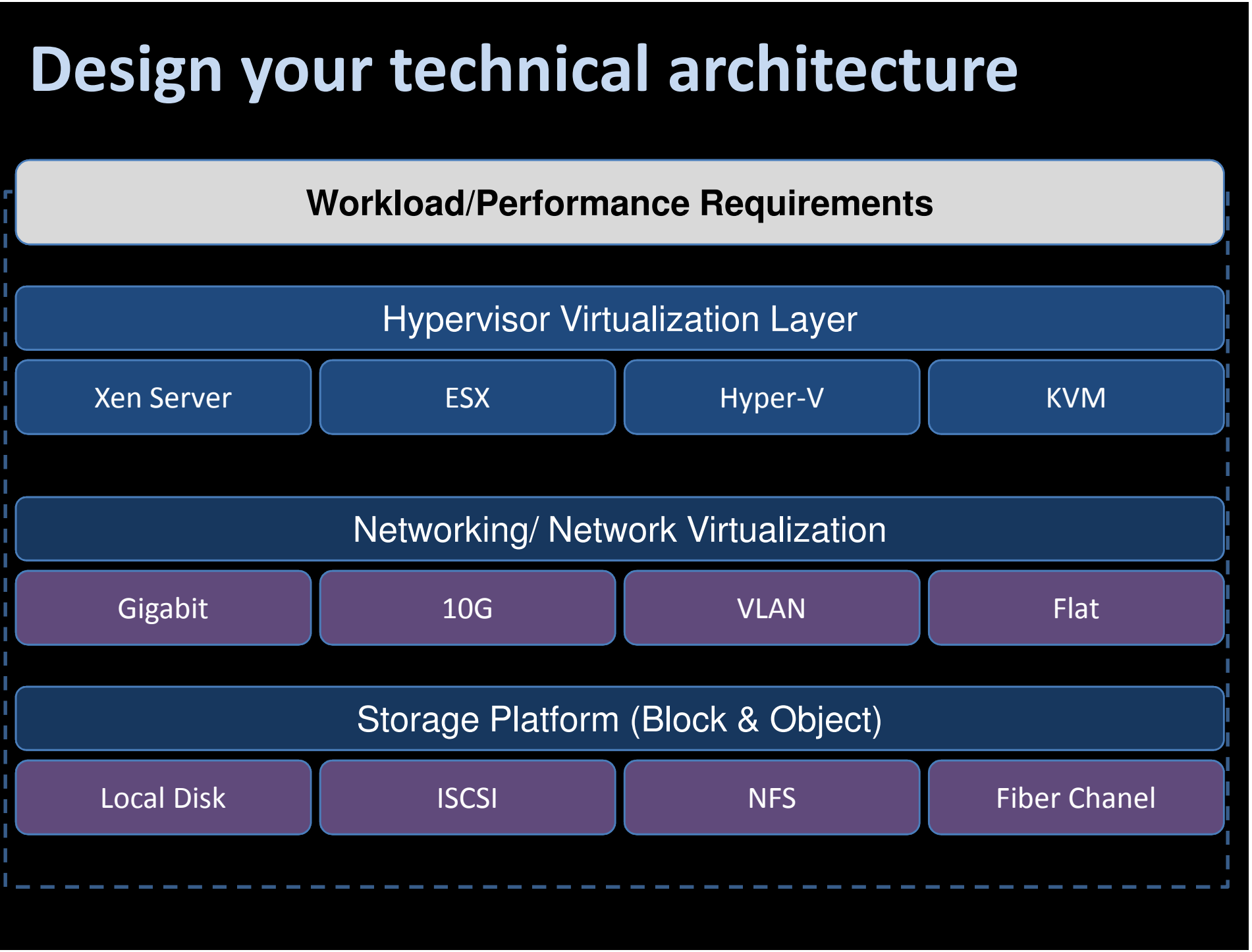
Template Management

- Master Template Library
- User Template upload
- User ISO upload
- Blank VM creation
- Private templates
- Template migration

Management Features

- Delegated Administration
- Live Migration of VMs
- Live Migration of Storage
- Usage Metering
- User Interface
- Console Access
- Multi-Hypervisor
- Open-Source
- Multi-Datacenter

Design your technical architecture

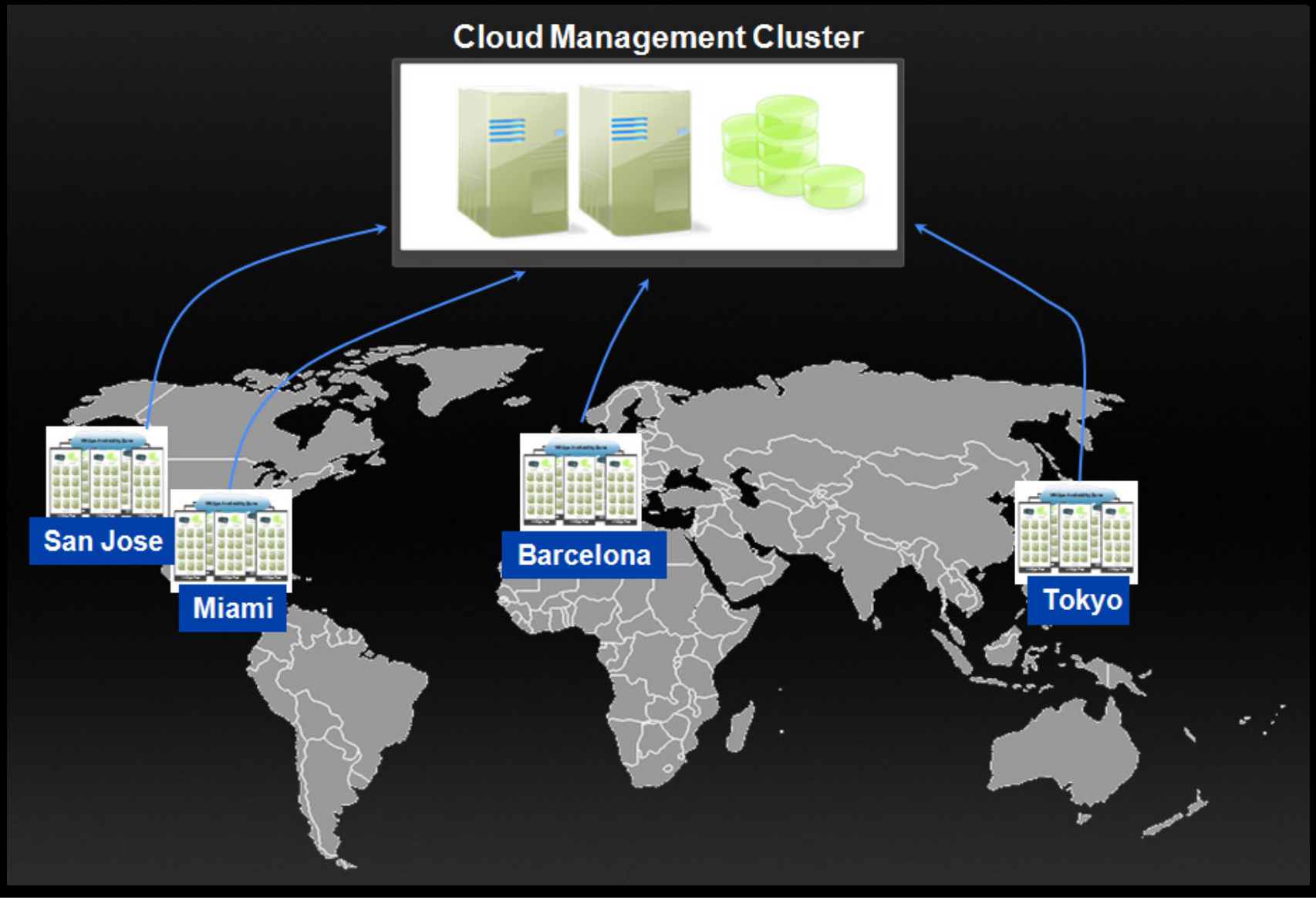


Cloud reliability is directly …

… connected to scalability

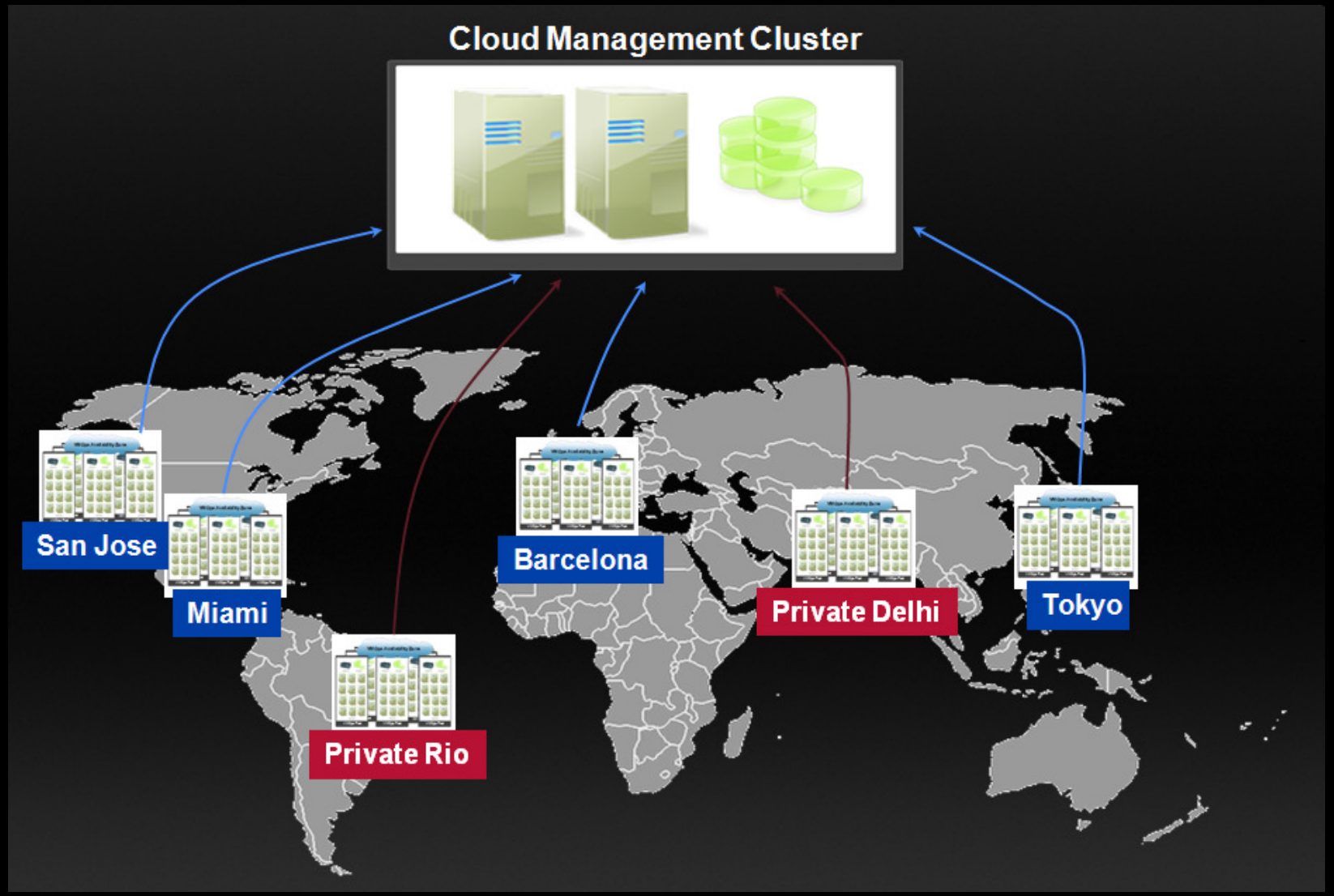
Cloud scalability must ….

… span multiple public DCs

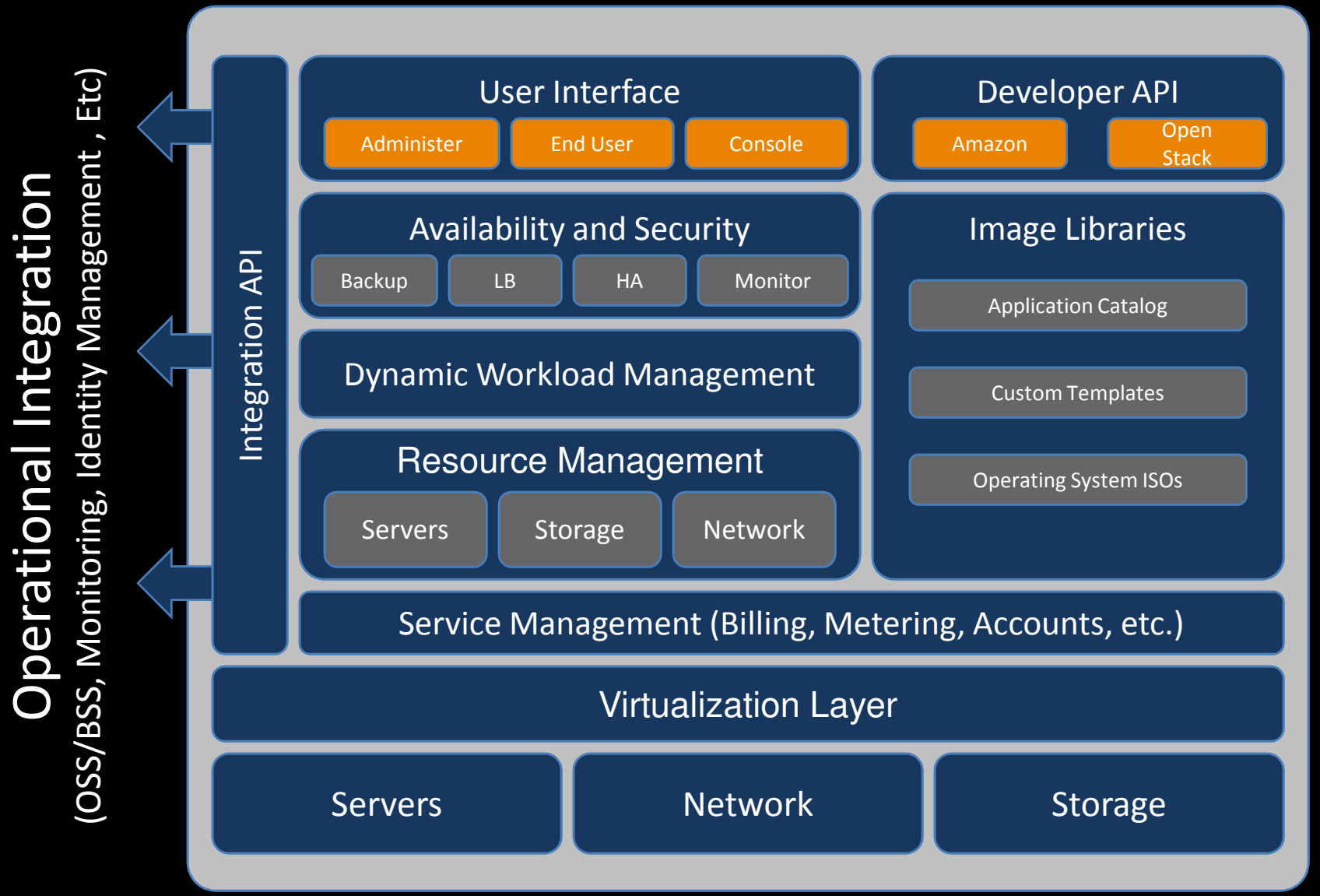


Cloud scalability must ….

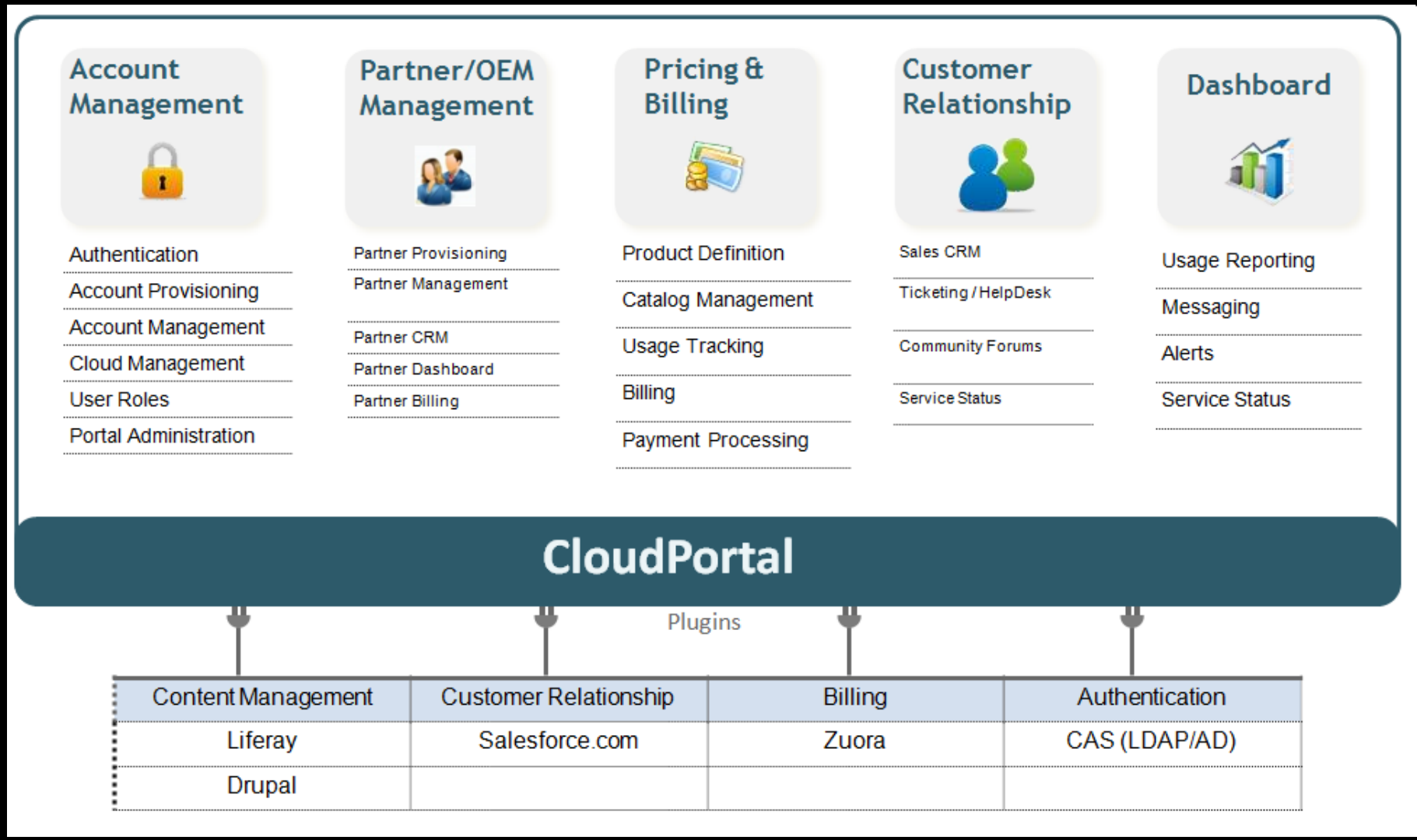
… span multiple public & private DCs



Cloud Stack Architecture



Cloud Business Logic Layer



Citrix powers large clouds

Citrix technologies power large production clouds

Telco and Service Providers

Web 2.0 and Media

Enlightened Enterprise


Cloud
Standards Initiatives


CCIF


ISO
JTC1
IEC


CSA
cloud
security
alliance SM


OpenGridForum


ITU


OCCI
Open Cloud Computing Interface


OASIS
The Organization for the Advancement of Structured Information Standards


SNIA
Storage Security Industry Forum


IEEE


ETSI


DMTF
distributed management task force, inc.


Open Cloud
Consortium


IETF


tmforum


OPPORTUNITY
BLVD
CAREER
DR

Reinventing Yourself

- Agile / Scrum / Lean Methodologies
- Distributed & Asynchronous Architectures
- API Driven Designs, Mash-ups, Cloud Services
- UX/UI, Javascript, HTML5, CSS3, Design Premium
- No SQL, Big Data, Analytics, Biz Intelligence
- AB Testing, Open Source, Open Standards
- Multiple Languages,
- Plug into the Ecosystem & Communities
- Constant "Build" vs. "Integrate"

"Cloud: Live in a box. Think outside it."

Predictions & Guidance

Software will be like fashion - better designs will dominate

Open source will grow dramatically - adopt and understand it

Change will accelerate - learn to embrace it

Options will skyrocket – integrate vs. build, use vs. acquire

Engineering jobs will restructure - prepare for the change

Systems admin jobs will totally morph - except at cloud providers

Cloud Computing

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