A Mainframe Guy Discovers Cloud Computing

SHARE in Boston, August 2010

Glenn Anderson, IBM Technical Training

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Computing models: A bit of history……

- **1950's / 60's / 70's - Centralized**
  - Sharing and reliability
- **Dumb, text-based terminals ----> PC's**
- **1980's - Distributed client server**
  - Low costs and simplicity
- **PC's ----> mobile devices and sensors**
- **Mid 1990's - Internet / Web**
  - On demand computing

Dissatisfiers → Disruptions / Technology Shifts

- **1980's** - how long it took IT to meet departmental needs
- **1990's** - thousands of physicists in the world who wanted access to data at CERN
- **Today** - IT apps are too costly and too difficult to use

The New Cloud Computing Model

- Internet / Web
- Linux / Open Source
- Grid…Autonomic…..SOA…..On Demand
- Web 2.0
- Social Networking
- Explosive rise of intelligent mobile devices - Blackberrys, iPhones, notebooks, sensors
- A confluence of forces building over the past decade….the evolution of the internet

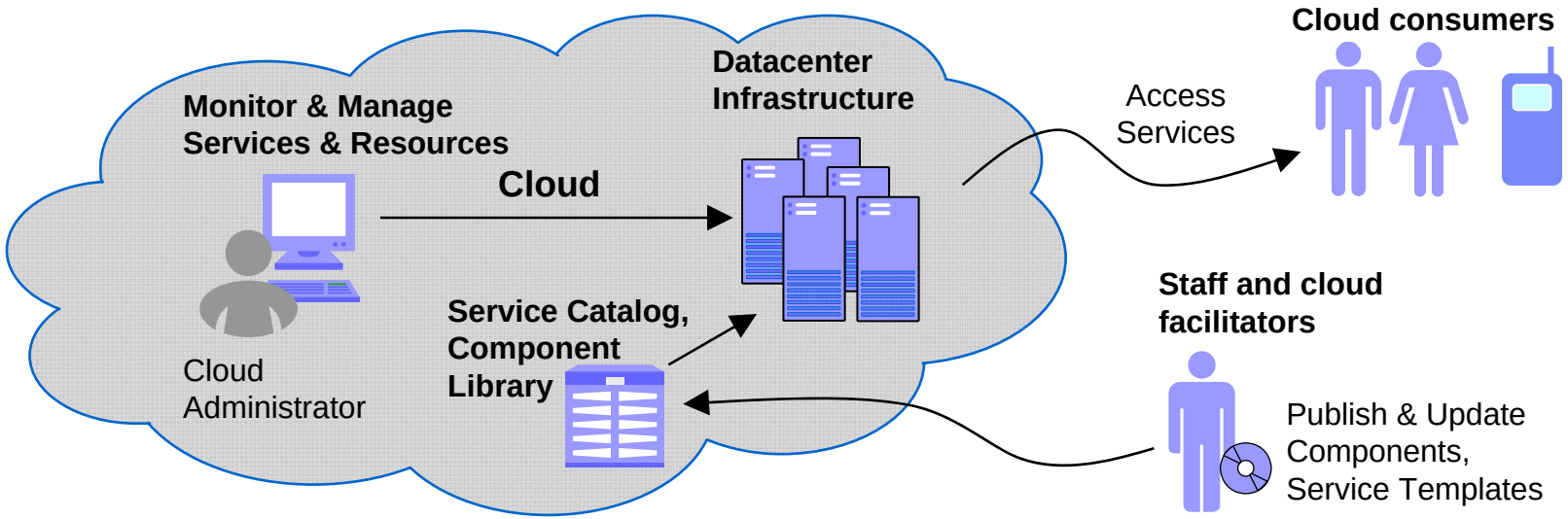
What is cloud computing?

A user experience and a business model

Cloud computing is an emerging style of IT delivery in which applications, data, and IT resources are **rapidly provisioned** and provided as **standardized offerings** to users over the web in a **flexible pricing model.**

An infrastructure management and services delivery methodology

Cloud computing is a way of **managing** large numbers of highly **virtualized resources** such that, from a management perspective, they resemble a single large resource. This can then be used to deliver services with **elastic scaling**.



Cloud-onomics…

CLOUD COMPUTING

….leverages virtualization, standardization and automation to free up operational budget for new investment

… allowing you to optimize new investments for direct business benefits

Some Characteristics of Cloud Computing

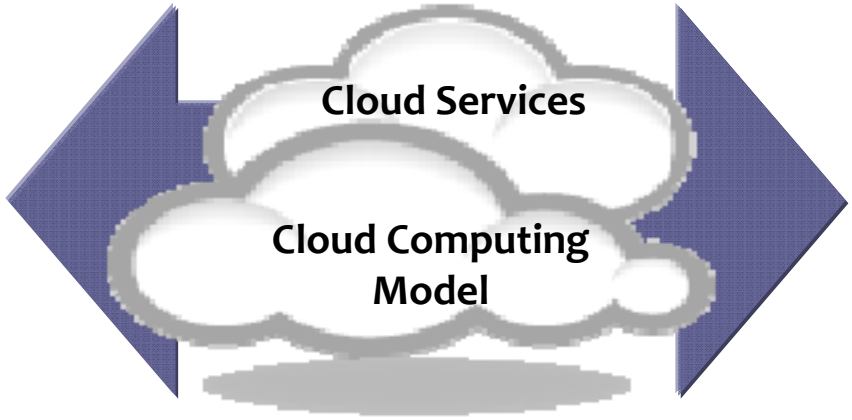
- **Internet of Services**
  - User experience
  - Decouple delivery from technology
- **Process-oriented, industrialized approach**
- **Virtualized Assets**
  - Security
  - Green footprint
  - Multi-tenant
- **Flexible acquisition model**

Cloud Computing Delivery Models

Flexible Delivery Models

Public …

- Service provider owned and managed.
- Access by Subscription.
- Delivers select set of standardized business process, application and/or infrastructure services on a flexible price per use basis.



Private …

- Privately owned and managed.
- Access limited to client and its partner network.
- Drives efficiency, standardization and best practices while retaining greater customization and control

Hybrid …

- Access to client, partner network, and third party resources

…. Standardization, capital preservation, flexibility and time to deploy

…. Customization, efficiency, availability, resiliency, security and privacy

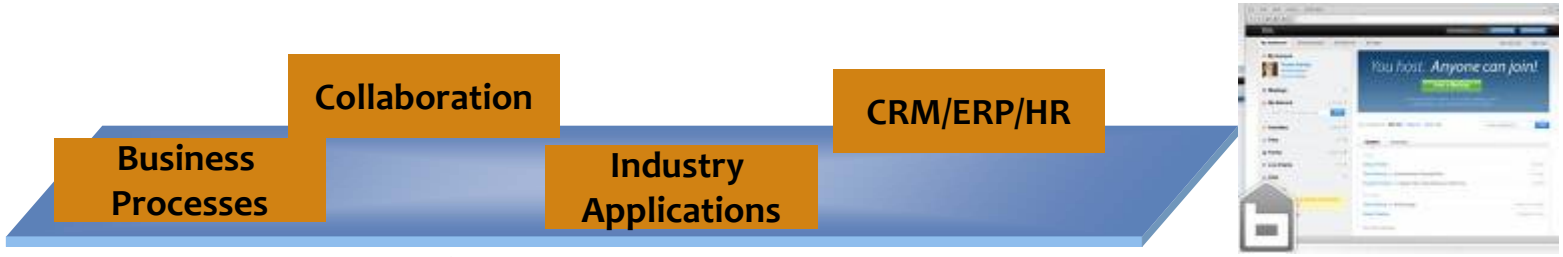
ORGANIZATION → CULTURE → GOVERNANCE

…service sourcing and service value

Why the crazy interest in cloud computing today?

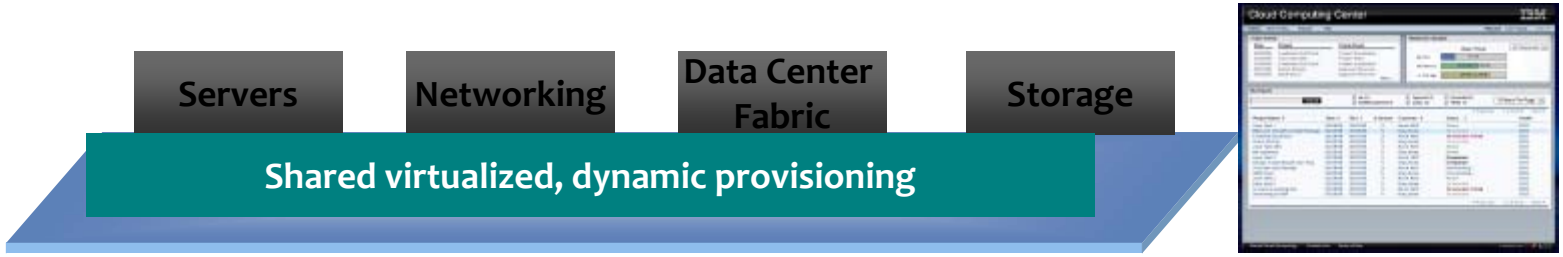
- IT needs to deliver service, to meet the needs of the business you are supporting
- IT has not been doing a good job of this. Users are not satisfied
- A private cloud is a model for IT to do a better job of delivering services to end users
- IT needs to operate as a value center. When IT is a cost center, the only thing they ask you to do is cut costs!

The layers of IT-as-a-Service



Software as a Service

Platform as a Service

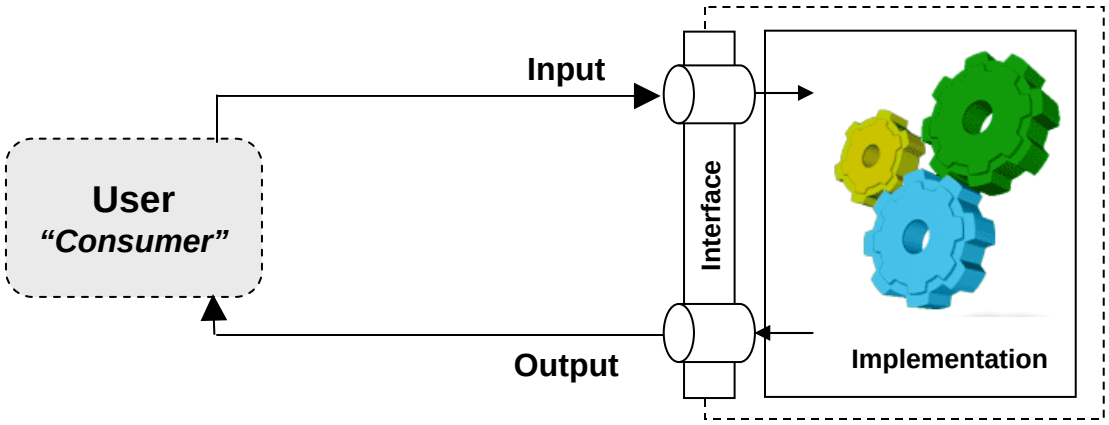


Infrastructure as a Service

A "Service"

A discrete set of business or technical functionality that can be identified, has a defined set of input and output, and is reusable

Discrete – can be contained within a definite and known "fence"
Identified -- it's recognized as a service and people acknowledge it as a service
Defined – the input and the outputs are known and understood
Reusable – is not just a one-time thing



Service
"Producer"

Exactly how the service is implemented behind the interface doesn't really matter to the consumer of the service

There's nothing revolutionary about this. What's different is that we're coming to a point where improvements in technology have allowed us to do this better than before:

- **Settled on a universal and common networking protocol -- TCP/IP**
- **Networking bandwidth is increasingly available, cheap and reliable**
- **The idea of "industry standards" has matured and is embraced rather than resisted**
- **Java as a platform-unaware language has opened up a new world of interoperability**

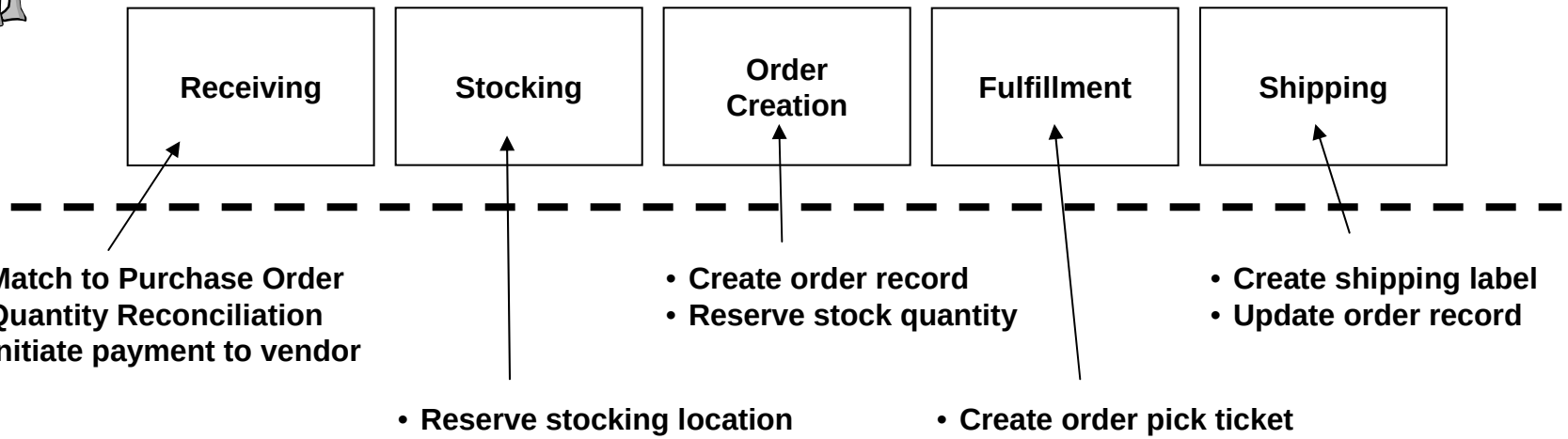
Two Perspectives of the Same Thing

Depending on who you are and how you approach this, the concept of a "Service" takes on different meanings

Business manager or business consultant

View business process as a set of functional services linked in a specified flow

This is where discussions of process re-engineering and business alignment to services orientation comes from. More business consulting than I/T architecture



IT specialist or architect

View as a set of computing actions – programs, subroutines, transactions, etc.

Both important! This is why you often see discussions that cross over from technology into business consulting language

Service Oriented Architecture

From www.ibm.com:

Service oriented architecture (SOA) is a business-driven IT architectural approach that supports integrating the business as linked, repeatable business tasks, or services.

An exact definition is probably not all that important. More important:

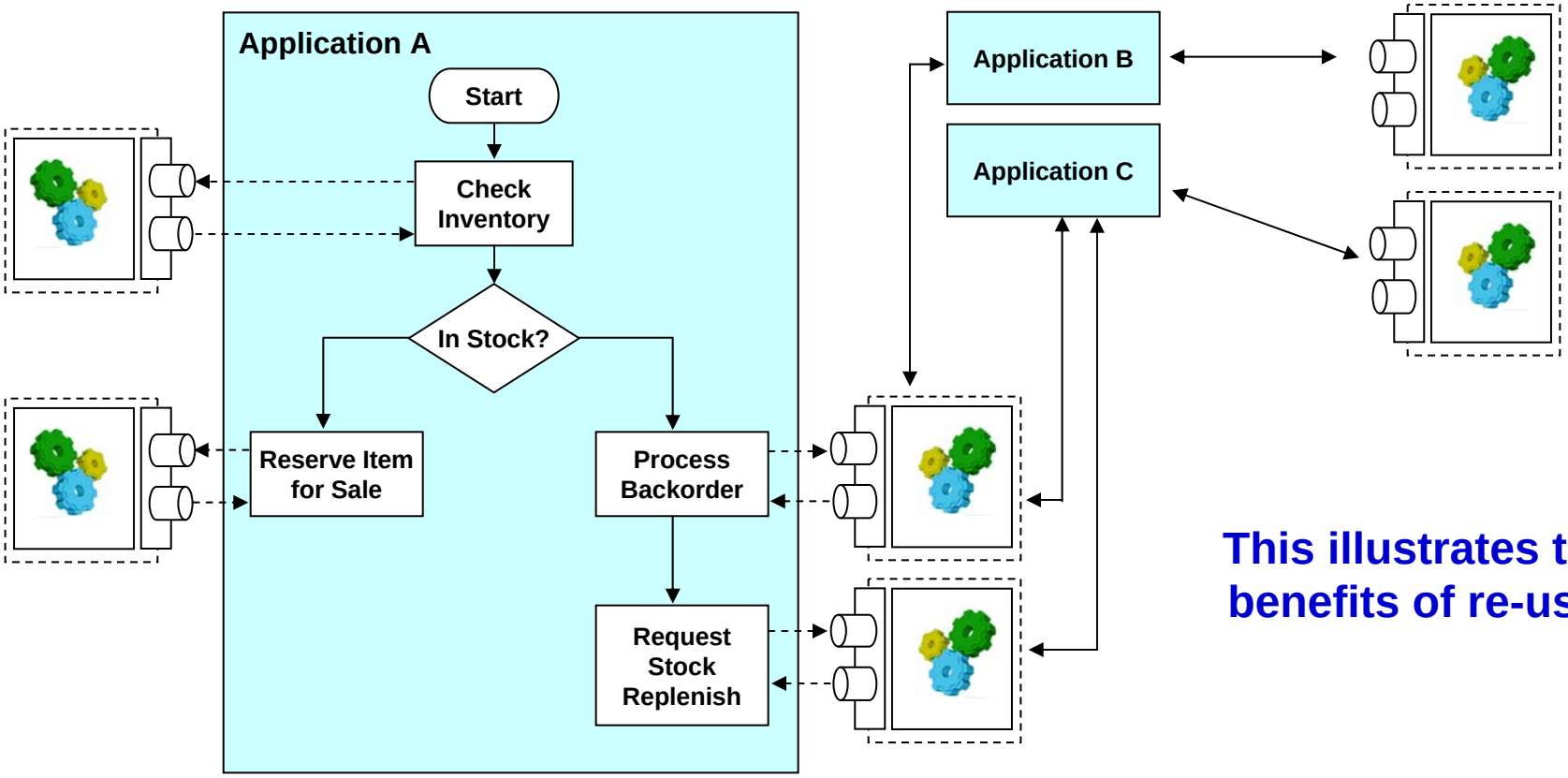
- **You understand the concept of a "service"**
- **You understand the implied value of a loosely coupled "service" rather than a tightly coupled connection to another application's interface … flexibility**
- **You understand that "SOA" is a *path* towards the use of more and more services in your I/T architecture … not a "thing" or an "all-at-once" proposition**
- **You understand that there's more to it than *just* services. We have yet to introduce the Enterprise Service Bus and the function within it.**

SOA – Service Oriented Architecture and Cloud Computing??

- A standard that supports cloud computing. SOA makes it possible to integrate new cloud-optimized workloads and platforms with the company's existing infrastructure

Composite Applications Built on a String of Services

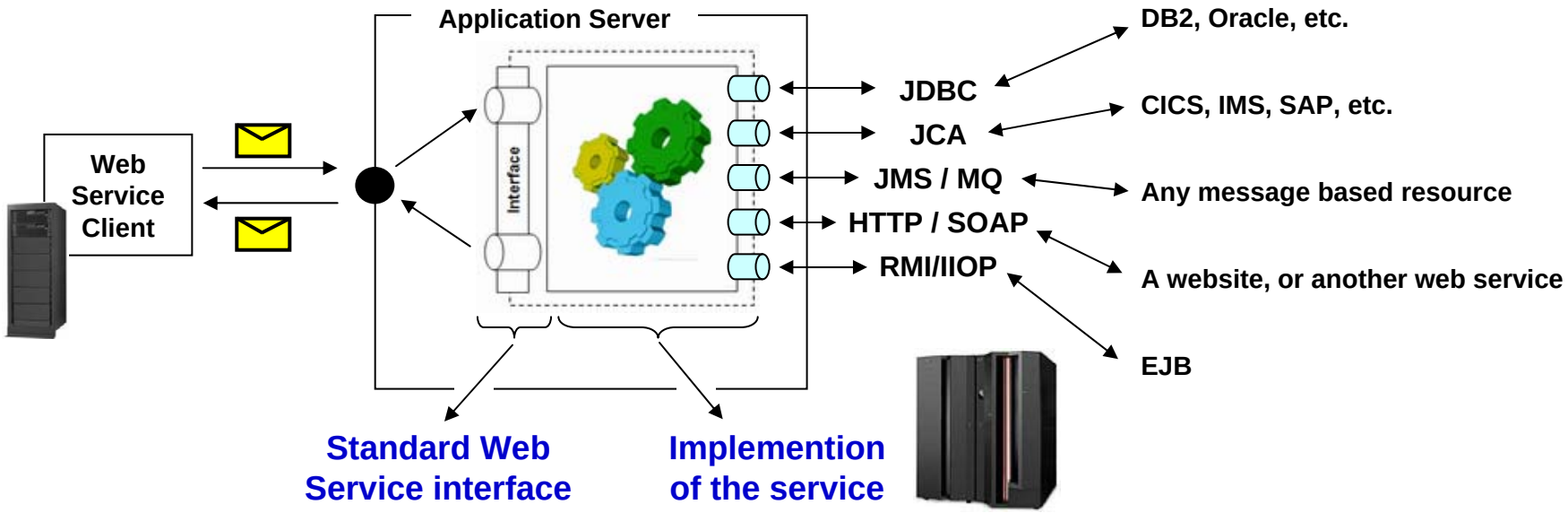
Extending the concept … once a library of reusable services has been built, future applications can be built by stringing services together:



This illustrates the benefits of re-use.

Web Service Inside of WebSphere Application Server

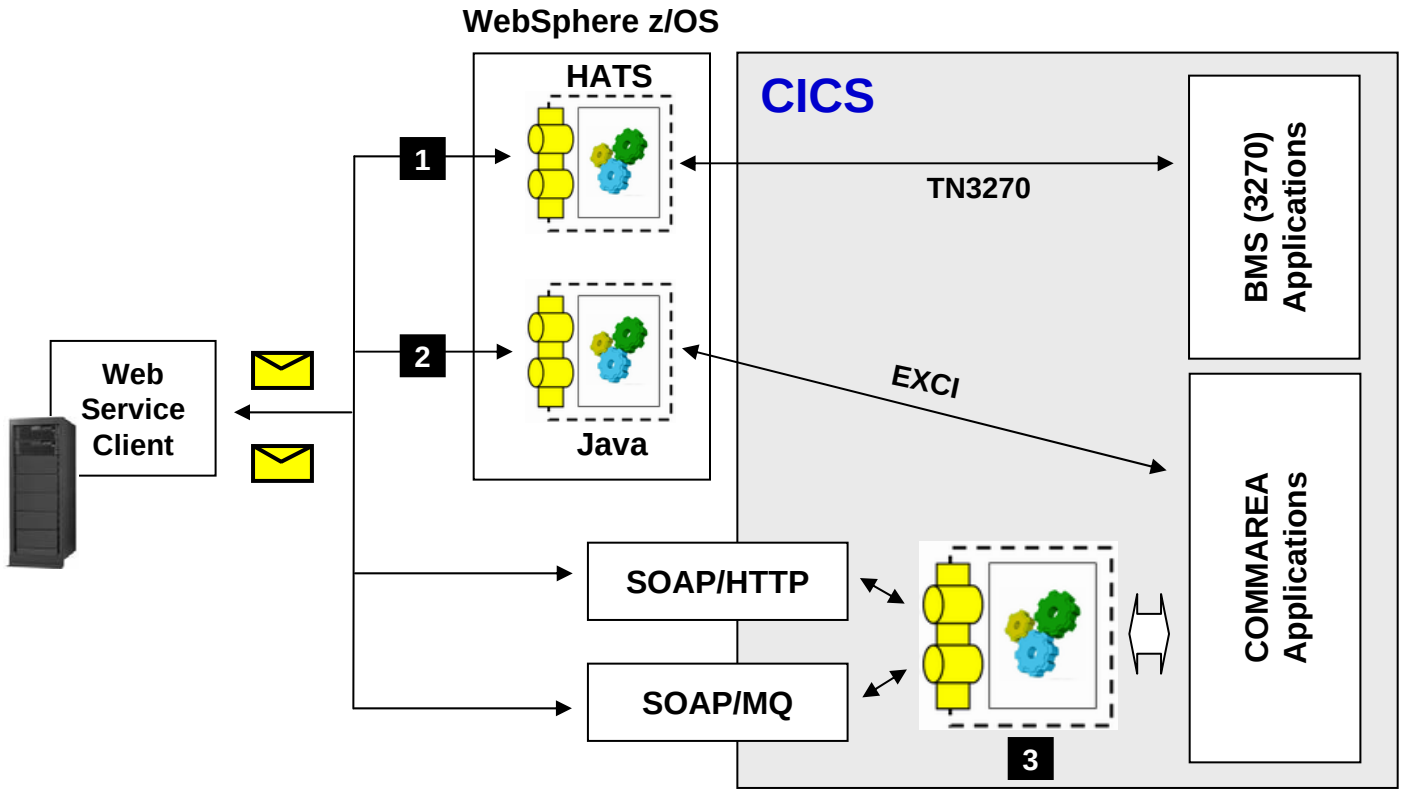
Is implemented as a Java program -- EJB or Javabean. The interface provides the standard Web Service features; the rest may do whatever you wish to provide the service. And with WebSphere, many options exist:



Two key points:

1. **WebSphere Application Server can access a wide range of resources on z/OS**
2. **When WebSphere and the resources are both on z/OS, you can benefit from close proximity**
   Cross memory speed; reduced TCP processing; potential reduced security complexity

Different Architectural Approaches to CICS and Web Services



1. SOAP/HTTP to Host Access Transformation Services (HATS), an application that runs in WebSphere and provides a web service interface (or browser interface) for BMS (3270) applications in CICS
2. SOAP/HTTP or SOAP/JMS to custom web service running in WebSphere.
3. Web service interface running inside of CICS, and accessed either through CICS HTTP listener (or MQ)

Approaches to Cloud Computing

1. Build a public cloud and market its services externally

2. Purchase services from a public cloud

3. Build your own private cloud, using technology that exhibits the characteristics of cloud computing

4. Enhance your service delivery to embrace the public cloud computing model

The mainframe for cloud computing

"It's a mainframe model where things run together but in isolation. The issue is whether the machines will bear up under the load of diverse work or will they grind down and you'll need to provision another machine. You need reliability, security, auditing, privacy, data integrity, automation and full isolation."

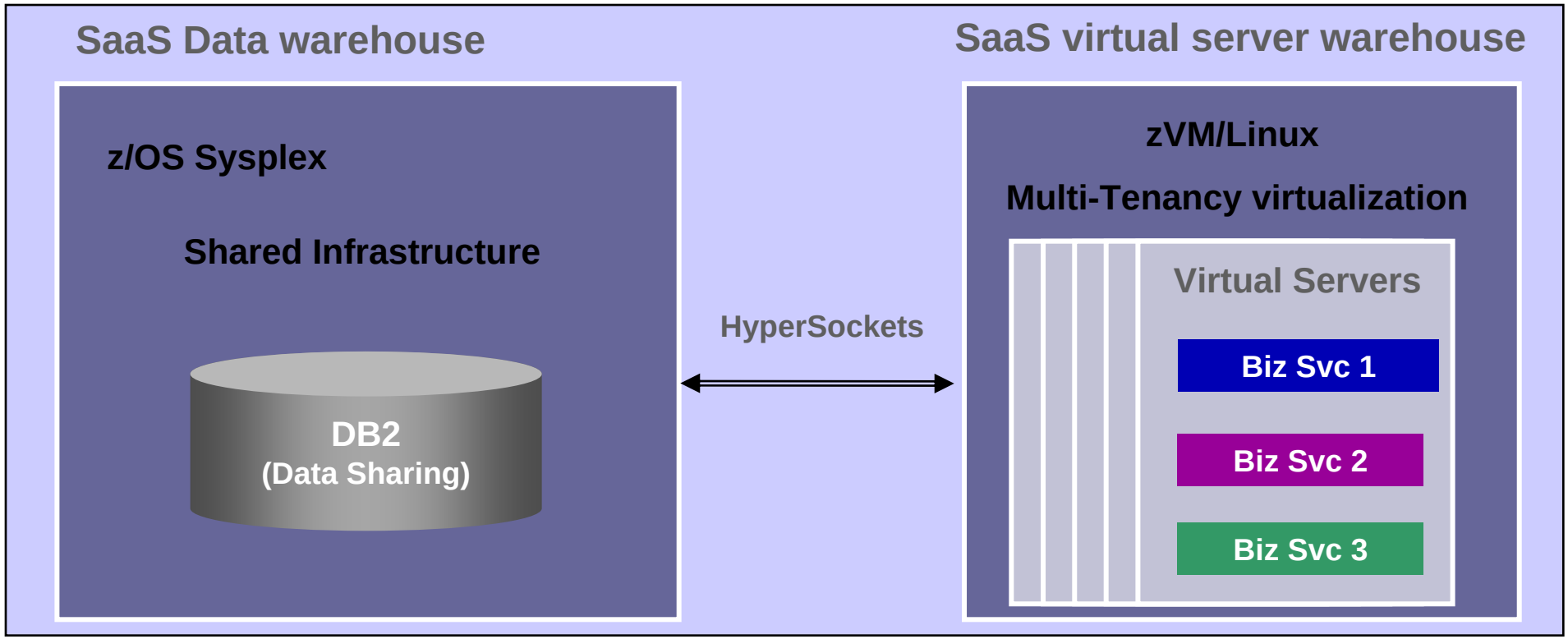
- Steve Mills, IBM Sr VP

- Strong TCO
- Energy efficient
- Near-linear scalability
- Capacity management & upgrades on demand
- Delivers a specialized IT environment
- Virtualizes from the silicon to the app
- Enables transparent multi-tenancy of applications
- Improves performance
- Comprehensive industry-leading security
- Enables seamless reliability

System z provides a hybrid -aaS hosting environment

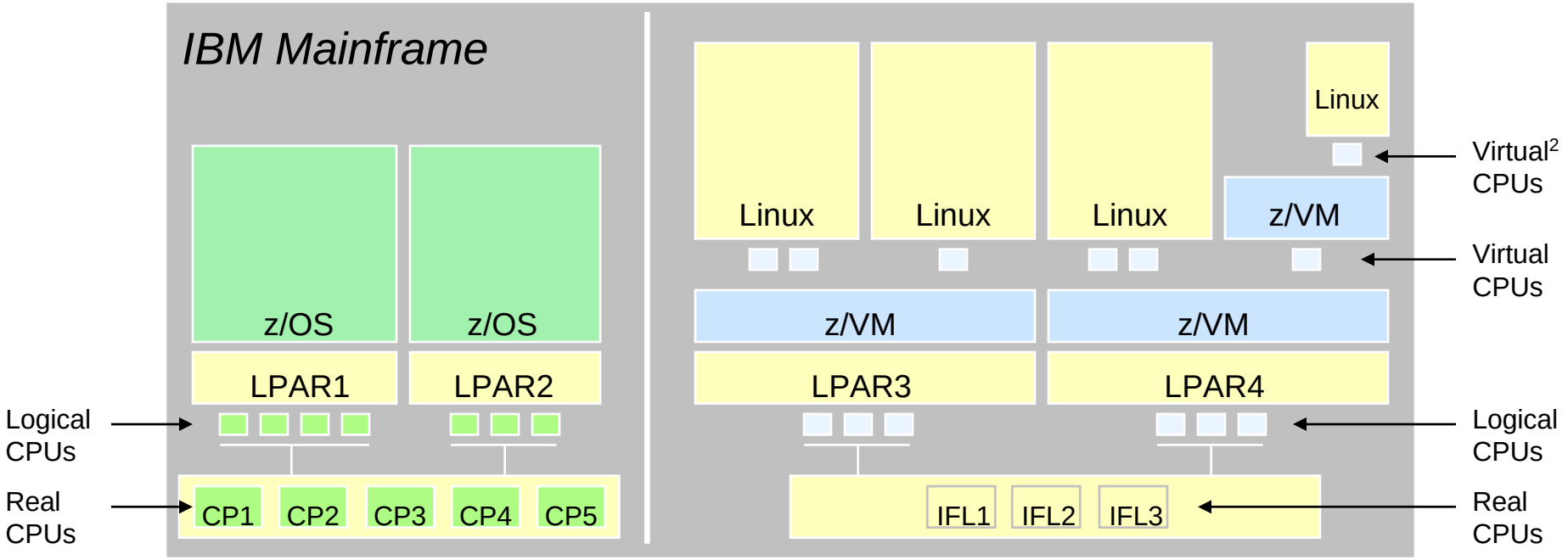
The core infrastructure of System z is multi-tenant by nature and highly efficient, resources (HW and SW) are shared and virtualized to ensure max utilization enabling you to deploy workload for fit.

zSaaS Landscape



Virtualized from the silicon to the app

The core infrastructure of System z is multi-tenant by nature and highly efficient, resources (HW and SW) are shared and virtualized to ensure utilization up to 100% without degradation.



"… new virtualization product (z/VM 5.3) release can host more then 1,000 virtual images on a singe hypervisor - topping any virtualization solution in the industry."

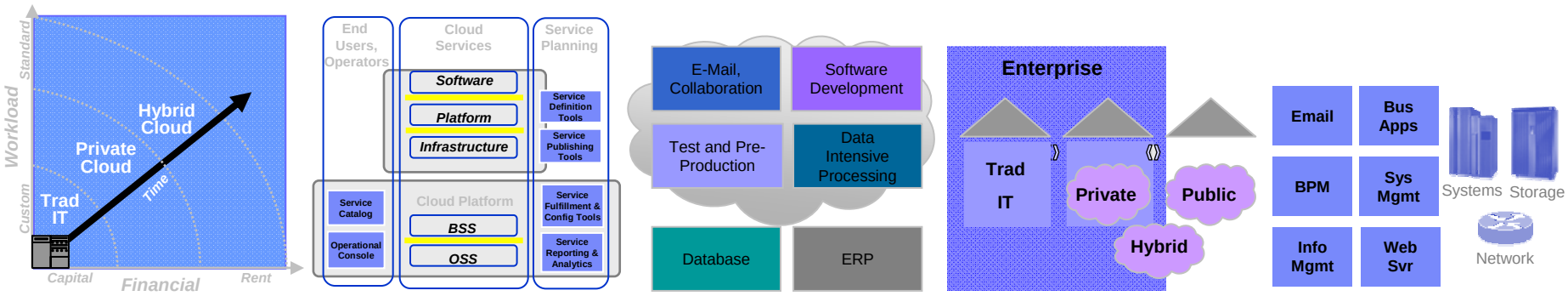
- Charles King, PUND-IT

The operational efficiency of the mainframe

▪ Near-linear scalability	up to 900,000+ concurrent users; TBs of data
▪ “Mean Time Between Failure”	measured in decades versus months
▪ ¼ network equipment costs	virtual and physical connectivity
▪ 1/25th floor space	400 sq. ft. versus 10,000 sq. ft
▪ 1/20 energy requirement	$32/day versus $600/day
▪ 1/5 the administration	< 5 people versus > 25 people
▪ Highest average resource utilization	Up to 100% versus < 15%
▪ Capacity Management & upgrades	On demand; in hours, not weeks/months
▪ Security intrusion points	Reduced by z architecture and # of access pts.
▪ Higher concurrent workload	hundreds of applications versus few

Develop a cloud strategy and implementation plan

- **Without a strategy, Public Cloud computing can be a threat to the CIO and the IT team**
  - Reduced control of IT services delivered over the Internet
  - Perceived cost gap between a cloud service delivered by providers outside of the IT team and “traditional” services delivered by IT
- **With a strategy, Cloud computing is a huge opportunity for the CIO**
  - Lower costs, more responsive IT, optimized delivery
  - Greater range of services and capabilities
  - Greater visibility in billing / chargeback to LOBs
  - Better control of the users’ systems, desktops, and services access



What IT Services workloads are we seeing move to a Public cloud delivery?

- Single virtual appliance workloads
- Test and pre-production systems
- Mature packaged offerings – email & collaboration
  - See www.lotuslive.com
- Software development environments
- Batch process jobs with limited security requirements
- Isolated workloads where latency between components is not an issue
- Storage as a Service
- Backup & restore as a Service
- Some data intensive workloads – if the provider has a cloud storage offering to complement the cloud compute offering

What IT Services workloads may not be ready for a Public cloud delivery today?

- Workloads which depend on sensitive data normally restricted to the Enterprise
  - Employee Information - Most companies are not ready to move their LDAP server into a public cloud because of the sensitivity of the data
  - Health Care Records - May not be ready to move until the security of the cloud provider is well established
- Workloads composed of multiple, co-dependent services
  - High throughput online transaction processing
- Workloads requiring a high level of auditability, accountability
- Workloads based on 3rd party software which does not have a virtualization or cloud aware licensing strategy
- Workloads requiring detailed chargeback or utilization measurement as required for capacity planning or departmental level billing
- Workloads requiring high degrees of customization

A practical approach to cloud computing

Plan & Prepare

Condition your existing infrastructure for cloud

- Virtualize and automate existing systems
- Add service management, service catalog

Define cloud strategy & roadmap

- Assess cloud deployment models, service options and workloads
- Plan cloud strategy and roadmap
- Choose initial project

Test & Deploy

Start with an isolated cloud deployment

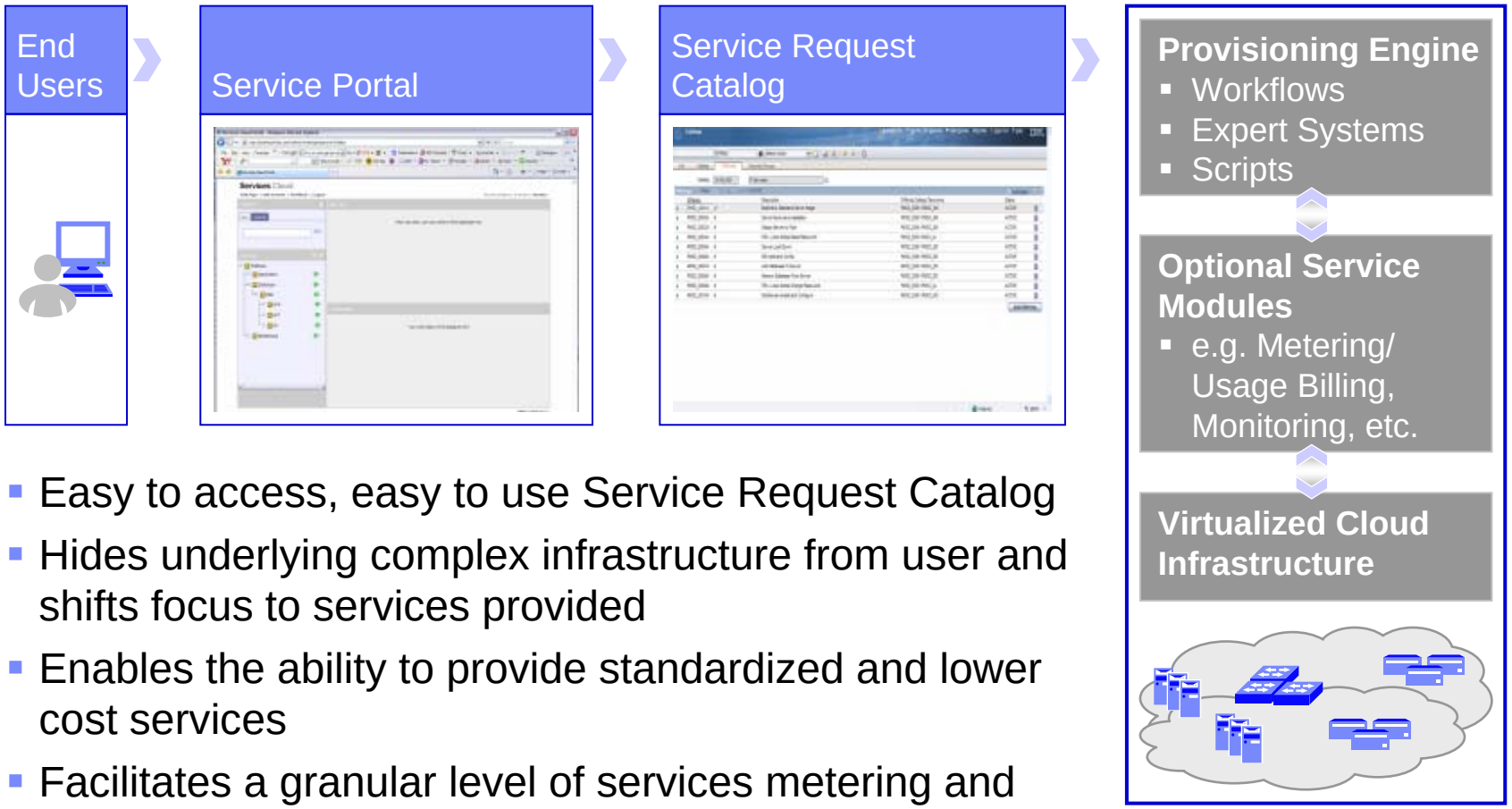
- Choose low-risk workload such as test and development
- Define cloud services
- Deploy self-service portal

Extend & Evolve

Use trusted cloud services to supplement data center capabilities for:

- Infrastructure as a Service (IaaS)
- Platform as a Service (PaaS)
- Software as a Service (SaaS)

Cloud implementation snapshot



- Easy to access, easy to use Service Request Catalog
- Hides underlying complex infrastructure from user and shifts focus to services provided
- Enables the ability to provide standardized and lower cost services
- Facilitates a granular level of services metering and billing
- Workload standardization eases complexity

What does all this mean to a mainframe person?

- Distributed models are learning what the mainframe already does
- Clients are beginning to use z/VM and zLinux to provide IaaS and PaaS
- Linux images can be built up quickly
- Address spaces on z/OS can be spun up
- We can be the private cloud for the enterprise

One more time…What are you doing with cloud computing……?

1. Build a public cloud and market its services externally

2. Purchase services from a public cloud

3. Build your own private cloud, using technology that exhibits the characteristics of cloud computing

4. Enhance your service delivery to emulate the public cloud computing model

Closing Thought…..Doesn't Every Business Want What Cloud is Trying to Deliver?

- Wide variety of consumer and business services delivered to a large number of clients around the world
- Operate highly scalable, well-engineered, efficient data centers delivering service with high quality and reasonable cost
- Green
- Secure
- Service Level Agreements in place