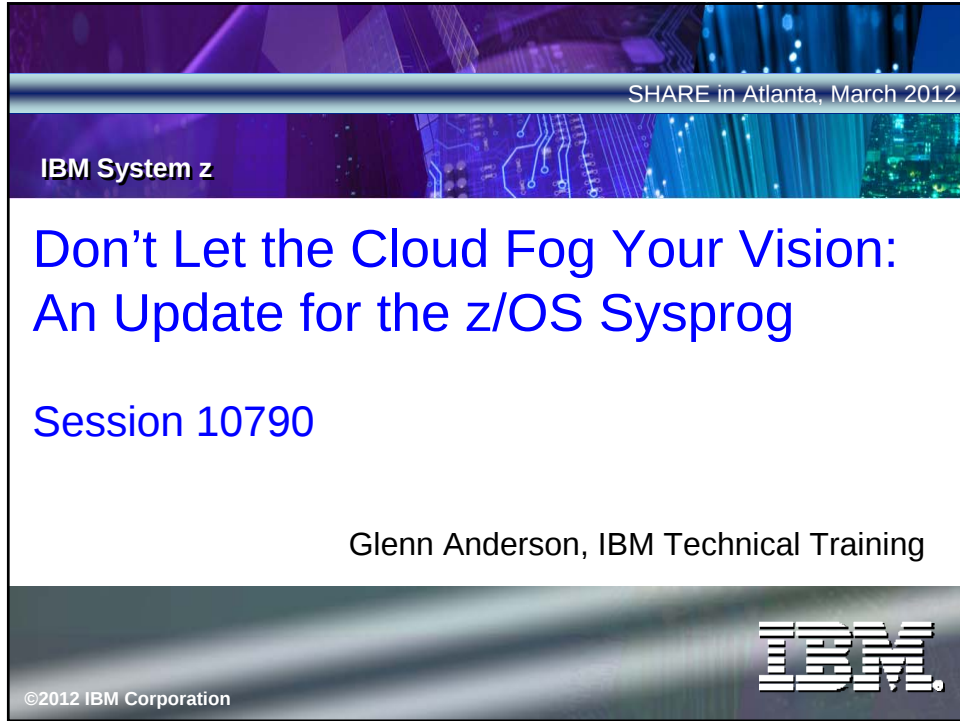




SHARE in Atlanta, March 2012

IBM System z

Don't Let the Cloud Fog Your Vision: An Update for the z/OS Sysprog

Session 10790

Glenn Anderson, IBM Technical Training

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The trouble with cloud.....

Too much hype ... "cloud" is positioned as the cure to all ills

Reaction to hype ... people wonder if "cloud" is real, or they simply reject it as marketing fluff

Everything is included in "Cloud Computing," making it difficult to see what's real and the value

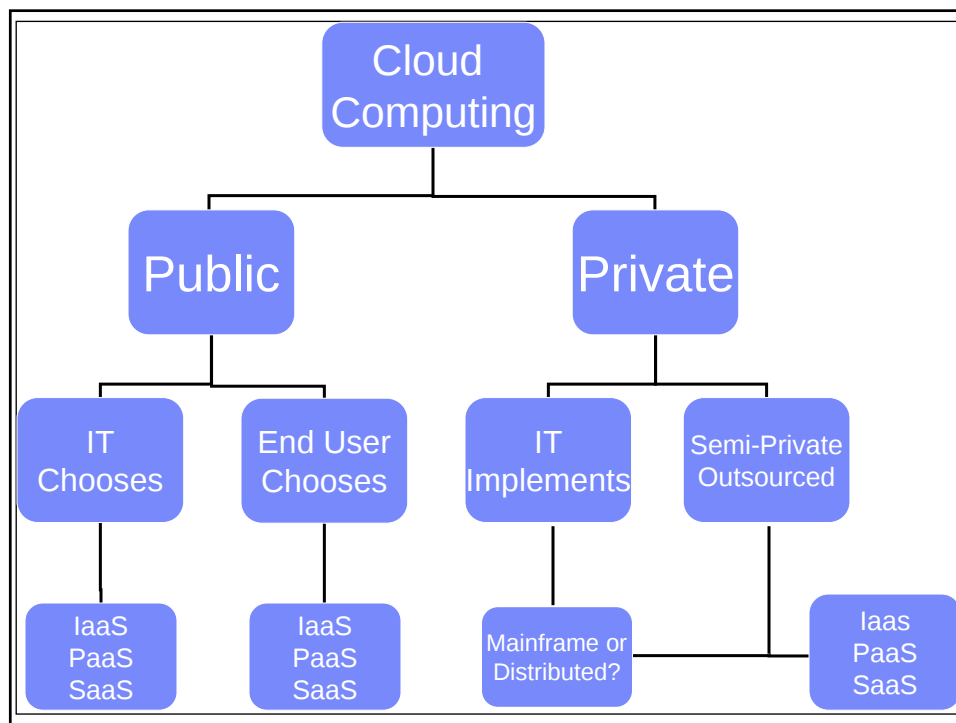


The trouble with cloud.....

The term “cloud computing” is used so generally and not specifically as to cause confusion.

What does it mean to “move to the cloud?”

A distinction always needs to be made between public cloud and private cloud.



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



5

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The History of Cloud Computing

- **1961 – John McCarthy at MIT – Computing as a Public Utility**
- **1999 – Salesforce application delivery over the Internet**
- **2002 – Amazon Web Services**
- **2006 – Google Docs**
- **2009 – Browser based enterprise applications – Google Apps, Windows Azure**
- **“Cloud Computing” term first used in 1997 – from diagrams of clouds representing the Internet**



6

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The Time Arrived for Public Cloud

- When the network becomes as fast as the processor, the processor hollows out and spreads across the network. This is what public cloud computing is doing.
- World Wide Web → World Wide Computer
- Every user got their own PC. Now every user gets their own data center.



7

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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



The Cloud as a Utility?

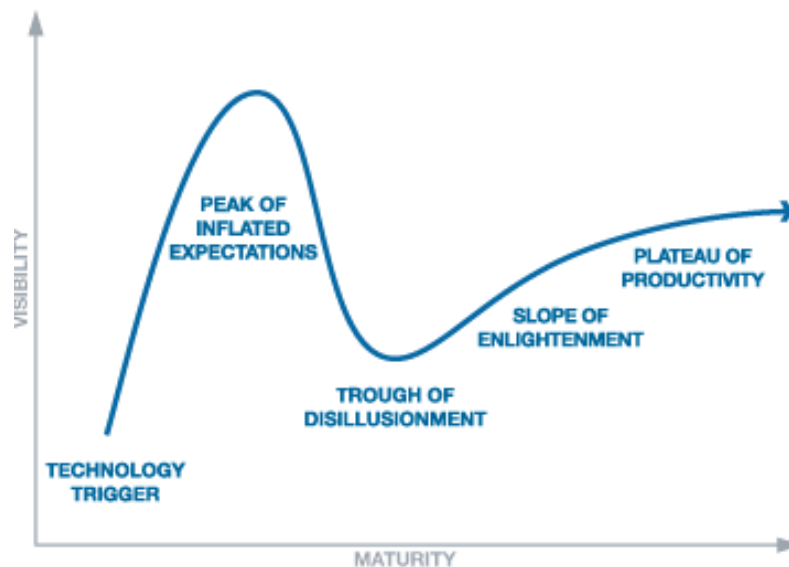


- The electricity analogy
- Cloud is more than Utility Computing
- Like a trip to the dry cleaners.....

9

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Gartner Hype Cycle



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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

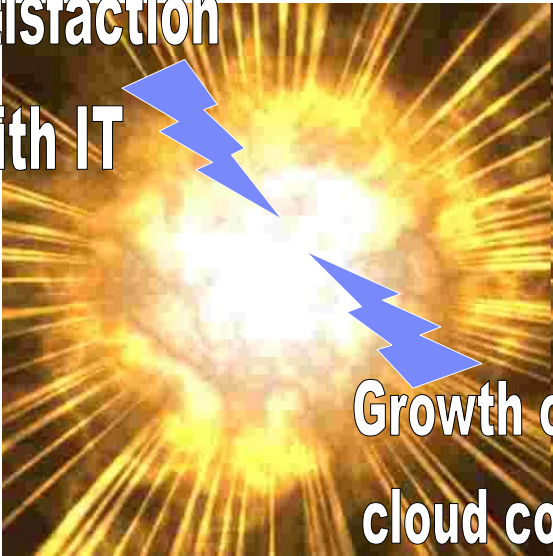


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Dissatisfaction With IT



Growth of public cloud computing

12

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What are the Characteristics of Public Cloud Computing?

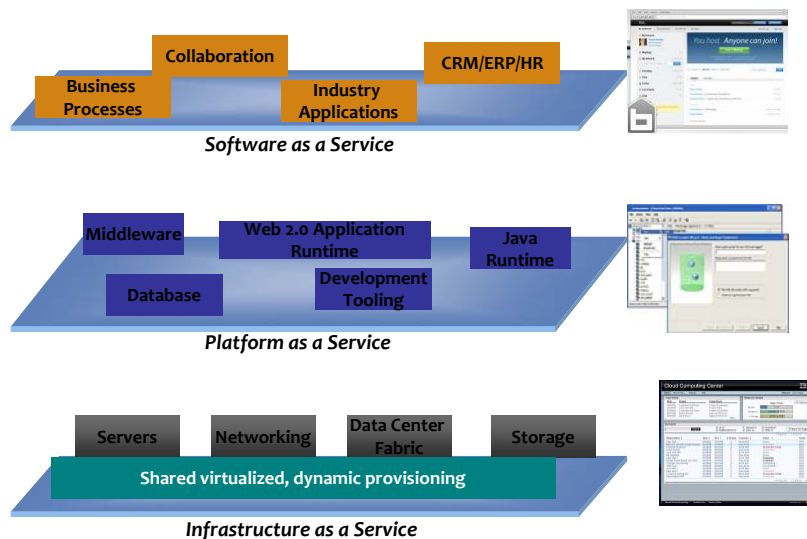
- **On-Demand Self Service**
 - Pick services you need, when you need them
- **Broad Network Access**
 - Available over network through thin or thick clients
- **Resource Pooling**
 - Resources are shared, serving multiple consumers
- **Rapid Elasticity**
 - Capabilities provisioned, in some cases automatically
- **Measured Service**
 - Pay only for what you use



13

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The layers of IT-as-a-Service



14

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Infrastructure as a Service (IaaS)

- Delivering cloud computing infrastructure as an on-demand service. Rather than purchasing servers, software, etc., clients buy those resources as an outsourced service on demand.
- Dynamic scaling, variable cost, multiple users on a single piece of hardware
- When demand is variable – spikes and troughs
- When no capital available to invest in hardware
- Need to understand regulatory compliance
- Amazon Web Services, Rackspace



15

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Platform as a Service (PaaS)

- A platform for the creation of software, delivered over the web, without the complexity of buying and maintaining the software and infrastructure underneath it.
- Services to develop, test, deploy, host and maintain applications in the same integrated development environment
- Multi-tenant architecture where multiple concurrent users utilize the same development application
- Concern if app needs to be highly portable in terms of where it is hosted
- Concern with possible vendor lock-in
- Google App Engine, Microsoft Azure Services, Force.com



16

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Software as a Service (SaaS)

- Software deployed over the internet. A provider licenses an app to customers either as a service on demand, through a subscription, in a pay-as-you-go model, or at no charge
- Web access to commercial software managed from central location
- Software delivered in one to many model
- Users not required to handle upgrades or patches
- Good for vanilla offerings, where solution is largely undifferentiated, such as email
- Software where demand spikes significantly
- Concern if requirement for extremely fast processing of real time data
- Salesforce.com CRM product



17

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Gartner says there are currently 10,000 cloud providers of one sort or another, suggesting a need for cloud brokers.....

18

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Public Cloud Trends

- Rise of Cloud Brokers
- Cloud Federation
- Going Up the Stack: From IaaS to SaaS
- Business Process as a Service
- Rise of the Virtual Cloud Operator
- Specialty Clouds for Industries



19

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

- 1 Single virtual appliance workloads
- 2 Test and Pre-production systems
- 3 Mature packaged offerings, like e-mail and collaboration
- 4 Software development environments
- 5 Batch processing jobs with limited security requirements
- 6 Isolated workloads where latency between components is not an issue
- 7 Storage Solutions/Storage as a Service
- 8 Backup Solutions/Backup & Restore as a Service
- 9 Some data intensive workloads if the provider has a cloud storage offering tied to the cloud compute offering

20

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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 public 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!



How IT Becomes a Liability

- Business proposes new product or service
- Mgmt allocates resources and establishes schedule and budget
- Concept / requirements to IT
- IT works to clarify requirements and deliver system on time and within budget
- Business adjusts requirements

From IT Savvy by Peter Weill



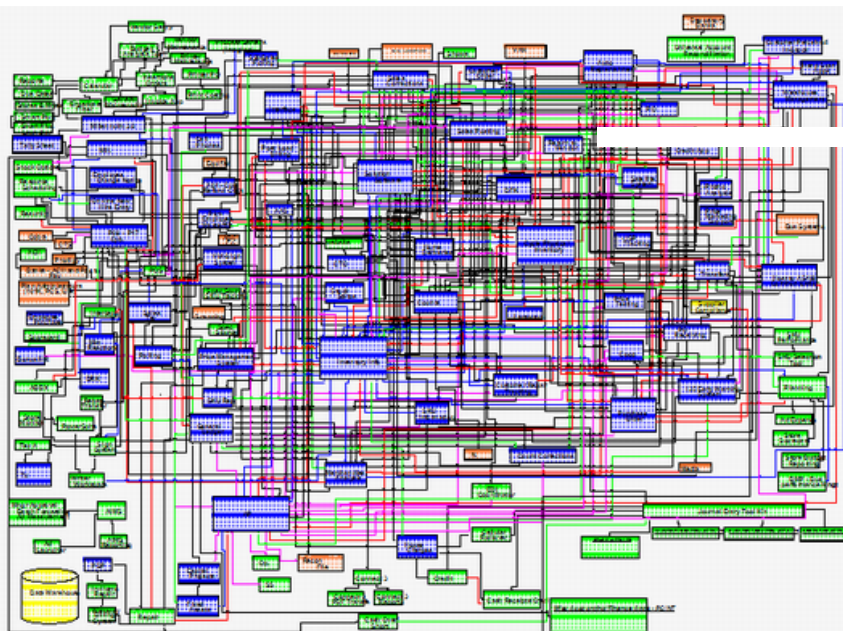
How IT Becomes a Liability

- IT works to address changes and meet schedule (budget abandoned)
- System delivered late with less than intended functionality. New product or service is still a success
- New system added to IT inventory of isolated solutions, patched together and managed to avoid breakage.

From IT Savvy by Peter Weill



Application Architecture Map



A well-organized IT department under direct control of top management is a substantial competitive advantage.....

From [IT Savvy](#) by Peter Weil



Well-executed IT Funding

- Senior executives establish clear priorities and criteria for IT investments
- Mgmt develops a transparent process for assessing potential projects and allocating resources
- Mgmt monitors the impacts of prior investment decisions

From [IT Savvy](#) by Peter Weil



Cost and Value Milking Stool

- Cost Case
(IT Finance)
- Technical Case
(Operations)
- Value Case
(Together)



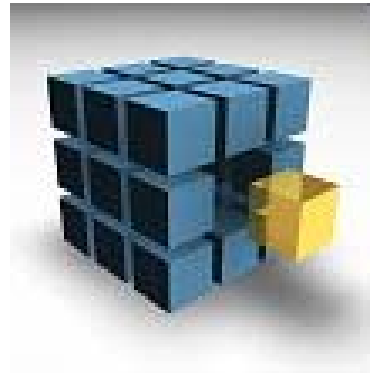
7

Thinking About Chargeback



28

Businesses need to get back to using IT as part of a **corporate strategy**, as opposed to an **inward-looking** operational role.



From *The IT Payoff*, by Sarv Devaraj and Rajiv Kohli

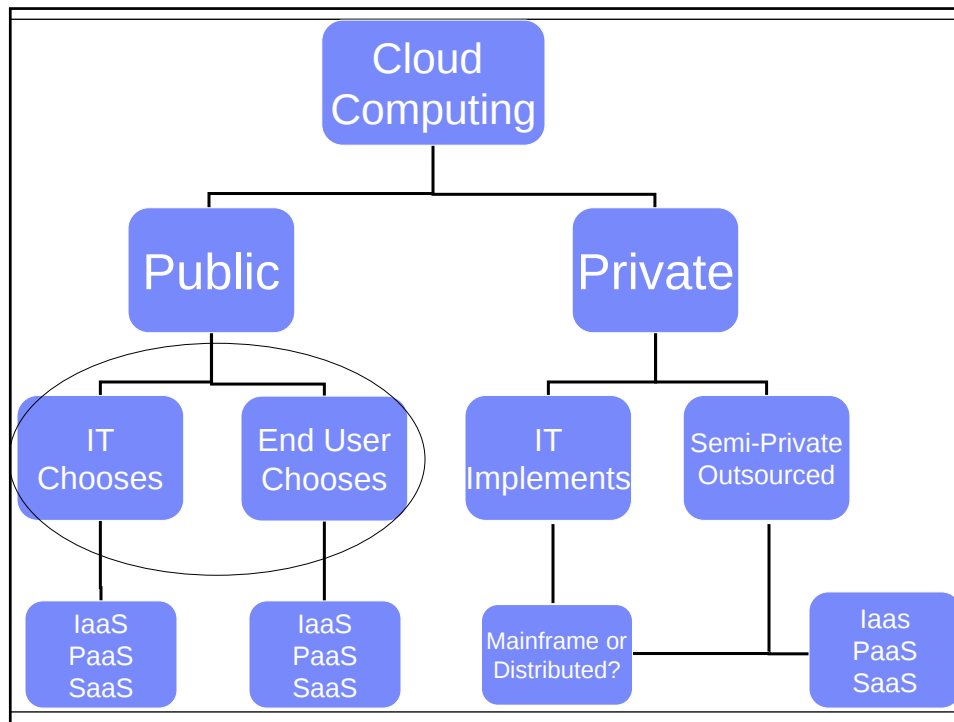
Reducing Cost and Optimizing Business



...leverages virtualization, standardization and automation to free up operational budget for new investment (**inward looking**)



... allowing you to optimize new investments for direct business benefits (**corporate strategy**)



Land of a 1000 CIOs.....

- If users aren't happy, you run the risk of them doing their own thing
- We cannot mandate that people use IT services
- Most dominant users of public cloud computing services don't work for IT
- By circumventing IT, business departments get their job done faster



The Challenge of Public Cloud Service Sprawl

- Maintaining business relevance
- Mitigating the risk of rogue services
- Obtaining the optimal IT service value
- Providing business with the support it needs
- Aligning service levels with business objectives



33

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Does a Public Cloud Really Lower IT Expenses?

- IaaS: Analyze Load Profiles
 - Bandwidth-heavy, compute-heavy, or combination
 - More spiky the load, IaaS more cost-efficient
- Cloud Storage: Beware of Hidden Costs
 - Basic cost per gigabyte of cloud storage
 - Extra charge for data transfers, metadata functions, copy/delete of files
- Pay-as-you-use Model Not Best for Resources Needed Constantly
 - Rental car analogy



34

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End to End Public Cloud Computing Issues

Consider Disaster Recovery
Replication between machines in a room is not DR

Compliance
How will Cloud providers put you at risk

Security
Secure the data.
Multi Tenancy issues



Selecting appropriate workloads
Cloud **technical** models do not solve all problems.

Performance and network latency
Huge amounts of data back and forth over the internet

35

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What IT Service workloads may **not** be ready for Public cloud delivery today?

- 1 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
- 2 Workloads composed of multiple, co-dependent services
 - High throughput online transaction processing
- 3 Workloads requiring a high level of auditability, accountability
 - Workloads subject to Sarbanes-Oxley, for example
- 4 Workloads based on 3rd party software that do not have a virtualization or cloud aware licensing strategy
- 5 Workloads requiring detailed chargeback or utilization measurement as required for capacity planning or departmental level billing
- 6 Workloads requiring customization (e.g. customized SaaS)

36

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Private vs. Public vs. Hybrid

Who has access to the cloud function and services?

Public

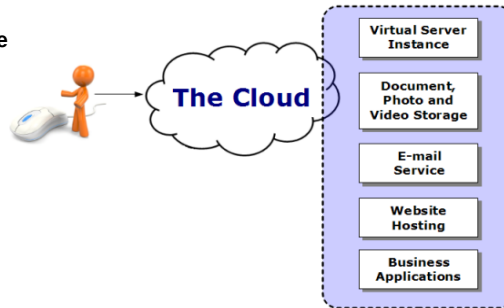
The service is open to anyone on the Internet

Private

Users are limited to a known set of internal people

Hybrid

A portion is private, with some element bridged to a public component



"Public" is the one that gets the most press, but there's a great deal of energy inside of customers to explore Private clouds.

Common early projects involve test/development system clouds



Is a Private Cloud Really a Cloud at All?

- It's still your data center
- You own the capital assets
- The resources are not infinite
- At the corporate level, there is no pay-as-you-go



Which of these Characteristics of Public Cloud Computing Interests You as a System z IT Organization?

- On-Demand Self Service
 - Pick services you need, when you need them
- Broad Network Access
 - Available over network through thin or thick clients
- Resource Pooling
 - Resources are shared, serving multiple consumers
- Rapid Elasticity
 - Capabilities provisioned, in some cases automatically
- Measured Service
 - Pay only for what you use

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Which of these Characteristics of Public Cloud Computing Interests You as a System z IT Organization?

- On-Demand Self Service (do end user's need this?)
 - Pick services you need, when you need them
- Broad Network Access (who needs access to your services?)
 - Available over network through thin or thick clients
- Resource Pooling (do you already do this?)
 - Resources are shared, serving multiple consumers
- Rapid Elasticity (does production really need this?)
 - Capabilities provisioned, in some cases automatically
 - (good for test/dev, requires automation)
- Measured Service
 - Pay only for what you use (you own it all already)

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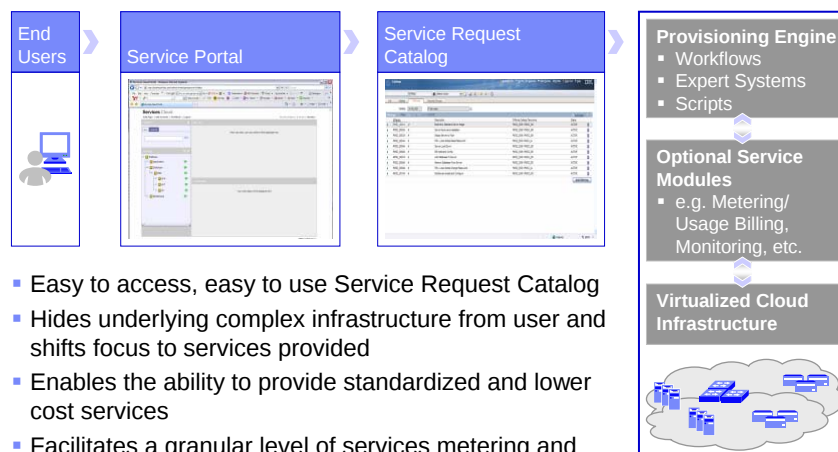
So What Makes a Private Cloud?

- **Automation**
 - Takes you from a virtualized environment to a more public cloud-like environment
- **IT service management**
 - Integrating with change, incident and config mgmt processes so that a server and its life cycle can be located and identified
- **Self-service from a UI**
 - This is not easy. Consider cultural churn and effective resource sharing.
- **Are you provisioning VM's or provisioning whole applications?**
- **A pay-as-you-go model between the IT organization and the line of business?**

41

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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

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



43

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Private clouds can provide benefits for improving service in the data center

Clients are looking for benefits from private clouds

- Higher availability of systems and applications
- Lower total costs and better utilization of hardware
- Labor savings and improved quality of IT services

And are deploying characteristics to build the foundation

- Highly standardized infrastructure
- Virtualization
- Multi-tenancy
- Service catalog
- Dynamic resource scaling



Source: IBM Market Development

Private clouds can provide benefits for improving service in the data center

Clients are looking for benefits from private clouds (**really looking for better IT service delivery**)

- Higher availability of systems and applications
- Lower total costs and better utilization of hardware
- Labor savings and improved quality of IT services

And are deploying characteristics to build the foundation (**does this make it a "Cloud?" Who cares, as long as it is better IT service delivery**)

- Highly standardized infrastructure
- Virtualization
- Multi-tenancy
- Service catalog
- Dynamic resource scaling

Do production applications need these characteristics, or are these better applied to development and test?

Source: IBM Market Development

Enterprise focus on private cloud

Infrastructure as a Service

Development and Test Instances

Best place to start

Quicker instance availability

Change the time to value of development

Easier to demonstrate value

Non production

Sophisticated user profile

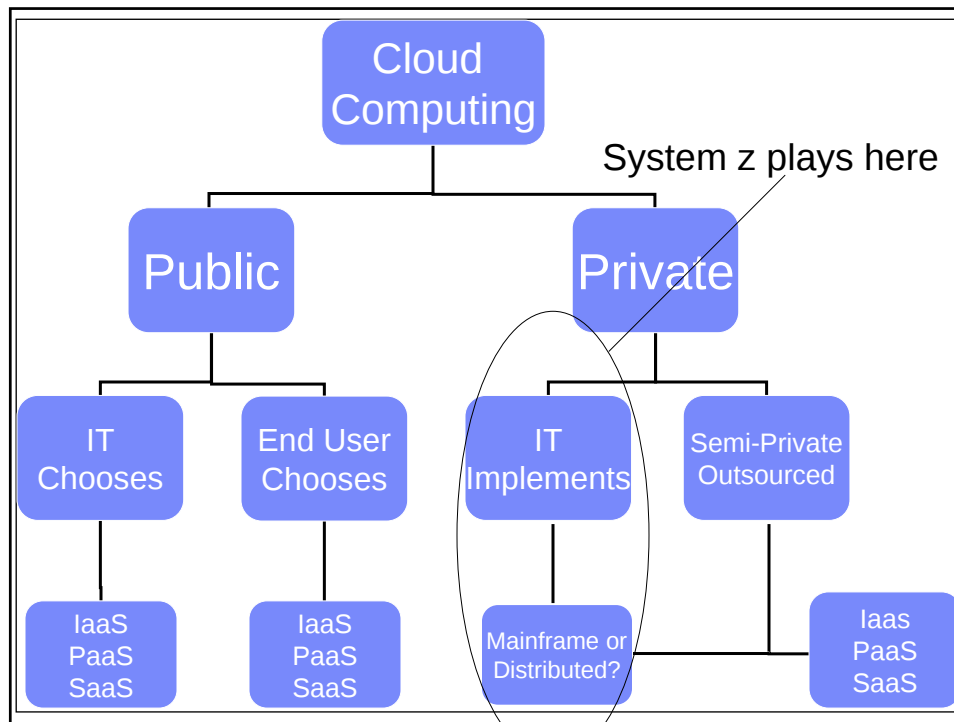
Challenges

Cloud crosses multiple Silos

Building consensus takes time

Immaturity of support processes





What does all this mean to a mainframe person?

- A mainframe is what you are trying to get to when you build a cloud
- We were doing cloud on the mainframe before “cloud” was defined
- 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
- zEnterprise Hybrid Computing for cloud
- We can be the private cloud for the enterprise



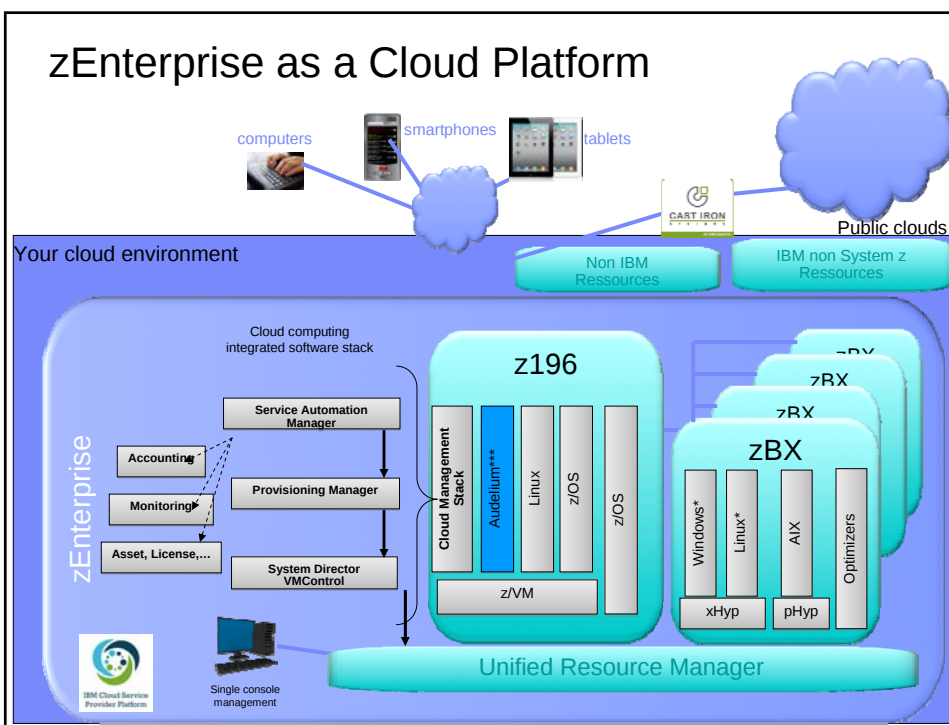
IBM System z the Ideal Cloud Platform

- **IBM Cloud Management Platform extends across systems**
 - Manage to or from System z – or both!
- **Do more with less**
 - Consolidate more servers, more networks, more applications, and more data with Linux® on z/VM®
 - Achieve nearly 100% utilization of system resources nearly 100% of the time
 - Enjoy the highest levels of resource sharing, I/O bandwidth, and system availability
- **Reduce costs on a bigger scale**
 - Consume less power and floor space
 - Save on software license fees
 - Minimize hardware needed for business continuance and disaster recovery
- **Manage growth and complexity**
 - Exploit extensive z/VM facilities for life cycle management: *provisioning, monitoring, workload mgmt, capacity planning, security, charge back, patching, backup, recovery, more...*
 - Add hardware resources to an already-running system without disruption – the epitome of dynamic infrastructure
 - Consolidation on a “scale up” machine like System z means fewer cables, fewer components to impede growth



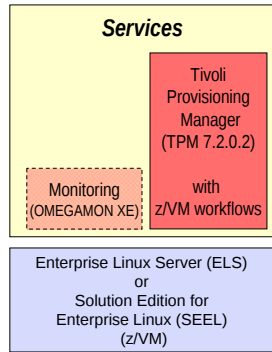
A Bathwick Group Whitepaper: [The Mainframe and the Cloud](#)

zEnterprise as a Cloud Platform



zEnterprise™ Cloud Starter Edition

- *Solution focused on establishing Infrastructure as a Service (IaaS) delivery model*

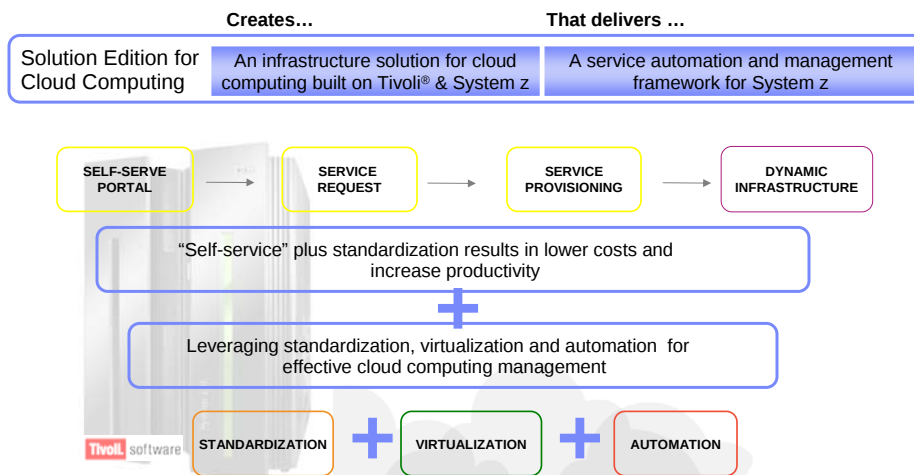


Built on top of Enterprise Linux Server or Solution Edition for Enterprise Linux

- Allows customers to create a Cloud IaaS environment
- Integrates into customer's self-service UI
- Resource monitoring provided by OMEGAMON XE for z/VM and Linux
- STG Lab Based Services provide rapid provisioning with newly created z/VM workflows

51

Solution Edition for System z Cloud Computing



Introducing the Smart Analytics Cloud

A private cloud optimized for analytic services in large enterprises

Defined as ...

To create...

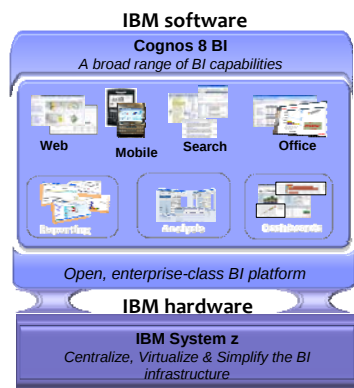
That delivers ...

Smart
Analytics
Cloud

IBM Smart Business -
services with industry
leading hardware & software

A private cloud computing
solution for business
intelligence (BI) & analytics

A services solution for delivering
business intelligence to the entire
organization



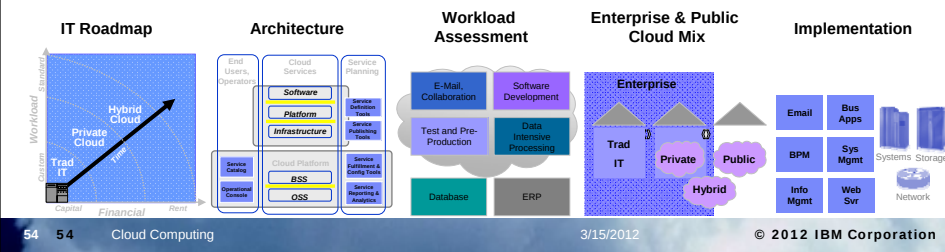
IBM Services

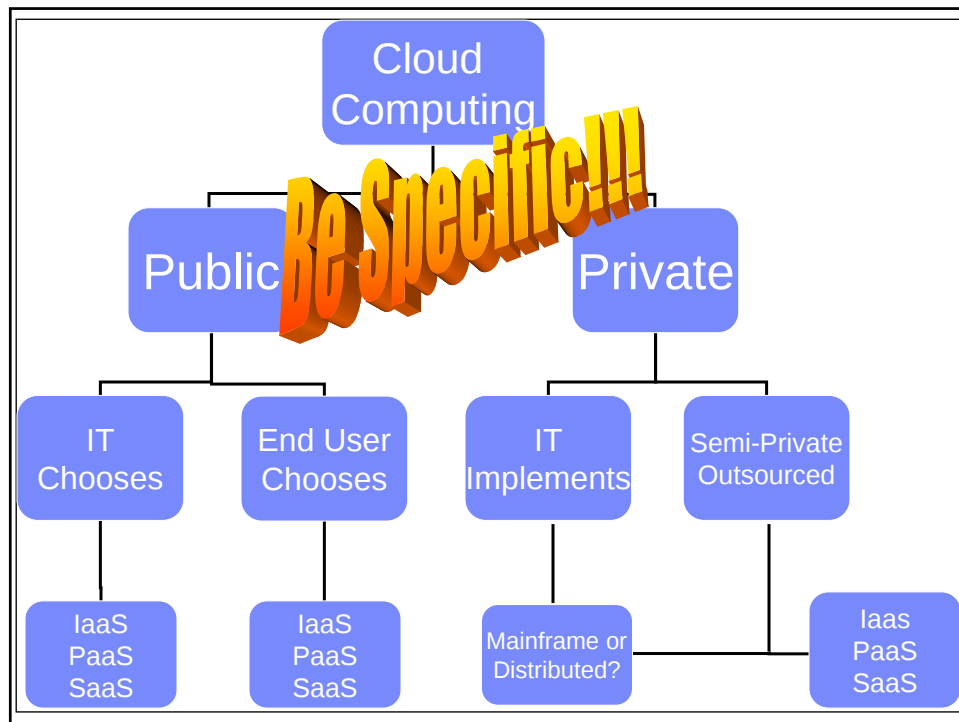
- Create awareness of BI and understand the needs for a BI strategy across the organization
- Complete a readiness assessment to define the scope and priorities for the solution
- Deploy Cognos 8 BI for Linux on System z as a private cloud
- Provide the skills for the on going management & expansion of their BI private cloud deployment



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, private 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
- Ignore the hype. Create a business case. Define your domains. Choose the right cloud technology.





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What Does it Mean – “We Should Be Doing 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 public cloud computing
4. Enhance your service delivery to emulate the public cloud computing model



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Don't Let the Cloud Fog Your Vision!

