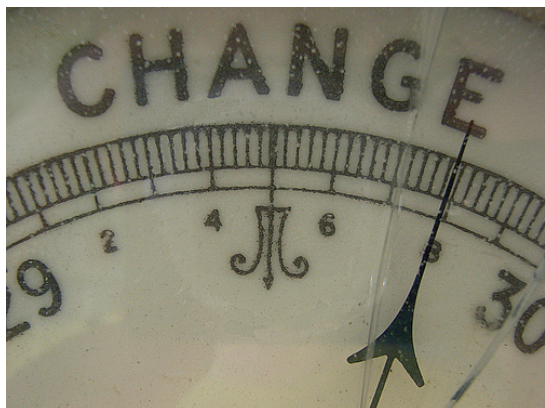Glenn Anderson, IBM Lab Services and Training
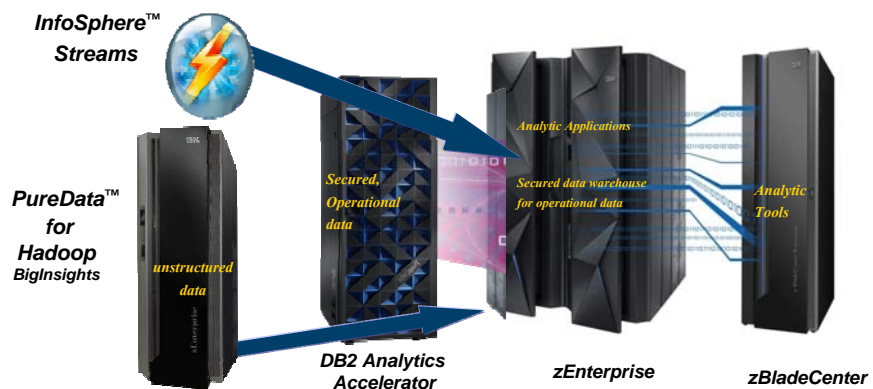
IBM

What's Happening to the Mainframe?
Mobile? Social? Cloud? Big Data?

Winter SHARE
March 2014
Session 15126

IBM

Today's mainframe is a hybrid system

InfoSphere™ Streams

PureData™ for Hadoop
BigInsights

unstructured data

Secured, Operational data

Analytic Applications

Secured data warehouse for operational data

Analytic Tools

DB2 Analytics Accelerator

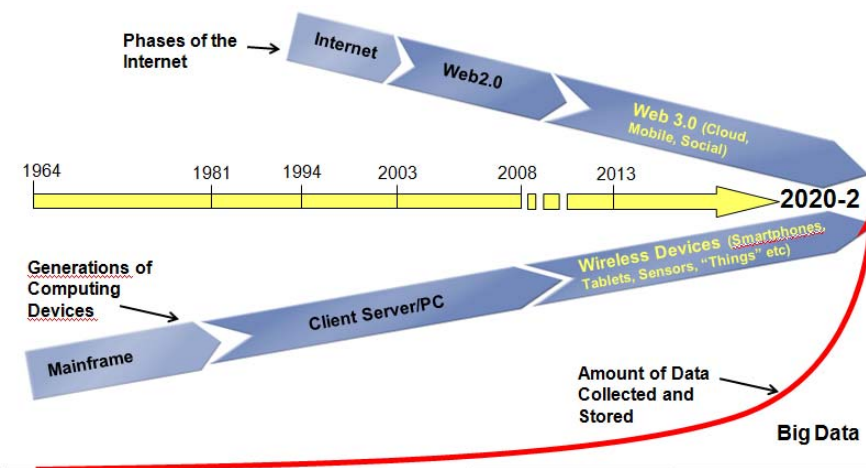**zEnterprise**

zBladeCenter

The business environment is shifting…

IBM

The perfect storm of disruption

IBM

Gartner: Nexus of Forces

IBM

- **Social**: A faster, richer, ubiquitous conversation
- **Information**: Big data evolves toward wisdom – the ubiquitous progress bar
- **Cloud**: The expectation of ubiquitous access
- **Mobile**: Becoming the primary computing platform

IBM

Cloud……

The trouble with cloud…….

IBM

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

IBM

Cloud [klaüd]
vb. to make obscure,
to confuse.

IBM

The trouble with cloud…….

The term "cloud computing" is used so generally and not specifically as to cause confusion.
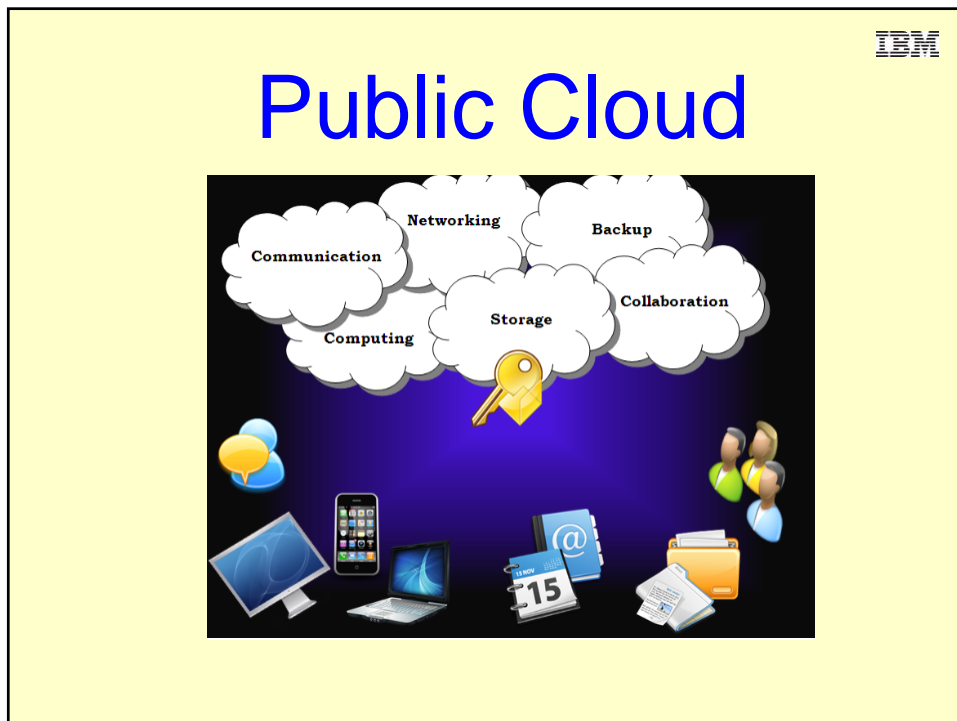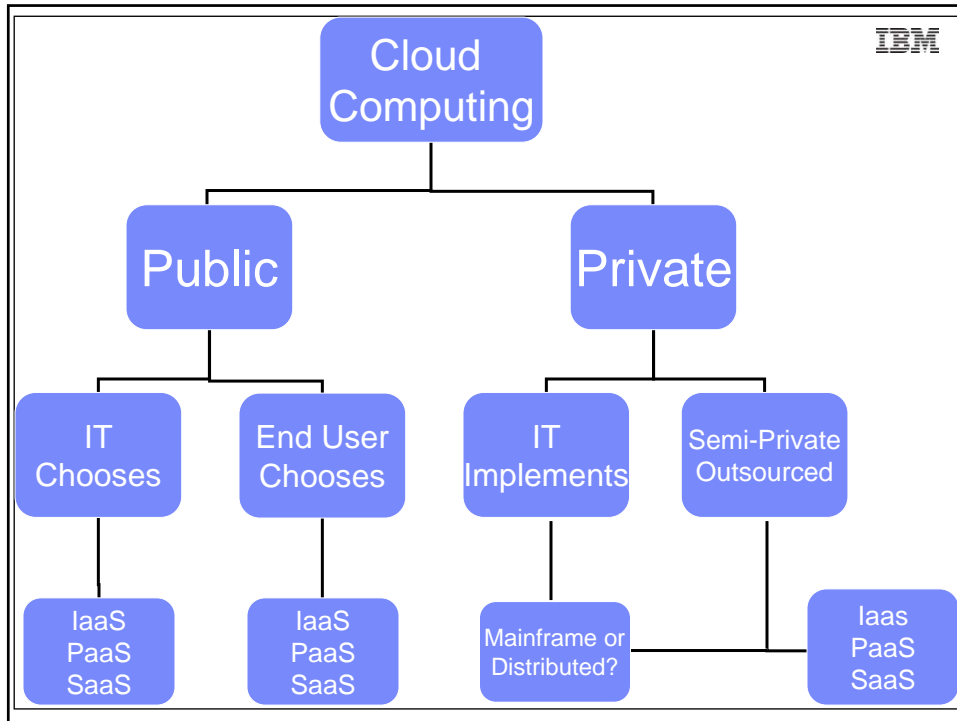
What does it mean to "move to the cloud?"

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

IBM

Public cloud and private cloud

- **Cloud is not a place. It is an operational model. A delivery model**
  - **Providing IT resources to end users as <u>services</u>**

- **Public cloud – applications, storage and other resources are made available to the general public over the internet by a service provider**

- **Private cloud – cloud infrastructure operated solely for a single organization, whether managed internally or by a third-party**
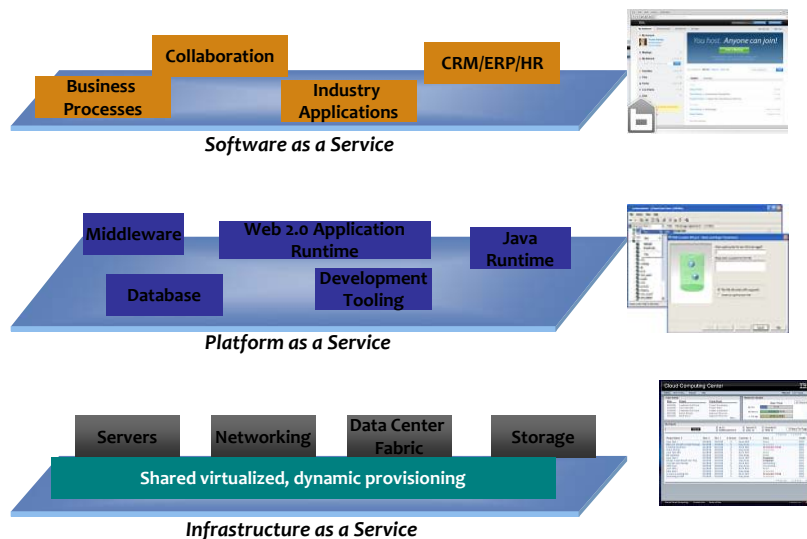
IBM

Cloud Computing

- **Public**
  - IT Chooses
    - IaaS PaaS SaaS
  - End User Chooses
    - IaaS PaaS SaaS
- **Private**
  - IT Implements
    - Mainframe or Distributed?
  - Semi-Private Outsourced
    - Iaas PaaS SaaS

IBM

Public Cloud

3/3/2014

What are the characteristics of public cloud computing?
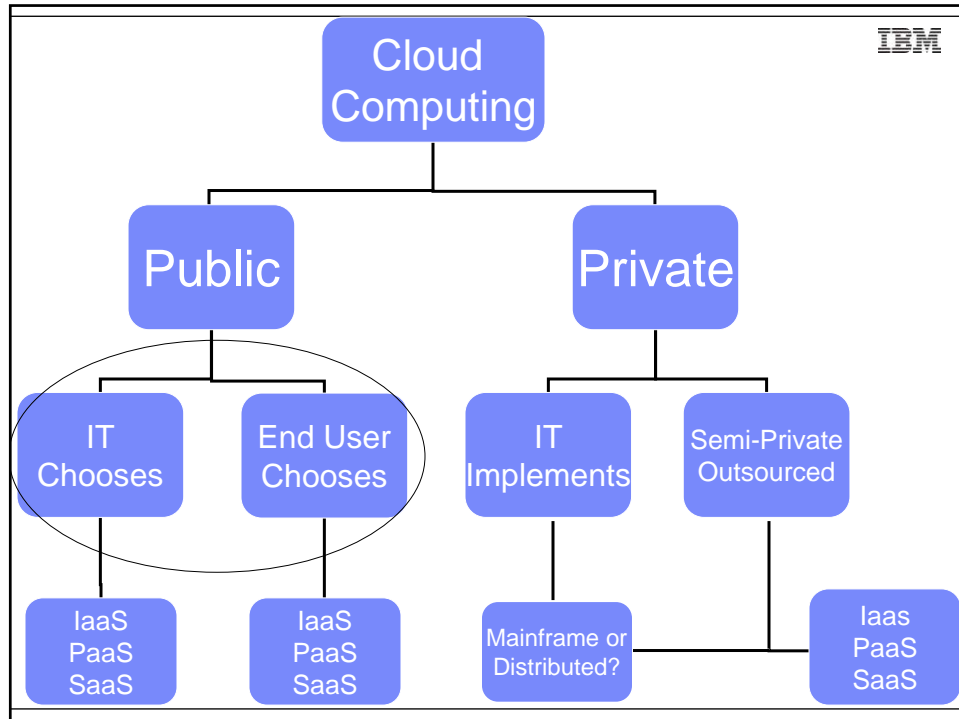
IBM

- **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**

The layers of IT-as-a-service

IBM

Collaboration
CRM/ERP/HR
Business Processes
Industry Applications

Software as a Service

Middleware
Web 2.0 Application Runtime
Java Runtime
Database
Development Tooling

Platform as a Service

Servers
Networking
Data Center Fabric
Storage

Shared virtualized, dynamic provisioning

Infrastructure as a Service

Cloud Computing

```
Cloud Computing
├── Public
│   ├── IT Chooses
│   │   └── IaaS PaaS SaaS
│   └── End User Chooses
│       └── IaaS PaaS SaaS
└── Private
    ├── IT Implements
    │   └── Mainframe or Distributed?
    └── Semi-Private Outsourced
        └── Iaas PaaS SaaS
```

IBM

IBM

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

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!**

IBM

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

Private Cloud

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**

IBM

Private cloud is really not a "cloud" at all. It means operating your data center to deliver service in a public cloud-like model.

IBM

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**
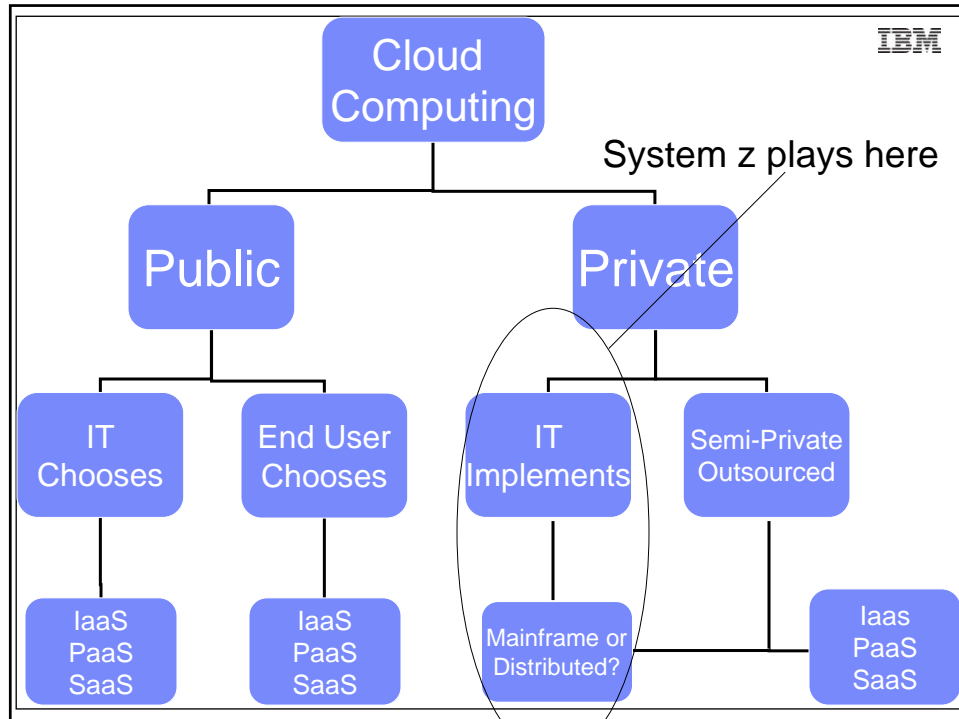
IBM

```
                    ┌──────────────┐
                    │    Cloud     │
                    │  Computing   │
                    └──────────────┘
```

System z plays here

Public   **Private**

| IT Chooses | End User Chooses | IT Implements | Semi-Private Outsourced |

| IaaS PaaS SaaS | IaaS PaaS SaaS | Mainframe or Distributed? | Iaas PaaS SaaS |

Which characteristics of public cloud computing interests you as a <u>System z</u> IT organization?

IBM

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

Which characteristics of public cloud computing interests you as a <u>System z</u> IT organization?

IBM

- **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)**

IBM

What is the problem you are trying to solve?

- **Probably depends on who you ask……..**

  - **More efficient use of IT resources?**
  - **Workload scalability?**
  - **Reduce costs?**
  - **Reduce time to market?**
  - **Reliability?**

  - **Meet the needs of the business?**
  - **Provide more agile service delivery?**

Typical reasons for cloud

IBM
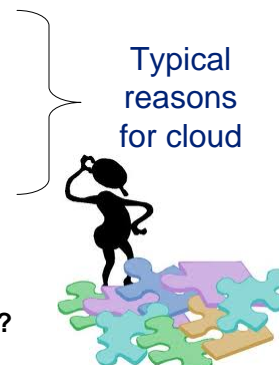
What is the problem you are trying to solve?

- **Do you want to provide Infrastructure as a Service (IaaS) or Platform as a Service (PaaS)? Why?**

  - **For your customers?**
  - **For your IT staff?**
  - **For your employees?**

- **Mainframe solution: z/VM and Linux on System z**

IBM

Why isn't the mainframe part of cloud discussions?

- **People responsible for cloud implementations focus on distributed**
  - **because that is what they have seen in the cloud space**
  - **that is the technology they know**
  - **The vast majority of articles, blogs, podcasts on cloud computing are focused on the distributed world**

- **Incorrect perception that the mainframe lacks sufficient cloud tools.**

- **Incorrect perception that mainframe is more expensive than distributed**

Key role of the hypervisor in cloud computing

IBM

In many cloud scenarios there's a hypervisor at the heart of it which provides the ability to spin up virtual resources:

Virtualized Resource	Virtualized Resource	•••	Virtualized Resource

Hypervisor

Physical Resources

For System z we have two hypervisors:

- **PR/SM** - logically partitions the physical CEC
- **z/VM** - provides "virtual machines" on LPAR

In addition:

- **zManager** - controls creation of "virtual servers" on top of the blades in the zBX

z/VM as a target hypervisor for cloud computing

IBM

It works and it works very well … because IBM has developed function to take programmatic requests and spin up virtualized environments:

z/VM Administrator

IBM System Director

IBM Tivoli Provisioning Manager / TSAM

IBM zEnterprise zManager

Linux — Virtual Machine
Linux — Virtual Machine
•• Linux — Virtual Machine

Interface Function   **z/VM Hypervisor**

zVM Operating System

System Resources Made Available Through PR/SM

Pool of Resources

Linux Images

Disk Storage

IP Addresses

User IDs

What is OpenStack?

OpenStack is a global collaboration of developers and cloud computing technologists that seek to produce a **ubiquitous Infrastructure as a Service (IaaS) open source cloud computing platform** for public and private clouds. OpenStack was founded by Rackspace Hosting and NASA jointly in July 2010. 160 companies and close to 3,000 developers.

http://openstack.org/
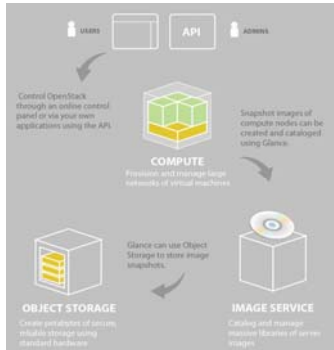
- **OpenStack Compute (core)**
  Provision and manage large networks of virtual machines

- **OpenStack Object Store (core)**
  Create petabytes of secure, reliable storage using standard hardware

- **OpenStack Image Service (core)**
  Catalog and manage massive libraries of server images

- **OpenStack Identity (core)**
  Unified authentication across all OpenStack projects and integrates with existing authentication systems.

- **OpenStack Dashboard (core)**
  Enables administrators and users to access & provision cloud-based resources through a self-service portal.

Code available under Apache 2.0 license

IBM Wave for z/VM Product Overview

IBM Wave for z/VM provides enhanced virtualization management capabilities that simplify and help automate the management of z/VM and Linux

- **Monitors and manages virtual servers and resources** from a single graphical interface
- **Simplifies and Automates** tasks
- **Provisions virtual resources** (Guests, Network, Storage)
- **Supports advanced z/VM capabilities** such as Single System Image and Live Guest Relocation
- **Allows delegation of administrative capabilities** to the appropriate teams
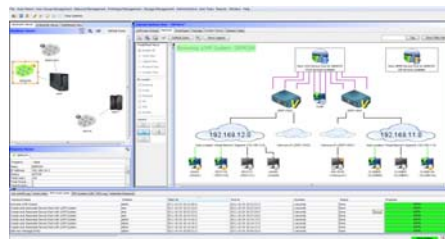
A simple, intuitive virtualization management tool providing management, provisioning, and automation for a z/VM environment supporting Linux virtual servers

Cloud computing on z/OS

IBM

With z/OS, we need to think about cloud just a bit differently…..

- Today in cloud environments on distributed servers, or even with Linux on System z, installations would provision a virtual machine with an instance of an operating system to run a single workload.
  - To deploy another workload would mean another virtual machine with another instance of the operating system.

- However, in the context of z/OS, this methodology goes against everything we have come to know and expect about z/OS.
  - On z/OS, you have the ability to run multiple disparate workloads with different service levels for those hosted workloads with isolation or multitenancy.

- Hence the **approach for cloud on z/OS** is not focusing on the provisioning of operating system instances, but rather **the ability to provision multiple workloads in a single z/OS instance.**

33

z/OS for software as a service (SaaS)

IBM

If the cloud resource offered is software functionality partitioned by identity, then z/OS can play as platform for cloud offering:

Reliability and Availability

LPAR	LPAR
zOS	**zOS**
Application Service	**Application Service**
CICS IMS DB2 WAS MQ	CICS IMS DB2 WAS MQ
RRS SAF SMF RMF TCP	RRS SAF SMF RMF TCP

CF

**Parallel Sysplex
Coupling Facility
Shared Data**

**Horizontal and
Vertical Scalability**

Standard Parallel Sysplex Story

Things to remember about cloud and System z

IBM

- **What is the problem you are trying to solve?**
- **What is meant by "We should be doing cloud computing?"**
- **Understand the dissatisfaction with IT that drives the crazy interest in cloud computing.**

- **The mainframe can provide cloud-like service delivery if that is what your business requires.**
- **Understand what is going on with public cloud in your shop.**
- **Make sure you, and System z, are a part of the cloud conversation at your shop.**

IBM

Mobile……

first smartphone

Typical mobile environment

Systems of Engagement   **Systems of Record**

Client Tier Devices   **Middle Tier Server**   **Back-end Data & Services**

• OS Device Variety • Screen size variety • Various Smartphones • Tablets	• Web Application Server • Mobile Application Runtime Server • Security components • Back-end access services • Caching to back-end services	• Databases and Data sources • Transactional services

---

System z bridges Systems of Record and Systems of Engagement

Systems of Engagement   **Systems of Record**

Mobile Apps

at&t

PayPal f

MySQL

t Salesforce

mongoDB

Finance

Corporate Data Ware-house

Accounting

Order Fulfillment

Existing Web Apps

Cloud APIs

Systems of Engagement are cloud-based, decentralized, support rapid app development

Linux on z   **z/OS**

Systems of Record are well integrated, trusted repositories

IBM MobileFirst Platform is shaping enterprise mobility

IBM MobileFirst

IBM Worklight

IBM Endpoint Manager

IBM API Management

- ✓ Native, web, or hybrid app development – Worklight.
- ✓ Tools to build & test high quality apps for many devices – Worklight.
- ✓ Management, security, continuous delivery & distribution of apps – Worklight, IBM Endpoint Manager.
- ✓ Easy connectivity to existing data & services for mobile usage – Worklight, System z Subsystem mobile access, IBM API Management.
- ✓ On-premises or managed service delivery
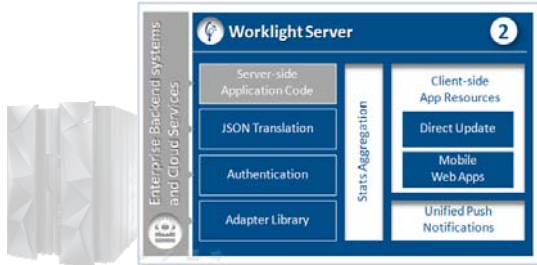
IBM Worklight overview

Worklight Studio
The most complete, extensible environment with maximum code reuse and per-device optimization

Worklight Server
Unified notifications, runtime skins, version management, security, integration and delivery

Worklight Device Runtime Components
Extensive libraries and client APIs that expose and interface with native device functionality

Worklight Console
A web-based console for real-time analytics and control of your mobile apps and infrastructure

Worklight Server
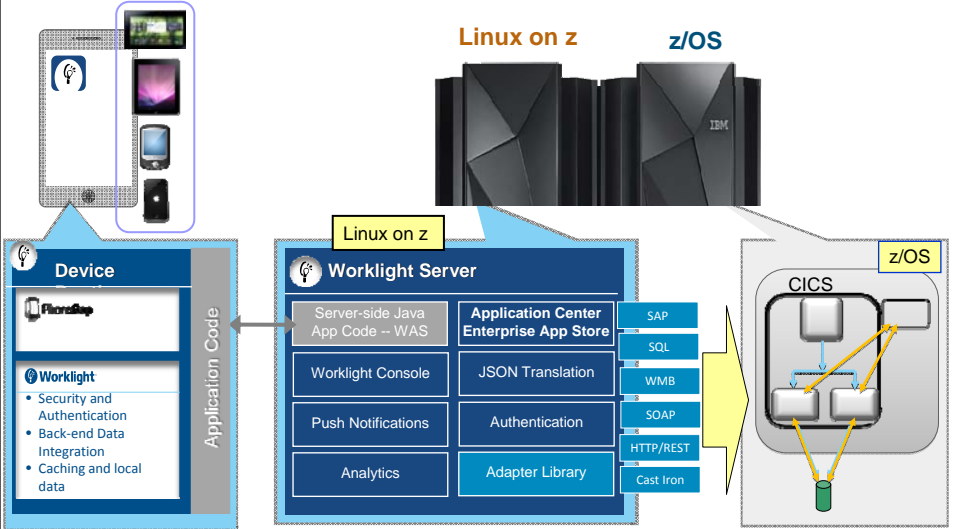
Worklight Server is a **WebSphere Application Server (WAS)/Java application**,
supported on **System z Linux** – WAS 7, 8, 8.5 on SLES 10, 11, and RHEL 5, 6.
It provides:

- **Adapters** are used to communicate to back-end services like databases, transaction systems, MQ, etc.
- **Data Transformation** - JSON is used to communicate to mobile devices – translation is done to HTTP or Web Services that are used by server components.
- Server and device **Security** control
- Controls Application Deployment and **Versioning**
- **Push Notification** administration
- **Analytics** including user adoption and usage data
- An **Enterprise App Store** for your B2E applications.

IBM Worklight Server on System z

Connecting mobile apps on the zEnterprise

- **Server side software components and adapters for channeling System z to mobile devices** with IBM Worklight Server

- **Mobile application support** with WebSphere Application Server on System z

- **Mobile protocol connectivity with core System z applications** including CICS, IMS, TPF, MQ, WMB and DB2
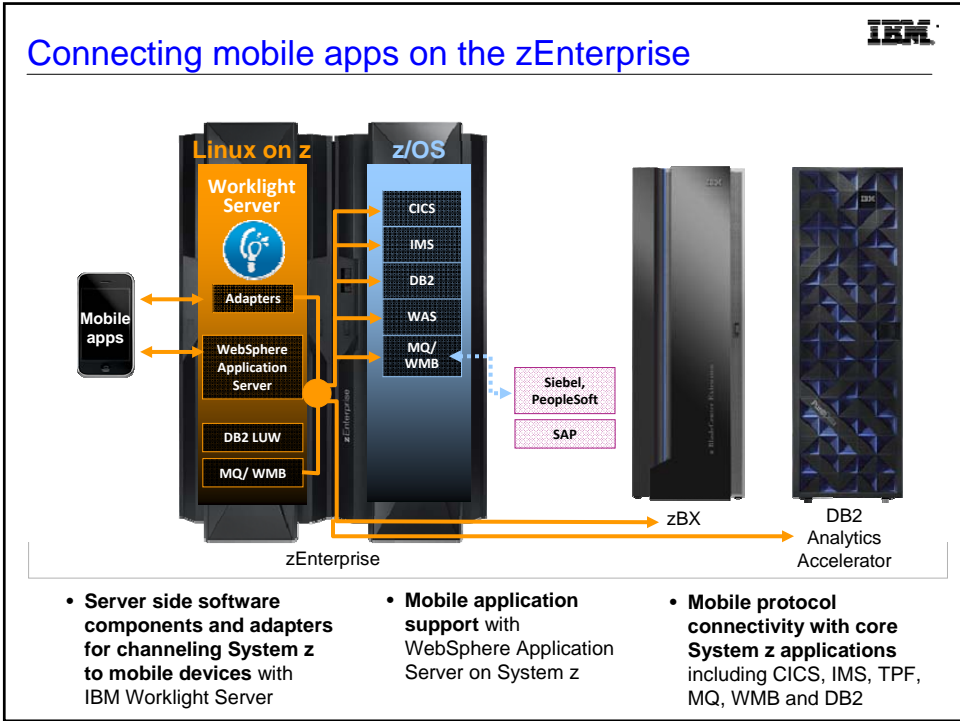
Social……

The social graph is transforming the way we interact

IBM

30 billion pieces of content are shared on Facebook each month

Pinterest drives more traffic to retail sites than Google+, YouTube and LinkedIn combined

More companies **Now** use social **Internally** than Externally

66% of top financially performing companies leverage social in their processes

---

What is social business?

IBM

- **A lot more serious than getting a nice presence on Facebook or Twitter or Google+**

- **The application of social networking tools, ideas and culture to business roles, processes and outcomes**

  - **Collective intelligence**
  - **A new way of working**
  - **Understand market shifts**

Three elements of successful Social Business approaches

IBM
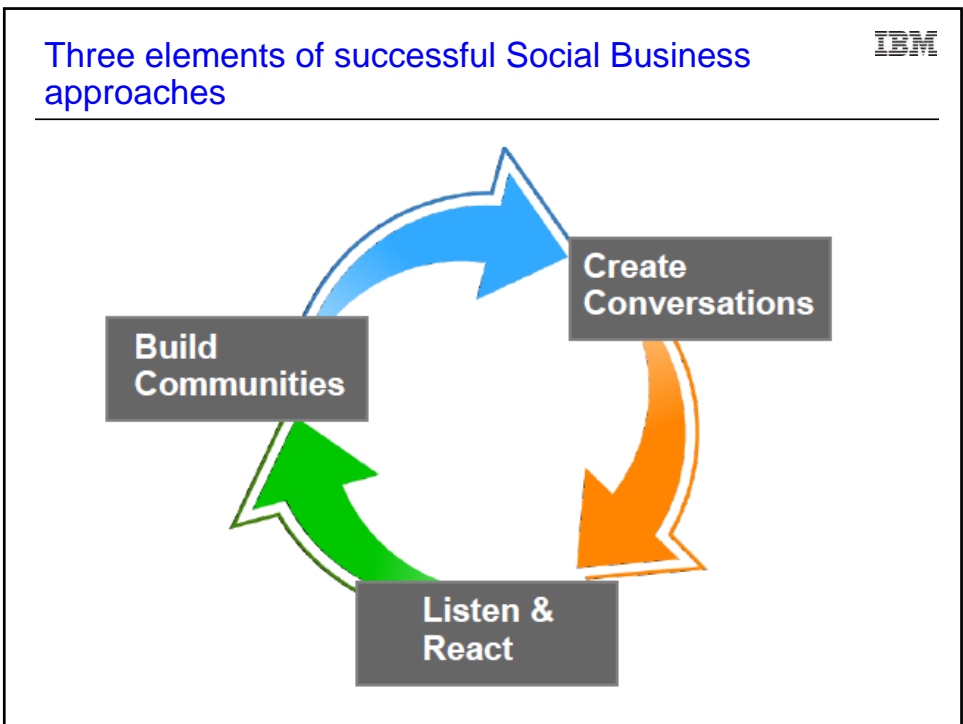
Social business creates value across every level of your company
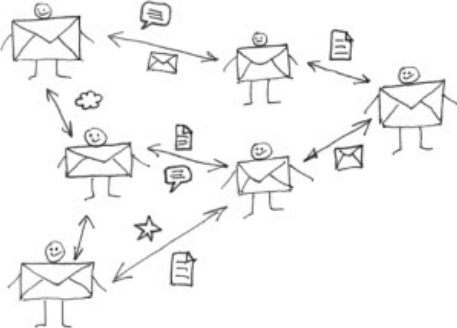
IBM

The future of email is social

IBM

Social email provides both a powerful accelerator for social adoption and the backdrop for relief from email fatigue.

Collaboration software for Linux on System z

IBM

IBM Connections
Social Software for Business

Empowers users to be more innovative and helps them collaborate & execute more quickly with dynamic networks of co-workers, partners and customers.

Home page
See what's happening across your social network

Profiles
Post updates to your board and find the people you need

Communities
Work with people who share common roles and expertise

Forums
Exchange ideas with, and benefit from the expertise of others

Files
Post, share, and discover documents, presentations, images, and more

Social Analytics
Discover who and what you don't know via recommendations

Wikis
Create web content together

Blogs
Present your own ideas, and learn from others

Activities
Organize your work and tap your professional network

Bookmarks
Save, share, and discover bookmarks

Big Data……

Technological immortality

- "….each of us now leaves a trail of digital exhaust, an infinite stream of phone records, texts, browser histories and other information that will live on forever."

    - The Human Face of Big Data

Big data is all data and all paradigms

IBM

Transactional & Application Data	Machine Data	Social Data	Enterprise Content
• Volume	• Velocity	• Variety	• Variety
• Structured	• Structured	• Unstructured	• Unstructured
• Throughput	• Ingestion	• Veracity	• Volume

"We have for the first time an economy based on a key resource [Information] that is not only renewable, but self-generating…..
….Running out of it is not a problem, *but drowning in it is*."
– John Naisbitt

Traditional IM

- Requirements based
- Top-down design
- Integration and reuse
- Technology consolidation
- World of DW and ECM
- Competence centers
- Better decisions
- Enterprise

"Big Data" Style

- Opportunity oriented
- Bottom-up experimentation
- Immediate use
- Tool proliferation
- "World of Hadoop"
- Hackathons
- Better business
- Marketing (+)

Gartner.

What does a big data platform do?

IBM

Analyze a Variety of Information
Novel analytics on a broad set of mixed information that could not be analyzed before

Analyze Information in Motion
Streaming data analysis

Large volume data bursts & ad-hoc analysis

Analyze Extreme Volumes of Information
Cost-efficiently process and analyze petabytes of information

Manage & analyze high volumes of structured, relational data

Discover & Experiment
Ad-hoc analytics, data discovery & experimentation

Manage & Plan
Enforce data structure, integrity and control to ensure consistency for repeatable queries

© 2013 IBM Corporation

The big data starting point

IBM

Where are organizations getting the most return on Big Data projects?

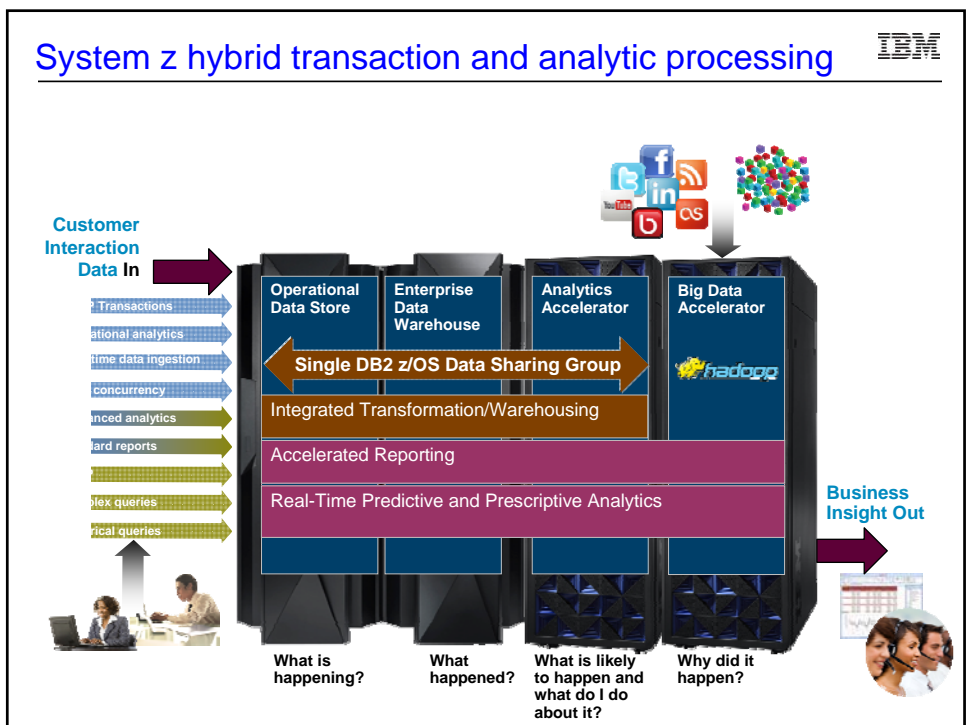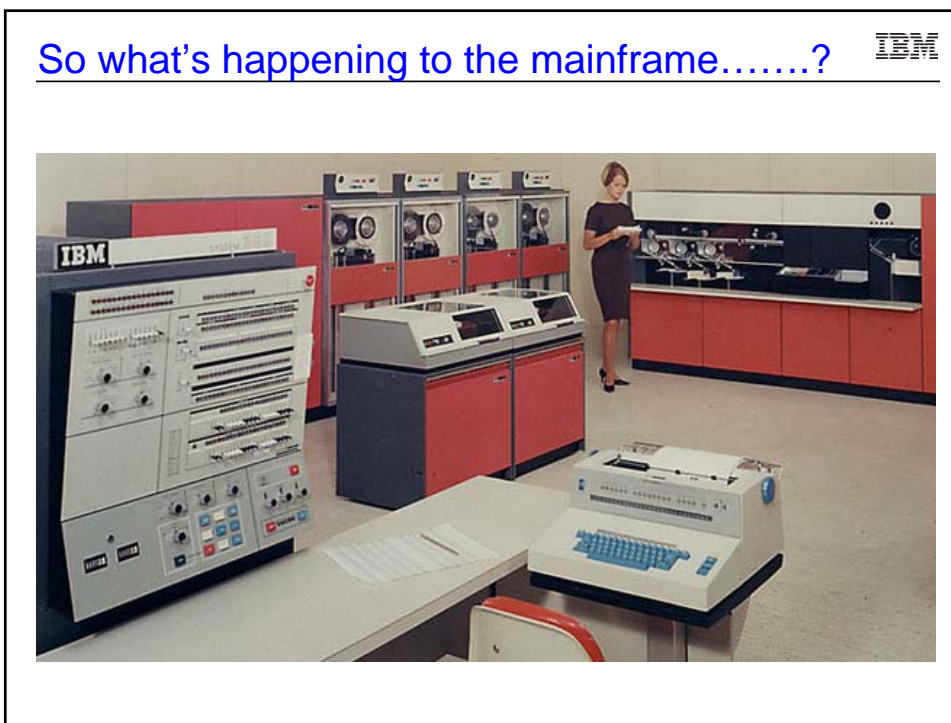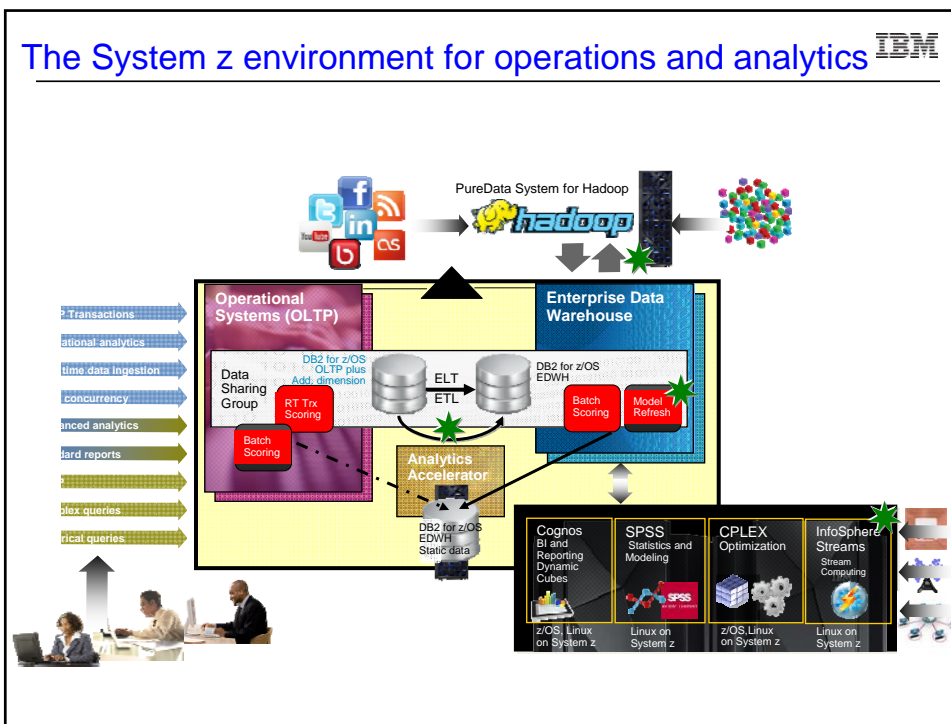"What types of data/records are you planning to analyze using big data technologies?"

Transactional data from enterprise applications	72%
Sensor/machine/device data	42%
Social media (Facebook, Twitter, etc.) data	35%
Unstructured content from email, office documents, etc.	35%
Clickstream	27%
Locational/geospatial data	27%
Image (large video/photographic) data	13%
Scientific/genomic data	12%
Other	7%
Don't know	5%

Base: 60 IT professionals
(multiple responses accepted)

(!) Most big data use cases hype its application for analysis of new, raw data from social media, sensors, and web traffic, but we found that firms are being very practical, with early adopters using it to operate on enterprise data they already have.

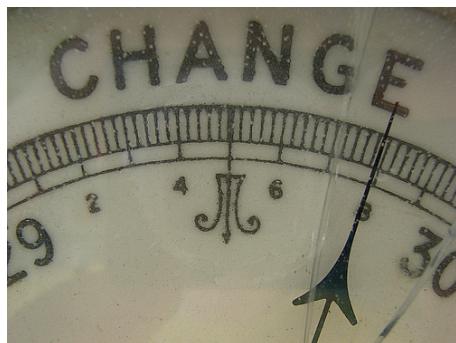Source: 2012 IBM Global Big Data Online Survey

System z integrates transactions and business critical analytics into one end-to-end data lifecycle

System z hybrid transaction and analytic processing

The System z environment for operations and analytics

So what's happening to the mainframe.......?

Glenn Anderson, IBM Lab Services and Training   IBM

What's Happening to the Mainframe?
Mobile? Social? Cloud? Big Data?

Thanks for coming!

CHANGE

Session 15126