
Today’s mainframe is a hybrid system
The business environment is shifting…

The perfect storm of disruption
Gartner: Nexus of Forces

- **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

Cloud......
The trouble with cloud…….

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

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

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 services

- 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
Cloud Computing

Public
- IT Chooses
  - IaaS
  - PaaS
  - SaaS

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

Public Cloud

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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

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The layers of IT-as-a-service

- **Software as a Service**
- **Platform as a Service**
- **Infrastructure as a Service**
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!

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

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
Which 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
Which 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)

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?
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

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

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

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

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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

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.

z/OS for software as a service (SaaS)

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

Reliability and Availability

Horizontal and Vertical Scalability

Standard Parallel Sysplex Story
Things to remember about cloud and System z

- 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.

Mobile......
Typical mobile environment

Client Tier Devices
- OS Device Variety
- Screen size variety
- Various Smartphones
- Tablets

Middle Tier Server
- Web Application Server
- Mobile Application Runtime Server
- Security components
- Back-end access services
- Caching to back-end services

Back-end Data & Services
- Databases and Data sources
- Transactional services

System z bridges Systems of Record and Systems of Engagement

Systems of Engagement
- Mobile Apps
- Cloud APIs
- Existing Web Apps
- Systems of Engagement are cloud-based, decentralized, support rapid app development

Systems of Record
- Finance
- Corporate Data Warehouse
- Accounting
- Order Fulfillment
- Systems of Record are well integrated, trusted repositories

Linux on z

z/OS
IBM MobileFirst Platform is shaping enterprise mobility

- 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
IBM Endpoint Manager
IBM API Management

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

- **Device**
- **Worklight**
  - Security and Authentication
  - Back-end Data integration
  - Caching and local data
- **Application Code**
- **Worklight Server**
  - Server-side Java App Code
  - JSON Translation
  - Authentication
  - Adapter Library
  - Application Center
  - Enterprise App Store
  - Push Notifications
- **Linux on z**
- **z/OS**
- **CICS**

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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

30 billion pieces of content are shared on Facebook each month

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

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

More companies Now use social Internally than Externally

What is social business?

- 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

Build Communities

Create Conversations

Listen & React

Social business creates value across every level of your company

Skill
Increased interest
Develop skills 50% faster using the largest network of specialists and experts

Marketing
Reaching new audiences
Can achieve 100% increase in market exposure

Product Development
Spending time to market
Can develop and bring new products to market 23% faster

Sales
Improving productivity
Can increase loan/sales volume by 34% and reduce operating costs by 85%

Customer Service
Improving customer retention
Deliver customer service 99% faster
A 24x7 automatic push notification and self service delivery
The future of email is social

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 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

- **Communities**
  - Work with people who share common roles and expertise

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

- **Wikis**
  - Create web content together

- **Activities**
  - Organize your work and tap your professional network

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

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

- **Social Analytics**
  - Discover who and what you don’t know via recommendations

- **Blogs**
  - Present your own ideas, and learn from others

- **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

- **Transaction & Application Data**
  - Volume
  - Structured
  - Throughput

- **Machine Data**
  - Velocity
  - Structured
  - Ingestion

- **Social Data**
  - Variety
  - Unstructured
  - Veracity

- **Enterprise Content**
  - Variety
  - Unstructured
  - 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

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**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 (+)
What does a big data platform do?

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

The big data starting point

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/mesh/network/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: 13%
- Other: 7%
- Don’t know: 5%
- Base: 601 IT professionals (multiple responses accepted)

Most big data use cases hype its applicability for analyses of new, rare 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

Better business response,
Reduced data movement, reduced complexity, reduced configuration resources,
More accurate, more secure, more available

Leverage System z Operational Data Store
Operational transactional data
Operational analytical data

Cleansed Transform Warehouse

Information Platform
DB2 for z/OS

SPSS
ODM
OLTP
InfoSphere

CICS/IMS
WebSphere
SAP, …

OLTP Transactions
Operational analytics
Real time data ingestion
High concurrency
Advanced analytics
Standard reports
Complex queries
OLAP
Integrated Transformation/Warehousing
Single DB2 z/OS Data Sharing Group
Analytics Accelerator

Big Data Accelerator

Customer Interaction
Data In

Business Insight Out

What is happening?
What happened?
What is likely to happen and what do I do about it?
Why did it happen?

Operational Data Store
Enterprise Data Warehouse
Analytics Accelerator

Real-Time Predictive and Prescriptive Analytics

Accelerated Reporting
Integrated Transformation/Warehousing

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The System z environment for operations and analytics

So what’s happening to the mainframe……..?

Thanks for coming!