Oracle Cloud Provisioning with IBM Wave and Oracle 12c Cloud Control on IBM z Systems

Sam Amsavelu
samvelu@us.ibm.com

Gaylan Braselton
gbrasel@us.ibm.com

Session Number: 17360
Agenda

- Why Cloud Computing?
- z Systems Cloud Blueprint
- Oracle Databases in a Cloud environment
- A demo of provisioning Oracle Databases using IBM Wave
- A demo of provisioning Oracle Databases using Oracle EM12C

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Oracle Databases on z Systems

• Oracle Databases on z Systems work same way as they work on any other platform.
  – The same source code is ported to all the supported platforms.
  – It installs and is administered to the same way as it is on Linux on Intel.
  – The differences are in configuring Linux and z/VM.
  – From a DBA perspective, once they get an IP address, userid and pw for Linux they are good to go.
Many enterprises are running Oracle on z Systems

Various sizes and deployments
• From z9 to z13
• Small, Medium, Large customers

Across all Industries
• Finance
• Healthcare
• Insurance
• Retail
• Education
• …. 

Across Gov. agencies
• State
• Federal
• Defense
Customer choices for Oracle Databases on z Systems

- Stand alone databases
- Active / Passive implementations RAC One
- RAC
- Databases with Data Guard
- Databases with GoldenGate
- Databases for custom (OLTP, DW), Weblogic, WebSphere, PeopleSoft etc., applications

Complete your session evaluations online at www.SHARE.org/Orlando-Eval

8/15/2015 Session Number : 17360
Oracle stand alone databases on z Systems

- Linux on its own LPAR
- Production on its own z/VM LPAR
- Prod, Dev, Test all in one z/VM LPAR
- Linux LPAR with one or more Databases
- One or more Databases under z/VM LPAR

Complete your session evaluations online at www.SHARE.org/Orlando-Eval

8/15/2015  Session Number : 17360
Steps for installing Oracle database binaries – just stand alone (minimum 15 steps)

- You need a Linux Guest
- Requires specific rpms for Oracle
- Create the user ids, groups – oracle, grid
- Customize the kernel parameters
- Huge Page setup
- Network setup
- Swap disks
- Disk / san storage setup (binary / data)
- Multipathing / udev rules setup
- Directories for binaries, data
- Authorization
- Binary down load
- Installation
- Oracle Agent installation
Overview of Major RAC Components – more complexity

Public Network

Private Network -- Primary

VIPA -- Backup

RAC
Node_1

Linux
Swap
$Oracle

Product Binaries

RAC
Node_2

Voting
OCR

Datafile
Datafile
Datafile

Position inside ASM for 11gR2

Product Binaries

Linux
Swap
$Oracle
IT Challenges – multiple environments

• Wide range of customers
  - *Internal and External*
• Heterogeneous hardware environments
  - *Legacy, Distributed*
• Many environments
  - Development, Q/A, Production
  - Hosted, Hosting, Disaster Recovery
• Multiple OS, Databases and products to support
• Storage complexities
  - *SAN, FLASH, Legacy*
• Geographically distributed locations
• Complicated procurement process
• Ever increasing infrastructure requirements
• Tedious provisioning processes
• Security issues
• Maintenance requirements
  - *Patches, Upgrades, Security*
• Changing technologies
  - *Cloud, Big Data*
No Big Deal….
Real example – the electrical grid

Most of us walk into a room and look for outlets

> plug in and use

- Nobody carries their own power generator
- Simple, available, relatively low-cost, utility
- You know what to expect, you know what you expect
The application team requests a new environment with Oracle database “now” and ...

- Find available hardware
- Create the virtual machine
- “Connect” the infrastructure
  - Storage and network
- Setup for virtual machine install
- Install and patch Linux and parameters
- Customize OS for Oracle database
- Install Oracle software

... ...

“Pay no attention to the man behind the curtain”
And ....
Cloud is not the solution; it enables the solution

• The enabled solution should allow…

Pay for Use
Cloud computing provides metered service usage, so you only pay for what you use.

Self Service
Cloud computing provides all the IT resources you need with the self-service access.

Elastic Resources
Cloud computing allows users to scale up or down quickly.

Three business imperatives fueling cloud adoption

Speed
Organizations must quickly, continuously improve the applications and services they deliver.

Empowerment
People want to serve themselves - they want intuitive access to business apps and application development environments.

Economics
Use-based payment models. Faster development. Adding capacity when it is needed, but not before.
z Systems Cloud Blueprint

The steps in the cloud journey offer different levels of capability for each customer IT environment.

Integrate

Virtualization

Infrastructure & Virtualization Management

This is where z Systems drives differentiation!

Infrastructure Scalability:
- Consolidate more workloads per core

Virtualization Management:
- More virtual servers in a single footprint

Security:
- Highest security rating for tenant isolation

Reliability & Availability:
- Unparalleled in the industry

Automate

Entry Level Cloud

Standardization & Automation

Orchestrate

Advanced Cloud

Orchestration & Optimization

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
# Virtualization and Cloud Portfolio for Linux on z Systems

<table>
<thead>
<tr>
<th>Virtualization Infrastructure &amp; Virtualization Management</th>
<th>Entry Level Cloud Standardization &amp; Automation</th>
<th>Advanced Cloud Orchestration &amp; Optimization</th>
</tr>
</thead>
</table>

**Servers:** z13, zEC12, zBC12  
- Massively scalable  
- Characterized by great economics / efficiencies  
- Highly secure / available

**z/VM 6.3**  
- Support more virtual servers than any other platform in a single footprint  
- Integrated OpenStack support

**IBM Wave for z/VM**  
- A graphical interface tool that simplifies the management and administration of z/VM and Linux environments

**xCAT**  
- Shipped with z/VM 6.3  
- Allows customers to set up a rudimentary cloud environment, without acquiring any additional product  
- Based on open source code  
- Not designed for upward integration to IBM Cloud suite

**IBM Cloud Manager with OpenStack**  
- A simple, entry level cloud management stack  
- Based on OpenStack  
- Managed from/to Linux on z

**Cloud Orchestrator**  
- Based on OpenStack  
- Builds on functionality of IBM Cloud Manager with OpenStack  
- Adds runbook automation and middleware pattern support for workload deployment

---

Differentiation  
Standardization  
Service Lifecycle Management
IBM Wave for z/VM (IBM Wave) Overview

IBM Wave simplifies and helps automate management and administration of z/VM and Linux virtual servers, jumpstarting the steps needed to get to cloud. With its content rich interface IBM Wave extends the reach of your staff and lets you manage z/VM and Linux intuitively and cost effectively, reducing reliance on deep expert skills.

- Monitors and manages virtual servers and resources from a single interface
- Simplifies and automates administration and management 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 graphical management, provisioning, and automation tool to help you fully leverage the power of System z virtualization on z/VM.

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Lab environment overview

- IBM Wave runs on LPAR1
Wave operations tour

• Wave login and walk around the shore
Wave demonstration

- Logon to Wave
- Hardware viewer
- For Oracle environment, some of the things to keep an eye are CPU, memory and obviously the page space
- Dashboard viewer (Dynamic, snapshot – no static info)
  - CPU utilization
  - Memory real to virtual
  - Page space
  - Spool space

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Wave demonstration

- z/VM User Groups
- Network
- Prototypes
- Storage
  - distribution
  - groups
  - volumes

Complete your session evaluations online at www.SHARE.org/Orlando-Eval

8/15/2015  Session Number : 17360
Wave demonstration

– User tasks
Oracle Stand alone Database provisioning

- Clone a Linux Guest

- Create a Oracle Database on that Linux Guest
Cloning a Linux Guest (IaaS)

- You need a template / prototype
- Nothing but a basic catalog of Linux guests
  - T-shirt sizes  -- small, medium, large, xtra Large
  - Service level  -- Bronze, Silver, Gold, Platinum
- Create a prototype from a running Linux guest
- Clone from that prototype
- IaaS  ----- Infrastructure as a Service

- Let us see how a Linux guest is cloned in Wave
Step 1: Create a prototype (ORAGOLD)

- Install Linux on a z/VM guest
- Customize the Linux guest for installing Oracle Database
- Convert the Linux guest as prototype
  - And this is our Golden Image
Look at the customized Linux Guest ORAGOLD in Wave

- Data, zVM, Linux and performance View
- SSH Access
Create the prototype ORAGOLD

- Deactivate ORAGOLD
- Convert to prototype

Complete your session evaluations online at www.SHARE.org/Orlando-Eval

8/15/2015  Session Number : 17360
Create the prototype ORAGOLD

- Select the DASD Group
- Converted to prototype
Clone a Linux guest from the prototype ORAGOLD

- Select clone from this prototype
Clone a Linux guest from the prototype ORAGOLD

• provide the name, password and choose storage group
Clone a Linux guest from the prototype ORAGOLD

• Choose ACCESS and specify the ip address
Clone a Linux guest from the prototype ORAGOLD

- Specify the domain and dedicate devices
Clone a Linux guest from the prototype ORAGOLD

- Press GO and then close
Clone a Linux guest from the prototype ORAGOLD

- See the cloning action and when done activate
Clone a Linux guest from the prototype ORAGOLD

- Now demo26 is up and active
Provision Oracle Database (DBaaS)

- DBaaS ----- Infrastructure as a Service

- Let us see how a Oracle DB is provisioned in Wave
- Execute db install script
- It takes around 10 minutes to create the Oracle Databases
- Agent installation
- Database installation
- Database creation
Standalone Database provisioning

- As oracle user execute single_db_fs script
Standalone Database provisioning

- It takes around 9 minutes
- Agent, db binary and database creation (guestname + fs)
Standalone Database provisioning

- sqlplus
- Oracle EM12c exposure
Wave Oracle Use cases (Swingbench)

- 4 GB memory
- 2 Virtual CPU
Wave Oracle Use cases (Swingbench)

- Increase memory
- Increase Virtual CPU
Wave Oracle Use cases (Swingbench)

- Increased memory
- Increased Virtual CPU
Wave Oracle Use cases (Swingbench)

- Increased memory
- Increased Virtual CPU
Demo Objectives

• Used IBM Wave installed on a System z to demonstrate

How easy to provision
Infrastructure as a Service (IaaS)
Platform as a Service (PaaS)

How easy to provision Oracle Databases
Database as a Service (DBaaS)
Steps for reusable and deployable provisions

- Install Linux on a z/VM guest
- Customize the Linux guest for creating Oracle Grid Infrastructure
- Create a prototype from the Linux guest
- Clone a Linux guest from that prototype
- Provision a Grid Infrastructure (RACOne) on the cloned guest using silent install scripts
- Install Agent,
  - Install Database binary
  - Create a RAC One Database

This Gold prototype can be “Cloned” as many requests. IaaS and PaaS

One time operation
Create required silent installation scripts in Wave

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Build Oracle GI Platform (PaaS)

• Provision a Grid Infrastructure (one node RAC) on the cloned guest using silent install scripts

• PaaS ---- Infrastructure as a Service

• Let us see how a Oracle GI Platform is created in Wave
• Execute RAC_ONE script
• It takes around 10 minutes to create the GI platform
• Grid SW silent installation
• Grid configuration (OCR, VOTING)
• DATAVG disk group creation
Provision Oracle Database (DBaaS)

- DBaaS ---- Infrastructure as a Service

- Let us see how a Oracle DB is provisioned in Wave
- Execute dbinstall script
- It takes around 10 minutes to create the GI platform
- Agent installation
- Database installation
- Database creation
Step 1 create a prototype (ORAGOLD)

- Install Linux on a z/VM guest
- Customize the Linux guest for creating Oracle Grid Infrastructure
- Create a prototype from the Linux guest
Create the prototype RAC1PLAT

• Convert the customized RAC1PLAT to a prototype
Create a clone from the prototype

• Choose a prototype and clone
Clone RAC1PLAT as CLONE02

- Customize the clone
  - Choose the name
    - CLONE02
  - Network selection
  - Domain name
  - Storage selection
    - Mod9
  - IP address
    - 9.82.21.28
  - Press GO
  - Wait till the disk
  - Space is setup
Activities performed during cloning

- Disks are formatted and copied
- Linux is cloned
- ASM disks udev rules are setup
- Oracle userids, Linux configuration as per prototype are created
CLONE02 guest is getting cloned

• Once the clone is created, activate
Check the CLONE02 guest

- Mount the script disks, SSH Validation

```
[root@CLONE02 dload]# cp /u01/cloud/fstab /etc/fstab
         cp: overwrite `/etc/fstab'? y
[root@CLONE02 dload]# mount /dload
[root@CLONE02 dload]# su - grid
[grid@CLONE02 ~]$ /u01/cloud/sshUserSetup.sh -user grid -hosts clone02
```
Step 3  Provision the Grid Infrastructure

- Install Linux on a z/VM guest
- Customize the Linux guest for creating Oracle Grid Infrastructure
- Create a prototype from the Linux guest
- Create a clone from the prototype
- Provision a Grid Infrastructure (one node RAC) on the cloned guest using silent install scripts

This Gold prototype can be “Cloned” as many requests. IaaS and PaaS

One time operation
Create required silent installation scripts in Wave

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Activities performed by RAC_ONE script

• Grid infrastructure to support RAC One installation
• Grid installation
• Grid configuration
• ASM disks creation
Build the Grid Infrastructure on CLONE02

• Use the Wave script manager
RAC_ONE script execution

• Select RAC_ONE silent install grid
Database as a Service (DBaaS)

• Now the RAC One Grid Infrastructure is created

Provision a Oracle Database on a cloned Linux Guest
Database as a Service (DBaaS)
Database as a Service (DBaaS)

- Execute the dbinstall script in Wave

Complete your session evaluations online at www.SHARE.org/Orlando-Eval

8/15/2015 Session Number : 17360
Activities performed by dbinstall script

- Agent installation
- Database installation
- Database creation
Check if the cluster is running with its services

- `/u01/app/grid/11.2/bin/crsctl status res -t`

<table>
<thead>
<tr>
<th>Cluster Resources</th>
<th>ONLINE</th>
<th>ONLINE</th>
<th>clone02</th>
</tr>
</thead>
<tbody>
<tr>
<td>ora.LISTENER_SCAN1.lsnr</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ora.LISTENER_SCAN2.lsnr</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ora.LISTENER_SCAN3.lsnr</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ora.clone02.vip</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ora.cv4</td>
<td>1</td>
<td></td>
<td>clone02</td>
</tr>
<tr>
<td>ora.cc4j</td>
<td>1</td>
<td>OFFLINE</td>
<td>clone02</td>
</tr>
<tr>
<td>ora.rac1db.db</td>
<td>1</td>
<td>ONLINE</td>
<td>clone02</td>
</tr>
<tr>
<td>ora.scan1.vip</td>
<td>1</td>
<td>ONLINE</td>
<td>clone02</td>
</tr>
</tbody>
</table>
Database as a Service (DBaaS)

- Now let us use EM12

Provision an Oracle Database on Linux Guest ORAEM12 Cloned in Wave from ORAGOLD prototype

Using Oracle EM Cloud Control 12C, Database as a Service (DBaaS) will be provisioned
Use EM12C to provision a Database

• In a System z environment, Oracle Enterprise Manager can be used to deploy
  • Database as a Service
  • Apply patches to Oracle Databases
  • Monitor Oracle Database instances

• The Databases can be installed and configured as
  • Single Instance
  • RAC One
  • RAC

• The following Demo on Oracle Enterprise Manager will show how a Oracle Database can be provisioned on an z Systems infrastructure provisioned using IBM Wave
Use EM12C to provision a Database

• Make sure that the agents are running
• Database Provisioning and select Launch in the Deployment procedure
  • Select provision and patching option
  • Launch deployment procedure.
• Select SW only installation option for Oracle Database and add hosts
  • Select Oracle designated platform name, “IBM: Linux on System z”
  • Select Oracle server Version number
  • Select Deploy software only
• Setup Hosts
  • Provision Oracle Database: Specify OS users
  • Select Override Preferred Credentials.
• Specify OS groups
  • Enter:
    • Inventory Group
    • Database Administrator
    • Database Operator
Use EM12C to provision a Database

- **Deploy Software**
  - Select Configure
- **Specify the source Database location**
  - Select desired name
- **Specify oracle home location**
  - Define a tmp with at least 2.5 GB
- **Start the provision job**
- **Monitor the job**
  - Provisioning tool monitors activity.
Summary

- System Administrator wants to create and manage the infrastructure and platforms
- DBAs are interested in provisioning, managing and maintaining the databases
- Considering that we demonstrated the following:
  - Use WAVE to build a infrastructure and Platform (IaaS and PaaS)
  - Use WAVE to provision Oracle Database
  - Demonstrate Oracle EM12c to provision Oracle Databases
References

IBM Redbooks
- IBM Wave for z/VM: An Introduction
- IBM Wave for z/VM Installation, Implementation, and Exploitation

IBM White Paper
- Oracle Database deployment using IBM Wave for z/VM

Oracle documentation and manuals
Thanks…. 

• To many of my IBM colleagues from who I got lot of slides and help to build this demo
Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and/or other countries.

- DirMaint
- Performance Toolkit for VM
- System z9*
- z10 EC
- IBM*
- RACF*
- System z10*
- zEnterprise*
- IBM (logo)*
- REXX
- System z10 Business Class
- z/VM*
- OMEGAMON*
- System z*
- z10 BC

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

- Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.
- Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license therefrom.
- Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.
- IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency which is now part of the Office of Government Commerce.
- ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office.
- Java and all Java based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.
- Linear Tape-Open, LTO, the LTO Logo, Ultrium, and the Ultrium logo are trademarks of HP, IBM Corp. and Quantum in the U.S. and Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.
- Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.
- OpenStack is a trademark of OpenStack LLC. The OpenStack trademark policy is available on the OpenStack website.
- TEALEAF is a registered trademark of Tealeaf, an IBM Company.
- Windows Server and the Windows logo are trademarks of the Microsoft group of companies.
- Worklight is a trademark or registered trademark of Worklight, an IBM Company.
- UNIX is a registered trademark of The Open Group in the United States and other countries.
  * Other product and service names might be trademarks of IBM or other companies.

Notes:
Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user’s job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here. IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.
All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions.
This publication was produced by IBM. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area.
All statements regarding IBM’s future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.
Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.
Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geographic area.
This information provides only general descriptions of the types and portions of workloads that are eligible for execution on Specialty Engines (e.g., zIPS, zAAPs, and IFLs) (“SEs”). IBM authorizes customers to use IBM SE only to execute the processing of Eligible Workloads of specific Programs expressly authorized by IBM as specified in the “Authorized Use Table for IBM Machines” provided at www.ibm.com/systems/support/machine_warranties/machine_code/aut.html ("AUT"). No other workload processing is authorized for execution on an SE. IBM offers SE at a lower price than General Processors/Central Processors because customers are authorized to use SEs only to process certain types and/or amounts of workloads as specified by IBM in the AUT.

Complete your session evaluations online at www.SHARE.org/Orlando-Eval

8/15/2015 Session Number : 17360
# Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and/or other countries.

<table>
<thead>
<tr>
<th>IBM i</th>
<th>Systems</th>
<th>Power7*</th>
<th>Redbooks*</th>
<th>WebSphere*</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIX*</td>
<td>FICON*</td>
<td>IMS</td>
<td>PowerHA</td>
<td>zEnterprise*</td>
</tr>
<tr>
<td>BladeCenter*</td>
<td>IBM*</td>
<td>InfiniBand</td>
<td>Power Systems</td>
<td>z/OS*</td>
</tr>
<tr>
<td>CICS*</td>
<td>IBM (logo)*</td>
<td>Lotus*</td>
<td>Power/VM</td>
<td>z/VSE*</td>
</tr>
<tr>
<td>Cognos*</td>
<td>GDPS*</td>
<td>MQSeries*</td>
<td>System x*</td>
<td>z/VM*</td>
</tr>
<tr>
<td>DataPower*</td>
<td>Geographically Dispersed Parallel Sysplex</td>
<td>Parallel Sysplex*</td>
<td>System z*</td>
<td></td>
</tr>
<tr>
<td>DB2*</td>
<td>HiperSockets</td>
<td>POWER*</td>
<td>PureSystems</td>
<td></td>
</tr>
<tr>
<td>DS8000*</td>
<td>HyperSwap</td>
<td>POWER4*</td>
<td>Rational*</td>
<td></td>
</tr>
</tbody>
</table>

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.

IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency which is now part of the Office of Government Commerce.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

Windows Server and the Windows logo are trademarks of the Microsoft group of countries.

ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Java and all Java based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.

Oracle and Java are registered trademarks of Oracle and/or its affiliates.

Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license therefrom.

Linear Tape-Open, LTO, the LTO Logo, Ultrium, and the Ultrium logo are trademarks of HP, IBM Corp. and Quantum in the U.S. and other countries.

* Other product and service names might be trademarks of IBM or other companies.

Notes:

Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user’s job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.

IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.

All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions.

This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the products or services available in your area.

All statements regarding IBM’s future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.

Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geography.
Increased Performance & Availability

- Provides insight into the health and performance of z/VM and Linux
  - Rich collections of attributes monitor thresholds for z/VM and Linux best practices.
  - Reflex automation provides timely resolution and/or notification.
  - Lightweight visibility to the z/VM hypervisor, Linux OS, and Linux Log data in one tool.
  - Deep integration with Cloud and Smarter Infrastructure Suite integrating z/VM and Linux data to the Enterprise view (Cross platform workflow management).
  - Persistent Historical views allows management of real and virtual resources across peak periods and downtimes for clear view of resource usage and constraints.
IBM SCCM Key Capabilities

- **Usage Reporting** – collection of data directly from the Cloud infrastructure using hypervisor and OS collectors, gather data on cpu, memory, network, storage, VMs.

- **Rating / Pricing Models** – support for flexible rating of usage information to apply different pricing models to report costs of services consumed. Support of tiered pricing.

- **Financial Modelling** – what-if modelling allowing the analysis of existing costs, and how these can be changed with different billing models.

- **Multi-tenant Reporting** – supporting service providers, allowing the aggregate customer reporting of usage and cost to feed billing systems. (By customer, by project/account, by VM)

- **Cognos Reporting** – powerful and flexible reporting engine shipped with many template reports which can be used out of the box or easily customised to needs. Interactive reports allowing powerful graphing and drill down capabilities.

- **Executive Dashboards** – to provide easily consumable management level information in graphic and dashboard format.

- **Enterprise Collectors** – for collection of application specific usage data for applications such as ERP, SAP, DB’s application servers, Email, network flow collector etc. (requires Enterprise Edition).
Use IBM SmartCloud Cost Management Collectors on Any System

<table>
<thead>
<tr>
<th>Mainframe</th>
<th>CICS/IMS</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jobs Processed</td>
<td>Elapsed Time</td>
<td>Space Allocated</td>
</tr>
<tr>
<td>Steps Processed</td>
<td>CPU Time</td>
<td>Space Used</td>
</tr>
<tr>
<td>CPU Time</td>
<td>Transactions</td>
<td>Space Wasted</td>
</tr>
<tr>
<td>Equation Time</td>
<td>Input Messages</td>
<td>Migrated Datasets</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unix/Linux</th>
<th>Windows</th>
<th>Other OSs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU – ucpu, scpu</td>
<td>Elapsed Time</td>
<td>POWERVM</td>
</tr>
<tr>
<td>Seat Time</td>
<td>CPU Time</td>
<td>VMware</td>
</tr>
<tr>
<td>Images Activated</td>
<td>Kernal CPU Time</td>
<td>z/VM</td>
</tr>
<tr>
<td>Software Packages</td>
<td>User CPU Time</td>
<td>KVM</td>
</tr>
<tr>
<td>...</td>
<td>...</td>
<td>...</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>E-Mail Systems</th>
<th>Databases</th>
<th>Internet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Exchange</td>
<td>DB2</td>
<td>WebSphere HTTP</td>
</tr>
<tr>
<td>Lotus Notes</td>
<td>Oracle</td>
<td>Apache</td>
</tr>
<tr>
<td>Sendmail</td>
<td>SQL Server</td>
<td>Microsoft IIS</td>
</tr>
<tr>
<td></td>
<td>Sybase</td>
<td>...</td>
</tr>
</tbody>
</table>

**Partial List**

**Goal:** ANY usage file from ANY system!

Don’t see what you need here -> use the Universal Collector to meet your custom needs
Please fill out an evaluation!

Schedule:
1st Session: Wednesday 9:00-10:15 Bellini 2106
1st Repeat: Thursday 1:00-2:15 Titian 2201 A
2nd Repeat: No repeat

Abstract:
Understand how software vendors charge for virtualized environments!

Some great prizes to be won!

Complete your session evaluations online at www.SHARE.org/Orlando
Continue growing your IBM skills

ibm.com/training provides a comprehensive portfolio of skills and accelerators that are designed to meet all your training needs.

• Training in cities local to you - *where and when you need it, and in the format you want*
  • Use IBM Training Search to locate public training classes near to you with our five Global Training Providers
  • Private training is also available with our Global Training Providers

• Demanding a high standard of quality – *view the paths to success*
  • Browse Training Paths and Certifications to find the course that is right for you

• If you can’t find the training that is right for you with our Global Training Providers, we can help.
  • Contact IBM Training at dpmc@us.ibm.com

Complete your session evaluations online at www.SHARE.org/Orlando-Eval

8/15/2015 Session Number : 17360