IBM Wave Setup, Use Cases, and Experiences

Tuesday, August 11, 2015: 04:30 PM - 05:30 PM, Dolphin, Southern Hemisphere 3

Richard Young
Executive I.T. Specialist
IBM Systems Lab Services
Session Agenda

- IBM Wave Product Architecture
- Installation of IBM Wave for z/VM
  - ESM Considerations
- Authentication and Authorization
- Guest discovery and initialization for Wave
- z/VM System Management Use Cases
- Linux System Management Use Cases
  - Provisioning/Cloning
  - BMI (just a few words)
  - Live Guest Relocation
- Customize and Extend
Wave 1.2 Announcement Summary

• New enhancements
  – Reporting Improvements
    • Customized and scoped only to authorized role of resources
    • More data
    • Exportable
  – Support of RHEL 7 and SLES 12
    • All currently supported and serviced levels of RHEL and SLES can be managed by Wave

• Recent enhancements
  – Improved LDAP integration
  – Site specific configuration via PROFILE EXEC exit
  – EDEV Management of SCSI LUNs
    • Cloning, storage management, EDEV definitions
  – Provisioning across CPCs / Cross system cloning
  – Ext 4 support was added
  – Layer 2 support for BMI
  – Mixed case password support
  – Performance improvements
    • Autodetect processing
    • Reduced SMF record generation
Session Agenda

- IBM Wave Product Architecture
- Installation of IBM Wave for z/VM
  - ESM Considerations
- Authentication and Authorization
- Guest discovery and initialization for Wave
- z/VM System Management Use Cases
- Linux System Management Use Cases
  - Provisioning/Cloning
  - BMI (just a few words)
  - Live Guest Relocation
- Customize and Extend
Architecture

The architecture consists of three tiers

- Intuitive graphical interface as a Java application accessed via a browser
- Linux based server component
  - Typically only one (except if you have a test environment)
  - Single RPM installation
- Three z/VM service machines to interface with hypervisor
  - One per z/VM instance
  - Utilizes z/VM SMAPI
  - SMAPI interacts with the z/VM directory manager
Architecture - Basic

Linux based Wave Server

WAVEWRKC
WAVEWRKS
WAVEWRKL

SMAPI
DIRMAINT
RACF
Architecture – Multi CEC

• No requirement for z/VM single system image
Architecture Network Ports

- Linux based Wave Server
  - Port 3300
  - Port 80/443
  - Port 389 (LPAP)
  - Port 1952
  - Port 1953
  - Port 1954
  - NFS Ports

- Linux on System z Virtual Server
  - Port 22

- z/VM FTPSERVE
  - Port 20/21

- SMAPI
  - Port 44444

- DIRMAINT

- RACF
  - Port 3300
  - Port 80/443
  - Port 44444

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

- Model 9 alone for the Wave Server will likely run out of log space
- Implement a log rotation scheme for /var/log/WAVE
- Use an LVM, if you are unsure of your needs so you can dynamically grow the filesystem
Architecture of Persistent Changes

Persistent changes are generally accomplished via:

– User directory and **EXTENT CONTROL** changes via SMAPI and DIRMAINT
– System resource definition outside of SYSTEM CONFIG via:
  AUTOLOGx
    ACTPROF WAVEPARAM  – XAUTOLOG WAVEWRKS
    EDEVPROF WAVEPARAM  – Commands to define EDEVs
    GRNTPROF WAVEPARAM  – VSWITCH GRANTs
    LANPROF WAVEPARAM  – Virtual network definitions
    WAVEAUTR EXEC  – Called by AUTOLOG PROFILE EXEC
    PROFILE AUTOORIG  – Original PROFILE EXEC

– Other changes via shell scripts and EXECs against guests or system resources
Atypical environments

- Linux OS on dedicated disk or DEVNO mdisks are not supported for cloning. LUNs via EDEVs or Emulated FBA device work just fine.
- Not using Virtual switches, allocating directly to OSA devices, can be limiting
- Linux OS on SCSI LUNs via dedicated FCP is not currently supported for cloning by Wave
- Wave needs to update sudoers, if you push a copy or have centralized instance this must be accounted for
- Standard but potentially challenging
  - Locked down with security software
  - Security policies prohibiting things Wave requires
If you need a function Wave does not yet offer

Submit and RFE (Request for enhancement)

– You need a Developerworks userid

– Select the “Submit” tab
– Login

Complete your session evaluations online at [www.SHARE.org/Orlando-Eval](http://www.SHARE.org/Orlando-Eval)
Session Agenda

- **IBM Wave Product Architecture**
- **Installation of IBM Wave for z/VM**
  - ESM Considerations
- **Authentication and Authorization**
- **Guest discovery and initialization for Wave**
- **z/VM System Management Use Cases**
- **Linux System Management Use Cases**
  - Provisioning/Cloning
  - BMI
  - LGR
- **Customize and Extend**
Installation

• Obtaining the code
  – **ShopzSeries** – Full product, base level code (lead time required) (rpm file)
  – **FixCentral** – Fixpack updates (not full product, immediate download when entitled) (tar file update)
  – **You need both!**
  – **Always apply the latest fixpack and read the included readme file**

• Prepare
  – Read the product manuals and review requirements
  – Enable directory manager to work with IBM Wave
  – Enable SMAPI, and authorize the IBM Wave server to it
  – Prepare a Linux Server with documented prerequisites to host the IBM Wave Server
  – Enable Perform Toolkit to work with Wave
  – Have a plan for authentication and role authorizations
  – Ensure ports are open thru any firewalls that communications must traverse
Installation – Requisite Knowledge

• Knowledge Center

• Admin and Customization Guide

• User Guide and Reference

• z/VM DIRMAINT

• z/VM SMAPI
Installation

• FP10 Readme note
  – If making changes with Wave via SMAPI and making DIRMAINT changes via command line, Wave is saying to disable SMAPI
  – Example of LOHCOST_Enabled=0 is given
  – LOHCOST_Enabled= LOHCOST_DIRECTORY is recommend
  – Normally it is LOHCOST_DIRECTORY + LOHCOST_GROUP

  – The change is made to DMSSICNF COPY
  – The proper way is to perform a VMSES Localmod (See the service guide)
  – You will have to remove and reapply the Localmod if there is any service to DMSSICNF COPY
Installation Tips

• Ensure you have adequate space in the /var/log/WAVE directory on the Wave Server. Plan for some sort of log rotation
• LANG AMENG is required on the WAVEWRK service machines
• Important to consider IPTIMEOUT in layer 2 networking environments. Consider increasing from default, especially with environments that have idle servers.
• Apply VM65560 and VM65601
• Apply latest IBM Wave fixpack
• If using RACF, DIRMAINT requires RACF special per DIRMAINT publications. WAVEWRKx require RACF operations
• Use the sample WAVEWRKx directory entries as given. Modifying aspects such as reader class could cause failures
• Ensure you have no empty DIRMAINT extent control groups
Installation Tips

• Ensure you have adequate space in the `/var/log/WAVE` directory on the Wave Server. Plan for some sort of log rotation
• LANG `AMENG` is required on the WAVEWRK service machines
• Consider `IP_TIMEOUT` in layer 2 networking environments. Consider increasing from default, especially with environments that have idle servers. Most relevant before the “init for Wave process”
• Apply latest IBM Wave fixpack
• If using RACF, DIRMAINT requires RACF special per DIRMAINT publications. WAVEWRKx require RACF operations
• Use the sample WAVEWRKx directory entries as given. Modifying aspects such as reader class could cause failures
• Ensure you have no empty DIRMAINT extent control groups
Installation Tips

• Review SMAPI steps in product publications. Especially Appendix F if you are using an external security manager (ESM)
• Ensure DIRMAINT Tailoring and Admin Guide Appendix B has been reviewed and implemented
• Monitor operator console for ESM and other relevant messages during initial bring up
• Wave autodetect failure RSN 168 – check AUTHFOR CONTROL and CONFIGxx DATADVH files. Ensure the WAVEWRK user directory matches the product documentation exactly. For example, don’t change reader class.
• Using SSI, but not attaching storage to all members could cause problems during clone, as some DATAMOVE operations may execute on other members.
• Predefine the WAVEWRKx servers, especially in instances where you have an ESM (ie RACF) or are in an SSI
Installation Tips

• Be aware you will need to allow direct logon access to the WAVEWRKx servers as the product itself requires such access. Currently no provision for LOGON BY / surrogate authority
Installation

- SMAPI authorizations required
  - Wave service machines
  - Wave userid

```
VSMWORK1 AUTHLIST Z1  F 195  Trunc=195 Size=10 Line=0 Col=1 Alt=2

00000  **  Top of File  **
00001 DO.NOT.REMOVE
00002 MAINT
00003 VSMPROXY
00004 VSMWORK1
00005 WAVSMAPI
00006 VSMGUARD
00007 WAVEWRKC
00008 WAVEWRKS
00009 WAVEWRKL
00010 ZHCP
00011  **  End of File  **
```
Installation

- Dirmaint CONFIGxx DATADVH authorizations required for IBM Wave and SMAPI

```plaintext
CONFIGxx DATADVH Z1 F 80 Trunc=80 Size=16 Line=0 Col=1 Alt=0

00000 * * * Top of File * * *
00001 DISK_CLEANUP= YES
00002 ONLINE= IMMED
00003 RUNMODE= OPERATIONAL
00004 DVHDXD_FLASHCOPY_BEHAVIOR= 1
00005 ASYNCHRONOUS_UPDATE_NOTIFICATION_EXIT.TCP= DVHXNE EXEC
00006 ASYNCHRONOUS_UPDATE_NOTIFICATION_EXIT.UDP= DVHXNE EXEC
00007 ALLOW_ASUSER_NOPASS_FROM= VSMWORK1 *
00008 ALLOW_ASUSER_NOPASS_FROM= VSMWORK2 *
00009 ALLOW_ASUSER_NOPASS_FROM= VSMWORK3 *
00010 ALLOW_ASUSER_NOPASS_FROM= VSMGUARD *
00011 ALLOW_ASUSER_NOPASS_FROM= WAVSMAPI *
00012 ALLOW_ASUSER_NOPASS_FROM= WAVEW PKS *
00013 ALLOW_ASUSER_NOPASS_FROM= WAVEWKLS *
00014 ALLOW_ASUSER_NOPASS_FROM= WAVEWKLC *
00015 ALLOW_ASUSER_NOPASS_FROM= MIGMAINT *
00016 ALLOW_ASUSER_NOPASS_FROM= ZHCP *
00017 * * * End of File * * *
```
Installation

- Dirmaint AUTHFOR CONTROL authorizations for IBM Wave and SMAPI
IBM Wave Linux Installation

rgylxsp2: # rpm -ivh IBM-Wave-1.1.0.1.fp001.s390x.rpm
Preparing...

### [100%]

Detected suse-11.2
ibm java detected.
mysql-5.0.96 detected
nfs-kernel-server-1.2.3 detected
apache2-Prefork-2.2.12 detected
mysql-Max-5.0.96 detected

1:IBM-Wave
### [100%]

Initializing DB...
starting MySQL...
Creating MySQL privilege database...
Installing MySQL system tables...
OK

( Content omitted due to output size)
IBM Wave Linux Installation

*--------------------------------------*
| IBM Wave Installed successfully!    |
*--------------------------------------*
rgylxsp2: #
IBM Wave Fix Pack Installation

• Update to fixpack 10 (always update to the latest fixpack)
• tar –xvf IBM-Wave-1.1.0.10.tar
• Run doUpdate.sh script
• Answer prompts about IBM Wave service machines
IBM Wave fixpack installation

rgylxsp2:~/wavfp2/IBM-Wave-1.1.0.02 # ./doUpdate.sh
Detected suse-11.2
Stopping IBM-Wave Background Services...
Shutting down WAVEBackgroundServices... done
Stopping mysql...
Shutting down service MySQL done
stopping apache2...
Shutting down httpd2 (waiting for all children to terminate) done
Backing up old version files...
Checking levels and updates...
grep: /usr/wave/install/smVer: No such file or directory
Updating files...
Updated Wave Jar
IBM Wave fixpack installation

06/05/2014 23:38:46 com.CSL.WAVE.upgrade.Upgrader : WARNING: service machines update will recycle the IBM-WAVE service machines. Also make sure FTP access to the system is available.

06/05/2014 23:38:46 com.CSL.WAVE.upgrade.Upgrader : Would you like to update Service Machines at z/VM POKLBS1 (1.2.3.4)?

no

Restarting Background Services...

Starting WAVEBackgroundServices...
done

• You would only reply “no” above if you had previously applied the Fixpack to the Wave worker servers
• Pay special attention to the statement about FTP access. Ensure firewalls are not an issue.
Installation - Verifications

- Access SMAPI testing application from your browser
- Available after Wave rpm installation

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

- Java based SMAPI testing application
- Important to validate SMAPI setup
IBM Wave Linux Installation

- Access Wave homepage from browser
IBM Wave Linux Installation

- Initial login panel
- You make up the initial userid and password
- Note: The userid can NOT be deleted
IBM Wave Linux Installation

- Launch “Add New CPC” task from hardware viewer frame
IBM Wave Linux Installation

- Define New CPC
- Obtain CPUID from /proc/sysinfo or other source
IBM Wave Linux Installation

- CPC but no z/VM systems (LPARs) defined yet

Select A System from the Hardware View Panel

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
IBM Wave Linux Installation

- Launch the External Entity Manager
IBM Wave Linux Installation

• Predefine new system in the External Entity Manager
IBM Wave Linux Installation

- “Add New System” task
IBM Wave Linux Installation

- New System Definition
  - z/VM version
  - IP Address
  - Performance Machine
  - Dummy Region
  - Region Volume id
IBM Wave Linux Installation

- Auto-Detect Wizard

Welcome to the IBM Wave z/VM System Auto-Detect Wizard

IBM Wave will now begin the auto-detect process for the newly created z/VM System.

Auto-Detection is composed of the following steps:

- Define the IBM Wave Service Machines.
- Update various Directory Manager parameters.
- Scan the z/VM System for Virtual Machines, Virtual LANs, DASD Volumes and DASD Groups.
- Create a list of site-specific virtual machines for OS classification.

Press "Next" to continue, or "Cancel" to abort this action.

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
IBM Wave Linux Installation

- z/VM SMAPI userid for IBM Wave
- Be alert for mixed case passwords being enabled
IBM Wave Linux Installation

- If services machines did not exist, Wave would define and populate in non-RACF/SSI environment.
Installation - Verifications

```
netstat
VM TCP/IP Netstat Level 630 TCP/IP Server Name: TCPIP

Active IPv4 Transmission Blocks:

<table>
<thead>
<tr>
<th>User Id</th>
<th>Conn</th>
<th>Local Socket</th>
<th>Foreign Socket</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>--------</td>
<td>----------</td>
<td>--------------</td>
<td>----------------</td>
<td>-------</td>
</tr>
<tr>
<td>FTPSERVE</td>
<td>1014</td>
<td>*..FTP-C</td>
<td><em>..</em></td>
<td>Listen</td>
</tr>
<tr>
<td>INTCLIEN</td>
<td>1018</td>
<td>*..TELNET</td>
<td><em>..</em></td>
<td>Listen</td>
</tr>
<tr>
<td>PERFSVM</td>
<td>1005</td>
<td>*..81</td>
<td><em>..</em></td>
<td>Listen</td>
</tr>
<tr>
<td>WAVEWRKS</td>
<td>1003</td>
<td>*..1952</td>
<td><em>..</em></td>
<td>Listen</td>
</tr>
<tr>
<td>WAVEWRKC</td>
<td>1017</td>
<td>*..1954</td>
<td><em>..</em></td>
<td>Listen</td>
</tr>
<tr>
<td>WAVEWRKL</td>
<td>1030</td>
<td>*..1953</td>
<td><em>..</em></td>
<td>Listen</td>
</tr>
<tr>
<td>VSMREQIN</td>
<td>1025</td>
<td>*..44444</td>
<td><em>..</em></td>
<td>Listen</td>
</tr>
<tr>
<td>VSMEVSRV</td>
<td>1006</td>
<td>*..55555</td>
<td><em>..</em></td>
<td>Listen</td>
</tr>
</tbody>
</table>

Active IPv6 Transmission Blocks:

<table>
<thead>
<tr>
<th>User Id</th>
<th>Conn</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>--------</td>
<td>----------</td>
<td>--------</td>
</tr>
<tr>
<td>VSMREQI6</td>
<td>1007</td>
<td>Listen</td>
</tr>
</tbody>
</table>
```

- The Wave servers should report they are listening on the specified ports

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
IBM Wave Linux Installation

- Default device pool names shown
- You can’t change the names here, but you can create new ones later

Device Pools are used to store information about real devices (DASD, OSA, HIPER, FCP) accessible to the z/VM System. New devices which are found when scanning this z/VM System will be automatically added to the selected Device Pools.
IBM Wave Linux Installation

- Typically no need to change these values, unless you use RACF. In which case you would want to change to AUTOLOG2.
IBM Wave Linux Installation

- Review summary and launch the Auto-Detect process

![IBM Wave Linux Installation Diagram]
IBM Wave Linux Installation

- Initial scan may take a period of time to process all devices it can detect
- Online and offline storage devices will be processed
- Don’t “sense” devices you don’t intend to ever work with in order to reduce auto detect time. Exclude them from being sensed in SYSTEM CONFIG ahead of time.

z/VM System is in Auto-Detect status, processing 1036 update events. Please wait...
IBM Wave Installation

• Installation completed
Session Agenda

- IBM Wave Product Architecture
- Installation of IBM Wave for z/VM
  - ESM Considerations
- Authentication and Authorization
- Guest discovery and initialization for Wave
- z/VM System Management Use Cases
- Linux System Management Use Cases
  - Provisioning/Cloning
  - BMI
  - LGR
- Customize and Extend
ESM Installation Actions

'EXEC RAC PERMIT DIRMSAT2 CLASS(VMRDR) ACC(UPDATE) ID(WAVEWRKC)'
'EXEC RAC PERMIT DIRMSAT2 CLASS(VMRDR) ACC(UPDATE) ID(WAVEWRKS)'
'EXEC RAC PERMIT DIRMSAT2 CLASS(VMRDR) ACC(UPDATE) ID(WAVEWRKL)'
'EXEC RAC PERMIT DIRMSAT3 CLASS(VMRDR) ACC(UPDATE) ID(WAVEWRKC)'
'EXEC RAC PERMIT DIRMSAT3 CLASS(VMRDR) ACC(UPDATE) ID(WAVEWRKS)'
'EXEC RAC PERMIT DIRMSAT3 CLASS(VMRDR) ACC(UPDATE) ID(WAVEWRKL)'
'EXEC RAC PERMIT DIRMSAT4 CLASS(VMRDR) ACC(UPDATE) ID(WAVEWRKC)'
'EXEC RAC PERMIT DIRMSAT4 CLASS(VMRDR) ACC(UPDATE) ID(WAVEWRKS)'
'EXEC RAC PERMIT DIRMSAT4 CLASS(VMRDR) ACC(UPDATE) ID(WAVEWRKL)'

'EXEC RAC PERMIT DIAG088 CLASS(VMCMD) ACC(READ) ID(WAVEWRKC)'
'EXEC RAC PERMIT DIAG088 CLASS(VMCMD) ACC(READ) ID(WAVEWRKS)'
'EXEC RAC PERMIT DIAG088 CLASS(VMCMD) ACC(READ) ID(WAVEWRKL)'

'EXEC RAC PERMIT WAVEWRKS CLASS(VMBATCH) ACC(CONTROL) ID(FTPSERVE)'
'EXEC RAC PERMIT AUTOLOG2.191 CLASS(VMMDISK) ACC(ALTER) ID(WAVEWRKS)'

'EXEC RAC PERMIT WAVEWRKS.191 CLASS(VMMDISK) ACC(ALTER) ID(VMADMINS)'
'EXEC RAC PERMIT WAVEWRKS.191 CLASS(VMMDISK) ACC(ALTER) ID(MAINT)'
'EXEC RAC PERMIT WAVEWRKS.399 CLASS(VMMDISK) ACC(ALTER) ID(VMADMINS)'
'EXEC RAC PERMIT WAVEWRKS.399 CLASS(VMMDISK) ACC(ALTER) ID(MAINT)'

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

'EXEC RAC PERMIT AUTOLOG1.191 CLASS(VMMDISK) id(WAVEWRKS) acc(alter)'
'EXEC RAC PERMIT AUTOLOG2.191 CLASS(VMMDISK) id(WAVEWRKS) acc(alter)'
'EXEC RAC PERMIT DIRMAINT.1DF CLASS(VMMDISK) id(WAVEWRKS) acc(read)'
'EXEC RAC PERMIT WAVEWRKS.191 CLASS(VMMDISK) id(WAVEWRKL) acc(read)'
'EXEC RAC PERMIT WAVEWRKS.191 CLASS(VMMDISK) id(WAVEWRKC) acc(alter)'
'EXEC RAC PERMIT WAVEWRKS.399 CLASS(VMMDISK) id(WAVEWRKS) acc(alter)'
'EXEC RAC PERMIT WAVEWRKS.399 CLASS(VMMDISK) id(WAVEWRKL) acc(alter)'
'EXEC RAC PERMIT WAVEWRKS.399 CLASS(VMMDISK) id(WAVEWRKC) acc(alter)'

'EXEC RAC RALT VMMDISK WAVEWRKS.399 UACC(READ)'
'EXEC RAC ALU WAVEWRKC OPERATIONS'

'EXEC RAC RDEFINE VMXEVENT USERSEL.WAVEWRKS'
'EXEC RAC RALT VMXEVENT USERSEL.WAVEWRKS ADDMEM(FOR.C/NOCTL FOR.G/NOCTL)
'EXEC RAC SETEVENT REFRESH USERSEL.WAVEWRKS'

'EXEC RAC RDEFINE VMXEVENT USERSEL.WAVEWRKC'
'EXEC RAC RALT VMXEVENT USERSEL.WAVEWRKC ADDMEM(FOR.C/NOCTL FOR.G/NOCTL)
'EXEC RAC SETEVENT REFRESH USERSEL.WAVEWRKC'

'EXEC RAC RDEFINE VMXEVENT USERSEL.WAVEWRK1'
'EXEC RAC RALT VMXEVENT USERSEL.WAVEWRK1 ADDMEM(FOR.C/NOCTL FOR.G/NOCTL)
'EXEC RAC SETEVENT REFRESH USERSEL.WAVEWRK1'

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Post Install Setup Actions

- Creating User Defined Groups
- Define Authentication mechanisms, role authorizations, and additional userids
- Define External Entities
- Review/Modify Device Pools
- Assign device pools to storage controllers
- Evaluate IPTTimeout for Layer 2 environment
- Init for Wave the guest that will be managed
Adding user defined groups

- Right mouse to define the name of a new user defined group
- Groups and projects are a point of access control
Adding External Entities

• z/VM instances, Storage Controller instances, routers and z/OS instances can be defined here. z/VM entities are required and part of the early setup process
• Storage Controller entities help in the visualization of the storage. Define one for each storage subsystem
Device Pools

- Changing names requires add, reassign, then delete, there is no rename
- Assign default virtual devices
Device Pools - DASD

Set default virtual device and review device:system associations
Device Pools - DASD

- You can associate a storage controller that you have defined in the “External Entities Manager” with a device pool
- As shown, DS8K1 is associated with this DASD device pool
Device Pools – FCP

- The process for FCP devices is similar to DASD devices
- Consider separate FCP pools for SSI/LGR systems to reserve relocation ranges
IP Timeout in Layer 2 environments

```
q vswitch net172a
VSWITCH SYSTEM NET172A  Type: QDIO   Connected: 13  Maxconn: INFINITE
PERSISTENT  RESTRICTED  ETHERNET   Accounting: OFF
USERBASED
VLAN Aware  Default VLAN: 0100  Default Porttype: Access  GVRP: Enabled
Native VLAN: 0001  VLAN Counters: OFF
MAC address: 02-1B-00-00-00-01  MAC Protection: Unspecified
IPTimeout: 5  QueueStorage: 8
Isolation Status: OFF  VEPA Status: OFF
Uplink Port:
State: Ready
PMTUD setting: EXTERNAL  PMTUD value: 8992
RDEV: 0147.P00 VDEV: 0600  Controller: DTCVSW2  ACTIVE
EQID: 456
Ready; T=0.01/0.01 07:15:27
```

- Use DEFINE LAN, DEFINE VSWITCH, SET LAN, SET VSWITCH IPTIMEOUT parameter to set duration to the desired value
Session Agenda

• IBM Wave Product Architecture
• Installation of IBM Wave for z/VM
  – ESM Considerations
• Authentication and Authorization
• Guest discovery and initialization for Wave
• z/VM System Management Use Cases
• Linux System Management Use Cases
  – Provisioning/Cloning
  – BMI
  – LGR
• Customize and Extend
Authentication and Authorization

- Authentication
  - LDAP/AD
  - Internal DB
  - Both
- Ability to group users in LDAP
- Ability to authorize by project
- Authorization via four different scope types
Authentication and Authorization

- LDAP is optional
- Used for authentication
- LDAP groups are optional
- Can have a mixture of LDAP and non-LDAP userids

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

- Users managed via administrative menu
Authentication and Authorization

- User management
- Can not change a logged on user
- Can not delete a user, but you can deactivate/suspend
## Authentication and Authorization

- **User management**

### Some of the active IBM Wave Users are super users

<table>
<thead>
<tr>
<th>Name</th>
<th>WA</th>
<th>SLA</th>
<th>NA</th>
<th>Status</th>
<th>Description</th>
<th>Created By</th>
<th>Created On</th>
<th>Modified By</th>
<th>Modified On</th>
<th>Lo...</th>
<th>IAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>alain</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Active</td>
<td></td>
<td>ryoun5</td>
<td>2014-03-04 14...</td>
<td>ryoun5</td>
<td>2014-03-04 14...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLIUser</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Active</td>
<td></td>
<td>WAVEinit</td>
<td>2007-12-13 13...</td>
<td>WAVEinit</td>
<td>2009-09-04 07...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>marian</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Active</td>
<td>Marian</td>
<td>ryoun5</td>
<td>2014-03-04 14...</td>
<td>ryoun5</td>
<td>2014-03-06 05...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ryoung1</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Active</td>
<td></td>
<td>WAVEinit</td>
<td>2014-03-04 13...</td>
<td>WAVEinit</td>
<td>2014-05-01 09...</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="mailto:ryoung1@us.ibm.com">ryoung1@us.ibm.com</a></td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Active</td>
<td></td>
<td>WAVEinit</td>
<td>2014-04-03 09...</td>
<td>ryoung1</td>
<td>2014-04-03 10...</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ryoung2</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Active</td>
<td></td>
<td>ryoun5</td>
<td>2014-03-04 14...</td>
<td>ryoun5</td>
<td>2014-03-04 14...</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

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

- Basic user attributes
  - User Status
Authentication and Authorization

- User type controls admin access
Authentication and Authorization

- Overview of scope and permissions
- Full access shown
- No one specific read only setting

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

- There are fine grained controls for authorizations by project
- Operational and configuration permissions can be controlled
Authentication and Authorization

- Permissions to work with DASD by Group
- Not all functions shown, as some functions are for admins

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

- Since permissions are given to device pools, you should setup device pools before you define users authorizations if you need pool granularity.
Authentication and Authorization

- Group controls are LDAP based
- Same permission controls as for individual users

LDAP Group based Scope and Permission assignment is not in use
Session Agenda

• IBM Wave Product Architecture
• Installation of IBM Wave for z/VM
  – ESM Considerations
• Authentication and Authorization
• **Guest discovery and initialization for Wave**
• z/VM System Management Use Cases
• Linux System Management Use Cases
  – Provisioning/Cloning
  – BMI
  – LGR
• Customize and Extend
Discovery and Initialization

- Guest discovery is automatic (on demand updates possible). Directory reprocessed on regular intervals
- Pre-existing guests and changes automatically picked up
- Pre-existing guests can be as fully managed as newly created guests
- Network and storage resources also periodically scanned and refreshed, so updates outside of IBM Wave are automatically learned by IBM Wave
- “Init for IBM Wave”
  - Stores detailed information about the guest in the Wave database and prepares it to work with Wave
Initialize guest for Wave management

- Required packages on managed Linux guest
  - cmsfs
  - vmcp
- Required access
  - A user with root level privilege via ssh
- IP must be visible on the network.
  - Apply **VM65560** and **VM65601**
  - Define `vswitch IPTIMEOUT` value up to 4 hours, in layer 2 networking environments
- Can NOT clone an uninitialized guest
- Can perform some levels of management on an uninitialized guest
Initialize a Guest

- Minimally must set Linux OS
Initialize for IBM Wave

- After OS is set to Linux, Penguin icon shown, warning message appears that guest is not initialized for IBM Wave
Initialize for IBM Wave

- Init action is under the “More Actions” submenu
Initialize for IBM Wave

- Can use root, or another user with root privileges
- Can use password or public key authentication

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Initialize for IBM Wave

- Task performed are detailed in BTS work unit for init action
Initialize for IBM Wave

- Virtual server successfully initialized
Session Agenda

- IBM Wave Product Architecture
- Installation of IBM Wave for z/VM
  - ESM Considerations
- Authentication and Authorization
- Guest discovery and initialization for Wave
- z/VM System Management Use Cases
- Linux System Management Use Cases
  - Provisioning/Cloning
  - BMI
  - LGR
- Customize and Extend
Key functions added in 2014

– EDEV/WWPN Management
  • Previously supported use of EDEV disks but did not allow you to define them from Wave
  • Now you can define the WWPN / LUN as an EDEV to z/VM from Wave

– Cross System Clone
  • Clone to another z/VM system that you may only have TCPIP network connectivity to.
  • Guest defined by Wave and disk copied from master image over the network to target z/VM

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
z/VM System Management

Network
• Add guest lan or vswitch
• Manage virtual network segments
• Visualize
• Draw new connection to a guest from a switch
• Perform actions on guests connected to a specific network

Storage
• Add/delete Extent Control group
• Execute Rexx against volume(s) or group
• Assign / unassign volume to group
• Define / undefine region
• Vary on/off storage device
• Attach/detach from/to system
• Mark/unmark as page/spool
• Add to system as page/spool
• Purge Spool
• More…

Guests management
• Add/remove
• Activate/deactivate
• Pause/resume
• Activate Default Guests
• Change memory/virtual CP assignment
• Change password
• Assign default system

Shutdown z/VM

Monitor
• Variety of CPU, Memory, Page, Spool metrics

Reporting
• z/VM CPC, System, User reports
• z/VM Guest Lan, Vswitch, Connection
• z/VM Prototype, DASD Group, Volume
• Flagged Objects
• Wave users and permissions

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Resource Monitoring High Level Data

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Storage Volume Drill Down

[Image of two open windows displaying storage volume information, including Volser, Device Type, Size, Free, and Real Address details.]

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Monitoring CPU Drill Downs
Monitoring Memory Drill Down

Virtual to Real Utilization Statistics

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Ratio Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Real Memory</td>
<td>34816M</td>
<td></td>
</tr>
<tr>
<td>Total Virtual Memory</td>
<td>26338M</td>
<td></td>
</tr>
</tbody>
</table>

Virtual Memory Utilization for All Guests - Last Updated: 15:59:51 EDT MONDAY 04/28/14

<table>
<thead>
<tr>
<th>Name</th>
<th>Type</th>
<th>Memory (MB)</th>
<th>VDisks (MB)</th>
<th>Total (MB)</th>
<th>% Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>HECLX003</td>
<td>CMS</td>
<td>4096</td>
<td>0</td>
<td>4096</td>
<td>15%</td>
</tr>
<tr>
<td>RGYLXWS8</td>
<td>Linux</td>
<td>4096</td>
<td>0</td>
<td>4096</td>
<td>15%</td>
</tr>
<tr>
<td>RGYLXNO1</td>
<td>Linux</td>
<td>4096</td>
<td>0</td>
<td>4096</td>
<td>15%</td>
</tr>
<tr>
<td>RGYLXSP3</td>
<td>Linux</td>
<td>2048</td>
<td>0</td>
<td>2048</td>
<td>7%</td>
</tr>
<tr>
<td>RGYLXSP2</td>
<td>Linux</td>
<td>2048</td>
<td>0</td>
<td>2048</td>
<td>7%</td>
</tr>
<tr>
<td>RGYLX001</td>
<td>Linux</td>
<td>2048</td>
<td>0</td>
<td>2048</td>
<td>7%</td>
</tr>
<tr>
<td>RGYLX002</td>
<td>Linux</td>
<td>2048</td>
<td>0</td>
<td>2048</td>
<td>7%</td>
</tr>
<tr>
<td>HUBLX002</td>
<td>CMS</td>
<td>1500</td>
<td>0</td>
<td>1500</td>
<td>5%</td>
</tr>
<tr>
<td>HECOX001</td>
<td>CMS</td>
<td>2024</td>
<td>0</td>
<td>2024</td>
<td>5%</td>
</tr>
<tr>
<td>HECOX001</td>
<td>CMS</td>
<td>2024</td>
<td>0</td>
<td>2024</td>
<td>5%</td>
</tr>
<tr>
<td>RGYLXVPN</td>
<td>Linux</td>
<td>1024</td>
<td>0</td>
<td>1024</td>
<td>3%</td>
</tr>
<tr>
<td>RGYLXSP3</td>
<td>Linux</td>
<td>1024</td>
<td>0</td>
<td>1024</td>
<td>3%</td>
</tr>
<tr>
<td>WAVERWC1</td>
<td>IBM Wave</td>
<td>32</td>
<td>0</td>
<td>32</td>
<td>0%</td>
</tr>
<tr>
<td>RGYLXMT</td>
<td>CMS</td>
<td>256</td>
<td>0</td>
<td>256</td>
<td>0%</td>
</tr>
<tr>
<td>WAVERWC1</td>
<td>IBM Wave</td>
<td>32</td>
<td>0</td>
<td>32</td>
<td>0%</td>
</tr>
</tbody>
</table>

Virtual Memory Usage Distribution (By Guest)

Virtual Memory Usage Distribution (By Type)

Include IBM Service Machines

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Monitoring Paging Drill Down

![Page Utilization Statistics](image)

- **Disk Usage**
  - VOLSER: P01P14, P01P13, P01P12, P01P11, P01P10, P01P0F
  - Real Dev: SF9E, SF9D, SF9C, SF9B, SF9A, SF99
  - Start Ext: 0, 0, 0, 0, 0, 0
  - End Ext: 10016, 10016, 10016, 10016, 10016, 10016
  - Total Pages: 1761000, 1761000, 1761000, 1761000, 1761000, 1761000
  - Pages In High Page: 75, 74, 110, 75, 75, 75
  - High Page Status: Active, Active, Active, Active, Active
  - % Used: 1%, 1%, 1%, 1%, 1%, 1%

- **Summary**
  - Unusable Pages, Usable Pages, Used Pages

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
z/VM Spool Management

- Utilizes SFPurger
- You select and execute the purge policy
- Policy would be on the maint 193 disk
Virtual Networking with IBM Wave

- Network topology visualized
- You can filter and customize the display

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Virtual Networking with IBM Wave

- Add a new virtual switch or guest lan
Virtual Networking with IBM Wave

• New virtual switch dialog
Virtual Networking with IBM Wave

• Drawing a new network connection
Virtual Networking with IBM Wave

- New connection dialog
- Does **NOT** make RACF calls for VMLAN

**Connect The Following Users to the virtual network**

<table>
<thead>
<tr>
<th>Name</th>
<th>System</th>
<th>New IP Address</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGYLXCL3</td>
<td>POKLBS1</td>
<td>9.12.22.2</td>
<td>Ready</td>
</tr>
</tbody>
</table>

**Select connection options**

- Connect through Virtual Network: NET9 (zVMVSwitch)
- Using VLAN ID: [ ]
- And Port Type: ACCESS

Waiting for user input

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Virtual Networking with IBM Wave

- Override default IP address selection for new connection

Connect The Following Users to the virtual network

<table>
<thead>
<tr>
<th>Name</th>
<th>System</th>
<th>New IP Address</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGYLXCL3</td>
<td>POKLBS1</td>
<td>9.12.22.21</td>
<td>Ready</td>
</tr>
</tbody>
</table>

Select connection options

- Connect through Virtual Network: NET9 (zVMVSwitch)
- Using VLAN ID: 
- And Port Type: ACCESS

Waiting for user input

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
IBM Wave Storage Management

- High level storage breakdown
IBM Wave Storage Management

- Storage groups
- Groups with no entries are NOT supported
IBM Wave Storage Management

- Volume list and storage tasks
Storage Map Visualized

- Storage resources of individual guest
- Dependent on external entity definitions and device pools
Storage Management - EDEVs

- You can now add/define SCSI/EDEV storage to z/VM
- Begin by clicking “Add Path”

- z/VM enabled for dynamic IO with HCD/HCM can only have EDEVs defined in the IOGEN and not via CP SET EDEV” In this case EDEVs are exclusively defined in the IOGEN
Storage Management - EDEVs

- Select the FCP device pool you wish to use
Storage Management - EDEVs

- Select the REAL FCP device from the pool
- The list of potential target WWPNs will be presented
- Note the comment at the bottom of the dialog
Storage Management - EDEVs

- Select the target WWPN and LUN
- Proper switch zoning and storage subsystem host definitions are important for security and performance
Storage Management - EDEVs

- Confirm the device add
- Repeat process to add more paths (highly recommended)
Storage Management - EDEVs

- Set your VOLSER and confirm you EDEV Address is unique
- The process for formatting the devices make take a little time depending upon its size
Storage Management - EDEVs

• Once the format is complete, you can perform all the tasks you would normally expect. You could add more paths, define region, add to an extent control group or whatever you wish.
Session Agenda

- IBM Wave Product Architecture
- Installation of IBM Wave for z/VM
  - ESM Considerations
- Authentication and Authorization
- Guest discovery and initialization for Wave
- z/VM System Management Use Cases
  - Provisioning/Cloning
  - BMI
  - LGR
- Linux System Management Use Cases
- Customize and Extend

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

• Operational and Life Cycle Functions
  – Activate
  – Deactivate
  – Recycle
  – Status
  – Pause
  – Resume
  – Send Message
  – Execute Script/Exec
  – Console Access
  – Clone or Install (including cross system)
  – SSI Live Guest Relocate
  – Lock/Unlock
  – Manage Storage
  – Change memory configuration
  – Change Virtual CPs
  – Activation System (Default home)
  – Activation Levels (ie Database, App Server, HTTP Server in sequence)

• Monitoring
  – Filesystem type, utilization, mount point
  – Process level details
  – Network Interface information
  – Routes
  – Reachability

• Project Assignment

• Classification

• Other
  – Add network connection
  – Disconnect an existing connection
  – IANs
Linux Scripts from IBM Wave

```
#!/bin/sh
hostname
```

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Linux Scripts from IBM Wave

![Linux Scripts from IBM Wave](image)

### Execute Selected Script on the following z/VM Users

<table>
<thead>
<tr>
<th>Name</th>
<th>System</th>
<th>User Name</th>
<th>Password</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGYLXWS8</td>
<td>POKLBS1</td>
<td>Default User</td>
<td>******</td>
<td>Ready</td>
</tr>
</tbody>
</table>

### With the following Execution Options:

- **Script Name**: /hoami
- **Script Parameters**: Debug Options None
- **Script Description**: `echo $hostname`
- **Created By**: ryang1 On 2014-04-30 10:55:53
- **Last Modified By**: ryang1 On 2014-04-30 10:55:53
Linux Script Execution and Output

Workunit Details

- Workunit Name: Execute Script on z/VM Guests
- Workunit Initiator: ryoung1
- Workunit Status: Done
- Workunit Duration: 2 seconds

BTS Requests

- Request Name: Execute Script WAVEInit.whoami ...
- Status: Done
- Progress: 100%

COR Entries

- Log COR
- Script COR

RGYLXWS8

WAVE_Information: WAVEInit.whoami finished with return code: 0
Manage Linux Storage

![Image of a GUI interface showing Linux file systems and storage management.

<table>
<thead>
<tr>
<th>Device</th>
<th>FS Type</th>
<th>Size (GB)</th>
<th>used (GB)</th>
<th>Free (GB)</th>
<th>Type</th>
<th>Storage Type</th>
<th>Mount Point</th>
<th>Status (Capacity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/dasda1</td>
<td>ext4</td>
<td>6.77</td>
<td>4.86</td>
<td>1.56</td>
<td>STD</td>
<td>DASD</td>
<td>/</td>
<td>71%</td>
</tr>
<tr>
<td>proc</td>
<td>proc</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>STD</td>
<td>DASD</td>
<td>/proc</td>
<td>0%</td>
</tr>
<tr>
<td>sysfs</td>
<td>sysfs</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>STD</td>
<td>DASD</td>
<td>/sys</td>
<td>0%</td>
</tr>
<tr>
<td>devpts</td>
<td>devpts</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>STD</td>
<td>DASD</td>
<td>/dev/pts</td>
<td>0%</td>
</tr>
<tr>
<td>tmpfs</td>
<td>tmpfs</td>
<td>1.90</td>
<td>0.00</td>
<td>1.90</td>
<td>STD</td>
<td>DASD</td>
<td>/dev/shm</td>
<td>0%</td>
</tr>
<tr>
<td>none</td>
<td>bincmbf</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>STD</td>
<td>DASD</td>
<td>/proc/sys/fs/bin...</td>
<td>0%</td>
</tr>
</tbody>
</table>
Manage Linux Storage

![manage linux storage screenshot](image-url)

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

Create New DASD Volume Group

- **Unit Specifications**
  - **DASD Allocation:** 1000 CYLS
  - **Storage Group:** LINUX (21.00 GB Free)

- **Volume Group Information**
  - **New VG Name:** VGTMP

[Image of the Create New DASD Volume Group dialog box]
Manage Linux Storage

Current Active LVM Volume Groups

<table>
<thead>
<tr>
<th>VG Name</th>
<th>Storage Type</th>
<th>Number of PPs</th>
<th>Total Size</th>
<th>Total Free</th>
</tr>
</thead>
<tbody>
<tr>
<td>VGTMP</td>
<td>DASD</td>
<td>1.68</td>
<td>0.68</td>
<td></td>
</tr>
</tbody>
</table>

Waiting for user input
Manage Linux Storage

![Image of a Linux storage management interface]

- **General Information**
  - z/VM Guest Name: RGYLXR64
  - z/VM System Name: POKLBS1
  - SDG Name: Richard

- **Linux File Systems**

- **Current Active File Systems on Server**
  - Device: /dev/dasda1, FS Type: ext4, Size (GB): 6.77, used (GB): 4.86, Free (GB): 1.56, Type: STD, Storage Type: DASD, Mount Point: /, Status (Capacity): 71%
  - proc, fsfs, devpts, tmpfs, and none are listed with similar details.

- **FCP / DASD Selection**
  - Please select the type of partition to add: DASD, FCP

---

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

![Create New DASD Partition](image)

- **DASD Allocation**: 500 MB (CKD)
- **Storage Group**: LINUX (20.30 GB Free)
- **Partition Definitions**
  - Standard Partition
  - LVM
- **VG Name**: VGTMP
- **LV Name**: LVTMP
- **File System Options**
  - **FS Type**: ext3
  - Mount on: /tmp
  - Add new filesystem to /etc/fstab

完成功能评估在线完成，访问 www.SHARE.org/Orlando-Eval
Manage Linux Storage

Workunit Details

- Workunit Name: Create New DASD Partition
- Workunit Initiator: ryoung1
- Workunit Status: Done
- Workunit Duration: 41 seconds

BTS Requests

- Add 300 MB (CKD) to Guest RGYLXR64(POKLBS1)
- Create New DASD Partition for z/VM Guest RGYLXR64 (POKLBS1)
- Create or Extend LVM Volume Group VGTMP for z/VM Guest RGYLXR64 (POKLBS1)
- Create or Extend LVM Logical Volume LVTMP for z/VM Guest RGYLXR64 (POKLBS1)
- Create New ext3 Filesystem for z/VM Guest RGYLXR64 (POKLBS1)
- Update Storage Aspects for z/VM Directory New Directory for POKLBS1(POKLBS1)

Status: Done
Progress: 100%

COR Entries

Select a BTS Request

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Manage Linux Storage – Added VG and LVM

Waiting for user input

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Linux Console/Shell Access

- User preference must be set in order to launch a shell session
- The application launched is NOT part of IBM Wave for z/VM

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
Linux Console/Shell Access

- The program location and variables must set to launch the terminal program you chose to use
Linux Console/Shell Access

- From any active Linux virtual server you can select either the 3270 console access or ssh/clc access.
- ssh will use a regular TCPIP connection to Linux OS, CLC does not. It requires TCPIP to z/VM only.
Linux Console/Shell Access

- You must provide credentials (could be key based)
- Provides easy navigation if you are in Wave to a shell session
Linux Console/Shell Access

- You must provide credentials (could be key based)
- Provides easy navigation if you are in Wave to a shell session
Session Agenda

- IBM Wave Product Architecture
- Installation of IBM Wave for z/VM
  - ESM Considerations
- Authentication and Authorization
- Guest discovery and initialization for Wave
- z/VM System Management Use Cases
- Linux System Management Use Cases
  - Provisioning/Cloning
  - BMI
  - LGR
- Customize and Extend
Virtual Server Provisioning

- Supports multiple disks in guest definitions
- Supports varied virtual device numbers (unlike other solutions)
- Supports one or multiple NICs
- Supports master images with logical volumes and multiple partitions (unlike other solutions)
- Can utilize Flashcopy via DIRMAINT configuration, it is not required, but it is very helpful, especially with large Linux master images
- No direct RACF influence, but that can be tailored via DIRMAINT CONFIGxx DATADVH and/or DVHXUN exit.
Provisioning

- Server must be “initialized for wave” and deactivated to clone
Provisioning

- Once deactivated, the clone task is available
Provisioning

- Assigned IP address can be overridden
Provisioning

Clone dialog

- Other optional configuration
- Allows for automation after cloning
Provisioning

- If you have a number of disk or guests to copy without a feature like flashcopy, you could tie up the SMAPI worker machines for extended periods.

- If you are in such a situation, it is recommended you add more SMAPI worker machines.
Provisioning

- If an ESM is managing the VMLAN class, VSWITCH grants are meaningless.
- An effective security strategy is important. You could manage access to switches via RACF groups and VMLAN class.
- Can grant access via guest security group assignment in DIRM user exits. Guest name prefix is just one option.

IBM Wave will not be able to grant access to the Virtual Networks listed below because the Virtual Networks are VLAN aware and the VNSs used for the connections do not have a default VLANID.

Virtual Network to VNS list that will need manual care:
- Virtual Network NET172A with VNS Auto-created Virtual Network Segment (172.110.100.0)

Press Continue to continue without IBM Wave issuing the grant command and add the grant manually.
Press Stop to stop the action.
Provisioning

- Select the storage group you prefer
- You can deploy multiple guests with similar characteristics at once
Provisioning

- Activate the new virtual server
Provisioning

- Attempting to start a VLAN interface (trunked is the default)
Provisioning

- New guest reports unreachable, because trunked guest access is not intended.
Provisioning

- Must select Trunk vs Access, it is not inherited from source image
Provisioning

• Newly cloned guest needs to be started
Provisioning - Completed

- New virtual server fully accessible
Provisioning - Completed

RGYLXCL3:~ # df -h
Filesystem    Size  Used  Avail  Use%  Mounted on
/dev/dasdal   5.0G  3.1G  1.7G   66%   /
udev           1001M 88K  1001M     1%   /dev
tmpfs          1001M  0   1001M     0%   /dev/shm
/dev/mapper/VGSYS-lvhome 97M  4.1M  88M   5%   /home
/dev/mapper/VGSYS-LVOPT   97M  4.1M  88M   5%   /opt
/dev/mapper/VGSYS-lvvar  485M 113M  347M  25%   /var
RGYLXCL3:~ # lsdasd
Bus-ID  Status   Name  Device  Type  BlkSz  Size  Blocks
---------------------------------------------------------------
0.0.0200 active   dasda  94:0   ECKD  4096 7041MB 1802700
RGYLXCL3:~ # pvs
PV   VG   Fmt  Attr  PSize  PFree
/dev/dasda2 VGSYS lvmm2 a--  1.88g  1.19g
RGYLXCL3:~ #
Session Agenda

- IBM Wave Product Architecture
- Installation of IBM Wave for z/VM
  - ESM Considerations
- Authentication and Authorization
- Guest discovery and initialization for Wave
- z/VM System Management Use Cases
- Linux System Management Use Cases
  - Provisioning/Cloning
  - BMI
  - LGR
- Customize and Extend
Bare Metal Installation

• For those opposed to cloning an alternative form of guest creation
• Still requires the use of z/VM
• Does not require a pre-existing master image
• “automates” transferring the 3 files to the reader needed to IPL the Linux installer image. No 3270 required!
• You need to load the Linux installation ISO images repository location in to IBM Wave
Bare Metal Installation

- You must begin by defining the Linux ISO repository
- This FTP server needs to be reachable over the network
Bare Metal Installation

- You can have multiple repositories
- The distribution and level are detected when defined.
- The install image/code does NOT transfer to the Wave server
Bare Metal Installation

- You need a guest container to install in to
- This could be a pre-existing Linux server you want to destroy and overwrite.
Bare Metal Installation

- The BMI install is wizard driven
Bare Metal Installation

- During the BMI install, only a single NIC is allowed, but that can be changed after installation.
- The service machine password is for WAVEWRKS. If you implement LOGON BY as the only means of logging on, you will need to make an exception here.
Bare Metal Installation

- You need to select the storage group/extent control pool that will be used for minidisk allocations. You are allowed only a single disk at this time, but you can adjust this later.
Bare Metal Installation

- The parmfile information is generated as shown below for the “installer” Linux to boot from

```
Bare Metal Installation

- The parmfile information is generated as shown below for the “installer” Linux to boot from

```

```
RGYLXCL9.INSTBASE:
ramdisk_size=65536 root=/dev/ram1 ro init=/linuxrc TERM=dumb Hostname=RGYLXCL9
nameserver=172.110.100.1 InstNetDev=osa OsaInterface=qdio OsaMedium=eth
Portname=NET172A layer2=1 reachchannel=0.0.0600 writechannel=0.0.0601
datchannel=0.0.0602 Portno=0 HostIP=172.110.100.47 Gateway=172.110.100.1
Netmask=255.255.255.0 Broadcast=172.110.100.255
install=http://root:zlinux@8.12.22.29/data/sles11-sp3/DVD1 Username=root
Password=zlinux UseSSH=1 SSHPassword=zlinux linuxrclog=/dev/console OSAHWADOR=

Complete your session evaluations online at www.SHARE.org/Orlando-Eval
```
Bare Metal Installation

- You will see the install is in progress, as shown below
- Next you will be prompted by a dialog that opens a shell
Bare Metal Installation

- Depending upon the distro you are installing, you will run different programs.
- The preceding Wave dialog provides the command to execute
Bare Metal Installation

- You can now proceed with business as usual installation of Linux.
- There was no need to logon to 3270 to accomplish this installation.
- VMRDR update access to the new server is required by WAVEWRKS, if using an ESM (like RACF).
Session Agenda

• IBM Wave Product Architecture
• Installation of IBM Wave for z/VM
  – ESM Considerations
• Authentication and Authorization
• Guest discovery and initialization for Wave
• z/VM System Management
• Linux System Management
  – Provisioning/Cloning
  – BMI
  – LGR
• Customizable and Extensible
• CLI Interface
IBM Wave and Live Guest Relocation

- Allows you to perform and visualize Live Guest Relocation under z/VM
- All the standard z/VM relocation rules apply
- Relocation task not available in the “Hardware View”
IBM Wave and Live Guest Relocation

- State before relocation, with ssh session
IBM Wave and Live Guest Relocation

- Initiating relocation
IBM Wave and Live Guest Relocation

- Relocation in progress
IBM Wave and Live Guest Relocation

- Relocation completed, ssh session maintained

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

• IBM Wave Product Architecture
• Installation of IBM Wave for z/VM
  – ESM Considerations
• Authentication and Authorization
• Guest discovery and initialization for Wave
• z/VM System Management Use Cases
• Linux System Management Use Case
  – Provisioning/Cloning
  – BMI
  – LGR
• Customize and Extend
Customizing and Extending

• Execs and Shell scripts to operate against virtual servers and resources such as disk volumes. Some possible execs:
  – Dynamically configure Linux virtual CPs on/off
  – Dynamically configure Linux memory on/off
  – Relabel a disk volume
  – Reassign system ownership of a volume
  – Format first n cyls (full volume format discouraged)
  – Flashcopy volumes
  – First boot scripts and first boot Execs
  – SMAPI Calls

• User Exits
  – WaveCloneConfigExit
  – WaveNetConfigExit
  – XVDSKOFF
  – XVDSKON

• Custom Attributes
Execs, Scripts, and Customizing Tips

• z/VM Execs
  – Primarily utilizes links to WAVEWRKS minidisk
  – Guest must be able to link to minidisk
• Linux shell scripts
  – Utilizes NFS server on Wave Server (or alternate NFS server)
  – Client must have NFS connectivity to the server
• Avoid writing long running Execs
  – They will timeout and report in error
  – They may tie up Wave Service Machines prevent other work from running
• Shell and Exec output captured in workunit, add commands to produce output that would add in debugging
Execs with IBM Wave

• Can be executed against individual objects or groups of objects
• Default location of Execs is WAVEWRKKS 399
• Exec output to BTW work unit COR tab
• Executed by WAVEWRKKS service machine
  – 60 second timeout
  – Never execute a long running Exec
• Test outside of IBM Wave before running under IBM Wave
Execs with IBM Wave

- Select multiple unlabeled volumes
Execs with IBM Wave

/*Rexx*/
trace o
Address COMMAND
Arg dasds .
'CP LINK MAINT 551 551 RR'
ACCESS 551 F
labelPrefix = 'LS'
    label = labelPrefix || dasds
    "CP detach " dasds " FROM SYSTEM 
    "CP detach " dasds USERID()
    "CP attach " dasds USERID()
Queue 'FORMAT'
Queue dasds
Queue '0 5'
Queue label
Queue 'YES'
Queue perm '0 END'
Queue 'END'
' CPFMTXA'
retVal = rc
"CP detach " dasds USERID()
Return retVal /* from formatOne */
Execs with IBM Wave

- Right mouse, More Actions, Execute Rexx
Execs with IBM Wave

- Check the parameters you want to pass
- No free form input

Execute REXX (5/5) Selected

REXX will terminate after one minute

REXX Parameters

REXX Name: ibls

Specify REXX Location

Owning Machine Name: Minidisk Address:

<table>
<thead>
<tr>
<th>Name</th>
<th>System</th>
<th>Parameters</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREE</td>
<td>POKLBS1</td>
<td>3F05</td>
<td>Ready</td>
</tr>
<tr>
<td>FREE</td>
<td>POKLBS1</td>
<td>3F06</td>
<td>Ready</td>
</tr>
<tr>
<td>FREE</td>
<td>POKLBS1</td>
<td>3F07</td>
<td>Ready</td>
</tr>
<tr>
<td>FREE</td>
<td>POKLBS1</td>
<td>3F08</td>
<td>Ready</td>
</tr>
<tr>
<td>FREE</td>
<td>POKLBS1</td>
<td>3F09</td>
<td>Ready</td>
</tr>
</tbody>
</table>

Complete your session evaluations online at
Execs with IBM Wave

- All 5 completed in 1 second
Execs with IBM Wave

- REXX COR tab contains output of Exec execution
Tips

- When applying a fixpack, always review the readme file first
- Clear the Java cache from the Windows Control Panel between each new level
- Remember that cloning is intended to be done with minidisks (ECKD or EDEV), no LUNs and not DEDICATED disks.
- DIRMAINT requires RACF Special
Thank you for attending

Richard G. Young
Executive I.T. Specialist
IBM STG Lab Services
Virtualization & Linux on zEnterprise Team Lead

IBM
777 East Wisconsin Ave
Milwaukee, WI 53202
Tel 262 893 8662
Email: ryoung1@us.ibm.com

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