Cloning WebSphere, DB2 and WebSphere MQ Series on Linux under z/VM

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Abstract

Creating WebSphere Application Server, DB2 and WebSphere MQ Series servers typically involves installing an operating system, then installing and configuring the software. The data associated with each solution also resides on the same server. When it is time to upgrade to a new release, each server must be upgraded individually. As the number of these types of servers increases, upgrading becomes cumbersome. This presentation describes how to install the middleware's executable files on virtual Linux servers under z/VM: call these the master servers. Other virtual servers can be cloned and configured to link the master servers' disks read-only: call these the clones. In this fashion the clones access the executables read-only while the application data is read-write. When a new version of middleware needs to be rolled out, it can be installed onto another set of disks on the masters for testing purposes. When that updated version of middleware is deemed acceptable, the clones can easily switch to the new level.

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Who am I?, who are you?

- Mike MacIsaac, mikemac@us.ibm.com
  - 20 years at IBM in NY
  - z/VM and Linux evangelist
  - Wrote much of *z/VM and Linux on IBM System z: The Virtualization Cookbook for SLES9*
- Who are you?
  - No Linux on zSeries?
  - Testing Linux/PoC?
  - Linux in production?
  - ==========
  - WebSphere Application Server in production on any platform?
  - DB2 in production?
  - MQ Series in production?

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Outline for the presentation

- Overview
- Roles
- Setting up a cloning infrastructure
  - z/VM
  - Linux
- WebSphere cloning
  - Installing on the "master"
  - Setting up a clone manually
  - Automating cloning
- DB2 cloning
  - Installing on the "master"
  - Setting up a clone manually
  - Automating cloning
- MQ Series cloning
  - Installing on the "master"
  - Setting up a clone manually
  - Automating cloning

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Overview: assumptions

- Discusses some IBM middleware products
  - WebSphere Application Server V6.0.2 (V6.1?)
  - DB2 V8.2
  - MQ Series V6.0
- Install binaries on a master server
- Link binaries R/O and create application data R/W on clones
  - WebSphere uses profiles
  - DB2 uses instances
  - MQ Series uses queue managers
- Use 2 disks on each of the masters
  - Production - stable version
  - Test - version.next
- Clones can alternate between production and test binaries

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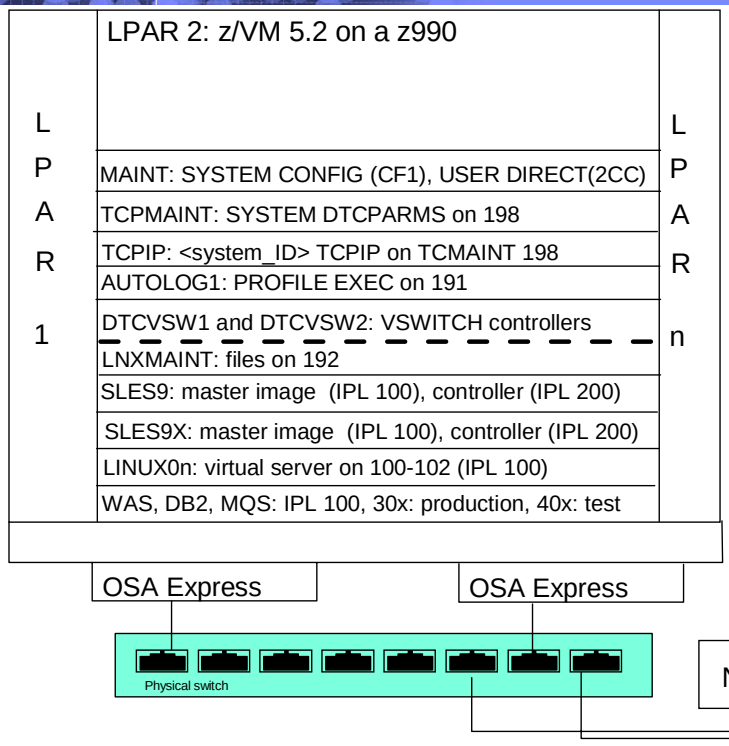

Overview: Infrastructure Block Diagram

For details see:
sessions 9216-7
Thurs@3:00 & 4:30
Room 321

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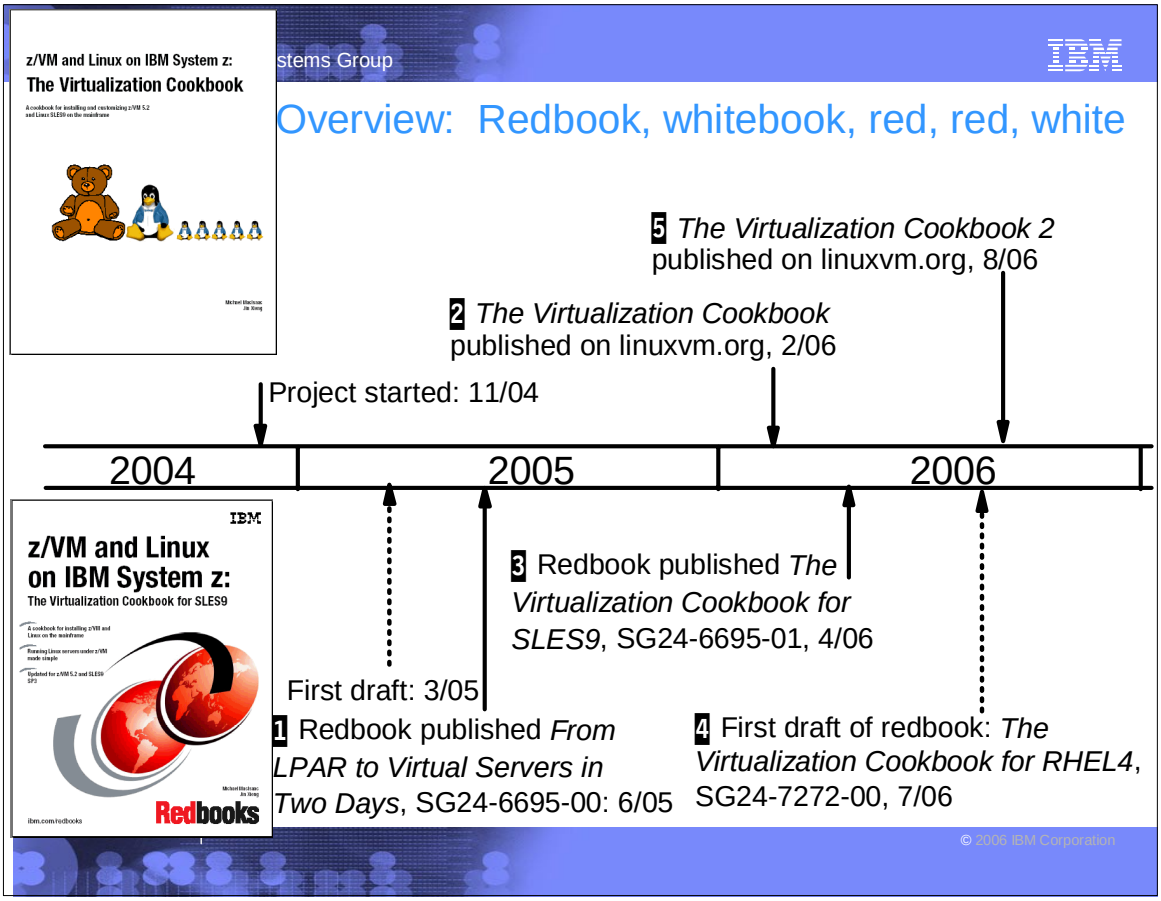

Overview: how to get it (let me count the ways :))

- Redbook version (SLES9 SP3, VM 5.2)
  - *z/VM and Linux on IBM System z: The Virtualization Cookbook for SLES9*
    - http://www.redbooks.ibm.com/abstracts/sg246695.html
  - Associated files:
    - ftp://www.redbooks.ibm.com/redbooks/SG246695/
- "Whitebook" version (about same as redbook)
  - *z/VM and Linux on IBM System z: The Virtualization Cookbook*
    - http://linuxvm.org/present/misc/virt-cookbook-1.pdf
  - Associated files
    - http://linuxvm.org/present/misc/virt-cookbook-1.tgz
- Redbook draft (RHEL4 U3, VM 5.2)
  - *z/VM and Linux on IBM System z: The Virtualization Cookbook for Red Hat Enterprise Linux 4*
    - http://www.redbooks.ibm.com/redpieces/abstracts/sg247272.html
  - Associated files
    - ftp://www.redbooks.ibm.com/redbooks/SG247272
- Whitebook-2 draft
    - http://linuxvm.org/present/misc/virt-cookbook-2.pdf
  - Associated files
    - http://linuxvm.org/present/misc/virt-cookbook-2.tgz

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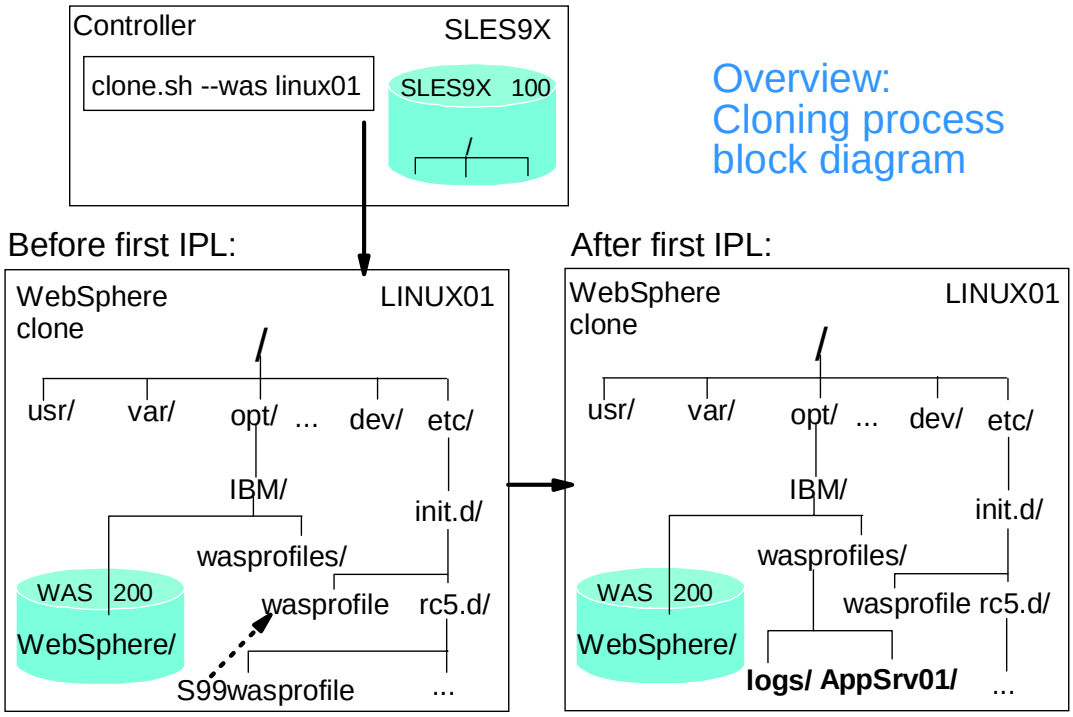
Overview: Cloning process block diagram



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Overview: User IDs, disks and mount points

Software	z/VM User ID of "master"	Important minidisks (production and test)	Mount point on clones
Linux	SLES9 or SLES9X	100-102: master image 200: controller	/sles9xmaster /
WebSphere	WAS	300 and 400	/opt/IBM/Websphere/
DB2	DB2	301 and 401	/opt/IBM/db2/
MQ Series	MQS	302 and 402	/opt/mqm/

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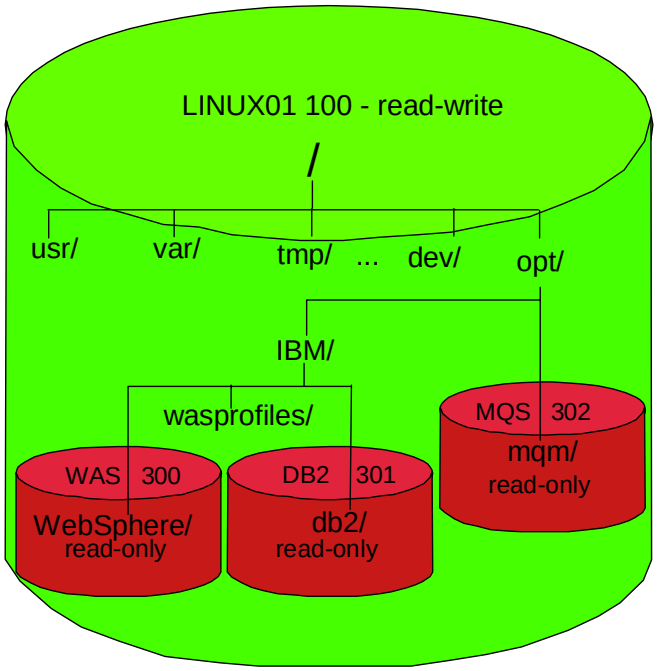
Overview: Cloned system block diagram



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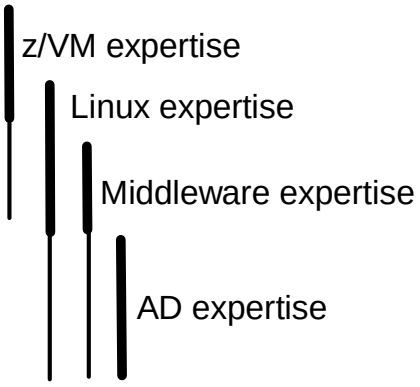
Roles

- Many possibilities
  - z/VM sysadmin (MAINT, etc)
  - z/VM Network admin (TCPMAINT)
  - Linux sysadmin (LNXMAINT, SLES9X, SLES9)
  - Middleware admins
    - WebSphere admin (WAS)
    - DB2 admin (DB2)
    - MQ Series admin (MQS)
  - Application owners
    - WebSphere (LINUXnn)
    - DB2 (LINUXnn)
    - MQ Series (LINUXnn)



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Setting up: z/VM

- Define 3 user IDs for masters

```
USER WAS      WAS     512M 1G G
  INCLUDE LNXDFLT
  OPTION APPLMON
  MDISK 100 3390 0001 3038 VMA78B MR LNX4VM LNX4VM LNX4VM
  MDISK 102 3390 3039 0300 VMA78B MR LNX4VM LNX4VM LNX4VM
  MINIOPT NOMDC
  MDISK 300 3390 0001 3338 VMA78C MR LNX4VM LNX4VM LNX4VM
  MDISK 400 3390 0001 3338 VMA78D MR LNX4VM LNX4VM LNX4VM
USER DB2      DB2     512M 1G G
  INCLUDE LNXDFLT
  OPTION APPLMON
  MDISK 100 3390 0001 3038 VMA78E MR LNX4VM LNX4VM LNX4VM
  MDISK 102 3390 3039 0300 VMA78E MR LNX4VM LNX4VM LNX4VM
  MINIOPT NOMDC
  MDISK 301 3390 0001 1669 VMA78F MR LNX4VM LNX4VM LNX4VM
  MDISK 401 3390 1670 1669 VMA78F MR LNX4VM LNX4VM LNX4VM
USER MQS      MQS     512M 1G G
  INCLUDE LNXDFLT
  OPTION APPLMON
  MDISK 100 3390 0001 3038 VMA790 MR LNX4VM LNX4VM LNX4VM
  MDISK 102 3390 3039 0300 VMA790 MR LNX4VM LNX4VM LNX4VM
  MINIOPT NOMDC
  MDISK 302 3390 0001 1669 VMA791 MR LNX4VM LNX4VM LNX4VM
  MDISK 402 3390 1670 1669 VMA791 MR LNX4VM LNX4VM LNX4VM
```

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Setting up: z/VM (cont'd)

- Define user IDs for clones

```
USER LINUX05 LNX4VM 512M 1G EG
  INCLUDE LNXDFLT
  OPTION APPLMON
  MDISK 100 3390 0001 3038 VMA788 MR LNX4VM LNX4VM LNX4VM
  MDISK 102 3390 3039 0300 VMA788 MR LNX4VM LNX4VM LNX4VM
  MINIOPT NOMDC
  LINK WAS 300 300 RR
  LINK WAS 400 400 RR
  LINK DB2 301 301 RR
  LINK DB2 401 401 RR
  LINK MQS 302 302 RR
  LINK MQS 402 402 RR
*
USER LINUX06 LNX4VM 512M 1G G
...
USER LINUX07 LNX4VM 512M 1G G
...
```

- Bring changes online
  - DISKMAP
  - DIRECTXA

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Setting up: Linux master image

- Set new clones to have Java, compat libraries and empty mount points
- Modify the master image with **chroot**:
  - Add RPMs

```
# chroot /sles9master/
# yast -i IBMJava2-JRE IBMJava2-SDK compat compat-32bit
...
```

  - Create mount points

```
# mkdir -p /opt/IBM/WebSphere /opt/IBM/db2 /opt/mqm
# exit
```

  - Could also be done *after* cloning
    - To keep all clones as lean as possible
- Clone a new Linux

```
# clone.sh WAS
```

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WebSphere cloning - installing the master

- Install WebSphere Network Deployment V6.0.2 on master image
  - SSH into new Linux running on WAS user ID
  - Activate minidisk 300, format, partition and make into file system:

```
# chccwdev -e 0.0.0300
# dasdfmt -b 4096 -y -f /dev/dasdd
# fdasd -a /dev/dasdd
```

  - Make into file system with label "was-prod"

```
# mke2fs -j -L was-prod /dev/dasdd1
```

  - Modify /etc/zipl.conf - add two new minidisks - run zipl

```
[ipl]
    target = /boot/zipl
    image = /boot/image
    ramdisk = /boot/initrd,0x1000000
    parameters = "root=/dev/dasda1 dasd=100-102,300,400 selinux=0 TERM=dumb elevator=cfq"
# zipl
```

  - Modify /etc/fstab - mount one minidisk (production)

```
/dev/dasda1          /                   ext3      acl,user_xattr        1 1
/dev/dasdb1          swap                swap      pri=42                0 0
/dev/dasdc1          swap                swap      pri=42                0 0
LABEL=was-prod       /opt/IBM/WebSphere  ext3      acl,user_xattr        0 0
devpts               /dev/pts            devpts    mode=0620,gid=5       0 0
...
```

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Installing the master WebSphere (cont'd)

- Reboot - new production disk should be mounted over /opt/IBM/WebSphere/

```
# reboot
# exit
... (new SSH session a minute later)
# mount | grep opt
/dev/dasdd1 on /opt/IBM/WebSphere type ext3 (rw,acl,user_xattr)
```

- Start VNC server for a graphical environment

```
# vncserver
```

- Install WebSphere V6 but don't create a profile (see book for details)
- Install RefreshPack 2 to get to V6.0.2
- Modify new wasprofile.properties file with r/w profiles directory

```
# cd /opt/IBM/WebSphere/AppServer/properties
# vi wasprofile.properties
...
WS_CMT_LOG_HOME=/opt/IBM/wasprofiles/logs
...
WS_PROFILE_REGISTRY=/opt/IBM/wasprofiles/properties
...
```

- Shutdown and logoff the master WebSphere system!
  - Don't write to file system that is R/O to clones
  - Save resources - especially memory

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Cloning WebSphere manually

- From the controller, clone a *vanilla* Linux

```
# clone.sh linux05
...
```

- SSH into new server and activate WebSphere production disk (300)

```
# chccwdev -e 0.0.0300
```

- Modify /etc/zipl.conf to access disks read-only and run zipl

```
...
[ipl]
    target = /boot/zipl
    image = /boot/image
    ramdisk = /boot/initrd,0x1000000
    parameters = "root=/dev/dasda1 dasd=100-102,300(ro),400(ro) selinux=0 TERM=dumb
...
# zipl
```

- Modify /etc/fstab to mount disks read-only

```
/dev/dasda1          /                    ext3       acl,user_xattr          1 1
/dev/dasdb1          swap                 swap       pri=42                  0 0
/dev/dasdc1          swap                 swap       pri=42                  0 0
LABEL=was-prod       /opt/IBM/WebSphere   ext2       ro,acl,user_xattr       0 0
devpts               /dev/pts             devpts     mode=0620,gid=5         0 0
proc                 /proc                proc       defaults                0 0
sysfs                /sys                 sysfs      noauto                  0 0
```

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Cloning WebSphere manually (cont'd)

- Mount new r/o file system

```
# mount /opt/IBM/WebSphere
# mount | grep opt
/dev/dasdd1 on /opt/IBM/WebSphere type ext2 (ro,acl,user_xattr)
```

- Reboot to test changes

```
# reboot
```

- Copy the wasprofile.properties file to the r/w /opt/IBM/wasprofiles/ directory

```
# cd /opt/IBM/wasprofiles
# mkdir properties
# cd properties
# cp /opt/IBM/WebSphere/AppServer/properties/wasprofile.properties .
```

- Add the WebSphere bin/ directory to the PATH

```
# cat /root/.bash_profile
export PATH=$PATH:/opt/IBM/wasprofiles/AppSrv01/bin
```

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Cloning WebSphere manually (cont'd)

- Create a script that is a wrapper around the wasprofile.sh command

```
# cat /usr/local/sbin/wasprofile
#!/bin/bash
HOST=`hostname -s`
/opt/IBM/WebSphere/AppServer/bin/wasprofile.sh \
-create \
-profileName AppSrv01 \
-profilePath /opt/IBM/wasprofiles/AppSrv01 \
-templatePath /opt/IBM/WebSphere/AppServer/profileTemplates/default \
-nodeName "$HOST"Node01 \
-cellName "$HOST"Node01Cell \
-hostName "$HOST".pbm.ihost.com
```

- Run the wasprofile script and view the resulting directory

```
# wasprofile
INSTCONFSUCCESS: Success: The profile now exists
# ls /opt/IBM/wasprofiles/AppSrv01
bin/     etc/         installableApps/  installedConnectors/  properties/  wstemp/
config/  firststeps/  installedApps/    logs/                 temp/
```

- Start the server

```
# startServer.sh server1
...
ADMU3000I: Server server1 open for e-business; process id is 1340
```

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Test WebSphere

- http://129.40.178.133:9080/snoop

Automating cloning of WebSphere

- Create new script in master image's services directory

```
# cd /sles9master/etc/init.d/
# cat wasprofile
#!/bin/bash
echo "$0 - Creating a WAS profile ..." | tee /tmp/wasprofile.log
host=`hostname -s`
domain=`hostname -d`
/opt/IBM/WebSphere/AppServer/bin/wasprofile.sh -create \
  -profileName AppSrv01 \
  -profilePath /opt/IBM/wasprofiles/AppSrv01 \
  -templatePath /opt/IBM/WebSphere/AppServer/profileTemplates/default \
  -nodeName ${host}Node01 \
  -cellName ${host}Node01Cell \
  -hostName ${host}.${domain}
echo "Return code from wasprofile.sh = $?" | tee -a /tmp/wasprofile.log
symlink="/etc/init.d/rc5.d/S99wasprofile"
if [ -h $symlink ]; then # remove symlink so script runs once
  rm $symlink
  echo "Removed symbolic link $symlink" | tee -a /tmp/wasprofile.log
fi
/opt/IBM/wasprofiles/AppSrv01/bin/startServer.sh server1 | \
  tee -a /tmp/wasprofile.log
...
```

- Create symbolic link

```
# cd rc5.d
# ln -s ../wasprofile S99wasprofile
```

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Automating cloning of WebSphere (cont'd)

- Add a function to the clone.sh script

```
#+-------------------------------------------------------------------------+
function clone_was()
#   Arg 1: Mount point of the newly cloned server
# Clone a WebSphere Application Server
#+-------------------------------------------------------------------------+
 {
  echo "Cloning WebSphere ..."
  echo "Modifying zipl.conf and running zipl ..."
  cd $1/etc
  cp zipl.conf zipl.conf.orig
  sed -i -e 's:dasd=100-102:dasd=100-102,300(ro),400(ro):g' zipl.conf
  chroot $1 zipl
  echo "Modifying fstab ..."
  cp fstab fstab.orig
  sed -i -e '4a LABEL=was-prod       /opt/IBM/WebSphere   ext2
    ro,acl,user_xattr     0 0' fstab
  echo "making symlink to /etc/init.d/wasprofile ..."
  cd $1/etc/init.d/rc5.d
  ln -s ../wasprofile S99wasprofile
  cd
 }
```

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Clone a WebSphere server with automation

- Use the **clone.sh** script with the **--was** flag

```
# clone.sh --was linux05
...
WARNING!!: this will copy 100 and 102 disks to LINUX01 100 and 102
New host name will be:  lat135.pbm.ihost.com
New TCP/IP address will be: 129.40.178.135
Other network data is retrieved from LINUX01 PARMFILE on 191 disk
A WebSphere system will be cloned
Are you sure you want to overwrite these disks (y/n): y
...
```

- Jump to the 3270 console after clone is XAUTOLOGed

```
...
/etc/init.d/rc5.d/S99wasprofile - Creating a WAS profile ...
Jun 22 12:33:13 lat133 kernel: eth0: no IPv6 routers present
INSTCONFSUCCESS: Success: The profile now exists.
Return code from wasprofile.sh = 0
Removed symbolic link /etc/init.d/rc5.d/S99wasprofile
ADMU0116I: Tool information is being logged in file
           /opt/IBM/wasprofiles/AppSrv01/logs/server1/startServer.log
ADMU0128I: Starting tool with the AppSrv01 profile
ADMU3100I: Reading configuration for server: server1
ADMU3200I: Server launched. Waiting for initialization status.
ADMU3000I: Server server1 open for e-business; process id is 2118
...
```

- Test WebSphere

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DB2 cloning

- Set up the DB2 master from the controller
  - Clone a vanilla server to the DB2 master user ID

```
# clone.sh db2
...
```

- SSH into the master
  - Configure minidisks 301 and 401 read/write
    - Enable - **chccwdev**
    - Format - **dasdfmt**
    - Partition - **fdasd**
    - Make a file system - **mke2fs -j -L <label>**
      - Labels are **db2-prod** and **db2-test**
  - Configure /etc/zipl.conf and /etc/fstab to mount db2-prod (301) disk over /opt/IBM/db2
  - Reboot to test changes

```
# mount | grep opt
/dev/dasdd1 on /opt/IBM/db2 type ext3 (ro,acl,user_xattr)
```

  - Start the VNC server
  - Install DB2 from a graphical environment (details in the book)
    - Don't create a DB2 instance
- Shut down the DB2 master

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Clone a DB2 server manually

- Clone a vanilla server to the target clone user ID

```
# clone.sh linux06
...
```

- SSH into new clone
  - Enable disk **db2-prod** read-only
    - Modify /etc/zipl.conf, /etc/zipl.conf, run zipl, reboot to test
  - Create DB2 users and groups
    - For the instance **db2inst1**

```
# groupadd db2grp1
# mkdir /tmp/noskel
# useradd -g db2grp1 -m -k /tmp/noskel db2inst1
# passwd db2inst1
```

    - For the DB2 fenced user **db2fenc1**
    - For the DB2 administration user **db2admn1**
  - Create an instance

```
# touch /home/db2inst1/.profile
# /opt/IBM/db2/V8.1/instance/db2icrt -u db2fenc1 db2inst1
DBI1070I Program db2icrt completed successfully.
```

  - Create an administrative user

```
# touch /home/db2admn1/.profile
# /opt/IBM/db2/V8.1/instance/dascrt db2admn1
...
```

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Test the DB2 server

- Change user to db2inst1, create a sample database and query it

```
# su - db2inst1
db2inst1> db2sampl
Connect to sample database query a table:
db2inst1> db2
...
db2 => connect to sample
 Database server        = DB2/LINUXZ64 8.2.0
 SQL authorization ID   = DB2INST1
 Local database alias   = SAMPLE

db2 => select * from staff where dept = 20

ID     NAME      DEPT   JOB   YEARS  SALARY    COMM
------ --------- ------ ----- ------ --------- ---------
    10 Sanders       20 Mgr        7  18357.50         -
    20 Pernal        20 Sales      8  18171.25    612.45
    80 James         20 Clerk      -  13504.60    128.20
   190 Sneider       20 Clerk      8  14252.75    126.50
...
```

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Automating cloning of DB2

- Create a script in master image's services directory

```
# cat /sles9master/etc/init.d/db2instance
#!/bin/bash
echo "Creating a DB2 instance ..." | tee /tmp/db2instance.log
mkdir /tmp/noskel            # create a DB2 instance user and group
groupadd db2grp1
useradd -g db2grp1 -m -k /tmp/noskel db2inst1
touch /home/db2inst1/.profile
groupadd db2fgrp1            # create a DB2 fenced user and group
useradd -g db2fgrp1 -m -k /tmp/noskel db2fenc1
groupadd db2agrp1            # create a DB2 administrative user and group
useradd -g db2agrp1 -m -k /tmp/noskel db2admn1
touch /home/db2admn1/.profile
/opt/IBM/db2/V8.1/instance/db2icrt -a SERVER -s ese -u db2fenc1 -p db2c_db2inst1 db2inst1
echo "Return code from db2icrt = $?" | tee -a /tmp/db2instance.log
/opt/IBM/db2/V8.1/instance/dascrt -u db2admn1
echo "Return code from dascrt = $?" | tee -a /tmp/db2instance.log
cp /opt/IBM/db2/V8.1/das/dasprofile /home/db2admn1/das
su - db2inst1 -c "db2iauto -on db2inst1"
echo "Return code from db2iauto = $?" | tee -a /tmp/db2instance.log
symlink="/etc/init.d/rc5.d/S98db2instance"
if [ -h $symlink ]; then # remove symlink so script runs once
  rm $symlink
  echo "Removed symbolic link $symlink" | tee -a /tmp/db2instance.log
fi
su - db2inst1 -c "db2start"
echo "Return code from db2start = $?" | tee -a /tmp/db2instance.log
```

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Automating cloning of DB2 (cont'd)

- Add a function to the clone.sh script

```
#+--------------------------------------------------------------------------+
function clone_db2()
#   Arg 1: Mount point of the newly cloned server
# Clone a DB2 Server
#+--------------------------------------------------------------------------+
 {
  echo "Cloning DB2 ..."
  echo "Modifying zipl.conf and running zipl ..."
  cd $1/etc
  cp zipl.conf zipl.conf.orig
  sed -i -e 's:dasd=100-102:dasd=100-102,301(ro),401(ro):g' zipl.conf
  chroot $1 zipl
  echo "Modifying fstab ..."
  cp fstab fstab.orig
  sed -i -e '4a LABEL=db2-prod       /opt/IBM/db2         ext2
    ro,acl,user_xattr     0 0' fstab
  echo "Modifying /etc/inittab"
  echo "fmc:2345:respawn:/opt/IBM/db2/V8.1/bin/db2fmcd #DB2 Fault Monitor Coordinator"\
    >> $1/etc/inittab
  echo "Making symlink to /etc/init.d/db2instance ..."
  cd $1/etc/init.d/rc5.d
  ln -s ../db2instance S98db2instance
  cd
 }
```

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Test DB2 automated cloning

- Clone a vanilla server to the target clone user ID

```
# # clone.sh --db2 linux06
...
WARNING!!: this will copy 100 and 102 disks to LINUX02 100 and 102
New host name will be:  lat136.pbm.ihost.com
New TCP/IP address will be: 129.40.178.136
Other network data is retrieved from LINUX02 PARMFILE on 191 disk
A DB2 system will be cloned
Are you sure you want to overwrite these disks (y/n): y
...
```

- SSH into new clone
  - View the log file

```
# cat /tmp/db2instance.log
Creating a DB2 instance ...
Return code from db2icrt = 0
Return code from dascrt = 0
Return code from db2iauto = 0
Removed symbolic link /etc/init.d/rc5.d/S98db2instance
Return code from db2start = 0
```

- Test DB2
- Test a reboot

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MQ Series cloning

- Set up the DB2 master from the controller
  - Clone a vanilla server to the MQ Series master user ID

```
# clone.sh mqs
...
```

- SSH into the master
  - Configure minidisks 302 and 402 read/write
    - Enable - **chccwdev**
    - Format - **dasdfmt**
    - Partition - **fdasd**
    - Make a file system - **mke2fs -j -L <label>**
      - Labels are **mqs-prod** and **mqs-test**
  - Configure /etc/zipl.conf and /etc/fstab to mount mqs-prod (302) disk over /opt/mqm
  - Reboot to test changes

```
# mount | grep opt
/dev/dasdd1 on /opt/mqm type ext3 (ro,acl,user_xattr)
```

  - Install MQ Series from RPMs

```
# rpm -ivh MQSeriesRuntime-6.0.0-0.s390.rpm MQSeriesSDK-6.0.0-0.s390.rpm
 MQSeriesServer-6.0.0-0.s390.rpm MQSeriesClient-6.0.0-0.s390.rpm
 MQSeriesSamples-6.0.0-0.s390.rpm MQSeriesJava-6.0.0-0.s390.rpm
...
```

- Shut down the MQ Series master

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Clone a MQ Series server manually

- Clone a vanilla server to the target clone user ID

```
# clone.sh linux07
...
```

- SSH into new clone
  - Enable disk **mqs-prod** read-only
    - Modify /etc/zipl.conf, run zipl, reboot to test
  - Create an MQ Series user and group

```
# groupadd mqm
# useradd -g mqm -d /var/mqm mqm
```

  - Create a .bash_profile in the mqm home

```
# cd /var/mqm
# vi .bash_profile
export PATH=$PATH:/opt/mqm/bin
```

- Test by creating an MQ Series queue manager

```
# su - mqm
$ crtmqm -q test.queue.manager
```

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Automating cloning of MQ Series (cont'd)

- Create a script in master image's services directory

```
# cat /sles9master/etc/init.d/mqmuser
#!/bin/bash
echo "Creating an MQ Series user ..." | tee /tmp/mqmuser.log
groupadd mqm
echo "Return code from groupadd = $?" | tee -a /tmp/mqmuser.log
useradd -g mqm -d /var/mqm mqm
echo "Return code from useradd = $?" | tee -a /tmp/mqmuser.log
chown -R mqm.mqm /var/mqm
echo "Return code from chown = $?" | tee -a /tmp/mqmuser.log
symlink="/etc/init.d/rc5.d/S97mqmuser"
if [ -h $symlink ]; then # symlink found - remove it so script runs once
  rm $symlink
  echo "Removed symbolic link $symlink" | tee -a /tmp/mqmuser.log
fi
```

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Automating cloning of MQ Series (cont'd)

- Add a function to the clone.sh script

```
#+--------------------------------------------------------------------------+
function clone_mqs()
# Clone a MQ Series Server
#+--------------------------------------------------------------------------+
 {
  echo "Cloning MQ Series ..."
  echo "Modifying zipl.conf and running zipl ..."
  cd $1/etc
  cp zipl.conf zipl.conf.orig
  sed -i -e 's:dasd=100-102:dasd=100-102,302(ro),402(ro):g' zipl.conf
  chroot $1 zipl
  echo "Modifying fstab ..."
  cp fstab fstab.orig
  sed -i -e '4a LABEL=mqs-prod       /opt/mqm      ext2    ro,acl,user_xattr     0 0' fstab
  echo "Making symlink to /etc/init.d/mqmuser ..."
  cd $1/etc/init.d/rc5.d
  ln -s ../mqmuser S97mqmuser
  cd
 }
```

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Test MQ Series automated cloning

- Clone a vanilla server to the target clone user ID

```
# clone.sh --mqs linux07
...
An MQ Series system will be cloned
Are you sure you want to overwrite these disks (y/n): y
...
Cloning MQ Series ...
...
```

- SSH into new clone
  - View the log file

```
#  cat /tmp/mqmuser.log
Creating an MQ Series user ...
Return code from groupadd = 0
Return code from useradd = 0
Return code from chown = 0
Removed symbolic link /etc/init.d/rc5.d/S97mqmuser
```

- Test MQ Series
- Test a reboot

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Live Demo!

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Resources

- The Linux for zSeries and S/390 portal
  - http://linuxvm.org/
- The linux-390 list server
  - http://www2.marist.edu/htbin/wlvindex?linux-390
- Linux for zSeries and S/390 developerWorks®
  - http://awlinux1.alphaworks.ibm.com/developerworks/linux390/index.shtml
- SUSE LINUX Enterprise Server 9 evaluation
  - http://www.novell.com/products/linuxenterpriseserver/eval.html
- Red Hat Enterprise Linux 4 evaluation
  - http://www.redhat.com/rhel/details/eval/
- z/VM publications
  - http://www.vm.ibm.com/pubs/
- z/VM performance tips
  - http://www.vm.ibm.com/perf/tips/

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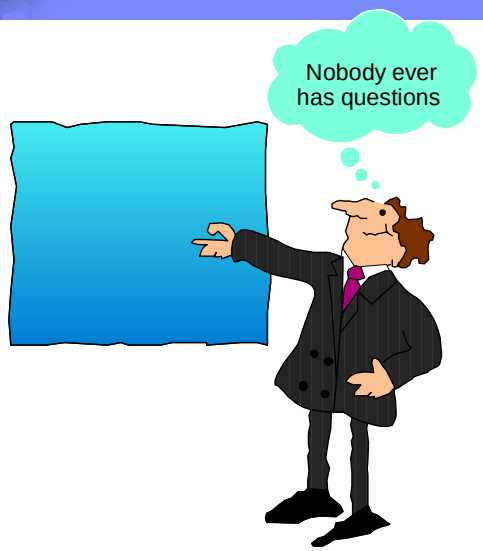
Questions - ???



- Mike's email: mikemac@us.ibm.com
- Whitebook: http://linuxvm.org/present/misc/virt-cookbook-2.pdf
- Associated files: http://linuxvm.org/present/misc/virt-cookbook-2.tgz
- This session: 1189/2954/9310

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