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The Cloud Computing Cookbook: The Linux Side

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IBM

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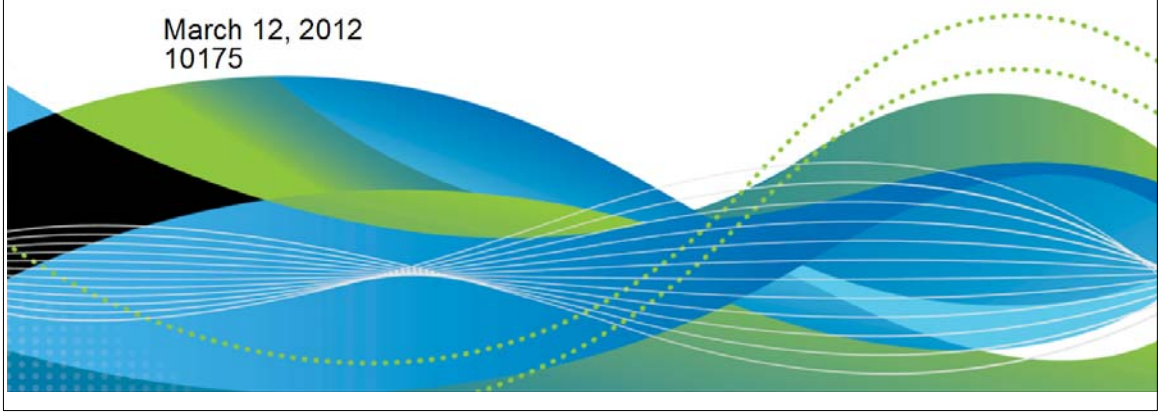
10175



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Abstract

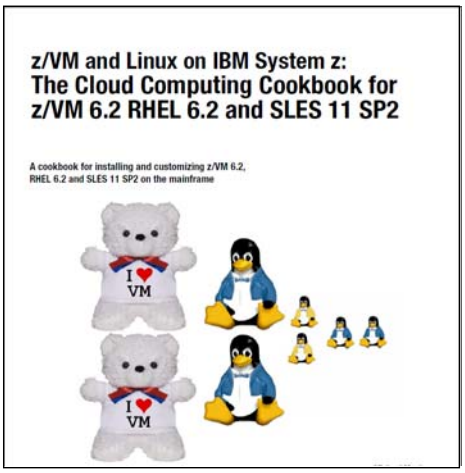
The "Virtualization Cookbook" for System z, usually in the form of a Redbook, has been a popular reference for many years. It has been updated for 2012 and renamed "The Cloud Computing Cookbook". This presentation will focus on the Linux systems. Both recent distributions, SLES 11 SP2 and RHEL 6.2 will be addressed. Many new sections of the book, including installing, configuring and using xCAT on System z will be covered. Session 10174, "The Cloud Computing Cookbook: The Hypervisor Side", focused on the Hypervisor end of the cloud. A live demo will be included.

Introductions

- Mike MacIsaac, mikemac@us.ibm.com
  - 25 years at IBM in NY
  - Programmer, z/OS USS, Redbook project lead
  - Marketing technical support of z/VM, Linux, IBM software, ...
  - z/VM development manager
  - Lab-based Services (New)
- Who are you?
  - Experience with z/VM and Linux:
    - z/VM?
    - Linux?
    - Other?
    - None of the abovehis book?
  - IT status:
    - Do you have Linux and z/VM in production?
    - In test?
    - Planning a proof of concept?
- Something you are hoping to get out of the next three days?

Overview

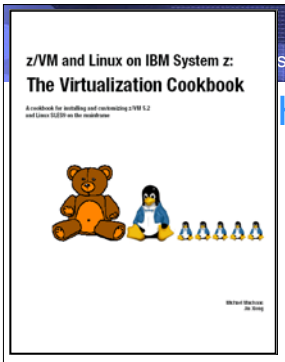
- The ***Virtualization Cookbooks*** and now the ***Cloud Computing Cookbook*** have always had the same goal in mind: to be a single source for installing and customizing z/VM, installing and customizing Linux, and getting to the point of cloning and making appliances of Linux virtual servers. Over the years, commonly used ***Miscellaneous Recipes*** have also been documented.



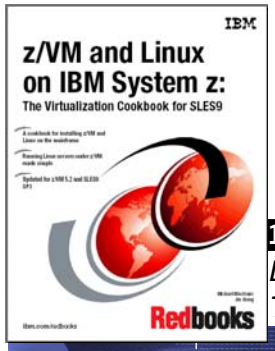
See: http://www.vm.ibm.com/devpages/mikemac/

Outline of current book

1. Introduction and z/VM - introduces z/VM 6.2, discusses planning, then installation and configuration into a two member SSI with z/VM 6.2.
2. ***RHEL 6.2 Linux*** - install, customizing and clone Red Hat Enterprise Linux (RHEL)
3. ***SLES 11 SP2*** Linux - install, customizing and clone SuSE Linux Enterprise Server (SLES)
4. ***Other topics*** - includes chapters on:
   a. Live Guest Relocation (LGR) between SSI members
   b. Configuring DirMaint and SMAPI
   c. **Monitoring z/VM and Linux**
   d. **Miscellaneous "recipes"**
   e. **xCAT - the eXtreme Cloud Administration Toolkit**
5. Appendices - includes references, cheat sheets and lists the source code



History of cookbooks



6,7 *The Virtualization Cookbook(s) for RHEL 5 and SLES 10*, **3/07**

5 *The Virtualization Cookbook 2* [1], **8/06**

2 *The Virtualization Cookbook*, **2/06**

Project started: 11/04

2004 | 2005 | 2006 | 2007

3 Redbook published *The Virtualization Cookbook for SLES9*, SG24-6695-01, **4/06**

4 Redbook: *The Virtualization Cookbook for RHEL4*, SG24-7272-00, **9/06**

1 Redbook published *From LPAR to Virtual Servers in Two Days*, SG24-6695-00: 6/05

[1] includes middleware cloning

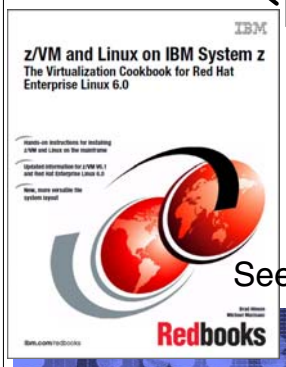
istory of books (cont'd)

See: http://www.vm.ibm.com/devpages/mikemac/

12 *The Cloud Computing Cookbook for z/VM 6.2, RHEL 6.2 and SLES 11 SP2*, **1/12**

9 *The Virtualization Cookbook for SLES 11*, **2/10**

2008 | 2009 | 2010 | 2011



8 Redbook: *The Virtualization Cookbook for SLES 10 SP2*[2], **10/08**

10 Redbook: *The Virtualization Cookbook for SLES 11 SP1*, **1/11**

11 Redbook: *The Virtualization Cookbook for RHEL 6*, **2/11**

See: http://www.redbooks.ibm.com/

[2] includes travelling /home

Changes in the Jan 1, 2012 book

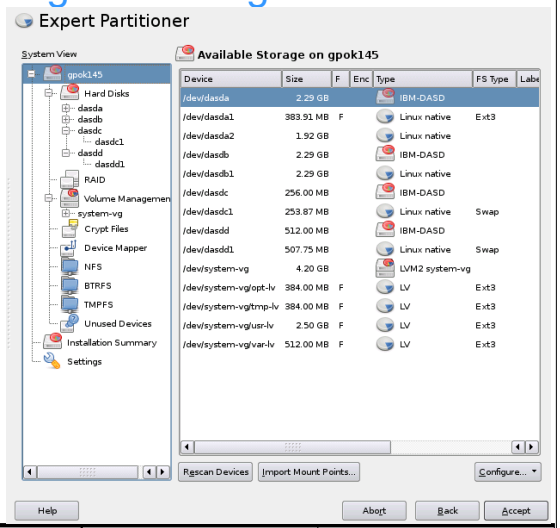
- *z/VM and Linux on IBM System z: The Cloud Computing Cookbook for z/VM 6.2 RHEL 6.2 and SLES 11 SP2* has many new sections:
  - z/VM sections are updated for 6.2 with a two member SSI setup
  - Linux sections are updated for both RHEL 6.2 and SLES 11 SP2, combined in one book
  - NFS-exported files are stored in /var/nfs/ rather than /nfs/ in keeping with Linux FHS
  - Use of both layer 2 and layer 3 virtual switches
  - VSWITCH authorization granted through COMMAND statements in user directory profile
  - Section on relabelling z/VM system volumes removed
  - New chapter (17) on Live Guest Relocation (LGR) between SSI members
  - New chapter (18) on how to install and configure z/VM's DirMaint and SMAPI
  - New chapter (21) on how to install and configure xCAT
  - New section (19.4) on how to install and configure sysstat on Linux
  - Title is buzzword compliant :))

Install and configure RHEL 6.2 on LNXADMIN

- Install the golden image (7.1)
  - Create the IDENTITY LNXADMIN
  - Set LNXADMIN to start at IPL time
  - Prepare the RHEL 6.2 bootstrap files
  - Install RHEL 6.2 Linux
  - Boot the new system from disk
- Configure the Linux administration system (7.2)
  - Copy RHEL 6.2 install tree/other files from PC to LNXADMIN
  - Configure yum
  - Turn off unneeded services
  - Configure the VNC server
  - Set system to halt on SIGNAL SHUTDOWN
  - Turn on NFS server
  - Configure SSH keys
  - Change order of swap disks
  - Insert vmcp module
  - Reboot/verify changes

Install and configure the RHEL 6.2 golden image

- Install the golden image
  - Create the RH62GOLD virtual machine
  - Prepare the RH62GOLD parameter files
  - Install RHEL 6.2 on the golden image
    - File system layout with LVMs
  - Verify the installation
- Configure the golden image
  - Configure automount of the install tree
  - Configure yum for online updates
  - Turn off unneeded services
  - Configure the VNC server
  - System to halt on SIGNAL SHUTDOWN
  - Configure SSH keys and boot time settings
  - Change the order of the swap disks
  - Reboot system and verify changes



Mount point§	Logical volume name§	Size§
/usr/§	**usr-lv§**	2.5 GB§
/var/§	**var-lv§**	512 MB§
/opt/§	**opt-lv§**	384 MB§
/tmp/§	**tmp-lv§**	384 MB§

Configure RHEL 6.2 for cloning

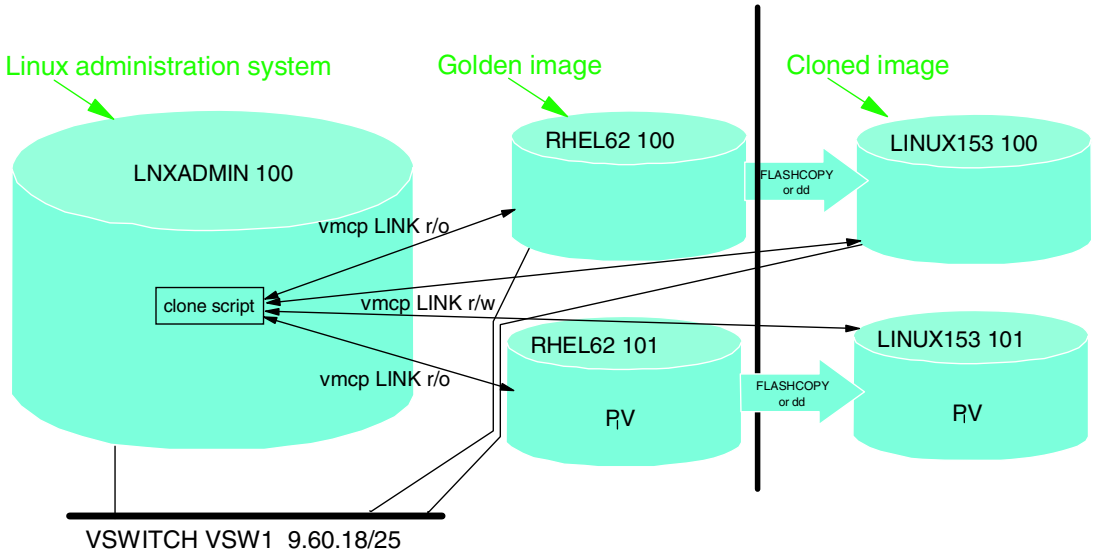
- Define two new virtual machines
- Clone a virtual server manually
- Clone a virtual server automatically
- Review system status

Tangent - virtualization terminology

- User ID
- Virtual machine
- Guest
- Container

Cloning Linux

- Cloning block diagram:

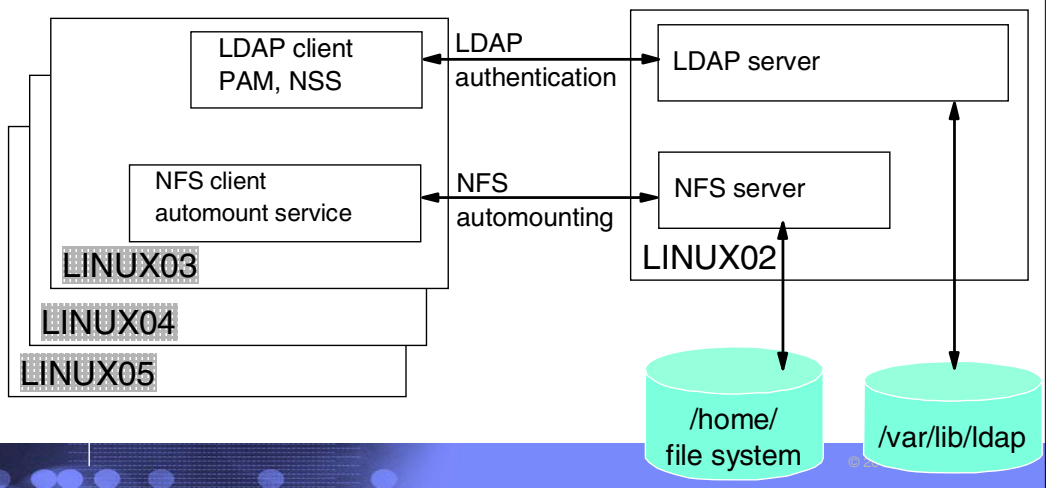


Install Linux with kickstart

- Configure the Linux Administration system for kickstart
- Configure a virtual machine for kickstart
- "Kickstart" RHEL 6.2 to the virtual machine

Create RHEL 6.2 appliances

- Create a Web Server appliance
- Create an application development appliance
- Create an LDAP appliance
- Create a file and print server appliance
- Also: "travelling /home" (details in SLES 10 SP2 book)
  - Brings together LDAP, LVM, PAM/NSS, Automount and NFS



Service Linux with the Red Hat Network

- Register your system with RHN
- Install and update packages with yum
- Manage your systems with RHN

Agenda

- ~~Introductions~~
- ~~Overview~~
- ~~Part 1 - Introduction and z/VM~~
- ~~Part 2 - RHEL 6.2 Linux~~
- Part 3 - SLES 11 SP2 Linux
  - Install SLES 11 SP2 on LNXADMIN (Chapter 13)
  - Install the SLES 11 SP2 golden image (Chapter 14)
  - Clone SLES 11 SP2 (Chapter 15)
- Part 4 - Other topics

Install SLES 11 SP2 on LNXADMIN

- Review the identity LNXADMIN
- Prepare the SLES 11 SP2 bootstrap files
- Install SLES 11 SP2 on to LNXADMIN
- Configure the Linux administration system
  - Copy files to the RHEL Linux administration system (large LV)
  - Reset install location
  - Turn off unneeded services
  - Apply service
  - Install the cmsfs package
  - Enable vmcp
  - Set system to halt on SIGNAL SHUTDOWN
  - Modify zipl.conf
  - Reboot and verify changes

Tangent: Common SSI IPL EXEC

- At z/VM IPL time:
  - Virtual machine AUTOLOG1 is started at IPL unless "NOAUTO" parameter is added
  - CMS is started
  - PROFILE EXEC is run
- In the past: One PROFILE EXEC per z/VM LPAR
- With z/VM 6.2 and SSI
  - Some common steps
  - Some specific to SSI members
- Recommendation:

```
==> Log on to AUTOLOG1
==> x profile exec
...
/*********************************************************************/
/* Customer processing can be added here                             */
/*********************************************************************/
"EXEC SSIPROFI"                /* Run a common EXEC on all members   */
...
==> x ssiprofi exec d          /* on a common disk */
/* Common code to be run at SSI IPL time                             */
"CP XAUTOLOG TCPIP"              /* Autolog TCPIP                    */
"CP SET MDC STOR 0M 128M"        /* Limit minidisk cache in CSTOR    */
"CP SET MDC XSTORE 0M 0M"        /* Disable minidisk cache in XSTOR  */
"CP SET SIGNAL SHUTDOWN 600"     /* Allow guests 10 min to shut down */
"CP XAUTOLOG LNXADMIN"           /* Start the Linux admin systems    */
...
```


Install the SLES 11 SP2 golden image

- Create the S112GOLD virtual machine
- Create the S112GOLD parameter file
- Install the SLES 11 SP2 golden image
  - Logical volumes for flexibility:

Mount point	Logical volume name	Size
/usr/	usr-lv	2.5 GB
/var/	var-lv	512 MB
/opt/	opt-lv	384 MB
/tmp/	tmp-lv	384 MB

- Configure SLES 11 SP2 golden image
  - Configure the VNC server
  - Prepare for YaST Online Update
  - Turn off unneeded services
  - Apply service with Online Update
  - Configure /etc/inittab
  - Configure SSH keys
  - Modify zipl.conf
  - Cleanup temporary files
  - Reboot and verify changes

Clone SLES 11 SP2

- Clone a virtual server manually
- Clone a virtual server automatically

Create SLES 11 SP2 appliances

- Create a Web Server appliance
- Create an LDAP appliance
- Create a file and print server appliance
- Create an application development appliance

Agenda

- ~~Introductions~~
- ~~Overview~~
- ~~Part 1 - Introduction and z/VM~~
- ~~Part 2 - RHEL 6.2 Linux~~
- ~~Part 3 - SLES 11 SP2 Linux~~
- Part 4 - Other topics
  - Monitor and tune z/VM and Linux (Chapter 19)
  - Miscellaneous recipes (Chapter 20)
  - xCAT (Chapter 21)

Monitor and tune z/VM and Linux

- Use basic z/VM commands
- The z/VM Performance Toolkit
  - Configure the z/VM Performance Toolkit
  - Configure Web Browser support
  - Configure PERFSVM
  - Start the z/VM Performance Toolkit
  - Use the z/VM Performance Toolkit
- Monitor Linux performance data from the kernel
- Monitor Linux with sysstat
- A GOOD GOAL: Get to z/VM and Linux historical graphs quickly

Miscellaneous Recipes

- Add disk space to virtual machines
- Add a logical volume
- Extend an existing logical volume
- Add SCSI/FCP disks
  - As emuldated devices (aka "EDEVs")
  - As real devices
- Rescue a Linux system
- Set up memory hot plugging
- Utilize the cpuplugd service
- Hardware cryptographic support for OpenSSH
- The X window system
- Centralizing home directories for LDAP users

xCAT

- Overview of xCAT
- Install the xCAT Management Node
  - Turn off SE Linux on RHEL 6.2
  - Download and unwind the xCAT Management Node install files
  - Create repositories for the xCAT code
  - Install the xCAT management node
- Install the xCAT User Interface
- Install the xCAT Hardware Control Point
  - Add a privilege class to LNXADMIN
  - Initialize the xCAT database
  - Define nodes
  - Configure networking servers
- xCAT tasks
  - Kickstart a RHEL 6.2 system
  - Clone a SLES 11 SP2 system
  - <hoped for more>

DASD view of the system

Role: *z/VM sysadmin*

CV6284 CV6285 CV6286 CV6287 — Common volumes (4 3390-3s)

JV6280 JS6281 JP6282 JV6283 — Member 1 volumes (4 3390-3s)

WV639B WS639C VP639D WV639E — Member 2 volumes (4 3390-3s)

JP6232 JP6233 JP6288 JP628A — Member 1 page space (4 3390-3s)

WP6288 WP633B WP633C WP633E — Member 2 page space (4 3390-3s)

Role: *Linux sysadmin*

JM6289 — LNXMAINT (320 cyl)

JM6289 JM6290 JM61A5 JM61B2 — Member 1 LNXADMIN (2 3390-3s, 2 3390-9s)

JM6293 — Member 2 LNXADMIN (1 3390-3s)

JM628C JM628D — RH62GOLD (2 3390-3s)

JM628E JM628F — S112GOLD (2 3390-3s)

JM6294 JM6327 — LINUX153 (2 3390-3s) **Role**: *Linux users*

JM6328 JM6339 — LINUX157 (2 3390-3s)

Live Demo

Resources

- All *Virtualization Cookbooks* and other papers:
  - http://www.vm.ibm.com/devpages/mikemac/
- *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
- Red Hat Enterprise Linux evaluation
  - http://www.redhat.com/rhel/server/mainframe/
- SUSE LINUX Enterprise Server evaluation
  - http://www.novell.com/products/linuxenterpriseserver/eval.html
- z/VM publications
  - http://www.vm.ibm.com/pubs/
- z/VM performance tips
  - http://www.vm.ibm.com/perf/tips/

Questions

- Are there any questions?