

SuSE* Linux Enterprise Server 10 SP1 and 10 SP2 (x86 and x64) Dual SCM (ALUA) Installation BKM

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SuSE* Linux Enterprise Server 10 SP1 and 10 SP2 Dual SCM Installation BKM – Table of contents

- Upgrading from Single SCM to Dual SCM: Slides 3 16
- New OS installation in a Dual SCM configuration: Slides 17 51



UPGRADING FROM SINGLE SCM TO DUAL SCM

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 This section covers the steps required to update a SLES 10 SP1 and 10 SP2 Single SCM installation to a Dual SCM configuration. The steps assume that the installation was performed with default settings for fstab values.

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Prior to installing the second SCM, perform the following steps:

- Boot the system and log in to the OS
- Type the following: ls -la /dev/disk/by-id
- Note the SCSI-ID associated with each partition (sda<u>x</u>)
- Edit /etc/fstab to reflect the "by-id" references
 - Modify the <u>/dev/sd*</u> references with <u>/dev/disk/by-id/scsi<xxxx></u> obtained from the above steps
- Next, edit /boot/grub/menu.lst
 - Modify the /dev/sd* entries to /dev/disk/by-id/scsi<xxxx>



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rwxr-xr-x 2 root root 300 Feb 14 01:13 .	
wxr-xr-x 5 root root 100 Feb 14 01:12	
<pre>:wxrwxrwx 1 root root 9 Feb 14 01:12 edd-int13_dev80 ->//sda</pre>	
wxrwxrwx 1 root root 10 Feb 14 01:12 edd-int13 dev80-part1 ->//sda1	
WXIWXXIWX I foot foot 10 Feb 14 01:12 edd-inti3 dev0-part2 -> .//Sdd2	
WXIWXIWX 1 root root 9 Feb 14 01:12 sci=2222900015530881b ->/./sdc	
wxrwxrwx 1 root root 9 Feb 14 01:12 scsi-222450001557b29ba ->//sdf	
wxrwxrwx 1 root root 9 Feb 14 01:12 cosi-22266000155593266 -> -> -/ / /cda	
wxrwxrwx 1 root root 10 Feb 14 01:12 scsi-2226f000155593266-part1 -> www.wimine	
wxrwxrwx 1 root root 10 Feb 14 01:12 scsi-2226f000155593266-part2 -> arteriation	
WXTWXTWX 1 root root 10 Feb 14 01:12 scs1-2226f000155593266-part3 ->	
WXIWXIWX 1 root root 9 Feb 14 01:13 usbarrigen Magstrende Ing. Virtual CDROM -> // (st	
WINKIWA 1 root root 9 Feb 14 01:13 usb-LaCie LaCie CDRW USB 10000E000D772A8C -> W/.//STO	
nux-uhzp:~ # -	
Terminal	
e Edit View Terminal Tabs Help	
Modified by YaST2. Last modification on Thu Feb 14 17:09:31 UTC 2008	
fault 0	
neout 8	
menu (hd0,0)/message	
aST - activate	
Don't change this comment - YaST2 identifier: Original name: linux###	
le SUSE Linux Enterprise Server 10 SP1	
root (hd0,0)	
kernel /vmlinuz-2.6.16.46-0.12-smp root=/dev/disk/by-#d/scsi-2226f000155593266-part3 vga=0x31a resume=/dev/disk/by-id/scsi-	-2226f000155593266-part
ash=silent showopts	
initra /initra-2.6.16.46-0.12-smp	
Don't change this comment - YaST2 identifier: Original name: failsafe###	
le Failsafe SUSE Linux Enterprise Server 10 SP1	
root (hd0.0)	
kernel /vmlinuz-2.6.16.46-0.12-smp root=/dev/sda3 vga=normal showopts ide=nodma apm=off acpi=off noresume edd=off 3	
kernel /vmlinuz-2.6.16.46-0.12-smp root=/dev/sda3 vga=normal showopts ide=nodma apm=off acpi=off noresume edd=off 3 initrd /initrd-2.6.16.46-0.12-smp	
kernel /vmlinuz-2.6.16.46-0.12-smp root=/dev/sda3 vga=normal showopts ide=nodma apm=off acpi=off noresume edd=off 3 initrd /initrd-2.6.16.46-0.12-smp	
<pre>kernel /vmlinuz-2.6.16.46-0.12-smp root=/dev/sda3 vga=normal showopts ide=nodma apm=off acpi=off noresume edd=off 3 initrd /initrd-2.6.16.46-0.12-smp</pre>	
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- Verify the installation of packages by typing:
 - rpm -qa | grep device-mapper
 - This should return device-mapper-1.02.13-6.9
 - Version may be slightly different based on the installation package.
 - rpm –qa | grep multipath-tools
 - This should return <u>multipath-tools-0.4.7-34.18</u>
 - Version may be slightly different based on the installation package.

See the screenshot on the next slide for reference.



(cont'd)		
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Redirection Devices Reyboard Options View Help		
root's Home		*
Trash		
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Elle Edit View Ierminal Tabs Help linux-uhzp:~ # rpm -qa grep device-mapper device-mapper-32bit-1.02.13-6.9 device-mapper-1.02.13-6.9 linux-uhzp:~ # rpm -qa grep multipath-tools multipath-tools-0.4.7-34.18 linux-uhzp:~ #	I	
▲ KVM Remote Console started		
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- Update the LSI* MPT SAS driver for SuSE* Linux Enterprise Server 10 SP1 only as follows:
 - Copy the SuSE* Linux Enterprise Server driver package (mptlinux-4.00.36.00-1sles10.x86_64.rpm) to a known location on the system under test.
 - /temp is assumed for the remainder of the BKM.
 - Open a terminal window
 - cd /temp/
 - Type "rpm -ivh mptlinux-4.00.36.00-1-sles10.x86_64.rpm"

NOTE: You do not need to update the LSI driver for SuSE* Linux Enterprise Server 10 SP2, as it already contains an updated driver.



- Set up Multipath ALUA
 - Copy the SuSE* Linux Enterprise Server driver package to a known location on the system under test
 - /temp is assumed for the remainder of the BKM
 - Open a terminal window
 - cd /temp/<OS type>/2.6.16.46-0.12-smp
 - For x86, type "rpm –ivh dm-intel-1.0.0140-3.i586.rpm"
 - For x64, type "rpm -ivh dm-intel-1.0.0140-3.x86_64.rpm"
 - Type "modprobe dm-intel"
 - The system will not return anything, which indicates a successful installation.
 - Verify the module loaded by typing "lsmod | grep dm_intel"
 - Load the priority driver by typing:
 - For x86 systems: rpm -ivh mpath_prio_intel-1.0.0140-3.i586.rpm
 - For x64 systems: rpm -ivh mpath_prio_intel-1.0.0140-3.x86_64.rpm



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	<u>File E</u> dit <u>View T</u> erminal	Ta <u>b</u> s <u>H</u> elp	
	<pre>linux-qxjs:/temp/x64/2.6.1 Preparing 1:dm-intel linux-qxjs:/temp/x64/2.6.1 linux-qxjs:/temp/x64/2.6.1 Preparing 1:mpath_prio_intel linux-qxjs:/temp/x64/2.6.1</pre>	6.46-0.12-smp # rpm -ivh dm-intel-1.0.0140-3.x86_64.rpm ####################################	
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			=
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- Copy "multipath.conf.SLES" to the /etc directory and rename multipath.conf
- Type the following commands:
 - chkconfig boot.multipath on <return>
 - chkconfig multipathd on <return>
- Edit /etc/sysconfig/kernel by adding "dm-multipath" and "dm-intel" to the INITRD_MODULES section in the mentioned sequence.
 - See the screenshot on the next slide for reference.
- Type the following:
 - mkinitrd

This will create a new kernel image file.

- Shut down the compute module and install the second SCM.
- Once the required FW updates have completed on the second SCM, power on the compute module.



	Terminal		- 0 >
<u>File Edit View Terminal Tabs H</u> elp	\square		
<pre># (like drivers for scsi-controllers, for lvm or reiserfs)</pre>			f
" INITRD_MODULES="mptsas processor thermal fan reiserfs edd dr	n-multipath dm-intel"		
## Type: string			
## Command: /sbin/mkinitrd			
*			
# This variable contains the list of modules to be added to	the initial		
# ramdisk that is created for unprivilegd Xen domains (domU)	; you may need		
# drivers for virtual block and network devices in addition	to filesystem		
# and device-mapper modules.	and a decisive a constrainty		
#			
DOMU_INITRD_MODULES="xennet xenblk"			
## Type: string			
## ServiceRestart: boot.loadmodules			
ter en la constante de la const F			
# This variable contains the list of modules to be loaded			
# once the main filesystem is active			
# You will find a few default modules for hardware which			
# can not be detected automatically.			-
#			
MODULES_LOADED_ON_BOOT=""			
## Type: string			
## Default: ""			
#			
# The file name of a binary ACPI Differentiated System Desc	iption Table		
# (DSDT). This table is appended to the initial ram disk (in	itrd) that		
# the mkinitrd script creates. If the kernel finds that its	initrd		
# contains a DSDT, this table replaces the DSDT of the bios.	. If the file		
# specified in ACPI DSDT is not found or ACPI DSDT is empty.	'not specified.		
# no DSDT will be appended to the initrd.			
# Example path /etc/acpi/dsdt			
#			
ACPI_DSDT=""			
## Type: integer(1000:50000)			
## Default: 1000			
		10,79	15%
		and we we	2 44.05
		Mon Nov	3, 14:05

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- To display the topology, type the following command:
 - multipath –ll

• See the screenshot on the next slide for a sample output of the "multipath –ll" command.

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• The server is now properly configured for Multipath usage.



NEW OS INSTALLATION IN A DUAL SCM CONFIGURATION

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New Installation in Dual SCM Configuration

• This section covers a fresh install of SuSE* Linux Enterprise Server 10 SP1 and 10 SP2 in a Dual SCM configuration.

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Virtual Drive Creation and Slot Assignment

- Create Storage Pool -> Virtual Drive and assign to a compute module
 - Note which SCM is assigned as the active path (see the red box in the screenshot on the next slide).
 - It is recommended to set controller Affinity to SCM1 during Virtual Drive creation, although installation to a drive with controller Affinity set to SCM2 is also supported.
 - If SCM1 is not the <u>active</u> path, it can be changed by selecting the virtual drive from the Storage tab, then clicking the "<u>affinity</u>" button and choosing SCM1 from the drop-down menu.



Virtual Drive Properties Page Showing SCM1 Affinity/Active Controller





Boot Drive Order in System BIOS

• Boot the compute module and enter the system BIOS (press F2 during POST)

- If the active SCM for LUN 0 is SCM #1, place it first in the HDD boot order. Typically, this will show up as <u>ID00</u> (LUNs assigned to SCM #1 usually have lower ID values than SCM #2, but not always) LUN0 (see the screenshot on the next slide).
- If the active SCM for LUN 0 is SCM #2, place it first in the HDD boot order. Typically, this will show up as <u>ID01</u> (LUNs assigned to SCM #2 usually have higher ID values than SCM #1, but not always) LUN0 (see the screenshot on the next slide).



HDD Ordering Based on Active SCM

Hard Disk #2	[#0400 ID00 LUN0 In] [#0400 ID01 LUN0 In]	Set hard disk boot order by selecting the boot option for this position.
		X Select Screen ↑↓ Select Item +/- Change Value Enter Select Field F1 General Help F9 Optimized Defaults F10 Save and Exit ESC Exit
Version 1.20.1	70 The smaller I	rican Megatrends, Inc. ID value corresponds to the path

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SuSE* Linux Enterprise Server 10 SP1 and 10 SP2 Notes

• It is recommended that you perform the install with only a single VD assigned to the compute module; however, installs may be performed with multiple VDs assigned.

• BIGSMP kernel is <u>NOT</u> supported – if the system is configured with 4 GB memory, it is highly recommended that you install the x64 version.

•LSI SAS driver update procedure is needed for SuSE* Linux Enterprise Server 10 SP1 only. SuSE* Linux Enterprise Server 10 SP2 already has an updated driver (skip slides 24 - 27).



• At the initial installation screen, press <F5> and change the selection from "No" to "Yes".

Remote H	KVM Sessio	on to Serve	r 6 - 0 fp	s							
direction	Devices	<u>K</u> eyboard	<u>O</u> ptions	View	<u>H</u> elp						
l sus	E Linux Ent	terprise Ser	ver								
			Boot	from	i Hard Di:	sk					
			Inst	allat	.10N		alad		ennen I		
			Inst	allat	ionACF		DIEO P Dicak	atod			
			Inst	allat	ionCot	al HFIU	s DISdl	ITEU			
			Reso	arrat Ne Su	istem	ie aetti	ings				
			Memr	iru Tr	est						
		Boot	Option	s		Y	es				
						N	0				
						F	ile				
1 Heln	F2 Lan	guage F	3 1280	× 102	4 E4 DV	D E5 D	river				



Select the device where the .dd image is located.
In the example shown, the image is located on the USB floppy.

🖀 Remote KVM Session to Server 6 - 0 fps	
Redirection Devices Keyboard Options View Help	
N SUSE Linux Enterprise Server	^
>>>> Linuxrc u2.0.67 (Kernel 2.6.16.46-0.12-default) <<<	
Please choose the Driver Update medium. sdd: USB Ploppy sr0: USB CD-ROH, TSSTcorp CDM/DVD SN-HZ4ZD sr1: USB CD-ROH, Virtual CDROH sda1: Partition, SEAGATE ST3967013S sdb: Disk, Intel Multi-Plex V-LUM sdc: Disk, Intel Multi-Plex V-LUM other device OK	
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Screenshot showing the image being read from the .dd image.





Screenshot indicating the completion of the .dd image transfer.

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N SUSE Linux Enterprise Server		^
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Remote KVM Session to Server 6 - 0 fps		
Sequection newces Kelmonia Obtions Alem Helb		
N SUSE Linux Enterprise Server		*
	>>> Linuxrc v2.0.67 (Kernel 2.6.16.46-0.12-default) <<<	
		Ŧ
	Driver Updates added	
	Fusion MPT Driver Update Disk 1	
	ОК	



Changes Required to Partitioning

- Select the appropriate responses to the setup questions based on the system setup.
- On the "Installation Settings" screen (shown on the right), select "Partitioning".

apgage Language License Agreement System Analysis Time Zone tallation Installation Summary Perform Installation Installation Summary Perform Installation Missiliation Summary Perform Installation Installation Summary Perform Installation Most Password Hostname Network Customer Center Online Update Service Users Clean Up Release Notes Hardware Configuration Hardware Configuration Active Server Hardware Configuration Active Server Hardware Configuration Primary Language: English (US)	



"Suggested Partitioning" Screen

• After selecting "<u>Partitioning</u>", the "Suggested Partitioning" screen will appear.

• Select "<u>Base Partition Setup</u> <u>on This Proposal</u>" and click the "Next" button at the bottom of the screen (see the screenshot).

Your hard disks have been thecked. The partition setup lisplayed is proposed for your ard drive. To accept these suggestions ind continue, select Accept Proposal. You want to do only small dijustments to the proposed letup (like e.g. changing liesystem types) choose base Partition Setup on this Proposal and do these modification in expert partioner dialog. If the suggestion does not fit your needs, create your own partition setup starting with he partitions a currently present on the disks. For this,	Suggested Partitioning Create swap partition /dev/sda1 (2.0 GB) Create root partition /dev/sda2 (97.9 GB) with reisenfs
elect Create Custom Partition Setup. This is also he option to choose for idvanced options like RAID ind encryption. Fo create a LVM based proposal choose the corresponding button.	Partitioning <u>Accept Proposal</u> Base Partition Setup on This Proposal Create LVM Based Proposal



Expert Partitioner Screen

• Clicking "Next" on the "Suggested Partitioning" screen brings up the "Expert Partitioner" screen (see the screenshot).

• On this screen, note the partitions are mounted by their "Device Name" as indicated by "K" in the highlighted box in screenshot to the right.

NOTE: If the drives are mounted by ID as the default (indicated by an "I" in the Mount By column), no changes are required.

• Select either the "swap" or "/" partition ("swap" selected in the screenshot) and click the "Edit" button at the bottom of the screen.

Semote KVM Session to Server 4 - 0 fps Redirection Devices Keyboard Options View Help Expert Partitioner Partition your hard disks... This is intended for experts. If you are not F Type Device Mount Mount By Start End Used By Label Device ID Device Path Size familiar with the concepts of hard disk partitions and /dev/sda 100.0 GB Intel-Multi-Flex 0 1 3 0 5 3 pci-0000:04:00.0-sas how to use them you might pci-0000:04:00.0-sas want to go back and select /dev/sda2 97.9 GB F Linux native (Reiser) / 262 13053 pci-0000:04:00.0-sas-К automatic partitioning. /dev/evms/sdb 100.0 GB EVMS Please note that nothing will be written to your hard disk until you confirm the entire installation in the last installation dialog. Until that point, you can safely abort the installation. For LVM setup, using a non-LVM root device and a non-LVM swap device is recommended. Other than the root and swap devices. you should have partitions managed by LVM The table to the right shows the current partitions on all vour hard disks. Hard disks are designated like this /dev/hda 1st EIDE disk /dev/hdb 2nd EIDE disk /dev/hdc 3rd EIDE disk

Create Edit Delete Desize

etc.

/dev/sda 1st SCSI disk /dev/sdb 2nd SCSI

- or -

disk /dev/sdc 3rd SCSI disk

etc.

like this:

This notation always refers to the entire disk.

Partitions are designated

partition on the 1ct FIDE Keyboard, Video and Mouse redirection

/dev/hda1 1st primary

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Expert Partitioner Screen – Edit Partition

Remote KVM Session to Server 4 - 0 fps

Redirection Devices Keyboard Options View Help

• Clicking the "Edit" button at the bottom of the screen brings up the "Edit Partition" dialog (see the screenshot).

• In the "Edit Partition" dialog, click the "Fstab Options" button (highlighted in the screenshot).

Expert Partitioner Partition your hard disks... This is intended for experts. If you are not F Type Device Mount Mount By Start End Used By Label Device ID Device Path Size familiar with the concepts of hard disk partitions and /dev/sda 100.0 GB Intel-Multi-Flex 0 1 3 0 5 3 pci-0000:04:00.0-sashow to use them you might F Linux swap pci-0000:04:00.0-sas want to go back and select /dev/sda2 97.9 GB F Linux native (Reiser) / 262 13053 pci-0000:04:00.0-sasĸ automatic partitioning. /dev/evms/sdb 100.0 GB EVMS Please note that nothing will be written to your hard disk until you confirm the entire installation in the last installation dialog. Until that point, you can safely abort the installation. For LVM setup, using a non-LVM root device and a Edit Partition /dev/sda1 First choose the non-LVM swap device is type of the partition recommended. Other than and whether this -Format Size the root and swap devices. partition should be Cylinder size: 7.84 M you should have partitions formatted. O Do not format managed by LVM. Start cylinder: Then, enter the The table to the right shows mount point Ŧ the current partitions on all (/, /boot, /usr, /var, vour hard disks. etc.) End: (9 or +9M or +3.2GB) Format Hard disks are designated 261 Now, enter the File system like this location of the new Swap partition on your /dev/hda 1st EIDE Fstab Ottions hard disk. disk /dev/hdb 2nd EIDE disk /dev/hdc 3rd EIDE disk Please enter the Encrypt file system Mount Point starting cylinder etc. number of the swap partition. - or -After that, either -/dev/sda 1st SCSI OK Cancel disk /dev/sdb 2nd SCSI disk /dev/sdc 3rd SCSI disk etc. This notation always refers to the entire disk. Partitions are designated like this: 4 1 /dev/hda1 1st primary partition on the 1ct FIDE Create Edit Delete Desize • Keyboard, Video and Mouse redirection

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F

Expert Partitioner Screen – Fstab Options

• In the "Fstab options" dialog, select "Device ID" and click "OK" (see the screenshot).

• Perform the steps on slides 31 and 32 for each of the partitions ("swap" and "/" for most installations or additional ones for expert users).





Expert Partitioner Screen – Completed

• After modifying all the partitions to mount by their "Device-ID", the "Mount By" column should change to "I" (see the screenshot on the right) from "K" (as seen in the screenshot on slide #30).

• Click the "Finish" button to proceed with the installation.



Keyboard, Video and Mouse redirection



SuSE* Linux Enterprise Server 10 SP1 and 10 SP2 Installation

• Complete the installation and reboot the host as instructed via the installation process.

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SuSE* Linux Enterprise Server 10 SP1 and 10 SP2 – Possible Error Scenario #1

• Upon reboot, there is a possibility that it will fail with the message shown in the screenshot.

• If this screenshot appears, press the "Return" key to continue.

🕌 Remote KVM Session to Server 4 - 11 fps

Redirection Devices Keyboard Options View Help

Booting from local disk... GRUB Loading stage2... graphics file "(hd1,0)/message" missing, press a key to continue...

Keyboard, Video and Mouse redirection

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SuSE* Linux Enterprise Server 10 SP1 and 10 SP2 – Possible Error Scenario #1 (Resolution)

- The GRUB boot order screen appears (see the screenshot).
- Using the arrow keys, highlight the first row as shown in the screenshot and press "<u>e</u>".

Remote KVM Session to Server 1 - 0 fps Redirection Devices Keyboard Options View Help GNU GRUB version 0.97 (635K lower / 1040600K upper memory) SUSE Linux Enterprise Server 10 SP1 Failsafe -- SUSE Linux Enterprise Server 10 SP1 Use the \uparrow and \downarrow keys to select which entry is highlighted. Press enter to boot the selected OS, 'e' to edit the commands before booting, or 'c' for a command-line.



SuSE* Linux Enterprise Server 10 SP1 and 10 SP2 – Possible Error Scenario #1 (Resolution)

- The GRUB boot screen appears (see screenshot).
- Using the arrow keys, highlight the "root (hd<u>x</u>, 0)" line similar to the one in the screenshot.
- Once highlighted, press the "e" key to edit the command .
- Modify the line as follows:
 - If the line is "root (hd0,0)", change it to "root (hd1,0)".
 - If the line is "root (hd1,0)", change it to "root (hd0,0)".
 - Press the "Return" key when the modification is complete.
- In some instances, you may need to hit the "Esc" key and "e" key several times before the "root (hd<u>x</u>,0)" line is displayed.
- <u>NOTE</u>: If this step is performed, the menu.lst file will need to be updated to reflect this change once the OS boots.

edirection Devices Keyboard Options View Help	
GNU GRUD VERSION 0.91 (655K LUWER / 2001512	ck upper memory)
root (hdl,0) kernel /vmlinuz-2.6.16.46-0.12-smp root=/dev/d	lisk∕hu-lahel/ROOT vga=0→
initrd /initrd-2.6.16.46-0.12-smp	
Use the 1 and 4 keys to select which entry	is highlighted.
boot sequence, 'c' for a command-line, 'o'	to open a new line
after ('O' for before) the selected line,	'd' to remove the
selected line, or escape to go back to the	main menu.



SuSE* Linux Enterprise Server 10 SP1 and 10 SP2 – Possible Error Scenario #2

• If the boot drive order was not set properly prior to OS installation, the error condition in the screenshot will appear.

• If this error condition occurs, reboot the server and enter the system BIOS by pressing "F2" during POST.

• Once in the system BIOS, swap the HDD boot order.

- 0 × 🕌 Remote KVM Session to Server 4 - 11 fps Redirection Devices Keyboard Options View Help Booting from local disk... isolinux: Disk error 80, AX = 0201, drive 80 Boot failed: press a key to retry...

Keyboard, Video and Mouse redirection



- Once the installation completes, log in to the system.
- Open a terminal window
 - Verify /, /boot, and swap are all referenced by their ID
 - Type "ls -la /dev/disk/by-id"
- Edit /etc/fstab to reflect the "by-id" references
 - Modify the <u>/dev/sd*</u> references with <u>/dev/disk/by-id/scsi<xxxx></u>
 - For <xxxx>, refer to the red box in the screenshot on the next slide for values on the system under test.



direction D <u>e</u> vices <u>K</u> eyboard	
	Options View Help
1	Terminal
<u>ile Edit ⊻iew T</u> erminal	Ta <u>b</u> s <u>H</u> elp
inux-uhzp:~ # ls -la /	/dev/disk/by-id/
otal 0	
wxr-xr-x 2 root root	300 Feb 14 01:13 .
rwxrwxrwx 1 root root	9 Feb 14 01:12 edd-int13 dev80 -> $//5dz$
rwxrwxrwx 1 root root	10 Feb 14 01:12 edd-int13 dev80-part1 ->/./sda1
rwxrwxrwx 1 root root	10 Feb 14 01:12 edd-int13_dev80-part2 ->//sda2
rwxrwxrwx 1 root root	10 Feb 14 01:12 edd-int13_dev80-part3 ->//sda3
rwxrwxrwx 1 root root	9 Feb 14 01:13 scs1-2222900015530881b ->/./sdc
TWXIWXIWX 1 FOOT FOOT	9 Feb 14 01:12 Scs1-222640001555298d -> .//./Sd1
rwxrwxrwx 1 root root	10 Feb 14 01:12 scsi-2226f000155593266-part1 ->
rwxrwxrwx 1 root root	10 Feb 14 01:12 scsi-2226f000155593266-part2 ->
rwxrwxrwx 1 root root	10 Feb 14 01:12 scsi-2226f000155593266-part3 ->
rwxrwxrwx 1 root root	9 Feb 10 01.13 State 222300013378330 -2
rwxrwxrwx 1 root root	9 Feb 14 01:13 usb-American Megatrends Inc. Virtual CDR0M ->/./Srl
wxrwxrwx 1 root root	9 Feb 14 01:13 USD-Lacie_Lacie_LDRW_05B_10000E000D//2A8C ->//ST0
	Terminal
	Tabs Help
Modified by YaST2. La	
,	ast modification on Thu Feb 14 17:09:31 UTC 2008
efault 0	ast modification on Thu Feb 14 17:09:31 UTC 2008
efault 0 imeout 8	ast modification on Thu Feb 14 17:09:31 UTC 2008
efault 0 imeout 8 fxmenu (hd0,0)/message	ast modification on Thu Feb 14 17:09:31 UTC 2008
efault 0 imeout 8 fxmenu (hd0,0)/message #YAST - activate	ast modification on Thu Feb 14 17:09:31 UTC 2008
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efault 0 imeout 8 fxmenu (hd0,0)/message #YaST - activate ##Don't change this cc itle SUSE Linux Enterp	ast modification on Thu Feb 14 17:09:31 UTC 2008 mmment - YaST2 identifier: Original name: linux### prise Server 10 SP1
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efault 0 imeout 8 fxmenu (hd0,0)/messaga #YAST - activate ##Don't change this cc itle SUSE Linux Enterp root (hd0,0) kernel /vmlinuz-2.6 plash=silent showopts initrd /initrd-2.6.	ast modification on Thu Peb 14 17:09:31 UTC 2008 mmment - YaST2 identifier: Original name: linux### prise Server 10 SP1 5.16.46-0.12-smp root=/dev/disk/by-Id/scsi-2226f000155593266-part3 vga=0x31a resume=/dev/disk/by-id/scsi-2226f000155593266-part 16.46-0.12-smp
efault 0 imeout 8 fxmenu (hd0,0)/message #YAST - activate ##Don't change this cc itle SUSE Linux Enterp root (hd0,0) kernel /vmlinuz-2.6 plash=silent showopts initrd /initrd-2.6.	ast modification on Thu Peb 14 17:09:31 UTC 2008 mment – YaST2 identifier: Original name: linux### prise Server 10 SP1 5.16.46-0.12-smp root=/dev/disk/by-Id/scsi-2226f000155593266-part3 vga=0x31a resume=/dev/disk/by-id/scsi-2226f000155593266-part .16.46-0.12-smp
efault 0 imeout 8 fxmenu (hd0,0)/message #YAST - activate ##Don't change this cc itle SUSE Linux Enterr root (hd0,0) kernel /vmlinuz-2.6 plash=silent showopts initrd /initrd-2.6.	ast modification on Thu Peb 14 17:09:31 UTC 2008 mmment - YaST2 identifier: Original name: linux### prise Server 10 SP1 5.16.46-0.12-smp root=/dev/disk/by-Id/scsi-2226f000155593266-part3 vga=0x31a resume=/dev/disk/by-id/scsi-2226f000155593266-part .16.46-0.12-smp ymment - YaST2 identifier: Original name: failsafe###
efault 0 imeout 8 fxmenu (hd0,0)/message #YAST - activate ##Don't change this cc itle SUSE Linux Enter; root (hd0,0) kernel /vmlinuz-2.6 plash=silent showopts initrd /initrd-2.6. ##Don't change this cc itle Failsafe SUSE	ast modification on Thu Peb 14 17:09:31 UTC 2008 mmment - YaST2 identifier: Original name: linux### prise Server 10 SP1 5.16.46-0.12-smp root=/dev/disk/by-Id/scsi-2226f000155593266-part3 vga=0x31a resume=/dev/disk/by-id/scsi-2226f000155593266-part .16.46-0.12-smp mmment - YaST2 identifier: Original name: failsafe### Linux Enterprise Server 10 SP1
efault 0 imeout 8 fxmenu (hd0,0)/messaga #YaST - activate ##Don't change this co itle SUSE Linux Enterp root (hd0,0) kernel /vmlinuz-2.6 ##Don't change this co itle Failsafe SUSE root (hd0,0) kernel /vmlinuz-2.6	ast modification on Thu Peb 14 17:09:31 UTC 2008 mmment - YaST2 identifier: Original name: linux### prise Server 10 SP1 5.16.46-0.12-smp root=/dev/disk/by-Id/scsi-2226f000155593266-part3 vga=0x31a resume=/dev/disk/by-id/scsi-2226f000155593266-part .16.46-0.12-smp mmment - YaST2 identifier: Original name: failsafe### Linux Enterprise Server 10 SP1 5.16.46-0.12-smp root=/dev/sda3 yga=normal showopts ide=nodma apm=off acpi=off noresume edd=off 3
efault 0 imeout 8 fxmenu (hd0,0)/message #YAST - activate ##Don't change this co itle SUSE Linux Enterry root (hd0,0) kernel /vmlinuz-2.6 plash=silent showopts initrd /initrd-2.6. ##Don't change this co itle Failsafe SUSE root (hd0,0) kernel /vmlinuz-2.6 initrd /initrd-2.6	ast modification on Thu Peb 14 17:09:31 UTC 2008 mment - YaST2 identifier: Original name: linux### prise Server 10 SP1 5.16.46-0.12-smp root=/dev/disk/by-Id/scsi-2226f000155593266-part3 vga=0x31a resume=/dev/disk/by-id/scsi-2226f000155593266-part .16.46-0.12-smp mment - YaST2 identifier: Original name: failsafe### Linux Enterprise Server 10 SP1 5.16.46-0.12-smp root=/dev/sda3 vga=normal showopts ide=nodma apm=off acpi=off noresume edd=off 3 .16.46-0.12-smp
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<pre>efault 0 imeout 8 imeout 8 ifxmenu (hd0,0)/message #YAST - activate ##Don't change this cc itle SUSE Linux Enter; root (hd0,0) kernel /vmlinuz-2.6 initrd /initrd-2.6. ##Don't change this cc itle Failsafe SUSE root (hd0,0) kernel /vmlinuz-2.6 initrd /initrd-2.6.</pre>	a mment - YaST2 identifier: Original name: linux### prise Server 10 SP1 5.16.46-0.12-smp root=/dev/disk/by-Id/scsi-2226f000155593266-part3 vga=0x31a resume=/dev/disk/by-id/scsi-2226f000155593266-part .16.46-0.12-smp mment - YaST2 identifier: Original name: failsafe### Linux Enterprise Server 10 SP1 5.16.46-0.12-smp root=/dev/sda3 vga=normal showopts ide=nodma apm=off acpi=off noresume edd=off 3 .16.46-0.12-smp
efault 0 imeout 8 fxmenu (hd0,0)/message #YAST - activate ##Don't change this or itle SUSE Linux Enterg root (hd0,0) kernel /vmlinuz-2.6 plash=silent showopts initrd /initrd-2.6. ##Don't change this or itle Failsafe SUSE root (hd0,0) kernel /vmlinuz-2.6 initrd /initrd-2.6.	ast modification on Thu Peb 14 17:09:31 UTC 2008 mment - YaST2 identifier: Original name: linux### prise Server 10 SP1 5.16.46-0.12-smp root=/dev/disk/by-Id/scsi-2226f000155593266-part3 vga=0x31a resume=/dev/disk/by-id/scsi-2226f000155593266-part .16.46-0.12-smp mment - YaST2 identifier: Original name: failsafe### Linux Enterprise Server 10 SP1 5.16.46-0.12-smp root=/dev/sda3 vga=normal showopts ide=nodma apm=off acpi=off noresume edd=off 3 .16.46-0.12-smp
efault 0 imeout 8 fxmenu (hd0,0)/messaga #YDON't change this co itle SUSE Linux Entery root (hd0,0) kernel /vmlinuz-2.6 plash=silent showopts initrd /initrd-2.6. ##DON't change this co itle Failsafe SUSE root (hd0,0) kernel /vmlinuz-2.6 initrd /initrd-2.6.	ast modification on Thu Feb 14 17:09:31 DTC 2008 mmment - YaST2 identifier: Original name: linux### prise Server 10 SP1 5.16.46-0.12-smp root=/dev/disk/by-Id/scsi-2226f000155593266-part3 vga=0x31a resume=/dev/disk/by-id/scsi-2226f000155593266-part .16.46-0.12-smp mmment - YaST2 identifier: Original name: failsafe### Linux Enterprise Server 10 SP1 5.16.46-0.12-smp root=/dev/sda3 vga=normal showopts ide=nodma apm=off acpi=off noresume edd=off 3 .16.46-0.12-smp

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- Next, edit /boot/grub/menu.lst
 - Modify the /dev/sd* entries to /dev/disk/by-id/scsi<xxxx>
 - See the red box in the screenshot on the next slide for reference.
 - If the steps on slide #37 were required to boot, also modify the line "root (hdx,y) to reflect the changes made when booting.



Remote KVM Session to Server 1 - 4 fps Redirection Devices Keyboard Options View Help E Terminal Eile Edit View Terminal Tabs Help linux-uhzp:~ # ls -la /dev/disk/by-id/ total 0 drwxr-xr-x 2 root root 300 Feb 14 01:13 . drwxr-xr-x 5 root root 100 Feb 14 01:12 .. lrwxrwxrwx 1 root root 9 Feb 14 01:12 edd-int13 dev80 -> ../../sd lrwxrwxrwx 1 root root 10 Feb 14 01:12 edd-int13 dev80-part1 -> lrwxrwxrwx 1 root root 10 Feb 14 01:12 edd-int13 dev80-part2 -> ./../sda lrwxrwxrwx 1 root root 10 Feb 14 01:12 edd-int13 dev80-part3 -> .../.../sda lrwxrwxrwx 1 root root 9 Feb 14 01:13 scsi-2222900015530881b -> ./../sd lrwxrwxrwx 1 root root 9 Feb 14 01:12 scsi-222450001557b29ba ./../sd lrwxrwxrwx 1 root root 9 Feb 14 01.12 lrwxrwxrwx 1 root root 10 Feb 14 01:12 lrwxrwxrwx 1 root root 10 Feb 14 01:12 - > lrwxrwxrwx 1 root root 10 Feb 14 01:12 lrwxrwxrwx 1 root root Feb lrwxrwxrwx 1 root root 9 Feb 14 01:13 usb-American Megatrends Inc. Virtual CDROM -> 9 Feb 14 01:13 usb-LaCie LaCie CDRW USB 10000E000D772A8C -> lrwxrwxrwx 1 root root linux-uhzp:~ # -File Edit View Terminal Tabs Help # Modified by YaST2. Last modification on Thu Feb 14 17:09:31 UTC 2008 default 0 timeout 8 gfxmenu (hd0.0)/message ##YaST - activate ###Don't change this comment - YaST2 identifier: Original name: linux### title SUSE Linux Enterprise Server 10 SP1 root (hd0,0) kernel /vmlinuz-2.6.16.46-0.12-smp root=/dev/disk/by-1d/scsi-2226f000155593266-part3 vga=0x31a resume=/dev/disk/by-id/scsi-2226f000155593266-part2 splash=silent showopts initrd /initrd-2.6.16.46-0.12-smp ###Don't change this comment - YaST2 identifier: Original name: failsafe### title Failsafe -- SUSE Linux Enterprise Server 10 SP1 root (hd0,0) kernel /vmlinuz-2.6.16.46-0.12-smp root=/dev/sda3 vga=normal showopts ide=nodma apm=off acpi=off noresume edd=off 3 initrd /initrd-2.6.16.46-0.12-smp 13.75 A11

KVM Remote Console started.

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- Verify the installation of packages by typing:
 - rpm -qa | grep device-mapper
 - This should return device-mapper-1.02.13-6.9
 - Version may be slightly different based on the installation package.
 - rpm –qa | grep multipath-tools
 - This should return <u>multipath-tools-0.4.7-34.18</u>
 - Version may be slightly different based on the installation package.

See the screenshot on the next slide for reference.

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🕌 Remote KVM Session to Server 1 - 4 fps

Redirection Devices Keyboard Options View Help



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- Setting up Multipath ALUA
 - Copy the SuSE* Linux Enterprise Server driver package to a known location on the system under test
 - /temp is assumed for the remainder of the BKM
 - Open a terminal window
 - cd /temp/<OS type>/2.6.16.46-0.12-smp
 - For x86, type "rpm –ivh dm-intel-1.0.0140-3.i586.rpm"
 - For x64, type "rpm –ivh dm-intel-1.0.0140-3.x86_64.rpm"
 - Type "modprobe dm-intel"
 - The system will not return anything, which indicates a successful installation
 - Verify the module loaded by typing: lsmod | grep dm_intel
 - Load the priority driver by typing:
 - For x86 systems: rpm –ivh mpath_prio_intel-1.0.0140-3.i586.rpm
 - For x64 systems: rpm -ivh mpath_prio_intel-1.0.0140-3.x86_64.rpm



	Terminal	_ 0
File Edit View Terminal	Tabs Heln	Confecture Confecture
<pre>inux-qxjs:/temp/x64/2.6. reparing 1:dm-intel inux-qxjs:/temp/x64/2.6. inux-qxjs:/temp/x64/2.6. reparing 1:mpath_prio_intel inux-qxjs:/temp/x64/2.6.</pre>	<pre>16.46-0.12-smp # rpm -ivh dm-intel-1.0.0140-3.x86_64.rpm ####################################</pre>	
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Computer	Terminal	Mon Nov 3, 13:56

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- Copy "multipath.conf.SLES" to the /etc directory and rename multipath.conf
- Type the following commands:
 - chkconfig boot.multipath on <return>
 - chkconfig multipathd on <return>
- Edit /etc/sysconfig/kernel by adding "dm-multipath" and "dm-intel" to the INITRD_MODULES section in the mentioned sequence.
 - See the screenshot on the next slide for reference.
- Type the following:
 - mkinitrd
 - This will create a new kernel image file.
- Reboot the server by typing "reboot".



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<u>File Edit View Terminal Tabs Help</u>	3		
# (like drivers for scsi-controllers, for lvm or reiserfs)			f
" INITRD_MODULES="mptsas processor thermal fan reiserfs edd	dm-multipath dm-intel"		
## Type: string			
## Command: /sbin/mkinitrd			
*			
# This variable contains the list of modules to be added t	to the initial		
# ramdisk that is created for unprivilegd Xen domains (dom	nU); you may need		
# drivers for virtual block and network devices in addition	on to filesystem		
# and device-mapper modules.	and the second		
#			
DOMU_INITRD_MODULES="xennet xenblk"			
## Type: string			
## ServiceRestart: boot.loadmodules			
ter en la constante de la const			
# This variable contains the list of modules to be loaded			
# once the main filesystem is active			
# You will find a few default modules for hardware which			
# can not be detected automatically.			-
#			
MODULES_LOADED_ON_BOOT=""			
## Type: string			
## Default: ""			
#			
# The file name of a binary ACPI Differentiated System Des	scription Table		
# (DSDT). This table is appended to the initial ram disk	(initrd) that		
# the mkinitrd script creates. If the kernel finds that it	s initrd		
# contains a DSDT, this table replaces the DSDT of the big	os. If the file		
# specified in ACPI DSDT is not found or ACPI DSDT is empty	zy/not specified,		
# no DSDT will be appended to the initrd.			
# Example path /etc/acpi/dsdt			
#			
ACPI_DSDT=""			
## Type: integer(1000:50000)			
## Default: 1000			
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- To display the topology, type the following command:
 - multipath –ll

• See the screenshot on the next slide for a sample output of the "multipath –ll" command.



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<pre>Edit View Terminal Tabs Help linux-qxjs:~ # multipath -ll 2223000155b96e2cdm-0 Intel,Multi-Flex [size=506][features=1 queue if no_path][hwhandler=1 intel] _ round-robin 0 [prio=50][active] _ round-robin 0 [prio=10][enabled] _ 0:0:1:0 sdb 8:16 [active][ready] linux-qxjs:~ #</pre>	
Computer	🚺 🕼 Mon Nov 3, 14:13

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• The server is now properly configured for Multipath usage.

