

# **Building a SUSE Linux distro**

**With SuseStudio and Kiwi**

Revision	Author	Date	Description
0.01	D Snider	15/11/30	Initial Outline
0.02	D Snider	15/12/07	Added suseStudio sample session. Retest OpenSuse builds. Setup a git repo.
0.03	D Snider	15/12/08	Retest OpenSuse OEM build. Added testing screenshots.
0.04	D Snider	15/12/08	Added OpenSuse stick build.
0.05	D Snider	15/12/09	Added SLES 12 iso build.

# Table of Contents

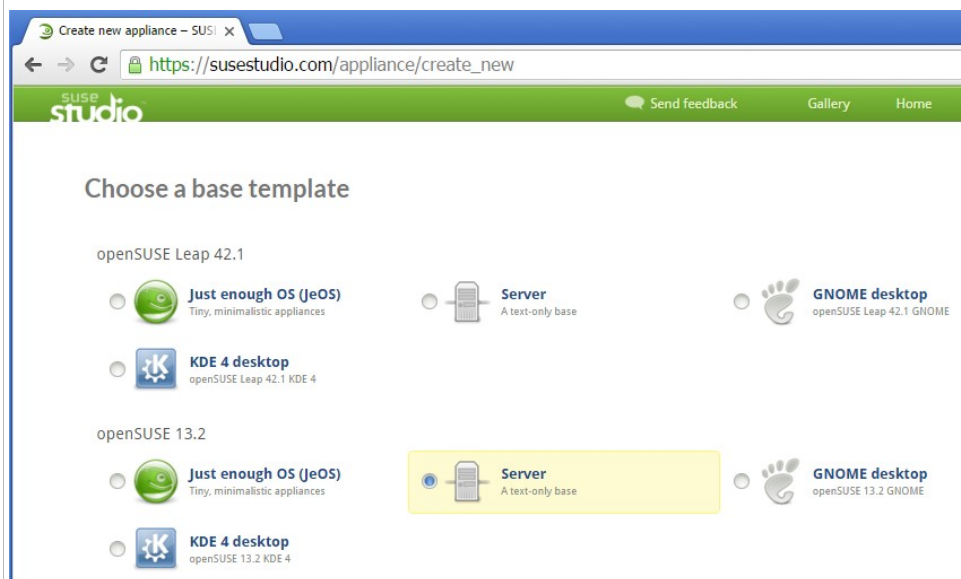
<b>1. FIRST DISTRO WITH SUSESTUDIO.COM – OPENSUSE 13.2.....</b>	<b>3</b>
1.1. ISO TESTING ON VMWARE WORKSTATION.....	6
<b>2. REPRODUCING A SUSESTUDIO BUILD WITH KIWI.....</b>	<b>8</b>
2.1. KIWI DOCUMENTATION.....	8
<b>3. OS BUILDER ENVIRONMENT – OPENSUSE.....</b>	<b>9</b>
3.1. REPOS/ISOs.....	9
3.2. OS INSTALL.....	9
3.3. KIWI INSTALLATION.....	9
<b>4. OPENSUSE 13.2 ISO.....</b>	<b>10</b>
<i>Build:</i> .....	10
<i>Test:</i> .....	10
<b>5. OPENSUSE 13.2 STICK.....</b>	<b>12</b>
<i>Build:</i> .....	12
<i>Test:</i> .....	13
<b>6. SLES 12 ISO.....</b>	<b>15</b>
<i>Build:</i> .....	15
<i>Test:</i> .....	15

NOTE: WHILE THIS DOCUMENT IS BEING REFINED, META INFORMATION WILL BE IN < BRACKETS > .

## 1. First distro with SuseStudio.com – OpenSUSE 13.2

*Register and Login to susestudio.com.*

*Start with creating an openSUSE 13.2 server:*



*Scroll down and name the appliance:*

### Select your architecture

☐ 32-bit ☒ 64-bit

### Name your appliance

openSUSE\_13.2 This can be changed later

Create appliance

*Select: Create appliance*

*The tabs further configure the new OS.*

*First there are the off the shelf RPMs that can be installed.*

*For now, the defaults are sufficient:*

#### Software information

0 patterns selected  
 24 packages selected  
 297 total packages

### Software sources

[openSUSE 13.2 Updates](#) , [openSUSE 13.2 OSS](#)

[Add repositories...](#) [Upload RPMs...](#)

### Selected software








Packages: [aaa\\_base](#), [branding-openSUSE](#), [e2fsprogs](#), [glibc-locale](#), [glibc-locale](#), [grub2](#), [gsettings-backend-dconf](#), [hwinfo](#),  
[iputils](#), [kernel-default](#), [less](#), [netcfg](#), [openssh](#), [openSUSE-build-key](#), [patterns-openSUSE-base](#), [plymouth](#),  
[polkit-default-privs](#), [rpcbind](#), [SuSEfirewall2](#), [syslog-ng](#), [timezone](#), [vim](#), [yast2](#), [yast2-firstboot](#), [zypper](#)

[Quick add...](#)

**Select Configuration:**  
**root password: 123456**

#### Software information

0 patterns selected  
 24 packages selected  
 297 total packages

[General](#)
[Personalize](#)
[Startup](#)
[Server](#)
[Desktop](#)
[Appliance](#)
[Scripts](#)

### Default locale

Language: [English \(US\)](#)  
 Keyboard Layout: [English \(US\)](#)

### Default time zone

Region: [Global](#)  
 Time Zone: [UTC](#)

### Network

- ☐ Do not configure network
- ☐ Configure network during first boot
- ☐ Use NetworkManager to configure the network at run-time
- ☒ Discover network settings automatically (DHCP)
- ☐ Manually configure network

**Note:** Your appliance will always run DHCP in Testdrive.

### Firewall

- ☒ Enable firewall
  - ☒ Open SSH port (22)
  - ☒ Open HTTP ports (80, 443)

### Users and groups

Login	UID (optional)	Password	Group	Home directory	Shell
root	0	<input type="password" value="123456"/>	root	/root	/bin/bash

[Add new user...](#)

Select → Build tab

Default format: Live CD / DVD (.iso)

The screenshot shows the 'Build' tab of the openSUSE 13.2 web interface. The header includes the openSUSE logo, version '13.2', and navigation links: Start, Software, Configuration, Files, and Build. On the left, 'Software information' shows 0 patterns selected, 24 packages selected, and 306 total packages. A 'Messages' section contains a tip about using the disk image format. The main area features a 'Version' dropdown set to '0.0.1', a 'Default format' dropdown set to 'Live CD / DVD (.iso)', and a green 'Build' button. Below these are 'Additional formats' with checkboxes for various virtualization and storage options. At the bottom, there are links for 'Changelog...' and 'Configuration...', and a note about exporting Kwi configuration.

Select → Build

This screenshot shows the 'Build' tab after the build process has completed. The 'Build' button is now disabled. A yellow banner at the bottom displays the build details: 'Uncompressed size: 274MB', 'Built 2 seconds ago, in 8:05', and 'Live CD / DVD (.iso) 274 MB'. To the right of the banner are links for 'Testdrive', 'Download', and 'View files'. The 'Additional formats' section remains visible. A timer '2:40' with a close button is visible in the top right corner.

After the build finishes,

Select Download to test the iso file.

## 1.1. ISO testing on VMware Workstation

*Under VMware workstation:*

*Select:*

*File→New Virtual Machine*

*Custom (advanced) configuration*

*Installer disk image file: <path/to>/openSUSE\_13.2.x86\_64\*.iso*

*Select “power on this virtual machine”*



*The GRUB2 menu should show. Then go to a linux login:*

```
Welcome to openSUSE 13.2 "Harlequin" – Kernel 3.16.7-29-default (tty1).  
  
linux login:
```

*Getting to this point means the ISO build was successful.*

*Use the configured id: root/123456*

### *Check network interface:*

```
> ifconfig
eno167777 Link encap:Ethernet HWaddr 00:0c:29:E8:23:44
  inet addr:192.168.17.139 Bcast:192.168.17.255 Mask:255.255.255.0
  inet6 addr: fe80::20c:29ff:fee8:2344/64 Scope:Link
  UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
  RX packets:57 errors:0 dropped:0 overruns:0 frame:0
  TX packets:48 errors:0 dropped:0 overruns:0 carrier:0
  collisions:0 txqueuelen:1000
  RX bytes:7101 (6.9 Kb) TX bytes:9609 (9.3 Kb)
```

### *SSH into this IP addr*

### *Verify the OS build:*

```
> cat /etc/os-release
NAME=opensuse
VERSION="13.2 (Harlequin)"
VERSION_ID="13.2"
PRETTY_NAME="opensuse 13.2 (Harlequin) (x86_64)"
ID=opensuse
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:opensuse:opensuse:13.2"
BUG_REPORT_URL="https://bugs.opensuse.org"
HOME_URL="https://opensuse.org/"
ID_LIKE="suse"
```

### *Check bundled RPMs:*

```
> rpm -qa
...
```

### *Shutdown the systemd way:*

```
> systemctl halt
```



## 2. Reproducing a suseStudio build with KIWI

The backend of suseStudio is the KIWI imaging system: <https://github.com/openSUSE/kiwi>

And the corresponding configuration files can be downloaded from suseStudio.com:

The screenshot shows the suseStudio web interface for openSUSE 13.2. The top navigation bar includes 'Start', 'Software', 'Configuration', 'Files', 'Build', and 'Share'. The 'Build' tab is active. On the left, a sidebar shows 'Software information' with 0 patterns selected, 24 packages selected, and 306 total packages. Below this is a 'Messages' section with a tip about using the disk image format. The main content area is titled 'Version 0.0.1' and features a 'Default format' dropdown set to 'Live CD / DVD (iso)' and a green 'Build' button. A list of 'Additional formats' includes USB Stick / Hard Disk Image, Preload ISO (iso), VMware Workstation / VirtualBox (.vmdk), OVF Virtual Machine / ESXi (.ovf), Xen guest (.img), Hyper-V Virtual Hard Disk (.vhdx), and SUSE Cloud / OpenStack / KVM (.qcow2). Below this is a 'Configuration...' link. A section for 'Version 0.0.1' shows a 'Live CD / DVD (iso)' format with a size of 275 MB, and links for 'Testdrive', 'Download', and 'View files'. A 'Configuration...' link and a 'Clone' button are also present. A note states: 'Builds older than seven days may be deleted to free up space on our servers. But don't worry, you can rebuild them at any time.' Below this is a link to 'View MD5 checksums' and a link to 'Export your appliance's Kiwi configuration'. An 'Export' section follows, with a note about using Kiwi and a link to 'Download appliance source' which is highlighted with a red rectangle. A 'Take notes' button is at the bottom left.

### 2.1. Kiwi documentation

A high level introduction: <https://www.suse.com/events/susecon/sessions/presentations/SUSECon-2012-TT1307.pdf>

The best general documentation is the Kiwi Cookbook:

html version: <https://doc.opensuse.org/projects/kiwi/doc/>

pdf version: <https://github.com/openSUSE/kiwi/blob/master/doc/kiwi.pdf>

After the kiwi RPMs are installed, there are a number of example config.xml files:

```
> rpm -ql 'kiwi-doc'
/usr/share/doc/packages/kiwi/kiwi.pdf
...
/usr/share/doc/packages/kiwi/examples/suse-13.2/suse-live-iso/config.xml

> rpm -ql 'kiwi-desc-oemboot'
...
/usr/share/kiwi/image/oemboot/suse-SLES12/config.xml
...

> rpm -ql 'kiwi-desc-isoooot'
...
/usr/share/kiwi/image/isoboot/suse-13.2/config.xml
```

### 3. OS Builder Environment – OpenSUSE

#### 3.1. Repos/ISOs

Obtain the x86\_64 ISO from the official site: <http://download.opensuse.org/distribution/13.2/iso/>

While downloading 'openSUSE-13.2-DVD-x86\_64.iso' is possible, it will be slow.  
A torrent client with the corresponding \*.torrent file is much faster.

#### 3.2. OS install

Using a Virtual environment like Vmware Workstation can speed up the iterations of OS installs.

Attach the ISO to a virtual CDROM, power up the virtual machine, and install the OpenSuse 13.2.

#### 3.3. Kiwi installation

Once the OS is installed, the zypper repositories need to point to the most recent updates:

```
> zypper lr -u
# | Alias | Name | Enabled | GPG Check | Refresh
|-----|-----|-----|-----|-----|-----|
1 | download.opensuse.org-13.2-non-oss | Update Repository (Non-Oss) | Yes | ( p) Yes | Yes
| http://download.opensuse.org/update/13.2-non-oss/
2 | download.opensuse.org-non-oss | Main Repository (NON-OSS) | Yes | ( p) Yes | Yes
| http://download.opensuse.org/distribution/13.2/repo/non-oss/
3 | download.opensuse.org-oss | Main Repository (OSS) | Yes | ( p) Yes | Yes
| http://download.opensuse.org/distribution/13.2/repo/oss/
4 | download.opensuse.org-oss_1 | Main Repository (Sources) | Yes | ( p) Yes | Yes
| http://download.opensuse.org/source/distribution/13.2/repo/oss/
5 | download.opensuse.org-update | Main Update Repository | Yes | ( p) Yes | Yes
| http://download.opensuse.org/update/13.2/
6 | openSUSE-13.2-0 | openSUSE-13.2-0 | Yes | ( p) Yes | No
| cd:///devices=/dev/disk/by-id/ata-Vmware_Virtual_IDE_CDROM_Drive_10000000000000000001
7 | repo-debug | openSUSE-13.2-Debug | No | ---- | Yes
| http://download.opensuse.org/debug/distribution/13.2/repo/oss/
8 | repo-debug-update | openSUSE-13.2-Update-Debug | No | ---- | Yes
| http://download.opensuse.org/debug/update/13.2/
9 | repo-debug-update-non-oss | openSUSE-13.2-Update-Debug-Non-Oss | No | ---- | Yes
| http://download.opensuse.org/debug/update/13.2-non-oss/
```

<Show deleting an entry>

<Show adding an entry>

<Add the latest kiwi repo>

latest kiwi repo for OpenSuse 13.2:

[http://download.opensuse.org/repositories/Virtualization:/Appliances/openSUSE\\_13.2/x86\\_64/](http://download.opensuse.org/repositories/Virtualization:/Appliances/openSUSE_13.2/x86_64/)

Then the kiwi tools can be installed:

```
> zypper in kiwi kiwi-doc kiwi-templates kiwi-tools kiwi-desc-vmxboot kiwi-desc-isoboot kiwi-desc-oemboot squashfs clicfs
...
> rpm -qa 'kiwi*'
kiwi-7.01.18-5.1.x86_64
kiwi-doc-7.01.18-5.1.noarch
kiwi-tools-7.01.18-5.1.x86_64
kiwi-desc-vmxboot-7.01.18-5.1.x86_64
kiwi-desc-isoboot-7.01.18-5.1.x86_64
kiwi-templates-7.01.18-5.1.x86_64
kiwi-desc-oemboot-7.01.18-5.1.x86_64
> kiwi --version
Dec-08 09:48:15 <1> : Version:
Dec-08 09:48:15 <1> : --> vnr: 7.01.18
```

## 4. OpenSUSE 13.2 ISO

This generates an ISO image that immediately installs Linux to a harddrive.

### Build:

```
# checkout
> git clone https://github.com/dsnider0909/suse_builds.git

# build
> cd suse_builds/opensuse_iso
> kiwi --build $PWD/source --destdir /tmp/opensuse_iso
Dec-08 11:37:16 <1> : Find build results at: /tmp/opensuse_iso
done
Dec-08 11:37:16 <1> : KIWI exited successfully
```

Here are the relevant changes to config.xml:

```
=== source/config.xml ===
<type checkprebuilt='true' boot='oemboot/suse-13.2' fsnocheck='true' filesystem='ext3'
bootloader='grub2' installiso='true' installboot='install' kernelcmdline='quiet'
fsmountoptions='acl' image='oem'>
  <oemconfig>
    <oem-swap>true</oem-swap>
    <oem-swapsize>512</oem-swapsize>
    <oem-boot-title>openSUSE_13.2_svr</oem-boot-title>
  </oemconfig>
</type>

<repository type='rpm-md'>
  <source path='http://download.opensuse.org/update/13.2/'/>
</repository>
<repository type='yast2'>
  <source path='http://download.opensuse.org/distribution/13.2/repo/oss/'/>
</repository>
```

### Test:

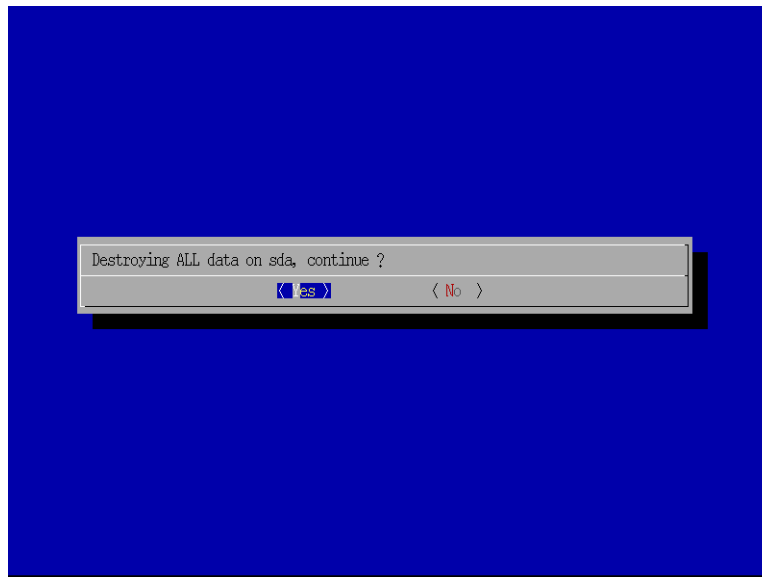
```
# copy out the ISO from the guest build environment
cygwin> scp root@<guest_ip>:/tmp/opensuse_iso/openSUSE_13.2.x86_64-0.0.2.install.iso .
```

*Under VMware workstation:*

*Select:*

*File→New Virtual Machine*  
*Custom (advanced) configuration*  
*Installer disk image file: <path/to/>openSUSE\_13.2.x86\_64-0.0.2.install.iso*  
*Guest OS: Linux*  
*Version: OpenSUSE 64-bit*  
*Processors – number of processors: 2*  
*Memory for this virtual machine: 2048MB*  
*Network connection: NAT*  
*SCSI Controller: LSI Logic*  
*Virtual disk type: SCSI*  
*Create a new virtual disk*

Select “power on this virtual machine”



```
Welcome to openSUSE 13.2 "Harlequin" - Kernel 3.16.7-29-default (tty1).  
  
linux login:
```

Getting to this point means the ISO build was successful.

Use the configured id: root/123456

## 5. OpenSUSE 13.2 stick

This generates a raw USB image that immediately installs Linux to a harddrive.

### Build:

```
# checkout
> git clone https://github.com/dsnider0909/suse_builds.git

# build
> cd suse_builds/opensuse_stick
> kiwi --build $PWD/source --destdir /tmp/opensuse_stick
Dec-08 11:37:16 <1> : Find build results at: /tmp/opensuse_stick
done
Dec-08 11:37:16 <1> : KIWI exited successfully
```

Here are the relevant changes to config.xml:

```
=== source/config.xml ===
<type checkprebuilt='true' boot='oemboot/suse-13.2' fsnocheck='true' filesystem='ext3'
bootloader='grub2' installstick='true' installboot='install' kernelcmdline=''
fsmountoptions='acl' image='oem' >
  <oemconfig>
    <oem-swap>>false</oem-swap>
    <oem-boot-title>openSUSE_13.2</oem-boot-title>
  </oemconfig>
</type>

<repository type='rpm-md'>
  <source path='http://download.opensuse.org/update/13.2/'/>
</repository>
<repository type='yast2'>
  <source path='http://download.opensuse.org/distribution/13.2/repo/oss/'/>
</repository>
```

## Test:

```
# copy raw image to a USB flash drive
> cd /tmp/opensuse_stick
> dd if=opensUSE_13.2_svr.x86_64-0.0.4.raw.install.raw of=/dev/sdb bs=1M
```

Then boot the USB flash drive on real hardware or boot this VM within VMware workstation to then boot a USB stick:  
<https://www.plop.at/en/bootmanagers.html>

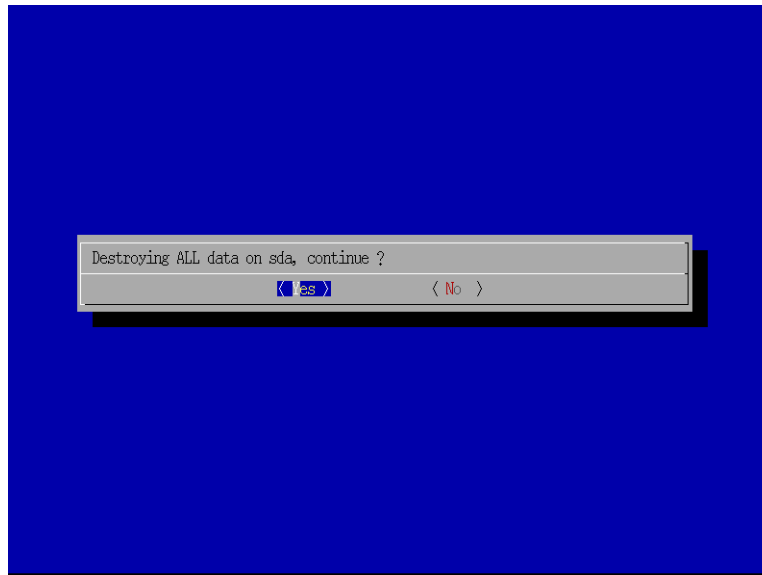
Boot to Plop Boot Manager  
Ensure the USB stick is attached  
Select: USB



Grub2 screen:



Starting hard drive initialization:



And then the login screen:

```
[ 288.328370] NET: Registered protocol family 17  
Welcome to openSUSE 13.2 "Harlequin" - Kernel 3.16.7-29-default (tty1).  
  
linux login:
```

## 6. SLES 12 ISO

```
# checkout
> git clone https://github.com/dsnider0909/suse_builds.git

# build
> cd suse_builds/SLES_12_iso
```

SLES 12 requires the following repo files accessible in a local directory. In this case in '/media/flash/suse'.

```
> ls -l /media/flash/suse
SLE-12-SDK-DVD-x86_64-GM-DVD1.iso
SLE-12-SDK-DVD-x86_64-GM-DVD2.iso
SLE-12-Server-DVD-x86_64-GM-DVD1.iso
SLE-12-Server-DVD-x86_64-GM-DVD2.iso
```

Official installation ISOs can be obtained with registration here:

<https://www.suse.com/products/server/download/>

The config.xml the following repository parameters to point to the '/media/flash/suse' directory.

```
=== config.xml ===
<repository type='yast2'>
  <!-- source path='{SLE 12 SDK x86_64}'/> -->
  <source path="iso:///media/flash/suse/SLE-12-SDK-DVD-x86_64-GM-DVD1.iso "/>
</repository>
<repository type='yast2'>
  <!-- source path='{SLES 12 x86_64}'/> -->
  <source path="iso:///media/flash/suse/SLE-12-Server-DVD-x86_64-GM-DVD1.iso "/>
</repository>
```

### Build:

```
# prepare
> cd suse_builds/sles_12_iso
> kiwi --build $PWD/source --destdir /tmp/sles_iso
Dec-09 10:17:44 <1> : KIWI exited successfully
Dec-09 10:17:44 <1> : Complete logfile at: /tmp/sles_iso/build/image-root.log

# <recheck>
> ls /tmp/sles_iso
SLES_12.x86_64-0.0.4.install.iso
```

### Test:

```
# copy out the ISO from the guest build environment
cygwin> scp root@<guest_ip>:/tmp/sles_iso/SLES_12.x86_64-0.0.4.install.iso .
```



*Under VMware workstation:*

*Select:*

*File→New Virtual Machine*

*Custom (advanced) configuration*

*Installer disk image file: <path/to/>SLES\_12.x86\_64-0.0.4.install.iso*

*Guest OS: Linux*

*Version: SUSE Linux Enterprise 64-bit*

*Processors – number of processors: 2*

*Memory for this virtual machine: 2048MB*

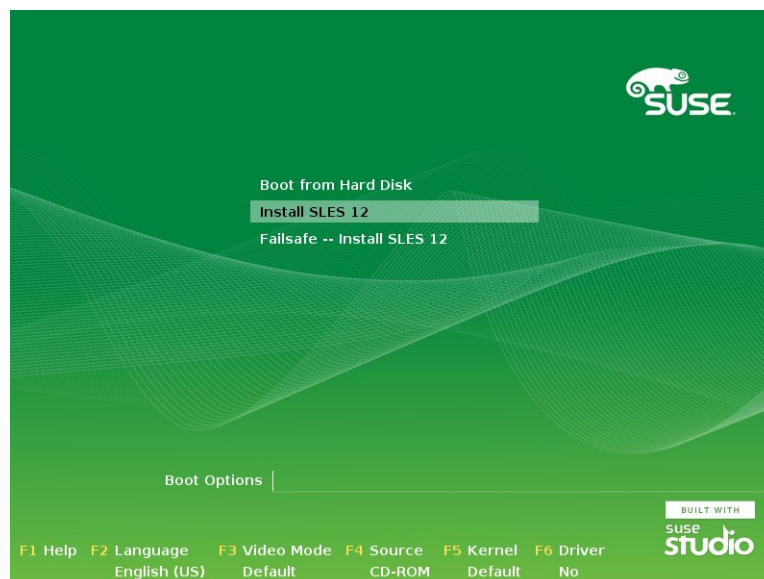
*Network connection: NAT*

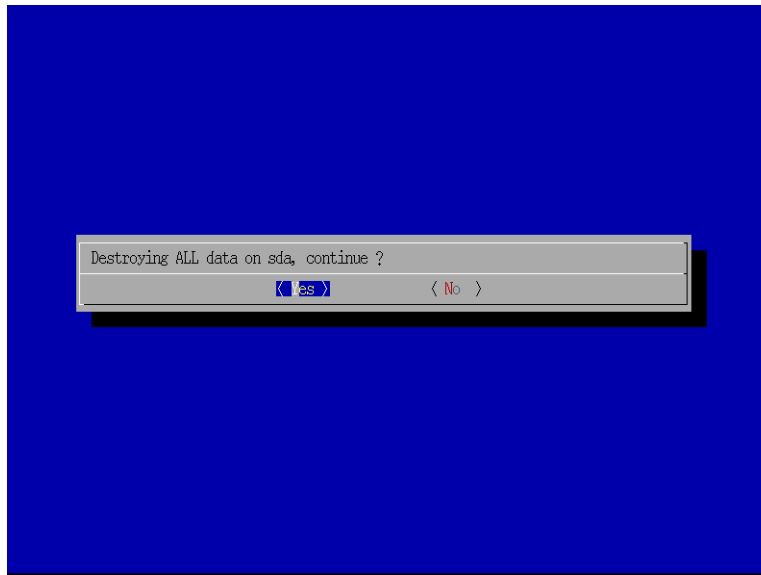
*SCSI Controller: LSI Logic*

*Virtual disk type: SCSI*

*Create a new virtual disk*

*Select “power on this virtual machine”*





```
Welcome to SUSE Linux Enterprise Server 12 (x86_64) - Kernel 3.12.28-4-default (tty1).
```

```
linux-bqrq login: root
```

*login id: root/123456*

*Check network interface:*

```
> ip addr
2: eth0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc pfifo_fast state UP group default qlen 1000
    link/ether 00:0c:29:9b:e5:35 brd ff:ff:ff:ff:ff:ff
    inet 192.168.17.140/24 brd 192.168.17.255 scope global eth0
        valid_lft forever preferred_lft forever
    inet6 fe80::20c:29ff:fe9b:e535/64 scope link
        valid_lft forever preferred_lft forever
```

*SSH into this IP addr*

*Verify the OS build:*

```
> cat /etc/os-release
NAME="SLES"
VERSION="12"
VERSION_ID="12"
PRETTY_NAME="SUSE Linux Enterprise Server 12"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12"
```

*Check bundled RPMs:*

```
> rpm -qa
...
```

*Shutdown the systemd way:*

```
> systemctl halt
```