

# **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.
0.06	D Snider	15/12/09	Retested setting OpenSuse build environment. Added screenshots.

# 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.....	13
<b>4. OPENSUSE 13.2 ISO.....</b>	<b>14</b>
<i>Build:</i> .....	14
<i>Test:</i> .....	14
<b>5. OPENSUSE 13.2 STICK.....</b>	<b>16</b>
<i>Build:</i> .....	16
<i>Test:</i> .....	17
<b>6. SLES 12 ISO.....</b>	<b>19</b>
<i>Build:</i> .....	19
<i>Test:</i> .....	19

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

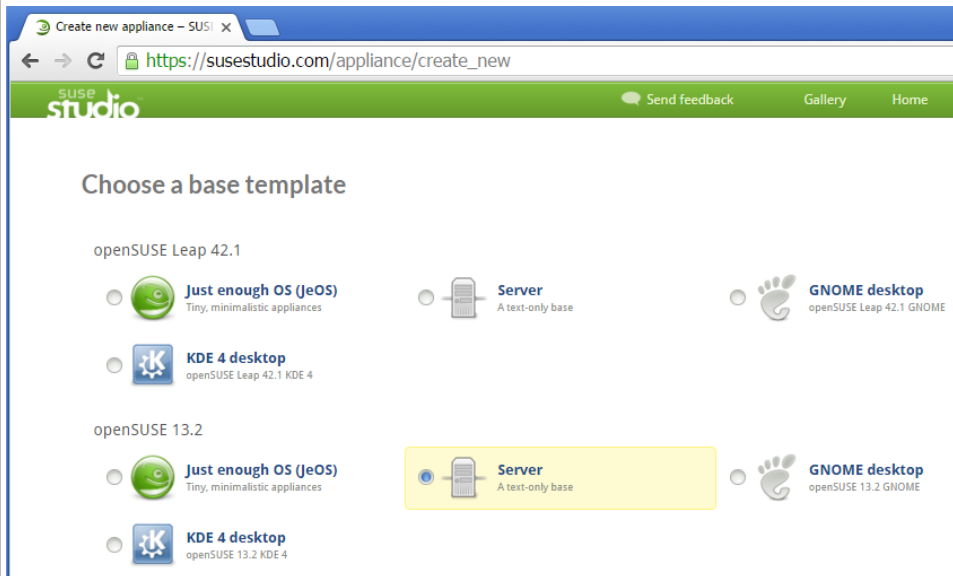
The Kiwi Imaging System prepares a Linux kernel and root filesystem to then bundle into one of many formats. The examples here include DVD isos and USB stick binaries for OpenSuse and SLES servers.

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

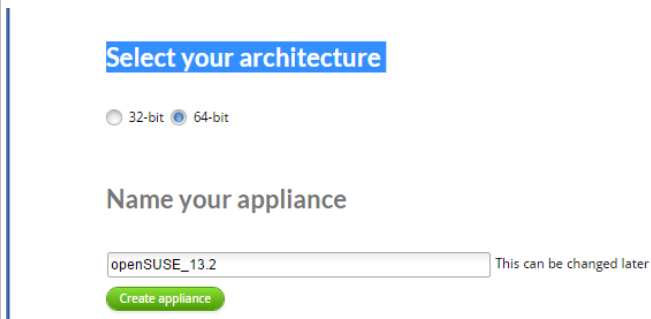
The simplest way to first get traction with Kiwi is to use the online graphical version. This will generate some example configurations that can later be ported to the off line Kiwi tools.

*Register and Login to susestudio.com.*

*Start with creating an openSUSE 13.2 server:*



*Scroll down and name the appliance:*

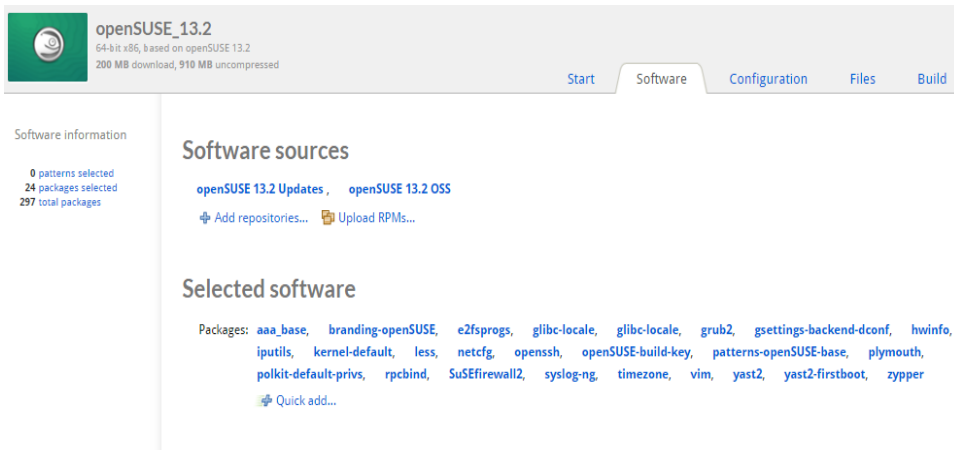


*Select: Create appliance*

The tabs further configure the new OS.

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

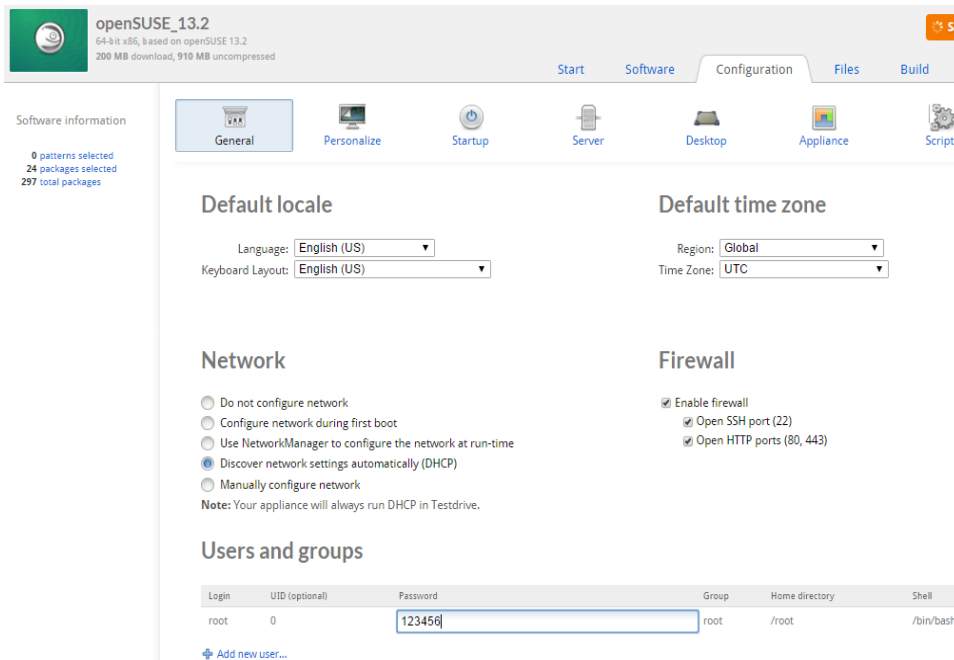
For now, the defaults are sufficient:



The screenshot shows the 'Software' tab of the openSUSE 13.2 installer. The top bar includes the openSUSE logo, version '13.2', architecture '64-bit x86', and download sizes. Navigation tabs are 'Start', 'Software' (active), 'Configuration', 'Files', and 'Build'. On the left, 'Software information' shows 0 patterns, 24 packages selected, and 297 total packages. The main area is titled 'Software sources' and lists 'openSUSE 13.2 Updates' and 'openSUSE 13.2 OSS'. Below this is 'Selected software', listing various packages like 'aaa\_base', 'branding-openSUSE', 'e2fsprogs', etc. Buttons for 'Add repositories...', 'Upload RPMs...', and 'Quick add...' are visible.

Select Configuration:

root password: 123456



The screenshot shows the 'Configuration' tab of the openSUSE 13.2 installer. The top bar is similar to the previous screen, but the 'Configuration' tab is active. The left sidebar shows 0 patterns, 24 packages selected, and 297 total packages. The main area has a navigation bar with icons for 'General', 'Personalize', 'Startup', 'Server', 'Desktop', 'Appliance', and 'Scripts'. The 'General' section is active, showing 'Default locale' (Language: English (US), Keyboard Layout: English (US)) and 'Default time zone' (Region: Global, Time Zone: UTC). Below this are 'Network' settings (with 'Discover network settings automatically (DHCP)' selected) and 'Firewall' settings (with 'Enable firewall' and 'Open SSH port (22)' and 'Open HTTP ports (80, 443)' checked). A 'Users and groups' section at the bottom shows a table with columns for Login, UID, Password, Group, Home directory, and Shell. The 'root' user is listed with UID 0, password '123456', group 'root', home directory '/root', and shell '/bin/bash'. A button 'Add new user...' is at the bottom left.

Login	UID (optional)	Password	Group	Home directory	Shell
root	0	123456	root	/root	/bin/bash

Select → Build tab

Default format: Live CD / DVD (.iso)

Select → Build

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 'Changelog...' link and 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 are links for 'View MD5 checksums' and 'Export your appliance's Kiwi configuration'. An 'Export' section follows, with a note about using Kiwi locally and a link to 'Download appliance source' which is highlighted with a red rectangle. A 'Take notes' link 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-isoboot'
...
/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/>

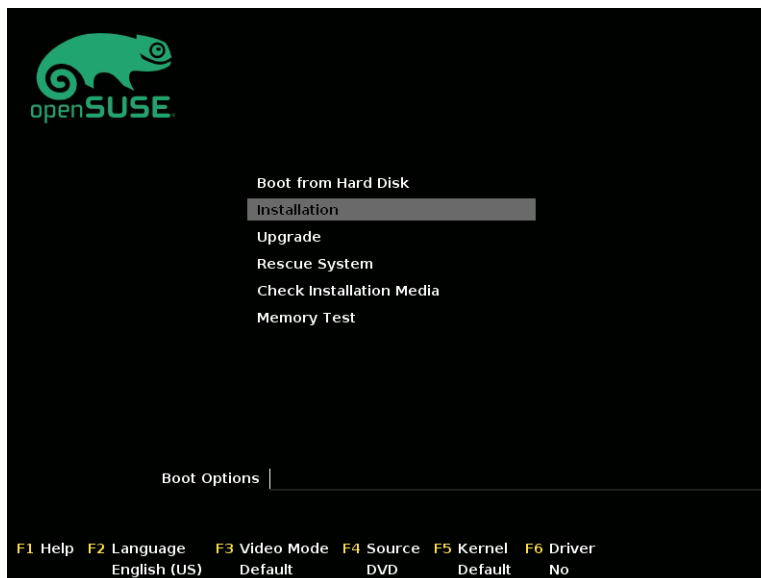
While downloading 'openSUSE-13.2-DVD-x86\_64.iso' is possible, it will be slow.

A torrent client with the corresponding \*.torrent file is much faster.

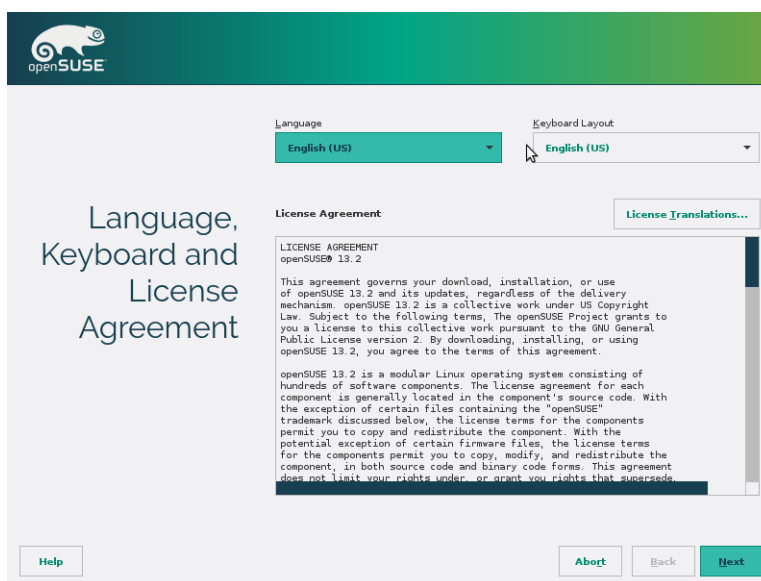
#### 3.2. OS install

Using a virtual environment like Vmware Workstation can speed up the iterations of OS installs. So this document assumes such a tool is being used.

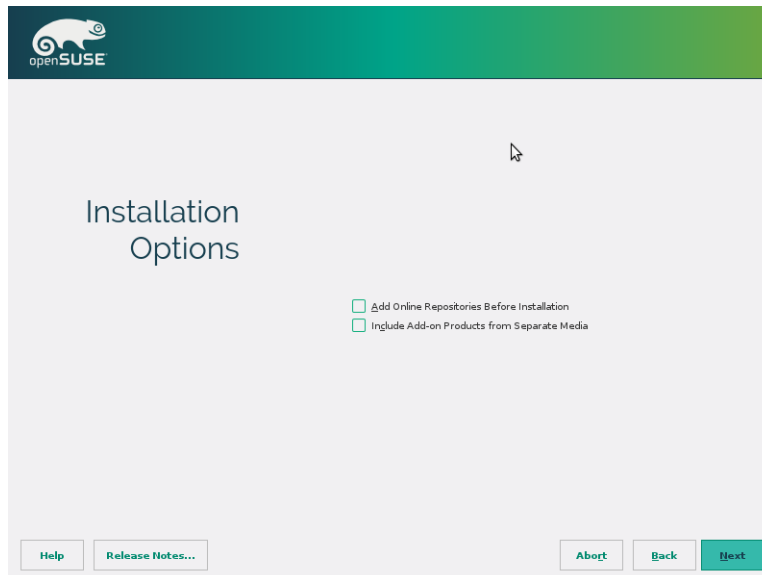
Attach the ISO to a virtual CDROM, power up the virtual machine, and install the OpenSuse 13.2.



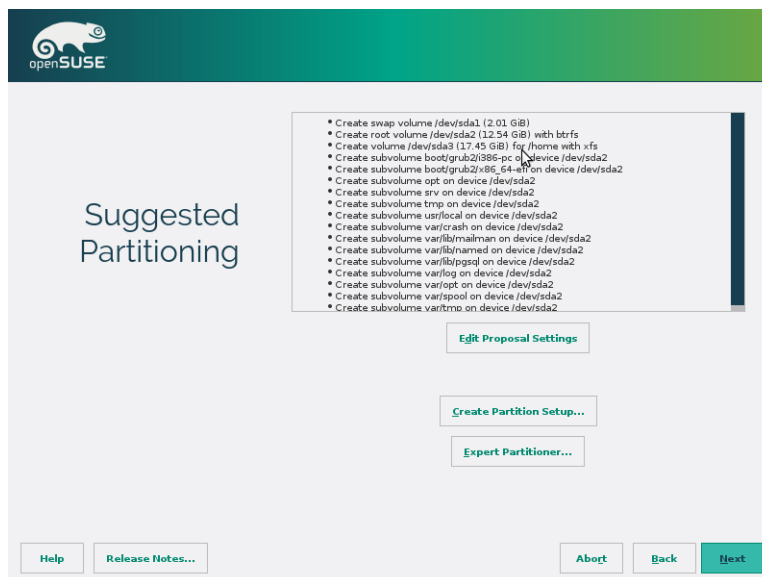
Select: Installation



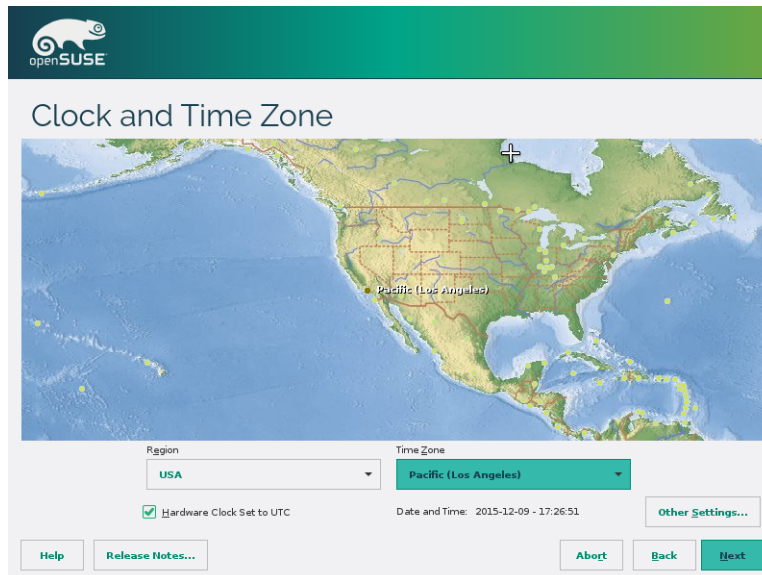
Select: Next



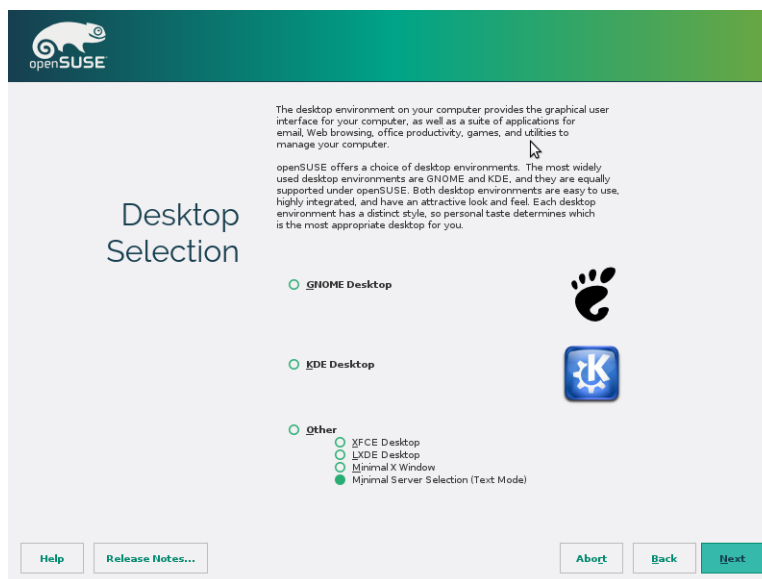
Install repositories later. Select: Next




Default partitioning. Select: Next



Select a timezone.



Select: Minimal Server (Text Mode)



## Create New User

User's Full Name  
user

Username  
user

Password  
••••••

Confirm Password  
••••••


☒ Use this password for system administrator  
☐ Receive System Mail  
☒ Automatic Login

Summary  
 The authentication method is local /etc/passwd.  
 The password encryption method is SHA-512.

[Change...](#)

[Help](#) [Release Notes...](#) [Abort](#) [Back](#) [Next](#)

Select a general user id: user/123456.  
This will also be the root password.



## Installation Settings

Click a headline to make changes.

- Do not install bootcode into MBR ([install](#))
- Install bootcode into "/*i*" partition ([do not install](#))

**Software**

- Product: openSUSE
- System Type: Minimal Server Selection (Text Mode)
- Patterns:
  - + Base System
  - + YaST Installation Packages
  - + Software Management
- Size of Packages to Install: 848.6 MiB

**Default systemd target**

- Text mode

**System**

- System and Hardware Settings

**Firewall and SSH**

- Firewall will be enabled ([disable](#))
- SSH port will be open ([block](#))
- SSH service will be enabled ([disable](#))

**Clone System Configuration**

- The AutoYaST profile will not be saved ([write it](#))

[Export Configuration](#)

[Help](#) [Release Notes...](#) [Abort](#) [Back](#) [Install](#)

Select: Enable SSH port  
Enable SSH

Select: Install

There will be a long process of initializing the hard drive, installing RPMs, and then a reboot.

```
Welcome to openSUSE 13.2 "Harlequin" - Kernel 3.16.6-2-default (tty1).

linux-wy1s login:
```

Then a login should come up.  
Login: root/123456

Get the IP address:

```
> ifconfig
eno167777 Link encap:Ethernet HWaddr 00:0C:29:90:0B:74
          inet addr:192.168.17.141 Bcast:192.168.17.255 Mask:255.255.255.0
          inet6 addr: fe80::20c:29ff:fe90:b74/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
          RX packets:141 errors:0 dropped:0 overruns:0 frame:0
          TX packets:139 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:15981 (15.6 Kb) TX bytes:17376 (16.9 kb)
...

```

SSH in to allow easier copy/paste from these instructions.

### 3.3. Kiwi installation

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

```
> zypper lr -E -u
# | Alias | Name | Enabled | Refresh | URI
+-----+-----+-----+-----+-----+-----+
1 | opensUSE-13.2-0 | opensUSE-13.2-0 | Yes | No | cd:///devices=/dev/disk/by-
id/ata-Virtual_IDE_CDROM_Drive_1000000000000000001
5 | repo-non-oss | opensUSE-13.2-Non-Oss | Yes | Yes |
http://download.opensuse.org/distribution/13.2/repo/non-oss/
6 | repo-oss | opensUSE-13.2-Oss | Yes | Yes |
http://download.opensuse.org/distribution/13.2/repo/oss/
8 | repo-update | opensUSE-13.2-Update | Yes | Yes |
http://download.opensuse.org/update/13.2/
9 | repo-update-non-oss | opensUSE-13.2-Update-Non-Oss | Yes | Yes |
http://download.opensuse.org/update/13.2-non-oss/

```

Note: there is one repo coming in from the original install ISO.

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

> rpm -qa 'kiwi*'
kiwi-tools-7.01.18-5.1.x86_64
kiwi-desc-vmxboot-7.01.18-5.1.x86_64
kiwi-doc-7.01.18-5.1.noarch
kiwi-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-desc-isoboot-7.01.18-5.1.x86_64

# possibly needed
> zypper in clicfs git
> rpm -qa clicfs
clicfs-1.4.6-6.1.3.x86_64

> kiwi --version
Dec-08 09:48:15 <1> : Version:
Dec-08 09:48:15 <1> : --> vnr: 7.01.18

```

These examples used the kiwi RPMs from the existing OpenSUSE 13.2 distro.

If for some reason, a bug is found. The latest kiwi RPMs are here:

[http://download.opensuse.org/repositories/Virtualization:/Appliances/opensUSE\\_13.2/x86\\_64/](http://download.opensuse.org/repositories/Virtualization:/Appliances/opensUSE_13.2/x86_64/)

## 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_13.2_iso
> kiwi --build 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:

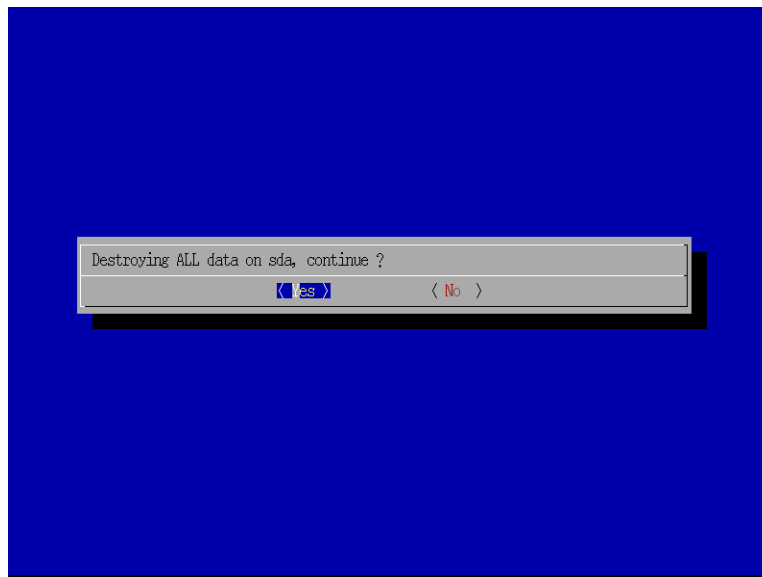
```
# copy out the ISO from the guest build environment
cygwin> scp root@<guest_ip>:/tmp/opensuse_iso/opensUSE_13.2.x86_64-0.0.2.install.iso .
```

*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_13.2_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>

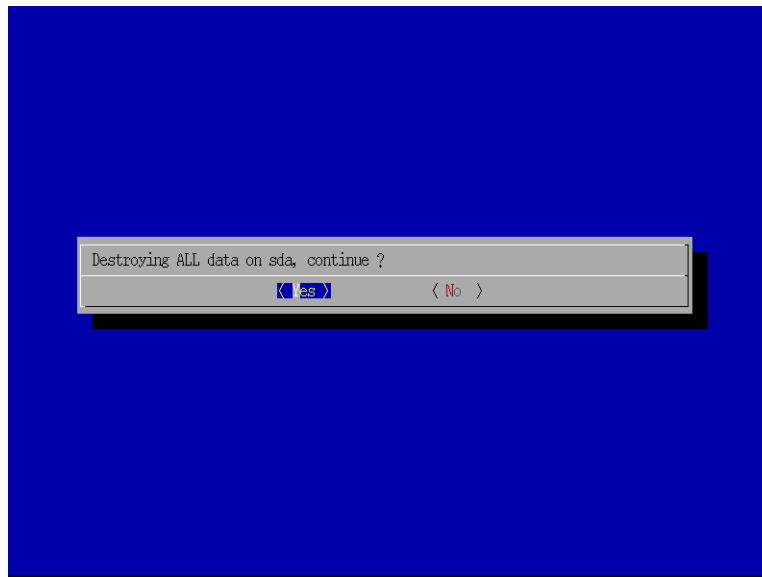
Boot to Plop Boot Manager  
Ensure the USB stick is attached  
Select: USB



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
```

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 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*

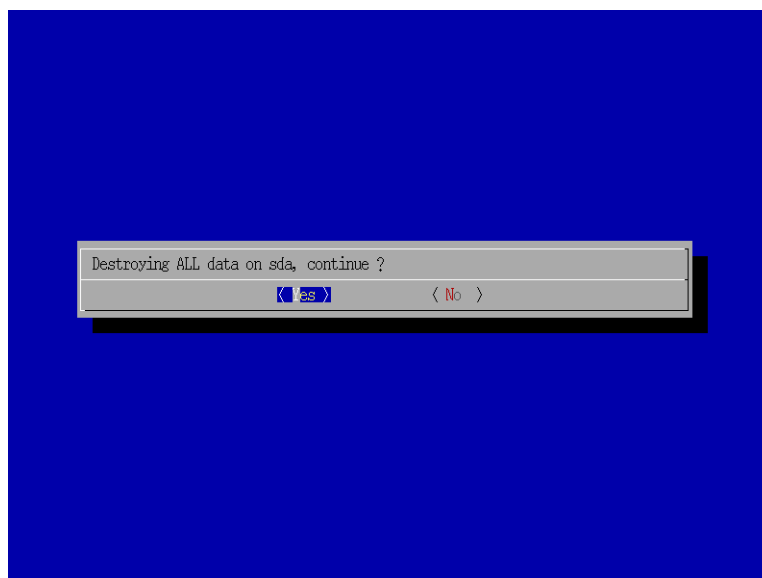
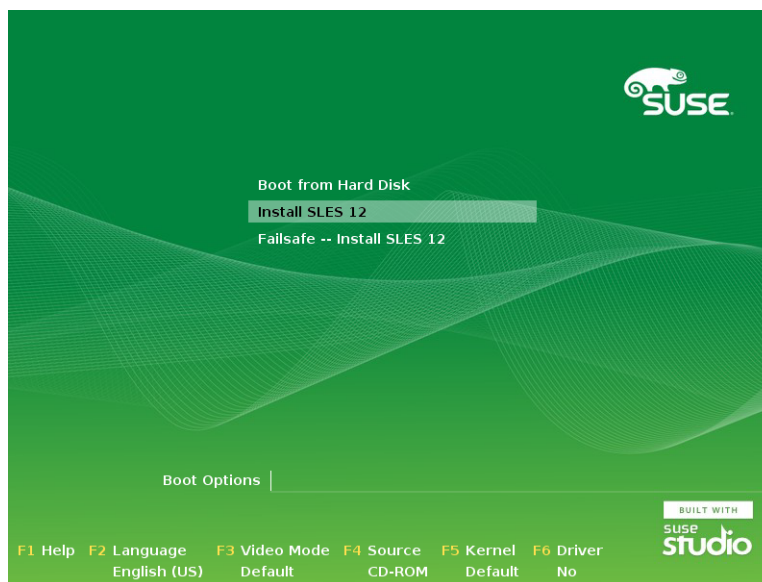
*Network connection: NAT*

*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*

```
> shutdown -h
```