

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.

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

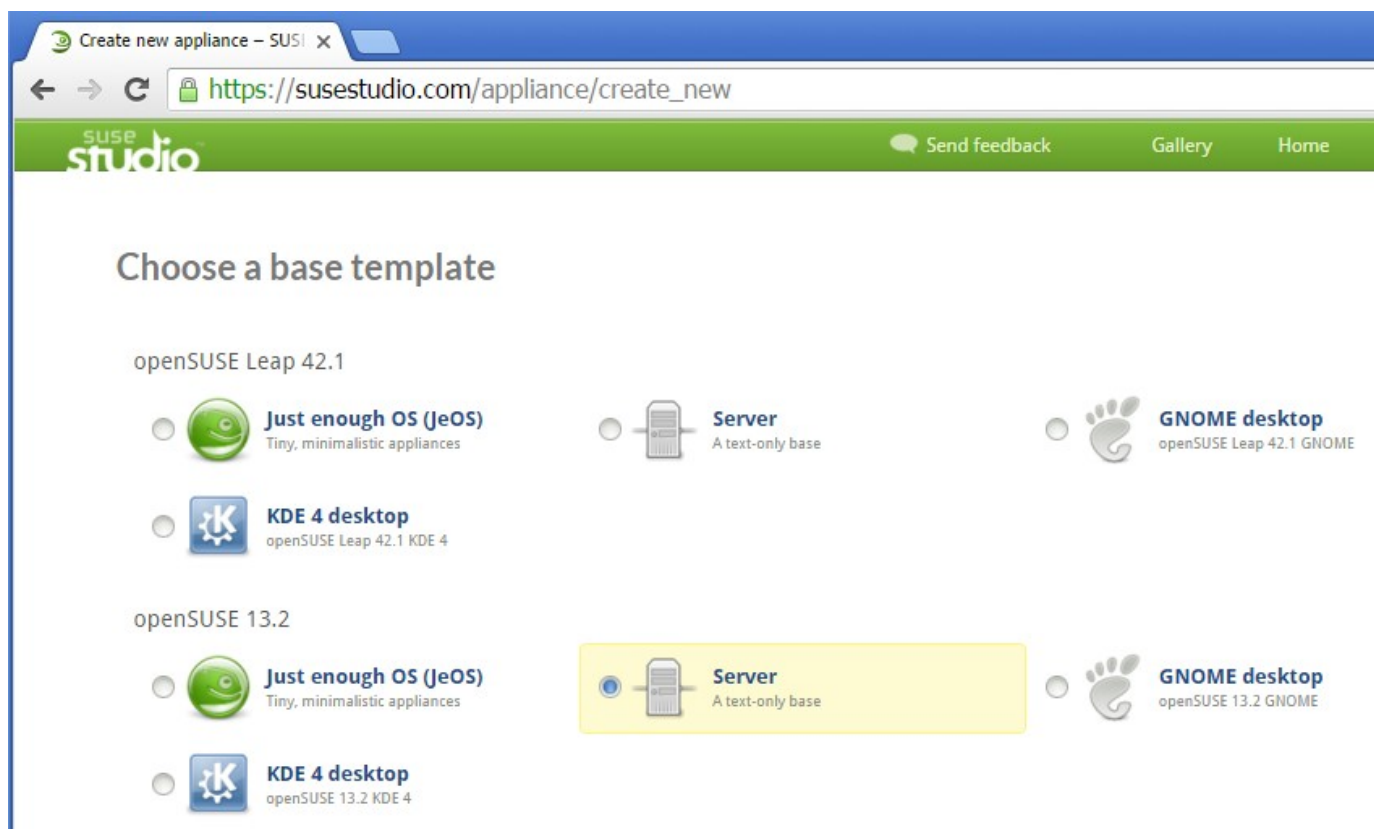
1. SW/HW Requirements

VMware Workstation or an equivalent

2. 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

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:

The screenshot shows the 'openSUSE_13.2' header with a green logo and text: '64-bit x86, based on openSUSE 13.2' and '200 MB download, 910 MB uncompressed'. Below the header are tabs: 'Start', 'Software' (active), 'Configuration', 'Files', and 'Build'. On the left, 'Software information' shows '0 patterns selected', '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' with links to 'Add repositories...' and 'Upload RPMs...'. Below this is 'Selected software' listing various packages like 'aaa_base', 'branding-openSUSE', 'e2fsprogs', etc., and a 'Quick add...' link.

Select Configuration:

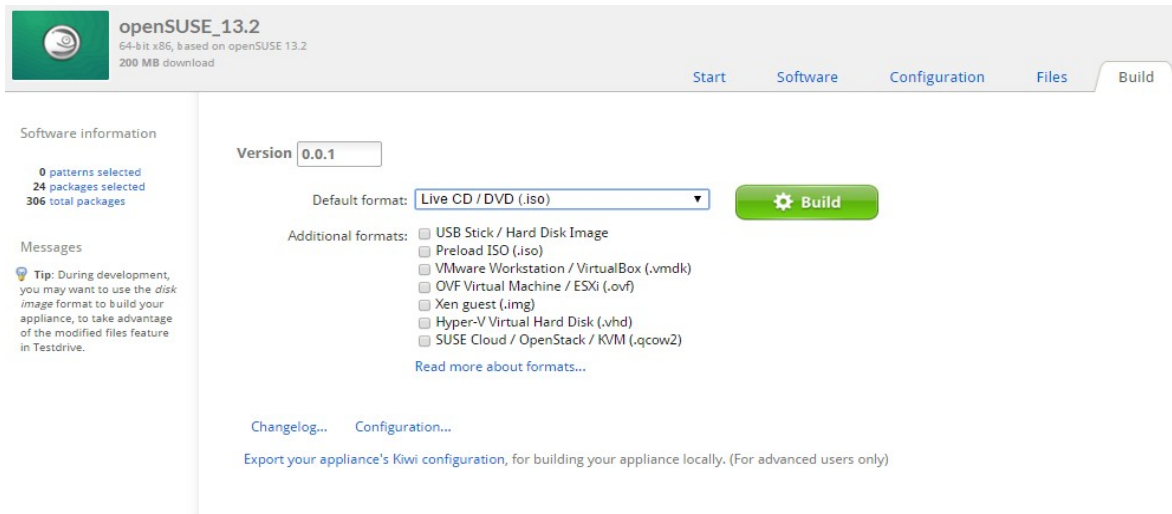
root password: 123456

The screenshot shows the 'openSUSE_13.2' header with a green logo and text: '64-bit x86, based on openSUSE 13.2' and '200 MB download, 910 MB uncompressed'. Below the header are tabs: 'Start', 'Software', 'Configuration' (active), 'Files', and 'Build'. On the left, 'Software information' shows '0 patterns selected', '24 packages selected', and '297 total packages'. The main area has a top bar with icons for 'General', 'Personalize', 'Startup', 'Server', 'Desktop', 'Appliance', and 'Scripts'. Below this are sections for 'Default locale' (Language: English (US), Keyboard Layout: English (US)), 'Default time zone' (Region: Global, Time Zone: UTC), 'Network' (radio buttons for network configuration, with 'Discover network settings automatically (DHCP)' selected), 'Firewall' (checkboxes for enabling firewall and opening ports), and 'Users and groups' (a table with columns for Login, UID, Password, Group, Home directory, and Shell, showing the root user with password 123456).

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

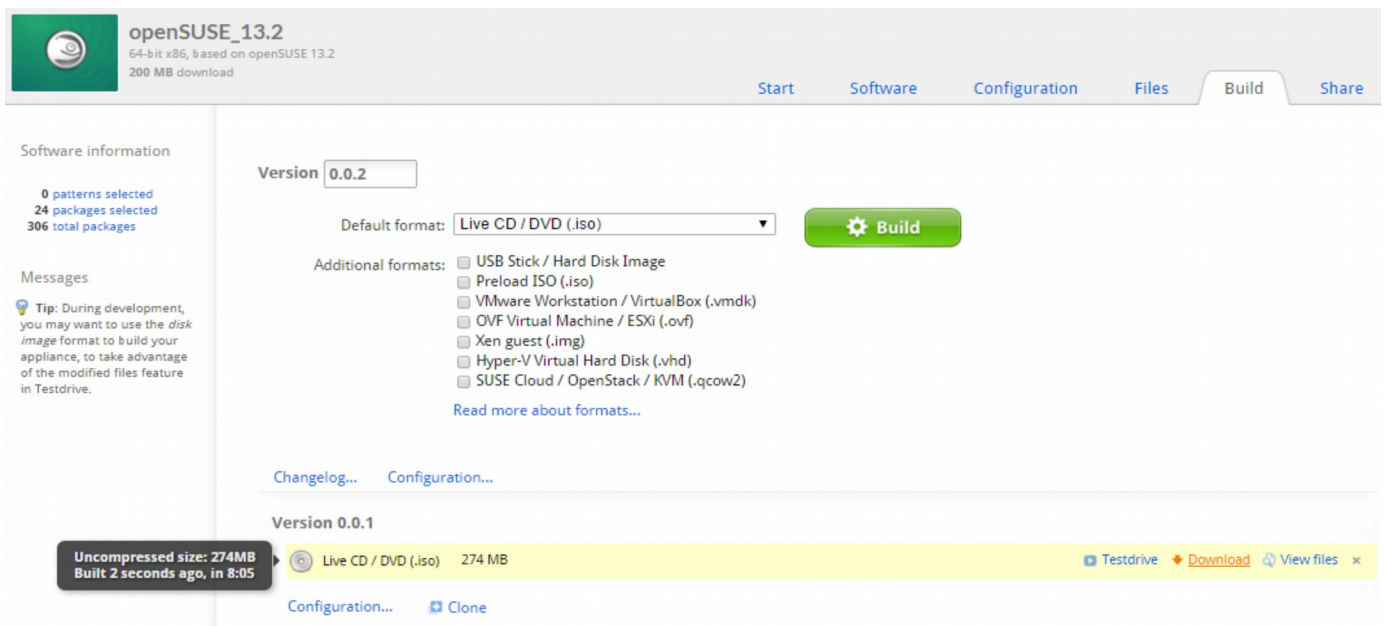
Select → Build tab

Default format: Live CD / DVD (.iso)



The screenshot shows the 'Build' tab of the openSUSE 13.2 interface. The header includes the openSUSE logo, version '13.2', architecture '64-bit x86', and a '200 MB download' link. Navigation tabs are 'Start', 'Software', 'Configuration', 'Files', and 'Build'. The left sidebar shows 'Software information' with '0 patterns selected', '24 packages selected', and '306 total packages'. Below it, a 'Messages' section contains a tip about using the 'disk image' format. The main area displays 'Version 0.0.1' and a 'Default format' dropdown set to 'Live CD / DVD (.iso)'. A green 'Build' button is present. Under 'Additional formats', several options are listed with checkboxes: 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 (.vhd), and SUSE Cloud / OpenStack / KVM (.qcow2). A link 'Read more about formats...' is below. At the bottom, there are links for 'Changelog...', 'Configuration...', and a note about exporting the Kiwi configuration.

Select → Build



This screenshot shows the 'Build' tab at a later stage, 'Version 0.0.2'. The interface is similar to the previous one, but the 'Build' button is now greyed out. A new section at the bottom, titled 'Version 0.0.1', lists the build artifacts. A tooltip on the left indicates 'Uncompressed size: 274MB' and 'Built 2 seconds ago, in 8:05'. The artifact list shows 'Live CD / DVD (.iso)' with a size of '274 MB'. To the right of this entry are links for 'Testdrive', 'Download', and 'View files', along with a close icon. Below the artifact list, there are links for 'Configuration...' and 'Clone'.

After the build finishes,

Select Download to test the iso file.

2.1. 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
```

3. 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.com web interface for creating an openSUSE_13.2 appliance. The top navigation bar includes links for Start, Software, Configuration, Files, Build, and Share. The main content area is divided into several sections:

- Software information:** Shows 0 patterns selected, 24 packages selected, and 306 total packages.
- Messages:** Includes a tip about using the disk image format for development.
- Build section:** 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 image types like USB Stick, Preload ISO, VMware Workstation, etc.
- Version 0.0.1 section:** Displays the selected format 'Live CD / DVD (.iso)' with a size of '275 MB'. It includes links for 'Testdrive', 'Download', and 'View files'. Below this is a 'Configuration...' link and a 'Clone' button.
- Export section:** Contains text about building locally using Kiwi and a note about the Kiwi version required for local builds. A link 'Download appliance source' is highlighted with a red box.

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

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

4. OS Builder Environment – OpenSUSE

4.1. 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.

4.2. 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.

4.3. 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
| URI |
+-----+-----+-----+-----+-----+
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/

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
```

4.4. Kiwi documentation

Or a config.xml file can be reverse engineered from the installed RPMs:

```
# kiwi.pdf is the best first place to learn about 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
```

5. OpenSUSE 13.2 OEM build

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:

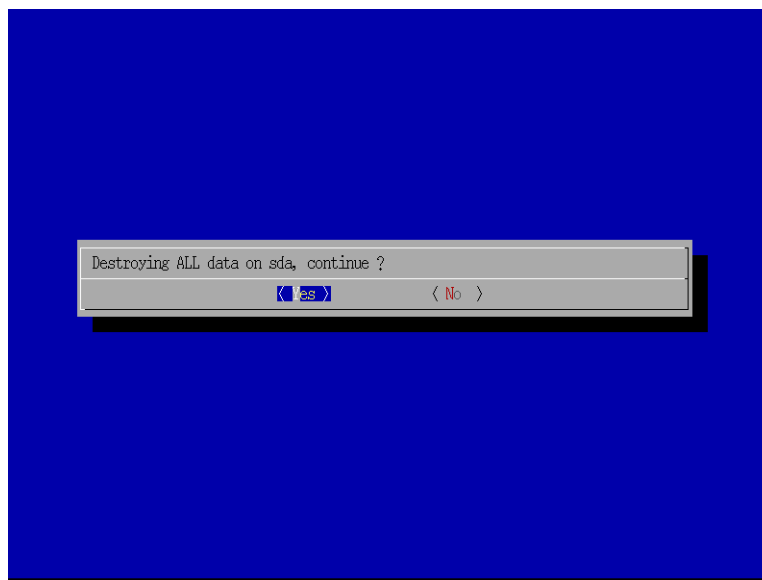
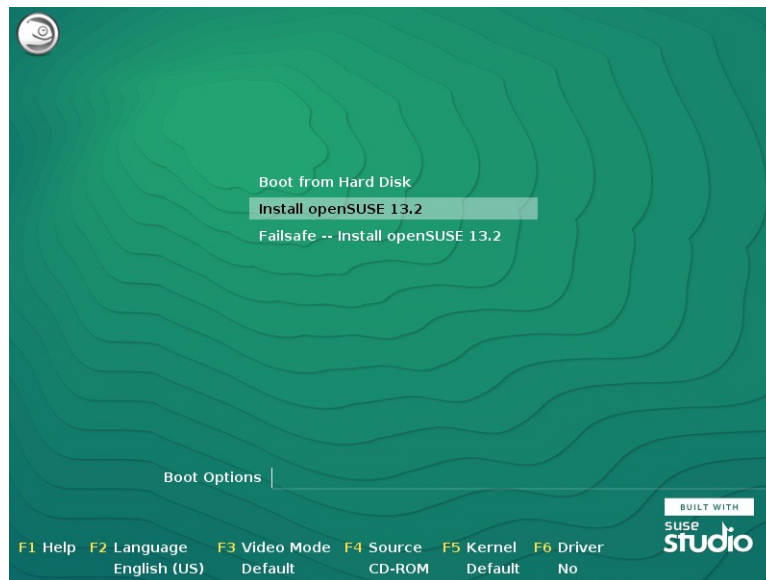
```
# copy out the ISO from the guest build environment
cygwin> scp root@<guest_ip>:/tmp/opensuse_iso/openSUSE_13.2.x86_64-0.0.2.install.iso .
```

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

6. SLES 12 build

<Where to obtain an initial config.xml>

SLES 12 requires the following repo files:

```
> 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/>

Update the config.xml the following repository parameters:

```
=== 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 /home/kiwi/sles_12/source
> kiwi -p /home/kiwi/sles_12/source --root /home/kiwi/sles_12/root
...
Nov-27 20:41:07 <1> : KIWI exited successfully
Nov-27 20:41:07 <1> : Complete logfile at: /home/kiwi/sles_12/root.log

# create
> kiwi -c /home/kiwi/sles_12/root -d /home/kiwi/sles_12/out
...
Nov-27 20:52:10 <1> : KIWI exited successfully
Nov-27 20:52:10 <1> : Complete logfile at: /home/kiwi/sles_12/root.log

> ls /home/kiwi/sles_12/out
# <recheck>
dsnider_SLES_12.x86_64-0.0.4.install.iso
```

Test:

<expected resulting file>

<attach to a new VM and boot>