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.

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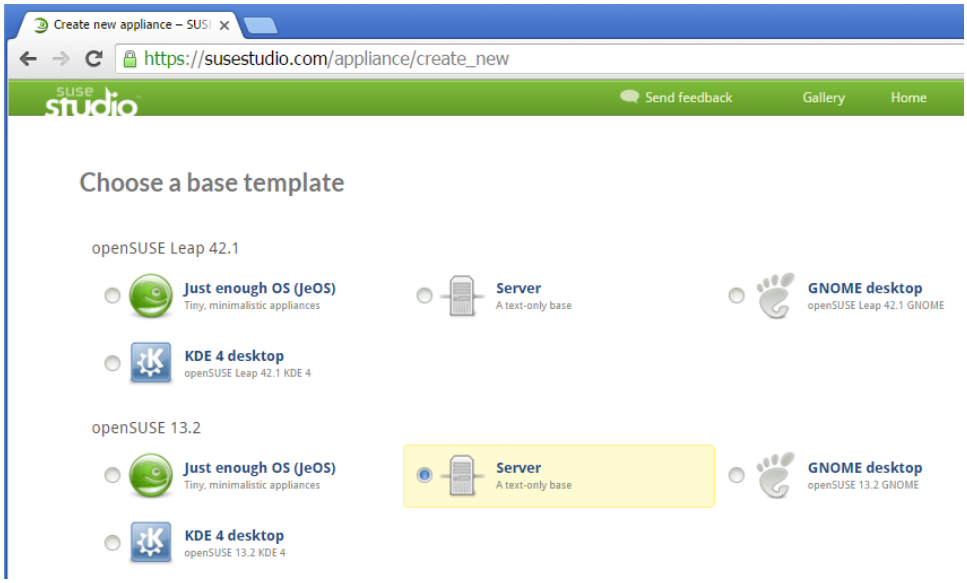
NOTE: WHILE THIS DOCUMENT IS BEING REFINED, META INFORMATION WILL BE IN < BRACKETS >.

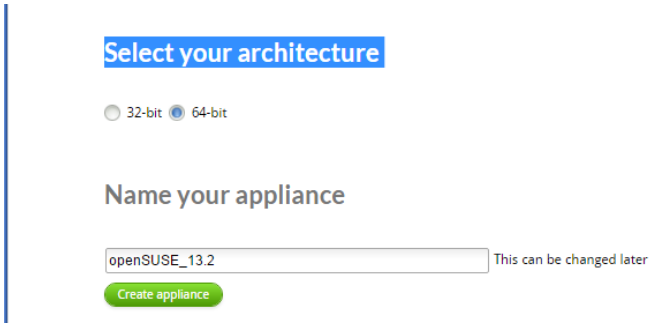
1. First distro with SuseStudio.com – OpenSUSE 13.2

Register and Login to susestudio.com.

Start with creating an openSUSE 13.2 server:

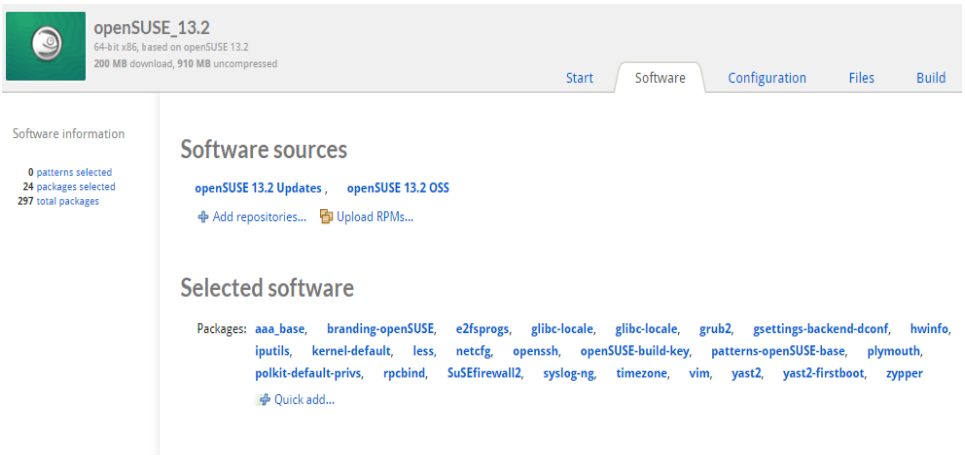


Scroll down and name the appliance:

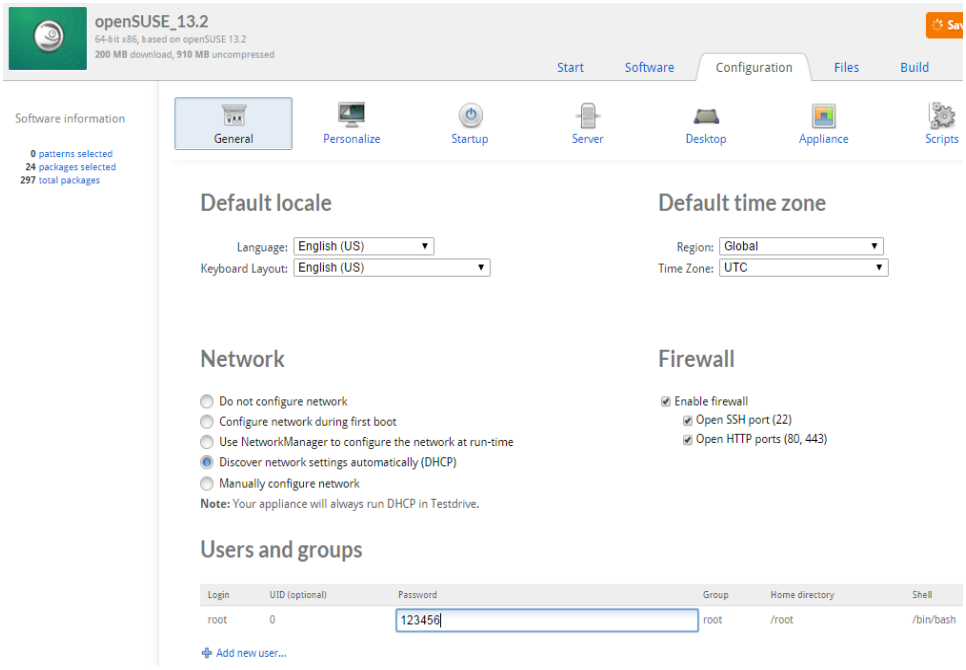


Select: Create appliance

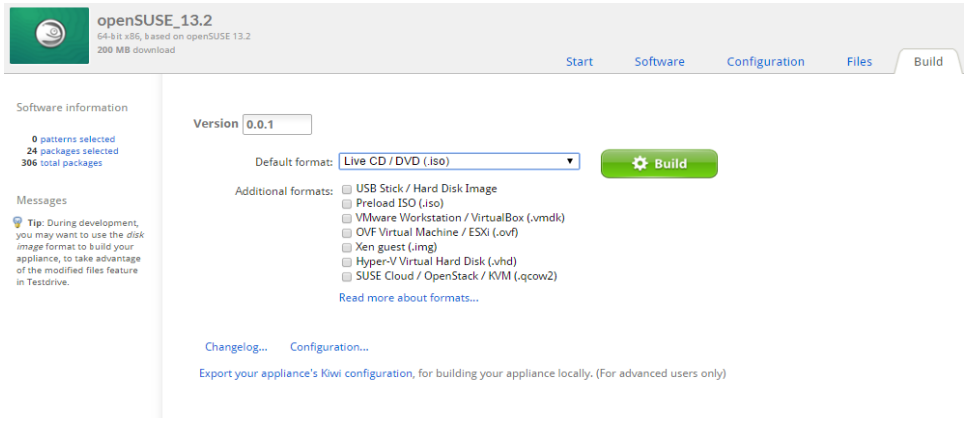
The tabs further configure the new OS.
First there are the off the shelf RPMs that can be installed.
For now, the defaults are sufficient:



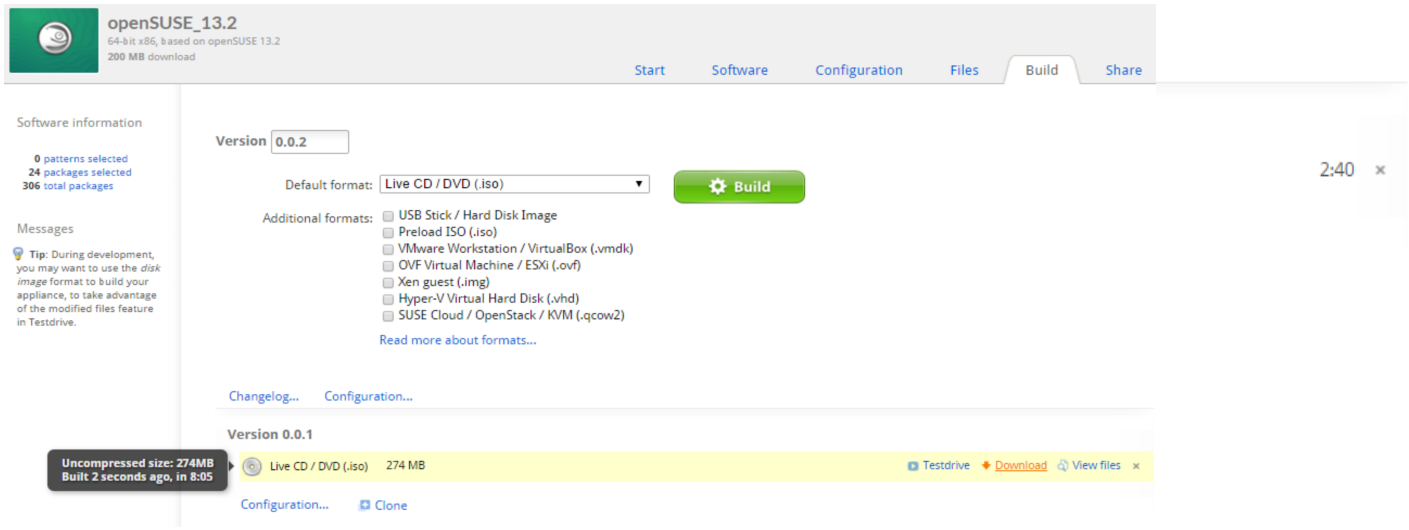
Select Configuration:
root password: 123456



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

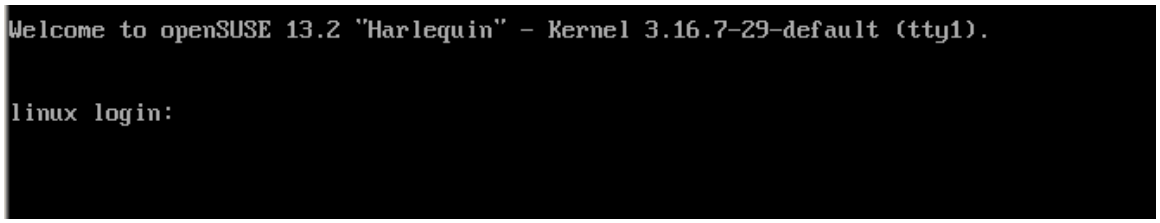
Under VMware workstation:

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:



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
…
```

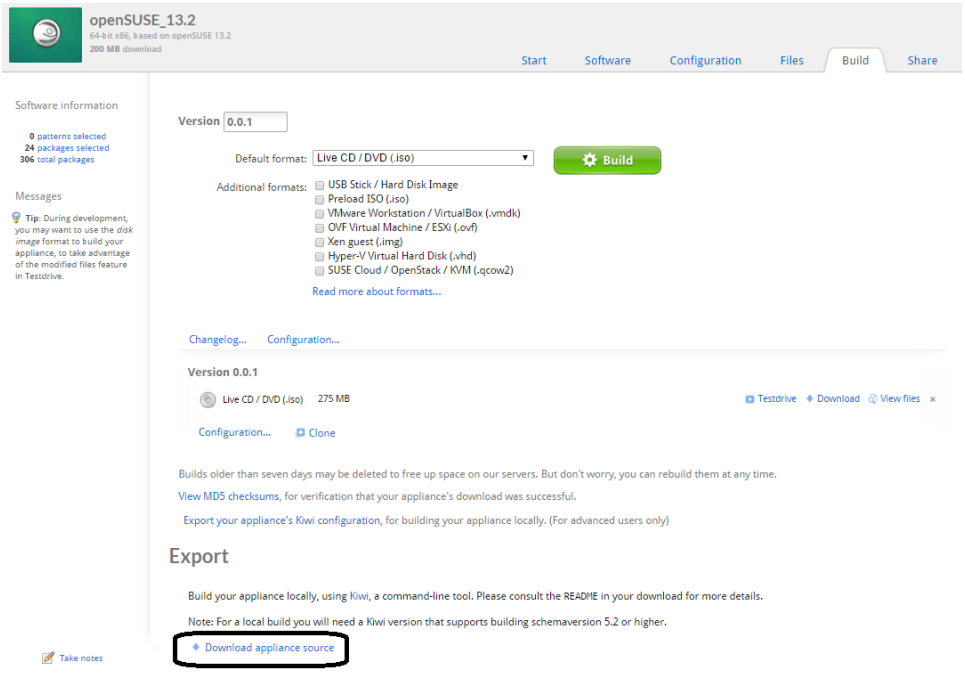
Shutdown the systemd way:

```
> 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:



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-isooot'
...
/usr/share/kiwi/image/isoboot/suse-13.2/config.xml
```

3. OS Builder Environment – OpenSUSE

3.1. Repos/ISOs

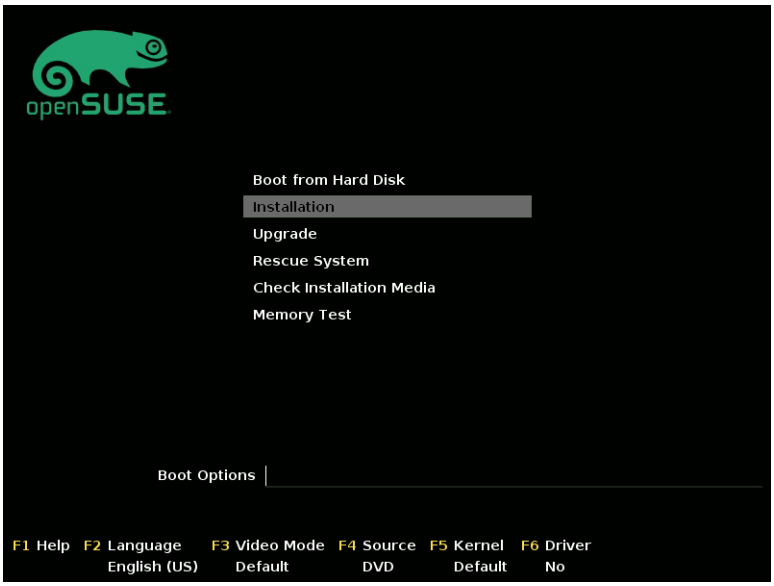
Obtain the x86_64 ISO from the official site: http://download.opensuse.org/distribution/13.2/iso/

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.

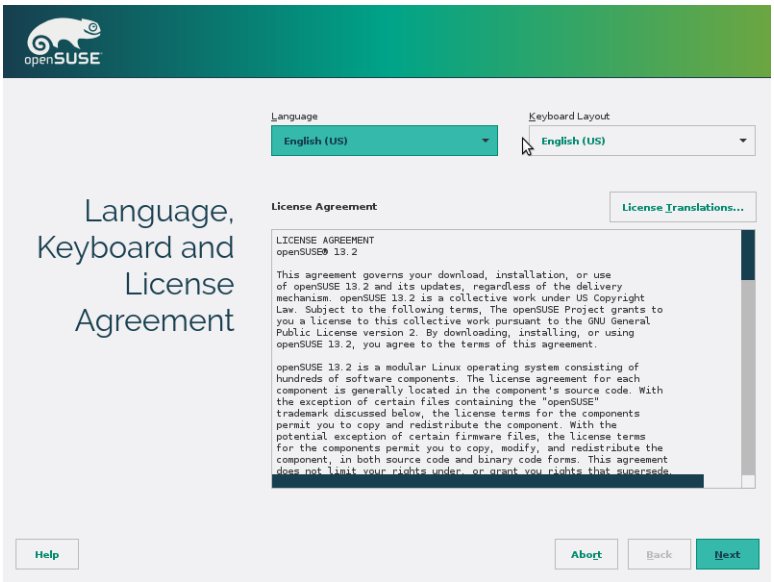
3.2. OS install

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.

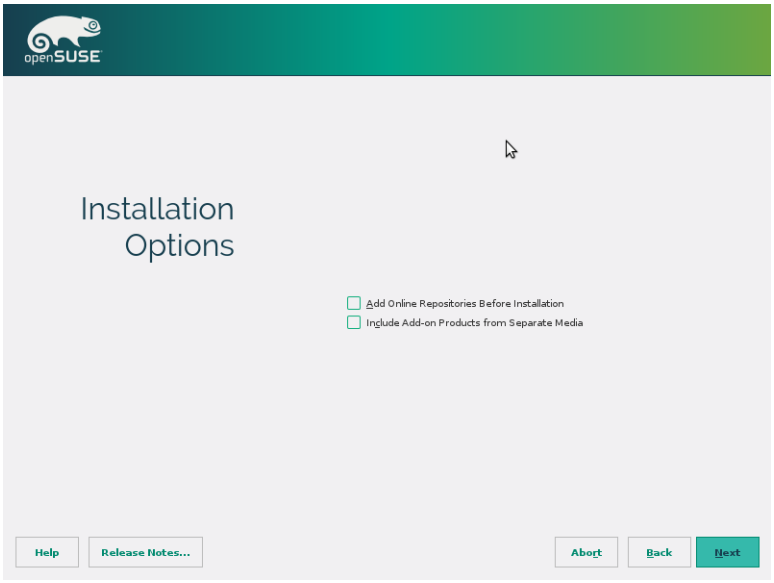
Attach the ISO to a virtual CDROM, power up the virtual machine, and install the OpenSuse 13.2.



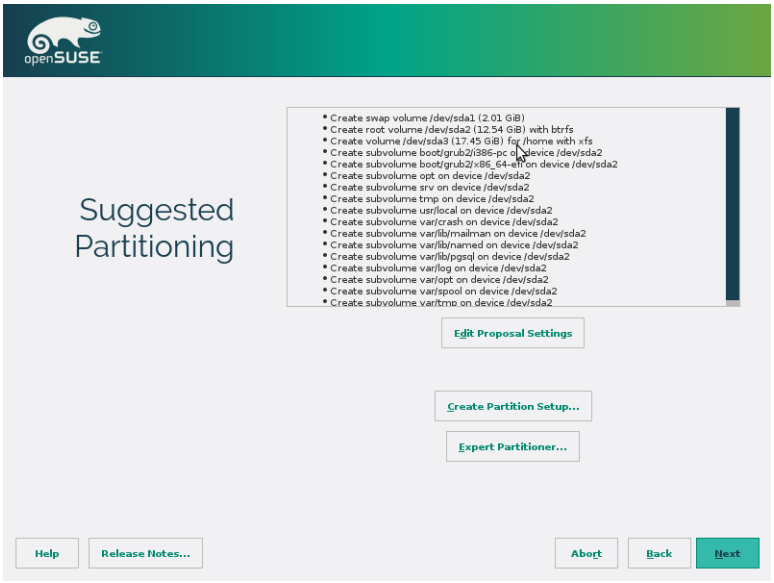
Select: Installation



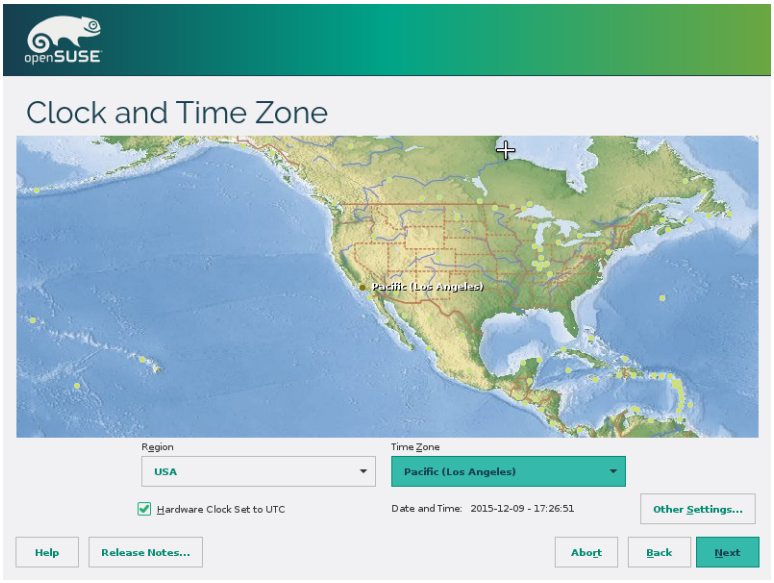
Select: Next



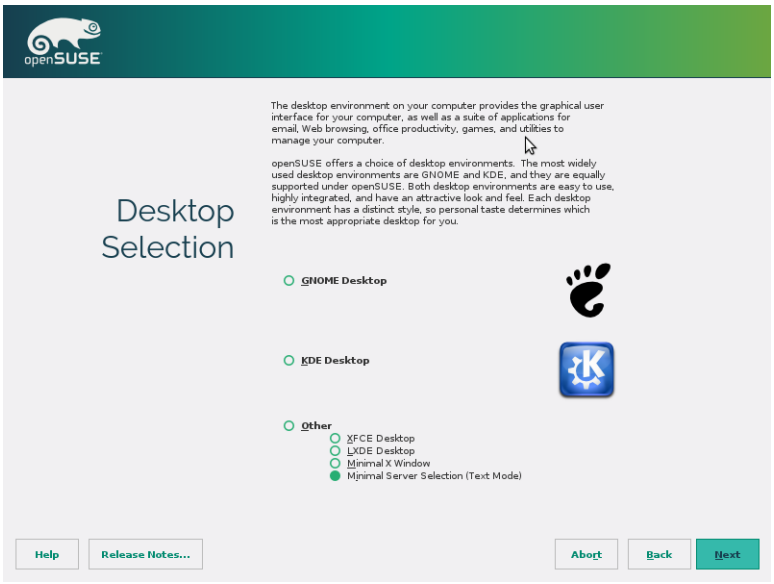
Install repositories later. Select: Next



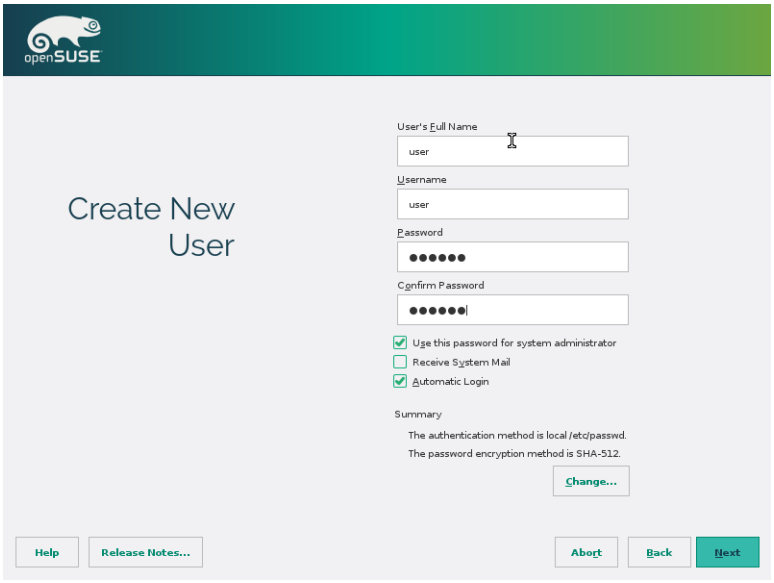
Default partitioning. Select: Next



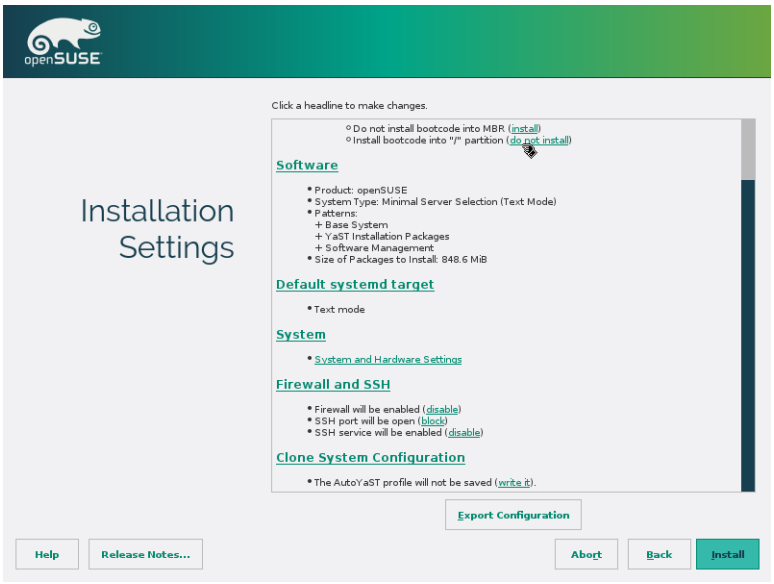
Select a timezone.



Select: Minimal Server (Text Mode)



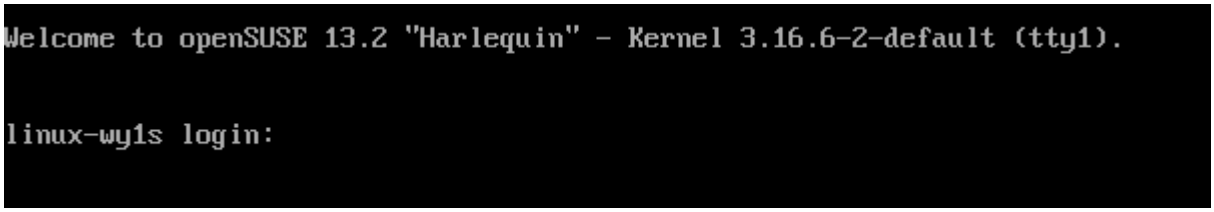
Select a general user id: user/123456.
This will also be the root password.



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.



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-VMware_Virtual_IDE_CDROM_Drive_10000000000000000001
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/

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:

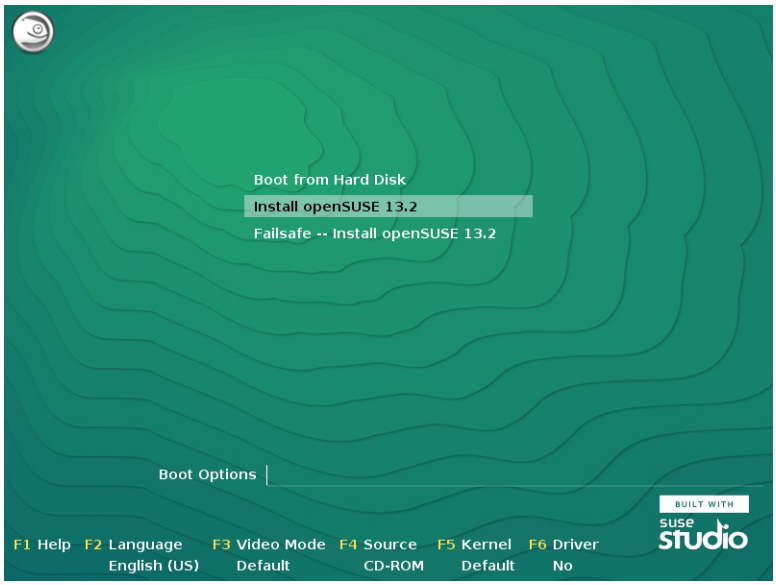
```
# copy out the ISO from the guest build environment
cygwin> scp root@<guest_ip>:/tmp/opensuse_iso/openSUSE_13.2.x86_64-0.0.2.install.iso .
```

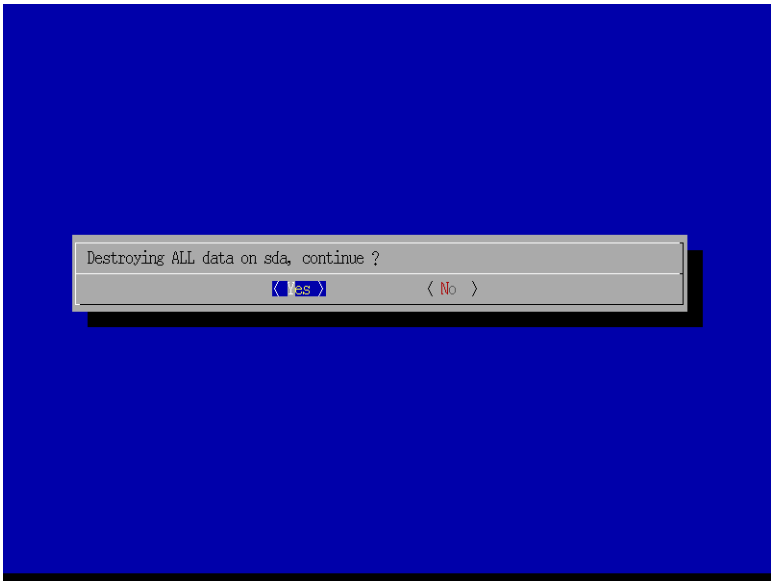
Under VMware workstation:

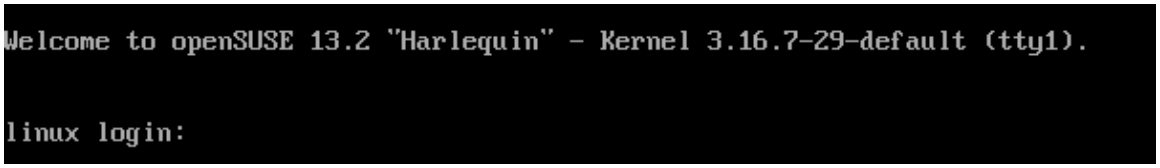
Select:

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”







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:

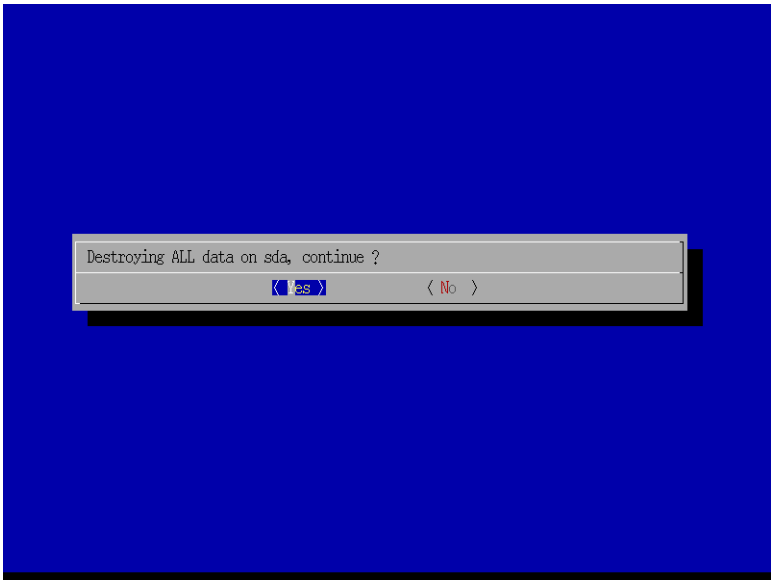
```
# copy raw image to a USB flash drive
> cd /tmp/opensuse_stick
> dd if=openSUSE_13.2_svr.x86_64-0.0.4.raw.install.raw of=/dev/sdb bs=1M
```

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 -1 /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:

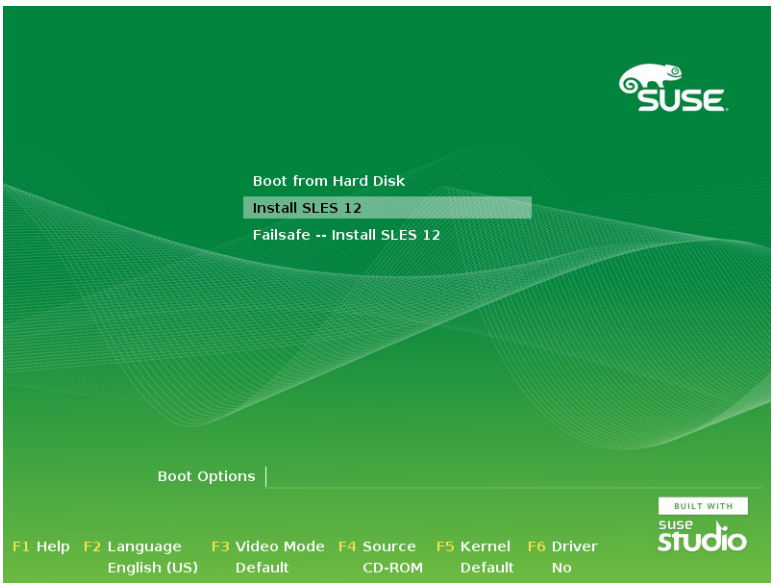
```
# copy out the ISO from the guest build environment
cygwin> scp root@<guest_ip>:/tmp/sles_iso/SLES_12.x86_64-0.0.4.install.iso .
```

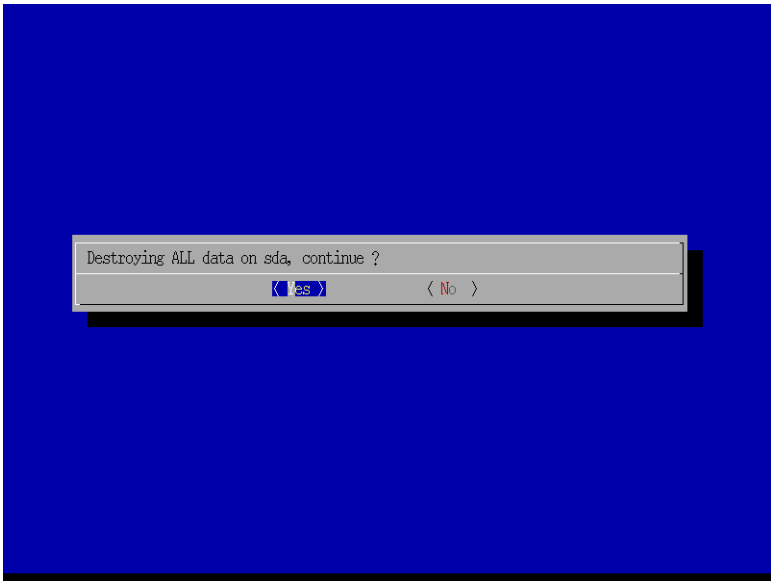
Under VMware workstation:

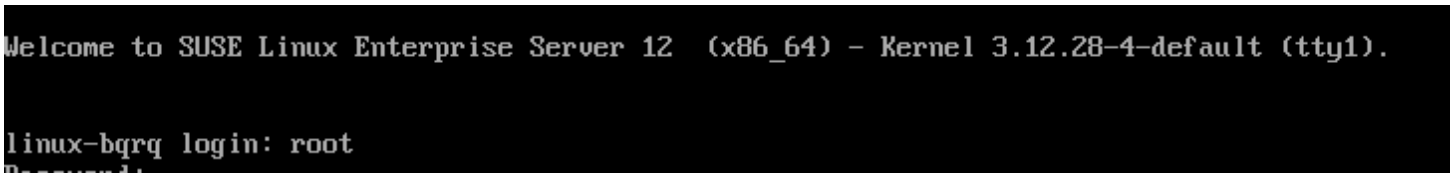
Select:

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"







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
```