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 >.

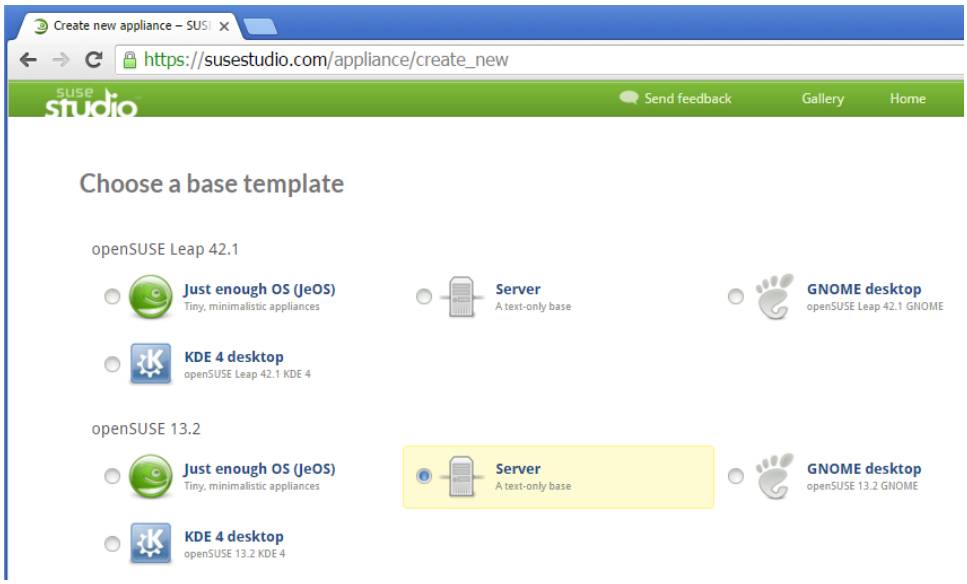
The Kiwi Imaging System prepares a Linux kernel and root filesystem to then bundle into one of many formats. The examples here include DVD isos and USB stick binaries for OpenSuse and SLES servers.

1. First distro with SuseStudio.com – OpenSUSE 13.2

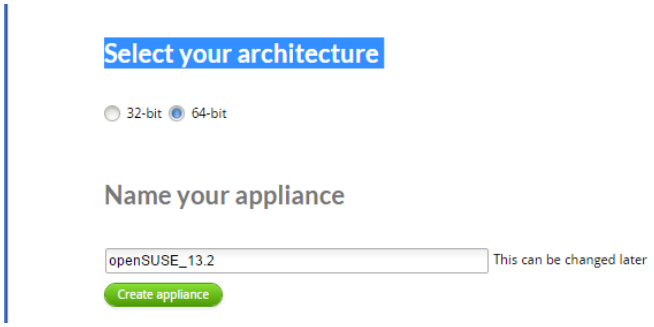
The simplest way to first get traction with Kiwi is to use the online graphical version. This will generate some example configurations that can later be ported to the off line Kiwi tools.

Register and Login to susestudio.com.

Start with creating an openSUSE 13.2 server:

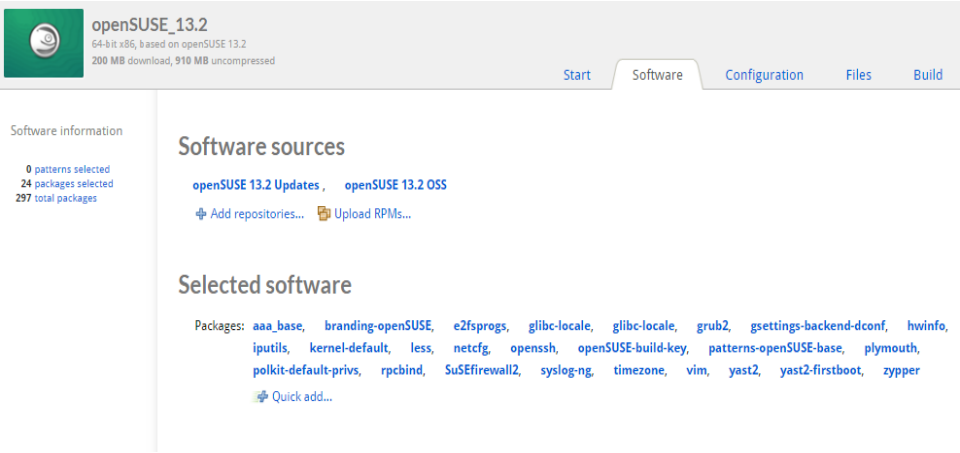


Scroll down and name the appliance:

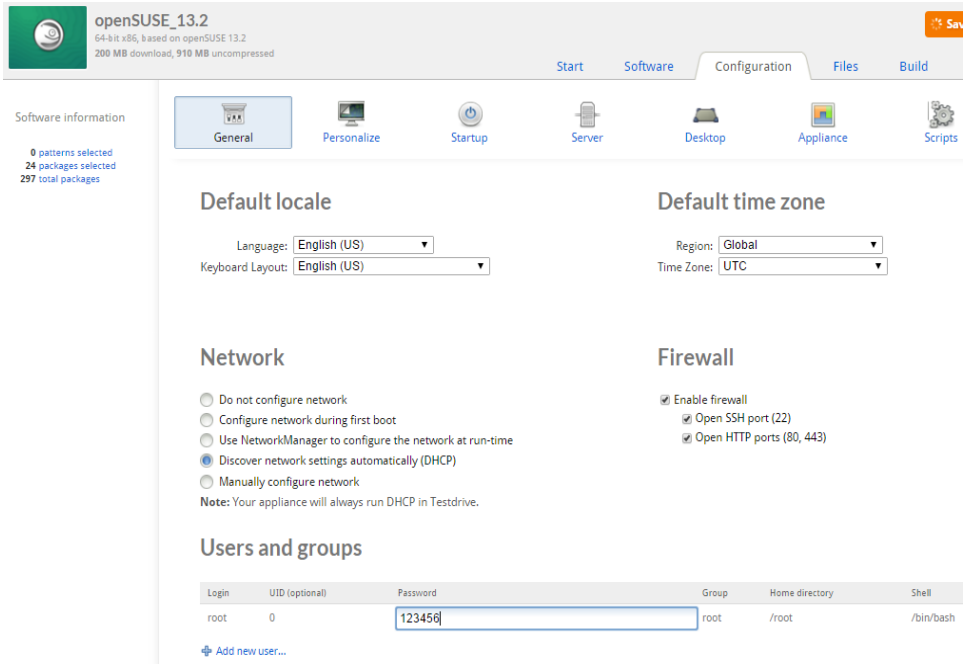


Select: Create appliance

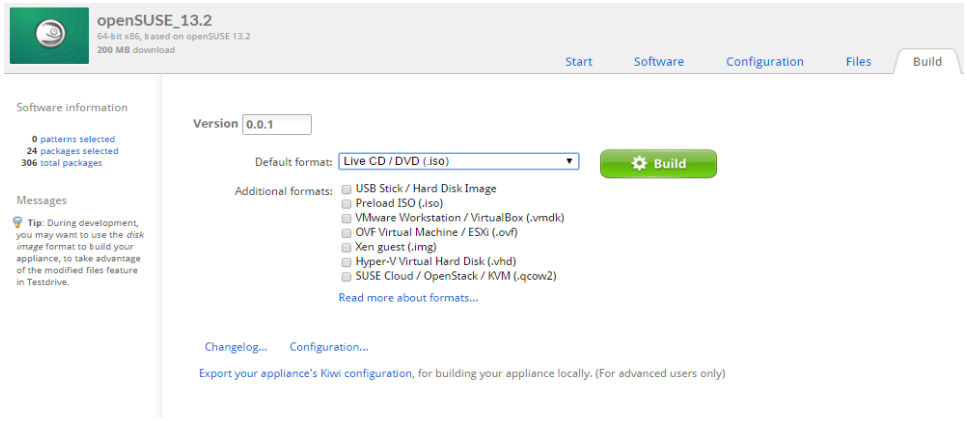
The tabs further configure the new OS.
First there are the off the shelf RPMs that can be installed.
For now, the defaults are sufficient:



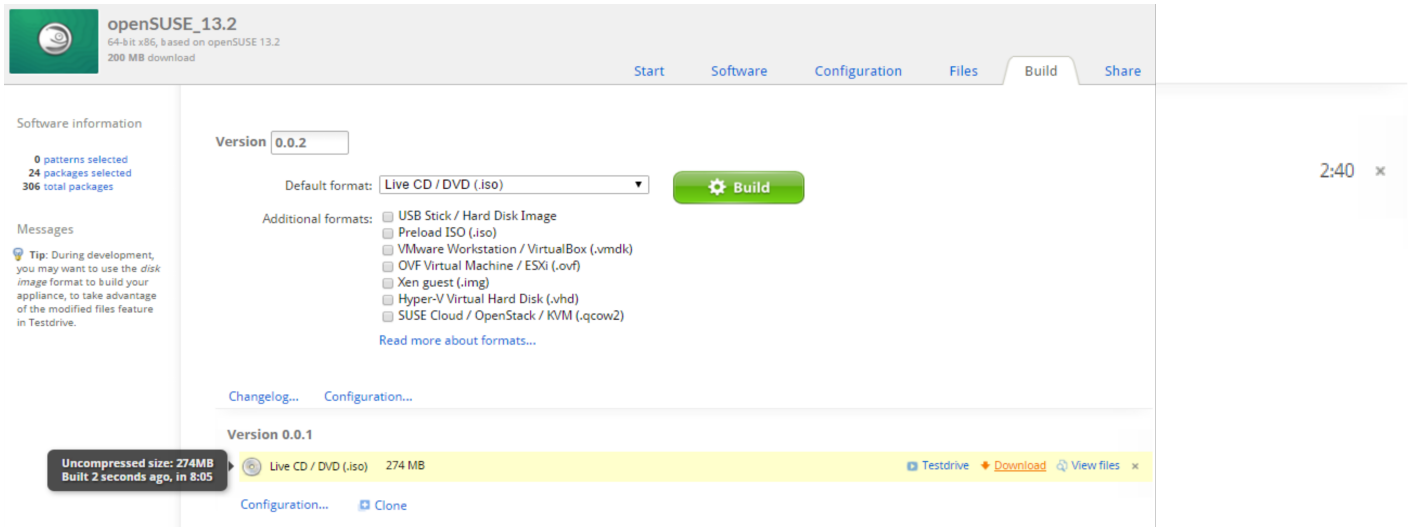
Select Configuration:
root password: 123456



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

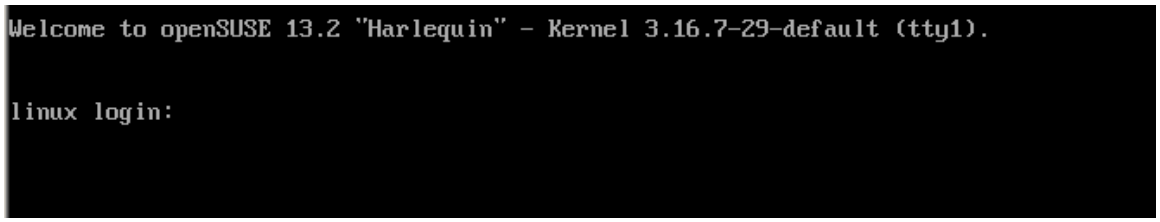
Under VMware workstation:

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
…
```

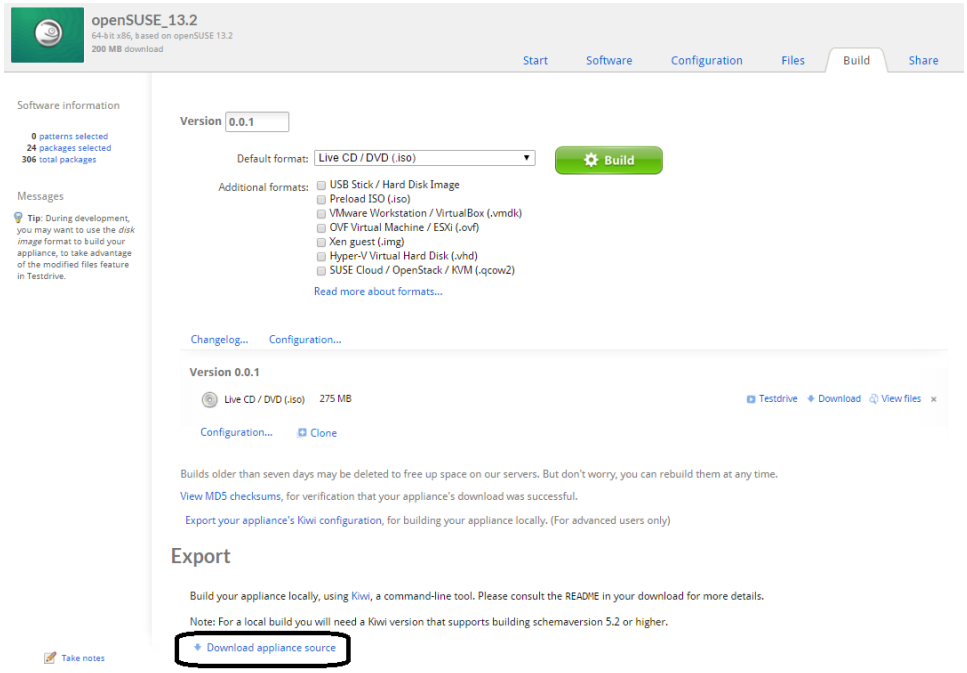
Shutdown the systemd way:

```
> 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

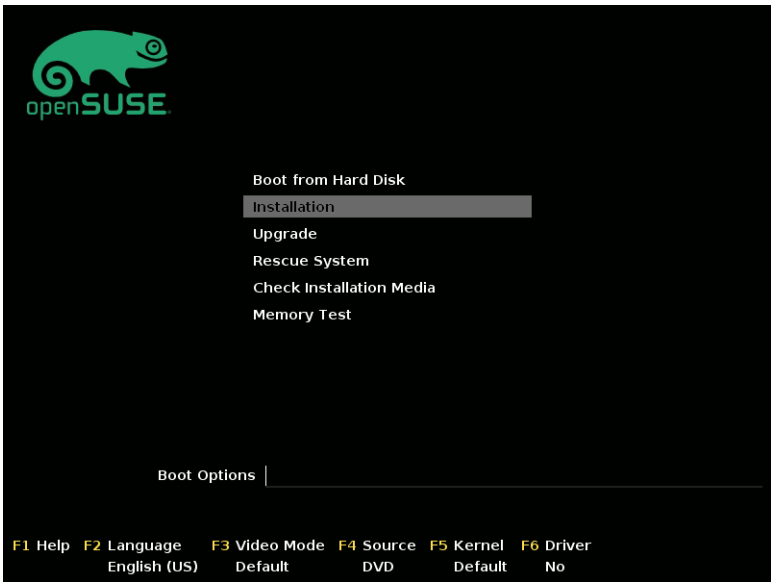
Obtain the x86_64 ISO from the official site: http://download.opensuse.org/distribution/13.2/iso/

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.

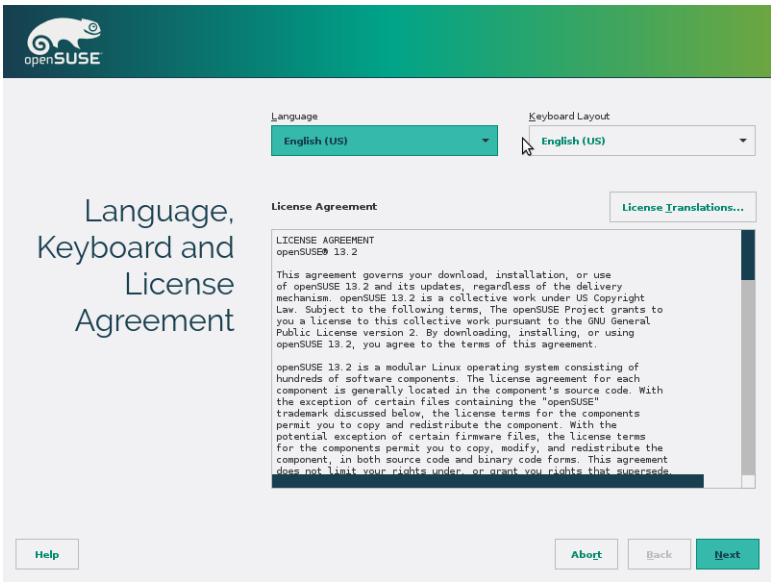
3.2. OS install

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.

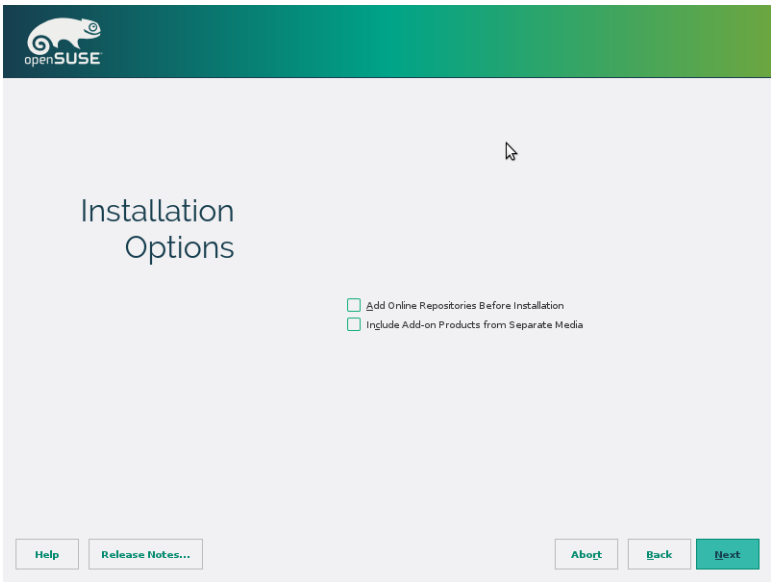
Attach the ISO to a virtual CDROM, power up the virtual machine, and install the OpenSuse 13.2.



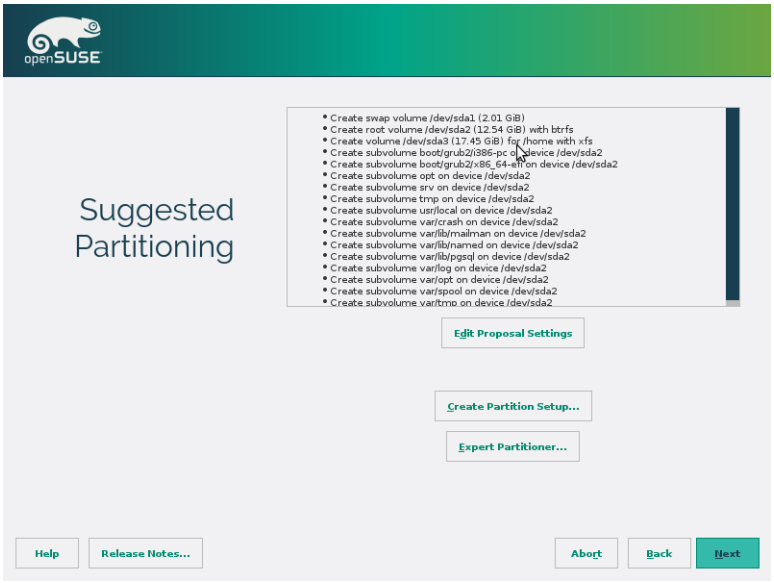
Select: Installation



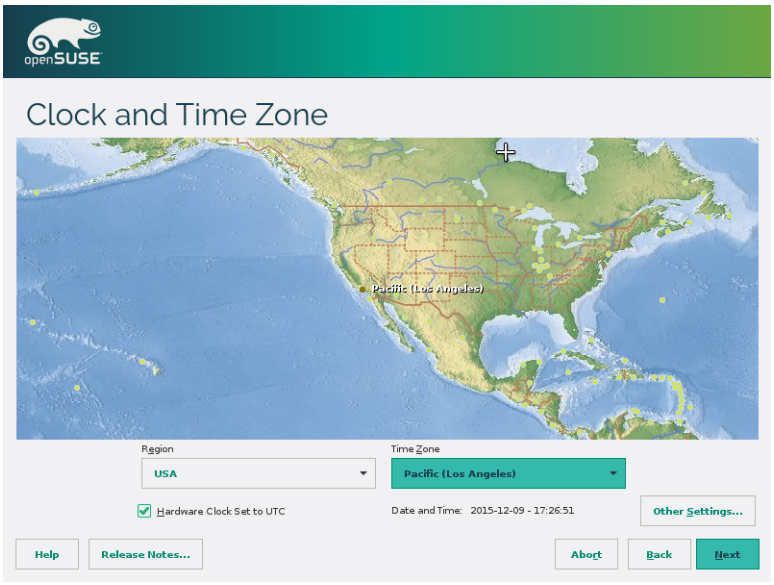
Select: Next



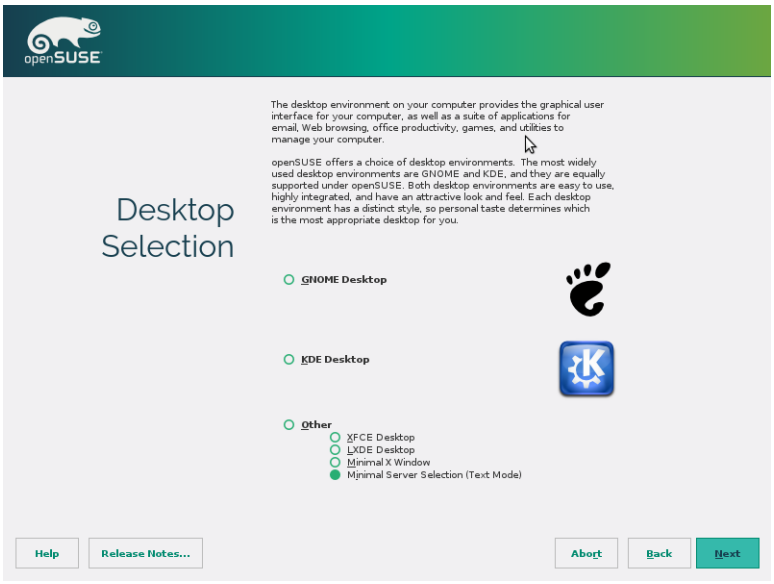
Install repositories later. Select: Next



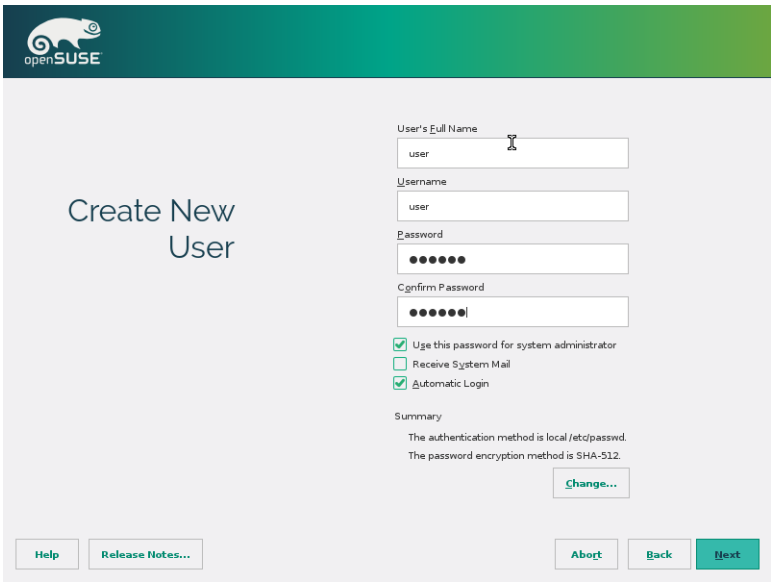
Default partitioning. Select: Next



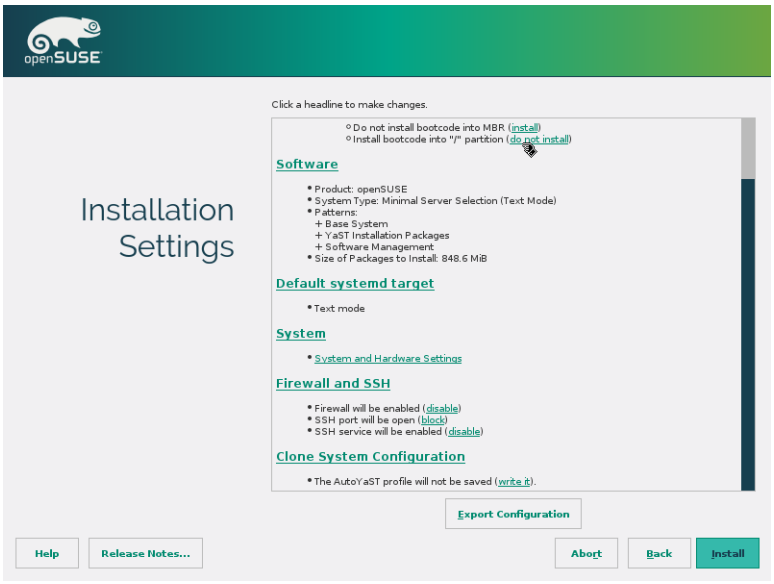
Select a timezone.



Select: Minimal Server (Text Mode)



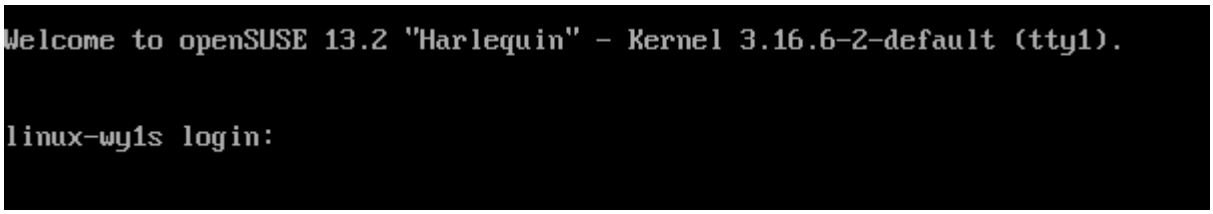
Select a general user id: user/123456.
This will also be the root password.



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:

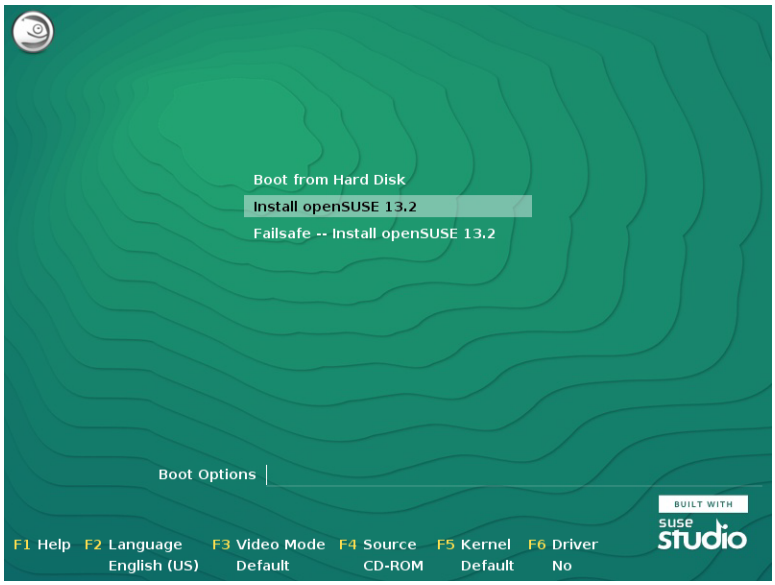
```
# copy out the ISO from the guest build environment
cygwin> scp root@<guest_ip>:/tmp/opensuse_iso/openSUSE_13.2.x86_64-0.0.2.install.iso .
```

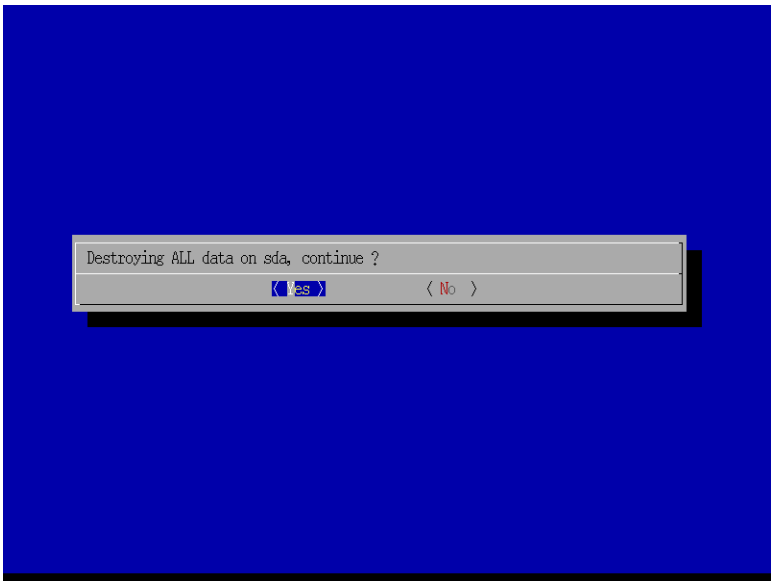
Under VMware workstation:

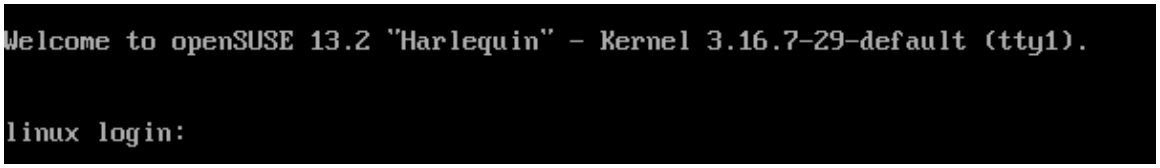
Select:

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:

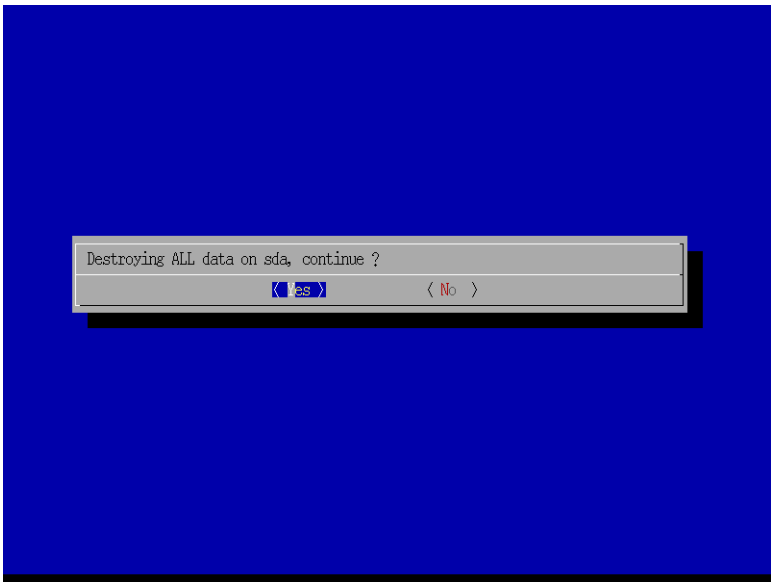
```
# copy raw image to a USB flash drive
> cd /tmp/opensuse_stick
> dd if=openSUSE_13.2_svr.x86_64-0.0.4.raw.install.raw of=/dev/sdb bs=1M
```

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

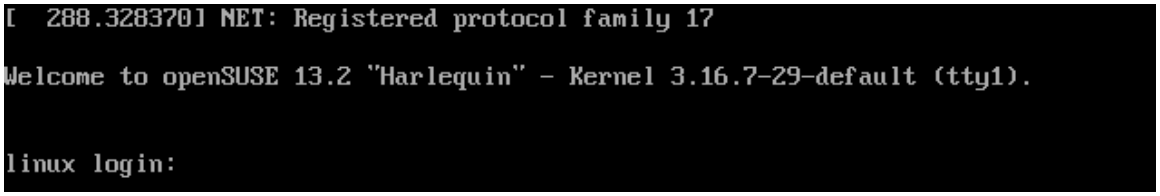
Boot to Plop Boot Manager
Ensure the USB stick is attached
Select: USB

Grub2 screen:


```
Starting hard drive initialization:
```



And then the login screen:



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:

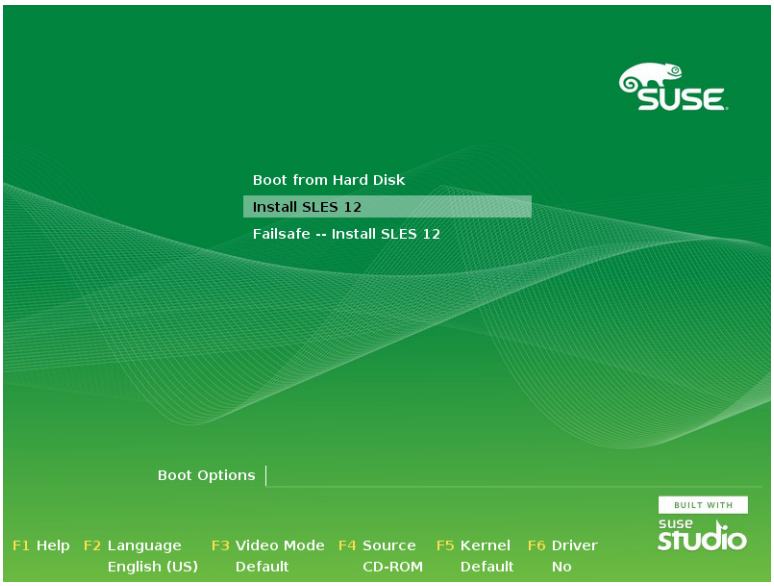
```
# copy out the ISO from the guest build environment
cygwin> scp root@<guest_ip>:/tmp/sles_iso/SLES_12.x86_64-0.0.4.install.iso .
```

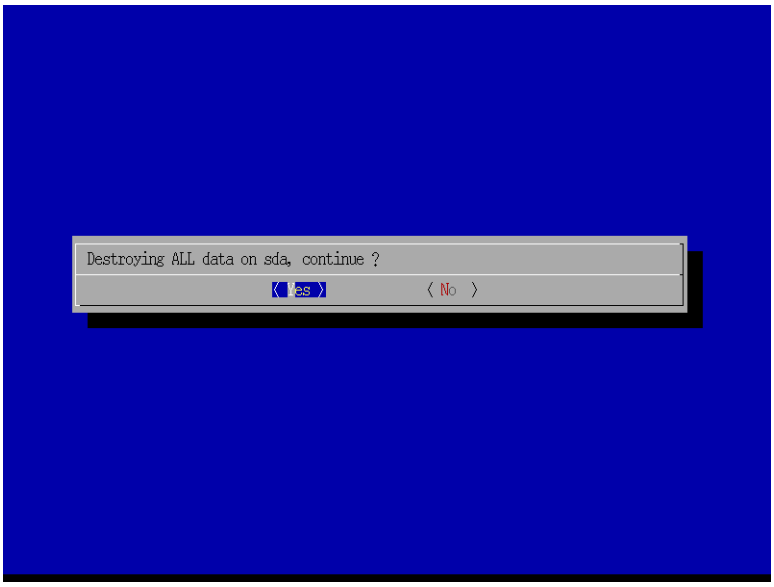
Under VMware workstation:

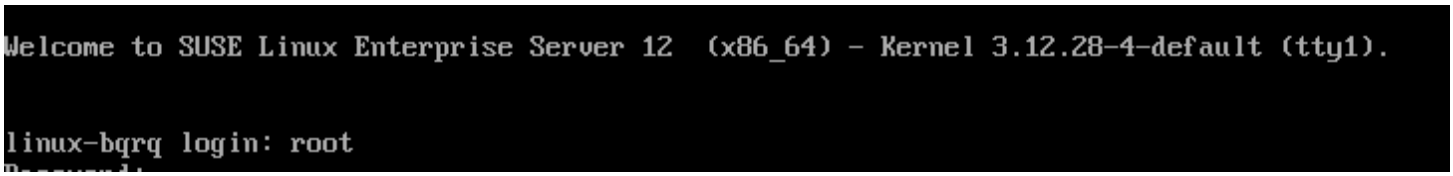
Select:

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
```