

By Falko Timme

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Cloning Linux Systems With CloneZilla Server Edition (CloneZilla SE)

Version 1.0

Author: Falko Timme <ft [at] falkotimme [dot] com>

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This tutorial shows how you can clone Linux systems with [CloneZilla SE](#). This is useful for copying one Linux installation to multiple computers without losing much time, e.g. in a classroom, or also for creating an image-based backup of a system. I will install CloneZilla SE on a Debian Etch server in this tutorial. The systems that you want to clone can use whatever Linux distribution you prefer.

I do not issue any guarantee that this will work for you!

1 Preliminary Note

The Debian server on which I want to install CloneZilla SE is in the local network `192.168.0.0` (netmask `255.255.255.0`) and has the IP address `192.168.0.100`.

To clone a system, the target systems should use the same or at least similar hardware, otherwise cloning might not work!

2 Installing CloneZilla SE

First we import the GPG key of the DRBL (Diskless Remote Boot in Linux, needed to boot the client systems from the network (PXE) later on) and CloneZilla repository:

```
wget -q http://drbl.sourceforge.net/GPG-KEY-DRBL -O- | apt-key add -
```

Then we open `/etc/apt/sources.list...`

```
vi /etc/apt/sources.list
```

... and add the DRBL/CloneZilla Debian repository to it:

```
[...]  
deb http://drbl.sourceforge.net/drbl-core drbl stable  
[...]
```

Run

```
apt-get update
```

afterwards.

Now we can install DRBL and CloneZilla like this:

```
apt-get install drbl
```

Then we run

```
/opt/drbl/sbin/drbl4imp
```

to configure DRBL and CloneZilla with default values (should work in most environments):

```
*****.
```

This script is for those impatient, it will setup the DRBL server by the default value which might not fit your environment. Are you impatient ?

[Y/n] <-- ENTER

*****.

Ok, Laziness is a virtue! Let us setup DRBL server with the default values!!!

Press "Enter" to continue... <-- ENTER

[...]

Starting the NAT services for DRBL clients... done!

ip_forward is already on.

The GDM or KDM config file is NOT found! Skip setting the DM! Maybe you will not be able to make this DRBL server as thin client server!

Clean all the previous saved config file if they exist...done!

Turn on the boot prompt for PXE client...done!

Turn off the thin client option in PXE boot menu...done!

Modifying /tftpboot/nbi_img/pxelinux.cfg/default to let DRBL client use graphical PXE boot menu... done!

Full DRBL mode. Remove clientdir opt for label drbl in pxelinux config...

Setting drbl_mode="full_drbl_mode" in /etc/drbl/drbl_deploy.conf and /etc/drbl/drblpush.conf... done!

Full clonezilla mode. Remove clientdir opt for label clonezilla in pxelinux config...

Setting clonezilla_mode="full_clonezilla_mode" in /etc/drbl/drbl_deploy.conf and /etc/drbl/drblpush.conf... done!

You have to use "/opt/drbl/sbin/dcs" -> clonezilla-start to start clonezilla service, so that there will be a clonezilla menu when client boots

*****.

Adding normal users to group "audio cdrom plugdev floppy video"..... done!

*****.

Updating the YP/NIS for group...

Note! If you add new or remove accounts in the DRBL server in the future, remember to run the following command again, so that some group (EX:plugdev) will be updated:

tune-debian-dev-group-perm -g "audio cdrom plugdev floppy video" -e

*****.

Enjoy DRBL!!!

<http://drbl.nchc.org.tw>; <http://drbl.name>

NCHC Free Software Labs, Taiwan. <http://free.nchc.org.tw>

```
*****.  
If you like, you can reboot the DRBL server now to make sure everything is ready...(This is not necessary, just an  
option.).  
*****.  
DRBL server is ready! Now set the client machines to boot from PXE or Etherboot (refer to http://drbl.sourceforge.net for  
more details).  
NOTE! If Etherboot is used in client machine, version 5.4.0 or newer is required!  
PS. The config file is saved as /etc/drbl/drblpush.conf. Therefore if you want to run drblpush with the same config again,  
you may run it as: /opt/drbl/sbin/drblpush -c /etc/drbl/drblpush.conf  
server1:~#
```

That's it for the installation.

3 Creating An Image Of A Linux System

To create an image, we first start CloneZilla on the Debian system and tell it to store an image (the server will then wait until a client connects to store the image), and then we boot the client system of which we want to create the image from the network - it should then boot into a CloneZilla Linux system that connects to the server and creates the image.

Run

```
/opt/drbl/sbin/dcs
```

on the Debian server and select *All Select all clients*:

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DRBL, developed by NCHC Free Software Labs

///Hint! From now on, if multiple choices are available, you have to press space key to mark your selection. A star sign (*) will be shown when the selection is done///

Do you want to set the mode for all clients or part of them ?

Choose the mode:

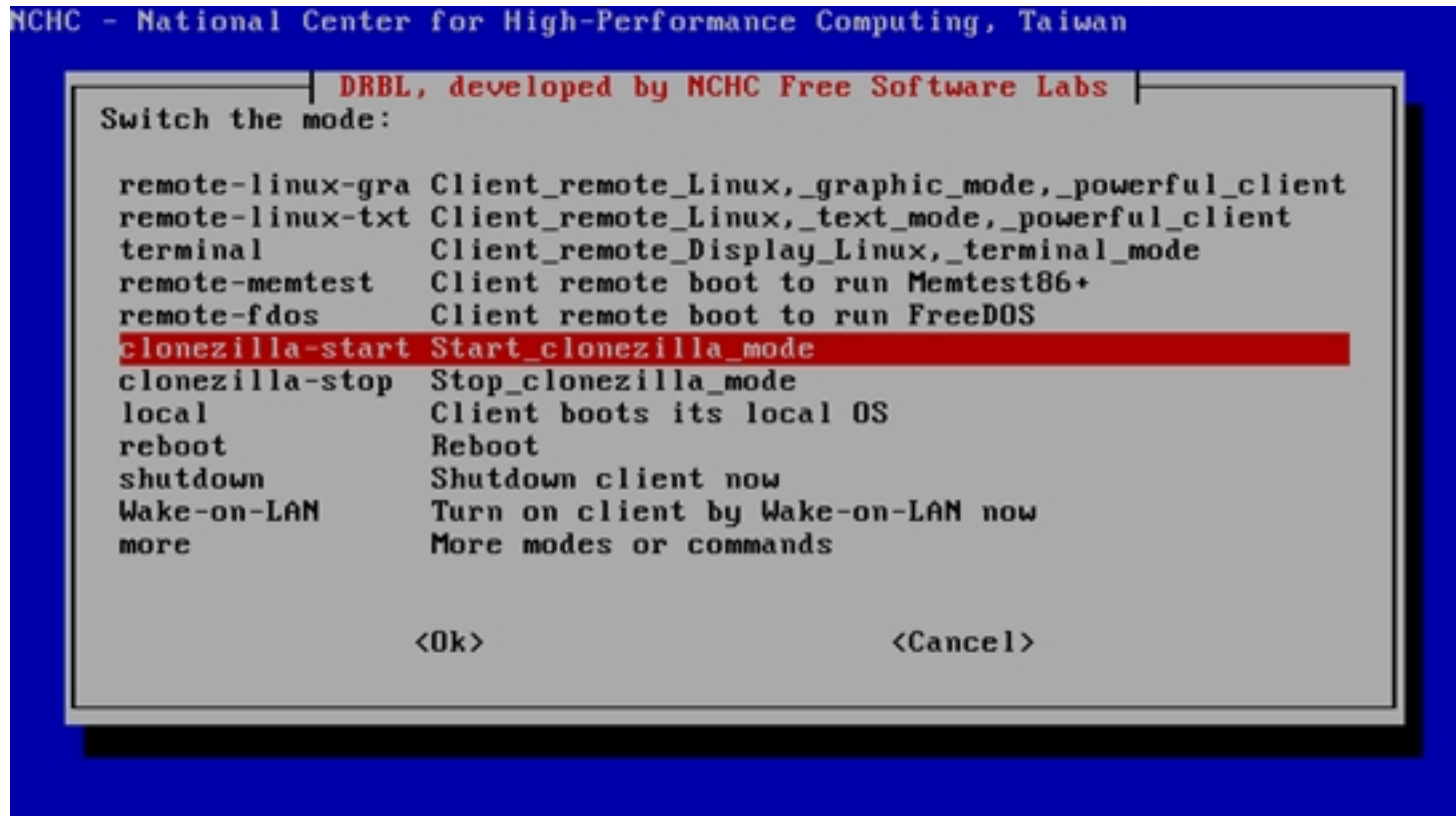
All Select all clients

Part Select part of clients by IP or MAC address

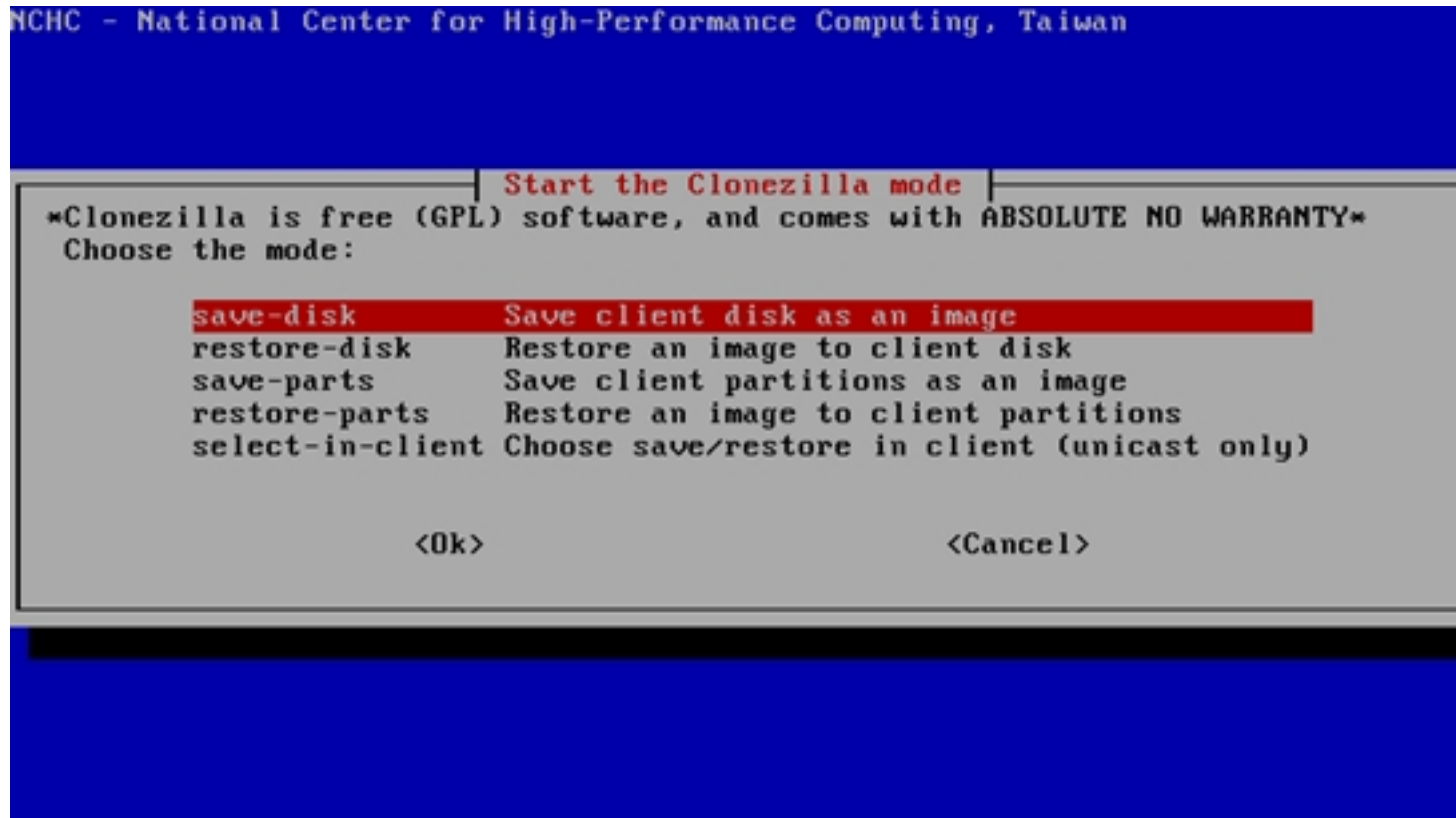
<Ok>

<Cancel>

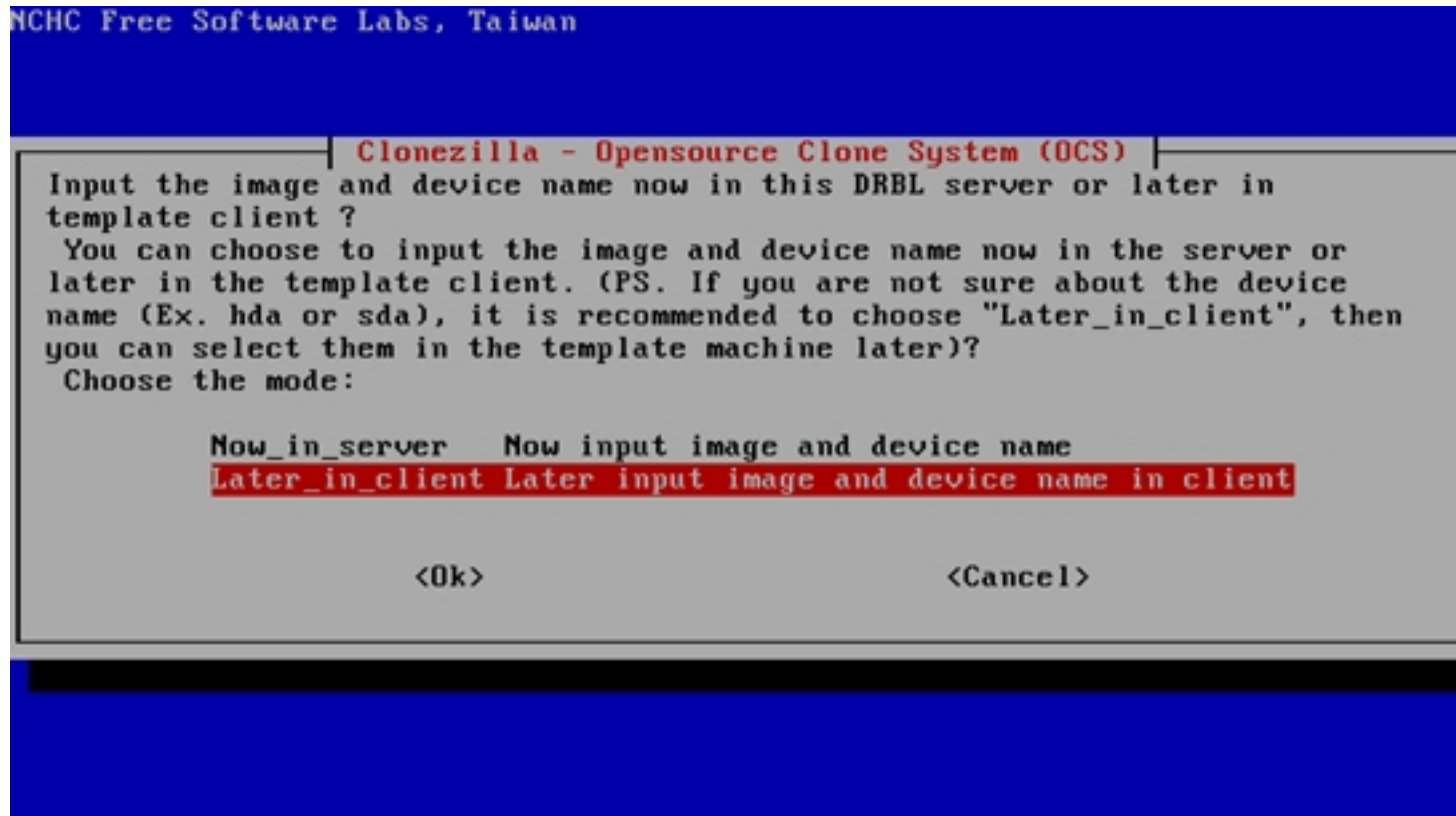
Next pick `clonezilla-start` `Start_clonezilla_mode:`



Choose *save-disk* *Save client disk as an image*:



Select *Later_in_client* Later input image and device name in client (you will then be prompted for an image name later on the client, instead of having to provide an image name now):



On the next two screens you can simply press *ENTER* to select the default values:

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Clonezilla advanced extra parameters

Which clone program(s) and what priority do you prefer ? The listed program(s) and priority mean that if the file system is not supported, the next program will be used. Ex. if you choose "Priority: ntfsclone > partimage > dd", then if the file system is xfs, clonezilla will try to use ntfsclone first, and of course, xfs is not supported by ntfsclone, then clonezilla will try to use partimage.

The default settings are optimized. If you have no idea, keep the default value, i.e. do NOT change anything, then say "OK" and continue.

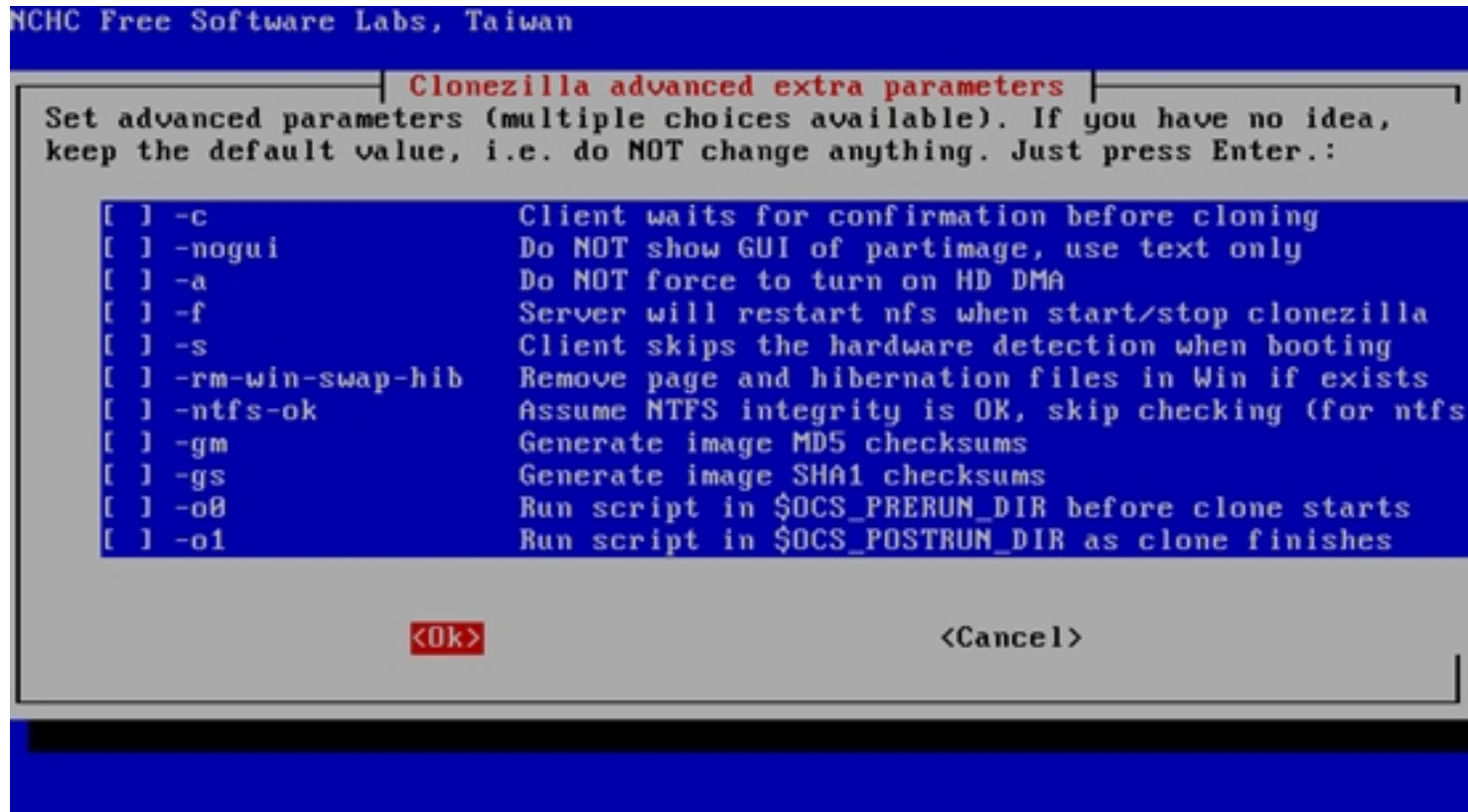
-q Priority: ntfsclone > partimage > dd

-q1 Priority: Only dd (support all filesystem, but inefficient)

-q2 Priority: ntfsclone, partclone (experimental) > partimage > dd
Priority: partimage > dd (no ntfsclone)

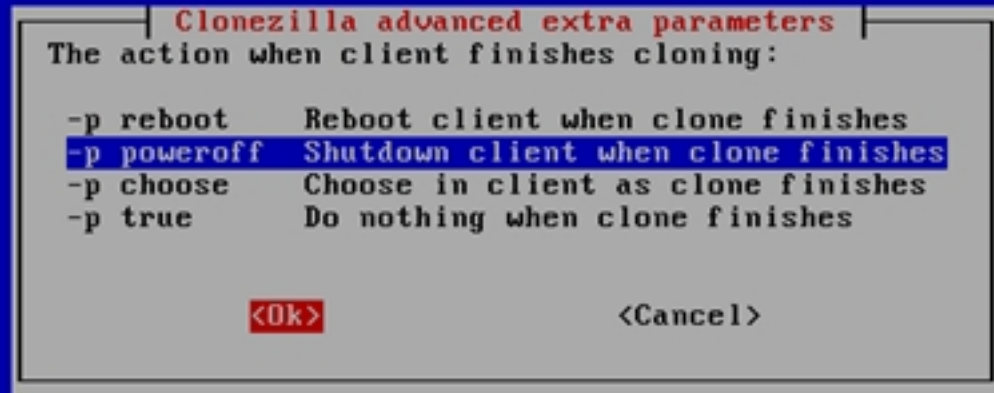
<Ok>

<Cancel>



Select the action when the client finishes cloning (I want to shut down the client after the image has been created, so I select `-p poweroff`):

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Press *ENTER* again on the next two screens to accept the default values:

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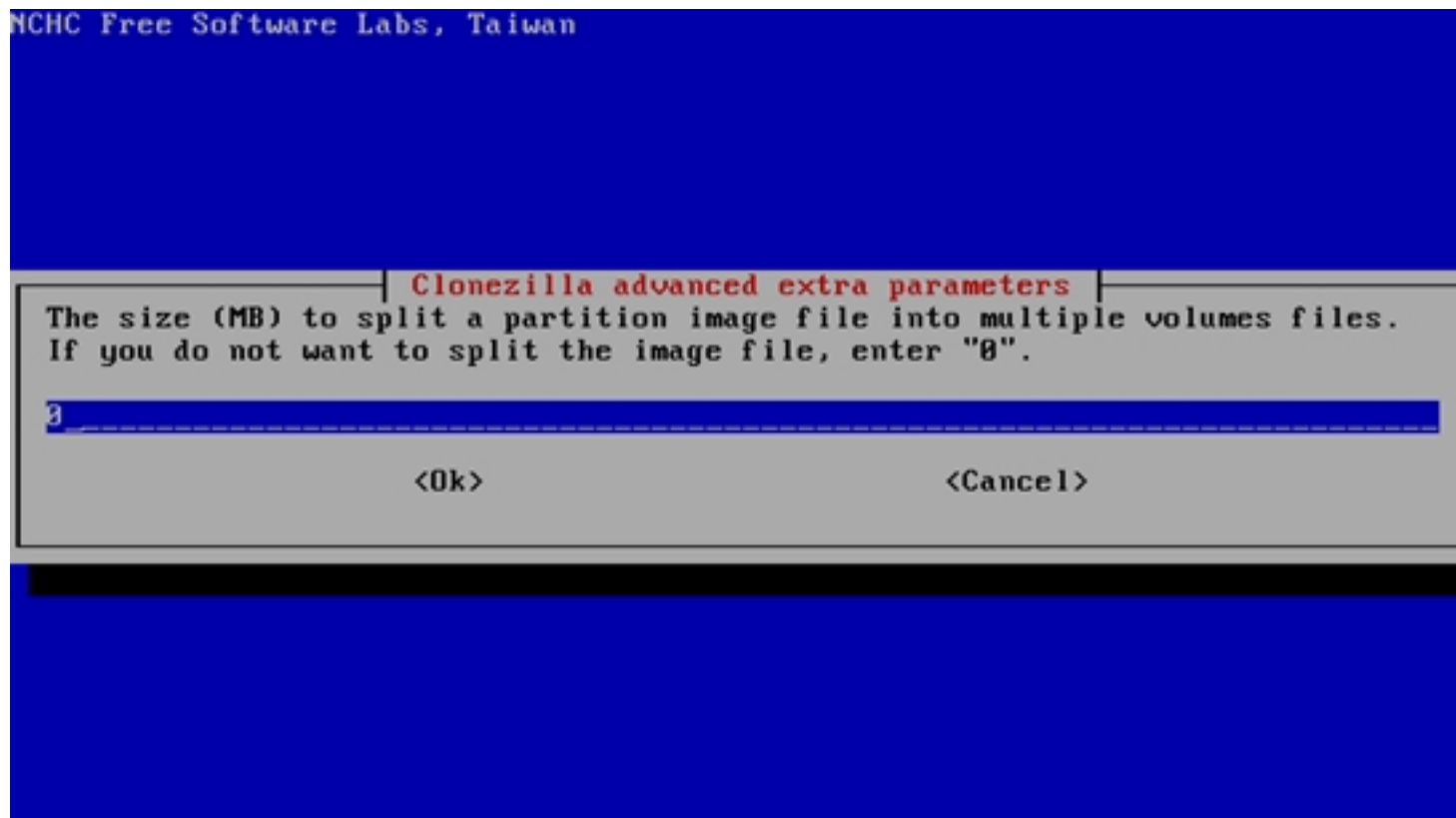
Clonezilla advanced extra parameters

Choose the compression option. If you have no idea, keep the default value, i.e. do NOT change anything. ///NOTE/// -z3 (lzop) is fastest for compressing image and the image size is good enough (slight larger than that of gzip). However, it is not recommended when saving the image in (1) a network-based directory (2) a machine with bad quality of memory (RAM). Its algorithm requires good quality network and RAM. If the network quality or RAM is not good enough, your saved image will be broken!

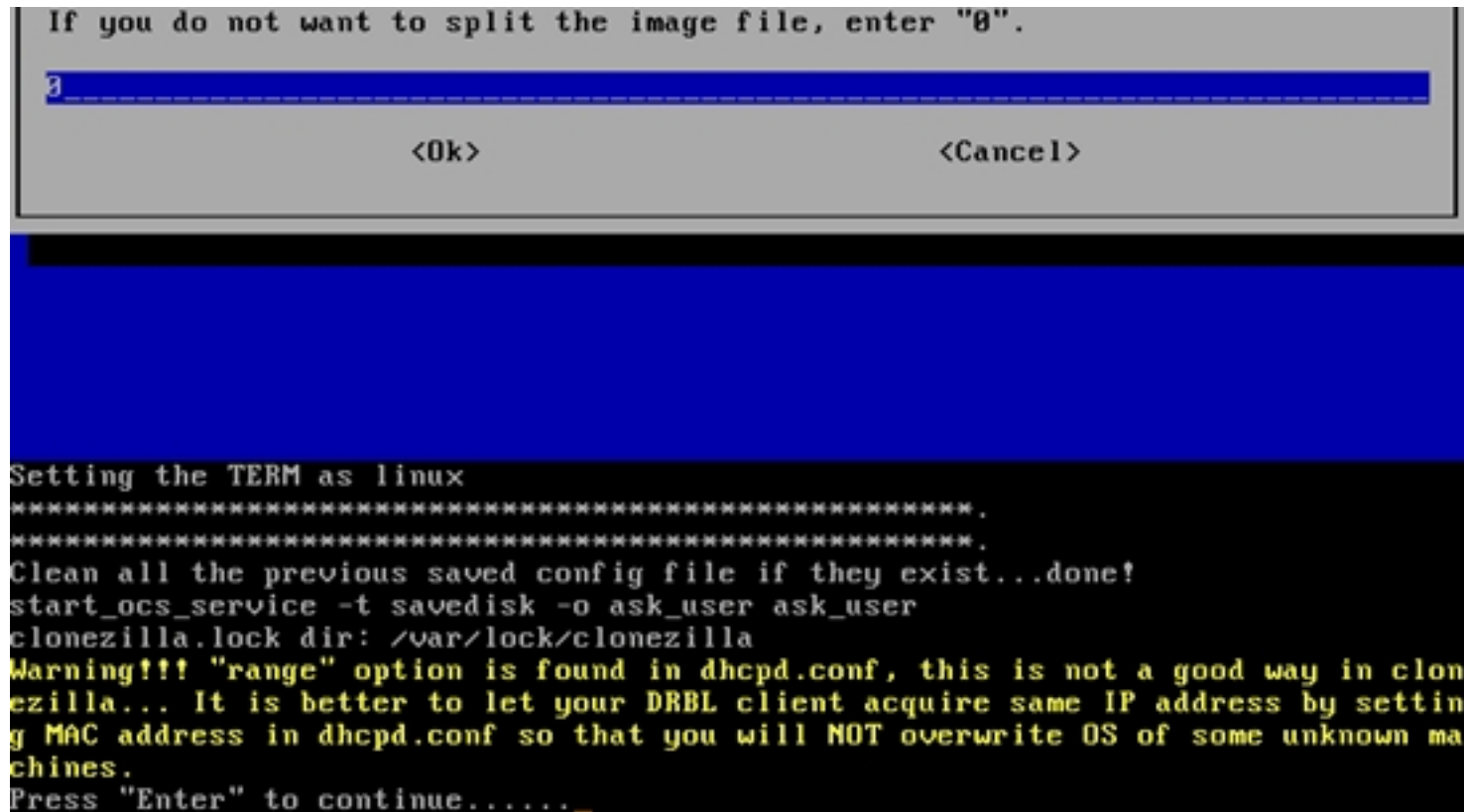
- z1 Use gzip compression(fast but smaller image)**
- z1p Use parallel gzip compression (testing), for multicore/CPU
- z2 Use bzip2 compression(slowest but smallest image)
- z3 Use lzo compression(faster, image size ~ gzip)
- z0 Without compression(fastest but largest image)

<Ok>

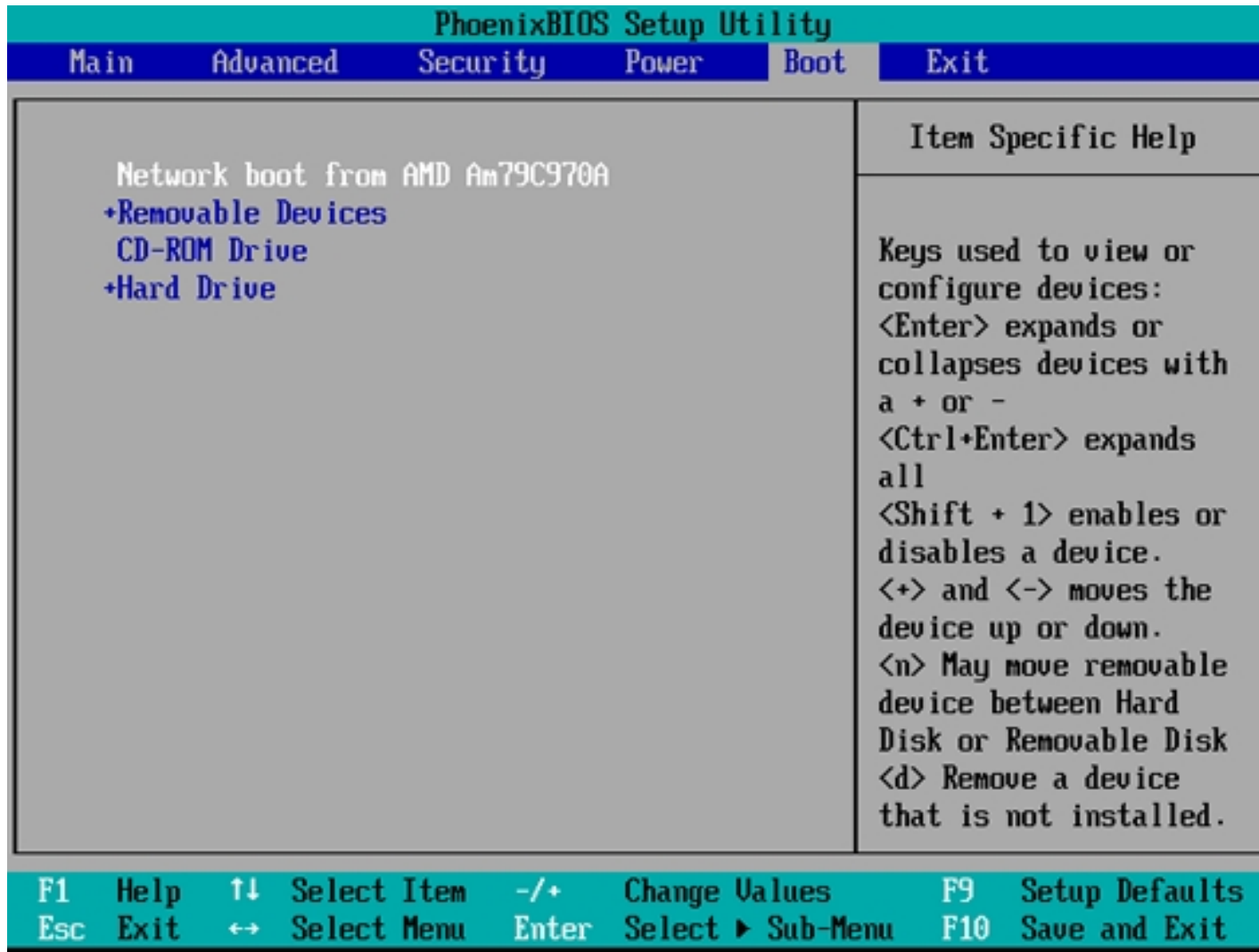
<Cancel>



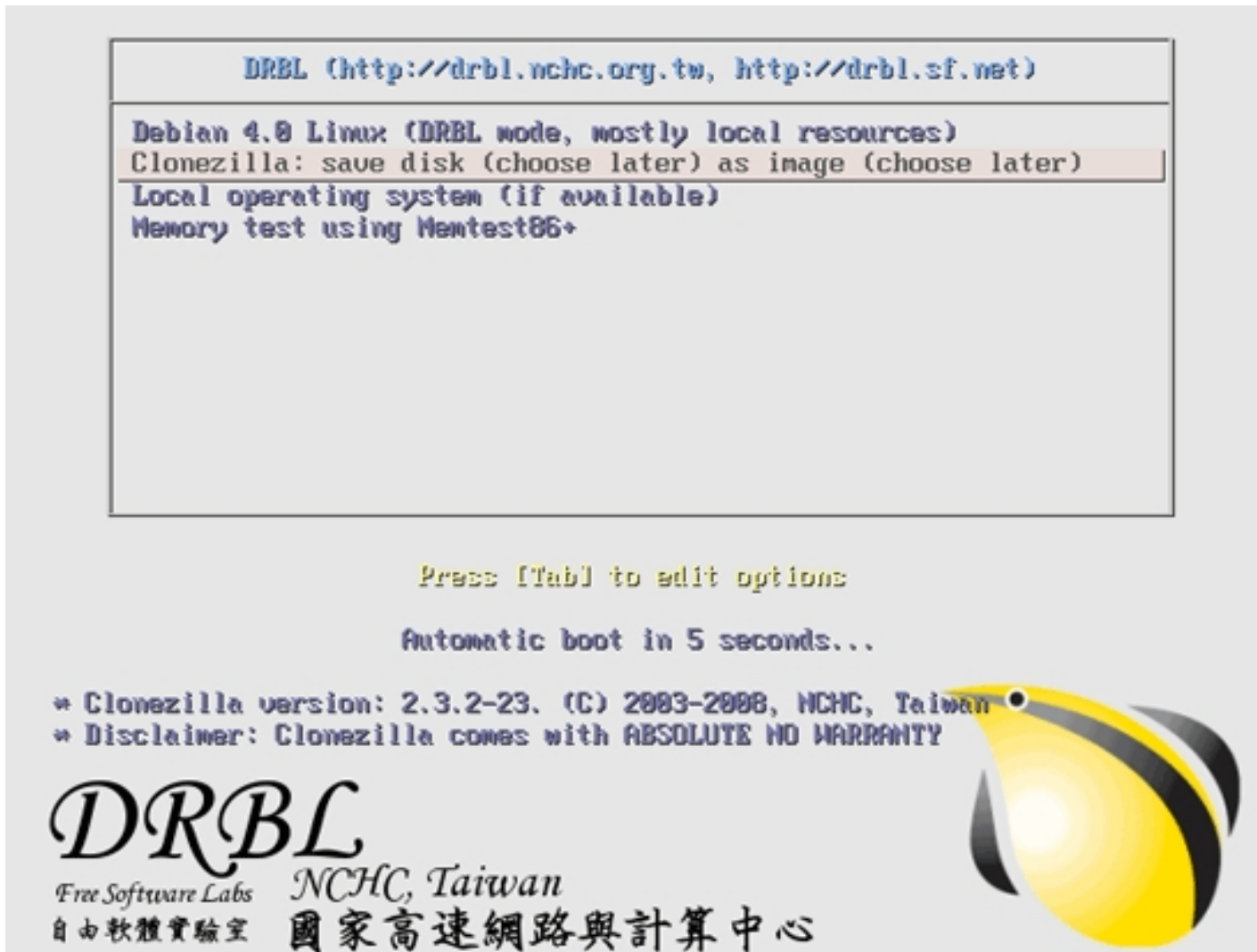
Press *ENTER* again:



The server is now ready. Now start the client system that you want to clone. It is important that you boot it from the network (via PXE) - you might have to adjust the boot order in the client's BIOS so that it boots via PXE:

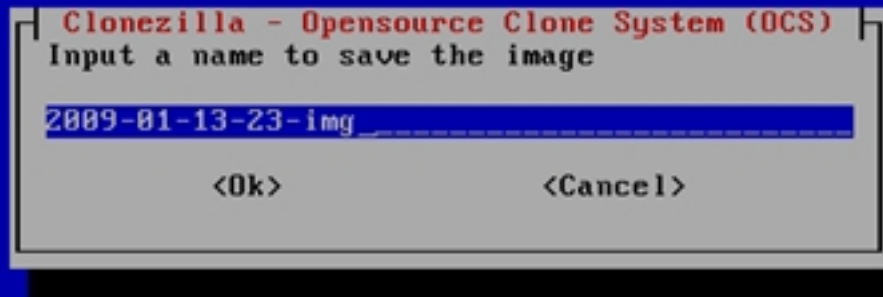


After you've configured the client to boot from the network, you should see a DRBL boot menu. Select *Clonezilla: save disk (choose later) as image (choose later)*:

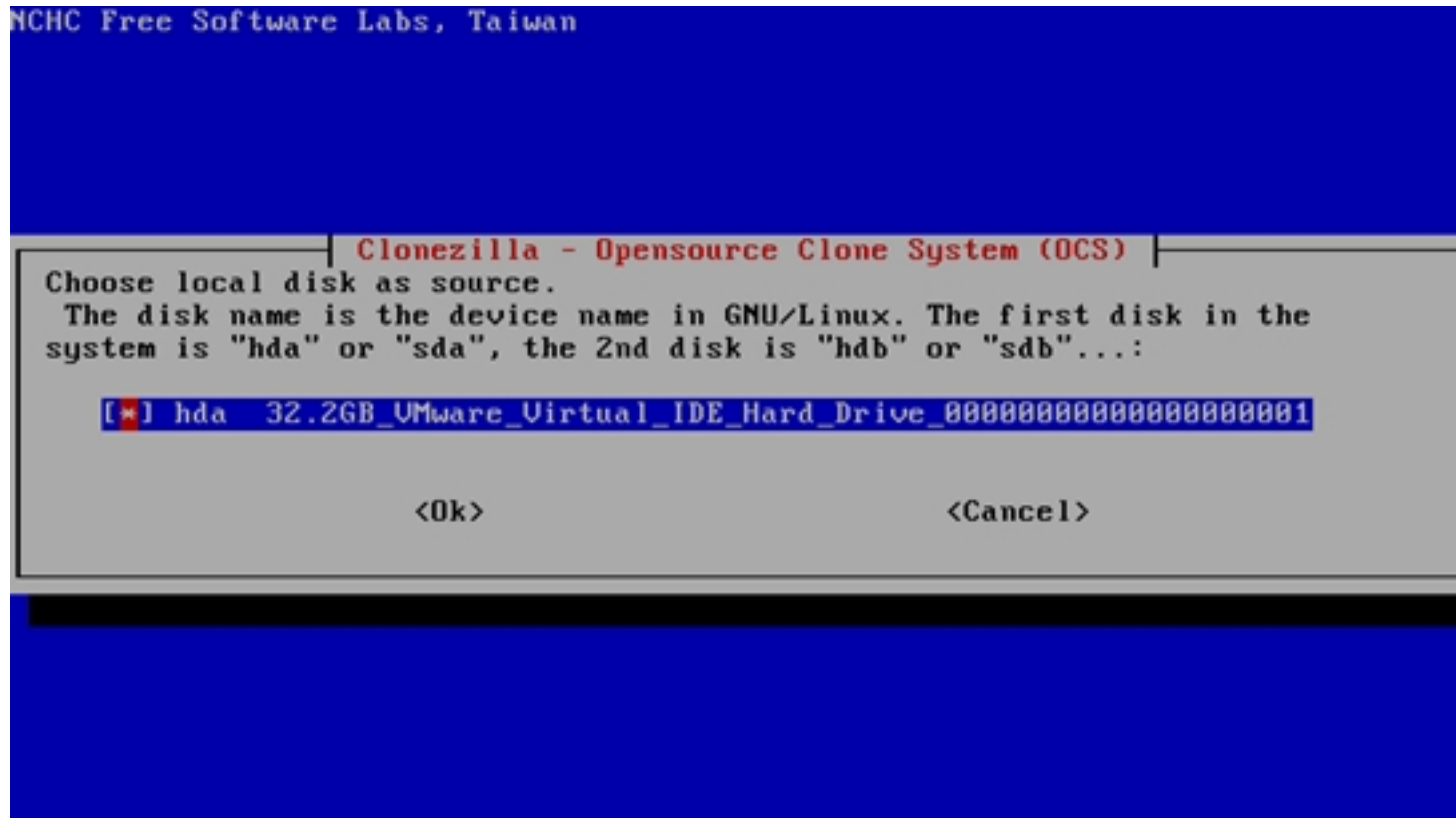


Next provide a name for the image (or accept the default value):

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Select the source hard drive:



Afterwards, the image is being created and transferred to the CloneZilla server:

```
Saving the VG config...
  Volume group "VolGroup00" successfully backed up.
done!
Saving /dev/VolGroup00/LogVol00 as filename: VolGroup00-LogVol00. Filesystem: Li
nux rev 1.0 ext3 filesystem data (large files)
*****.
*****.
Starting saving /dev/VolGroup00/LogVol00 as /home/partimag/2009-01-13-23-img/Vol
Group00-LogVol00.XXX...
/dev/VolGroup00/LogVol00 filesystem: ext3.
*****.
Checking file system integrity in /dev/VolGroup00/LogVol00... done!
Use gzip to compress the image.
Image will not be split.
*****.
Volume size: 0 bytes (0 MiB)
partimage: status: initializing the operation.
partimage: status: Partimage: 0.6.1
partimage: status: Image type: NONE
partimage: status: Saving partition to the image file...
partimage: status: reading partition properties
partimage: status: writing header
stdout      S:   4M partimage: status: copying used data blocks
File Name   Size      T:Elapsed/Estimated  Rate/min    Progress
stdout      S: 809M  T:00:01:33/00:04:15  R: 520M/min  P: 26%_
```

Then the CloneZilla server is notified that the image creation process has finished...

```

stdout      S:   4M partimage: status: copying used data blocks
File Name    Size      T:Elapsed/Estimated  Rate/min    Progress
stdout      S:2.95G  T:00:05:13/00:00:00  R: 578M/min  P:100%

partimage: status: committing buffer cache to disk.
>>> Time elapsed: 317.47 secs (~ 5.291 mins)
*****.
Finished saving /dev/VolGroup00/LogVol00 as /home/partimag/2009-01-13-23-img/Vol
Group00-LogVol00.XXX
*****.
*****.
Saving /dev/VolGroup00/LogVol01 as filename: VolGroup00-LogVol01. Filesystem: Li
nux/i386 swap file (new style) 1 (4K pages) size 262143 pages
Saving swap /dev/VolGroup00/LogVol01 info in /home/partimag/2009-01-13-23-img/sw
appt-VolGroup00-LogVol01.info...
*****.
Saving hardware info...
Saving DMI info...
Saving package info...
*****.
*****
*****
/opt/drbl/sbin/ocs-sr is spawned by S19ocs-run
*****.
Notifying clonezilla server my job is done... 11 10 9 8 7 _

```

... and the client system is shut down (or rebooted - that depends on the action you've chosen on the server):

```
Finished saving /dev/VolGroup00/LogVol00 as /home/partimag/2009-01-13-23-img/Vol
Group00-LogVol00.XXX
*****.
*****.
Saving /dev/VolGroup00/LogVol01 as filename: VolGroup00-LogVol01. Filesystem: Li
nux/i386 swap file (new style) 1 (4K pages) size 262143 pages
Saving swap /dev/VolGroup00/LogVol01 info in /home/partimag/2009-01-13-23-img/sw
appt-VolGroup00-LogVol01.info...
*****.
Saving hardware info...
Saving DMI info...
Saving package info...
*****.
*****
*****
/opt/drbl/sbin/ocs-sr is spawned by S19ocs-run
*****.
Notifying clonezilla server my job is done... 11 10 9 8 7 6 5 4 3 2 1
Sending info "192.168.0.10 00:0c:29:d5:ef:f8 Saved /home/partimag, /dev/hda1, su
ccess, .054 mins; /dev/VolGroup00/LogVol00, success, 5.291 mins;" to 192.168.0.1
00:6461... done!
*****.
Finished!
Now syncing - flush filesystem buffers...
Will poweroff... 5 4 3 _
```

That's it, we now have an image of our Linux system that we can clone to other systems.

4 Cloning/Restoring The Image

To clone or restore the image to other systems, run

```
/opt/drbl/sbin/dcs
```

again on the CloneZilla Server. Select *All Select all clients*:

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///Hint! From now on, if multiple choices are available, you have to press space key to mark your selection. A star sign (*) will be shown when the selection is done///

Do you want to set the mode for all clients or part of them ?

Choose the mode:

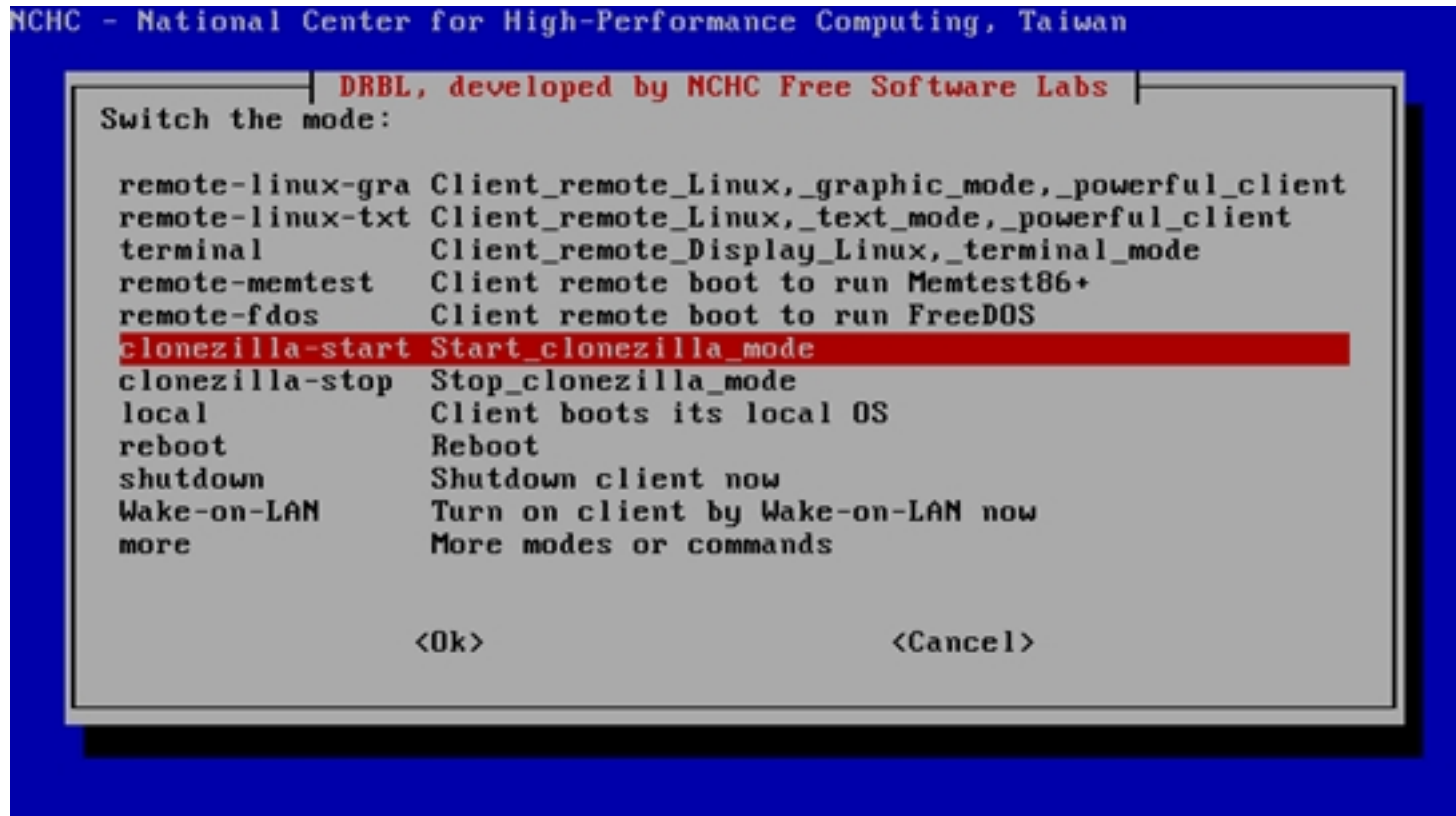
All Select all clients

Part Select part of clients by IP or MAC address

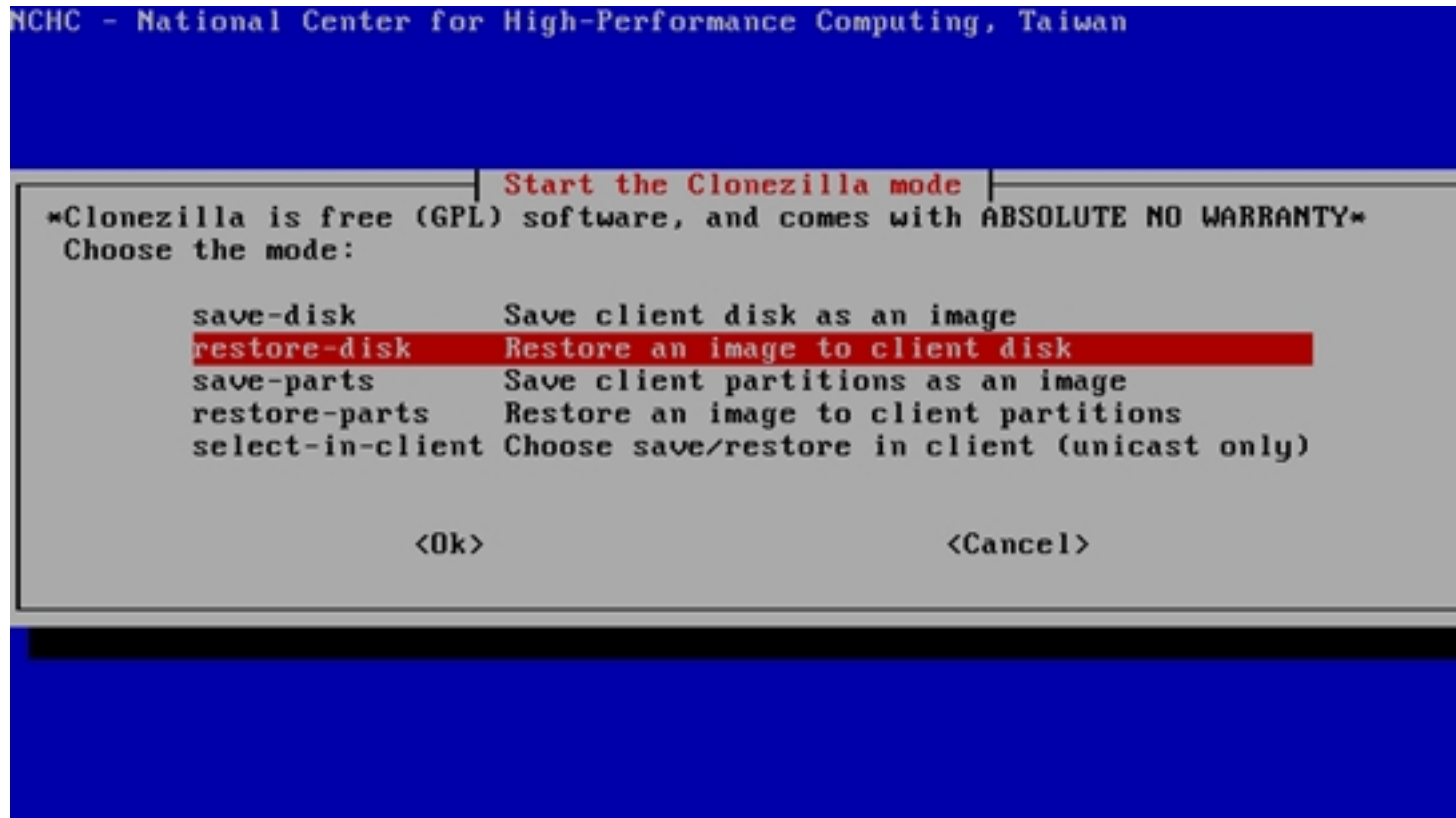
<Ok>

<Cancel>

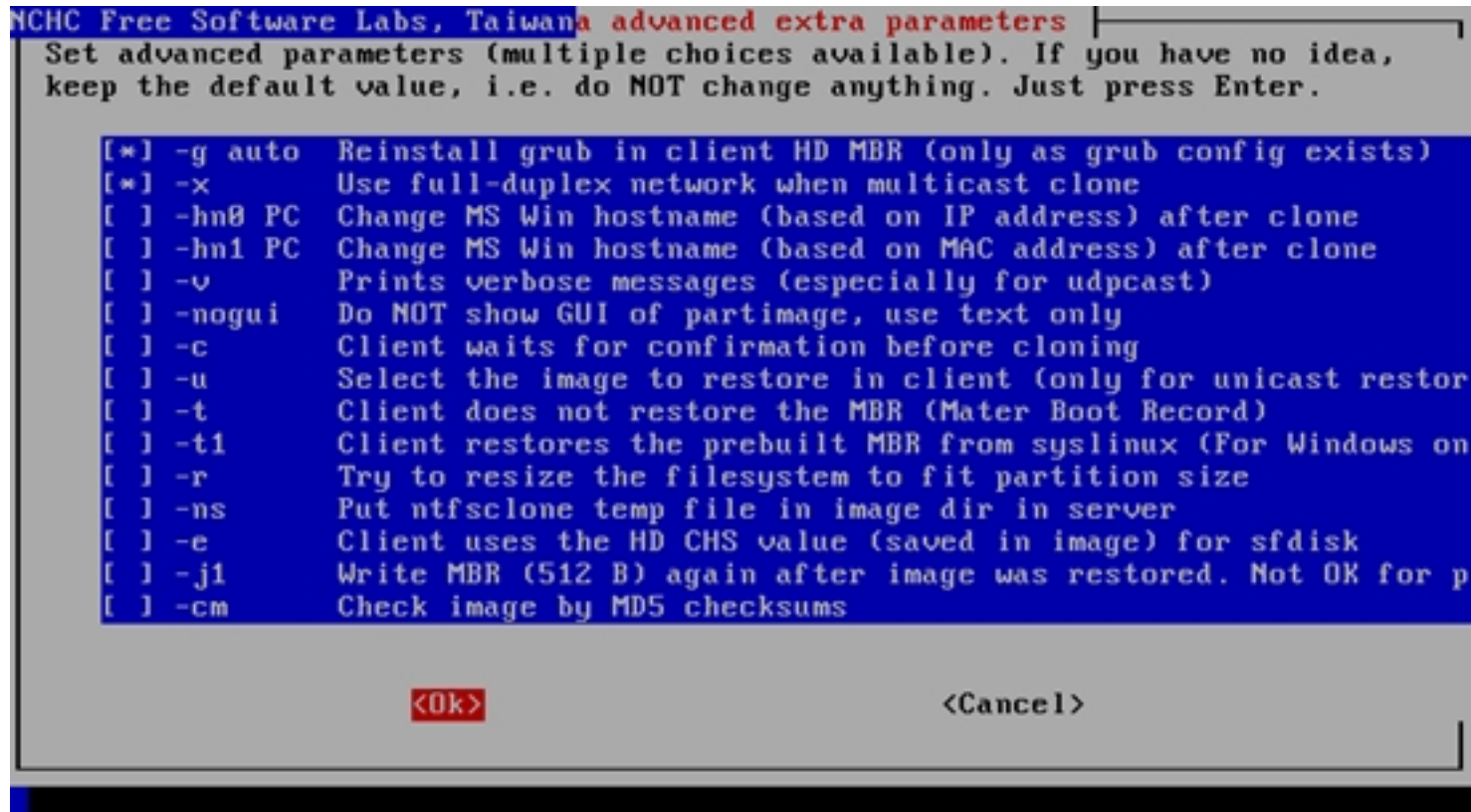
Choose *clonezilla-start* *Start_clonezilla_mode*:



Select *restore-disk* Restore an image to client disk:



You can accept the default values on the next four screens by pressing *ENTER*:



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Clonezilla advanced extra parameters

Set advanced parameters. If you have no idea, keep the default value, i.e. do NOT change anything. Just press Enter. Choose the mode to create the partition table on the target disk: ***ATTENTION*** (1) TO CREATE A NEW PARTITION TABLE IN THE TARGET DISK. ALL THE DATA ON THE TARGET DEVICE WILL BE ERASED!!! (2) Clonezilla will not restore an image from large disk (partition) to smaller disk (partition). However, it can restore an image from small disk (partition) to larger disk (partition). (3) If you do NOT want clonezilla to create partition table, check -k:

	Use the partition table from image
-k	Do NOT create partition table in
-k1	Create partition table proportion
-k2	Enter command line prompt to create
-j0	Use dd to create partition table
exit	Exit

<Ok>

<Cancel>

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Clonezilla advanced extra parameters

Do you want to ALWAYS provide clonezilla service for client ?

NOTE! If you choose anyone -y option, the client won't boot local OS after it finishes clone OS into local harddrive! If you are not sure, do NOT choose anyone -y option!

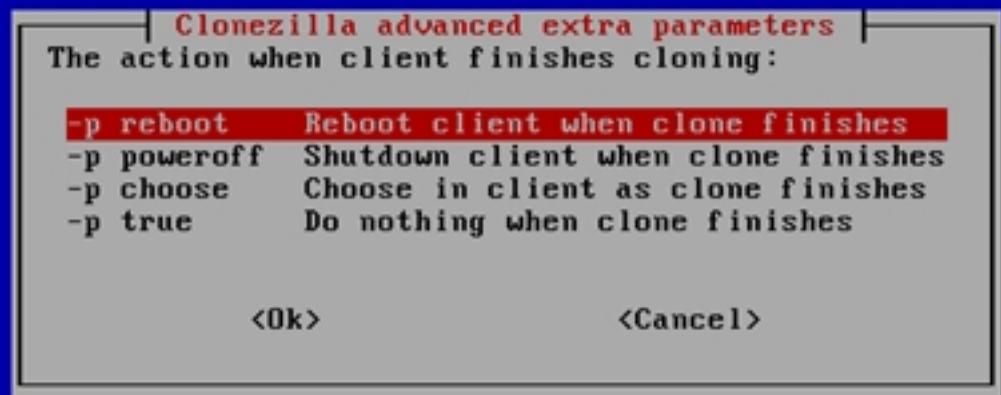
Skip this option

- y0 Server always provides clone mode - default local boot
- y1 Server always provides clone mode - default clonezilla
- y2 Server always provides clone mode - default drbl

<Ok>

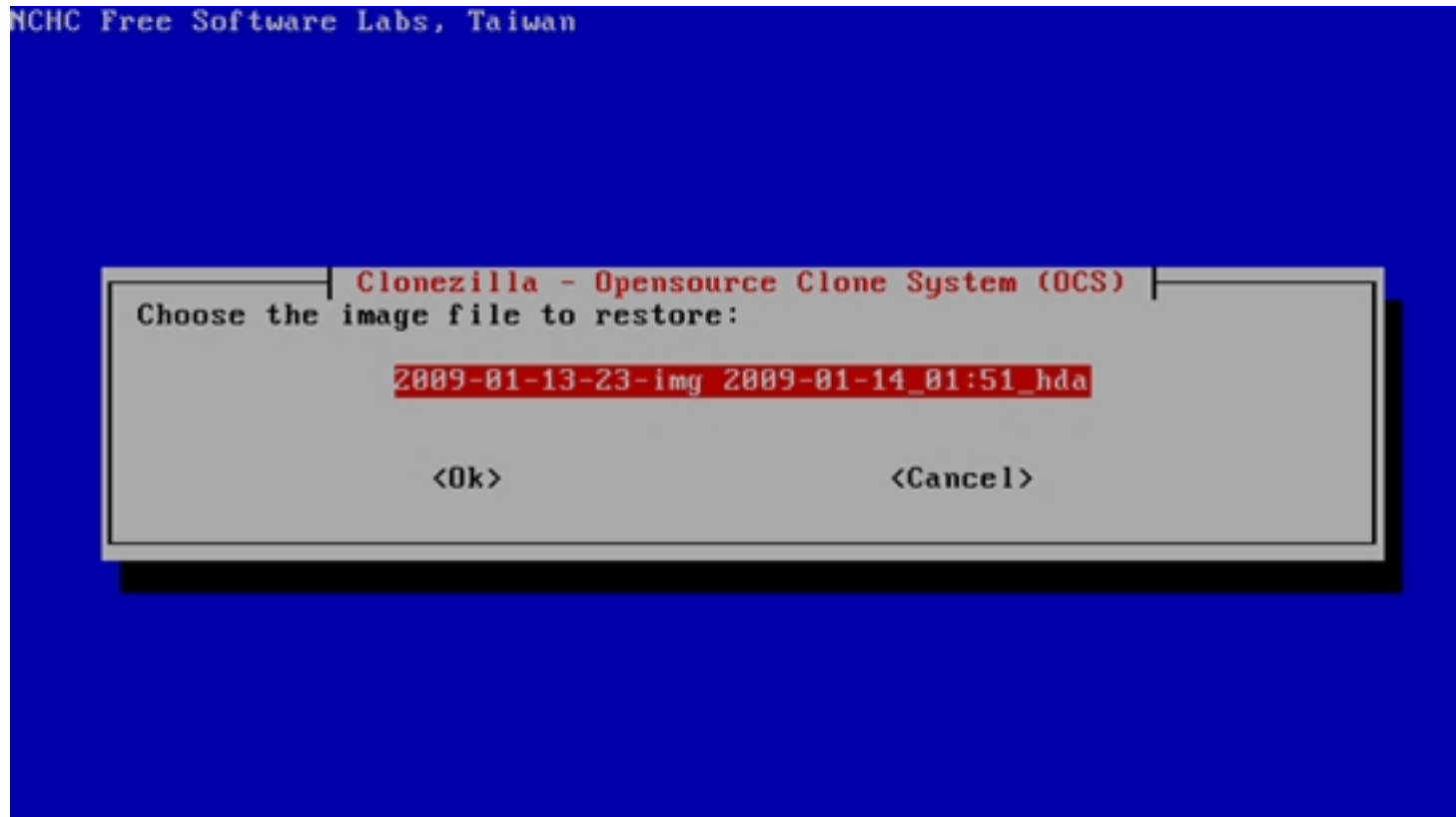
<Cancel>

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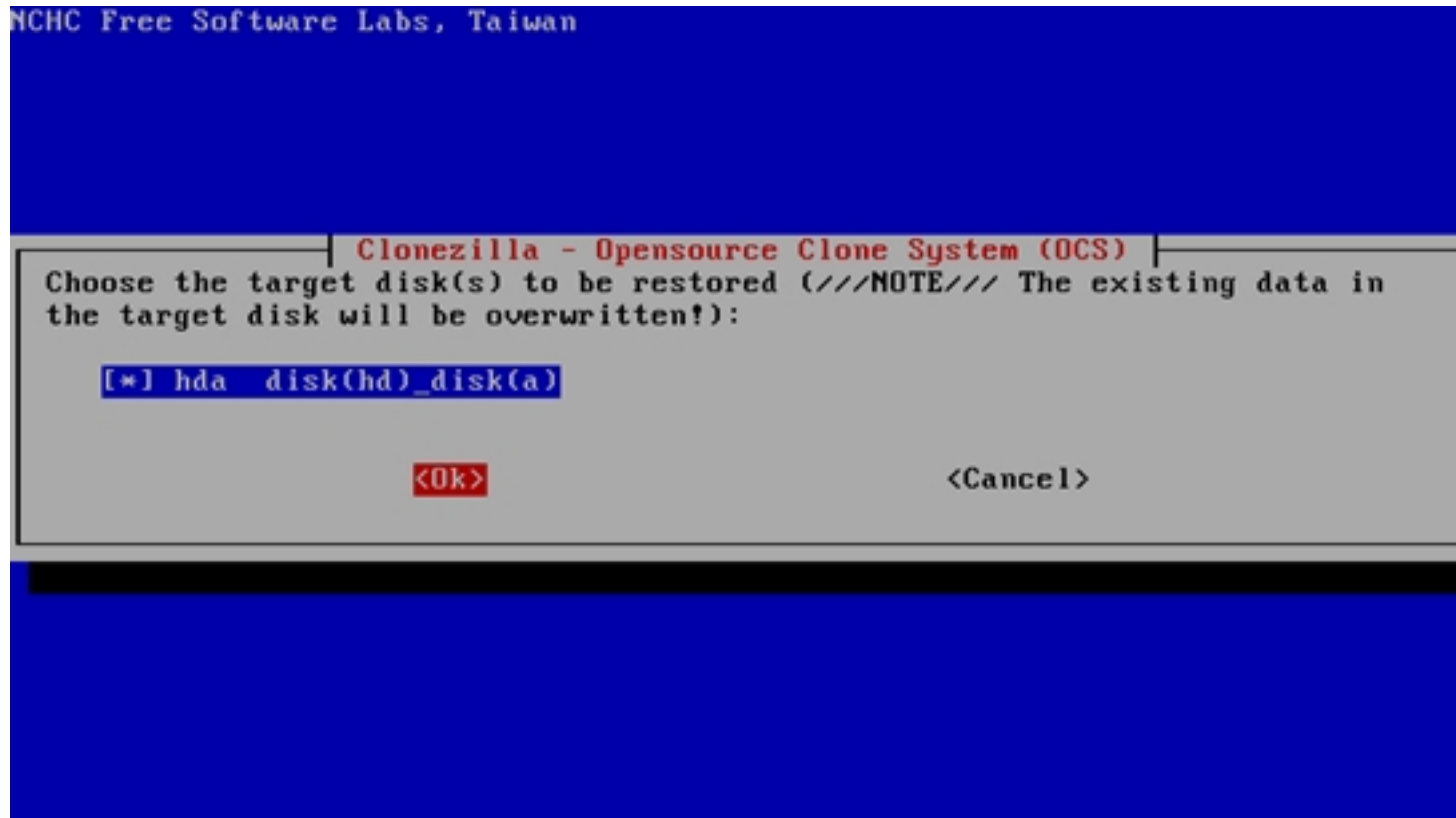


Pick the image that you want to restore:

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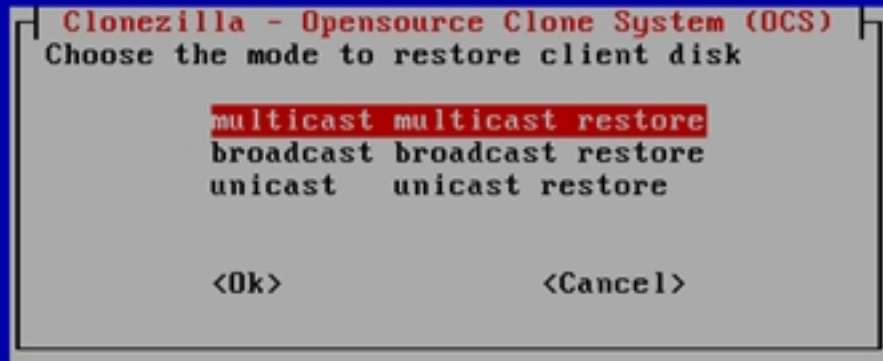


Choose the target hard drive:

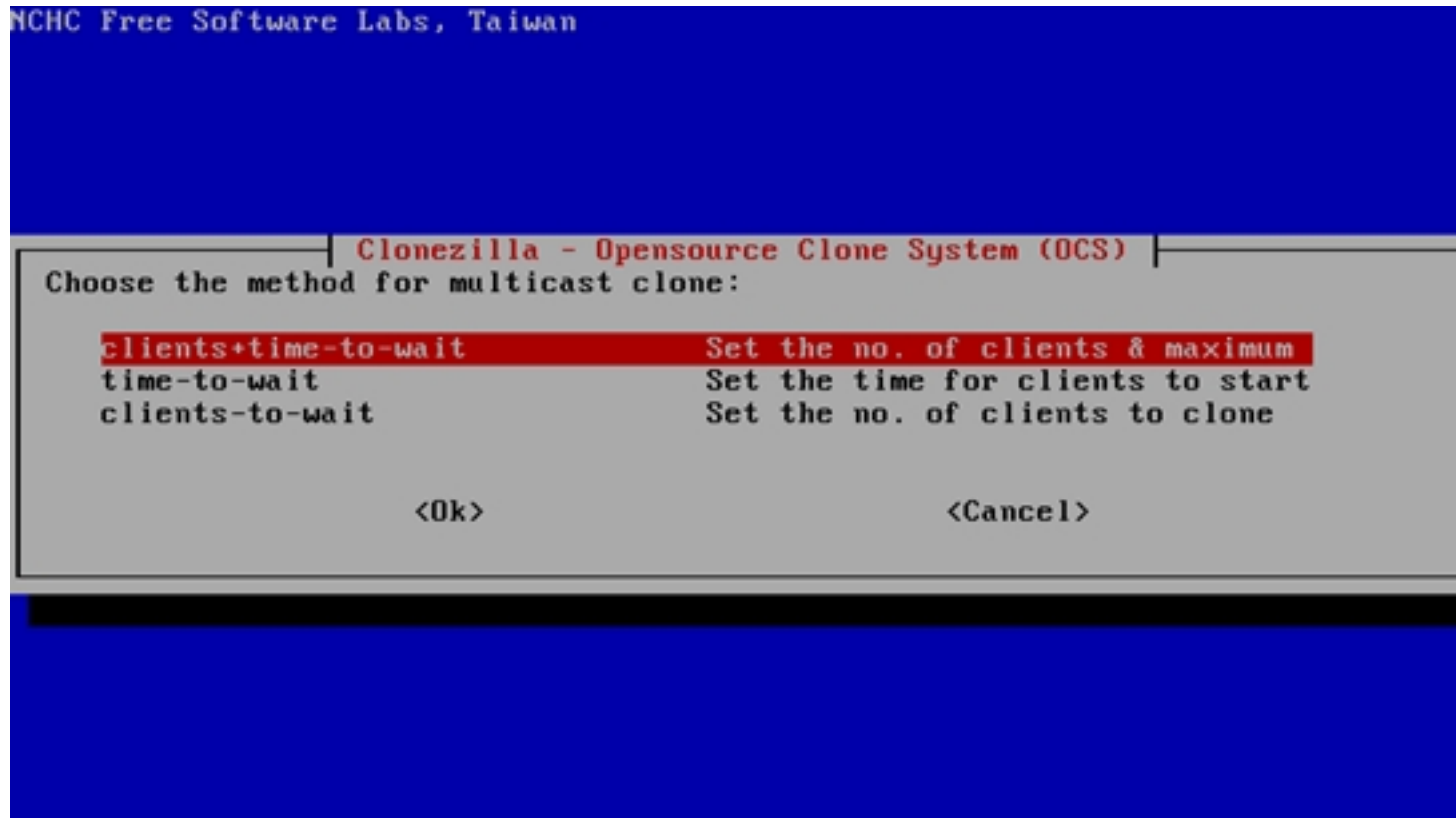


Select *multicast multicast restore*:

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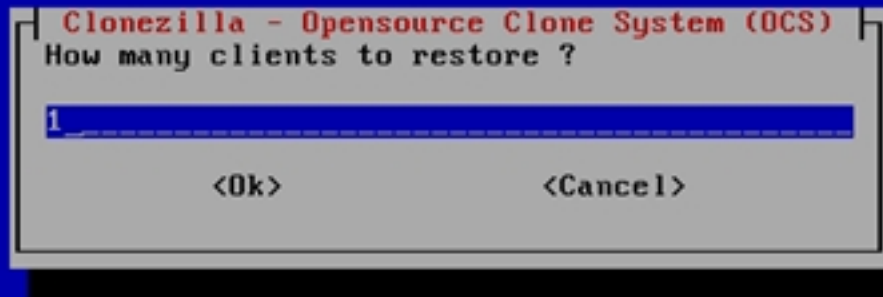


Choose *clients+time-to-wait*:

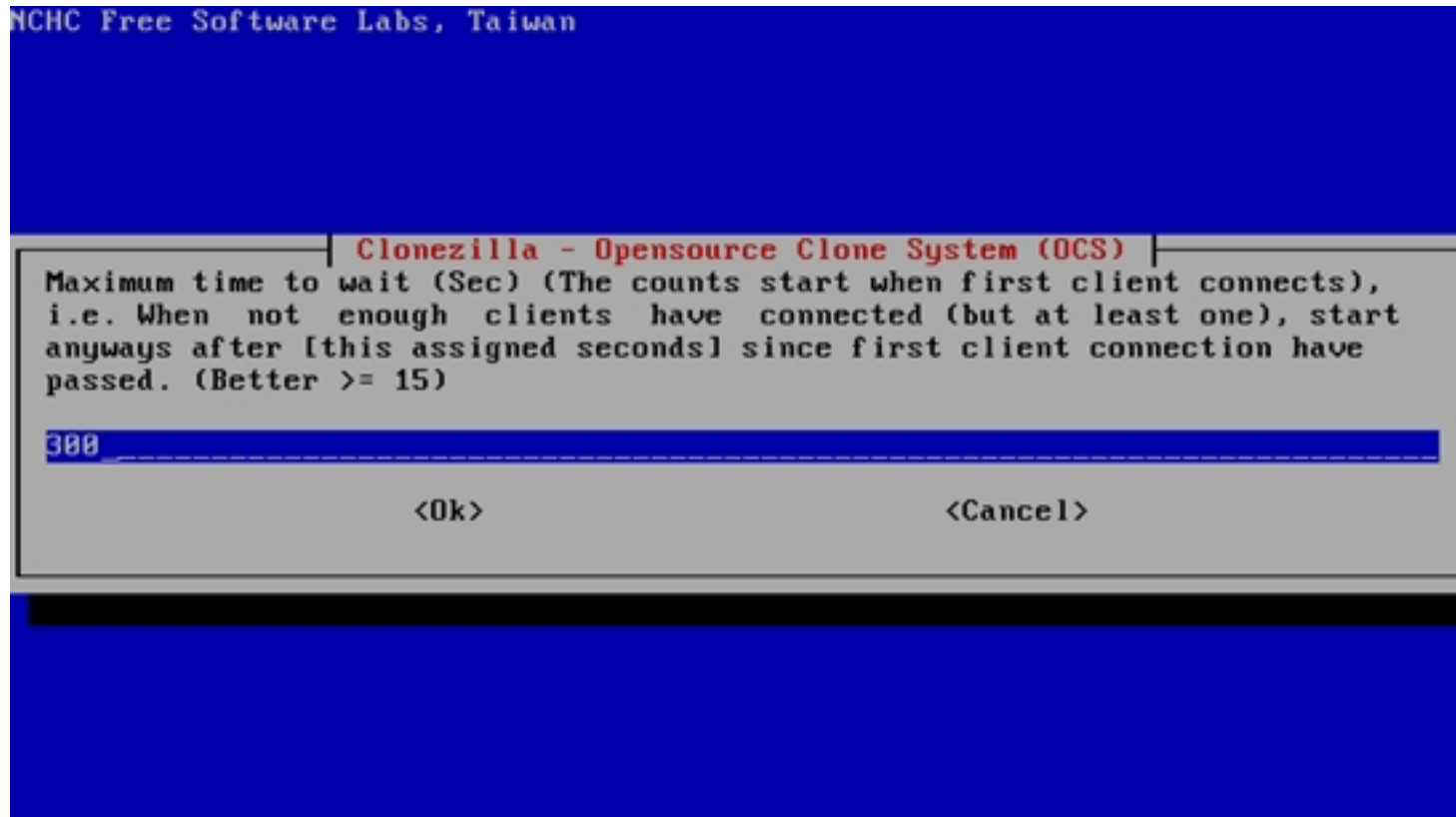


Fill in the number of systems on which you want to restore the image (I want to restore just one system in this example):

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Fill in the max. time (in seconds) that the server will wait until all clients are powered on (i.e., if you want to restore the image on ten clients, you have 300 seconds to power on the other nine computers after you have powered on the first one - if you are too slow, CloneZilla will start to restore the image only on the systems that have been powered on in time):



Afterwards, press *ENTER* twice:

```
anyways after [this assigned seconds] since first client connection have
passed. (Better >= 15)

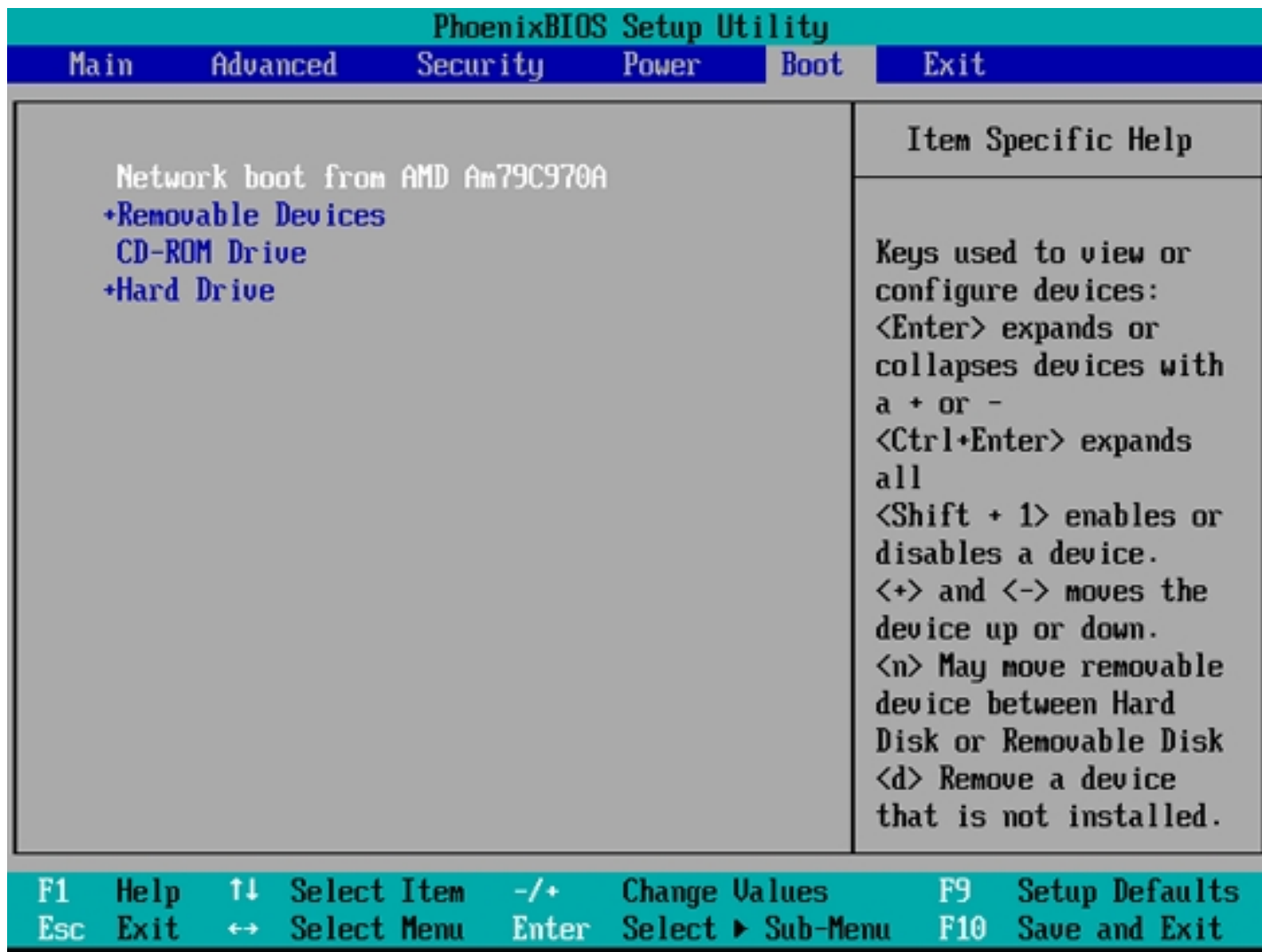
300

<Ok>          <Cancel>

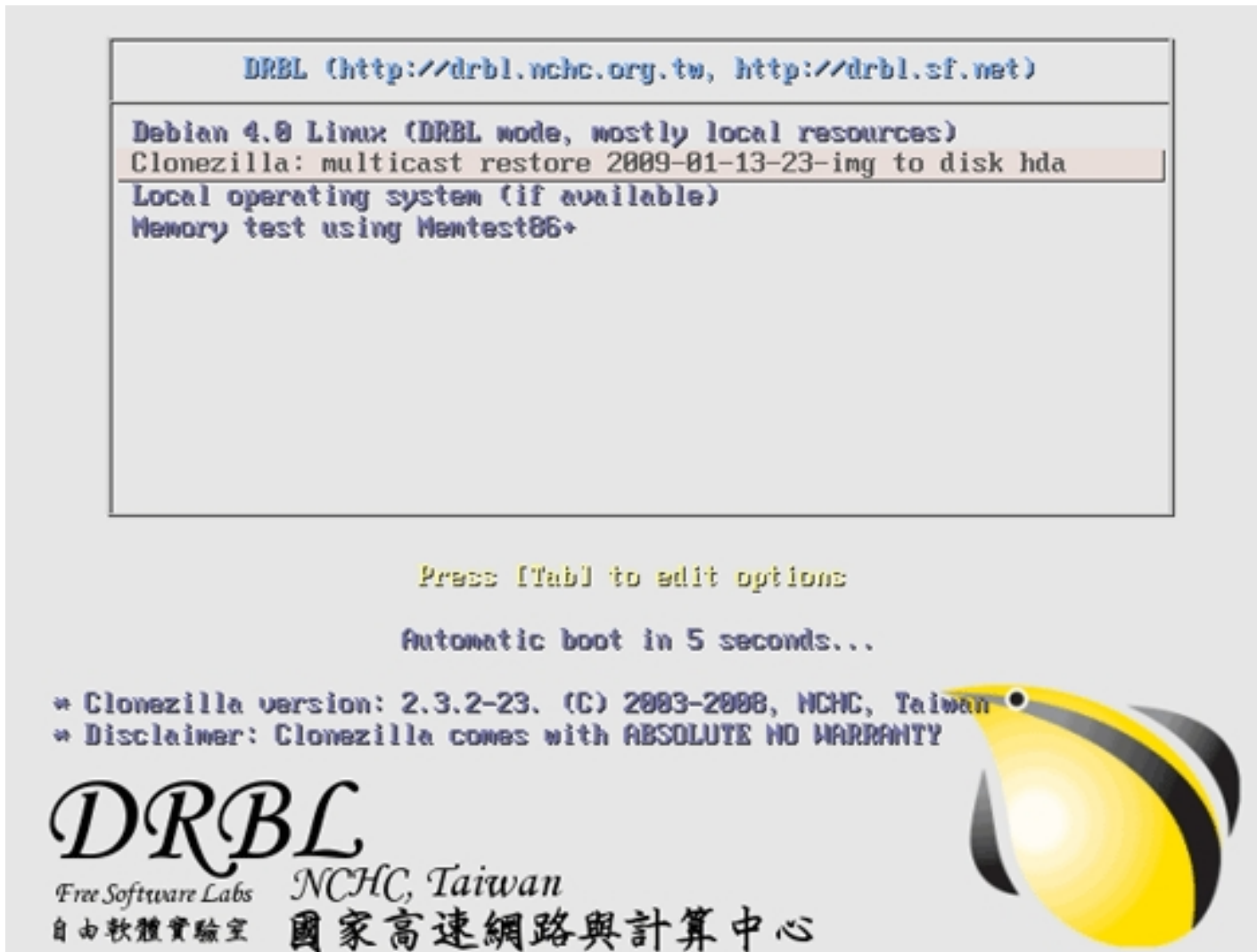
Setting the TERM as linux
*****.
*****.
Clean all the previous saved config file if they exist...done!
start_ocs_service -n 1 -t multicast_restoredisk -o 2009-01-13-23-img hda
clonezilla.lock dir: /var/lock/clonezilla
Warning!!! "range" option is found in dhcpd.conf, this is not a good way in clonezilla... It is better to let your DRBL client acquire same IP address by setting MAC address in dhcpd.conf so that you will NOT overwrite OS of some unknown machines.
Press "Enter" to continue....._
```

```
Setting the TERM as linux
*****.
*****.
Clean all the previous saved config file if they exist...done!
start_ocs_service -n 1 -t multicast_restoredisk -o 2009-01-13-23-img hda
clonezilla.lock dir: /var/lock/clonezilla
Warning!!! "range" option is found in dhcpd.conf, this is not a good way in clonezilla... It is better to let your DRBL client acquire same IP address by setting MAC address in dhcpd.conf so that you will NOT overwrite OS of some unknown machines.
Press "Enter" to continue.....
Finding the multicast seed ethernet port... done.
Will use ethernet port eth0 for multicast seed in this clonezilla server.
You are using multicast clonezilla, please make sure:
1. This ethernet port in server is up and connected: eth0
2. If you have more than 1 (>=2) network switches for DRBL environment, make sure all switches are connected to each other, otherwise multicast packets will not send to every clients from the ethernet port mentioned above via all the switches, so the multicast clone might NOT start.
Press "Enter" to continue....._
```

Now power on the clients. Make sure they are configured to boot from the network (via PXE):



In the boot menu, select *Clonezilla: multicast restore*:



The cloning process will then begin:

```
restore partition from image file
Partition to restore:...../dev/VolGroup00/LogVol00
Size of partition to restore:.....28.75 GiB = 30870077440 bytes
Current image file:.....stdin
File system:.....ext3fs

Partition was on device:...../dev/VolGroup00/LogVol00
Image created on:.....Tue Jan 13 23:45:17 2009
Size of the original partition:...28.75 GiB = 30870077440 bytes

Time elapsed:.....37sec
Estimated time remaining:..... 2m:51sec
Speed:.....866.44 MiB/min
Data copied:.....534.30 MiB / 2.94 GiB

17% 17 %

copying used data blocks [* to cancel, CtrlS to pause, CtrlQ to resume]
```

Afterwards, the server will be notified that the process has finished...

```
kjournal starting. Commit interval 5 seconds
EXT3 FS on dm-0, internal journal
EXT3-fs: mounted filesystem with ordered data mode.
/dev/mapper/VolGroup00-LogVol00 is mounted as root partition for grub-install...
kjournal starting. Commit interval 5 seconds
EXT3 FS on hda1, internal journal
EXT3-fs: mounted filesystem with ordered data mode.
Running: grub-install --no-floppy --root-directory=/tmp/hd_img.AL2353 /dev/hda
You shouldn't call /sbin/grub-install. Please call /usr/sbin/grub-install instead!

Probing devices to guess BIOS drives. This may take a long time.
Installation finished. No error reported.
This is the contents of the device map /tmp/hd_img.AL2353/boot/grub/device.map.
Check if this is correct or not. If any of the lines is incorrect,
fix it and re-run the script 'grub-install'.

(hd0)  /dev/hda
done!
*****.
*****
*****
/opt/drbl/sbin/ocs-sr is spawned by S19ocs-run
*****.
Notifying clonezilla server my job is done... 10 9 8 7 _
```

... and the client system will reboot:


```
Running: grub-install --no-floppy --root-directory=/tmp/hd_img.AL2353 /dev/hda
You shouldn't call /sbin/grub-install. Please call /usr/sbin/grub-install instead!

Probing devices to guess BIOS drives. This may take a long time.
Installation finished. No error reported.
This is the contents of the device map /tmp/hd_img.AL2353/boot/grub/device.map.
Check if this is correct or not. If any of the lines is incorrect,
fix it and re-run the script 'grub-install'.

(hd0)  /dev/hda
done!
*****.
*****
*****
/opt/drbl/sbin/ocs-sr is spawned by S19ocs-run
*****.
Notifying clonezilla server my job is done... 10 9 8 7 6 5 4 3 2 1
Sending info "192.168.0.9 00:0c:29:d8:b9:5b Multicast restored 2009-01-13-23-img
, /dev/hda1, success, .089 mins; /dev/VolGroup00/LogVol00, success, 3.275 mins;"
to 192.168.0.100:6461... done!
*****.
Finished!
Now syncing - flush filesystem buffers...
Will reboot... 5 4 3 _
```

Before the client system boots, enter its BIOS again and configure it to boot from the hard drive!

If all goes well, the computer should boot into the cloned operating system.

5 Troubleshooting

It is possible that you see this message during the restore:

Failed to install grub

and that the system will not boot afterwards:

```
Grub  
error 2
```

(I've had this with Ubuntu systems.)

The solution is to boot into a rescue system (e.g. [Knoppix](#) or the Ubuntu Live-CD) and install GRUB from the rescue system.

Once Knoppix or the Ubuntu Live system has started, open a terminal and become root:

Knoppix:

```
su
```

Ubuntu:

```
sudo su
```

Run

```
fdisk -l
```

to learn more about your partitioning:

```
root@Knoppix:~# fdisk -l
```

```
Disk /dev/sda: 32.2 GB, 32212254720 bytes  
255 heads, 63 sectors/track, 3916 cylinders  
Units = cylinders of 16065 * 512 = 8225280 bytes
```

<i>Device</i>	<i>Boot</i>	<i>Start</i>	<i>End</i>	<i>Blocks</i>	<i>Id</i>	<i>System</i>
/dev/sda1	*	1	3749	30113811	83	Linux
/dev/sda2		3750	3916	1341427+	5	Extended
/dev/sda5		3750	3916	1341396	82	Linux swap / Solaris

root@Knoppix:~#

In this example, I have one big partition (/dev/sda1) that also contains the /boot directory (the *Boot* column is marked with a star).

I will now mount that partition to the /mnt directory:

```
mount /dev/sda1 /mnt

mount -o bind /dev /mnt/dev

mount -o bind -t proc /proc /mnt/proc
```

(If you have a separate /boot partition, e.g. /dev/sda2, you'd mount it to /mnt/boot after you have mounted /dev/sda1 to /mnt.)

Now we install GRUB as follows:

```
chroot /mnt grub-install --no-floppy "(hd0)"
```

This will give you the following error:

```
root@Knoppix:~# chroot /mnt grub-install --no-floppy "(hd0)"
You shouldn't call /sbin/grub-install. Please call /usr/sbin/grub-install instead!
```

```
/dev/sda1 does not have any corresponding BIOS drive.
```

```
root@Knoppix:~#
```

To overcome the error, run

```
chroot /mnt grub-install --no-floppy "(hd0)" --root-directory=/ --recheck
```

```
root@Knoppix:~# chroot /mnt grub-install --no-floppy "(hd0)" --root-directory=/ --recheck
You shouldn't call /sbin/grub-install. Please call /usr/sbin/grub-install instead!
```

```
Probing devices to guess BIOS drives. This may take a long time.
Installing GRUB to (hd0) as (hd0)...
Installation finished. No error reported.
This is the contents of the device map //boot/grub/device.map.
Check if this is correct or not. If any of the lines is incorrect,
fix it and re-run the script `grub-install'.
```

```
(hd0) /dev/sda
root@Knoppix:~#
```

That's it - now reboot...

```
reboot
```

... and don't forget to remove the Knoppix or Ubuntu CD from the CD drive. If everything goes well, the GRUB error should be gone, and the system should boot without any problems.

6 Links

- CloneZilla SE: <http://clonezilla.org/clonezilla-server-edition/>
- Debian: <http://www.debian.org/>