

### Clonezilla Basics for Windows Embedded

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# 1 Introduction: Cloning the Master Image

Cloning a master image for mass production is an important step for Windows Embedded Standard and Windows Embedded Industry. First, the image must be rolled back to create the master, which is accomplished using sysprep. Here is an example command:

Sysprep /generalize /oobe /shutdown /unattend:c:\myunattend.xml

The unattended XML file is a small answer file that handles several of the Out-of-Box Experience (OOBE) screens as well as accounts, run—time key, computer names, etc. There are those that say you don't need sysprep, but failure to run sysprep and just copy the image can run into technical consequences. In short, one must run sysprep to duplicate the image.

Once the image has been rolled back, the next step is to capture the master image for deployment to other systems. The books: Starter Guide for Windows® System Image Manager, Professional's Guide To Windows® Embedded 8 Standard, and Professional's Guide To Windows® Embedded Standard 7 - 2nd Edition cover creating the unattended file and running sysprep, but what is not covered is an actual full disk capture utility. There are several hardware disk duplication solutions for hard drive and compact flash cards. International Microsystems Inc. and Logicube are two companies that offer hardware duplication products. There are also software solutions, but some of the most popular like Norton Ghost are going end-of-life in favor of licensed server-based solutions. Microsoft has solutions to capture partitions into WIM files, but when multiple partitions need to be captured, the WIM file solution is very cumbersome. Simple and inexpensive software image capture solutions are becoming hard to find. Luckily, the Linux community has developed a solution called Clonezilla that captures full disk images; and best of all, it is a free solution that can be used to capture a Windows Embedded master image.

This paper walks through the steps to create a Clonezilla disk to capture and deploy a Windows Embedded master disk image. You will need two USB flash disks. One will hold the Clonezilla boot disk image (USB disk size 8 GB), and the other will hold the captured image (USB flash disk size 32 GB or greater recommended).

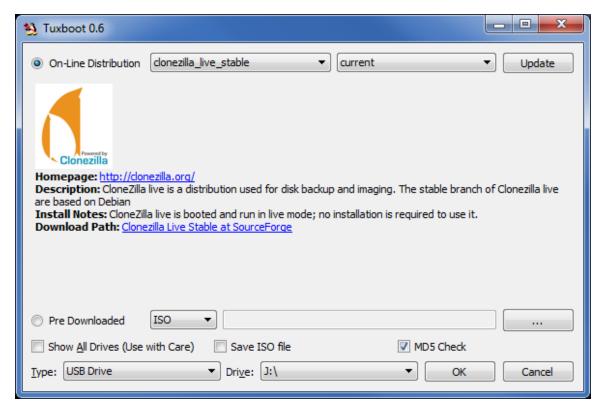
**Note**: This paper is based on Clonezilla 2.2.3-25 live image. The steps and pictures will be different for later versions.



### 2 Generate Clonezilla boot disk

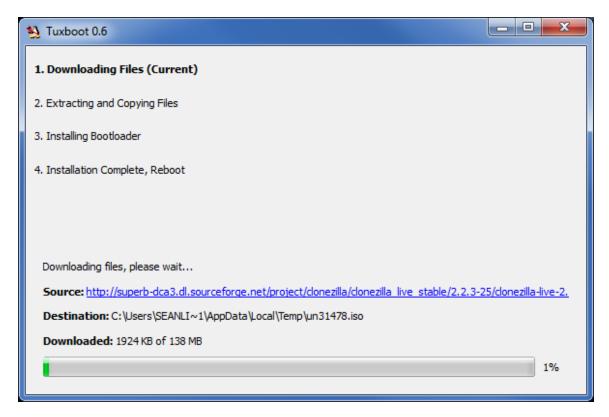
We start on the development machine, and download a utility to help create the Clonezilla boot disk.

- 1. Download Tuxboot from <a href="tuxboot.org">tuxboot.org</a>. The actual download comes from SourceForge.
- 2. Format the smaller USB flash disk as FAT 32. Format the larger flash disk as exFAT.
- 3. Plug the smaller USB flash disk into the development machine and run Tuxboot.
- 4. The Tuxboot application will start. Make sure that **clonezilla\_live\_stable** is selected for the On-Line Distribution. Also, point to the correct USB flash drive.



5. Click **OK** to start the process. The Clonezilla ISO will be downloaded, mounted locally, and then copied over to the flash disk.





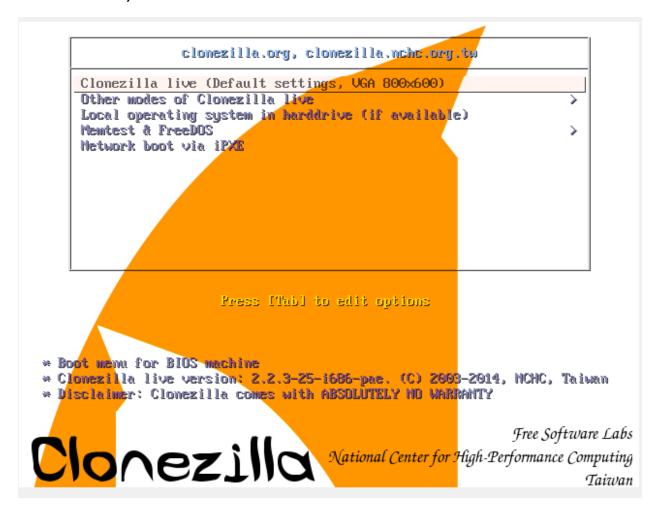
- 6. <u>Do not reboot</u> when asked. Just Exit Tuxboot.
- 7. Safely eject the USB flash drive.



## 3 Capture Disk Image

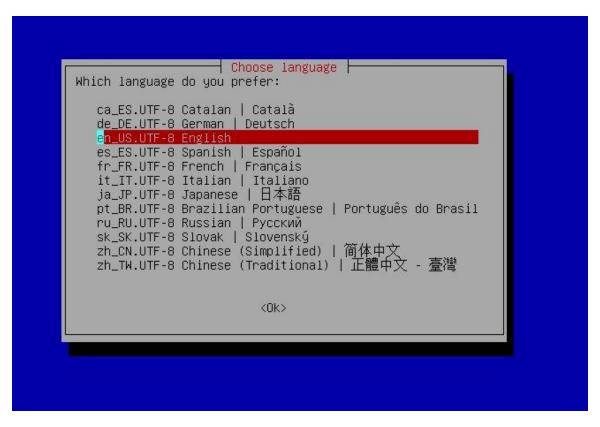
Now, we move to the target system that holds the master image.

- 1. Plug the Clonezilla boot disk that we just created into the target system.
- 2. Boot the target and make sure the BIOS is set up to boot from the USB flash disk.
- 3. The Clonezilla boot screen appears. Select Clonezilla Live (Default settings, VGA XXXXYYY) and hit Enter.

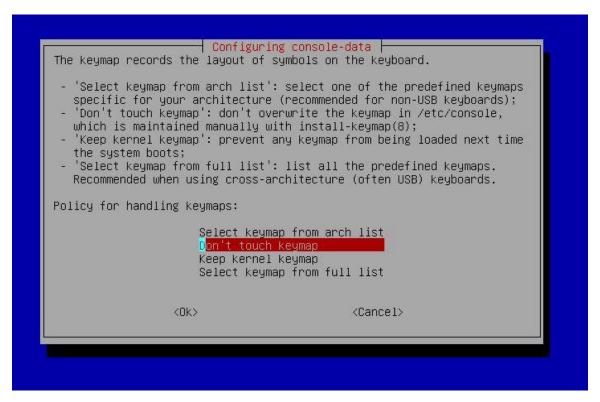


4. The OS will load. Select **English** as the language to use and hit **Enter**.



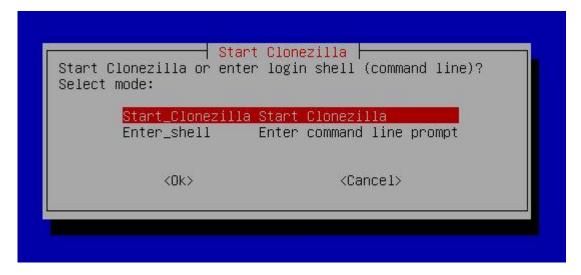


5. Keep the default **Don't touch keymap** and hit **Enter**.



6. The default Start\_Clonezilla Start Clonezilla should be selected, hit Enter.

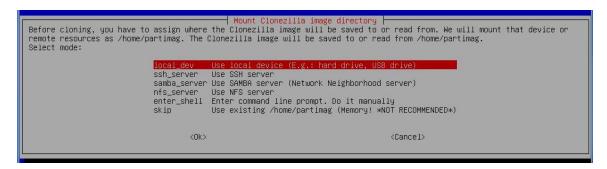




7. In the next menu, select **device-image work with disks or partitions using images** as the operation mode and hit **Enter**.



8. The next menu is for the image directory. Keep the default, local dev, and hit Enter.



9. Insert the larger USB flash disk when prompted, wait about 5 seconds, and then hit **Enter**.



```
ocsroot device is local_dev
Preparing the mount point /home/partimag...
If you want to use USB device as a Clonezilla image repository, please

* Insert USB device into this machine *now*

* Wait for about 5 secs

* Press Enter key
so that the OS can detect the USB device and later we can mount it as /home/partimag.
Press "Enter" to continue.....
Informing the OS of partition table changes...
Mounting local dev as /home/partimag...
Excluding busy partition or disk...
```

10. The system will mount and prepare the UBS flash disk for the image. You will be asked for the home directory to store the image. Select the USB flash disk image (sdx1) and hit Enter.

```
Clonezilla – Opensource Clone System (OCS) | Mode:

Now we need to mount a device as /home/partimag (Clonezilla image(s) repository) so that we can read or save the image in /home/partimag.

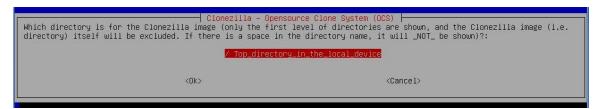
///NOTE/// You should NOT mount the partition you want to backup as /home/partimag
The partition name is the device name in GNU/Linux. The first partition in the first disk is "hda1" or "sda1", the 2nd partition in the first disk is "hda2" or "sda2", the first partition in the second disk is "hdb1" or "sdb1"... If the system you want to save is MS windows, normally C: is hda1 (for PATA) or sda1 (for PATA, SATA or SCSI), and D: could be hda2 (or sda2), hda5 (or sda5)...

sda1 11.8G_ntfs(In_VBOX_HARDDISK_)_VBOX_HARDDISK_VB5df6c02a-8cbb63e7

sdb1 7.2G_exfat(In_Patriot_Memory_)__Patriot_Memory_070B42B3965D71B2-0:0

(Ok)
Cancel>
```

11. The top directory is the default, hit **Enter**.

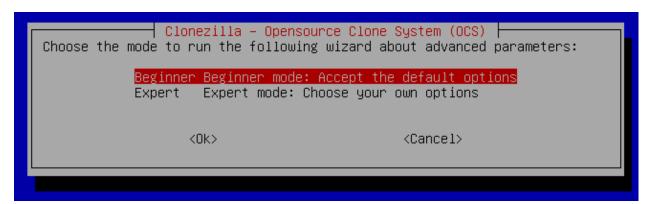


12. A summary will appear, hit Enter.



```
The file system disk space usage
Filesystem
              Size Used Avail Use% Mounted on
rootfs
               748M 7.2M
                         741M
                                1% /
sysfs
                                 - /proc
proc
                                0% /dev
devpts
                                 /dev/pts
tmpfs
/dev/sr0
                    139M
                             0 100% /lib/live/mount/medium
                    111M
                             0 100% /lib/live/mount/rootfs/filesystem.squashfs
/dev/loop0
                                0% /lib/live/mount/overlay
               748M
                          748M
tmpfs
tmpfs
               748M
                          748M
                                0% /lib/live/mount/overlay
               748M
                    7.2M
aufs
               5.0M
                          5.0M
                                0% /run/lock
tmpfs
                                 – /sys/fs/pstore
ostore
tmpfs
               299M
                          299M
                                0% /run/shm
fusectl
pc_pipefs
                                 - /run/rpc_pipefs
                          7.3G
/dev/sdb1
               7.3G
                    2.2M
                                 1% /tmp/local-dev
/dev/sdb1
               7.3G
                    2.2M
                          7.3G
                                1% /home/partimag
Press "Enter" to continue.....
```

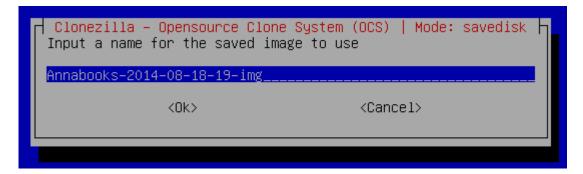
13. The clone wizard starts. Select Beginner and hit Enter.



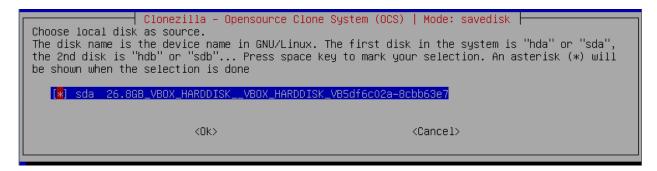
14. The Select Mode screen appears. Select save disk, and hit Enter.

15. An image name with date has been started. Rename the image as you like. For example "Annabooks-2014-08-18-19-img", hit **Enter**.

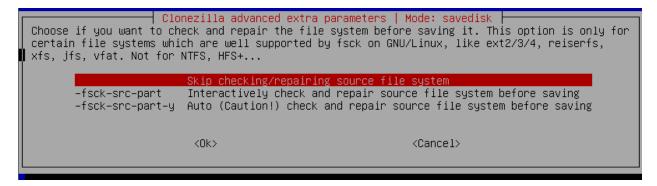




16. The hard disk will be selected as the default source. Hit Enter.



17. Select Skip checking/repairing source file system, hit Enter.



18. Check save disk image option appears, the default is **Yes**, **check the saved image**. Hit **Enter**.

```
Clonezilla advanced extra parameters | Mode: savedisk |

After the image is saved, do you want to check if the image is restorable? ///NOTE/// This action will only check the image is restorable, and it will not write any data to the harddrive.

Yes, check the saved image

-sc No, skip checking the saved image

<Ok>

Cancel>
```

19. Hit **Enter** to continue.

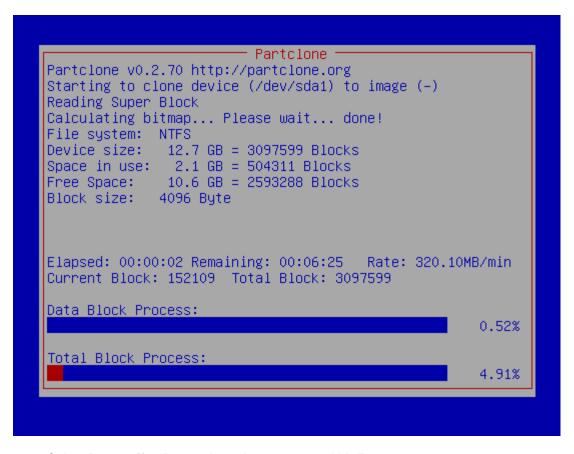


20. Click **y** at the prompt and hit **Enter** to begin the backup process.

```
S. Next time you can run this command directly:
/usr∕sbin∕ocs–sr –q2 –c –j2 –z1 –i 2000 –p true savedisk Annabooks–2014–08–18–19–img sda
This command is also saved as this file name for later use if necessary: /tmp/ocs–Annabooks–2014–08-
18-19-img-2014-08-18-19<u>-33</u>
. ********************
Press "Enter" to continue...
Activating the partition info in /proc... done!
Selected device [sda] found!
The selected devices: sda
Searching for data partition(s)...
Excluding busy partition or disk...
Unmounted partitions (including extended or swap): sda1
Collecting info.. done!
Searching for swap partition(s)...
Excluding busy partition or disk...
Unmounted partitions (including extended or swap): sda1
Collecting info.. done!
The data partition to be saved:
                                sda1
The swap partition to be saved:
Activating the partition info in /proc... done!
Selected device [sda1] found!
The selected devices: sda1
Getting /dev/sda1 info...
*************
The following step is to save the hard disk/partition(s) on this <u>machine as an image:</u>
Machine: VirtualBox
da (26.8GB_VBOX_HARDDISK__VBOX_HARDDISK_VB5df6c02a-8cbb63e7)
sda1 (11.8G_ntfs(In_VBOX_HARDDISK_)_VBOX_HARDDISK_VB5df6c02a-8cbb63e7)
\mathbf{x}_{\mathbf{x}}
> "/home/partimag/Annabooks-2014-08-18-19-img".
re you sure you want to continue? (y/n)
```

21. The capture and check process takes several minutes depending on image size. Hit **Enter** when completed





22. Select **Poweroff** to Power down the system, and hit **Enter**.

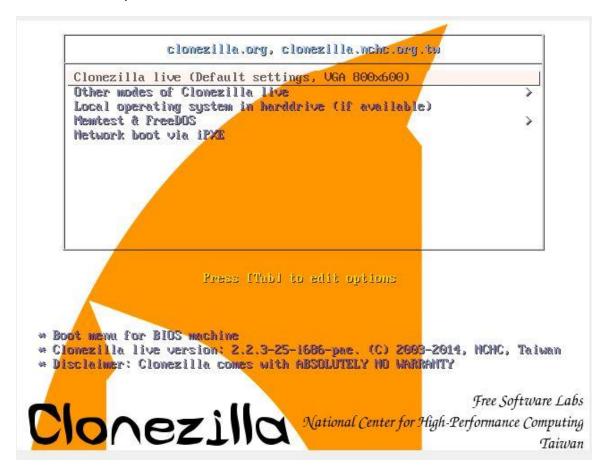


23. Remove both flash disks after the target powers down.

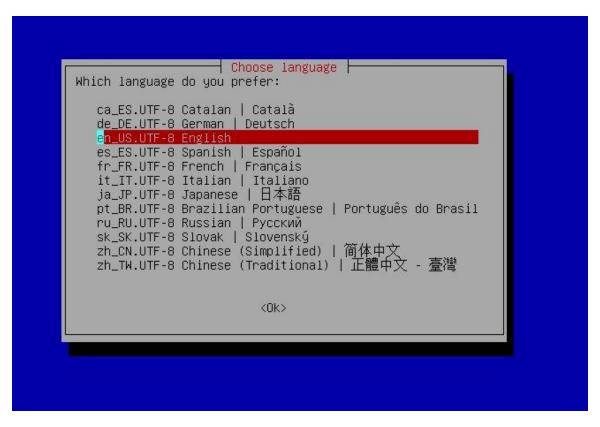
### 4 Deploy the Captured Disk Image

The two USB disks to capture the image can now be used to deploy the image to other systems.

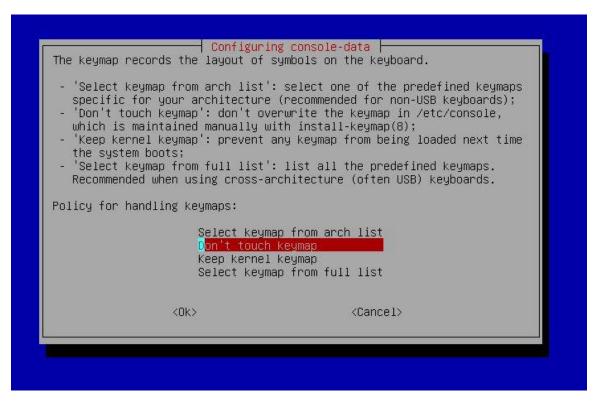
- 1. Plug the Clonezilla boot disk into the target system.
- 2. Boot the target and make sure the BIOS is setup to boot from the USB flash disk.
- 3. The Clonezilla boot screen appears. Select Clonezilla Live (Default settings, VGA XXXxYYY) and hit Enter.



4. The OS will load. Select **English** as the language to use and hit **Enter**.

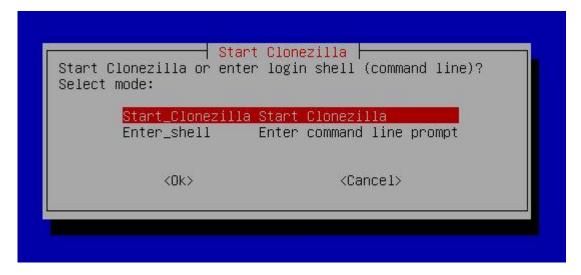


5. Keep the default **Don't touch keymap** and hit **Enter**.

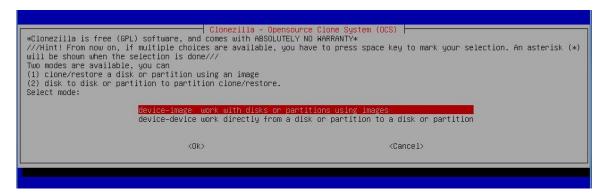


6. The default Start\_Clonezilla Start Clonezilla should be selected, hit Enter.

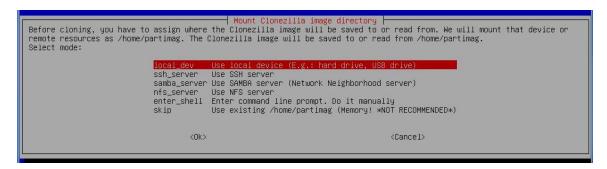




7. In the next menu, select **device-image work with disks or partitions using images** as the operation mode and hit **Enter** 



8. The next menu is for the image directory. The default is for local dev, hit Enter.

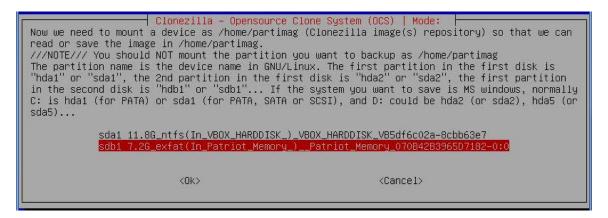


9. Insert the larger USB flash disk when prompted, wait about 5 seconds, and then hit **Enter**.

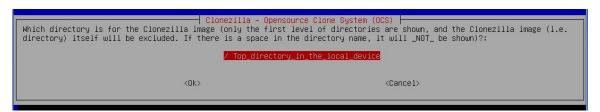


```
ocsroot device is local_dev
Preparing the mount point /home/partimag...
If you want to use USB device as a Clonezilla image repository, please
* Insert USB device into this machine *now*
* Wait for about 5 secs
* Press Enter key
so that the OS can detect the USB device and later we can mount it as /home/partimag.
Press "Enter" to continue.....
Informing the OS of partition table changes...
Mounting local dev as /home/partimag...
Excluding busy partition or disk...
```

10. The system will mount and prepare the UBS flash disk for the image. You will be asked for the home directory to store the image. Select the USB flash disk image (sdx1) and hit Enter.



11. The top directory is the default, hit **Enter**.

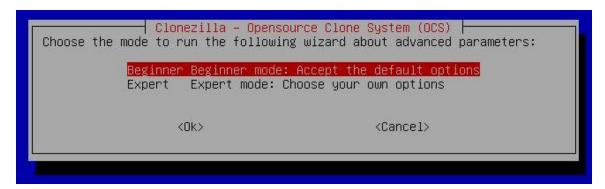


12. A summary will appear, hit Enter.



```
The file system disk space usage
Filesystem
               Size Used Avail Use% Mounted on
rootfs
               748M
                    7.2M 741M
                                 1% /
sysfs
                                  - /proc
oroc
udev
                                 0% /dev
devpts
                                  – /dev/pts
tmpfs
                             0 100% /lib/live/mount/medium
/dev/sr0
               139M
               111M
                             0 100% /lib/live/mount/rootfs/filesystem.squashfs
/dev/loop0
                     111M
                                 0% /lib/live/mount/overlay
tmpfs
               748M
                           748M
tmpfs
               748M
                           748M
                                 0% /lib/live/mount/overlay
               748M
                     7.2M
aufs
tmpfs
               5.0M
                          5.0M
                                 0% /run/lock
                                  - /sys/fs/pstore
pstore
tmpfs
               299M
                          299M
                                  /sys/fs/fuse/connections
fusectl
                                - /run/rpc_pipefs
11% /tmp/local-dev
pc_pipefs
/dev/sdb1
               7.3G
                     745M
                          6.5G
                          6.5G 11% /home/partimag
/dev/sdb1
               7.3G
                     745M
Press "Enter" to continue...._
```

13. The clone wizard starts. Select **Beginner** and hit **Enter**.

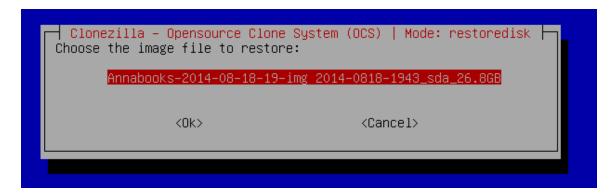


14. The Select Mode screen appears. Select **restoredisk** and hit **Enter**.

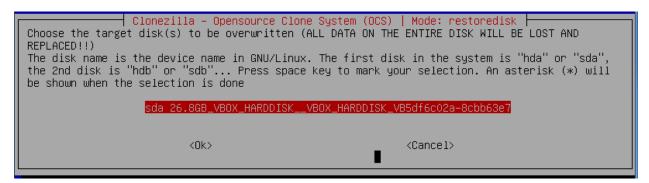
```
Clonezilla – Opensource Clone System (OCS): Select mode
*Clonezilla is free (GPL) software, and comes with ABSOLUTELY NO WARRANTY*
This software will overwrite the data on your hard drive when restoring! It is recommended to
backup important files before restoring!****
///Hint! From now on, if multiple choices are available, you have to press space key to mark
your selection. An asterisk (*) will be shown when the selection is done///
                                  Save_local_disk_as_an_image
              savedisk.
              saveparts_
                                  Save_local_partitions_as_an_image
              restoredis
              restoreparts
                                  Restore_an_image_to_local_partitions
              1-2-mdisks
                                  Restore_an_image_to_multiple_local_disks
              recovery-iso-zip
                                  Create_recovery_Clonezilla_live
              chk-img-restorable Check_the_image_restorable_or_not
              cvt-img-compression Convert_image_compression_format_as_another_image
                                  Exit. Enter command line prompt
              exit
                          <0k>
                                                              <Cancel>
```

15. The system will search the disk for an image. Since there is only one image on the disk, it is already select, so hit **Enter**.





16. Select the hard drive and hit Enter.



17. Hit Enter again.

- 18. Enter **y** at the prompt and hit **Enter**.
- 19. One more time, enter **y** at the prompt and hit **Enter**.



```
Activating the partition info in /proc... done!
Getting /dev/sda1 info...
The following step is to restore an image to the hard disk/partition(s) on this machine: "/home/part
imag/Annabooks–2014–08–18–19–img" –> "sda sda1"
The image was created at: 2014–0818–1943
WARNING!!! WARNING!!! WARNING!!!
 ARNING. THE EXISTING DATA IN THIS HARDDISK/PARTITION(S) WILL BE OVERWRITTEN! ALL EXISTING DATA WILL
BE LOST:
 , κοιοιοκοιοιοκοιοιοκοιοιοκοιοιοκοιοιοκοιοιοκοιοιοκοιοιοκοιοιοκοιοιοκοιοιοκοιοιοκοιοιοκοιοιοκοιοιο
Machine: VirtualBox
sda (26.8GB_VBOX_HARDDISK__VBOX_HARDDISK_VB5df6c02a=8cbb63e7)
sda1 (11.8G_ntfs(In_VBOX_HARDDISK_)_VBOX_HARDDISK_VB5df6c02a-8cbb63e7)
Are you sure you want to continue? (y/n) y
OK, let's do it!!
This program is not started by clonezilla server.
et me ask you again.
The following step is to restore an image to the hard disk/partition(s) on this machine: "/home/part
imag/Annabooks–2014–08–18–19–img" –> "sda sda1"
The image was created at: 2014–0818–1943
 HARNING!!! WARNING!!! WARNING!!!
 ARNING. THE EXISTING DATA IN THIS HARDDISK/PARTITION(S) WILL BE OVERWRITTEN! ALL EXISTING DATA WILL
BE LOST:
Machine: VirtualBox
sda (26.8GB_VBOX_HARDDISK__VBOX_HARDDISK_VB5df6c02a−8cbb63e7)
sda1 (11.8G_ntfs(In_VBOX_HARDDISK_)_VBOX_HARDDISK_VB5df6c02a-8cbb63e7)
 Are you sure you want to continue? (y/n) _
```

20. The process can take several minutes. Hit **Enter** when completed.

```
Partclone
Partclone v0.2.70 http://partclone.org
Starting to restore image (–) to device (/dev/sda1)
Calculating bitmap... Please wait... done!
File system: NTFS
Device size:
              12.7 GB = 3097599 Blocks
Space in use:
              2.1 GB = 504311 Blocks
              10.6 GB = 2593288 Blocks
Free Space:
Block size: 4096 Byte
Elapsed: 00:00:10 Remaining: 00:03:06 Rate: 629.15MB/min
Current Block: 175396 Total Block: 3097599
Data Block Process:
                                                     5.08%
Total Block Process:
                                                      5.66%
```

21. Select to **Poweroff** to power down the system, and hit **Enter**.





- 22. Remove both flash disks after the target powers down.
- 23. Boot the system again and let the Windows cloning process run on the system.

Once the master Clonezilla image has been created, it can be deployed any number of times to identical target hardware systems. This could easily be incorporated as part of the manufacturing process for an embedded system product.