

BEST System Upgrade Guide



CAEN ELS s.r.l.



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1 Document Revisions

Document Revision	Date	Comments
1.0	1 March 2022	Initial release
1.1	8 March 2022	Added Firmware Upgrade



2 Preliminary Check

2.1 Check disk model and size

Open the application **Disks**:

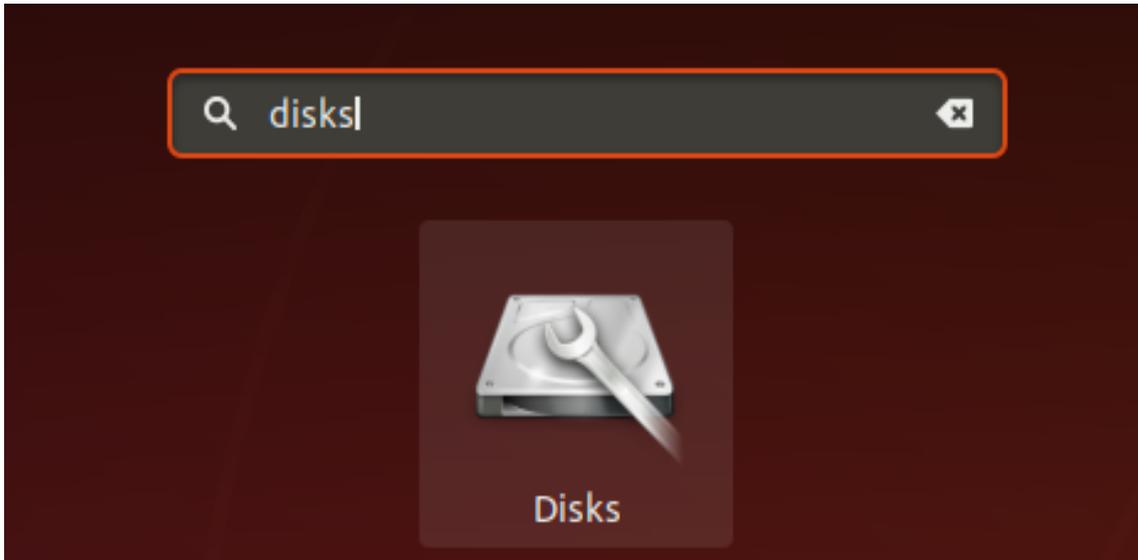


Figure 1: Open Disks

Write down **Model** and **Size** of the HD; it will be required in future steps.

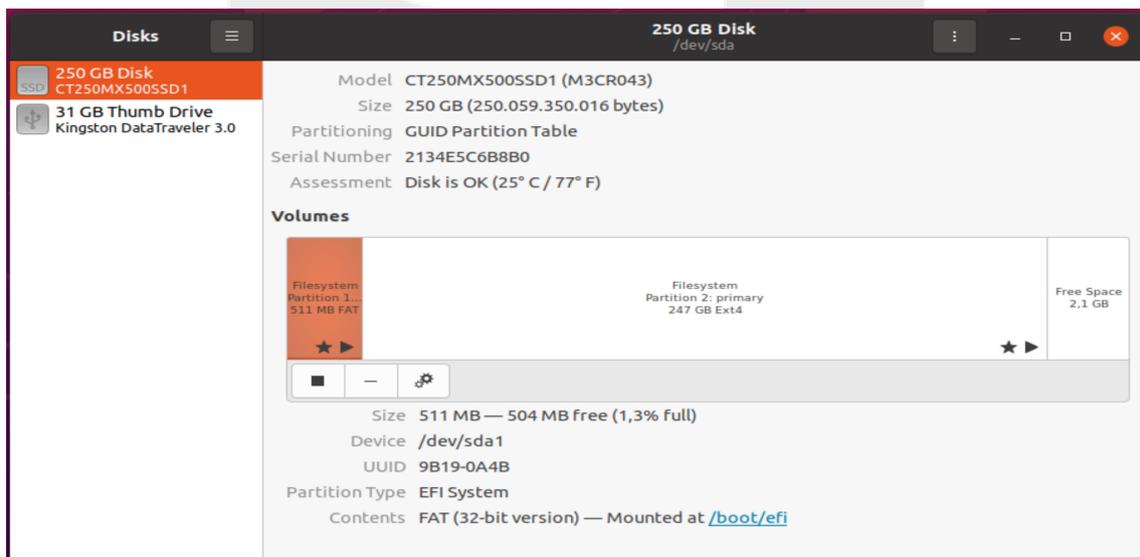


Figure 2: Check HD Model and Size

2.2 Requirements

- Clonezilla-USB
- BEST-images-USB
- USB-to-miniUSB cable

With the Upgrade Procedure all the data on the Central Unit will be lost. Please, perform a backup up of your data before proceeding with the Upgrade Procedure.



3 Upgrade Procedure

- Connect Clonezilla-USB on the front USB
- **Power-up** the BEST Central Unit (front power button)
- press F11 to go to the **Boot Menu** (some PCs requires F10 or F8 for the Boot Menu depending on the BIOS)

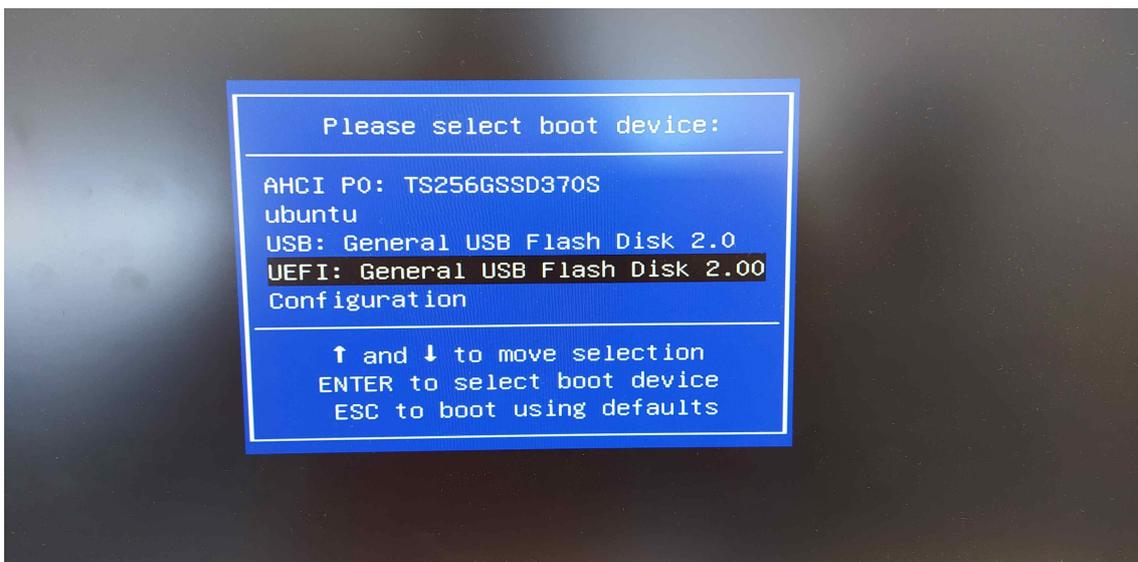


Figure 3: Boot Menu

Select the Clonezilla-USB and press **Enter** to start Clonezilla live.

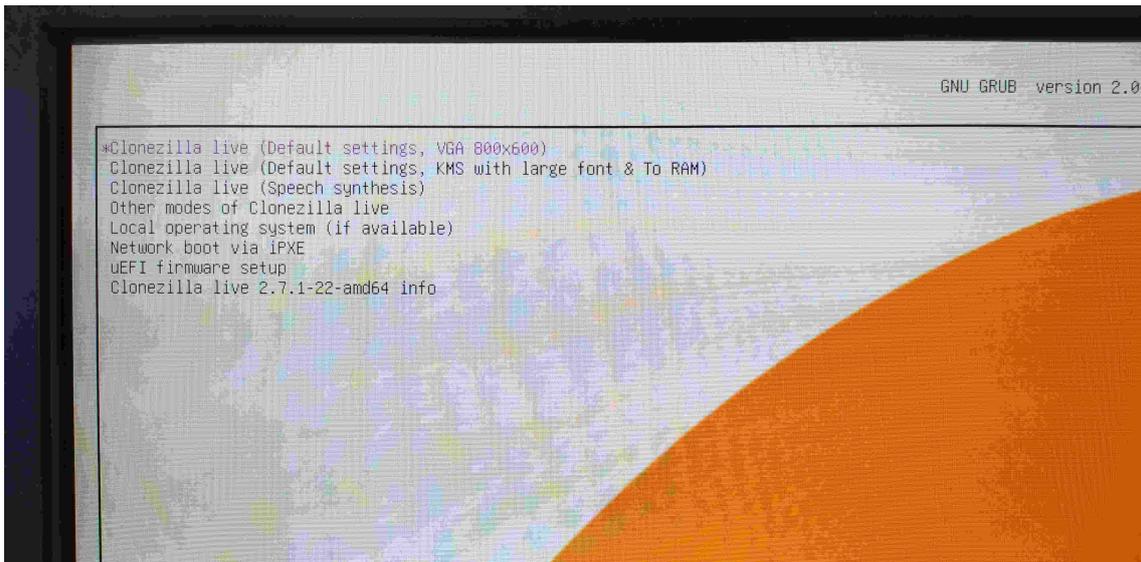


Figure 4: Clonezilla Live

Select the first entry and press **Enter**.



Figure 5: Choose Language

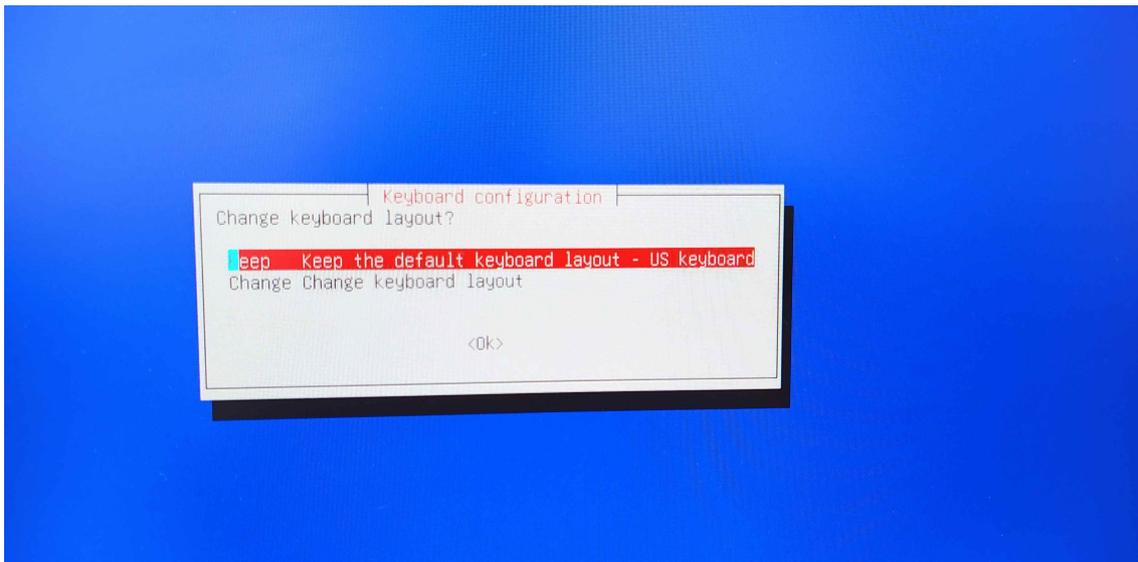


Figure 6: Keyboard Configuration

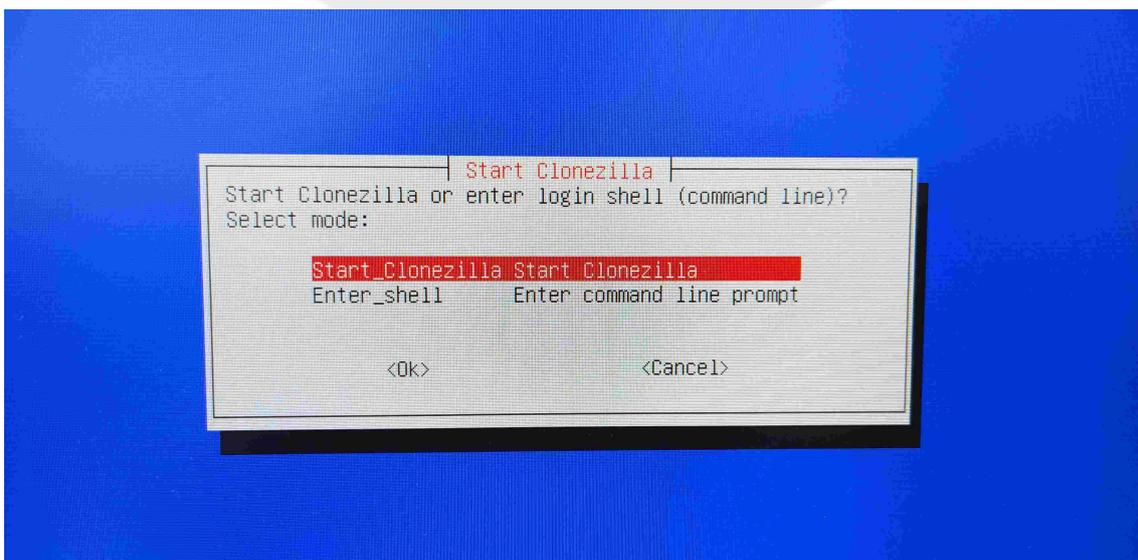


Figure 7: Start Clonezilla

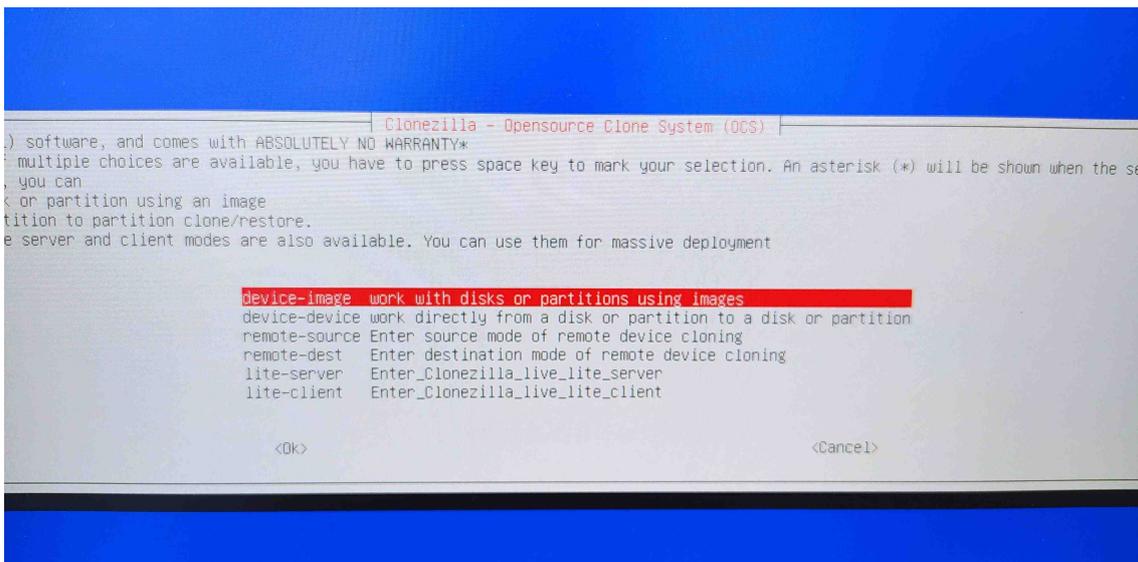


Figure 8: Select device-image

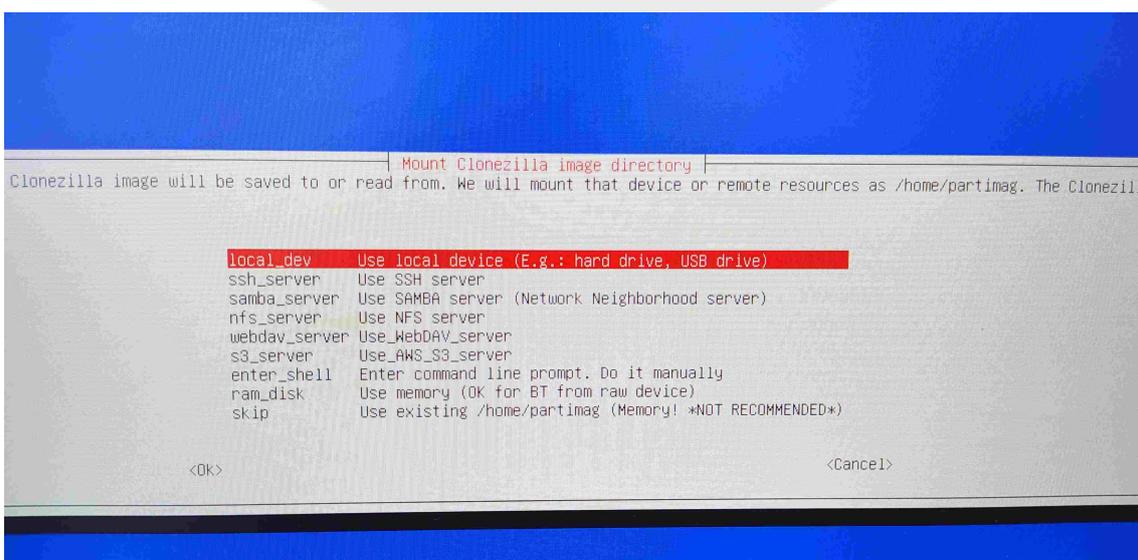


Figure 9: Use local device

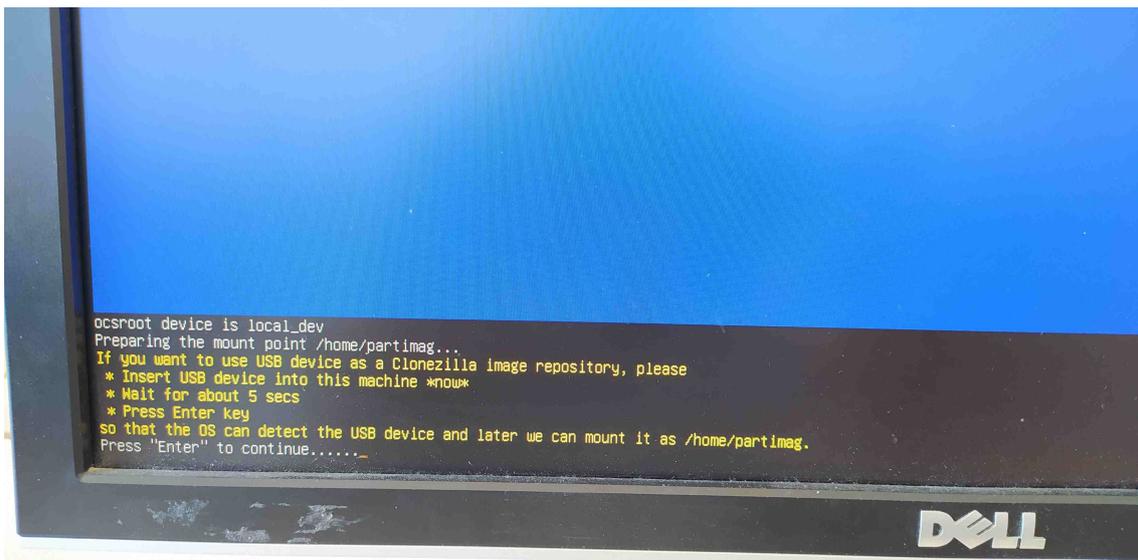


Figure 10: Checking for USB devices

Insert the BEST-Images-USB and then press **Enter**

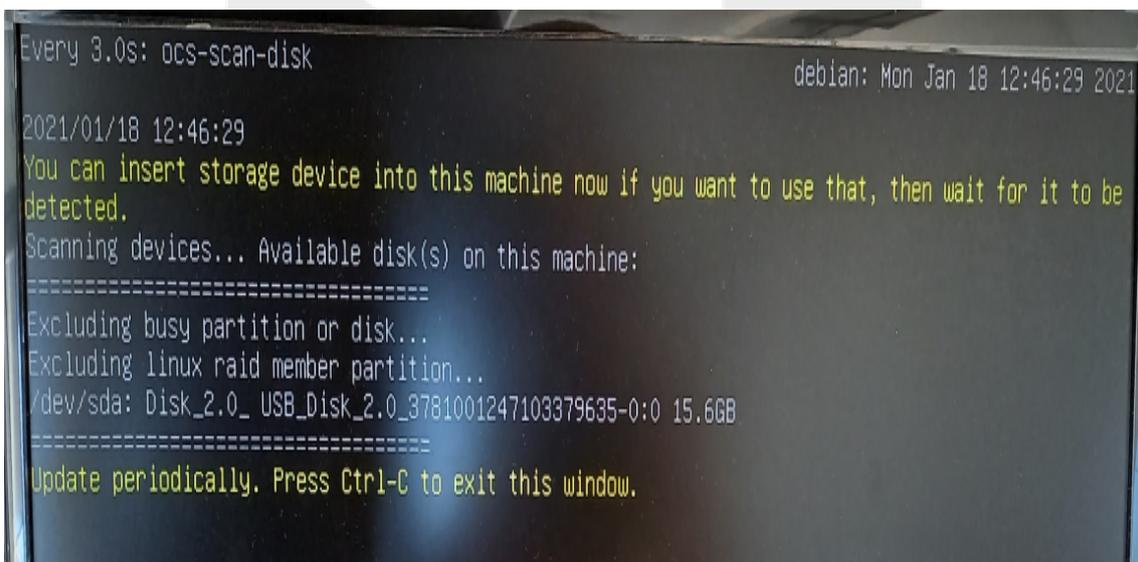


Figure 11: Check USB

Check if the USB is recognized; look for the 15.6 GB USB. If present, press Ctrl+C.

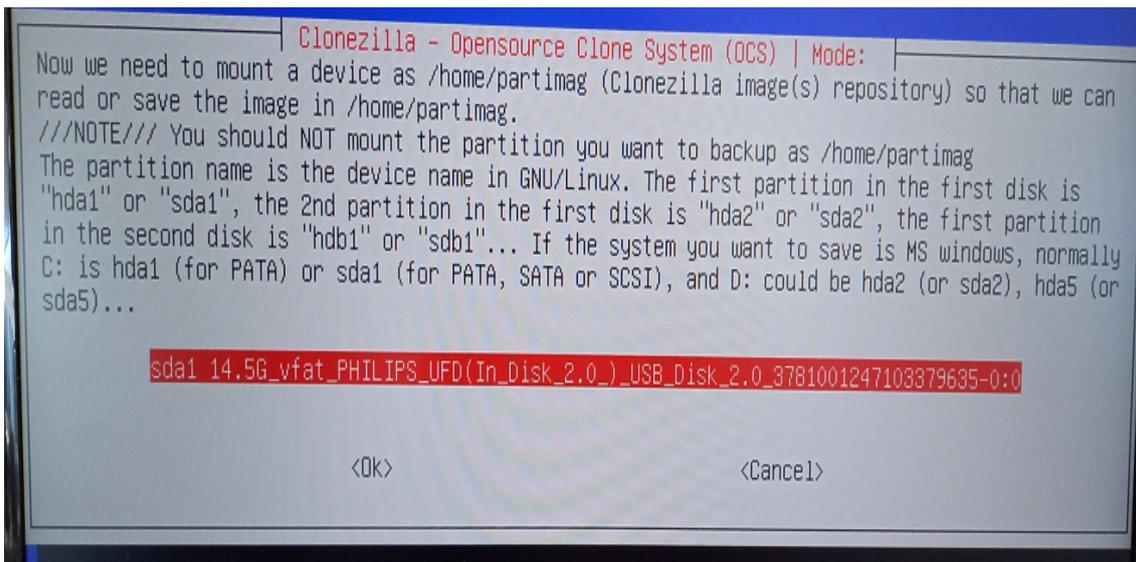


Figure 12: Select the USB

Select the USB and press **Enter**.

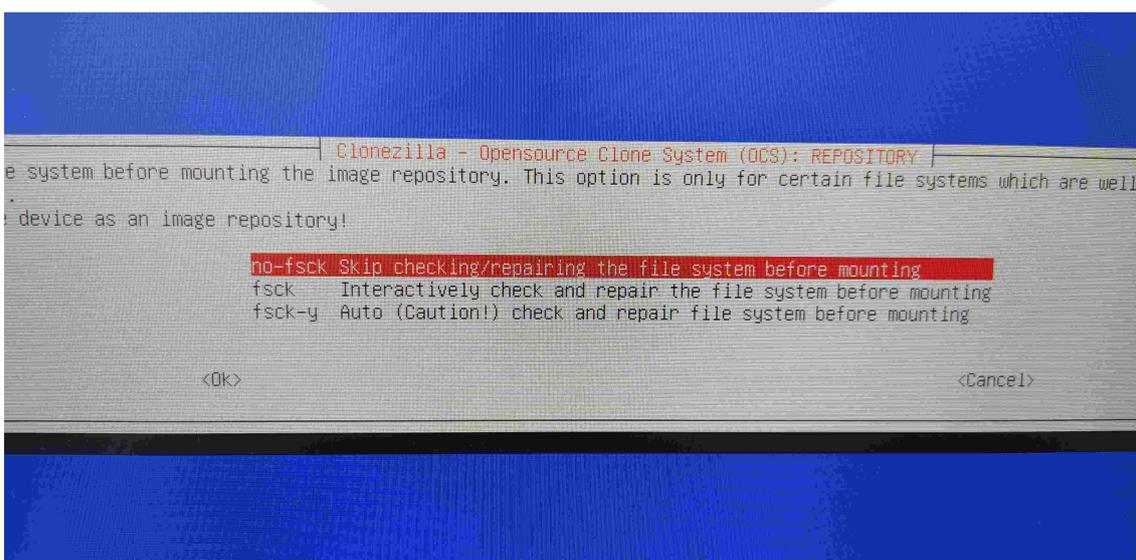
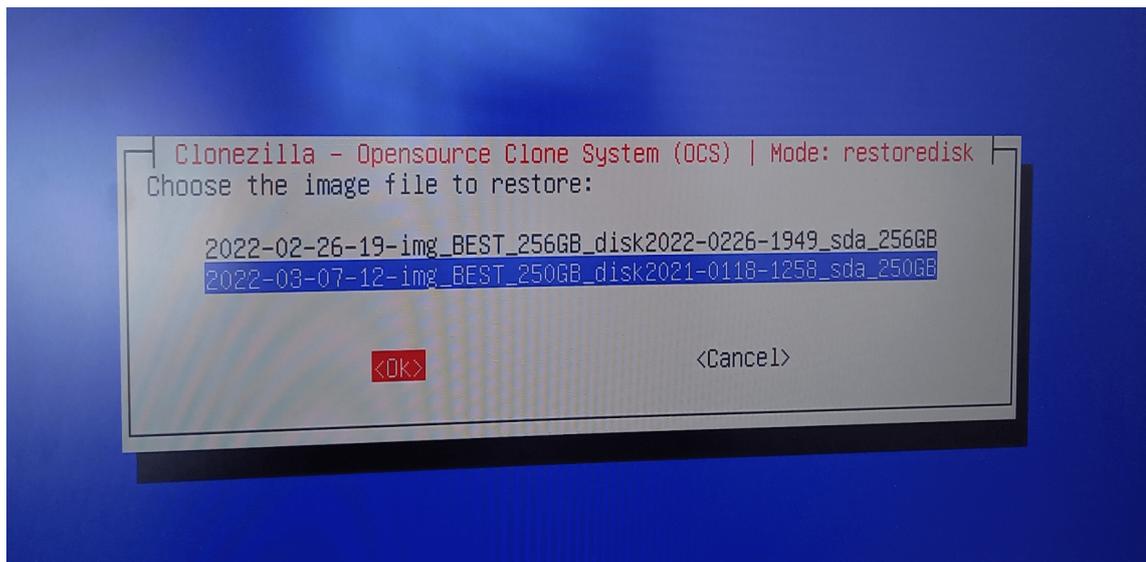


Figure 13: no-fsck



Select the proper image depending on the HD size (see Preliminary Check for more info). Once selected, move the cursor (using the right and left arrows) to the **Done** button and press **Enter**.

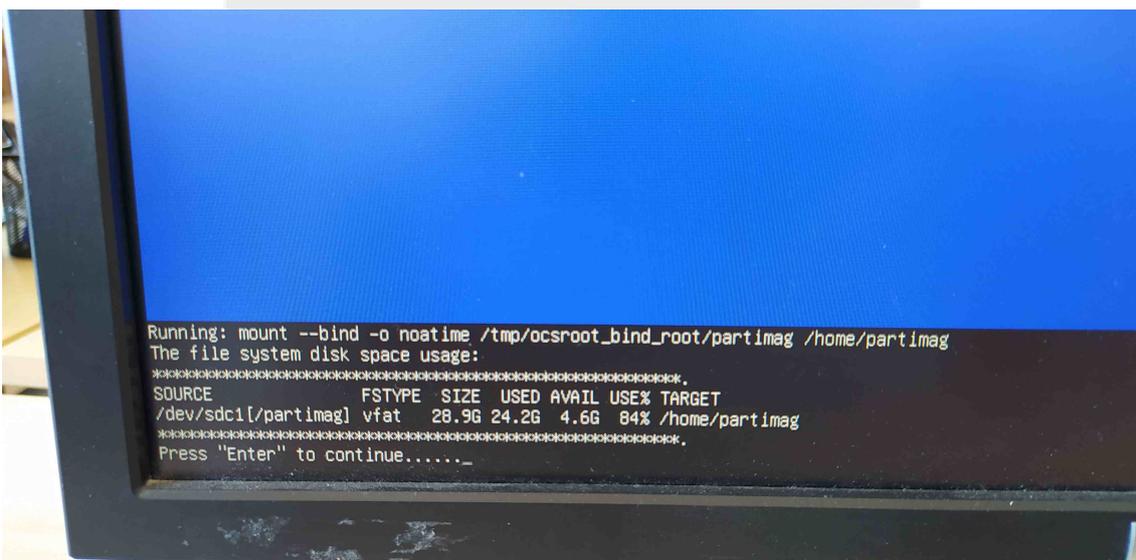


Figure 14: Mount Image Repository

Press **Enter**

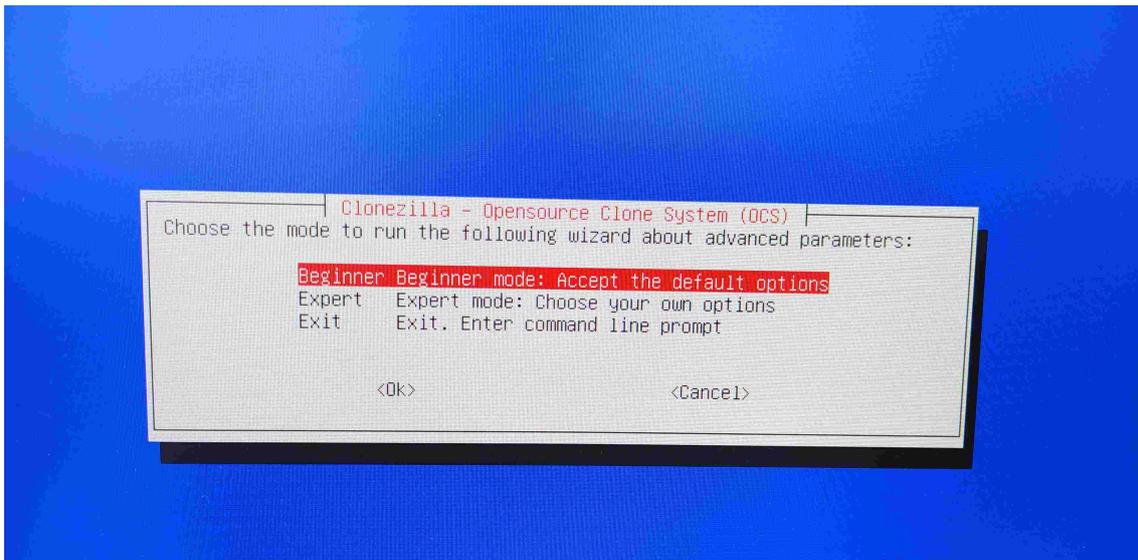


Figure 15: Choose Wizard Mode

Select **Beginner** and press **Enter**.

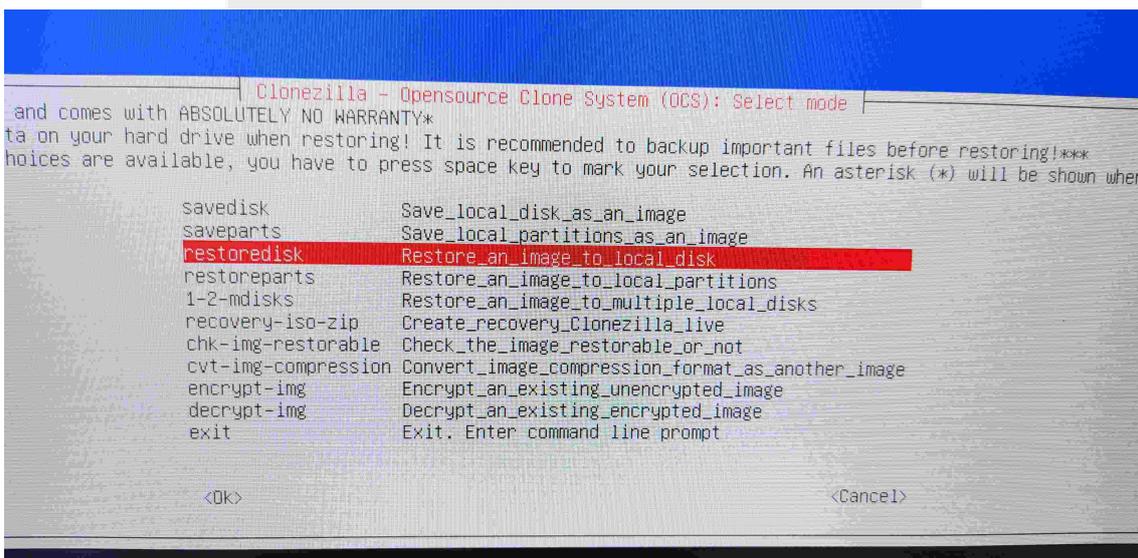


Figure 16: Restore Parts

Select **restoredisk** and press **Enter**.

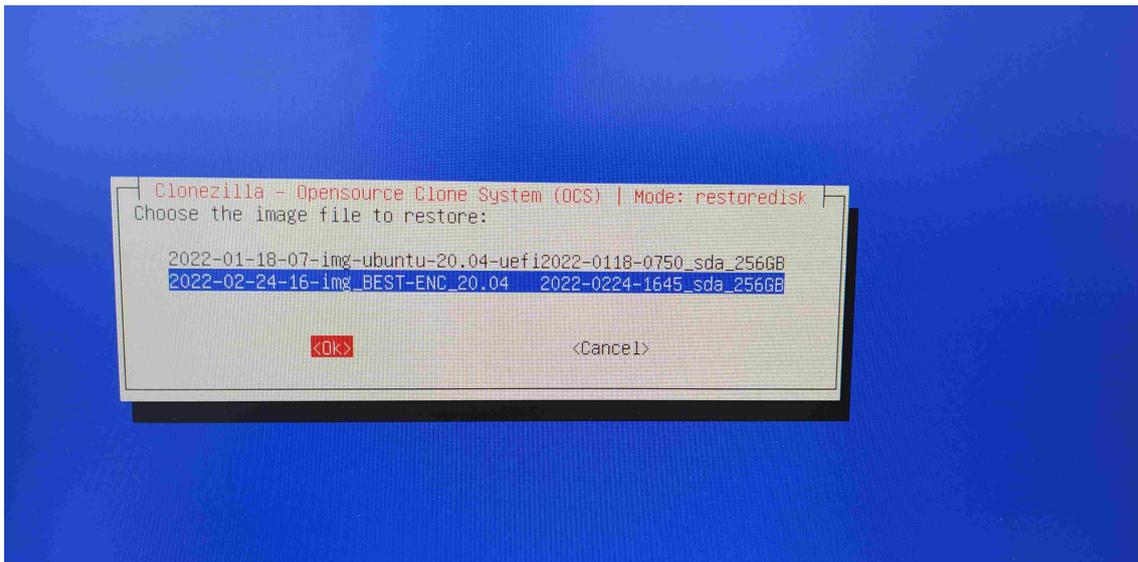


Figure 17: Select the image (image names in the picture may change)

Select the proper image depending on the HD size (see Preliminary Check for more info). Once selected, move the cursor (using the right and left arrows) to the **Ok** button and press **Enter**.

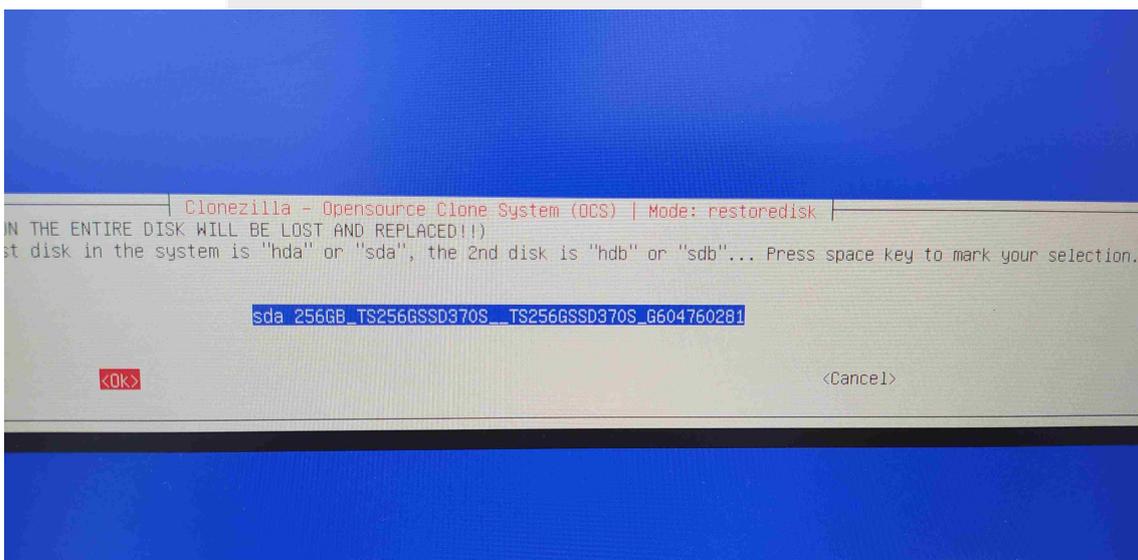


Figure 18: Select the main HD

Select the main HD and press **Enter**.

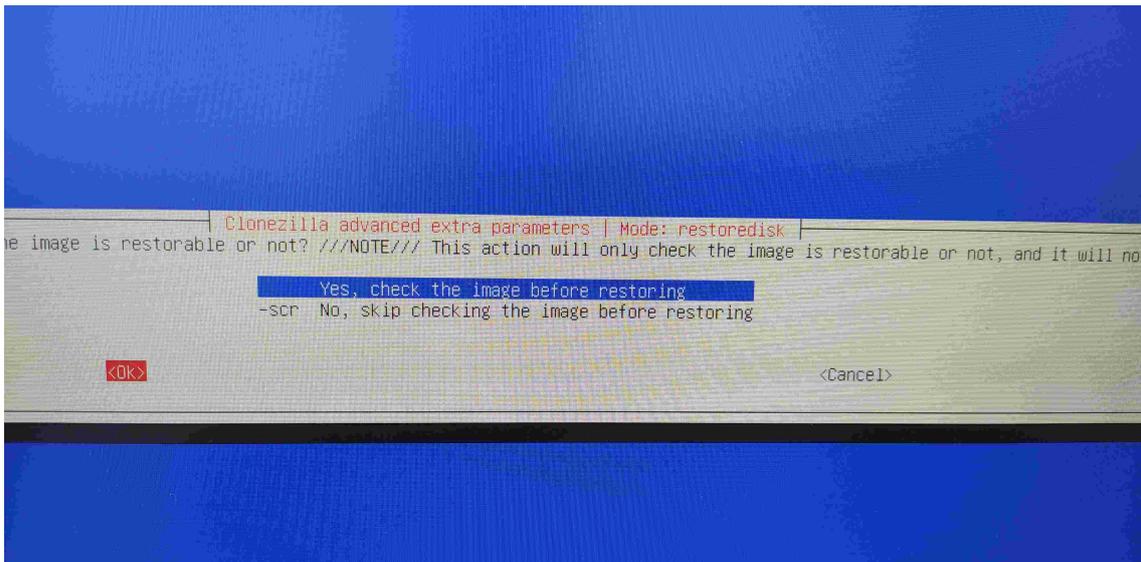


Figure 19: Check the image

Select **Yes, check the image before restoring** and press **Enter**.

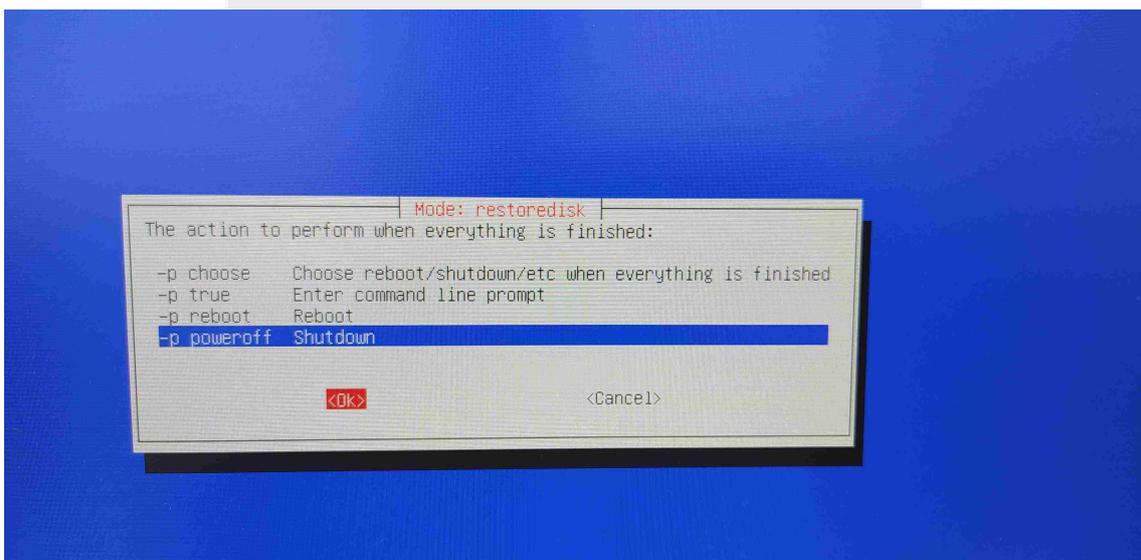


Figure 20: Select Shutdown

Select **poweroff** and **Enter**.

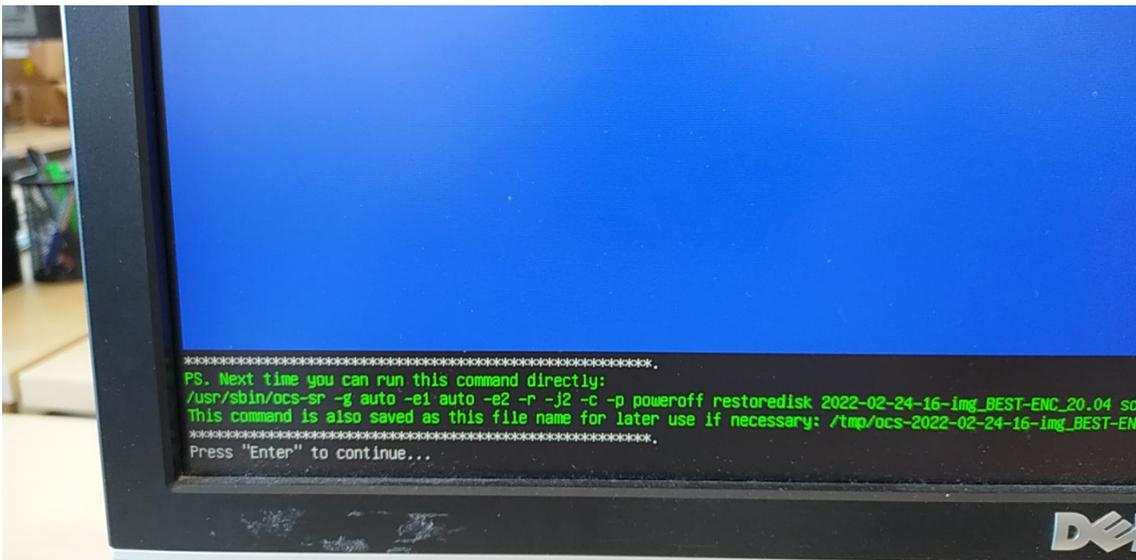


Figure 21: System overview

Press **Enter** and **Yes(Y)** if prompted.

Now the Clone will start and when completed the system will automatically shutdown. After the shutdown both USB devices can be removed.

4 CPLD Firmware Upgrade

Before powering-up the system, **connect the USB/USB-mini cable** as shown in the picture.



Figure 22: Connect the USB/USB-mini cable

Power-up the Central Unit.

Log-in and **Open a terminal** (Ctrl-T)

4.1 Check if the docker is running

Run the following command in the terminal:

```
systemctl status docker
```

Check if the docker is active (running) as shown in the picture; press q to exit the command.

```
[17:06:56 - 22-03-03 - paolo@paolo-pc] /home/paolo
$ systemctl status docker
● docker.service - Docker Application Container Engine
   Loaded: loaded (/lib/systemd/system/docker.service; enable
   Active: active (running) since Tue 2022-03-01 10:35:07 CET
     Docs: https://docs.docker.com
  Main PID: 2529 (dockerd)
    Tasks: 29
   CGroup: /system.slice/docker.service
           └─2529 /usr/bin/dockerd -H fd:// --data-root /mnt/
             └─5528 /usr/bin/docker-proxy -proto tcp -host-ip 0
```

Figure 23: Check Active Running

Run the following command to check if a specific docker called **quartus-programmer** is up and running:

```
docker ps -a
```

The column STATUS should indicate Up ..., it should not indicate Exited ...

```
best@best-desktop:~$ docker ps -a
CONTAINER ID   IMAGE                                COMMAND                  CREATED        STATUS        PORTS        NAMES
d7f9eb50ef04   nas.caenels.com:6000/quartus-programmer:14.1.0.186  "/bin/bash"            5 days ago    Up 4 minutes        caenels-quartus-programmer
best@best-desktop:~$
```

Figure 24: Check Status

4.2 Perform the CPLD firmware upgrade

Run the following commands:

```
docker exec -it --user root caenels-quartus-programmer bash -c "kill -9 jtagd"
docker exec -it --user root caenels-quartus-programmer bash -c "udevadm control --reload"
docker exec -it --user root caenels-quartus-programmer bash -c "jtagd"
docker exec -it --user root caenels-quartus-programmer bash -c "cd Git && quartus_pgm -c 1 max5.cdf"
```

Figure 25: List of commands

The output should be the following:

```
best@best-desktop:~$ docker exec -it --user root caenels-quartus-programmer bash -c "kill -9 jtagd"
bash: line 0: kill: jtagd: arguments must be process or job IDs
best@best-desktop:~$ docker exec -it --user root caenels-quartus-programmer bash -c "udevadm control --reload"
best@best-desktop:~$ docker exec -it --user root caenels-quartus-programmer bash -c "jtagd"
best@best-desktop:~$ docker exec -it --user root caenels-quartus-programmer bash -c "cd Git && quartus_pgm -c 1 max5.cdf"
```

Figure 26: System overview

```
best@best-desktop:~$ docker exec -it --user root caenels-quartus-programmer bash -c "udevadm control --reload"
best@best-desktop:~$ docker exec -it --user root caenels-quartus-programmer bash -c "jtagd"
best@best-desktop:~$ docker exec -it --user root caenels-quartus-programmer bash -c "cd Git && quartus_pgm -c 1 max5.cdf"
Info: *****
Info: Running Quartus II 64-Bit Programmer
Info: Version 14.1.0 Build 186 12/03/2014 SJ Full Version
Info: Copyright (C) 1991-2014 Altera Corporation. All rights reserved.
Info: Your use of Altera Corporation's design tools, logic functions
Info: and other software and tools, and its AMPP partner logic
Info: functions, and any output files from any of the foregoing
Info: (including device programming or simulation files), and any
Info: associated documentation or information are expressly subject
Info: to the terms and conditions of the Altera Program License
Info: Subscription Agreement, the Altera Quartus II License Agreement,
Info: the Altera MegaCore Function License Agreement, or other
Info: applicable license agreement, including, without limitation,
Info: that your use is for the sole purpose of programming logic
Info: devices manufactured by Altera and sold by Altera or its
Info: authorized distributors. Please refer to the applicable
Info: agreement for further details.
Info: Processing started: Fri Mar 4 13:04:11 2022
Info: Command: quartus_pgm -c 1 max5.cdf
Info (213045): Using programming cable "USB-BlasterII [3-3]"
Info (213011): Using programming file max5.pof with checksum 0x00900F16 for device 5H2210ZF250@2
Info (209060): Started Programmer operation at Fri Mar 4 13:04:12 2022
Info (209017): Device 2 contains JTAG ID code 0x020A40DD
Info (209018): Device 2 silicon ID is ALTERA10-6
Info (209044): Erasing MAXII/MAXV configuration device(s)
Info (209023): Programming device(s)
Info (209021): Performing verification on device(s)
Info (209011): Successfully performed operation(s)
Info (209001): Ended Programmer operation at Fri Mar 4 13:04:17 2022
Info: Quartus II 64-Bit Programmer was successful. 0 errors, 0 warnings
Info: Peak Virtual memory: 401 megabytes
Info: Processing ended: Fri Mar 4 13:04:17 2022
Info: Elapsed time: 00:00:06
Info: Total CPU time (on all processors): 00:00:01
::
::
best@best-desktop:~$
```

Figure 27: System overview

The last command will perform the upgrade of the CPLD firmware. You should notice an increase in the fans of the Central Unit for a short time (couple of seconds). When the upgrade is completed the Central Unit can be powered off.

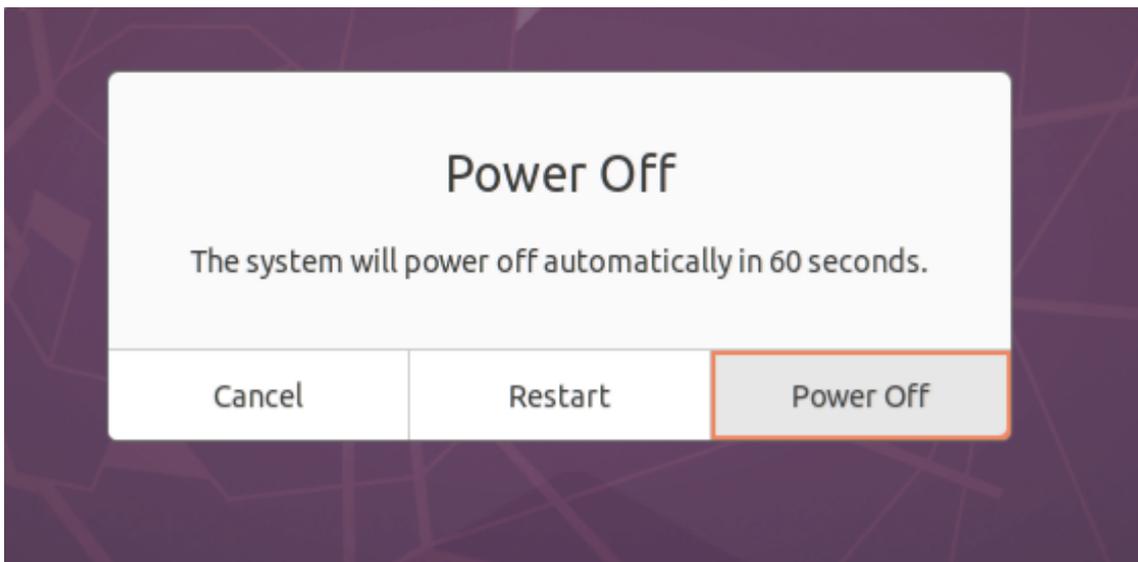
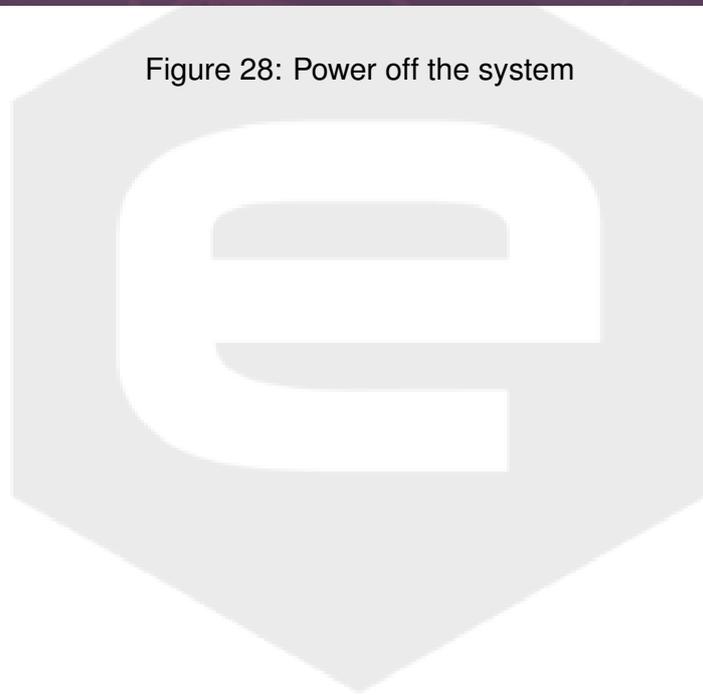


Figure 28: Power off the system



4.3 Perform the FPGA firmware upgrade (ONLY if firmware < 1.2.16)

Power-on the BEST system.

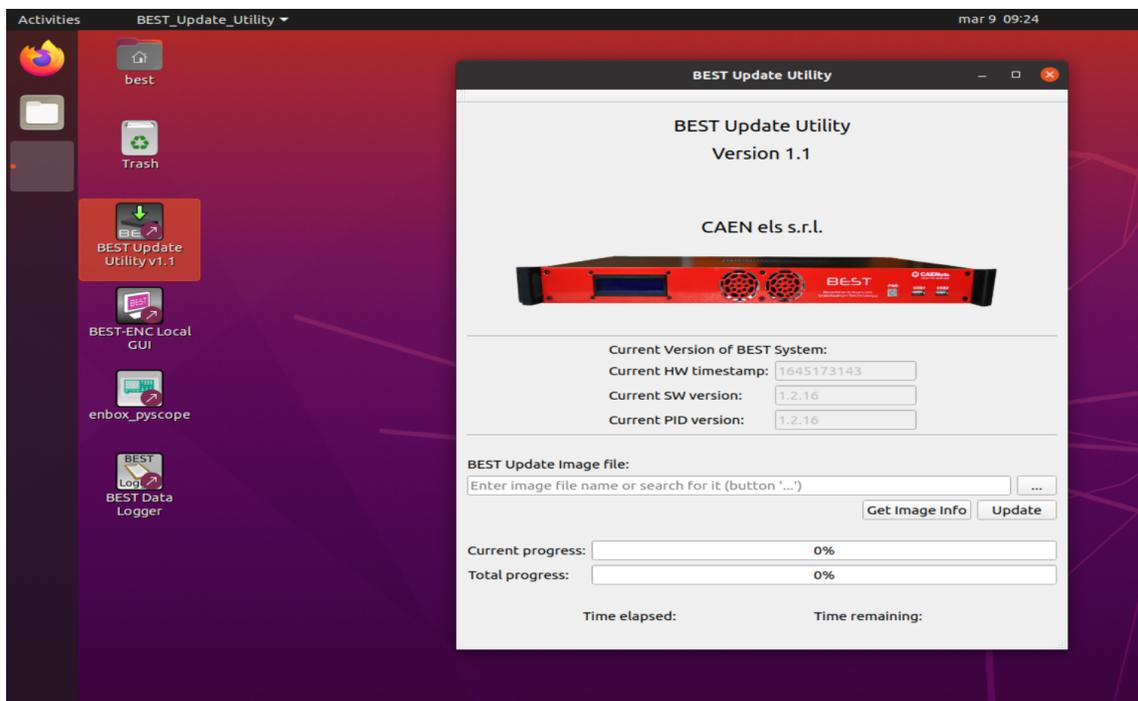


Figure 29: BEST Update Utility

Open the BEST Update Utility software (double click on the BEST Update Utility desktop icon)



Figure 30: Select the update firmware

Select the firmware from the **Download** folder. The firmware can also be downloaded from CAEN ELS website.

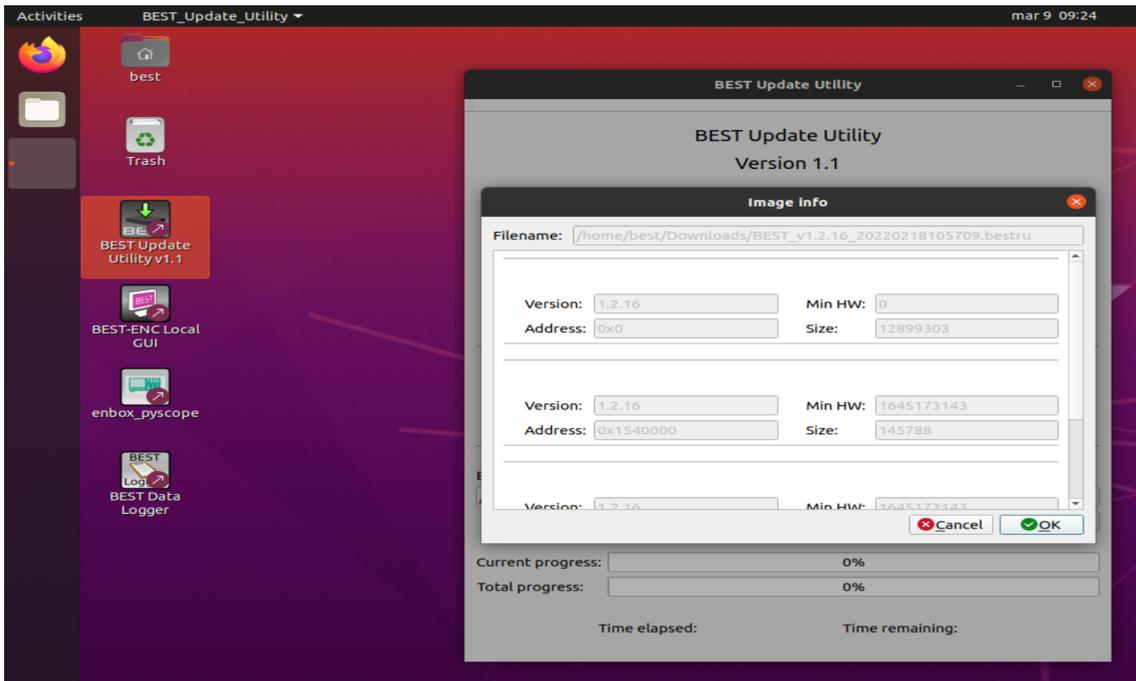


Figure 31: Upload the firmware

Click **OK** to confirm the Image Info and then the **Update** button. The update procedure should take around 30 min.

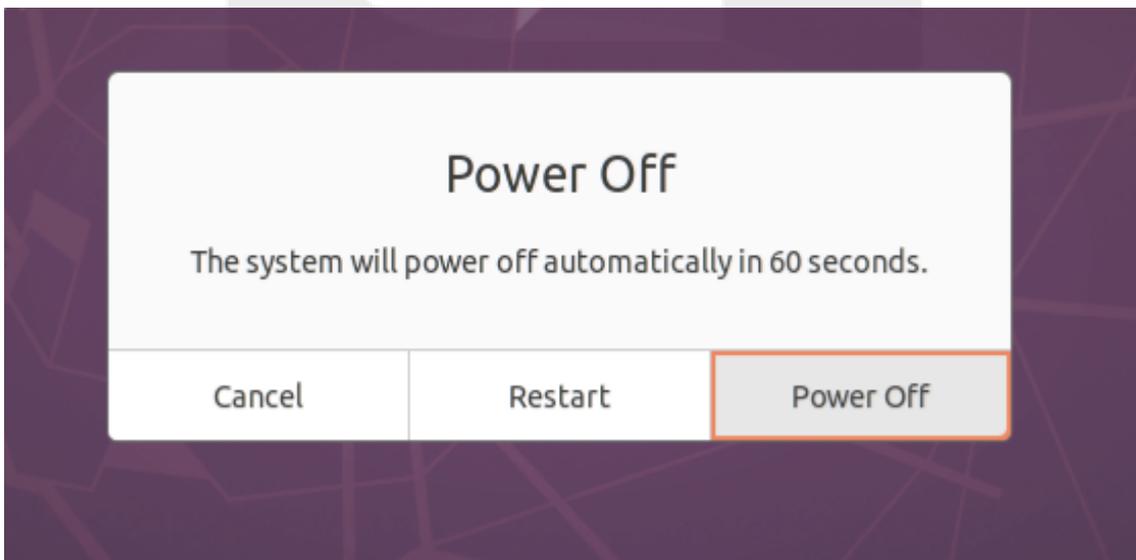


Figure 32: Power off the system

At the end of the procedure the Central Unit can be powered off.
The Upgrade is now completed!