

# Backup as a service with Clonezilla

*Steven Shiau*  
*clonezilla.org*  
Q2, 2015



# Outline

- Introduction to Clonezilla
  - Features
  - Updates since 2014 Summer
- Backup as a service with Clonezilla
  - Basic ideas
  - How
  - Use cases
- Q&A



# Outline

- Introduction to Clonezilla
  - Features
  - Updates since 2014 Summer
- Backup as a service with Clonezilla
  - Basic ideas
  - How
  - Use cases
- Q&A



# System imaging and cloning - backup



You want to crash!!!  
I show you how to crash!!!

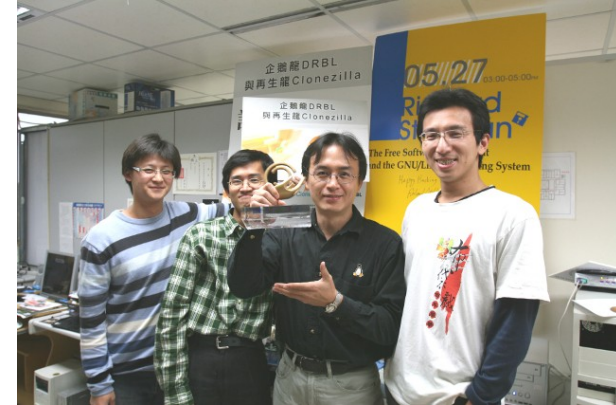
image source: [maggiesfarm.anotherdotcom.com](http://maggiesfarm.anotherdotcom.com)  
[www.compsults.com](http://www.compsults.com), and [jervisdabreo.com](http://jervisdabreo.com)

# Massive system deployment



# About us

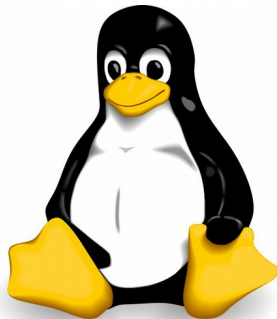
- Developers of the free software DRBL, Clonezilla and more...
- Steven is also the maintainer of GParted live CD
- From Taiwan, working for the NPO NCHC (National Center for High-Performance Computing)



Taiwan image source: wikipedia.org

# What is Clonezilla?

- A partition and disk imaging/cloning utility similar to True image® or Ghost®
- GPL license
- A bare metal recovery tool for



\*1



\*2



\*3



\*4

**VMFS**

VMware  
ESX/ESXi

\*5



**MINIX**

\*6



\*Logo source: (1) Larry Ewing, Simon Budig and Anja Gerwinski, (2) Apple, (3) Microsoft, (4) Marshall Kirk McKusick, (5) VMWare (6) Distrowatch.com



**TAIWAN**

www.nchc.org.tw



# Clonezilla Feature

- Free ([GPL](#)) Software
- File systems supported:
  - [Ext2/3/4](#), [ReiserFS](#), [Reiser4](#), [XFS](#), [JFS](#), [HFS+](#), [BrFS](#), [F2fs](#), [UFS](#), [Minix](#), [VMFS](#), [F2FS](#), [FAT](#) and [NTFS](#)
  - Supports [LVM2](#)
  - Support some [hardware RAID](#) chips (by kernel)
- [Smart copying](#) for supported filesystem. For unsupported file systems sector-to-sector copying is done via [dd](#).
- Boot loader : [syslinux](#), [grub 1/2](#) ; [MBR](#) and hidden data (if exist)
- [Serial console](#)
- Unattended mode
- One image restoring to multiple local devices
- [Multicast](#) supported in Clonezilla Server Edition (SE)
- The image format is transparent, open and flexible



# DRBL live, i.e. Clonezilla Server Edition

drbl.sourceforge.net, drbl.nchc.org.tw

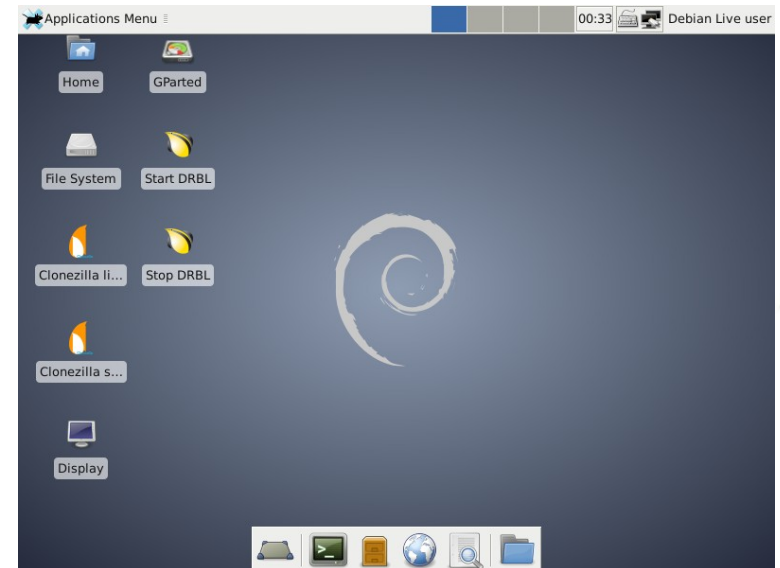
DRBL Live (Default settings)

- Other modes of DRBL Live >
- Local operating system in harddrive (if available) >
- Newtest & FreeDOS >
- Network boot via IPXE

Press [Tab] to edit options

\* Boot menu for BIOS machine  
\* DRBL live version: 2.2.0-15-1686-pae. (C) 2003-2013, NCHC, Taiwan  
\* Disclaimer: DRBL comes with ABSOLUTELY NO WARRANTY

**DRBL**  
Free Software Labs NCHC, Taiwan  
自由軟體實驗室 國家高速網路與計算中心



# Clonezilla Live

```
clonezilla.org, clonezilla.nchc.org.tw
Clonezilla live (Default settings, VGA 800x600)
Other modes of Clonezilla live >
Local operating system in harddrive (if available) >
Newtest & FreeDOS
Network boot via IPXE
```

Press [Tab] to edit options

- \* Boot menu for BIOS machine
- \* Clonezilla live version: 2.4.2-10-1686-pae. (C) 2008-2015, NCHC, Taiwan
- \* Disclaimer: Clonezilla comes with ABSOLUTELY NO WARRANTY

**Clonezilla** *Free Software Labs*  
National Center for High-Performance Computing  
Taiwan

```
NCHC Free Software Labs, Taiwan

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///

savedisk          Save_local_disk_as_an_image
saveparts         Save_local_partitions_as_an_image
*restoredisk      Restore_an_image_to_local_disk
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
encrypt-img       Encrypt_an_existing_unencrypted_image
decrypt-img       Decrypt_an_existing_encrypted_image
exit              Exit. Enter command line prompt

<OK>                <Cancel>
```

# Developers

- Steven Shiau
- K. L. Huang
- Ceasar Sun
- Jazz Wang
- Thomas Tsai
- Jean-Francois Nifenecker
- Louie Chen
- Nagappan Alagappan



# Language file contributors

- English (en\_US): Dylan Pack.
- German (de\_DE): Michael Vinzenz.
- Hungarian (hu\_HU): Greg Marki
- Spanish (es\_ES): Juan Ramón Martínez and Alex Ibáñez López.
- French (fr\_FR): Jean-Francois Nifenecker and Jean Francois Martinez.
- Italian (it\_IT): Gianfranco Gentili.
- **Japanese (ja\_JP): Akira Yoshiyama and Annie Wei.**
- Brazilian Portuguese (pt\_BR): Marcos Pereira da Silva Cruz.
- Russian (ru\_RU): Anton Pryadko and Igor Melnikov.
- Slovak (sk\_SK): Ondrej Dzivy Balucha
- Turkish (tr\_TR): Ömer YILDIZ
- Simplified Chinese (zh\_CN): Zhiqiang Zhang and Liang Qi.
- Traditional Chinese (zh\_TW): T. C. Lin.

# Partners

- The following companies either embed Clonezilla in their products or promote Clonezilla:

– Linmin



– eRacks Open Source Systems



– Miracle Linux





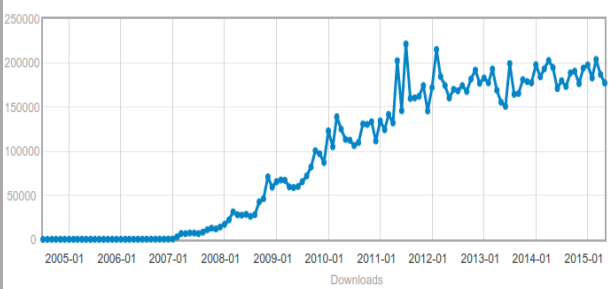
# Changes and features from 2015 Summer

- Image **encryption**
- **WebDAV/S3/Swift** device as image repository
- **Chrome OS/Chromium OS** imaging
- Device like `/dev/rd/c0d0` and `/dev/ida/c0d0` RAID cards
- Support PV on disk, not only on partition
- Fake RAID/**firmware RAID** is now supported if its device naming style is `/dev/md`.
- The partition from an image could be now restored to different name device, e.g. `sda1` could be restored to `sdb5`.
- File system **f2fs** support
- "ocs-img-2-vdk" was added. It can be used to **convert Clonezilla image as virtual disk file** (qcow2 and vmdk) via KVM
- **Slovak, Turkish and Hungarian** locales were added

# Clonezilla Users Worldwide



ca_ES.UTF-8	Catalan		Català
de_DE.UTF-8	German		Deutsch
eh_US.UTF-8	English		
hu_HU.UTF-8	Hungarian		Magyar
es_ES.UTF-8	Spanish		Español
fr_FR.UTF-8	French		Français
it_IT.UTF-8	Italian		Italiano
ja_JP.UTF-8	Japanese		日本語
pt_BR.UTF-8	Brazilian Portuguese		Português do Brasil
ru_RU.UTF-8	Russian		Русский
sk_SK.UTF-8	Slovak		Slovenský
tr_TR.UTF-8	Turkish		Türkçe
zh_CN.UTF-8	Chinese (Simplified)		简体中文
zh_TW.UTF-8	Chinese (Traditional)		正體中文 - 臺灣



<b>DOWNLOADS</b>	<b>12,187,605</b>
In the selected date range	
<b>TOP COUNTRY *</b>	<b>United States</b>
24% of downloaders	
<b>TOP OS *</b>	<b>Windows</b>
70% of downloaders	

**>12,000,000** downloads

# Outline

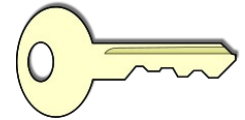
- Introduction to Clonezilla
  - Features
  - Updates since 2014 Summer
- Backup as a service with Clonezilla
  - Basic ideas
  - How
  - Use cases
- Q&A





# Backup as a service

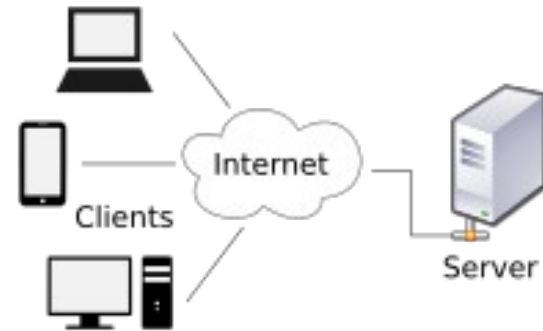
- Requirement for **system backup**:
  - Local and cloud backup
  - **Security**
  - Flexibility
  - Bare-metal recovery
- Image-based backup by Clonezilla
  - Image repo: local, NFS, CIFS, SSHFS, WebDAV
  - AES 128 bits (or 256 bits)



Images source: wikipedia.org

# Backup as a service server side

- BaaS server
  - Server provides one of the following service
    - WebDAV
    - SSHFS
    - CIFS
    - NFS
    - OpenStack Swift
    - Amazon S3



- FOSS solutions:

- OwnCloud
- FreeNAS
- GNU/Linux + Apache WebDAV/SSHFS/CIFS/NFS
- OpenStack Swift
- ...



# Backup as a service

## client side: interactive mode



- Clonezilla live  $\geq$  2.4.2-10
  - Boot Clonezilla live on the machine you want to backup
  - Configure network connection
  - Choose image repository:

- SSHFS
- CIFS
- NFS
- WebDAV
- S3
- Swift

```
Mount Clonezilla image directory
Before cloning, you have to assign where the Clonezilla image will be saved to or read from. We
will mount that device or remote resources as /home/partimag. The Clonezilla image will be saved
to or read from /home/partimag.
Select mode:

local_dev      Use local device (E.g.: hard drive, USB drive)
ssh_server     Use SSH server
samba_server   Use SAMBA server (Network Neighborhood server)
nfs_server     Use NFS server
webdav_server  Use WebDAV server
s3_server      Use_AWS_S3_server
swift_server   Use_OpenStack_swift_server
enter_shell    Enter command line prompt. Do it manually
skip           Use existing /home/partimag (Memory! *NOT RECOMMENDED*)

<OK>          <Cancel>
```

- Choose encryption

- Not ready  
for S3 &  
Swift

```
Clonezilla advanced extra parameters | Mode: savedisk
Do you want to encrypt the image?
If yes, eCryptfs program will be used to encrypt the image. It uses industry-standard
cryptographic ciphers, key generation, and passphrase protection mechanisms. Without your
salt/passphrase or private key, nobody will be able to retrieve your data.
//NOTE// You have to remember the passphrase, otherwise the image will _NOT_ be usable in the
future.

Not to encrypt the image
-enc Encrypt the image

<OK>          <Cancel>
```



# Backup as a service

## client side: almost unattended



- Clonezilla live  $\geq$  2.4.2-10
  - Pre-seed configuration in the boot parameters, e.g:

- `locales=en_US.UTF-8`
- `keyboard-layouts=NONE`
- `ocs_prerun1="dhclient -v eth0"`
- `ocs_prerun2="ocs-tune-conf-for-webdav"`
- `ocs_prerun3="mount -t davfs -o noexec http://192.168.120.254:8080/share/ /home/partimag"`
- `ocs_live_run="ocs-sr -q2 -j2 -z1p -enc -p true savedisk myimg sda"`

//NOTE// volume size is based on the free memory due to davfs2 cache mechanism limitation.



# Boot parameters

[clonezilla.org](http://clonezilla.org), [clonezilla.nchc.org.tw](http://clonezilla.nchc.org.tw)

Clonezilla live (Default settings, VGA 800x600)  
Other modes of Clonezilla live >  
Local operating system in harddrive (if available)  
Memtest & FreeDOS >  
Network boot via iPXE

```
> /live/vmlinuz initrd=/live/initrd.img boot=live union=overlay username=user  
config components quiet noswap edd=on nomodeset nodmraid locales=en_US.UTF-8 k  
eyboard-layouts=NONE ocs_prerun1="dhclient -v eth0" ocs_prerun2="ocs-tune-conf  
-For-webdav" ocs_prerun3="mount -t davfs -o noexec http://192.168.56.1/share/  
/home/partimag" ocs_live_run="ocs-sr -q2 -j2 -zlp -enc -p true savedisk myimg  
sda" ocs_live_extra_param="" ocs_live_batch=no vga=788 ip= nosplash 1915.blac  
klist=yes radeonhd.blacklist=yes nouveau.blacklist=yes &lang%.enable_fbdev=1_
```

# Clonezilla

*Free Software Labs*  
*National Center for High-Performance Computing*  
*Taiwan*

TAIWAN

[www.nchc.org.tw](http://www.nchc.org.tw)



# Booting

```
Sending on Socket/fallback
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 3
DHCPDISCOVER on eth0 to 255.255.255.255 port 67 interval 6
DHCPPREQUEST on eth0 to 255.255.255.255 port 67
DHCPOFFER from 192.168.56.1
DHCPACK from 192.168.56.1
bound to 192.168.56.3 -- renewal in 118 seconds.
*****
Now run "ocs_prerun2": ocs-tune-conf-for-webdav...
Tuning davfs2 parameters in /etc/davfs2/davfs2.conf...
*****
Now run "ocs_prerun3": mount -t davfs -o noexec http://192.168.56.1/share/ /home/partimag...
Please enter the username to authenticate with server
http://192.168.56.1/share/ or hit enter for none.
  Username: steven
Please enter the password to authenticate user steven with server
http://192.168.56.1/share/ or hit enter for none.
  Password:
Setting the TERM as linux
Starting /usr/sbin/ocs-sr at 2015-06-12 15:18:29 UTC...
*****
Clonezilla Image dir: /home/partimag
*****
Shutting down the Logical Volume Manager
  No volume groups found
Finished Shutting down the Logical Volume Manager
Selected device [sda] found?
The selected devices: sda
*****
//NOTE// You have to remember the passphrase, otherwise the image will _NOT_ be usable in the future
.
*** Enter the passphrase to encrypt the image: myimg ***
(It will not be echoed in the screen)
*** Re-enter to verify the passphrase for encrypting the image: myimg ***
(It will not be echoed in the screen)
```

WebDAV  
authorization

passphrase  
for  
encryption

# Files in the encrypted image dir

```
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:21 blkdev.list
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:21 blkid.list
-rw-r--r-- 1 www-data www-data 16K 6月 13 00:22 clonezilla-img
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:22 dev-fs.list
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:22 disk
-rw-r--r-- 1 www-data www-data 141 6月 13 00:22 ecryptfs.info
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:22 Info-dmi.txt
-rw-r--r-- 1 www-data www-data 20K 6月 13 00:22 Info-fdisk.txt
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:22 Info-lspci.txt
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:22 Info-packages.txt
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:22 Info-saved-by-cmd.txt
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:22 parts
-rw-r--r-- 1 www-data www-data 95M 6月 13 00:22 sda1.ext4-ptcl-img.gz.aaa
-rw-r--r-- 1 www-data www-data 95M 6月 13 00:22 sda1.ext4-ptcl-img.gz.aab
-rw-r--r-- 1 www-data www-data 95M 6月 13 00:22 sda1.ext4-ptcl-img.gz.aac
-rw-r--r-- 1 www-data www-data 89M 6月 13 00:22 sda1.ext4-ptcl-img.gz.aad
-rw-r--r-- 1 www-data www-data 724K 6月 13 00:22 sda5.ext4-ptcl-img.gz.aaa
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:21 sda-chs.sf
-rw-r--r-- 1 www-data www-data 1.1M 6月 13 00:21 sda-hidden-data-after-mbr
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:21 sda-mbr
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:22 sda-pt.parted
-rw-r--r-- 1 www-data www-data 12K 6月 13 00:22 sda-pt.parted.compact
```

The only plain text file in the image dir, Others are encrypted

```
# This image was saved with ecryptfs
disk_of_img="sda"
parts_of_img="sda1 sda5"
time_of_img="2015-0220-0650"
disks_size_all_of_img=" 8590MB"
```

Volume size reset by ocs-tune-conf-for-webdav

AES is not currently known to be susceptible to known-plaintext attacks.



# Demo - Save an image to WebDAV

- Server side:
  - WebDAV, provided by the running Ubuntu 14.04 system with enabled Apache2 WebDAV
  - URL: `http://192.168.56.1/share/`
- Client side:
  - Use Clonezilla live to 2.4.2-10 with preseeded boot parameters to save a local disk as an image
    - `locales=en_US.UTF-8 keyboard-layouts=NONE`
    - `ocs_prerun1="dhclient -v eth0"`
    - `ocs_prerun2="ocs-tune-conf-for-webdav"`
    - `ocs_prerun3="mount -t davfs -o noexec http://192.168.56.1/share/ /home/partimag"`
    - `ocs_live_run="ocs-sr -q2 -j2 -z1p -enc -p true savedisk myimg sda"`



# Conclusion

- With **image encryption**, you can provide BaaS for system imaging to **multiple users in the same image repository**.
- Due to the file system support issue, the ecryptfs has a compatible issue with **s3fs** (for S3) and **cloudfuse** file (for Swift) systems. We will keep improving it.
- WebDAV service is **more flexible**. However, there might be some limits. E.g. single file size limit on the server side. Therefore you have to make sure it's compatible with Clonezilla.

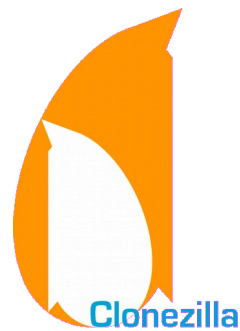
# Reference

- Clonezilla: <http://clonezilla.org>
- DRBL: <http://drbl.org>



# Questions ?

Great!



??????

