System deployment using bittorrent

Steven Shiau, Thomas Tsai, Ceasar Sun
clonezilla.org
Q2, 2017
Outline

- Introduction to Clonezilla
  - Features
- System deployment using bittorrent
  - Challenge
  - Implementation
- Demo
- Q&A
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System imaging and cloning - backup

image source: maggiesfarm.anotherdotcom.com
www.compsults.com, and 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)
What is Clonezilla?

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

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

• Free (GPL) Software

• File systems supported:
  – Ext2/3/4, ReiserFS, Reiser4, XFS, JFS, HFS+, BrtFS, F2fs, UFS, Minix, VMFS, F2FS, NILFS2, 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** and **bittorrent** (in beta) deployment are supported in Clonezilla Server Edition (SE) and lite server

• The image format is transparent, open and flexible
DRBL live, i.e. Clonezilla Server Edition
Clonezilla Live

Clonezilla Live (Default settings, UGA 08h08h)
Other modes of Clonezilla live
Local operating system in harddrive (if available)
Network boot & FV现代

Press F10 to exit options
Automatic boot in 25 seconds...

= Boot menu for BIOS machine
= Clonezilla live version 2.4.5-28-amd64. (C) 2009-2016, NCHC, Taiwan
= Disclaimer: Clonezilla comes with ABSOLUTELY NO WARRANTY

Free Software Labs
The Center for High Performance Computing
Taiwan

Clonezilla

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Clonezilla - (OpenSource Clone System (OCS): Select mode)

- Clonezilla is free GPL software, and comes with ABSOLUTELY NO WARRANTY.
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
- save-local-partition as an image
- restore
- restore particular local partitions
- create-partition
- create_recovering Clonezilla Live
- check_the_image is restorable
- convert_image_compression
- encrypt_and_decrypt
- exit
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
- Catalan (ca_ES): René Mérou and Innocent De Marchi
- German (de_DE): Michael Vinzenz
- Hungarian (hu_HU): Greg Marki
- Spanish (es_ES): Juan Ramón Martínez and Alex Ibáñez López.
- French (fr_FR): Jean-François Nifenecker and Jean Francois Martinez.
- Italian (it_IT): Gianfranco Gentili.
- 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.
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Bittorrent vs. multicast

Bittorrent

Uploader

Downloader

Downloader

Downloader

Multicast

source

Scale

Bittorrent

System Deployment via Bittorrent-Challenge and Solution

• Challenge
  – For peer to peer file sharing, a temp storage space is required
  – For bare metal recovery, the available storage space is RAM
    • Because the existing disk is the destination disk to be overwritten
  – However, RAM disk is normally not big enough for system deployment
    • Disk image: ~ GB to 100 GB or more

• Solution
  – By Date Huang, etc.
  – Separate the seeder and downloader
  – Seeder
    • Special format image file
  – Downloader
    • Directly write image to disk and share the blocks from disk
Bittorrent in Clonezilla

**Image server**
- Metainfo
- Special format of image
- Seeder with usual BT program, e.g. ctorrent

**Diagram**
- Peer 1
  - Disk
  - EZIO
- Peer 2
  - Disk
- Peer 3...
  - Disk
System Deployment via Bittorrent

- The image has to be in **special format for bittorrent** purpose. Hence extra space on hard drive is required.
  
  ```
  root@debian:~# ls /home/partimag/btzone/stretch-x64-20170626/sda1
  00000000000000000000000000000000 0000000000000000000000001f0fa000
  00000000000000000000000000000040c000 000000000000000000000000100000
  0000000000000000000000000000001f120000 000000000000000000000000441000
  00000000000000000000000000000000200000 0000000000000000000000001f123000
  000000000000000000000000000000442000 0000000000000000000000001f23000
  0000000000000000000000000000001f125000 000000000000000000000000441400
  00000000000000000000000000000000400000 0000000000000000000000001f175000
  0000000000000000000000000000004418000 00000000000000000000000000500000
  0000000000000000000000000000001f179000 000000000000000000000000441af000
  00000000000000000000000000000000600000 0000000000000000000000001f193000
  000000000000000000000000000000441e000 00000000000000000000000000700000
  0000000000000000000000000000001f196000 00000000000000000000000044200000
  ...
  ```

- Each file stores a section of used continuous file system blocks. The file name denotes its offset on the partition.
System Deployment via Bittorrent

- Extra packages are required:
  - Ezio, ocs-bttrack, ctorrent, mktorrent
  - Ezio is a blocks deployment program with bittorrent, and is developed by Date Huang (tjjh89017), Ching-Hsuan Yen (mangokingTW), and Pu Lee (leepupu): https://github.com/tjjh89017/ezio
  - Ocs-bttrack is a bittorrent tracker, and is developed by Clonezilla team based on BitTornado
    https://github.com/stevenshiau/ocs-bttrack
- Partclone >= v0.3.5
- More tests and improvements are required before official release
**Screenshots**

`Clonezilla - Opensource Clone System (OCS) | Mode: restore-disk`

Choose the mode to restore client disk

- multicast
- multicast restore
- broadcast
- broadcast restore
- bittorrent
- bittorrent restore
- unicast
- unicast restore

**(OK) Cancel**

---

The partition table has been altered.
Type `loctl` to re-read partition table.

Syncing disks...
This was done by:

```
LC_ALL=C sfdisk --force /dev/sda < /home/partimg/xenial-x84-desktop-20161210/sda-part.sfs > sfdisk-20141214
```

Checking the integrity of partition table in the disk /dev/sda...

Learning the OS of partition table changes... done!

The first partition of disk /dev/sda starts at 0x48.
Restoring the hidden data between MBR (1st sector, i.e. 512 bytes) and 1st partition, which might be useful for some recovery tool, by:

```
cd /home/partimg/xenial-x84-desktop-20161210
zstd -d /dev/sda-hidden-data-after-mbr-of/dev/sda-seek=1 bs=512 count=2047
```

Restoring partition /dev/sdal...

Checking the integrity of partition table in the disk /dev/sda...

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```
Tests

- Bittorrent (BT) deployment testing results at NCHC computer classroom
  - 1 PC as the server, 38 clients. Image size is 6 GB (uncompressed)
  - To deploy the image to 38 clients
    - 360 secs with multicast mechanism
    - 750 secs with BT mechanism
    - 250 secs (180+70) if deploying 3 clients first (180 secs), once it’s done, then deploying the rest of 35 (70 secs).
Demo

- Clonezilla live experimental 2.5.3-1exp
  - Not ready for public testing yet until early Aug
- Deploy Debian Stretch by Bittorrent to 2 clients

In closed network i.e., not connected to upstream
More info on site

• Workshop
  – Clonezilla workshop
  – Wednesday 5/Jul, 09:40-10:40 (Workshop, Room A 013 Coté Serveur)

• Booth
  – Clonezilla booth at the Village of associations
Reference

- Clonezilla: http://clonezilla.org
- DRBL: http://drbl.org
Questions ?

Great!

?????