

DRBL/Clonezilla 的過去，現在與未來

蕭志槐 孫振凱 蔡育欽

<http://drbl.nchc.org.tw>, <http://drbl.org>

<http://clonezilla.nchc.org.tw>, <http://clonezilla.org>

國家高速網路與計算中心

Q2, 2014



系統印象檔，複製，備份



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

image source: maggiesfarm.anotherdotcom.com
www.compsults.com, and jervisdabreo.com

大量系統佈署



國網中心自由軟體實驗室

高速計算技術及經驗發展之核心技術



企鵝龍 DRBL

(Diskless Remote Boot in Linux)

無碟環境，適合將整個電腦教室轉換成純自由軟體環境



再生龍 Clonezilla

適用完整系統備份、裸機還原或災難復原

是自由！不僅是免費...

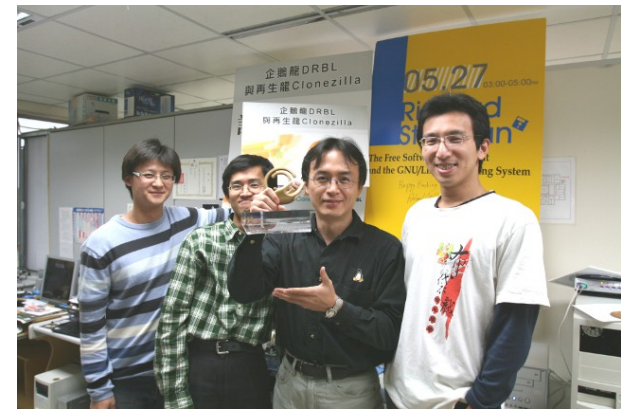
使用、複製、修改與再散播軟體的自由。免費是附加價值。人人皆可自由享用。



過去、現在



- 一晃 12 年過去了
- NCHC 內部開發者 2->4->3
- 外部參與者來來回回，不少潛水艇



DRBL 與 Clonezilla 開發大事紀

- ✓ 2002/05 商業軟體聯盟大規模掃蕩盜版
- ✓ 2002/06/17 輔仁大學毛慶禎教授在福營國中，主持「會診 LTSP 會議」，NCHC 在該會議中**第一次提出 DRBL 的想法**
- ✓ 2002/06/20 DRBL 雛形完成
- ✓ 2002/07/15 新店大豐國小研習，DRBL 第一次上線面對使用者測試。
- ✓ 2004/01/01 Clonezilla (OCS 的程式名稱) 雛形問世，Clonezilla 正式整合到 DRBL 中
- ✓ 2005/11/28 發行大一統版本，一個版本適用所有支援的 GNU/Linux 套件



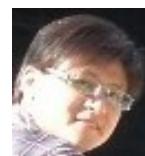
DRBL 與 Clonezilla 開發大事紀

- ✓ 2006/05/08 新增 DRBL Single System Image (SSI) 與 Clonezilla box 模式。這些模式，理論上 server 一張網卡可以支援 253 台 client
- ✓ 2007/03/14 首次發行 Clonezilla live
- ✓ 2007/12/04 DRBL 榮獲在法國所舉辦的第四屆國際自由軟體比賽 " 公部門 " 類別 (public sector software) 的第一名
- ✓ 2008/07/15 DRBL 與 Clonezilla 榮獲國家實驗研究院科技貢獻獎技術發展類玉山獎 (第一名)
- ✓ 2009/03/11 DRBL 與 Clonezilla 榮獲 2008 年行政院傑出科技貢獻獎
- ✓ 2010/01 Clonezilla 榮獲 sourceforge 2010 年 1 月份的最佳專案 (Project Of The Month)
- ✓ 2011/04 Clonezilla 獲選為國際知名雜誌 PC Magazine—2011 年最佳備份軟體之一
- ✓ 2012/04 Clonezilla 連續兩年獲選為國際知名雜誌 PC Magazine— 最佳備份軟體之一
- ✓ 2013/12 Linux Journal 讀者票選為最佳備份軟體



開發者

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



語言檔貢獻者

- English (en_US): Dylan Pack.
- German (de_DE): Michael Vinzenz.
- 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.
- Simplified Chinese (zh_CN): Zhiqiang Zhang and Liang Qi.
- Traditional Chinese (zh_TW): T. C. Lin.

DRBL

- 網路到處有，便宜，速度快
- DRBL
 - 透過網路線取代硬碟排線
 - 所有的用戶端共享伺服器的硬碟中的作業系統與應用程式

有碟
PC



=



+



+



無碟
PC



Server

DRBL



server



switch



client nodes



DHCP — IP →

pxe/etherboot

192.168.0.1

pxe/etherboot

172.16.100.10

TFTP — kernel →

boot

boot

NFS — file system →

/, /usr, /home ...

/, /usr, /home ...

NIS — account →

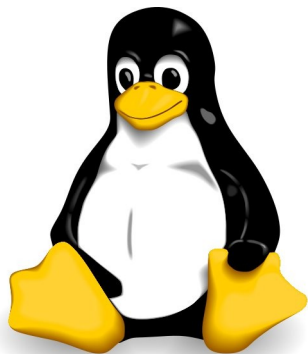
user login

user login



Clonezilla?

- 硬碟或者分割區的複製與存取印象檔之軟體，類似 Norton Ghost® 或者 True image®
- 自由軟體， GPL 授權
- 適用作業系統：



*1



*2



*3



*4

VMFS

VMware
ESX/ESXi

*5



MINIX

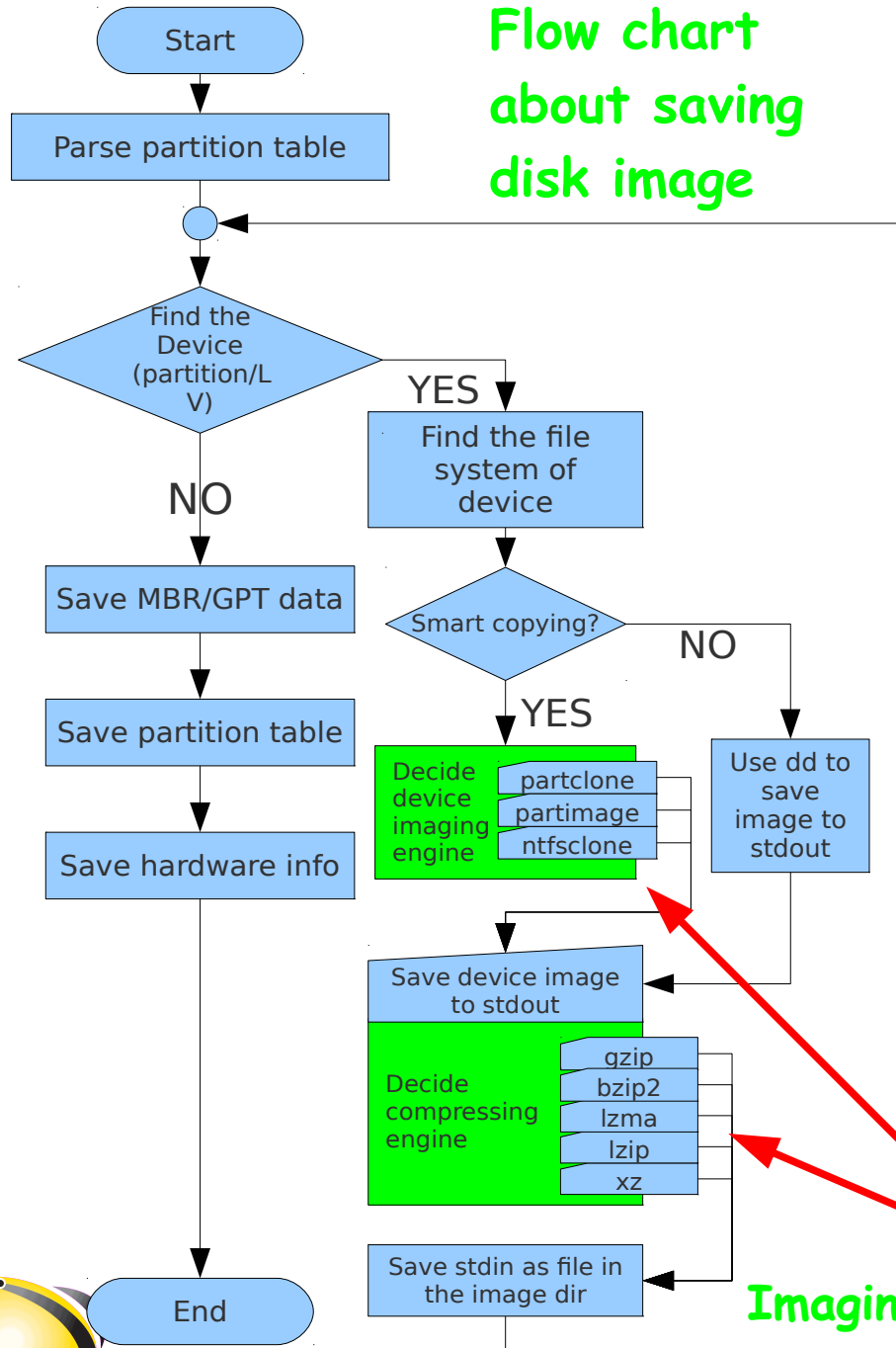
*6

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

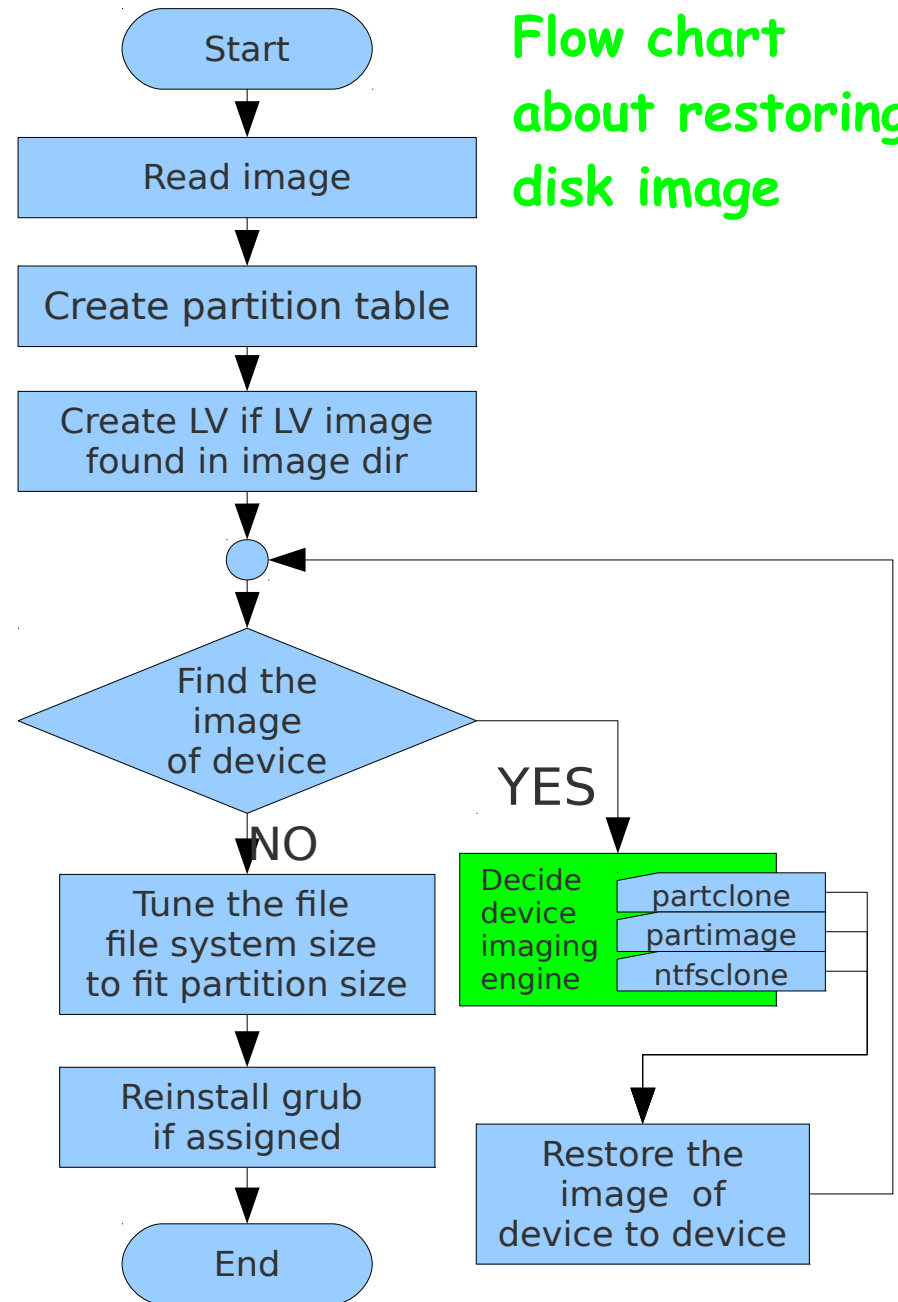


Open and Flexible Architecture of Clonezilla

Flow chart
about saving
disk image



Flow chart
about restoring
disk image



Imaging and compressing engines can be easily added

國際自由軟體競賽

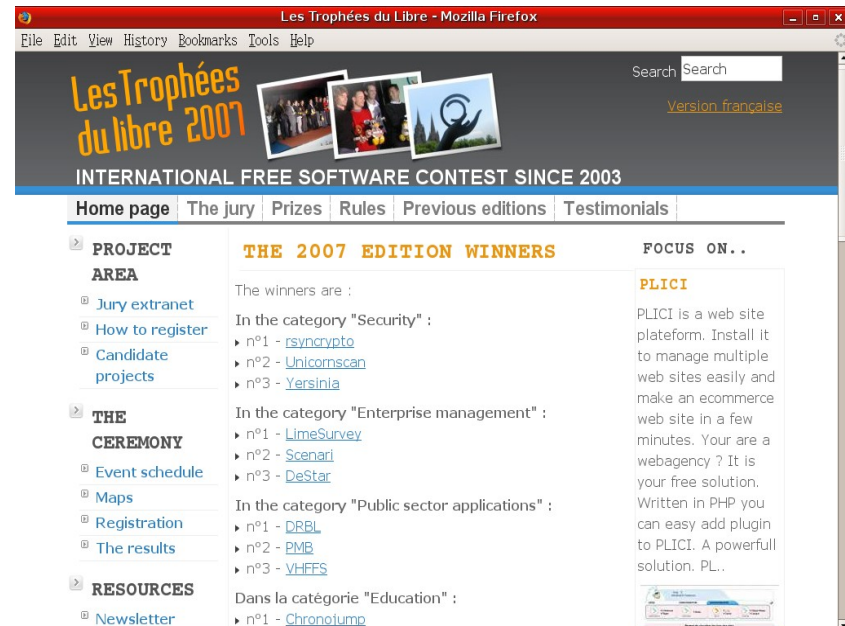
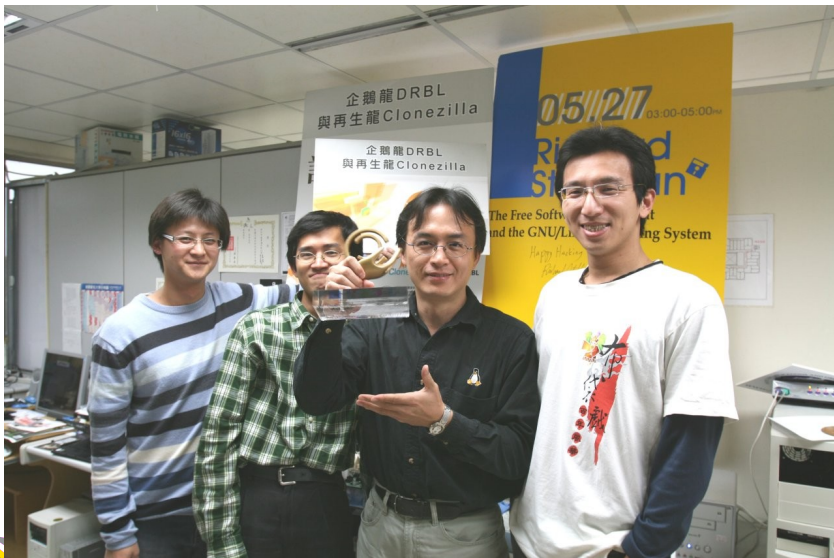


- 2007 年 11 月 29 日，Centri 協會在法國 Soissons 所舉辦的國際自由軟體競賽中 (Les Trophées du libre)，DRBL 贏得 'public sector software' 分類的首獎
 - <http://www.freesoftwareawards.com> or <http://tropheesdulibre.org/?lang=fr>



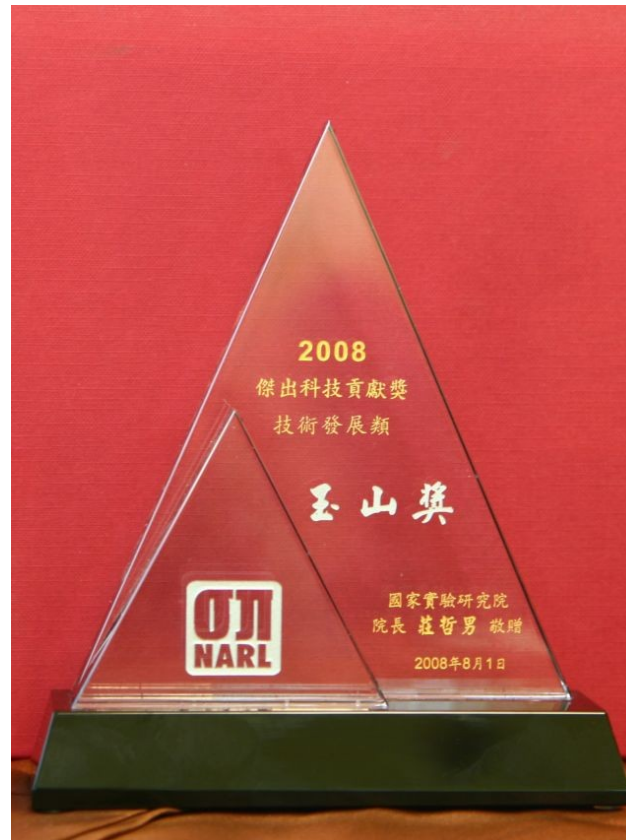
International Free Software Contest

Soissons, France, Nov 07



2008 年國家實驗研究院 傑出科技貢獻獎

DRBL/Clonezilla 團隊獲得 ' 技術發展 ' 類的
玉山獎 (第一名)



2008 年行政院傑出科技貢獻獎

名稱：『高效能計算平台 DRBL 與 Clonezilla 軟體的技術發展
與推廣應用』

頒獎典禮：2009 年 3 月 11 日





Project of the Month, January 2010

sourceforge FIND AND DEVELOP OPEN SOURCE SOFTWARE

Welcome, Guest! [Log In](#) | [Create Account](#)

[Find Software](#) | [Develop](#) | [Create Project](#) | [Blog](#) | [Site Support](#) | [About](#)

[SourceForge.net](#) > Blog
Project of the Month, January 2010

Clonezilla

Clonezilla is a partition or disk clone tool similar to Norton Ghost. It saves and restores only the used blocks in the hard drive. Two types of Clonezilla are available, Clonezilla live and Clonezilla SE (Server Edition). The filesystem supported by Clonezilla are: ext2, ext3, ext4, reiserfs, xfs, jfs of GNU/Linux, FAT, NTFS of MS Windows, and HFS+ of Mac OS. Therefore you can clone GNU/Linux, MS windows and Intel-based Mac OS whether they be 32-bit (x86) or 64-bit (x86-64) OS. For these file systems, only the used blocks in the partition are saved and restored. For unsupported file systems, a sector-to-sector copy is done by dd in Clonezilla.

Why and how did you get started?

On the 29th of March, 2003, the computers in the computer classrooms at the National Center for High-Performance Computing (NCHC, <http://www.nchc.org.tw>) were all upgraded. However, the deployment software did not support the new hardware. That's why we started the Clonezilla project. In the beginning, we started the Clonezilla server edition first, then, in 2007, Clonezilla live was created.

Who is the software's intended audience?

System administrators, that being, PC cluster administrators, computer classroom administrators, and of course anyone who needs a tool to clone or image his/her computer.

What are a couple of notable examples of how people are using your software?

* The National Computer Centre Wonen, Netherlands, used Clonezilla to, "clone a 3 GB image to 27 machines with an average speed was 2.4 GB/min."

* Cisco Systems used DRBL, "...in the design of our Cisco Computational Cloud cluster to multicast a 5 GB disk image to 64 machines simultaneously."

* Information Systems Security, Southbridge, Massachusetts, USA, said, "So far, I have cloned 1,084 systems using DRBL. By carefully following the instructions on the DRBL website, and using multicasting and dividing the number of systems into groups of 80-100 PCs at the time, it took me somewhere between 16-38 minutes for each group of PCs, using images of various operating systems that averaged 1 GB in size. DRBL has reduced the recovery/cloning factor by more than 500% as compared with the previous commercial solution [we were] using"

Project name: Clonezilla

Date founded: July 2004

Project page: <https://sourceforge.net/projects/clonezilla/>

Project Leader

Steven Shiau

Occupation: Researcher at the NCHC, Taiwan

Location: Hsinchu, Taiwan

Education: M. S. (Nuclear Engineering), National Tsing Hua University, Taiwan



Key Developers

Blake, Kuo-Lien Huang

Occupation: Open source hobbyist

Education: M. S.

Location: Hsinchu, Taiwan



Chenkai (Ceasar) Sun

Occupation: Associate Researcher at the NCHC, Taiwan

Education: M. S. (Department of Management Information System) National Sun Yat-Sen University, Kaohsiung, Taiwan

Location: Hsinchu, Taiwan



Yao-Tsung (Jazz) Wang

Occupation: Associate Researcher at the NCHC, Taiwan

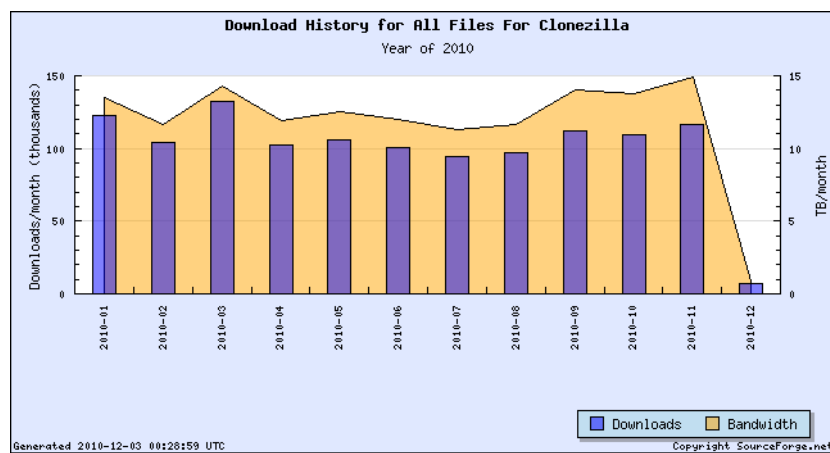




Clonezilla

2011 年 1 月份的 Linux Journal 有 5 頁的 Clonezilla 報導，內文特別提到臺灣與 NCHC，封面並寫上：

Clonezilla –
High Performance Open-Source Cloning



Date (UTC)	Rank	Downloads	Project Web Hits	Tracker opened (closed)	Forum Posts
Dec 2010 *	24	7259	3818	0 (0)	9
Nov 2010	19	116409	54991	8 (2)	279
Oct 2010	18	109299	53209	3 (3)	265
Sep 2010	20	112318	23865	3 (0)	260
Aug 2010	20	97041	18784	6 (6)	330
Jul 2010	18	94321	17468	1 (1)	300
Jun 2010	16	100353	18191	5 (1)	312
May 2010	18	105519	17904	5 (0)	393
Apr 2010	14	102175	18583	7 (2)	340
Mar 2010	20	132196	30223	6 (5)	393
Feb 2010	19	103756	25595	5 (1)	349
Jan 2010	23	123078	33061	2 (0)	413

* 統計至 2010/12/3

2013 年 12 月份 Linux Journal 讀者票選 最佳備份軟體為 Clonezilla

Linux Journal 於 1994 年在美國德州休士頓成立，專注在 Linux 與 OpenSource 的內容。與 Linux Magazine 以及 Linux Format 並列為世界上三大專注於 Linux 的期刊雜誌。

FEATURE Readers' Choice Awards 2013

BEST CLOUD-BASED FILE STORAGE

Dropbox is still the favorite cloud-based storage option, but it's great to see ownCloud nipping at its heels. No, not because I have anything against Dropbox (I use it myself), but because I love to see open-source alternatives whenever possible.

35.5% Dropbox

16.3% ownCloud
16.2% Google Drive
7.1% Ubuntu One
6.8% rsync
5.2% Other*

4.8% Amazon S3
4.6% SpiderOak
1.7% Copy
1.4% Box
.4% AjaXplorer

.1% Norton Zone
*Popular write-ins:
BitTorrent Sync, MEGA, Skydrive
and Wuala.



BEST LINUX GAME

Okay, true confession, it's been a couple years now, and I still don't understand the popularity of *Minecraft*. I just don't get it. That's okay, however, because most of you obviously do! *Minecraft* takes more than 20% of the vote this year. Will Steam's Linux support change things up next year? We'll have to wait and see.

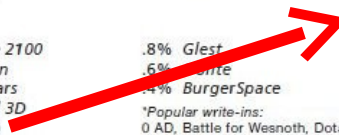
21.2% Minecraft

20.9% Other*
18.5% Half-Life
11.1% Frozen Bubble
7.1% Trine 2
5.2% OpenTTD
4.2% Battle Field

3.3% Warzone 2100
1.8% FreeOrion
1.6% Hedgewars
1.4% Scorched 3D
1.2% Darwinia
.9% KGoldrunner

.8% Glest
.6% X-Wing
.4% BurgerSpace

*Popular write-ins:
0 AD, Battle for Wesnoth, Dota 2
and FTL: Faster Than Light.



BEST BRAND OF VIDEO CHIPSET

51.6% NVIDIA

26.3% Intel

21.3% AMD

.8% Other



BEST SQL DATABASE

Databases may not be the most exciting topic of discussion, but as someone who spent the past year working in the database department of a university, I can assure you, they are important.



The numbers are very close this year, but it's neat to see MariaDB topple PostgreSQL.

29.7% MySQL

28.5% MariaDB
26.8% PostgreSQL

8.8% SQLite
4.4% Oracle

1.8% Other

BEST NOSQL DATABASE

43.6% MongoDB

15.3% Apache HBase
13.2% Cassandra

13.2% CouchDB
7.7% Other

4.5% Redis RethinkDB
2.6% Neo4j

BEST BACKUP SOLUTION

The short version of our results: I don't care which option you use, just back up! Now! Seriously though, it's interesting to see Dropbox as a backup solution. Yes, it does versioning, but I guess I've never considered it a backup. Perhaps I'm too old.

19.6% Clonezilla

19.3% Dropbox
19.1% Other*
8.8% Bacula
7.7% rdiff-backup
7.5% CrashPlan
5.4% Back In Time

4.5% Amanda
4.1% luckyBackup
1.8% Tivoli Storage Manager
1.4% Symantec Backup Exec
.5% Storix
.4% Areca-Backup

*Popular write-ins:
BackupPC, Deja Dup,
SpiderOak, duplicity and rsync +
tar/btrfs/ftp/cron/and so on.

DRBL/Clonezilla Use In Taiwan

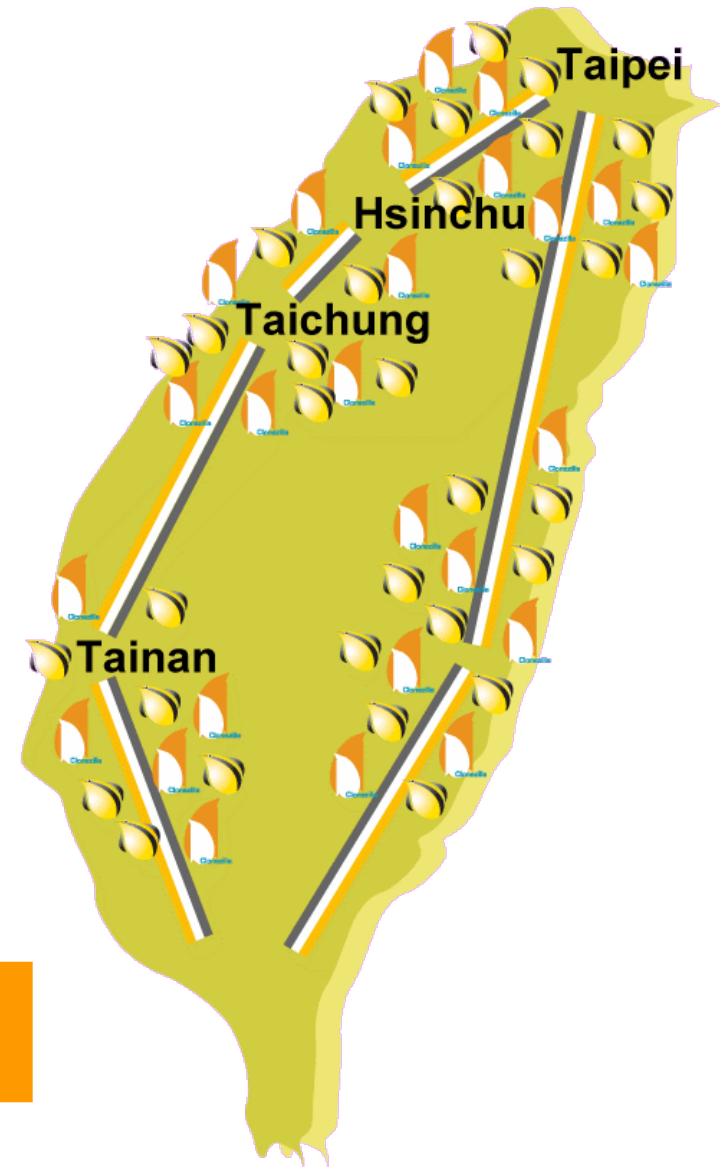
✓ Public Sector:

Primary/High schools	295
Universities	95
Local governments	35
Hospitals	3
TV stations	1

✓ **SMBs** 124

✓ **Misc.** 2

Known sites > **500!!!**





Clonezilla Users Worldwide



ca_ES.UTF-8 Catalan | Català
de_DE.UTF-8 German | Deutsch
en_US.UTF-8 English
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
zh_CN.UTF-8 Chinese (Simplified) | 简体中文
zh_TW.UTF-8 Chinese (Traditional) | 正體中文 - 臺灣

Home (Change File)

Date Range: 2004-07-26 to 2013-11-30



DOWNLOADS

8,812,678

In the selected date range

TOP COUNTRY *

United States

25% of downloaders

TOP OS *

Windows

70% of downloaders

使用者使用之主要情境：

- 單機之系統備份與還原
- 為使用者提供客製化還原光碟 / 隨身碟
- 多機系統之大量佈署

2013 年度達 209 萬人次下載
2004 至 2013 累積超過 899 萬人次下載

有趣的使用案例（一）

- 蘇仕文老師
- 基隆深美國小
- 2008 年 12 月
- 使用再生龍複製超過 100 個 USB (2.0) 隨身碟，每個有 3 GB 的作業系統與資料。一次 8 個，約 30 分鐘



有趣的使用案例（二）

- 蔡明貴校長
- 新北市南勢國小
- 2014 年 4 月下旬
- 使用再生龍複製約 200 個 USB (2.0) 隨身碟，每個有 2.7GB 的作業系統與資料。一次 16 個，約 16 分鐘



Testimonials

- Kristian Hermansen
- Cisco Systems, Boston, MA, USA, Sept. '07
- Cloned a 5GB image to 64 machines in 5 under minutes!!!
 - "I used Clonezilla in the design of our Cisco Computational Cloud Cluster to multicast a 5GB disk image to 64 machines simultaneously and all in under five minutes! Amazing! Thanks Clonezilla!"

Testimonials

- Barny Sanchez
- Information Systems Security, Southbridge, Massachusetts, USA
- Cloned 1,084 systems using DRBL (Clonezilla SE)
 - "I've used DRBL to clone 1,084 systems so far! It was simple! All I had to do was divide each system into groups of 80-100 PCs and then use multicasting to do the cloning. It took anywhere from 16-38 minutes to clone each system. The images of various operating systems averaged 1GB in size. DRBL has reduced the recovery/cloning factor by more than 500% as compared to the commercial solution I used previously! You can imagine how happy my project managers are!"

Use case in enterprise

- Nagappan Alagappan from VMware
- Palo Alto, CA, USA
 - Before Clonezilla we were using Symantec Altiris, but it worked fine only for Windows and RedHat, it doesn't work for Ubuntu / SUSE
 - As a product company, we need to test our product in all popular operating system, when exploring different opportunity, we found Clonezilla appropriate, Reason: It support all the Linux distribution (RedHat, SUSE, Ubuntu, Mandriva) and different file system, which we use (ext3, ext4, reiserfs)

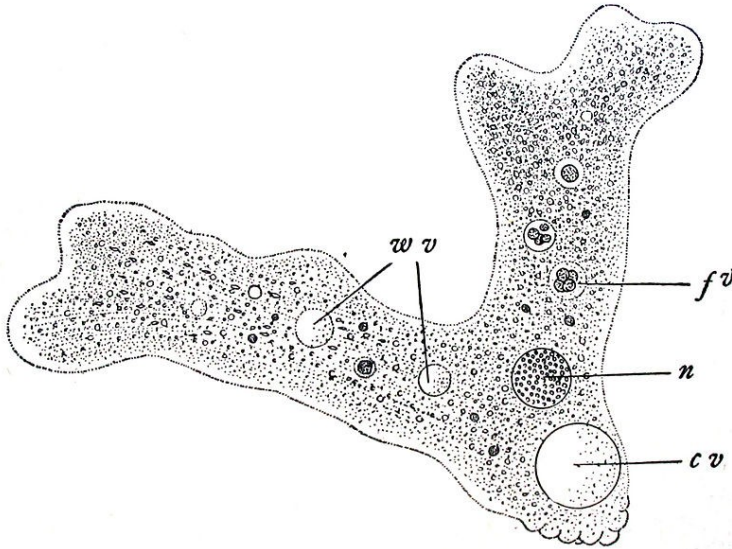
Use case in enterprise

- Initially evaluated Clonezilla live and found a very good performance, Windows XP image restoration 7 minutes, Ubuntu 3 minutes, SUSE / RHEL 5 minutes from a NFS server
- Later we (in VMware) have implemented a service, which will automate the Clonezilla reimaging part, without any manual intervention, which have saved our life and ofcourse money, as Clonezilla is Free Software !

Use case in enterprise

- When a new (internal) build is released (at least **one build a day**), **Basic Acceptance Test** (BATS in short) will be executed. The process is: Install a new OS image in a single test machine (pool of 70 machines), download the latest build, download the test scripts to execute, start the test, publish the result and release the machine back to pool, if all the tests in BATS are passed
- VMware has proudly **contributed back the code to Clonezilla team** and will be happy to support anyone who wants to use in their environment

未來



圖片與資料來源 : wikipedia.org

- 未來充滿了變數
- 自由軟體不死：
- 就像變形蟲那樣，能在全身各處伸出偽足來運動和攝食
- 就像蟑螂比起其他脊椎類生物有較高的抗輻射性，輻射致命劑量比人類高出 6 至 15 倍不等

參考文件

- DRBL/Clonezilla 進階使用
 - <http://drbl.nchc.org.tw/advanced>
- Clonezilla Live 文件集
 - <http://clonezilla.nchc.org.tw/clonezilla-live/doc/>
- Clonezilla 相關文章與報導
 - http://clonezilla.nchc.org.tw/related_article/

