

裸機還原系統 Clonezilla

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- Clonezilla 簡介 (30 mins)
 - 關於 Clonezilla
 - 台灣與世界使用者使用情形
 - 相關活動
 - 成功案例
- Demo (20 mins)
- Q&A (10 mins)



- Free software projects developed by NCHC Free Software Labs
- Our goal - FSSC (Free Software Smart Classroom) – based on HPC (**High Performance Computing**) experience
 - DRBL, Clonezilla, DRBL-winroll, Tux2live, Partclone**
 - Multicast VNC
 - Access Grid, E-learning
 - Cluster computing
 - Grid computing



自由軟體 (Free Software)

站在巨人的肩膀上，是自由軟體發展的理念。
其靈活、**可自由使用，複製、修改**與散播的價值，將有效解決資訊教育的管理成本及商業軟體高成本負擔的問題。

需要「化繁為簡」的解決方案！



一般國內小學的電腦教室

☑ 人力、時間成本高

教師 1 人維護管理多組設備
教學同時分派或收集作業

☑ 設備維護成本高

需分別處理設定（每班約 35 台）
如：電腦中毒、環境設定
系統操作問題、開關機、
備份還原等

知識和軟體都需要讓孩子「帶著走」！



☒ 商業獨家軟體授權高成本

在校學習，也需回家複習
學校每台（平均）約 6 千至 1 萬
學生家用（平均）約 1 至 2 萬

☒ 知識與法治的學習

教育知識，也需教育尊重
尊重智財權觀念

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)

適合提供高效能計算簡化管理工作，或者將整個電腦教室轉換成純自由軟體環境



Clonezilla

再生龍

Clonezilla

適用大量系統佈署，完整系統備份，裸機還原或災難復原

是自由！不僅是免費...

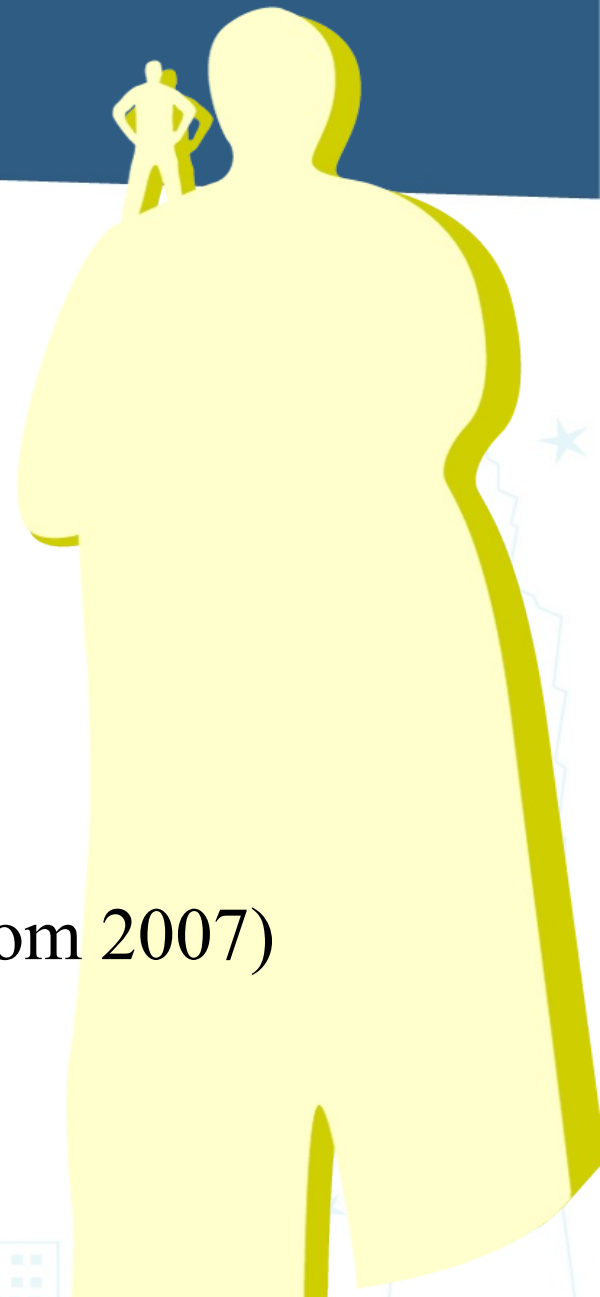
使用，複製，修改，再散播的自由。免費是附加價值。

- Bare-metal restore -> A technique in the field of data recovery and restoration where the backed up data is available in a form which allows one to restore a computer system from "bare metal", i.e. **without any requirements as to previously installed software or operating system** – wikipedia
- **Image-based backup** & restore is different from file-based one ('cp', 'tar', 'rsync'...)



- Free (GPL) Software
- **Filesystem supported:** ext2/3, reiserfs, reiser4, xfs, jfs, hfs+, FAT and NTFS
- **LVM2** (Linux Logical Volume Manager 2, stackable block device) is supported
- **Multicast** is supported in Clonezilla server edition
- Save and restore not only partitions, but also whole disks
- If file system is supported, only used blocks in harddisk are saved and restored. For unsupported file system, sector-to-sector copy is done by dd
- **drbl-winroll:** the hostname, group, and SID of cloned MS windows machine can be automatically changed.

- Based on existing software
 - partimage
 - ntfscclone
 - dd
 - updcast
 - **DRBL** (For massive clone)
 - **partclone** (Developed @NCHC from 2007)
 - and more...



- <http://www.partclone.org>
- Developed by Thomas Tsai and Jazz Wang
- Only used blocks are saved and restored.
- Supports ext2, ext3, reiserfs, **reiser4**, xfs, **hfs+**, fat
- The next target is to support zfs

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
- ✓ ...

- Diskless Remote Boot in Linux (DRBL) 提供一個無碟或是硬碟上無系統的環境
 - 不同於 LTSP (Linux Terminal Server Project), DRBL 使用分散式的硬體資源, 所以用戶端可以充份的使用所有的硬體。
 - 可與用戶端硬碟中的作業系統共存
 - 用戶端電腦隨插即用 (plug-and-play)
- Clonezilla 是硬碟資料複製的工具, 類似 Symantec Ghost 或是 Rembo
 - 支援點播 (unicast) 或是群播 (multicast) 複製
- DRBL: 基本上無碟環境使用, GNU/Linux 專用
- Clonezilla: 有硬碟環境使用, 安裝在 GNU/Linux, 可以佈署 Linux/ 微軟 Windows

DRBL - Diskless Remote Boot in Linux

✓ **pxe/etherboot + nfs + nis** - 站在巨人的肩膀上

起源： **PC Cluster** -> 自由軟體電腦教室需求

1. 支援多元化的電腦教學 - **Linux** 與微軟 **Windows** 可同時並存

– **DRBL** 環境下， **OS** 存在 **server** 端， **client** 端的作業系統可保留

2. 簡化管理工作

– 所有的服務集中在 **server** 管理，減少檢視每台 **client** 軟體的困擾

– 作業系統與軟體只需要在 **server** 上安裝一遍即可

3. 硬體與安裝雖簡化，軟體卻完整

– 軟體和逐一安裝的機器一樣，沒有任何偷工減料

DRBL

- Network is everywhere, cheap, and fast
- In DRBL
 - The harddrive bus cable is replaced by network cable
 - All DRBL clients share 1 harddrive in the server



既有 LTSP，何要 DRBL？

- 中央集權 vs. 地方分權
- 精簡型電腦 (Thin client) vs. 功能強大電腦 (powerful client)
- 有些人需要在用戶端能玩 **3D** 遊戲，播放電影，或者需要用戶端的計算資源
- DRBL 的特別功能
 - Clonezilla
 - 單一指令切換所有用戶端電腦的環境
 - DRBL, FreeDOS, 硬碟中的 OS, memtest...
 - 網路安裝 GNU/Linux 套件
- DRBL 不適用於老舊電腦使用
- 因地制宜，取己所需

大量複製 MS Windows 系統時，如果沒有使用 / 購買其他服務管理系統時，便會衍生出一些相關問題。

- 使用上

- 主機名稱重複

- 網路芳鄰錯誤
 - NetBIOS 協定中 Name service 的廣播封包

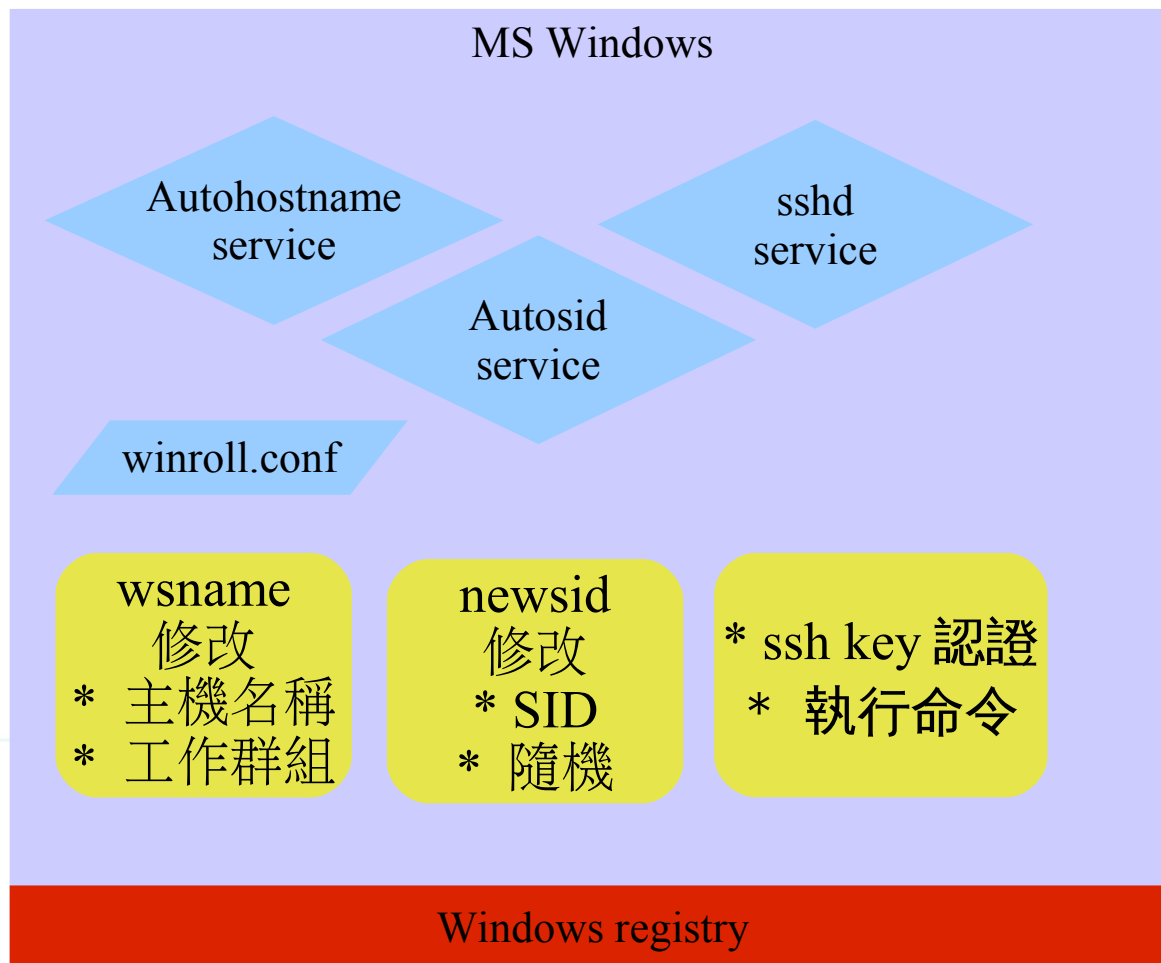
- SID 重複

- 安全識別項 (Security Identifier)
 - AD 網域中的唯一性：認證 / 登入失敗等安全性問題

- 管理上

- 無法進行集中式管理：單一指令群體動作
 - 無法分群辨識：複製後群組名稱相同

drbl-winroll 架構示意圖



Commands form drbl server



- * dcs 指令
- * 開 / 關機
- * 變更開機選單

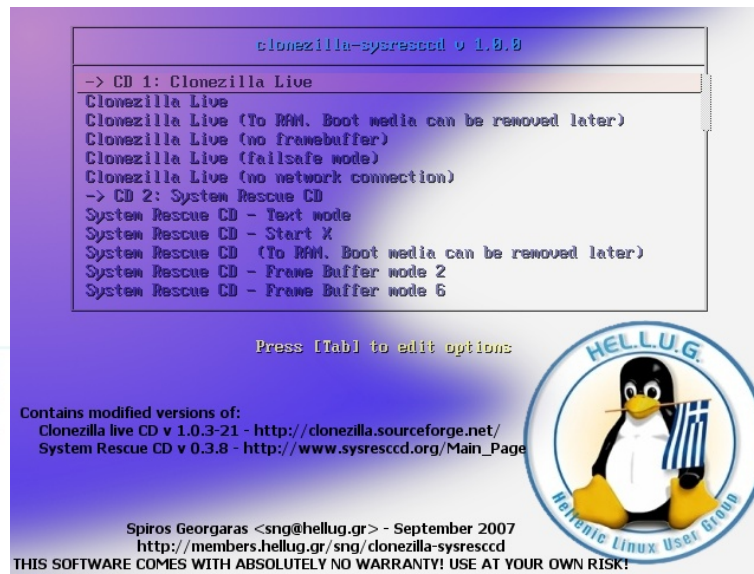
Two types of Clonezilla

■ Clonezilla server edition

- Massive clone
- Network boot (PXE)
- DRBL server is required

■ Clonezilla live

- Single machine backup
- Based on **Debian Live (live helper and live initramfs)**
- CD/USB flash drive is required
- Also available in
 - **Clonezilla-SysRescCD**, created by Spiros Georgaras



DRBL (Clonezilla server edition)



server



switch



client nodes



DHCP

IP

pxe/etherboot

192.168.0.1

pxe/etherboot

192.168.0.40

TFTP

kernel

boot

boot

NFS

file system

/, /usr, /home ...

/, /usr, /home ...

NIS

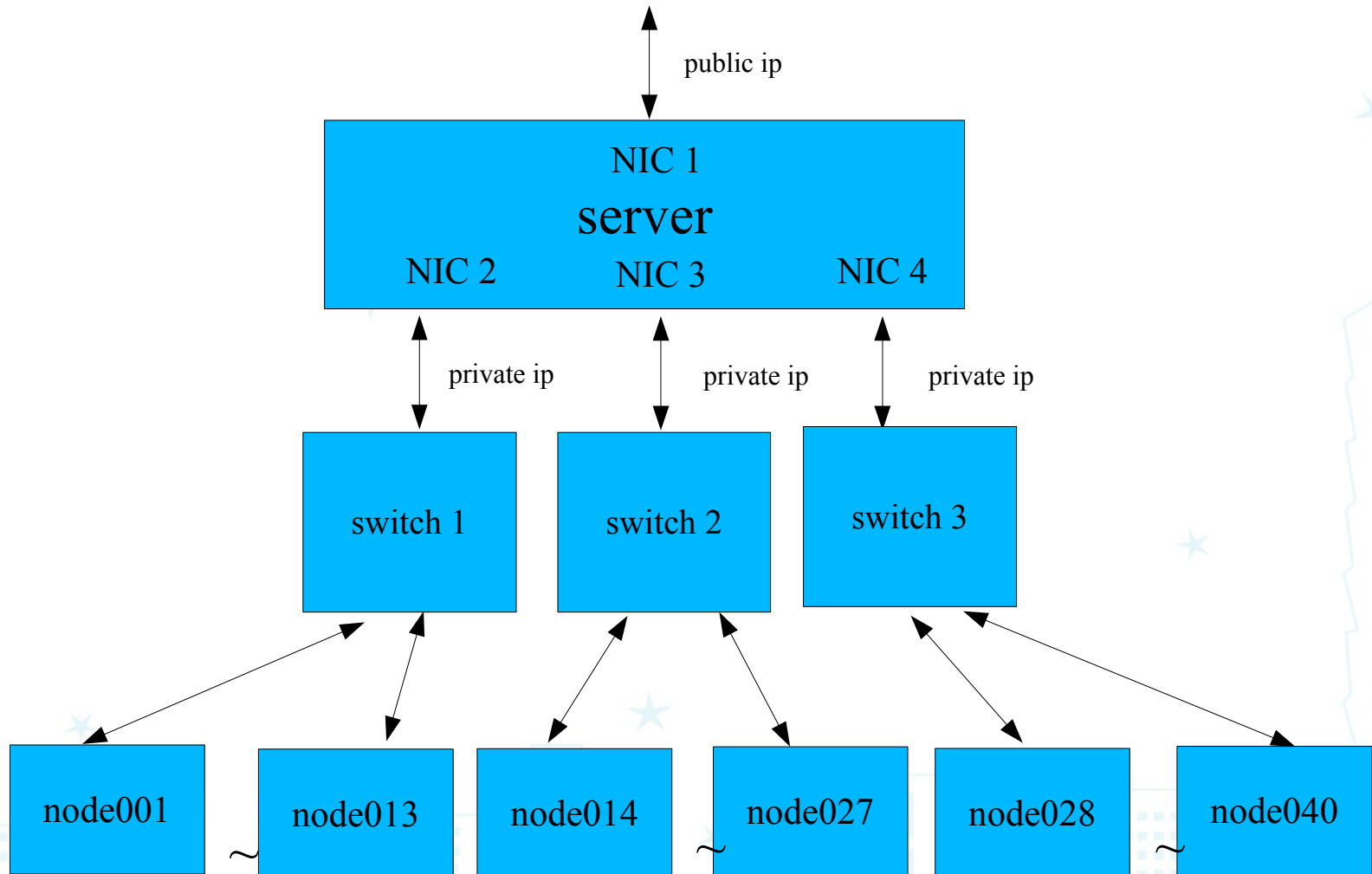
account

user login

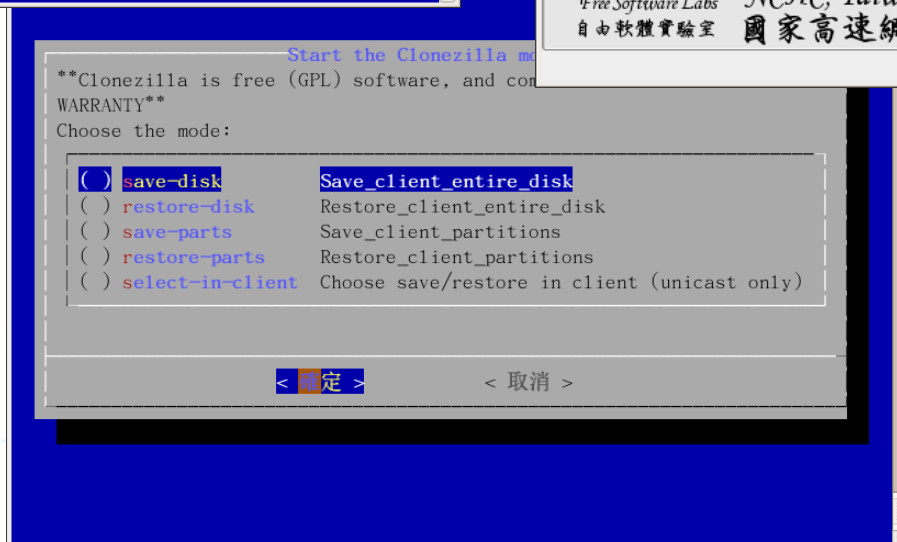
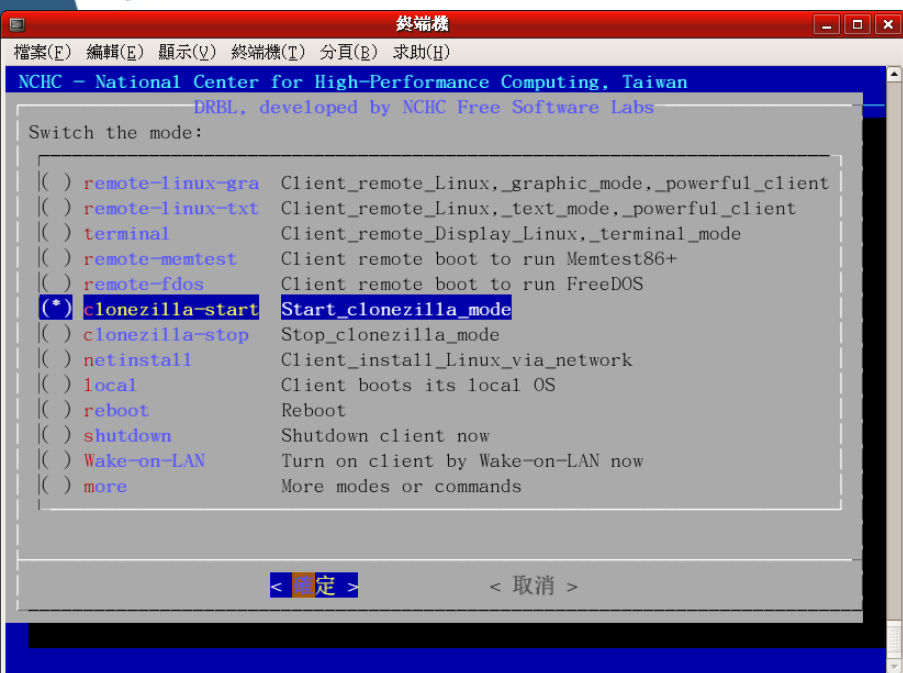
user login



DRBL (Clonezilla Server edition) Schematic

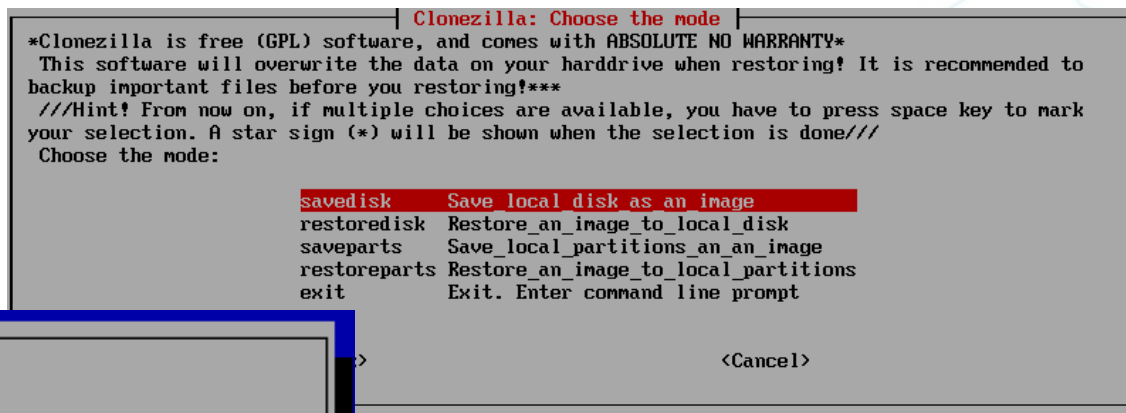
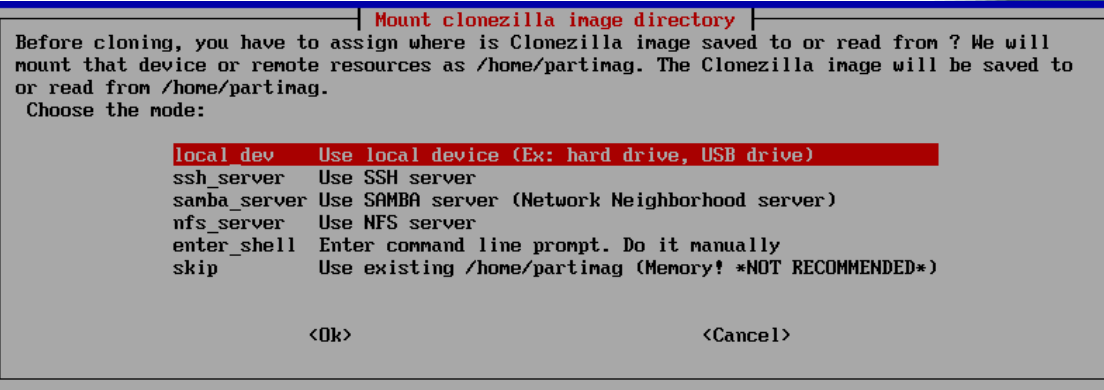
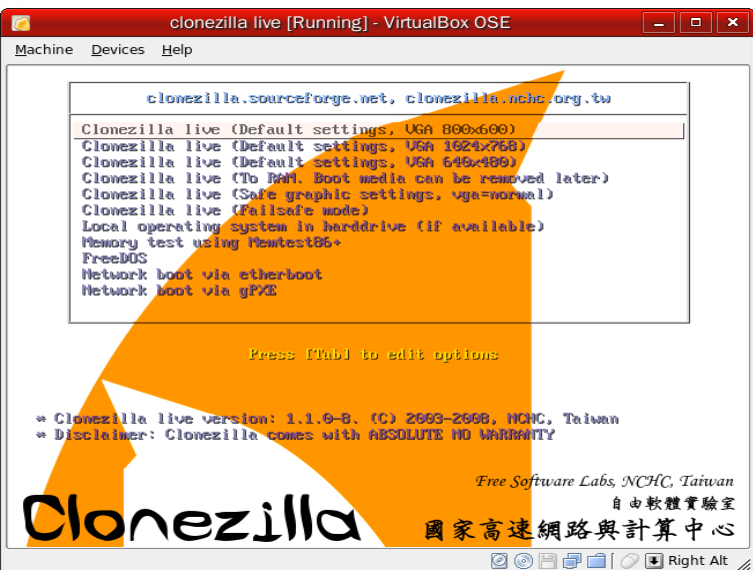


DRBL (includes Clonezilla Server Edition)





- On CD or USB flash drive
- Languages:
 - Chinese, English, **French** (from Jean-Francois Nifenecker), **Japanese** (from Akira Yoshiyama and Annie Wei)
- General purpose use - Save or restore interactively
- Special purpose use — recovery CD/USB
 - Clonezilla image embedded in CD or USB flash drive. One command to restore image.
 - Created by one command:
 - Ex: `/opt/drbl/sbin/ocs-iso sarge-image`
 - User can press one key to restore the image



✓ Public sectors

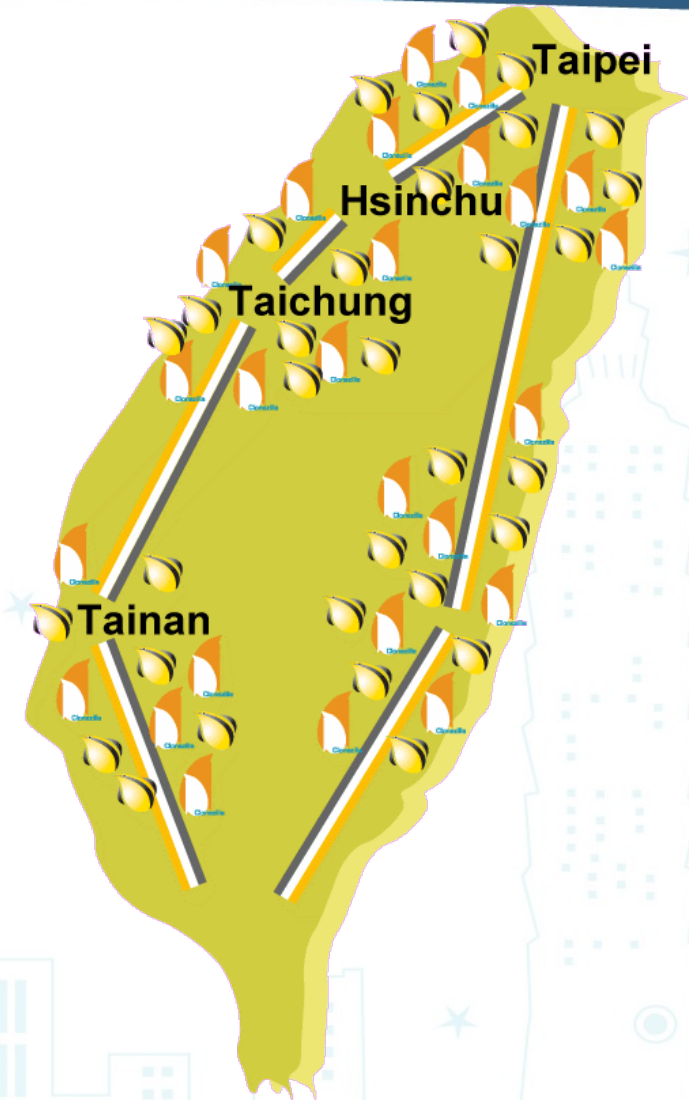
Primary/High schools	295
Universities	95
Governments	35
Hospitals	3
TV station	1

✓ SMBs

124

✓ Misc

2



Known sites or users > 500

DRBL & Clonezilla worldwide



More than **300K** downloads for DRBL and Clonezilla

DRBL & Clonezilla 國際活動

2007 國網中心獲邀演講與經驗分享

ADOC (APEC Digital Opportunity Center) 邀請



July 15, 2007

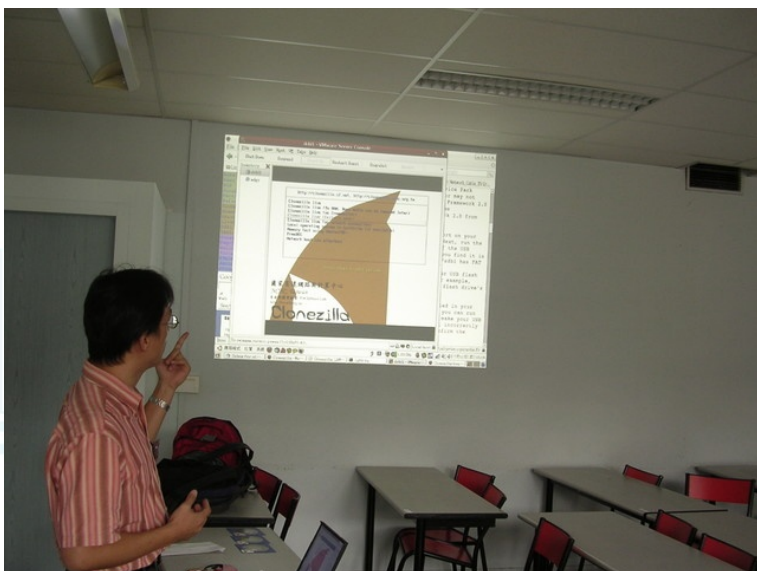
“Open Source, Linux & DRBL

- Alternative Approach for Setting Up a Classroom ”

National Computer Center, CICT (Commission on Information and Communications Technology)

- **8th Libre Software Meeting (LSM 2007)**,
July 10th to 14th, AMIENS, France
 - ✓ Clonezilla : A better choice than Ghost
 - ✓ Steven Shiau, Chen-Kai Sun, Yao-Tsug Wang and Yu-Chin Tsai
- **9th Libre Software Meeting (LSM 2008)**,
July 1st to 5th, Mont de Marsen, France
 - ✓ Clonezilla live, the bare metal backup and recovery tool
 - ✓ Steven Shiau, Chen-Kai Sun, Yao-Tsug Wang and Yu-Chin Tsai



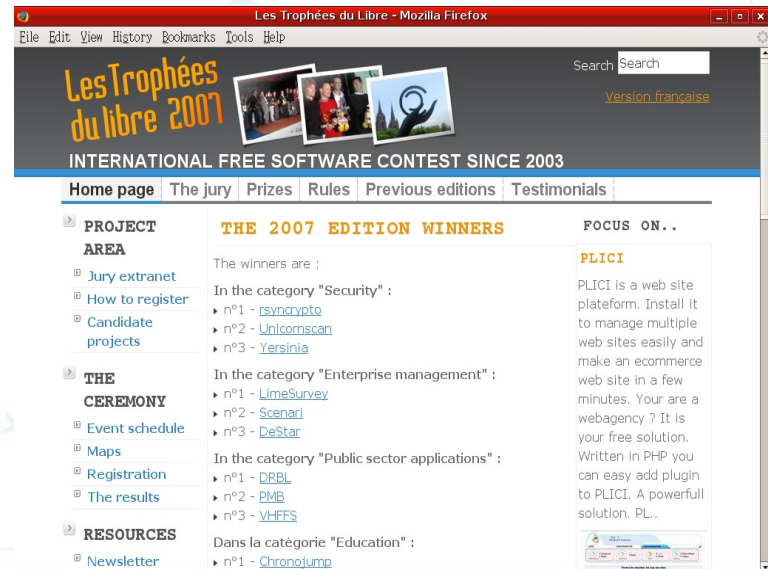
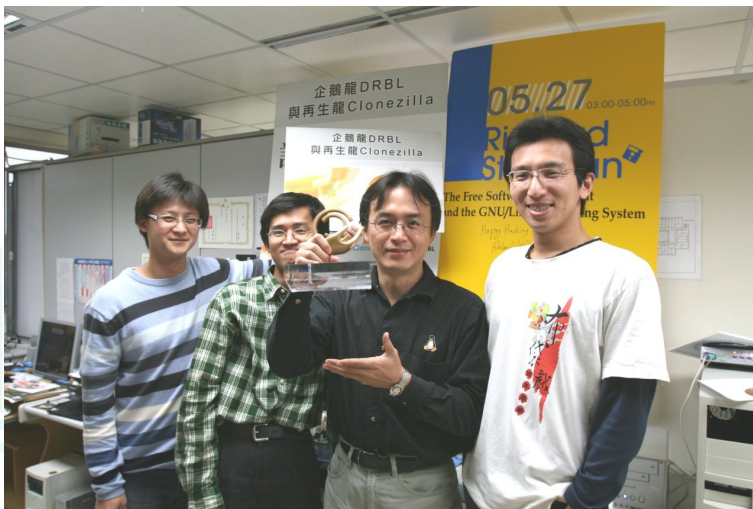


- Ubuntu Live Conference
 - Portland, Oregon, USA, 23 July, 2007
 - **Clonezilla: It's Better Than Ghost**
 - Speaker: Kristian Hermansen, Security Researcher/Developer, Cisco Systems, Inc.
 - http://www.ubuntulive.com/cs/ubuntu/view/e_sess/12510
- LinuxWorld Conference & Expo
 - San Francisco, Aug, 2007
 - Dell booth
 - **Massive Deployments**
 - Speaker: Torsten Spindler, Canonical





- DRBL is the winner in the category '**public sector software**' in Les Trophées du libre 2007 @ France
 - The finals and awards ceremony: 29 Nov, 2007
 - <http://www.freesoftwareawards.com> or <http://tropheesdulibre.org/?lang=fr>

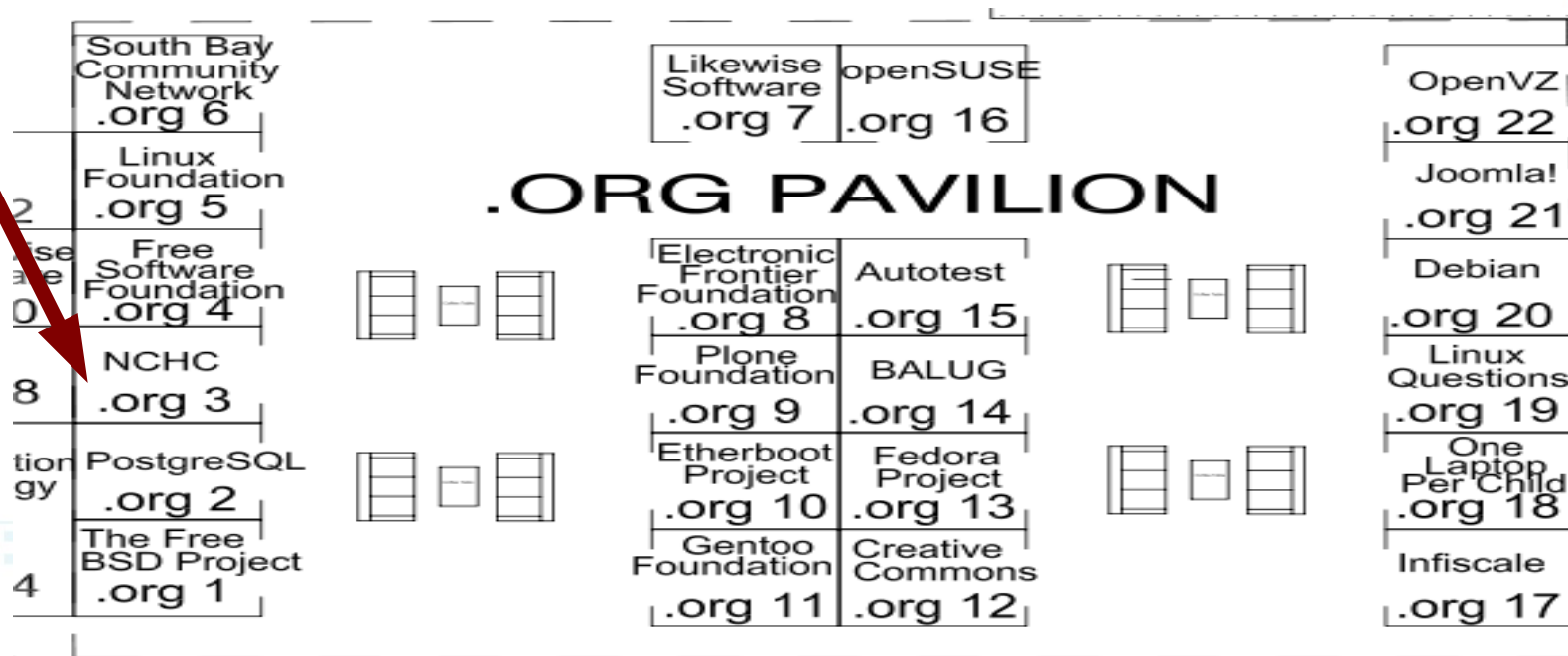


✓ 2008 Linux World and Expo, San Francisco

One of the largest Linux expo.

 Aug 4-7, 2008

1. **.org Pavilion** (booth #: .org 3)
2. **BoF**: “Clonezilla hands-on Lab: the universal bare metal backup and recovery tool for Linux, Mac OS and MS Windows” (August 6th, 2008)





台北縣新店市大豐國小



大豐國小電腦教室

- ✓ 使用 DRBL 與 Clonezilla 管理電腦教室
- ✓ 2006 年知名 Linux 網站 distrowatch.com 特別報導 - Linux in education
- ✓ 國網中心 2007 年 7 月 4 日 DRBL 與 Clonezilla 記者會在大豐國小舉行 <play>



花蓮縣 教育局

- ☒ **DRBL 管理電腦教室**
- ☒ **全縣共 145 所中小學採用 (2008/6 月份統計)**
- ☒ **花蓮縣政府特來函致謝**

主旨：感謝 貴中心提供本縣各校 DRBL 系統建置技術服務，請 查照。

說明：

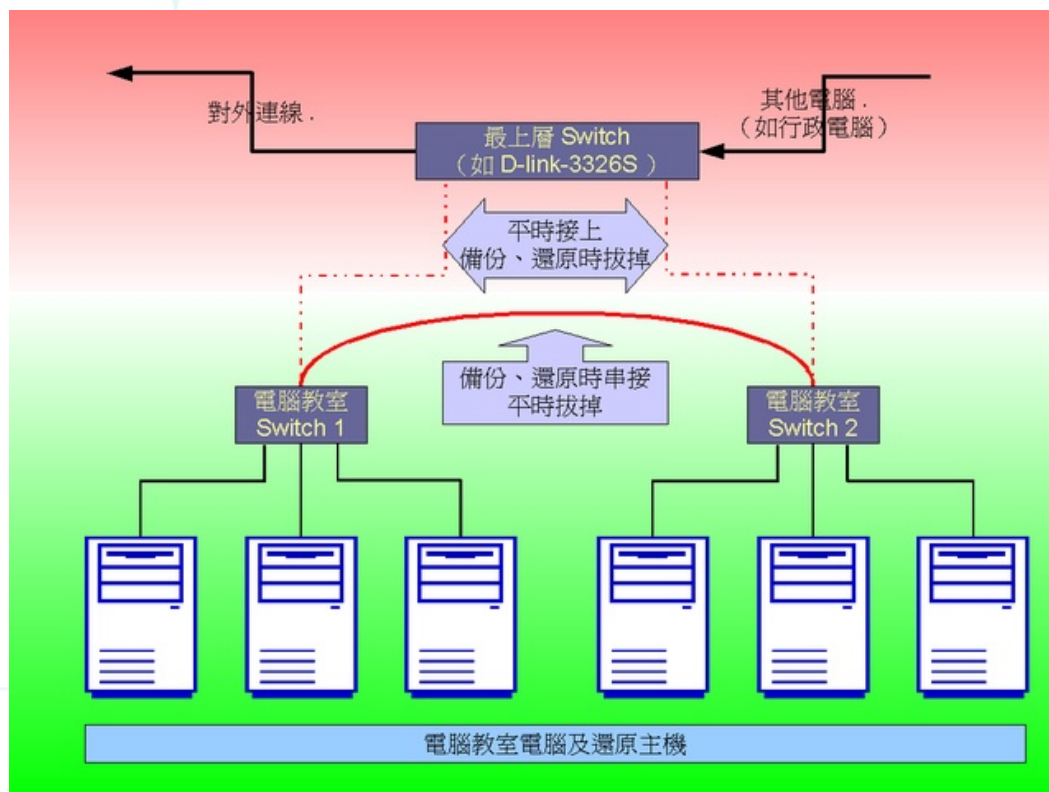
- 一、本府教育局推廣使用校園自由軟體業務，承蒙「自由軟體實驗室」提供縣內學校建置 DRBL 技術，使各校在使用自由軟體作業系統及電腦教室管理維具有穩定、快速、便捷等特色，大幅減少網管人員負荷，提升工作效率，使得自由軟體資訊教育順利，特此致謝。
- 二、案經本府 95 年 12 月 11 日府教學字第 0950189 函，於 12 月 19 日回收各校填報「電腦教室作業系統調查表」統計，共有 35 所國民中小學已安裝使用系統，詳如附件所示。

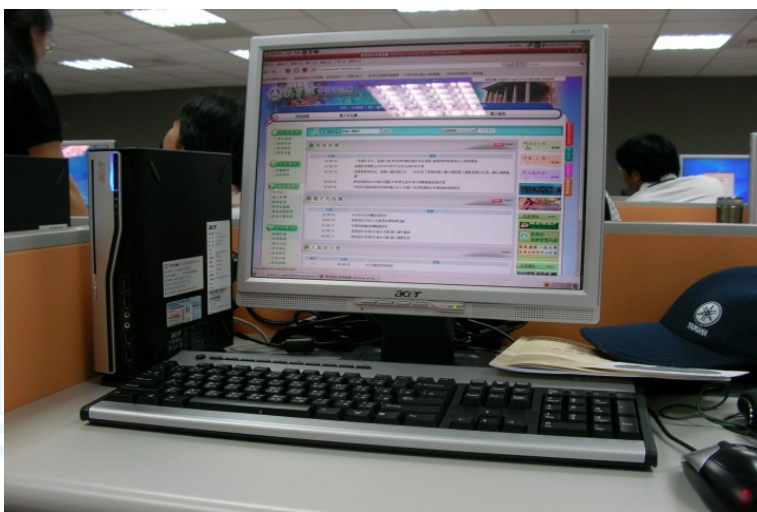
正本：國家高速網路與計算中心<0076 新竹市科學園區研發六路 7 號>
副本：本府教育局教育網路中心

花蓮縣政府

成功案例：嘉義縣

- ✓ 嘉義縣網中心
 - ✓ 縣網中心提供嘉義縣 94PC 更新案專用 DRBL Clonezilla Box 伺服器還原光碟
 - <http://enc.cyc.edu.tw/modules/news/article.php?>
 - ✓ 感謝嘉義縣網提供示意圖





感謝黃德文老師提供照片

- A user from a semiconductor company, Feb/2007
 - DRBL helps us a lot! Thank you!
 - I just wanted to send a message of thanks that since I found DRBL last year its use in our lab has **saved hundreds of hours of work**, not to mention having excellent support and while being a little "do it yourself" it has still only cost us our time invested to get it set up and configured and **has better functionality than most enterprise-class imaging tools, like Acronis and Symantec/Norton Ghost.**

- Kristian Hermansen
- Cisco Systems, Boston, MA, USA. Sep/2007
- **Clone 5 GB image to 64 machines in 5 minutes**
 - "I used Clonezilla in the design of our Cisco Computational Cloud cluster to multicast a 5GB disk image to 64 machines simultaneously. And I did it all in under five minutes! Thanks Clonezilla!!!"

- Barny Sanchez
- Information Systems Security, Southbridge, Massachusetts, USA.
- **Cloned 1084 systems with DRBL** (Clonezilla server edition)
 - "So far I have cloned 1084 systems with DRBL. I followed carefully the advise from the website, and using multicasting plus dividing the amount of systems in groups of 80-100 PCs at the time, it has taken me somewhere from 16-38 minutes each turn, using images for various operating systems, averaging 1GB in size. **This has reduced the recovery/cloning factor from the previous commercial solution I had, for more than 500%**, so you could only imagine how happy my project managers are :-)."



- Clonezilla live 1.1.0-8
 - <http://www.clonezilla.org/clonezilla-live>
- 使用 **Virtualbox** 1.5.6 OSE (來自 Ubuntu 8.04)
- 場景：
 - 現有一個 **Debian Etch text mode (LVM2)**
 - 使用 Clonezilla live 來備份這個 Debian Etch
 - Debian Etch **毀損** (使用這個指令來砍掉分割表與 MBR: `dd if=/dev/zero of=/dev/hda bs=1M count=10`)
 - 裸機還原

Questions ? Comments ?