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# 自由軟體應用於個人電腦叢集技術的成功案例 - DRBL ( 無碟遠端開機 ) 軟體


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http://drbl.nchc.org.tw, http://drbl.sf.net

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# DRBL and Clonezilla

- Diskless Remote Boot in Linux (DRBL) provides a diskless or systemless environment for client machines.
  - Unlike LTSP (Linux Terminal Server Project), DRBL uses distributed hardware resources and makes it possible for clients to fully access local hardware.
  - Peacefully coexist with the OS in client's local HD
  - Client machines are plug-and-play
- Clonezilla is a partitioning and disk cloning utility similar to Symantec Ghost or Rembo.
  - Unicast or multicast clone

# Free Software Smart Classroom, FSSC

- Free software projects developed by NCHC Free Software Labs
- Our goal
  - FSSC (Free Software Smart Classroom)
    - DRBL, Clonezilla
    - Multicast VNC
    - Access Grid, E-learning
    - Cluster computing ready classroom
    - Grid computing ready classroom

# DRBL - Diskless Remote Boot in Linux

- PXE/Etherboot + NFS + NIS - standing on a giant's shoulder

Orig: PC Cluster -> Free Software Classroom

1. Multi environment in computer classroom
   - Linux & M$ Windows coexist
2. Simplify the management
   - All services and programs are in one server, you do not have to check every client
   - OS and packages are installed once in DRBL server.
3. Hardware and installation are simplified, but software is full and all ready for clients!

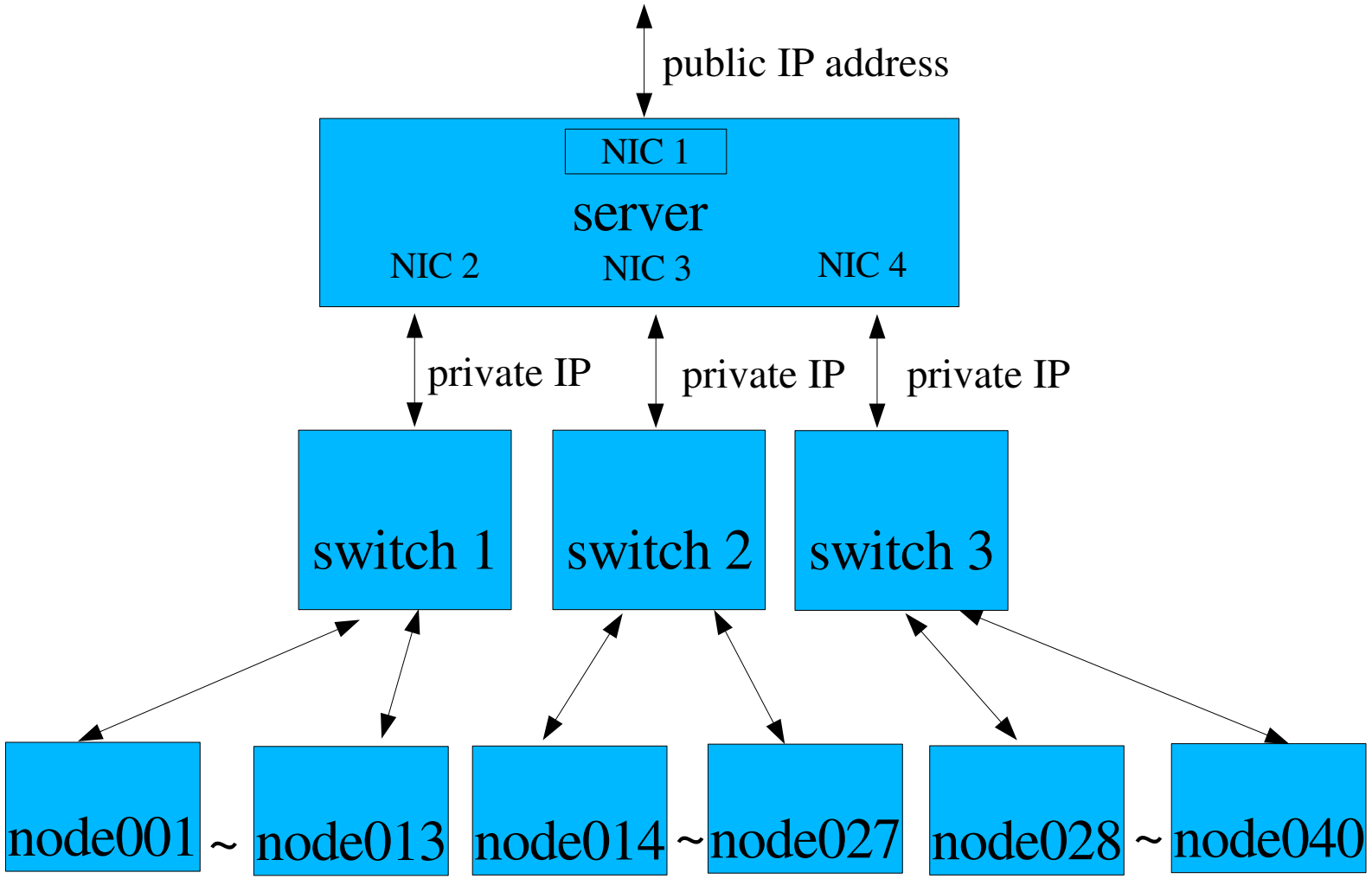
# DRBL and LTSP

- **Since there is LTSP, why DRBL ?**
  - Centralized resource vs. distributed resource
  - Thin client vs. powerful client
  - **Some people want to play 3D game or video in client, i.e. they need client's computing power**
  - Special features for DRBL
    - Clonezilla
    - One  command to switch client environment
      - DRBL, FreeDOS, OS in local HD, memtest...
    - Linux network installation
  - DRBL is not suitable for old machines/thin clients
  - Choose what you need

# Clonezilla

- Clonezilla [OCS (Opensource Clone System)]
  - With partimage (http://www.partimage.org), ntfsclone, and udpcast ( http://udpcast.linux.lu/), Clonezilla is a partitioning and disk cloning utility similar to Symantec Ghost or Rembo.
  - In NCHC PC classroom, it takes about 50 minutes to clone 3.5 GBytes M$ windows XP image for 36 clients. For multicast cloning, it takes about only 10 minutes.
- Save and restore different OS images
  - GNU/Linux, M$ windows
  - File system: ext2/3, xfs, jfs, reiserfs, ntfs, fat.
  - Supports LVM2
- DRBL-winRoll
  - A DRBL extension in M$ windows, (1) change hostname automatically after cloning (2) accept command from server.

# DRBL Environment



# DRBL

server

switch

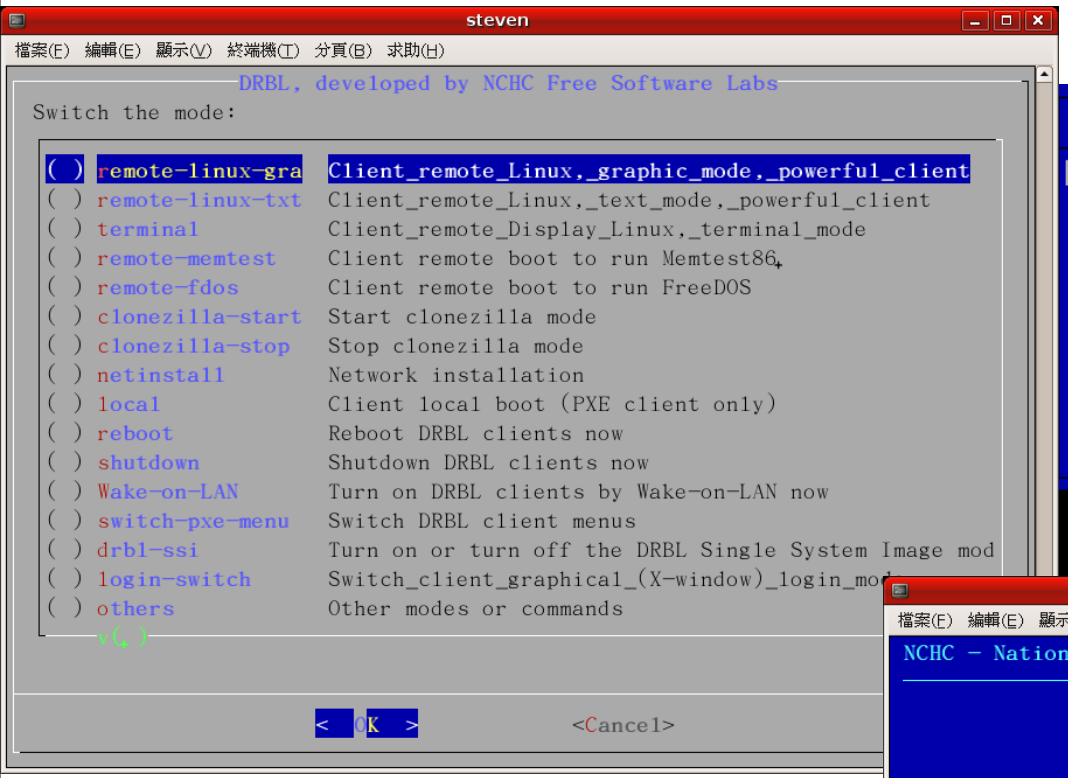
client nodes

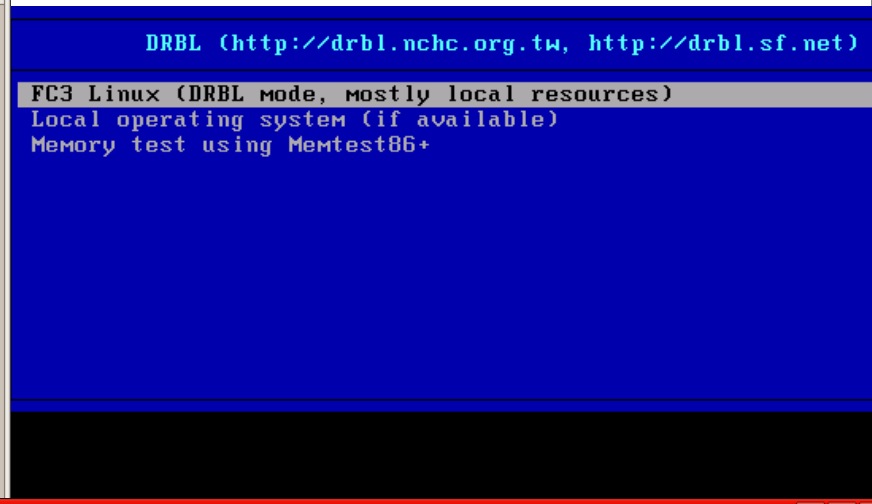
| | | pxe/etherboot | pxe/etherboot |
|---|---|---|---|
| DHCP | IP → | 192.168.0.1 | 172.16.100.10 |
| TFTP | kernel → | boot | boot |
| NFS | file system → | /, /usr, /home ... | /, /usr, /home ... |
| NIS | account → | user login | user login |

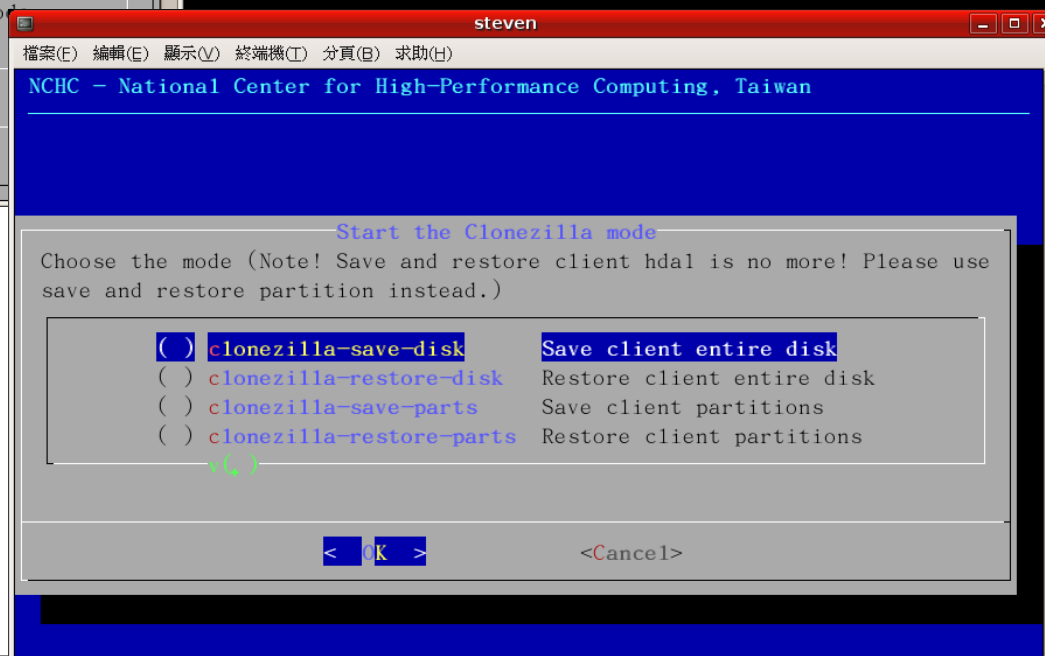
# Installation

- http://drbl.nchc.org.tw; http://drbl.sf.net
- GNU/Linux distributions
  - i386/X86_64 platform
    - Debian Woody(3.0)/Sarge(3.1)/Etch, B2D, Ubuntu Breezy(5.10)/Dapper(6.06),
    - RedHat Linux 8.0, 9, Fedora Core 1, 2, 3, 4, 5,
    - Mandrake 9.2, 10.0, 10.1, Mandriva LE2005 (10.2), 2006,
    - CentOS 4 (4.1, 4.2, 4.3)
    - SuSE 9.3, 10.0, 10.1, OpenSuSE 10.0, 10.1
- 4 steps to install
  - Install GNU/Linux
  - Install DRBL package
  - Configure server
  - Configure client

# DRBL and Clonezilla




# 個人電腦叢集成功案例

- 國家高速網路與計算中心
  - Formosa 1: 150 nodes, Xeon 3.0G*2/node, gigabits switch, Using Clonezilla
  - Formosa 2: 82 nodes AMD Opteron 275*2/node (IBM e326), gigabits switch, using Clonezilla

# 個人電腦叢集成功案例 ( 續 )

- 國立交通大學生物科技學系 / 生物資訊中心
  - Server: Dual Intel Xeon/Nocona 3.4GHz
  - 15 nodes of dual Intel Xeon/Nocona 2.8 GHz
  - 48 gigabits ports switch
  - Using DRBL
- 國立交通大學分子中心
  - 16 nodes AMD Opteron 275*2/Node gigabits switch, using Clonezilla
- 台北教育大學自然科學教育學系
  - 5 nodes AMD Opteron 275*2/Node (IBM e326) gigabits switch, using Clonezilla

# 叢集計算上相關文章，論文與報導 ( 續 )

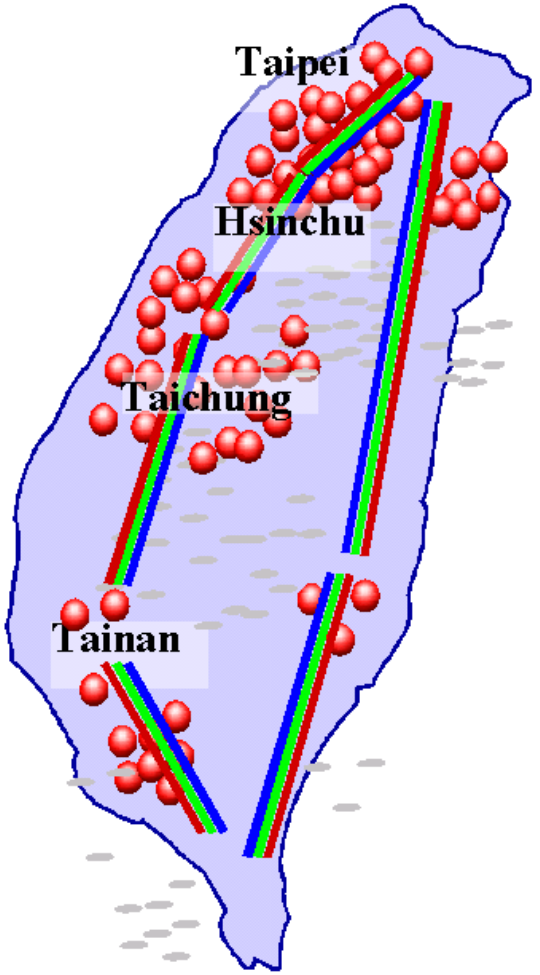
- Performance Evaluation of SLIM and DRBL Diskless PC Clusters on Fedora Core 3
  - Authors: Chao-Tung Yang; Ping-I Chen; Ya-Ling Chen, Tunghai University, Taiwan, R.O.C
  - Parallel and Distributed Computing, Applications and Technologies, 2005. PDCAT 2005. Sixth International Conference on 05-08 Dec. 2005 Page(s):479 - 482
- Implement the PIC-MCC simulation of ECR plasma source on PC cluster with DRBL, an effective approach to integrate PC cluster
  - Authors: Shiau, J.H.; Hu, Y.; Lin, T.L.; Huang, K.L.
  - Cellular Neural Networks and Their Applications, 2005 9th International Workshop on 28-30 May 2005 Page(s):311 - 314

# 叢集計算上相關文章，論文與報導 ( 續 )

- Condor: Building a Linux cluster on a budget
  - Author: Bruno Goncalves
  - http://servers.linux.com/article.pl?sid=05/11/08/1940210&tid=44
- Condor and DRBL
  - Authors: Bruno Goncalves & Stefan Boettcher. Emory University
  - Condor Week, University of Wisconsin, Madison, Wisconsin. April 24-27, 2006
  - http://www.cs.wisc.edu/condor/CondorWeek2006/presentations/goncalves_condor_drbl.ppt
- DRBL 與 Clonezilla 在 Linux Magazine 69 期 (Aug 2006)
  - http://www.linux-magazine.com/issue/69/Linux_World_News.pdf

# Known sites/users in Taiwan

- Known sites/users about 310
  - Public Sector
    - Primary/High school 102
    - University 68
    - Hospital 3
    - TV station 1
    - Government 7
    - NPOs 18
  - SMB 78
  - Misc 35




*Statistics on 2006/5/29

# DRBL/Clonezilla users around the world

- Japan
  - Osaka Prefecture University
  - Tokyo Christian University
- Canada
  - Department of Education, Province of Nova Scotia
- Holland
  - NCCW ( National Computer Centre Wonen )
- Indonesia
  - E-learning Centre, Aceh
  - Index Opensource Cafe, Manado (North Sulawesi)

# DRBL/Clonezilla users around the world

- Portugal
  - College ISPGaya
- USA
  - Internet Cafe @ Chicago
  - University of Louisville
- Brazil, France, Germany, Sweden, UK...

# Question ?