Diskless Remote Boot in Linux (DRBL)

[Copyright] [Authors] [Preamble] [Requirements] [Install] [Download] [Upgrade] [Uninstall] [Bug report] [Acknowledgements] [Misc] [Reference]

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3. Preamble

This document describes the steps to setup the "DRBL" environment in:

- Debian Woody(3.0), Sarge(3.1), Etch(4.0), Lenny (5.0),
- Ubuntu Breezy(5.10), Dapper(6.06), Edgy(6.10), Feisty(7.04), Gutsy (7.10), Hardy(8.04), Intrepid(8.10), Jaunty(9.04).
- B2D,
- RedHat Linux 8.0, 9,
- Fedora Core 1, 2, 3, 4, 5, 6, Fedora 7, 8, 9. 10, 11
- Mandrake 9.2, 10.0, 10.1, Mandriva LE2005 (10.2), 2006, 2007.0, 2007.1, 2008.0, 2009.0.
- CentOS 4, CentOS 5,
- Scientific Linux 4.x/5.x, RHEL 4.x/5.x (Use drblsrv-offline)
- SuSE 9.3, SuSE 10.0, OpenSuSE 10.0, 10.1, 10.2. 10.3, 11.0, 11.1
  Sorry but it will NOT work in other distributions or versions.

4. Basic hardware requirements

- Check here for more details.

5. Setup the Diskless Remote boot in Linux (DRBL) Environment

I. Setup the Linux Server

- Install the GNU/Linux distribution and configure all network cards. In the following, we use "eth0" to connect the Internet, while eth1, eth2, eth3 are for DRBL environment(set the network card's IP addresses to be private IPs

(i.e. 192.168.x.x, the following example, we set eth1:192.168.101.254, eth2:192.168.102.254, eth3:192.168.103.254...); Please remember this principle, private IP (e.g. 192.168.x.x) is used for DRBL environment. If on your GNU/Linux, the NetworkManager service is startup automatically, it is recommended to turn off it or remove it. For Fedora, you can: chkconfig --del NetworkManager, chkconfig --del NetworkManagerDispatcher, and turn on network service by "chkconfig network on". For Debian or Ubuntu, it is recommended to remove it completely by: apt-get remove network-manager. Your firewall rules will be overwritten when setting up the DRBL server. After completing the DRBL setup and successfully testing it, you can config your firewall using your own rules. Remember, in the DRBL environment, NFS, NIS, tftp, and dhcp services are required, so dot NOT block them in your firwall rules.

- If you want to get better performance, you can do some tuning as following. This is just an option, not a must:
  - If you are using Gnome as the desktop environment, for example, Fedora Core 6, you can delete some language files in /etc/gconf/gconf.xml.defaults/ if you are sure they are useless to you (For Ubuntu 6.10, those files are in directory /var/lib/gconf/defaults/). This will save a lot of disk space in the server (For example, if you just keep %gconf-tree.xml and %gconf-tree-zh_TW.xml, then 40 MB space will be released. Say, if you have 40 clients, then you will save 1.6 GB disk space in this server), and the loading of NFS server will be lower. In Debian or Ubuntu, you can also install localepurge, then run "localepurge" to remove those unnecessary locale files.
  - If reiserfs filesystem is available in your GNU/Linux distribution, it is recommended for its better performance compared with ext2/ext3. You can refer to this benchmark.

- After Linux is installed on the server, make sure the hard disk drive DMA mode is on. It will accelerate the access speed of the server's hard disk drive. Use "hdparm /dev/hdx" to check to see if the DMA mode is on or off. If it is off, run "hdparm -d1 -c3 -k1 /dev/hdx" to turn it on. Replace the /dev/hdx to the /dev/hda if your IDE HD for this Linux system is in "Primary IDE."

- Note:Regarding Selinux in Fedora Core 3 or later version - Unless you are an administrator who thoroughly understands SELinux, we recommend you turn SELinux off, otherwise you will probably encounter some unusual problems such as "Permission denied." To disable SELinux, set SELINUX=disabled in /etc/sysconfig/selinux or /etc/selinux/config and then reboot your machine.

- If you have only one NIC, you may set two IP addresses, i.e. one in eth0 and another alias IP address in eth0:1. eth0 will be used for the DRBL server to connect to the public Internet while eth0:1 will be used for the DRBL environment. Here's how to setup eth0:1 in RedHat-like Linux. NOTE! This alias IP address will cause some problems if you do not provide static IP address to DRBL client via its MAC address. In this example, the DRBL server will lease IP address to any machine connected to eth0 if no MAC address is set in the DHCP service. Hence you'd better not to use alias IP if you do not know exactly what you are doing! Two or more NICs are recommended!

II. Setup the clients

Note: This process is done in the server but its purpose is for use by the clients. NOTE! You have to finish the step 1 before doing the step 2 here.

- Before downloading or installing, read the "Change log" for different branches: stable, testing, unstable. Also refer to "Known issues" for different branches. This is especially important when your client machine has an annoying SIS network interface card:stable, testing, unstable. Besides, please also refer to "Release Notes" for different branches:stable, testing, unstable.
- <Step 2a> According different distribution, we have different method to get and install program "drbl"
  - RedHat/Fedora Core/Mandriva (Mandrake)/CentOS
    - Install the DRBL key (ID: 1024D/D7E8DF3A, Key fingerprint = F532 A131 65AF 2168 1634 DB1B 4000 9511 D7E8 DF3A) to your rpm system. There are two ways to do this. First one: "rm -f GPG-KEY-DRBL; wget http://drbl.sourceforge.net/GPG-KEY-DRBL; rpm --import GPG-KEY-DRBL" or "rm -f GPG-KEY-DRBL; wget http://drbl.nchc.org.tw /GPG-KEY-DRBL; rpm --import GPG-KEY-DRBL". Second one: Download the key from key

server. The KeyID for DRBL is D7E8DF3A, you can do it by "gpg --keyserver subkeys.pgp.net --recv-key D7E8DF3A", then run "gpg -a --export D7E8DF3A > GPG-KEY-DRBL; rpm --import GPG-KEY-DRBL" to add it to your rpm system.

- Download DRBL RPM file:
  Stable branch: sourceforge site or NCHC site
  Testing branch: NCHC site
  Unstable branch: NCHC site
- If you do not login as a system administrator (root), execute the command "su - root", then enter root password to sign in at the root
- Execute "rpm -Uvh drbl-XXX.i386.rpm" or "yum install drbl-XXX.i386.rpm" (If your GNU/Linux supports yum) to install package DRBL, the "drbl-XXX.i386.rpm" is the program name you just downloaded. If you just download the drbl rpm in the stable branch, then execute "rpm -Uvh drbl-current.i386.rpm" or "yum install drbl-current.i386.rpm".
- Note: A perl module is necessary for drbl rpm. Most of the distribution will install package "perl-Digest-SHA1" by default, if rpm complains perl-Digest-SHA1 is necessary, install it manually. As an example, in Fedora 8, you can install it by "rpm -Uvh http://opensource.nchc.org.tw /fedora/linux/releases/8/Fedora/i386/os/Packages/perl-Digest-SHA1-2.11-4.fc8.i386.rpm" or by "yum install perl-Digest-SHA1" if you have already configured your yum config.

○ Debian or Ubuntu

- If your GNU/Linux distribution supports secure apt (such as Ubuntu Gutsy or Debian Etch), you can add the DRBL key (ID: 1024D/D7E8DF3A, Key fingerprint = F532 A131 65AF 2168 1634 DB1B 4000 9511 D7E8 DF3A) to your apt-key as root privilege. There are two ways to do this. First one: "wget -q http://drbl.sourceforge.net/GPG-KEY-DRBL -O- | sudo apt-key add -". Second one: Download the key from key server. The KeyID for DRBL is D7E8DF3A, you can do it by "gpg --keyserver subkeys.pgp.net --recv-key D7E8DF3A", then run "gpg -a --export D7E8DF3A | apt-key add -" to add it to your secure apt.
- Edit /etc/apt/sources.list per the following:
- If your distribution is Etch (4.0):
  ----
  deb http://ftp.us.debian.org/debian/ etch main # (Or any Debian mirror site near you)
  deb http://drbl.sourceforge.net/drbl-core drbl stable

  If your distribution is based on Sarge (3.1) (i.e. genuine Debian Sarge or other derived version like B2D pureKDE20051011 or others):
  ----
  deb http://ftp.us.debian.org/debian sarge main # (Or any Debian mirror site near you)
  deb http://drbl.sourceforge.net/drbl-core drbl stable

  If your distribution is Woody (3.0):
  ----
  deb http://ftp.us.debian.org/debian/ woody main # (Or any Debian mirror site near you)
  deb http://drbl.sourceforge.net/drbl-core drbl stable
  deb http://www.backports.org/debian/ woody grep

  If it's Ubuntu Jaunty (9.04):
  ----
  deb http://archive.ubuntu.com/ubuntu jaunty main restricted universe multiverse # (Or any Ubuntu mirror site near you)
  deb http://drbl.sourceforge.net/drbl-core drbl stable

  If it's Ubuntu Intrepid (8.10):
  ----
  deb http://archive.ubuntu.com/ubuntu intrepid main restricted universe multiverse # (Or any Ubuntu mirror site near you)
  deb http://drbl.sourceforge.net/drbl-core drbl stable

```
----------
```
If it's Ubuntu Hardy (8.04):
```
----------
```
deb http://archive.ubuntu.com/ubuntu hardy main restricted universe multiverse # (Or any Ubuntu mirror site near you)
deb http://drbl.sourceforge.net/drbl-core drbl stable
```
----------
```
If it's Ubuntu Gutsy (7.10):
```
----------
```
deb http://archive.ubuntu.com/ubuntu gutsy main restricted universe multiverse # (Or any Ubuntu mirror site near you)
deb http://drbl.sourceforge.net/drbl-core drbl stable
```
----------
```
If it's Ubuntu Feisty (7.04):
```
----------
```
deb http://archive.ubuntu.com/ubuntu feisty main restricted universe multiverse # (Or any Ubuntu mirror site near you)
deb http://drbl.sourceforge.net/drbl-core drbl stable
```
----------
```
If it's Ubuntu Edgy (6.10):
```
----------
```
deb http://archive.ubuntu.com/ubuntu edgy main restricted universe multiverse # (Or any Ubuntu mirror site near you)
deb http://drbl.sourceforge.net/drbl-core drbl stable
```
----------
```
If it's Ubuntu Dapper (6.06):
```
----------
```
deb http://archive.ubuntu.com/ubuntu dapper main restricted universe multiverse # (Or any Ubuntu mirror site near you)
deb http://drbl.sourceforge.net/drbl-core drbl stable
```
----------
```
If it's Ubuntu Breezy (5.10):
```
----------
```
deb http://archive.ubuntu.com/ubuntu breezy main restricted universe multiverse # (Or any Ubuntu mirror site near you)
deb http://drbl.sourceforge.net/drbl-core drbl stable
```
----------
```
- Regarding the 1st line in the above, you can use other apt repository for Debian or Ubuntu. The 2nd line, however, is for DRBL-related programs, there are some mirror sites of DRBL-related programs available here.
  If you want to use the DRBL's testing branch, the 2nd line is:
  ```
  ----------
  ```
  deb http://drbl.sourceforge.net/drbl-core drbl stable testing
  ```
  ----------
  ```
  If you want to use the unstable branch of DRBL, set the 2nd line as:
  ```
  ----------
  ```
  deb http://drbl.sourceforge.net/drbl-core drbl stable testing unstable
  ```
  ----------
  ```
- Execute "apt-get update"
- Execute "apt-get install drbl" to install drbl program.

  ○ SuSE
    - If you do not login as a system administrator (root), execute the command "su - root", then enter root password to sign in at the root.
    - Install the DRBL key (ID: 1024D/D7E8DF3A, Key fingerprint = F532 A131 65AF 2168 1634 DB1B 4000 9511 D7E8 DF3A) to your rpm system. There are two ways to do this. First one: "rm -f GPG-KEY-DRBL; wget http://drbl.sourceforge.net/GPG-KEY-DRBL; rpm --import

GPG-KEY-DRBL" or "rm -f GPG-KEY-DRBL; wget http://drbl.nchc.org.tw /GPG-KEY-DRBL; rpm --import GPG-KEY-DRBL". Second one: Download the key from key server. The KeyID for DRBL is D7E8DF3A, you can do it by "gpg --keyserver subkeys.pgp.net --recv-key D7E8DF3A", then run "gpg -a --export D7E8DF3A > GPG-KEY-DRBL; rpm --import GPG-KEY-DRBL" to add it to your rpm system.

- For SuSE 9.3 (Since there is not built-in apt/yum in SuSE 9.3, you have to install it first.)
  - Download this program first: "http://linux01.gwdg.de/~scorot/install-apt4suse"
  - Execute "sh install-apt4suse" to install apt for SuSE
  - Edit /etc/apt/sources.list, the content should contain these lines at least:
    ```
    ------------------------------------
    rpm ftp://mirrors.mathematik.uni-bielefeld.de/pub/linux/suse/apt SuSE/9.3-i386 base
    rpm http://drbl.sourceforge.net/drbl-core i386 drbl-stable
    ------------------------------------
    ```
  - You can assign other SuSE apt repository in the fist line above, but keep the 2nd line as. If you want to use the testing branch of DRBL, the 2nd line will be:
    ```
    ----------
    rpm http://drbl.sourceforge.net/drbl-core i386 drbl-stable drbl-testing
    ----------
    ```
    If you want to use the unstable branch of DRBL, set the 2nd line as:
    ```
    ----------
    rpm http://drbl.sourceforge.net/drbl-core i386 drbl-stable drbl-testing drbl-unstable
    ----------
    ```
  - Execute "apt-get update"
  - Execute "apt --no-checksig install drbl" to install the DRBL program.
- For OpenSuSE/SuSE 10.0 or later
  - Download the DRBL RPM file:
    Stable branch: sourceforge site or NCHC site
    Testing branch: NCHC site
    Unstable branch: NCHC site
  - Execute "rpm -Uvh drbl-XXX.i386.rpm" to install package DRBL, the "drbl-XXX.i386.rpm" is the program name you just downloaded, such as "drbl-1.5.5-12.i386.rpm".
- PS. There are two DRBL-core mirror sites: (1) http://ftp.twaren.net/local-distfiles/drbl-core/ (2) http://free.nchc.org.tw/drbl-core

- <Step 2b>
  - Scenario 1: If your network bandwidth to Internet is good, and your GNU/Linux distribution provides apt, urpmi or yum repository: Execute "/opt/drbl/sbin/drblsrv -i". Note: There is a space before the "-i". This is the example execution. If you are uncertain, just press Enter to accept the default value.
  - Scenario 2: If you can not access Internet, the network bandwidth is narrow, you do not want drblsrv to install the required packages for you, or your GNU/Linux distribution does NOT provides apt, urpmi or yum repository (such as RHEL): You can install the required packages by yourself (such as by apt-get, up2date, yum, yast or urpmi), then use "/opt/drbl/sbin/drblsrv-offline" to finish this step <2b>. (drblsrv-offline is available from drbl version 1.7.6-22). Those required packages can be listed by "/opt/drbl/sbin/drblsrv-offline -r". After you install those required packages, if you are sure the kernel in the server meets the client's CPU arch, you can run "/opt/drbl/sbin/drblsrv-offline -s `uname -r`", or you can download appropriate kernel rpm/deb file, which meets the client's CPU arch. Then run "/opt/drbl/sbin/drblsrv-offline -k $KERNEL_PKG" (Replace $KERNEL_PKG with the downloaded kernel rpm or deb file name with path). If you are uncertain, just press Enter to accept the default value when you run drblsrv-offline. (PS 1. More options for drblsrv-offline can be shown by "/opt/drbl/sbin/drblsrv-offline --help". PS 2. To install DRBL in Scientific Linux 5.0, you can refer to this FAQ)

- For the impatient: If you are impatient, your network bandwidth to Internet is good, and your GNU/Linux distribution provides apt, urpmi or yum repository, you can run "/opt/drbl/sbin/drbl4imp" to finish step "2b" and "3a". "drbl4imp" uses the default values to setup the DRBL server. THIS IS VERY IMPORTANT! The default value might not fit your environment! It uses the "range" option in dhcp server so your DRBL client will not always get the same IP address. It also assumes each of the server's network card (except eth0)

provides DRBL services to 12 clients. If you want the setup to fit your environment, please run steps "2b" and "3a" step-by-step.

III. Set up the file system for the client in the Server

- Arrange your environment and make sure you know it.

- Taking **NCHC's** computer class room C as an example: There are 40 computers. In order to get DRBL to work more efficiently, we separated them to 4 subnets: 192.168.100.0, 192.168.101.0, 192.168.102.0 and 192.168.103.0. There are four Ethernet cards in DRBL server. One is for WAN and the others are for LAN. The IPs of DRBL environment (LAN) are 192.168.100.254, 192.168.101.254, 192.168.102.254 and 192.168.3.254. The services DHCP, TFTP, NFS, etc will run on eth0:1, eth1, eth2, and eth3.

```
            NIC    NIC IP                    Clients
+----------------------------+
|        DRBL SERVER         |
|                            |
|+-- [eth0] public IP        +- to WAN
|     (ex. 61.216.116.23)    |
|                            |
|+-- [eth0:1] 192.168.100.254 +- to clients group 1 [ 10 clients, their IP
|                            |                from 192.168.100.1 - 192.168.100.10 ]
|+-- [eth1] 192.168.101.254  +- to clients group 1 [ 10 clients, their IP
|                            |                from 192.168.101.1 - 192.168.101.10 ]
|+-- [eth2] 192.168.102.254   +- to clients group 2 [ 10 clients, their IP
|                            |                from 192.168.102.1 - 192.168.102.10 ]
|+-- [eth3] 192.168.103.254   +- to clients group 3 [ 10 clients, their IP
|                            |                from 192.168.103.1 - 192.168.103.10 ]
+----------------------------+
```

- There are four modes available from DRBL version 1.6.3 or later: Full DRBL, Full Clonezilla, DRBL SSI (Single System Image) and Clonezilla Box. The network bandwidth and disk space requirement are higher in the former two modes, but all the system setting will be saved to server's disk, and every client can have its own individual setting. On the other hand, the DRBL SSI uses single system image for all clients, and the necessary individual settings of clients are created run-time when they boot. This will reduce the required disk space in the server since only one image is necessary. However, the disadvantage is every client can NOT have its own individual system setting (Users' setting will be saved to server). In DRBL SSI mode, once there are extra client nodes want to join DRBL environment, all you have to do is modify the dhcpd config file (dhcpd.conf), then use "/opt/drbl/sbin/dcs -> others -> gen_3N_conf" to create or run "/opt/drbl/sbin/drbl-3n-conf generate", the necessary files will be created. In this mode, theoretically one network card in the server can provide 253 clients. The fourth mode, Clonezilla box mode, is based on DRBL SSI mode, especially for clone system. If you want to use DRBL SSI mode, make sure your client has large memory (say > 512 MB), and all the hardware (especially the graphic card) in the clients are the same. Check this comparison table for these four modes.

- Notes for network switch and NICs when using multiple NICs:

  When you use multiple NICs to expand the bandwidth, we recommend you set the MAC addresses so that every node will get the same IP address all the time. (i.e. in the following step 3a, when you run "/opt/drbl/sbin/drblpush -i", it prompts "Do you want to fix the IP address of client connected to eth1 by giving MAC address ? [y/N]", choose "Y"). If you do NOT set MAC address (we will call it "range" from now), and you have only one 48-port network switch (or many switches but connected to be one), and you use four NICs (or more than two...) in DRBL server to expand the network bandwidth, a problem will occur (i.e. some clients will not lease IP from DHCP server) so it will not be able to boot.
  On the other hand, if your DRBL server uses four NICs to expand the network bandwidth (meaning that four NICs with four private subnets such as 192.168.100.x, 192.168,101,x, 192.168.102.x, 192.168.103.x), and you have exactly four switches that are separated and not connected to each other, then you can use range (i.e. you do not have to set the MAC address of clients).
  Remember, if you use N NICs to expand network bandwidth in the DRBL server, if using the "range" method, then

you must have N switches and they can NOT be connected to each other.

- Before executing step <3a>, you can do some customized config:
    1. If you have some specific directories in this DRBL server to share, such as /work1, then you can use text editor to open file /opt/drbl/conf/drbl.conf, edit the diskless_root_dir_ro_user_add="/work1"(If you want /work1 can only be read by clients, not writable), or diskless_root_dir_rw_user_add="/work1"(If you want /work1 to be readable and writable by clients. (Warning!!! drbl.conf is VERY IMPORTANT, be careful when you edit it!!!)
    2. If all the clients have their local harddisk, and the partition is formated (For example, /dev/hda1, its filesystem is ext3), then if you want the client to mount /dev/hda1 as /localwork when booting. Therefore you can edit /opt/drbl/conf/client-append-fstab, and its syntax is just like /etc/fstab. In this example, you can make /opt/drbl/conf/client-append-fstab like this:
    /dev/hda1 /localwork ext3 defaults 0 0
    (PS: You do not have to create the directory /tftpboot/node_root/localwork in DRBL server manually, later drblpush will do that for you)
    3. If you have extra services (such as apmd and bluetooth) to be on when client boots, you can edit /opt/drbl /conf/client-extra-service, let service_extra_added="apmd bluetooth".
    4. If you want to overwrite some or all automatically created hostnames later by "drblpush -i", you can edit "/opt/drbl/conf/client-ip-hostname" now. Check that file for the format. If some machines are not assigned, drblpush will use those automatically created hostname.

- <Step 3a> run "/opt/drbl/sbin/drblpush -i". The software will auto-detect the system to figure out the argument. If the argument is not set up in the system, the system will request you to do that. Example: see here.

- Note!!! If newer packages are installed in the server after this step, you have to run "/opt/drbl/sbin/drblpush -i" or "/opt/drbl/sbin/drblpush -c /etc/drbl/drblpush.conf" (This will loaded the previously saved settings) again so that newer packages will be deployed to clients.
- Note!!! It is not recommended to turn on the system update automatically. Since If newer packages are installed in the server automatically, without running "/opt/drbl/sbin/drblpush -i", the programs for client might not be compatible with that newer in server. If you want to turn on system update automatically, remember to follow the above step to update the files in client automatically.

IV. Setting up clients to use the DRBL environment

- There are four different scenarios where you can make clients boot from network: 1) the client has PXE network interface card, 2) the client has a floppy drive, 3) the client has a CDROM, 4) the client has a local hard drive. We use etherboot 5.4.3 as an example for cases 2-4. NOTE! With DRBL version 1.3.9 or later, if you want to use Etherboot, Etherboot bersion 5.4.0 or newer is required.

- Case 1: The client has a PXE network interface card
    - Set the client's BIOS to boot from "LAN" or "network".
    - Take one of the Asus motherboards for example, in this manual file.
        1. Page 4-24, you will see OnBoard LAN, there is a subfuncton "OnBoard LAN BOOT ROM", normally it's disabled, you have to enable it.
        2. Usually you have to reboot it now, make the function re-read by BIOS.
        3. After rebooting, enter BIOS setting again, this time, in Page 4-35, you have to make LAN boot as the 1st boot device.
    - That's it. Let client boot and enjoy DRBL!!!

- Case 2: The client has a floppy drive.
    - <Step 4a> Get the image file first.
        - Use the "universal" image /opt/drbl-etherboot/etherboot-net.zdsk in the DRBL server. It supports most modern network cards. (Ref: here. If this universal image fails, try using specific image for client's network card, the image file is located in /opt/drbl-etherboot/. As an example, if you have a Realtek 8139 network card, use the image /opt/drbl-etherboot/rtl8139.zdsk.

- <Step 4b> Insert the floppy to floppy drive in DRBL server
  - Run "cat /opt/drbl-etherboot/etherboot-net.zdsk > /dev/fd0" in the DRBL server.
  - If you want to create the image floppy in M$ windows, download rawrite.exe or "RawWrite for windows" (http://uranus.it.swin.edu.au/~jn/linux/) to write the ROM image to floppy.
- <Step 4c> Put this floppy to client's floppy drive, make sure the floppy is the first boot device in the client's BIOS. If everything was done correctly, after a few minutes, the clients will be waiting for you to login, All the accounts are same as the ones in server.

- Case 3: Client has a CDROM (Reference):
  - 1) The "universal" image is located in /opt/drbl-etherboot/etherboot-net.iso
    2) Burn the ISO to a CD:
    cdrecord -v speed=12 fs=16m dev=0,0,0 -data etherboot-net.iso
    (If necessary, modify "dev=0,0,0", run "cdrecord -scanbus" to get your CD burner.)
    3) Ensure the PC is set to boot from CDROM, place the burned CD in the drive, and reboot. Done!

- Case 4: client has a local hard drive
  - If the client has a local hard drive which is installed with the bootloader grub in GNU/Linux:
    1. Copy the file "/opt/drbl-etherboot/etherboot-net.zlilo" to client's directory "/boot/" in its harddisk
    2. Append one block in the client's /boot/grub/menu.lst or /boot/grub/grub.conf (depends on your distribution) like this:
    ----
    title Etherboot-PXE
    kernel /boot/etherboot-net.zlilo
    ----
    3. Change the default boot to the corresponding one above, like "default 1", in menu.lst or grub.conf in client.
  - If the client is running M$ Windows XP/2K on its hard disk:
    You can install WINGRUB. Put the file etherboot-net.zlilo in C:\, and the files: C:\boot.ini and C:\GRUB\MENU.LST look like: (This method is only suitable for installing wingrub in BOOT.INI (Tool -> Install grub -> Boot from BOOT.INI). If necessary, you can use other modes provides by WinGRUB):
    boot.ini:

    [boot loader]
    timeout=30
    default=C:\GRLDR
    [operating systems]
    multi(0)disk(0)rdisk(0)partition(1)\WINDOWS="Microsoft Windows XP Professional" /fastdetect
    C:\GRLDR="Etherboot"

    MENU.LST:

   timeout 7

    title etherboot
    root (hd0,0)
    kernel /etherboot-net.zlilo

    title Windows at (hd0,0)
    root (hd0,0)
    chainloader +1

  - If the client has local hard drive which is installed with M$ Windows 9x:
    1. Copy the file "/opt/drbl-etherboot/etherboot-net.com" to client's hard disk
    2. Rename it so that it is shorter in client, for example, "eb-net.com".
    3. Write a multi-boot config file in the client (e.g. add one paragraph to run "eb-net.com").

V. Additional usage for the DRBL environment

- Some useful scripts are located in the directories /opt/drbl/sbin and /opt/drbl/bin in the server, Take a look at them. Usage will appear by running them without parameters.
- The most useful command is /opt/drbl/sbin/dcs which sets the client's default boot mode. Here's a screenshot of what it looks like:
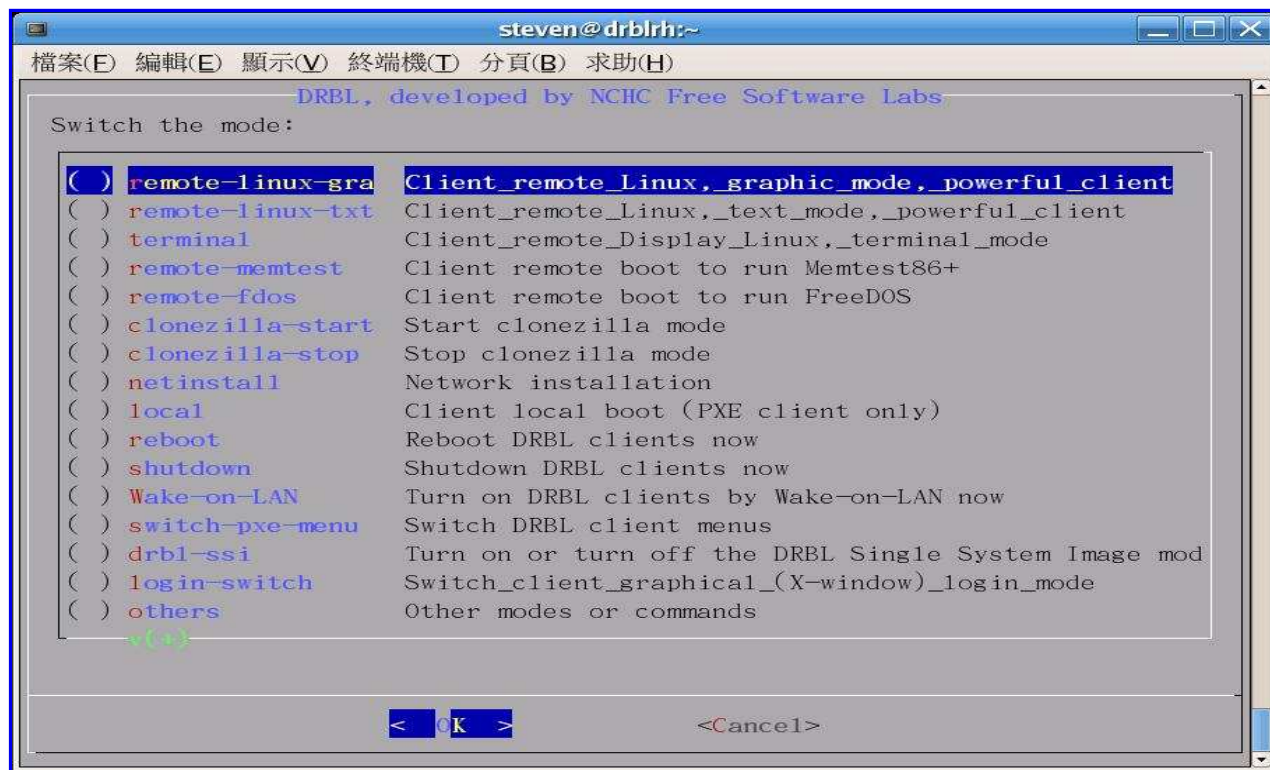
- Another useful command is drbl-SL.sh, it can load Small GNU/Linux (DSL, PuppyLinux, INSERT, PLD, Debian Live, GeeXbox, PUD-Linux...) into DRBL environment. By doing this, the client can use that Small GNU/Linu after booting via PXE. The client still can work even if the network cable is unplugged. It's fire and forget. For more info, check here.

6. Upgrade

If newer DRBL packages are available, and you want to upgrade, you can do it by:
1. Backup the important files, such as those files in /etc/drbl and /etc/dhcpd.conf or /etc/dhcp3/dhcpd.conf, etc...
2. Run "/opt/drbl/sbin/drblsrv -u" to uninstall all the DRBL-related packages
3. Follow the step II, download the drbl main program, re-install and configure it again (i.e. /opt/drbl /sbin/drblsrv -i and /opt/drbl/sbin/drblpush -i)

Sometimes if the versions are close, maybe you can try to upgrade the packages without re-install and re-configure it (i.e. just use apt-get update; apt-get upgrade or yum upgrade). However, this is not recommended, since some of the files will only be deployed to clients after drblsrv and drblpush are run.

7. Uninstall

To uninstall DRBL, run: "/opt/drbl/sbin/drblsrv -u", then follow it to uninstall DRBL and related packages.

8. Bug report

If you find any bug or any problem, please follow this to report:
- Excute "/opt/drbl/bin/drbl-bug-report", then you will get a report (refer to this example). Please follow the the format to fill your description.
- Mail that to DRBL user mailing list drbl-user _at_ lists sourceforge net (You have to subscribe to that mailing list), or post that in the DRBL forum.

Donation

If you use DRBL and it does the job for you, please donate to help us to make DRBL better.

Donate

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Misc.

If you think DRBL is the greatest thing since sliced bread, email NCHC (webmaster _at_ nchc org tw), and the developers to let us know how you use it. If you find any bug, please let us know.

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sourceforge