Overview of the Instructional Lab Imaging System

Chris Wilson
cwilson@physics.wisc.edu

June 29, 2010

1   Getting Started

1.1   Overview and purpose

This is a guide designed to help you use the imaging setup that I've cobbled together (almost 100%-based upon the excellent Clonezilla/DRBL). I want to get you started ASAP and have a lab up and running.

In order to help make each section more modular, I'll assume that you just leap to a section you're interested in and then start from there. I'll try and assume that in any given section, you haven't read any of the others. Because of this, there will be a fair amount of re-hashing old concepts.

Even though I'll try to make sections self-contained there are some basic infrastructure things that I'm only going to cover in the first section (this one). This will make sense because if you try and start in Section 2 ("Taking an Image"), you'll soon find that you don't have a computer set up with the correct software stack!

1.2   Prerequisites

You're going to need a fair amount of starting time and material, but here's a list of things that I know *will* be required.

- Fresh install of your favorite Linux distro (I'll use Xubuntu, but I think Ubuntu Server would work well.)

- Add the following repos:

    ```
    deb http://free.nchc.org.tw/ubuntu hardy main restricted universe multiverse
    deb http://free.nchc.org.tw/drbl-core drbl stable
    ```

    Make sure to substitute the correct Ubuntu version in the above command!

- HDD space will be about 30 GiB per image (about half that when gzipped)

- Multicast-able network (this is important). This is not a problem in the Physics Department right now.

- A network card that can do PXE boot (Dell Optiplex GX280's seem to have trouble with this to the tune of about 50% of them, whereas I have yet to find an Optiplex 780 that has any trouble)

1.3 Start

There is an excellent tutorial on the process here: http://packratstudios.com/index.php/2008/04/20/how-to-setup-clonezilla-on-linux-ubuntu-quick-start-guide/
   The overview is:

1.3.1 Set Up The DRBL Server

Get and install the DRBL/Clonezilla system. There is a lot of documentation about how to use this with two NICs, one for external use and one for internal. I just use one NIC and observe a caveat, *do not install a DHCP or DNS server on the DRBL server.* We'll use the department DNS and DHCP.

1. Run the commands:

   ```
   sudo apt-get update

   sudo apt-get install drbl

   sudo apt-get install util-linux tar gzip bzip2 procps dialog rsync parted
    pciutils tcpdump bc grub gawk hdparm sdparm netcat file ethtool etherwake
    ssh syslinux mtools mkisofs e2fsprogs psmisc locales wget disktype zip
    unzip initscripts tftpd-hpa nfs-kernel-server nis ntp curl lftp iptables
    sysutils libdigest-sha1-perl

   sudo apt-get install partclone mkpxeinitrd-net clonezilla mkswap-uuid
    drbl-partimage drbl-ntfsprogs drbl-chntpw drbl-lzop udpcast drbl-etherboot
    freedos

   sudo apt-get install lvm2 ntfs-3g lshw
   ```

   I have left out a few packages from the list that you may have seen on the web page listed in Section 1.3. I'm assuming we won't need any ReiserFS utilities and we won't need DHCP or DNS.

2. Next the install will heavily rely on MAC addresses. We don't need to bother with this because we'll be adding static assignments in DHCP based on MAC. This will allow us to choose what systems to clone based upon IP (i.e. $DHCP \rightarrow MAC \rightarrow Hostname/IP$)

3. Run `sudo /opt/drbl/sbin/drblpush -i`. This will ask a series of questions. Just remember: that you can safely ignore anything having to do with DNS or DHCP (we'll get to that later), you don't want diskless linux, we do want "Clonezilla Box" and no, we don't want NAT.

4. We *would* be ready to go now, but we need a few more things.

(a) Clear out the `/tftboot/nbi_image/pxelinux.cfg/` directory except for "default" and/or "default_skeleton". Files in here indicate what hosts we will image. Anything starting with `80` (IP address converted to hex) or `01-B8-AC` ("01"-prefixed MAC) will limit the pxelinux boot image to those hosts.

(b) Make sure that NFS is correctly configured and that you can mount a directory from one of the hosts.

(c) Otherwise ensure correct network behavior (no firewalls, hosts.allow or hosts.deny etc.). Remember that we have to network boot a host (DHCP and TFTP), once that loads it must be able to mount an NFS share on the DRBL server, and finally download a gzipped image.

1.3.2 Gather MAC Addresses

After setting up DRBL/Clonezilla we can gather the MACs of a computer lab. Get each computer's MAC address and decide on what IP and host name you'd like it to have.

1. Add the correct host names and IPs to `ns1:/usr/local/named.d/227.addrs`. These files are under version control, check them out with:

   `sudo co -l 227.addrs`

   and check them back in with:

   `sudo ci -u 227.addrs`

   Please provide a log message when doing so. When you're done, look at the README there for instructions on reloading the config.

2. Add an entry for each host at `noc:/etc/instr-dhcpd.conf`. An entry looks like this:

   ```
   host fzx23311 {
           hardware ethernet 00:11:43:C9:AE:98;
           fixed-address 128.104.227.91;
           next-server 128.104.227.245;
           filename "pxelinux.0";
   }
   ```

   Make sure that "next-server" points to the IP of the DRBL server. Bounce the DHCP server with:

   `sudo /etc/init.d/dhcpd restart`.

1.3.3 Finished

Everything is now configured for either taking an image (see Section 2) or pushing out an image (see Section 3).

3

2   Taking an image

Taking an image means that you have a computer, the prototype, where you want to capture the *exact* setup for cloning to other systems. You should take one last pass though the prototype making sure transient things like temp files and such are deleted. Also make sure that as many patches as possible are applied and that they are working correctly. At your option, you may also run a disk defragmentation. Defragging may or may not reduce the size of the image file on the DRBL server (I have not tested this).

1. Run: `sudo /opt/drbl/sbin/dcs`. This will present a series of curses (text-based) menus. Select the IP of the prototype when asked which host to operate on. Choose "Clonezilla Start", "Save Disk", "Expert", and go with all the defaults except choosing "gzip" and where it lists the priority of cloning methods. You should select "ntfsclone" to come first (because Windows 7 uses this filesystem, ntfsclone will be able to exclude unused blocks of data).

2. Restart the prototype and make sure that it can network boot. On the Dell Optiplex 780, you must set the onboard NIC to "Enable with PXE" and then hit F12 when the "Dell" logo is displayed during startup. There will now be an option to boot from the integrated network controller.

3. If all has been configured properly you'll see many screens of text and then a timer indicating how much progress has been made in the the image-taking process.

4. When the image-taking finishes the system will either reboot, power down, or ask, depending on what you selected in `dcs`.

3   Pushing an image

Pushing an image assumes you have some number of computers and an appropriate image file stored on the DRBL server. You should also have completed the prep work listed in Section 1.3.

At this point you may or may not have collected the MACs of the target hosts. If you have not, see Section 1.3.2, about collecting MAC addresses and making the necessary changes on `noc` and `ns1`.

1. Run: `sudo /opt/drbl/sbin/dcs`. This will present a series of curses (text-based) menus. Select the IPs of the hosts you'll be imaging when prompted. Choose "Clonezilla Start", "Restore Disk", "Expert", "Use Partitions From Image", select number of hosts (a whole lab room is nine hosts), use "Number of hosts + Time to wait" and use something like 300 seconds (plenty).

2. Boot all the systems from the network (details of how to accomplish this can be found in Section 2).

3. You should see many screens of text and then finally a status message showing how much time remains and percentage of the imaging is complete.

4. When the imaging finishes the systems will either reboot, power down, or ask what to do, depending on what you selected in `dcs`.