Solving Problems with Booting

1   Aim

A number of students made some mistakes when installing Linux. This is intended to be a quick guide to people to solve these problems.

2   Background

Booting depends on LILO.

You can read the user manual for LILO (in Red Hat 7) by typing:

```
xdvi /usr/share/doc/lilo-21.4.4/doc/user &
```

or

```
gv /usr/share/doc/lilo-21.4.4/doc/User_Guide.ps &
```

There are a number of reasons why Linux didn't start for a few students. Here are some of these reasons:

- LILO was installed in the boot partition instead of in the master boot record. Esily fixed.

- Linux partitions have been deleted. Hmm,... reinstall!

- You entered `/root` instead of `/boot` as the mountpoint for `/dev/hda7`. This is not so simple, but I'll describe a solution here.

- I can boot, but I forgot my root password! (Blush with shame). Okay, that's easily fixed. Boot into single user mode and type `passwd`, enter a new password. Remember it!

- I can boot, but I forgot my normal account password. Easy. Log in as root, and type `passwd` *username*

- I can boot, but I didn't make a non-root account for myself. Easy. Log in as root, and type `useradd` *username*

  Then type `passwd` *username*

3   Procedure

3.1   Determining the cause of the problem

1. Boot the machine into Linux from the boot disk you created as the last step of the installation process.

What? You mean you didn't make one? Oh, dear, well, borrow a boot disk from someone who did make one. This is *not* the network installation boot disk, but is the emergency boot disk created at the last stage of installation.

2. If it doesn't boot, then use the procedure you used to run `fdisk` in the first class to examine the partition table. If the Linux partitions are not there, tough! You need to reinstall. Otherwise, you can ask Nick to have a look if he is around.

3. After logging in as root, type `emacs /etc/lilo.conf`

3.2 Put boot loader in the right place (MBR)

This is the easiest to fix.

1. The top line of `/etc/lilo.conf` should read:

   `boot=/dev/hda`

   and *not*

   `boot=/dev/hda7`

   If you see `boot=/dev/hda7`, change that to `boot=/dev/hda`

2. Save the file `lilo.conf` by pressing (Control-x)(Control-s) within `emacs`.

3. Exit from `emacs` by typing (Control-x)(Control-c).

4. As root, type:

   `/sbin/lilo`

5. If you see no error messages, then the problem is solved, and you can boot in future without the floppy disk.

6. To check that all is well, remove the boot disk, reboot the computer, and when it restarts, log in to your own (non-root) account.

7. In future, always log in using your own account; do not log in as root.

3.3 I think I typed `/root` instead of `/boot`

Hmm, it still doesn't boot? Let's check another possibility.

There are two disk partitions used to hold data in our Linux system: `hda7` and `hda9`. Linux does not have a `C:` dirve, a `D:` drive, an `E:` drive,..., but it puts all the partitions under one *root* directory called '/'. The problem described here is that the student selected that the small 8 or 16 MB partition `hda7` be mounted on `/root`, instead of `/boot`. This means that the boot files are not below the disk cylinder 1024. This prevents the operating system from being started by the BIOS. To solve this, we need to perform the following steps (described in detail further below in section 3.3.1 on the following page

- edit the <u>f</u>ile <u>s</u>ystem <u>tab</u>le to always mount `hda7` on `/boot` in the future.

- change to single user mode (like Windows' safe mode)

- unmount `/root` and mount it on `/mnt`

- copy all files from `/mnt` to `/root`, inlcuding those "hidden" files that begin with a dot

- move all files from /boot to /mnt

- unmount the partition hda7 from /mnt, and mount it where it was supposed to be, on /boot.

- run lilo.

Note that /root is the home directory for the root user. The /boot partition contains the essential files required to boot the operating system, including the operating system *kernel*.

This procedure uses methods that you will learn about later. I do not expect you to understand a great deal of it yet (you *will* understand it in its entirely later). If you feel nervous about doing this, you could ask Patrick, our helpful and capable technician to do it. Show him this document.

3.3.1 How to diagnose the /boot ⇔ /root problem

1. Log in as root

2. Type emacs /etc/fstab

   This is the **f**ile **s**ystem **tab**le. It is a very important configuration file in Linux. It is described in the current *Linux Training Materials Project* document at http://nicku.org/ossi/lab/workshop-notes.pdf in sections **??**, **??**, and **??**.

3. There are two lines in this file that mount the hard disk partitions containing Linux file partitions; they *should* look something like this (from memory):

   ```
   LABEL=/          /       ext2    defaults        1 1
   LABEL=/boot     /boot    ext2    defaults        1 2
   ```

   If instead, they look something like this:

   ```
   LABEL=/          /       ext2    defaults        1 1
   LABEL=/root     /root    ext2    defaults        1 2
   ```

   then you have the problem that the next section shows you how to fix.

3.3.2 How to fix the /boot ⇔ /root problem

Here we assume that you are logged in as root, and that you are editing /etc/fstab in emacs.

1. Change the line that looks like this:

   ```
   LABEL=ROOT       /root   ext2    defaults        1 2
   ```

   to this:

   ```
   /dev/hda7        /boot   ext2    defaults        1 2
   ```

2. Save the file by typing (Control-x)(Control-s), then exit emacs by typing (Control-x) (Control-c).

3. Change to *single user mode* by typing at the command prompt: telinit 1

   The screen will change to text mode.

4. Unmount the `hda7` partition by typing `umount /root`

5. Mount it temporarily on the directory `/mnt` by typing:

   `mount /dev/hda7 /mnt`

6. Move all the files from `/mnt` to `/root`, except for the directory '.' and the directory '..'. This is a bit tricky, since most files will be "hidden", that is, their file name begins with a dot '.'. To move the files:

   (a) type `ls -a`
   (b) For each file `file` listed, type: `mv file /root`
   (c) Do **not** try to move the current directory '.' or the parent directory '..', or you may be sorry!

7. Set the correct permissions on the `/root` directory by typing `chmod 700 /root`

8. Now move all the files from the `/boot` directory to the small `hda7` partition by typing:

   ```
   cd /boot
   mv * /mnt
   ```

9. Unmount `hda7` from the directory `/mnt` by typing:

   `umount /mnt`

10. Mount `hda7` on `/boot` (the proper place it would have been if you didn't make the mistake!) by typing:

    `mount /dev/hda7 /boot`

11. Run lilo (this step actually puts the boot loader into the master boot record `/dev/hda`):

    `lilo`

12. If you see no error messages, remove the boot disk and reboot the computer by either typing (Alt)(Control)(Delete) or by typing

    `shutdown -r now`

13. If you see error messages when you typed `lilo` above, then talk with Nick if he is nearby.

14. Your computer should reboot successfully; if not, talk with Nick.

3.4 Always log in as your own personal account

Always log in as your own personal account from now on. Do not log in as root in the future; otherwise two things will inevitably happen:

- I will look upon you with great scorn.

- One day you will make a typing mistake and destroy some important files (or maybe delete all of your files on the entire hard disk!)