Multiboot with GRUB Mini−HOWTO

Table of Contents

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This document describes how to install Windows 98, Windows 2000, DOS and Linux using GRUB.

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1. Why ?

I wanted to be able to boot all operating systems without having to go through multiple menus. I know I can install NT on top of win9x on top of DOS. I would have to go through the NT menu then the win9x menu in order to boot DOS. I wanted to be able to boot all these operating systems at once.

This turned out to be quite a challenge. The problem with Microsoft operating system is that they all want to boot from the primary partition. This is where GRUB comes in. It can hide primary partitions. You can use up to 3 partitions to install Microsoft operating systems. GRUB will hide the other 2 partitions so that the operating systems will not see it. This means you will need another partition to share data between DOS, Win9x and Windows 2000. The 4th partition is used for the extended partition.

I also wanted a menu system and GRUB provides a nice one.

Another nice feature of GRUB is that it supports reiserfs so I don't need to keep my /boot file in a separate ext2 partition.

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2. Installation procedure

2.1 Preparing boot floppies

You will need 3 floppy disks. Make the first floppy a DOS bootable disk. Copy fdisk.exe and sys.exe onto this floppy disk.

```
FORMAT /S A:
COPY FDISK.EXE A:
COPY SYS.EXE A:
```

Use your second floppy disk to make a Windows 98 emergency disk. You will use the third floppy for GRUB shortly.

2.2 Installing linux

Install your favorite distribution of linux. You will need to use fdisk to partition your hard disk. Calculate ahead of time how much disk space each of your operating systems will take.

Here is how I partitioned my hard disk:

```
   Device Boot    Start       End    Blocks   Id  System
/dev/hda1             1         6     48163+  16  Hidden FAT16
/dev/hda2             7        19    104422+  16  Hidden FAT16
/dev/hda3            20       593   4610655   1b  Hidden Win95 FAT32
/dev/hda4           594      3737  25254180    5  Extended
/dev/hda5           594       848   2048256    6  FAT16
/dev/hda6           849      2123  10241406    7  HPFS/NTFS
/dev/hda7          2124      2140    136521   82  Linux swap
/dev/hda8          2141      2523   3076416   83  Linux
```

My first partition is for booting Windows 2000. 10MG should be plenty to do that. This partition will only contains the file necessary to boot NT such as boot.ini, ntldr, ntdetect.com, etc... NT will reside in partition 6 in my example. This partition is Hidden FAT16.

The second partition is for DOS. I deemed 100M sufficient. This is FAT16 too

The third partition is for Win9x. I gave it 5G and made it FAT32 for performance.

Next create the extended partition for the remaining of your hard disk. This shows up as partition 4 on fdisk.

Create a 2GB partition. This partitions is used to share data between all operating systems. Make sure that all the sum of all above partitions are less than 8GB. This is a DOS limitation.

Next create your Windows 2000 partition. I gave it 10G since this breed of windows is a bloated pig. I made it a HPFS/NTFS partition for speed.

Next add your swap partition and linux partition. Make sure you do not have a separate partition for /boot. Things look better in GRUB if you keep /boot in the root partition.

After you have installed linux go ahead and format the fat16 partitions:

```
mkdosfs /dev/hda1
mkdosfs /dev/hda2
mkdosfs /dev/hda6
```

2.3 Installing GRUB

Make sure you have the latest version of GRUB. I am using version 0.5.96.1. The version that came with my distribution was out of date and gave me a lot of grief. You can download the latest version at http://www.fsf.org.

Now you'll want to install GRUB on the floppy disk. You don't want to install it on the hard disk yet because Windows 2000 will overwrite it.

```
grub-install '(fd0)'
```

Create the following menu.lst for GRUB. This file lives in /boot/grub.

```
#
# Sample boot menu configuration file
#

# Boot automatically after a minute.
timeout 60

# By default, boot the second entry.
default 1

# Fallback to the first entry.
fallback 0

title Windows 2000
unhide (hd0,0)
hide (hd0,1)
hide (hd0,2)
rootnoverify (hd0,0)
chainloader +1
makeactive

# For booting Linux
title  Linux
root (hd0,7)
kernel /boot/vmlinuz-2.2.17 root=/dev/hda8 video=matrox:vesa:261

title Windows 98
hide (hd0,0)
hide (hd0,1)
unhide (hd0,2)
rootnoverify (hd0,2)
chainloader +1
makeactive

title DOS 6.22
hide (hd0,0)
unhide (hd0,1)
hide (hd0,2)
rootnoverify (hd0,1)
chainloader +1
makeactive
```

```
# For booting Linux
title  Linux (single user)
root (hd0,7)
kernel /boot/vmlinuz-2.2.17 root=/dev/hda8 video=matrox:vesa:261 single

title Partition 2 (floppy)
hide (hd0,0)
unhide (hd0,1)
hide (hd0,2)
chainloader (fd0)+1

title Partition 3 (floppy)
hide (hd0,0)
hide (hd0,1)
unhide (hd0,2)
chainloader (fd0)+1
```

Check that you can boot linux with the floppy disk. If you are having trouble you can drop in GRUB's command line and figure out what is going on. GRUB is very well documented, if you have any trouble please take a look at the documentation.

2.4 Installing windows 2000:

I had to initialize the first partition before installing windows 2000. Insert the DOS startup disk and reboot your computer. Once you get to the DOS prompt do the followings:

```
FDISK /MBR
SYS C:
```

Now you can go ahead and install windows 2000. At some point Windows 2000 will prompt you for the partition on which you want to install. The partition you created with fdisk should show up as damaged or unformatted partition. Go ahead and select it.

To hide the Windows 2000 menu edit a file called boot.ini that should be in the C: drive. Change the timeout value from 30 to 0.

```
[boot loader]
timeout=0
default=multi(0)disk(0)rdisk(1)partition(1)\WINNT
[operating systems]
...
```

2.5 Installing DOS.

Insert the GRUB disk. When you see the menu insert the DOS boot disk. Select partition 2 (floppy) from the menu.Hit enter. This will boot the floppy disk and hide partition 1 and 3.

Run FDISK and check that the C: drive is partition 2. Next install DOS:

```
SYS C:
```

2.6 Installing Windows 98

Insert the GRUB disk. When you see the menu insert the Windows 98 Emergency disk. Select partition 3 (floppy) from the menu.Hit enter. This will boot the floppy disk and hide partition 1 and 2.

Run FDISK and check that the C: drive is partition 3. Next install Windows 98:

```
SYS C:
```

2.7 The final touch

Test that everything is working from GRUB:

You should be able to boot from all 4 operating systems from the GRUB floppy disk.

If everything looks right you can go ahead and install GRUB on your hard disk. From linux type:

```
grub−install /dev/hda
```

You should now be able to boot all 4 operating systems from the GRUB menu. Enjoy!

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3. References

I have found these links useful while setting up my system.

- GNU GRUB
- The Linux−DOS−Win95−OS2 mini−HOWTO

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4. Feedback

I would like to hear about your experience (good or bad) with this document. If you have some instructions for adding another OS please send them to me so that I can add them.
