Linux+WindowsNT mini−HOWTO

Table of Contents

Linux+WindowsNT mini−HOWTO......1
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1. INTRODUCTION......1
2. HOW TO INSTALL: LINUX FIRST, WINDOWS NT AFTER......1
3. HOW TO INSTALL: WINDOWS NT FIRST, LINUX AFTER......1
4. HOW TO UPGRADE WINDOWS NT TO WINDOWS 2000......1
5. HOW TO INSTALL WINDOWS 2000 BESIDE LINUX AND WINDOWS 98......1
6. FURTHER INFORMATION......1
7. GETTING HELP......1
1. INTRODUCTION......1
2. HOW TO INSTALL: LINUX FIRST, WINDOWS NT AFTER......2
3. HOW TO INSTALL: WINDOWS NT FIRST, LINUX AFTER......4
3.1 If you have only one IDE hard disk......4
3.2 If you have more than one (SCSI) hard disk......6
4. HOW TO UPGRADE WINDOWS NT TO WINDOWS 2000......9
5. HOW TO INSTALL WINDOWS 2000 BESIDE LINUX AND WINDOWS 98......9
6. FURTHER INFORMATION......10
6.1 Copyright......10
6.2 Disclaimer......10
6.3 News......11
6.4 Credits......11
6.5 HOWTO......11
6.6 Mini−HOWTO......11
6.7 Local Resources......11
6.8 Web Pages......12
7. GETTING HELP......12

Linux+WindowsNT mini−HOWTO

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This mini−HOWTO covers some ways on how to install both Linux and Windows NT on the same computer and how to boot either of them from within LILO menu. There is also another mini−HOWTO "Linux+NT−Loader" that covers how to boot either of them from within NT Loader menu. As I consider Windows 2000 to be NT 5.0 this mini−HOWTO also covers upgrading from NT 4.0 to 2000.

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1. INTRODUCTION

2. HOW TO INSTALL: LINUX *FIRST*, WINDOWS NT *AFTER*

3. HOW TO INSTALL: WINDOWS NT *FIRST*, LINUX *AFTER*

- 3.1 If you have *only one* IDE hard disk
- 3.2 If you have *more than one* (SCSI) hard disk

4. HOW TO *UPGRADE* WINDOWS NT TO WINDOWS 2000

5. HOW TO INSTALL WINDOWS 2000 *BESIDE* LINUX AND WINDOWS 98

6. FURTHER INFORMATION

- 6.1 Copyright
- 6.2 Disclaimer
- 6.3 News
- 6.4 Credits
- 6.5 HOWTO
- 6.6 Mini−HOWTO
- 6.7 Local Resources
- 6.8 Web Pages

7. GETTING HELP

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1. INTRODUCTION

Bill Wohler wrote in his v1.1 of The Linux+WindowsNT mini−HOWTO:

"Due to hardware or software problems or user headroom, I pulled my hair out for several days trying to get both NT and Linux happily settled on my new HP Vectra PC at work."

I could say that was true in my case too, but you **really** have a way to make both Linux and Windows NT co−existing on the same machine and to switch from one of them to another.

"Under no circumstances run the Disk Administrator from NT 3.51 to format partitions. It asks if it can write a signature "which will cause absolutely no harm." When it did this, it hosed my partition table until fixed by steps 3 and 7 below. Because of these problems, I was limited to one FAT NT partition. Also remember that even if you do get the Disk Administrator to work, you'll want at least one small FAT partition to use as a staging area for exchanging files between Linux and NT until Linux has an NTFS filesystem."

Well, NT's Disk Administrator is sufficient tool to check what situation on your hard disk(s) you have, before and after you used an utility called Partition Magic by Power Quest. This utility might be needed to 'shrink' your NT (either NTFS or FAT) partition, in order to get some free space for your further Linux' partitions. (After a while, I recognized that 'shrinking' used partition might not be needed. Actually, if you start from 'scratch', it might be the best way to re−format your whole disk(s) using **FDISK** command. You should make a DOS boot floppy diskete where DOS commands FDISK and FORMAT have to be also copied. More details later...)

"I installed Linux first and then NT, but based on my experience, I might now be able to install NT first and then Linux."

Of course you all are able to install Windows NT first and after that Linux. We'll see how to do that and how to use **LILO** (**Li**nux **Lo**ader) to chose which operating system to boot. But, before that we'll see the procedure that Bill Wohler, the previous maintainer of this mini−HOWTO, has been using:

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2. HOW TO INSTALL: LINUX *FIRST*, WINDOWS NT *AFTER*

1. Install a minimal Linux (hold off on installing the rest until you win the Linux/NT battle). Do all your disk partitioning in Linux, including your NT partition (make it FAT). I was not successful at making more than one NT partition. I also made it the first partition, but I don't know if that is essential or not.

2. Edit `/etc/lilo.conf` and use **boot=/dev/sda** (I was not successful at installing LILO on the Linux partition−−`/dev/sda3` in my case) and run "lilo". You'll have to use the editor ae. You'll live.

3. Save the MBR with this: **dd if=/dev/sda of=/dev/fd0 bs=512 count=1** Use a floppy. Trust me. Also do this each time you change the disk partition table.

4. Install NT, part 1. When it goes to reboot halfway through the process you'll boot into Linux.

5. Add NT stanza to /etc/lilo.conf, e.g.:

```
other=/dev/sda1
label=NT
table=/dev/sda
```

and run lilo. If lilo complains about this (I forget the message), add the "linear" flag to /etc/lilo.conf near the "compact" keyword. Furthermore, if your partition table is screwed up by NT you'll either need to use "ignore−table" or follow the directions in Step 7. See also "fix−table". The LILO HOWTO is your friend.

6. Reboot, select NT from LILO, and finish NT install. You'll need the "Boot Disk XU, HP Vectra AIC 7880 Driver A.01.02" floppy to install the ethernet drivers and the "XU/VT Drivers and Documentation" CD (directory video/disk4 if I recall correctly) to install the video drivers for the Matrox MGA Millennium.

7. Back to Linux, run fdisk and ensure you don't get "partition doesn't end on cylinder boundary" on your Linux partitions. You'll still have this error on the NT partition though, but this seems to be OK.

```
/dev/sda1            1         1      322   329301    6  DOS 16-bit >=32M
```

Partition 1 does not end on cylinder boundary:

phys=(321, 39, 9) should be (321, 63, 32)

Cfdisk reports strangeness, but it seems OK:

```
                                         Unusable                      0.04*
 /dev/sda1                Primary        DOS 16-bit >=32Mb           321.59*
                                         Unusable                      0.39*
```

If you do get the cylinder boundary warning on your Linux partitions, it is sufficient to use cfdisk to do something innocuous like changing the boot sector.

If, however, NT has really screwed you over and cfdisk can't even run, complaining that it cannot open /dev/sda, then you'll need to take more extreme action. You'll need that MBR you saved previously. Clear and restore the MBR (but not the signature) with:

```
dd if=/dev/zero of=/dev/sda bs=512 count=1

dd if=/dev/fd0 of=/dev/sda bs=510 count=1
```

8. Install the rest of Linux. Easy, huh?

If you prefer to have NT write the MBR instead of LILO, you may have to resort to the following to clear the MBR first:

- dd if=/dev/zero of=/dev/sda bs=446 count=1 (in Linux) or perform a low−level format with the SCSI utilities. I've heard that a low−level format of an IDE disk is fatal, so don't do it.
- fdisk /mbr (you've obviously already created a DOS boot disk that contains fdisk).
- delete NT partition and create it again in NT install.
- continue with NT install.

Epilogue: After first posting this message, I heard from several folks that they had no problems with NT's Disk Administrator, and were able to install either NT or Linux first without any problems. Hopefully, you'll be in this camp, but if not, perhaps this campfire story will be of some use.

Since the first edition of this mini−HOWTO, others have written similar documents as well. Please be sure to consult them. If your experience differs from any presented, then you should submit your own mini−HOWTO or submit a revised version of this document to the HOWTO maintainer (reference this sentence) and send a carbon copy to me as I don't have the time to maintain this document. Someone should eventually combine all of these documents into a single coherent HOWTO.

Finally, I'm afraid this document details all I know about this subject. I should point you to an appropriate Linux newsgroup for further information. I use NT about one day a year. Under duress.

---

3. HOW TO INSTALL: WINDOWS NT *FIRST*, LINUX *AFTER*

3.1 If you have *only one* IDE hard disk

- First of all, I would suggest you to install a fresh copy of Windows NT 4.0 on your hard disk. I suppose that you already made a backup of your important data, so the NT installation shouldn't be a problem. During the NT installation, setup is not going to ask you where to place NT's boot loader, so it would be placed into the MBR (Master Boot Record) of your hard disk. But, there is a possibility for a previous content of the MBR to remain within the MBR (especially any previous Lilo), so I would suggest you (*before* installation of NT) to boot the computer with a DOS floppy diskette having DOS version of FDISK. At the prompt a:\ just enter the command: **fdisk /mbr** and restart the computer again (without that floppy).

- After you have successfully installed your NT, you will see that it uses the whole hard disk or a specific partition of the hard disk (depending on what you decided during the setup process). So, it is advisible to 'shrink' the partition where NT resides in order to make some free space on the disk. Onto that free space you will install your Linux. After you have your NT configured and running, you have to boot your computer using a floppy diskette with Partition Magic utility by Power Quest. It is a graphical tool able to see all partitions on all hard disks you have. The best thing is that you can make some changes with your partitions but *not* to destroy your existing data. One of the available changes is to make your existing partition(s) smaller, so to get some free space on the disk(s) for other purposes. Although you are advised to make a backup before you make any changes to the partitions, I usually practise to 'shrink' NT's partition(s) before I install anything else onto this NT (so, if needed, a repetitive NT re−installation wouldn't be a problem). Well, Partition Magic (or any other similar utility you are familiar with) will shrink your NT's partition (either NTFS or FAT) to a smaller measure and place it to either the beginning or to the end of the previous measure. It means that you may choose to have your 'shrinked' NT partition at the beginning or at the end of your disk (I usually choose NT to be at the beginning, so the ending part of the disk will become a 'free space'). After the 'shrinkin' is finished, you may re−boot your NT in order to check the new situation: you may use Windows Explorer or Disk Administrator for that.

- As it was said in Introduction, it might *not* be needed always to use such tools like Partition Magic. It is better to say that this tool is of a great value in all those cases you have been running Windows NT for a long time, so you don't want to start from 'scratch'. For example, you are fully satisfied with your beloved NT and related applications. You are not likely to kill NT, but you have recognized that you have enough *unused* space on NT's partition(s) (i.e. NT's partition(s) might look not much populated). That case, Partition Magic is your choice. But, if you do start from the beginning, or you don't mind re−formatting the disk, it might be suitable to get a blank floppy diskette, make it to be DOS bootable and copy two DOS tools on it: FDISK and FORMAT. So, restart your computer with such floppy and at **A:** prompt enter **fdisk**. There you'll find several options that allow re−partition of your hard disk(s). Now you could make a part of the disk a FAT partition (where you'll later install your beloved NT). The rest of space you'd better leave alone (i.e. do not attempt making Linux partition(s) right now, using DOS's version of FDISK). If you *really* want to make Linux−type partitions now, you should look after Linux version of FDISK.

- So far so good. Next step is to install your Linux. Case you are familiar with RedHat distribution (I hope with other distros is the same or similar), you start by putting your installation CD in the drive and re−boot the computer). Well, when you are about to choose what type of installation it will be (Gnome or KDE Workstation, Custom, etc.) you may choose whatever you planned before, but I would suggest to install a Workstation *at first*. This is good because Linux setup will find *automatically* the free space on the (first) hard disk, make all partitions needed for Linux, format them properly, make majority of options by default so you won't have much pain during the setup (*later*, if you want, you may either **add** missing components or **re−install** RedHat Linux as Custom over the existing linux partitions). Lilo should go to the MBR.

- **Don't forget to make Linux boot floppy diskette. You'll never know when you may need it. If something goes wrong with the MBR, and you don't have boot floppy, your Linux might become not accessible, so you might have to re−install it again.**

- After it looks that Linux installation is finished, you are going to re−start the computer and there you will only see **Lilo** with only one entry to boot: Linux (or maybe more than one Linux entry, in case your hardware is multi−processor one or so). But, don't panic! Your Windows NT is still there − where you had installed it before Linux. You should become some familiar with Linux as soon as possible, in order to be able to find and edit your new **/etc/lilo.conf** file. When you open this file for the first time, you'll see that there is only one (or more) Linux entry. Well, you should know the exact position (read: a partition) where Windows NT has been installed, so you could add an appropriate entry into `/etc/lilo.conf` file. After you make those changes, restart Lilo with a command: **/sbin/lilo** and, after the next re−boot, you will have both 'linux' and 'nt' (or 'dos' or similar) entries under Lilo menu.

- My added NT entry is:

```
other=/dev/hda1
label=nt
```

  So, the whole `/etc/lilo.conf` looks like this:

```
boot=/dev/hda
timeout=50
prompt
    default=linux
    vga=normal
    read-only
image=/boot/vmlinuz-2.2.12-20
    label=linux
    root=/dev/hda3
other=/dev/hda1
    label=nt
```

- Some more explanations regarding details from my `/etc/lilo.conf` file: After I have installed Windows NT, I assigned the letter C: to that drive. Beside that, I wanted to have another NTFS partition in order to store and backup important files, case I have to re−install NT on C: for some reason in the future. That's why I've made another NT partition, that has been assigned as D: disk. Both NTFS partitions are approximatelly 3 GB each and Linux setup found them as /dev/hda1 and

/dev/hda2 partitions. The rest free space on the disk was cca 2 GB, where I have made the /root partition of near 1.9 GB and /swapp part of cca 100 MB (/dev/hda3 and /dev/hda4 respectively). Lilo went to the MBR and all has been running fine.

For your information, I *wanted* to make these linux partitions that time. Later, I found that it was not needed, so now I let Linux setup to make partitions from the free space in a way it likes to do that. I trust it :−)

3.2 If you have *more than one* (SCSI) hard disk

*Notice: Folks, you see, at my place, one of computers has several SCSI disks. That's why I put the word 'SCSI' in parentheses. There I have several SCSI controllers, SCSI CD ROM drive and SCSI Tape drive. So, it doesn't mean that *you* will be using SCSI parts at all. You'd rather handle more than one IDE disks, but I hope that install process shouldn't change too much, if any.*

- First of all, I would suggest you to install a fresh copy of Windows NT 4.0 on your **first** hard disk. I suppose that you already made a backup of your important data, so the NT installation shouldn't be a problem. You can easily copy your data on your second hard disk or so. During the NT installation, setup is not going to ask you where to place NT's boot loader, so it would be placed into the MBR (Master Boot Record) of your **first** hard disk. But, there is a possibility for a previous content of the MBR to remain within the MBR (especially any previous Lilo), so I would suggest you (before installation of NT) to boot the computer with a DOS floppy diskette having DOS version of FDISK. At the prompt a:\ just enter the command: fdisk /mbr and restart the computer again (without that floppy). If you want to be sure about your machine is 'clean', you may also delete any existing partition(s) on your *other* disks, during the Windows NT Setup **in case you have *not* made any backup on other disks**.

- After you have successfully installed your NT, you will see that it uses the whole hard disk or a specific partition of the hard disk (depending on what you decided during the setup process). So, it is advisible to 'shrink' the partition where NT resides in order to make some free space on the disk. Onto that free space you will install your Linux. Well, you may also think of using other disk(s) you have for Linux (so did I). That case, you would start your linux installation and tried to use, for example, /dev/sdb (or sdc, or sdd, or else in case of SCSI system) or /dev/hdb (or hdc, or hdd, or else in case of IDE system). Looked that Linux installation accepted whatever I chose, but somehow after all was finished, when I did that, LILO was not able to do anything. Actually, it always stopped after 'LI' so it was not possible to start Linux at all. Finally, after pulling my hair out, I decided to make it all on the **first** disk. So, after I had NT configured and running, I had to boot my computer using a floppy diskette with Partition Magic utility by Power Quest. It is a graphical tool able to see all partitions on all hard disks you have. The best thing is that you can make some changes with your partitions but not to destroy your existing data. One of the available changes is to make your existing partition(s) smaller, so you can get some free space on the disk(s) for other purposes. Although you are advised to make a backup before you make any changes with your partitions, I usually practise to 'shrink' NT's partition *before* I install anything but NT itself (so, if needed, a repetitive re−installation wouldn't be a problem). Well, Partition Magic (or any other similar utility you are familiar with) will shrink your NT's partition (either NTFS or FAT) to a smaller measure and place it to either the beginning or to the end of the previous measure. It means that you may choose to have your 'shrinked' NT partition at the beginning or at the end of your disk. I usually choose NT to be at the beginning, so the ending part of the disk will become a 'free space'. I discovered some problems if the 'free space' is made at the beginning of disk (later we'll talk about). So, after the 'shrinkin' is finished, you may re−boot your NT in order to check the new situation: you may use Windows Explorer or

Disk Administrator for that. You will also note how NT can 'see' all (other) disks you have in your machine (either partitioned or as 'free space' areas).

* Once again, as it was said earlier, it might *not* be needed always to use such tools like Partition Magic. It is better to say that this tool is of a great value in all those cases you have been running Windows NT for a long time, so you don't want to start from 'scratch'. For example, you are fully satisfied with your beloved NT and related applications. You are not likely to kill NT, but you have recognized that you have enough *unused* space on NT's partition(s) (i.e. NT's partition(s) might look not much populated). That case, Partition Magic is your choice. But, if you do start from the beginning, or you don't mind re−formatting the disk(s), it might be suitable to get a blank floppy diskette, make it to be DOS bootable and copy two DOS tools on it: FDISK and FORMAT. So, restart your computer with such floppy and at **A:** prompt enter **fdisk**. There you'll find several options that allow re−partition of your hard disk(s). Now you could make a part of the disk a FAT partition (where you'll later install your beloved NT). The rest of space you'd better leave alone (i.e. do not attempt making Linux partition(s) right now, using DOS's version of FDISK). If you *really* want to make Linux−type partitions now, you should look after Linux version of FDISK.
* So far so good. Next step is to install your Linux. Case you are familiar with RedHat distribution (I hope with other distros is the same or similar), you start by putting your installation CD in the drive and re−boot the computer). Well, when you are about to choose what type of installation it will be (Gnome or KDE Workstation, Custom, etc.) you may choose whatever you planned before, but I would suggest to install a Workstation at first. This is good because Linux setup will find automatically the free space on the **first** hard disk, make all partitions needed for Linux, format them properly, make majority of options by default so you won't have much pain during the setup (later, if you want, you may either add missing components or re−install Linux as Custom over the existing linux partitions). Lilo should go to the MBR of your **first** disk.
* After it looks that Linux installation is finished, you are going to re−start the computer and there you will only see Lilo with one Linux entry to boot (or maybe more than one Linux entry, in case your hardware is multi−processor one). But, don't panic! Your Windows NT is still there where you had installed it before Linux. You should become some familiar with Linux as soon as possible, in order to be able to find and edit your new `/etc/lilo.conf` file. When you open this file for the first time, you'll see that there is only one (or more) Linux entry. Well, you should know the exact position (read: a partition) where Windows NT has been installed, so you could add an appropriate entry into `/etc/lilo.conf` file. After you do that, restart Lilo and, after the next re−boot, you will have both 'linux' and 'nt' entries under Lilo menu.
* My added NT entry is:

```
other=/dev/sda1
label=nt
```

So, the whole `/etc/lilo.conf` looks like this:

```
boot=/dev/sda
map=/boot/map
install=/boot/boot.b
prompt
timeout=50
default=linux
image=/boot/vmlinuz-2.2.12-20smp
     label=linux-mp
     initrd=/boot/initrd-2.2.12-20smp.img
```

```
        read−only
        root=/dev/sda6
    image=/boot/vmlinuz−2.2.12−20
        label=linux−up
        initrd=/boot/initrd−2.2.12−20.img
        read−only
        root=/dev/sda6
    other=/dev/hda1
        label=nt
```

* Some more explanation, regarding details from my `/etc/lilo.conf` file: After I have installed Windows NT on the **first** disk, I assigned the letter C: to that drive. After I made enough free space *after* the NTFS partition, I let Linux setup to handle further partitioning. Although Linux should support as far as four primary partitions per disk, it seems that Linux setup is likely to make an extended partition, whenever it recognizes that there is already a primary partition on the disk. Considering that those 'virtual' primary partitions would be numbered from /dev/sda1 to /dev/sda4 (including an extended one, of course), the extended one should become /dev/sda4. Following that idea, the first one logical partition within the extended one was numbered as /dev/sda5 (in my case, it was the /boot partition that physically was the first from the beginning of the **first** hard disk). So, the /root and /swapp partitions are /dev/sda6 and /dev/sda7 respectively. You may see a line "root=/dev/sda6" telling you that. Once again, Lilo went to the MBR and all has been running fine.

* Well, you may ask me: Ok, but what in a case I have several hard disks installed in the machine? Good question. You see, I myself have *four* SCSI disks and, of course, I tried to install Linux on the 2nd one, next the 3rd and, finally, on the 4th disk. Whatever I did (Linux setup haven't complained at all), when I was about to finish the installation and after performing the final automatic re−boot, my Lilo would stop after 'LI' so the computer had to be re−started. Finally, I realized that there must be a problem with disks that are too "far" from the MBR that is located at the beginning of the **first** hard disk. That's why I suggest you to make them all (both NT and Linux) on your **first** disk. After having all of them running ok, there is no problem to make other disks visible (and usable) by both operating system. I hope your **first** disk is large enough to carry both operating systems (NT needs at least cca 150 MB for itself, Linux depends on what you want to get: Gnome or KDE Workstations are about 580 MB, but the Custom wants more than 1.4 GB). That means the **first** hard disk of cca 2.4 GB should fit.

* You may also ask me: Ok, but, could I 'shrink' my NT partition in a way the 'free space' is made at the beginning of the disk? Well, I remember I tried to do so and to install, at first, Gnome Workstation (395 packages, 570 MB) there. During the setup, everything looked fine, but neither Lilo was not installed, nor the boot floppy was made. You bet, Linux was not functional. Then I tried to install KDE Workstation (377 packages, 582 MB) on the same place. Once again, everything looked fine, but neither Lilo was not installed, nor the boot floppy was made. Investigating that, I studied the structure of all existing partitions. I was surprised when recognized that new born *logical* partitions (within the new born *extended* one) were numbered as if they were physically positioned *after* the NT partition! In the other words, there I have got a 'funny' order: /dev/sda5, /dev/sda6, /dev/sda7 and, finally, /dev/sda1. Looked like the system was a bit confused. So I considered that it is advisible to make the 'free space' **after** already existing NT partition(s).

* Regarding two similar Linux images (differ in 'smp'). It is a server hardware with a multi−processor support. The "inteligent" setup has inspected the hardware and offered me to have both 'multi' and 'uni' processor functionality. Nevertheless, I still have only one CPU there.

4. HOW TO *UPGRADE* WINDOWS NT TO WINDOWS 2000

Well, actually, it isn't a real "upgrade" of ***running*** *NT to 2000, but a "fresh" installation of Windows 2000 Professional. I hope it should also work for other Windows 2000 products. I haven't tried its server−type installations yet, but I remember I haven't experienced any problem with NT, regarding it was Server or Workstation.*

- First of all, a backup of important data should be made! I do it by having another Windows−like partition on the disk, where I copy/move my texts, drawings etc. That partition is *not* going to be handled during the installation. After the backup is made, it's the right time to install Windows 2000.
- You see, folks, whenever I (re)install a Windows NT product, I like to see it on a clean partition. It means, I remove i.e. delete the existing partition where NT "system" files were stored, in order to get free ('unused') space. Then I chose to make a new partition that will be formatted as NTFS type of file system. After that, I opt to install Win2000 onto the new partition.
- The procedure of Windows 2000 Setup will remove LILO from the MBR, so a couple of next re−bootings during the installation won't show LILO prompt.
- When the Win2000 installation is finished, you may re−install your favourite applications and restore your data from the backup. You should then check if everything goes fine with your new and old Windoze stuff :−)
- So far − so good. Now you have to look after your Linux boot floppy diskette. If you can't find it, you are out of luck. Actually, I am not sure if all Linux systems might be now activated without boot diskette. Some Linux *gurus* suggest to boot Linux from the installation CD, but I don't know if it can help in case your system doesn't have *bootable* CDROM drive, i.e. a modern motherboard's BIOS. Any comment here?
- Well, after you successfully boot your Linux, you should go to `/etc/lilo.conf` to check it once again. You should have there at least two options: Linux and NT. Case you don't see the option to boot your beloved Windoze, you have to add it. It was described in previous sections. Then you have to run **/sbin/lilo** in order to put LILO boot loader into the MBR.
- That's all. Next time you boot your computer, you'll get your LILO prompt. Using <Tab> key you'll see your boot options.
- From my experience − all work great! Although I *removed* previous WinNT installation in order to make new Win2000 installation and also *lost* (temporarily) LILO boot loader, at the end I got both of them, Win2000 and Linux, the same way as I did with WinNT and Linux!

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5. HOW TO INSTALL WINDOWS 2000 *BESIDE* LINUX AND WINDOWS 98

Notice: When I say 'beside Linux and Windows 98', I mean of Linux and Windows 98 that ***already*** *work together, so they were installed earlier,* ***before*** *we made a decission to add Windows 2000. One of the machines I use at work, has both Linux and Win98. They both load from under LILO menu.*

Actually, it is not a very big problem to install Windows 2000 on a computer where another Windows is running. In my case, it is Windows 98 so I just put 2000's CD into the drive. After it recognized that an 'older' version of Windows was running on my machine, it offered me either to upgrade it to 2000 or to install W2k as the 'clean' installation. At first, I tried to upgrade my Windows 98 to W2k, in order to get a very similar combination that I have at home (described in previous chapter). But, some hardware and software compatibility issues were reported (I mean, some of my components wouldn't stay fully operational if I just did an upgrade).

When saw that, I considered to try the 'fresh' installation of W2k, *beside* Win98 and Linux. Happily, I recently installed another HD into the box, so I did not need to handle the first disk, where Win98 and Linux were living. Actually, the main reason to add the second disk was that the first one got almost full. If I wanted to install the third operating system on the first disk, I'd have to clean it well. So, when W2k's Setup asked for the location to be installed, I told it to use the second disk, repartition it and format it as the NTFS file system (just to mention that my Win98 was FAT32 and Linux was ext2).

After an hour or so, W2k's installation was finished. During the setup procedure, it re−started the system a couple of times. When it was about to do that for the first time, I was curious if it would re−write the MBR, where LILO resides (actually, in the previous chapter, I have mentioned that W2k's installation was likely to re−write the MBR). Interestingly, it did not do that this time, so I continued to see 'LILO boot:' on the screen. But, a *new* thing has appeared after LILO: the Windows 2000 boot loader, that in turn offered not only to load W2k but a 'Windows' (ie. my old Win98) too.

Well, depending on which operating system I like to start, the procedure might slightly differ, but it is easy. No problem at all. For example:

- If I like to load my Linux, then LILO boot is the "cross−road". At this point, the 'linux' entry should either be chosen or set as default in **/etc/lilo.conf**;
- If I like to load Windows, then the other entry under LILO boot should either be chosen or set to be default. After it is done, Windows 2000 boot loader should appear on the screen. On that point, I have two choices: W2k and W98. The rest is easy, both Windozes start from there happily.

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6. FURTHER INFORMATION

6.1 Copyright

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6.2 Disclaimer

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You are strongly recommended to take a backup of your system before major installation and backups at regular intervals.

6.3 News

This is not the first release of this mini−HOWTO. I hope to improve it whenever possible. Beside that, there are other documents that may help you to install more than one operating system on the same computer. You may look for them at the same location where you get Linux+WindowsNT mini−HOWTO.

This mini−HOWTO would be improved from time to time. If you think that the HOWTO on your Linux installation CD is some out−of−date, you may check for newest release on the Internet. It could be found within the main Linux Documentation Project homepage.

6.4 Credits

This version of Linux+WinNT mini−HOWTO is based on:

```
The Linux+WindowsNT mini−HOWTO
by Bill Wohler, wohler@newt.com
v1.1, 19 February 1997
```

Any comments or suggestions can be mailed to my email address: m.skoric@eunet.yu.

6.5 HOWTO

These are intended as the primary starting points to get the background information as well as show you how to solve a specific problem. Some relevant HOWTOs are `Bootdisk`, `Installation`, `SCSI` and `UMSDOS`. The main site for these is the LDP archive at Metalab (formerly known as Sunsite).

6.6 Mini−HOWTO

These are the smaller free text relatives to the HOWTOs. Some relevant mini−HOWTOs are `Backup−With−MSDOS`, `Diskless`, `LILO`, `Large Disk`, `Linux+DOS+Win95+OS2`, `Linux+OS2+DOS`, `Linux+Win95`, `Linux+WindowsNT`, `Linux+NT−Loader`, `NFS−Root`, `Win95+Win+Linux`, `ZIP Drive`, `FBB packet−radio BBS`. You can find these at the same place as the HOWTOs, usually in a sub directory called `mini`. Note that these are scheduled to be converted into SGML and become proper HOWTOs in the near future.

6.7 Local Resources

In most distributions of Linux there is a document directory installed, have a look in the /usr/doc directory. where most packages store their main documentation and README files etc. Also you will here find the HOWTO archive (/usr/doc/HOWTO) of ready formatted HOWTOs and also the mini−HOWTO archive (/usr/doc/HOWTO/mini) of plain text documents.

Many of the configuration files mentioned earlier can be found in the /etc directory. In particular you will want to work with the /etc/fstab file that sets up the mounting of partitions and possibly also /etc/mdtab file that is used for the `md` system to set up RAID.

The kernel source in /usr/src/linux is, of course, the ultimate documentation. In other words, *use the source, Luke*. It should also be pointed out that the kernel comes not only with source code which is even commented (well, partially at least) but also an informative documentation directory. If you are about to ask any questions about the kernel you should read this first, it will save you and many others a lot of time and possibly embarrassment.

Also have a look in your system log file (/var/log/messages) to see what is going on and in particular how the booting went if too much scrolled off your screen. Using `tail −f /var/log/messages` in a separate window or screen will give you a continuous update of what is going on in your system.

You can also take advantage of the /proc file system that is a window into the inner workings of your system. Use `cat` rather than `more` to view the files as they are reported as being zero length. Reports are that `less` works well here.

6.8 Web Pages

There is a huge number of informative web pages out there and by their very nature they change quickly so don't be too surprised if these links become quickly outdated.

A good starting point is of course the Linux Documentation Project home page, an information central for documentation, project pages and much, much more.

Please let me know if you have any other leads that can be of interest.

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7. GETTING HELP

In the end you might find yourself unable to solve your problems and need help from someone else. The most efficient way is either to ask someone local or in your nearest Linux user group, search the web for the nearest one.

Another possibility is to ask on Usenet News in one of the many, many newsgroups available. The problem is that these have such a high volume and noise (called low signal−to−noise ratio) that your question can easily fall through unanswered.

No matter where you ask it is important to ask well or you will not be taken seriously. Saying just *my disk does not work* is not going to help you and instead the noise level is increased even further and if you are lucky someone will ask you to clarify.

Instead describe your problems in some detail that will enable people to help you. The problem could lie somewhere you did not expect. Therefore you are advised to list up the following information on your system:

Hardware

- ♦ Processor
- ♦ DMA
- ♦ IRQ
- ♦ Chip set (LX, BX etc)
- ♦ Bus (ISA, VESA, PCI etc)
- ♦ Expansion cards used (Disk controllers, video, IO etc)

Software

- ♦ BIOS (On motherboard and possibly SCSI host adapters)
- ♦ LILO, if used
- ♦ Linux kernel version as well as possible modifications and patches
- ♦ Kernel parameters, if any
- ♦ Software that shows the error (with version number or date)

Peripherals

- ♦ Type of disk drives with manufacturer name, version and type
- ♦ Other relevant peripherals connected to the same busses

Remember that booting text is logged to `/var/log/messages` which can answer most of the questions above. Obviously if the drives fail you might not be able to get the log saved to disk but you can at least scroll back up the screen using the `SHIFT` and `PAGE UP` keys. It may also be useful to include part of this in your request for help but do not go overboard, keep it *brief* as a complete log file dumped to Usenet News is more than a little annoying.