

Mondo Rescue and Mindi Linux HOWTO

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Mondo Rescue and Mindi Linux is a Disaster Recovery Solution which allows you to effortlessly backup and interactively restore Linux, Windows and other supported filesystem partitions to/from CD-R/RW media.

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Chapter 1. About this HOWTO

1.1. Purpose / Scope of this Guide

This HOWTO serves to help people get started with using mondo/mindi as way to backup their system. This is a work constantly evolving and being improved upon. It was started by Hugo Rabson and has since been worked upon by a number of people..

The newest version of this document can always be found on Mondo's homepage <http://www.microwerks.net/~hugo/>.

There are many ways to contribute to the Linux movement without actually writing code. One of the most important is writing documentation, allowing each person to share their knowledge with thousands of others around the world. This HOWTO is designed to help you get familiar with how Mondo/Mindi works.

1.2. Feedback

This HOWTO is incomplete but accurate to the best of my knowledge. Please provide and recommendations for improving this document in a separate e-mail to Hugo Rabson at ([<hugo@firstlinux.net>](mailto:hugo@firstlinux.net)). The separate e-mail will allow Hugo to easily forward the document-related recommendations to his "document helpers." Include the section title and recommended changes. Whenever possible, include the exact, spell-checked, grammar-checked text that you think would improve the document.

1.3. Acknowledgments and Thanks

Thanks goes to these people for helping and adding to this HOWTO.

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Chapter 2. QuickStart

- Recommend that you read the complete Mondo Rescue and Mindi LINUX HOWTO.
- Install the tarball, RPM, or DEB Mindi package and mondo package. (see Installation for more details)
- Make a Mindi "Test" CD to checkout the compatibility of your system. (see Testing Mindi for more details)

Execute as root

```
bash# mindi
bash# cd /root/images/mindi
```

(for CD-R)

```
bash# cdrecord dev=0,0,0 speed=2 mindi.iso
```

(for CD-RW)

```
bash# cdrecord dev=0,0,0 speed=2 mindi.iso
```

Reboot your system with the created Mindi CD, with the BIOS set do boot from CD. If the result is a command line in 'Expert' mode, your system checks out. Remove the CD and reboot your system.

- Backup your system by executing a command line.

Important: When making a backup on a live system, there will always be processes running that will write out data on the system after you have made the backup and before you have made the compare, this will result in difference showing up when comparing your backup. For a full explanation and what can be done to avoid this, please read this section.

Example: (2 is the speed, modify for your CD writer)

Example 2-1. A test backup

```
bash# mondoarchive -Oc2 -d 0,0,0
```

- This QuickStart covers the ideal case. Upon receiving any system feedback/errors, read each related HOWTO section.

Chapter 3. Overview

3.1. Mondo Rescue

Mondo Rescue backs up your file system to CD. Mondo uses `afio` as the backup engine. In the event of catastrophic data loss, you may restore some or all of your system from those CD, even if your hard drives are now blank. Mondo Rescue can do a lot of other cool things:

- You can use Mondo to clone an installation of Linux.
- You can backup a non-RAID file system and restore it as RAID including the root partition (if your kernel supports that).
- You can backup a system running on one format and restore as another format.
- You can restructure your partitions, e.g. shrink/enlarge, reassign devices, add hard drives, etc, before you partition and format your drives. Mondo will restore your data and amend `/etc/lilo.conf` and `/etc/fstab` accordingly.
- You can backup Linux/Windows systems, including the boot sectors. Mondo will make everything right at restore-time. (However, do run "Scandisk" when you first boot into Windows, just in case.)
- You can use your Mondo backup CD to verify the integrity of your computer.

Mondo's principal virtue is that it protects you from the problems that can arise when you reinstall completely from scratch. If you want to wipe and restore your system every year just as a matter of 'good practice', Mondo is not for you.

If Mondo eats your data, I shall apologize a lot but I am not to be held liable. I have tested it a thousand times on my own computer with my own data and with no alternate backup regime. It worked for me. If it didn't work for you, it's probably your fault. There, is that harsh enough for disclaimer or what?

3.2. Mindi Linux

Mindi Linux creates a set of boot/root floppy disk images that will let you perform basic system maintenance on your Linux distro. The principal virtues of Mindi's boot disks are the fact that they contain your kernel, modules, tools and libraries. You can ask for additional binaries (or other files) to be included on the kit. The libraries will be added for you.

Whichever modules were loaded at backup-time, they are reloaded at boot-time. So, in theory, you will boot into almost the same environment as you were in when you backed up. If you want to add files to your Mindi boot disks, edit '`<INSTALLPATH OF MINDI>/mindi/deplist.txt`' and add the files to that list. The added files and dependencies, will be spread across the data disks at run-time.

3.3. Linux Backup

Mondo Rescue and Mindi Linux are used primarily as Linux backup and cloning tools. The fall in prices of CD-RW drives and writable discs allows current users to keep good backups and future users to leverage the cloning

capability.

3.4. Windows Backup

Backing up windows partitions.

3.4.1. Windows ME/95/98

Verify that the partition is listed in `/etc/fstab` and is mounted (e.g. `/dev/hda1`). Mondo will take care of everything else. The files will be archived just like all other files in the live file system. At restore-time, Mondo will take care of the boot sector of `/dev/hda1` prior to the restore.

Note: if Windows ME/95/98 is not located on `/dev/hda1` or `/dev/sda1`, then Mondo will not take care of the boot sector of `/dev/hda1`. The user will have to boot from a DOS floppy and run `SYS C:` to correct the Windows boot sector.

3.4.2. Windows NT4/2K/XP

Windows NT4/2K/XP typically use the NTFS file system, not VFAT.. The user should use `'-x /dev/hda1'` (or whichever device the Windows partition resides). Mondo will treat the partition as a biggiefile. Mondo will also add an entry to the mountlist to reflect the size and type of the partition. The user may not edit that partition's size at restore-time (for obvious reasons).

3.5. Mondo Rescue and Mindi Linux History

Mondo Rescue was created in December 1999 as a utility to clone Linux/Windows installations. Norton Ghost would not do the job, and my boss wanted to jump on the Linux bandwagon. So, I wrote a few scripts and shoehorned them into the latest Linux-Mandrake CD. Since that time, Mondo grew into a disaster recovery suite for Linux and Windows. Mondo forced me to learn about the kernel, its `initrd` initial ramdisk, modules, library dependencies, disk partitioning, and the myriad differences between the Top 10 Linux distributions.

Chapter 4. System Requirements

4.1. Hardware Requirements

Your computer must have:

- Intel(R)-compatible CPU
- 64MB of RAM (128MB recommended)
- 800MB of hard disk space free

Note: It is recommended that your computer have very good airflow. The backup with Mondo Rescue and Mindi Linux will utilize your CPU, CD drive and fixed disk(s) like very few other applications. With a few hours of system backup activity, computers without sufficient airflow may show symptoms such as not burning full CD discs. The solution is a \$20 or less additional fan at your local electronics discount store.

4.2. Linux Kernel Support

Your kernel must have:

- stable loopfs support, which means it really needs to be 2.2.19 or 2.4.7 (or later)
- CD-ROM device support
- ISO9660 file system support
- initrd ramdisk support (built-in)
- Virtual memory file system support (built-in)
- floppy disk support (built in)
- ext2 file system support (built-in)
- Support for the backup media (Tape, CD-RW, NFS, Hard disk)
- If the backup media is CD-RW then you need SCSI emulation also

4.3. Linux Kernel Modules

Mondo (specifically Mindi) does not require any specific modules. It does require that your kernel support the initrd initial ramdisk facility. Typically this is supported by the Linux kernel. Modules used are needed to support the CD, floppy disks, hard disks, etc. If the support is modular, then the modules will be incorporated in a boot disk by Mindi. If the support is built-in (static), then it will be available at boot-time by default.

4.4. Related Linux Packages

- afio [tgz] (<http://metalab.unc.edu/pub/linux/system/backup/afio-2.4.7.tgz>) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=afio>)
- buffer [tgz] (<http://www.microwerks.net/~hugo/download/download/buffer-1.19.tgz>) [rpm] (<ftp://rpmfind.net/linux/contrib/libc6/i386/buffer-1.19-1.i386.rpm>)
- bzip2 [tgz] (<ftp://sourceware.cygnum.com/pub/bzip2/v100/bzip2-1.0.1.tar.gz>) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=bzip2>)
- cdrtools [tgz] (<ftp://ftp.fokus.gmd.de/pub/unix/cdrecord/>) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=cdrecord>)
- ncurses [tgz] (<ftp://ftp.gnu.org/gnu/ncurses/>) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=ncurses>)
- newt [tgz] (<ftp://ftp.msg.com.mx/pub/Newt/Newt-1.08.tar.gz>) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=newt>)
- Isolinux [tgz] (<http://syslinux.zytor.com/iso.php>) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=isolinux>)
- lzo [tgz] (<http://www.oberhumer.com/opensource/lzo/>) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=lzo>)
- lzop [tgz] (<http://www.oberhumer.com/opensource/lzop/>) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=lzop>)
- mkisofs [tgz] (<ftp://ftp.fokus.gmd.de/pub/unix/cdrecord/mkisofs/mkisofs-1.13.tar.gz>) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=mkisofs>)
- slang [tgz] (<ftp://space.mit.edu/pub/davis/slang/v1.4/slang-1.4.4.tar.gz>) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=slang>)
- Alien (for Debian users wishing to convert RPMs to DEBs) [tgz] (http://kitenet.net/programs/code/alien/alien_8.00.tar.gz) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=alien>)
- popt [tgz] (<ftp://ftp.rpm.org/pub/rpm/dist/rpm-4.0.x/>) [rpm] (<http://rpmfind.net/linux/rpm2html/search.php?query=popt>)

Chapter 5. Installation

5.1. Mindi

5.1.1. TGZ

If you are installing from a tarball then copy it to wherever you have enough space, for example /tmp and type:

```
bash# cd /tmp
bash# tar -zxvf mindi-0.5x.tgz
bash# cd mindi-0.5x
bash# ./install.sh
```

This installs mindi into /usr/local/share/mindi and installs links to the programs into /usr/local/sbin

5.1.2. RPM

Or, if you are installing from an RPM then copy it to wherever you have enough space, for example /tmp and type:

```
bash# rpm -Uvh /tmp/mindi-0.5x-x.i386.rpm
```

This installs mindi into /usr/share/mindi and installs links to the programs into /usr/sbin

5.1.3. DEB

Debian users may wish to first create a .deb file and then use the debian package manager:

```
bash# cd /tmp
bash# alien mindi*.rpm
bash# dpkg -i mindi*.deb
```

This installs mindi into /usr/share/mindi and installs links to the programs into /usr/sbin

5.2. Mondo

5.2.1. TGZ

If you are installing from a tarball then copy it to wherever you have enough space, for example /tmp and type:

```
bash# cd /tmp
bash# tar -zxvf mondo-1.4x.tgz
bash# cd mondo-1.4x
```

```
bash# ./configure && make && make install
```

This installs mondo into `/usr/local/share/mondo` and installs links to the programs into `/usr/local/bin`

5.2.2. RPM

Or, if you are installing from an RPM then copy it to wherever you have enough space, for example `/tmp` and type:

```
bash# rpm -Uvh /tmp/mondo-1.4x-x.i386.rpm
```

This installs mondo into `/usr/share/mondo` and installs links to the programs into `/usr/bin`

5.2.3. DEB

Debian users may wish to first create a `.deb` file and then use the debian package manager:

```
bash# cd /tmp
bash# alien mondo*.rpm
bash# dpkg -i mondo*.deb
```

This installs mondo into `/usr/share/mondo` and installs links to the programs into `/usr/bin`

Chapter 6. Testing Mindi

6.1. Making a Test CD

Since mindi is a vital part of the backup procedure, i would recommend trying it out first to see if it can produce a bootable CD on you're system.

Make sure you are root while doing this, otherwise mindi will fail, now do this.

Type:

```
bash# mindi
```

Example screen output, selecting to use your own kernel, to create boot disks, and to create a bootable CD image:

```
Mindi Linux mini-distro generator v0.58 by HRabson <hugo@firstlinux.net>
-----
Do you want to use your own kernel to build the boot disk (y/n) ? y
Your kernel is /boot/vmlinuz-2.4.14-k6 (v2.4.14-k6)
Generating list of dependency files..... Done.
Analyzing your keyboard's configuration.
Adding the following keyboard mapping tables:..... Done
Dropping i686-optimized libraries if appropriate.....Done
Assembling dependency files..... Done.
The files have been subdivided into 2 directories.
Your mountlist will look like this:-
DEVICE MOUNTPOINT FORMAT SIZE (MB)
/dev/hda3 / ext2 996
/dev/hda2 swap swap 127
/dev/hda4 /usr ext2 6189
Tarring and zipping the groups..... Done.
Creating data disk #1...#2... Done.
1722KB boot disk was created OK..... Done.
2880KB boot disk was created OK..... Done.
In the directory '/root/images/mindi' you will find the images:-
mindi-boot.1722.img mindi-boot.2880.img mindi-data-1.img mindi-data-2.img
Would you like to create boot+data floppy disks now (y/n) ?y
WARNING! THIS WILL ERASE YOUR FLOPPY DISKS.
About to write boot disk. Please press ENTER.
Writing boot disk..... Done.
About to write data disk #1. Please press ENTER.
Writing data disk #1..... Done.
About to write data disk #2. Please press ENTER.
Writing data disk #2..... Done.
Shall I make a bootable CD image? (y/n) y
Finished.
```

One 1.72MB boot disk, one 2.88MB boot disk and 2 data disks were created.

If your kernel is too large (more than about 900KB) then you cannot make boot floppies, although you can still make a bootable CD image. The easiest way to test Mindi in either case is to say 'n' to its first question and 'y' to its second, then use the separate application `cdrecord` to make a bootable CD-R or CD-RW.

6.2. Writing the Test CD image

Use the `cdrecord` application to write the CD image:

```
bash# cd /root/images/mindi
bash# cdrecord -scanbus
```

The output of the above call to `cdrecord` will tell you your CD writer's node. It is usually '0,0,0'. Choose one of the following calls to write the CD, depending on whether the disk in the drive is a CD-R or a CD-RW. Please replace 'x,x,x' with your writer's node. For further information, type 'man `cdrecord`' from a Linux command line.

If writing to a CD-RW Drive/Disc:

```
bash# cdrecord -blank fast dev=x,x,x speed=2 mindi.iso (for CD-RW)
```

If writing to a CD-R Drive/Disc:

```
bash# cdrecord dev=x,x,x speed=2 mindi.iso (for CD-R)
```

Chapter 7. Backup

7.1. Trying

Mama does Mondo? Papa does Mondo? Is that a Dean Martin song? Well, anyway, here is how I backup my system:

- Shut down all possible applications (this minimizes any compare differences following the backup)
- Type:

```
bash# cdrecord -scanbus
bash# cd /home
bash# mondoarchive -Ow 2 -d 0,0,0 -9
```

Cdrecord will tell me where my CD recorder lives, in SCSI terms, which in my case is '0,0,0'. By running Mondo from my /home directory, I am asking Mondo to use my /home directory for temp storage space. This does not affect your data. Mondo creates a folder called 'mondo.scratch' in your home directory; it then deletes it when it is done. Finally, the call to mondoarchive tells Mondo that I want to backup everything to a 2x CD-RW drive that has a CD-RW disk in it. (Use -Oc instead of -Ow if you are using CD-R.)

Please put the first CD-R(W) in the drive now. You will be prompted to insert CD #2 but you will not be prompted to insert the first disk. However, if you forget, do not worry: if Mondo fails to write the first (or any) disk, it will offer to retry, abort or fail.

I run Mondo at the highest compression available and then go to work. I then walk home at lunch (I live right by my workplace), change CD, eat lunch, and go back to work. When I get home, it has all been done.

Your mileage may vary. Experiment. Find the speed/compression compromise that best suits your needs.

7.2. Backup Command and Options

Backup Command:

```
mondoarchive <-option1> <-option2> ... <-optionN>
```

E.g.,

```
bash# mondoarchive -E /mnt/dos /mnt/cdrom -9 -Oc 2 -d 0,0,0
```

Would create backup CD to a CD-R disc at the highest compression level, writing at speed 2 and ignoring the /mnt/dos and /mnt/cdrom directories.

To see a detailed list of switches and their meaning, see the HTML man page (<http://www.microwerks.net/~hugo/download/mondoarchive.1.html>) on the website or type 'man mondoarchive' at the console.

7.2.1. Standard Example With CD-R

```
bash# mondoarchive -Oc 2 -d 0,0,0
```

Replace '2' in '-Oc2' with the writer's speed.

Please insert the first disk in the writer while the PC is chugging away. If Mondo needs additional CD-R(W) then it will ask for them.

7.2.2. Standard Example With CD-RW

```
bash# mondoarchive -Ow 2 -d 0,0,0
```

Replace '2' in '-Ow2' with the writer's speed.

Please insert the first disk in the writer while the PC is chugging away. If Mondo needs additional CD-R(W) then it will ask for them.

7.2.3. Standard Example With Tape

```
bash# mondoarchive -Ot -d /dev/st0 -s 4g
```

7.2.4. Failsafe Kernel Example w/CD-RW

```
bash# mondoarchive -k FAILSAFE -Ow 2 -d 0,0,0
```

Due to slight policy differences in the Debian distribution approach, the '-k FAILSAFE' option is typically needed with Debian.

7.2.5. Network backup example

```
bash# mount 192.168.1.3:/home/nfs -t nfs /mnt/nfs
bash# mondoarchive -OVn 192.168.1.3:/home/nfs -g -s 200m
bash# umount /mnt/nfs
```

The resultant ISO's can be burned to CD's if you want (which isn't a good idea unless you're a Mondo expert because they'll try to restore over a network by default, which is silly cos the archives are on the CD's). Or, you can boot from the Mindi floppies (or mindi.iso) and hit ENTER a few times to restore.

Chapter 8. Compare

Before you trust your backup CD, make sure your BIOS can boot CD (and that it is configured to do so).

- Boot from the first CD.
- Type:

```
bash# compare
```

Follow the on-screen instructions. This will compare your backup against your original file system.

FYI, no data loss has been reported since May 2000. Having said that, I would still encourage you to run Compare before trusting the backups.

To view the file differences, look at the file `~/tmp/changed.txt`. Normal differences include logs and other dynamic system files that changed during the time of the backup process. If only a few files differ - e.g. files in `/var`, files ending in `~`, logs, temporary files, `/etc/mstab`, `/etc/adjtimex` - then you know the archives are good.

Chapter 9. Restore

9.1. Overview

I hope you don't have to restore very often. It's nerve-wracking until you realize that Mondo's restore engine is very reliable. I backup and restore my system 2 or 3 times a week as part of the testing process. I have no other backup regime, so it had better work.

If you find that you cannot make your PC boot from the CD, take heart: the first backup CD of each set contains floppy disk images to give you the same functionality as the CD (minus the archives, of course J) on floppies. Remember, your Mondo CD is a fully functional CD-based mini-distribution as well as a recovery CD.

You can choose from the following modes:

Interactive

Restore step-by-step, or restore a subset of the archives. This is the method you should mainly use for your recovery needs.

Nuke

Wipe your drives and restore everything, automatically and unattended. Warning: This does exactly what it says, so be careful using it.

Expert

Boot to a shell prompt. If you want to do anything creative, you should boot into Expert Mode. It's called expert, I think that says it all.

If the CD is not found during the initial restore CD boot attempt, reboot the PC a second time prior to reporting failure. Occasional timing errors and hardware/software/system conflicts do occur.

9.2. Restore-Related Tips

Ideally, restore your system to a spare hard drive to test the integrity and reliability of your disks. To do that, either edit your mountlist to make the devices point to your spare hard drive, or swap your hard drive cables between boots.

At a bare minimum, compare your CD against your file system before you decide whether to trust them.

To test Mondo's ability to handle your LILO file:

- Boot from the backup CD into Expert Mode
- Type:

```
bash# mount-me  
bash# stablilo-me  
bash# unmount-me
```

- To fix any mess it made, type:

```
bash# lilo -r /mnt/RESTORING -c lilo.conf.pre-hack
```

- (Oh, and later, copy lilo.conf.pre-hack back to lilo.conf.)

9.2.1. Barebones (Nuke) Restore

Imagine that your hard drives happen to be wiped, deliberately or accidentally. Or, imagine that you want to clone your existing operating system. In either case, you want to run in Nuke Mode.

If you want to wipe everything and restore your whole system from CD, please:

- Boot from the first Mondo CD
- Press <enter>
- Insert the subsequent CD when asked
- Watch the screen for errors

That's it.

Now, should something go wrong, you will be able to examine /tmp/mondo-restore.log to see what happened. All is not lost. You can fdisk and format the partitions yourself, using the tools that come with the CD. You can then mount the drives manually and type 'restore-me' to restore all data; then run 'lilo -r /mnt/RESTORING' to reconfigure the boot sectors; finally, unmount the partitions manually. That is as a last resort. I have never had to do that - at least, not with any published version of Mondo.

If you want to see exactly what Mondo is doing while it is restoring, press <Alt><à> and type 'tail -f /tmp/mondo-restore.log' to monitor its progress in detail.

9.2.2. Interactive Restore

Interactive Mode is for people who have lost a subset of data from their live file system, or perhaps who have lost some data from their latest backup and want to restore a subset of data from an earlier backup. If you want to restore only some files or if you do not want to prep/format your drives, then you should boot into Interactive Mode. The interactive mode will provide an 'Editing mountlist screen' that allows you to setup a different disk geometry.

To move up and down between partitions in the 'Editing mountlist screen', use the Up and Down arrows. To move between the main window and the buttons at the bottom, use the Left and Right cursor keys. TAB shifts focus from one screen item to the other in a haphazard fashion, owing to the complexities of the Newt library.

If you want to restore selectively, just press <enter> and follow the on-screen instructions. You will be asked to say yes/no to a range of questions.

If you are planning to modify your partition table, you would do well to read up on the partition layout and the use of fdisk, it gives you some good pointers on how to best lay out partitions. You can find good guide her.

<http://www.linuxdoc.org/HOWTO/mini/Partition/index.html>

If you want to restore a subset of the backup then:

- Boot from the CD
- Type:

```
bash# interactive
```

- Then, after booting, answer the questions as follows:

```
Do you want to partition your devices? yes
Do you want to format them? no
Do you want to restore everything? no
Do you want to restore something? yes
Which path do you want to restore? /home/hugo [e.g.]
Do you want to run LILO to setup your boot sectors? Yes
```

9.2.3. Expert Restore

If you are planning to modify your partition table, you would do well to read up on the partition layout and the use of fdisk, it gives you some pointers on how to best lay out partitions. You can find good guide [here](http://www.linuxdoc.org/HOWTO/mini/Partition/index.html).

<http://www.linuxdoc.org/HOWTO/mini/Partition/index.html>

To restore manually, please:

- Boot from the first CD, then type:

```
bash# expert
```

- Then type the following:

```
bash# pico /tmp/mountlist.txt
```

- (edit the mountlist)

```
bash# mondorestore
```

9.2.4. Modified partitions - Restore to a different disk geometry

One of the nice things about Mondo is that it lets you wipe your existing system and restore it in any layout you like (within reason). You can move from non-RAID to RAID, install and utilize additional drives, move from ext2 to ReiserFS, etc., all without risking the loss of data.

If the user excluded a particular partition from backup and specifically excluded it from the mountlist itself using -E then Mondo will insert a small (32MB) partition at restore-time, in order to avoid having to re-jig fstab, the partition table, etc.

To do this:

- Boot into Expert Mode, then type:

```
bash# expert
```

- Wait for the shell prompt, then type:

```
bash# pico /tmp/mountlist.txt
```

- (edit the mountlist)

Pico is a text editor. You may edit the layout of the partitions, the sizes and the formats before you format and restore them. If you have added a hard drive, list it here.

If you want to move from ext2 to ReiserFS, you can do it here (so long as your kernel supports ReiserFS). Ditto for XFS, JFS or ext3.

Stabilo-me will modify your /etc/fstab to reflect changes you have made to the mountlist. If you are not using LILO, you can still create your own /mnt/RESTORING/etc/lilo.conf and run `lilo -r /mnt/RESTORING` to configure your boot sectors and Master Boot Record.

Mondo (technically, Mindi on behalf of Mondo) creates a file called a mountlist. This can be found on the ramdisk at /tmp/mountlist.txt; it looks something like this:

```
/dev/hda1/mnt/windows vfat 4096000
/dev/hda5 / reiserfs 6023000>
/dev/hda6 /tmp xfs 955000
/dev/hda7 /usr xfs 4096000
```

It is fairly easy to understand the list. Each line refers to a single device/partition. The line format is:

```
<device> <partition> <format> <Kilobytes>
```

If you have added a hard drive and want to take advantage of the additional space, you could amend the above mountlist to read:

```
/dev/hda1/mnt/windows vfat 6096000
/dev/hda5 / reiserfs 9123000
/dev/hda6 /tmp xfs 955000
/dev/hdb1 /usr xfs 8192000
/dev/hdb2 /home xfs 8192000
```

This assumes that your old hard drive is /dev/hda and the new hard drive is /dev/hdb.

Or, if you want to add RAID support, create a new /etc/raidtab on the ramdisk (which is beyond the scope of this HOWTO) and then write a mountlist like this:

```
/dev/hda1 /mnt/windows vfat 6096000
/dev/md0 / reiserfs 9123000
/dev/md1 /tmp xfs 955000
/dev/md2 xfs 8192000
/dev/md3 /home xfs 8192000
```

So long as your `/etc/raidtab` file is sane, Mondo can automatically partition and format your disks for you, including the RAID devices.

Once you have finished editing `/tmp/mountlist.txt` (and `/etc/raidtab` if necessary) then you may run `'mondo-restore --interactive'`.

9.2.5. Advanced

Future content is planned for this section.

In principle, you could do everything by hand using the Mondo CD as a big mini-distro. You could partition, format, mount and restore the disks yourself. Mondo comes with scripts and tools to automate the process but in a jam you could do everything manually.

Chapter 10. Troubleshooting/FAQ

10.1. Overview

Are the errors from Mindi or Mondo? Look at `/var/log/mondo-archive.log`, `/var/log/mindi.log` or the `mondo.err.xxxxx.tgz` log indicated by the screen message. Pipe screen errors which relate to the creation of boot disk(s) and or data disk(s) to a text file.

See the web site (<http://www.microwerks.net/~hugo>) for details. If you are going to e-mail the list (or me) then please attach that text file and tell me:

- Your kernel version
- Your Linux distro's name and version
- Whether your kernel supports `initrd` and `loopfs`; it should!
- What sort of PC you are using, including hard disk configurations

Mondo is freely available, you are given it for no charge and I am giving you technical support in my spare time. When you e-mail me, please bear this in mind.

10.2. General

Q: What is "Mindi"?

A: Mindi, a.k.a. Mindi-Linux, makes a mini-distribution from your kernel, modules, modules, tools and libraries. It can also generate an El Torito 2.88MB boot disk image. Mondo uses Mindi to create a mini-distro, then boots from it and runs on it.

Q: Why is it called "Mondo"?

A: The Teenage Mutant Ninja Turtles described cool things as 'mondo'. I wasn't sure what to call this project. 'Faust' was one idea I had, partly as a dig at my former boss who practically owned me because of my legal status at the time. In the end, I chose something short and distinctive.

Q: Mondo does not work on my system. It keels over and dies. What's wrong?

A: It works on Red Hat 7.x, Linux-Mandrake 8.x, some flavors of SuSE, some flavors of Slackware, some flavors of Debian, etc. Do you have any idea how many little differences exist between these distributions? The more distributions I support, the more moving targets I have to hit. Please bear this in mind when e-mailing me. If you would like to help me by beta-testing Mondo (or Mindi) on your PC then I would be very interested in working with you to work around the eccentricities of your Linux distro. However, rest assured, 90% of the bugs reported to me are actually symptoms of FooLinux X.Y's unique way of doing things.

Q: What if the error is in Mindi?

A: Then send me a copy of `/var/log/mindi.log`, along with a description of your distro, your kernel, etc.

Q: Can I trust Mondo?

A: Mondo has generated reliable archives since May 2000. I have lost data by using bad CD-R disks and not verifying their contents. Some users have not tried booting from their CD until crunch time. Remember to boot into Compare Mode to verify the backup before you trust it. If Mondo did not work, you would not be reading this. If it does not work for you, your kernel is usually the culprit. Check Linux Kernel support to see what your kernel should support. Please e-mail the list (or me) if you need some help with this.

Q: How do I report a bug?

A: E-mail the bug report (mondo.err.xxxxx.tgz) to me. If you want to discuss it, please e-mail the list. The list is for talking; my e-mail address is for big files. :-) If you don't send me a logfile then there isn't a lot that I can do for you, so PLEASE include a logfile at the very least. Or, pop into #mondo on irc.redhat.com and see if I'm there.

Q: I think Mondo should (...insert suggestion here...) and I have rewritten it accordingly. Would you like to see my patch?

A: Absolutely! :-) The best way for you to make Mondo do what you want is to modify it and then send me the patch. That way, we can all benefit.

Q: I think Mondo should (...insert suggestion here...); will you incorporate this feature for me, please?

A: I'll definitely think about it. Would you like to help?

Q: Mondo says, "XXX is missing," and then terminates. What's wrong?

A: A good Linux distribution should contain XXX but the designers, in their infinite wisdom, decided not to include that particular tool. Check Related Linux Packages and install the missing package. If that fails, contact the vendor/distributor/manufacturer/designer of your distro.

Q: Can Mondo handle multi-CD backups and restores?

A: Yes, up to twenty CD per set. This 20-CD limit results from laziness on my part. I can remove it at any time. However, if your system occupies more than 20 CD, may I recommend that you invest in a tape streamer?

Q: Can Mondo handle Linux/Windows dual-boot systems?

A: Yes. If your system currently boots into Linux or Windows via LILO, you can backup and restore both OSES at the same time using Mondo. If you are using NTFS then add the switch, '-x <device>'.

Q: Can Mondo backup Windows-only systems?

A: Sure, if you pay me to play catch-up to Microsoft. ;)

Q: Does Mondo support LVM?

A: Mondo supports LVM, yes. Mondo backs up and restores your existing setup but it does not make it easy for you to change your LVM configuration. You have to edit /tmp/i-want-my-lvm (IIRC) at boot-time to do that.

Q: What if I don't use LILO? What if I use GRUB?

A: GRUB is supported by current Mondo versions.

Q: Mondoarchive (or mondorestore) segfaults when I run it. What could be wrong?

A: Install from tarball instead of RPM. (Or, try RPM if you just installed from tarball.) Your compiler or your libraries may be fubar. We'll see. If that doesn't work then please e-mail the mailing list.

Q: I get the error, 'Cannot find /tmp/dev.0' or 'Cannot mount device 0x0701'; what do I do?

A: Please free up /dev/loop0 using 'losetup /dev/loop0 -d' to unmount that loop device. If your OS will not let you do that, contact your local support group or Linux vendor.

Q: Can I create a Mondo CD and then use it to create an archive of any OS on any PC?

A: Not yet. You can use Mondo to backup Linux or Linux/Windows dual boot. One day, Mondo will let you backup partitions it can't read or write, by treating each partition as one long file to be backed up. This file will be chopped, compressed and archived like any other big file.

Q: Why do you insist on putting floppy disk images on Mondo CD? They waste space and I never use them. The CD works just fine, so why keep the floppy disk images?

A: Because of my old college buddy, Justin Case. If you really, truly want them gone then please submit a patch to make them optional.

Q: Why doesn't the Mondo project have a cool-looking animal logo?

A: Excellent question! Please submit graphics of candidate animal logos!

Q: Is there a Mondo user 'Code of Conduct'?

A: Yes. Read the HOWTO. Submit patches. Recommend realistic improvements. Be courteous to other users on the discussion list. Do not whine.

10.3. Kernel/Linux/Booting

Q: How do I know if Mondo works with my Linux distro?

A: Check the download page (<http://www.microwerks.net/~hugo/download.html>).

Q: When I try to boot from the Mondo CD, it says, "VFS: Unable to mount root fs." I am using a Debian distro. What do I do?

A: Ask Debian's designers why they, unlike every other distro I can find, have included cramfs and other 'goodies' with their kernel. In the meantime, please use '-k FAILSAFE' in your command line when calling Mondo.

Q: When I try to boot from the Mondo CD, it says, "Cannot mount root fs - kernel panic," or something similar. What do I do?

A: Recompile your kernel (or use '-k FAILSAFE'). Take a look at Linux Kernel support to see what you're kernel must support.

Q: When I try to boot from the Mondo CD, it says, "Mounting /tmp/tmpfs...fatal error! Failed UPGRADE YOUR RAM". What does that mean?

A: Recompile your kernel and add Virtual memory file system support. Take a look at Linux Kernel support to see what you're kernel must support.

Q: When I try to boot from the Mondo CD, it says something about not finding my CD-ROM drive and then it blames the kernel. What does that mean?

A: Your kernel must support initrd, loopfs, IDE CD-ROM's, and ramdisks. Take a look at Linux Kernel support to see what your kernel must support. If your kernel does not support these things, Mondo will not boot from your CD. However, when running Mindi, you may choose to use `_its_` kernel instead of your own. In addition, you may boot from floppy disk images instead the CD: copy the disk images from the CD /images directory to floppy disks, using `'dd'`. Take a look at Copy boot data disks on how to make those.

Q: The Mondo CD/floppy takes ages to boot. How can I speed it up?

A: Edit `/usr/local/mindi/mindi` and change `LILO_OPTIONS=""` to `LILO_OPTIONS="-c"`. This enables map compaction in lilo and speeds up booting, for more info see the lilo man page.

Q: I made a Mondo CD using the failsafe kernel (i.e. I said 'no' when Mondo asked if I wanted to use my own kernel). It still doesn't boot. Help!

A: OK, now `_that_` is a bug. :-) I included a kernel with Mondo (technically, with Mindi, which Mondo uses) to make sure that users could use Mondo despite flaws in their own kernels. If you are using Mondo/Mindi's kernel but still cannot boot from your Mondo CD then please e-mail the list.

Q: What if my PC won't boot from a CD?

A: Copy the image files from the CD /images directory, using the `dd` command. Take a look at Copy boot data disks on how to make those. Then boot from the first floppy; follow it up with the data disks; finally, type `'mount /mnt/cdrom'` and then utilize the restore script as usual, e.g. `mondorestore`.

Q: But why won't Mondo boot from my CD? It says my kernel is flawed/outdated/ whatever, and when I wrote to you, you told me the same thing... but I still don't get it. I mean, my kernel works for everything else. Why not Mondo?

A: Because Mondo makes a boot disk using your kernel. I bet your other software doesn't do that. Also, not all kernels are suitable for boot disks. I'm sorry but that's Life. Upgrade your kernel and/or recompile it. Take a look at Linux Kernel support to see what your kernel must support.

Q: Why do I only need a boot disk if I'm using a tape drive? Where are the data disks?

A: On the tape. :-) The first 32MB of the tape will be set aside for a large tarball containing the data disks, a list of all files backed up, and other sundries. If Mondo and Mindi do their respective jobs then you won't need additional floppies, just the boot floppy and the tape(s).

Q: Why does it say, "Process accounting FAILED" when I reboot?

A: You were using Process Accounting. Red Hat (or whichever distro you are using) does not provide a startup/shutdown script yet. So, when you try to backup the process log, it just grows and grows as Mondo tries to back it up. Mondo doesn't back it up anymore and that's why. The unfortunate side-effect is... well, what you see on your screen. Type `'touch /var/log/pacct'` and then `'paccton'` to fix the error message.

Q: Why does it say, "request_module[block-major-1]: Root fs not mounted VFS: Cannot open root device "100" or 01:00 Please append a correct "root=" boot option kernel panic: VFS: Unable to mount root fs on 01:00" when i boot from the CD?

A: Recompile your kernel and add initrd support. Take a look at Linux Kernel support to see what your kernel must support.

Q: How do i copy boot+data disk images to physical floppy disks ?

A: The images are in /root/images/mindi (eve if they are created by Mondo) and also in the 'images' directory on the first CD of your backup set, if you have backed up to CD. You can copy the images to disk as follows:-

```
[boot disk]
bash# fdformat /dev/fd0u1722
bash# dd if=/root/images/mindi/mindi-boot.1722.img of=/dev/fd0u1722
```

```
[data disk]
bash# fdformat /dev/fd0
bash# dd if=/root/images/mindi/mindi-data-N.img of=/dev/fd0
```

Replace N with 1, 2, etc.

10.4. Installation

Q: Why do I get, "newt.h not found," several times when I try to install Mondo?

A: You have not installed libnewt and/or libnewt-devel. Please do so. Check Related Linux Packages to see what Mondo requires and where you can get tarballs and RPM's.

Q: Newt won't compile when i try, what's the problem?

A: You are probably missing poppt.h, which newt needs to compile, it can be found in the 'popt' package. Check you're distribution and see if they have poppt, if not check Related Linux Packages to see where you can get it.

Q: I've just used up 6 CD-R, only to find that Mondo won't boot!

A: You should have used CD-RW. ;) In the HOWTO, it gives instructions on how to create a test CD (one, not six).

10.5. Hardware Related

Q: Can Mondo handle CD-RW?

A: Yes. Use '-Ow <speed> <device>' to make it work.

Q: Does Mondo support tape drives?

A: Yes. See above.

Q: Does Mondo support tape drives?

A: Yes. See above.

Q: How do I copy the floppy images from the CD to floppy disks?

A: Mount the CD-ROM, e.g. at /mnt/cdrom. Insert a blank floppy. Type:

```
bash# cd /mnt/cdrom/images
bash# dd if=mindi-boot.1722.img of=/dev/fd0u1722
```

Insert another blank floppy and type:

```
bash# dd if=mindi-data-1.img of=/dev/fd0u1722
```

Do the above for each 'mindi-data' disk image.

Q: Sometimes, my laptop won't mount Mondo CD properly, or something. Umm...

A: Please insert the CD, close the CD-ROM tray, wait a few seconds and then press Enter to acknowledge insertion of the next CD. Your laptop is on crack and is sucking a little too hard on the pipe.

Q: Does Mondo support RAID?

A: Yes. You may backup and restore RAID systems. You may also backup a non-RAID system and restore as RAID (or vice versa) by using the mountlist editor to edit your RAID and non-RAID partitions and their settings. Mondo will do the partitioning and formatting for you.

Q: Where is my CD burner, in SCSI terms?

A: Type:

```
bash# cdrecord -scanbus
```

Find your CD burner's device# (e.g. '0,0,0'). Call Mondo with the switch '-Oc <speed>' -d '<device>'. Or, if you feel lucky, just use '-Oc 2'; Mondo will (a) assume you want to write at 4x to

a CD-R and (b) will do its best to find your CD burner.

Q: Can Mondo handle SCSI devices?

A: Mondo should be able to handle almost any hardware. So long as your kernel and modules support it, Mindi will support it and therefore so will Mondo.

10.6. Backup

Q: Can Mondo burn CD as they are created?

A: Yes. Use the '-Oc <speed> <device>' switch. Use a negative number for a dummy burn.

Q: When I try to backup to CD, cdrecord/mkisofs returns an error. Nothing else appears to be wrong. What do I do?

A: Upgrade cdrecord and mkisofs.

Q: Mondo failed to burn my CD. It said something like, "Error CDB A1 01 02 53 ..." and so on. What does that mean?

A: Cdrecord reported some serious errors while trying to burn your CD. Check your CD burner, your CD-R and your kernel.

Q: May I backup my system with one partition layout and restore with another?

A: Yes. Boot in Interactive Mode and edit the mountlist using the snazzy new mountlist editor. Mondo can now edit your RAID partitions for you. Just open /dev/md0 (or whatever) and select "RAID.." to start. Or, to add a RAID device:

- Add two or more partitions, of type and mountpoint 'raid'
- Add device '/dev/md0' and click OK
- Follow the prompts and your own common-sense :)

Q: Why does Mondo need so much free disk space?

A: Because I'm a bitter, twisted man who lives to torment you. Mwahahahaha! :-) Mondo has to work around the inadequacies of mkisofs, cdrecord and your own Linux distribution; in return, it asks for a lot of free disk space.

Q: Will Mondo backup partitions whose formats are not understood by Linux, such as NTFS?

A: Yes. Use '-x <device>'. (You can have more than one device.)

Q: I am trying to do something clever, e.g. write my ISO's to an NFS mount, and I get some weird error messages. What do I do?

A: Well, (a) use '-T /tmp' or '-T /home' or something in your call to Mondo. Oh, and (b) send me /var/log/mondo-archive.log, please :-)

Q: Can Mondo backup to data files on another partition, e.g. an NFS mount?

A: Yes. Just backup as usual but add '-d /mnt/nfs' or wherever your partition is mounted; don't use '-Oc' or '-Ot' at all; just '-Oi -d /root'. Then, after booting from the floppies which Mondo generates, you need to type 'ISO' at the console.

Q: Can Mondo backup _to_ an NFS partition, i.e. backup over a network? How about restoring?

A: Yes. Use '-On <mount> <directory>'. On my system, I use:

```
bash# mondoarchive -On 192.168.1.3:/home/nfs
```

Q: Does Mondo handle System or Hidden attributes when archiving Dos/Win files?

A: No. It probably never will, either. Sorry.

Q: Why do you include IO.SYS and MSDOS.SYS in mondo-vfat, when they belong to Microsoft and are copyrighted?

A: Well, I used to, but I don't anymore. However, if you do have a Windows partition, you can still use 'format-and-kludge-vfat <DEVICE>/' to format and make bootable a VFAT partition. AFAIK, I am the only person to write a Linux equivalent of the DOS "SYS" command.

10.7. Compare

Q: When I compare my archives to my file system, Mondo tells me there are differences or errors. Are the archives bad?

A: Look at /tmp/changed.files; if the files are logfiles, temp files or files which you think you may have changed recently then the archives are simply out of date, albeit only by a few minutes. Not a problem. However, if lots of files in /usr have changed or if you get lots of _errors_ then perhaps your CD, your tapes or even your hardware could be to blame. Check your CD writer or tape streamer.

10.8. Restore

Q: Can Mondo help me move/resize/re-allocate my partitions?

A: Yes. Just backup your system in Interactive Mode using Mondo. Edit the mountlist when prompted.

Q: My zip drive is a SCSI drive. When I restore, Mondo craps out, saying it can't mount the drive (because there is no disk in it). What do I do?

A: Restore in Interactive Mode. Delete the SCSI drive from the mountlist before you restore. Then Mondo won't try to partition or format it. Next time you backup, use -E /dev/sdd (or whatever your zip drive is). The /dev entry will be excluded from the mountlist but not from the filelist. So, when you restore, you won't accidentally reformat your zip disk. However, after restoring, you will find that /dev/sdd (the _file_) will be present in your /dev directory. Cool, eh?

Q: I recieved a message like, 'Fileset NNN failed' during restore. What does it mean.

A: It usually means either you had a very large (>2GB) file which was not archived owing to a flaw in your distro or your filesystem has changed in relation to the backup.

Q: Why does my ext3 partition have less space free than when I backed it up?

A: Mondo creates a 10MB journal file area. Your journal was probably smaller than that, hence the difference.

10.9. Hugo

Q: Who are you, anyway?

A: My name is Hugo Rabson (<hugo@firstlinux.net>) and I was born in England. I emigrated in late August '99 to be with my wonderful wife, Jeanette (who is now my equally wonderful ex-wife). I worked for WebMD Transaction Services Division until my visa ran out. I am now in England, temping for \$\$\$ and working on Mondo. If you have any comments or questions, please join the mailing list (on the web page).

Q: How should I pronounce your last name?

A: Hugo Rabson - rhymes with 'bubo scabs-on'. *shrug* Well, it dows. :) Please don't make Rabson sound like Robson. I get that all the time in England.

Q: I'm still reading this FAQ. Shouldn't I get a prize or something?

A: Yes, here's a cookie. Enjoy. :-)

Q: What if my browser doesn't support cookies?

A: *groan* Corky, quit messing with me, dawg...