

GNU/THIX

THIX GUIDE

V1.0

SUPPORTS THIX 0.5.0

## Releases

### 1.0 Initial Install Document

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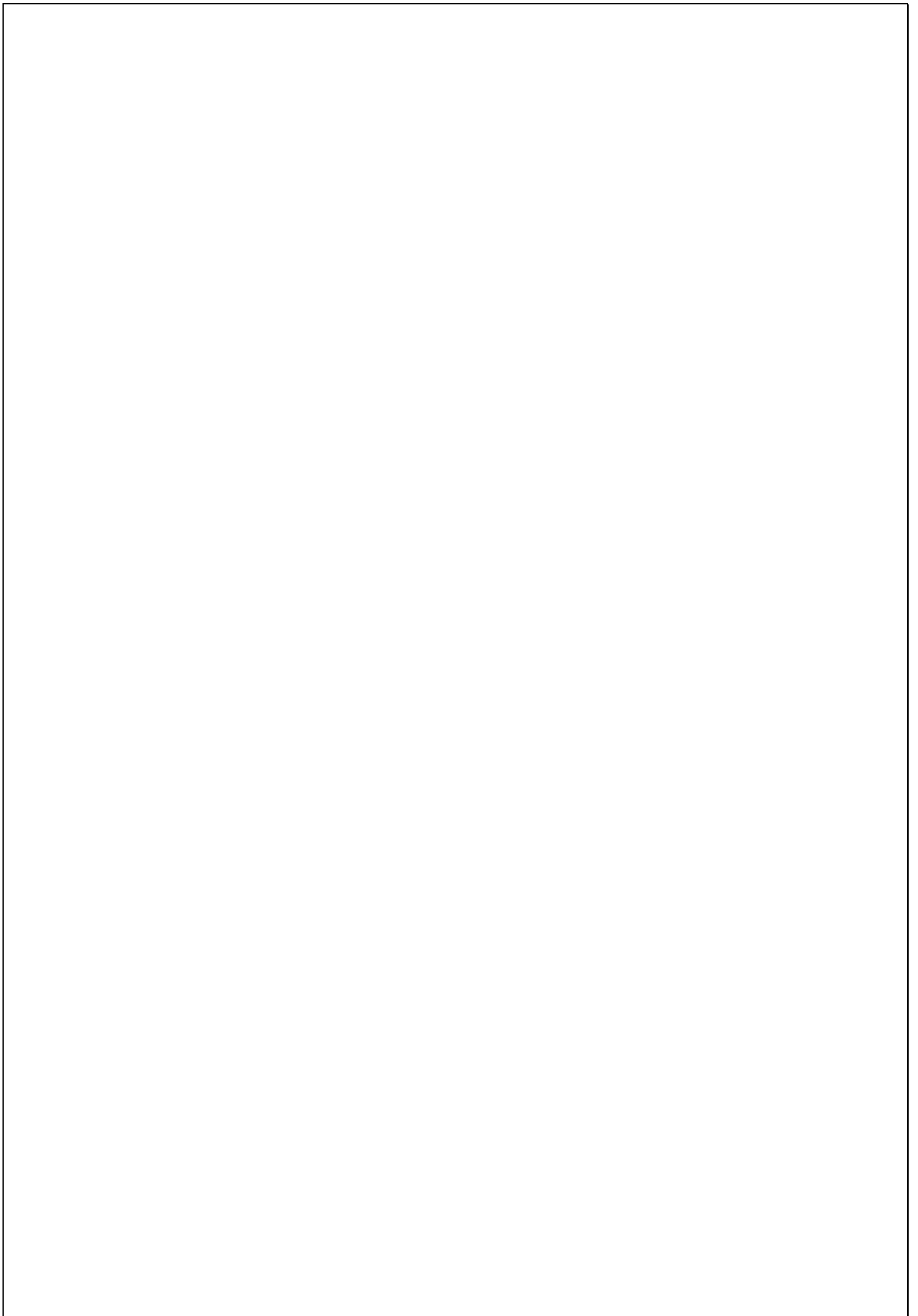
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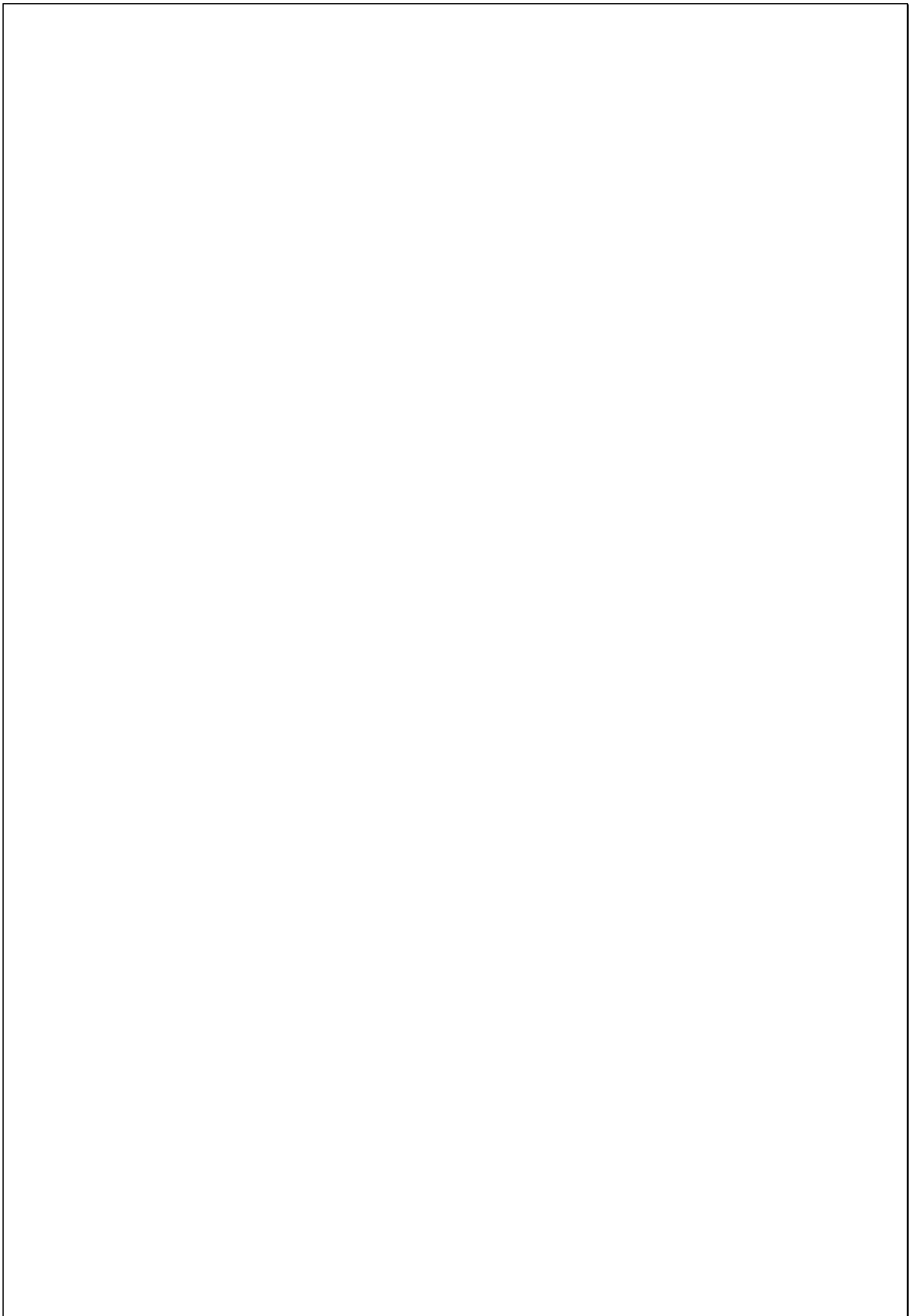
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## 1. Introduction

This is a UNIX kernel originally developed in 1995. Since then little progress has been made with the kernel. As of December 2007 Paul Hulme has taken over the maintenance and development of the Thix Kernel and OS. The aim now is to provide an up-to-date Kernel with support for many current packages from the GNU project.

This document describes how to build a fresh install of THIX OS.



# INSTALLING THIX

## 2. Required Files

To install THIX the following files are required. All are available within each release. Starting with 0.5.0.

thix-0.x.x-IMG-BIN.tar.gz

thix-0.x.x-SRC.tar.gz

thix-0.x.x-INSTALL.tar.gz

### 3. Required Hardware/Software

To install THIX OS you will require:

Hardware:

- IA-32 Processor (32bit Intel)
- 32MB RAM
- Hard Drive  $\leq 4$ GB (see appendix note A)
- Floppy Drive
- Keyboard

Software:

- Linux/Unix pre-installed
- DD or Winimage (see appendix note B)
- as86 (see appendix note D)
- ld86 (see appendix note D)
- mktfs (see appendix note E)

## 4. Build THIX Install Floppy from Image

Using file: `thix-0.x.x-INSTALL.tar.gz`

- Extract image:

<u>Linux/Unix</u>	<u>Windows</u>
<code>tar -xzf thix-0.x.x-INSTALL.tar.gz</code>	Extract using Winrar (see appendix note C)

This will produce a file “`thix-install.bin`”

- Write image to floppy: (skip if using parallels)

<u>Linux/Unix</u>	<u>Windows</u>
<code>dd if=thix-install.bin of=/dev/fd0</code>	Write using Winimage (see appendix note B)

## 5. Checking THIX Compatibility

Before trying to install THIX, we must check THIX can see and mount our Hard Drive.

Boot the floppy created in step 4.

Read the Thix boot messages carefully and see if Thix is able to correctly detect the geometry of your hard disk and if it correctly reports your *\*primary\** disk partitions. Note that Thix is not yet able to detect extended partitions or secondary (E)IDE controllers. It should only detect your master/slave hard disks (if any) on your first controller. If your hard disk works with LBA mode enabled, Thix should report it. (see fig 1)

Switch to another virtual tty and type `root` at the login prompt (password `root`). After logging in, try to see if things look ok. An important thing is to make sure that the special file denoting the partition on which you want to install Thix actually corresponds to your partition. Thix uses the same name scheme for its special files as Linux, so you will probably have no problems figuring out which is the special file needed. As an example, if you want to install Thix in the third partition on your primary master hard disk, you will want to take a look at `/dev/hda3`.

The only thing you can do is to type:

```
more /dev/hda3
```

and see if `more' displays something that you know it should be there, (a boot sector or something).

```
FDC: first floppy disk drive is 1.44M  
FDC: second floppy disk drive is not installed  
HDC: first IDE hard disk: type 47 (163/16/63) ← Fig 1
```

## 6. Build & Install THIX Partition/System

Creating the THIX partition is made up of several steps:

- a) Create partition
- b) Format TFS
- c) Install Boot Sector
- d) Install Kernel Image
- e) Install Filesystem

### a) Create Partition

Boot into your Linux system, ensuring the drive/image you wish to use for THIX is connected.

Using fdisk, create a new partition on the drive.

```
fdisk /dev/hdx    (where x is the drive letter)
```

Option n – add a new partition

```

debian:~# fdisk /dev/hdb

Command (m for help): m
Command action
 a  toggle a bootable flag
 b  edit bsd disklabel
 c  toggle the dos compatibility flag
 d  delete a partition
 l  list known partition types
 m  print this menu
 n  add a new partition
 o  create a new empty DOS partition table
 p  print the partition table
 q  quit without saving changes
 s  create a new empty Sun disklabel
 t  change a partition's system id
 u  change display/entry units
 v  verify the partition table
 w  write table to disk and exit
 x  extra functionality (experts only)

Command (m for help): n
Command action
 e  extended
 p  primary partition (1-4)

```

Follow the prompts to create your partition

(ensure partition created is a primary partition, This will not recognise extended partitions)

Once done write the new partition table to disc

(option w)

```

Command (m for help): w
The partition table has been altered!

Calling ioctl() to re-read partition table.
hdb: hdb1
hdb: hdb1
Syncing disks.
debian:~# _

```

Re-enter fdisk, using option p - print the partition table, make a note of:

Start & End Block  
Heads  
Sectors  
Cylinders  
Blocks

These will be needed during the "install boot sector" section

```

debian:~# fdisk /dev/hdb

Command (m for help): p

Disk /dev/hdb: 524 MB, 524353536 bytes
16 heads, 63 sectors/track, 1016 cylinders
Units = cylinders of 1008 * 512 = 516096 bytes

   Device Boot      Start         End      Blocks   Id  System
/dev/hdb1            1         1016     512032   83  Linux

```

## b) Format TFS

Using the MKTFS utility, available from the THIX development environment (see the building THIX section), or in the THIX-PARALLELS-0.x.x image:

To format your Thix partition. Type `mktfs -h' to get the list of possible options. It is suggested you reserve about 256K for the kernel (the -k option).

This equates to:

```
Mktfs -k <kernel space> <device> <# of 1K blocks>
```

The number of 1K blocks is found by using fdisk during the previous section, in that example we would use:

```
Mktfs -k 256 /dev/hdb1 512032
```

```
[root@thix]:/root # mktfs -k 256 /dev/hdb1 512032_  
TFS 0.2 [Software] on /dev/hdb1 info:  
block size      : 1024  
total blocks    : 66528  
data blocks     : 65216  
inodes          : 8192  
clusters       : 8  
max bad blocks  : 0  
  
1 block reserved for the boot block  
256 block(s) reserved for the second stage boot loader  
1 block reserved for the superblock [dca]  
0 block(s) reserved for the bad blocks list  
66264 blocks used for clusters  
  
Clusters info:  
superblock backup in the first block  
data blocks/cluster : 8192  
inodes/cluster      : 1024  
last cluster blocks : 7872  
  
Writing the boot block ... (not implemented yet)  
Writing the superblock ...  
Writing the bad blocks list ... (not implemented yet)  
Writing cluster 0 ...Mwriting cluster 1 ...Mwriting cluster 2 ...Mwriting clust  
Writing the root directory inode ...  
Writing the root directory ...
```

### c) Install Boot Sector

Using File:            thix-0.x.x-SRC.tar.gz

Setting up the boot sector is a three stage process:

    Edit boot.s source code

    Compile boot code

    Install boot code

#### Edit boot.s Source code

The boot.s source code is located in the thix-0.x.x-SRC.tar.gz file, in the directory “/thix/usr/src/thix/boot/harddisk”.

Edit the file boot.S. Set the HEAD\*\* and SECTORS\*\* constants to the number of heads and the number of sectors per track of your hard disk. Also set the START\_CYLINDER\*\* and START\_HEAD\*\* constants to the number of the first cylinder of your Thix partition (0-based) and to the number of the head (usually 0) where the partition starts. USE LBA NUMBERS IF YOUR HARD DISK USES LBA!

\*\*found at the end of section 6 using fdisk

```

/*
 * HEADS   - Your hard disk's number of heads.
 * SECTORS - Your hard disk's number of sectors per track.
 *
 * Note: use LBA converted numbers if your hard disk uses LBA.
 */
HEADS      EQU      64
SECTORS    EQU      63

/*
 * START_CYLINDER - The cylinder number where the Thix partition starts.
 * START_HEAD     - The head number into that cylinder.
 */
START_CYLINDER EQU    570
START_HEAD     EQU    0

```

## Compile Boot Code

- If using the THIX development environment:
  - Enter the  
home/tudor/thix/usr/src/thix/boot/harddisk  
directory
  - Run the command “make clean”
  - Run the command “make”

```

historic-linux:/ # cd /home/tudor/thix/usr/src/thix/boot/harddisk
historic-linux:/home/tudor/thix/usr/src/thix/boot/harddisk # make clean
rm -f core.* *.o *.img *.bin *~
historic-linux:/home/tudor/thix/usr/src/thix/boot/harddisk # make
as86 -0 -a -o boot.o boot.S
ld86 -0 -s -o boot.img boot.o
dd if=boot.img of=boot.bin bs=32 skip=1
19+1 records in
19+1 records out
historic-linux:/home/tudor/thix/usr/src/thix/boot/harddisk # _

```

- If using a Linux environment:
  - Enter the /thix/usr/src/thix/boot/harddisk  
directory

- Run the following commands
  - `as86 -O -a -o boot.o boot.s`
  - `ld86 -O -s -o boot.img boot.o`
  - `dd if=boot.img of=boot.bin bs=32 skip=1`

In both cases you will be left with a boot.bin file

### Install boot Code

To install the boot code we must place the code at the first sector of the drive.

Using your Linux distro, use the following command:

```
dd if=boot.bin of=/dev/hdxX
```

(where x is the drive, and X is the partition)

## d) Install Kernel Image

Using File:            `thix-0.x.x-IMG-BIN.tar.gz`

Extract the above file. There is a selection of pre-compiled Kernels. Select the Kernel image that represents your Thix system, i.e. If the drive you are installing Thix on, is The primary master drive, and is the first partition then select the Kernel image:

`thix-X.X.X-hda1`

(Be careful selecting the correct image, the kernel will not be able to mount a root filesystem if the incorrect image is selected. The image you select must reflect the drive from how Thix will see it, NOT how your linux distro sees it.)

Install the image to the Thix Drive:

```
dd if=thix of=/dev/hdxX bs=1024 seek=2
```

(where x is the drive, and X is the partition)

### e) Install Filesystem

Boot the install disk created in section 4. At the login prompt type root (password root) and then start the `install' script. Specify the name of the target partition as a command line argument:

```
install /dev/hdxX
```

(where x is the drive, and X is the partition)

This will install a minimal set of utilities on the drive and create the necessary special files in the /dev directory. When done, press Ctrl-Alt-Del to reboot.

You should now have a working, bootable but minimal Thix system. See the section Installing Packages to build up the system.

## 7. Installing Packages

Download the packages you wish to install. Put the file/package on a separate 1.44 MSDOS formatted floppy. Boot into Thix. Log in as root and type

```
mmdir a:
```

to see if you can list the files on floppies. You may install any package you want from any floppy, in any order, by running:

```
pkginst package-name
```

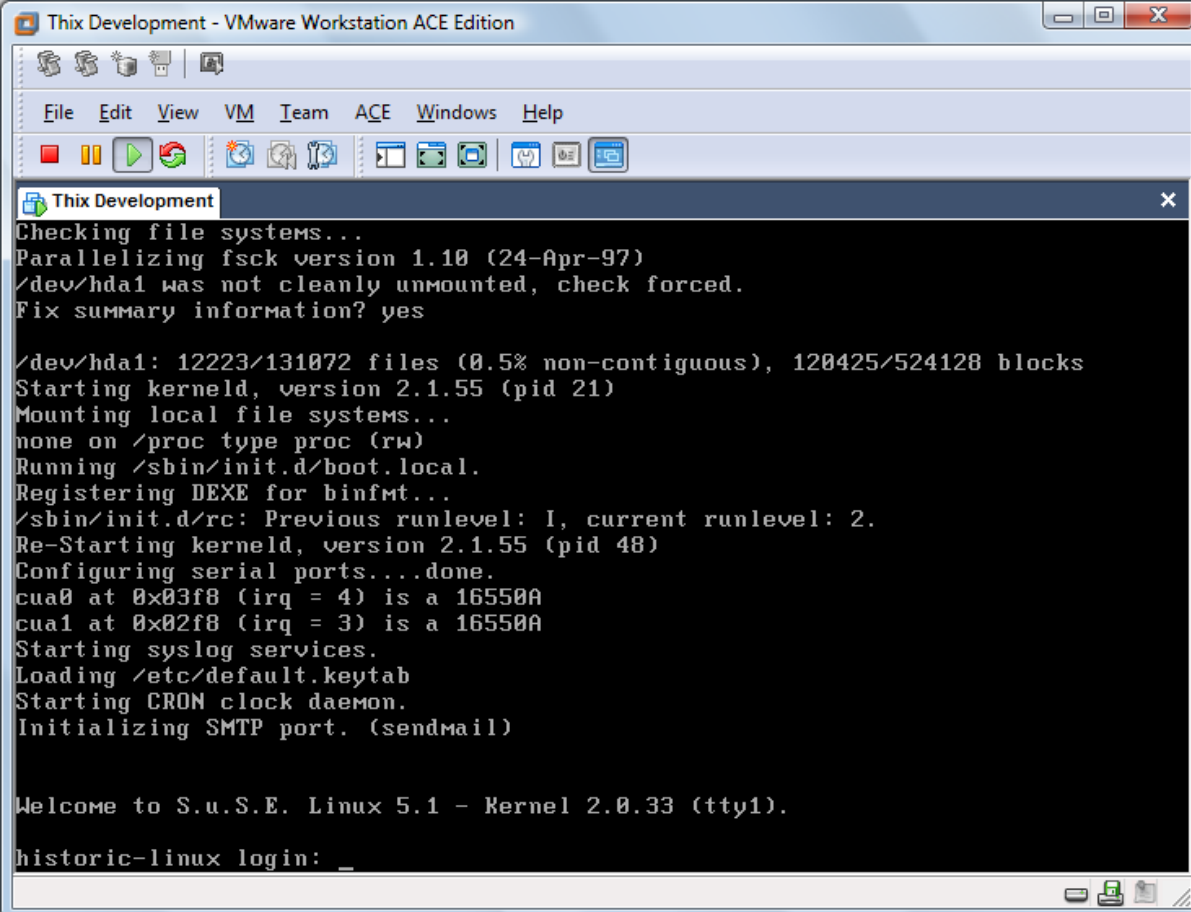
For example, to install the GNU C compiler, insert a floppy disk containing gcc.tgz in the first drive and type:

```
pkginst gcc.tgz
```

**BUILDING THIX**

## 8. Thix Development Environment

The Thix system currently uses an older compiler output, namely a.out. The Kernel is compiled with historic releases of GCC and binutils. As most current Linux/Unix variants use newer ELF compilers, compiling the Thix system is not possible. To solve this, a VMWARE image is provided for download consisting of an older release of Linux with supported compilers.



```
Thix Development - VMware Workstation ACE Edition
File Edit View VM Team ACE Windows Help
Thix Development
Checking file systems...
Parallelizing fsck version 1.10 (24-Apr-97)
/dev/hda1 was not cleanly unmounted, check forced.
Fix summary information? yes

/dev/hda1: 12223/131072 files (0.5% non-contiguous), 120425/524128 blocks
Starting kerneld, version 2.1.55 (pid 21)
Mounting local file systems...
none on /proc type proc (rw)
Running /sbin/init.d/boot.local.
Registering DEXE for binfmt...
/sbin/init.d/rc: Previous runlevel: I, current runlevel: 2.
Re-Starting kerneld, version 2.1.55 (pid 48)
Configuring serial ports...done.
cua0 at 0x03f8 (irq = 4) is a 16550A
cua1 at 0x02f8 (irq = 3) is a 16550A
Starting syslog services.
Loading /etc/default.keytab
Starting CRON clock daemon.
Initializing SMTP port. (sendmail)

Welcome to S.u.S.E. Linux 5.1 - Kernel 2.0.33 (tty1).
historic-linux login: _
```

To login:

User: ROOT

Pass: ROOT

(the image is produced by the original developer of Thix, and as such no support is available for this.  
Visit the forums for more information)

## 9. Building Kernel

Using File:            thix-0.x.x-SRC.tar.gz

To build the kernel you will require a suitable GCC compiler with binutils. The Thix development environment uses GCC 2.7.2.1, built to produce a.out files.

Using the Thix Development Environment, extract the Kernel sources to /home/tudor/src/

```
historic-linux:/home/tudor/src # ls
thix                    thix-0.4.2-SRC.tar.gz
historic-linux:/home/tudor/src # _
```

“CD” through the folders to:

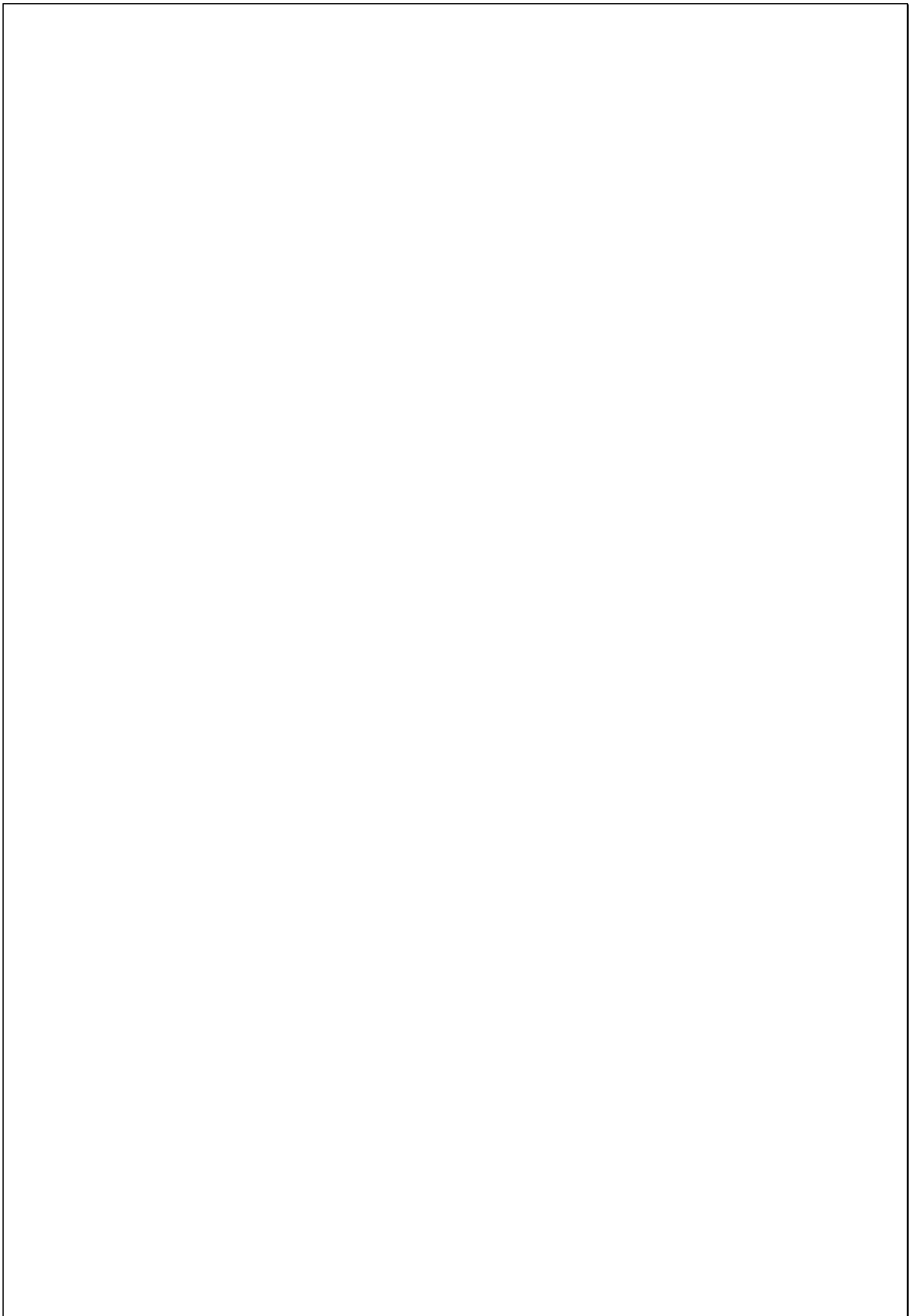
/home/tudor/src/thix/usr/src/thix

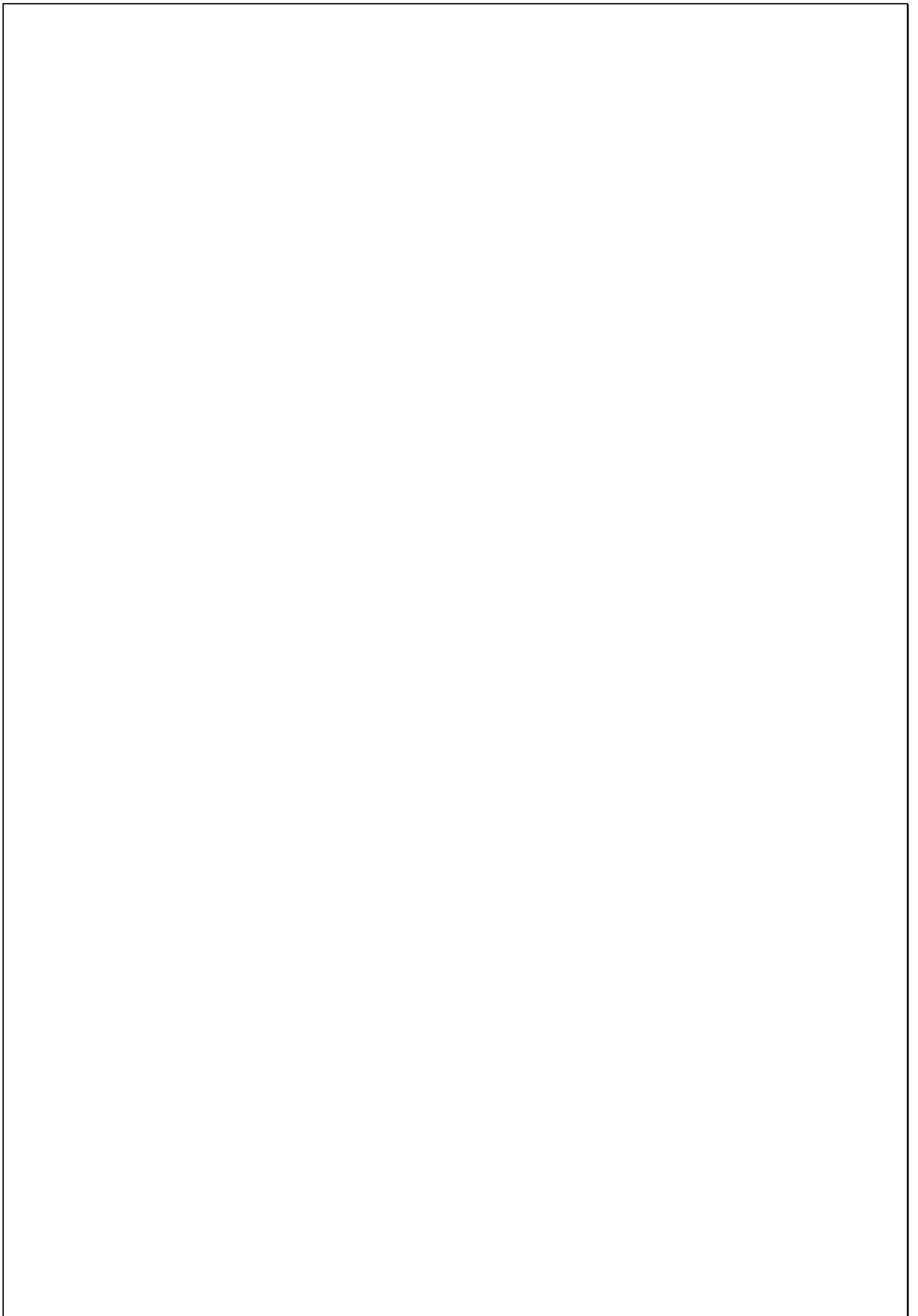
Clean up the Kernel Source`s:

*Make clean*

Now build the kernel:

*Make dep all*





**APPENDIX**

**&**

**SUBNOTES**

## APPENDIX

- A. Currently THIX`s (E)IDE driver is limited to 4GB LBA drives and 500mb CHS drives. Drives over 4GB will be ignored. This limit will be removed/fixed in future releases. If no suitable drive is available, try installing THIX on a Parallels virtual machine.
- B. Winimage is available from <http://www.winimage.com/download.htm>
- C. Winrar is available from <http://www.rarsoft.com/>
- D. AS86/LD86 are part of bin86
- E. mktfs is available via the THIX development env

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