

**LinuxDays 2005**

January 25<sup>th</sup> and 26<sup>th</sup> 2005

**Linux**

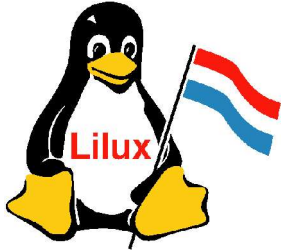
**Basic Course**

Duration : 3h

LinuxDays 20051212

**Linux Basic Course**

25<sup>th</sup> & 26<sup>th</sup> January 2005



**LiLux a.s.b.l.**

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**LinuxDays 20051212**

**Linux Basic Course**

25<sup>th</sup> & 26<sup>th</sup> January 2005

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# I. Introduction

## 1. GNU/Linux

Linux is an operating system kernel supporting multiple platforms.

Linux is multitasking, multiuser, supports a huge number of devices, is stable, fast and most of all you get the source code and may play with it.

The first version was a very small kernel which ran on a PC but very soon more and more people started to add new features, correct bugs and make it faster and more stable.

Today more than 17.000 people work on the kernel.

GNU/Linux is an operating system using the GNU tools and the Linux kernel.

## 2. History

- 1969 First Unix systems by AT&T - Unix System V.
- 1973 First Berkley BSD versions.
- 1984 First X-window system.
- 1985 Creation of the FSF by Richard Stallman - GNU software.
- 1991 First Linux Kernel by Linus Torvalds.
- 1993 Advanced Floppy drivers by Alain Knaff.
- 1994 1.0 Kernel (same year as the creation of the WEB).
- 1997 2.2 Kernel.
- 2001 2.4 Kernel.
- 2003 2.6 Kernel.

## 3. Distributions

Linux is "sold" as distribution.

A distribution is a Linux Kernel with a whole bunch of applications and some installation and configuration programs.

The most used nowadays are:

RedHat / Fedora	<a href="http://www.redhat.com/">http://www.redhat.com/</a>
SuSE	<a href="http://www.suse.com/">http://www.suse.com/</a>
Mandrake	<a href="http://www.mandrakelinux.com/">http://www.mandrakelinux.com/</a>
Debian	<a href="http://www.debian.org/">http://www.debian.org/</a>
Knoppix	<a href="http://www.knoppix.org/">http://www.knoppix.org/</a>
Redflag	<a href="http://www.redflag-linux.com">http://www.redflag-linux.com</a>
Ubuntu	<a href="http://www.ubuntu.com">http://www.ubuntu.com</a>

Some others:

Gentoo	<a href="http://www.gentoo.org/">http://www.gentoo.org/</a>
Slackware	<a href="http://www.cdrom.com/">http://www.cdrom.com/</a>

There are over 200 different distributions out there but most of them are used for special projects or in appliances.

#### **4. LiLux**

The Linux User Group Luxembourg was created in 1997, since 1998 it has an a.s.b.l. status.

The main goals of the user group are:

- Have Linux and free software users come together.
- Help each other.
- Promote Linux and free software for companies and home users.
- Organize events (LinuxFest)
- Do or participate in projects.
- Presentations and Courses (on request)
- Be a central point for all open source movements in Luxembourg.

LiLux has regular meetings (ca. once a month).

## **5. Major Projects**

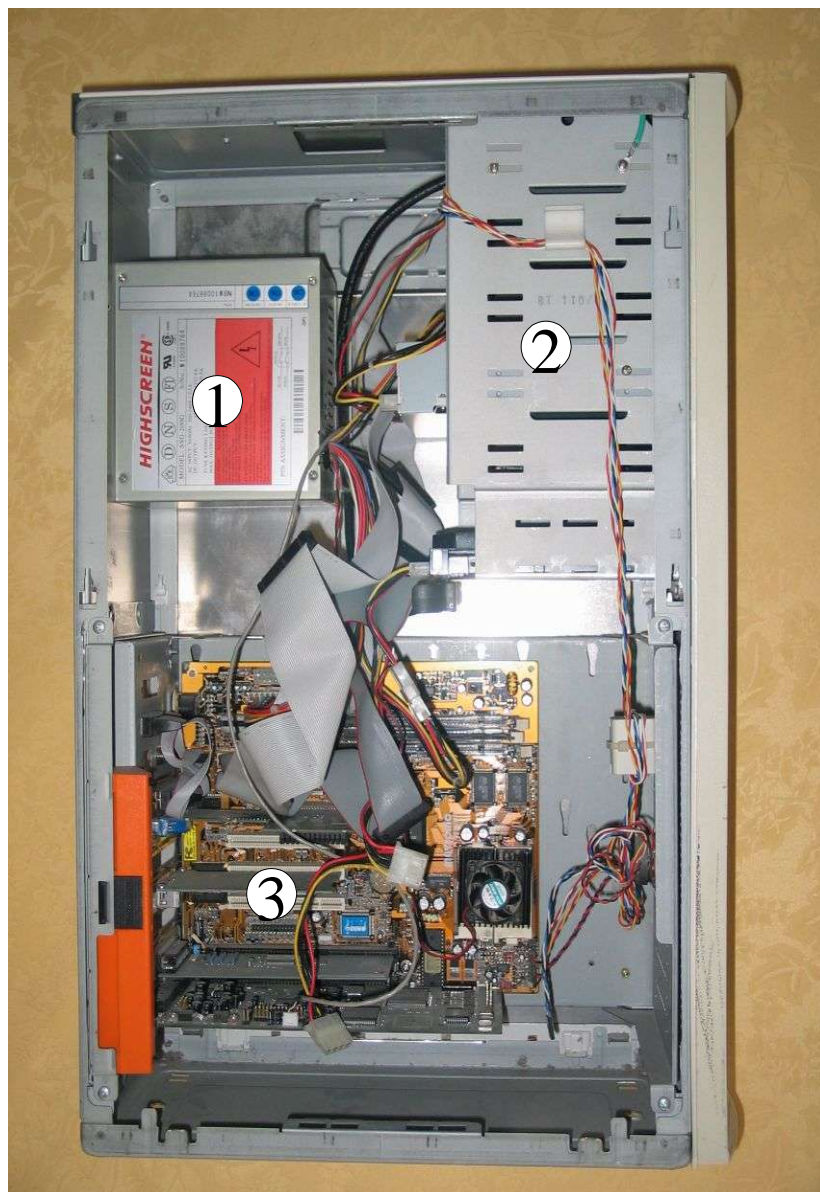
- **LLL - Linux dans les Lycees Luxembourgeois**  
Give Internet access to students in schools
- **swpat**  
Inform politicians about the dangers of software patents, get them to reject laws that threaten to introduce them in Europe.
- **Freeducation**
- **e-banking**
- **Wikipedia**

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## II. The Computer

### 1. How does a computer work, and what is the operating system's role?



### Opened tower PC case

1. Power Supply Unit (PSU)
2. Disk bay, containing floppy drive, CDROM, hard disk etc.
3. Mainboard with CPU (central processing unit), RAM (random access memory), disk controller, expansion cards...

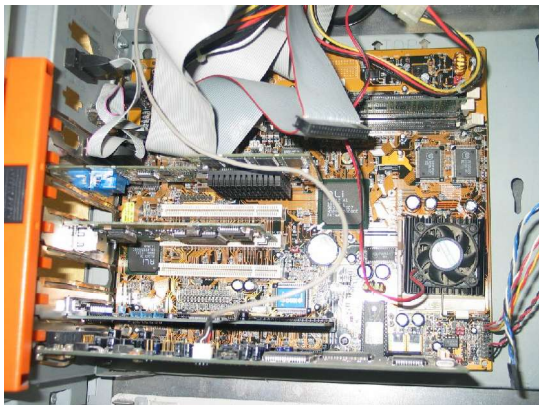


This is the disk bay.

We can see at the upper end a floppy drive, in the middle a CDROM drive, and at the lower end, a hard drive.

The connections we see are power supply (always at the right) and the data lines, with the ribbon cables.

While the floppy and CDROM drives can receive removable media, allowing to carry data to/from other computers, the hard drive is built in and will contain the operating system, local applications, local data.



This is an equipped mainboard.

On the right, below the ventilator, resides the CPU. A bit higher is the RAM.

On the upper left side reside the onboard disk controllers, where the ribbon cables to the drives are connected.

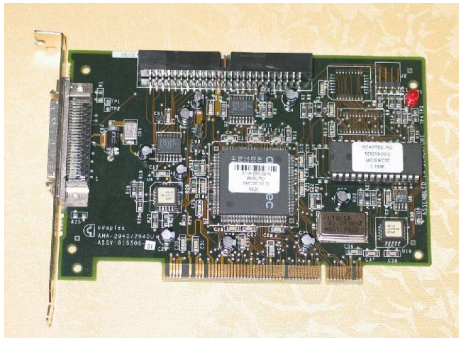
Below are the slots receiving expansion cards, such as network, graphics card, sound card.



These are CPUs

The central processing units shown here are early Pentium 1 models.

This is the heart of a computer, doing the calculations.



This is a PCI expansion card

On this specific picture, you see a SCSI (small computer system interface) controller, which allows connecting disks, scanners and other peripherals requiring high bandwidth. It fits into a PCI-type slot.

All processing in a computer fits a simple schema:

1. fetch next instruction from memory
2. fetch data required by the instruction from memory
3. execute the instruction
4. write results back to memory
5. go back to 1.

The peripherals allow to make sense of the raw numbers handled by the CPU. The graphics card will transform them into text or pictures, the sound card can transform them into music, while the keyboard or mouse will transform the keys hit or the mouse movements into numbers understandable by the CPU.

The role of the operating system is to manage everything happening inside the computer - handle all the different peripherals and resources, present users and applications with a standard interface.

Logically, the operating system must be started before any kind of application can be used.

## **2. Filesystem**

Most, if not all of today's operating systems, are file-oriented. A file can be a unit of data, like a text, a picture, or music, or it can be an executable program.

Usually, such files are organized in a hierarchical (tree-) structure. This is true in Linux as well as in other well-known operating systems.

This tree structure can be in place for each drive separately, with a special designation added for the drive (as in DOS/Windows:

a:\example\_dir\example\_file.txt would represent a file named example\_file.txt on the floppy drive, in the directory example\_dir), or the tree structure can be global, with different drives "mounted" at certain places within the structure - in Linux, the same file as above would typically be accessed via

```
/floppy/example_dir/example_file.txt.
```

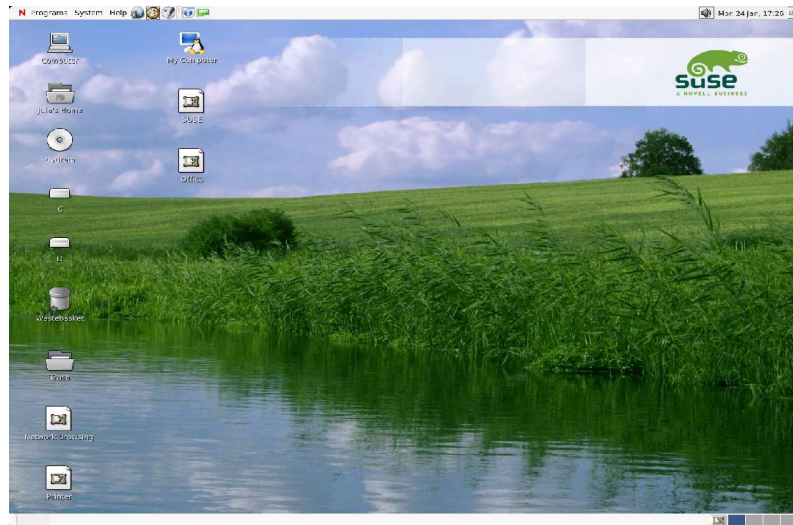
You will note the use of "\" as a separator in DOS/Windows versus the "/" in UNIX/Linux - this goes back to the early 80ies, when DOS was created, so that it shouldn't be too obvious that it was a very bad copy of the UNIX way of doing things. What is of general interest here is where to put your own data files on a Linux system. Every user on a UNIX/Linux system has his/her own "home" directory, usually in /home/username.

### 3. GUI

GUI stands for **Graphical User Interface**. While some operating systems have this built into their very kernel, this is something entirely separate in Linux - it is a normal user application. Therefore, it is simple to switch, and indeed some different basic GUIs exist. The one usually seen though is X-Window, in it's incarnation X11. This provides some basic functionality, like drawing rectangles etc. It is the Window Manager that then provides the functionality of having multiple applications on the screen, allowing moving individual windows etc. A Desktop Environment takes this a step further and integrates many functionalities into a coherent user experience.

These different levels allow the user to select his/her preferred way of doing things. While a headless server (i.e. a machine connected to the network, but without keyboard or screen) can go entirely without a GUI, not wasting resources on it, a weak machine can be used with a simple window manager for low resource consumption, and your normal average workstation can be used with the full-blown comfortable desktop system such as KDE or GNOME.

#### GNOME Desktop



### III. How to get into a Linux Desktop

#### 1. *Boot procedure*

The first thing to do when wanting to work with a computer is of course to switch it on. A PC will first show a few boot messages from the built-in so-called BIOS (Basic Input Output System), which does a few hardware checks, determines which device to boot from, and finally loads and starts the so-called bootloader. It is the bootloader that now will determine which operating system to start.

If you have a PC with only MS Windows installed, the MS Windows bootloader will normally be used. Unless you press a specific key (F8), it will simply boot up Windows normally, otherwise it will present you with a few choices, such as booting in safe mode.

If you have installed a GNU/Linux system alongside MS Windows, normally a Linux bootloader will have replaced the one from Windows - most of the time, this will be either "lilo" or "grub". These will present the user with a choice, whether to boot Linux or Windows, and possibly a couple of other options too. It is normally configured to boot one of the two systems after several seconds, so if you want to select to non-default operating system, you will have to make your choice quickly enough, or at least play with the up/down curser keys to interrupt the countdown.

When you now select to boot Linux, the bootloader will locate the Linux kernel, load it to memory and give it a few parameters, and start it up. From here, the Linux kernel will initialize the hardware according to the configuration options found on the

hard drive, and run a number of programs, start up services etc. Depending on the Linux distribution and it's settings, you may get to see some pretty graphics, or a whole lot of text messages detailing what is currently happening - these messages are nothing to be scared about, they can help a lot in diagnosing problems in case something's amiss.

## ***2. Login prompt***

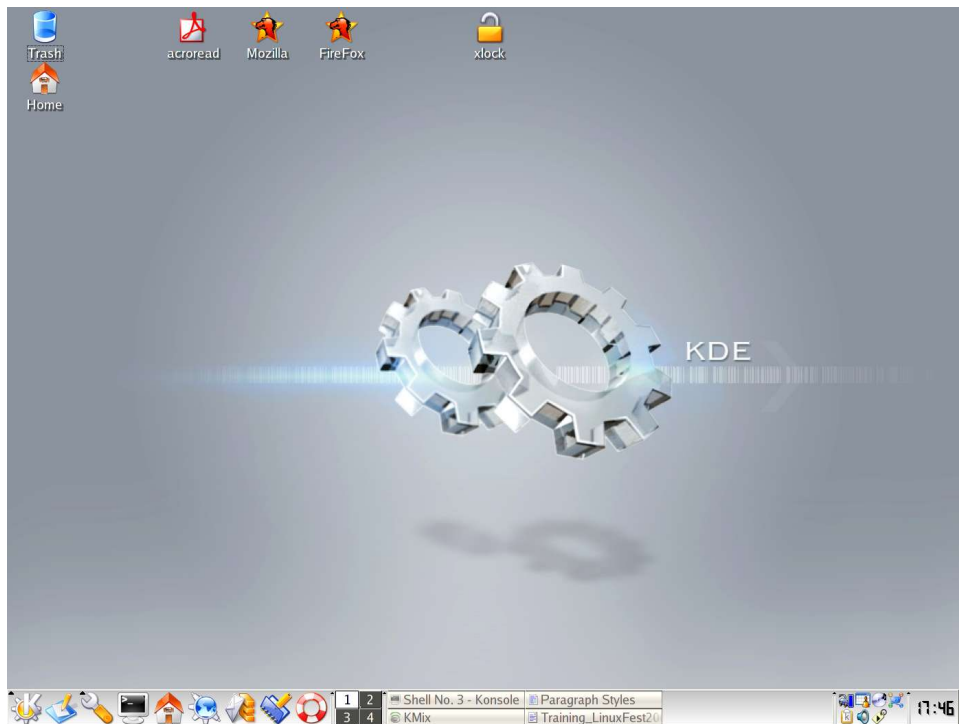
Finally, the GNU/Linux system will present you with a login prompt - depending on it's configuration, this will be in text mode (which would be typical for servers) or in graphical mode (for workstations).

The login prompt asks for a username and password.

This will tell the operating system who wants access, and whether proper credentials are there. Remember, Linux (as other systems from the greater UNIX family) is a multiuser system - it needs to know who's there, so as to properly manage individual user's access rights, protect one user's files from the other users, allow for different setting per user, and so on. This way, for instance, the different members of the family can have their own desktop background, their own mail account settings, the kids won't have access to daddy's adult stuff and can't trash the family accounting data etc. This is also an important protection from viruses. If a user logs in with normal user rights, the worst that can happen if something untoward occurs, is that that user's files and settings are messed up - the system as a whole will remain untouched, as the user has limited access rights. A Windows user who is logged on as Administrator at all times (many Windows applications are badly written and require full access, even when objectively that would not be necessary) and who catches a virus will trash his whole system - not so on UNIX or Linux, where "root" (the Administrator account) is used exclusively for system maintenance. Note that viruses on Linux are virtually unheard of. Depending on the login prompt you are presented with, you can now type in your username or just select the icon corresponding to your username, and type in your password. In this course, you will most probably be using kdm,

which is the login manager coming with the KDE desktop environment. Other managers are gdm (coming with GNOME) or xdm (plain X11). These graphical login managers will normally also allow for a selection of the GUI environment you wish to use, in case several of them were installed - so you can select, say, KDE, GNOME, afterstep, fluxbox etc.. For this course, select KDE (which is probably the default setting).

### 3. Basic use of the Linux Desktop and the file manager (KDE)



the KDE desktop

The desktop as such resembles what may be known from other operating systems. Some icons are scattered on the desktop, which may feature a nice background picture. At the lower end it is possible to identify a menu button (K), next to which some icons for much-used applications and tasks are located. The little rectangle split into four parts is the pager, which manages (in this case) four complete desktops, it is a matter of a single mouseclick to switch around. This allows to organize separate desktops for separate tasks. Next to this the taskbar is found, showing the different applications that are running. If many windows are opened by one application, these will be grouped under a single entry. At the right end we see a simple clock, next to it are the mini-icons of background applications - here these go from a display of the battery status (the screenshot was taken on a laptop), a cd player, the KDE mixer applet, etc.

The desktop is highly customizable, meaning not only looks, but also

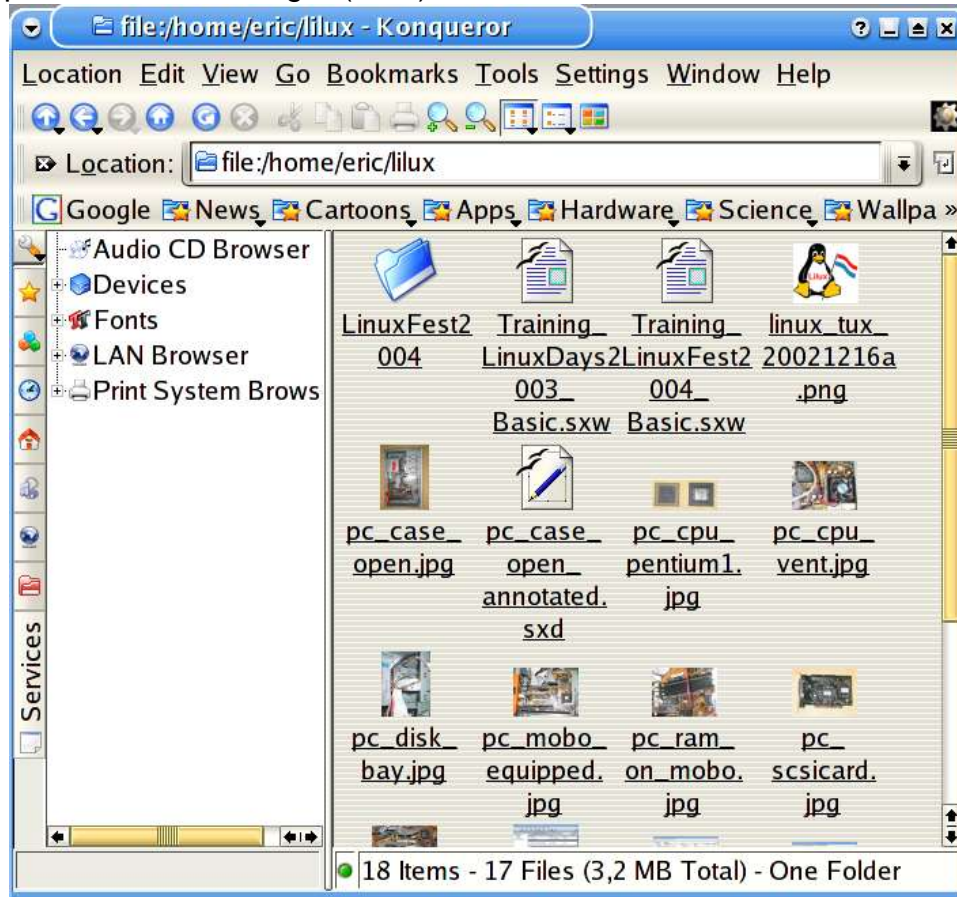
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behavior. These settings are easily accessible through the KDE control centre.

Konqueror as a filemanager (KDE):



In GNOME you can find “Nautilus” as a dedicated filemanager.

#### **4. How to configure internet access (SuSE, yast)**

Linux and all the tools associated with it have seen the light of day only thanks to the Internet. It is therefore quite natural that getting things work properly with networks was very high on the priority list of the programmers, and it shows in the quality and features of everything network-related in Linux.

SuSE, through yast, makes it simple to configure your network.

## IV. SuSE 9.2 Applications

### 1. Internet

#### 1.1 Browsers

- Konqueror

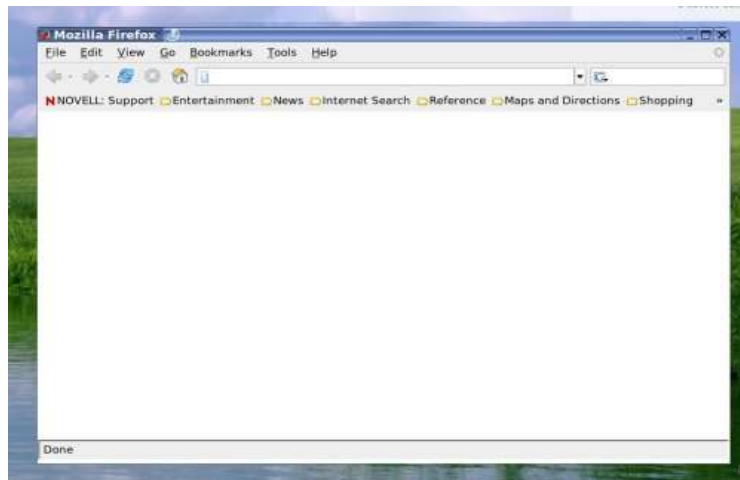


- Firefox

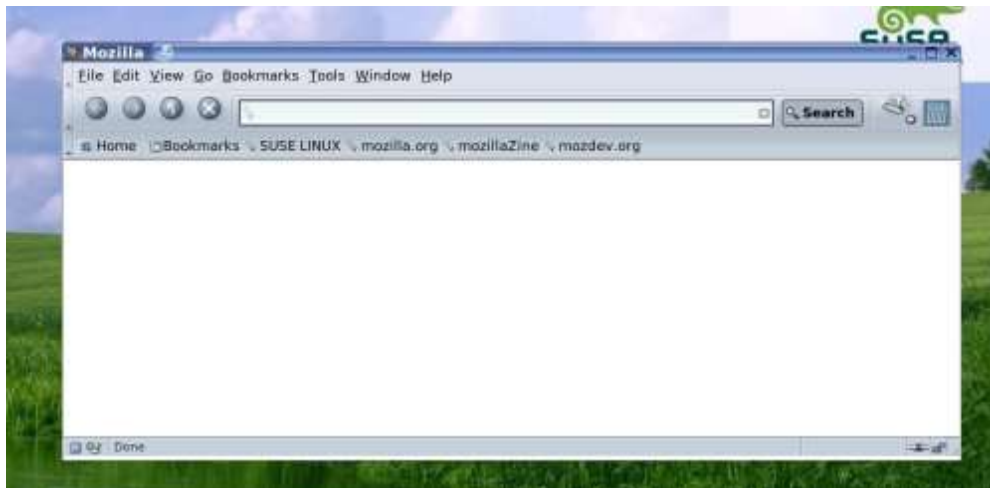
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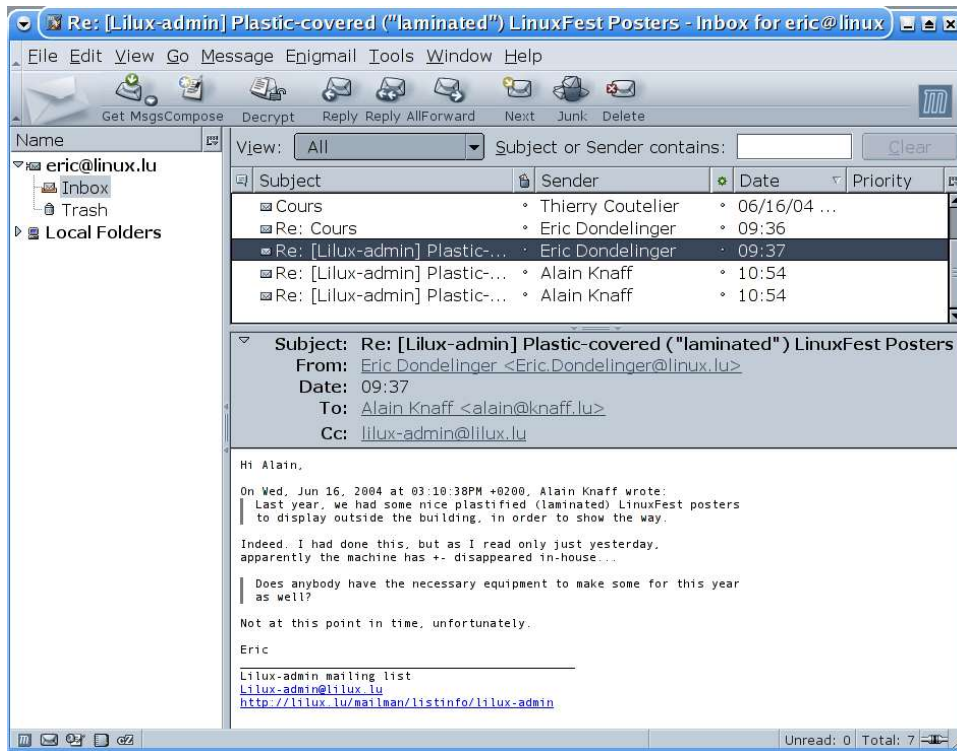


- **Mozilla**

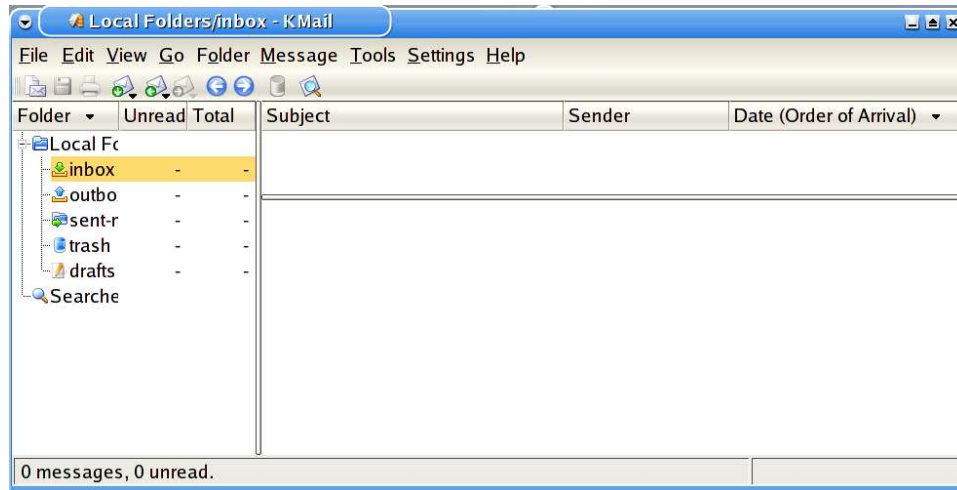


## 1.2 Email

- **Mozilla Mail**



- **Kmail**



- **Thunderbird**

### 1.3 Chat

- Kopete



- xchat



## 2. Multimedia

### 2.1 MP3 Players

- XMMS



xmms is an MP3 and OGG player. Similar to WinAMP, it features visualization plugins, can handle playlists, etc.

- amarok

### 2.2 Video

mplayer, xine, ogle, vlc, cinelerra, transcode

Video was for a long time a problematic matter in free software, as most of the video codecs are heavily patent-encumbered or secret, and their creators require license fees. Players have anyway appeared, sometimes making use of Windows codecs. A player like mplayer is actually much more feature-complete than anything on Windows, as it can handle about anything you may throw at it, allowing for recording, transcoding to other formats, which is not always offered by the Windows-based proprietary counterparts (ex. recording and transcoding a real-media stream).

Video editing is available in professional quality - and complexity. The simple-to-use editors are not available now. Hollywood heavily uses the Linux platform for video editing.

mplayer, xine, vlc are all excellent video / audio players. They can handle most formats available, as well as playing DVDs and different types of video CDs. ogle is a more specialized DVD player.

**mencoder**, which belongs to mplayer, allows for converting video from one format to another.

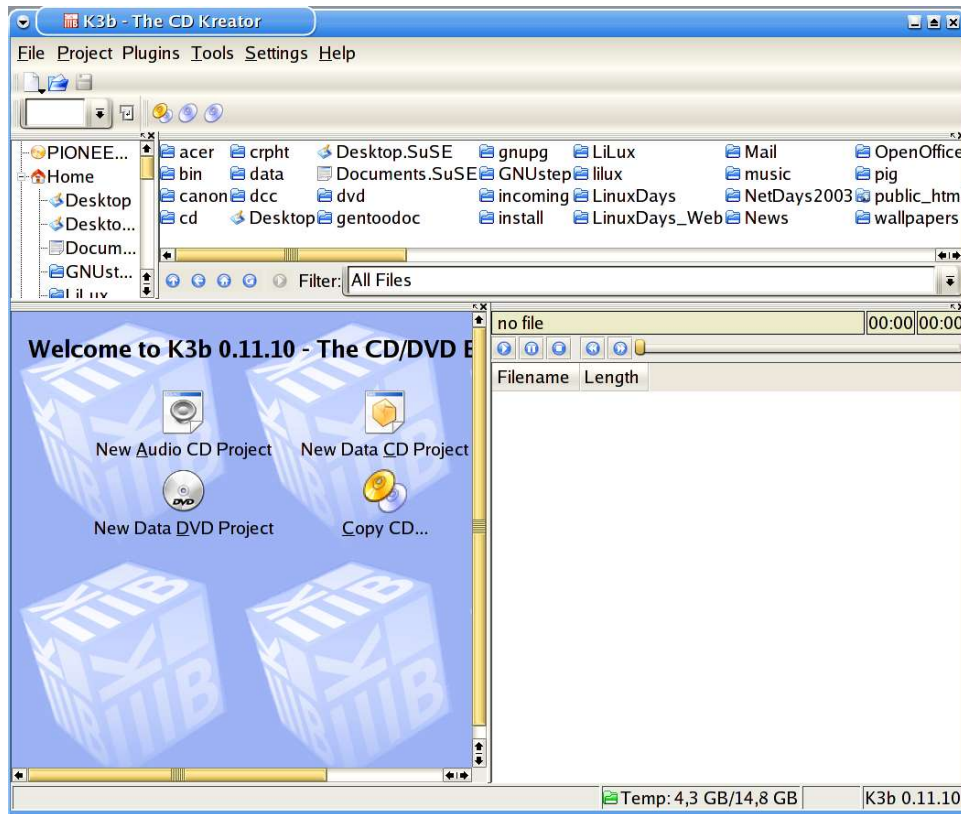
**transcode** can also transform streams from one format into another, but additionally allows for distributing this task to several computers on a network. It is for instance possible of ripping a DVD on one machine, distributing the contents to several machines, have them transcode the MPEG2 stream to DivX ;-), and sent the results to a final machine that can burn the complete results to a video CD.

**cinelerra** or it's predecessor broadcast2000 are very powerful video editing software, requiring very solid computing power to function. Users of these packages should be quite knowledgeable about video editing to get good results.

## 2.2 CD/DVD Burners

CD or DVD burning on Linux is perfectly available, and simple to use thanks to interfaces such as k3b.

- **k3b**



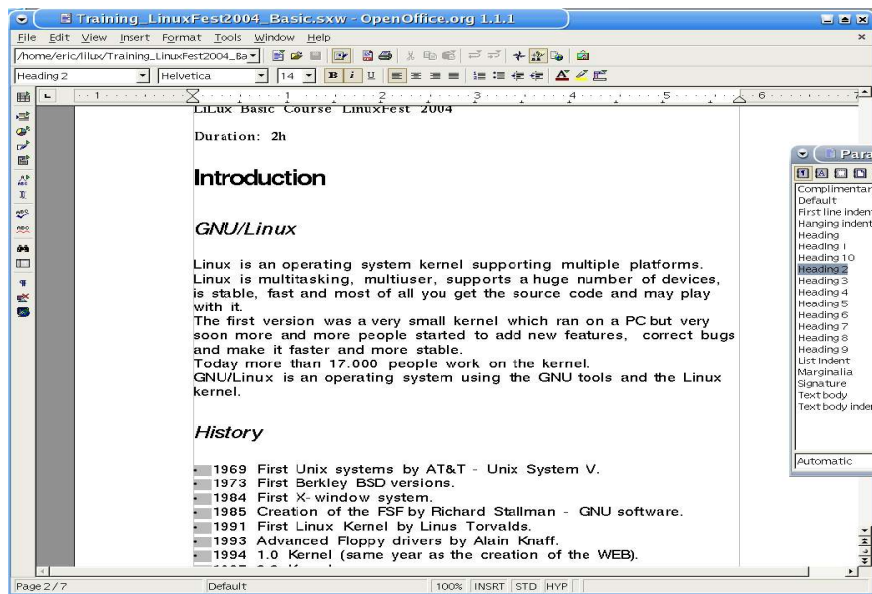
- XCDroast

### 3. Office applications

#### 3.1 Offices Suites

- **OpenOffice.org**

Word processing, spreadsheet, presentation, graphics. Printing, PDF export.



OpenOffice is a complete office suite, featuring a word processor, spreadsheet, simple vector graphics program, a presentation module, and (sort of hidden and in development) a database interface. It can handle a lot of different formats, including MS Office. As a very nice feature not found natively with other office suites is the direct export to PDF format.

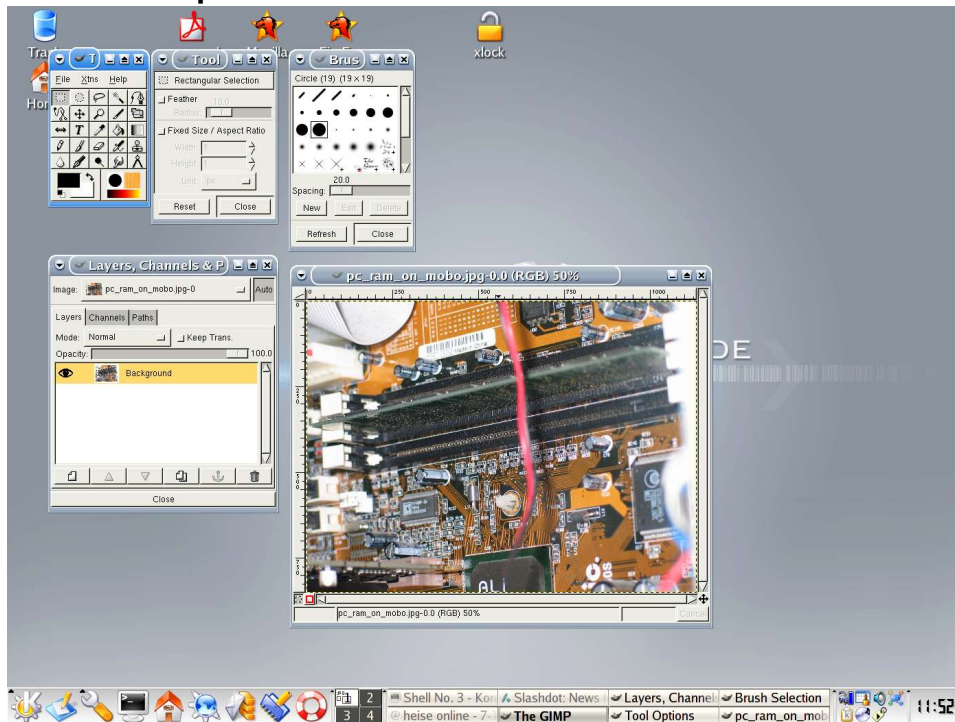
- Koffice

### 3.1 Flowcharts

- Dia
- 
- Kivio

## 4. Graphics

### 4.1 The Gimp



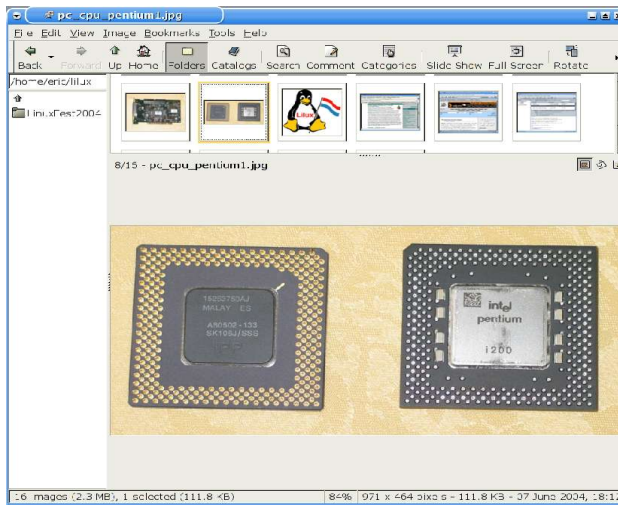
GIMP, or GNU Image Manipulation Program, is a very powerful bitmap-oriented graphics editor. It handles all the usual functions, and features many less common or even unique filters. Extensions allow it to be used even for simpler video editing, and it can be remote-controlled through scripting, allowing for automated batch processing.

### 4.2 gthumb

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gthumb is a rather feature-complete and fast image organizer.

### 4.3 gtkam

gtkam is your connection to your digital camera.

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