

Debian/GNU Linux

Introduction

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1 1st steps

2 Structure of Linux

3 Filesystem

4 Account

5 Permissions

6 File management

7 Editing

8 X Window

9 KDE

Agenda

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First Steps in Linux - The Login

How to login

Directly

- xdm/kdm: by graphical display managers login prompt
- on the serial console (24x80 character terminal window)

Remotely

- from other computer (through network) from terminal window
 - `ssh [-X] host name or host IP`

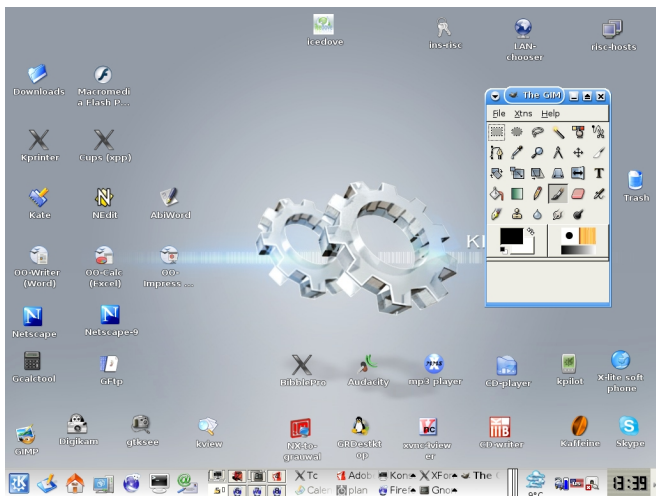
Working Environment

- shell in terminal window; command line input, closed by RETURN
 - some simple commands: `ls`; `who`; `date`; `wc`;
- GUI, see the KDE desktop

Logout

- shell: `exit`, `logout`, etc.
- KDE/X: use GUI

My KDE Screen



First Steps in Linux - The Login

How to change the password

In shell:

- yppasswd for network environment
- passwd for a computer without networking

in KDE with GUI: kdesu



First Steps in Linux - The Login

How to start an application

In Linux

- on the local computer
 - click on the application's icon on the desktop
 - start from the menu system
 - start from the command line (shell)
- start it on a remote computer
 - using networking, X11, display local

Advantage of Linux

Using Linux

Advantage of Linux

- FREE, OpenSource Software by no cost !
- multitasking OS, multiuser OS
- native networking OS (to use remote resources)
- native graphical networking capabilities (X11)
- very stable, very secure OS
- wide Internet support (mailing lists, irc groups, etc.)
- wide free documentation
 - User Guides, HowTos, FAQs, etc.
- lot of FREE software packages are available
- the absolute leader OS in the server area

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Structure of Linux

The Kernel

Kernel: the conductor in the OS

- loaded by the boot loader at start of the OS
- managing processes (scheduler)
- managing memory (real and virtual); access to memory
- doing multitasking
- serves the File System
- manages rights and permissions (users, files)
- manages hardware units (I/O, hard disks, equipments, etc.)
- networking

Structure of Linux

Unix Processes

Process - a running program

- started by kernel;
- get CPU time slices (multitasking)
- priority: 0 to 64 (minimal)
- PID (process ID, sequential number)
- first process: **kswapd0**
 - for virtual memory management
- second process: **init**, PID=1
 - start and stop the system (i.e. all other processes)
- process state: see **ps** output
 - running (R) - stopped (T),
 - active (S) - idle (I) (waiting 20sec)

Structure of Linux

The Shell - an overview

Shell

- User Interface to the OS
- it runs in a terminal window
- is a command language interpreter
 - usable as an interactive login shell
 - shell script command processor
- interprets command line inputs; manages display output
 - includes a command-line editor
- included is a programming language (shell script)
 - commands, variables, expressions,
- includes a job control
- lot of built in commands for each specific area
- invokes programs; redirects input/output; makes pipelining

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The Linux file system

Structure and Components

File System

- tree structure, begins with the root (/) directory
- any number of (nested) subdirectories
- any number of files (file = leaf in the tree structure)

File Types

- ordinary files (text, executable, jpeg, wav, doc, etc.)
- special files (dev files = device description files)
- symbolic link (pointer to another file)
- subdirectories contains any type of files

Linux Root directory structure

```
/bin/ /boot /cdrom /dev /etc {\emph{/home}} /lib  
/lost+found /media /proc /root /tmp /usr /var
```

The Linux file system

Symbolic link, path

Symbolic link:

- only one physical file; any number of symbolic link to it
- delete symlink: the physical file will not be deleted !

```
lrwxrwxrwx 1 ke ke 24 2008-10-21 22:04 oxygen.png -> ../oxy.png
```

Path

- the exact location of an object (file, subdir, etc.)
 - /usr/share/doc/latex-beamer/solutions/generic-talks
- absolute path; relative path (../rlogin-ssh)
- gives shell the directory list to search for executable commands
- commands: pwd - current location; cd - change dir
- echo \$PATH

```
/usr/local/bin:/usr/bin:/bin:/usr/bin/X11:/usr/games:/zvol/timer/bin  
/home/ke/bin:/usr/NX/bin:/usr/local/Adobe/Acrobat7.0/bin
```

The Linux file system

Symbolic link, path

file systems on the file server atlantis

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
/dev/sda1	15377820	4914984	9681680	34%	/
/dev/sda3	15377852	7398996	7197696	51%	/zlocal/sda3
/dev/sda5	15377820	12158088	2438576	84%	/zlocal/sda5
/dev/sda6	15377820	13050212	1546452	90%	/zlocal/sda6
/dev/sda7	15377820	13734280	862384	95%	/zlocal/sda7
/dev/sda8	15377820	11910696	2685968	82%	/zlocal/sda8
/dev/sda9	15377820	12721576	1875088	88%	/zlocal/sda9
/dev/sda10	15377820	169368	14427296	2%	/zlocal/sda10
/dev/sda11	15377820	169368	14427296	2%	/zlocal/sda11
/dev/sda12	15377820	169368	14427296	2%	/zlocal/sda12
/dev/sda13	15377820	169368	14427296	2%	/zlocal/sda13
/dev/sda14	6261684	143664	5799936	3%	/zlocal/sda14
/dev/sdb1	15377820	169368	14427296	2%	/zlocal/sdb1
/dev/sdb2	15377852	169368	14427324	2%	/zlocal/sdb2
/dev/sdb3	15377852	169368	14427324	2%	/zlocal/sdb3
/dev/sdc1	480719056	7563748	448736108	2%	/zlocal/sdc1

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The user account

Overview

user identification by login:

- Linux: username, passwd
 - similar by gmail account or by XP Professional

further parts of the Linux user account:

- the home directory; the shell; the user's group; other parameters

location of the Linux home directory: `/home/username`

- (XP: Eigene Dateien, gmail: not visible)
- local `/home/username` not a usable solution in a networking environment
- problems by backup, by changing the workstation, etc.

LAN-wide home directory

The solution for a computer network

riscwide Home directory

- at RISC the home directories are located on a file server
 - the file server exports them by NFS to all other workstations
- you have always the same home directory
 - independently on which workstation you logged in
- advantage by backup
 - only the file server hard disk has to be backedup
- miscellaneous information must be distributed LAN-wide
 - see later: NIS, YP, etc.

special user in Linux: root (read/write rights for all files)

Parameters of the user account

Files related to accounts:

- /etc/passwd, /etc/group, /etc/shadow, /etc/gshadow
- /etc/passwd:

```
login name:password:UID:GID:real name,,,:home directory: shell
sysadmin:x:1000:1000:sysadmin at risc,,,:/home/sysadmin:/bin/bash
```

- /etc/group

```
sysadmin:x:1000:
```

additional information:

- real name, location (room number)
- work phone number, home phone number,
- shadow: additional information about:
 - password expires, last changed, has to be changed
 - account expires, etc.

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Permissions in Linux file system

Groups and attributes

Groups

- files and users have miscellaneous attributes
- the user belongs to a group in Linux (adm, root, audio, etc.)
- /etc/group file contains the groups

```
root:x:0:          cdrom:x:24:ke
daemon:x:1:        audio:x:29:ke
bin:x:2:           video:x:44:ke
```

- more users may belong to a group

```
webadmin:*:10019:sysadmin,mkauers,wwindste
sysadmin:*:10017:sysadmin,ke,landerl,kesysadm
```

- the file gets attributes for the grouping: u/g/o
 - u: the user, who owns the file
 - g: all users in a group
 - o: other users not in the files group and not owner (others=world)

Permissions in Linux file system

attributes

Attributes

- files/directories get attributes for the grouping: u/g/o
- file attributes:
 - r: read; w: write; x: execute; -: no rights
 - special permissions: s: execution with rights of the owner
- directory:
 - r: list of files; w: create/delete file; x: change into directory; -: no
- `ls -l /etc/passwd /etc/shadow`
 - `-rw-r-- 1 root root 119 Nov 02 1999 /etc/passwd`
 - `-rw-r-- 1 root shadow 1079 2008-01-12 18:48 /etc/shadow`
- `ls -ld /etc/network`
 - `drwxr-xr-x 7 root root 4096 2009-05-15 08:43 /etc/network/`

1.character:

- - file, d directory, l link, c char device, b block device

Permissions in Linux file system

umask - user mask

Umask is a shell variable and a function

- defines the default permissions for files and folders
- is calculated by using the bitwise AND and NOT
- Umask is confusing in that it is set up by defining what is not wanted
- Using umask
 - umask (lists the current value)
 - umask 022 (sets new values)
 - 022 means the rights: 755 for dirs, 644 for files
 - 000 means: 777 for directories, 666 for files
- To find the proper permission wanted, subtract the umask
 - Permissions for files = $666 - \text{umask}$
 - Permissions for directories = $777 - \text{umask}$

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File and directory management

Functions of File Managers

Functions

- create, remove directory, file
- copy, move file1 file2, directory1 directory2
- change permissions
- create symbolic links (for files, directories)

there are a lot of file managers in Debian

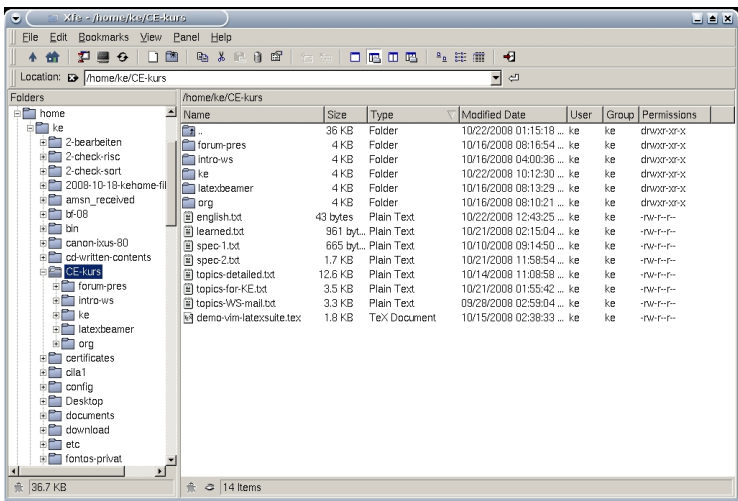
- get list with `grep "file manager" lenny-packages.txt`

File Managers

- xfe: X file explorer
 - a lightweight file manager for X11, like Windows Explorer
- konqueror:
 - advanced file manager and the central unit in KDE
 - a web browser, document viewer, application starter

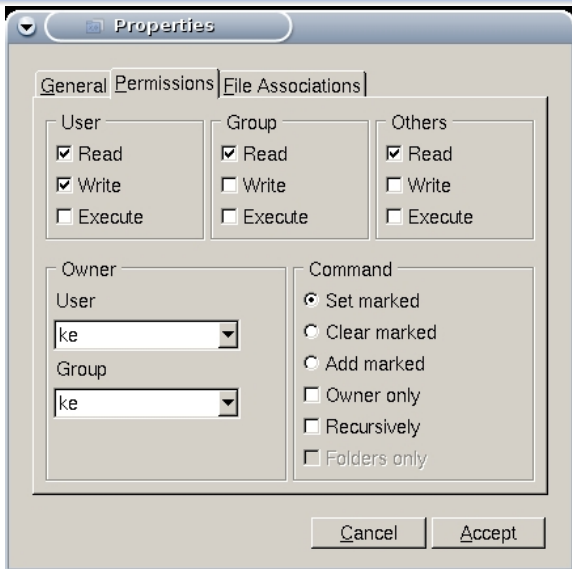
File Managers

xfe - X File Explorer

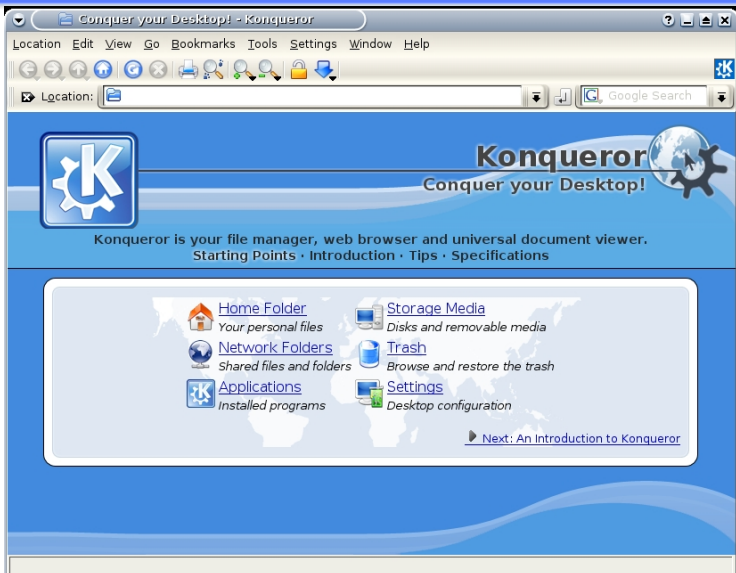


File Managers

xfe - X File Explorer

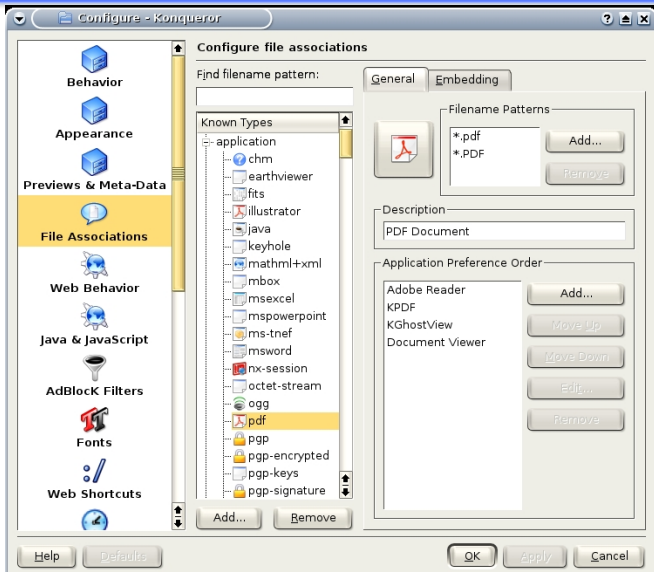


Konqueror - Start window



Konqueror - Configuration

File associations



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Editing function in Linux

Editing

- what kind of object do we want to edit
 - text file, audio file, jpeg image file, etc.
 - cd, dvd contents
- dozens of editor are available
 - check them with `grep editor lenny-packages.txt`
 - 236 lenny packages, with 'editor'
- general purpose text editors of different power
- special editors for specific objects
 - audacity, gimp, xfig
 - K3B CD/DVD creator

Office suites, Text editors

Open Office (OO)

- oowriter (Word processor), oocalc (Spreadsheet), ooimpress (Presentation), oodraw (Drawing), oobase (Database), oomath (Equation editor)

K-Office (KDE Office suite)

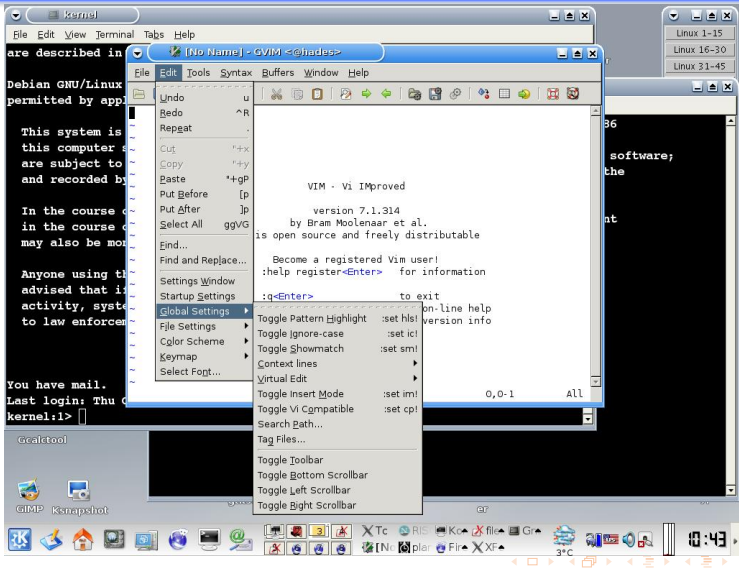
- kwriter, kspread, kpresenter, kformula, kthesaurus, etc.

Text Editors

- vi: historical times, but very powerful
- gvim: emacs-like, very powerful (www.vim.org)
- emacs: very powerful
- kate: advanced text editor for KDE

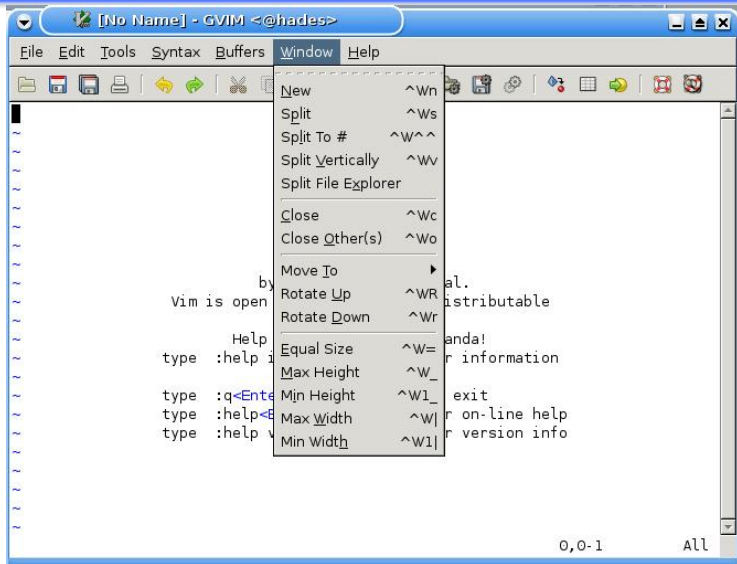
Text editor

Gvim



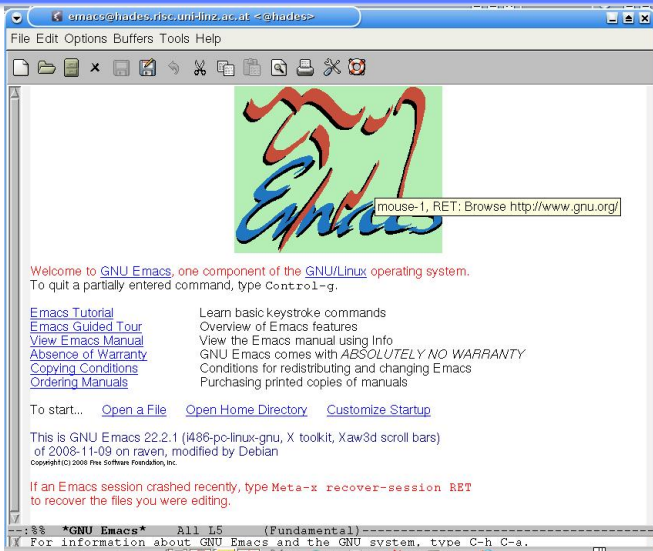
Text editors

Gvim



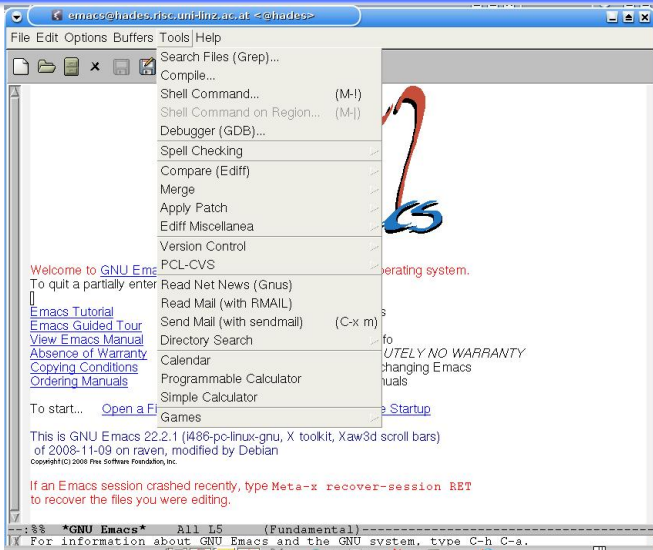
Text editors

Emacs



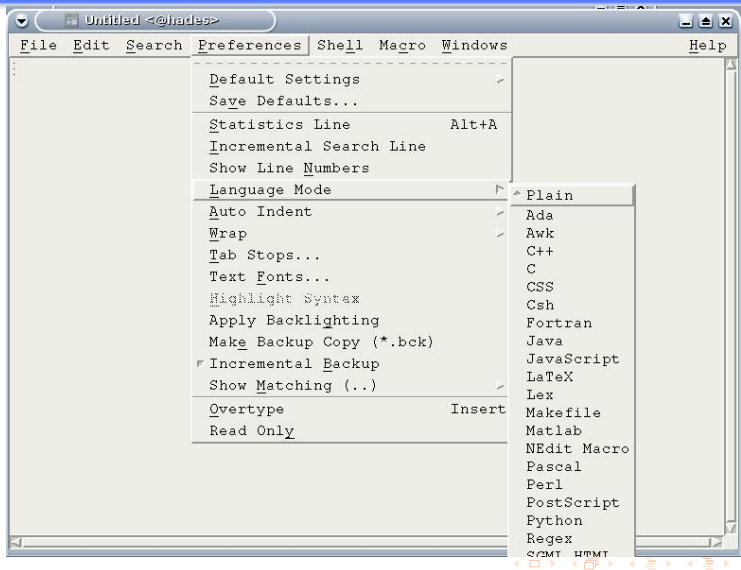
Text editors

Emacs



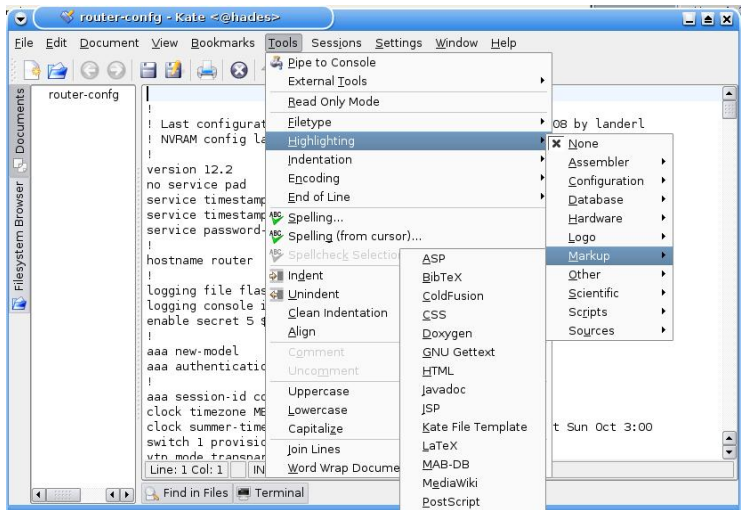
Text editors

Nedit



Text editors

Kate - KDE advanced text editor



Special editors

For object types

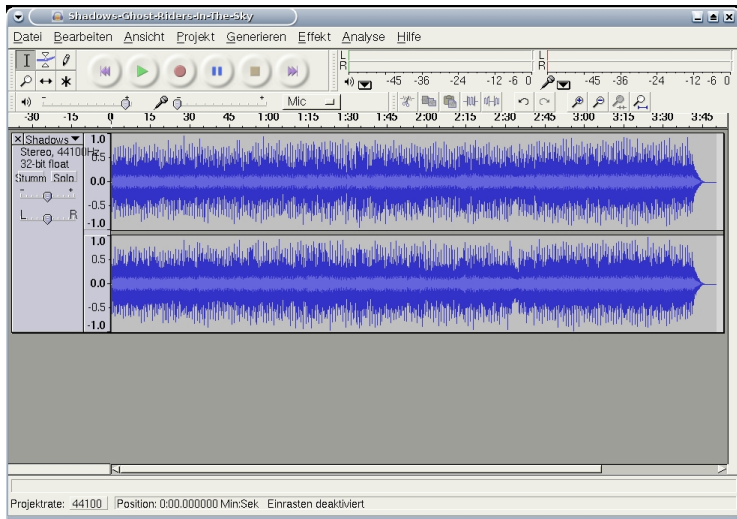
Object Editors

- audacity: a fast, cross-platform audio editor
 - audio recorder, converter, audio file manipulator
 - Linux, Windows, Mac versions available
- GIMP: the Gnu Image Manipulation Program
 - almost as powerfull as Photoshop
- K3B: the KDE CD and DVD creator

Special program - ksnapshot

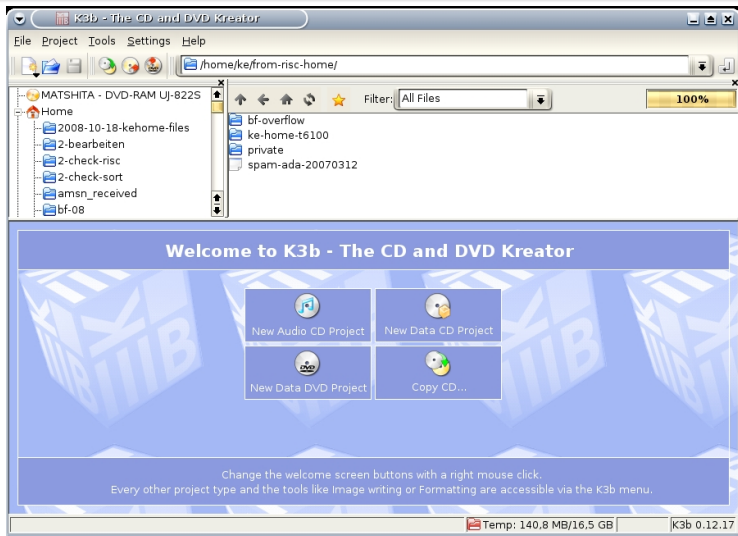
- to create screen shots about different parts of the screen

Object Editors - Audacity



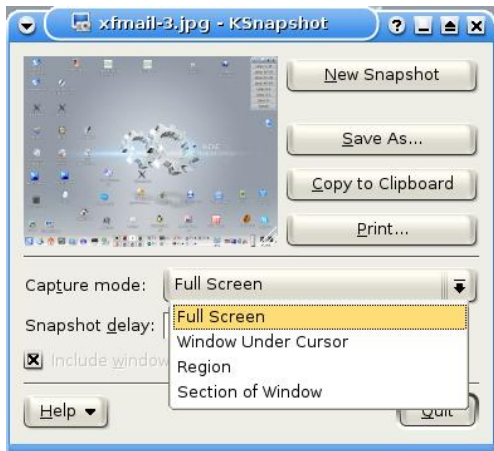
Object Editors - K3B

CD-DVD creator



Special program - ksnapshot

screen shot creator



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X Window System

The X-Server

X Window System

- X-Windows, Version 11: X11 - today: X.org
- Developed in **1984** at MIT
 - supported by DEC, HP, SUN, IBM
- **Network-based graphics window system** for Unix
- Uses the multitasking function of Unix
- A client-server model

X server

- runs on a host (in the network)
- controls the display (=graphics card) and keyboard/mouse
- binds to the D-K-M (in contrast to XVNCServer)
- mediator between X-clients (applications) and D-K-M
- accepts client connections from local host (remote host)

X Window System

The X-client

X client

- connects to the X-server, to display its GUI
- most important X-clients
 - the X Window Manager; Xterm - the terminal emulator
- name begins with **x** (xterm, xclock, xcalc, etc.)
- any window on the screen is an X-client !

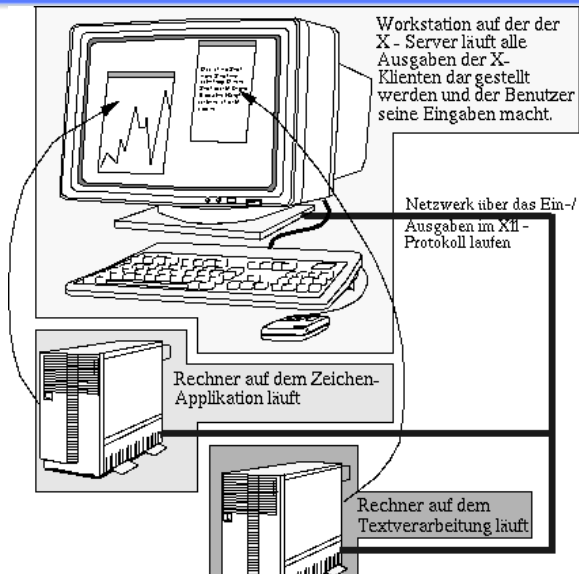
Networking feature of X-Window system

- host runs an **X-server**
- any X-client executed on the host connects to X-server
- any X-client executed on a remote host can connect to the X-server
 - it displays its GUI on the remote server !
- client and server (may) run on different hosts

Seperation between where a program runs and where its display is!

X Window System

X11 scenario



X Window System

Some components

Display Manager

- displays the graphical login window ("login manager")
- after successful authentication starts an x-session
- restarting the display manager (Ctrl+Alt+Backspace)
 - finishes all programs in the session (new login window)

X Window Manager

- provides the frame around a window with its functions
- responsible to move, resize, minimize, maximize, close any window
- responsible for the pointing device input
- provides part of GUI: look and feel; lot of WM; grep for it

X terminal emulator

- a window that functions as a standard terminal
- xterm the first version; try, use: gnome-terminal, konsole

Agenda

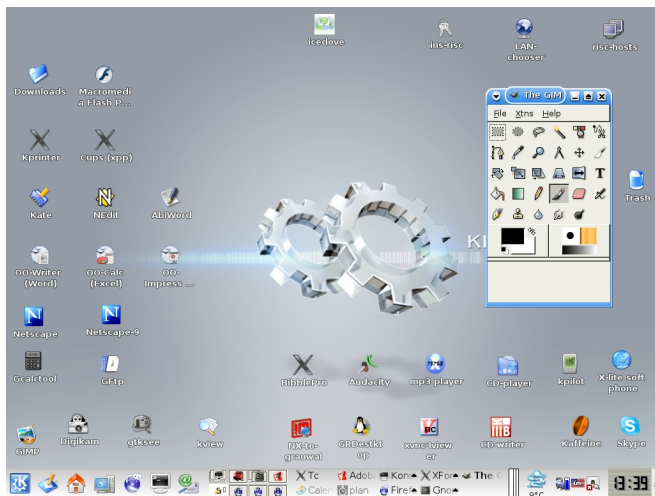
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The KDE Desktop, details

Desktop KDE

- KDE is a very big, powerful system (desktop environment)
- explore the KDE menu Application tree
- explore the KDE Application Debian tree
- customizing the menu bar
 - adding new applications and applets
 - virtual desktops
- creating desktop icons
- learn the KDE Control Center
- learn the KDE components
- learn the Help in KDE

My KDE Screen



The KDE Control Center

Main KDE components:

- Desktop (Multiple Desktops)
- Internet and Network
 - bluetooth, WLAN, Samba
- KDE Components (File Association)
- Peripherals (Display, Keyboard, Printers, etc.)
- Power Control (Laptop Battery)
- Regional settings
- etc: Security, Sound, System Administration

KDE Control Center - Printer

The screenshot shows the KDE Control Center window titled "Printers - Control Center". The left sidebar contains a tree view of system settings, with "Printers" highlighted. The main area displays a list of installed printers:

canon	floor1_color	fw	swp
canon_color	floor2	fwtest	Advanced Faxing Tool (ksendfax)
floor0	floor2_color	hp_color	Mail PDF File
floor1	floor2old	secr	Print to File (PDF)

Below the list, the "Information" tab is selected for the printer "floor1". The details are as follows:

- Type: Remote printer
- State: Idle (accepting jobs)
- Location: RISC-Linz castle first floor
- Description: HP Laserjet 4050
- URI: ipp://osprey.risc.uni-linz.ac.at:631/printers/floor1
- Device: ipp://osprey.risc.uni-linz.ac.at:631/printers/floor1
- Model: HP Laserjet 4050 Series PS

At the bottom, it indicates "Print system currently used: CUPS (Common UNIX Print System)" and "Server: localhost:631". There is also an "Administrator Mode" button.

End of Overview

Thanks for your attention !