# Debian/GNU Linux Overview

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#### 1. November 2008

Károly Erdei — Debian/GNU Linux

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#### Computer equipment

#### 2 Structure of Linux

### 3 Linux FS

#### 4 The Shell

#### 5 Command Line

#### 6 File management

## 7 Editing

#### 8 X Window

#### 9 KDE

# Agenda



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# The history of the computer equipment at RISC Overview the early times at/from 1985

## Needs of computing resources at RISC

- writing and printing scientific articles, using latex
- using mathematical software
  - Mathematica, 1992, on floppies for NeXT-Stations

#### Solution: Unix Workstations

- Multiuser, multitasking OS
- Graphical user interface for the main user (WS:200K ATS)

## Solution-B: ASCII RS232 Terminals

- using the resources of a workstation remotely
- only an ASCII window (24x80 chars) available (no X!), 10k ATS

## RISC is from the beginning a place for UNIX

## The history of Unix at RISC The different workstation (and Unix) types

Only Unix workstations from the beginning on...

- Apollo Workstations (later HP Apollo) / HP Workstation
  - Apollo Domain OS Unix; from 1986; max. 14 WSs
- DEC Workstations
  - DEC Ultrix Digital Unix; 1991-1992; 8 WSs
  - the most stable workstation ever (last switched off 2003)
- X-Terminals
  - Graphical Terminal (1991-1995), max. 20 NCD X-Terminals
- Other Workstations
  - 2 Sun workstations; Sun Solaris Unix
  - IBM-RT workstation; IBM AIX Unix
- NeXT-Stations
  - NeXT-Mach 3.0 Unix; with excellent GUI !!
  - in 1992, 1993. Number of WS: 12; for secretaries, too!

## The history of Unix at RISC Migrating to Linux

## Migrating to Linux

- Silicon Graphics Workstations,
  - IRIX SysV.3, SGI Unix; January 1993; 14 WS.
- Sequent Symmetry
  - Multiprocessor computer; 20 Intel 386 CPU; late 1991
  - 32 RS232 terminals connected (mainframe for RISC)
- Unix PCs
  - early 1991; 3 PC; Interactive Systems Unix SysV.3
  - supporting the transputer systems (16 CPUs)
- GNU/Linux Debian, 1995
  - new hardware: only PCs; Debian PCs replacing slowly WSs, X-Terms
- Advantage of Linux
  - Free Software by no cost! Thousands of software packages
  - multiuser OS; multitasking OS; very stable, very secure OS

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## Structure of Linux Kernel, Shell

## Kernel

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

## Shell

- User Interface to the OS.
- interprets command line inputs;manages display output
- Iot of built in commands
- invokes programs; redirects input/output; makes pipelining
- included is a programming language (shell script)

## 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: swap
  - for virtual memory management
- second process: init, PID=1
  - start and stop the system (i.e. all processes)
- process state: see ps output
  - running (R) stopped (T),
  - active (S) idle (I) (waiting 20sec )

## First Steps in Linux - The Login How to login

## Directly

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

## Remotely

- from other computer (through network) from terminal window
  - telnet host name/host IP; ssh [-X] host name/host IP

### Working Environment

- shell in terminal window; command line input, closed by RETURN
- some simple commands:
  - Is; who; date; wc (word count); passwd; in RISC: yppasswd

## Logout

shell: exit, logout, etc.; X: use GUI

First Steps in Linux - Need Help about the system parts How to get information about commands, files, etc.

#### Man pages

command not known:

- man -k topic (e.g.: man -k file; man -k shell; man -k ls )
- structure of man pages (learn, check: 8 sections)
  - man man; man tty; man 1 tty; man 4 tty;
- xman: graphical tool

### Info pages

- another structuring of the information
- man info; info info, etc. (often man page points to info page)

## T LDP - The Linux Documentation Project

- http://www.tldp.org/
- HOWTOs, GUIDEs, FAQs, Wiki, etc.

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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 /home /lib /lost+found /media /proc /root /tmp /usr /var

The Linux file system Linux Root directory structure

#### Root directory structure in detail

- base is the the root (/) directory
  - in Windows this is the C: drive
- programs are located in /bin, /usr/bin, /usr/sbin, /usr/local/bin
- /home for the home directories of the users
- /lost+found used by fsck (for lost and found files)
- /etc for system and application configuration files
- /proc contains every information about a running system
- /dev contains the physical devices files
- /media contains the mounted units (/media/cdrom; /media/IOMEGA HDD;)
- /var working area (/var/log; /var/spool/mail; /var/run)
- /tmp used for temporary files

## The Linux file system Some special files and directories: /proc /dev

## Features of the /proc file system

- process information pseudo-file system
- used as an interface to kernel data structures

## Quick tour through the /proc hierarchy

- /proc/[number]: subdirectory for each running process
- /proc/cpuinfo: CPU and system architecture dependent items
- /proc/modules: list of modules loaded by the system (lsmod)
- /proc/net: status of some part of the networking layer

## I/O devices

acces as/through files: /dev/cdrom, /dev/audio, /dev/hda

The Linux file system Symbolic link, path

## Symbolic links:

- only one physical file; any number of symlink to it
- delete symlink: not the physical file

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

## Path

- the exact location of an object (file, subdir)
  - /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:/usr/bin/X11:/usr/games:/zvol/timer/bi /home/ke/bin:/usr/NX/bin:/usr/local/Adobe/Acrobat7.0/bin

## Permissions in Linux file system

#### Permissions

- files and users have miscellaneous attributes
- the user belongs to a group in Liux(adm, root, audio, etc.)
- 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 (=world)
- 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
- Is -I /etc/resolv.conf
  - -rw-r-r-1 root root 119 Nov 02 1999 /etc/resolv.conf

## Filerunner - main window

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Filerunner - File permissions Changing attributes in Linux file system



#### Commands to change rights

- chmod [ugoa]\*([-+=]([rwxXst-]\*-[ugo]))+
  - a: all (u+g+o)
  - chmod g-rwx,o-rwx /home/kerdei
  - chmod 700 /home/kerdei/private (4: read; 2: write; 1: execute; 0: no right)

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### The Shell - Main Features The User Interface to the OS

## Shell features

- an ASCII terminal window will be started
  - like in XP the DOS window (run cmd)
- shell versions
  - sh, csh, bash, tcsh; others; see the man pages of the shells
  - at RISC default is the tcsh; echo \$SHELL
- miscellaneous parameters will be set per default
- environment variables: inherit values to sub-shells
  - list with printenv; set with setenv VARIABLE value
- local variables: scope only for the active shell
- lot of internal commandos; invoking external (OS) commandos, too
- programing language: powerful shell scripting possible
- man sh: 4918 lines (80 pages)

The Shell - Redirection Input/Output, process management

## Input/Output redirection

- standard input: console; standard output: display
- input output redirection;
  - Is -I > junk; cat jj >> junk; grep "txt" < junk|wc
- pipeline connects output/input of two subsequent processes:
  - ps auxw | grep sendmail|wc
  - more pipelines: who | sort | lpr
  - processes executed parallel

### Process management

- commands for listing/killing processes:
  - ps auxw ; ps auxw | grep pattern
  - kill -TERM process number; kill -9 process number
- starting a command in foreground / background
  - commands: &; bg; fg; jobs; kill % number

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# The Shell - Environment Variables

List of the environment parameters

### Environment variables

SHELL=/bin/tcsh HOST=11h11 USER=ke GROUP=ke HOSTTYPE=i486-linux PATH=/usr/local/bin:/usr/bin:/bin:/usr/bin/X11: /zvol/timer/bin:/home/ke/bin: DESKTOP-SESSION=kde PWD=/home/ke I.ANG=en-US.UTF-8 HOME=/home/ke OSTYPE=linux VENDOR=intel LOGNAME=ke MACHTYPE=i486 DTSPLAY=:0 TERM=xterm

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# Working on a command line Using commands in a shell

## Useful commands:

- Is -laRtrF (d: directory; -:ordinary files; I: link)
- du -s \*
- find . -name "\*pattern\*"
  - man find, please check, extreme powerful command
  - find /tmp -name EXP; find / -name "\*latex\*"
- grep -r -i -v pattern path; egrep; searchmonkey
  - grep process etch-allpackages.txt wc
  - grep " processes" software/etch-allpackages.txt wc
- top display Linux tasks; htop
- mount list/mount file systems and devices
- which mathematica:
  - /zlocal/mathematica/mathematica-6.0/Executables/mathematica

# Working on a command line Installing Debian packages

### Debian package system

- package structure: main contrib non-free
  - (package ends: .deb)
- http://www.at.debian.org/distrib/packages/
- http://packages.debian.org/stable/
  - get the file: (compact compressed textlist) allpackages.htm
  - search it with grep by keywords for topics

## Installing Debian packages (command line)

- apt-get install package-name (as root !)
- use the aptitude command (for advanced user)
- sudo apt-get install searchmonkey

## Installing Debian packages with KDE Kpackager

■ KDE menu -> System -> Package manager (Kpackage)

# Working on a command line i.e. working in a shell

### Summary

- you work in a terminal window on the console
  - Kmenu: Utilities: Terminal / Root Terminal
  - Kmenu: System: Terminal Program (Konsole)
- from a MS Windows computer by SSH (ssh.com, putty)
- from other Linux/Unix/Mac computer:
  - ssh -X -I username computername

## Advantages

- common for every Linux/Unix system
- more flexible than a windowing interface
- based on commands you can write (big) shell programs
- according your rights
  - you can start (all) programs on the system
  - you have (full) control on the OS
  - as root user you have the full control without restrictions by GUIs

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### File and directory management Commands and File Managers

#### using a terminal window (on a command line)

- create, remove: mkdir directory; rmdir directory; touch file; rm file
- cp file1 file2; mv file1 file2; mv directory1 directory2
- change permissions
- create symbolic links (for files, directories)

#### using a GUI, i.e. a File Manager

- there are a lot of file managers in Debian
  - get list with grep "file manager " etch-packages.txt
  - check them for features, looks, etc.
- some of them: konqueror, bsc, mc, filerunner, xfe

## File managers in details I

## File Managers

- bsc: BeeSoft Commander
  - graphical file manager with two panels
- mc: midnight commander
  - a powerful file manager
- filerunner:
  - X-Based FTP program and file manager, very powerful
- 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
  - Desktop configurator, etc.

## Konqueror - Start window



# Konqueror - Configuration

👻 🦳 🖻 Configure - Konc	lietor 🤅 🛎 🗙
Behavior	You can configure how Konqueror behaves as a file manager here
Appearance	<ul> <li>Open folders in separate windows</li> <li>Show network operations in a single window</li> <li>Show file tips</li> <li>Show previews in file tips</li> <li>Rename icons inline</li> </ul>
File Associations	Home URL:
Web Behavior	Show 'Delete' context menu entries which bypass the trashcan Ask Confirmation For Konfirmation For Konfirma
Java & JavaScript	I Dglete
AdBlocK Filters	
Help Defaults	

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### Konqueror - Configuration File associations

👻 🦳 🖹 Configure - Ko	ndnetot	? 🛋 🎗
	Configure file association: Find filename pattern: Find filename pattern: F	s General Embedding Filename Patterns Filename P
Web Behavior Java & JavaScript AdBlock Filters Fonts	- msexcel - mspowerpoint - msstnef - msword - msword - msword - octet-stream - octet-stream - ogg - ∑pdf - △ pgp - △ pgp	Adobe Reader kpDF KGhostView Document Viewer Edge Remove
Web Shortcuts	pgp-keys pgp-signature Add <u>B</u> emove	OK Apply Cancel

# Konqueror - Configuration

🕏 🤇 📄 Configure - Kor	idheiloi. 3	
Web Shortcuts	Configure the browser plugins	
	Global Settings	
History Sidebar	Enable plugins globally	
History Sidebar	Only allow HTTP and HTTPS URLs for plugins	
<u></u>	Load plugins on demand only	
Cookies	CPU priority for plugins: highest	
- <u> </u>	L	
Cache	Domain-Specific Settings	
200		
Proxy	Netscape Plugins	
css	Scan <u>P</u> lugins	
Stylesheets	Scan for New Plugins	
Styleaneets	Scan for new plugins at KDE startup	
	Scan Folders - Scan	
Crypto		
🍈	New New	
Browser Identification	\$HOME/.netscape/plugins	
2	/usr/lib64/browser-plugins	
Plugins	/usr/local/netscape/plugins	
	/opt/mozilla/plugins	
Performance		
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Help Defaults	QK Apply Can	cel

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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 etch-packages.txt
  - 236 etch packages, with 'editor'
- general purpose text editors of different power
- special editors for specific objects
  - audacity, gimp, kguitar, xfig
  - K3B CD/DVD creator

# Office suites

## Suites

- 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.

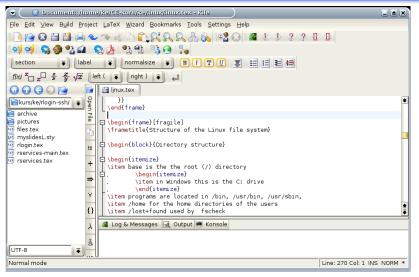
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# Text editors

#### Text Editors

- ed: The classic Unix line editor
- vi: historical times, but very powerful
- gvim: emacs-like, very powerful (www.vim.org)
- emacs: very powerful
- axe, nedit
- kedit, gedit: basic editors 4 KDE,GNOME
- kate: advanced text editor for KDE
- bluefish: html, php, etc
- conglomerate: XML editor
- kile: KDE Integrated LaTeX Environment
  - Latex Editor (XP: TexnicsCenter)

#### Text editors LaTeX Editor - Kile



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#### change to edit mode

i - insert text; a append text to line;

#### editing commands

**5**yy - mark 5 lines; **p** insert marked lines; **r**2w - replace two words;

#### advantage of vi for emergency case:

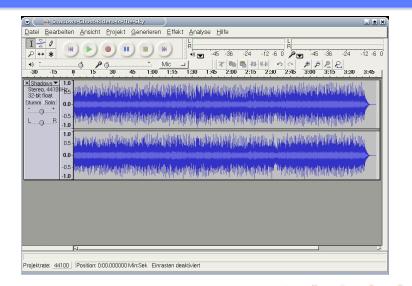
- you can always connect to Linux computer by ssh
- you can always use vi in the terminal window

## 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
- dia: diagram editor
- etktab: ASCII guitar tab editor
- kguitar: Stringed instrument tablature editor KDE
- pixmap: a pixmap editor
- GIMP: the Gnu Image Manipulation Program
- K3B: the KDE CD and DVD creator

# **Object Editors - Audacity**



## Object Editors - K3B CD-DVD 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)
  - intermediator between X-clients (applications) and D-K-M
  - accepts client connections from local host (remote host)

## X Window System The X-client

## X client

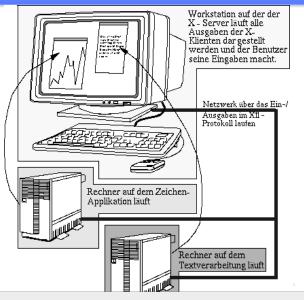
- connects to the X-server, to display its GUI
- most important X-clients
  - the X Window Manager; Xterm the terminal emulator
- name begins with x (xterm, xclock, xcalc, etc.)
- any window on the screen is an X-client !

#### 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

## X Window Manager

- provides the frame around a window with its functions
- responsible to move, resixe, 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

## Display Manager

- displays the graphical login window ("login manager")
- after successfull authentication starts an x-session
- restarting the display manager
  - finishes all programs in the session (new login window)

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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

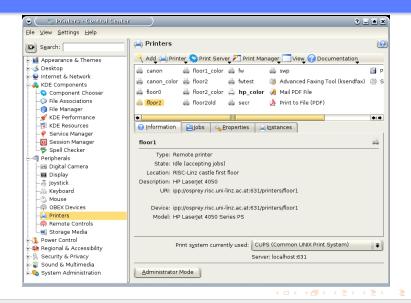


# The KDE Control Center

#### 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



# KDE Control Center - Service Manager

Search:	– 🛛 🌳 Service Manager		
Appearance & Themes	Load-on-Demand Services		
S Desktop	Service Description	Status	
Internet & Network	KDED Cookie Jar Module Keeps track of all cookies in the s	system Running	
KDE Components	KDED Favicon Module Shortcut icon support	Running	
Component Chooser	KDED KMRML Daemon Watcher Starts daemons on demand and	resta Not running	
- File Associations	KDED Kongueror Preloader Module Reduces Kongueror startup time	Running	
- 🗿 File Manager	KDED Password Module Password caching support	Running	
KDE Performance	KDE Print Daemon Print daemon for KDE	Not running	
KDE Resources	KSSL Daemon Module KSSL daemon module for KDED	Not running	
👻 Service Manager	Insulta estimate and the insultant and the foresees		
O Session Manager	- Startup Services		
Spell Checker			
Peripherals	Use Service Description	Status	
- iii Digital Camera	DNS-SD Services Watcher Keeps track of DNS-SD services		
- 🖬 Display	KDED Home Base URL Notifier	Running	
- Joystick	KDED Media Manager Keep track of media activities	s and all Running	
- A Keyboard	KDED Remote Base URL Notifier	Running	
- Mouse	KDED System Base URL Notifier	Running	
-  OBEX Devices	KDE Internet Daemon An Internet daemon that star	ts netw Running	
	KDE Write Daemon Watch for messages from loc	al users Running	
- Bemote Controls	KMilo KDE special key notifier	Running	
- III Storage Media	Media Notifier Daemon A media plugged notifier	Running	
Power Control	<ul> <li>Network Status Daemon Tracks status of network inte</li> </ul>	rfaces a Running	
Regional & Accessibility			
	Stert Step		
Security & Privacy			

# KDE Control Center - Security and Privacy

👻 🦳 📑 Crypto - Control Center		? _ = ×
<u>F</u> ile <u>∨</u> iew <u>S</u> ettings <u>H</u> elp		
Ele View Settings Help  Search: Search: Construction Cons	Enable [LS support if supported by the served of the	Stu3 Ciphers to Use         SALCOHAES128 SHA (128 of 128 b)         AECOHAES126 SHA (128 of 128 b)         AECOHAES126 SHA (128 of 128 b)         AES256 SHA (128 of 128 b)         AES256 SHA (128 of 128 b)         DAES256 SHA (128 of 128 b)         DAES256 SHA (128 of 128 b)         DHOSSAES128 SHA (128 of 128 b)         DHE0SSAES128 SHA (128 of 128 b)         DHE0SSAES1
	Warn on entering SSL mode	🗶 Warn on leaving SSL mode
	Warn on sending unencrypted data	
	Help Defaults	<u>Apply</u> <u>Lese</u>

## End of Overview

Thanks for your attention !