

# Debian/GNU Linux

## Working on a Command Line

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1 General

2 man

3 ls

4 ps-top

5 find

6 du/df

7 user-evn

8 dpkg

9 account

# Agenda

1 General

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# Working on a command line

i.e. working in a shell

## Summary

- you work in a terminal window on the console
- starting the terminal window KDE:
  - Kmenu: System: Terminal Program (Konsole)
  - Kmenu: Utilities: Terminal / Root Terminal
- more terminal programs are available
  - **konsole** (KDE), **gnome-terminal** (gnome), **xterm** the original X terminal
- connecting remotely to a terminal window (to a computer)
  - from a MS Windows computer by SSH (ssh.com, putty)
  - from other Linux/Unix/Mac computer: `ssh -X -l username computername`
- you are working with a shell in the terminal window

# Working on a command line

i.e. working in a shell

## Advantages

- common for every Linux/Unix/Mac OS-X 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

## Most important advantage

- using the command you have full access to all parameters
- no restrictions against GUI represented solution
  - using these access only to programmed features is available !!!

# Working on a command line

Useful commands: an overview - I

## File system

- Manage files:
  - create file (touch); delete file (rm); list file (cat); copy file (cp); move file (mv); compare files (cmp);
- Manage directories:
  - create directory (mkdir); remove empty directory (rmdir); remove directory (rm -r ); move directory (mv); copy directory (cp -r); print working directory (pwd); change directory (cd); list directory content (ls);
- Manage attributes:
  - chmod, chown, chgrp, umask;
- Other commands:
  - du, df, ln, mount

# Working on a command line

Useful commands: an overview - II

## Processes

- kill, killall, nice, ps, sleep, top

## User environment

- finger, id, passwd, su, sudo, uptime, w, wall, who, whoami, talk

## Text processing

- awk, cut, join, ed, sed, head, tail, less, more, sort, strings, vi, wc

## Networking

- netstat, ping, traceroute

## Searching

- find, locate, which; grep

## Packaging

- dpkg

# Working on a command line

Useful commands: top ten

## Useful commands:

- man man; man top; man ps;
- ls -laRtrF (d: directory; -:ordinary files; l: link)
- top - display Linux tasks; htop
- ps - list processes
- kill - kill processes
- find . -name "\*pattern\*"
  - man find, please check, extreme powerful command
  - find /tmp -name EXP; find / -name "\*latex\*"
- du -s \*
- grep -r -i -v pattern path; egrep; searchmonkey
  - grep process lenny-allpackages.txt | wc
  - grep " processes" software/lenny-allpackages.txt | wc
- do NOT forget the difference between OS commands and shell builtin commands !



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# Working on a command line

How to get information about commands, files, etc.

## Man pages

- if 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.

## Working on a command line

examples: man -k

```
hades:sysadmin!16> man -k "file manager"
filerunner (1)      - simple and efficient file manager with FTP
fr (1)             - simple and efficient file manager with FTP
gnome-commander (1) - A GNOME file manager
konqueror (1)      - Web browser, file manager, ...
nautilus (1)       - the GNOME File Manager
hades:sysadmin!17>

hades:sysadmin!29> man -k "ripper"
grip (1)           - A gtk-based cd-player and cd-ripper
kaudiocreator (1) - CD ripper and audio encoder front-end
sound-juicer (1)  - GNOME-desktop CD ripper and player using GStream
hades:sysadmin!30>
```

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# Working on a command line

Usefull commands: ls

## ls -laRtrFd

- l: use a long listing format
  - first character in the list entry:
    - d: directory; -:ordinary files; l: link;
- a: do not ignore entries starting with . (hidden files)
- R: list subdirectories recursively
- t: sort by modification time
- r: reverse order while sorting
- F: append indicator (one of \*/=>@| ) to entries
- d: list directory entries instead of contents
- 1: list one file per line
- and a lot of other parameters

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# Working on a command line

Usefull commands: top

## top - display Linux tasks

```
top - 10:34:51 up 3 days, 5:15, 2 users, load average: 0.09, 0.06, 0
Tasks: 125 total, 2 running, 123 sleeping, 0 stopped, 0 zombie
Cpu(s): 2.2%us, 0.2%sy, 0.0%ni, 97.7%id, 0.0%wa, 0.0%hi, 0.0%si,
Mem: 1034352k total, 1002484k used, 31868k free, 228300k buffer
Swap: 3028212k total, 51428k used, 2976784k free, 260068k cached
```

PID	USER	PR	NI	VIRT	RES	SHR	S	%CPU	%MEM	TIME+	COMMAND
9840	craab	20	0	179m	98m	17m	S	5	9.7	104:16.82	Mathematic
8123	craab	20	0	89908	6040	2884	S	1	0.6	14:14.38	gnome-term
18956	root	20	0	2888	688	540	S	1	0.1	0:01.06	dirmngr
26613	sysadmin	20	0	2356	1168	920	R	1	0.1	0:00.12	top
8117	craab	20	0	35348	27m	2888	S	0	2.7	7:40.05	Xvnc4
9847	craab	20	0	223m	64m	12m	S	0	6.4	17:37.62	MathKernel
9990	craab	20	0	435m	33m	8748	S	0	3.3	15:14.87	java

# Working on a command line

Usefull commands: htop - basic view

The screenshot shows the htop utility running in a terminal window. At the top, system statistics are displayed with progress bars: CPU usage is 5.8%, memory usage is 641/1011MB, and swap usage is 568/1906MB. System tasks are 170 total with 4 running. The load average is 0.18, 0.54, and 0.65. The system uptime is 7 days, 13:08:36.

Below the statistics is a table of running processes. The table has columns for PID, USER, PRI, NI, VIRT, RES, SHR, S, CPU%, MEM%, TIME+, and Command. The processes listed include htop, kconsole, kwin, ksnapshot, kicker, kdesktop, dcopserver, kpdf, udevd, ssh, portmap, syslogd, and klogd.

At the bottom of the terminal, there is a legend for function keys: F1 Help, F2 Setup, F3 Search, F4 Invert, F5 Free, F6 SortBy, F7 Nice, F8 Nice +, F9 Kill, and F10 Quit.

```

CPU [|||||] 5.8%] Tasks: 170 total, 4 running
Mem [|||||] 641/1011MB] Load average: 0.18 0.54 0.65
Swp [|||||] 568/1906MB] Uptime: 7 days, 13:08:36

  PID USER   PRI  NI  VIRT   RES   SHR  S  CPU% MEM%   TIME+  Command
 4343 root    15   0  231M  71580  3404  R   3.9  2.7  2h40:11 /usr/bin/X -br -nolisten tcp
 3194 ke      15   0   2264   1200   916  R   2.6  0.0  0:00.78 htop
 5356 ke      15   0  74452  8824   4712  S   0.0  0.3  1:09.80 kconsole [kdeinit] -session 1
 5309 ke      15   0  31044  6920   4452  S   0.0  0.3  2:15.88 kwin [kdeinit] -session 1075
21210 ke     15   0  215M  103M  21656  S   0.0  4.0  19:19.08 /usr/lib/iceweasel/firefox-b
10157 ke     15   0   748M  374M  22528  S   0.0  14.6  44:51.10 /home/ke/software/linux/navi
 3196 ke     15   0  31468  15920  13644  S   0.0  0.6  0:00.52 /usr/bin/ksnapshot
 5313 ke     15   0  38644  10860  7864  S   0.0  0.4  2:57.70 kicker [kdeinit]
 5311 ke     15   0  33676  8344   6148  S   0.0  0.3  0:54.05 kdesktop [kdeinit]
 5316 ke     19   0  30376  5776   4896  S   0.0  0.2  0:25.93 kweatherservice
 5295 ke     19   0  24884  1836   1400  S   0.0  0.1  0:06.23 dcopserver [kdeinit] --nosid
30701 ke     15   0  77496  23152  10924  S   0.0  0.9  6:51.17 kpdf linux-main.pdf
   1 root    15   0   1944   436   408  S   0.0  0.0  0:00.96 init [2]
 1248 root    21  -4   2712   412   340  S   0.0  0.0  0:01.40 udevd --daemon
 2259 ke      15   0   5848  1404   664  S   0.0  0.1  0:00.06 ssh -f -N -L 22000:bullfinch
 2261 ke      15   0   5552   732   264  S   0.0  0.0  0:00.00 ssh -f -N -L 3389:crutch.ris
 3075 daemon  19   0   1688   376   344  S   0.0  0.0  0:00.41 /sbin/portmap
 3325 root    18   0   2560   560   488  S   0.0  0.0  0:00.79 /sbin/syslogd
 3331 root    15   0   1580   360   308  S   0.0  0.0  0:00.06 /sbin/klogd -x
 3373 root    19   0   4884   364   356  S   0.0  0.0  0:00.00 /usr/sbin/hpid

F1Help F2Setup F3Search F4Invert F5Free F6SortBy F7Nice -F8Nice +F9Kill F10Quit
  
```



# Working on a command line

Usefull comands: htop - tree view of processes

```

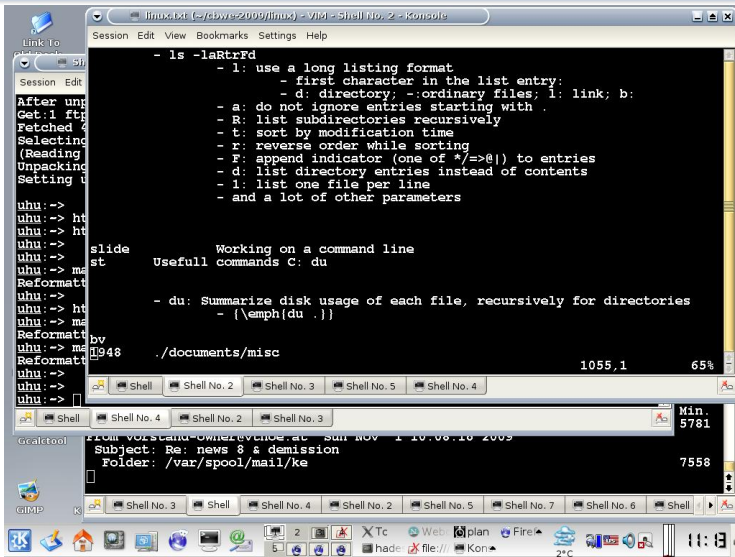
CPU [|||||] 9.7% Tasks: 171 total, 2 running
Mem [|||||] 643/1011MB Load average: 0.62 0.61 0.66
Swp [|||||] 568/1906MB Uptime: 7 days, 13:10:33

  NI  VIRT  RES  SHR  S  CPU%  MEM%  TIME+  Command
  0 25036 1864 1484 S  0.0  0.1  0:00.58  ~- kdeinit Running...
  0 40832 19320 16388 S  0.0  0.7  0:01.33  ~- /usr/bin/ksnapshot
  5 29408 11292 9936 S  0.0  0.4  0:00.25  ~- kio_thumbnail [kdeinit] thumbnail /tmp/k
  0 27268 3308 2748 S  0.0  0.1  0:00.61  ~- klauncher [kdeinit] --new-startup
  0 31044 6920 4452 S  0.0  0.3  2:16.08  ~- kwin [kdeinit] -session 1075687500001233
  0 30944 4964 3444 S  0.0  0.2  0:34.09  ~- /usr/bin/artsd -F 10 -S 4096 -n -s 60 -m
  0 44204 13936 4456 S  0.0  0.5  1:16.29  ~- konsole [kdeinit] -session 1075687500001
  0 4544 1072 616 S  0.0  0.0  0:00.06  ~- -bin/tcsh
  0 4548 1200 688 S  0.0  0.0  0:00.09  ~- -bin/tcsh
  0 31580 7264 5412 S  0.0  0.3  0:03.69  ~- vi linux.txt
  0 31580 7264 5412 S  0.0  0.3  0:00.00  ~- vi linux.txt
  0 4576 1236 688 S  0.0  0.0  0:00.21  ~- -bin/tcsh
  0 77496 23152 10924 S  0.0  0.9  6:51.19  ~- - kpdf linux-main.pdf
  0 4544 408 400 S  0.0  0.0  0:00.09  ~- -bin/tcsh
  0 4468 396 388 S  0.0  0.0  0:00.04  ~- -bin/tcsh
  0 38116 5908 3984 S  0.0  0.2  0:21.14  ~- konsole [kdeinit] -session 1075687500001
  0 4560 408 400 S  0.0  0.0  0:00.07  ~- -bin/tcsh
  0 4464 412 404 S  0.0  0.0  0:00.04  ~- -bin/tcsh
  0 2776 356 320 S  0.0  0.0  0:00.03  ~- - tail -f mails/incoming/procmail1
  0 4548 424 416 S  0.0  0.0  0:00.09  ~- -bin/tcsh

F1Help F2Setup F3Search F4Invert F5Free F6SortBy F7Nice -F8Nice +F9Kill F10Quit
  
```

# Working on a command line

Working environment of KE:



# Working on a command line

Usefull commands: ps - the help page of ps

```

Shell No. 2 - Konsole
Session Edit View Bookmarks Settings Help

uhu:~>
uhu:~> ps --help
***** simple selection *****          ***** selection by list *****
-A all processes                         -C by command name
-N negate selection                       -G by real group ID (supports names)
-a all w/ tty except session leaders      -U by real user ID (supports names)
-d all except session leaders            -g by session OR by effective group name
-e all processes                          -p by process ID
T all processes on this terminal          -s processes in the sessions given
a all w/ tty, including other users       -t by tty
g OBSOLETE -- DO NOT USE                  -u by effective user ID (supports names)
r only running processes                  U processes for specified users
x processes w/o controlling ttys         t by tty
***** output format *****             ***** long options *****
-o,o user-defined      -f full             --Group --User --pid --cols --ppid
-j,j job control      s signal             --group --user --sid --rows --info
-O,O preloaded -o     v virtual memory     --cumulative --format --deselect
-l,l long              u user-oriented     --sort --tty --forest --version
-F extra full         X registers          --heading --no-heading --context
***** misc options *****
-V,V show version     L list format codes  f ASCII art forest
-m,m,-L,-T,H threads S children in sum    -y change -l format
-M,Z security data   c true command name  -C scheduling class
-w,w wide output     n numeric WCHAN,UID  -H process hierarchy
uhu:~>

```

# Working on a command line

Usefull commands: ps - an example

**ps auxw:** To see every process on the system (BSD like format)

```

USER      PID %CPU %MEM    VSZ   RSS TTY      STAT START   TIME COMMAND
craab    9840  2.4  9.9 186784 103100 pts/1    Sl   Oct29 110:17
          /zvol/mathematica/mathematica-7.0/SystemFiles/FrontEnd/Binaries/Li
root     4197  0.0  0.0   8736   828 ?        Ss   Oct29   0:05
sendmail: MTA: accepting connections
craab    14143  0.2  0.1   2480   1204 pts/1    S+   Oct29 10:36 top

```

**ps auxw | grep sysadmin**

```

root     27329  0.0  0.2   9372   2972 ?        Ss   12:35   0:00 sshd:
sysadmin 27336  0.0  0.1   9372   1612 ?        S    12:35   0:00 sshd:
sysadmin 27337  0.0  0.2   4644   2328 pts/2    Ss   12:35   0:00 -tcsh
sysadmin 27494  0.0  0.0   2396    952 pts/2    R+   12:50   0:00 ps aux
sysadmin 27495  0.0  0.0   1832    540 pts/2    S+   12:50   0:00 grep s

```

## Working on a command line

Usefull commands: kill

### Terminate processes: kill, killall (/bin/kill)

- kill -TERM proc-ID (sends the terminate signal)
- kill -KILL proc-ID (sends the KILL signal)
  - this signal may not be blocked
  - KILL or 9 (numeric values available)
- /bin/kill is the path for this program

### shell builtin command: kill [-s signal] job | pid

- signals are identical of the /bin/kill program
- you can kill jobs, too.
- default signal is TERM (terminate)
- examples:
  - kill %1; kill PID; kill -9 PID

## Working on a command line

Usefull commands: kill - how to kill jobs

```
uhu:~/cbwe-2009/linux> kpdf linux-main.pdf &
[1] 14338
uhu:~/cbwe-2009/linux>
uhu:~/cbwe-2009/linux> kpdf ~/CBWE-certificatespdfpreview.pdf
```

Suspended

```
uhu:~/cbwe-2009/linux> bg
[2] kpdf ~/CBWE-certificatespdfpreview.pdf &
uhu:~/cbwe-2009/linux>
uhu:~/cbwe-2009/linux> jobs
[1] + Running kpdf linux-main.pdf
[2] Running kpdf ~/CBWE-certificatespdfpreview
uhu:~/cbwe-2009/linux>
uhu:~/cbwe-2009/linux> kill %2
uhu:~/cbwe-2009/linux>
[2] Terminated kpdf ~/CBWE-certificatespdfpreview
uhu:~/cbwe-2009/linux>
```

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**5 find**

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# Working on a command line

Usefull commands: find - the help page

```

Usage: find [path...] [expression]

default path is the current directory; default expression is -print
expression may consist of: operators, options, tests, and actions:

operators (decreasing precedence; -and is implicit where no others are given):
( EXPR ) ! EXPR -not EXPR EXPR1 -a EXPR2 EXPR1 -and EXPR2
EXPR1 -o EXPR2 EXPR1 -or EXPR2 EXPR1 , EXPR2

normal options (always true, specified before other expressions):
-depth --help -maxdepth LEVELS -mindepth LEVELS -mount -noleaf
--version -xdev -ignore_readdir_race -noignore_readdir_race

tests (N can be +N or -N or N): -amin N -anewer FILE -atime N -cmin N
-cnewer FILE -ctime N -empty -false -fstype TYPE -gid N -group NAME
-ilname PATTERN -iname PATTERN -inum N -iwholename PATTERN -iregex PATTERN
-links N -lname PATTERN -mmin N -mtime N -name PATTERN -newer FILE
-nouser -nogroup -path PATTERN -perm [+_]MODE -regex PATTERN
-wholename PATTERN -size N[bcwkMG] -true -type [bcdpfls] -uid N
-used N -user NAME -xtype [bcdpfls]

actions: -delete -print0 -printf FORMAT -fprintf FILE FORMAT -print
-fprint0 FILE -fprint FILE -ls -fls FILE -prune -quit
-exec COMMAND ; -exec COMMAND {} + -ok COMMAND ;
-execdir COMMAND ; -execdir COMMAND {} + -okdir COMMAND ;

uhu:~>

```



# Working on a command line

Usefull commands: find

## find command

- By default, find returns all files below the current directory
- allows user to specify an action to be taken on each matched file
- extremely powerful program for applying actions to many files

## find [-H] [-L] [-P] [path...] [expression]

- At least one path must precede the expression
- capable of interpreting wildcards internally
- commands must be constructed carefully in order to control shell globbing
- supports regex matching; expression elements are whitespace-separated and evaluated from left to right
- by default, find executes the '-print' action
- The GNU find has a large number of additional features not specified by POSIX.

## Working on a command line

Usefull commands: examples of find

```
find . -name "*mp3"
```

```
./mp3-what/csendes.mp3  
./gnome/Gnomp3  
./private/DanielGerard-Butterfly.mp3
```

- searches current directory (represented by a period) and below it
- the quotes avoid the shell expansion

```
find . -size 15M
```

```
./skype-debian_2.0.0.72-1_i386.deb  
./mails/mails-lists/2006/greifvoegel-1  
./mails/spam-last-part  
./nature-docs/at/arge-orni/00e-BVAtlas-methode.pdf
```

# Working on a command line

Usefull commands: examples of find

```
find . -size 15M -exec ls -l {} \;
```

```
-rw-r--r-- 1 ke ke 15504764 2009-08-27 10:45 ./skype-debian_2.0.0.72-1_  
-rw-rw-r-- 1 ke ke 15037423 2006-12-31 23:32 ./mails/mails-lists/2006/g  
-rw-r--r-- 1 ke ke 14970181 2007-03-30 10:14 ./mails/spam-last-part  
-rw----- 1 ke ke 14965394 2005-06-14 11:41 ./nature-docs/at/arge-orni
```

## parameter

- `{}` means: replacing `{}` with the name of the file
- the semicolon indicates the end of the command
  - backslashed to avoid the shell interpreting it as a command separator

## find

```
find /scratch/ke -name "*.mp3" -type f -exec chmod 400 {} \;
```

## Working on a command line

Usefull commands: examples of find

```
uhu:~/cbwe-2009/linux> find . -name "*toc" -print
./linux-2-main.toc
./linux-main.toc
uhu:~/cbwe-2009/linux>
```

```
uhu:~/cbwe-2009/linux> find . -name "*toc" -exec ls -l {} \;
-rw-r--r-- 1 ke ke 267 2009-11-02 12:03 ./linux-2-main.toc
-rw-r--r-- 1 ke ke 388 2009-11-13 20:41 ./linux-main.toc
uhu:~/cbwe-2009/linux>
```

```
uhu:~/cbwe-2009/linux> find . -name "*toc" -exec ls {} \;
./linux-2-main.toc
./linux-main.toc
uhu:~/cbwe-2009/linux>
```

# Working on a command line

Usefull commands: examples of find

```

uhu:~/cbwe-2009/linux> find . -name "*toc" -exec ls \;
archive                linux-2-main.tex      linux-main.tex
beamernew-slides2tex.pl linux-2-main.toc      linux-main.toc
beamerthemeOxygen.sty  linux-2-main.vrb     linux-main.vrb
cancelled-parts.txt    linux-2.tex           linux.tex
compile                linux-2.txt           linux.txt
compile-2              linux-body.tex        oxygen-header_ke3.png
linux-2-main.nav       linux-main.nav        pictures
linux-2-main.pdf       linux-main.pdf        twocol
linux-2-main.snm       linux-main.snm
archive                linux-2-main.tex      linux-main.tex
beamernew-slides2tex.pl linux-2-main.toc      linux-main.toc
beamerthemeOxygen.sty  linux-2-main.vrb     linux-main.vrb
cancelled-parts.txt    linux-2.tex           linux.tex
compile                linux-2.txt           linux.txt
compile-2              linux-body.tex        oxygen-header_ke3.png
linux-2-main.nav       linux-main.nav        pictures
linux-2-main.pdf       linux-main.pdf        twocol
linux-2-main.snm       linux-main.snm

```

# Working on a command line

Usefull commands: examples of find

```
find cbwe-2009/ -type l -exec file {} \;
```

The screenshot shows a terminal window titled "Shell - Konsole" with a menu bar (Session, Edit, View, Bookmarks, Settings, Help). The terminal output is as follows:

```

uhu:~> find cbwe-2009/ -type l
cbwe-2009/linux/oxygen-header_ke3.png
cbwe-2009/linux/beamernew-slides2tex.pl
cbwe-2009/linux/beamerthemeOxygen.sty
uhu:~>
uhu:~> find cbwe-2009/ -type l -exec file {} \;
cbwe-2009/linux/oxygen-header_ke3.png: symbolic link to `../oxygen-header_ke3.png'
cbwe-2009/linux/beamernew-slides2tex.pl: symbolic link to `../beamernew-slides2tex.pl'
cbwe-2009/linux/beamerthemeOxygen.sty: symbolic link to `../beamerthemeOxygen.sty'
uhu:~>
uhu:~> find cbwe-2009/ -type l -exec ls -l {} \;
lrwxrwxrwx 1 ke ke 24 2009-10-20 17:28 cbwe-2009/linux/oxygen-header_ke3.png ->
../oxygen-header_ke3.png
lrwxrwxrwx 1 ke ke 26 2009-10-20 17:28 cbwe-2009/linux/beamernew-slides2tex.pl ->
../beamernew-slides2tex.pl
lrwxrwxrwx 1 ke ke 24 2009-10-20 17:28 cbwe-2009/linux/beamerthemeOxygen.sty ->
../beamerthemeOxygen.sty
uhu:~>
uhu:~>
uhu:~>

```

The terminal window has three tabs at the bottom: "Shell", "Shell No. 3", and "Shell No. 2".

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# Working on a command line

Usefull commands: du

## du: Summarize disk usage of each file, recursively for directories

### ■ du . (for the current directory)

```
1948    ./documents/misc
1572    ./documents/bva-docs
38524   ./documents/books/from-GG
2820    ./documents/books/linux
120     ./documents/books/digi-foto/macro_files
```

### ■ du -s path

#### ■ display only a total for each argument (., \*, name)

```
uhu:~> du -s documents/
481452  documents/
uhu:~>
```

### ■ du -s .\*

#### ■ display total for the hidden dot-directories (.\* .\*?)



## Working on a command line

Usefull commands: df - report file system disk space usage

```
hades:sysadmin!5> df
```

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
/dev/hda1	14421344	11933544	1755240	88%	/
tmpfs	513564	0	513564	0%	/lib/init/rw
udev	10240	716	9524	7%	/dev
tmpfs	513564	0	513564	0%	/dev/shm
/dev/hda5	22643764	20763036	730476	97%	/zlocal/hda5
atlantis:/zlocal/sdb7/sysadmin					
	15377920	12132608	2464256	84%	/home/sysadmin
atlantis:/zlocal/sda8/maple					
	15377920	10851840	3745024	75%	/zvol/maple
atlantis:/zlocal/sda6/mathematica					
	15377920	11300864	3296000	78%	/zvol/mathemati

```
hades:sysadmin!6>
```

# Working on a command line

Usefull commands: examples of **df**

```
hades:sysadmin!6> df -l
```

Filesystem	1K-blocks	Used	Available	Use%	Mounted on
/dev/hda1	14421344	11933544	1755240	88%	/
tmpfs	513564	0	513564	0%	/lib/init/rw
udev	10240	716	9524	7%	/dev
tmpfs	513564	0	513564	0%	/dev/shm
/dev/hda5	22643764	20763036	730476	97%	/zlocal/hda5

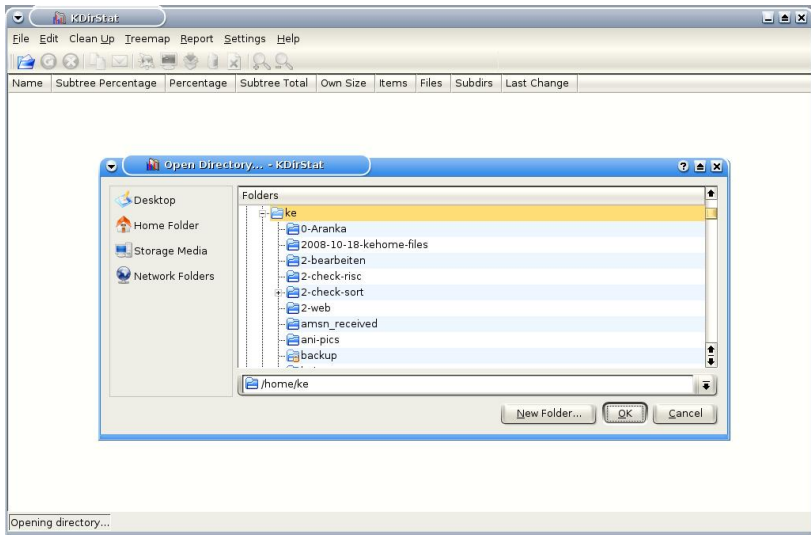
```
hades:sysadmin!7> df -l -h
```

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/hda1	14G	12G	1.7G	88%	/
tmpfs	502M	0	502M	0%	/lib/init/rw
udev	10M	716K	9.4M	7%	/dev
tmpfs	502M	0	502M	0%	/dev/shm
/dev/hda5	22G	20G	714M	97%	/zlocal/hda5

```
hades:sysadmin!8>
```

# Working on a command line

Kdirstat - graphical view of the disk usage - the start screen



# Working on a command line

## Kdirstat

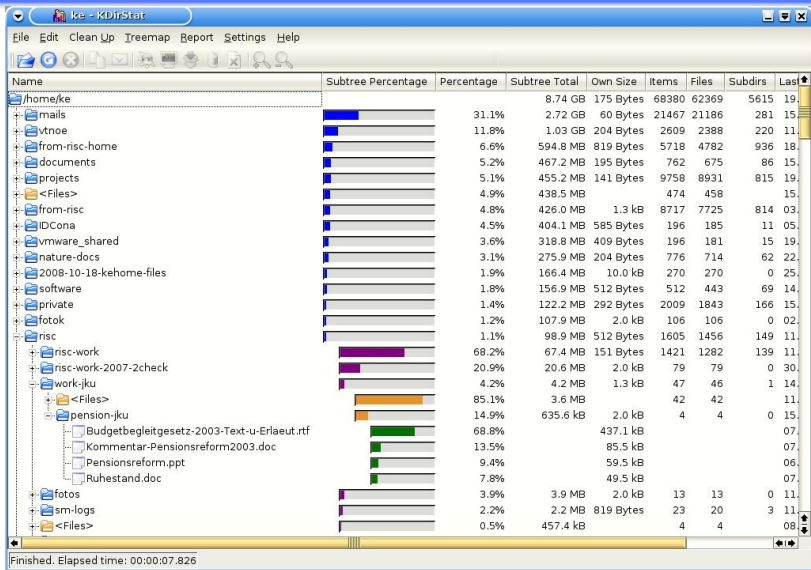
The screenshot shows the KDirStat application window. The title bar reads "ke - KDirStat". The menu bar includes "File", "Edit", "Clean Up", "Treemap", "Report", "Settings", and "Help". The main area displays a directory tree on the left and a table of statistics on the right. The table columns are: Name, Subtree Percentage, Percentage, Subtree Total, Own Size, Items, Files, Subdirs, and Last Change. The data is sorted by subtree percentage in descending order.

Name	Subtree Percentage	Percentage	Subtree Total	Own Size	Items	Files	Subdirs	Last Change
/home/ke			8.74 GB	175 Bytes	68380	62369	5615	19.01.2038 04:14:07
mails	31.1%		2.72 GB	60 Bytes	21467	21186	281	15.11.2009 17:32:06
vtnoe	11.8%		1.03 GB	204 Bytes	2609	2388	220	11.11.2009 17:08:17
from-risc-home	6.6%		594.8 MB	819 Bytes	5718	4782	936	18.10.2008 13:24:41
documents	5.2%		467.2 MB	195 Bytes	762	675	86	15.11.2009 17:28:15
projects	5.1%		455.2 MB	141 Bytes	9758	8931	815	19.01.2038 04:14:07
<Files>	4.9%		438.5 MB		474	458		15.11.2009 17:35:29
from-risc	4.8%		426.0 MB	1.3 kB	8717	7725	814	03.12.2007 10:04:39
IDCona	4.5%		404.1 MB	585 Bytes	196	185	11	05.03.2009 08:35:56
vmware_shared	3.6%		318.8 MB	409 Bytes	196	181	15	19.01.2038 04:14:07
nature-docs	3.1%		275.9 MB	204 Bytes	776	714	62	22.07.2009 15:48:02
2008-10-18-kehome-files	1.9%		166.4 MB	10.0 kB	270	270	0	25.11.2008 13:29:41
software	1.8%		156.9 MB	512 Bytes	512	443	69	14.11.2009 18:53:59
private	1.4%		122.2 MB	292 Bytes	2009	1843	166	15.10.2009 16:47:11
fotok	1.2%		107.9 MB	2.0 kB	106	106	0	02.08.2009 13:20:14
risc	1.1%		98.9 MB	512 Bytes	1605	1456	149	11.11.2009 11:04:53
CE-kurs	1.0%		93.8 MB	409 Bytes	694	632	45	29.10.2009 17:57:46
.mozilla	1.0%		89.9 MB	682 Bytes	797	661	135	15.11.2009 17:20:16
download	0.6%		57.5 MB	819 Bytes	154	143	11	14.03.2009 23:15:04
new-docs	0.6%		54.4 MB	1.3 kB	47	46	1	21.06.2007 18:44:30
karacsony	0.5%		46.8 MB	1.3 kB	42	41	1	27.12.2008 13:33:50
bf-08	0.5%		45.8 MB	1.3 kB	29	28	1	18.12.2008 23:13:20
pdf-files-20090305	0.5%		40.9 MB	2.0 kB	28	28	0	05.03.2009 17:15:25
fontos-privat	0.4%		36.0 MB	256 Bytes	194	174	20	11.11.2009 17:39:16
fotok-ek	0.4%		35.0 MB	2.0 kB	33	33	0	07.06.2009 19:52:37
vmware	0.4%		33.8 MB	2.0 kB	1	1	0	28.12.2008 23:16:33

Finished. Elapsed time: 00:00:07.826

# Working on a command line

## Kdirstat



# Working on a command line

## Kdirstat

The screenshot shows the KDirStat application window titled "ke - KDirStat". The window has a menu bar (File, Edit, Clean Up, Treemap, Report, Settings, Help) and a toolbar with various icons. The main area is divided into two parts: a tree view on the left and a table on the right.

The tree view shows a directory structure starting with "risc". The table below provides detailed statistics for each subtree and file.

Name	Subtree Percentage	Percentage	Subtree Total	Own Size	Items	Files	Subdirs	Last
risc		1.1%	98.9 MB	512 Bytes	1605	1456	149	11
├─ risc-work		68.2%	67.4 MB	151 Bytes	1421	1282	139	11
├─ risc-work-2007-2check		20.9%	20.6 MB	2.0 kB	79	79	0	30
├─ work-jku		4.2%	4.2 MB	1.3 kB	47	46	1	14
├─ <Files>		85.1%	3.6 MB		42	42		11
├─ pension-jku		14.9%	635.6 kB	2.0 kB	4	4	0	15
│ └─ Budgetbegleitgesetz-2003-Text-u-Erlaeut.rtf		68.8%		437.1 kB				07
│ └─ Kommentar-Pensionsreform2003.doc		13.5%		85.5 kB				07
│ └─ Pensionsreform.ppt		9.4%		59.5 kB				06
│ └─ Ruhestand.doc		7.8%		49.5 kB				07
└─ fotos		3.9%	3.9 MB	2.0 kB	13	13	0	11

The bottom part of the window shows a treemap visualization of the directory structure, with a red box highlighting a specific area. The status bar at the bottom left shows the current path: `/home/ke/risc`.

# Working on a command line

## Kdirstat

The screenshot shows the KDirStat application window. The top part displays a file tree with columns for Name, Subtree Percentage, Percentage, Subtree Total, Own Size, Items, and Files. The file 'debian-503-i386-netinst.iso' is selected and highlighted in yellow.

Name	Subtree Percentage	Percentage	Subtree Total	Own Size	Items	Files
projects		5.1%	455.2 MB	141 Bytes	9758	893
<Files>		4.9%	438.5 MB		474	45
debian-503-i386-netinst.iso		34.2%		150.0 MB		
marano-1.odp		10.6%		46.5 MB		
aarmean-image_resize.avi		9.0%		39.6 MB		
xflog.txt		6.8%		29.6 MB		
Memo-96.amr		4.6%		20.0 MB		
skype-debian_2.1.0.47-1_i386.deb		4.3%		19.0 MB		
skype-debian_2.0.0.72-1_i386.deb		3.4%		14.8 MB		
ARC-KeplerOverview-480p.mp4		2.7%		12.0 MB		

The bottom part of the window shows a treemap visualization of the selected file's contents. The treemap is a complex, multi-colored grid of rectangles representing the internal structure of the ISO file. A red rectangle highlights a specific area on the right side of the treemap.

The status bar at the bottom of the window shows the path: `/home/ke/debian-503-i386-netinst.iso`

# Working on a command line

## Kdirstat

ke - KDirStat

File Edit Clean Up Treemap Report Settings Help

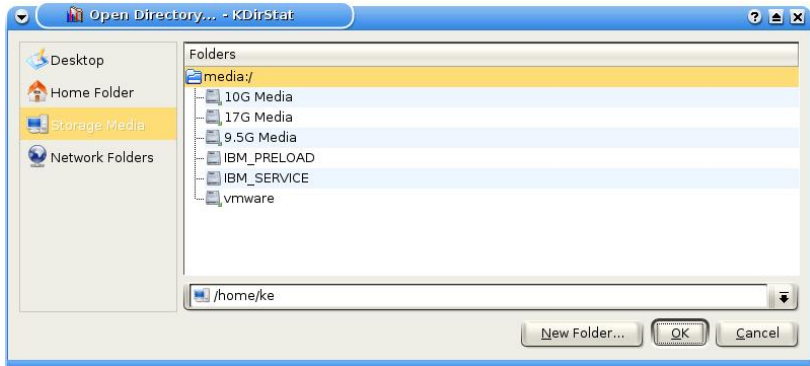
Name	Subtree Percentage	Percentage	Subtree Total	Own Size	Items	Files
.mozilla		1.0%	89.9 MB	682 Bytes	797	66
download		0.6%	57.5 MB	819 Bytes	154	14
new-docs		0.6%	54.4 MB	1.3 kB	47	4
karacsony		0.5%	46.8 MB	1.3 kB	42	4
bf-08		0.5%	45.8 MB	1.3 kB	29	2
pdf-files-20090305		0.5%	40.9 MB	2.0 kB	28	2
fontos-privat		0.4%	36.0 MB	256 Bytes	194	17
fotok-ek		0.4%	35.0 MB	2.0 kB	33	3
vmware		0.4%	33.8 MB	2.0 kB	1	
heic0406a-galaxies.jpg	100.0%			33.8 MB		

/home/ke/vmware/heic0406a-galaxies.jpg



# Working on a command line

Kdirstat



# Agenda

1 General

2 man

3 ls

4 ps-top

5 find

6 du/df

7 user-evn

8 dpkg

# Working on a command line

Commands in the user environment

## Commands: uptime and who

- **uptime** - Tell how long the system has been running

```
uhu:~> uptime
```

```
19:51:40 up 3 days, 7:33, 2 users, load average: 0.11, 0.16, 0.
```

```
uhu:~>
```

- **who** - show who is logged on

```
gonzales:sysadmin!2> who
```

```
cschneid pts/1 Nov 18 11:58 (ozelot.risc.uni-linz.ac.at)
```

```
cschneid pts/0 Nov 18 12:06 (ozelot.risc.uni-linz.ac.at)
```

```
cschneid pts/2 Nov 18 12:11 (ozelot.risc.uni-linz.ac.at)
```

```
cschneid pts/3 Nov 19 15:33 (ozelot.risc.uni-linz.ac.at)
```

```
cschneid pts/4 Nov 18 13:52 (ozelot.risc.uni-linz.ac.at)
```

```
cdoench pts/5 Nov 20 09:50 (dog.risc.uni-linz.ac.at)
```

```
mkauers pts/6 Nov 21 12:01 (fennek.risc.uni-linz.ac.at)
```

```
fstan pts/7 Nov 22 11:30 (ap164144.wlan.jku.at)
```

```
cschneid pts/8 Nov 22 15:21 (ozelot.risc.uni-linz.ac.at)
```

```
sysadmin pts/9 Nov 22 19:54 (hades.risc.uni-linz.ac.at)
```

```
gonzales:sysadmin!3>
```



# Working on a command line

## Commands in the user environment

### w - Show who is logged on and what they are doing

```
gonzales:sysadmin!1> w
```

```

19:54:20 up 4 days,  8:03, 10 users,  load average: 4.78, 4.37, 4.18
USER      TTY      FROM          LOGIN@      IDLE        JCPU        PCPU  WHAT
cschneid pts/1    ozelot.risc.uni- Wed11    32:45    2:54m    3.96s  top
cschneid pts/0    ozelot.risc.uni- Wed12    24:29m  13:44    0.06s  -tcsh
cschneid pts/2    ozelot.risc.uni- Wed12    24:32m  33:40    0.12s  -tcsh
cschneid pts/3    ozelot.risc.uni- Thu15     2:23m    4:35m    0.32s  tail -f
cschneid pts/4    ozelot.risc.uni- Wed13    24:27m    4:41m    0.68s  -tcsh
cdoench  pts/5    dog.risc.uni-lin Fri09     2days    0.20s    0.20s  -tcsh
mkauers  pts/6    fennek.risc.uni- Sat12    31:52m    1:25     1:24   top
fstan    pts/7    ap164144.wlan.jk 11:30    50:48    50.24s   50.22s  top
cschneid pts/8    ozelot.risc.uni- 15:21     4:16m    4:17m    0.16s  -tcsh
sysadmin pts/9    hades.risc.uni-l 19:54     0.00s    0.02s    0.00s  w
gonzales:sysadmin!2>

```

# Agenda

1 General

2 man

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4 ps-top

5 find

6 du/df

7 user-evt

8 dpkg

# Working on a command line

## Installing Debian packages

### Debian package system

- package structure: main contrib non-free
  - (file name of 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 aptitude install package-name (will use a graphical terminal)
- sudo apt-get install searchmonkey

# Working on a command line

## Installing Debian packages - dpkg - options summary

### Install a Debian package: -i

- `sudo dpkg -i skype-debian_2.1.0.47-1_i386.deb`

### Search for package name: -s

- `dpkg -s searchmonkey`

### Search for file name in all Debian packages: -S

- `dpkg -S /usr/bin/searchmonkey`

### List the contents of a Debian package : -L

- `dpkg -L searchmonkey`

### List package names: -l

- `dpkg -l "browser*"`

# Working on a command line

Installing Debian packages - search for a package name

```

Shell - Konsole - Shell - Konsole - Shell - Konsole - Shell - Konsole - Sh - Shell - Konsole
Session Edit View Bookmarks Settings Help
uhu:~>
uhu:~> dpkg -s searchmonkey
Package: searchmonkey
Status: install ok installed
Priority: optional
Section: utils
Installed-Size: 280
Maintainer: Varun Hiremath <varunhiremath@gmail.com>
Architecture: i386
Version: 0.7.1-1
Depends: libatk1.0-0 (>= 1.12.2), libc6 (>= 2.3.6-6), libcairo2 (>= 1.2.4), libfontconfig1 (>= 2.4.0), libglib2.0-0 (>= 2.12.0), libgtk2.0-0 (>= 2.8.0), libpango1.0-0 (>= 1.14.7), libx11-6, libxcursor1 (> 1.1.2), libxext6, libxfixes3 (>= 1:4.0.1), libxi6, libxinerama1, libxrandr2, libxrender1
Description: search files using regular expressions aiming to replace find/grep tools
 SearchMonkey is a light-weight Gtk application that aims to replace the cumbersome find/grep with a slick user interface that quickly provides a mark-up showing locations and quantity of text matches.
 The goal is to provide a simple to use and accessible search tool for end-users, and software developers alike.

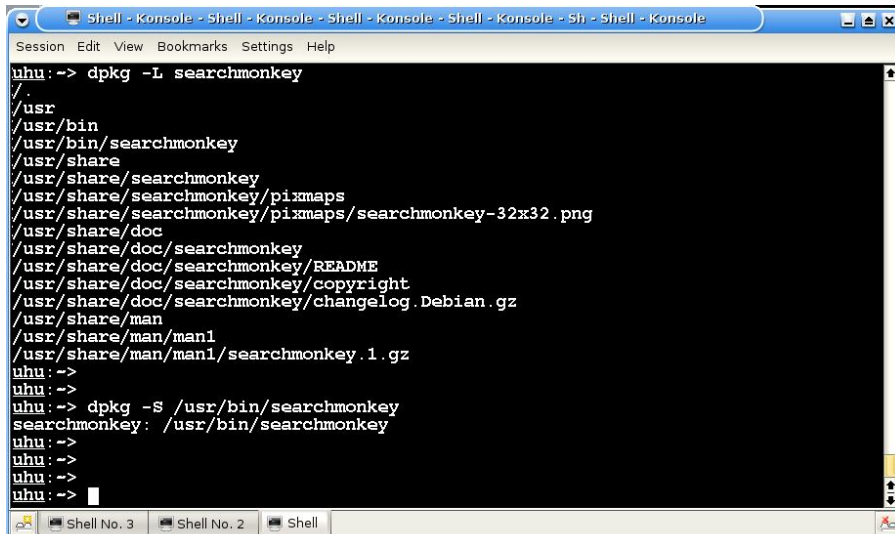
 Homepage: http://sourceforge.net/projects/searchmonkey/
uhu:~>
uhu:~> █

```



# Working on a command line

Installing Debian packages - L list contents, -S search for name



```
Shell - Konsole - Shell - Konsole - Shell - Konsole - Shell - Konsole - Sh - Shell - Konsole
Session Edit View Bookmarks Settings Help
uhu:~> dpkg -L searchmonkey
./
./usr
./usr/bin
./usr/bin/searchmonkey
./usr/share
./usr/share/searchmonkey
./usr/share/searchmonkey/pixmaps
./usr/share/searchmonkey/pixmaps/searchmonkey-32x32.png
./usr/share/doc
./usr/share/doc/searchmonkey
./usr/share/doc/searchmonkey/README
./usr/share/doc/searchmonkey/copyright
./usr/share/doc/searchmonkey/changelog.Debian.gz
./usr/share/man
./usr/share/man/man1
./usr/share/man/man1/searchmonkey.1.gz
uhu:~>
uhu:~>
uhu:~> dpkg -S /usr/bin/searchmonkey
searchmonkey: /usr/bin/searchmonkey
uhu:~>
uhu:~>
uhu:~>
uhu:~>
```

# Working on a command line

## Installing Debian packages - list packages

```

Shell - Konsole - Shell - Konsole - Shell - Konsole - Shell - Konsole - Sh - Shell - Konsole
Session Edit View Bookmarks Settings Help
uhu:~> dpkg -l "*browser*"
Desired=Unknown/Install/Remove/Purge/Hold
| Status=Not/Installed/Config-files/Unpacked/Failed-config/Half-installed
|/ Err?=(none)/Hold/Reinst-required/X=both-problems (Status,Err: uppercase=bad)
||/ Name          Version          Description
+++-----+-----+-----+
pn browser-histor <none>           (no description available)
pn cbrowser       <none>           (no description available)
ii epiphany-brows 2.14.3-8        Intuitive GNOME web browser
pn epiphany-brows <none>          (no description available)
pn gimp-helpbrows <none>          (no description available)
un gnome-www-brow <none>          (no description available)
ii iceape-browser 1.0.13-pre0806 Iceape Navigator (Internet browser) and Comp
un info-browser   <none>           (no description available)
un infobrowser    <none>           (no description available)
un java-browser-p <none>           (no description available)
pn libhttp-browse <none>           (no description available)
un man-browser    <none>           (no description available)
un midbrowser     <none>           (no description available)
pn monodoc-browse <none>           (no description available)
ii mozilla-browse 1.8+1.0.13~pre Transition package for Iceape Navigator and
un mozilla-browse <none>           (no description available)
ii mysql-query-br 1.2.5beta-3    Official GUI tool to query MySQL database
ii mysql-query-br 1.2.5beta-3    Architecture independent files for MySQL Que
un mythbrowser    <none>           (no description available)

```

# Agenda

1 General

2 man

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4 ps-top

5 find

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7 user-evn

8 dpkg

# Working on a command line

## Changing a user account by commands

### chfn; chsh: change real user name and information; login shell

- `chfn -f fullname -r roomno -w workph -h homeph -o other user`
- `chsh -help -shell SHELL [LOGIN]`

### YP Commands: yppasswd, ypchfn, ypchsh, ypcat, ypwhich, ypmatch

- `yppasswd [-f] [-l] [-p] [user]`
  - `-p passwd`; `-l login shell`; `-f login data`
  - `ypchfn [user]`; `ypchsh [user]` (is a link to `yppasswd`)

- `hades 4> yppasswd -l ke`

```
Changing NIS account information for ke on atlantis.risc.uni-linz.a
```

```
Please enter password:
```

```
Changing login shell for ke on atlantis.risc.uni-linz.ac.at.
```

```
To accept the default, simply press return. To use the
system's default shell, type the word "none".
```

```
Login shell [/bin/bash]: /bin/tcsh
```

```
The login shell has been changed on atlantis.risc.uni-linz.ac.at.
```

```
hades:5>
```

# Account - Permissions

## Using groups

```
atlantis:~> ls -ld /home/doench/ /home/khan
drwxr-x--- 2 doench doench 4096 Oct 29 17:35 /home/doench/
drwxr-x--- 2 khan  khan  4096 Oct 29 17:35 /home/khan
atlantis:~>
atlantis:~> ypcat passwd | grep doench
doench:Fusb8x9TDxDuc:13144:13144:Christian Doench:/home/doench:/bin/tcsh
atlantis:~>
atlantis:~> ypcat group | grep 13144
doench*:13144:ke
atlantis:~>
atlantis:~> ypcat group | grep khan
khan*:13134:ke
student*:10030:ablinger,sinka,tec,rahkooy,khan,ghira,galea,vele,
korporal,korbelar,zaf,velkov,conran,sharkey,doench,wiesinge
atlantis:~>
```

## Account - Permissions

Changing permissions by commands

```
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)

default setting for directory: `drwxr-xr-x`

```
sysadmin!16> mkdir junk
sysadmin!17> ls -ld junk
drwxr-xr-x 2 sysadmin sysadmin 4096 Oct 31 21:20 junk/
sysadmin!18> chmod g-r,o-r junk
sysadmin!19>
sysadmin!19> ls -ld junk
drwx--x--x 2 sysadmin sysadmin 4096 Oct 31 21:20 junk/
sysadmin!21>
```

## Account - Permissions

Changing permissions by commands

```
sysadmin!20> touch junk/file1.txt
sysadmin!21>
sysadmin!21> ls -l junk/file1.txt
-rw-r--r-- 1 sysadmin sysadmin 0 Oct 31 21:20 junk/file1.txt
sysadmin!22>
hades:sysadmin!22> sudo su - ke
hades:1> cd /home/sysadmin
hades:2> ls -l junk/fi
junk/ unreadable
hades:2> ls -l junk
ls: cannot open directory junk: Permission denied
hades:3>
hades:3> ls -l junk/file1.txt
-rw-r--r-- 1 sysadmin sysadmin 0 Oct 31 21:20 junk/file1.txt
hades:4> ls -ld junk/
drwx--x--x 2 sysadmin sysadmin 4096 Oct 31 21:20 junk//
hades:5>
```

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# Text editors

vi

## vi modes: command mode, editing mode

- change to command mode: **ESC** from editing

## command mode

- file: read: **:e file**; write: **:w file** reread: **:e! file**; insert: **:r file**
- file: exit: **:q, ZZ**; starting vi: **vi filename**;

## change to edit mode

- **i** - insert text; **a** append text to line;

## editing commands

- **5yy** - mark 5 lines; **p** insert marked lines; **r2w** - 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

# Agenda

1 General

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3 ls

4 ps-top

5 find

6 du/df

7 user-evn

8 dpkg

# the grep/egrep command

## grep [OPTIONS] PATTERN [FILE...]

grep searches the named input FILES (or standard input if no files are named, or if a single hyphen-minus (-) is given as file name) for lines containing a match to the given PATTERN.

- By default, grep prints the matching lines.

## Matcher Selection options

- E, -extended-regexp
  - Interpret PATTERN as an extended regular expression

# the grep/egrep command

## Options, Examples

### Matching Control options

- `-e PATTERN, --regexp=PATTERN` (Use PATTERN as the pattern. This is useful to protect patterns beginning with hyphen-minus (-).
- `-f FILE, --file=FILE` (Obtain patterns from FILE, one per line)
- `-i, --ignore-case` (Ignore case distinctions in both the PATTERN and the input files.
- `-v, --invert-match` (Invert the sense of matching, to select non-matching lines.
- `-R, -r, --recursive` (Read all files under each directory, recursively)

### Simple examples

- `grep -i manager linux-all-packages.txt`
- `grep "File Manager" linux-all-packages.txt`

# Regular Expressions

A regular expression is a pattern that describes a set of strings. Regular expressions are constructed analogously to arithmetic expressions, by using various operators to combine smaller expressions.

## Simplest expression

- Most characters, including all letters and digits, are regular expressions that match themselves.
- Any meta-character with special meaning may be quoted by preceding it with a backslash.

meta-characters: `\{ \} \^ \$ \.` The period matches any single character.

## Character Classes and Bracket Expressions

- A bracket expression is a list of characters enclosed by `[` and `]`. It matches any single character in that list; if the first character of the list is the caret `^` then it matches any character not in the list.
  - example: `[0123456789]` matches any single digit.

# Regular Expressions

## Character Classes and Bracket Expressions

### Bracket Expressions

- Range expression
  - within a bracket expression it consists of two characters separated by a hyphen
  - It matches any single character between the two characters, inclusive, using the locales collating sequence and character set.
- example
  - in the default C locale, [a-d] is equivalent to [abcd]
  - Many locales sort characters in dictionary order: [abcd] might be equivalent to [aBbCcDd]
- certain named classes of characters are predefined  
`[:alnum:]`, `[:alpha:]`, `[:digit:]`, `[:lower:]`, `[:space:]`, `[:upper:]`  
`[[[:alnum:]]` means `[0-9A-Za-z]`

Note that the brackets in these class names are part of the symbolic names, and must be included in addition to the brackets delimiting the bracket expression.

# Regular Expressions

## Character Classes and Bracket Expressions

### Bracket Expressions

#### ■ Anchoring

The caret `^` and the dollar sign `$` are meta-characters that respectively match the empty string at the beginning and end of a line.

#### ■ The Backslash Character and Special Expressions

The symbols `\<` and `\>` respectively match the empty string at the beginning and end of a word.

#### ■ Repetition

?        The preceding item is optional and matched at most once.  
\*        The preceding item will be matched zero or more times.  
+        The preceding item will be matched one or more times.  
{n}     The preceding item is matched exactly n times.

- A regular expression may be followed by one of several repetition operators:

# Regular Expressions

## Operators

### Operators

#### ■ Concatenation

Two regular expressions may be concatenated; the resulting regular expression matches any string formed by concatenating two substrings that respectively match the concatenated expressions.

#### ■ Alternation

Two regular expressions may be joined by the infix operator `|`; the resulting regular expression matches any string matching either alternate expression.

#### ■ Precedence

Repetition takes precedence over concatenation, which in turn takes precedence over alternation. A whole expression may be enclosed in parentheses to override these precedence rules and form a subexpression.



# Regular Expressions

## Exit, Examples

### EXIT STATUS

- it is 0 if selected lines are found
- it is 1 otherwise
- in case of error it is greater than 1

### Examples

```
DEFAULT=/var/spool/mail/ke
```

```
:0 c
```

```
* ! ^X-Spam-Flag: YES
```

```
| /usr/bin/vacation -a K.Erdei ke
```

```
:0:
```

```
* ^From:(.*The System Administration|.*sysadmin|.*Super-user|.*root)
```

```
$DEFAULT
```

# Agenda

1 General

2 man

3 ls

4 ps-top

5 find

6 du/df

7 user-evn

8 dpkg

# 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 commands; invoking external (OS) commandos, too
- programing language: powerful shell scripting possible
- man sh: 4918 lines (80 pages)

# The Shell - Redirection

## Input/Output

### Input/Output redirection

- standard input: console; standard output: display
- input output redirection;
  - `ls -l > junk`; (creates file **junk** and writes the output of `ls -l` in it)
  - `cat jj >> junk`; (appends the contents of the file **jj** to **junk**)
  - `grep "txt" < junk | wc`; (pipes the content of the file **junk** into the **grep** command and the output will be piped to the **wc** command (word count))
  - minus (-) means standard input/output
- pipeline connects output/input of two or more subsequent processes:
  - `ps auxw | grep sendmail | wc`; (counts how many sendmail processes are running)
  - more pipelines: `who | sort | lpr`; (prints a sorted list of the output of **who**)
  - processes executed parallel

# The Shell - Redirection

## Input/Output redirection - an example

### tar - store and extract files from an archive file known as a tarfile

- `tar cf deepsky.tar deepsky/;` (creates the single file: `deepsky.tar`, as archive file)
- `tar cf - deepsky/ | (cd /scratch/ke/pictures/; tar xf -)`
  - the contents of `deepsky` directory (tree structure) will be archived as a single file and will be piped to the standar output
  - the brackets `( )` create a single command
  - first the current directory will be changed to the given one
  - second the standard input will be piped to the `tar` command and the archive will be extracted. In this process the same directory tree will be created as the original one.
- `tar cf - deepsky/ | ssh bullfrog "(cd /scratch/ke/pics; tar xf -)"`
  - the first process is identical with the above one
  - the second process is an `ssh` command, logging in a remote host.
  - the `ssh` command reads as input the standard input, which will be piped to the `tar` command

# The Shell - Processes

## Process management

### Commands for the Process management - background/foreground processes

- commands for listing/killing processes:
  - `ps auxw ; ps auxw | grep pattern`
  - `jobs`
  - `kill -TERM process-number`
  - `kill -9 process-number`
  - `kill % number; killall`
- starting a command in foreground / background
  - start in background: `&` (command line available)
  - start in the foreground: without `&` (command line is not available for work)
  - stop `%job | number` - stop the current job in foreground: `^Z`
  - `bg %job | number`
  - `fg %job | number`

# The Shell - Processes

## Process management

### Limit/change/set some resources

- `limit [-h] [resource [maximum-use]]`
  - limits the given resource for the (next) started processes
  - resources: `cpulimit`, `memoryuse`, `filesize`, `concurrency`, `maxproc`
  - maximum-use: floating point or integer number followed by a scale factor
  - scale factor: for `cpu` use: `second`; for all others: `k`(kilobyte), `m`(megabyte)
- `nice [+number] [command]`
  - run a program with modified scheduling priority
- `renice priority [[-p] pid ...] [[-u] user ...]`
  - alter priority of running processes

# The Shell - Environment Variables

## Builtin commands

### Alias

- `alias [name [wordlist]]`
  - `alias ar acroread`
  - `alias psh "ps auxw | grep ssh"`

### Commands for defining cycles

- `foreach name (wordlist) ... end`

```
foreach i (*)  
echo $i  
end
```
- Lot of other commands are available:
  - `while`, `break`, `continue`, `repeat`, `count` etc.



# The Shell - Builtin commands

if structures

```
if (expr) command
if (expr) then
...
else if (expr2) then
...
else
...
endif
while (expr) ... end
switch (string)
  case str1:
    ...
    breaksw
  default:
    ...
    breaksw
endsw
```

# The Shell - Builtin commands

switch structures

```
switch ("$(HOSTTYPE)")
case *linux:
    alias lsl      ls -l
breaksw
case decstation:
    alias lsl      ls -lg
breaksw
case sun*:
    if ("$(hostname)" == sun) then
        alias lsl      ls -lg
    else
        alias lsl      ls -l
    endif
breaksw
default:
    alias lsl      ls -l
breaksw
endsw
```

# The Shell - Builtin commands

other commands

## Variables, environment variables and commands on it

- **set** - manages local variables
  - set (print all values)
  - set name ... (delete value)
  - set name=word ... (assign value)
  - unset pattern (delete variable)
- **setenv** - manages environment variables
  - setenv [name [value]]
  - unsetenv pattern

## Shell config file: `/home/username/.cshrc`

- `.cshrc` will be executed by starting a new shell
- add command here to simplify or define work
- activate changed `.cshrc` file
  - `source filename; source .cshrc`

# The Shell - Environment Variables

List of the environment parameters

## Environment variables

```
SHELL=/bin/tcsh
HOST=uhu
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
LANG=en-US.UTF-8
HOME=/home/ke
OSTYPE=linux
VENDOR=intel
LOGNAME=ke
MACHTYPE=i486
DISPLAY=:0
TERM=xterm
```

# Working on a command line

Links to Wikipedia

## Other shells

- Bash - Bourne Again Shell
  - man bash
  - .bashrc

## Links to Wikipedia

- [http://en.wikipedia.org/wiki/List\\_of\\_Unix\\_programs](http://en.wikipedia.org/wiki/List_of_Unix_programs)
- <http://www.think-lamp.com/2008/11/very-useful-linuxunix-commands/>

# End of Working on a Command Line

Thanks for your attention !