

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

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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:
 - Gnome: Applications: 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 implemented 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.
- <http://man.sourcentral.org/debian-squeeze/>

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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Usefull commands: ls

ls -laRtrFd

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

top - most important information

load avarage

- system load state

Cpu usage:

- us, sy, id

Memory

- used / free

Swap

- used

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 at 5.8%, Memory at 641/1011MB, and Swap at 568/1906MB. System status includes 170 total tasks (4 running), a load average of 0.18 0.54 0.65, and an uptime of 7 days, 13:08:36.

The main display is a table of running processes. The header row is highlighted in green and lists columns: PID, USER, PRI, NI, VIRT, RES, SHR, S, CPU%, MEM%, TIME+, and Command. The process list includes various system services like htop, kconsole, kwin, kicaker, kdesktop, and kweather, as well as user processes like ssh and portmap.

At the bottom, a status bar shows keyboard shortcuts: F1 Help, F2 Setup, F3 Search, F4 Invert, F5 Free, F6 SortBy, F7 Nice, F8 Nice +, F9 Kill, and F10 Quit.

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	kweather
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

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

Usefull commands: ps - the help page of ps

```

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

uhu:~>
uhu:~> ps --help
***** simple selection *****
-A all processes
-N negate selection
-a all w/ tty except session leaders
-d all except session leaders
-e all processes
T all processes on this terminal
a all w/ tty, including other users
g OBSOLETE -- DO NOT USE
r only running processes
x processes w/o controlling ttys
***** output format *****
-o,o user-defined -f full
-j,j job control s signal
-O,O preloaded -o v virtual memory
-l,l long u user-oriented
-F extra full X registers
***** 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:~>
***** selection by list *****
-C by command name
-G by real group ID (supports names)
-U by real user ID (supports names)
-g by session OR by effective group name
-p by process ID
-s processes in the sessions given
-t by tty
-u by effective user ID (supports names)
U processes for specified users
t by tty
***** long options *****
--Group --User --pid --cols --ppid
--group --user --sid --rows --info
--cumulative --format --deselect
--sort --tty --forest --version
--heading --no-heading --context

```

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)
 - -TERM is default
- 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 programm

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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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>
```

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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

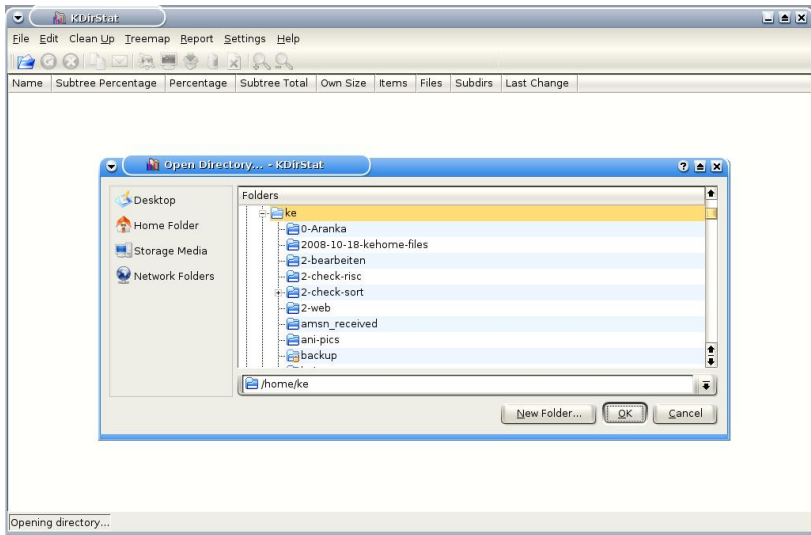
```
hades:sysadmin!7> df -l -h
```

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>
```

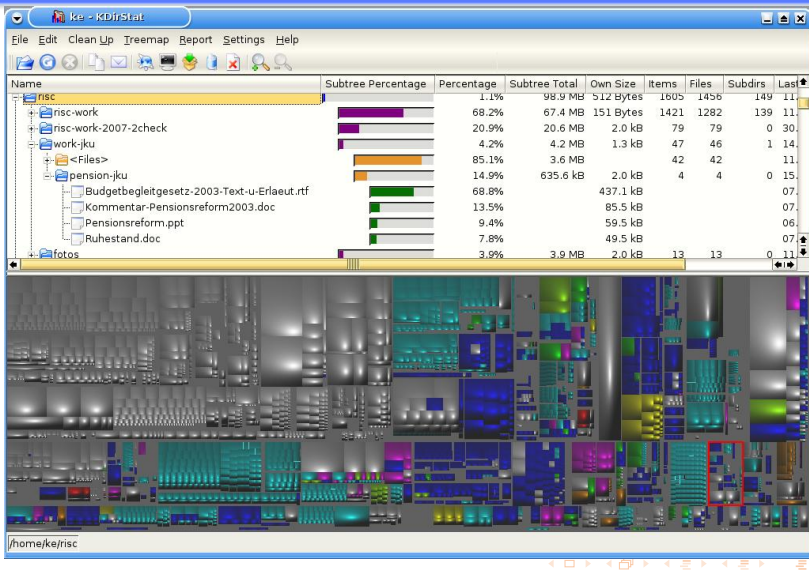

Working on a command line

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



Working on a command line

Kdirstat



Working on a command line

Kdirstat



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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>

```

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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

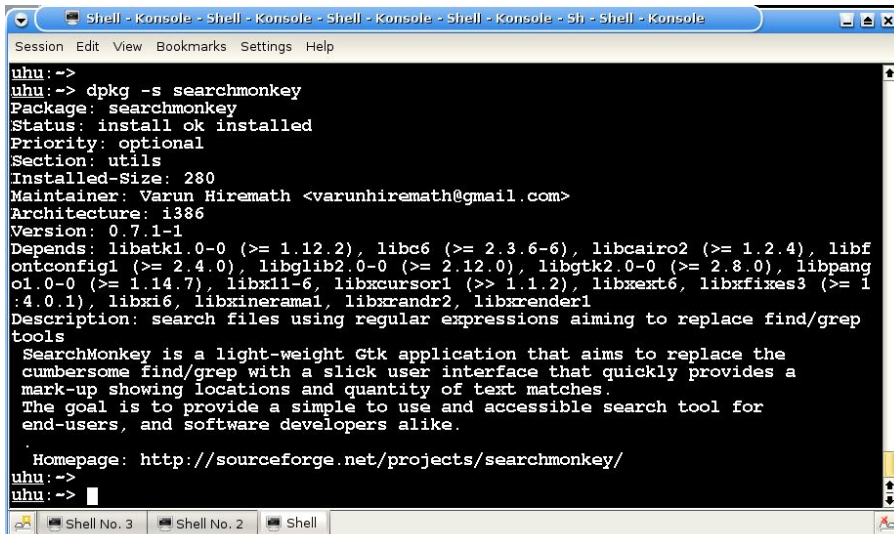
Installing Debian packages - dpkg - options summary

Using dpkg

- Install a Debian package: -i
 - `sudo dpkg -i skype-debian_2.1.0.47-1_i386.deb`
 - You can install any Debian package using: `sudo dpkg -i ...` on any RISC computer !
- 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*"`
- LIVE presentation of dpkg !

Working on a command line

Installing Debian packages - search for a package name

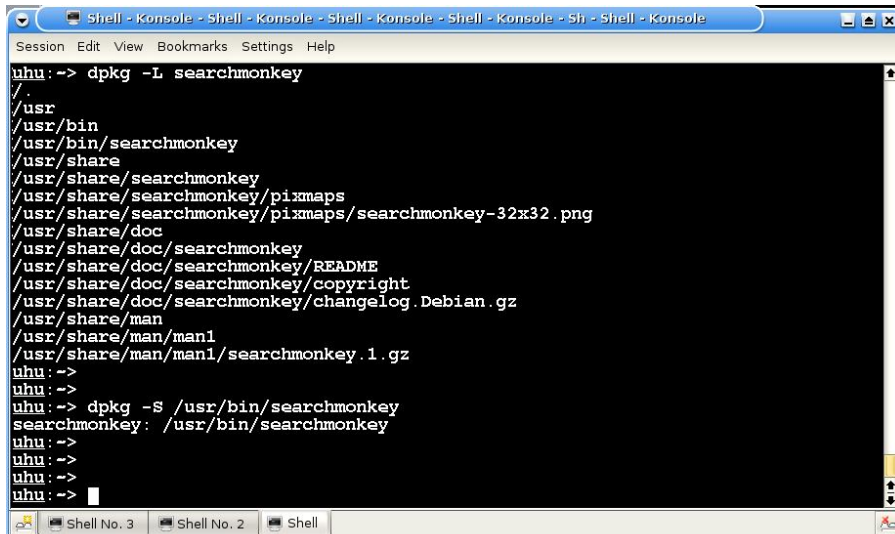


```
Shell - Konsole - Shell - Konsole - Shell - Konsole - Shell - Konsole - Sh - Shell - Konsole
Session Edit View Bookmarks Settings Help
uhu:~>
uhu:~> dpkg -s searchmonkey
Package: searchmonkey
Status: install ok installed
Priority: optional
Section: utils
Installed-Size: 280
Maintainer: Varun Hiremath <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)

```

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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>
```

Working on a command line

yp-commands

ypcat

```
ypcat passwd |grep abaumgar
ypcat auto.home |grep abaumgar
ypcat auto.scratch |grep abaumgar
```

ypmatch

```
gorilla:sysadmin!1> ypmatch abaumgar passwd
abaumgar:x:10211:10020:Alexander Baumgartner:/home/abaumgar:/bin/tcsh

gorilla:sysadmin!4> ypmatch abaumgar auto.home
atlantis:/zlocal/sdb10:abaumgar

gorilla:sysadmin!5> ypmatch abaumgar auto.scratch
ibis:/zlocal/sda3:abaumgar
gorilla:sysadmin!6>
```

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>
```

Account - Permissions

Changing active group

Special files and commands

- /etc/passwd
 - defines only one group, your main group of default group
 - as PhD students you have **risc** as the default group
- /etc/group - contains groups in the system
- groups - list of groups you belongs to
- Creating files, directories
 - the object's group will be your default group
- newgrp
 - **newgroup** groupname
 - changes your main group to the defined one
 - group **cbwe2012** contains all PhD students at RISC
 - **newgroup cbwe2012** changes your active group to that one
 - all files, directories you create will have this group

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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

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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

Matching Control options

- `-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)
 - for big hierarchy structure and/or big files this option need lot of time to search all files !
- `-f FILE`, `-file=FILE` (Obtain patterns from FILE, one per line)
- `-e PATTERN`, `-regexp=PATTERN` (Use PATTERN as the pattern. This is useful to protect patterns beginning with hyphen-minus (-).

The grep/egrep command

Examples

Simple examples

- `grep -i manager linux-all-packages.txt`
- `grep "File Manager" linux-all-packages.txt`
- `grep -i -e "file" -e "manager" linux-all-packages.txt`
- `grep -v " "`
- `grep -R -i Chau sysadmin/mails/archive.12`

More examples

- check man page, internet sites, etc.

Regular Expressions

A regular expression is a pattern that describes a set of strings. Regular expressions are constructed similar 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
 - it consists of two characters separated by a hyphen
 - it is within a bracket expression
 - 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]
- using
 - `du -s /[bcel-ort-v]*`
 - `ls -ld /[l-ot-v]*`

Regular Expressions

Character Classes and Bracket Expressions

Predefined names

- 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.

Bracket Expressions

- Anchoring

The caret `^` and the dollar sign `$` are meta-characters that match respectively 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.

Regular Expressions

Character Classes and Bracket Expressions

Repetition

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

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

Examples

- edit the `tvlist.txt` file in `vi`
- use regular expressions to get a readable version of the file

Regular Expressions

Bracket Expressions

Input lines

```
< value='9'>010 ZDF HD</option>
```

- commands with regular expressions in **vi**

```
:%s/option//g
```

```
:%s/>$//
```

```
:%s/\\///
```

```
:%s/<$//
```

```
:%s/<\\option>$//
```

```
:%s/^< value=//
```

```
:%s/^'//
```

```
:%s/[0-9]*//
```

```
:%s/^'>//
```

```
:%s/^< value=' [0-9]*'>//
```

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

Repetition, etc.

Examples

`abc|def` Finds either `abc` or `def`

`abc+` Finds `abc` or `abcc` or `abccc` or ...

`abc?` Finds `ab` or `abc`

`abc*` Finds `ab` or `abc` or `abcc` or `abccc` or ...

`abc$` Finds `abc` that occurs at the end of a line

`^abc` Finds `abc` that occurs at the beginning of a line

`[abcx-z]` Finds any single character of `a`, `b`, `c`, `x`, `y`, or `z`

`[^abcx-z]` Finds any single character except `a`, `b`, `c`, `x`, `y`, or `z`

Regular Expressions

Examples

Examples in .procmailrc file

```
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
```

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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
 - we'll use/learn the bash, too
 - you can change your login 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
- programming 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
 - minus (-) means standard input/output
- 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))
- 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 standard output
 - the parentheses () 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 (tcsh)

- `limit [-h] [resource [maximum-use]]`
 - limits the given resource for the (next) started processes
 - resources: `cputime`, `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(byte)`, `m(byte)`
- `nice [+number] [command]`
 - run a program with modified scheduling priority

Limit/change/set some resources (OS)

- `renice priority [[-p] pid ...] [[-u] user ...]`
 - alter priority of running processes

Limit/change/set some resources (bash)

- `ulimit [-HSTabcdefilmnpqrstuvx [limit]]`

The Shell - Environment Variables

Builtin commands, loops

Alias in tcsh/bash

- tcsh: `alias [name [wordlist]]`
 - `alias ar acroread`
 - `alias psh "ps auxw | more | grep ssh"`
- bash: `alias [name]=[wordlist]`
 - `alias psh="ps auxw | grep ssh"`

Commands for defining loops (tcsh)

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

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

The Shell - Loops

Example loops

Example

- create a subdirectory in your home as pdf-files-2012-Oct
- copy all pdf files from your home to that directory

Solution tcsh

```
cd; pwd; mkdir pdf-files-2012-Oct
foreach i in (*pdf)
echo $i
cp -p $i pdf-files-2012-Oct
end
ls -l pdf-files-2012-Oct | wc
```

The Shell - Environment Variables

Looping in bash

Commands for defining loops (bash)

- for name [[in [word ...]] ;] do list ; done

```
for i in a b c ;  
do  
echo $i;  
done
```

Lot of other commands are available for cycles:

- for ((expr1 ; expr2 ; expr3)) ; do list ; done
- case word in [[(] pattern [— pattern] ...) list ;;] ... esac
- while list; do list; done
- until list; do list; done

The Shell - Builtin commands

if structures in tcsh

```
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 in tcsh

```
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 in tcsh

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
- Learning how to use .bashrc
 - ypcat passwd —grep bash
 - ls -l /loginname/.bashrc
 - more /loginname/.bashrc

Links to Wikipedia

- 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 !