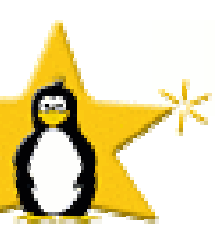# CARNet Users Conference 2002
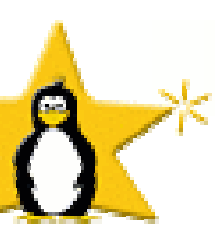
How to make most of your Linux workplace?

Vlatko Košturjak
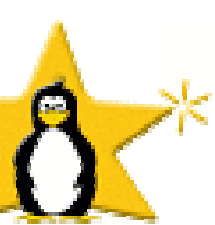**kost@linux.hr**

How to take most of any workplace?

- Powerful
- Easy
- User friendly
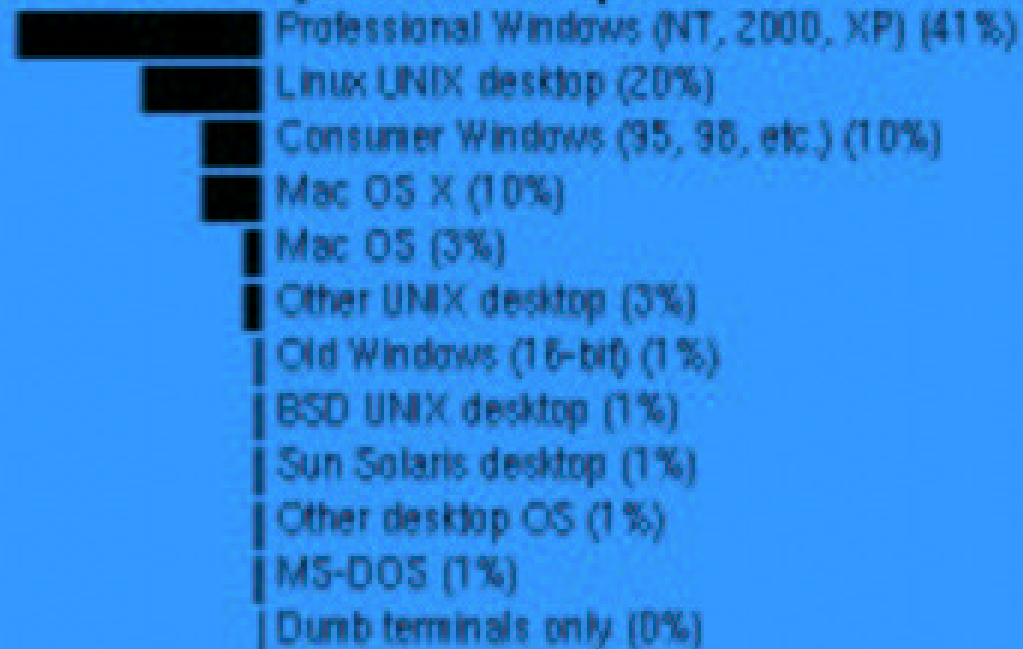- Cutting-edge
- Well organized

Linux?

- *Clone of UNIX*
  - *invented at AT&T in the 60's*
  - *UNIX forked significantly into a number of proprietary products (SunOS, AIX, etc)*
- *multi-user*
- *multi-process networking operating system*
- *open source*
  - *active development*
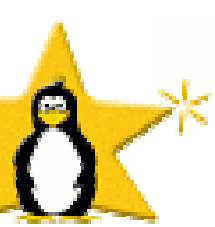 - *open*
  - *free*
  - *secure*

Linux and workplace?

Which operating system family do you personally consider most appropriate for a workplace desktop?
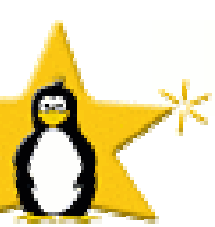
Professional Windows (NT, 2000, XP) (41%)
Linux UNIX desktop (20%)
Consumer Windows (95, 98, etc.) (10%)
Mac OS X (10%)
Mac OS (3%)
Other UNIX desktop (3%)
Old Windows (16-bit) (1%)
BSD UNIX desktop (1%)
Sun Solaris desktop (1%)
Other desktop OS (1%)
MS-DOS (1%)
Dumb terminals only (0%)

http://www.misterpoll.com

- *"If a user follows simple philosophy and logic which lies behind, Linux can be used as a very good and productive workplace. "* -workshop abstract
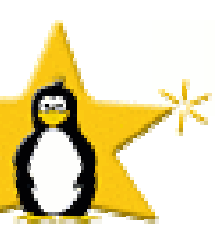
Kernel / distributions

- Kernel
  - the core of the system
  - written by Linus Torvalds, now it is written by thousands of developers
- Distributions
  - consist of
    - GNU software from FSF
    - kernel, installer, ...
  - RedHat, Suse, Debian, Mandrake, ...
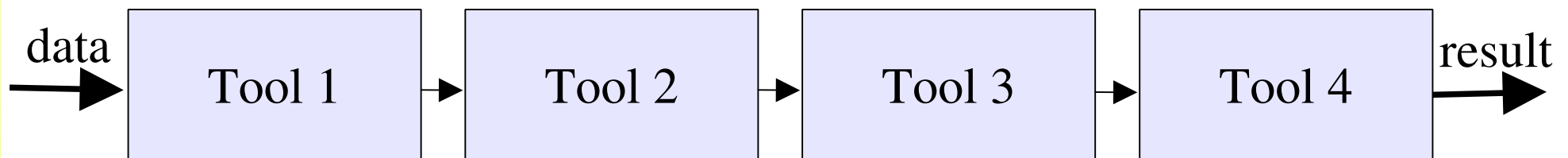 - Linux Standard Base

Everything is a file
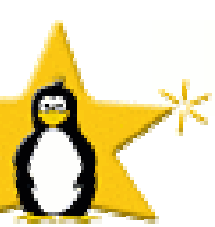
- everything really means everything
  - serial port
  - hard disk
  - cd rom
  - partition on a hard disk
  - ethernet card
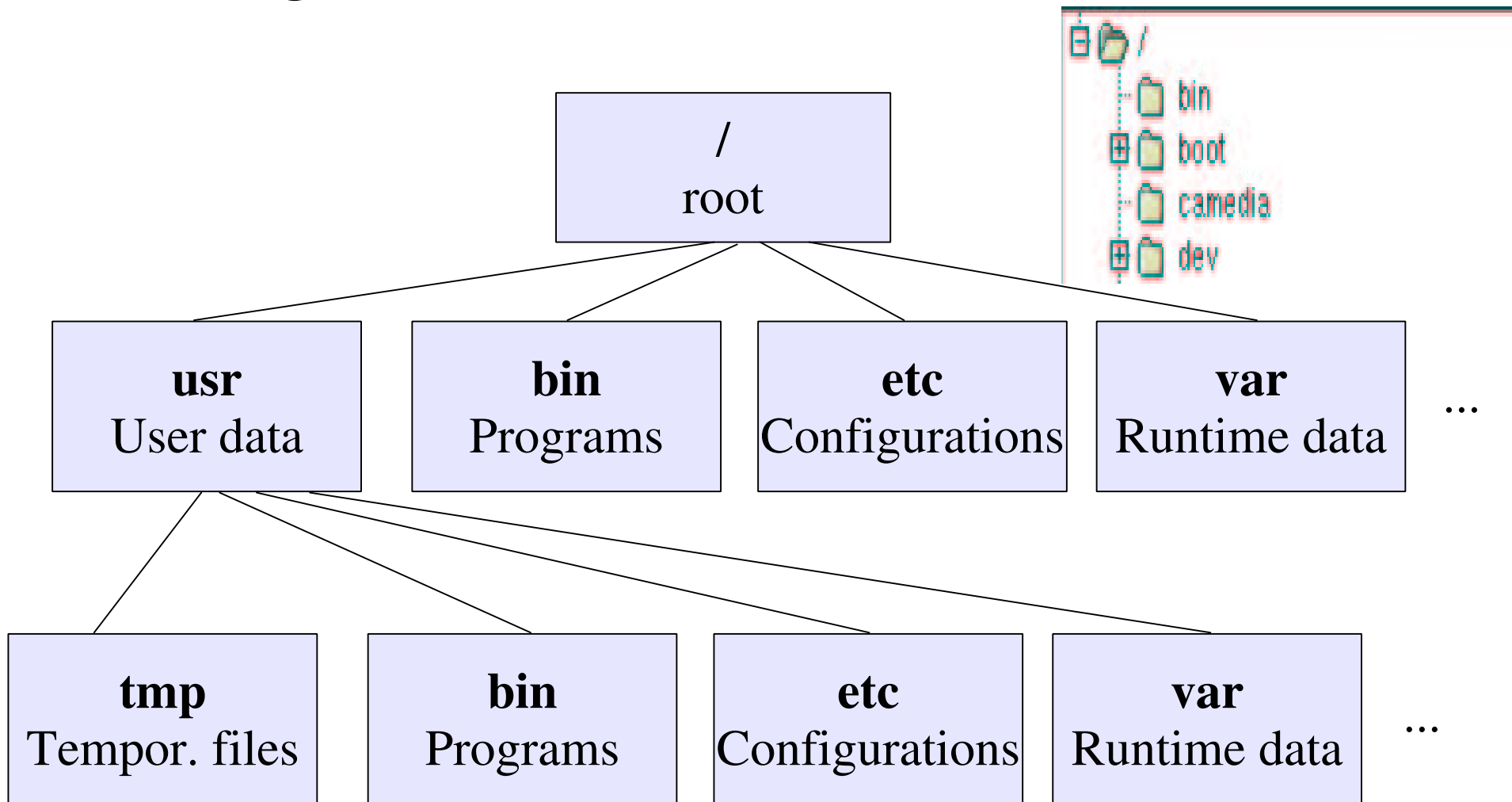 - sound card
  - ...
  - directories
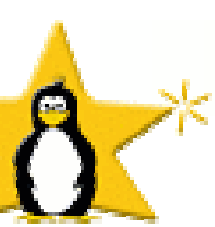
Small tools doing small jobs

- Linux comes with a lot of small programs called "tools"

- each tool is generally capable of performing a very simple and specific task

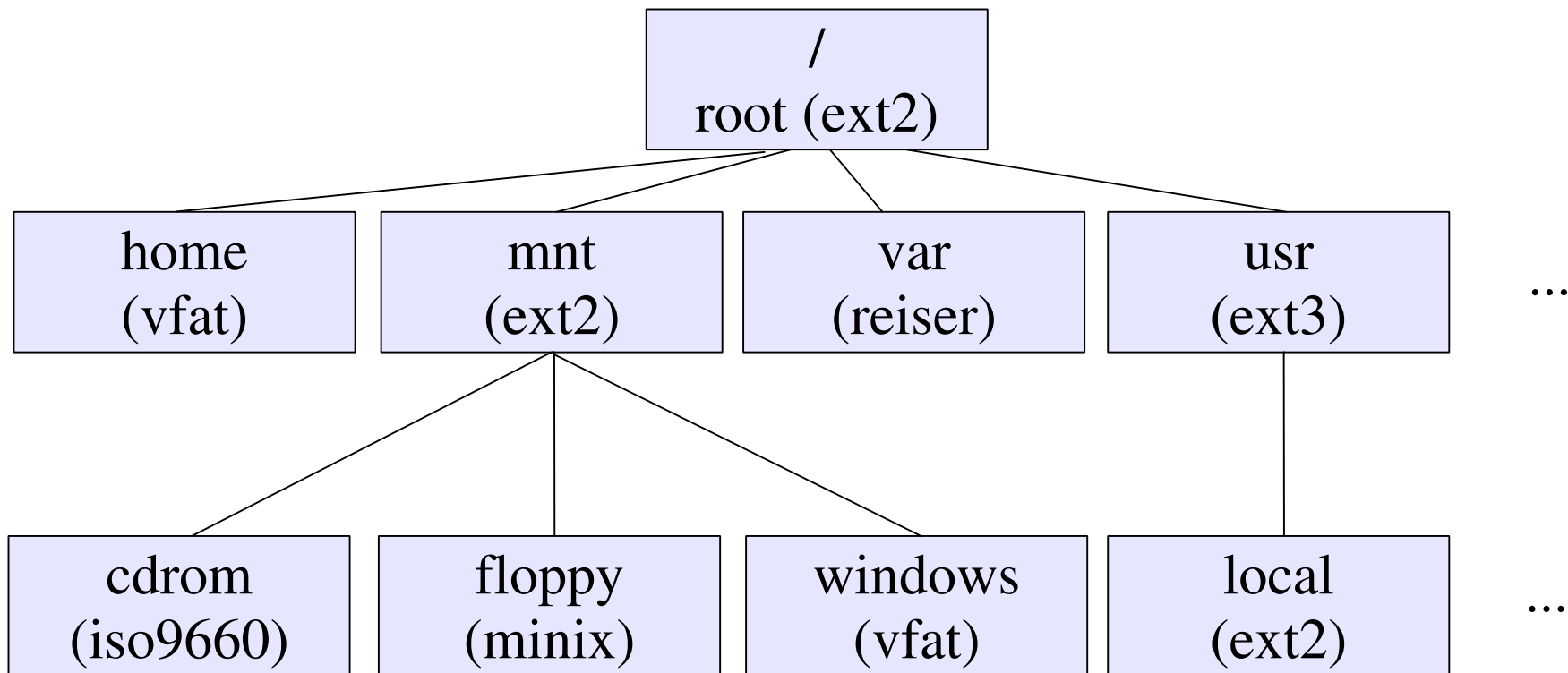- specific tool = powerful tool

- Examples: sort, wc, grep, ...

data → | Tool 1 | → | Tool 2 | → | Tool 3 | → | Tool 4 | → result

Organization of the File Tree


```
/
root
```

usr	bin	etc	var
User data	Programs	Configurations	Runtime data

...

tmp	bin	etc	var
Tempor. files	Programs	Configurations	Runtime data

...

...

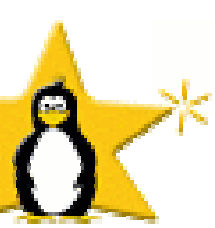# File systems / Mount points

- mount points = directories

```
                    /
                root (ext2)

  home        mnt         var         usr              ...
  (vfat)     (ext2)     (reiser)    (ext3)

         cdrom    floppy    windows    local           ...
       (iso9660)  (minix)   (vfat)    (ext2)
```
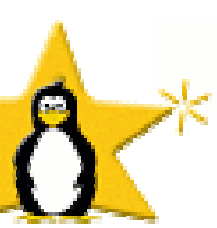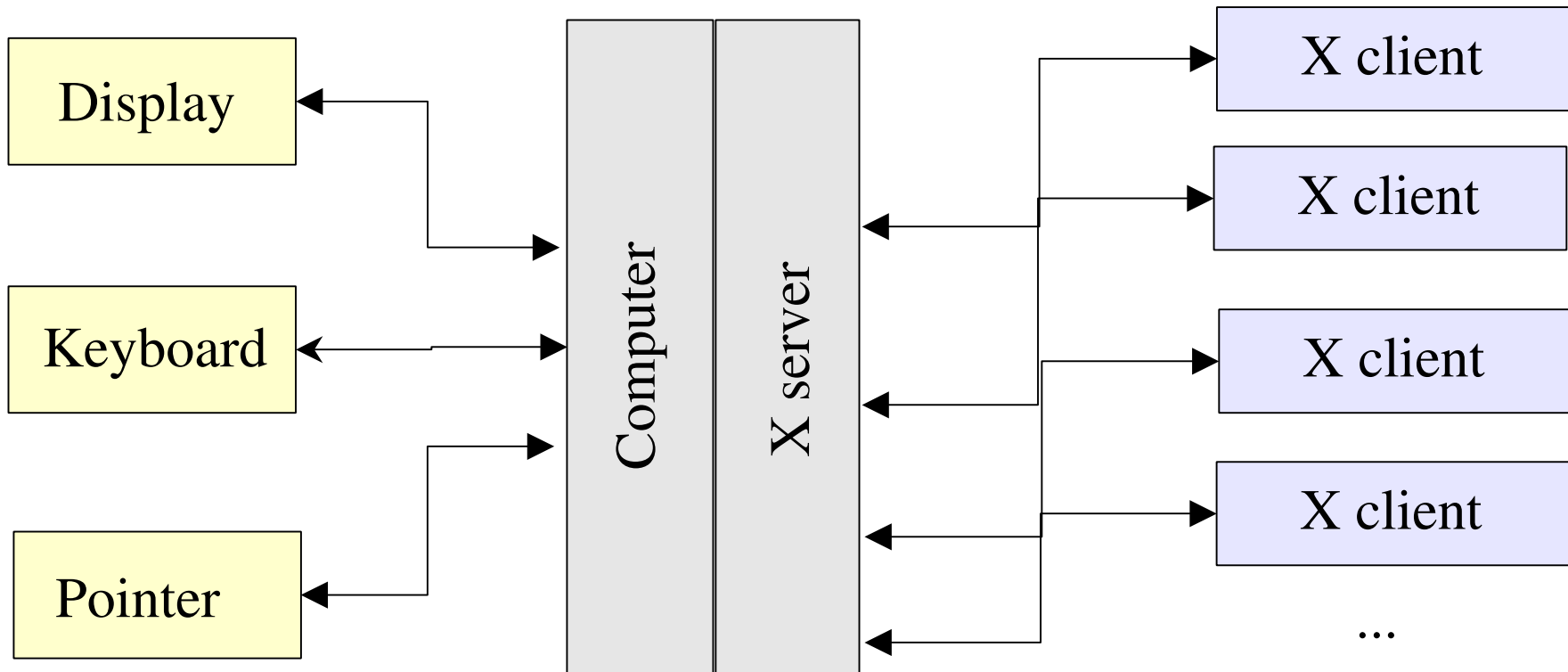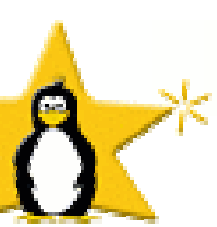
X

- a portable, network-transparent window system

- correct names
  - X
  - X Window System
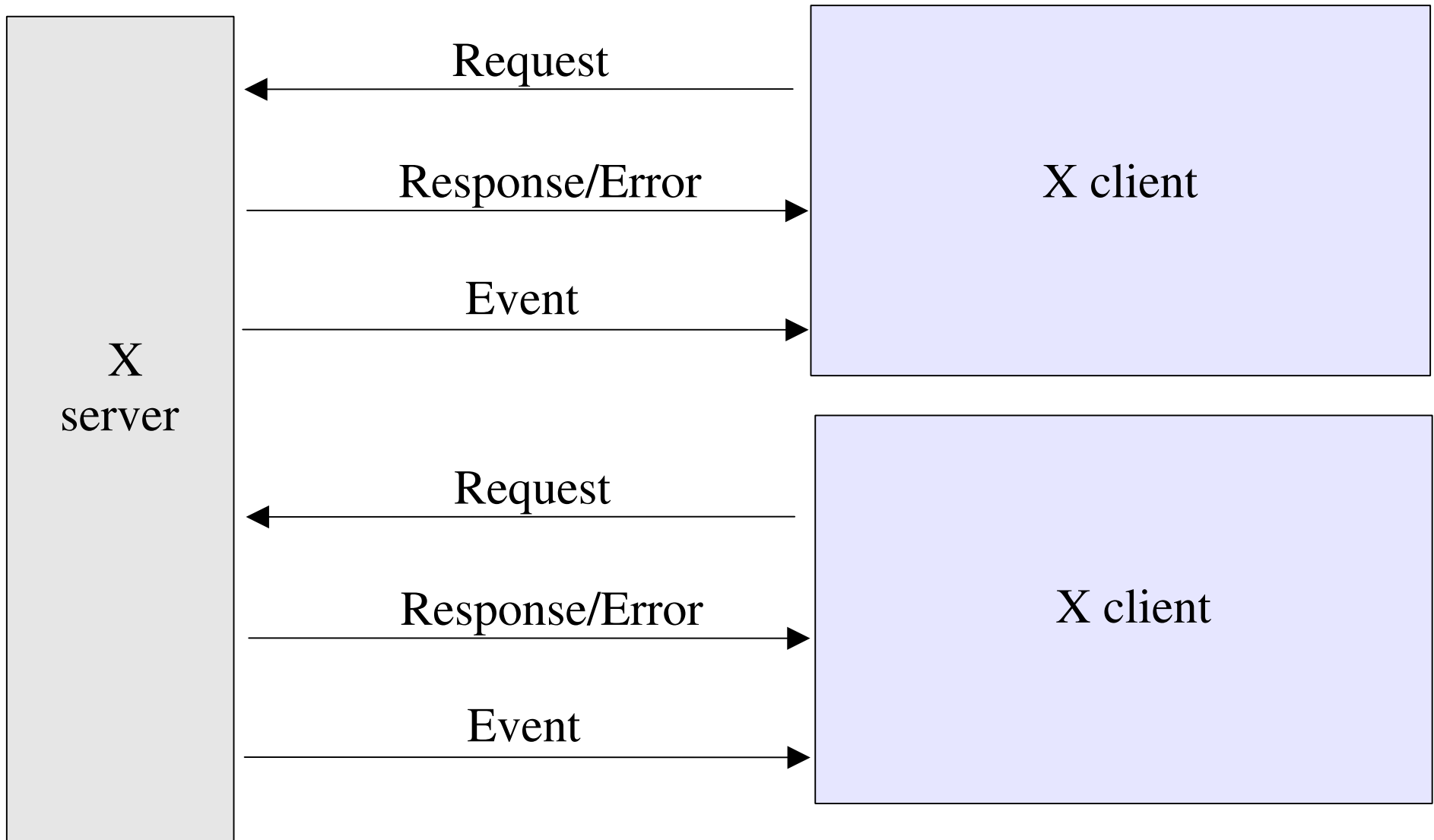 - X Version 11
  - X Window System, Version 11
  - X11
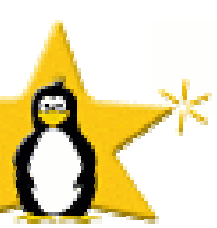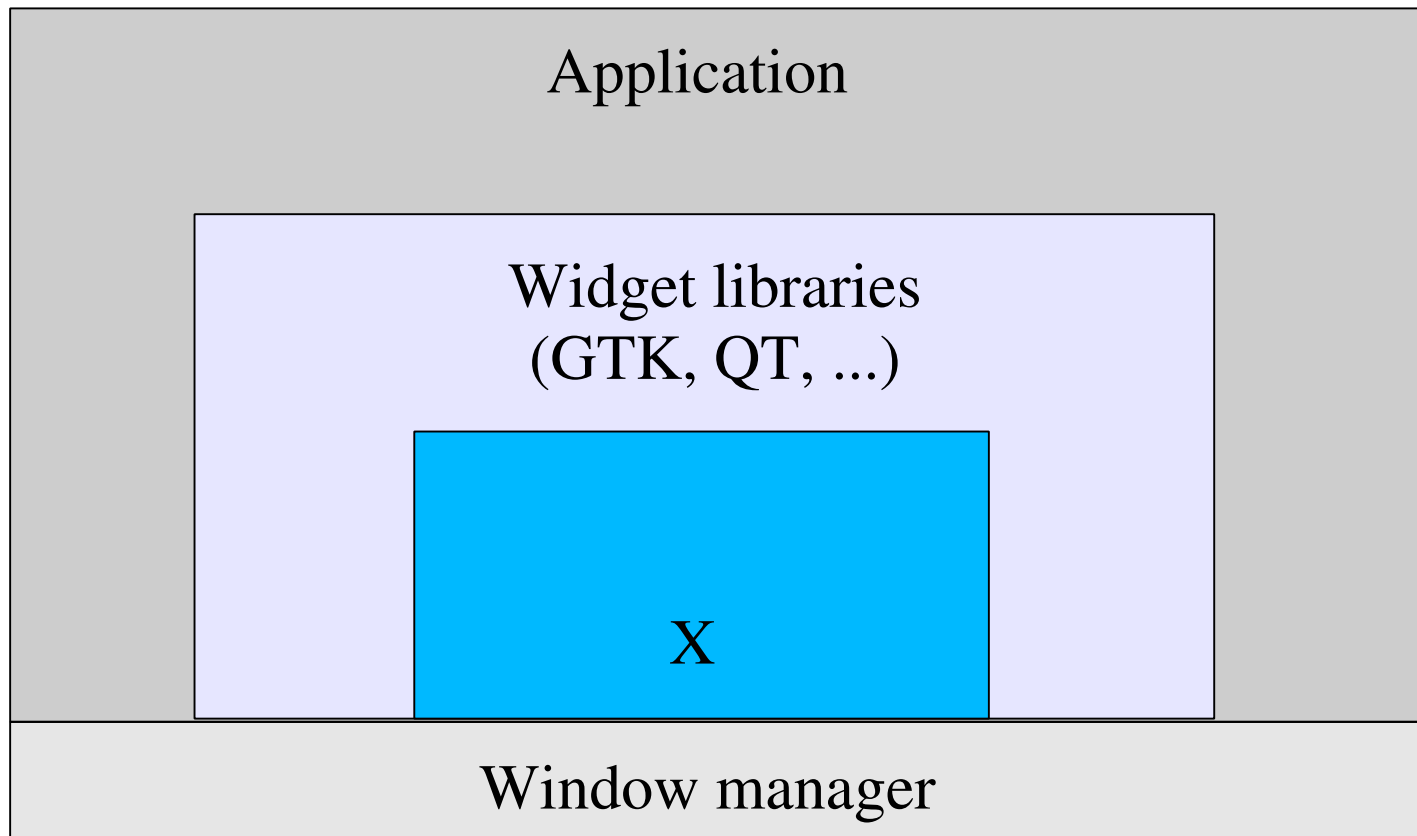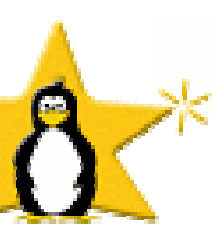
X Architecture

Client-Server architecture

X architecture][

Window managers and libraries

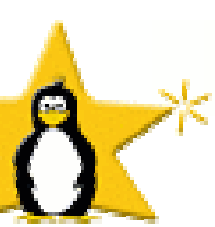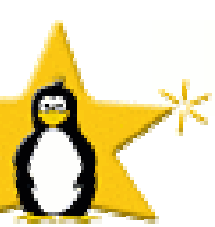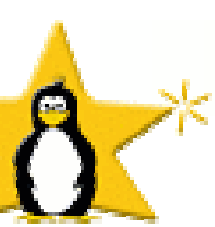| Libraries	Window Managers
GTK QT FLTK Motif TK ...	Twm Olwm IceWM Qvwm Window Maker Xfce Enlightment Synapse ...
	KDE GNOME

KDE

- powerful open source graphical desktop enviroment for Unix workstations

- *combines ease of use, contemporary functionality, and outstanding graphical design with the technological superiority of the Unix operating system*

- *Internet project that is truly open in every sense*

  - *use, modify, learn, redistribute, ...*

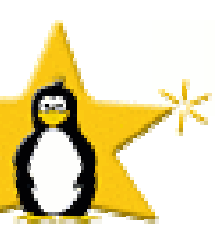- *includes powerful document technology*

- *mature desktop suite*

GNOME

- an effort to create an entirely free desktop enviroment for free systems

- main objective is to provide a user friendly suite of applications and an easy-to-use desktop

  - the objectives of the project have been extended to address a number of problems in the existing Unix infrastructure

- project acts as an umbrella, the major components of GNOME are:

  - The GNOME desktop

  - The GNOME development platform

  - The GNOME Office
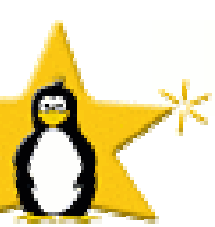
Process control

- all processes are organized in the form of tree
  - the root of this tree is init
- each process has a number (Process ID = PID) and a number of its parent process (Parent Process ID = PPID)
- every process in Unix can react to signals sent to it
  - there are 64 different signals
  - process can define its own behaviour for each signal (except for signal number 9 and 19)
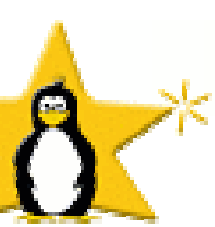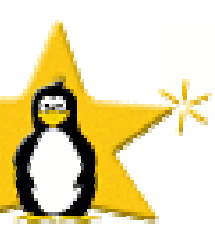
Process control II

/proc filesystem

- virtual filesystem

- it takes no room on your disk

- way to obtain information on the system

  – system state, processes, hardware, ...

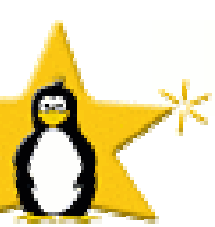- way to change some kernel parameters in real time

/proc filesystem - processes

- /proc/process_id/ directory holds info about each process on the system

  - cmdline

  - cwd

  - environ

  - exe

  - fd

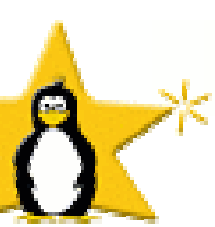 - maps

  - root

  - status

/proc - hardware/kernel

- proc contains a lot of information on the hardware and kernel

  - apm

  - cpuinfo

  - filesystems

  - interrupts

  - ioports

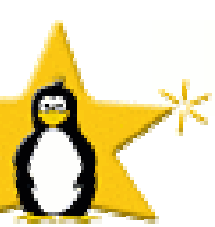 - dma

  - meminfo

  - bus

/proc - kernel configuration

- /proc/sys subdirectory
  - setting different kernel parameters
  - /proc/sys/net/ipv4/ip_forward
  - /proc/sys/net/ipv4/icmp_echo_ignore_all
  - /proc/sys/net/ipv4/conf/all/rp_filter
  - /proc/sys/net/ipv4/ip_default_ttl
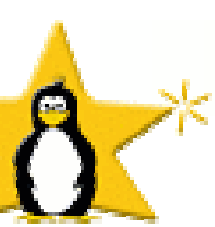 - /proc/sys/fs/file-max
  - /proc/sys/fs/inode-max

Linux startup

- unix startup schemes

  – BSD

  – System V

- kernel executes /sbin/init after kernel startup

- init

  – the father of all processes on the system

  – configuration file: /etc/inittab

  – responsible for taking the system to the desired runlevel

Linux startup - runlevels

- 7 runlevels

  - 0   machine stop

  - 1   single-user mode

  - 2   multi-user mode (no networking)

  - 3   multi-user mode

  - 4   unused

  - 5   multi-user mode with GUI

  - 6   restart

- /etc/rc.d/

  - rc.sysinit

  - rc.local

Killing "bad" applications

- xkill = CTRL+ALT+ESC

System freeze

- under X (GUI)

  - ctrl-alt-backspace - X shutdown

  - login from network

  - switch to other console (ctrl+alf+f1, ctrl+alf+f2, ...)

- System Request (SysRq)

  - raw mode   LALT+SysRq+r

  - sync disk   LALT+SysRq+s

  - killall ps   LALT+SysRq+e

  - read-only   LALT+SysRq+u

  - reboot   LALT+SysRq+b

Command line

- terminals

  – xterm, rxvt, gterm, eterm, ...

- used for sending direct commands to the system

- extremely powerful

  – command line completion

  – history

  – organization of jobs

  – synergy of tools

- *"Command line is your friend!"* © Dobrica

Commands

dir	ls
cd	cd
cd..	cd ..
type	cat
less	
move	mv
copy	cp
del	rm
md	mkdir

Shell globbing patterns

- which files match the specific pattern

- *.txt   matches all files with names ending with .txt

- matching is done with shell itself

ls *.txt

ls	*.txt

ls	letter.txt phones.txt todo.txt

Shell globbing patterns][

?   matches one and only one character

*   matches zero or more characters

[...]   matches any character found in the []

[!...]   matches any character not found in
   the []

{p1,p2} matches p1 or p2 where p1 and p2 are
           also globbing patterns

Examples: documents/cuc[0-9]/*.doc

Command line tips

- redirections

    - \>   **ls *.doc > dokumenti.txt**
        ls *.txt >> dokumenti.txt

    - \<   **gzip -dc < dokument.txt.gz**
        mysql baza < create.sql

- pipe

    - | **who | wc -l**

    "the most quoted pipe in the world"

Regular expression (regexp)

- A regular expression describes strings of characters.

- It's a pattern that matches certain strings and doesn't match others.

- Programs that use regexp

  - grep, sed, awk, ed, vi, emacs, ...

  - each program has a different set of (mostly overlapping) template characters

- Typical example: **a.*c.*d**

Regular expression explanation

- *   matches zero or more characters
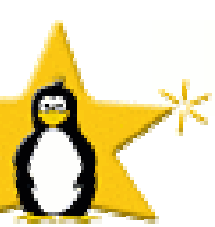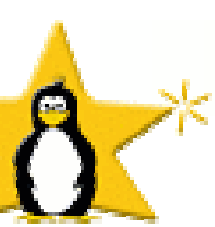- +   matches one or more characters
- ?   matches zero or one character
- .   matches any character except newline (\n)
- [ab]   matches any character found in the []
- [^ab] matches any character not found in the []
- x{min,max}

Regular expression examples

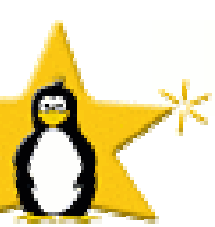.*changed.*permission

grep '.*changed.*permission' /var/log/syslog
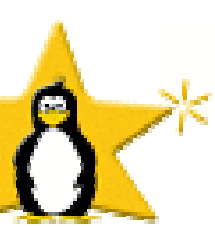
grep 'changed.*permission.*to [4]??[67]' syslog

grep '.*changed.*' syslog | sed -e 's/changed/modified/g'

From.*spam@spam\.host\..*

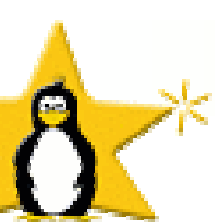# Optimizing Linux workplace

- speed
  - hdparm
  - services

- memory managament
  - services

- power managament
  - apm
  - hdparm

Future

- *"The idea that occurred to me was to work on unifying theme definitions, so that a user can define a theme just once and have it work with both GNOME and KDE." -Richard Stallman*

- *Uniform themes (GNOME and KDE)*

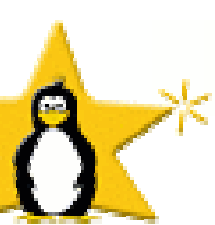- *Default Linux theme (look'n'feel)*

Interesting Quote

"A good deal of writing addicts need only a typewriter: I'm not interested in hda, hdb, hdz or anything else concerning technicalities and machine work! I just want to write 'chicken', if I feel like to. I want to see the word 'chicken' on the screen, and to have it printed out by a printer. Nothing else. Some of You skillful folks could make such a program which would, probably, have a wider commercial value. I repeat: just a typewriter, not an ICBM launcher or something."

Original text (on croatian):

"Jednom dobrom dijelu skribomana potrebna je isključivo pisaća mašina: ne interesira me hda, hdb, hdz, ni bilo što drugo što se tiče tehnike i rada mašine! Zelim isključivo napisati 'kokoš' ako mi to padne napamet. Želim da riječ 'kokoŠ' vidim na monitoru, te da mi riječ 'kokoš' isprinta printer. Ništa drugo. Netko od Vas spretnijih bi mogao napraviti takav program, koji bi vjerojatno imao širu komercijalnu vrijednost. Ponavljam: samo pisaća mašina, ne i lanser za intekontinentalne rakete i slično."

Questions?

Vlatko Košturjak
E-mail:
kost@linux.hr