CHALMERS

GÖTEBORGS UNIVERSITET

# Introduction to Linux

## *Lecture 1*

Prof. Dr. Philippe Tassin
*Chalmers University of Technology*

Dr. Evangelos Siminos
*Chalmers University of Technology and University of Gothenburg*

Göteborg, 27 March 2019

# Who are you?

- Who has already used Linux?

- Why do you want to use Linux?

# Course description

# History of Linux

- 1960s: large computer systems; dedicated software and OS
  - expensive
  - training necessary for every system

- 1969: Bell Labs develops UNIX
  - one OS for many hardware systems
  - Only the “kernel” needs to be adapted to the specific hardware; other software can be reused
  - Software written in C language
  - UNIX is still proprietary software
    (compare with MS/DOS in 1982)

# History of Linux

- 1991: Linus Torwald starts a “UNIX” version for Intel x86 personal computers
  - compatible with UNIX systems (same software works!)
  - free
  - source code may be used, modified, and distributed

# Linux

- Kernel

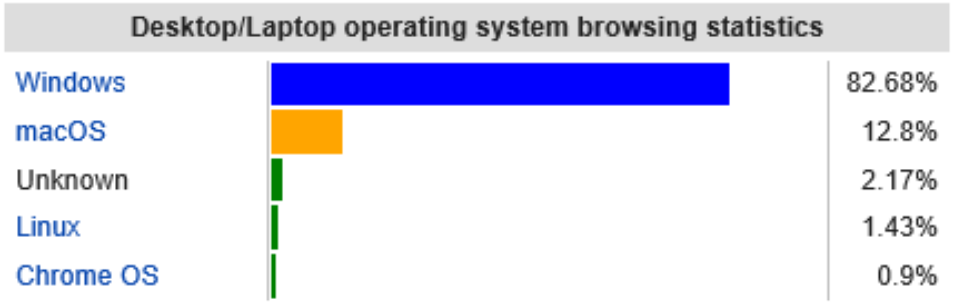
+

- Basic tools (GNU software):
  - Bash
  - Coreutils
  - GCC
  - Gnome/KDE
  - …

+

- Other software packages (GNU licensed or proprietary)

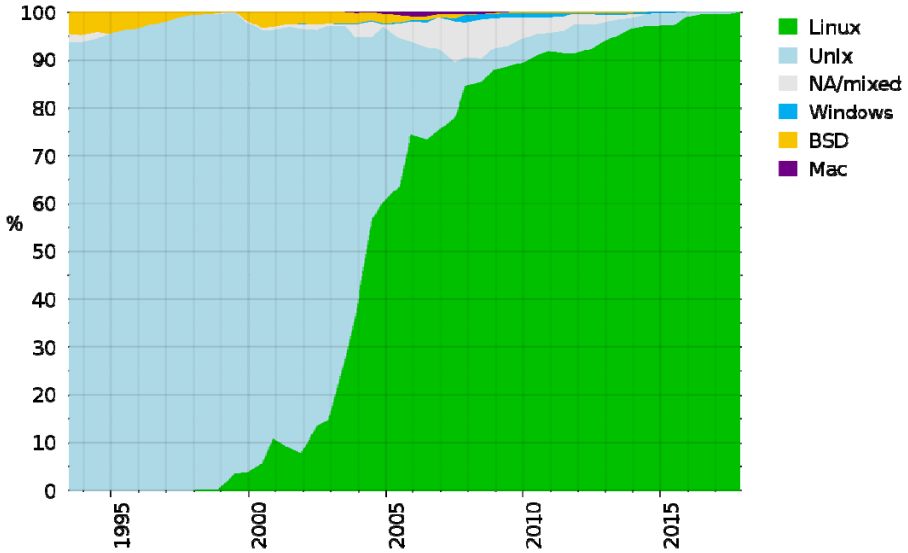
# What is Linux used for today?




desktop/laptop computers

web/mail/DNS servers

| Source | Date | Unix, Unix-like | | | | Microsoft Windows |
|---|---|---|---|---|---|---|
| | | All | Linux | FreeBSD | Unknown | |
| W3Techs | Feb 2015 | 67.8% | 35.9% | 0.95% | 30.9% | 32.3% |
| Security Space | Feb 2014 | <79.3% | N/A | | | >20.7% |




high-performance computing servers

(data from Wikipedia, retrieved 20 March 2018)

# Typical features of Linux

Pros:

- Open source
- Free (GPL license)
- Portable to any hardware platform
- Secure (if used correctly!)
- Scalable (from a Raspberry Pi to large clusters with thousands of CPUs)

# Typical features of Linux

Cons:

- Many distributions
- Often not very user-friendly
- Open source

# Typical applications

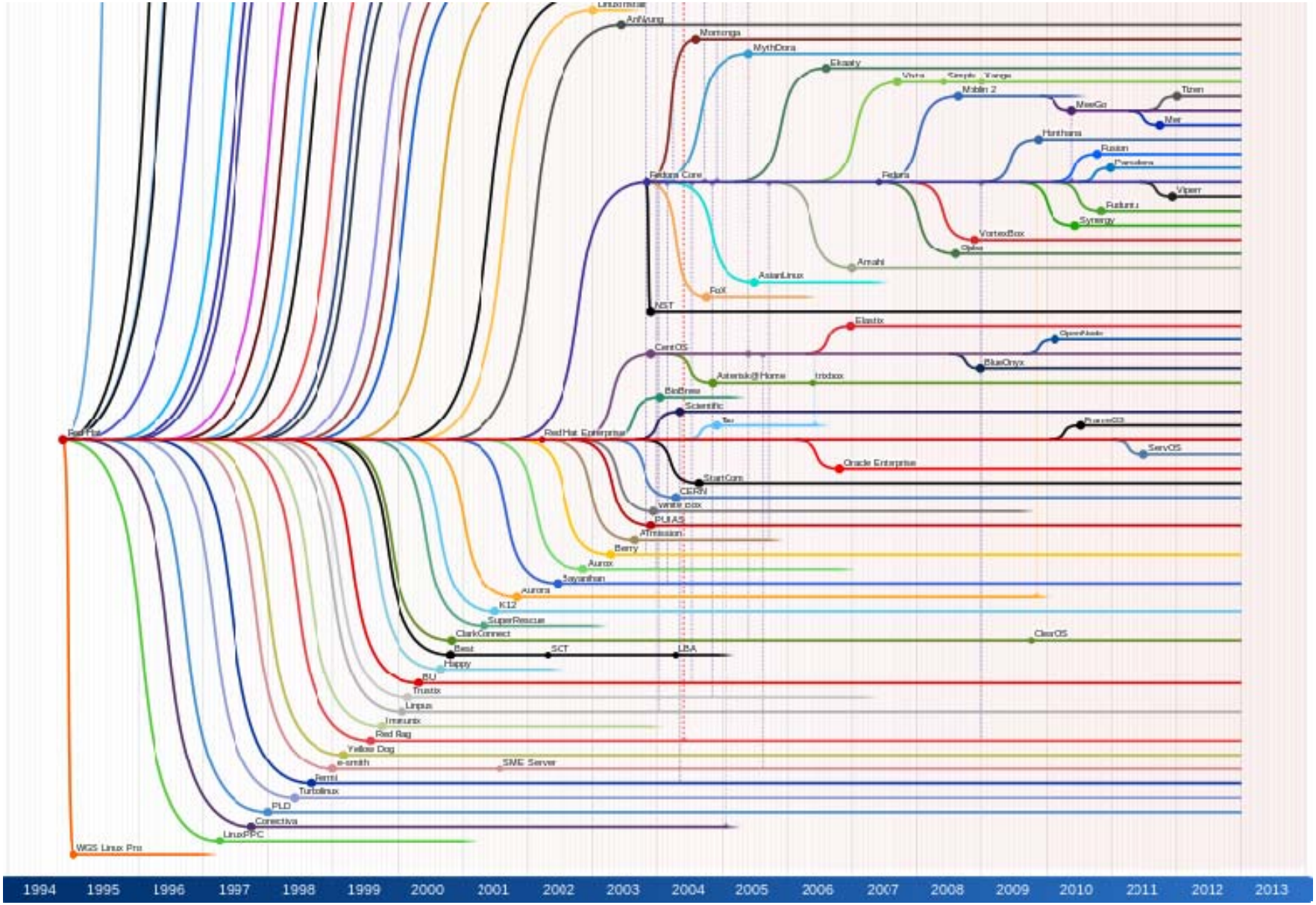
- Servers
- High-performance computing
- Single-board computers like the Raspberry Pi

# Distributions

There is not one Linux, but there are several “distributions”

- Distributions are often for specific target users, e.g.,
  - Red Hat Enterprise: for companies, Red Hat sells support services
  - Ubuntu: targeted to home users; more user friendly
  - CentOS: community-supported distribution derived from Red Hat
  - Raspbian
- There are hundreds of different distributions
- The core of the Linux system is the same for all distributions

# Distributions



# The shell

- Graphical mode vs text mode

- The shell is a command-line interpreter, i.e., the programme you interact with when you issue commands

```
[tassin@hebbe ~]$ echo "This is the best course in the world"
This is the best course in the world
[tassin@hebbe ~]$
```

- The most popular shell is called Bash

# Terminal control characters

- You can only interact with the shell using the keyboard (no mouse!)

- Control characters:
  - Ctrl-A: move cursor to begin
  - Ctrl-E: move cursor to end
  - Ctrl-D: exit
  - Ctrl-L: clear screen

# Commands

- The shell takes commands, e.g.:

```
[tassin@hebbe ~]$ echo "This is the best course in the world"
This is the best course in the world
[tassin@hebbe ~]$
```

- `echo` displays text on the screen

- Display a list of files in a directory:

```
[ptassin@aphy1 linuxcourse]$ ls -la
total 8
drwxr-xr-x+  4 ptassin localusers  5 Mar 18 20:15 .
drwx------+ 29 ptassin localusers 38 Mar 19 17:53 ..
-rw-r--r--+  1 ptassin localusers  9 Mar 18 20:15 coursename
drwxr-xr-x+  4 ptassin localusers  5 Mar 18 20:15 notes
drwxr-xr-x+  2 ptassin localusers  4 Mar 18 20:18 tasks
[ptassin@aphy1 linuxcourse]$
```

# Get help

- How do I find information about a command? RTFM!

```
[tassin@hebbe ~]$ man echo
```

```
ECHO(1)                          User Commands                          ECHO(1)
       \c     produce no further output
NAME
       echo - display a line of text

SYNOPSISf     form feed
       echo [SHORT-OPTION]... [STRING]...
       echo LONG-OPTION

DESCRIPTION   carriage return
       Echo the STRING(s) to standard output.
       \t     horizontal tab
       -n     do not output the trailing newline
       \v     vertical tab
       -e     enable interpretation of backslash escapes
:
       -E     disable interpretation of backslash escapes (default)    ECHO(1)

       --help display this help and exit
       echo - display a line of text
       --version
              output version information and exit
       echo [SHORT-OPTION]... [STRING]...
       If -e is in effect, the following sequences are recognized:

       \\     backslash
       Echo the STRING(s) to standard output.
       \a     alert (BEL)
       -n     do not output the trailing newline
       \b     backspace
       -e     enable interpretation of backslash escapes
       \c     produce no further output
```

# Get help

- Other ways to find information about a command:
  - `info`
  - STFW: use Google
  - user forums on the internet
  - `--help` or `-h` option to a command (short summary)

- How to find the name of a command you need?
  - apropos
  - Google

# More shell features

- Shell history:

  Use the ArrowUp and ArrowDown keys to search in the list of previously issued commands

- Tab completion:

  If you type the first few characters of a command or file name, you can have the remaining characters autocompleted by pressing Tab.

  If there is not a unique completion, then the shell will beep and you can press Tab again to see all possible completions.

# Combine commands

- You can use | to feed the output of one command to the next command:

```
[ptassin@aphy1 ~]$ ls linuxcourse | less
coursename
notes
tasks
(END)
```

# Any other questions?