

Introduction to Linux for bioinformatics

Getting Linux

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Mixing exercises and theory



This training will introduce you to Linux in a broad range of concepts.

- Exercises
- Graphical
- Terminology

>>> command line



Linux ...



Can somebody tell me what they think about when hearing 'Linux' ?

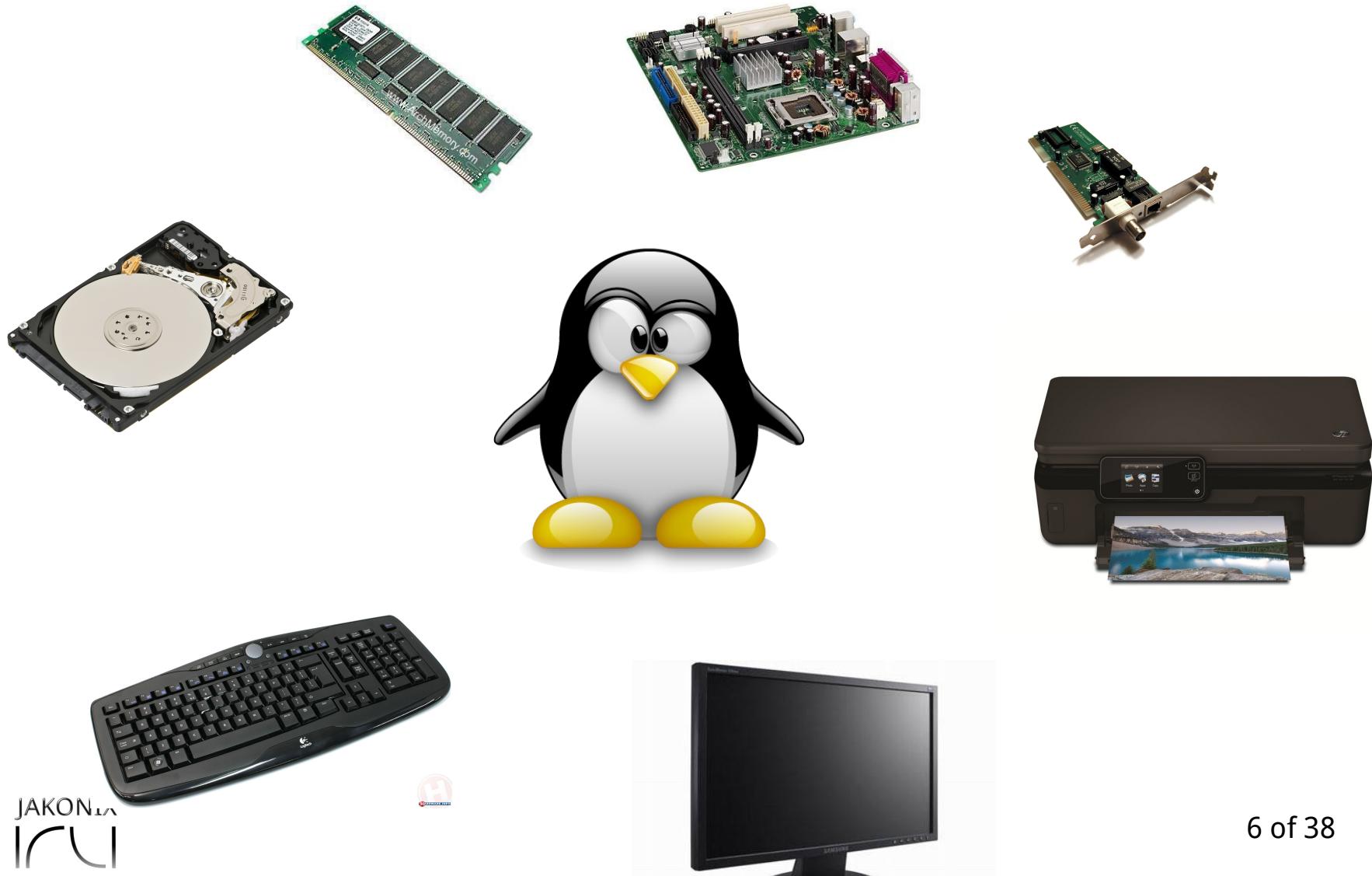
A bunch of hardware: a computer!



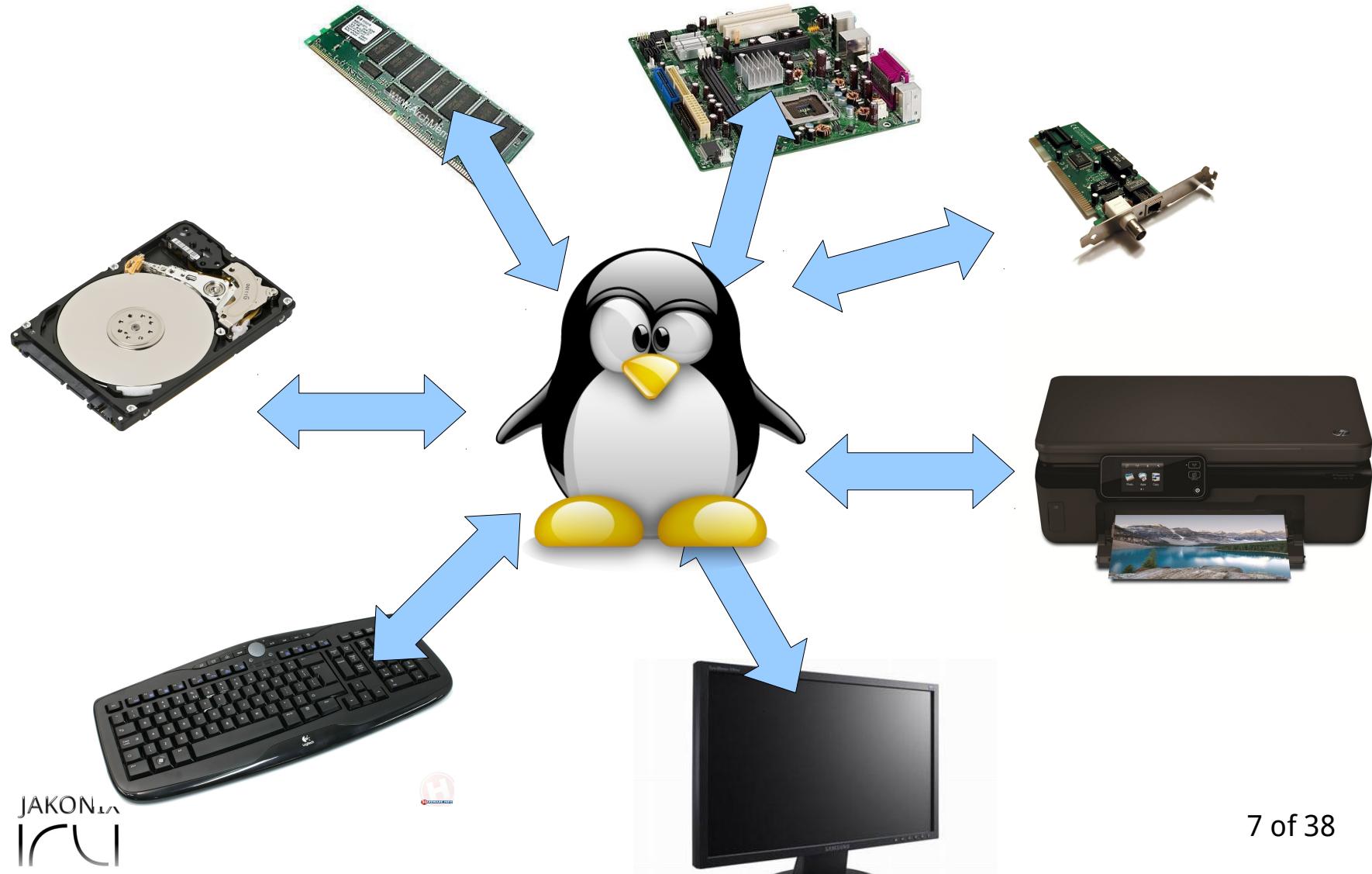
They use different signals to communicate



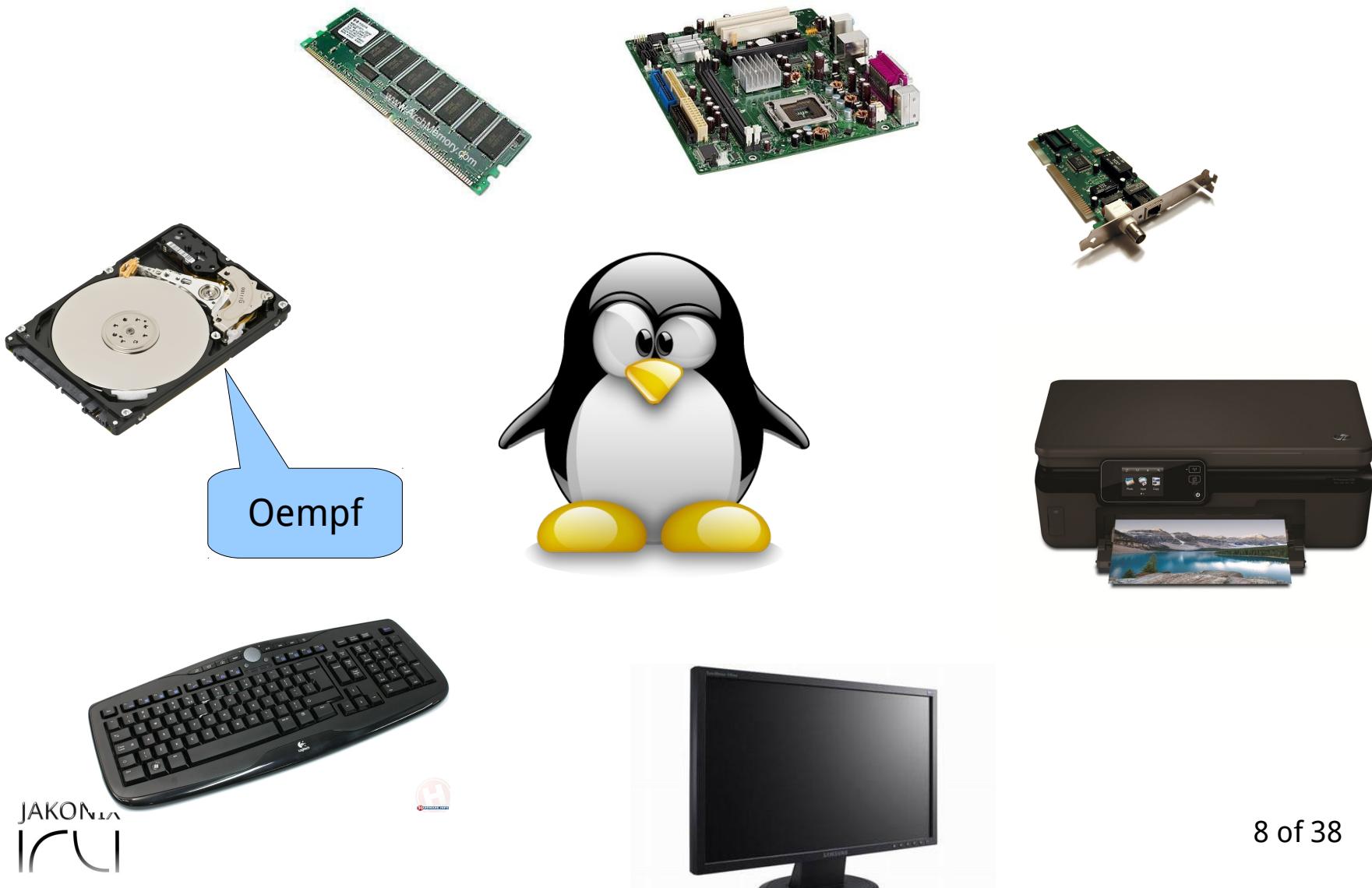
An operating system translates



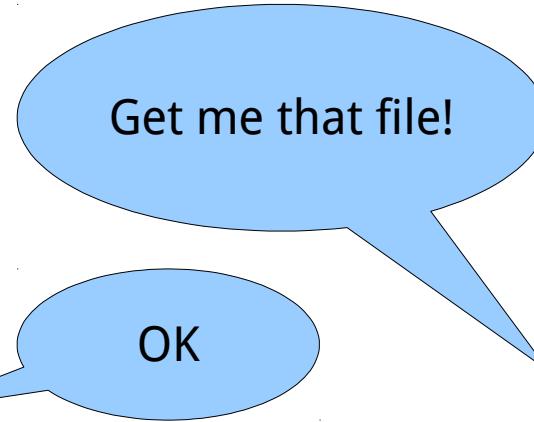
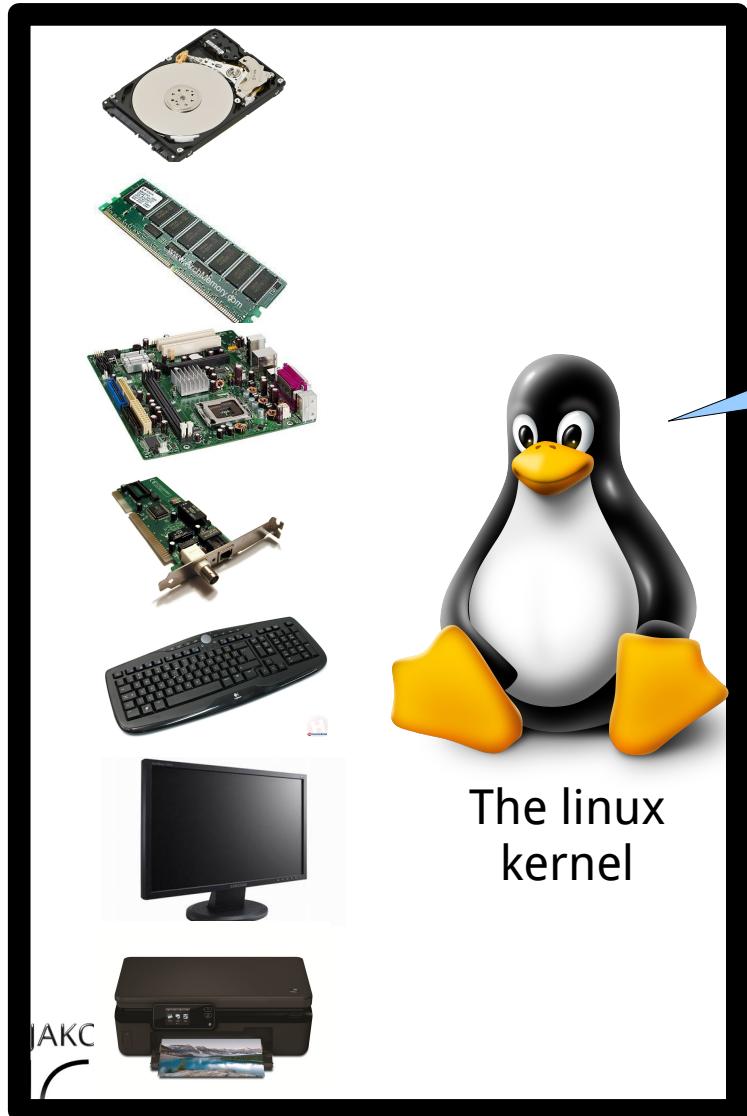
An operating system translates



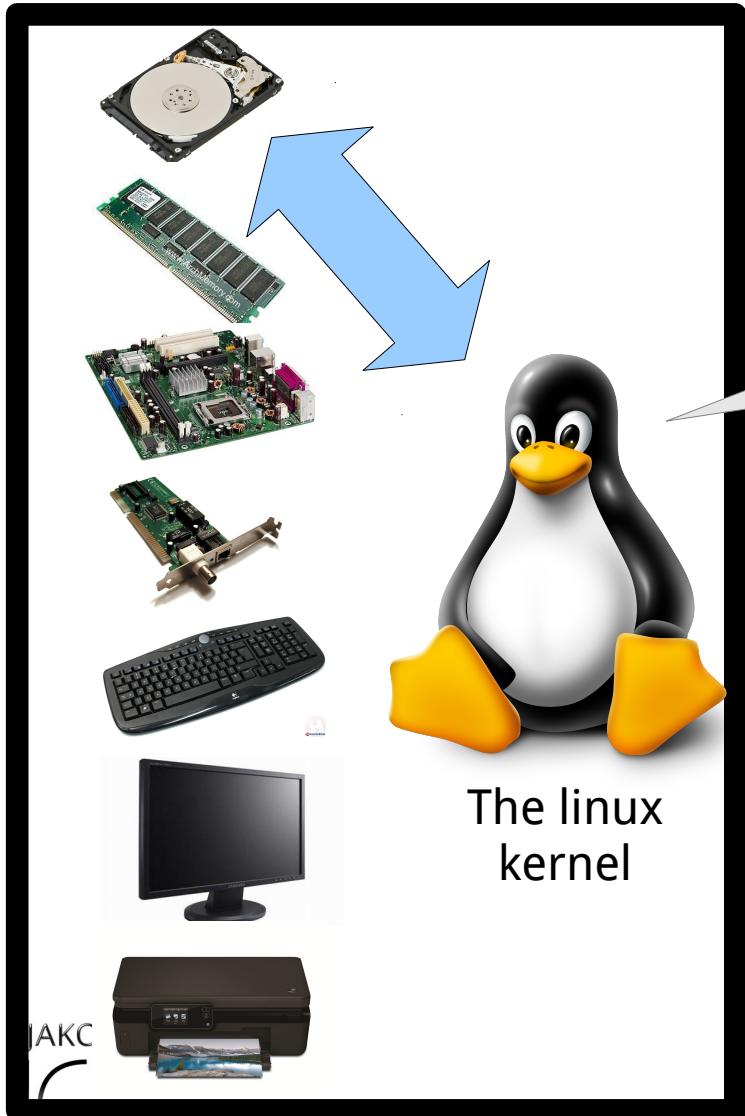
An OS is stored on the hard disk



Linux drives the computer hardware



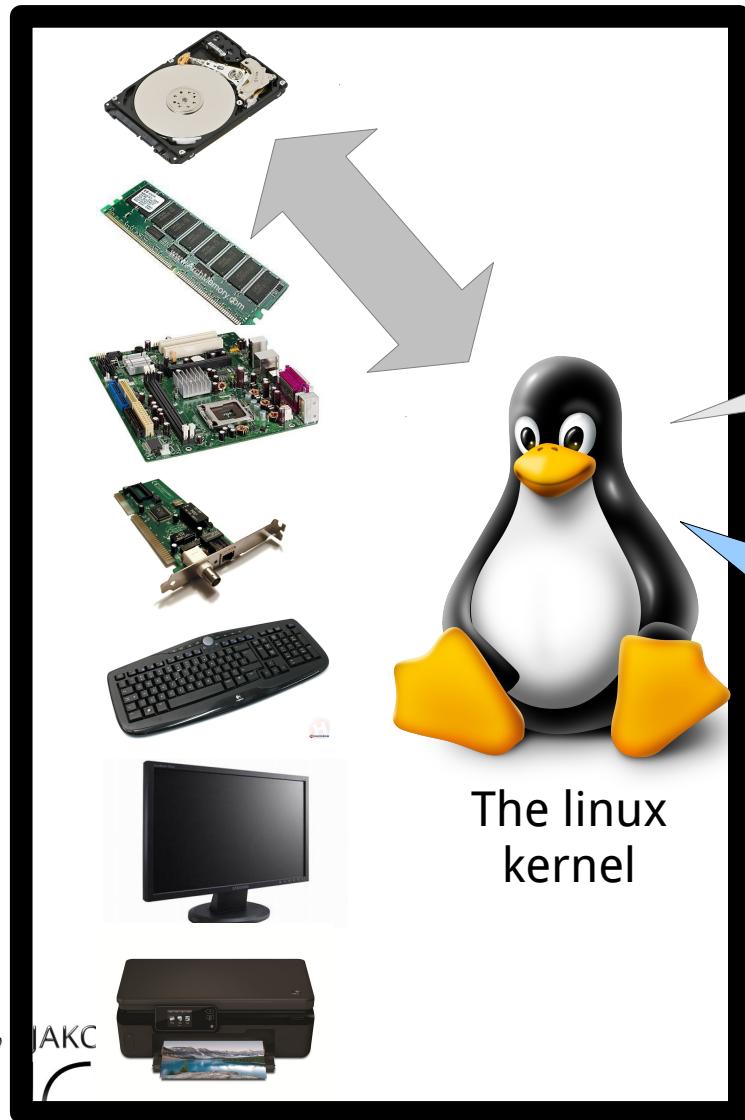
Linux drives the computer hardware



Get me that file!

OK

Linux drives the computer hardware



Get me that file!

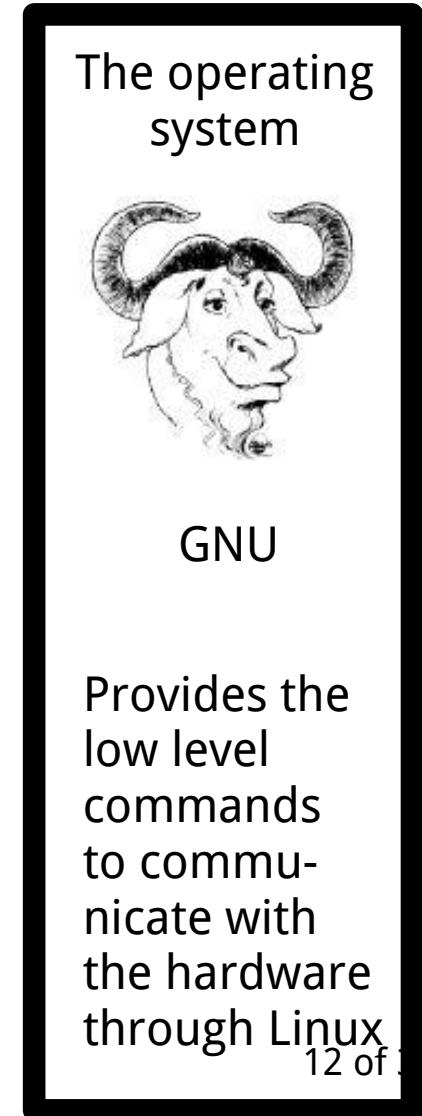
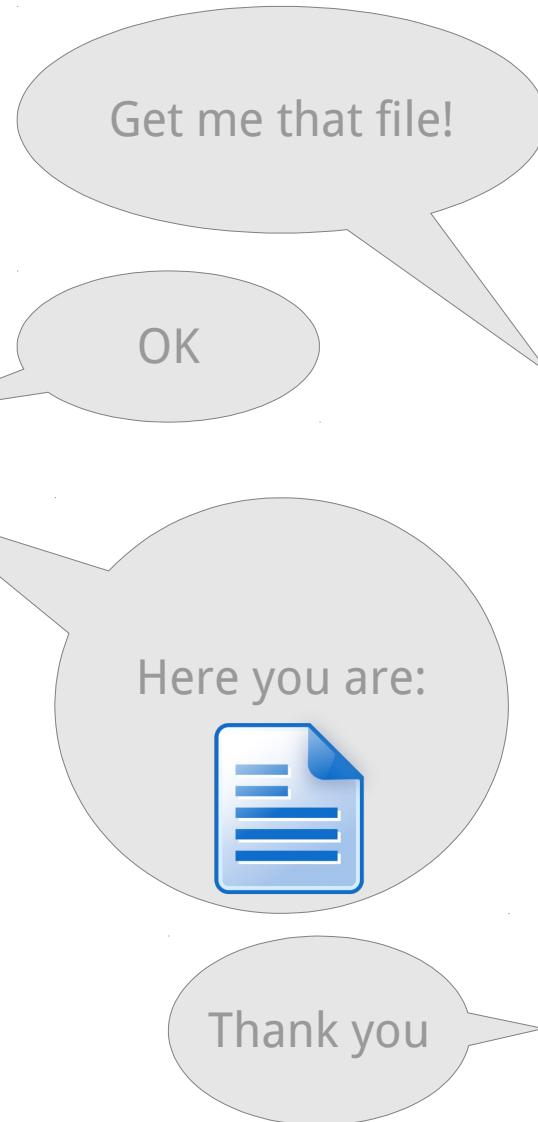
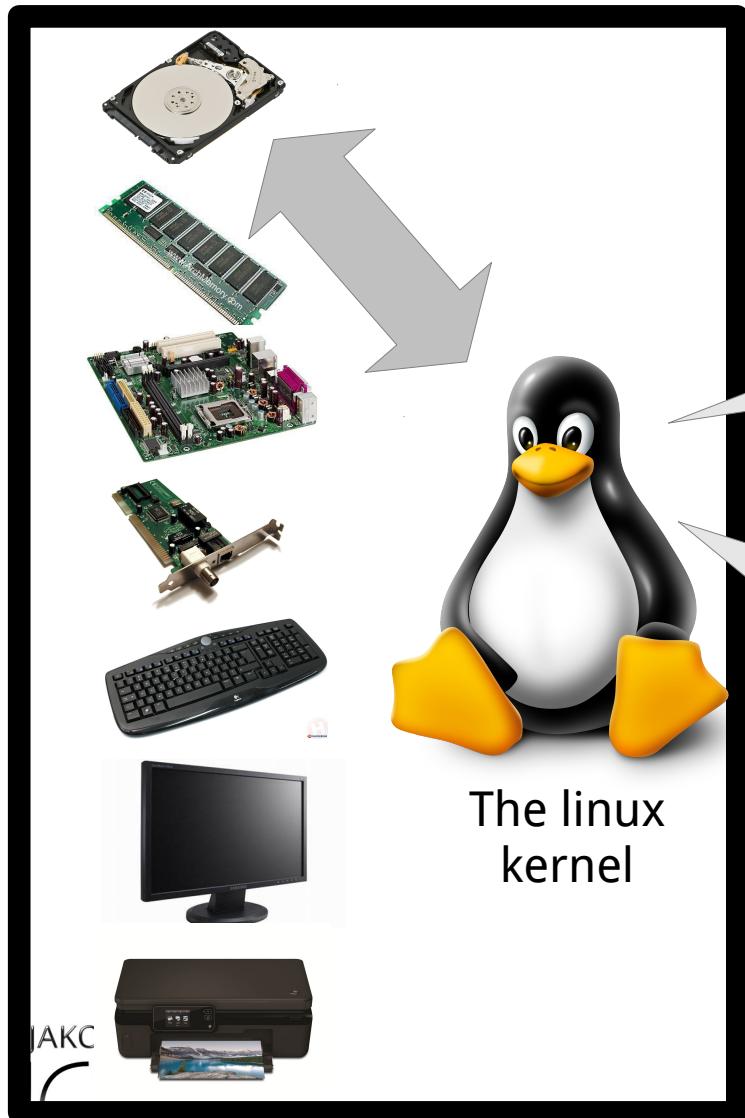
OK

Here you are:

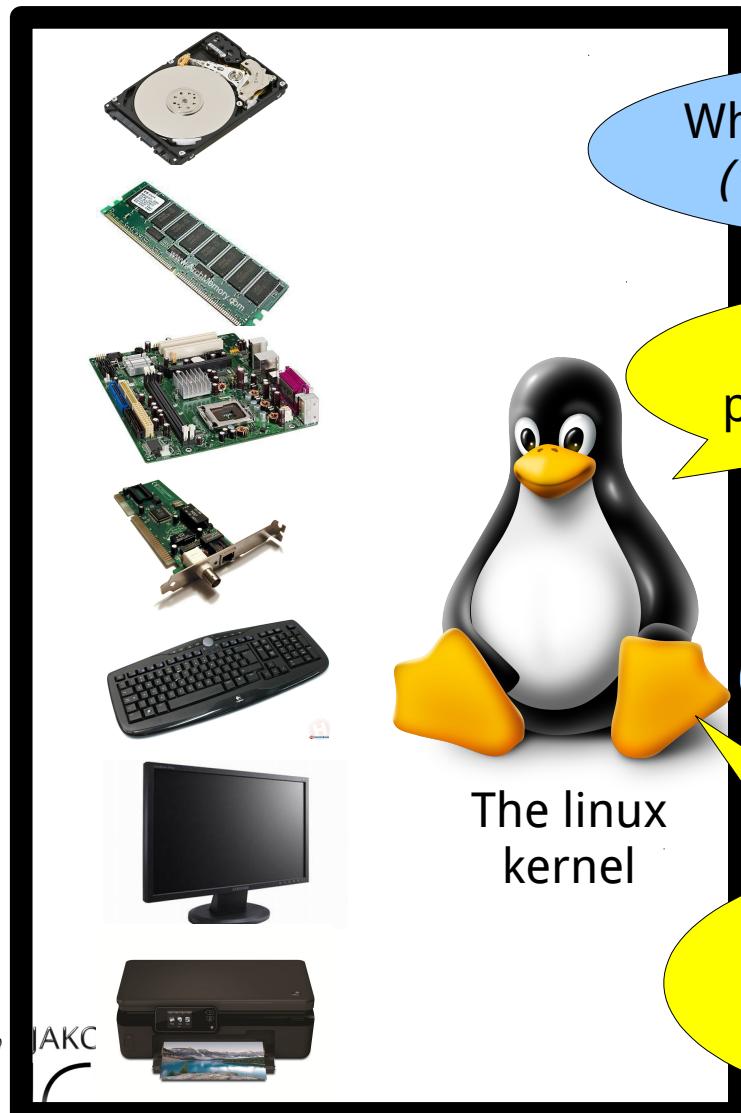


Thank you

Who's asking? GNU!



There's a lot of chatter



What's in that directory?
(*'ls'* in GNU language)

3 files: reads.fastq,
pe_aln.sam, README

Show me the content of
that file reads.fastq
(e.g. *'head'*)

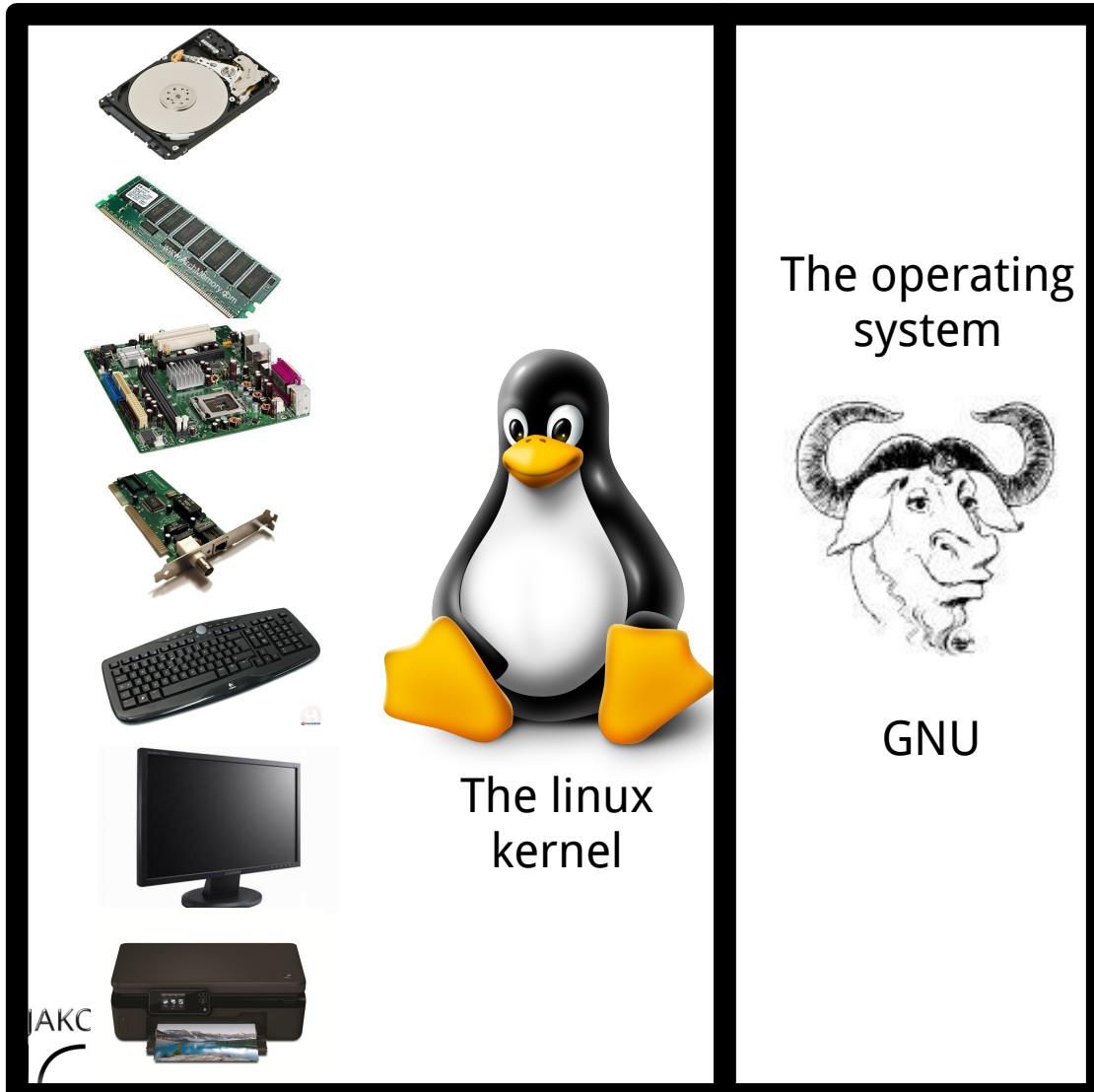
I read:
>HS:0012541
ATCGAATATAACGATG
...

The operating system



GNU

GNU/Linux goes along very well



While the **linux** kernel takes care of managing the computer resources (CPU, disks, file system, RAM, networkcards, ...), **GNU** provides the means of communication with the linux kernel through the well-known commands and programs (bash, ls, mkdir,...).

GNU is usually the first layer of user interaction.

But who cares?



GNU/Linux

The goal of linux is to be as invisible as possible, doing the heavy lifting on the background.

This GNU/Linux operating system is a solid core for a lot of computers and devices.

<https://www.dlitz.net/go/sticker/linuxstk800.jpg>

<http://coe.uncc.edu/mosaic/mosaic-linux/linux-basics/linux-kernel.html>

Other OSes: Windows, Mac OS x, Solaris, ¹⁵ of 38

Why Linux?

International Space Station switches from Windows to Linux, for improved reliability

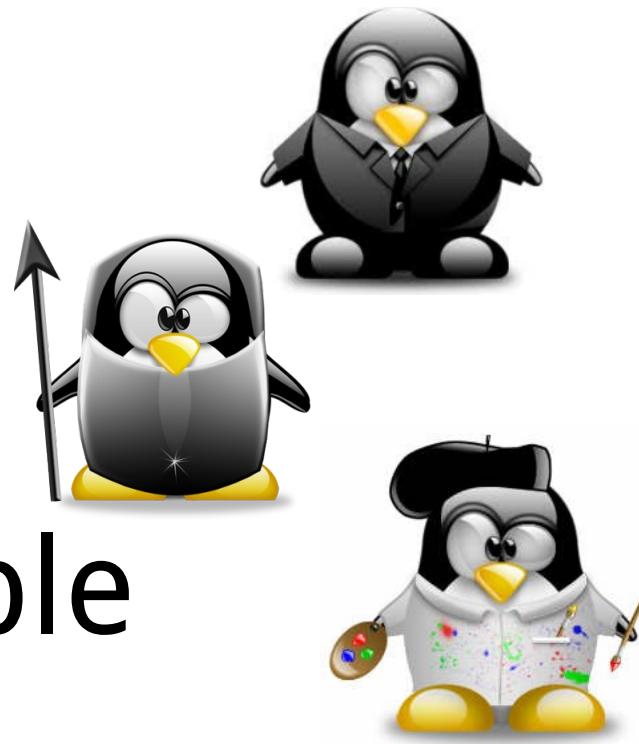
By Sebastian Anthony on May 9, 2013 at 9:21 am

[169 Comments](#)



Why Linux?

- Stable
- Safe
- Adjustable



Why Linux?

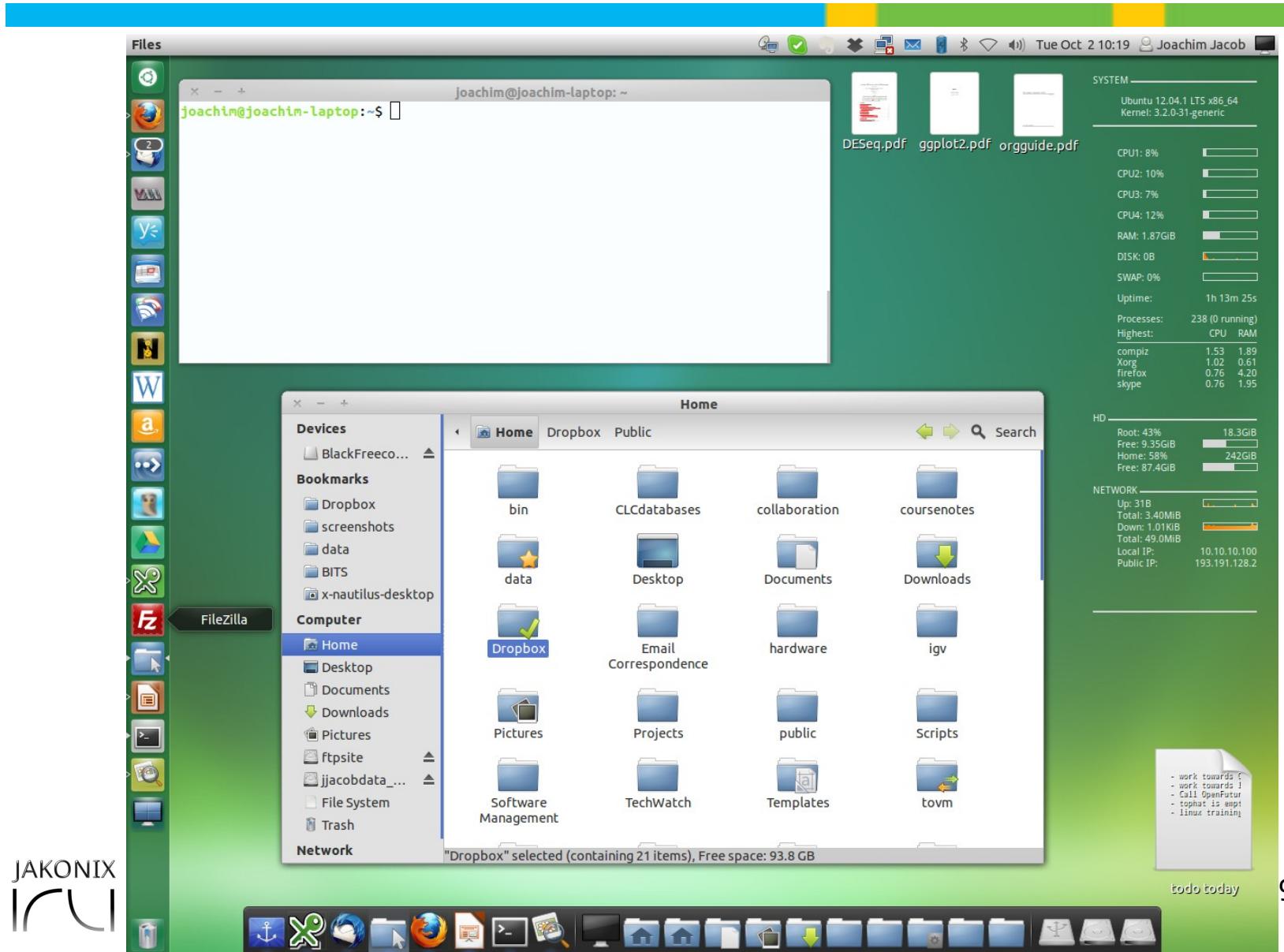


- **Open source:** the *kernel* code is viewable by anyone.
- **Open development:** anybody can propose enhancements /change it to their needs.
- **Free-to-use:** anybody can use the kernel to drive their own computer or device (always interesting in academics: a lot of development here)
- **Stable:** it is one of the most stable OS you can find.

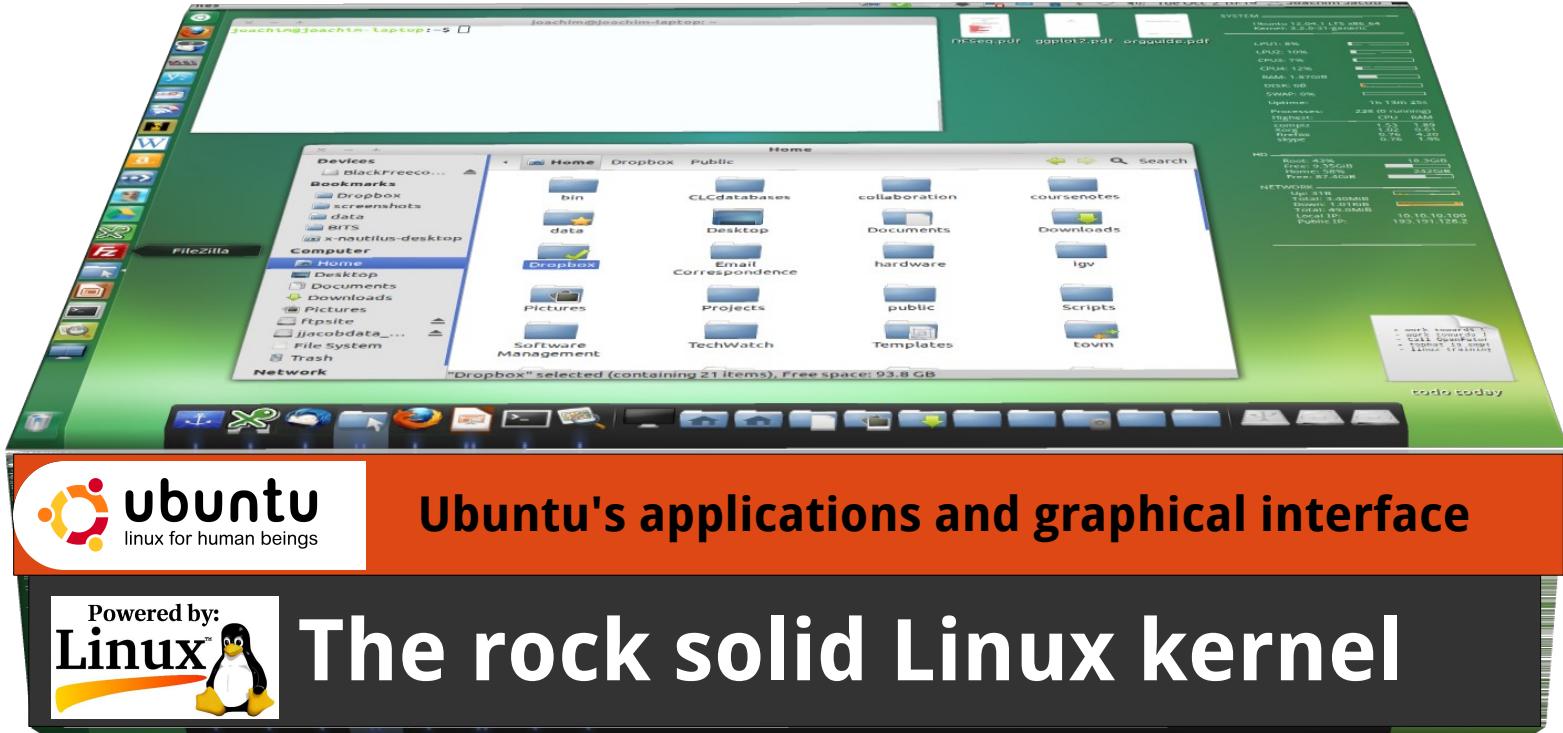
* since so many people use the linux kernel for their projects, and because of the many eyes watching it, debugging happens at an astonishing rate.

** all this is protected (to remain open) by powerful licenses such as GPL, Apache license, creative commons,....

But, the teacher's computer runs not 'linux'



This is the Ubuntu flavour of Linux



Ubuntu's applications and graphical interface



The rock solid Linux kernel

Many different organisations use the Linux kernel.
Some, such as Canonical, to create the Ubuntu Linux
distribution, adding **their graphical sauce** to it.

So – who of you is using Linux already?



<http://www.linuxfoundation.org/>

<http://www.youtube.com/watch?v=yVpbFMhOAwE>

So – who of you is using Linux already?



Linux for your computer



Different **distributions**

- They all use the Linux OS kernel
- They add their graphical user interface
- They add tools and applications (backup, texteditor,...)
- They provide a software package manager
- *initialization & configuration scripts*
- *commercial support*

There are many distributions (600+), but perhaps only a few that really matter...

<http://www.distrowatch.com>

Linux for the desktop

Dozens Linux distributions to run on your desktop exist.



A top 10 on
<http://distrowatch.com/dwres.php?resource=major>

Guide to choosing your distribution

- **Server**

- Commercial support (company driven)
 - SUSE Linux ES, Red Hat EL, Ubuntu Server



- Free and community driven
 - Debian, CentOS, Scientific Linux



- **Personal computer**

- Old hardware, slow:
 - Puppy Linux, Crunchbang, Lubuntu, ...



- New hardware, fast:
 - For home use: Linux Mint, Ubuntu ...
 - For work use: Crunchbang, OpenSuse, Ubuntu,...



Guide to choosing your distribution

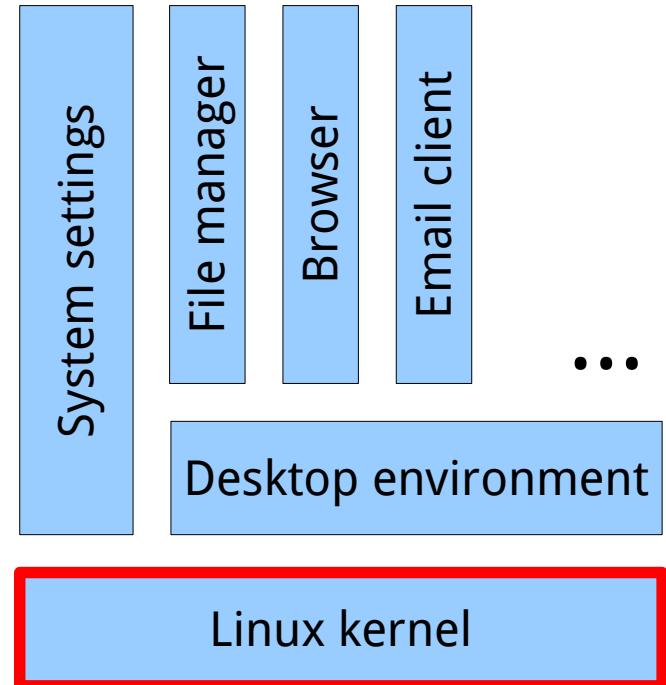


Perhaps it's easier to define the **opposite**

- Want *stability*? **Don't** choose Fedora.
- Want the *latest and hottest*? **Don't** choose CentOS
- Want a *lightweight* distro? **Don't** choose Ubuntu
- Want *classic look*? *Don't* choose Elementary OS
- Want to do *bioinformatics*? *Don't* choose CentOS, go for the latest actively developed.
- ...

(guess I can keep going)

Linux in different disguises

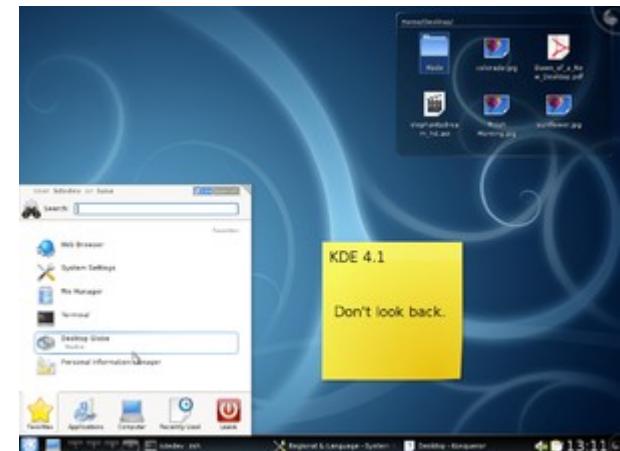


The philosophy is to have the choice of several exchangeable components to **customize** your experience.

They differ in 'desktop environment'



Unity

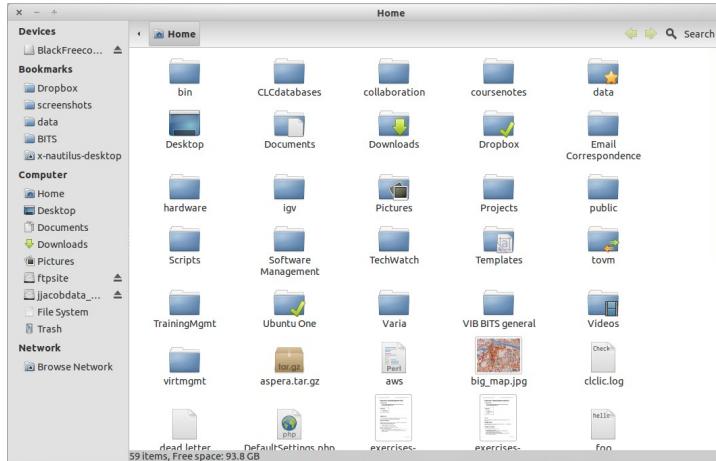


KDE



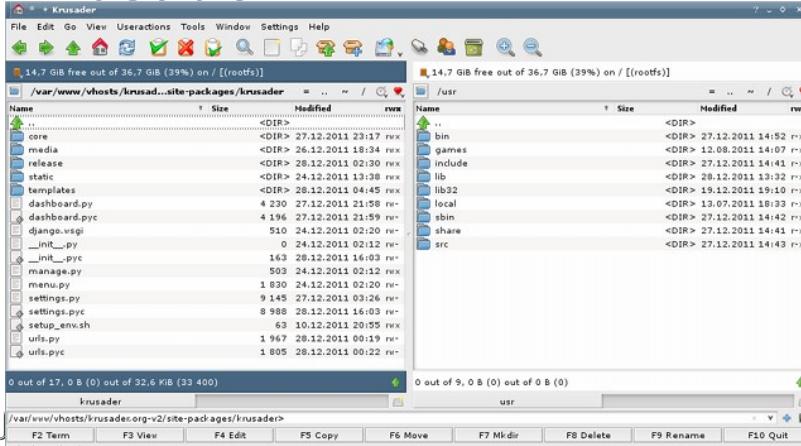
Cinnamon

They differ in file managers

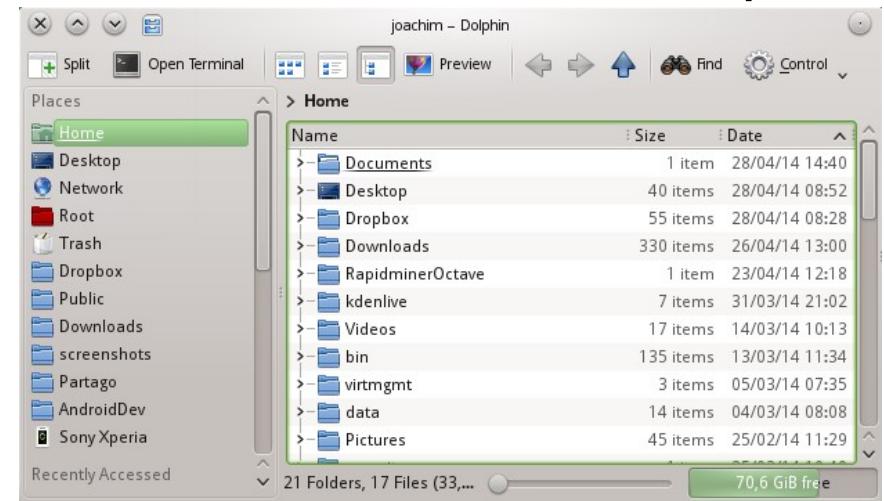


Nautilus

Krusader



Dolphin



Thunar

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How do I choose?



<http://fedoraproject.org>



<http://www.ubuntu.com>



<http://linuxmint.com/>



<http://pinguyos.com/>

Quickly and easy try them out!



Run Linux in 'live modus'

Put Linux on a USB stick, and tell your computer to start up from the USB stick, instead of the hard drive.



How to create a live USB

Live modus!

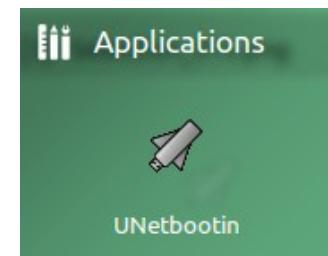
1. Grab a USB key or CD



2. Download an ISO file: pick the 64-bit version



3. Put the ISO image to the USB key or CD, e.g. with Unetbootin



4. Boot your computer from the USB key or CD (press F2 during boot)

Notes about installing Linux



★: level of difficulty

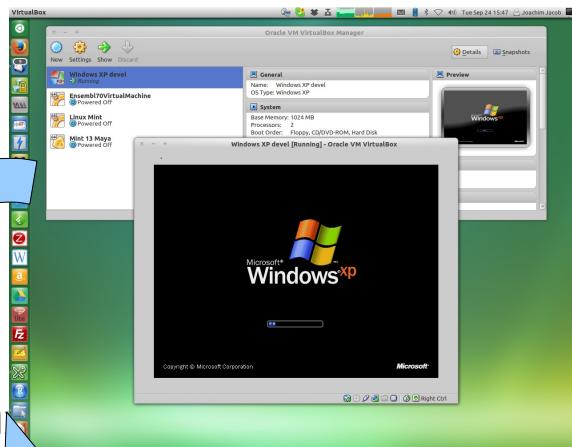
Straight forward ★★

Give your complete hard disk to Linux.

The current installers are very user friendly.

If you want access to other OSes on your computer (Windows,...): 2 options

VIRTUALISATION ★



<http://www.virtualbox.org>

DUAL BOOT ★★★



Choose during boot which OS you want to launch.

<http://www.gnu.org/software/grub/>

Keywords



operating system

linux

GNU

open source

distribution

desktop environment

live CD

virtual machine

dual boot

Exercise: let's play!

To complete the exercises, you will find .iso images of different distributions in the Downloads folder.

Pick one of those 2 exercises (click on the link):

A: Create a bootable live USB

or

B: Install Linux as a virtual machine





Break

