Computer Hardware

External

What you see with the machine turned off.

Why you care:

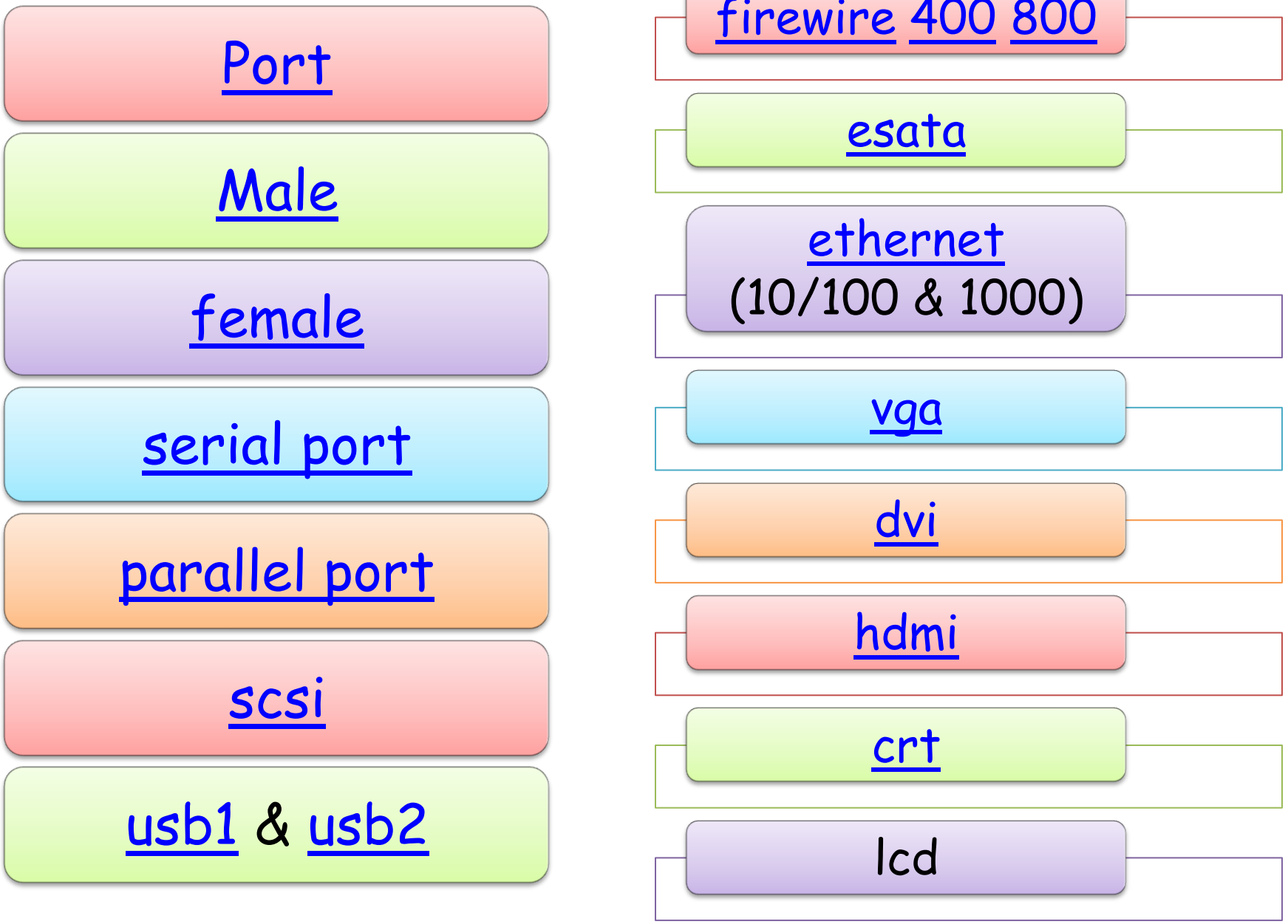
You want to know if you have a good machine for the job.

Can I plug in my USB key?

What kind of monitor can I use?

Is it old?

Can I add more cards?


Port
Male
female
serial port
parallel port
scsi
usb1 & usb2
firewire 400 800
esata
ethernet
(10/100 & 1000)
vga
dvi
hdmi
crt
lcd

Step 1 in machine evaluation

Look at the Back

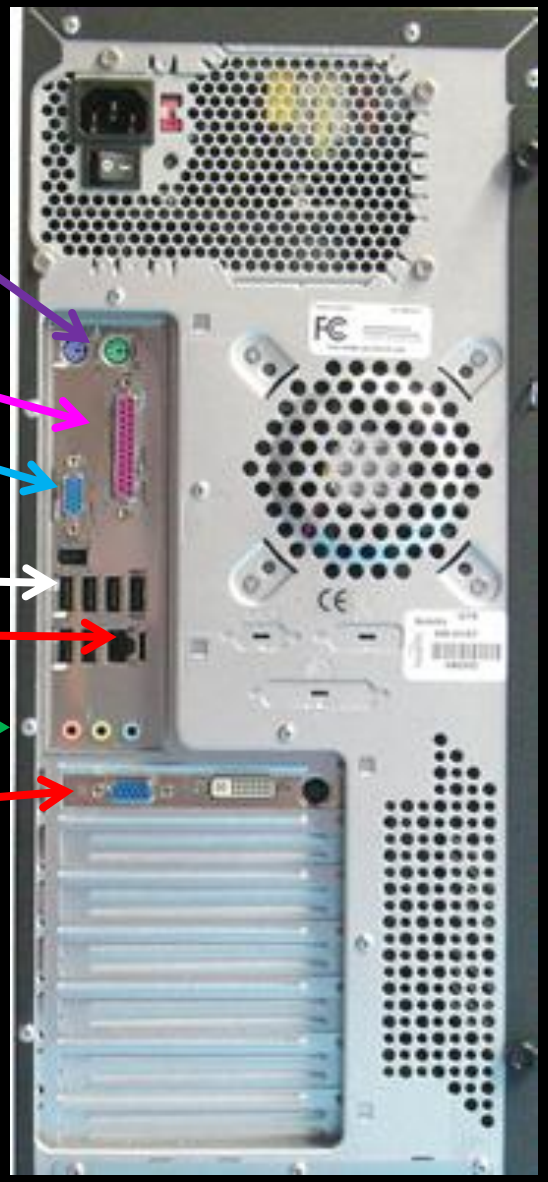
Why?

The ports you see give you a quick idea of the age of the machine.

and

you'll find out what you can plug in.

The Back: Quick View



What's a computer hardware port?

An interface between the computer and other devices

i.e., a specialized outlet where a plug or cable connects.

Why do you care about ports?

To attach external devices,

You need the correct ports

Ports have sex

They can be **male** (have protruding pins):

Or

female

(have small holes)

Usually they are female on the computer, since pins have a tendency to break off.

Ports can be identified by

size

shape

and # of pins
(or holes)

Ports from the past

Serial ports connected lots of devices before usb

D-shaped connector, 9 pins

Keyboard and Mouse

Parallel ports were used for printers

D-shaped connector 25 pins

Then there's the Small Computer System Interface (SCSI)

Manufacturers vainly hoped it would be pronounced SEXY when first introduced…

But, their users preferred "scuzzy".

SCSI


NARROW SCSI
DB 25 pin connector
WIDE SCSI
Very High Density Wide connector
WIDE SCSI
Wide 68 pin connector
NARROW SCSI
High Density 50 connector
NARROW SCSI
50-pin Centronics connector

SCSI has several incarnations,

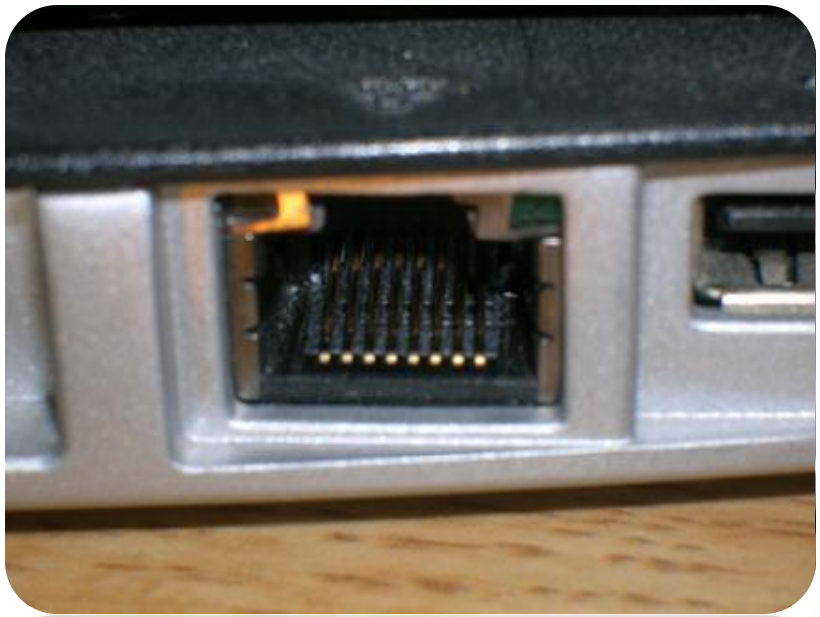
and was once **the** choice for high speed interfaces,

(compared to serial and parallel ports).

It was very expensive,

and is now mostly outdated.

Network (Ethernet)



Ethernet ports connect to the internet.

Some are slow: 10/100.

Others quite speedy: gigabit (1000).

Trivia: 100 speed is also called “fast” ethernet

Ubiquitous USB

Universal
Serial Bus
(3 speeds):

USB 1

Introduced in 1996.
Slow (1.5 MB/s),
doesn't need separate power;
fine for mouse or keyboard.

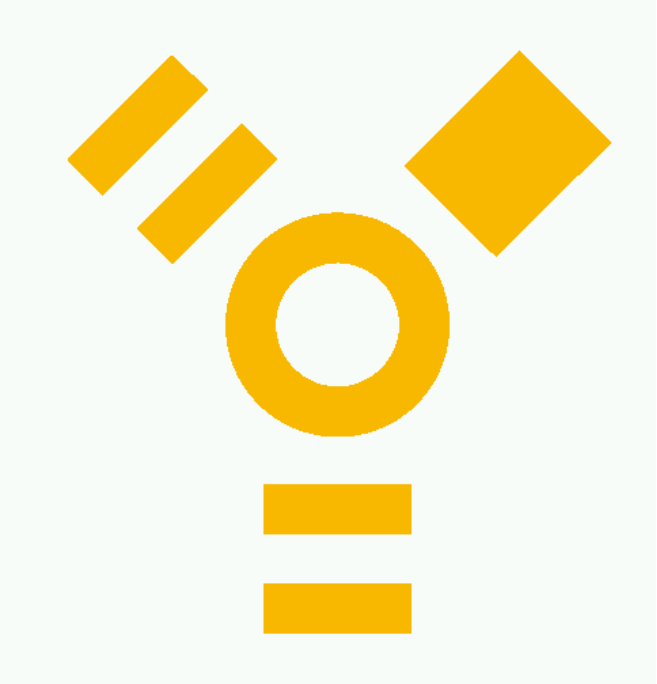
USB 2

Introduced in 2000. Faster data transfer (35-60 MB/s), but may require power for the device.

USB 3

Introduced Nov 2009.
Faster data transfer (15 MB/s to 600 MB/s).
Potential still not fully realized.

Fabulous FireWire (2 speeds…with a 3rd on the way)



IEEE 1394
(400 Mbits/sec)
(50 MB/s)

IEEE 1394b
(800 Mbits/sec)
(100 MB/s)

FireWire is less common & more difficult to implement than usb.

FireWire is more common on macs.

It is often used for
camcorders,
but can be found on
some external drives.

USB vs FireWire

In theory, USB 2 runs at 480 Mbit/s

and FireWire 400 runs at 400 Mbits/s

but in reality,

USB rarely exceeds 280 Mbit/s, with 240 Mbit/s being more typical.

Why?

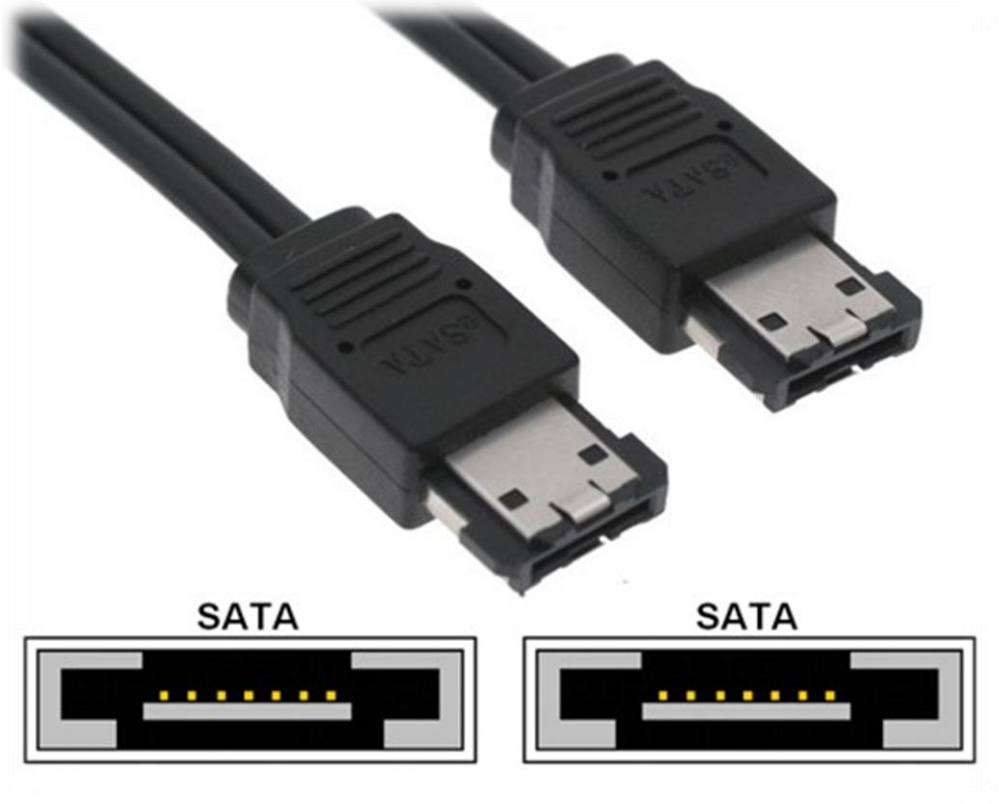
USB relies on the cpu to manage transfers,

so if the cpu is busy, USB gets slowed down.

FireWire handles things by itself.

So, FireWire has some subtle advantages.

eSATA (external SATA)



eSata is the fastest so far, attaining speeds of internal hard drives… (150 & 300 MB/s)

but the ports are still fairly uncommon.

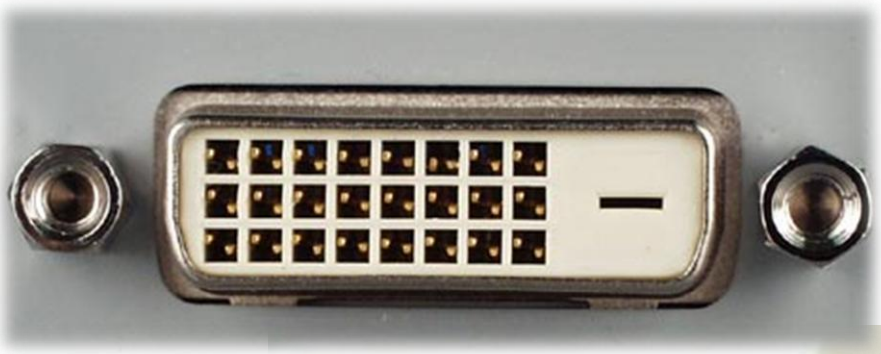
VGA Video

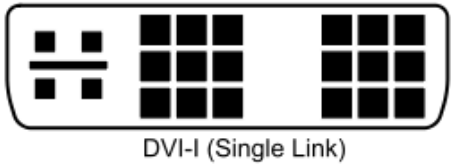
15 pin D-shaped connector

Video Graphics Array (VGA)

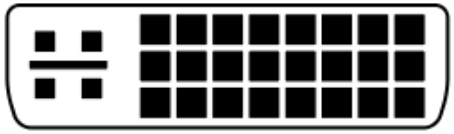
Designed for an analog output, especially CRT monitors

DVI Video

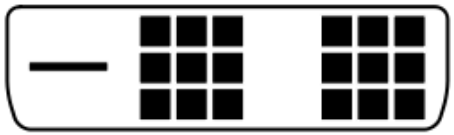




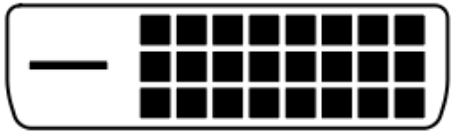
DVI-I (Single Link)



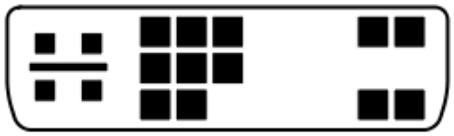
DVI-I (Dual Link)



DVI-D (Single Link)



DVI-D (Dual Link)

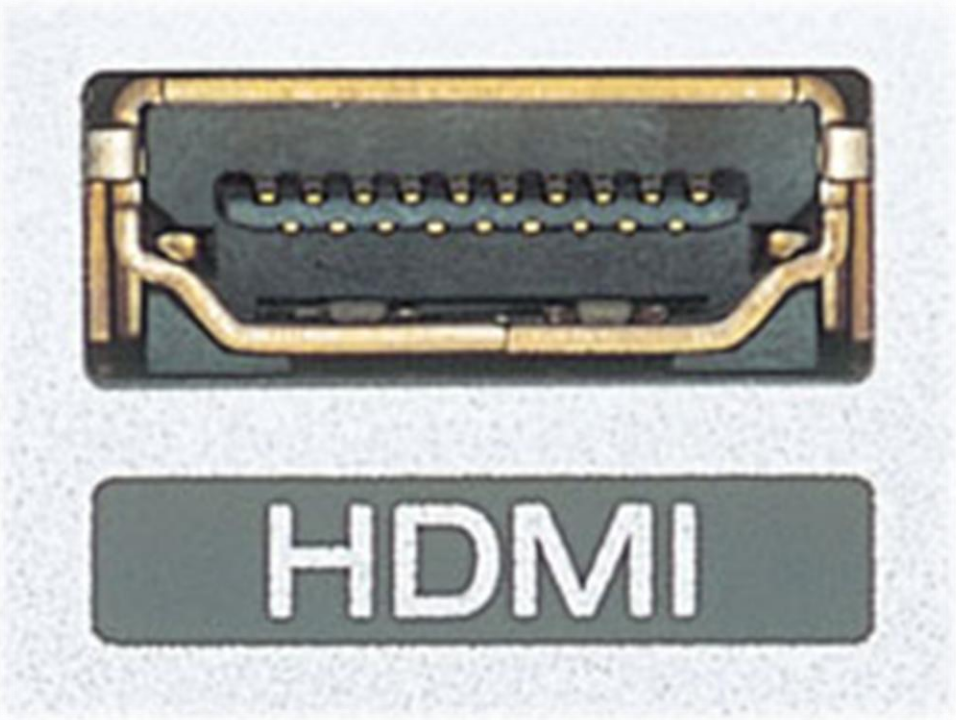


DVI-A

Digital Visual Interface (DVI)

Better than VGA for flat panel (LCD) monitors …

HDMI Video



High-Definition Multimedia Interface (HDMI)
(Introduced 2003) transmits video, sound & remote control signals,

backward compatible
with dvi video
(no degradation).

HDMI 1.0 supports 1080p at 1920x1200.

HDMI 1.3 supports 2560x1600 across a single digital link.

Video Connectors from Apple

- Display Port (May 2006): slimmer than dvi cables, easier to connect, compatible with hdmi and dvi signals.
- Mini Display Port (Oct, 2008)…preceded by the mini-dvi and the micro-dvi, but able to drive 2560x1600 30" displays can support audio (but doesn't on the apple laptops)

Let's examine 4 display technologies (CRT, LCD, OLED, E-Paper).

Cathode Ray Tube

CRTs always use VGA (analog) connectors.

CRTs have more accurate split-second timing, and may have better color accuracy.

Liquid Crystal Display

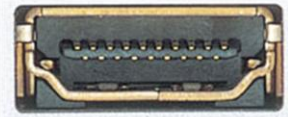
LCDs use

VGA,

DVI

or

HDMI,



LCDs:
-last longer,
-use less energy,
-are easier on the eyes,
-weigh less,
-and use less room on the desk.

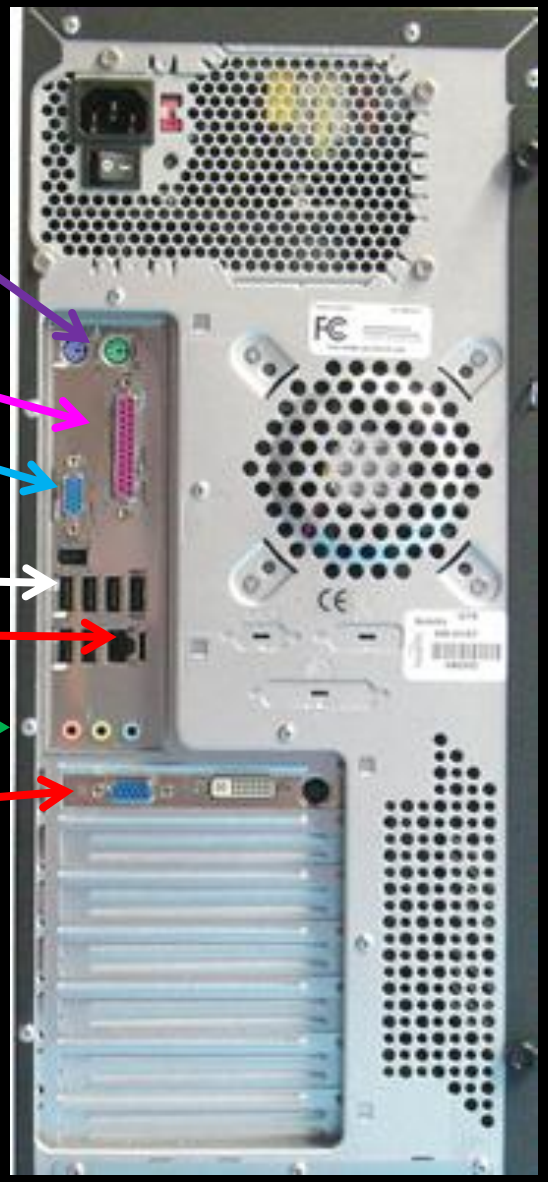
OLED (Organic LED)

- Advantages over LCD (OLEDs don't require a baclight):
  - blacker blacks & higher contrast ratios.
  - They use less power than LCDs.
  - Thinner & lighter than LCDs.
- Disadvantages
  - short lifespans (especially for blue)
  - color balance issues (especially for blue)

E-Paper (Electronic Paper)

- Mimics ink on paper, lower power/ low voltage
- Stable image: no refresh, holds single image indefinitely w/o electricity)
- Reflective; no backlight. Good in direct sunlight
- Disadvantages: Very slow to change an image.
- No color
- Only a few levels of grey.

The Back: Quick View



Summary

- Computers interface with other components through ports.
- Recognizing the ports on your machine will help you:
  - date the machine
  - understand what you can plug in
  - choose compatible peripherals

Port

Male

female

serial port

parallel port

scsi

usb1 & usb2

firewire 400 800

esata

ethernet (10/100 & 1000)

vga

dvi

hdmi

crt

lcd