

LIS-5364

Linux, Hardware and Virtualization

Broad definition: Computer, by parts

- Input
- Processor
- Output

Slightly Less Basic

INPUT

PROCESSOR

STORAGE

OUTPUT

(power)

(“gluing it all together”)

PROCESSOR (CPU)

Brains of the operation. “Does” the things.

(GPU's are quite similar; just slightly more optimized to make pretty pictures and animations...

and increasingly, other stuff.e.g bitcoin mining, scientific calculations)

PROCESSOR (CPU)

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Bitcoin farm



Power

Lately, not a lot. At all.

Even old computers - generally less than a lamp.



- ..touch it. :)

STORAGE

- Permanent (REALLY BASIC)
- Semi-Permanent (Firmware/ROM/Bios)
- Changeable
 - Short-Term (RAM)
 - Long-Term (All them “drives”)

PERMANENT

- The “Board.” That's about it.
- Reliance on this layer is increasingly rare, for obvious reasons.

(ROM used to mean this, now it usually means the next thing...)

Semi-Permanent Storage (Firmware)

- Much of what you think of as “permanent” is more likely “firmware”

That is, technically changeable, but you don't do it a whole lot, only when you want to make deep, fundamental changes/updates to how the hardware operates.

- BIOS
- ROMS
- Devices (routers, cameras, dj equipment, etc)

“Changeable” storage (another badly named thing in computing)

So, you're in the library using books to work on a paper like it's ancient history or something...

RAM



RAM

(when people say “memory”)

- what you're working on now



- (short term memory)

DRIVES (hard, solid-state, CD, etc.)

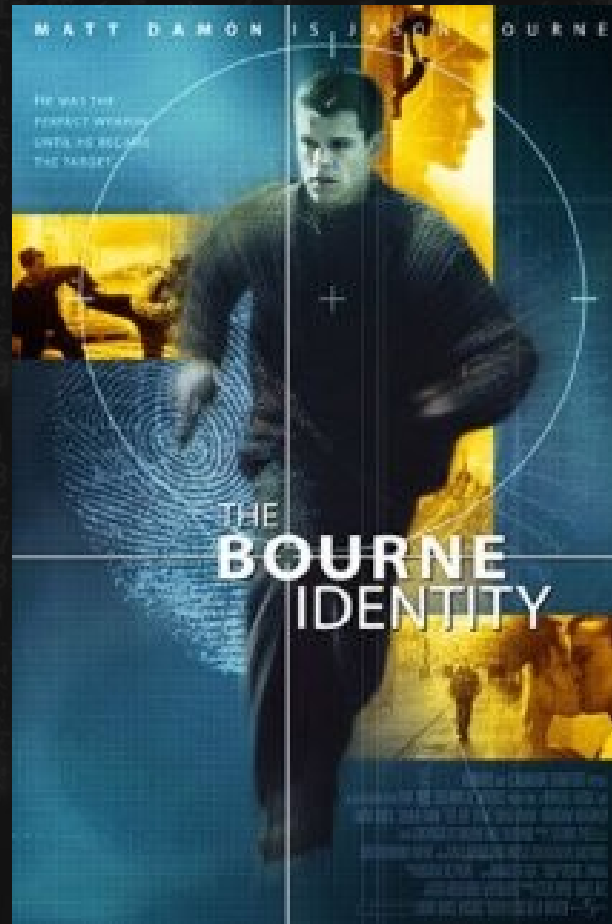
All (usually local) information that you can get to.



– (long term memory)

I won't be putting movies on the quiz, but...

Hard drive was accidentally rm -rf-ed, he's trying to recover it. His RAM is fine.



All data was preserved, but his hard drive is now read only. Also, has minimal RAM.



“Drives”

Old school

- * Floppies
- * CD-ROM, DVD-ROM (blu-ray ROM?)

Today

- * Hard Drives – IDE v. SATA (or external USB)
- * USB thumb
- * SD/microSD
- * SSD's (the future! Possibly identical to RAM, soon)

“Spinny circle thing and a pointy thing”

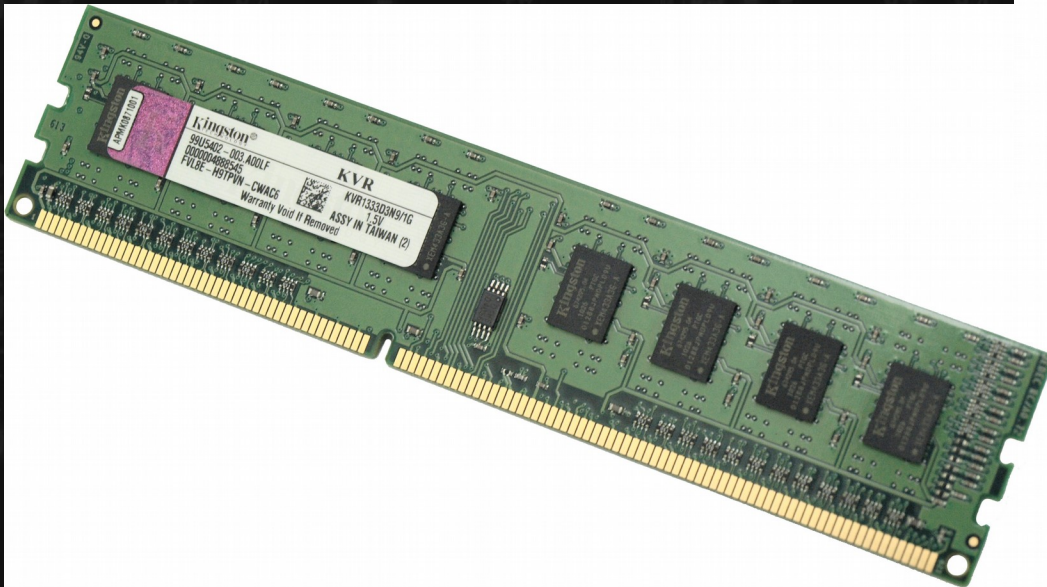
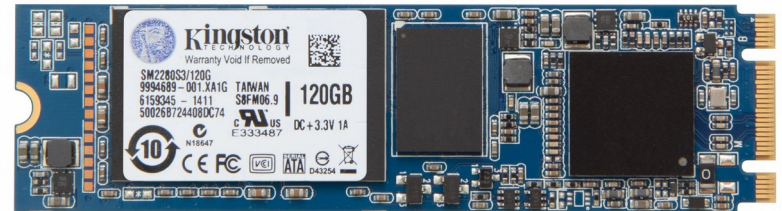
Vinyl Records, Floppies, Laserdiscs.

* CD-ROM, DVD-ROM (blu-ray ROM?)

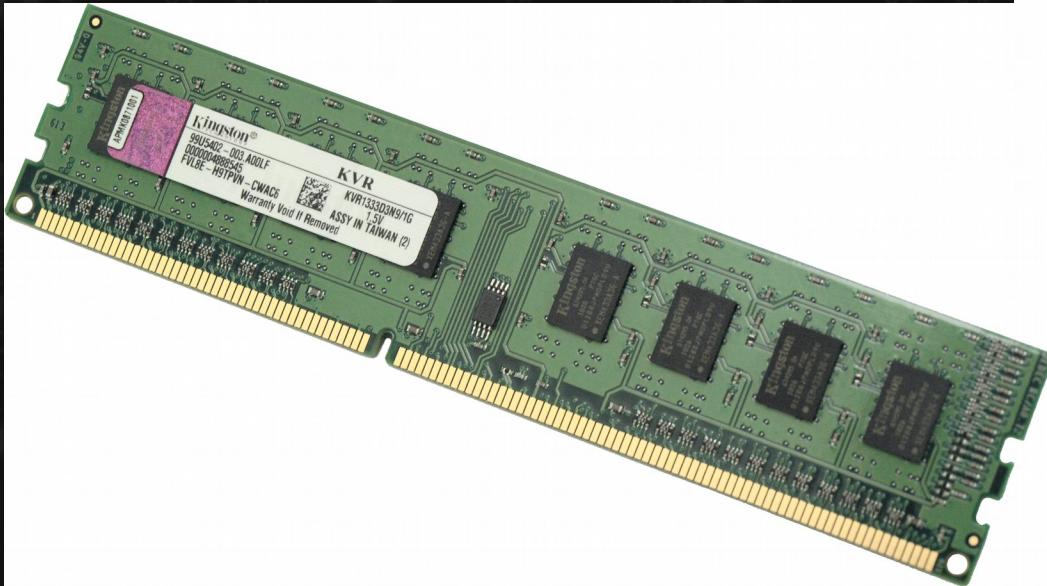
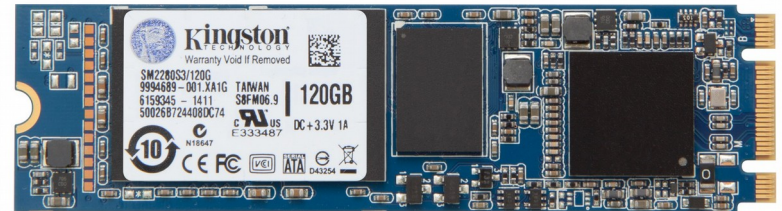
* Hard Drives – IDE v. SATA (or external USB)

Any “disc,” really....

To further confuse the issue: SSD's



To further confuse the issue: SSD's



INPUT - OUTPUT

Human Input

Human Output

Digital Input

Digital Output

(Increasing trend towards “digital until the very last possible second... consider why?”)

Human Input (analog)

Keyboard

- Touchscreen
- Webcam
- Microphone
- Motion-Sensor
- Mouses/Buttons/Sticks
- Thermometers?

(and other “Internet of things” stuff”

Human Output (analog)

- Screen*
- Speakers*/Headphones*
- Paper
- “Internet of things” stuff here too?
Oculus Rift, Drones, lights/temp in your house, etc.

*but what are the “wires” lately? More to come

Digital Input/Output

- General purpose:

Old-school – *Serial and Parallel*

New hotness: *Universal Serial Bus! (USB)*

Input, output, charging, various sizes

(oh, and also whatever Apple's things are that should probably just be USB – Europe's cell phone chargers are, by law, ALL Micro USB...discuss)

Digital Input/Output

Internet Data Oriented:

Phone line

Ethernet (wire)

Wireless (802.11 and bluetooth)

Digital/Analog Stuff

Generally, the wires going to the outputs are moving from analog to digital.

Advantage: Signal Quality.

(Monster Cables are definitely a ripoff here)

Disadvantage: Sometimes, reduced interoperability, opportunity for DRM.

Audio

Analog: “RCA” – usually the “1/8” in jack, sometimes 1/4
(arguably the best standard ever created, stop being suckers)

Digital: Bluetooth, USB, occasionally Ethernet and others

Video

ANALOG

TV Video: Cable cord, but lately the RCA A/V (Red / White / Yellow)

(also, occasionally “composite,” RGB)

Computer Video: VGA

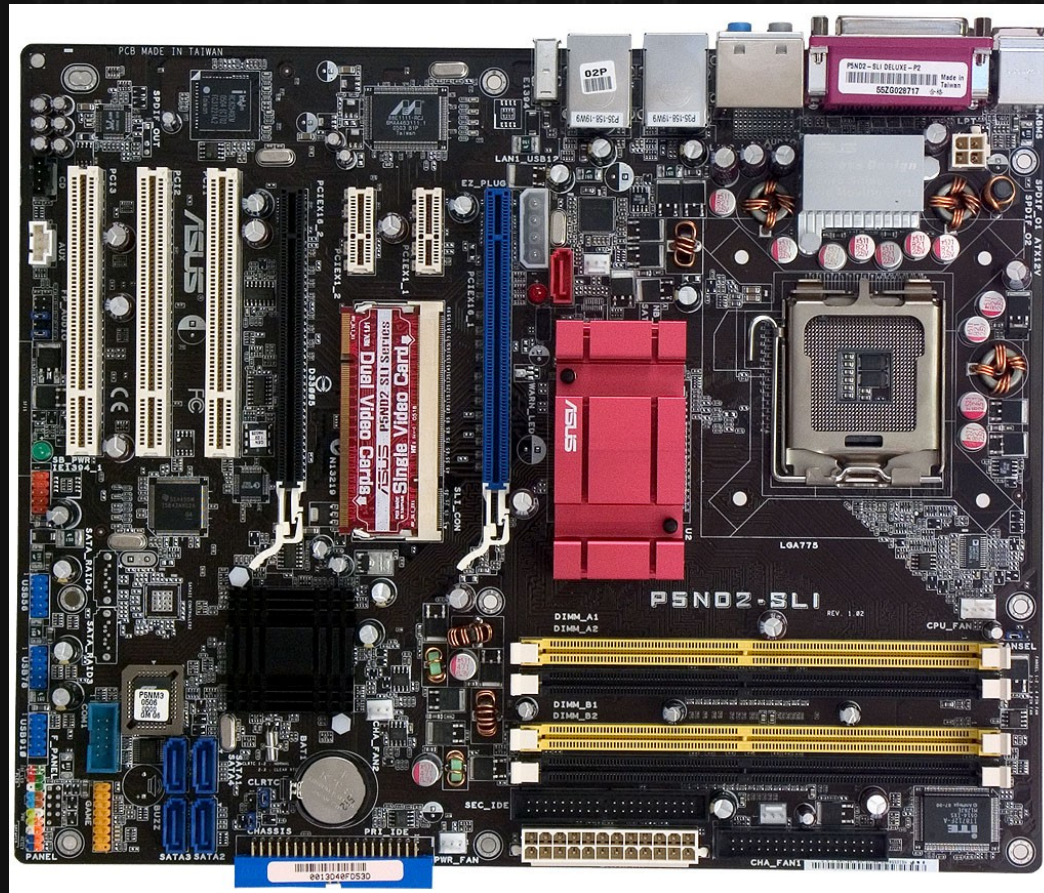
DIGITAL:

DVI

HDMI

“glue”

Motherboards. Where it all comes together.



Ridiculous computing factoids

- The Apollo Computer = Original NES
- Your cell phone > All of NASA, 1969
- A singing birthday card > computing power than all the combined Allied forces in 1945

So what?

Raw computing power is extremely CHEAP
and PLENTIFUL for most real-world
applications:

So what?

The bad news:

- Companies will pretend that “hardware” and “software” can’t be separated to jack up prices (i.e. non-changeable instructions)
- IoT security is garbage, because you throw an ultracheap, untested computer in your toaster and rush to market, and now your toaster is attacking your family.

So what?

The weird:

”Most software today is very much like an Egyptian pyramid with millions of bricks piled on top of each other, with no structural integrity, but just done by brute force and thousands of slaves.“

Alan Kay

So what?

The weird:

“The Cloud” / Servers / Web Services etc..

Virtualization and its cousins
LXC, LXD, Docker, etc etc.

So what?

The good news: This means we can all buy cheap computers to play and learn with.

