Template Week 3 – Hardware

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Assignment 3.1: Examine your phone

What processor is in your phone?

To which architecture family does this processor belong? In other words, which Instruction Set Architecture (ISA) is used?

How much RAM is in it?

How much storage does your phone have?

What operating system is running on your phone?

Approximately how many applications do you have installed?

Which application do you use the most?

Can your phone be charged with what type of plug?

Which I/O ports can you visually see on your phone?

My mobile phone is a Samsung S25 The processor is an **octa-core ARM-based SoC (Samsung Exynos / Qualcomm Snapdragon)**, which implements the 64-bit ARM architecture (ARMv8-A / ARMv9). The phone contains **12 GB RAM and has 512 GB memory.** The current OS of the phone is **Android 15 with Samsung One UI 7**. I have installed approximately **201 apps** on it. The most used app is **TikTok** with approximately **8 hours average screen time usage**. The phone uses: **USB Type-C 3.2 for charging and data and supports USB-C Power Delivery 3.0 (PD3.0) fast charging and DisplayPort 1.2 over USB-C.**

Visually observable I/O ports:

- One USB-C port on the bottom edge.
- No 3.5 mm headphone jack.
- Speaker and microphone openings, and SIM tray cut-out; exact layout you confirm by looking at the device.

Assignment 3.2: Examine your laptop

What processor is in your laptop?

To which architecture family does this processor belong? In other words, which Instruction Set Architecture (ISA) is used?

How much RAM is in it?

How much storage does your laptop have?

Which operating system is running on your laptop?

Approximately how many applications do you have installed?

Which application do you use the most?

Can your laptop be charged with what type of plug?

Which I/O ports can you visually see on your laptop?

My laptop is an **Acer Nitro 5 (AN515-56**). It contains an **11th-generation Intel Core i5-11300H** processor, which belongs to the x86-64 family, so the **ISA is 64-bit x86**. It has **8 GB of DDR4 RAM** and a **512 GB NVMe SSD for storage**. The operating system running on my laptop is 64-bit **Windows 11 Education**. I have around **177 applications installed**, and the most frequently used one is **Zen Browser**. The laptop is charged via a round barrel-type DC power connector, though it could also receive power via the USB-C port in case a proper Power Delivery charger is used in some configurations.

Visually observable I/O ports:

- Left/right side: multiple USB-A 3.2 ports and one USB-C port.
- HDMI port.
- RJ-45 Ethernet port.
- 3.5 mm audio combo jack.
- Barrel-type DC power jack for the main charger.

Assignment 3.3: Power to the laptop

What is the input voltage?

What is the output voltage?

How many watts can your power adapter deliver?

Is the input voltage AC or DC?

Is the output voltage AC or DC?

AC/DC what is that?

If you reverse the polarity of the output voltage, is that bad for your laptop?

You forgot your power adapter; your laptop normally needs 15 watts. You will be loaned a power adapter that can deliver 50 watts. Voltage, polarity, etc. are all the same compared to the original power adapter. You can connect the borrowed power adapter to your laptop. What will happen? Also explain why you think that.

Input voltage is 100-240V AC. Output voltage is 19.5V DC. The charger can deliver up to 135W.

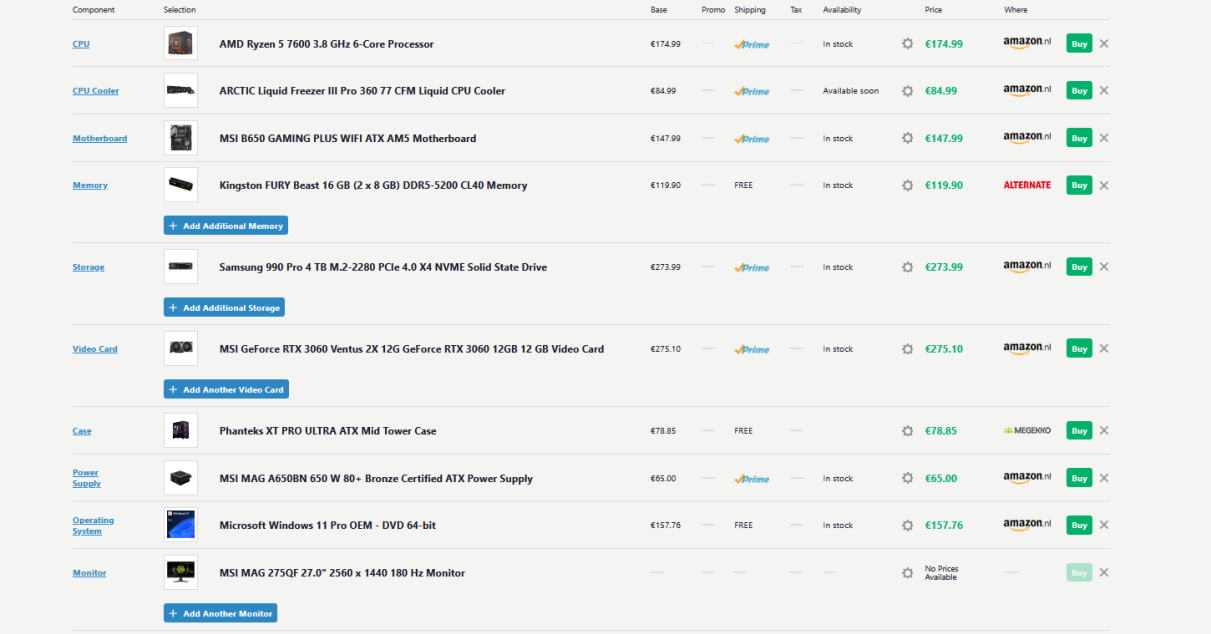
- AC (Alternating Current) - Voltage/current change direction periodically (what comes out of wall sockets).
- DC (Direct Current) - Voltage/current flow in one direction only (what batteries and laptop internals use).

If I would reverse the polarity of the DC output, that would be bad for my laptop, because its power electronics are designed for a fixed polarity; reversing it can damage protection components or even the motherboard.

My laptop needs about 15 W to run, but if I have forgotten my own adapter and used a borrowed one that can deliver up to 50 W, with the same voltage and polarity, nothing harmful would happen. The laptop would not be “forced” to take 50 W; it would take the 15 W it needs, while the 50 W rating just indicates the maximum the adapter can supply.

Assignment 3.4: Build your dream PC

Screenshots PC configuration + motivation:



Component	Selection	Base	Promo	Shipping	Tax	Availability	Price	Where
CPU	AMD Ryzen 5 7600 3.8 GHz 6-Core Processor	€174.99	—	Prime	—	In stock	€174.99	amazon.nl Buy
CPU Cooler	ARCTIC Liquid Freezer III Pro 360 77 CFM Liquid CPU Cooler	€84.99	—	Prime	—	Available soon	€84.99	amazon.nl Buy
Motherboard	MSI B650 GAMING PLUS WIFI ATX AM5 Motherboard	€147.99	—	Prime	—	In stock	€147.99	amazon.nl Buy
Memory	Kingston FURY Beast 16 GB (2 x 8 GB) DDR5-5200 CL40 Memory	€119.90	—	FREE	—	In stock	€119.90	ALTERNATE Buy
	+ Add Additional Memory							
Storage	Samsung 990 Pro 4 TB M.2-2280 PCIe 4.0 X4 NVME Solid State Drive	€273.99	—	Prime	—	In stock	€273.99	amazon.nl Buy
	+ Add Additional Storage							
Video Card	MSI GeForce RTX 3060 Ventus 2X 12G GeForce RTX 3060 12GB 12 GB Video Card	€275.10	—	Prime	—	In stock	€275.10	amazon.nl Buy
	+ Add Another Video Card							
Case	Phanteks XT PRO ULTRA ATX Mid Tower Case	€78.85	—	FREE	—		€78.85	MEGEKKO Buy
Power Supply	MSI MAG A650BN 650 W 80+ Bronze Certified ATX Power Supply	€65.00	—	Prime	—	In stock	€65.00	amazon.nl Buy
Operating System	Microsoft Windows 11 Pro OEM - DVD 64-bit	€157.76	—	FREE	—	In stock	€157.76	amazon.nl Buy
Monitor	MSI MAG 275QF 27.0" 2560 x 1440 180 Hz Monitor	—	—	—	—	—	No Prices Available	— Buy
	+ Add Another Monitor							

Here is my budget desktop PC build, as shown in the PCPartPicker screenshot.

I chose the AMD Ryzen 5 7600 for its great multitasking performance at a reasonable price. I included the ARCTIC Liquid Freezer III Pro for efficient CPU cooling, so the system keeps temperatures low even during demanding work or future upgrades. The MSI B650 GAMING PLUS Wi-Fi motherboard lets me use fast DDR5 memory and supports future upgrades on the AM5 platform.

I chose 16 GB of Kingston FURY DDR5-5200 RAM, which should handle gaming, productivity, and streaming with ease. In terms of storage, I opted for the Samsung 990 Pro 4 TB NVMe SSD. This provides blistering-fast read/write speeds and plenty of space for large-sized games and files. For graphics, the MSI GeForce RTX 3060 12GB will easily run most games on high settings in 1080p, and it does quite well even at 1440p. The Phanteks XT PRO ULTRA case offers great airflow and lots of space for upgrades. I matched this up with a reliable 650W 80+ Bronze MSI power supply, which should give me ample headroom for further upgrades or a better GPU later. For operating system purposes, I chose Windows

11 Pro. I chose the MAG 27" QHD (2560×1440), 180Hz monitor for super-smooth gameplay and sharp visuals.

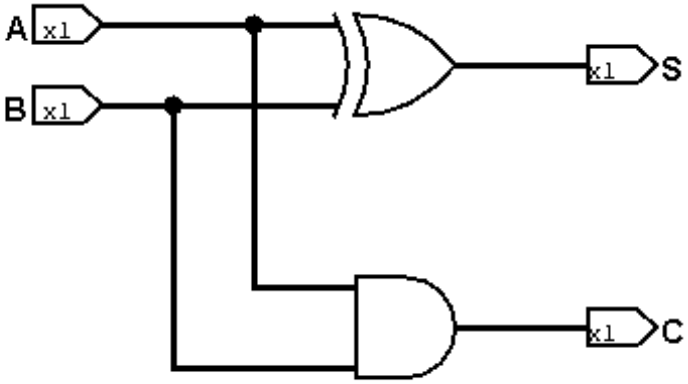
Comparing it to my current laptop:

- The desktop's Ryzen 5 7600 CPU is much more powerful than my laptop's Intel Core i5-11300H, especially for gaming and heavy multitasking.
- My dream PC has a discrete RTX 3060 12GB graphics card, which delivers much higher gaming performance than the Nitro 5's typical GTX 1650 or RTX 3050 mobile GPU.
- I chose 16 GB of DDR5 RAM and a 4 TB NVMe SSD for fast multitasking and massive storage - my laptop only has 8 GB DDR4 RAM and a 512 GB SSD, which fills up quickly.
- The desktop's spacious ATX case and liquid cooling keep things quieter and cooler than the cramped, louder laptop chassis.
- With the desktop, I can easily upgrade parts later (GPU, CPU, RAM, SSD), while the Nitro 5 is very limited for upgrades - mostly just RAM and SSD.
- The 27" 1440p monitor gives more screen space, sharper image, and higher refresh rate, making everything look and feel smoother than the laptop's much smaller 1080p screen.
- The laptop is portable and battery powered, but the desktop is for higher performance and longer life.

Assignment 3.5: Adders

Complete the **half adder**, **full adder** and **4-bit adder** assignment as described in the PowerPoint slides of week 3 in Logisim. Save the chip design and also export three PNG pictures of the separate finished designs. See the PowerPoint slides of week 3.

Paste the three exported PNG pictures in here.



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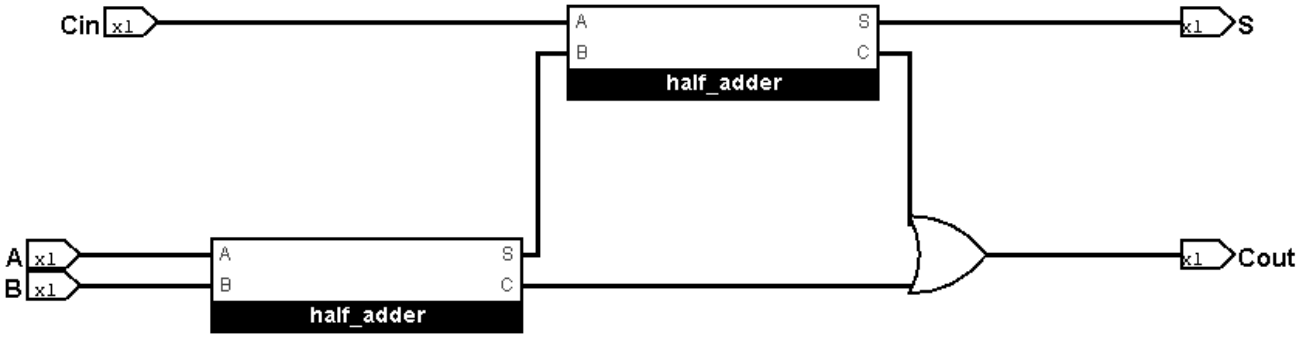

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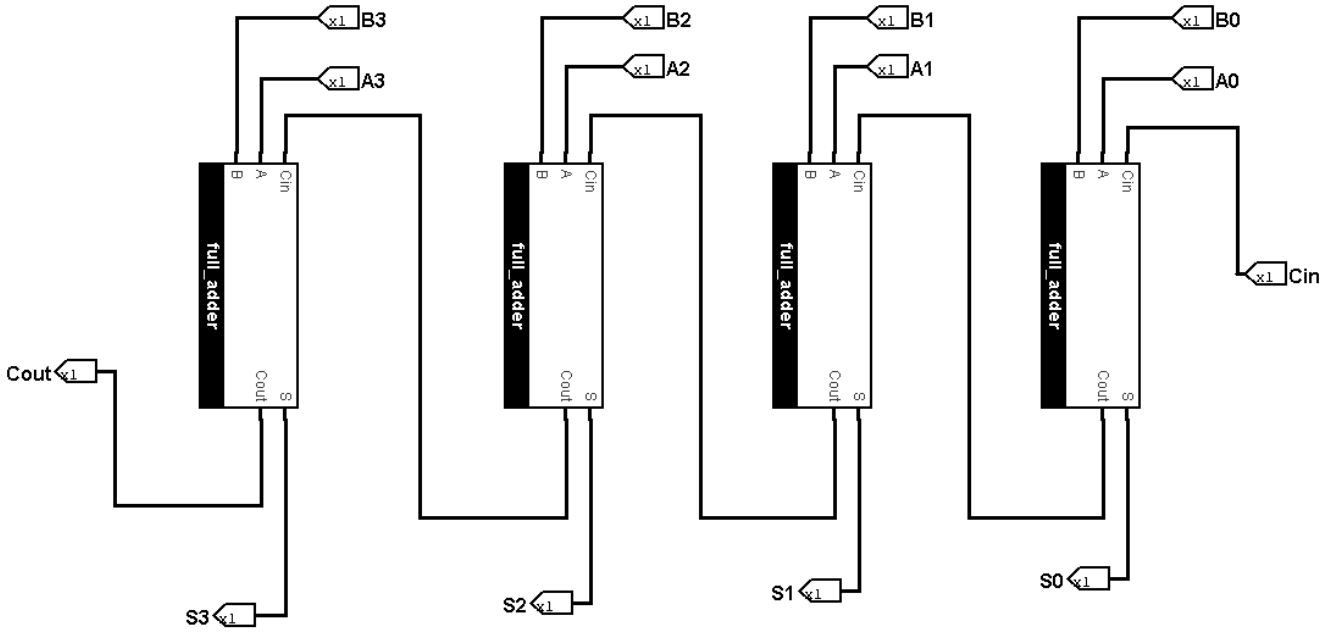

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