Week 3 – Hardware

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Assignment 3.1: Examine your phone

What processor is in your phone?

= A18 pro chip.

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

= ARM 64 – bit architecture.

How much RAM is in it?

= 8 GB LPDDR5X

How much storage does your phone have?

= 256 GB

What operating system is running on your phone?

= iOS 18.7.2

Approximately how many applications do you have installed?

= 44

Which application do you use the most?

= According to my screen time, I have used Facebook most on weekly basis and WhatsApp on daily basis.

Can your phone be charged with what type of plug?

= USB- C port.

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

= I can see USB-C port for charging and data transfer on the bottom and SIM card slot on the left side.

Assignment 3.2: Examine your laptop

What processor is in your laptop?

= Apple M4 Pro

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

= 64- bit ARM

How much RAM is in it?

= 24 GB

How much storage does your laptop have?

= 512 GB

Which operating system is running on your laptop?

= MacOS Sequoia 15.1

Approximately how many applications do you have installed?

= 73

Which application do you use the most?

= Chrome

Can your laptop be charged with what type of plug?

- MagSafe 3 magnetic connector and
- USB-C ports

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

- MagSafe 3 charging port
- USB- C/ Thunderbolt ports (for data, charging, video output)
- HDMI port (video output)
- SDXC card slot
- 3.5 mm headphone jack

Assignment 3.3: Power to the laptop

What is the input voltage?

= 100- 240 V AC, 50- 60 Hz.

What is the output voltage?

= 20.5 V DC.

How many watts can your power adapter deliver?

= 96 W(USB- C / MagSafe)

Is the input voltage AC or DC?

= AC

Is the output voltage AC or DC?

= DC

AC/DC what is that?

AC: An electric current that periodically reverses direction. It is the form of electricity supplied by household power outlets (mains power).

DC: An electric current that flows in only one direction. It is used by batteries and most electronic devices internally.

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

= If the polarity of the output voltage is reversed (so the positive and negative wires are swapped), it is very bad for the laptop. The laptop is designed to receive DC power in one specific direction only. If the polarity is wrong, the current can flow through components in ways they were not designed for, which can cause overheating and permanent damage to the charging circuit, the battery, or even the motherboard.

With the original charger that comes with the laptop(for example, Apple's USB-C or MagSafe adapter), this should never happen the plug and the electronics are designed so that the polarity is always correct. However, using a wrong or modified power supply with reversed polarity is dangerous and can easily destroy the laptop, so it should always be avoided.

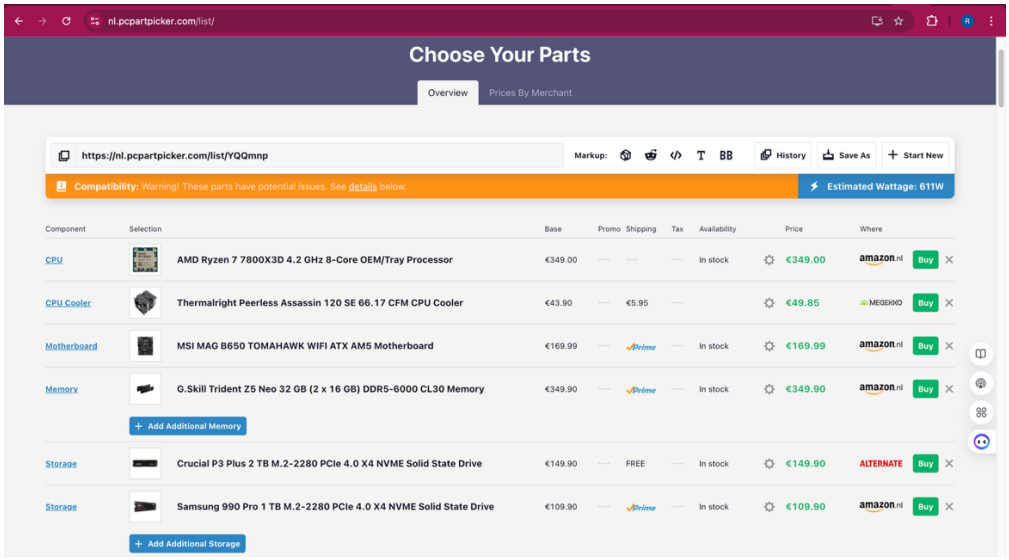
You forgot your power adapter, your laptop normally needs 15 watts. You will be loaned a power adapter that can deliver 50 watts. Voltage, polarity, etc. are all the same compared to the original power adapter. You can connect the borrowed power adapter to your laptop. What will happen? Also explain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

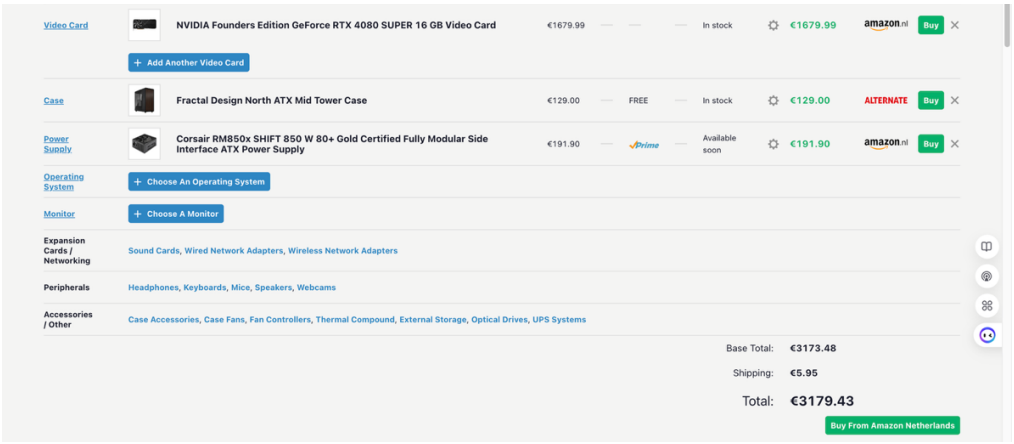
= If I connect the 50 W power adapter to my laptop, the laptop will still only take the power it needs, which is about 15W. The important thing is that the voltage and polarity are the same as the original adapter. The power rating (15 W or 50 W) is just the maximum the adapter can deliver, not what it forces into the laptop.

The laptop behaves as the load and decides how much current to draw. The adapter provides a fixed voltage U; the laptop then draws a certain current I, so the power is $P = U \times I$. Even though the new adapter can supply up to 50 W, the laptop will only draw about 15 W, so the adapter is working well below its limit and is safe to use.

Assignment 3.4: Build your dream PC

Screenshots PC configuration + motivation





I chose this because I want a solid all- round Windows desktop that can finally run modern games properly, but is still reasonable for studying, coding and some light editing. The 7800X3D is fast enough without going completely overboard, 32 GB RAM is plenty for multitasking, and 3 TB of SSD space means I don't have to keep uninstalling things. The RTX 4080 SUPER is basically the "fun" part of the build for me, since my laptop can't really do heavier gaming.

My real laptop is a MacBook Pro with an M4 Pro chip, 24 GB memory and a 512 GB SSD. It's great for school, battery life, and everyday work, and it's quiet and easy to carry around. The desktop I designed is the opposite: stuck on a desk, uses more power, but much better for Windows games and has more storage and upgrade options.

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.

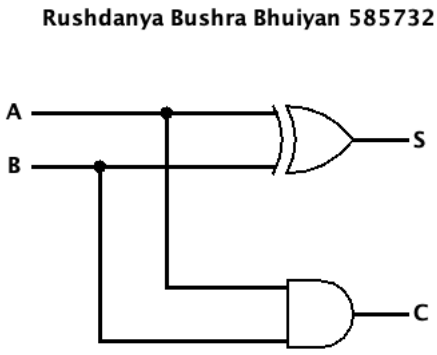


Fig1: Half Adder.

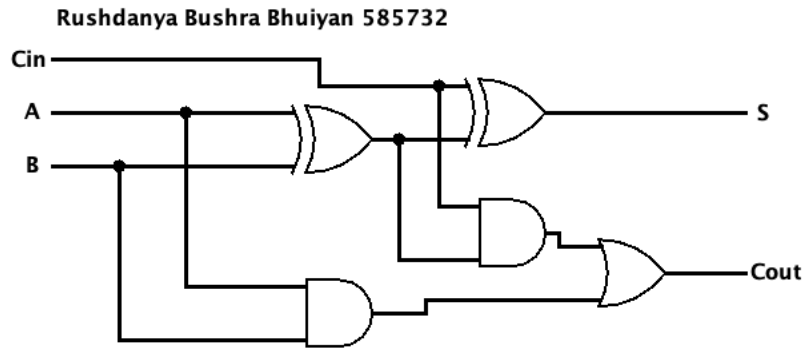


Fig2: Full Adder.

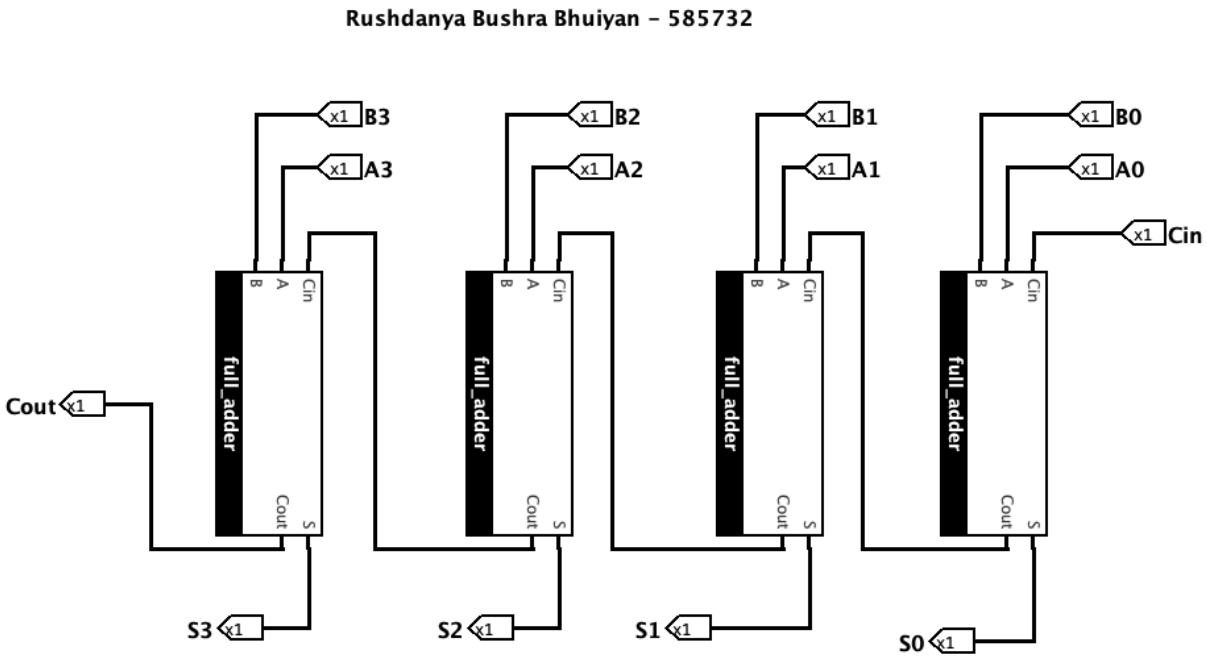


Fig3: 4-Bit Adder.