Week 3 – Hardware

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Assignment 3.1: Examine your phone

What processor is in your phone?

- My phone is an iPhone 16 Pro Max, which uses Apple's **A18 Pro chip**

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

- The A18 Pro is based on **ARM architecture**, so it uses an **ARM instruction set (ARM64)**

How much RAM is in it?

- The iPhone 16 Pro Max has **8 GB of RAM**

How much storage does your phone have?

- It has **512 GB of internal storage**

What operating system is running on your phone?

- It is running **iOS 18**

Approximately how many applications do you have installed?

- I have around **65 apps** installed

Which application do you use the most?

- The apps I use the most are **Instagram** and **TikTok**

Can your phone be charged with what type of plug?

- The iPhone 16 Pro Max charges with a **USB-C** plug

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

- The visible I/O ports are: the **USB-C charging port**, the **SIM tray**, speaker/microphone openings, and there is **no headphone jack**

Assignment 3.2: Examine your laptop

What processor is in your laptop?

- My laptop is a Lenovo 20SM and it uses an **Intel Core i5-1035G1** processor

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

- This processor belongs to the **x86-64 architecture**, so it uses the **x86-64 ISA**

How much RAM is in it?

- It has **16 GB of RAM**

How much storage does your laptop have?

- It has an **SSD with 477 GB** of storage available

Which operating system is running on your laptop?

- It is running **Windows 11**

Approximately how many applications do you have installed?

- I have around **6 or 7 applications** installed

Which application do you use the most?

- The application I use the most is **Microsoft Word**

Can your laptop be charged with what type of plug?

- My Lenovo uses the **standard 65W Lenovo round-tip charging plug**

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

- The laptop has the following I/O ports visible: **USB-A ports**, **USB-C**, **HDMI**, **headphone jack**, **power input**, and a **SD/SIM tray** depending on the configuration

Assignment 3.3: Power to the laptop

What is the input voltage?

- The input voltage is **100–240 V**

What is the output voltage?

- The output voltage is **20 V**

How many watts can your power adapter deliver?

- It can deliver **65 W** (which matches the label "65W")

Is the input voltage AC or DC?

- The input voltage is **AC**, which is shown with the **~** symbol

Is the output voltage AC or DC?

- The output is **DC**, shown with the ⎓ symbol

AC/DC what is that?

- AC (**Alternating Current**) has a changing direction of flow and changing voltage, these are characteristics that make AC an appropriate choice for transmitting over the electrical grid system. DC (**Direct Current**) on the other hand, travels in one direction, consistently, and this is the type of current that all electronic devices need to function. The power adapter takes the AC power provided by your local utility company and turns it into DC power for the laptop

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

- Reversing the polarity of the AC power source is extremely dangerous to the laptop. The laptop requires a specific polarity of both the positive and negative connections. If you reverse the polarity you can cause a short circuit or damage internal components of the 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.

- The laptop cannot draw any more than it needs. It draws approximately 15 watts of power at most. The 50 watts rating on the power adapter simply indicates how much total power (watts) the adapter can provide. It does not force 50 watts into the laptop. Since the borrowed adapter matches the required voltage and polarity of the laptop, the borrowed adapter is completely safe to use

Assignment 3.4: Build your dream PC

Screenshots PC configuration + motivation:

Component	Selection		Base	Promo	Shipping	Tax	Availability		Price	Where	
CPU		Intel Core i9-14900K 3.2 GHz 24-Core Processor	€456.22	—	Prime	—	In stock	⚙	€456.22	amazon.nl	Buy ✕
CPU Cooler		Corsair iCUE H150i ELITE LCD XT 65.57 CFM Liquid CPU Cooler	€326.79	—	—	—	In stock	⚙	€326.79	amazon.nl	Buy ✕
Motherboard		MSI MAG Z790 TOMAHAWK WIFI ATX LGA1700 Motherboard	€209.00	—	Prime	—	In stock	⚙	€209.00	amazon.nl	Buy ✕
Memory		G.Skill Trident Z5 Neo RGB 64 GB (2 x 32 GB) DDR5-6000 CL30 Memory	€689.00	—	FREE	—	In stock	⚙	€689.00	ALTERNATE	Buy ✕
	+ Add Additional Memory										
Storage		Samsung 990 Pro 2 TB M.2-2280 PCIe 4.0 X4 NVME Solid State Drive	€159.00	—	Prime	—	In stock	⚙	€159.00	amazon.nl	Buy ✕
	+ Add Additional Storage										
Video Card		NVIDIA Founders Edition GeForce RTX 5090 32 GB Video Card	€3289.99	—	—	—	In stock	⚙	€3289.99	amazon.nl	Buy ✕
	+ Add Another Video Card										
Case		Lian Li O11 Dynamic EVO XL ATX Full Tower Case	€234.90	—	FREE	—		⚙	€234.90	MEGEKKO	Buy ✕
Power Supply		Corsair RM1000x SHIFT 1000 W 80+ Gold Certified Fully Modular Side Interface ATX Power Supply	€199.90	—	Prime	—	Available soon	⚙	€199.90	amazon.nl	Buy ✕

Motivation:

I wanted to make my dream gaming computer a beast for extreme gaming performance and reliability for a long period of time and high-quality components. I chose the Intel Core i9-14900K as the CPU because it is one of the top performing processors available for gaming and heavy workload use, offering an abundance of performance for future games, heavy application use, and multitasking through its ability to run at high clock speeds and offer great multi-core performance.

I selected the Corsair iCUE H150i Elite LCD XT as my cooling solution for the CPU because of its superior thermal performance and aesthetically pleasing addition of an LCD display, adding a modern and premium feel to the system. My choice for the motherboard was the MSI MAG Z790 Tomahawk WiFi, because it will be able to support the newest technologies (such as DDR5 Memory, PCIe 5.0, M.2 Storage) and provide a solid foundation for the 14900K's power needs.

For memory, I added 64GB of G.Skill Trident Z5 Neo DDR5-6000 CL30, providing a tremendous amount of speed and ensuring there will never be a need for additional memory in the future due to the demands of today's gaming, multitasking, and productivity-based applications. The 2TB Samsung

990 Pro NVMe SSD provides the fastest read/write speeds available and is more than enough room for today's largest game titles and software.
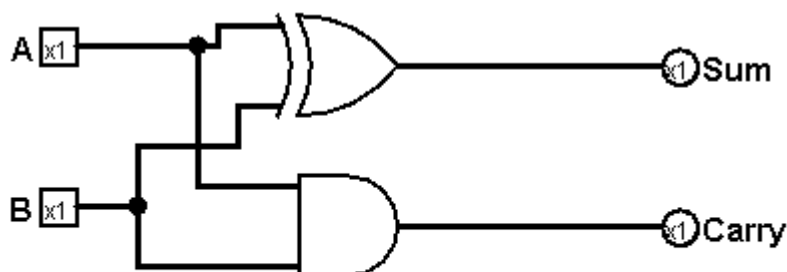
The central component of this build is the NVIDIA GeForce RTX 5090 Founders Edition with 32GB of VRAM. Currently, this is one of the fastest graphics cards available for gaming, and with its performance capabilities, it will easily be able to handle 4K gaming, Ray Tracing, and other graphically intense workloads. As for the case, I have chosen the Lian Li O11 Dynamic EVO XL, a spacious Full Tower Case that is known for its superior airflow and clean design. Last but not least, I have chosen the Corsair RM1000x SHIFT 1000W 80+ Gold certified Power Supply to ensure this build will receive the necessary power to support its powerful components.

This build is far more advanced compared to my current laptop computer or even my pc at home. With this build, I will experience extreme performance while playing games, be able to utilize multiple resource-intensive programs simultaneously, and continue to have exceptional performance for several years. Although my laptop is sufficient for academic use and some light applications, this build represents the type of computer I would desire for extreme gaming and high-performance computing.
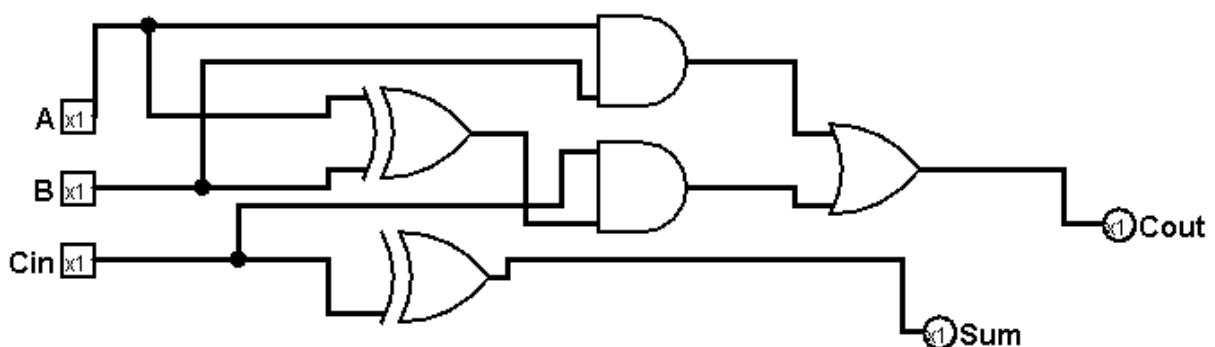
Assignment 3.5: Adders

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.
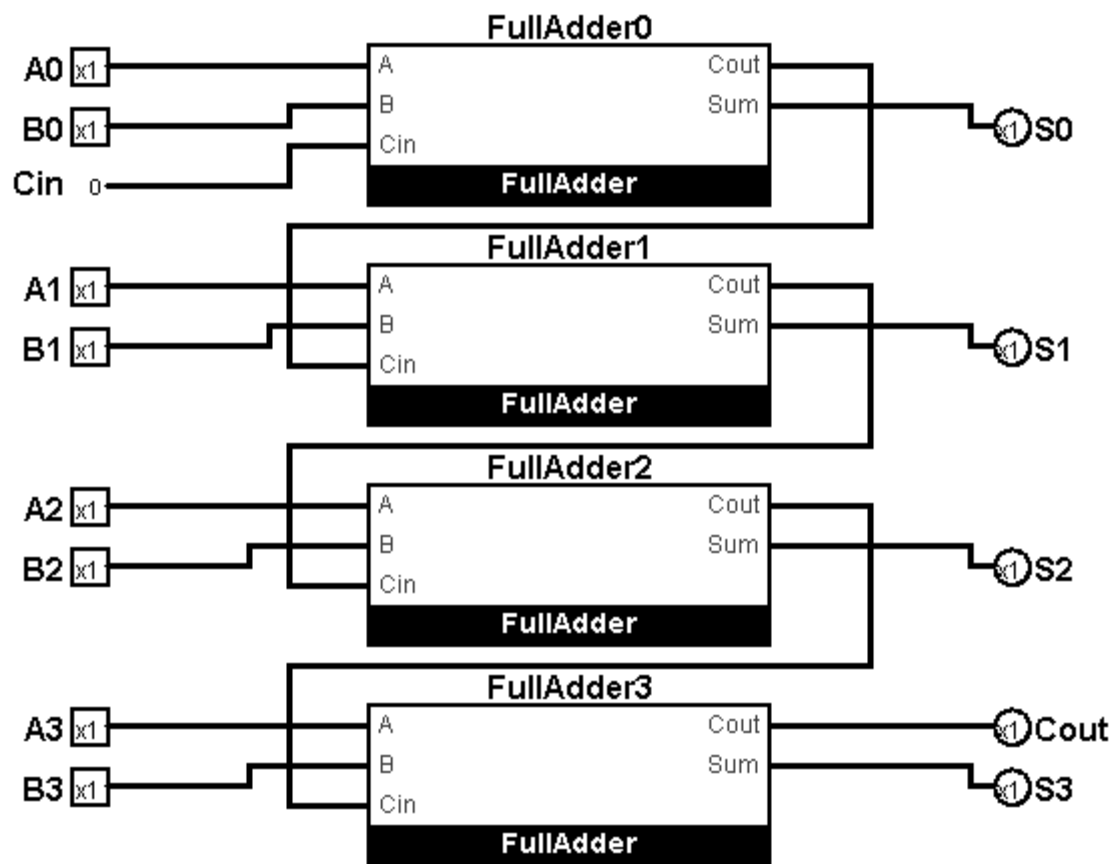
Paste the three exported PNG pictures in here.

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