Week 3 – Hardware

Student number: 589932

Assignment 3.1: Examine your phone

What processor is in your phone?

- My phone uses the Qualcomm Snapdragon 8 Gen 1 processor

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

- The processor belongs to the ARM architecture family, using the ARM64 / AArch64 Instruction Set Architecture (ISA)

How much RAM is in it?

- 8 GB of RAM

How much storage does your phone have?

- 128 GB of storage

What operating system is running on your phone?

- Android 14 (One UI 6)

Approximately how many applications do you have installed?

- 94 applications installed on my phone

Which application do you use the most?

- I use YouTube the most

Can your phone be charged with what type of plug?

- My phone uses a USB-C charging port

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

- The visible I/O ports are:
  o USB-C port
  o Speaker grille
  o Microphone holes
  o S-Pen slot

- o SIM tray

Assignment 3.2: Examine your laptop

What processor is in your laptop?

- My laptop uses the AMD Ryzen 7 4800H processor

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

- The processor belongs to the x86-64 architecture family, using the AMD64 Instruction Set Architecture (ISA)

How much RAM is in it?

- My laptop has 16 GB of RAM

How much storage does your laptop have?

- My laptop has a 1TB NVMe SSD

Which operating system is running on your laptop?

- My laptop is running Windows 11

Approximately how many applications do you have installed?

- I have approximately 60–90 applications installed on my laptop

Which application do you use the most?

- I use Google the most

Can your laptop be charged with what type of plug?

- My laptop uses a round-barrel 230W Lenovo charging plug

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

Left side:

- 1× USB-C 3.2 Gen 1
- 1× 3.5mm audio jack

Right side:

- 1× USB-A 3.2 Gen 1
- Camera e-shutter switch

Back side:

- 2× USB-A 3.2 Gen 1
- 1× USB-C (DisplayPort 1.4)
- 1× HDMI 2.0
- 1× RJ-45 Ethernet port
- 1× Charging port

Assignment 3.3: Power to the laptop

What is the input voltage?

- The input voltage of the power adapter is 100–240 V

What is the output voltage?

- The output voltage of the adapter is 20 V DC

How many watts can your power adapter deliver?

- The Lenovo Legion 5 power adapter can deliver 230 W

Is the input voltage AC or DC?

- AC

Is the output voltage AC or DC?

- DC

AC/DC what is that?

- AC (Alternating Current): The electric current constantly changes direction. This is the type of electricity delivered by wall sockets
- DC (Direct Current): The electric current flows in a single direction, which is required by electronic devices such as laptops, phones, and batteries.
- A laptop adapter converts AC (from the wall) → DC (for the laptop)

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

- Yes, reversing the polarity is very bad for the laptop
- If the positive and negative terminals are swapped, the laptop's internal circuits may receive current in the wrong direction, which can cause:
  - short circuits
  - damage to the motherboard
  - failure of power regulation components
  - permanent hardware damage
- Modern laptops sometimes have protection, but it is still unsafe.

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.

- Situation:

My laptop normally needs 15 W (example), but I borrow an adapter that can deliver 50 W. Voltage, polarity, and connector are the same

- What will happen?

Nothing bad will happen — the laptop will charge normally

- Explanation:

A power adapter does not push its maximum wattage into the laptop. Instead, the laptop pulls only the amount of power it needs

- Since:
  - Voltage is identical
  - Polarity is identical
  - Connector matches
 - Output wattage is higher but not lower

=> the laptop will safely draw only 15 W, even though the charger can provide up to 50 W

Assignment 3.4: Build your dream PC

Screenshots PC configuration + motivation:

Component	Selection		Base	Promo	Shipping	Tax	Availability	Price	Where	
CPU		AMD Ryzen 7 7800X3D 4.2 GHz 8-Core Processor	€339.90	—	✓Prime	—	In stock	€339.90	amazon.nl	Buy
CPU Cooler		Lian Li GALAHAD AIO 360 RGB 69.17 CFM Liquid CPU Cooler	€260.00	—	—	—	In stock	€260.00	amazon.nl	Buy
Motherboard		MSI MAG X670E TOMAHAWK WIFI ATX AM5 Motherboard	€249.00	—	✓Prime	—	In stock	€249.00	amazon.nl	Buy
Memory		G.Skill Trident Z5 Neo RGB 32 GB (2 x 16 GB) DDR5-6000 CL30 Memory	€286.99	—	✓Prime	—	In stock	€286.99	amazon.nl	Buy
Storage		Samsung 990 Pro 1 TB M.2-2280 PCIe 4.0 X4 NVME Solid State Drive	€109.90	—	✓Prime	—	In stock	€109.90	amazon.nl	Buy
Video Card		NVIDIA Founders Edition GeForce RTX 4080 SUPER 16 GB Video Card	€1679.99	—	—	—	In stock	€1679.99	amazon.nl	Buy
Case		Lian Li LANCOOL III RGB ATX Mid Tower Case	€145.52	—	—	—	In stock	€145.52	amazon.nl	Buy
Power Supply		Corsair RM850x SHIFT 850 W 80+ Gold Certified Fully Modular Side Interface ATX Power Supply	€186.86	—	✓Prime	—	Available soon	€186.86	amazon.nl	Buy
Operating System		Microsoft Windows 11 Pro Retail - Download 64-bit	€258.00	—	FREE	—	In stock	€258.00	bol.	Buy
Monitor		Asus TUF Gaming VG279QM1A 27.0" 1920 x 1080 280 Hz Monitor	€279.00	—	FREE	—		€279.00	MEGEKKO	Buy
								Total:	€3795.16		

Selected components:

- **CPU:** AMD Ryzen 7 7800X3D

- **CPU Cooler:** Lian Li GALAHAD AIO 360 RGB – Liquid Cooler

- **Motherboard:** MSI MAG X670E Tomahawk WiFi (AM5)

- **Memory:** G.Skill Trident Z5 Neo RGB 32GB (2×16GB) DDR5-6000 CL30

- **Storage:** Samsung 990 Pro 1TB NVMe M.2 SSD

- **Video Card:** NVIDIA GeForce RTX 4080 SUPER 16GB – Founders Edition

- **Case:** Lian Li Lancool III RGB ATX Mid Tower

- **Power Supply:** Corsair RM850x SHIFT (850W, 80+ Gold, ATX 3.0)

- **Operating System:** Microsoft Windows 11 Pro

- **Monitor:** ASUS TUF Gaming VG279QM1A (27", 1080p, 280Hz)

Why I built this configuration

CPU Choice – AMD Ryzen 7 7800X3D

I chose this processor because it is currently one of the best gaming CPUs in the world.
The 3D V-Cache technology significantly increases performance in games and reduces latency.
It is extremely energy efficient and runs cool even under heavy load.

GPU Choice – NVIDIA RTX 4080 SUPER

I picked the RTX 4080 SUPER because it is a high-end GPU capable of running all modern games at ultra settings, high FPS, and even 4K.
It also performs extremely well for AI workloads, video editing, and deep learning tasks.

Memory – 32GB DDR5-6000 CL30

This RAM speed is optimal for Ryzen 7000-series processors.
CL30 provides very low latency, giving better performance in gaming and multitasking.

Storage – Samsung 990 Pro 1TB

The Samsung 990 Pro is one of the fastest Gen4 NVMe SSDs available.
It ensures fast boot time, instant program loading, and excellent durability.

Motherboard – MSI X670E Tomahawk

This motherboard supports PCIe 5.0, fast DDR5 memory, stable VRMs for
the 7800X3D, and modern connectivity (USB-C, WiFi 6E).
It provides excellent long-term upgrade potential.

Cooling – Lian Li Galahad AIO 360

A 360mm liquid cooler ensures ultra-low temperatures, quiet operation,
and strong thermal performance for future CPU upgrades.

Power Supply – 850W Gold (ATX 3.0)

An 850W Gold-rated PSU is perfect for powering the RTX 4080 SUPER
safely and efficiently.
ATX 3.0 ensures compatibility with modern GPUs.

Case – Lian Li Lancool III RGB

This case has excellent airflow, easy cable management, and full radiator
support.
The RGB lighting adds a stylish look.

Monitor – 1080p 280Hz

I chose a 280Hz monitor for extremely smooth gameplay and competitive
esports performance.

Comparison: My Dream PC vs My Current Laptop

Category	Dream PC (Ryzen 7 7800X3D + RTX 4080 SUPER)	Lenovo Legion 5-15ARH05H (Ryzen 7 4800H)	Difference
CPU	AMD Ryzen 7 7800X3D (Desktop,	AMD Ryzen 7 4800H (Laptop, 8C/16T)	Desktop CPU is much faster, cooler, higher

Category	Dream PC (Ryzen 7 7800X3D + RTX 4080 SUPER)	Lenovo Legion 5-15ARH05H (Ryzen 7 4800H)	Difference
	8C/16T, 3D V-Cache)		cache, no thermal throttling
CPU Power Limit	~120W sustained	~45W (can drop to 25–35W under heat)	Dream PC CPU performs 2–3× better in sustained workloads
GPU	NVIDIA RTX 4080 SUPER 16GB	Laptop dGPU (GTX 1660 Ti / RTX 2060 depending on model)	Desktop GPU is 4–6× more powerful, supports 4K gaming and AI workloads
RAM	32GB DDR5-6000 CL30	16GB DDR4-3200	DDR5 has higher bandwidth, lower latency, double capacity
Storage	Samsung 990 Pro 1TB NVMe Gen4	Standard NVMe SSD	Dream PC SSD is faster in read/write and durability
Cooling System	360mm Liquid AIO	Dual-fan laptop cooling	Desktop cooling is far better, no throttling
Motherboard	X670E (PCIe 5.0, DDR5, WiFi 6E)	Laptop board (DDR4, PCIe 3/4)	Dream PC supports future upgrades, more ports

| Category	Dream PC (Ryzen 7 7800X3D + RTX 4080 SUPER)	Lenovo Legion 5-15ARH05H (Ryzen 7 4800H)	Difference
Power Supply	850W 80+ Gold ATX 3.0	230W laptop charger	Desktop allows much more powerful hardware
Case / Airflow	Lian Li Lancool III (High airflow)	Compact laptop chassis	Desktop airflow is massively better
Monitor	ASUS TUF 27" 1080p 280Hz	Laptop 15.6" 1080p 120Hz/144Hz	Larger, smoother, color-accurate display
Upgradeability	Fully upgradeable (GPU, RAM, PSU, storage, fans…)	Very limited (RAM + SSD only)	Dream PC is future-proof
Gaming Performance	Ultra settings 1440p / 4K	Medium settings 1080p	Dream PC is 4–5× stronger
Programming Performance	Excellent for IDEs, compilers, VM, Docker	Good for basic school tasks	Dream PC handles heavy workloads easily
Overall Performance	Enthusiast	Mid-range laptop	Dream PC is superior in every category

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.
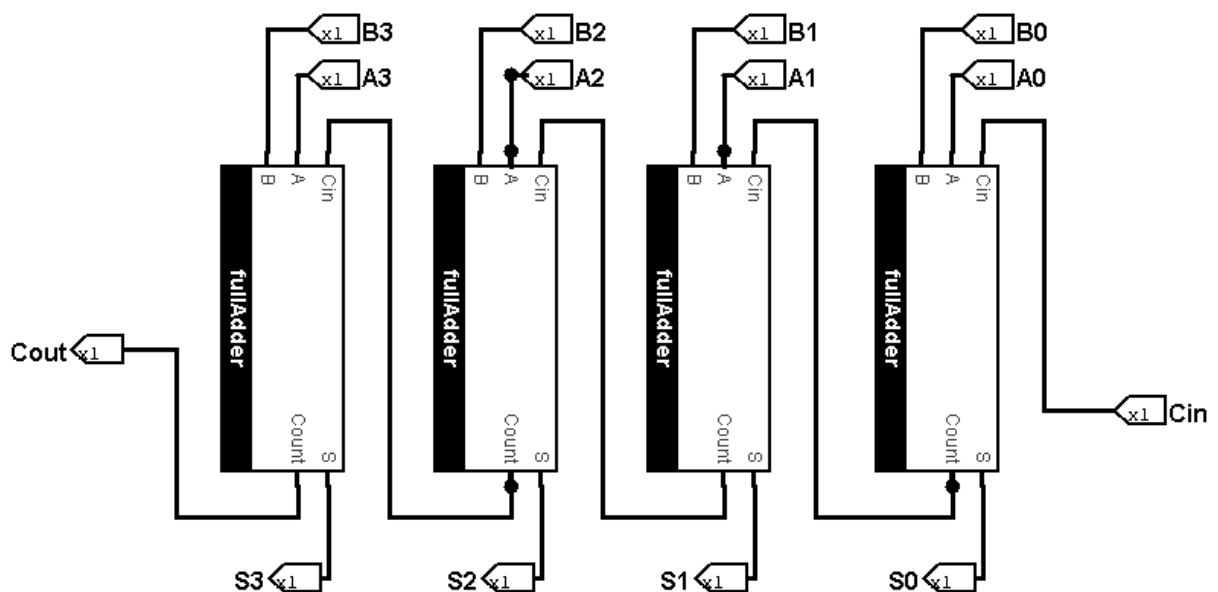
Paste the three exported PNG pictures in here.
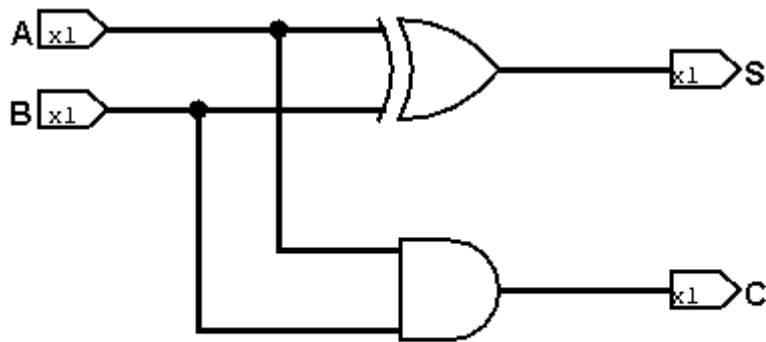
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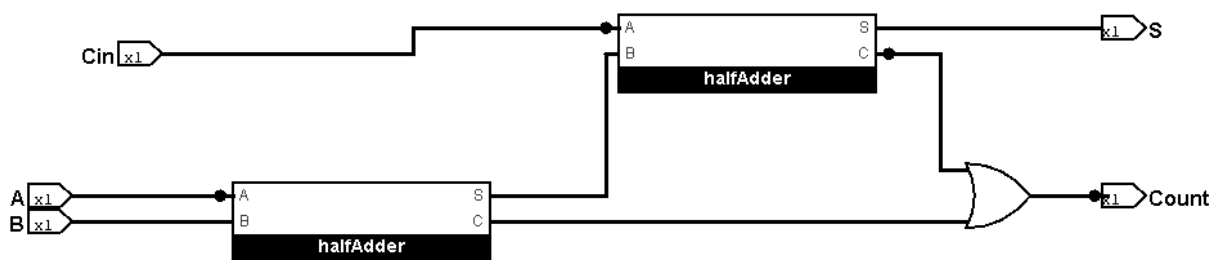
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