No E-Mail submissions will be accepted.
Submission formats and file naming:
File name : Pts_firstName_lastName_lab_5
File format: pdf or MS Word format
e.g. Pts_Joe_Biden_lab_5.pdf

Reading materials

Use the following link and write a one page summary about the movie.

GPUs: Explained
https://youtu.be/LfdK-v0SbGI

This video explains what a GPU is and how it differs from a CPU . A CPU is designed to handle a wide range of tasks and has only a few powerful cores that process information one step at a time, serial processing. A GPU has hundreds or even thousands of smaller cores, allowing it to handle many calculations at once, or parallel processing. This makes GPUs much faster than CPUs for certain tasks, especially those requiring heavy computations for many tasks.

GPUs were originally developed for rendering graphics in video games, but their usefulness has expanded far beyond that. They play a major role in industries like engineering, animation, artificial intelligence, and high-performance computing. For example, GPUs allow engineers to work with 3D modeling software, Like CAD, remotely through Virtual Desktop Infrastructure, or VDIs. Instead of needing a powerful computer on-site, they can access a GPU-powered server from anywhere, making work more flexible and efficient.

AI is another area where GPUs are essential. AI involves machine learning and deep learning, requiring massive amounts of data to be processed. GPUs help train neural networks, allowing computers to recognize patterns and make decisions like a human brain. Without GPUs, these processes would take far too long on a CPU alone.

GPUs are also a key part of High-Performance Computing or HPC, where companies distribute large workloads across multiple servers. While HPC doesn't always require a GPU, adding one can improv performance for tasks like AI simulations and rendering.
She then goes on to mention how companies make use of cloud GPUs, instead of buying expensive hardware. This is because the GPUs can become outdated quickly. Instead like most if not all cloud use caases, the organization can rent GPU resources from cloud providers, paying only for what they use. This reduces costs and ensures they always have access to the latest technology without needing to upgrade physical machines.

We've seen what a GPU is and how it differs from a CPU and are no longer just for gaming. They have become a crucial tool for businesses and researchers, providing the power needed for advanced computing tasks, with the benefits of not actually owning the hardware.

1) Explain each of following terms in your own words:

a. Bus skew - A timing mismatch where signals on a bus arrive at different times, causing data corruption
b. Multiplexed bus - A bus that shares data, address, and control lines to reduce hardware but needs extra control logic
c. Synchronous and Asynchronous bus – Synchronous bus uses a clock signal to synchronize data transfer where as Asynchronous bus doesn't and devices rely on each other through control signals.
d. Half-duplex - Data flows one direction at a time
e. Control, data, and address pins in CPU – Control pins manage operations, data pins transfer data/information and address contains the location of the information or where to send or receive data.

2) What is difference between centralized and decentralized Bus arbitration?

Centralized: A single controller decides who uses the bus
Decentralized: Multiple controllers negotiate for bus access

So the difference between the two is that a centralized bus arbitration has a single controller that is essentially what decides who uses the bus. Whereas in Decentralized bus arbitration, the devices negotiate for bus access, essentially biding on who can use the bus

3) What is the cycle time (in nano seconds) for a bus with a frequency of 66MHz?

cycle speed = $1/\text{frequency}$

$C = 1/66\text{MHz}$

to ns

$C = 0.000000015151 \times 10^9$

$C = 15.15\text{ns}$

$C = 1/66 \times 10^6$ hz

$C = 0.000000015155$

4) An analog signal carries 4 bits in each signal and the bit rate is 8 kbps. Obtain the symbol(or signal) rate for this system.

$$\text{Baud Rate} = \frac{\text{Bit rate}}{\text{Number of bits per symbol}} \rightarrow \frac{8000}{4}$$

$$b = \frac{8\text{kbps}}{4} \qquad b = 2,000$$

5) A communication system has a bit rate of 9600 bps and each signal element represents 2 bits. What is the symbol (or signal) rate?

$$\text{baud rate} = \frac{9600}{2}$$

$$= 4800 \text{ symbols}$$

6) An analog signal carries 16 bits in each signal. If 1000 signal units (symbols) are sent per second, find the bit rate.

$$\text{baud rate} = \frac{\text{bit rate}}{\#\text{bits/symbol}}$$

$$1000 = \frac{b}{16} \quad \times 16$$

$$16000 = b$$

16,000 bits per second

or

16 kbs