

Khaula Molapo

Computer Architecture

Year 2 semester 2

Question 1

When a user opens a web browser and requests a website, the computer processes this action through several coordinated components. The CPU acts as the brain, interpreting the browser's instructions and executing the necessary calculations to start the request. It communicates with the operating system and network stack to prepare and send data. Memory especially ram, temporarily stores, the active web request and any resources being downloaded, allowing quick access during processing. This prevents delays and enables smooth multitasking. Input and output (I/O) devices then handle communication with the outside world. The network interface card sends the request through the internet, while storage devices may cache parts of the page locally. The monitor displays the content once processed, and input devices like mouse and keyboard allow further interactions. Together CPU, memory and I/O work seamlessly to process and deliver a browser's request efficiently and in real time.

Question 2

The Von Neumann architecture is a computer design model that uses a single memory space to store both instructions and data. It features a central processing unit (CPU) made up of the control unit and arithmetic logic unit (ALU), which work together to fetch, decode, and execute instructions. Data and instructions travel along a common system bus, creating a simple yet powerful design. Key components include input and output devices for communication, memory for storage and the CPU for processing. Its main strength is simplicity and flexibility, though it suffers from the "Von Neumann bottleneck" due to shared memory access.

Question 3

In Logisim I build a simple circuit using an AND gate to explore how digital logic works. The circuit had two inputs and one output, when both inputs were set to 1, the output showed 1, otherwise it stayed 0. Watching the changes in real time helped me see how inputs directly control outputs. The software made it easy to place components and connect them with wires, giving a clear view of the process. It feels simple but shows the basic principles behind digital circuits, which are the building blocks of more complex computer systems.

Question 4

Ram and cache memory both play an important roles in a gaming pc, but they work differently. Ram is larger and stores game data, textures, assets that the CPU and GPU need during play. It ensures smooth loading and multitasking but is slower compared to cache. Cache memory is build directly into the CPU, is much smaller but extremely fast. It stores frequently used instructions and data so the processor can access them instantly without waiting on ram. In gaming ram handles big workload while cache boosts performance by reducing delays, making gameplay more responsive and efficient overall.