

## Learning Outcomes:

- **Identify and explain the architecture, structure and functionality of essential components of a computer system.**

A computer system has several essential components, each with a specific architecture, structure, and functionality. Some of these components include:

**Central Processing Unit (CPU):** The CPU, also known as the processor, is the computer's brain, and it interprets and executes instructions from software, performs mathematical operations and manages the computer's data flow. The architecture of a CPU is based on a Von Neumann structure, which consists of an instruction register, an arithmetic logic unit, and a control unit.

**Memory:** Memory, also known as random access memory (RAM), stores data and instructions temporarily for processing by the CPU. The memory structure is based on a series of memory cells that the CPU can quickly access. The functionality of memory is to store data for processing and provide a working area for the CPU.

**Hard Disk Drive (HDD) or Solid-State Drive (SSD):** The hard disk or solid-state drive is a storage device that provides long-term storage for data and software. The architecture of an HDD consists of spinning disks and read/write heads, while the architecture of an SSD is based on flash memory chips. The structure and functionality of both HDDs and SSDs are to provide a permanent storage location for data and software, allowing the computer to access information even when it is powered off.

**Motherboard:** The motherboard is the main circuit board in a computer system and provides a physical structure for connecting and communicating between the various components. The motherboard contains the CPU, memory, and expansion slots for additional features like graphics card sound cards. The functionality of the motherboard

is to provide a central point of communication and control for the computer's components.

**Power Supply Unit (PSU):** The power supply unit provides power to the computer components. The architecture of a power supply unit is based on a series of voltage regulators that convert AC power from the wall to the DC power required by the computer. The functionality of the power supply is to provide a steady and reliable power source to the computer components.

**Input/Output Devices:** Input/output devices allow the computer to communicate with the outside world. Examples of input devices include keyboard, mouse, and scanners, while output devices include displays and printers. The functionality of input/output devices provides a means for the computer to receive and give information to the user.

These are the essential components of a computer system, and they work together to perform the various functions of a computer. The architecture, structure, and functionality of each element are designed to support the overall operation of the computer system.

Reference: (Mueller, 2003).

- **Critically appraise the emerging trends in the field, such as cloud computing, big data, cyber security, and the professional and ethical requirements for dealing with such contemporary computer-based technologies.**

Information and communication technologies are evolving at a breakneck pace. What were once multi-year product life cycles have now been reduced to life cycles of less than a year in many cases (Vanderheiden, 2006). Conventionally, Vanderheiden (2006) states that this trend towards greater computational power with reduced size

and cost has the potential to enable improved and entirely new types of assistive technology.

Emerging trends in the field of computer technology have significant impacts on the way organisations and societies operate. Here is a critical appraisal of some of these trends:

**Cloud computing** refers to delivering computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet (“the cloud”) to offer faster innovation, flexible resources, and economies of scale. One of the advantages of cloud computing is the ability to access a large pool of computing resources on demand, reducing the need for organisations to invest in and maintain their hardware and software. Another advantage is the ability to scale resources up or down as needed, allowing organisations to respond quickly to changing business needs. However, there are also some disadvantages, including security concerns and a lack of control over data. Organisations must consider these trade-offs when adopting cloud computing (Balachandran & Prasad, 2017).

**Big Data** refers to enormous data sets that can be analysed to reveal patterns, trends, and associations relating to human behaviour and interactions. The advantage of big data is the ability to gain insights from vast amounts of data, leading to improved decision-making and operational efficiency. However, some disadvantages include privacy concerns and the need for specialised data analysis skills. Organisations must also consider the ethical implications of collecting and using large amounts of personal data (Balachandran & Prasad, 2017).

**Cyber security** protects digital information and systems from unauthorised access, use, disclosure, disruption, modification, or destruction. With the increasing reliance

on technology and the internet, cyber security is becoming an increasingly important concern for organisations. The advantage of robust cyber security measures is protecting sensitive information and systems from threats like hackers, malware, and ransomware. However, there are also some disadvantages, including the cost of implementing and maintaining security measures and the potential for these measures to restrict access to information or hinder business operations. The professional and ethical requirements for dealing with such contemporary computer-based technologies include ensuring that data is secure and private, complying with relevant laws and regulations, and ensuring that users are informed about how their data is being used (Kemmerer, 2003).

Organisations must weigh the risks and benefits of different security measures and develop a comprehensive security strategy. These include the need to respect privacy and confidentiality, maintain the security and integrity of data, act with integrity and professionalism in all dealings, and stay up-to-date with developments in the field. Organisations and individuals must also be mindful of the potential for technology to create inequalities and work to ensure that the benefits of these technologies are accessible to all (Rowe & Gallaher, 2006).

In conclusion, emerging trends in computer technology have the potential to bring significant benefits but also carry substantial risks and challenges. Organisations and individuals must carefully consider these trends, their potential impacts, and the professional and ethical requirements for dealing with them to ensure responsible and effective use of technology.



## References:

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