

Unit 4—Jobs and Systems...

HCCS STEM—Computer Science, IT, Engineering, Food/Nutrition, Business Studies

What do I need to be able to do?

- I can explain how computers function using input, process, and output, identifying core hardware such as the CPU, motherboard, and various storage devices like RAM, ROM, and hard drives, and how data is stored as bits and bytes
- I can understand and convert between binary, denary (decimal), and hexadecimal number systems, explaining why binary (0s and 1s) is used by electronic circuits to store information, and how hexadecimal simplifies binary codes
- I can identify different job roles in the computing and ICT sector, and discuss the societal impacts of technology, including the nature and future implications of Artificial Intelligence (AI) and the challenges related to data privacy and security

Computers fundamentally rely on binary because their electronic components are built with circuits of interconnected switches that control the flow of electricity. These switches have two states, representing "on" or "off", which perfectly aligns with binary's use of only two numbers, 0 and 1. This two-state system is how computers store and understand all kinds of information.

Hexadecimal serves a crucial purpose in making these binary codes more manageable for humans. It is a base-16 number system, using digits 0-9 and letters A-F to represent values from 10-15. Its main purpose is to simplify and shorten binary codes into a more understandable form, making it easier for programmers and technicians to read and work with large strings of binary data.

Main memory, or primary storage, is like the computer's short-term memory. RAM (Random Access Memory) is a fast, temporary storage that holds data only when the system is running, and this data is lost when the computer is turned off. ROM (Read Only Memory) is also a type of main memory, but it's used to store permanent instructions, like those needed for the computer to boot up, so its data is not lost when the power shuts down. In contrast, secondary storage, such as a hard drive or solid-state disk (SSD), is for permanent storage, meaning it saves your files, programs, and other data for years, even after the computer is turned off.

Your assessment is a 50 question examination paper. For this assessment, you must be prepared to answer questions on all the stage of the I-P-O-S diagram and expand and give examples of each. You must know the difference between IT and CS jobs and you must know how to work things out in decimal and convert to binary/hexadecimal.

Keywords

Computer: An electronic device that manipulates information or data, possessing the ability to store, retrieve, and process that data.

IPO Model: This model describes how a computer fundamentally operates by taking in information (Input), carrying out instructions (Process), and then giving back results (Output).

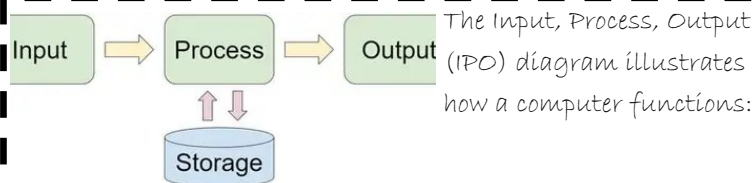
CPU: Known as the "brain" of the computer, the Central Processing Unit is responsible for fetching and executing instructions, which helps the computer run programs and complete tasks faster.

Binary: This is a special computer language that only uses two numbers, 0 and 1, because electronic devices are built using circuits of interconnected switches that control the flow of electricity, representing these two states.

Hexadecimal: A base-16 number system that uses digits 0-9 and letters A-F (representing values 10-15), which is used in computing to simplify and shorten binary codes into a more understandable form.

Computer Storage: This refers to the various ways a computer remembers information, encompassing different types of memory like RAM (Random Access Memory), ROM (Read Only Memory), hard drives, and solid-state disks.

Artificial Intelligence (AI): This field involves understanding what AI is and how it might change the future and daily life through concepts such as machine learning, algorithmic bias, and humanoid robots.



Input is the data collected and sent to the computer, which the computer then processes by carrying out instructions. Finally, the computer provides output, presenting the results of this processing back to the user, with storage involved in saving data not currently in use.

10 Test your understanding questions

Here are 10 multiple-choice questions summarising the whole unit:

1. What is the primary purpose of a general-purpose computer?
A) To heat buildings and provide light. B) To execute programs that operate on data C) To act as a decorative piece of furniture. D) To only perform calculations for scientific research.
2. Which hardware component is described as the "brain" of the computer because it helps the computer follow instructions and run programs faster?
A) RAM (Random Access Memory). B) Hard Drive. C) CPU (Central Processing Unit). D) Monitor.
3. Why do computers primarily use binary (a system of 0s and 1s) to store and understand all kinds of information?
A) It's the most efficient way to display images. B) Electronic devices are built using circuits of interconnected switches that control the flow of electricity, representing two states (on/off). C) It allows them to connect to the internet more quickly. D) Binary numbers are easier for programmers to write.
4. What is the denary (decimal) equivalent of the 8-bit binary number 01011111?
A) 87 B) 95 C) 127 D) 155
5. Which of the following is not an example of an output device?
A) Printer. B) Projector. C) Screen (VDU). D) Touchscreen.
6. What is the main reason hexadecimal is used in computing?
A) To increase the complexity of computer programming. B) To store data more permanently than a hard drive. C) To directly control the flow of electricity in circuits. D) To simplify and shorten binary codes to a more understandable form.
7. Convert the hexadecimal number D3 into its denary (decimal) equivalent.
A) 133 B) 2111. C) 301 D) 218
8. Which type of computer storage is described as "temporary storage" that holds data only when the system is running, with data being lost when the computer is turned off?
A) Hard Disk. B) RAM (Random Access Memory). C) ROM (Read Only Memory). D) Solid State Disk.
9. According to the provided sources, what is a potential issue related to "Civil liberties" when storing large amounts of personal information on computers?
A) Personal data can be used to offer tailored online experiences. B) Entering personal details only needs to be done once. C) Analysis of behaviour could wrongly lead police to suspect innocent people of criminal behaviour. D) Personal data helps doctors provide better medical care.
10. Which of these job roles is primarily classified under IT, rather than Computer Science?
A) Software Engineer. B) Programmer. C) Database Developer. D) Helpdesk Assistant.

10 Test your understanding answers

1. B, 2. C, 3. B, 4. B, 5. D, 6. D, 7. B, 8. B, 9. C, 10. D