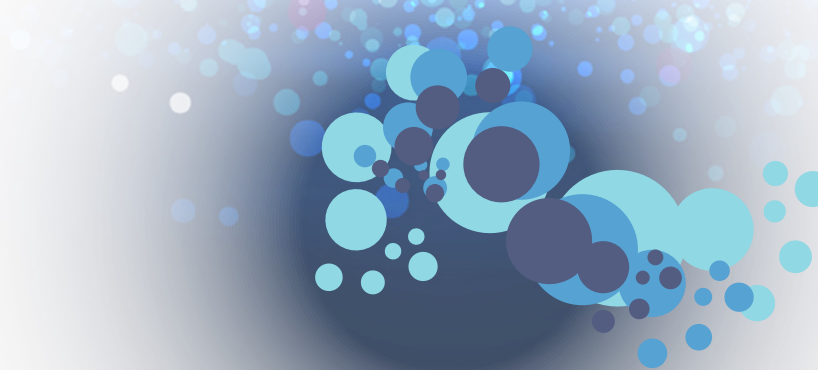


The need for virtual memory

Teacher's Notes

Lesson Plan

| Length | 60 mins | Specification Link | 212/k | |
|--------------------|--|---|-------|--|
| Learning objective | Candidates should be able to: (k) explain the need for virtual memory | | | |
| Time (min) | Activity | Further Notes | | |
| 10 | <ul style="list-style-type: none"> Discuss with the students that one of the strategies people use when they are trying to memorise new things or revise for an examination, is to make notes on paper. Point out that they are 'swapping out' – moving items of information from their memories onto a storage area (the paper) and that it can be 'swapped back in' when they need to process the information – use it in an essay. When they revise for a test or examination, they are moving the data back into their physical memories from their virtual ones – their notes. Point out that computers have very limited memories and they need to do this all the time. | | | |
| 15 | Watch the set of videos, pausing to discuss the content. | | | |
| 5 | <p>Discuss the videos to assess learning. Ask questions such as:</p> <ul style="list-style-type: none"> Why do computers need to use virtual memory? What is the downside of using virtual memory? What is meant by 'disk thrashing'? | <p>The physical memory often becomes full and instead of closing some programs the operating system will use 'pretend' or virtual memory to store some of the data.</p> <p>The read/write speed of a hard drive is much slower than RAM and if the system has to rely too heavily on virtual memory, there will be a significant performance drop.</p> <p>This is the constant disk activity that occurs when the operating system has to constantly swap information back and forth between RAM and the hard disk.</p> | | |
| 10 | <p>Worksheet 1</p> <p>Pupils to complete Worksheet 1 either on paper or on computer.</p> <p>Ask individual students for their answers and discuss with the class so that all students have the correct answers.</p> | <p>Answers provided.</p> <p>Ask students with the correct responses to explain to the class how they arrived at their answers.</p> | | |
| 10 | The students use the Interactive Activity 1 . | | | |



| Time (min) | Activity | Further Notes |
|------------|--|---------------|
| | Extension Challenge/Homework Students to complete and submit any remaining sections of Worksheet 1 and Worksheet 2 for homework. | |
| 5 | Plenary – Quick revision To assess learning, repeat the questions asked after the video. | |



WORKSHEET 1 ANSWERS

1

Why do computers need to use virtual memory?

When a computer is running the operating system and several other programs at the same time, the physical memory often becomes full.

Instead of closing some programs the operating system will use 'pretend' or virtual memory to store some of the data.

2

Where is the data stored when it is in virtual memory?

It is stored on an area of a secondary storage device e.g. hard disk drive.

3

Describe how a computer uses virtual memory.

A process running on the computer may need to store data in the physical memory.

If there are no free pages, the memory manager will 'swap out' a page of memory to the page file or swap area on the hard disk drive and 'swap in' the requested data into the now free page.

Usually the least recently used page is swapped out.

If a page is swapped out and then is referenced, it is swapped back in, from the swap area, at the expense of another page.

4

Describe a disadvantage of using virtual memory.

The read/write speed of a hard drive is much slower than RAM, and the technology of a hard drive is not geared toward accessing small pieces of data at a time.

If the system has to rely too heavily on virtual memory, there will be a significant performance drop.

5

Explain what is meant by 'disk thrashing'

This occurs when the operating system has to constantly swap information back and forth between RAM and the hard disk.

It significantly slows down the execution of the programs.



WORKSHEET 2 ANSWERS

- 1** A computer is advertised as having 4GB of RAM.
(a) Describe the purpose of RAM in a computer. (2)

Stores parts of the operating system currently used by the computer.

Stores programs that are currently running.

Stores data that are currently used by the computer.

- (b) The computer also uses virtual memory.**

- (i) Explain what is meant by virtual memory. (2)**

A section of the hard disk is used to store items in RAM which are not being currently used.

- (ii) State why virtual memory is needed. (1)**

Used to allow more programs / data to be loaded when the RAM is insufficient.