1.1 PROCESSORS, INPUT/OUTPUT AND STORAGE · 1.1.1

Processor performance & pipelining

Original practice questions · 37 marks · about 45 minutes · spec 1.1.1(c)(d)

Instructions. Answer all questions. The number of marks is shown in brackets [ ]. Quality of written communication is assessed in the extended-response question.

1

Total: 4 marks

This question is about the performance of a CPU.

(a) State **two** factors that affect the performance of a CPU. **[2]**

(b) State the unit in which clock speed is measured. **[1]**

(c) State which of the following a CPU can access most quickly: cache, RAM, or a hard disk drive. **[1]**

2

Total: 7 marks

This question is about clock speed and cores.

(a) Explain how increasing the clock speed can improve the performance of a CPU. **[2]**

(b) Define the term *multicore processor*. **[2]**

(c) Explain why a quad-core processor is not always four times faster than a single-core processor. **[3]**

3 **Total: 6 marks**

This question is about cache memory.

(a) Describe the purpose of cache memory in a CPU. **[2]**

(b) State the order of the levels of cache from fastest to slowest. **[1]**

(c) Explain why a CPU with more cache may outperform a CPU that has a higher clock speed but less cache. **[3]**

4 **Total: 6 marks**

This question is about pipelining.

(a) Define the term *pipelining*. **[3]**

(b) Explain how pipelining improves the performance of a CPU. **[3]**

5 **Total: 5 marks**

> A charity is replacing its old office computers with newer models that have faster processors.

(a) Give **two** features of a replacement processor that would increase its typical performance. **[2]**

(b) Explain **one** benefit to the charity of choosing a processor that supports pipelining. **[3]**

6 **Total: 9 marks**

A company develops **video-editing software**. Its work includes a long, mostly **sequential** rendering task that turns a project into a finished video, and many **independent** image operations (such as applying the same filter to thousands of frames).

Discuss which processor features (clock speed, number of cores, cache and pipelining) the company should prioritise. In your answer you should justify a recommendation for the two different types of task. **[9]**

END OF QUESTIONS