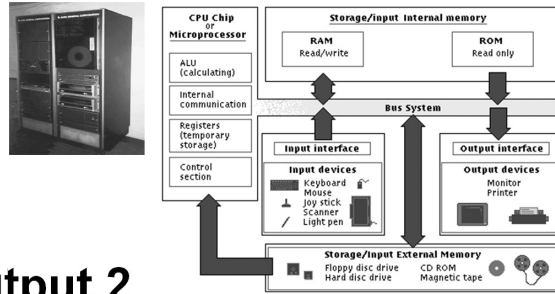


COMP25111

Operating Systems

Lectures 15:

Controlling Input and Output 2



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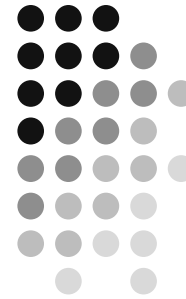
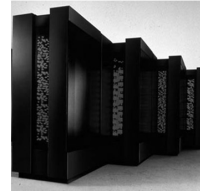
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Week

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NOTE: The up-to-date version of this lecture is kept on the associated web site – available [on-line] @ Blackboard select: COMP25111 Introduction to Computer Systems www.manchester.ac.uk/portal



1

Short Exam Questions

Q1

1. Question

List a number of devices that connect to the system bus, via I/O modules.

ANSWER(S):

- A typical list of devices that connects to the system bus is:
 - Mouse, Keyboard, DVD, Hard disk, Monitor, modem etc.

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- NOTE: In the exam approximately 2 question are taken from the topics (and program examples) covered in each lecture

2



Getting ready for next week

Do next week's Q3's NOW

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- Once you have re-read the lecture notes; and listened to the audio recording [while stepping through the PPT] of the lecture again:
- Please have a think about next week's Q3's
 - on the next page
- If you try to answer the Q3's now you will be in a much better position to recall the information.
- Once you have done this, transfer your answers to next weeks "Student [OWN answers] version" at the start of next weeks lecture.
 - YES this implies bringing the last weeks lecture notes to the next lecture ...

3



THIS week's

Short Exam Questions

Q3

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1. Question
List a number of devices that connect to the system bus, via I/O modules.
ANSWER(S):
 - A typical list of devices that connects to the system bus is:
 - Mouse, Keyboard, DVD, Hard disk, Monitor, modem etc.
2. Question
Name the two different types of information I/O registers store?
ANSWER(S):
 - Information in the form of:
 - 1) Data; one or more bytes; &
 - 2) Status; the actual state of the I/O device.
3. Question
Name the two different types of interrupts.
ANSWER(S):
 - The two different types of interrupts are:
 - 1) Software interrupts (or Exceptions); and
 - 2) Hardware interrupts; driven by interrupt lines.

- NOTE: In the exam approximately 2 question are taken from the topics (and program examples) covered in each lecture

4



Questions

Introduction to Questions:

The set of questions are based on lecture 15.

Answer Sheet will be given later in year and will contain the answers to these questions.

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- Remember to find detailed and comprehensive answer you should [also] reference associated text books in the library.
- A reasonable starting place for associated book titles are:
 - 1) This units 'module guide'; given to you in RN's first lecture – or on the web [Blackboard];
 - 2) Those books mentioned in 'Background Reading;'
 - 3) Those books [and web resources] mentioned in Learning Resources.

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Questions

1. Question

- In the event an interrupt occurring; one process has to hand over to another. State the basic steps that have to happen before the second process starts.

- **Answer**

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1. Answer

The basic steps are:

- 1) Interrupt line is activated;
- 2) Present process stores its PC and registers;
- 3) Next (interrupting) process starts;
 - after its meta data, has been loaded into the registers and start address [of routine] into PC.
- Note: the detailed procedure requires the use of an interrupt vector to select; via a table; the start address of the appropriate interrupt servicing routine.



2. Question

- Given the overall steps the processor takes to handle an interrupt can be summarised in six basic steps. List the six basic steps (in a interrupt summary).

- **Answer**



2. Answer

- 1) External line interrupts processor;
- 2) IACK cycle identifies the interrupting device;
- 3) Processor accepts interrupt after current instruction;
- 4) The processor stores the information necessary to restart the original program following the interrupt;
- 5) ISR is run for interrupting device until return from interrupt instruction is reached; then finally...
- 6) Stored information is reloaded into the processor, processor continues executing the original program as if nothing had happened.



3. Question

- Explain how a peripheral communicates with the CPU using interrupts.

- Answer



3. Answer

- The following points should be covered to some degree in the answer:
- A peripheral wanting to make a transfer raises a hardware signal [interrupt line]. The CPU completes its current instruction and then enters a routine to service the peripheral. This may either be by a single routine address (in which case the routine must use polling to identify the peripheral) or a device specific address via a table. The CPU then reads from or writes to the device before resuming the original program that was interrupted. The address required to do this is saved by the hardware when the interrupt occurs.
- Other keywords that may be utilised [in context]: interrupt acknowledgement – IACK, processor saves the current value, interrupt vector, Interrupt Service Routine (ISR)..



Revision Exercises

- Scan read Lecture 15's Questions.
 - Answer Lecture 15's Questions
 - Particularly those questions you had difficulties with when you first tried them.