2910110 Introduction to Computing and Internet 2010–2011
Coursework I: Memory and CPU

There are 100 marks available for this assignment.

1. The basic hardware elements that make up a conventional computer system include
   (a) input devices
   (b) output devices
   (c) memory and storage
   (d) control units
   (e) processing units

   Describe, in no more than 100 words, each of these components in terms of their individual functions in the computer system. In other words, the total words of your answer to this question should be no more than 500 words. [35]

2. Draw a diagram to accommodate all the components discussed in Question 1 to summarise the logical relations and connections between the elements of the computer system. You should distinguish the flow of
   (a) data and instructions (use solid arrow lines)
   (b) command and signals (use dashed arrow lines). [30]

3. The first generation of electronic computers were born in 1940s. Since then, many generations of computer systems have been developed. The acceleration of the evolution is astonishing. However, have the fundamental structures and principles of the CPU and the main memory of computer systems changed? What would be regarded as the characteristics of the next generation of computer systems in your opinion?

   Conduct a research on ONE characteristic of the next generation of computer systems. Write an abstract of up to 500 words (apart from references) to summarise your findings. You should concentrate on the technical rather than commercial achievements. For example, cache and parallel processors are good technical topics. Finally, you should provide accurate references. [35]
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DIPLOMA AND BSc IN COMPUTING AND RELATED SUBJECTS
FOR INTERNATIONAL PROGRAMMES STUDENTS

COURSEWORK SUBMISSION FORM

IMPORTANT, PLEASE NOTE:

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I declare that:

• I understand what is meant by plagiarism.
• I understand the implications of plagiarism.
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2910110 Introduction to Computing and Internet 2010–2011
Coursework II: Data Representations and Operating Systems

There are 100 marks available for this assignment.
When converting numbers from one notation to another notation, you should show your work including the following steps whenever applicable: (1) sign, (2) magnitude, or exponent, or true exponent, (3) significand, or true significand, or significand after normalisation, (4) the final result. Add assumptions if necessary:

1. Determine the decimal value represented by the bit pattern 1000 0111 in each of the four systems: unsigned notation, signed magnitude, excess notation, and two’s complement notation. [20]

2. Represent the decimal number 22 in excess notation, and two’s complement notation, using a 10-bit word. [20]

3. The following bit pattern represents a single precision floating point number with an 8 bit exponent (with a bias of 127) and a normalised 23 bit significand conforming to IEEE 754.

<table>
<thead>
<tr>
<th>Sign</th>
<th>Exponent</th>
<th>Significand</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1000 0000</td>
<td>1000 0000 0000 0000 0000 000</td>
</tr>
</tbody>
</table>

Showing all your work and identify the decimal number that is represented by the bit pattern. [20]

4. Represent the negative decimal number -1.26 using IEEE754 single precision format. [20]

5. Pipelining is a method of speeding up the fetch-execute cycle. Consider a situation where the fetch-execute cycle is further decomposed into 6 stages, and 10 instructions are required in a specific task. Draw a diagram, with a brief explanation, to show how the speed-up is achieved by use of pipelining. [Hint: Contrast the total units of the time required with and without the use of pipelining.] [20]
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1. Describe concisely each of the standard network structures below. Draw a diagram to show the topology of each structure. Investigate any real-world network structures near you. You may discuss, for example, what network structures are used in your university, work place or at home to demonstrate your understanding of the network structures. [35]

   (a) Star  
   (b) Ring  
   (c) Multidrop  
   (d) Tree  
   (e) Mesh  
   (f) Interconnected rings  
   (g) Ad Hoc

2. Explain with a suitable diagram the use of headers in routing protocols under the TCP/IP model. Give an example where two computers A and B wish to establish a communication. What essential steps do they need to take under the TCP/IP model? Show step by step how headers can be implemented and useful for routing. Add details of assumptions in your discussion if necessary. [35]

3. Consider the class-based IP addressing scheme. Explain how the following network addresses can be used to identify a particular network. Discuss the advantages and disadvantages of the class-based IP addressing. [30]

   (a) 18.7.22.83:80;  
   (b) 172.20.149.22:143.

Your solutions should include all your work, and certain details, further assumptions and related topics if appropriate, such as the binary version of address and mask, boolean AND mask/address, address class or network address, subnet address, host, and application.
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1. Write a short essay up to 1500 words on comparative studies of current policies on academic plagiarism. Academic Plagiarism is a serious offense. What are your experience, knowledge and views about the seriousness of the offense? What are the legal rights of the original authors and the plagiarists? What would be a good policy on plagiarism in your opinion?
Conduct research on and compare the policies on academic plagiarism in three academic journals in Computing. Focus on one aspect of the many issues on academic plagiarism. For example, you may focus on how well each of the policies protects the copyrights of the original authors, or how effectively the policies punish the plagiarists, or on the differences in approach or ambiguousness of the policies. Good conclusions can only be drawn based on facts. You should therefore pay attention to adequate details of factual data, and make sure that you present sufficient factual data in your essay. You should also use tables, figures and quotations to support your arguments, and include correct references. [50]

2. Design and develop a webpage for Linda.
It is difficult sometimes for Linda, an office manager for a small company, to take requests for maintenance and chase bills to everyone involved because the new work and bills keep coming in before the old ones get done and paid.
Your task is to help Linda and her staff build a simple dynamic web page where Linda can put up any new expenses for small projects such as painting and general repairs, etc. on a specific area of the webpage as soon as they are completed, and people can sign up for other work to be done themselves. The priority for Linda at this stage is to make the webpage work so there is no need to consider issues such as security or system management. You may add assumptions if necessary to simplify the task. You need to make sure, however, that once a project is signed up, no one except the work requester who signed it up previously can update the time slot and estimate of the cost. Linda and staff members are willing to learn to use any new table format, but prefer a user interface that is as simple as possible.
Your submission should include the following sections for assessment purposes:
(a) A flowchart to explain your algorithms or a diagram to explain your coding [10]
(b) Up to 5 screen shots with specifications of the web page viewer, for example, Internet Explorer [10]
(c) A detailed description to explain the techniques that you have applied to make the web page work [10]
(d) A brief self-evaluation to the web page that you have developed and a list of techniques that you have learnt from this coursework [10]
(e) Any convenient features or advanced techniques applied. [10]
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