**COSC 2325 Computer Organization Assignment 2**

**Due: 23:59:00, Sept. 12, 2022**

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1. Here is a section of an assembly language program:

asciiz “COSC 2325”

What is the bit pattern *in hexadecimal* that the assembler will produce in the object module? (20 points)

43 51 53 43 20 32 33 32 35 7F

1. A computer system has 32-bit addresses, and the figure below shows a part of the main memory.
   1. If the CPU reads a bit pattern from the memory and the 32 wires of the address bus are set to 0010 0000 0010 0010 1111 1010 1001 0111, what is the bit pattern CPU will get? (10 points)

0x2022FA97 → 01000001

* 1. What is the address *in binary* of the memory unit containing a bit pattern 01101101? (10 points)

0x2022FA9B → 0001 0000 0001 0001 1111 1010 1001 1011

* 1. If the bit patterns in the memory are ASCII codes, what are the corresponding characters from 0x2022FA97 to 0x2022FA9E? (20 points)

*Address*

|  |  |  |
| --- | --- | --- |
| 0x2022FA9E  0x2022FA9D  0x2022FA9C  0x2022FA9B  0x2022FA9A  0x2022FA99  0x2022FA98  0x2022FA97 | 01111001  01101100  01100010  01101101  01100101  01110011  01110011  01000001 | 79  6C  62  6D  65  73  73  41 |

1. A computer uses 32-bit addresses with 2 gigabytes of main memory installed.
   1. What technique can be used in order to provide full address space? Please describe this technique. (15 points)

Virtual Memory, which utilizes the hard disk and RAM. Some of the space on the hard disk is used as RAM, and this is called virtual memory because this is not actually real memory.

* 1. How much space is needed from the hard disk and why? (25 points)

If 2 GB is installed as RAM, and 4 GB is what is needed to be stored, then 2 GB of the hard disk must be used. This is because 2 GB + 2 GB = 4 GB in the most basic form, where the RAM holds as much memory as possible, and the hard disk holds the rest.