COE 301: Computer Organization – Term 211

Quiz 1: Introduction to MIPS Assembly Language, Thursday, September 16, 2021

Solution

1. (3 pts) Fill in the blanks:

   a) The maximum size of memory addressed by a 20-bit number is: **2^{20} Bytes = 1,048,576 Bytes.**

   b) The interface between software and hardware is called **Instruction Set Architecture**.

   c) A 4 GHz clock has a cycle = **$1/4 \times 10^{-9}$ sec = 0.25 nsec** .

2. (2 pts) Write a sequence of MIPS instructions to print string **Str1** on the screen:

   ```
   Str1: .asciiz "COE 301 Quiz 1\n"

   la    $a0, Str1     # Load address of Str1 into register $a0

   li    $v0, 4        # 4 is for printing a null-terminated string

   syscall             # Execute the system call and print the string
   ```

3. (5 pts) Given the following data definitions, fill the data segment with **byte values** (as characters or hexadecimal numbers) using the **little-Endian byte ordering**. Show also the mapping of the labels to their corresponding memory addresses in the symbol table, given that the starting address of **var1** is **0x10010000** (hexadecimal).

   ```
   .data
   var1: .byte 'C','O','E'
   var2: .half 0xabc:3
   var3: .asciiz "Hello\n"
   var4: .word 0x1234567:2
   ```

Label	Address
var1	0x10010000
var2	0x10010004
var3	0x1001000A
var4	0x10010014

Data Segment (Fill-in the bytes)

Byte	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0x10010000	'C'	'O'	'E'		0xbc	0x0a	0xbc	0x0a	0xbc	0x0a	'H'	'e'	'l'	'l'	'o'	'\n'
0x10010010	0				0x67	0x45	0x23	0x01	0x67	0x45	0x23	0x01				
0x10010020																