CompSci 2GA3 Assignment 1

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Name: Jatin Chowdhary

Student #: 400033011

Mac ID: Chowdhaj

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Assignment Question 1.3

a.

lw $t0, 0x8 ($s0)

lw $t1, 0xC ($s0)

add $t0, $t0, $t1

lw $t1, 0x10 ($s0)

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0123 4567 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | 0000 0000 |

**lw $t0, 0x8 ($s0) # load value from 0x8 into $t0**

lw $t1, 0xC ($s0)

add $t0, $t0, $t1

lw $t1, 0 x10 ($s0)

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0123 4567 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | 0000 0000 |

lw $t0, 0x8 ($s0)

**lw $t1, 0xC ($s0) # load value from 0xC into $t1**

add $t0, $t0, $t1

lw $t1, 0x10 ($s0)

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0123 4567 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | 0000 0000 |

lw $t0, 0x8 ($s0)

lw $t1, 0xC ($s0)

**add $t0 , $t0 , $t1 # add $t0 and $t1 and store that in $t1**

lw $t1, 0x10 ($s0)

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 8ACF 1356 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | 0000 0000 |

lw $t0, 0x8 ($s0)

lw $t1, 0xC ($s0)

add $t0, $t0, $t1

**lw $t1, 0x10 ($s0) # load value from 0x10 to t1**

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 8ACF 1356 | 1000 0008 | 0123 4567 |
| t1 | 0000 0000 | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | 0000 0000 |

lw $t0, 0x8 ($s0)

lw $t1, 0xC ($s0)

add $t0, $t0, $t1

lw $t1, 0x10 ($s0)

**add $t0, $t0, $t1 # add t0 and t1 and store that in t0**

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 8ACF 1356 | 1000 0008 | 0123 4567 |
| t1 | 0000 0000 | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | 0000 0000 |

b.

addi $s1, $s0, 0x8

lw $t0, 0($s0)

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0123 4567 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | 0000 0000 |

**addi $s1, $s0, 0x8 # add 8 to $s0 and store that in $s1**

lw $t0, 0($s0)

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0123 4567 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 1000 0008 | 1000 0014 | 0000 0000 |

addi $s1, $s0, 0x8

**lw $t0, 0($s0) # store the value in memory at 1000 0000 in $t0**

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0000 0000 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 1000 0008 | 1000 0014 | 0000 0000 |

addi $s1, $s0, 0x8

lw $t0, 0($s0)

**addi $s1, $s0, 0x4 # add 4 to $s0 and store it to $s1**

lw $t1, 0($s0)

add $t0, $t0, $t1

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0000 0000 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 1000 0004 | 1000 0014 | 0000 0000 |

addi $s1, $s0, 0x8

lw $t0, 0($s0)

addi $s1, $s0, 0x4

**lw $t1, 0($s0) # load memory at 1000 0000 into $t1**

add $t0, $t0, $t1

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0000 0000 | 1000 0008 | 0123 4567 |
| t1 | 0000 0000 | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 1000 0004 | 1000 0014 | 0000 0000 |

addi $s1, $s0, 0x8

lw $t0, 0($s0)

addi $s1, $s0, 0x4

lw $t1, 0($s0)

**add $t0, $t0, $t1 # add $t1 to $t0 and store it in $t0**

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0000 0000 | 1000 0008 | 0123 4567 |
| t1 | 0000 0000 | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 1000 0004 | 1000 0014 | 0000 0000 |

addi $s1, $s0, 0x8

lw $t0, 0($s0)

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

**addi $s1, $s0, 0x4 # add 4 to $s0 and store it in $s1**

lw $t1, 0($s0)

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0000 0000 | 1000 0008 | 0123 4567 |
| t1 | 0000 0000 | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 1000 0004 | 1000 0014 | 0000 0000 |

addi $s1, $s0, 0x8

lw $t0, 0($s0)

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

addi $s1, $s0, 0x4

**lw $t1, 0($s0) # load value from 1000 000 into $t1**

add $t0, $t0, $t1

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0000 0000 | 1000 0008 | 0123 4567 |
| t1 | 0000 0000 | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 1000 0004 | 1000 0014 | 0000 0000 |

addi $s1, $s0, 0x8

lw $t0, 0($s0)

addi $s1, $s0, 0x4

lw $t1, 0($s0)

add $t0, $t0, $t1

addi $s1, $s0, 0x4

lw $t1, 0($s0)

**add $t0, $t0, $t1 # add $t1 and $t0 and store that in $t0**

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0000 0000 | 1000 0008 | 0123 4567 |
| t1 | 0000 0000 | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 1000 0004 | 1000 0014 | 0000 0000 |

c.

lui $t0, 0xFEDC

ori $t0, 0xBA98

sw $t0, 0($s0)

sw $t0, 5($s0)

sw $t0, 0xA($s0)

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | 0123 4567 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | 0000 0000 |

**lui $t0, 0xFEDC # loads ‘FEDC’ into the upper 16 bits of $t0**

ori $t0, 0xBA98

sw $t0, 0($s0)

sw $t0, 5($s0)

sw $t0, 0xA($s0)

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | FEDC 0000 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | 0000 0000 |

lui $t0, 0xFEDC

**ori $t0, 0xBA98 # loads BA98 in the lower 16 bits in $t0**

sw $t0, 0($s0)

sw $t0, 5($s0)

sw $t0, 0xA($s0)

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | 0000 0000 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | FEDC BA98 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | 0000 0000 |

lui $t0, 0xFEDC

ori $t0, 0xBA98

**sw $t0, 0($s0) # stores $t0 into the first memory address (1000 000)**

sw $t0, 5($s0)

sw $t0, 0xA($s0)

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | FEDC BA98 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | FEDC BA98 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | 0000 0000 |

lui $t0, 0xFEDC

ori $t0, 0xBA98

sw $t0, 0($s0)

**sw $t0, 5($s0) # stores $t0 into the 5th index of the array (memory) [at the address 1000 0014]**

sw $t0, 0xA($s0)

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:** | |
| a0 | 0000 0190 | 1000 0000 | FEDC BA98 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | FEDC BA98 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | FEDC BA98 |

lui $t0, 0xFEDC

ori $t0, 0xBA98

sw $t0, 0($s0)

sw $t0, 5($s0)

**sw $t0, 0xA($s0) # CAUSES AN EXCEPTION [0xA is not a valid memory address]**

|  |  |  |  |
| --- | --- | --- | --- |
| **Registers:** | | **Memory:**  ERROR | |
| a0 | 0000 0190 | 1000 0000 | FEDC BA98 |
| a1 | 0000 03E7 | 1000 0004 | 0000 0000 |
| t0 | FEDC BA98 | 1000 0008 | 0123 4567 |
| t1 | 89AB CDEF | 1000 000C | 89AB CDEF |
| s0 | 1000 0000 | 1000 0010 | 0000 0000 |
| s1 | 251F 326D | 1000 0014 | FEDC BA98 |