

Directed Work N° 02

Exercise1:

In the MIPS R3000 processor there are three formats of instructions, give the general syntax of each format.

Exercise2:

1. Give the assembly instructions in MIPS R3000 correspond to the following machine codes:

- 0x00024021

- 0x14200003

2. Give the machine codes correspond to the following MIPS R3000 assembly instructions:

- sub \$8, \$10,\$9

- add \$10, \$11,\$12

Exercise3:

Here is an assembler program in MIPS R3000.

The window below represents the Text Segment after the program assembly in the Mars simulator.

- 1- Fill in the Address field for each line
- 2- What are the codes corresponding to lines 6,14,18,22 ,23 and 24?
- 3- What is a pseudo-instruction? Give two examples in the program.

	Address	Code	Basic
1	0x00400000	0x24080000	addiu \$8,\$0,0
2		0x24090000	addiu \$9,\$0,0
3		0x2001000a	addi \$1,\$0,10
4		0x10280008	beq \$1,\$8,8
5		0x24020005	addiu \$2,\$0,5
6			syscall
7		0x3c011001	lui \$1,4097
8		0x00290821	addu \$1,\$1,\$9
9		0xac220000	sw \$2,0(\$1)
10		0x21080001	addi \$8,\$8,1
11		0x21290004	addi \$9,\$9,4
12		0x08100002	j 0x00400008
13		0x20010000	addi \$1,\$0,0
14			beq \$1,\$8,10
15		0x20010001	addi \$1,\$0,1
16		0x01014022	sub \$8,\$8,\$1
17		0x20010004	addi \$1,\$0,4
18			sub \$9,\$9,\$1
19		0x3c011001	lui \$1,4097
20		0x00290821	addu \$1,\$1,\$9
21		0x8c240000	lw \$4,0(\$1)
22		0x24020001	addiu \$2,\$0,1
23			syscall
24		0x0810000c	j 0x00400030

```

.data
X: .word 0
.text
li $t0,0
li $t1,0
for: beq $t0,10,fin
li $v0,5
syscall
sw $v0,X($t1)
addi $t0,$t0,1
addi $t1,$t1,4
j for
fin:
for1: beq $t0,0,fin1
subi $t0,$t0,1
subi $t1,$t1,4
lw $a0, X($t1)
li $v0,1
syscall
j for1
fin1:

```

Field Opcode

		28...26						
	000	001	010	011	100	101	110	111
000	special	regimm	j	jal	beq	bne	blez	bgtz
001	addi	addiu	slti	sltiu	andi	ori	xori	lui
010	cop0	-	-	-	-	-	-	-
31...29	011	-	-	-	-	-	-	-
	100	lb	lh	-	lw	lbu	lhu	-
	101	sb	sh	-	sw	-	-	-
	110	-	-	-	-	-	-	-
	111	-	-	-	-	-	-	-

Field func when opcode is special

5...3

2...0								
	000	001	010	011	100	101	110	111
000	sll	-	srl	sra	sllv	-	srlv	srav
001	jr	jalr	-	-	syscall	break	-	-
010	mfhi	mthi	mflo	mtlo	-	-	-	-
011	mult	multu	div	divu	-	-	-	-
100	add	addu	sub	subu	and	or	xor	nor
101	-	-	slt	sltu	-	-	-	-
110	-	-	-	-	-	-	-	-
111	-	-	-	-	-	-	-	-