

Assignment 2

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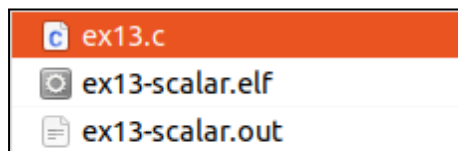
Exercise 13 (Worksheet 3)

1. Scalar Version

- Compile and Execute **scalar**:

```
mipsisa64r6-linux-gnuabi64-gcc-10 -mmsa ex13.c -o ex13-scalar.elf -static  
qemu-mips64 -cpu i6400 ex13-scalar.elf > ex13-scalar.out
```

- Save the output in an .out file to check the values.



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2. MIPS MSA Version (With addvi.b)

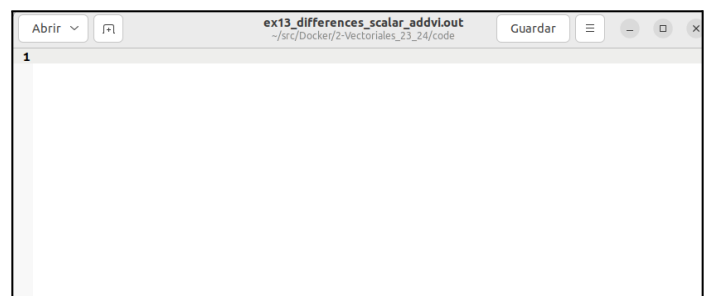
- Compile and Execute **addvi.b**:

```
mipsisa64r6-linux-gnuabi64-gcc-10 -mmsa ex13.c -o ex13-addvi.elf -static -DADDVI_VERSION  
qemu-mips64 -cpu i6400 ex13-addvi.elf > ex13-addvi.out
```

- Compare results of **addvi.b** with **scalar**:

```
diff ex13-scalar.out ex13-addvi.out > ex13_differences_scalar_addvi.out
```

- Save the output in an .out file to check the values.
- Compare scalar and addvi and save the output in an .out file to see if there is any difference.
- Both outputs are identical (*differences file is empty*).

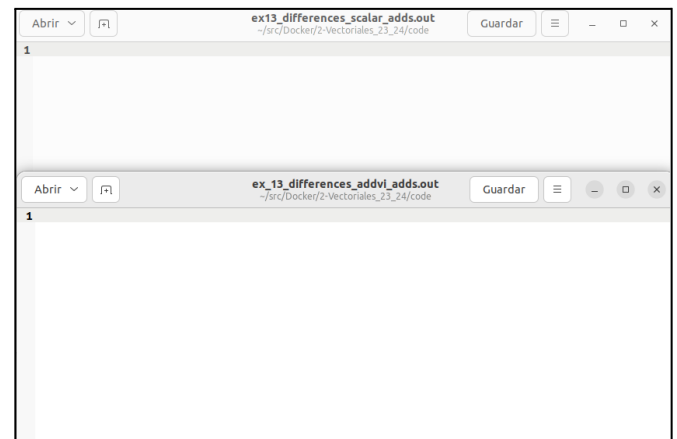


3. MIPS MSA Version (With adds_u.b)

- Compile and Execute **adds_u.b**:
`mipsisa64r6-linux-gnuabi64-gcc-10 -mmsa ex13.c -o ex13-adds.elf -static -DADDS_VERSION`
`qemu-mips64 -cpu i6400 ex13-adds.elf > ex13-adds.out`

- Compare results of **adds_u.b** with **addvi.b** and **scalar**:
`diff ex13-scalar.out ex13-adds.out > ex13_differences_scalar_adds.out`
`diff ex13-addvi.out ex13-adds.out > ex13_differences_addvi_adds.out`

- Save the output in an .out file to check the values.
- Compare scalar and addvi and save the output in an .out file to see if there is any difference.
- All three outputs are identical (*differences files are empty*).

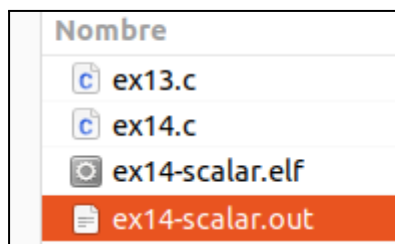


Exercise 14 (Worksheet 3)

1. Scalar Version

- Compile and Execute **scalar**:
`mipsisa64r6-linux-gnuabi64-gcc-10 -mmsa ex14.c -o ex14-scalar.elf -static`
`qemu-mips64 -cpu i6400 ex14-scalar.elf > ex14-scalar.out`

- Save the output in an .out file to check the values.



ex14-scalar.out				
~/src/Docker/2-Vectoriales_23_24/code				
1	a:0.000000	b:-5.000000	c:0.000000	d:0.000000
2	a:0.200000	b:-4.800000	c:0.100000	d:0.000000
3	a:0.400000	b:-4.600000	c:0.200000	d:0.000000
4	a:0.600000	b:-4.400000	c:0.300000	d:0.000000
5	a:0.800000	b:-4.200000	c:0.400000	d:0.000000
6	a:0.500000	b:-4.500000	c:0.000000	d:1.500000
7	a:1.200000	b:-3.800000	c:0.600000	d:0.000000
8	a:1.400000	b:-3.600000	c:0.700000	d:0.000000
9	a:1.600000	b:-3.400000	c:0.800000	d:0.000000
10	a:1.800000	b:-3.200000	c:0.900000	d:0.000000
11	a:2.000000	b:-3.000000	c:1.000000	d:0.000000
12	a:2.200000	b:-2.800000	c:1.100000	d:0.000000
13	a:2.400000	b:-2.600000	c:1.200000	d:0.000000
14	a:2.600000	b:-2.400000	c:1.300000	d:0.000000
15	a:2.800000	b:-2.200000	c:1.400000	d:0.000000
16	a:3.000000	b:-2.000000	c:1.500000	d:0.000000
17	a:3.200000	b:-1.800000	c:1.600000	d:0.000000
18	a:3.400000	b:-1.600000	c:1.700000	d:0.000000
19	a:3.600000	b:-1.400000	c:1.800000	d:0.000000
20	a:3.800000	b:-1.200000	c:1.900000	d:0.000000

2. MIPS MSA Version

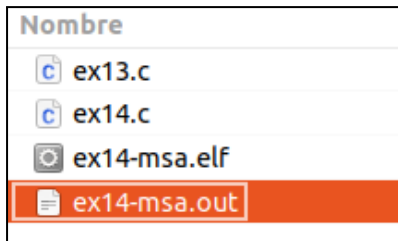
- Complete the code for ***MIPS MSA***:

```
LD.D      $w7, 0(%[Rthree])
LD.D      $w8, 0(%[Rfive])
li        $1, 256                // i = 256
li        $6, 0x10               // increment the address of the vectors by 16
move      $2, %[Ra]              // &a[0]
move      $3, %[Rb]              // &b[0]
move      $4, %[Rc]              // &c[0]
move      $5, %[Rd]              // &d[0]

loop:
LD.D      $w0, 0($3)             // load b[i] and b[i+1] into $w0
LD.D      $w1, 0($4)             // load c[i] and c[i+1] into $w1
FADD.D    $w2, $w0, $w1          // a[i] = b[i] + c[i] and a[i+1] = b[i+1] + c[i+1]
ST.D      $w2, 0($2)             // store a[i] and a[i+1]
FCEQ.D    $w3, $w2, $w0          // compare a[i] == b[i] and a[i+1] == b[i+1]
FMUL.D    $w4, $w2, $w7          // a[i]*3 and a[i+1]*3
AND.V     $w5, $w4, $w3          // d[i] = a[i]*3 for elements where a[i] == b[i]
ST.D      $w5, 0($5)             // store d[i] and d[i+1]
FSUB.D    $w6, $w2, $w8          // a[i] - 5 and a[i+1] - 5
ST.D      $w6, 0($3)             // store b[i] and b[i+1]
dsubu     $1,$1,2                // decrement i - 2 as we are loading i and i+1
dadd      $2,$2,$6               // increment address &a
dadd      $3,$3,$6               // increment address &b
dadd      $4,$4,$6               // increment address &c
dadd      $5,$5,$6               // increment address &d
bgtz      $1, loop              // continue loop if i > 0
nop
```

- Compile and Execute ***adds u.b:***
`mipsisa64r6-linux-gnuabi64-gcc-10 -mmsa ex14.c -o ex14-msa.elf -static -DMSA_VERSION`
`qemu-mips64 -cpu i6400 ex14-msa.elf > ex14-msa.out`

- Save the output in an .out file to check the values.



ex14-msa.out ~/src/Docker/2-Vectoriales_23_24/code				
1	a:0.000000	b:-5.000000	c:0.000000	d:0.000000
2	a:0.200000	b:-4.800000	c:0.100000	d:0.000000
3	a:0.400000	b:-4.600000	c:0.200000	d:0.000000
4	a:0.600000	b:-4.400000	c:0.300000	d:0.000000
5	a:0.800000	b:-4.200000	c:0.400000	d:0.000000
6	a:0.500000	b:-4.500000	c:0.000000	d:1.500000
7	a:1.200000	b:-3.800000	c:0.600000	d:0.000000
8	a:1.400000	b:-3.600000	c:0.700000	d:0.000000
9	a:1.600000	b:-3.400000	c:0.800000	d:0.000000
10	a:1.800000	b:-3.200000	c:0.900000	d:0.000000
11	a:2.000000	b:-3.000000	c:1.000000	d:0.000000
12	a:2.200000	b:-2.800000	c:1.100000	d:0.000000
13	a:2.400000	b:-2.600000	c:1.200000	d:0.000000
14	a:2.600000	b:-2.400000	c:1.300000	d:0.000000
15	a:2.800000	b:-2.200000	c:1.400000	d:0.000000
16	a:3.000000	b:-2.000000	c:1.500000	d:0.000000
17	a:3.200000	b:-1.800000	c:1.600000	d:0.000000
18	a:3.400000	b:-1.600000	c:1.700000	d:0.000000
19	a:3.600000	b:-1.400000	c:1.800000	d:0.000000
20	a:3.800000	b:-1.200000	c:1.900000	d:0.000000
21	a:4.000000	b:-1.000000	c:2.000000	d:0.000000
22	a:4.200000	b:-0.800000	c:2.100000	d:0.000000

- Compare results of ***scalar*** with ***msa***:
`diff ex14-scalar.out ex14-msa.out > ex14_differences_scalar_msa.out`

- Compare scalar and msa and save the output in an .out file to see if there is any difference.

- Both outputs are identical (*differences file is empty*).

