

Annexe TD n° 4 : Fonctions et procédures

Code généré par le compilateur gcc pour NIOS II.

```

max:
00000258 2005883a    add    r2, r4, zero
0000025c 29000116    blt    r5, r4, +0x4 (00000264)
                else return y;
00000260 2805883a    add    r2, r5, zero
00000264 f800283a    ret
                } 264:    f800283a    ret

main:
00000268 00c003c4    addi   r3, zero, 0xf
0000026c 00800284    addi   r2, zero, 0xa
00000270 deffff04    addi   sp, sp, -0x4
00000274 1009883a    add    r4, r2, zero
00000278 180b883a    add    r5, r3, zero
0000027c dfc00015    stw    ra, 0(sp)
00000280 d0e00715    stw    r3, -32740(gp)
00000284 d0a00615    stw    r2, -32744(gp)
00000288 00002580    call   0x00000096 (00000258, max)
0000028c d0a00515    stw    r2, -32748(gp)
00000290 0005883a    add    r2, zero, zero
00000294 dfc00017    ldw    ra, 0(sp)
00000298 dec00104    addi   sp, sp, 0x4
0000029c f800283a    ret

```

Figure 1 : fonction max et programme principal (exercice 1)

```

change (char v[], int k, int m)
{
char temp;
temp=v[k];
v[k]=v[m];
change:
00000230 218d883a    add    r6, r4, r6
00000234 30c00003    ldbu   r3, 0(r6)
00000238 2149883a    add    r4, r4, r5
0000023c 21400003    ldbu   r5, 0(r4)
00000240 20c00005    stb    r3, 0(r4)
                v[m]=temp;
00000244 31400005    stb    r5, 0(r6)
                }
00000248 f800283a    ret

```

Figure 2 : fonction change pour le tri (exercice 2)

		tri (char v[], int n)	
		{	
		tri:	
0000024c	defffa04	addi	sp, sp, -0x18
00000250	dc800215	stw	r18, 8(sp)
		int i, j;	
		for (i=n-1;i>0; i--){	
00000254	2cbfffc4	addi	r18, r5, -0x1
00000258	dc400315	stw	r17, 12(sp)
0000025c	dfc00515	stw	ra, 20(sp)
00000260	dc000415	stw	r16, 16(sp)
00000264	dcc00115	stw	r19, 4(sp)
00000268	dd000015	stw	r20, 0(sp)
0000026c	2023883a	add	r17, r4, zero
00000270	04800f0e	bge	zero, r18, +0x3c (000002b0)
		for (j=i-1; j>=0 ; j--){	
00000274	953fffc4	addi	r20, r18, -0x1
00000278	a021883a	add	r16, r20, zero
0000027c	a0000a16	blt	r20, zero, +0x28 (000002a8)
00000280	8ca7883a	add	r19, r17, r18
		if (v[j] >v [i])	change (v,j, i);
00000284	8c05883a	add	r2, r17, r16
00000288	11c00007	ldb	r7, 0(r2)
0000028c	98c00007	ldb	r3, 0(r19)
00000290	800b883a	add	r5, r16, zero
00000294	8809883a	add	r4, r17, zero
00000298	843fffc4	addi	r16, r16, -0x1
0000029c	900d883a	add	r6, r18, zero
000002a0	19c00b16	blt	r3, r7, +0x2c (000002d0)
000002a4	803ff70e	bge	r16, zero, -0x24 (00000284)
000002a8	a025883a	add	r18, r20, zero
000002ac	053ff116	blt	zero, r20, -0x3c (00000274)
		}	
		}	
		}	
000002b0	dfc00517	ldw	ra, 20(sp)
000002b4	dc000417	ldw	r16, 16(sp)
000002b8	dc400317	ldw	r17, 12(sp)
000002bc	dc800217	ldw	r18, 8(sp)
000002c0	dcc00117	ldw	r19, 4(sp)
000002c4	dd000017	ldw	r20, 0(sp)
000002c8	dec00604	addi	sp, sp, 0x18
000002cc	f800283a	ret	
000002d0	00002300	call	0x0000008c (00000230, change)
000002d4	803feb0e	bge	r16, zero, -0x54 (00000284)
000002d8	003ff306	br	-0x34 (000002a8)

Figure 3 : fonction tri exercice 2

```

main:
000002dc  deffff04  addi    sp, sp, -0x4
000002e0  01800034  orhi    r6, zero, 0x0
000002e4  3181b704  addi    r6, r6, 0x6dc
000002e8  dfc00015  stw     ra, 0(sp)
000002ec  03801904  addi    r14, zero, 0x64
000002f0  03401404  addi    r13, zero, 0x50
000002f4  03001184  addi    r12, zero, 0x46
000002f8  02c00f04  addi    r11, zero, 0x3c
000002fc  02800dc4  addi    r10, zero, 0x37
00000300  02400a04  addi    r9, zero, 0x28
00000304  020008c4  addi    r8, zero, 0x23
00000308  01c00784  addi    r7, zero, 0x1e
0000030c  00c00284  addi    r3, zero, 0xa
00000310  00800644  addi    r2, zero, 0x19
00000314  3009883a  add     r4, r6, zero
00000318  01400284  addi    r5, zero, 0xa
0000031c  33800005  stb     r14, 0(r6)
00000320  33400045  stb     r13, 1(r6)
00000324  33000085  stb     r12, 2(r6)
00000328  32c000c5  stb     r11, 3(r6)
0000032c  32800105  stb     r10, 4(r6)
00000330  32400145  stb     r9, 5(r6)
00000334  32000185  stb     r8, 6(r6)
00000338  31c001c5  stb     r7, 7(r6)
0000033c  30800205  stb     r2, 8(r6)
00000340  30c00245  stb     r3, 9(r6)
00000344  000024c0  call    0x00000093 (0000024c, tri)
00000348  0005883a  add     r2, zero, zero
0000034c  dfc00017  ldw     ra, 0(sp)
00000350  dec00104  addi    sp, sp, 0x4
00000354  f800283a  ret

```

Figure 4 : fonction main pour le tri (exercice 2)