```cpp
#include <iostream>
using namespace std;

int arr[10] = {0, 1, 2, 3, 4, 5, 6, 7, 8, 9};

void swap(int a, int b) {
    int x = arr[a];
    int y = arr[b];
    arr[a] = y;
    arr[b] = x;
}

int main(void) {
    swap(5, 7);
    swap(0, 1);
}
```

Figure 1: Leaf Procedure in C++

riscv1.asm | bubble_sort.asm | procedure_call.asm*

```
1   main:   addi t0 x0 11
2           addi t1 x0 22
3           addi t2 x0 33
4           addi a0 x0 5
5           addi a1 x0 7
6           jal swap
7           addi a0 x0 0
8           addi a1 x0 1
9           jal swap
10          j end
11  swap:   addi sp sp -12
12          sw t0 8(sp)
13          sw t1 4(sp)
14          sw t2 0(sp)
15          la t0 array
16          slli a0 a0 2
17          slli a1 a1 2
18          add a0 a0 t0
19          add a1 a1 t0
20          lw t1 0(a0)
21          lw t2 0(a1)
22          sw t1 0(a1)
23          sw t2 0(a0)
24          lw t2 0(sp)
25          lw t1 4(sp)
26          lw t0 8(sp)
27          addi sp sp 12
28          jalr x0 ra 0
29  end:    addi s0 s0 122
30
```

Figure 2: Leaf Procedure in RISC-V

```
1 0 2 3 4 7 6 5 8 9
```

Figure 3: Expected Result

```
 0   01 00 00 00
 4   00 00 00 00
 8   02 00 00 00
12   03 00 00 00
16   04 00 00 00
20   07 00 00 00
24   06 00 00 00
28   05 00 00 00
32   08 00 00 00
36   09 00 00 00
```

Figure 4: Actual Result

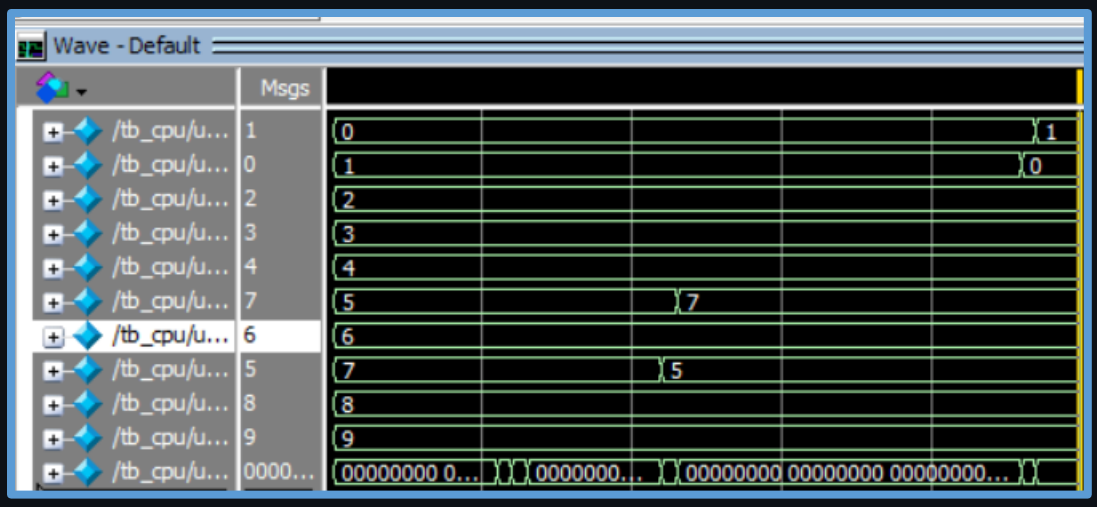


Figure 5: Data Memory (Memory Segment)

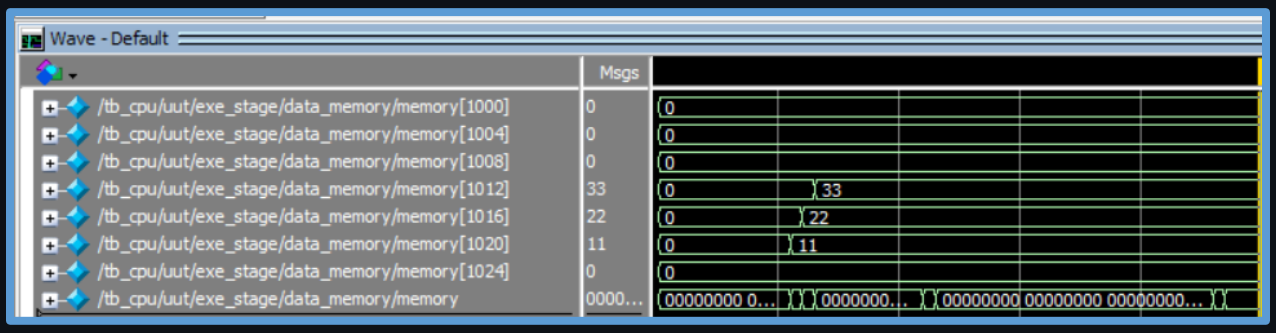


Figure 6: Data Memory (Stack Segment)

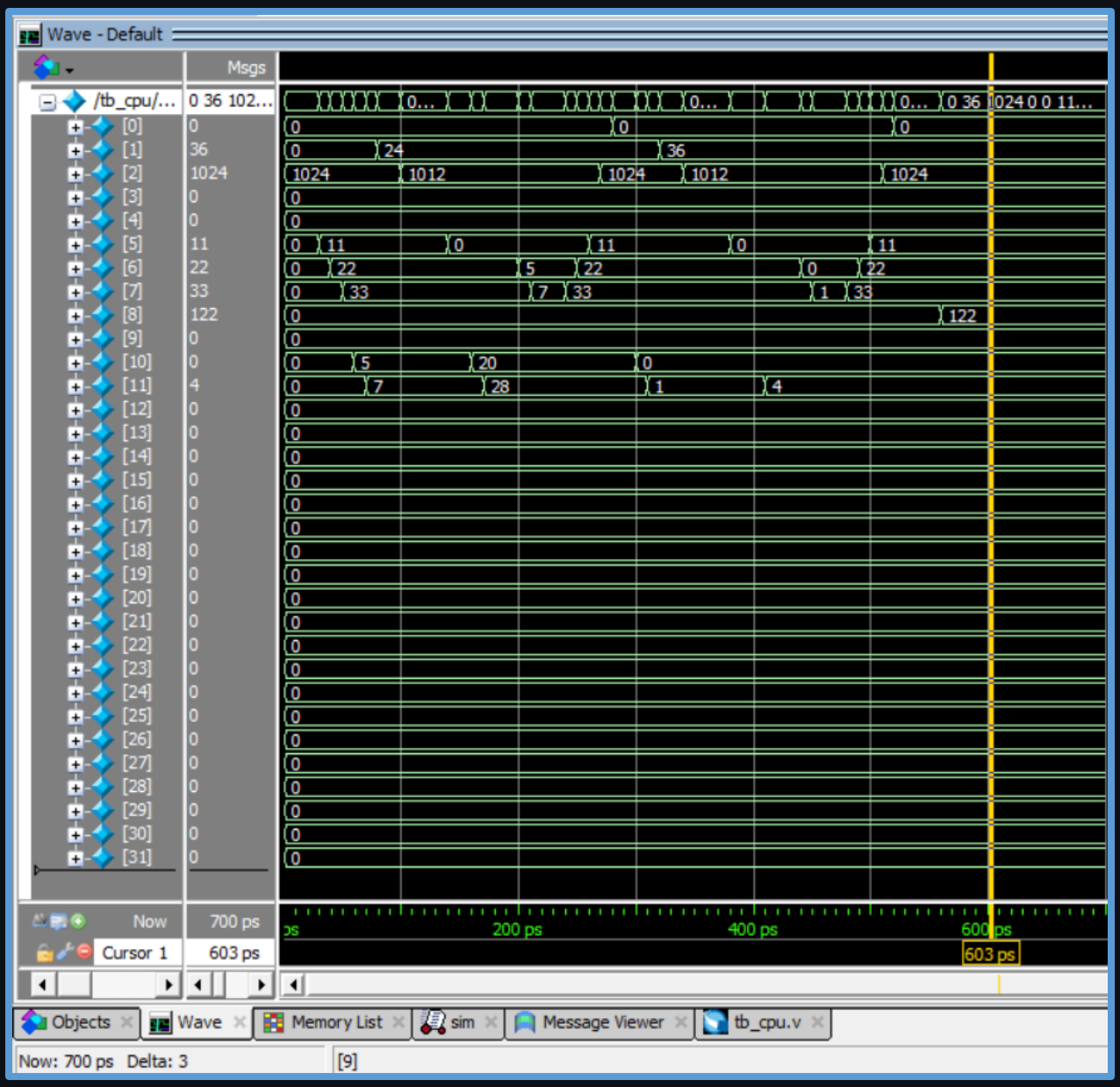
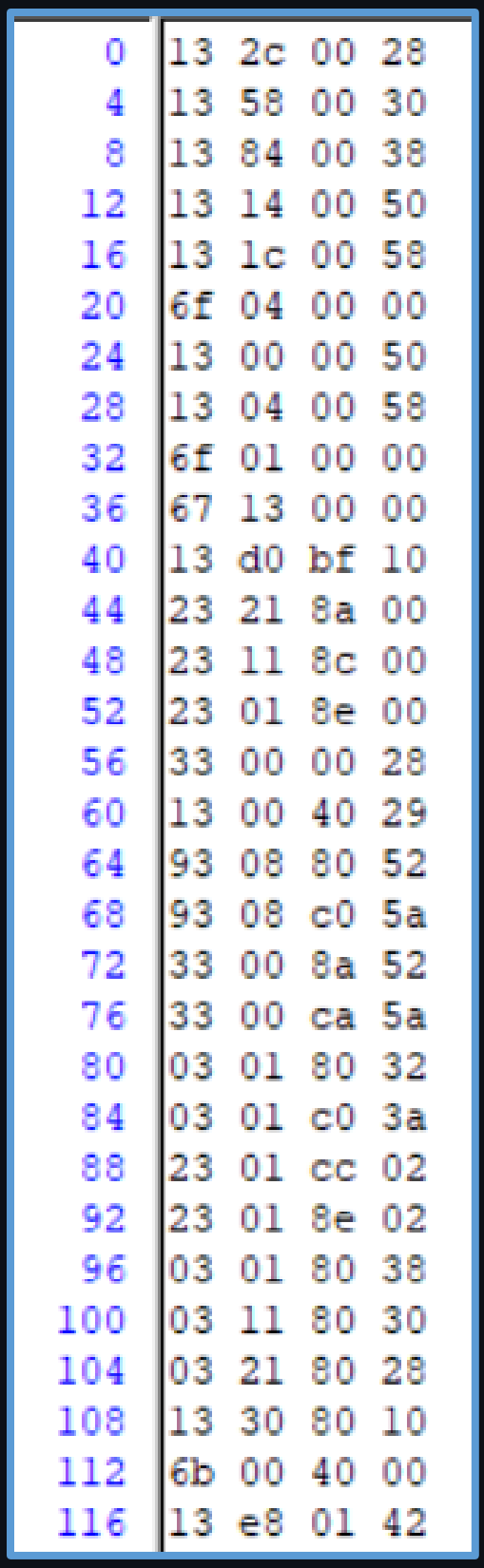


Figure 7: Register File



0	13 2c 00 28
4	13 58 00 30
8	13 84 00 38
12	13 14 00 50
16	13 1c 00 58
20	6f 04 00 00
24	13 00 00 50
28	13 04 00 58
32	6f 01 00 00
36	67 13 00 00
40	13 d0 bf 10
44	23 21 8a 00
48	23 11 8c 00
52	23 01 8e 00
56	33 00 00 28
60	13 00 40 29
64	93 08 80 52
68	93 08 c0 5a
72	33 00 8a 52
76	33 00 ca 5a
80	03 01 80 32
84	03 01 c0 3a
88	23 01 cc 02
92	23 01 8e 02
96	03 01 80 38
100	03 11 80 30
104	03 21 80 28
108	13 30 80 10
112	6b 00 40 00
116	13 e8 01 42

Figure 8: Instruction Memory