Arquitetura de Computadores 2019/20

TPC 3

Deadline: 23:59, May 11, 2020

This homework consists of two individual programming exercises. You can discuss general doubts with colleagues, but the solution and the code writing should be strictly individual. All solutions will be automatically compared, and plagiarism cases will be punished in accordance with the regulations.

Your solutions are to be submitted to DI's Mooshak (`http://mooshak.di.fct.unl.pt/~mooshak/`). You are limited to 10 submissions for each exercise (more will be ignored!). The OS is a Linux and your program is compiled with a command similar to the following one (in case of errors or warnings your program will fail!):

```
cc -m32 -Wall -std=c11 -o main.c func.s
```

Note that your program's output must be exactly the same as in the examples. The points obtained by Mooshak will be used as guide to your grade (100 points = 20 mark).

Problem 1 (50%)

Consider the following C program that uses a function `match` to check if the binary representation of `a` and `b` have any bits with value 1 in common but none in common with the bits of `c`.

```
extern int match( int a, int b, int c );

int main() {
      int x, y, z;
      scanf("%d%d%d", &x, &y, &z);
      if ( match(x, y, z) )
            printf("right bits\n");
      else
            printf("wrong bits\n");
      return 0;
}
```

For input values 2, 3 and 1 the result should be:

```
wrong bits
```

For input values 2, 3 and 8 the result should be:

```
right bits
```

Write that function in assembly (Linux/Intel 32bits) so that the program can produce the correct output.

Start your solution by the provided templates (main1.c and ex1.s). Submit only ex1.s to mooshak.

Problem 2 (50%)

Write an assembly function (`mycompare`) that compares two arrays of integers returning the first index where they differ, or -1 if the arrays are equal. The arrays have the same size and that size is also an argument for your function. The following C program will use your function:

```
extern int mycompare( int size, int x[], int y[] );

int main() {
      int i, n;
      int a1[MAX], a2[MAX];
      n = readArrs(MAX, a1, a2);
      i=mycompare(n, a1, a2);
      if ( i == -1 )
            printf("equal\n");
      else
            printf("different at %d\n", i);
      return 0;
}
```

Examples:
for the inputs:
```
1 2 5 7 10
1 2 5 7 10
```
writes:
```
equal
```

for the inputs:
```
1 2 5 -7 10
1 2 5 7 10
```
writes:
```
different at 3
```

Start your solution by the provided templates (main2.c and ex2.s). Submit only ex2.s to mooshak.