Homework 3-1 (50 pts)

1 Floating-point Exception Handling Practice

In homework 3-1, you are required to write a C program to generate the same result as the “An Example in Handlers I” by using the GNU C Library [1]. To be specific, when we discuss trap handlers in the course, the slide provided a Sun’s example in “An Example in Handlers I”.

Here is a summary of how the code is organized:

- The code enables the trap of the “common” floating-point exception cases, i.e. invalid, division by zero, and overflow.
- After that, the program run underflow and overflow floating-point operation in sequence.

Because the code only enables traps and handles the common case, only the overflow floating-point operation will trigger the trap and activate the handler.

1.1 Details of the Program Requirement

We will compile and run your code in the CSIE workstation. Please make sure your program can be compiled and run on the CSIE workstation. If you don’t have an account please go to CSIE 217 room to apply for one.

- Your program should be organized in the following way:
  
  STUDENT_ID/hw3-1.c
  STUDENT_ID/makefile

  The executable title should be called hw3-1. Then zip your STUDENT_ID folder to
  
  STUDENT_ID.zip

- We will run your program with the following command:
  
  unzip STUDENT_ID.zip
cd STUDENT_ID
make
./hw3-1 > out

Please make sure that submitted file can be tested on CSIE workstation by using above commands!

- In your program, you should output to stdout. In your code please exactly use the following output formats:
  
  printf("min_normal = %g\n", x);
  printf("min_normal / 13.0 = %g\n", x);
  printf("max_normal = %g\n", x);
  printf("max_normal * max_normal = %g\n", x);

  where x is a double type. Each output is respectively for min_normal, underflow value, max_normal and overflow value. Your output order should be like
  
  min_normal = ***
  min_normal / 13.0 = ***
  max_normal = ***
  max_normal * max_normal = ***
where *** is the value of x.

- Additionally, when your program trap the overflow operation, program should output an error message to stderr in the following format.

  ```c
  fprintf(stderr, "SIGFP is catched!\n");
  ```

- Please follow the exact output format or your credit will be affected. That is, your code should go on after the handling.

1.2 Useful Resources

- Floating-point Exception Handling: [https://gcc.gnu.org/onlinedocs/gcc-3.3.6/g77/Floating-point-Exception.html](https://gcc.gnu.org/onlinedocs/gcc-3.3.6/g77/Floating-point-Exception.html)


- Here is a simple example for makefile:

  ```
  all: hw3-1.c
       gcc -o hw3-1 hw3-1.c -lm
  ```

References