CIS 620 Sec. 50 Homework 1 Spring 2021

(Due: Feb. 4)

In this warm-up homework, you are asked to use the gdb debugger on Linux to debug the following program (main.c and pie.c) :

```
/* file pie.c */
#include <stdio.h>
#include <string.h>

const int N = 80000;
void applepie(char *tptr,int seed)
{
    char title[24];
    double x,y;
    int i, count=0;
    srand48(seed);
    for(i=0; i<N; i++ ) {
         x= drand48();
         y= drand48();
         if(x*x+y*y < 1) count++;
    }
    strcpy(title,tptr);
    printf("%s \n applepie = %f\n", title, count / N * 4.0);
}

/* file main.c */

int main(int argc, char **argv)
{   int seed;
    if (argc < 2 ) { printf("need a seed!\n"); }
    else {
         seed = atoi(argv[1]);
         applepie("CIS 620 Homework 1 Spring 2021",seed);
    }
}
```

Follow the procedure below and put your answers in your report.

1. Login a Linux workstation. Type `tar xvfz ~cis620s/pub/hw1.tar.gz` to uncompress and extract files (i.e. main.c pie.c makefile) to your working directory.
2. Type `make` to compile the program. Run the executable file `hw1` along with a seed value (e.g. 29) and check the output result.
3. Invoke the `gdb` with the executable file `hw1`. Type `list pie.c:1` to list the file pie.c.
4. Set a breakpoint at the `if` statement inside the for loop. Run the program with an input integer value (e.g. 29). Type `info locals` to view the local variables when the breakpoint is reached.

5. Iterating the loop for three times (i.e. type `cont` and then `info locals`). What are the values of `x` and `y`? Are they reasonable?
6. Take a screenshot of the `gdb` window and save the image to a file.
7. Find and fix the first bug in the source files with gdb. That is, you will get a reasonable value of the variable `count` when the for loop finishes. What is the value of `count`?
8. To find the second bug, set a breakpoint at the `printf` statement. What is the value of `count` before `printf`? Fix the second bug.
9. Find, fix and explain the third bug in the source files.
10. Recompile and then run the correct program with gdb. Take a screenshot of the `gdb` window and save it to a file.
11. Print the two screenshot files.

Turnin

Each student has to submit this homework electronically using the exact command below (on grail):

```
turnin -c cis620s -p hw1 hw1_report.pdf
```

Your report should include the two screenshots, the answers of the questions, and the detailed explanations about the bugs you found. The cover page should contain your photo, name, and your login id. Start on time and good luck. If you have any questions, send e-mail to `j.sang@csuohio.edu`.