Assignment 2

Duration: 1 week

In this assignment, we will build a (somewhat generic) instrumentation tool.

Input to the tool (via command line):

1. a cpp file that has (i) a main() function, and (ii) global boolean variables to be instrumented – each variable is marked by the string "`$TO_INSTRUMENT$`" in a comment in the line preceding the variable's declaration.
2. An integer – this number denotes the sampling interval in milliseconds. Try with the value 50 in initial experiments.
3. Absolute path of the cpp file (file to be created by your tool) that will contain the new code with instrumentation included.
4. Absolute path of the text file (file to be created by the process corresponding to the C++ program given in input 3) that will contain the observations.

Output of the tool:

- a cpp file (path indicated by input 3) that when compiled and run (i) performs all the functionality as the original input file (input 1), and (ii) records the values of the instrumented variables in the mentioned text file (path indicated by input 4) at the prescribed frequency (input 2). Each row in the file corresponds to a single sample, and has the following format:

```
<sample index>,<value of variable 1>,<value of variable 2>, …
```

How to achieve this: Your tool must add code in the given cpp file (in effect, your code is writing code!). The new code must create a new thread, and this new thread must do the instrumentation – recording of variable values in the file. You can write your tool in any language of your choice. Place the tool code in the folder "instrumentation_synthesizer".

Study the overhead of instrumentation: since this is a toy application that is mostly sleeping, adding instrumentation will not really affect the simulator's performance. However, you may be able to notice an increase in the use of system resources. Study this and document your findings. Vary the sampling interval and study its effects. You can comment out print statements (if any) while performing this study.

Submit the entire code with makefile(s) and your report on Moodle.