

New York University

Tandon School of Engineering

Department of Electrical & Computer Engineering

Introduction to Operating Systems (CS-GY6233)
Fall 2020

Assignment 5
(10 points)

Write a program that calculates the area of a circle with unit radius (= the value of π). This can be achieved by enclosing a circle inside a square of length 2 units.

Your program's main routine shall create 4 worker threads in order to speedup the computation and only use one shared variable (an integer).

Each of the worker threads shall generate 1,000,000 random points, each with an (x,y) coordinate, with x and y ranging between -1 and 1. Each thread shall then compute whether the point is inside the circle or not (it may do so by computing the radius $r = \sqrt{x^2 + y^2}$ and evaluating if it's ≤ 1) and immediately increment the shared variable only if the point is inside the circle, i.e. the updates shall not wait for the entire 1,000,000 points to be computed but rather update the shared variable after each computation.

The main thread shall wait for all four worker threads to exist (at such point 4,000,000 points would have updated) and print the area of the circle as the $4 \times \frac{\text{points inside}}{\text{total points}}$

What to hand in (using NYU Classes):

- Your “.c” and “.h” files (with appropriate comments).
- A screen shot of your terminal window showing the current directory, the command used to compile your program, the command used to run your program and the output of your program.

RULES:

- You may consult with other students about GENERAL concepts or methods but copying code (or code fragments) or algorithms to solve your coding assignment is NOT ALLOWED and is considered cheating (whether copied from other students, the internet or any other source).
- If you are having trouble, please ask your teaching assistant for help.
- You must submit your assignment prior to the deadline.