General

This program estimates the value of pi using the Monte Carlo method. It generates a specified number of random points within a unit square and determines how many fall within the unit circle inscribed in that square. By comparing the ratio of points inside the circle to the total number of points, it estimates the value of pi.

Usage

To compile and run the program, execute the following commands:

```
make
```

The program will initiate multiple threads to generate random points and estimate the value of pi using the Monte Carlo method.

Implementation

The main part of program is `runner` function. It receive a parameter `n`, which represents the number of random points to generate. Within the `runner` function, each thread generates random points and determines whether they fall within the unit circle. The total number of points inside the circle is accumulated, and the estimation of pi is calculated based on the ratio of points inside the circle to the total number of points.

Screenshots

The following screenshots illustrate the program's execution and output for estimating the value of pi using the Monte Carlo method with 20 threads. Each thread generates random points and calculates the estimation of pi based on the ratio of points inside the circle to the total number of points.

```
vincent@DESKTOP-G0KHUT9:~/LOSE/Monte_Carlo_sync$ make
gcc -o main main.c -lm
./main
PI = 3.091384, in_circle = 296, out_of_circle = 87
PI = 3.120603, in_circle = 621, out_of_circle = 175
PI = 3.138863, in_circle = 842, out_of_circle = 231
PI = 3.156561, in_circle = 872, out_of_circle = 233
PI = 3.157076, in_circle = 1015, out_of_circle = 271
PI = 3.191589, in_circle = 1366, out_of_circle = 346
PI = 3.208099, in_circle = 1426, out_of_circle = 352
PI = 3.178521, in_circle = 1687, out_of_circle = 436
PI = 3.180703, in_circle = 1945, out_of_circle = 501
PI = 3.185213, in_circle = 2111, out_of_circle = 540
PI = 3.186271, in_circle = 2553, out_of_circle = 652
PI = 3.198086, in_circle = 3342, out_of_circle = 838
PI = 3.187412, in_circle = 3950, out_of_circle = 1007
PI = 3.195681, in_circle = 4291, out_of_circle = 1080
PI = 3.185508, in_circle = 4572, out_of_circle = 1169
PI = 3.190932, in_circle = 4997, out_of_circle = 1267
PI = 3.194938, in_circle = 5302, out_of_circle = 1336
PI = 3.196043, in_circle = 5331, out_of_circle = 1341
PI = 3.188990, in_circle = 5851, out_of_circle = 1488
PI = 3.176324, in_circle = 6359, out_of_circle = 1649
```