

Parallel Computing Lab
Nilay Ganvit - 200001053
20th October 2022

Lab 6

```
#include <pthread.h>
#include <stdlib.h>
#include <stdio.h>
#define NUM_THREADS 32
#define usr_num 32

void *compute_pi(void *s)
{
    int seed, i, *hit_pointer;
    double x_coord, y_coord;
    int local_hits;
    hit_pointer = (int *)s;
    seed = *hit_pointer;
    local_hits = 0;
    int sample_points_per_thread = usr_num;
    for (i = 0; i < sample_points_per_thread; i++)
    {
        x_coord = (double) (rand_r(&seed)) / (RAND_MAX)-0.5;
        y_coord = (double) (rand_r(&seed)) / (RAND_MAX)-0.5;
        if ((x_coord * x_coord + y_coord * y_coord) < 0.25)
            local_hits++;
    }
    *hit_pointer = local_hits;
    pthread_exit(0);
}

int main()
{
    pthread_t p_threads[NUM_THREADS];
    pthread_attr_t attr;
    pthread_attr_init(&attr);
    int hits[NUM_THREADS];
    int total_hits = 0;
    for (int i = 0; i < NUM_THREADS; i++)
```

```

{
    hits[i] = i;
    pthread_create(&p_threads[i], &attr, compute_pi,
                  (void *)&hits[i]);
}
for (int i = 0; i < NUM_THREADS; i++)
{
    pthread_join(p_threads[i], NULL);
    total_hits += hits[i];
}
int sample_points_per_thread = usr_num;
int total_points = sample_points_per_thread * NUM_THREADS;
double pi = (double)4 * (double)total_hits / (double)total_points;
printf("estimated value of pi using %d sample points per %d threads is
%.4f\n", sample_points_per_thread, NUM_THREADS, pi);
}

```

Input/Output:

```

● nilay@Nilay-PC:~/Documents/cs359$ gcc pi.c -pthread
● nilay@Nilay-PC:~/Documents/cs359$ ./a.out
estimated value of pi using 25 sample points per 32 threads is 3.1250
● nilay@Nilay-PC:~/Documents/cs359$ gcc pi.c -pthread
● nilay@Nilay-PC:~/Documents/cs359$ ./a.out
estimated value of pi using 50 sample points per 32 threads is 3.2000
● nilay@Nilay-PC:~/Documents/cs359$ gcc pi.c -pthread
● nilay@Nilay-PC:~/Documents/cs359$ ./a.out
estimated value of pi using 1000 sample points per 32 threads is 3.1359
● nilay@Nilay-PC:~/Documents/cs359$ gcc pi.c -pthread
● nilay@Nilay-PC:~/Documents/cs359$ ./a.out
estimated value of pi using 32 sample points per 32 threads is 3.1406

```