CSCI803 Assignment

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December 11, 2020

1 Task 1

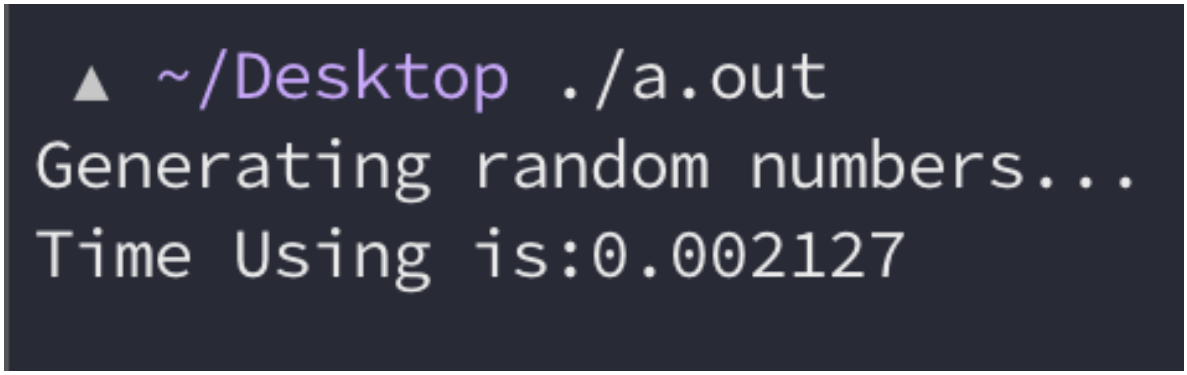
```
public class Fibonacci{
        public static int fibDP(int x) {
                        int fib[] = new int[x + 1];
                        fib[0] = 0;
                        fib[1] = 1;
                        for (int i = 2; i < x + 1; i++) {
                                fib[i] = fib[i - 1] + fib[i - 2];
                        }
                return fib[x];
                }
        public static int main(String[] args){
        System.out.println(fibDP(10));
        return 0;
        }
}
```

2 Task 2

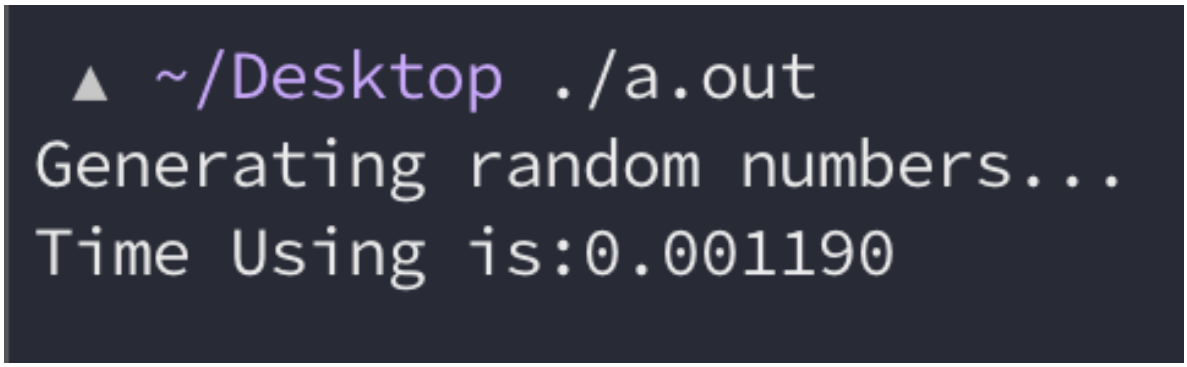
```
#include <iostream>
#include <stdio.h>
#include <time.h>
#include "/usr/local/Cellar/libomp/11.0.0/include/omp.h"

using namespace std;

void merge_sort_recursive(int arr[], int reg[], int start, int end)
    {
    if (start >= end)
        return;
    int len = end - start, mid = (len >> 1) + start;
    int start1 = start, end1 = mid;
    int start2 = mid + 1, end2 = end;
    omp_set_num_threads(12);
```

```
#pragma omp task
    merge_sort_recursive(arr, reg, start1, end1);
#pragma omp task
    merge_sort_recursive(arr, reg, start2, end2);
    int k = start;
    while (start1 <= end1 && start2 <= end2)
        reg[k++] = arr[start1] < arr[start2] ? arr[start1++] : arr[
            start2++];
    while (start1 <= end1)
        reg[k++] = arr[start1++];
    while (start2 <= end2)
        reg[k++] = arr[start2++];
    for (k = start; k <= end; k++)
        arr[k] = reg[k];
}

int *merge_sort(int arr[], int len) {
    int reg[100000];
    merge_sort_recursive(arr, reg, 0, len - 1);
    return arr;
}

int main() {
    int arr[100000];
    int num_start = 1;
    int num_end = 100001;
    double duration;
    clock_t start, end;
    printf("Generating random numbers...\n");
    for (int i = 0; i < 100000; ++i)
        arr[i] = (rand() % (num_end - num_start)) + num_start;
    start = clock();
#pragma omp parallel
    {
#pragma omp single nowait
        merge_sort(arr, 100000);
    }
    end = clock();
    duration = (double) (end - start);
    printf("Time Using is:%f\n", (duration / CLOCKS_PER_SEC));
    return 0;
}
```

2.1 Comparsion



(a) Single thread computing without OpenMP



(b) Multithread parallel computing using OpenMP

Since my CPU has 6 cores and 12 threads, it can be seen from the figure above that CPU power consumption is the largest, the computing speed is the fastest, and the consumption time is the smallest.