Q5

מגישות - שני גולומב 325184653 , יובל בצר 212725048

השוואה בין האלגוריתמים לבין הזמן של יצירת המספרים האקראיים עם קלט בגודל 100:

```
shani@shani:~/Documents/OperatingSystem/Ex1/Q5$ make profile ARGS="100 42"
gcc -Wall -pg -o subarr maxSubArray.c
./subarr 100 42
max sub array n^3 = 2075
max sub array n^2 = 2075
max sub array n^1 = 2075
gprof subarr gmon.out > analysis.txt
cat analysis.txt
Flat profile:

Each sample counts as 0.01 seconds.
 no time accumulated

  %   cumulative   self              self     total
 time   seconds   seconds    calls  Ts/call  Ts/call  name
  0.00      0.00     0.00        1     0.00     0.00  generate_random_array
  0.00      0.00     0.00        1     0.00     0.00  max_sub_array_n
  0.00      0.00     0.00        1     0.00     0.00  max_sub_array_n2
  0.00      0.00     0.00        1     0.00     0.00  max_sub_array_n3

 %         the percentage of the total running time of the
time       program used by this function.

cumulative a running sum of the number of seconds accounted
 seconds   for by this function and those listed above it.

 self      the number of seconds accounted for by this
seconds    function alone.  This is the major sort for this
```

השוואה בין האלגוריתמים לבין הזמן של יצירת המספרים האקראיים עם קלט בגודל 1000:

```
shani@shani:~/Documents/OperatingSystem/Ex1/Q5$ make profile ARGS="1000 42"
gcc -Wall -pg -o subarr maxSubArray.c
./subarr 1000 42
max sub array n^3 = 25530
max sub array n^2 = 25530
max sub array n^1 = 25530
gprof subarr gmon.out > analysis.txt
cat analysis.txt
Flat profile:

Each sample counts as 0.01 seconds.
  %   cumulative   self              self     total
 time   seconds   seconds    calls  ms/call  ms/call  name
100.00      0.06     0.06        1    60.00    60.00  max_sub_array_n3
  0.00      0.06     0.00        1     0.00     0.00  generate_random_array
  0.00      0.06     0.00        1     0.00     0.00  max_sub_array_n
  0.00      0.06     0.00        1     0.00     0.00  max_sub_array_n2

 %         the percentage of the total running time of the
time       program used by this function.

cumulative a running sum of the number of seconds accounted
 seconds   for by this function and those listed above it.

 self      the number of seconds accounted for by this
seconds    function alone.  This is the major sort for this
           listing.
```

השוואה בין האלגוריתמים לבין הזמן של יצירת המספרים האקראיים עם קלט בגודל 10000:

```
shani@shani:~/Documents/OperatingSystem/Ex1/Q5$ make profile ARGS="10000 42"
gcc -Wall -pg -o subarr maxSubArray.c
./subarr 10000 42
max sub array n^3 = 247358
max sub array n^2 = 247358
max sub array n^1 = 247358
gprof subarr gmon.out > analysis.txt
cat analysis.txt
Flat profile:

Each sample counts as 0.01 seconds.
  %   cumulative   self              self     total
 time   seconds   seconds    calls   s/call   s/call  name
 99.97    134.65   134.65        1   134.65   134.65  max_sub_array_n3
  0.03    134.69     0.04        1     0.04     0.04  max_sub_array_n2
  0.00    134.69     0.00        1     0.00     0.00  generate_random_array
  0.00    134.69     0.00        1     0.00     0.00  max_sub_array_n

 %         the percentage of the total running time of the
time       program used by this function.

cumulative a running sum of the number of seconds accounted
 seconds   for by this function and those listed above it.

 self      the number of seconds accounted for by this
seconds    function alone.  This is the major sort for this
           listing.
```

- ניתן לראות כי זמן ריצת האלגוריתם של n^3 גדול משמעותית מכל זמני הריצה האחרים, כצפוי. בנוסף ניתן לראות כי זמן הריצה של יצירת המספרים האקראיים הוא מאוד מאוד קטן, במיוחד בהשוואה לזמני הריצה של האלגוריתם n^3.

הפלט עבור הרצה רגילה לקלטים באורך 100, 1000 ו10000:

```
shani@shani:~/Documents/OperatingSystem/Ex1/Q5$ make
gcc -Wall -o subarr maxSubArray.c
shani@shani:~/Documents/OperatingSystem/Ex1/Q5$ ./subarr 100 56
max sub array n^3 = 2799
max sub array n^2 = 2799
max sub array n^1 = 2799
shani@shani:~/Documents/OperatingSystem/Ex1/Q5$ ./subarr 1000 12
max sub array n^3 = 24351
max sub array n^2 = 24351
max sub array n^1 = 24351
shani@shani:~/Documents/OperatingSystem/Ex1/Q5$ ./subarr 10000 21
max sub array n^3 = 245787
max sub array n^2 = 245787
max sub array n^1 = 245787
shani@shani:~/Documents/OperatingSystem/Ex1/Q5$
```