



Lab 3 - Marina Martin

1. Qual o tempo de execução serial e paralelo para 1, 2, 4, 6 e 8 processadores? Desenhe um gráfico contendo todos os tempos de execução

tempo de execução serial

36.77 seg

tempo de execução paralelo para:

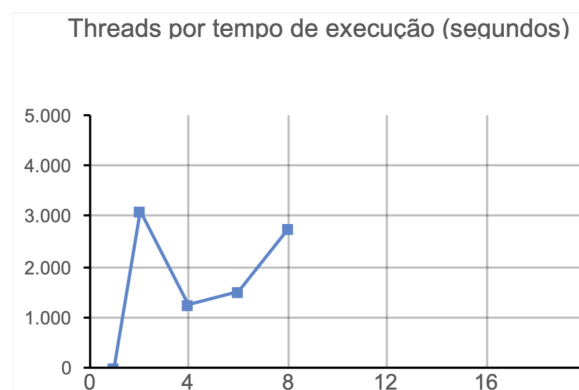
1 thread = 36.77seg

2 threads = 3.108seg

4 threads = 1.237seg

6 threads = 1.527seg

8 threads = 2.743seg



2. Qual o speedup para 1, 2, 4, 6 e 8 processadores? Desenhe um gráfico mostrando os diferentes valores de speedup.

speedup para:

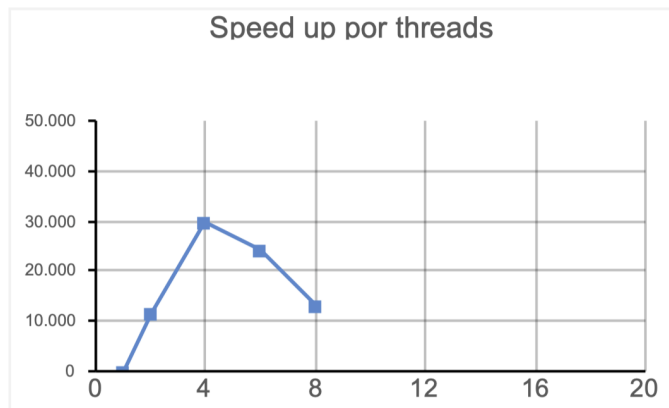
1 thread = 1

2 threads = 11.831

4 threads = 29.725

6 threads = 24.080

8 threads = 13.405



3. Introduza na sua solução a diretiva critical. O que muda? Para provar seu ponto, refaça a solução com essa abordagem, calcule os novos valores e construa um novo gráfico de speedup para 1, 2, 4, 6 e 8 processadores.

os tempos de execução foram muito menores.

tempo de execução serial

36.77 seg

tempo de execução paralelo para:

1 thread = 3.065seg

2 thread = 1.466seg

4 threads = 1.441seg

6 threads = 1.305seg

8 threads = 1.124seg

speedup para:

1 thread = 1

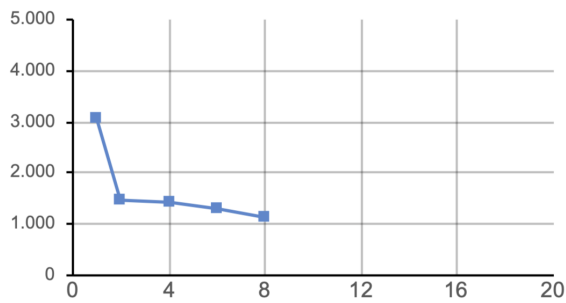
2 thread = 2.091

4 threads = 2.127

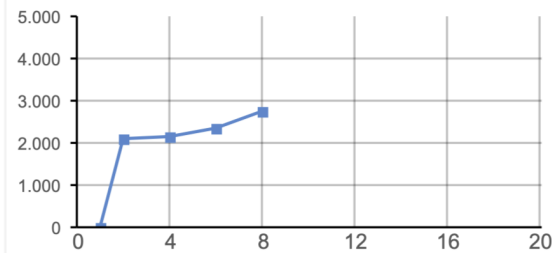
6 threads = 2.349

8 threads = 2.727

Threads por tempo de execução (segundos)



Speed up por threads



Processo

1. dicionando o helloWorld da aula

```
eee_W_2981676@runweb121802:~$ ssh -i .ssh/labsuser.pem ec2-user@54.162.30.125
The authenticity of host '54.162.30.125 (54.162.30.125)' can't be established.
ECDSA key fingerprint is SHA256:FvdKSIQSBpS0z6aY//ACcH2bxNDNPtzLebRwif7X+kU.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '54.162.30.125' (ECDSA) to the list of known hosts.
Register this system with Red Hat Insights: insights-client --register
Create an account or view all your systems at https://red.ht/insights-dashboard
Last login: Thu Apr 18 12:40:24 2024 from 34.208.51.7
[ec2-user@ip-172-31-40-3 ~]$ ls
Paralela
[ec2-user@ip-172-31-40-3 ~]$ cd Paralela
[ec2-user@ip-172-31-40-3 Paralela]$ ls
Lab01 Lab02 Lab03 README.md
[ec2-user@ip-172-31-40-3 Paralela]$ cd Lab03
[ec2-user@ip-172-31-40-3 Lab03]$ ls
helloWorld.c
[ec2-user@ip-172-31-40-3 Lab03]$ gcc -g -Wall -fopenmp -o helloWorld.exe helloWold.c
cc1: fatal error: helloWold.c: No such file or directory
compilation terminated.
[ec2-user@ip-172-31-40-3 Lab03]$ gcc -g -Wall -fopenmp -o helloWorld.exe helloWorld.c
[ec2-user@ip-172-31-40-3 Lab03]$ ./helloWorld.exe 4
Hello from thread 0 of 4
Hello from thread 3 of 4
Hello from thread 2 of 4
Hello from thread 1 of 4
[ec2-user@ip-172-31-40-3 Lab03]$
```

2. Adicionando código com munça na função f para ser seno

```
#include <stdio.h>
#include <stdlib.h>
#include <omp.h>
#include <math.h>
```

```

void Trap(double a, double b, int n, double* global_result_p)

int main(int argc, char* argv[]){
    double global_result = 0.0;
    double a, b;
    int n;
    int thread_count;

    thread_count = strtol(argv[1], NULL, 10);
    printf("Enter a, b, and n\n");
    scanf("%lf %lf %d", &a, &b, &n);
    #pragma omp parallel num_threads(thread_count)
    Trap(a, b, n, &global_result);

    printf("With n = %d trapezoids, our estimate\n", n);
    printf("of the integral from %f to %f = %.14e\n", a, b, g
    return 0;
}

double f (double x){
    return sin(x);
}

void Trap(double a, double b, int n, double* global_result_p)
    double h, x, my_result;
    double local_a, local_b;
    int i, local_n;
    int my_rank = omp_get_thread_num();
    int thread_count = omp_get_num_threads();

    h = (b-a)/n;
    local_n = n/thread_count;
    local_a = a + my_rank*local_n*h;
    local_b = local_a + local_n*h;
    my_result = (f(local_a) + f(local_b)) / 2.0;
    for (i = 1; i <= local_n-1; i++){
        x = local_a + i*h;
        my_result += f(x);
    }
}

```

```

    }

    //#pragma omp critical
    *global_result_p += my_result;
}

```

4 Answers

Sorted by: Highest score (default)

Não encontrou uma resposta? [Pergunte em Stack Overflow em Português.](#)



You have compiled your code with references to the correct math.h header file, but when you attempted to link it, you forgot the option to include the math library. As a result, you can compile your .o object files, but not build your executable.

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As Paul has already mentioned add "`-lm`" to link with the math library in the step where you are attempting to generate your executable.



In the [comment](#), [linuxD](#) asks:



Why for `sin()` in `<math.h>`, do we need `-lm` option explicitly; but, not for `printf()` in `<stdio.h>`?

resolução de problema na compilação

```

eee_W_2981676@runweb121879:~$ ssh -i .ssh/labsuser.pem ec2-user@54.196.67.56
The authenticity of host '54.196.67.56 (54.196.67.56)' can't be established.
ECDSA key fingerprint is SHA256:FvdKSIQSBpS0z6aY//ACcH2bxNDNPtzLebRwif7X+kU.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '54.196.67.56' (ECDSA) to the list of known hosts.
Register this system with Red Hat Insights: insights-client --register
Create an account or view all your systems at https://red.ht/insights-dashboard
Last login: Fri Apr 19 15:56:13 2024 from 54.213.87.229
[ec2-user@ip-172-31-40-3 ~]$ ls
Paralela
[ec2-user@ip-172-31-40-3 ~]$ cd Paralela
[ec2-user@ip-172-31-40-3 Paralela]$ ls
Lab01 Lab02 Lab03 README.md
[ec2-user@ip-172-31-40-3 Paralela]$ cd Lab03
[ec2-user@ip-172-31-40-3 Lab03]$ ls
helloWorld.c helloWorld.exe lab03.c
[ec2-user@ip-172-31-40-3 Lab03]$ rm lab03.c
[ec2-user@ip-172-31-40-3 Lab03]$ nano lab03.c
[ec2-user@ip-172-31-40-3 Lab03]$ gcc -g -Wall -fopenmp -o lab03.exe lab03.c
/usr/bin/ld: /tmp/ccUcY9dC.o: in function `f':
/home/ec2-user/Paralela/Lab03/lab03.c:26: undefined reference to `sin'
collect2: error: ld returned 1 exit status
[ec2-user@ip-172-31-40-3 Lab03]$ nano lab03.c
[ec2-user@ip-172-31-40-3 Lab03]$ gcc -g -Wall -fopenmp -o lab03.exe lab03.c
/usr/bin/ld: /tmp/ccOfP5yK.o: in function `f':
/home/ec2-user/Paralela/Lab03/lab03.c:26: undefined reference to `sin'
collect2: error: ld returned 1 exit status
[ec2-user@ip-172-31-40-3 Lab03]$ gcc -g -Wall -fopenmp -lm -o lab03.exe lab03.c
[ec2-user@ip-172-31-40-3 Lab03]$ ./lab03.exe
Segmentation fault (core dumped)
[ec2-user@ip-172-31-40-3 Lab03]$ ./lab03.exe 4
Enter a, b, and n
5 15 4
With n = 4 trapezoids, our estimate
of the integral from 5.000000 to 15.000000 = 1.73338751281158e-01
[ec2-user@ip-172-31-40-3 Lab03]$ 

```

3. Rodar código

```

[ec2-user@ip-172-31-40-3 Lab03]$ time ./lab03.exe 1
Enter a, b, and n
1 9 9
With n = 9 trapezoids, our estimate
of the integral from 1.000000 to 9.000000 = 1.52390512741643e+00

real    0m36.770s
user    0m0.001s
sys     0m0.000s
[ec2-user@ip-172-31-40-3 Lab03]$ time ./lab03.exe 2
Enter a, b, and n
1 9 9
With n = 9 trapezoids, our estimate
of the integral from 1.000000 to 9.000000 = 8.34283909172244e-01

real    0m3.108s
user    0m0.002s
sys     0m0.000s
[ec2-user@ip-172-31-40-3 Lab03]$ time ./lab03.exe 4
Enter a, b, and n
1 9 9
With n = 9 trapezoids, our estimate
of the integral from 1.000000 to 9.000000 = 8.34283909172244e-01

real    0m4.699s
user    0m0.002s
sys     0m0.000s
[ec2-user@ip-172-31-40-3 Lab03]$ time ./lab03.exe 4
Enter a, b, and n
1 9 9
With n = 9 trapezoids, our estimate
of the integral from 1.000000 to 9.000000 = 8.34283909172244e-01

real    0m1.237s
user    0m0.001s
sys     0m0.001s
[ec2-user@ip-172-31-40-3 Lab03]$ time ./lab03.exe 6
Enter a, b, and n
1 9 9
With n = 9 trapezoids, our estimate
of the integral from 1.000000 to 9.000000 = -4.81331281391914e-01

real    0m1.527s
user    0m0.001s
sys     0m0.001s
[ec2-user@ip-172-31-40-3 Lab03]$ time ./lab03.exe 8
Enter a, b, and n
1 9 9
With n = 9 trapezoids, our estimate
of the integral from 1.000000 to 9.000000 = 8.34283909172245e-01

real    0m2.743s
user    0m0.000s
sys     0m0.002s
[ec2-user@ip-172-31-40-3 Lab03]$ 

```

1 thread = 36.77seg

2 threads = 3.108seg

4 threads = 1.237seg

6 threads = 1.527seg

8 threads = 2.743seg

Paralelo seria 36.77 seg sempre

4. Calculo do speedup

1 thread = 1

2 threads = 11.831

4 threads = 29.725

6 threads = 24.080

8 threads = 13.405

5. descomentar linha sobre o critical

```
To github.com:Marina-Martin/Paralela.git
b923c00..372ef98  main -> main
[ec2-user@ip-172-31-40-3 Lab03]$ gcc -g -Wall -fopenmp -lm -o lab03b.exe
/usr/bin/ld: /usr/lib/gcc/x86_64-redhat-linux/11/../../../../lib64/crt1.o: in function
(.text+0x1b): undefined reference to `main'
collect2: error: ld returned 1 exit status
[ec2-user@ip-172-31-40-3 Lab03]$ nano lab03.c
[ec2-user@ip-172-31-40-3 Lab03]$
[ec2-user@ip-172-31-40-3 Lab03]$ gcc -g -Wall -fopenmp -lm -o lab03b.exe lab03.c
```

6. refazer os testes


```

[ec2-user@ip-172-31-40-3 Lab03]$ time ./lab03b.exe 1
Enter a, b, and n
1 9 9
With n = 9 trapezoids, our estimate
of the integral from 1.000000 to 9.000000 = 1.52390512741643e+00

real    0m3.065s
user    0m0.001s
sys     0m0.000s
[ec2-user@ip-172-31-40-3 Lab03]$ time ./lab03b.exe 2
Enter a, b, and n
1 9 9
With n = 9 trapezoids, our estimate
of the integral from 1.000000 to 9.000000 = 8.34283909172244e-01

real    0m1.466s
user    0m0.001s
sys     0m0.000s
[ec2-user@ip-172-31-40-3 Lab03]$ time ./lab03b.exe 4
Enter a, b, and n
1 9 9
With n = 9 trapezoids, our estimate
of the integral from 1.000000 to 9.000000 = 8.34283909172244e-01

real    0m1.441s
user    0m0.000s
sys     0m0.002s
[ec2-user@ip-172-31-40-3 Lab03]$ time ./lab03b.exe 6
Enter a, b, and n
1 9 9
With n = 9 trapezoids, our estimate
of the integral from 1.000000 to 9.000000 = -4.81331281391914e-01

real    0m1.305s
user    0m0.001s
sys     0m0.001s
[ec2-user@ip-172-31-40-3 Lab03]$ time ./lab03b.exe 8
Enter a, b, and n
1 9 9
With n = 9 trapezoids, our estimate
of the integral from 1.000000 to 9.000000 = 8.34283909172245e-01

real    0m1.124s
user    0m0.000s
sys     0m0.002s

```

1 thread = 3.065seg

2 thread = 1.466seg

4 threads = 1.441seg

6 threads = 1.305seg

8 threads = 1.124seg

speedup

1 thread = 1

2 thread = 2.091

4 threads = 2.127

6 threads = 2.349

8 threads = 2.727

7. Processador

Intel(R) Xeon(R) CPU E5-2676 v3 @ 2.40GHz

```
[ec2-user@ip-172-31-40-3 Lab03]$ cat /proc/cpuinfo
processor       : 0
vendor_id      : GenuineIntel
cpu family     : 6
model          : 63
model name     : Intel(R) Xeon(R) CPU E5-2676 v3 @ 2.40GHz
stepping       : 2
microcode      : 0x49
cpu MHz        : 2399.921
cache size     : 30720 KB
physical id    : 0
siblings       : 1
core id        : 0
cpu cores      : 1
apicid         : 0
initial apicid : 0
fpu            : yes
fpu_exception  : yes
cpuid level    : 13
wp             : yes
flags          : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat
rdtscp lm constant_tsc rep_good nopl xtopology cpuid tsc_known_freq pni pclmulqdq ss
opcnt tsc_deadline_timer aes xsave avx f16c rdrand hypervisor lahf_lm abm cpuid_fault
mi2 erms invpcid xsaveopt
bugs           : cpu_meltdown spectre_v1 spectre_v2 spec_store_bypass l1tf mds swap
bogomips       : 4800.00
clflush size   : 64
cache_alignment : 64
address sizes   : 46 bits physical, 48 bits virtual
power management:
```