```
Architecture:          x86_64
  CPU op-mode(s):      32-bit, 64-bit
  Address sizes:       46 bits physical, 48 bits virtual
  Byte Order:          Little Endian
CPU(s):                80
  On-line CPU(s) list:  0-79
Vendor ID:             GenuineIntel
  Model name:          Intel(R) Xeon(R) Gold 6248 CPU @ 2.50GHz
    CPU family:        6
    Model:             85
    Thread(s) per core: 2
    Core(s) per socket: 20
    Socket(s):         2
    Stepping:          7
    CPU max MHz:       3900.0000
    CPU min MHz:       1000.0000
Caches (sum of all):
  L1d:                 1.3 MiB (40 instances)
  L1i:                 1.3 MiB (40 instances)
  L2:                  40 MiB (40 instances)
  L3:                  55 MiB (2 instances)
NUMA:
  NUMA node(s):        2
  NUMA node0 CPU(s):   0-19,40-59
  NUMA node1 CPU(s):   20-39,60-79
ProLiant XL270d Gen10
available: 2 nodes (0-1)
node 0 size: 385636 MB
node 0 free: 2878 MB
node 1 size: 387008 MB
node 1 free: 921 MB
PRETTY_NAME="Ubuntu 22.04.3 LTS"
NAME="Ubuntu"
VERSION_ID="22.04"
VERSION="22.04.3 LTS (Jammy Jellyfish)"
VERSION_CODENAME=jammy
ID=ubuntu
ID_LIKE=debian
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"
BUG_REPORT_URL="https://bugs.launchpad.net/ubuntu/"
PRIVACY_POLICY_URL="https://www.ubuntu.com/legal/terms-and-policies/privacy-policy"
UBUNTU_CODENAME=jammy
```

Задание 1

Программа запускалась 5 раз подряд:

```
d.kulev@d2e6a4e2eddd:~/Task_2$ ./test1
20000*20000, 1 threads: 9.36783 seconds
20000*20000, 2 threads: 5.0006 seconds
20000*20000, 4 threads: 2.42765 seconds
20000*20000, 7 threads: 1.43906 seconds
20000*20000, 8 threads: 1.23732 seconds
20000*20000, 16 threads: 0.682347 seconds
20000*20000, 20 threads: 0.546311 seconds
20000*20000, 40 threads: 0.44703 seconds
40000*40000, 1 threads: 37.1458 seconds
40000*40000, 2 threads: 18.5734 seconds
40000*40000, 4 threads: 8.9107 seconds
40000*40000, 7 threads: 5.26432 seconds
40000*40000, 8 threads: 4.71932 seconds
40000*40000, 16 threads: 2.65562 seconds
40000*40000, 20 threads: 2.3153 seconds
40000*40000, 40 threads: 1.7104 seconds
```

```
d.kulev@d2e6a4e2eddd:~/Task_2$ ./test1
20000*20000, 1 threads: 9.29614 seconds
20000*20000, 2 threads: 4.33814 seconds
20000*20000, 4 threads: 2.19506 seconds
20000*20000, 7 threads: 1.28705 seconds
20000*20000, 8 threads: 1.16632 seconds
20000*20000, 16 threads: 0.655951 seconds
20000*20000, 20 threads: 0.551283 seconds
20000*20000, 40 threads: 0.432529 seconds
40000*40000, 1 threads: 37.0851 seconds
40000*40000, 2 threads: 18.8094 seconds
40000*40000, 4 threads: 9.29052 seconds
40000*40000, 7 threads: 5.49121 seconds
40000*40000, 8 threads: 4.87906 seconds
40000*40000, 16 threads: 2.49029 seconds
40000*40000, 20 threads: 2.12598 seconds
40000*40000, 40 threads: 1.68372 seconds
```

```
d.kulev@d2e6a4e2eddd:~/Task_2$ ./test1
20000*20000, 1 threads: 9.49102 seconds
20000*20000, 2 threads: 4.54284 seconds
20000*20000, 4 threads: 2.30547 seconds
20000*20000, 7 threads: 1.39436 seconds
20000*20000, 8 threads: 1.20345 seconds
20000*20000, 16 threads: 0.637145 seconds
20000*20000, 20 threads: 0.530857 seconds
20000*20000, 40 threads: 0.428274 seconds
40000*40000, 1 threads: 37.7717 seconds
40000*40000, 2 threads: 17.8005 seconds
40000*40000, 4 threads: 9.60427 seconds
40000*40000, 7 threads: 5.61398 seconds
40000*40000, 8 threads: 5.02845 seconds
40000*40000, 16 threads: 2.49754 seconds
40000*40000, 20 threads: 2.11673 seconds
40000*40000, 40 threads: 1.68033 seconds
```

```
d.kulev@d2e6a4e2eddd:~/Task_2$ ./test1
20000*20000, 1 threads: 9.24186 seconds
20000*20000, 2 threads: 4.41288 seconds
20000*20000, 4 threads: 2.23734 seconds
20000*20000, 7 threads: 1.35444 seconds
20000*20000, 8 threads: 1.16157 seconds
20000*20000, 16 threads: 0.623848 seconds
20000*20000, 20 threads: 0.563618 seconds
20000*20000, 40 threads: 0.425136 seconds
40000*40000, 1 threads: 36.3915 seconds
40000*40000, 2 threads: 17.6093 seconds
40000*40000, 4 threads: 9.63973 seconds
40000*40000, 7 threads: 5.44536 seconds
40000*40000, 8 threads: 4.64024 seconds
40000*40000, 16 threads: 2.64481 seconds
40000*40000, 20 threads: 2.1557 seconds
40000*40000, 40 threads: 1.7206 seconds
```

```
d.kulev@d2e6a4e2eddd:~/Task_2$ ./test1
20000*20000, 1 threads: 8.86474 seconds
20000*20000, 2 threads: 4.51971 seconds
20000*20000, 4 threads: 2.20396 seconds
20000*20000, 7 threads: 1.29634 seconds
20000*20000, 8 threads: 1.14791 seconds
20000*20000, 16 threads: 0.678194 seconds
20000*20000, 20 threads: 0.566105 seconds
20000*20000, 40 threads: 0.415167 seconds
40000*40000, 1 threads: 37.6162 seconds
40000*40000, 2 threads: 20.4025 seconds
40000*40000, 4 threads: 9.12245 seconds
40000*40000, 7 threads: 5.34728 seconds
40000*40000, 8 threads: 4.66708 seconds
40000*40000, 16 threads: 2.56777 seconds
40000*40000, 20 threads: 2.10053 seconds
40000*40000, 40 threads: 1.62193 seconds
```

В таблице средние данные по результатам этих запусков.

M = N	Количество потоков							
	1	2	4	7	8	16	20	40
20k T	9,252318	4,562834	2,273896	1,35425	1,183314	0,655497	0,5516348	0,4296272
40k T	37,20206	18,63902	9,313534	5,43243	4,78683	2,571206	2,162848	1,683396
ideal S	1	2	4	7	8	16	20	40
20k S	1	2,027756872	4,068927515	6,83206055	7,818988029	14,1149662	16,77254227	21,53568955
40k S	1	1,995923605	3,994408567	6,848143464	7,771752914	14,46872013	17,20049675	22,09941095

Ускорение программы относительно идеального графика ускорения
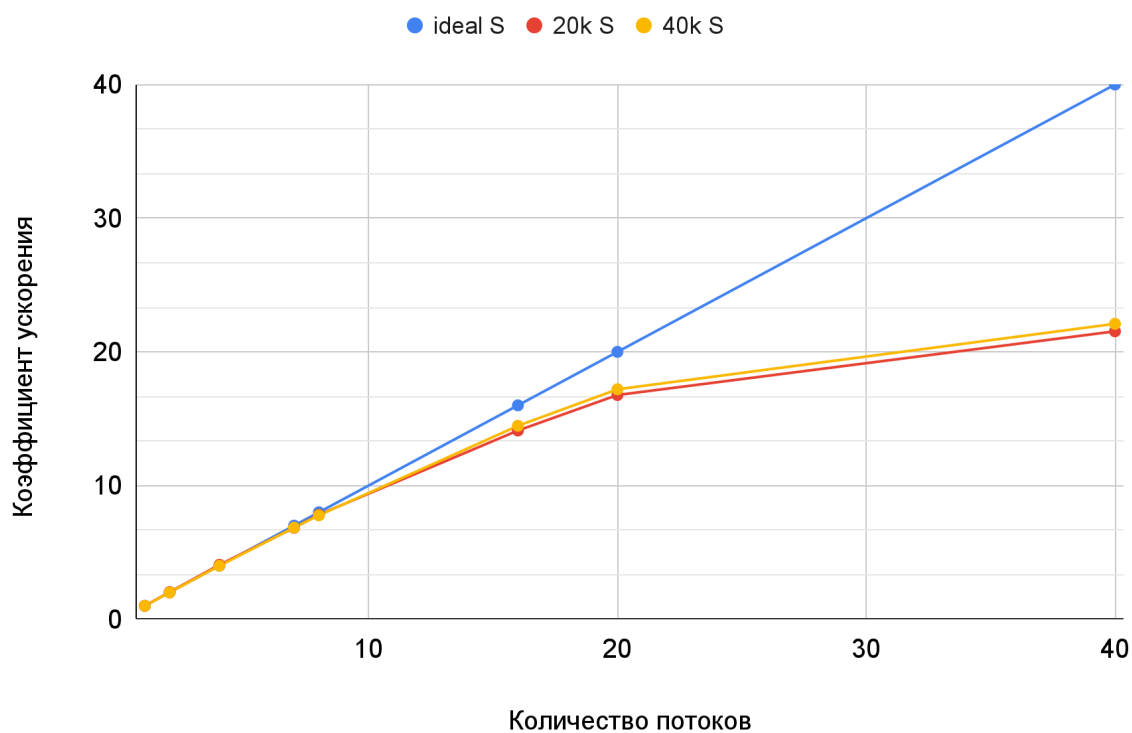
Вывод:

Коэффициент ускорения снижается с увеличением числа потоков, но не зависит от размера матрицы.

Задание 2

Программа запускалась 5 раз подряд:

```
d.kulev@d2e6a4e2eddd:~/Task_2$ ./test2
1 threads: 0.521756 seconds, sum = 1.77245
2 threads: 0.260902 seconds, sum = 1.77245
4 threads: 0.141807 seconds, sum = 1.77245
7 threads: 0.0841312 seconds, sum = 1.77245
8 threads: 0.0728965 seconds, sum = 1.77245
16 threads: 0.0472167 seconds, sum = 1.77245
20 threads: 0.037376 seconds, sum = 1.77245
40 threads: 0.0341651 seconds, sum = 1.77245
```

```
d.kulev@d2e6a4e2eddd:~/Task_2$ ./test2
1 threads: 0.523638 seconds, sum = 1.77245
2 threads: 0.255227 seconds, sum = 1.77245
4 threads: 0.130733 seconds, sum = 1.77245
7 threads: 0.0795554 seconds, sum = 1.77245
8 threads: 0.064916 seconds, sum = 1.77245
16 threads: 0.0484937 seconds, sum = 1.77245
20 threads: 0.0384048 seconds, sum = 1.77245
40 threads: 0.023482 seconds, sum = 1.77245
```

```
d.kulev@d2e6a4e2eddd:~/Task_2$ ./test2
1 threads: 0.481887 seconds, sum = 1.77245
2 threads: 0.256011 seconds, sum = 1.77245
4 threads: 0.131543 seconds, sum = 1.77245
7 threads: 0.0893286 seconds, sum = 1.77245
8 threads: 0.0718092 seconds, sum = 1.77245
16 threads: 0.0491818 seconds, sum = 1.77245
20 threads: 0.0370655 seconds, sum = 1.77245
40 threads: 0.0340093 seconds, sum = 1.77245
```

```
d.kulev@d2e6a4e2eddd:~/Task_2$ ./test2
1 threads: 0.521059 seconds, sum = 1.77245
2 threads: 0.259528 seconds, sum = 1.77245
4 threads: 0.135633 seconds, sum = 1.77245
7 threads: 0.0843313 seconds, sum = 1.77245
8 threads: 0.0652565 seconds, sum = 1.77245
16 threads: 0.051431 seconds, sum = 1.77245
20 threads: 0.0362524 seconds, sum = 1.77245
40 threads: 0.0337686 seconds, sum = 1.77245
```

```
d.kulev@d2e6a4e2eddd:~/Task_2$ ./test2
1 threads: 0.522858 seconds, sum = 1.77245
2 threads: 0.264237 seconds, sum = 1.77245
4 threads: 0.135977 seconds, sum = 1.77245
7 threads: 0.0831207 seconds, sum = 1.77245
8 threads: 0.0651422 seconds, sum = 1.77245
16 threads: 0.0434162 seconds, sum = 1.77245
20 threads: 0.0452363 seconds, sum = 1.77245
40 threads: 0.0333793 seconds, sum = 1.77245
```

В таблице средние данные по результатам этих запусков.

M = N	Количество потоков							
	1	2	4	7	8	16	20	40
	T	T	T	T	T	T	T	T
real	0,5142396	0,259181	0,1351386	0,08409344	0,06800408	0,0483119	0,038867	0,03176086
ideal	1	2	4	7	8	16	20	40
real	1	1,984094513	3,805275473	6,115097682	7,561893345	10,64416013	13,23075102	16,19098475

Ускорение программы относительно идеального графика ускорения

● ideal   ● real
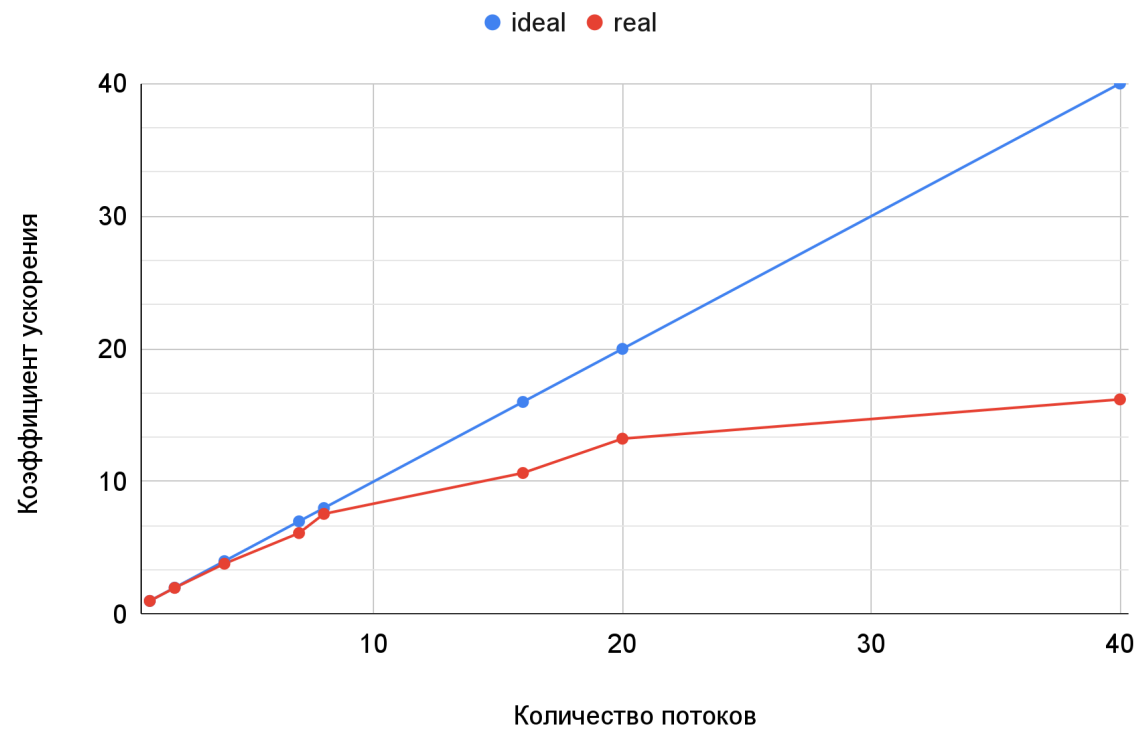
Вывод:
Коэффициент ускорения снижается с увеличением числа потоков.

Задание 3