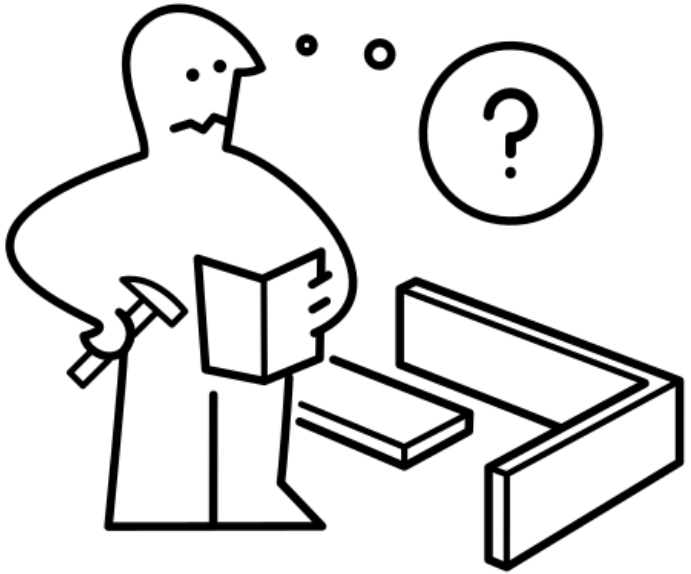
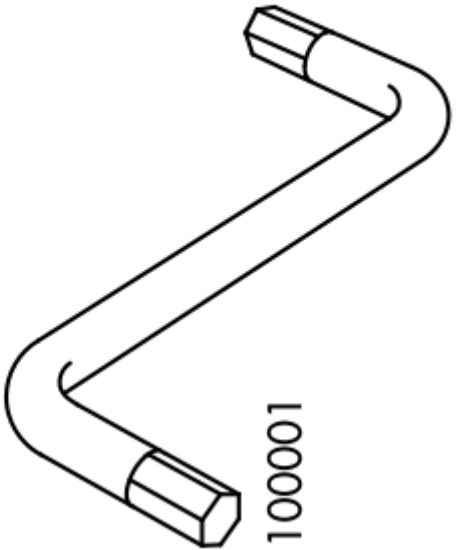
How worse can a stock perform?

Markus Bilz, 1705042



Greatest, likely loss?



Value at Risk
Simulation

(c) ikea.com

Value at Risk using a Monte Carlo simulation

```
repeat n times -> first kernel
    repeat t times
        generate normal distributed number
        update interim price
    save end price to path array
extract the nth rank -> second kernel
scale value at risk to holding period
print results
```

1st kernel

(generating random prices)

specification

trivial problem / no interaction between threads

transform algorithm

All threads run the same code / no thread divergence

...

{demo}

2nd kernel

(extracting the minimal price)

{demo}

specification

non trivial problem / dependence between threads

reduce algorithm

potential bank conflicts / idle threads

...

performance evaluation

gpu specification

gpu specification

NVIDIA GeForce 940MX

3 Mb dedicated memory

384 cores

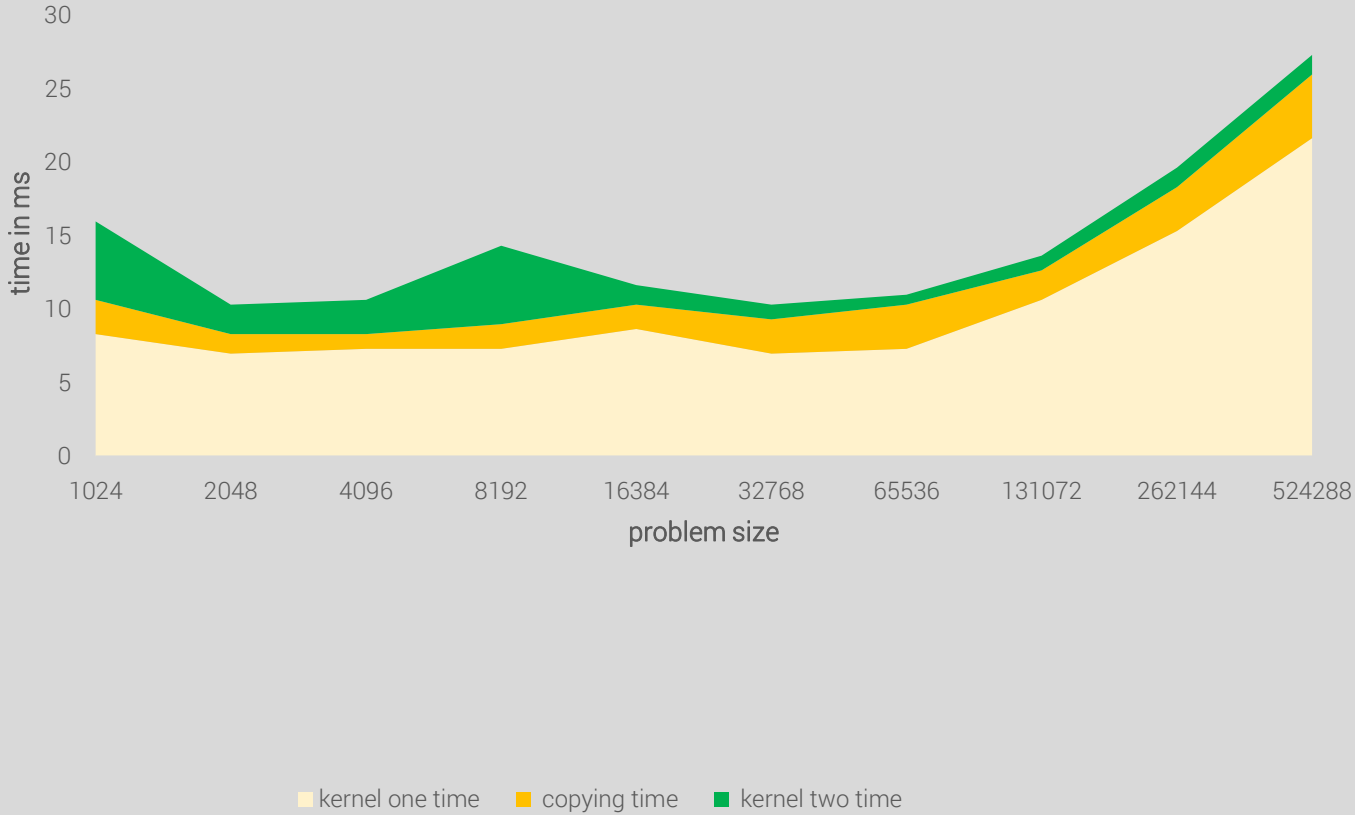
misc

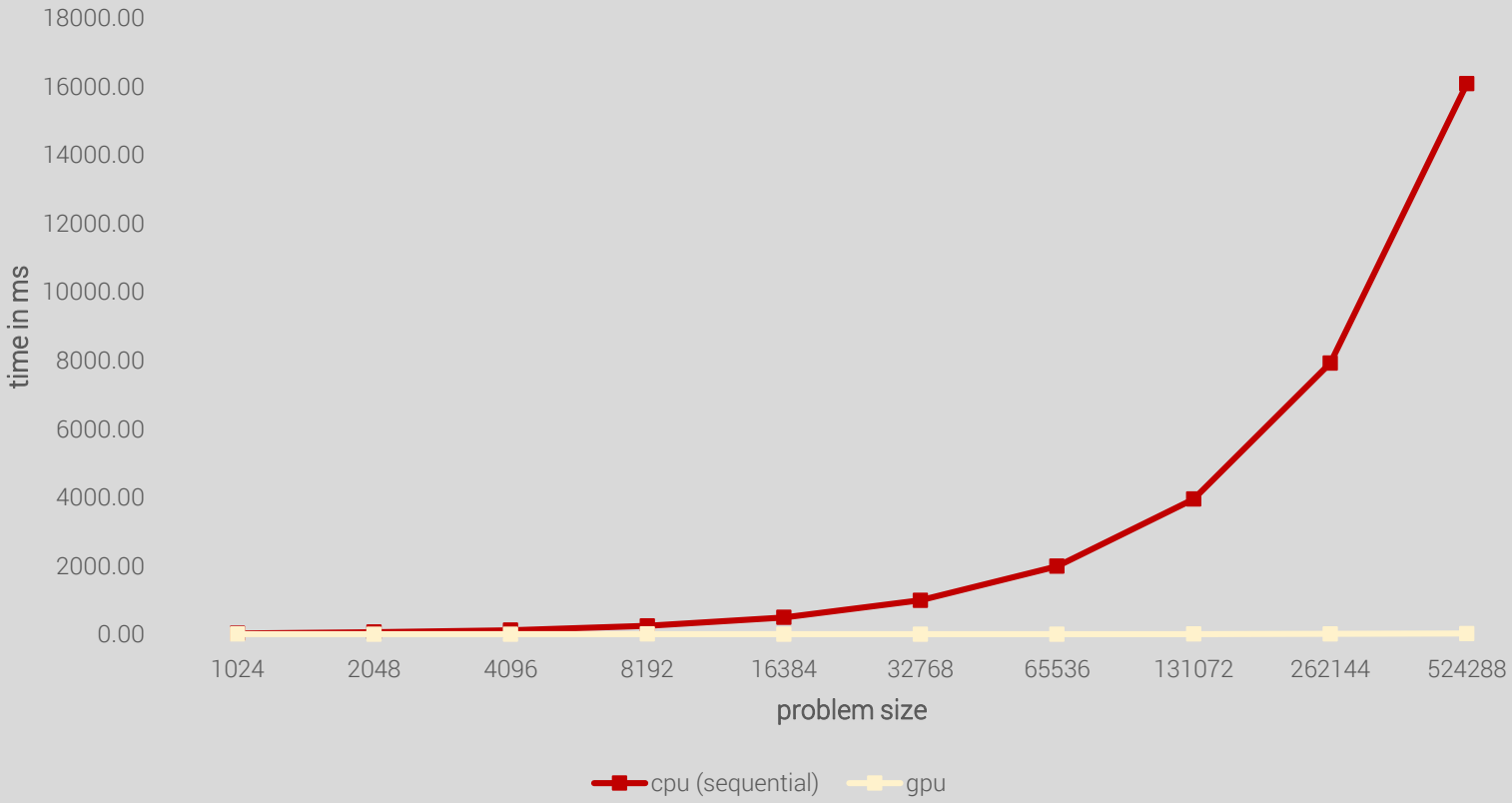
using wakeup call to prevent JIT and lazy initialization

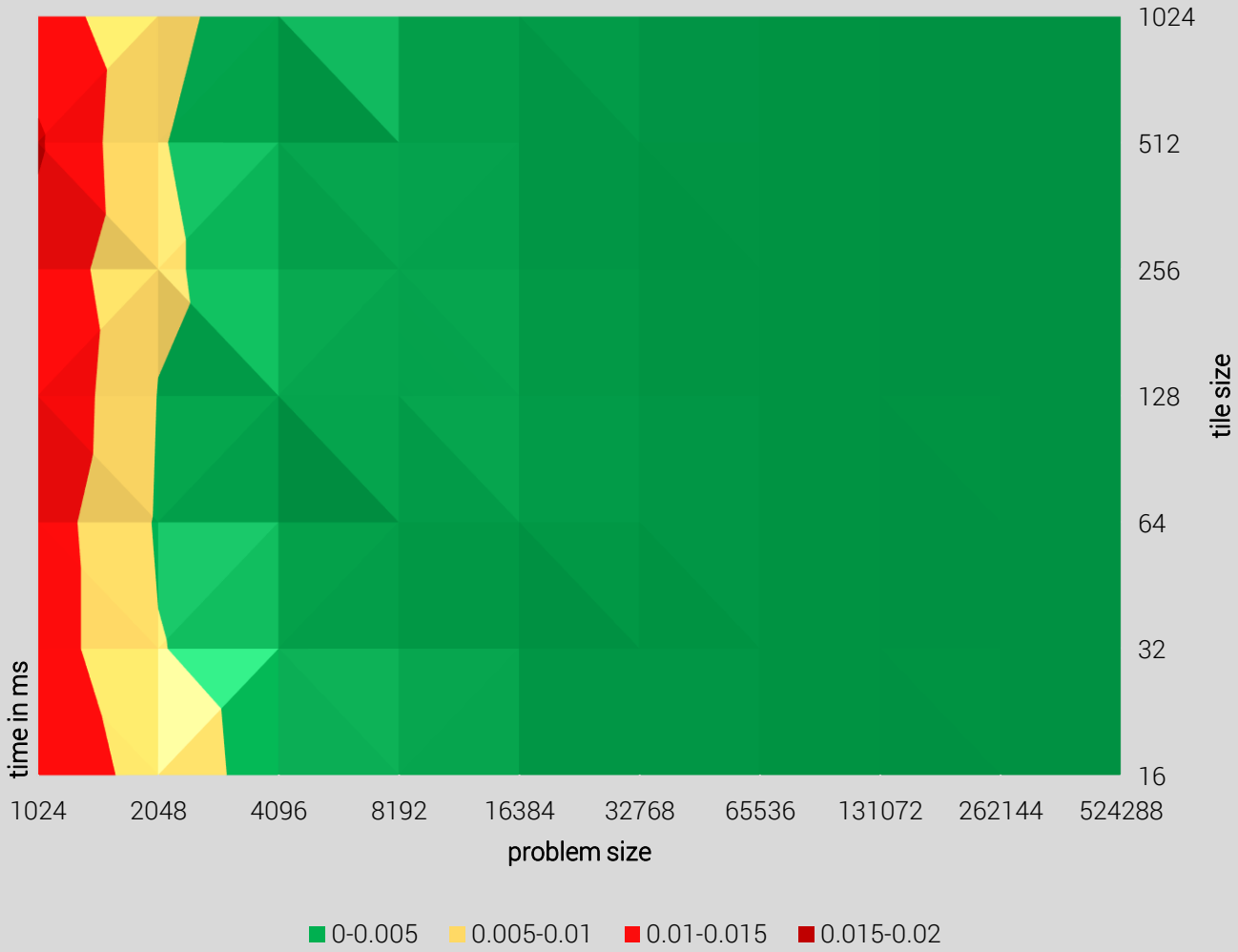
using std::chrono::steady_clock

using tile_size with multiple of two

accelerator_view::wait()


30
25
20
15
10
5
0
time in ms
1024
2048
4096
8192
16384
32768
65536
131072
262144
524288
problem size
kernel one time
copying time
kernel two time


18000.00
16000.00
14000.00
12000.00
10000.00
8000.00
6000.00
4000.00
2000.00
0.00
time in ms
1024
2048
4096
8192
16384
32768
65536
131072
262144
524288
problem size
cpu (sequential)
gpu


1024
512
256
128
64
32
16
tile size
time in ms
1024
2048
4096
8192
16384
32768
65536
131072
262144
524288
problem size
0-0.005
0.005-0.01
0.01-0.015
0.015-0.02

https://github.com/KarelZe/MC-VAR-Sim