ETH
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Programming Techniques for Scientific Simulations Exercise 6

HS 12
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Problem 6.1 Cache effects (Block A)

Write a program to determine the cache sizes of your computer. To that end, write a program that

1. creates an array of numbers,
2. repeatedly loops over the array, incrementing every n'th element,
3. and calculates the time per operation. You can measure the execution time using the `gettimeofday(...)` function. You should probably repeat the measurement several times in order to get a stable result.

Repeat this for different array sizes and step sizes n. Plot the calculated throughput versus array size for each value of n. Identify the size(s) of your computer's cache(s). Can you see an effect of the cache line size and/or cache associativity?

Problem 6.2 Report Block A - Hardware

Please write a report for the exercises about the exercises in Block A: machine precision, endianness and cache size and hand it in by next week.
We expect you to comment on what you learned from the hardware exercises, and to show your results of the cache measurements.

Problem 6.3 Traits (Block B)

Recall: You've introduced templates for the function object implementation of the Simpson integration (see last part of problem 5.1).
Your function should be able to give the correct result even if you call it like: `simpson(F, 5, 10, 128)`, where the boundaries are of type `int`. Using the `limits` library you should be able to write an automatic solution for all types.
[Bonus] Could you solve it for the case when allowing for different boundary type for a and b?