GPU, Multi/Many Core Computing I: Introduction to HPC

Exercise 1: *n*-body problem

Tweaks / errors

- Missing header files
  - check cppreference.com or so
- Fixes on web site
  - computepower.cpp
    - fixed peak performance with SSE enabled

Performance analysis

$$\mathrm{K2}(\beta) \rightarrow v_i := v_i + \beta\ a_i(\mathbf{x})\ ,\ a_i(\mathbf{x}) = G \sum_{j \neq i} \frac{m_j(\mathbf{x}_j - \mathbf{x}_i)}{\|\mathbf{x}_j - \mathbf{x}_i\|^3}.$$

- Question 1
  - State your assumptions!
    - Masses: you can assume constant m_i as in the implementation (or not)
    - Cache (for amount of transfers M):
      - always assume some local storage
      - you can assume infinite cache (or not)
    - you can include “smoothing length” (or not)

Performance analysis

- Questions 2-4
  - get C (FLOP) and M (transfers) according to implementation (might differ between CPU and GPU)
  - sqrt = 1 FLOP, rsqrt (if available) = 1 FLOP
  - Cache assumptions as in Question 1