

# N-body memory layout exploration

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# Structure

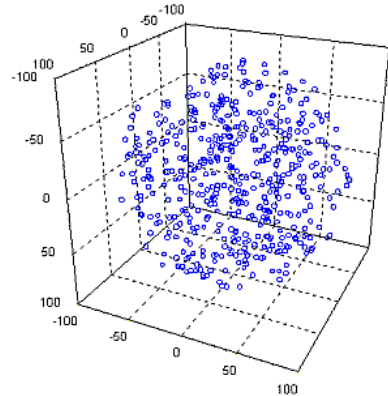
The task

Results

Explanation

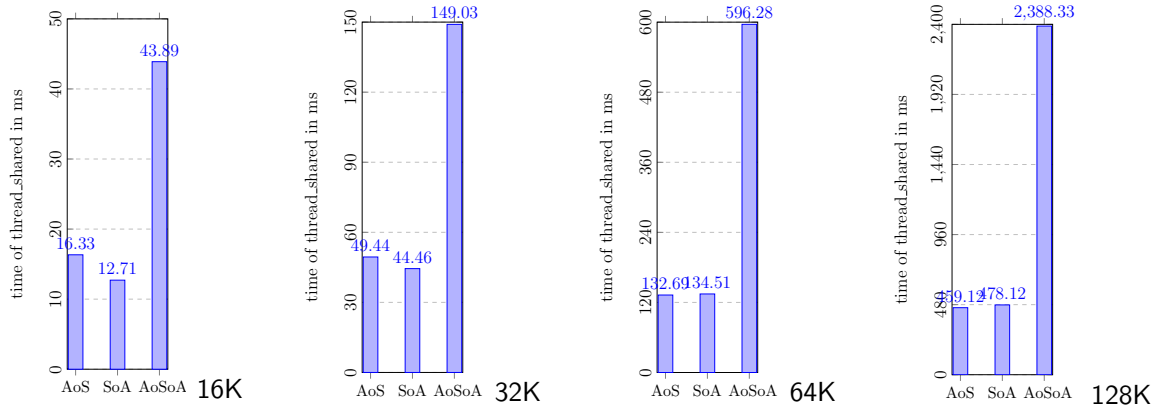
# The n-body simulation

- ▶ simulate the interaction of  $n$  particles
- ▶ each particle has
  - ▶ position  $x$
  - ▶ position  $y$
  - ▶ position  $z$
  - ▶ velocity  $x$
  - ▶ velocity  $y$
  - ▶ velocity  $z$
  - ▶ mass

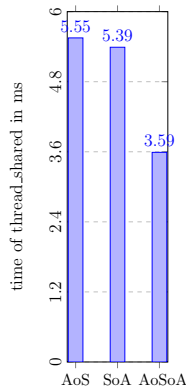


<http://astro.dur.ac.uk/~nm/pubhtml/nbody/nbody.html>

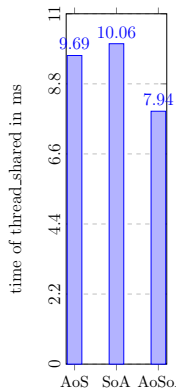
# Compare the memory structures - on K80



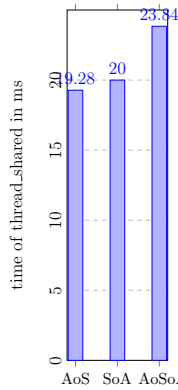
# Compare the memory structures - on v100



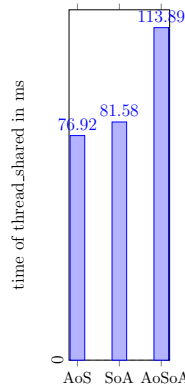
16K



32K

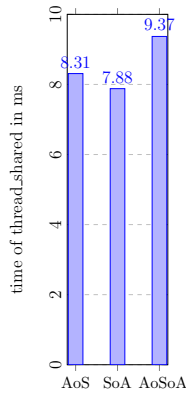


64K

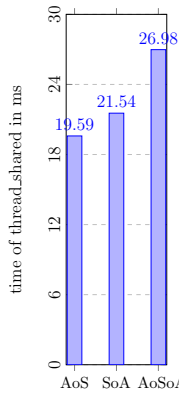


128K

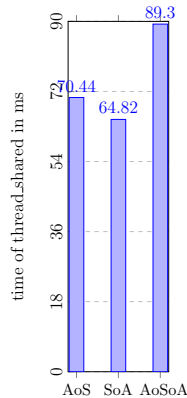
# Compare the memory structures - on 1070



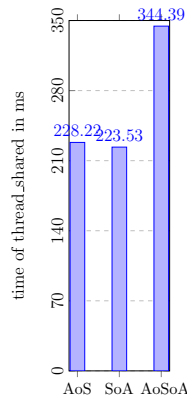
16K



32K



64K



128K

# Why?

Memory Layout:

- ▶ K80 - HBM
- ▶ v100 - ...
- ▶ 1070 - GDDR