

ACTS Parallelization Meeting

23-07-2021

Experiment setup

Hardware

- Intel i7-10870H @2.2 GHz: 1 socket x 8 cores x 2 hyper-threads
- Compiler: gcc 7.3.0

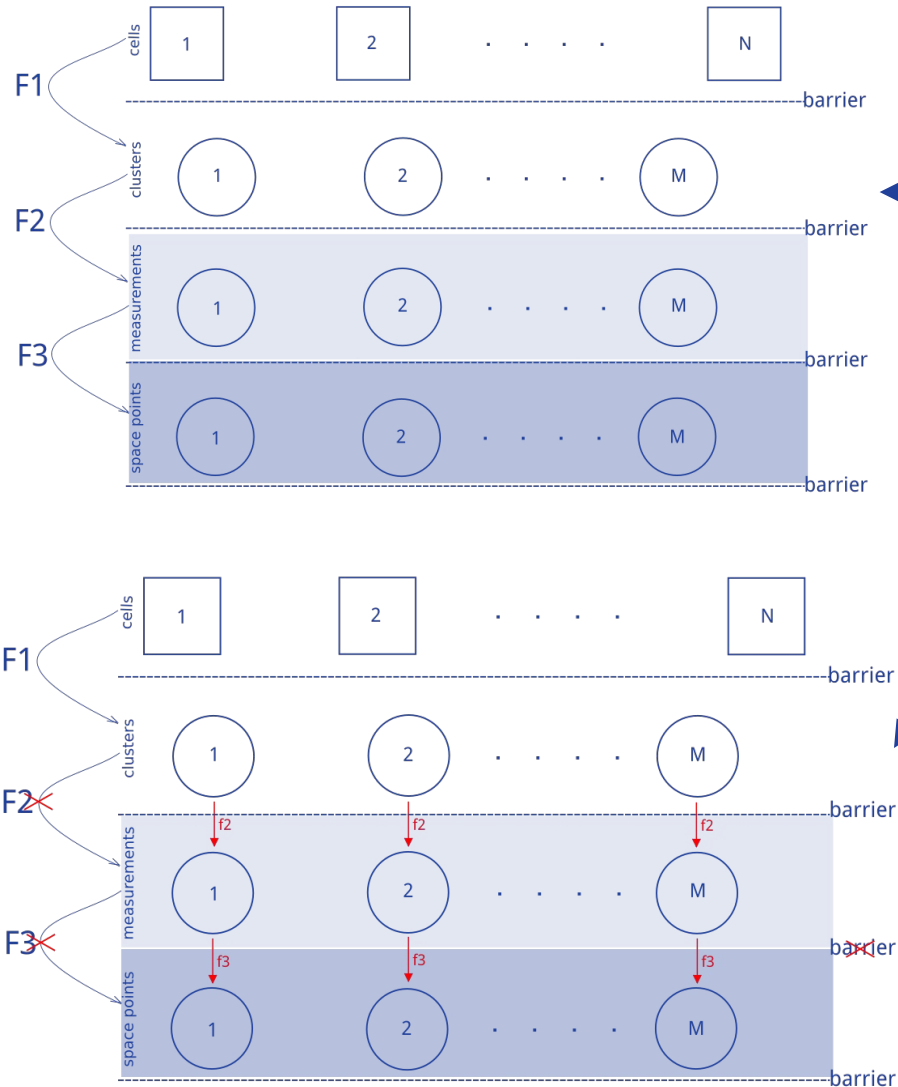
Physics data setup

- 100k single muons with 100GeV
- Constant magnetic field of 2T
- Pixel barrel hits only
- 10, 100, 500, 1000 events

Experiments

- 5 runs / test case
- Average values used for plotting

Implementations



Code versions

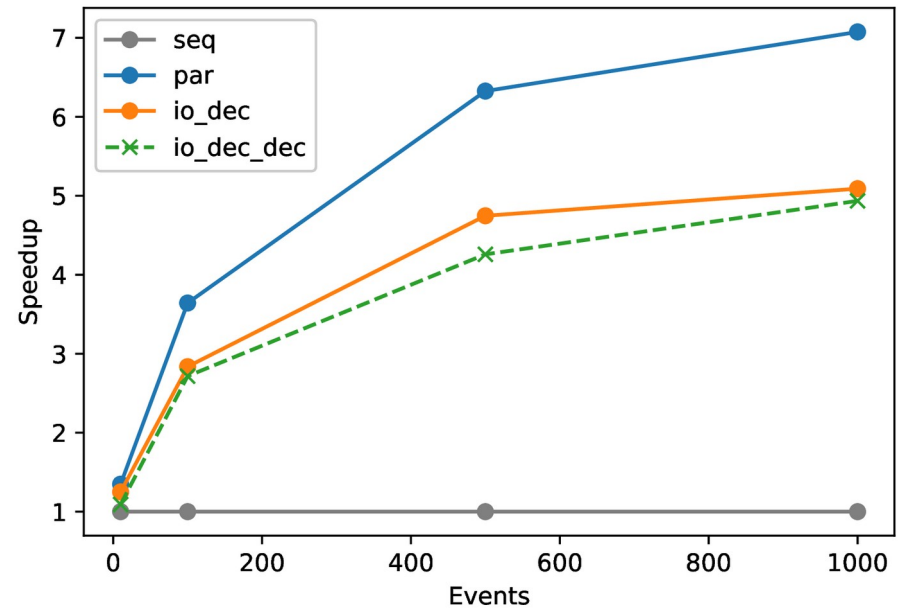
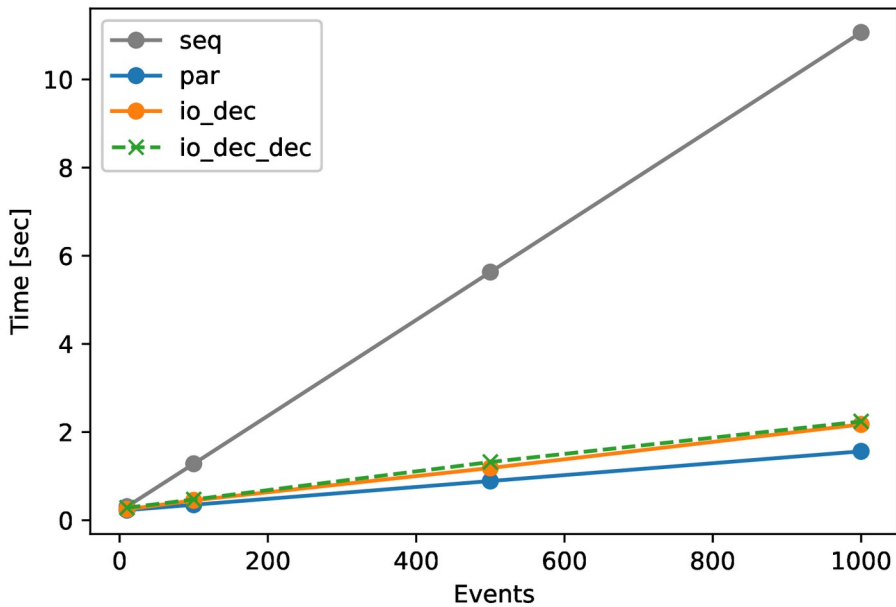
- seq = sequential example
- par = sequential + OpenMP support
- io_dec = → parallel read all
→ run parallel algorithms
→ parallel write all

io_dec_dec = io_dec
+ algorithm fragmentation

Performance measurements

Weak-scaling results

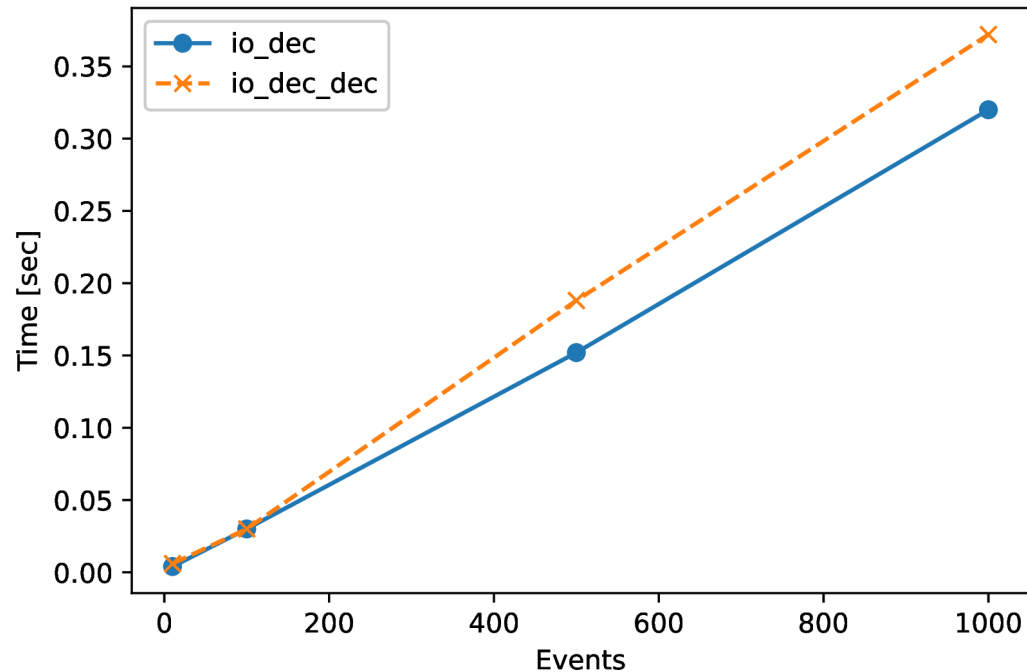
- par is 7x faster than seq (for 1k events)



Performance measurements

I/O decoupled

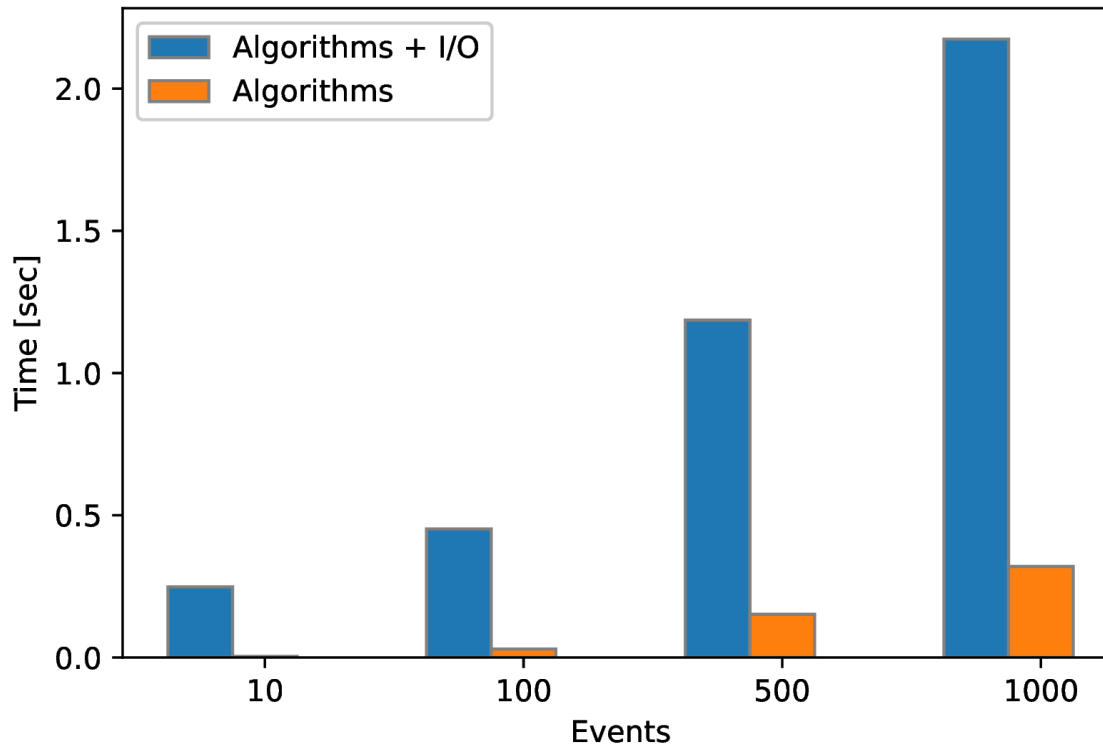
- `io_dec` is 0-20% faster than algorithms in `io_dec_dec`
- Worth retesting when seeding is in place



Performance measurements

I/O vs Algorithms (for decoupled example io_dec)

- I/O operations take 10x more than the algorithms (for 1k events)



Status

- par implementation is merged into traccc (PR#40)
- The I/O decoupled versions are still in my local branch
 - Should I create a PR for them? (Wait until more algorithms are added?)
- My current focus: automatically parallelize (& offload) computations using compiler support