CORSIKA 8 Parallelism & Performance Meeting

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Presented at 1st CORSIKA 8 Parallelism & Performance Meeting - KIT, Karlshuhe
January 21, 2021

Why a CORSIKA 8 Parallelism & Performance Meeting ?

- As already it was discussed many times: *"the current roadmap to increase overall efficiency is to deploy concurrency and parallelism: multiprocessing, multithreading and vectorization"*.
- CORSIKA shower simulations are among the most computing intensive tasks in HEP.
- It was decided that CORSIKA should take advantage of current parallel platforms in order to accelerate its calculations.
- Deployment of parallelism involves specific programming techniques and expertise.

The main goal of this new meeting is to provide an venue to a focused discussion of parallelism related matters, probably in a slightly higher technical level, as well as producing and collecting the corresponding documentation.

Accelerating CORSIKA 8

Things we need to understand before trying accelerate CORSIKA 8:

- How to produce program using patterns that favor parallelism. What are the suitable patterns?
- Where most of the time is spent ?
- What platforms fit better the workloads found CORSIKA 8 ?
- How much parallelism can be actually deployed in CORSIKA 8?
- How much speedup can we expect?
- Thread safety of algorithms, interfaces and modules.

Goals and tasks

- Benchmark CORSIKA 8 and its modules.
- Define a suitable computing model for parallelism: parallelization model, interfaces, policies and platforms.
- Define a suitable set of interfaces and primitives for parallelism.
- Draw recommendations and specifications for module developers.

Final comments

- The meetings will be hold initially in a monthly basis, but we can organize ad hoc meetings as well.
- Module developers, please: bring up some information regarding implementations, micro(macro)benchmarks.
- Permanent topics: GPUs, MPI, vectorization, thread-safety, thread-safe data structures.