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GPU for online processing in low-level trigger

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We describe a pilot project for the use of GPUs (Graphics processing units) in online triggering applications for high energy physics experiments.

General-purpose computing on GPUs is emerging as a new paradigm in several fields of science, although so far applications have been tailored to the specific strengths of such devices as accelerator in offline computation. With the steady reduction of GPU latencies, and the increase in link and memory throughput, the use of such devices for real-time applications in high-energy physics data acquisition and trigger systems is becoming ripe.

We will discuss in details the use of online parallel computing on GPU for synchronous low level trigger. We will show the results of two solution to reduce the data transmission latency: the first based on fast capture special driver and the second based on direct GPU communication using NaNet, a multi-standard, FPGA-based, low-latency, PCIe network interface card with GPUDirect capabilities.
We will present preliminary results on a first field test in the CERN NA62 experiment.

This study is done in the framework of GAP (GPU application project), a wider project intended to study the use of GPUs in real-time applications.

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