Improvements of the ALICE HLT data transport framework for LHC Run 2

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Highlights

- **The ALICE HLT framework was improved to cope with high rates expected in run 2.**

- **All trigger scenarios and maximum run 2 readout speed of detectors has been simulated with event replay and can be handled.**

- **CPU requirements of data transport framework reduced significantly to provide more compute power for reconstruction processing tasks.**
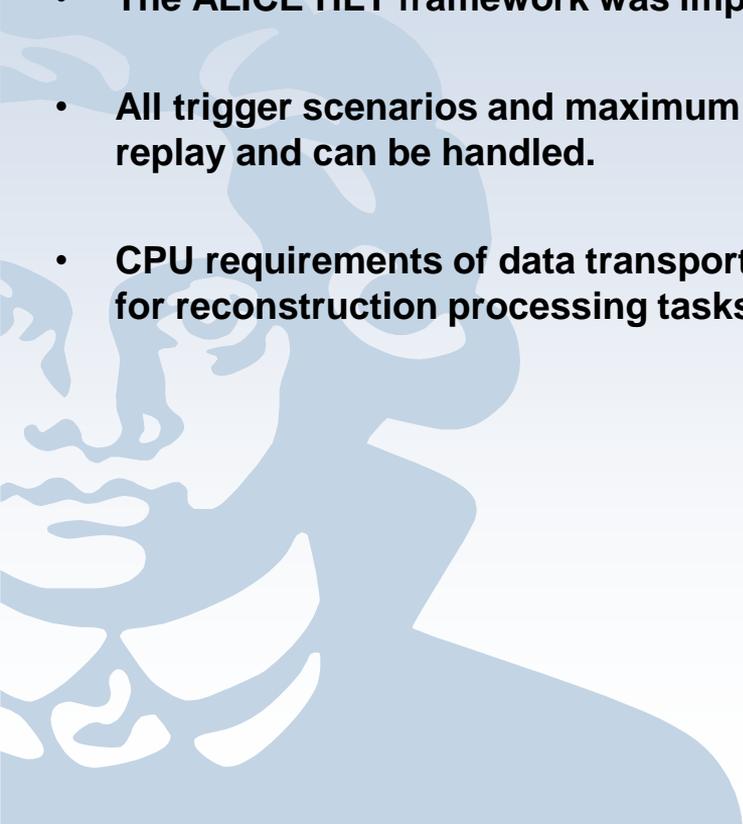
Summary

- **HLT framework throughput improved:**
  - Can cope with any data and event rate expected for run 2.
  - Can process TPC data at maximum link speed of 50 GB/s.
  - Event mergers with highest load of 12 links operate at up to 6 kHz.
  - Framework load reduced significantly, leaving more resources for reconstruction tasks.

- **HLT Startup time improved → never delays the start of run.**

- **Main improvement step:**
  - Improve inter-process communication via shared memory.
  - Redesign processing graph for better load-balancing.
  - Speed up python configuration scripts, use multi-processing in python.

- **New feature added:**
  - Feedback loop and asynchronous processes enable online calibration.
  - ZeroMQ transport added for calibration and for online QA.
  - Asynchronous processes protected against fatal errors like segmentation violations.