Implementation of the ATLAS trigger within the multi-threaded AthenaMT framework

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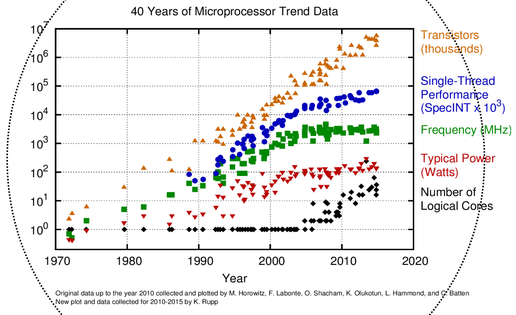
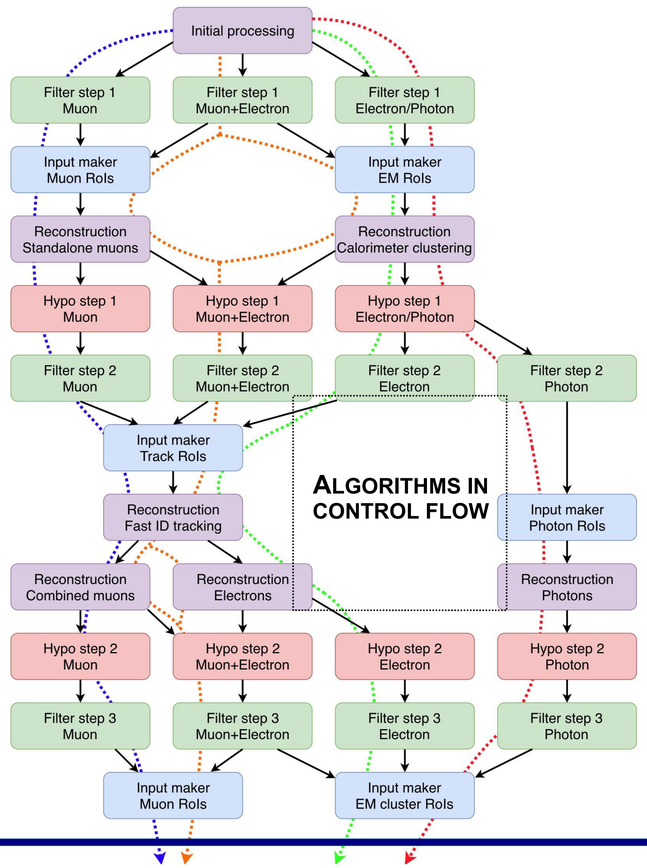
MOTIVATION

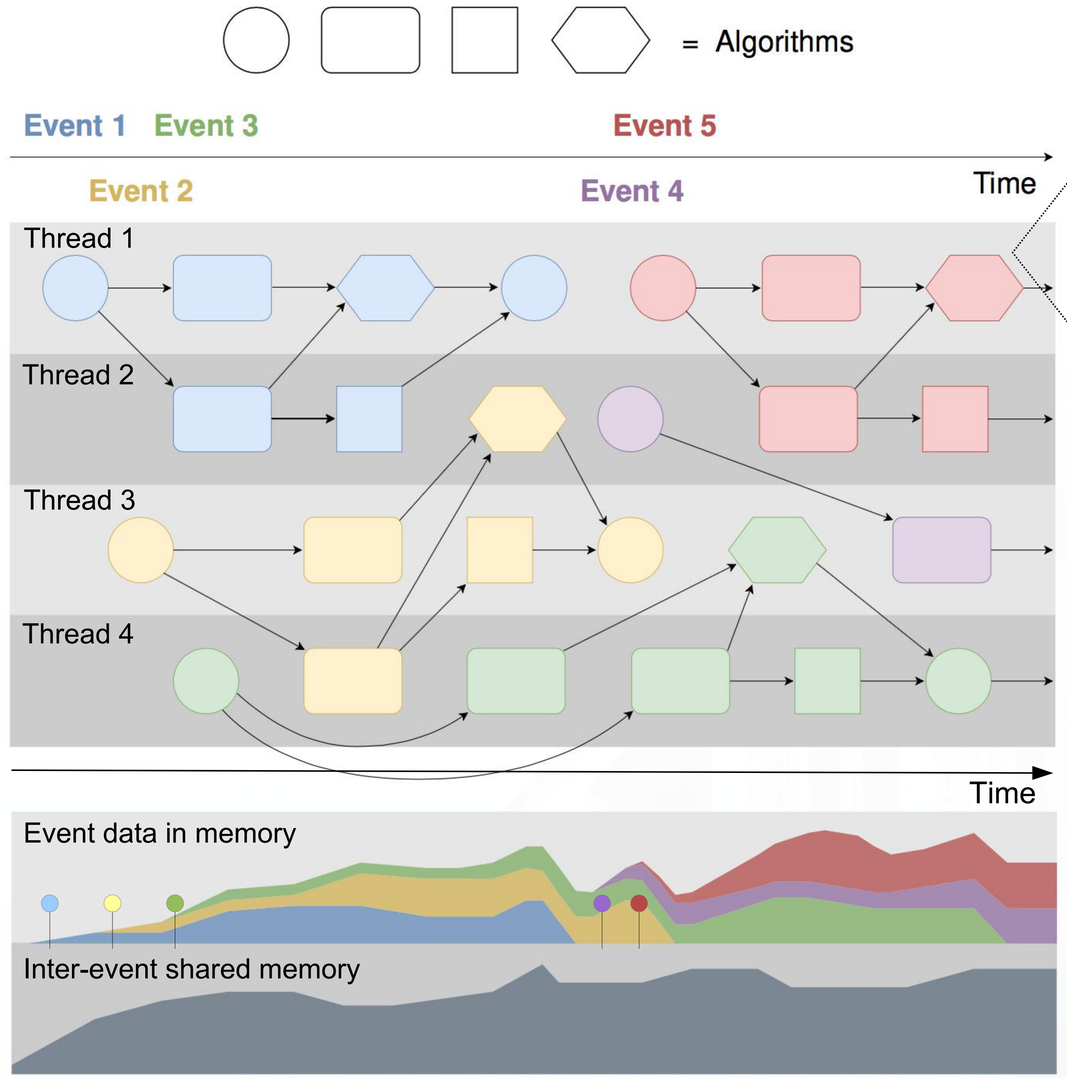


DESIGN

- Algorithm input / output are known in advance to the scheduler component
- Filtering and hypotheses provide input to the control flow of the scheduling process
- Scheduling allowing for **early event rejection**
- Data is retrieved and can be analysed over the whole detector or in small Regions of Interest



MULTI EVENT AND MULTI THREAD PROCESSING EXAMPLE



Data dependencies
define how algorithms are scheduled

Trigger chains
correspond to different paths through the fixed control flow diagram

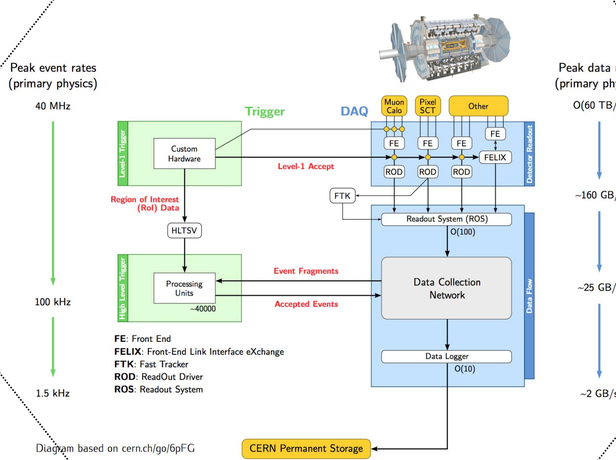
Filter algorithms
run at the start of each step and implement the early rejection

Input maker algorithms
restrict the following reconstruction to a region of interest

Reconstruction algorithms
process detector data to extract features

Hypothesis algorithms
execute hypothesis testing (e.g. $p_T > 10$ GeV) for all active chains

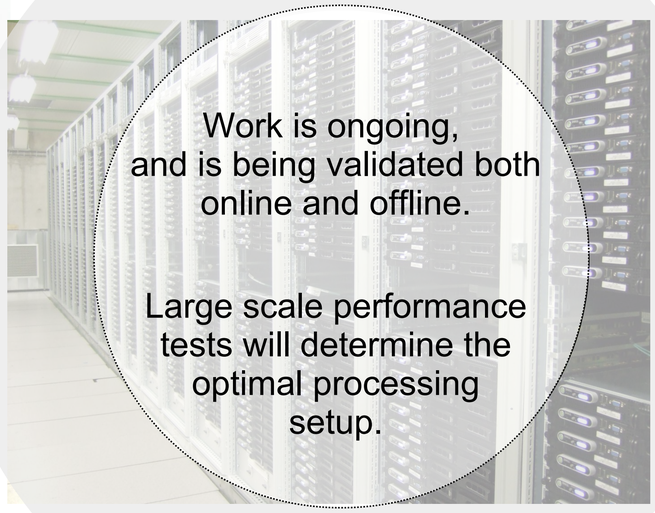
EXPERIMENT



OPERATION

- **40k physical cores** make up the High Level Trigger which will run a combination of the multi-process and multi-threaded approaches
- Online event processing and offline reconstruction will share more code and common configurations

STATUS



Work is ongoing, and is being validated both online and offline.

Large scale performance tests will determine the optimal processing setup.

REFERENCES

- R. Bielski, ATLAS Collaboration, 2019, ATL-DAQ-PROC-2019-004
- https://www.karlrupp.net/2015/06/40-years-of-microprocessor-trend-data/
- ATLAS TDAQ racks, cds.cern.ch/record/1696907