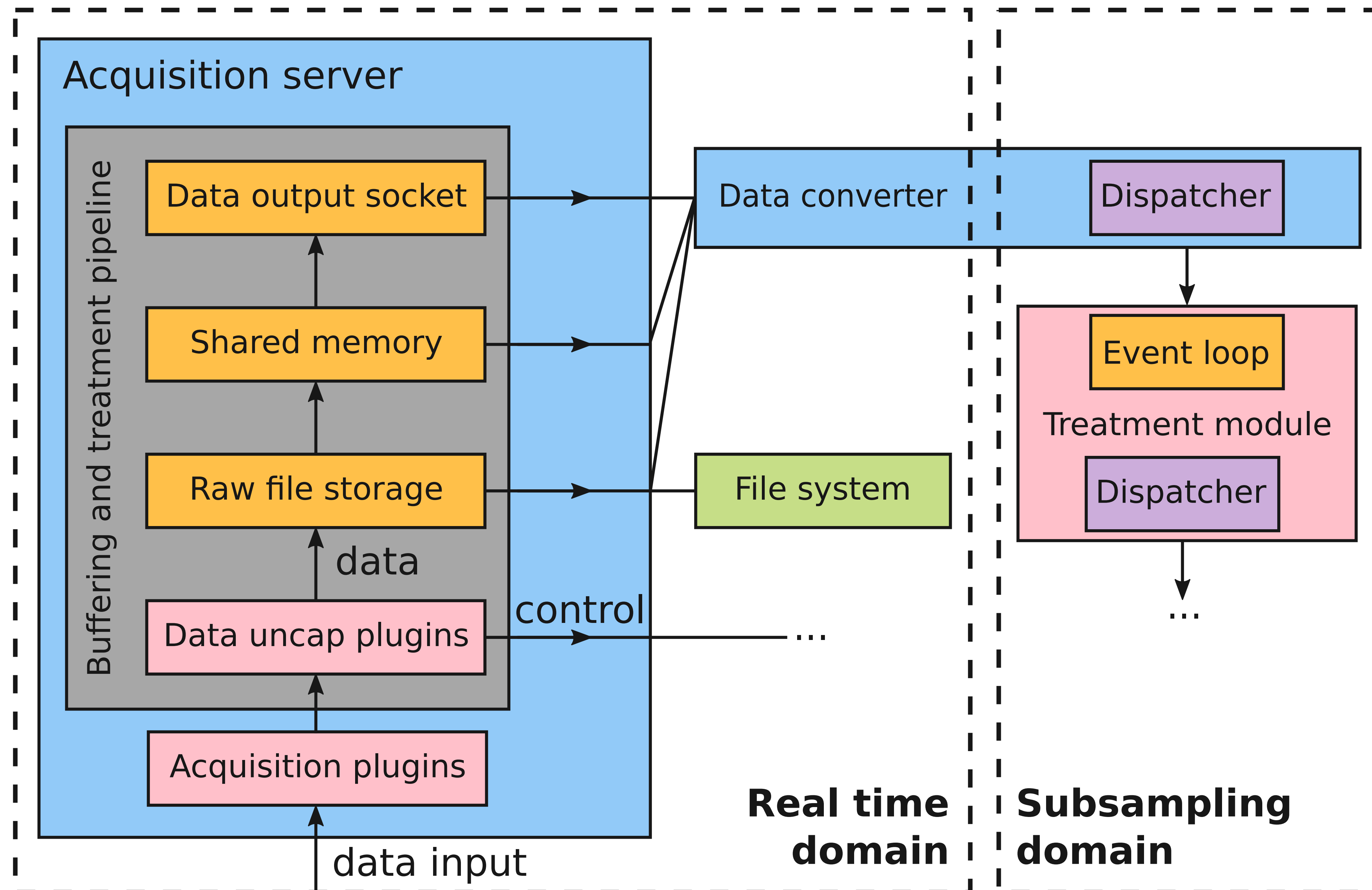


# Flexible online monitoring for high-energy physics with Pyrame

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## Acquisition chain

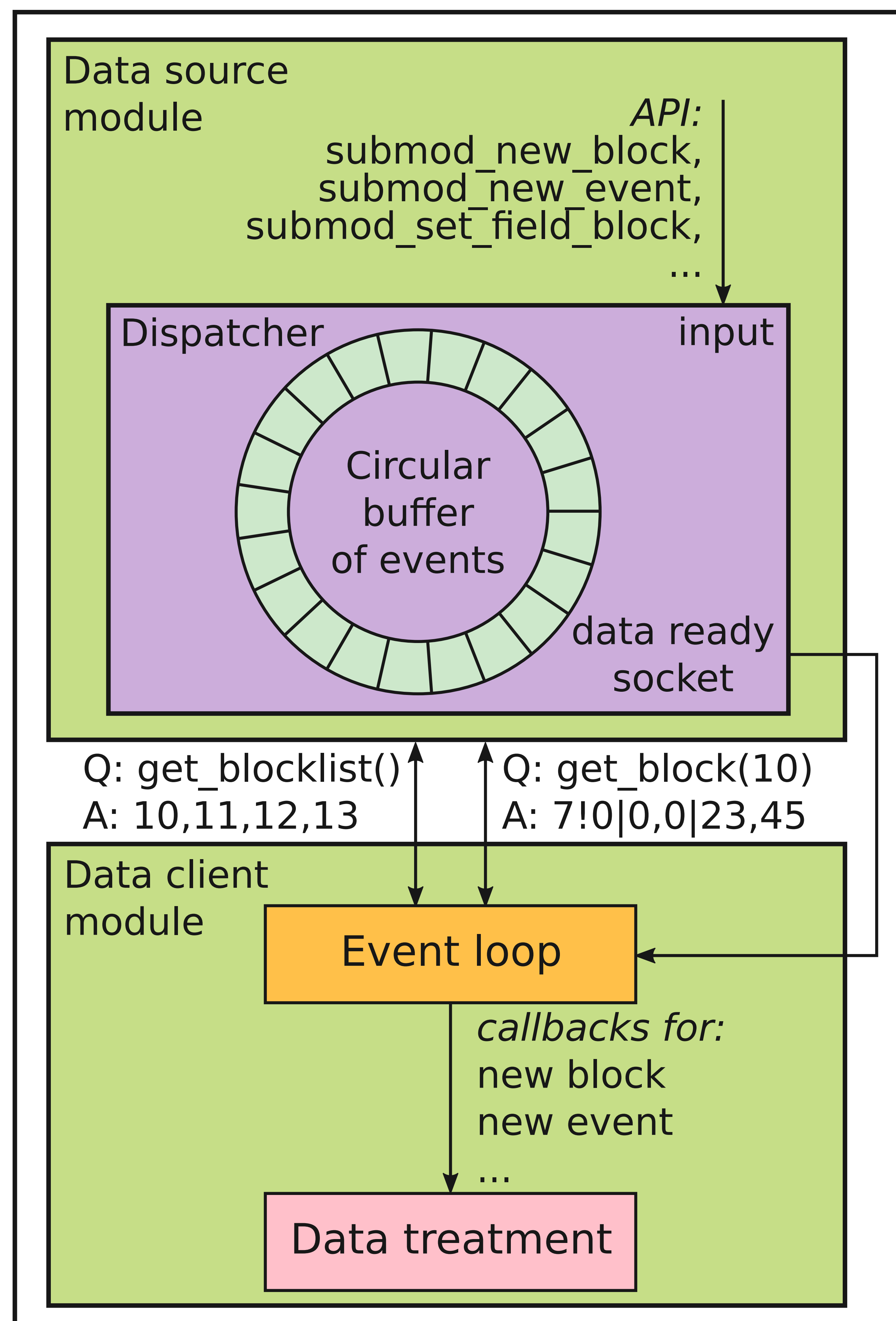


## What is Pyrame?

Pyrame is a **fast prototyping framework for online systems**. It provides basic blocks (modules) of **control-command** or **data acquisition**. These blocks can be assembled together to quickly obtain complete systems for testbenches. The framework is highly flexible, stable and allows the system to **evolve as fast as the testbench**.

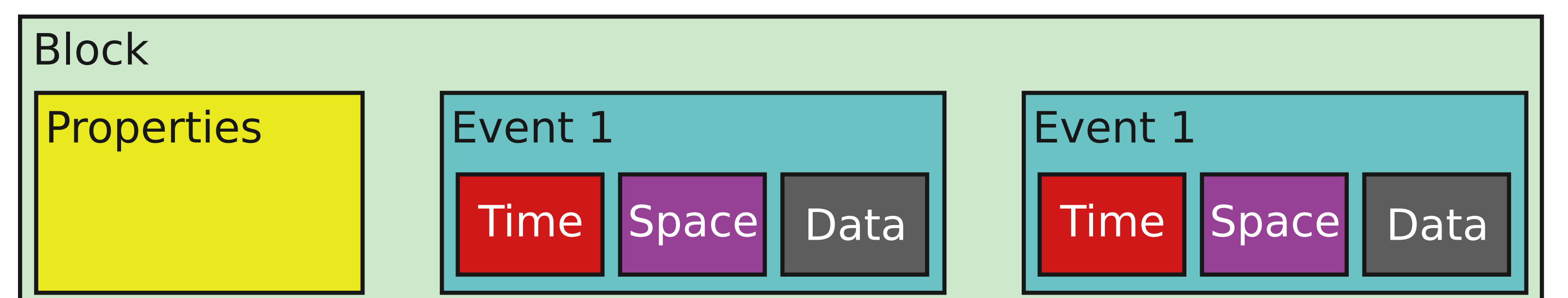
The new online monitoring architecture is based on the **distribution of data treatment operations among any module**, with multiple I/O streams. Uncontrolled data loss is prevented by providing data at the speed of the consumers. In addition, a performance-oriented module dedicated to real-time data acquisition is included.

## Online data transfer



## Data structure

Data are provided in blocks, which are composed of events



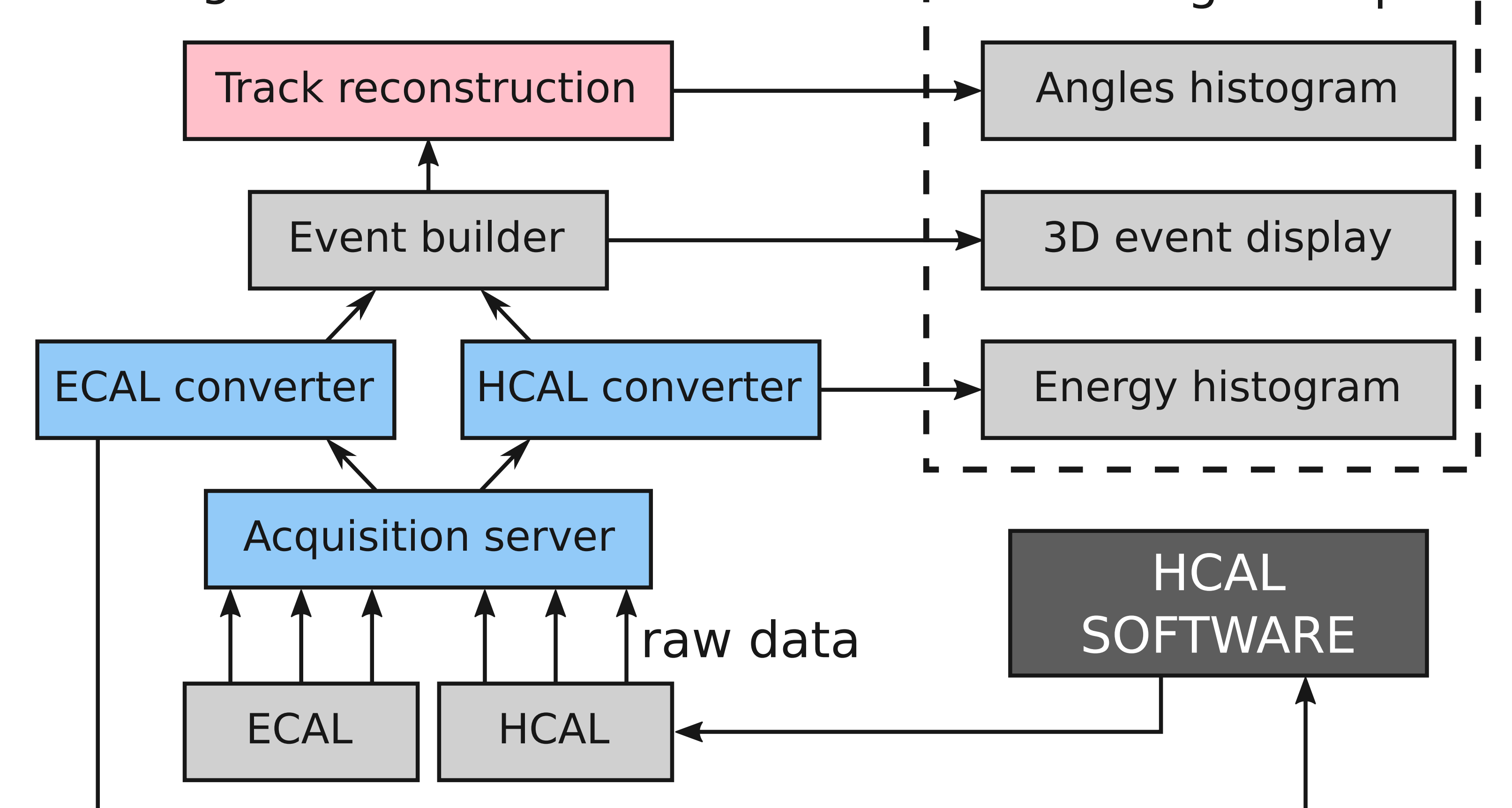
Properties (p), time (t), space (s) and data (d) can be an arbitrary number of strings that the client can convert to numerical values.

The current implementation formats data with a Simple ASCII Format (SAF):  
`p1,p2!t1,t2|s1,s2,s3|d1,d2,d3,d4!t1,t2|s1,s2,s3|d1...`

## Application example:

### ECAL + HCAL acquisition and monitoring

Common test-beam at CERN of CALICE's SiW-ECAL and SDHCAL with bidirectional data exchange.



## Monitoring tools

Event builder (time multiplexer)  
Generic online data viewer (events in 3D, histograms, plots)