Scalable Readout System Data Acquisition using LabVIEW

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Needs

- A flexible, portable and easy-to-use Data Acquisition program for APV readout via “srs”
- Useful for μMeGas in laboratory tests and Test Beams
- Compatible with existing analysis programs

The LabVIEW Project for «srs» DAQ

ALTRO ?

- Till «yesterday» Data Acquisition on μMeGas detectors was made by using ALTRO System
- Hardware based on single channel P.A. → Shaper →ADCs → Buffers → DCS Cards → RORc …
- Software was a subset of the Data Acquisition for ALICE Experiment (DATE)
  - Several restrictions concerning compatibility between Linux and DATE versions
  - Need very often Experts to fix problems

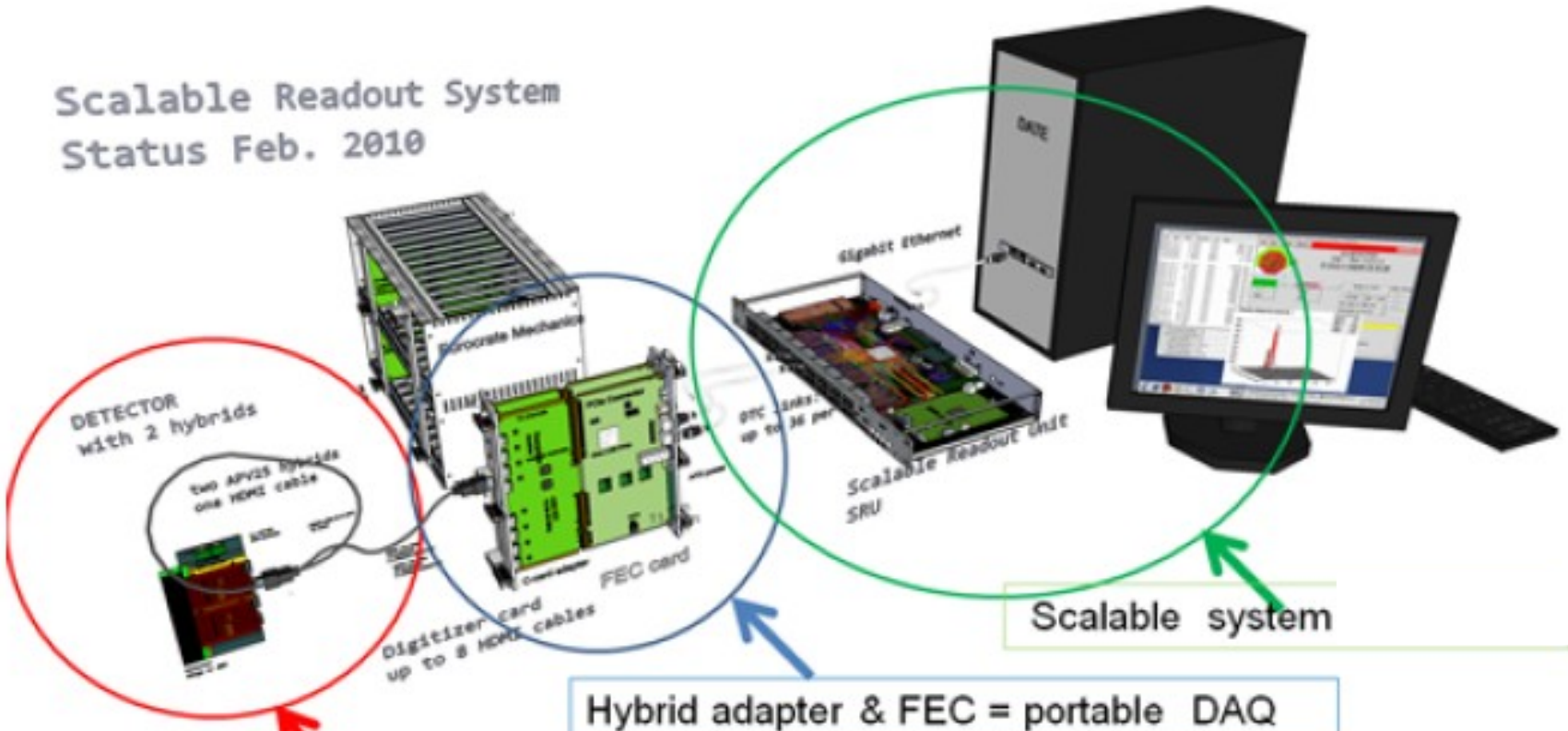
Not so suitable as an “off the shelf” DAQ in the Laboratory or Test Beams

SRS of RD51

- Scalable Readout System
- Compact and powerful signal sampling DAQ hardware
- Use of on-Detector PA (APVs)
- Front End Card (FEC) as hub and logic handler (including Trigger facilities) based on FPGA
- Data communication on Giga bit Ethernet (different protocols)
  - 1-Giga Ethernet card needed in the PC only !

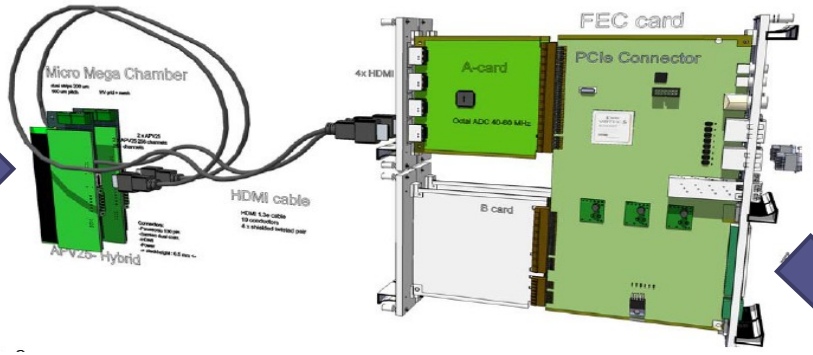
DAQ Software must receive data via UDP protocol

physical overview SRS of RD51

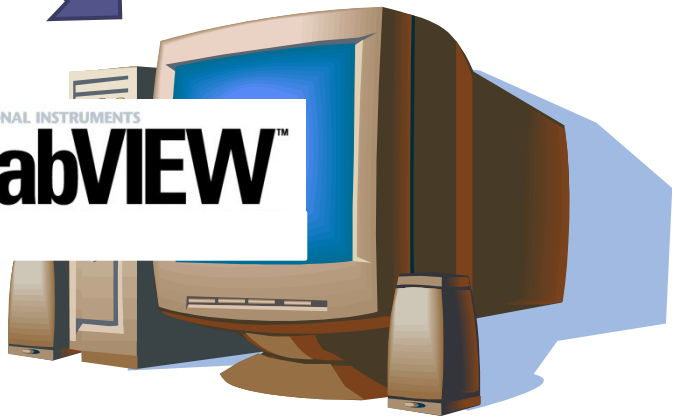


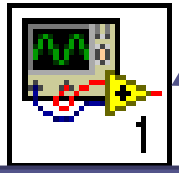
The LV Project for srs-DAQ

μMeGas chambers



UDP connection





"RD51-srs" LabVIEW Project

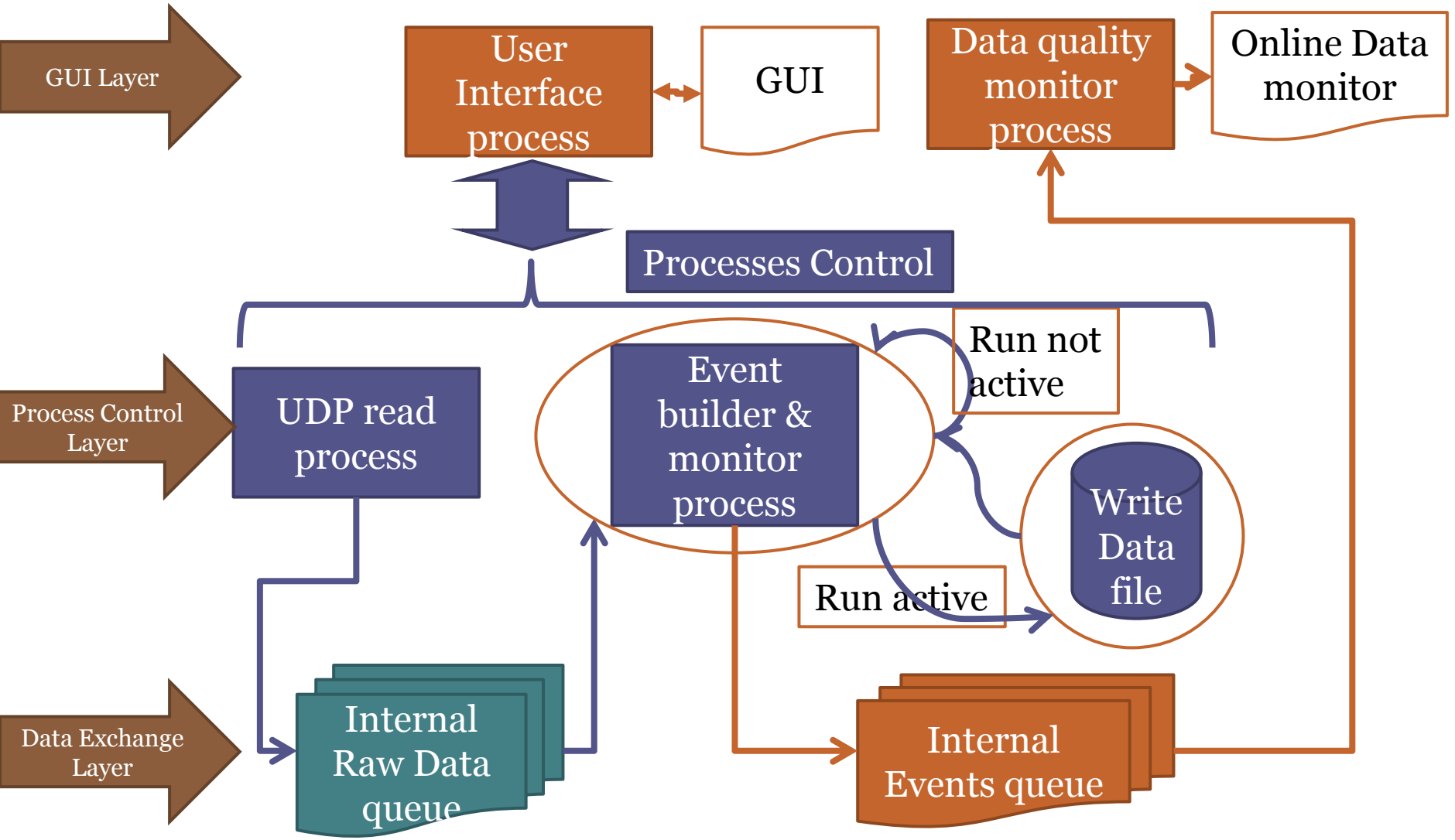
LabVIEW RD51-srs

- ~30 modules developed (VIs)
- GUI (Graphical User Interface)
- Monitors for data flow
- RUN handling
- File saving
- Data quality monitor (under development)

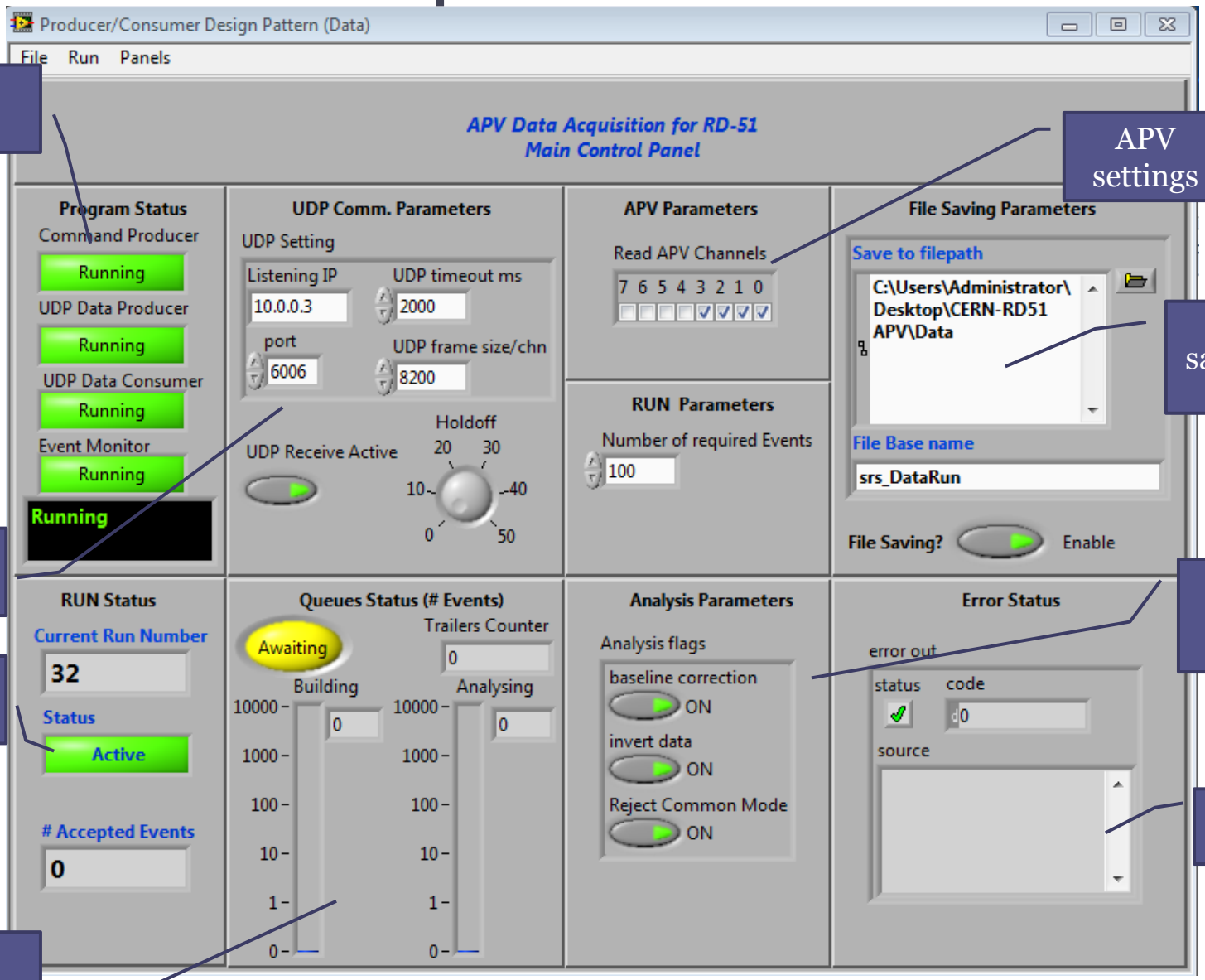
Features

- UDP Connection monitor
- Events recognition based on data integrity
- Events building (Header and Payload composition)
- Data file saving
  - Binary format
  - Compatible with the existing Analysis program
- Parallel processing for:
  - GUI commands handling
  - Watch UDP connection and packets receiving
  - Events recognition by discarding incoherent data
  - File saving using a “Run“ sessions logic
- Online Data quality monitor (under development)

Processes logics



Main control panel



Running Processes control

APV settings

Data Files saving paths & Naming

UDP Parameters

Online analysis parameters

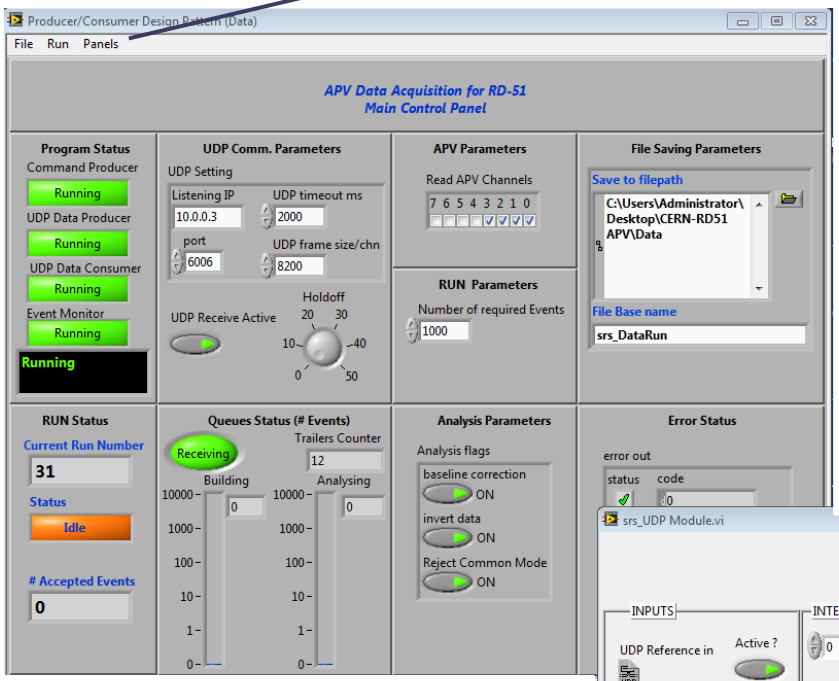
RUN status control

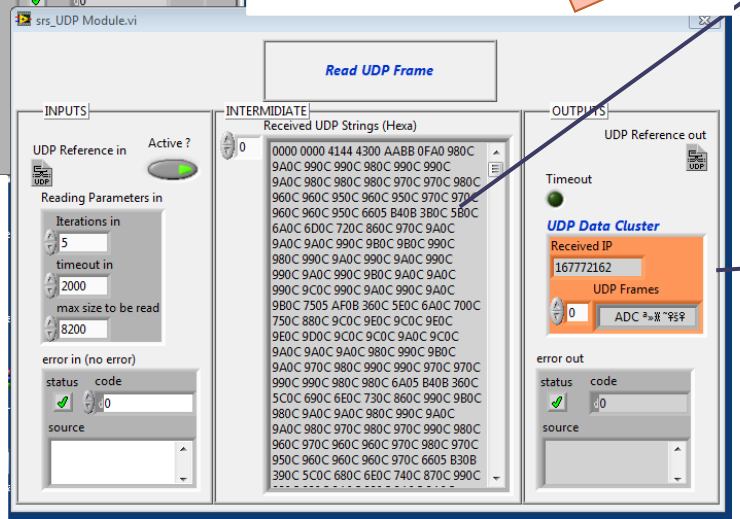
Error status

Internal queues occupacy

UDP Data Receiver

Open panles from Menu Items

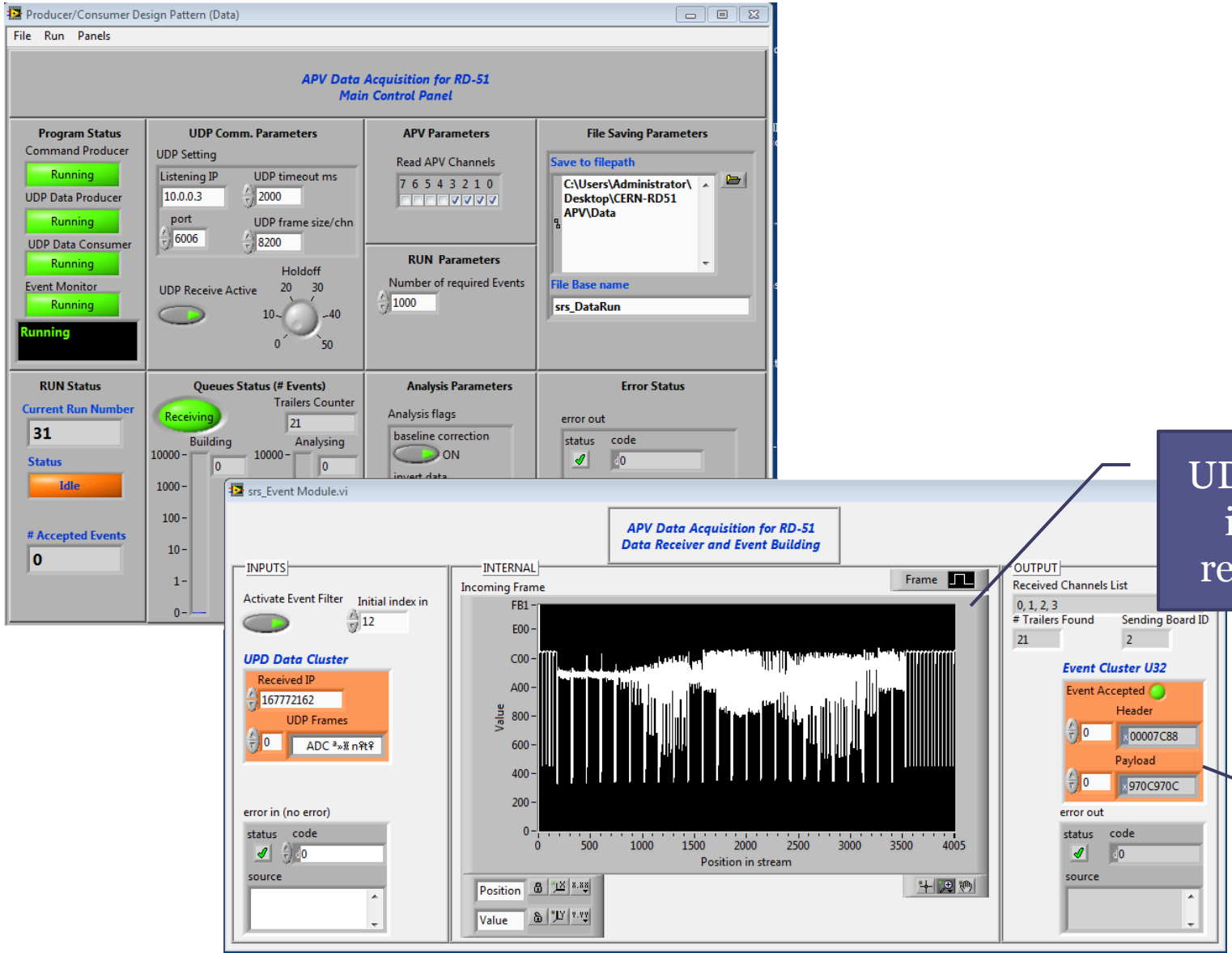




UDP Codes data monitor

Formatted internal Data “cluster” as Output

Event recognition and formatting

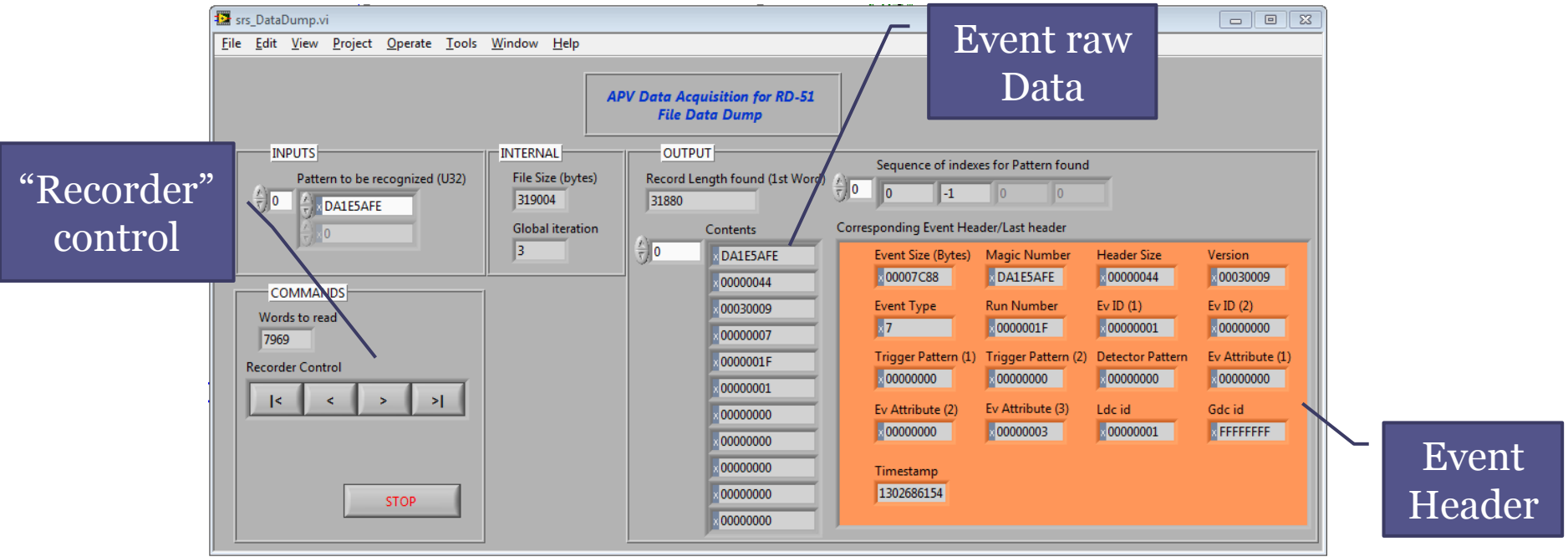


UDP data frame in graphical representation

Formatted Event

Data Dump

- A preliminary Dumping program has been written in order to check Data Files for correctness



LabVIEW RD51-srs

- Portable
  - Easily portable on different machines and Operating System
- Scalable
  - Ready to accept new features if required
- Fast
  - Able to handle different parallel processes with fine priorities tuning
- Compatible
  - Data file format compatible with existing analysis

Suitable for daily Laboratory usage or Test Beam activities