TRB / HADAQ plug-ins for DABC and Go4

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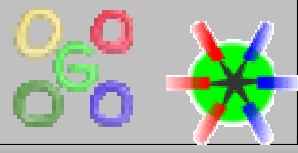
Outline

- Motivation
- Go4 trb v2/v3 unpacker and .hld user event source
- DABC plugin for hadaq
- Tests and Experience
- Conclusions

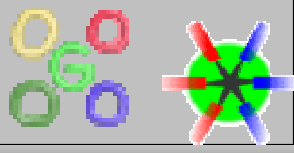
Motivation



Goal: Integration of TRB frontends to CBM (PANDA, R3B?) test DAQ

- **Read out TRB data with DAQ software DABC**
- **Combine hadaq events with mbs/roc/spadic data (common trigger or sync message)**
- **Data analysis with Go4 framework (process hadaq .hld files)**
- **Online monitoring with Go4 (at DABC stream server)**

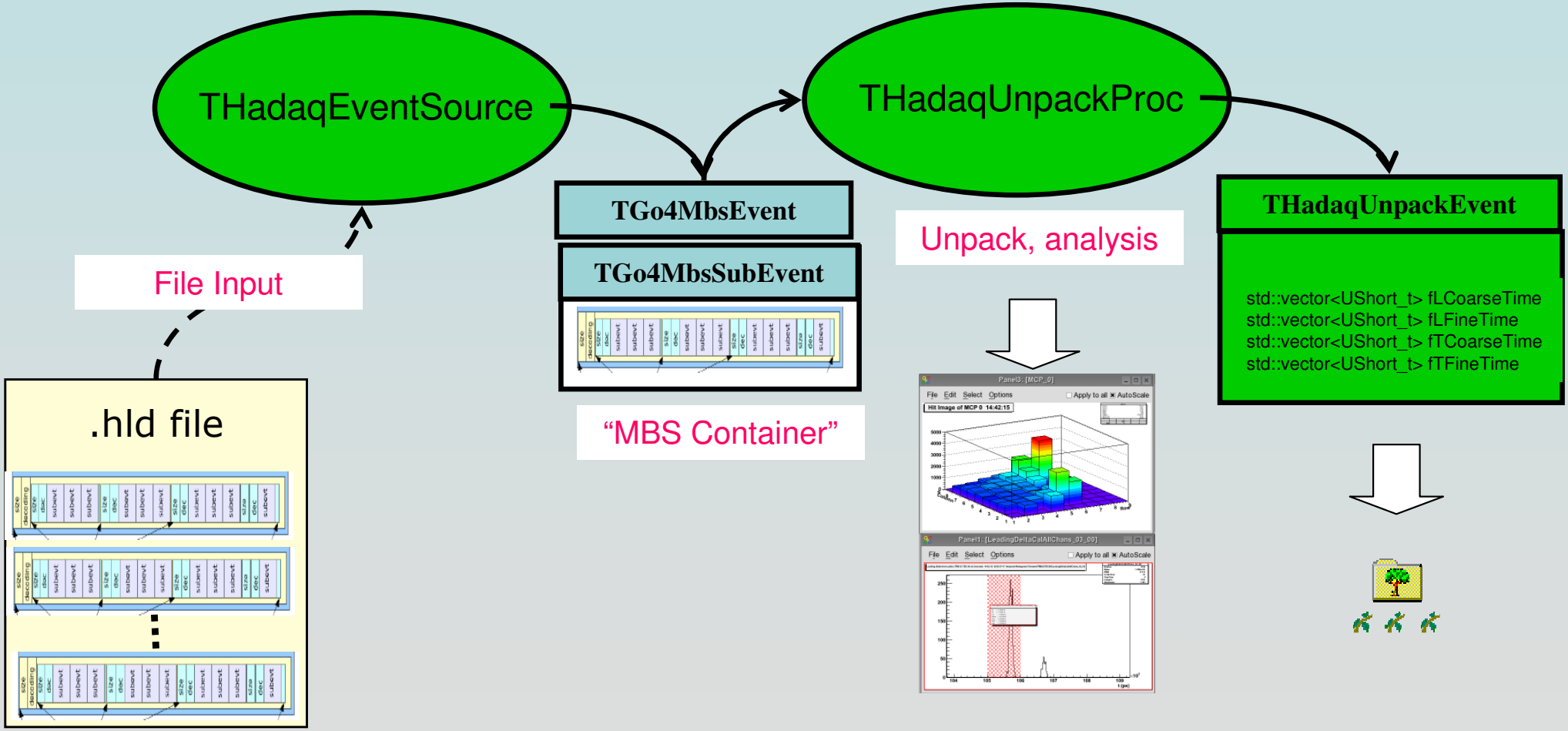
Go4 implementations



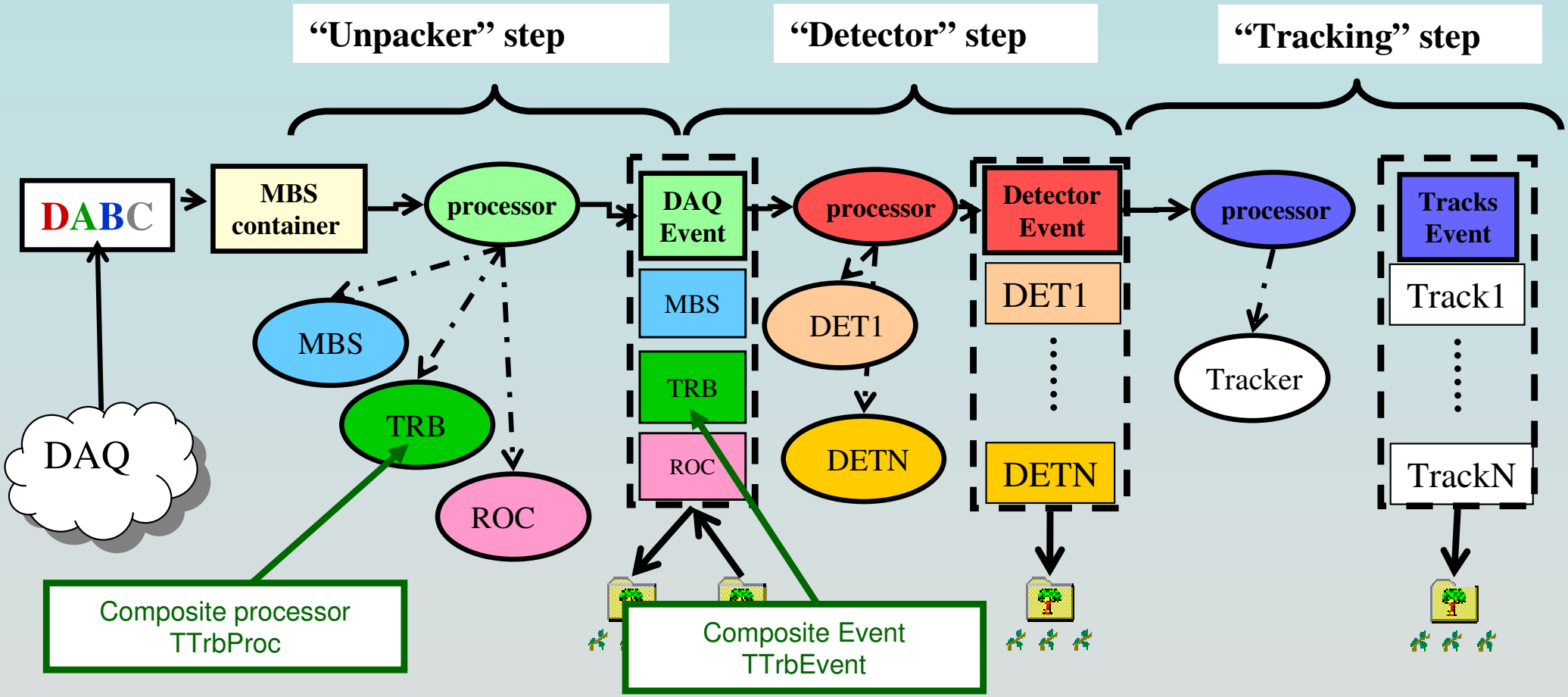
- File input for .hld files (*THadaqEventSource*)
  - knows HADES hadtu / event / subevent formats
  - each hadaq event is wrapped "as is" in a MBS subevent
  - MBS output event is passed to subsequent unpacker
- Data analysis class (*THadaqUnpackProc*)
  - Can dump *any* hadaq-formatted data
  - Unpacking and histogramming of TRB v2 and v3 formats
  - Time bin correction/calibration
  - Channel correlations + delta t evaluation (configurable)
  - Special MCP mapping for PANDA-DIRC / Mainz (Cahit Ugur)

Repository: https://subversion.gsi.de/go4/trunk/applications/hadaq-go4

Hadaq-go4 data flow



Go4 trbmonitor for CBM testbeam monitoring



hadaq-go4 adjusted to CBM beamtime framework (classes TTrb*.cxx):
https://subversion.gsi.de/cbm/ROC/trunk/onlinemonitor/trbmonitor

DABC hadaq plugin

- Read .hld files
- Wrap hadaq event into MBS subevent
  - ⇒ export to .lmd file or stream server (-> Go4)
  - ⇒ combine hadaq and mbs data (to do!)
- Receive data from TRBnet hubs via udp sockets
- Combine hadaq subevents from different trb inputs
- Export control variables to shared memory
  - connect to HADES eventbuilder controls / EPICS
- Write .hld files

Like Go4 event source

CBM beam tests

Full HADES eventbuilder! (daq_netmem, daq_evtbuild)

Repository: https://subversion.gsi.de/dabc/trunk/plugins/hadaq

DABC hadaq components

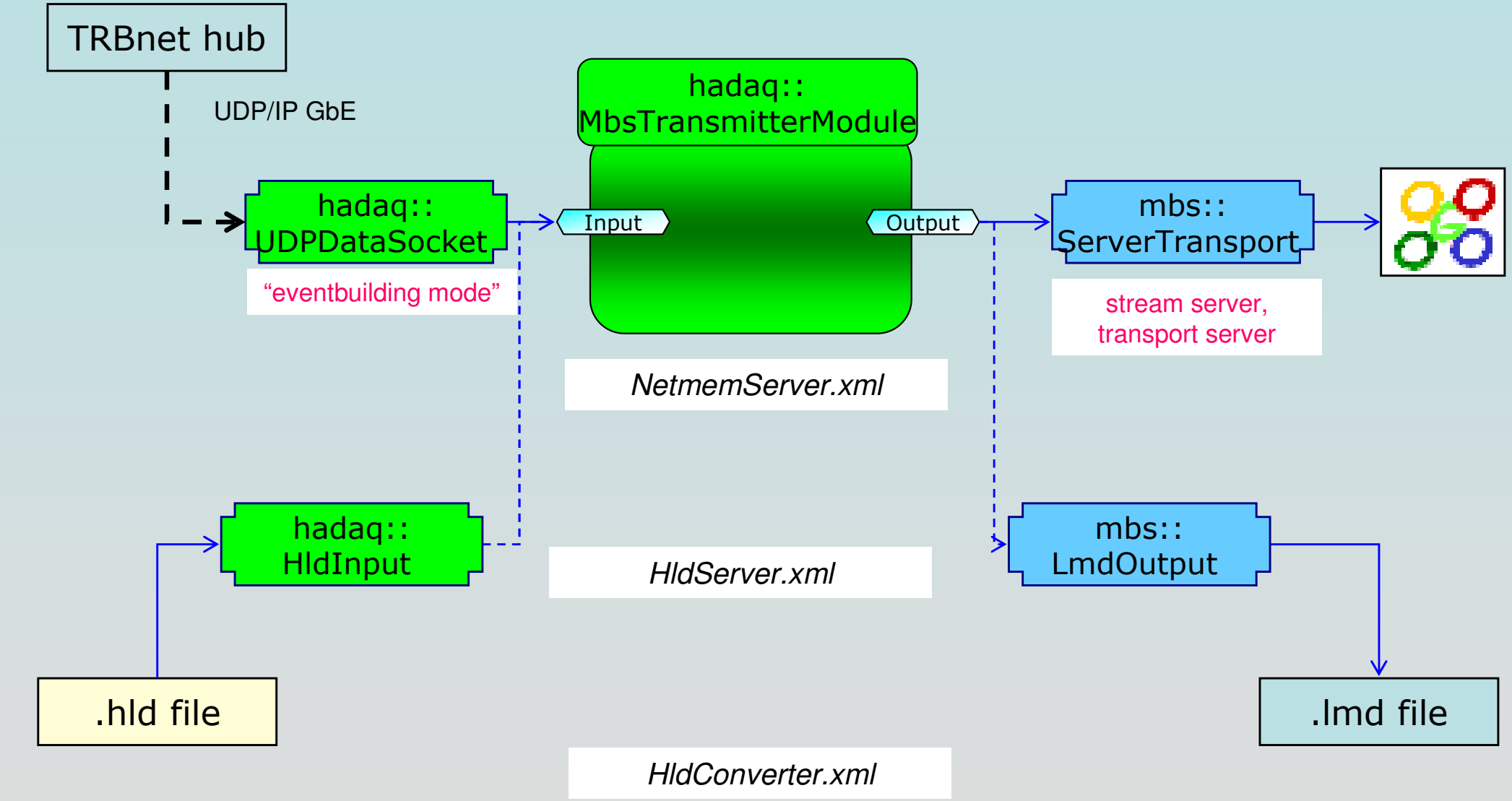
Classes:

- HldFile –
  input and output of hld file format
- HldInput –
  read hadtu format from file
- HldOutput-
  write hadtu format to file
- UdpDataSocket –
  receive hadtu packets from trb frontend (single stream)
- MbsTransmitterModule –
  wrap hadtu format into mbs event container
- CombinerModule –
  eventbuilding of hadtu format from several data streams
- Observer –
  Control system interface to hades shared memory

Example application configurations:

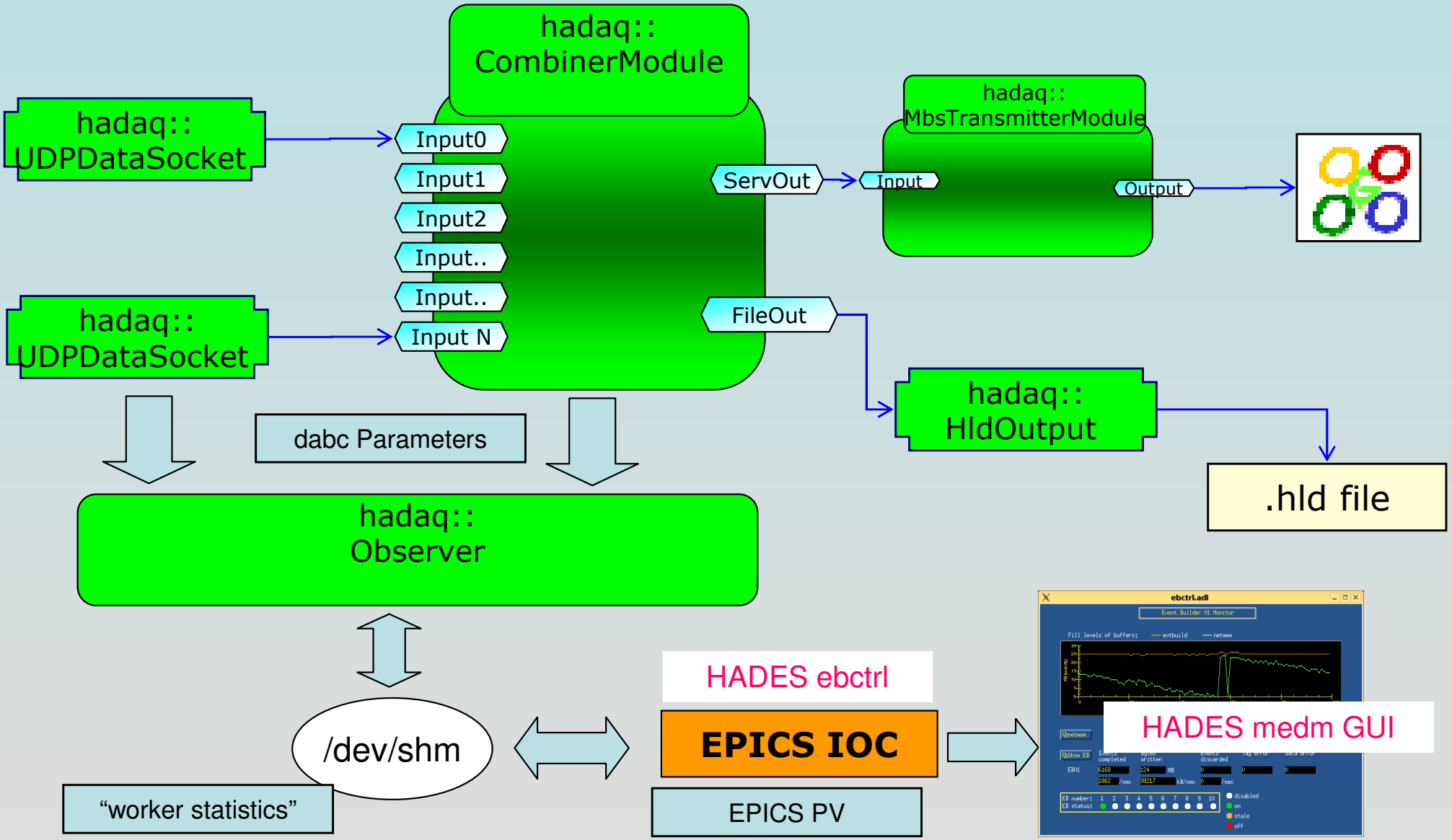
- *HldConverter.xml* –
  read hld file and write to lmd file
- *HldServer.xml* –
  read hld file and serve at mbs transport server
- *NetmemServer.xml* –
  receive trbnet data at 1 udp socket and serve events at mbs transport/stream server
- *EventBuilder.xml* -
  receive trbnet data at n udp sockets and do a full eventbuilding

Use case : converter, online monitoring server

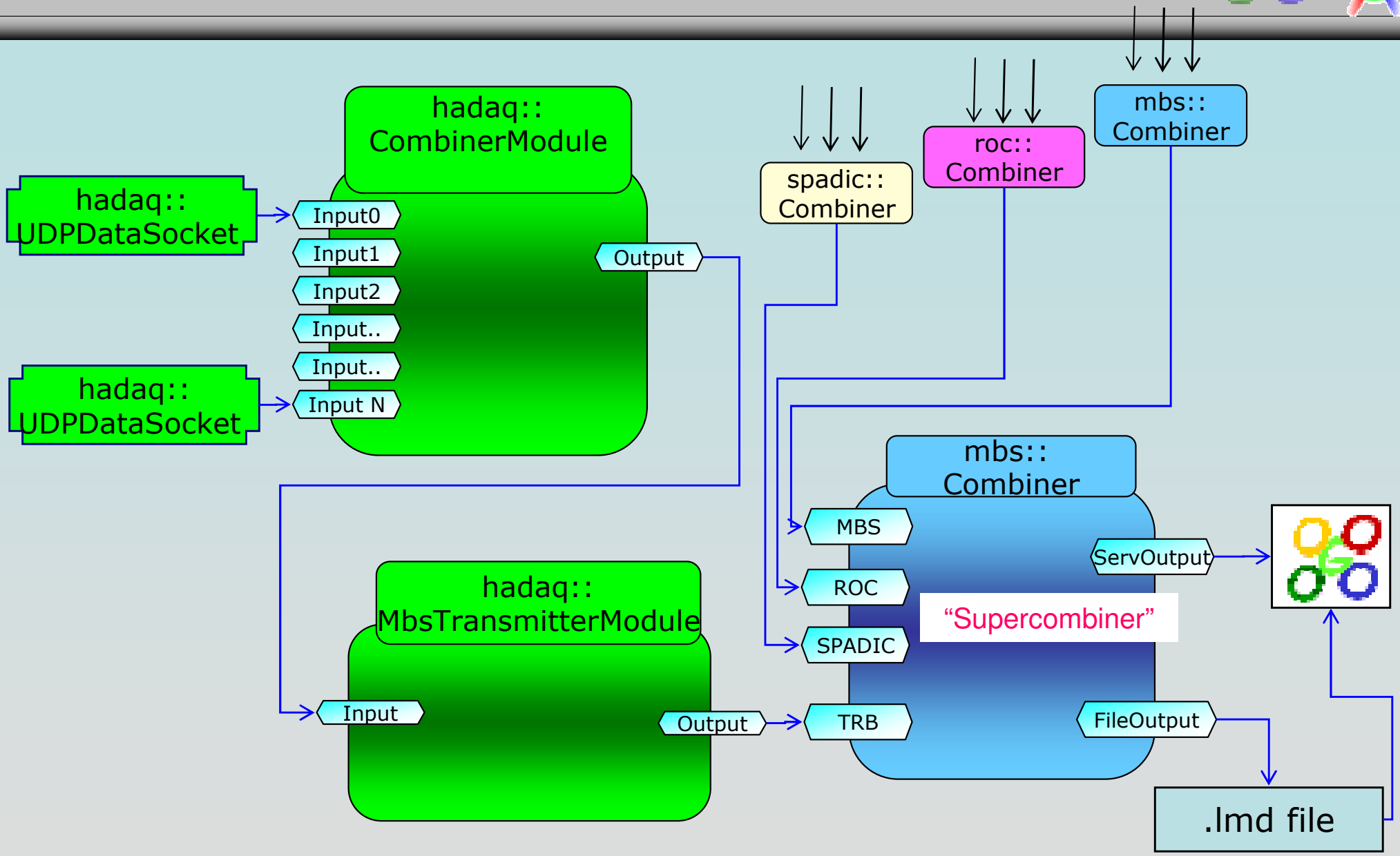


Use case: HADES event builder

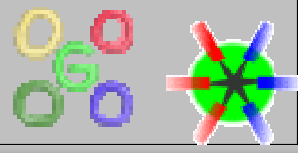
EventBuilder.xml



Use case: CBM beamtest DAQ



Tests + Experience



PANDA-DIRC@Mainz (C.Ugur):

- hadaq-go4 for offline analysis of .hld files
  (acquired with old HADES production eventbuilder)

  Used for MAMI beamtimes June and July 2012

- *dabc_run NetmemServer.xml* + hadaq-go4 for online monitoring:

  Usable, but dabc fails for high event rates >40kHz? ?? Mb/s
  (queue full, or crash) => dabc v1.9 debugging! Fine tuning of buffer setup!

- *dabc_run EventBuilder.xml* + hld file output + hadaq-go4:

  ⇒ Works with 1 trb input up to some event rate limit, see above

  ⇒ can not yet deliver performance (100kHz writing) of old hadaq eventbuilder!

Tests with udp data sender simulator (JAM):

- *dabc_run EventBuilder.xml* + hld file output + hadaq-go4 + EPICS ioc + MEDM gui

  With 5 UDP streams, localhost (10kHz/1000Bytes/ 20s spill):
  19 Mbyte/s with file to local disk (41 Mb/s without file)

  Limit: hld file io -> queue back pressure -> 60% dropped events

Conclusions

⇒ Go4 analysis of hld files and trbdata from DABC online is ready
(still under development)

⇒ Go4 trb classes adjusted for CBM online monitoring framework

⇒ DABC plugin for trbnet udp inputs is ready
TODO: trb/mbs super combiner implementation for CBM

⇒ DABC can almost emulate the HADES production eventbuilder!
(missing: RFIO, disk load balancing, multi-EBserver tests..)

⇒ DABC hadaq modules still lack performance of HADES eventbuilder
TODO: optimization of i/o implementations + memory set up
DABC v1.9 debugging (stability? error recovery?)