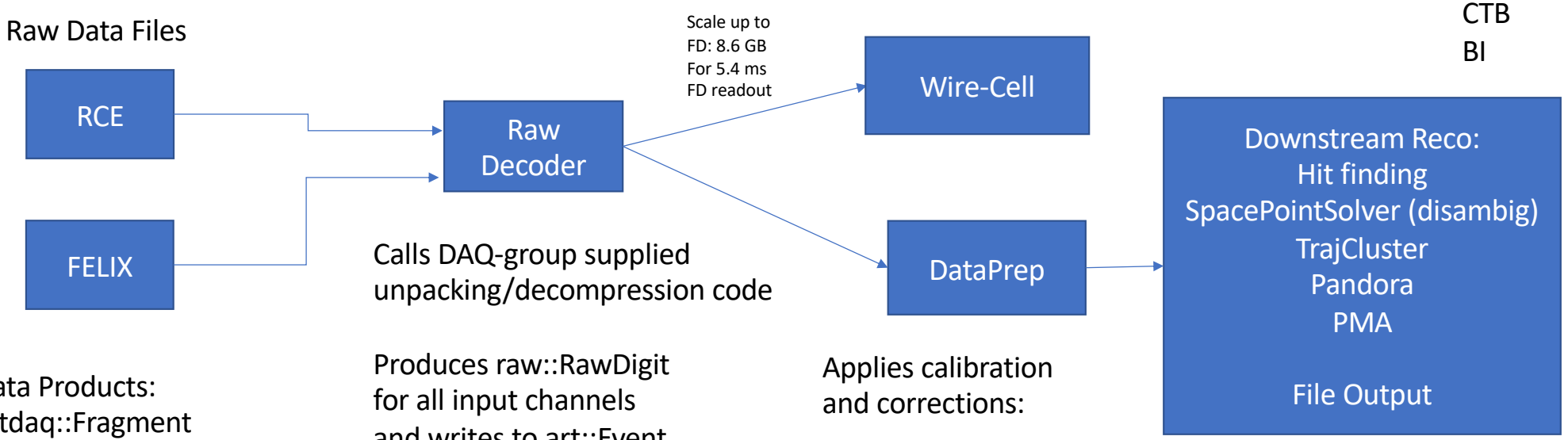
TPC Wire Data Processing Chain for ProtoDUNE-SP and Similar Systems, e.g. ICEBERG

Not shown: PDS, CRT, CTB, BI



Data Products:
artdaq::Fragment
artdaq::ContainerFragment

TBranches:
TPC
FELIX
ContainerTPC
ContainerFELIX
additional ones defined for test runs

Calls DAQ-group supplied unpacking/decompression code

Produces raw::RawDigit for all input channels and writes to art::Event

Also produces raw::RDTimestamp and associations with raw::RawDigit

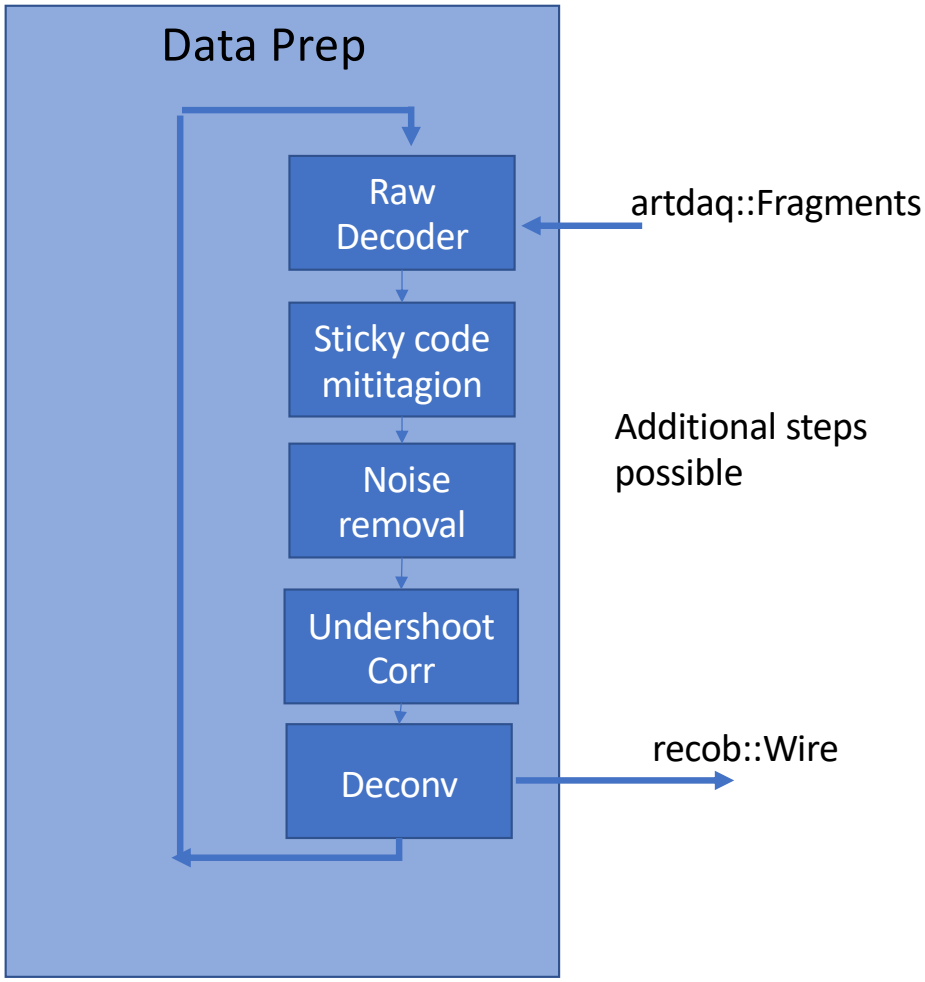
Applies online->offline channel map
Integrity checks

Applies calibration and corrections:

Sticky-code mitigation
Correlated noise removal
Pedestal subtraction
Undershoot Correction
Field response and electronics deconvolution

Produces recob::Wire (floats with ROI's)

Chunked TPC Wire Data Processing Chain, Option #1, Single Threaded



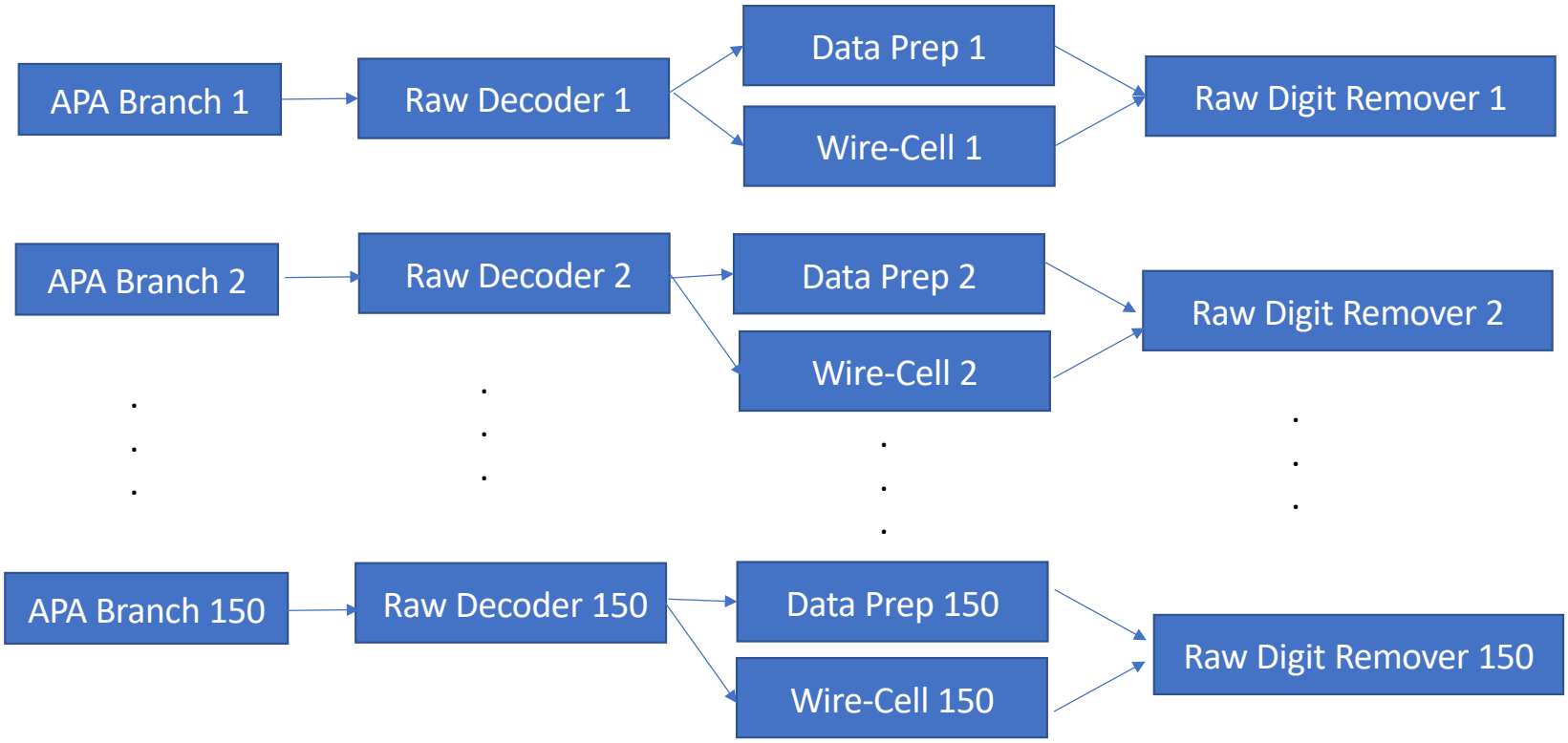
Loop over
- APAs, or
- DAQ chunks

Free up memory from artdaq::Fragments and raw::RawDigits inside loop. Storage of these is temporary

Where does Wire-Cell go?

Is recob::Wire small enough to store the FD module's data in an event?

Chunked TPC Wire Data Processing Chain, Option #2, Threadable Module Instances



Data Prep and Wire Cell may have to be serialized so that we are sure that everyone who needs raw digits for APA n is done and the raw digit remover can run.
ART does not currently support removing produced cached products however.

Also, threads have to process different events in art 3. The art wiki suggests user-level parallelization if needed and mentions this use case – a big data product – as a reason to go that route.

Comments

This is not a new problem – we've been thinking about this since 2013.

FD MC has used zero suppression and the 1x2x6 geometry to operate.

The branch in artdaq events that contain data from APA n has not been stable in ProtoDUNE-SP

APA 5's data have been at different times on TPC, ContainerTPC, and ContainerFELIX

Test runs and runs with long readout windows have had custom labels for the data.

We'd like to be able to decode everything we get, even if the labels are new, as long as they follow some sort of pattern.

We would prefer not to have to swizzle the data separately.