The new road to micro-second land

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The story so far...

- retrieving raw TBB data required
  1. login at LCU
  2. run `tbbcontrol` script to trigger dump of raw TBB data
  3. copy individual files (one per dipole) to output cluster
  4. copy data to RU Nijmegen
  5. use custom input routines to extract the data from within the frames sent by the TBBs

- drawbacks:
  - lot of moving around files
  - lot of temporary code to access raw TBB dumps
  - no self-contained dataset shipped to user

- intended changes:
  - ship well-defined standard data product to user
  - full support of file-format through DAL
  - connect CR software to TBB time-series

New members of the DAL family

- well defined data structure: time-series HDF5 data format *(Masters, Bähren)*
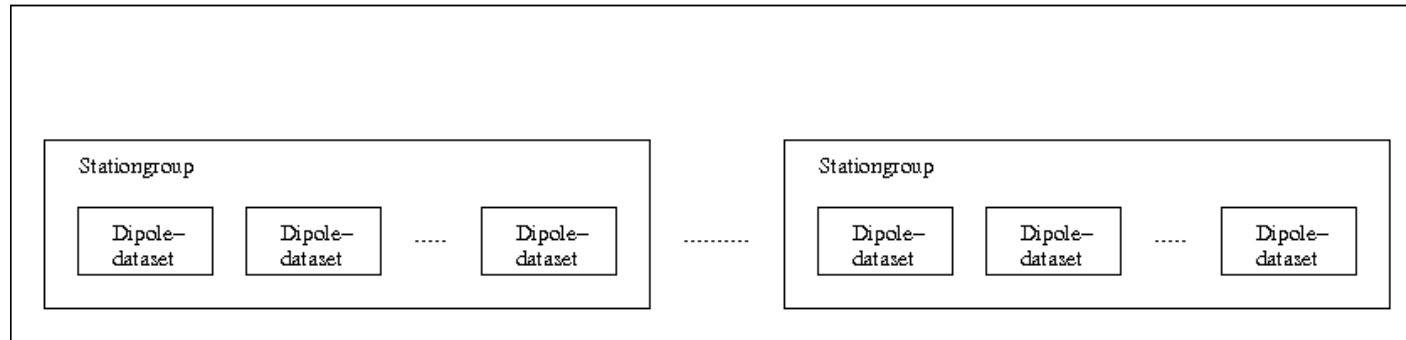
- generic support of the defined data format through the DAL *(Masters)*
  - **dalDataset** – handles a dataset structure within a HDF5 file
  - **dalGroup** – handles a group structure within a HDF5 file
 - **Enumerations** – List of common attributes/keywords

New members of the CR family

- mapping of file structure onto C++ objects *(Bähren)*
    - `LOFAR_DipoleDataset`
    - `LOFAR_StationGroup`
    - `LOFAR_Timeseries`

  → individual substructures can be used separately
  → test programs & documentation available
  → classes integrated into DAL this month

- connection to CR data input framework *(Bähren)*
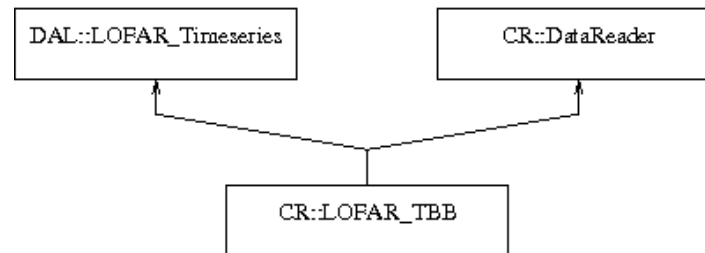
    - knows and handles internal structure of dataset
    - overloads `fx()` function to connect to processing tree
    - internal details of dataset hidden from application programmer

Behind the scenes
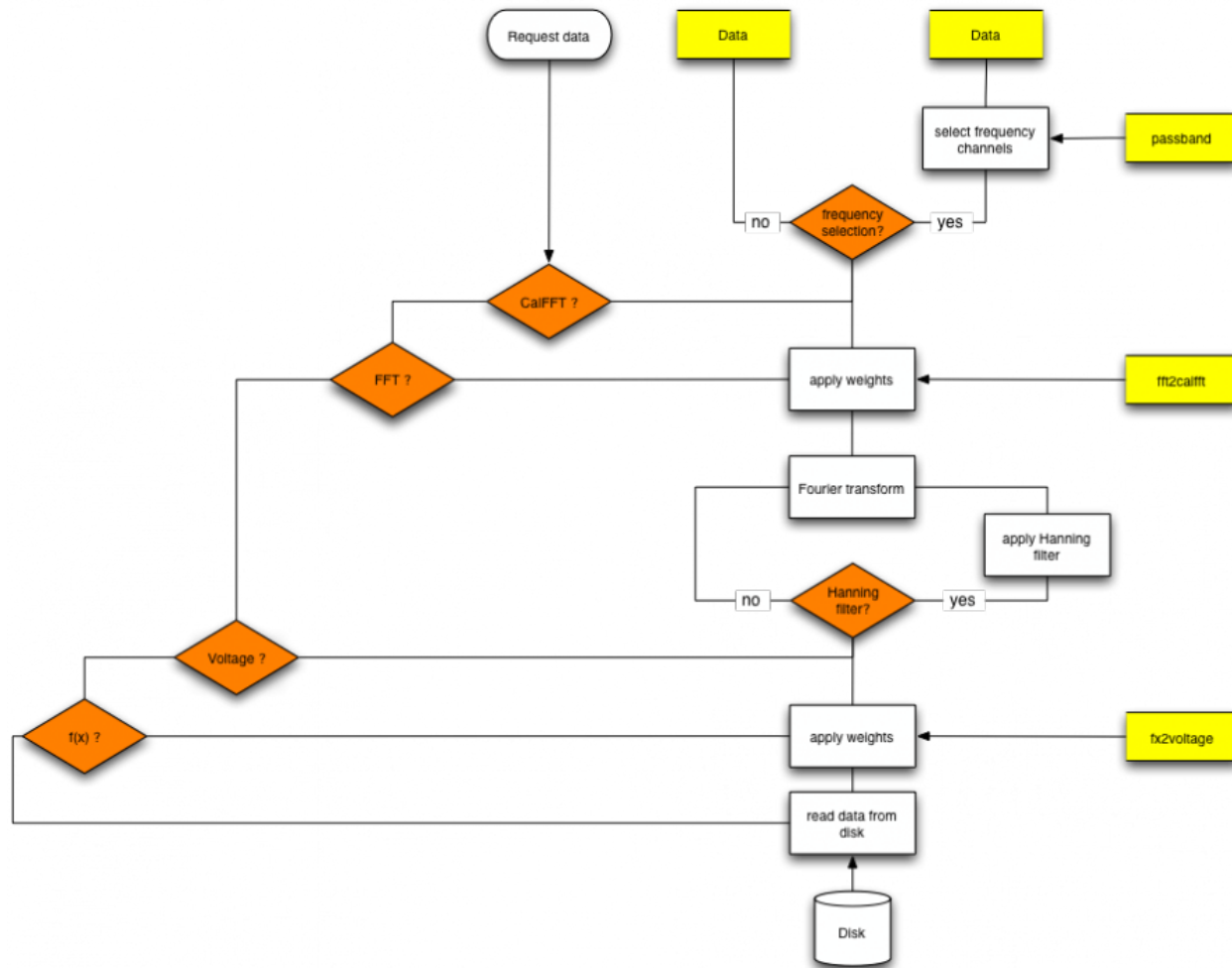
Working with LOFAR TBB data

1. Open a dataset and provide a short summary

```
CR::LOFAR_TBB dataset (filename);
dataset.summary();
```

2. Retrieve raw ADC time-series

```
casa::Matrix<casa::Double> adc = dataset.fx();
```

3. Retrieve raw spectra for all dipoles

```
casa::Matrix<casa::DComplex> spectra = dataset.fft();
```

4. Tool for basic spection under way (`tbbStatistics`)

```
[LOFAR_TBB] Summary of object properties
-- Name of data file ... : /Users/lars/Code/research/src/CR-Tools/../../data/tbb_test_file_v2.h5
-- Telescope ........... : LOFAR
-- Observer ............ : J.S. Masters
-- Project ............. : Transients
-- nof. station groups . : 1
-- nof. data channels .. : 20
-- blocksize  [samples ] : 1024
-- FFT length [channels] : 513
-- Sample frequency [Hz] : 2e+08
-- Nyquist zone ........ : 1
```

+ dynamic spectrum

+ time alignment

The stones in the road

- data format
  - adjustment of default values
  - antenna positions and orientations are still missing
  - minor corrections of dataset structure

- processing
  - generation of dynamic spectra
  - inspection of timing between input data channels