

Pandora SDK for Particle Flow Calorimetry

Friday 1st February 2013

J. S. Marshall
University of Cambridge



Pandora Client App

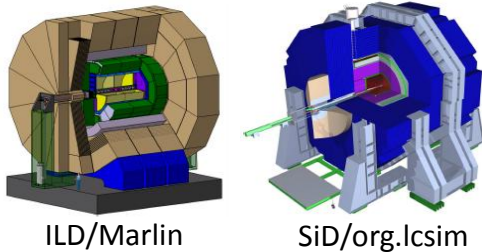


Can be detector or software specific

Custom Content Libraries



Pandora Client App



Isolates specific detector and software details, creating self-describing hits, tracks, etc.

Register, via APIs

Runs registered content and performs book-keeping

Pandora SDK

Algorithm Manager

CaloHit Manager

Cluster Manager

Plugin Manager, etc.

Often re-usable, applicable to multiple detectors

Pandora Content Libraries

FineGranularity Content

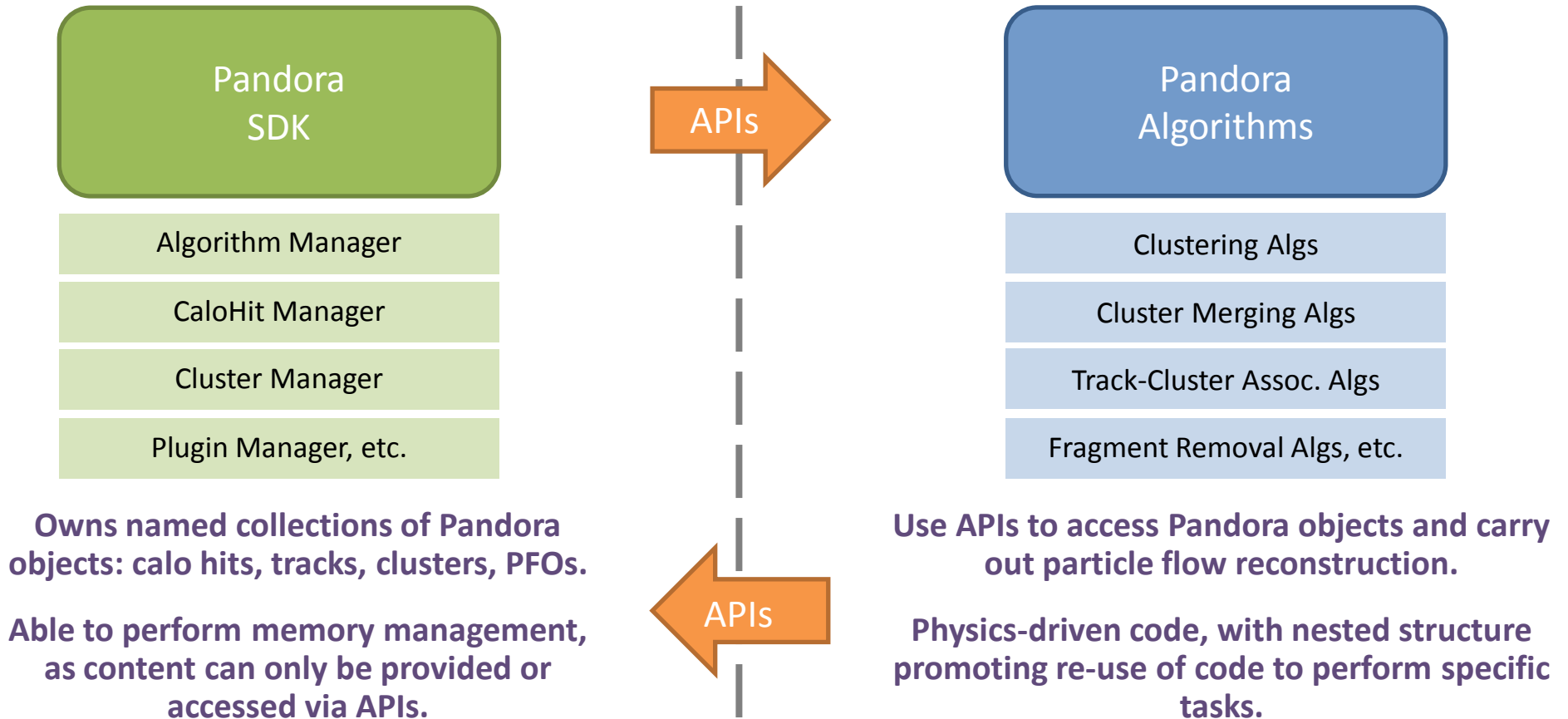
LAr Content, etc.

Pandora content:

algorithms, particle id functions, energy correction functions, shower profile calculators, etc...



Pandora Algorithms



Currently available: 56 algorithms for fine-granularity detectors, including clustering, visualization, etc.
24 algorithms for reconstruction of neutrino-induced events in LAr TPCs.
6 algorithms for reconstruction in coarse granularity detectors.



Pandora SVN Repository



- Take this opportunity to discuss Pandora library structure, and the different SVN repositories in the main PandoraPFANew repository at DESY. Snapshot as of Tuesday 29th January:

File ▲	Rev.	Age	Author	Last log entry
FineGranularityContent/	1359	5 weeks	marshall	Update ChangeLogs and create
LArContent/	1363	11 days	marshall	Quiet error messages in case w/
MarlinPandora/	1359	5 weeks	marshall	Update ChangeLogs and create
PandoraAnalysis/	1365	3 days	marshall	Explicitly set ROOT directory for
PandoraMonitoring/	1361	5 weeks	marshall	Update ChangeLogs and create
PandoraPFANew/	1359	5 weeks	marshall	Update ChangeLogs and create
PandoraSDK/	1364	11 days	marshall	Provide opportunity to receive ac
PandoraSettings/	1359	5 weeks	marshall	Update ChangeLogs and create
TestPandora/	1357	5 weeks	marshall	Rename Monitoring to Pandora

Note: All libraries now contain change logs

<https://svnsrv.desy.de/viewvc/PandoraPFANew/>

Or use websvn if you prefer!



Pandora SDK



Pandora SDK contains source and include files for libPandoraSDK. No dependencies (except libstdc++, etc).

Contains Pandora object definitions, object and algorithm managers, APIs and some helper functions.

Dependency for Pandora client apps and algorithms.



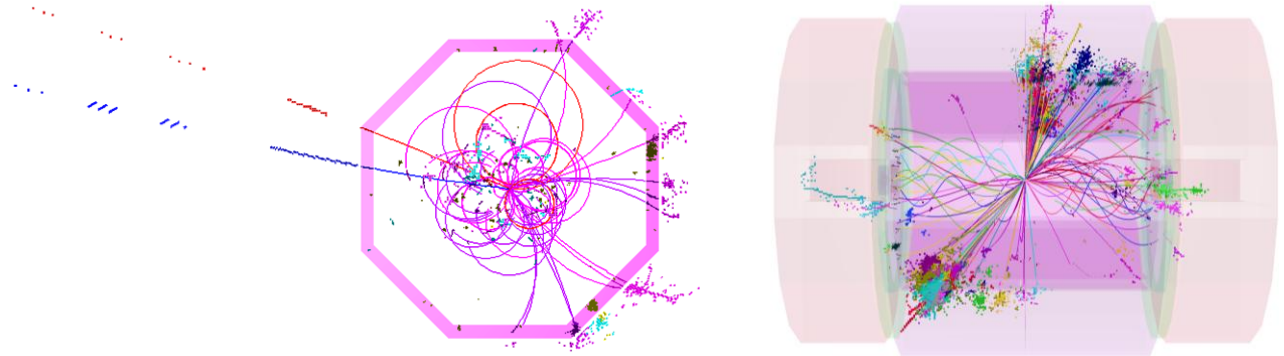
Pandora Monitoring



- File** ▲
- [FineGranularityContent/](#)
- [LArContent/](#)
- [MarlinPandora/](#)
- [PandoraAnalysis/](#)
- [PandoraMonitoring/](#)
- [PandoraPFANew/](#)
- [PandoraSDK/](#)
- [PandoraSettings/](#)
- [TestPandora/](#)

Pandora Monitoring library offers ROOT TEve-based event display, plus tree- and histogram-writing functionality.

Optional, depends upon ROOT and PandoraSDK.





Pandora Content Libraries



Pandora algorithms are registered by the client app and can exist in any external library.

Some algorithms are sufficiently generic that they can be re-used by multiple client apps. Algs for ILC/CLIC bundled together into FineGranularityContent library.

To use algs, client app must depend upon library.

- Content library also contains particle id helper functions, shower-profile calculators, pseudolayer calculators, etc.
- Content library depends upon PandoraSDK and, if monitoring functionality desired, can depend upon PandoraMonitoring.



Metadata Package



PandoraPFANew is now just a metadata package, containing build material.

For users of iLCsoft, CMakeLists file uses the ExternalProject_Add macro to check out and build:

1. PandoraSDK
2. PandoraMonitoring, if `-DPANDORA_MONITORING=1`
3. FineGranularityContent

Each library also contains a simple Makefile, so you can perform this process manually, too, if required.



Client Apps



Client app registers all Pandora content with PandoraSDK, plus provides “building blocks” and the PandoraSettings.

Registering content (algs, etc.) with PandoraSDK gives framework ability to instantiate and run content.

The content that is actually instantiated and run is then that referenced in PandoraSettings xml file.

- MarlinPandora is the interface package for ILD-like detectors, described by GEAR, with input objects in Icio format.
- TestPandora is the simplest possible client app. It is a command-line app that runs off Pandora .pndr binary files.



Remaining Repositories



- File ▲
- [FineGranularityContent/](#)
- [LArContent/](#)
- [MarlinPandora/](#)
- [PandoraAnalysis/](#)
- [PandoraMonitoring/](#)
- [PandoraPFANew/](#)
- [PandoraSDK/](#)
- [PandoraSettings/](#)
- [TestPandora/](#)

PandoraAnalysis contains Marlin processors developed for examining PFA Z' output in LCIO format.

PfoAnalysis processor writes out a ROOT TTree that can be queried using the simple executables in the PandoraAnalysis/test/ directory.

PandoraSettings repository contains Pandora configuration for fine granularity content algorithms.

Allows reproduction of optimal Pandora jet energy reconstruction. There are a few variant files, described in PandoraSettings_README.txt



- **Pandora code is in good shape and is cleanly divided into libraries for easy assembly and re-use.**
- **Finish with a question for discussion: What are the priorities for future Pandora development?**