PandAna Tutorial

Micah Groh

People!

PandAna and hdf5s developed by contributions from many people.

Initial Work: SciDAC

HDF5 Development: Chris B, Justin V, Fernanda P, Evan N, Karl W

PandAna Framework: Micah G, Nitish N

Validation: Micah G, Nitish N, Reddy G

Join #pandana on slack for support and help!

Why Pandas?

Pros:

Python is generally easier to write code

No dependence on the rest of the NOvA framework

PandAna on a plane!

Faster sorting speeds

Better interface with ML

HDF5

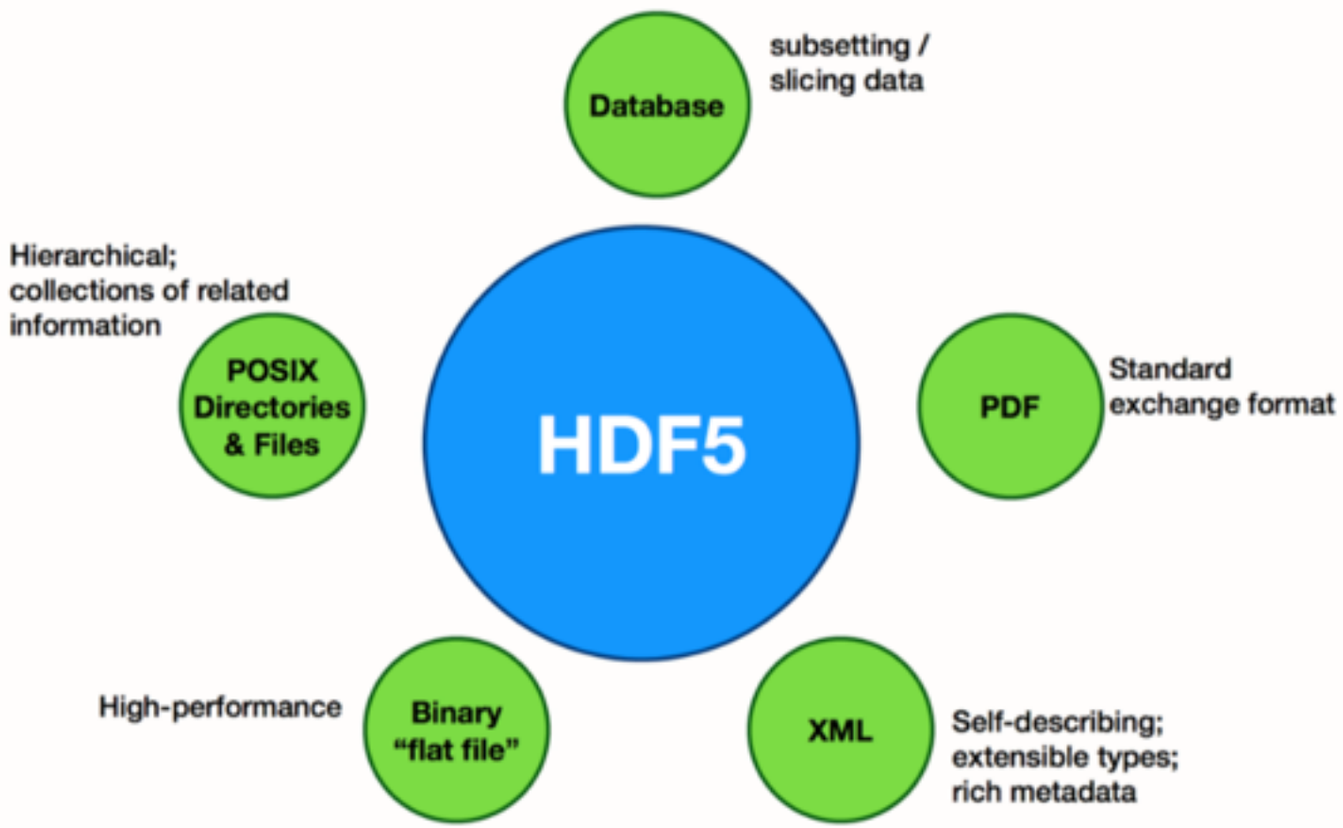
From Justin: DocDb 32637

From Micah (DocDB 32631)

HDF5

From Justin (DocDB 31435)

HDF is like…



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Micah Groh 3 September 2018

CAFAna

C++

Root

TTree

CAF

CAFAna	PandAna
C++	Python
Root	Pandas
TTree	DataFrame
CAF	HDF5

Jupyter Notebook!

Demo/Workshops/YoungNOvA2019

PANDAS LOVE DATA SCIENCE

NOvA Data

Event	calE	x1	x2	y1	y2	...
1	1.4	117	673	110	597	...
2	2.4	-548	181	-755	760	...
.	.	.	.	.	.	
.	.	.	.	.	.	
.	.	.	.	.	.	

CAFAna

Event	calE	x1	x2	y1	y2	...
1	1.4	117	673	110	597	...
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.	.	.	.	.	.	
.	.	.	.	.	.	
.	.	.	.	.	.	

Read in one row at a time and compute each value one at a time.

PandAna

Event	calE	x1	x2	y1	y2	...
1	1.4	117	673	110	597	...
2	2.4	-548	181	-755	760	...
.	.	.	.	.	.	
.	.	.	.	.	.	
.	.	.	.	.	.	

Read in one column at a time and compute values for all events at once.

Multiple Objects

Some objects will exist multiple times in an event or not at all.

Prongs, tracks, etc

Stored as arrays in cafs

These are flattened and stored in there own list with an additional index.

Event	Prong	calE	...
1	1	1.4	...
1	2	2.2	...
1	3	2.1	...
3	1	1.9	...
4	1	0.2	...

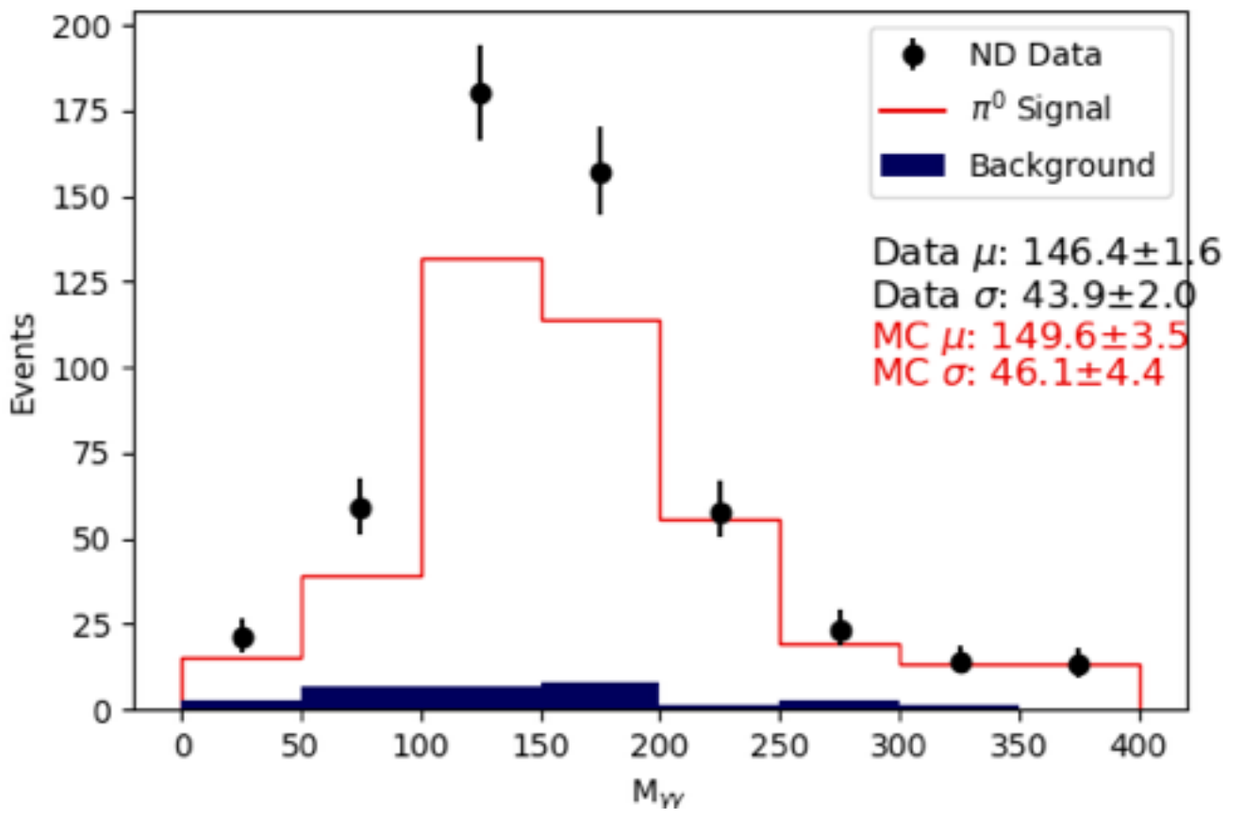
Depending on the analysis you are trying to do these can be grouped together in different ways.

Demos!

Note: current set of NOvA hdf5 files are in:

/pnfs/nova/persistent/users/karlwarb/HDF5-Training-19-02-26/

Conclusion



PandAna is a useful analysis framework built around python.

Join #pandana if you’re interested in using this framework for an analysis

Or, message myself or Reco Conveners to get involved further!