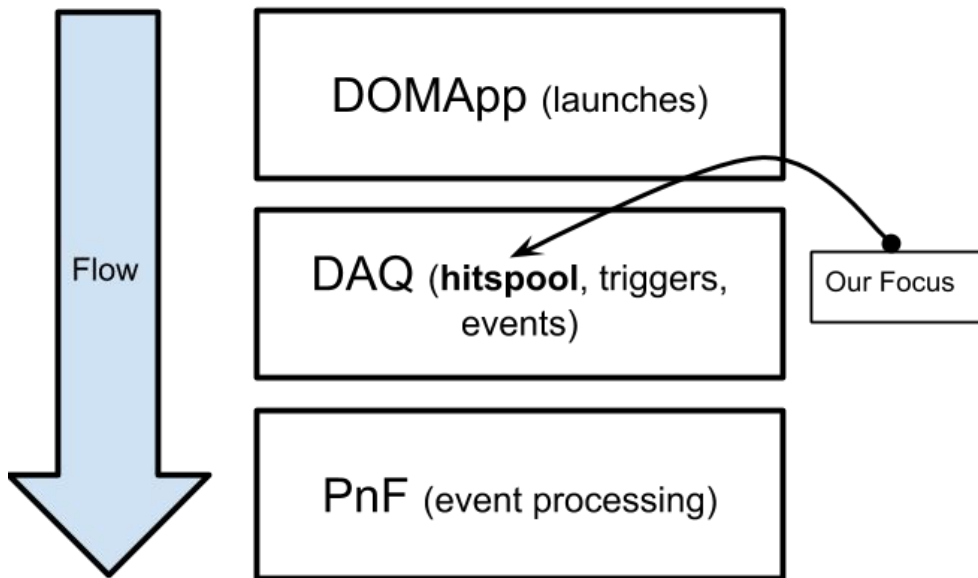


PDAQ Hitspool Data

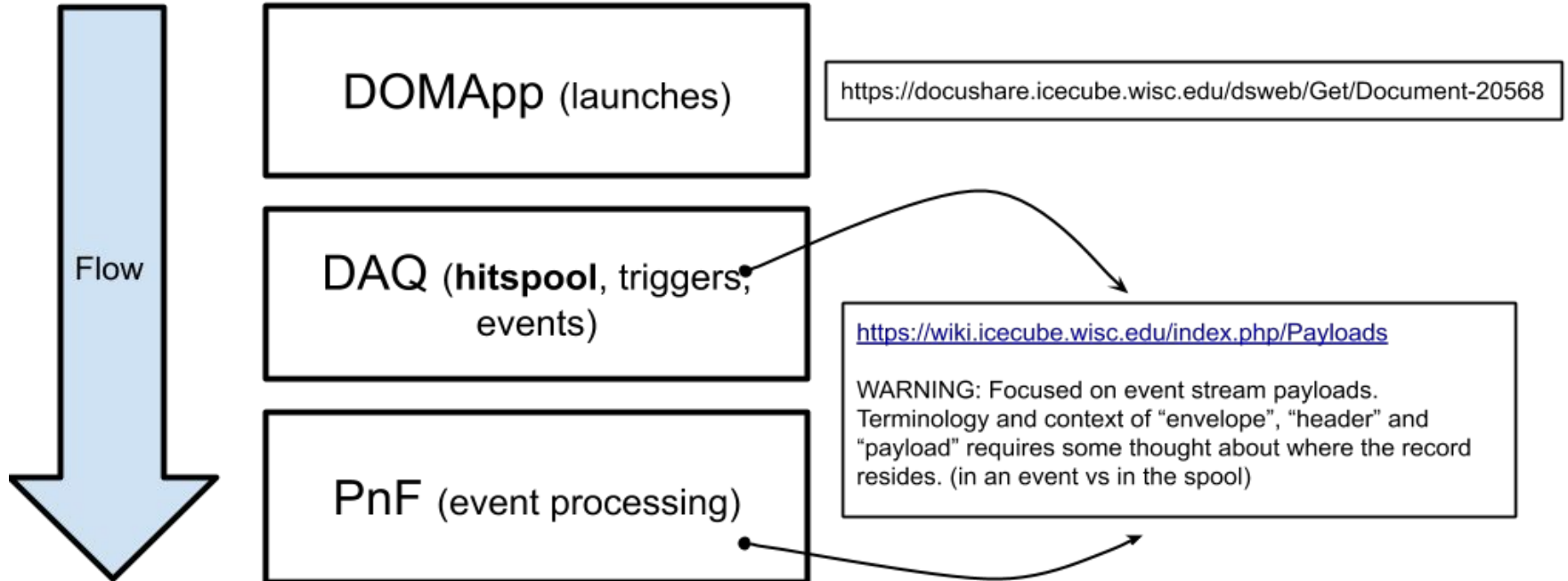
DOM to Spool

Hit Record Flow

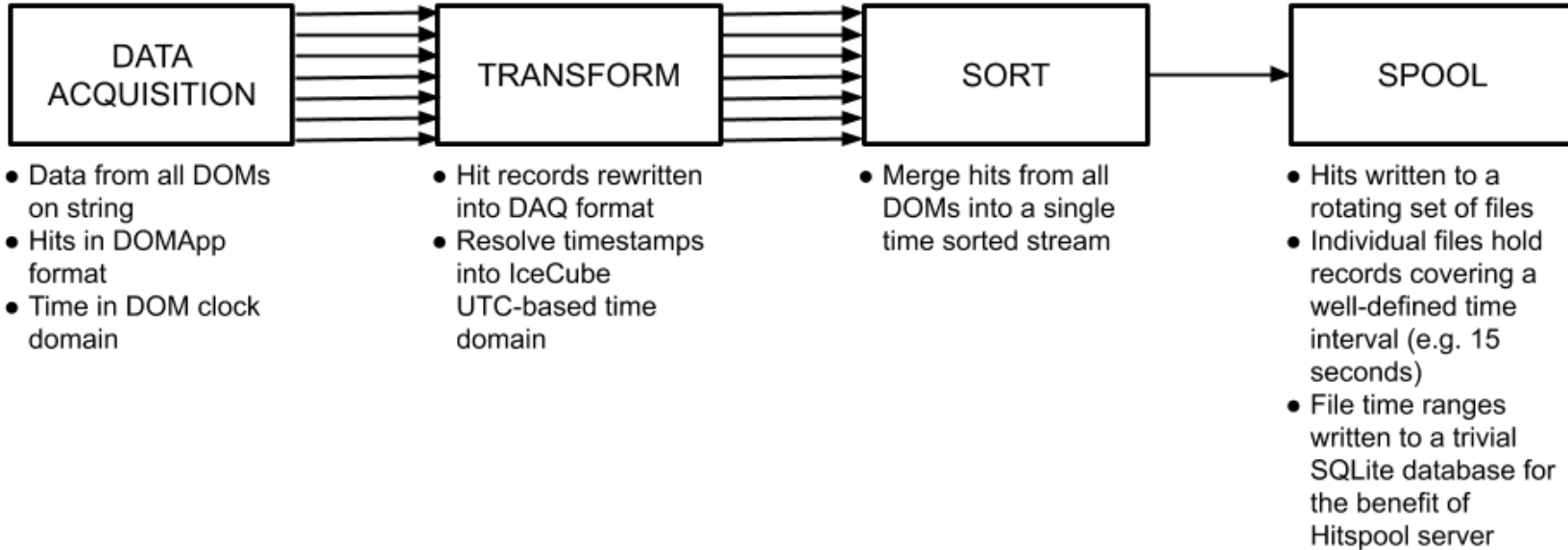


- Hit formats and naming conventions vary by processing domain
- Data is substantially similar but many fields are added, removed, moved or altered
- Hit data is “tee’ed” such that triggers, events and hitspool streams are not identical formats.
- Hitspool and trigger record formats are generally called “DAQ” formats
- Naming conventions are loose and not standardized across the collaboration

Documentation



Hitspooling (in situ, single string)



Hitspool Files (in situ, single string)

```
hitspool
|-- HitSpool-0.dat
|-- HitSpool-1.dat
|-- HitSpool-2.dat
|-- HitSpool-3.dat
|-- HitSpool-4.dat
|-- ...
|-- HitSpool-NNN.dat
|-- hitspool.db
```

Rolling set of hitspool files holding data for a configured interval of time.

Configured by:

```
long fileInterval;
int  maxNumberOfFiles
```

Sqlite database holds simple registry of file to time interval

```
>sqlite3 hitspool.db
```

```
sqlite> .tables
hitspool
```

```
sqlite> .schema hitspool
CREATE TABLE hitspool(filename text primary key not null,start_tick integer, stop_tick integer);
```

```
sqlite> select * from hitspool order by start_tick asc;
```

```
HitSpool-1985.dat|257397750002630038|257397899994628715
HitSpool-1986.dat|257397900000930029|257398049995084698
HitSpool-1987.dat|257398050006797773|257398199990440906
HitSpool-1988.dat|257398200032147539|257398349982813323
HitSpool-1989.dat|257398350038641549|257398455628874081
HitSpool-0.dat|257400136872855781|257400149981961366
HitSpool-1.dat|257400150006447250|257400299991309517
HitSpool-2.dat|257400300016101568|257400449998697299
HitSpool-3.dat|257400450011817045|257400599996883858
HitSpool-4.dat|257400600001438623|257400749993270382
HitSpool-5.dat|257400750003489174|257400899990734059
HitSpool-6.dat|257400900003882475|257401049991115444
HitSpool-7.dat|257401050002421425|257401199996603143
HitSpool-8.dat|257401200003169812|257401349996126371
HitSpool-9.dat|257401350006889644|257401499993576384
HitSpool-10.dat|257401500003805971|257401649991368015
```

Currently IceCube string hubs are configured for 15 second file intervals and 360000 files for a rolling data lookback of 6.25 days. This is based on the disk capacity and data production rate of the highest producing hub.

Filename generated based on pdaq configuration. This can change.

// get the file number for a record of time t

```
final int fileNo =
    (uint32) ((t / fileInterval) %
maxNumberOfFiles);
```

// calculate the span interval

```
final long latest = ((t / fileInterval) *
fileInterval) + (fileInterval - 1);
final long earliest = latest - fileInterval + 1;
```

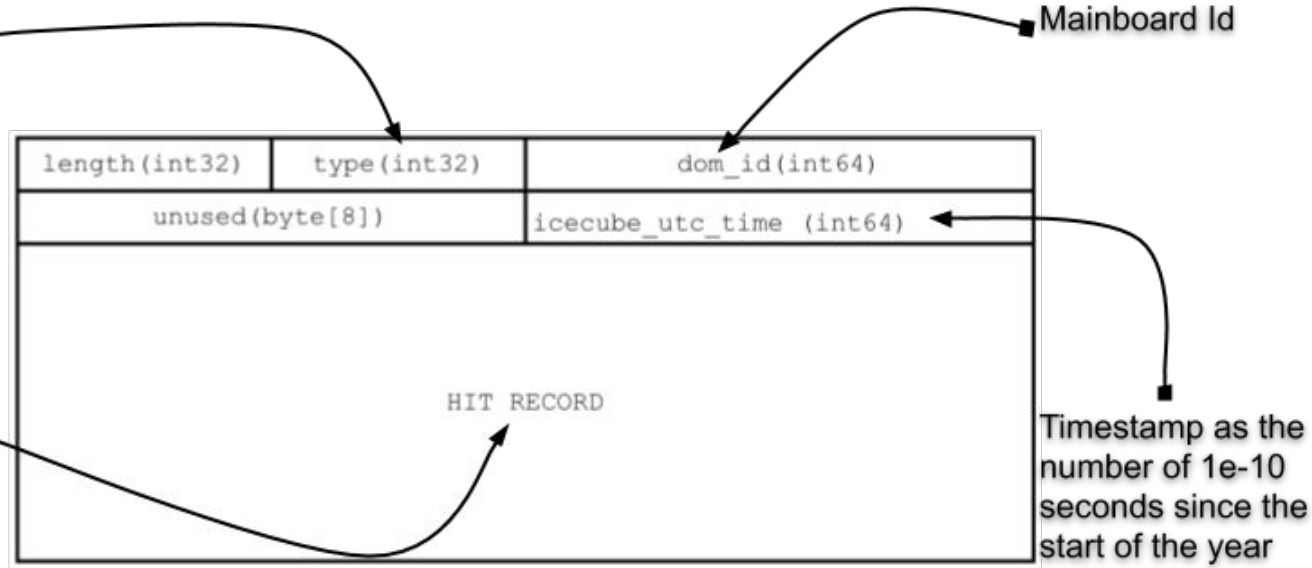
// These are implementation details and should not be relied on by downstream consumers of spool data ... but can be duplicated by producers

Hitspool Request

A hitspool request is a verbatim copy of the in situ hitspool files across the entire detector for a specific time range.

Hitspool Hit Format (aka DAQ format)

2 engineering hit
3 compressed hit
102 moni data
202 tcal data
302 supernova
.



For hitspool usually a delta-compessed hit

Special runs (Flasher?) may produce engineering format hits
Upgrade/Gen2 may introduce new formats

Big-Endian data fields

Mainboard Id

Timestamp as the number of 1e-10 seconds since the start of the year (UTC-0)

This requires knowledge of leap seconds to implement correctly

Delta Compressed Hit (DAQ type 3)

length (uint32)		type(uint32) = 3		domid(uint64)	
unused(byte[8])				timestamp(uint64)	
byte-order mark	version	pedestal	DOM clock (uint64)		
word-1		word-3		<compressed hit data>...	

See:

https://wiki.icecube.wisc.edu/index.php/Payloads#Delta_Compressed_DOM_Hit_Type_3.29

And

<https://docushare.icecube.wisc.edu/dsweb/Get/Document-20568>

Delta Compressed Hit (DAQ type 3)

length (uint32)		type(uint32) = 3		domid(uint64)	
unused(byte[8])				timestamp(uint64)	
byte-order mark	version	pedestal	DOM clock (uint64)		
word-1		word-3		<compressed hit data>...	

bo-mark	0x01
version	0x02
pedistal	[&0x01=pedestal subtraction, &0x02=atwd charge stamp]

Delta Compressed Hit (DAQ type 3)

word-1

Bit Position	Length	Description
31	1	Compression Flag
30	1	Minimum Bias Flag
29	12	Trigger Word
17	2	Local Coincidence (01 below, 10 above, 11 below and above)
15	1	fADC available
14	1	ATWD available
13	2	ATWD Size
11	1	ATWD A or B
10	11	Hit Size

word-2

Bit Position	Length	Description
31	1	Peak Range
30	4	Peak Sample
26	9	Pre-Peak Count
17	9	Peak Count
8	9	Post-Peak Count

Delta Compressed Hit (DAQ type 3)

length (uint32)		type(uint32) = 3		domid(uint64)	
unused(byte[8])				timestamp(uint64)	
byte-order mark	version	pedestal	DOM clock (uint64)		
word-1		word-3		<compressed hit data>...	

Compressed Hit Data See:

<https://docushare.icecube.wisc.edu/dsweb/Get/Document-20568>

Reference Code

DOMApp

<http://code.icecube.wisc.edu/daq/projects/domapp/releases>

DAQ

<https://code.icecube.wisc.edu/daq/meta-projects/pdaq/releases/>