13File Tools and Visulaization

Kevin Meagher
5 June 2024
IceCube Summer School



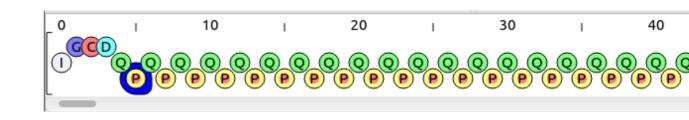
What is an .i3 File?

- Standard file format for IceCube data
- Used for both experimental data and simulation
- I3 files are used for serial processing of data
- The frame is the fundamental unit of an i3 file
- Each frame represents one IceCube event (~10ms of IceCube data)

```
6.i3.bz2
076.i3.bz2
```

Different types of frames

Frames are Identified by a letter



Metadata (usually once per file)

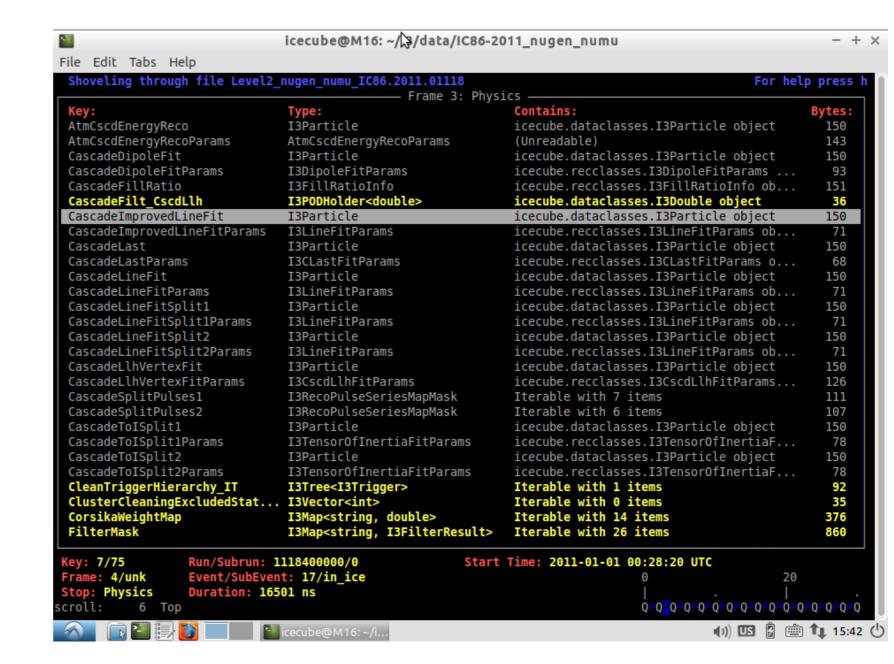
- "I" (TrayInfo): Information on how the file was previously processed
- "G" (Geometry): Geometric coordinates of each DOM
- "C" (Calibration): Calibration constants relating to the photomultiplier tubes
- "D" (Detector Status): How the data acquisition sysetem was configured for this particular (8 hour) run. le which DOMs were on.

Event Info: (~10 us of data)

- "Q" (DAQ): Waveforms recorded for this event
- "P" (Physics): High level pulse information and reconstructions

Dataio-shovel

- Tool for easily viewing .i3 files in terminal
- Can be run on remote machines (such as cobalts)



To Use

1. First enter the IceTray environment:

On the VM: ~/i3_software/combo/build/env-shell.sh

2. For a file in .i3 format

on the VM: dataio-shovel GCD-File.i3[.zst] Data.i3[.zst]

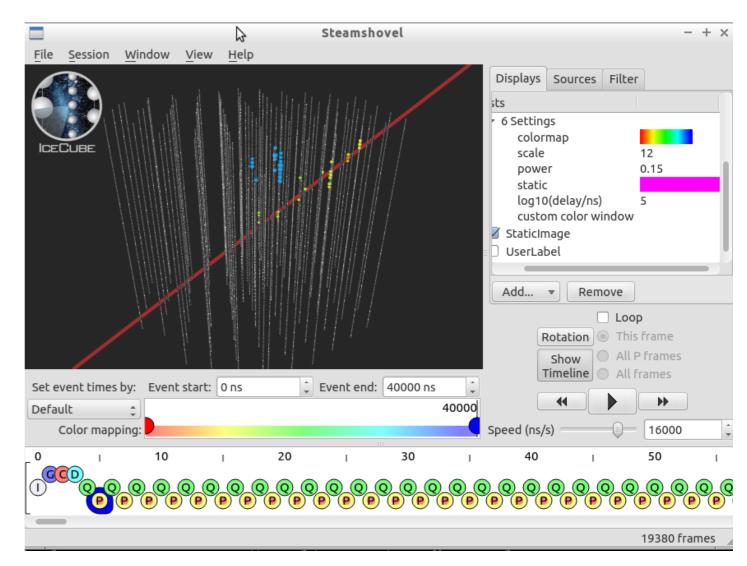
Useful commands In dataio-shovel

- "x": open a module in XML format
- "enter": open an object in a cleaned human readable format
- "g": goto a frame number
- "i": enter an python shell
- "L": import a library
- "?": show all available commands

dataio-shovel Demo

Steamshovel

Tool for 3D visualization of IceCube events in a GUI



To Use

1. First enter the IceTray environment:

On the VM: ~/i3_software/combo/build/env-shell.sh

2. For a file in .i3 format

on the VM: steamshovel GCD-File.i3[.zst] Data.i3[.zst]

steamshovel documentation:

https://docs.icecube.aq/icetray/main/projects/steamshovel/index.html

Steamshovel Demo

Don't Suffer in silence, if you have any problems with Steamshovel or dataio-shovel do one of the following thing:

- File a issue on GitHub: https://github.com/icecube/icetray/issues
- Ask on #Software on Slack
- Send an email to <u>software@icecube.wisc.edu</u>