

The TID software package

Julien Sylvestre
LIGO-MIT

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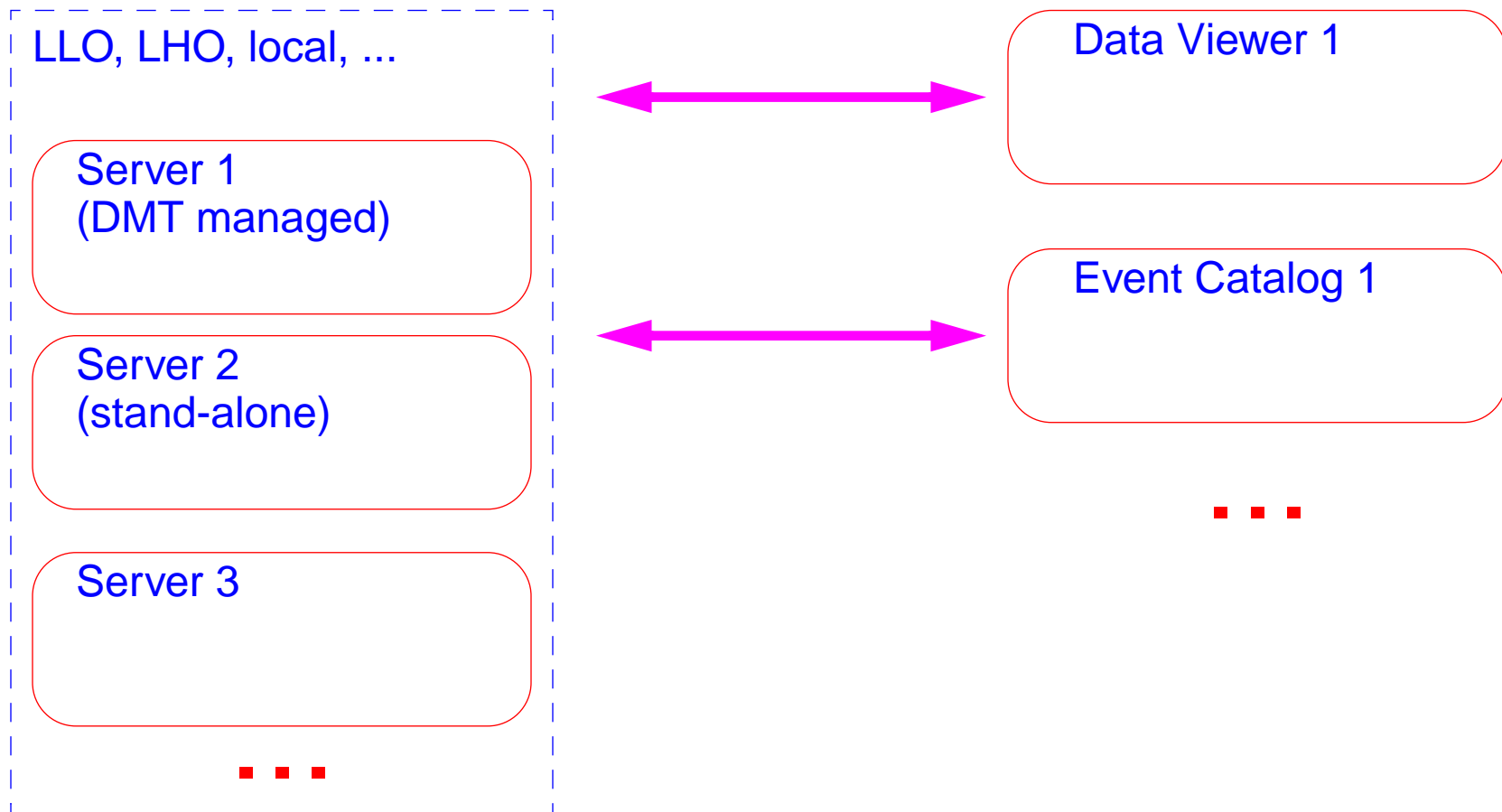
LSC Meeting - LIGO Hanford Observatory
13 August 2001



Features

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- Time-frequency detection of transients with clustering analysis and power thresholds
 - Real-time, configurable data viewer
 - Pattern classification, trigger generation

Architecture



Server

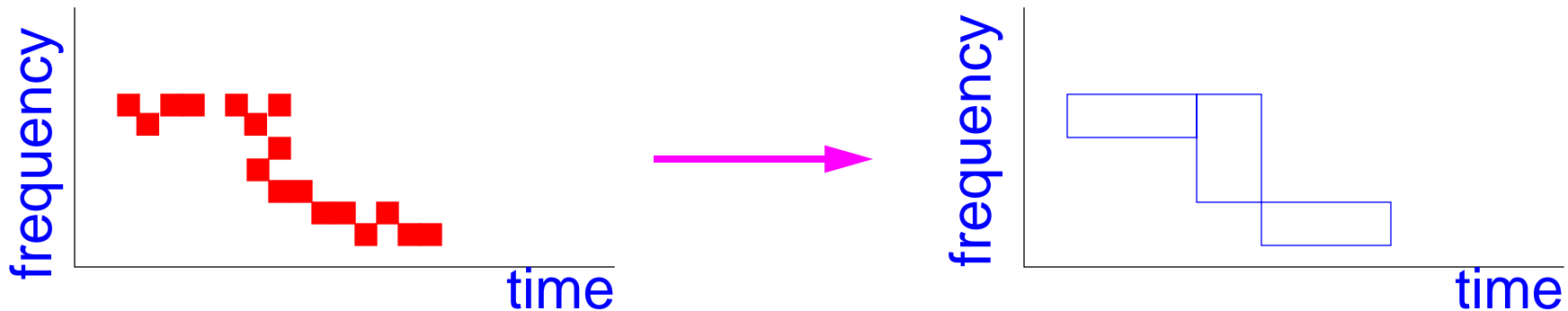
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- time-frequency representation from short-time Fourier transforms
 - At every frequency, noise power modeled by Rice distribution (allow lines and colored Gaussian noise)
 - Chi-square test over long timescale (e.g. 5 minutes) to check validity of fit to steady-state noise
 - Three stages in analysis:
 - ›› threshold on power to generate black pixels
 - ›› clustering analysis to eliminate small groups of pixels
 - ›› threshold on power integrated over clusters
 - Can do ~20 2 kHz channels / CPU (depends on bpp)

Data Viewer

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- Display data from available channels on any number of servers
 - Configurable, zooms in time and frequency, postscript dumps
 - Export event measures: times, bandwidth, power, etc.

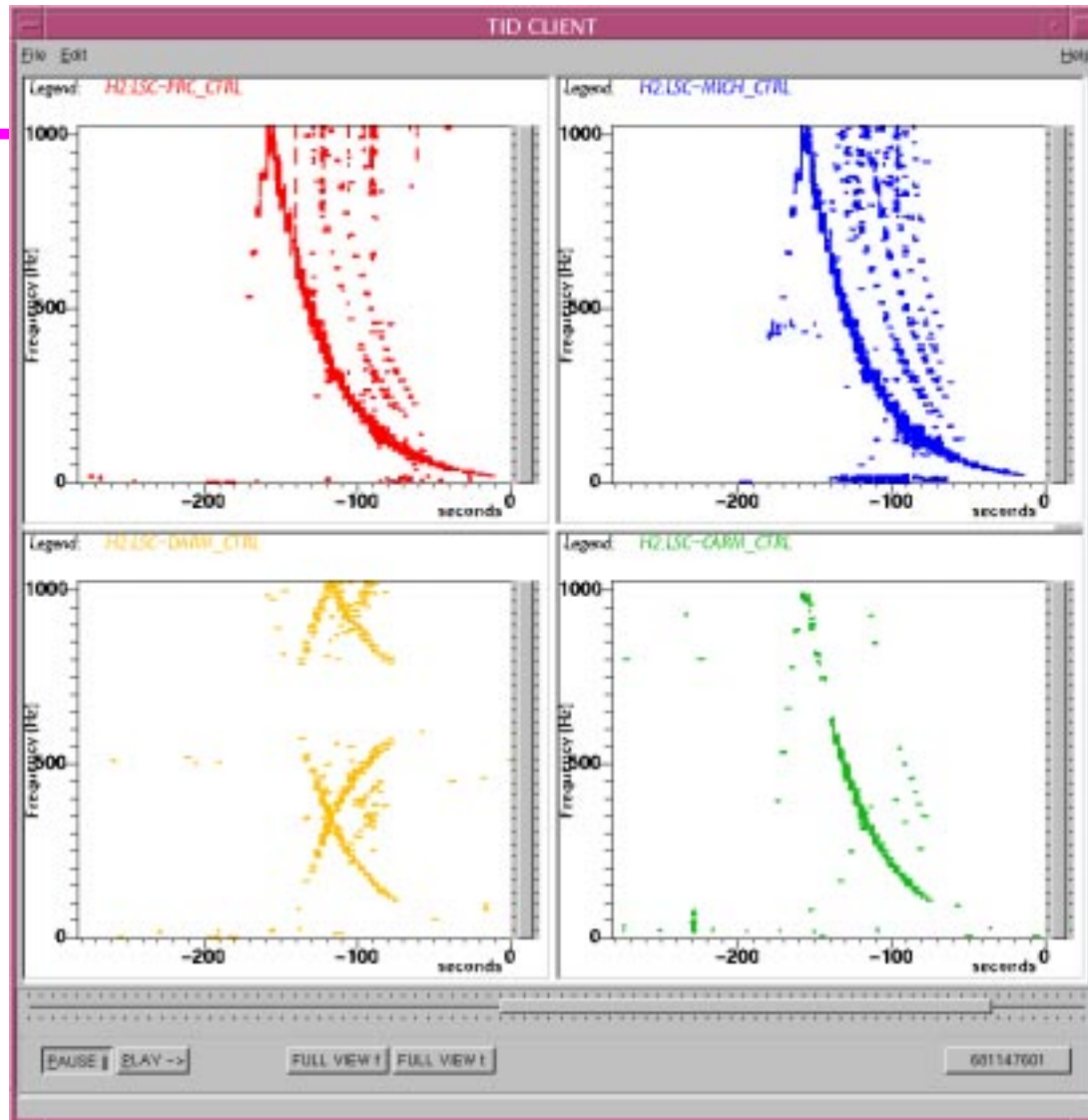
Event Catalog

- Allows definition of events as arbitrary groups of rectangles

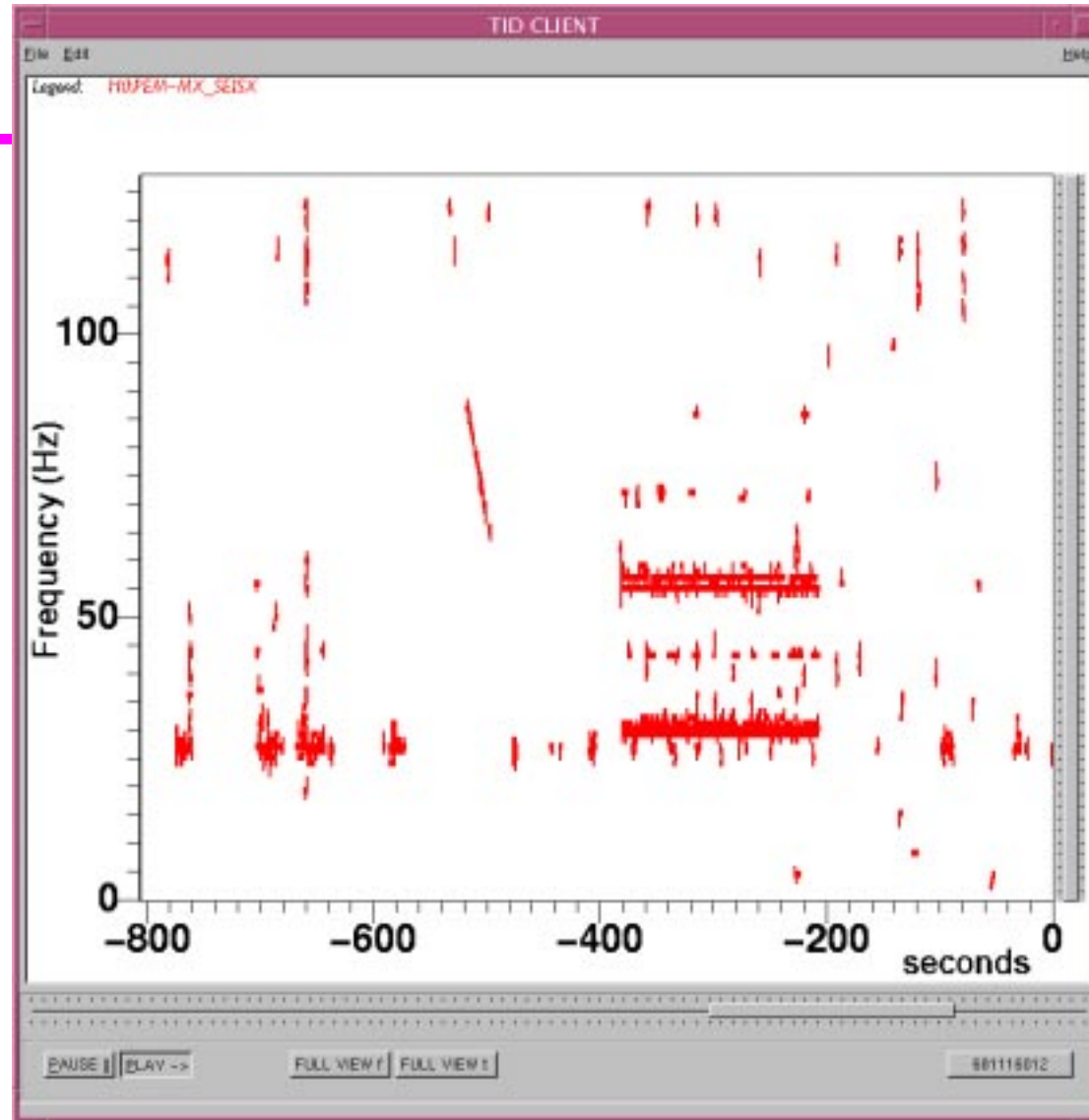


- Computes a cost for each pattern:
$$\text{cost} = \#(\text{black that should be white}) + \alpha \#(\text{white that should be black})$$
- Exports triggers to HTML or ASCII files
- Writes triggers to the LDAS database via the DMT trigger manager

Example: E5 sweeps



Example: seismometer signal



Example: seismometer signal

- File `mxpump.tid`:

```
# name of the event class
class mxpump

...

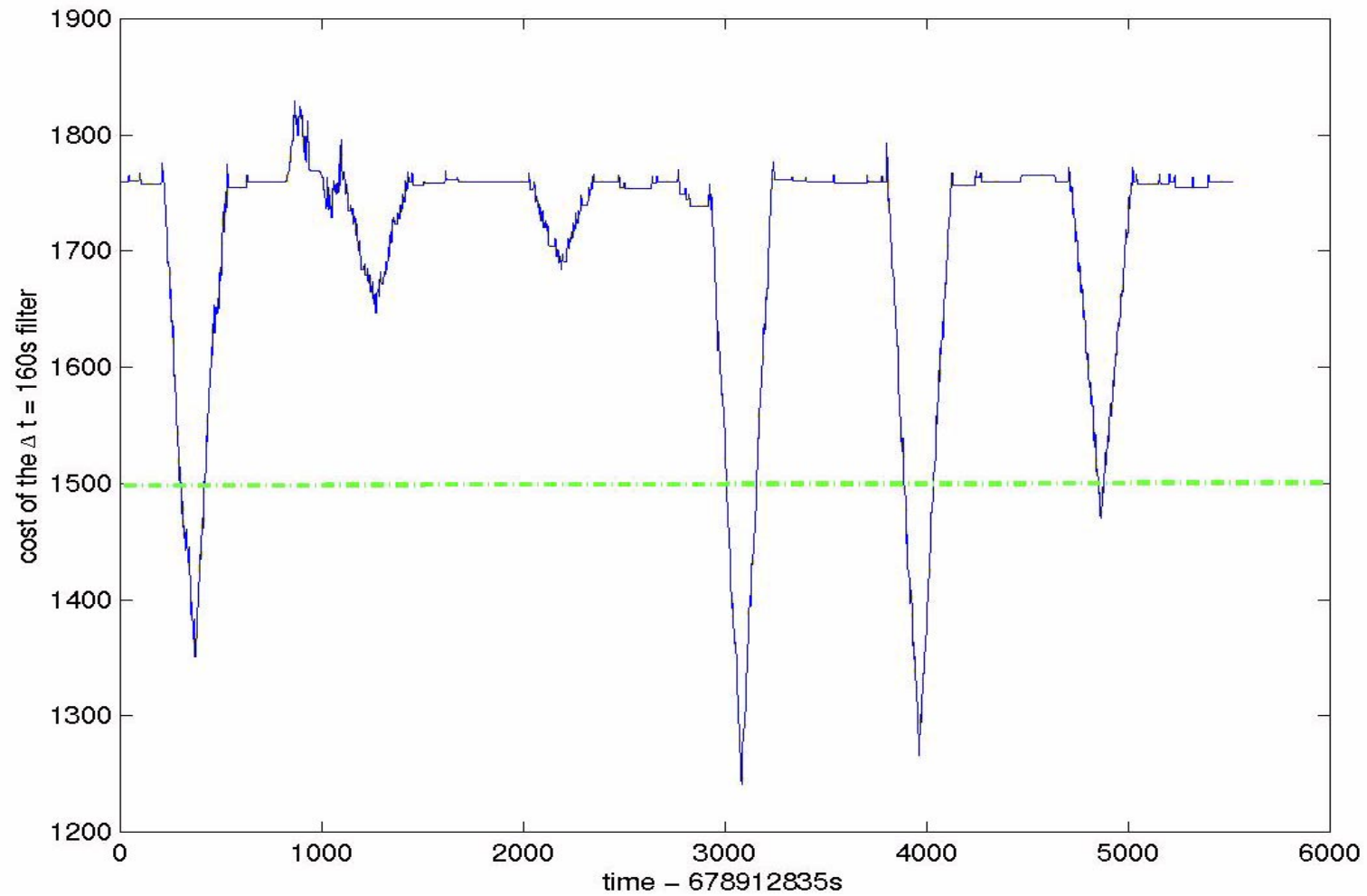
# name of channel to search
channel=H0:PEM-MX_SEISX

# declaration of variables
var(t,160,200,5)

# declaration of rectangles
rectangle(5,t+5,27,33,0,t+10,25,35)
rectangle(5,t+5,55,57,0,t+10,53,59)
rectangle(5,t+5,70,73,0,t+10,68,75)

# mandatory end statement to terminate the class declaration
end
```

Example: seismometer signal



Example: seismometer signal

Entries in table GDS_TRIGGER (LHO, default database)

Column selected: START_TIME_NS Hide Show Resize

Rows	NAME	SUBTYPE	START_TIME	START_TIME_NS	DURATION	SIZE
1	TID	mzpump	681517503	0	1.6000000e+02	8.9999998e-01
2	TID	mzpump	681518380	0	1.6000000e+02	8.9999998e-01
3	TID	mzpump	681519267	0	1.7000000e+02	8.1957698e-01
4	TID	mzpump	681520172	0	1.7000000e+02	7.3174602e-01
5	TID	mzpump	681521051	0	1.7000000e+02	7.9470903e-01
6	TID	mzpump	681521944	0	1.7000000e+02	7.7777803e-01
7	TID	mzpump	681522845	0	1.7000000e+02	7.3968297e-01
8	TID	mzpump	681523730	0	1.7000000e+02	7.3915303e-01
9	TID	mzpump	681524626	0	1.8000000e+02	7.8530401e-01
10	TID	mzpump	681525546	0	1.7000000e+02	7.3121703e-01
11	TID	mzpump	681526437	0	1.7000000e+02	7.4074101e-01
12	TID	mzpump	681527319	0	1.7000000e+02	7.3650801e-01
13	TID	mzpump	681608829	0	2.0000000e+02	8.1206399e-01
14	TID	mzpump	681609653	0	1.8000000e+02	8.0529898e-01
15	TID	mzpump	681614119	0	1.6000000e+02	7.5077301e-01

file: http://198.129.208.245/ldas_outgoing/jobs/NORMAL79/guildquery001.xml

query was: SELECT * FROM GDS_TRIGGER WHERE (subtype = 'mzpump') ORDER BY start_time, Full

show cross-ref: Process... Filter... Data source Transformed data Coincidences

Save as... Help Close ma

More information

- <http://web.mit.edu/julien/www/tid/tidhowto.html>
 - ››documentation on server, viewer, catalog
 - ››download
 - ››installation instructions