

# **What We've Learned About "FRAMES"**

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# *What are FRAMES...*

- *FRAMES are sequentially ordered units of data*
- *Each FRAME has fixed time length*
- *FRAME holds all descriptive data from IFO*
- *Hierarchical organization of data into C structures*
  - *FRAME uses evolving Dictionary to understand content*
- *Various C structures used for different data types*
  - *Fast ADC, Slow ADC, Static, Detector, ...*
- *Arbitrary number of FRAMES stored in files*
- *Single representation of static information per file*
  - *Calibration, State Vector, ...*

# *LIGO's Use of FRAMES...*

- *One year of experiences with FRAMES*
- *Nov., 94 Dataset from 40m converted to FRAMES*
- *LIGO using FRAMES in new 40m DAQ System*
- *May, 1997 40m data runs used FRAMES*
- *Real-time data visualization possible with FRAMES*
- *GRASP data analysis of FRAMES both on/off line*
- *FRAME development benefits from support of 40m data runs, CDS DAQS prototype and GRASP analysis*

# *FRAME I/O Library Background...*

- *FRAME software library originated with VIRGO*
- *Author: Benoit Mours, Annecy France (LAPP)*
- *LIGO investigated many formats (HDF, CDF, FITS, etc.)*
- *Proposed as common format for LIGO and VIRGO*
  - *VIRGO visits LIGO at Annecy & Caltech in April, 1996*
  - *LIGO began working with library ~ 1 month later*
  - *Suggestions for major enhancements made by LIGO in July, 96*
  - *GEO becomes interested in the FRAME format in July, 96*
  - *TAMA becomes interested in FRAMES at GWDAAW in Dec., 96*
- *Prototype 40 meter DAQS targeted using FRAMES*

# *FRAME I/O Library Status...*

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- *First LIGO/VIRGO FRAME distribution May, 96*
  - *Several minor revisions made to CDS*
  - *V2.2 distributed in Jan., 97*
  - *V2.3 & V2.33 distributed in May, 97 (Current version 1 day old)*
  - *Software now publicly available on the web*  
*(<http://lapphp.in2p3.fr/virgo/FrameL>)*
- *FRAME Library software complex*
  - *software written with roughly 5200 lines of C code*
  - *supports big-endian and little-endian integers and IEEE reals*
  - *supports 17 different C-Structures*
  - *functionality controlled by 147 C-Functions*
- *Versions 2.2 and 2.3 include a FRAME document*

## *Collaborative Results...*

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- *Working together, LIGO and VIRGO have made progress towards a common data format*
- *The FRAME format can deliver the needed data throughput for LIGO*
- *A common data format has been embraced by the gravitation wave detector community*
- *The FRAME format carried from concept to example, from acquisition to analysis*

## *Present Issues...*

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- *Memory-leaks in FRAME library limits run-times*
- *Long turnaround times for fixes and improvements*
- *Coding Standards inadequate for maintaining*
- *Documentation and Examples less than minimal*
- *Formal FRAME Specification missing*
- *More expertise with FRAME software needed*
- *More experience with FRAME data analysis needed*
- *Avenue for partnership code development needed*

# *How to Proceed...*

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- *Frame development limited by Benoit Mours' visits*
  - *Caltech: July, 96 - Initial meeting to specify common format goals*
  - *Caltech: April, 96 - Focus on bugs found in DAQS implementation*
- *Code Support*
  - *Establish faster turnaround to debug reports and extensions*
  - *Establish an in-house FRAME expert to existing code*
- *Lazzarini & Blackburn to visit Benoit Mours*
  - *Improving coding standards, documentation and specifications*
  - *Implement code configuration management tools*
- *LIGO may need tighter control of FRAMES*
  - *Should LIGO become the official developer of the FRAMES?*