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# The datacondAPI

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# datacondAPI: Role

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- Pre-conditioning
  - » Preparing and packaging data for analysis
  - » E.g., channel selection, frame concatenation, decimation, whitening, linear filtering, basebanding, etc.
- Conditioning
  - » Identification and removal of instrumental and environmental artifacts
  - » E.g., Violin modes, power main features, seismic noise correlations, etc.
  - » Drop-out correction
- Characterization
  - » Statistical characterization of noise
  - » E.g., Power spectra, cross power spectra, stationarity, gaussianity, etc.
- Data packaging
  - » All data destined for search engines (I.e., the wrapperAPI) passes through the datacondAPI
  - » E.g., frame data, metadatabase data, instrument calibrations, etc.

LIGO-G010109-00-Z



# “Programming” the datacondAPI

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- Specify location of input, output
  - » Frames, metadatabase, wrapperAPI, etc.
- Specify input data, name output data
  - » Channel names & duration, database tables & keys, data names expected by wrapper, etc.
- Specify “actions”
  - » Matlab-like commands on input data
  - » E.g., decimate, linear filter, estimate power spectra, regress, etc.



# “Developing” for the datacondAPI

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- C++
  - » Part of LDAS, not LAL
  - » Developers handbook for datacondAPI
  - » LDAS Style Guide
- Library + Actions
  - » Library is C++ layer of classes that provide functionality
  - » Actions are Matlab-commands available to datacondAPI users
  - » Actions are built on top of library
- Interface layers
  - » Datatypes specified
    - Time series, sequences, spectra, etc.
  - » Library interface requires certain methods, signatures, datatypes
  - » Actions (matlab-like commands) all have return values
    - Chosen from specified data types



# Current actions

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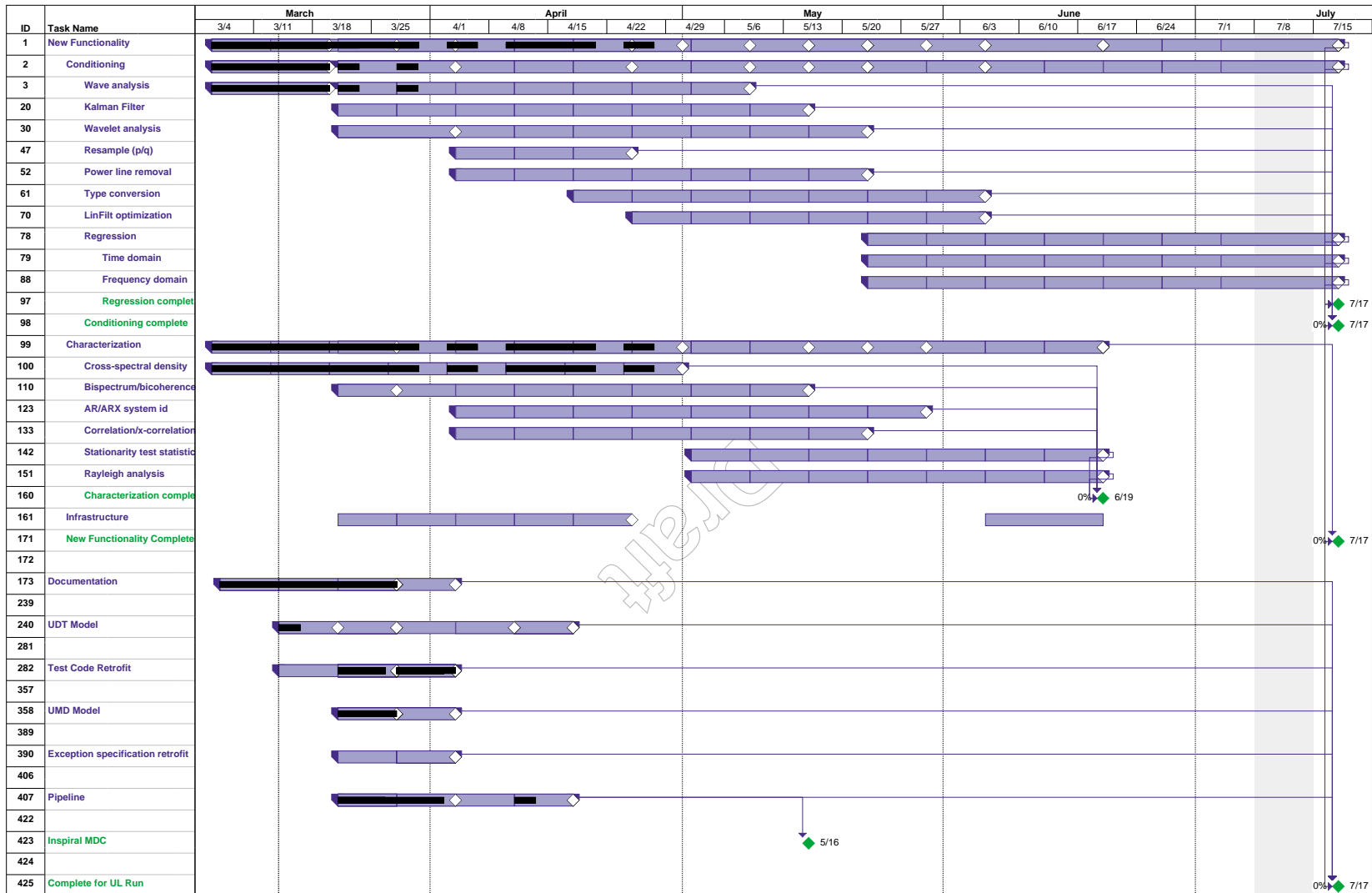
- (I)DFT
  - » Forward, reverse DFT or arbitrary sequence. Automatic recognition and optimization of real, complex DFT
- Linear filtering
  - » Apply arbitrary IIR filter to a sequence
- Decimation
  - » Up, down sample sequence by arbitrary integer factor
- Slicing
  - » Subset a sequence, choosing elements by number, stride
- Power spectrum estimation
  - » Welch estimation with optional detrending, choice of windows, overlapping and resolution
- X-spectral density, coherence
  - » Same options as for psd
- Heterodyning
  - » Digital lock-in with arbitrary phase
- Descriptive statistics
  - » Max, min, mean, variance, skew, kurtosis of sequence
- +, -, \*, /, log, sin, cos
  - » Basic math on sequences



# Actions in development

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- Auto, cross-correlations
- System ID
  - » AR/ARX model
- Power main line removal
  - » ARX modeling
- Violin mode line removal
  - » Kalman filtering
- Power spectrum estimation
  - » All-pole parametric modeling
- Regression
  - » Multi-channel
- Resample
  - » Arbitrary rational ratio
- Bispectrum/bicoherence
  - » For identification of bilinear couplings
- Stationarity tests
  - » Broadband, narrow band



Project: Software Development Plan  
Date: Wed 3/14/01

