



Anatomy of an IdasJob

LSC Meeting March 2001

Antony C. Searle

ACIGA / ANU

LIGO-G010120-00-Z



LDAS and E3

- E3 study by Philip Charlton (CIT) using LDAS datacondAPI.
- Correlations and PSDs produced in real-time.
 - Continuous loop submitted batch jobs.
 - Considered channels AS_Q and *_SEIS?.



An IdasJob

```
IdasJob
{
  -name name
  -password password
  -email email
}
{
  conditionData
  -inputprotocol file:/directory/name.extension
    -inputformat ilwd
  -returnprotocol file:/directory/name.extension
    -returnformat ilwd
  -result name correlation
    -result comment {correlation of input channels}
  -aliases
  {
    alpha = channel Alpha:component;
    beta = channel Beta:component;
  }
}
```

```
-algorithms
{
  psd_alpha = psd(alpha);
  intermediate(,psd_alpha,power spectral density of
alpha);

  psd_beta = psd(beta);
  intermediate(,psd_beta,power spectral density of
beta);

  alpha_sub_beta = sub(alpha,beta);
  psd_alpha_sub_beta = psd(alpha_sub_beta);
  intermediate(,psd_alpha_sub_beta, power spectral
density of difference);

  csd(alpha,beta);
}
}
```



What?

- Follows a simple structure (really!)
- Usually submitted to managerAPI socket by an enclosing Tcl script.

```
set sid [ socket lidas.ligo-la.caltech.edu 10001 ]  
puts $sid $command  
flush $sid
```



IdasJob Syntax

IdasJob

{

[job arguments]

}

{

[job contents]

}



Job Arguments

IdasJob

{

-name [account name]

-password [account password]

-email [notification email]

}

{ ...



Job Contents

IdasJob

...

{

conditionData

[conditionData arguments]

}



conditionData

- The conditionData instruction is followed by arguments specifying:
 - Input methods.
 - Output method.
 - Algorithms to apply.



Input Arguments

conditionData

-inputprotocol

`file:/directory/name.extension`

-inputformat `ilwd`

...



Supported Input/Output

- Different input/output locations and formats in various stages of support.
 - File
 - Other APIs
 - Database



Output Arguments

...

-outputprotocol

`file:/directory/name.extension`

-outputformat `ilwd`

-resultname `name`

-resultcomment `comment`

...



Aliases for Algorithm

- Native names of data typically long and unwieldy. Aliases allow convenient short names.

...

-aliases

{

alpha = HoRrIbLy_MaNgLeD_Alpha;

beta = HoRrIbLy_MaNgLeD_Beta;

}

...



Algorithm syntax

...

-algorithm

{

[datacondAPI actions]

}

...



Algorithm section

- The text following the -algorithm argument consists of datacondAPI **actions**.
- Actions are MATLAB-style statements to process the input data into the output data.
 - Syntax is C/MATLAB-like: **$y = f(x);$**



Algorithm example

```
-algorithms
{
  psd_alpha = psd(alpha);
  intermediate(,, psd_alpha, power spectral density of alpha);

  psd_beta = psd(beta);
  intermediate(,, psd_beta, power spectral density of beta);

  alpha_sub_beta = sub(alpha, beta);
  psd_alpha_sub_beta = psd(alpha_sub_beta);
  intermediate(,, psd_alpha_sub_beta, power spectral density of difference);

  csd(alpha, beta);
}
```



Actions

- `psd(input[, arguments]);`
 - Power Spectral Density
 - By default, uses Welch windowing
 - MATLAB-compatible
 - User may supply additional parameters
 - length, overlap, window...
 - Built using datacondAPI DFT component



Actions

- `intermediate(,,variable,comment);`
 - Adds an 'intermediate' value to the output file.
 - The last variable produced by an algorithm is 'the result' and automatically output with the name and comment set by
 - `-resultname`
 - `-resultcomment`



Actions

- `sub(a,b)`
 - `conditionData` does not support 'natural syntax' arithmetic (+, -, /, *).
 - Introduces more complexity to parser
 - Instead use `add`, `sub`, `div`, `mul`.
 - Many other trivial functions: `sqrt`, `exp`, `sin`, `cos`, `real`, `imag`, `conj`...



Actions

- `csd(a,b[,arguments])`
 - Correlation spectrum.
 - Functionality requested by user for E3 run.
 - Quickly produced by UTB, integrated by ANU and tested by CIT.



Output

- Several possible formats and protocols
 - Example: ILWD (ASCII) to file:

```
<?ilwd?>
```

```
<ilwd>
```

```
<real_8 name="alpha" comments="power spectral  
density of alpha">7.0899404e+03 3.9207999e+02 ...
```

```
</real_8>
```

```
...
```

```
</ilwd>
```



E3 Investigation

- IdasJobs like the above launched by a looping script to compute power spectra of IFO and seismometer channels, and correlations between them, throughout E3 run.
- Successfully stored in the database.
- Plotted for examination...



Summary

- IdasJob used in E3 to produce spectra and correlations.
- Simple syntax of account and I/O arguments followed by a block of MATLAB-like computation.
- Functionality to be discussed and extended...