SimpleTimeSeries Overview

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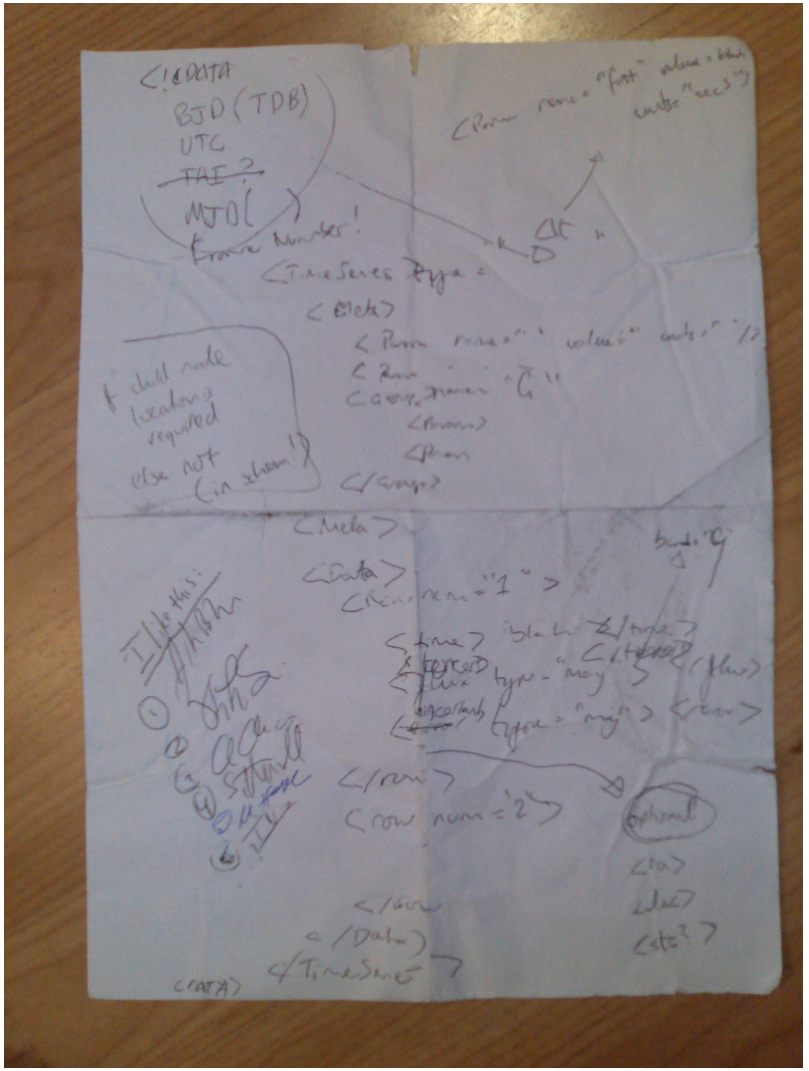
History and TL;DR

- First light curve DM proposed by Enrique Solano (7/2007)
- This led to the *Napkin Representation* and much discussion



History and TL;DR

- Light curve data collected for analysis (2010)
  http://wiki.ivoa.net/twiki/bin/view/IVOA/CSPTimeSeries
  http://wiki.ivoa.net/twiki/bin/view/IVOA/LightCurves
- John Brewer put together a schema for Josh Bloom's group,

http://www.cacr.caltech.edu/hotwired2/book/chapters/TimeSeries.pdf

- Arnold suggested revisions for consistency
- No response from berkely, STS is as it is
- STS reviewed by DM w/ agreement to publish as a Note (Feb13)
- Final STS Note published May14

SimpleTimeSeries

Four basic elements:

<TIMESYS> - contains details of time system used (units, defaults) and whether peiod folded data

<BAND> - description of bandpasses used, allowing multi-bp data in same document

<FIELD> - UCD references to fields used

<SERIES> - one or more <ELEM> containing the data itself

<TIMESYS>

```
<TIMESYS>
 <TimeType ucd="time;pos.frame;pos.heliocentric"
  unit="day">hjd</TimeType>
  <TimeZero ucd="time.epoch;arith.zp" unit="day">0</
  TimeZero>
  <!-- describe the progress of the time axis -->
  <TimeUnits ucd='time.epoch' datatype='float'
  unit='day' />
  <TimeWidthDefault ucd="time.period"
  unit="seconds">10.0</TimeWidthDefault>
  <TimeSystem ucd="frame.time.scale">UTC</TimeSystem>
</TIMESYS>
```

<BAND> and <FIELD>

```
<BAND ucd="instr.filter;em.opt" bandid="I" description="This
   is the Johnson-Cousins I-band">I</BAND>
<BAND ucd="instr.filter;em.opt" bandid="V">V</BAND>

<FIELD fld="imag" bandid="I" ucd="opt;phot;i" datatype="float"
   unit="mag">I-band photometry</FIELD>
<FIELD fld="vmag" bandid="V" ucd="opt;phot;v" datatype="float"
   unit="mag">V-band photometry</FIELD>
```

<SERIES>

```
<SERIES>
  <ELEM>
     <TIME><T>2448919.8</T></TIME>
     <MAG fld="imag"><VAL>17.535</VAL><ERR>0.03</ERR></MAG>
     <MAG fld="vmag"><VAL>17.327</VAL><ERR>0.03</ERR></MAG>
  </ELEM>
  <ELEM>
     <TIME>2448920.72</T>
     <MAG fld="vmag"><VAL>17.37</VAL><ERR>0.036</ERR></MAG>
  </ELEM>
  <ELEM>
     <TIME><T>2448922.82</T></TIME>
     <MAG fld="imag"><VAL>17.697</VAL></MAG>
     <MAG fld="vmag"><VAL>17.424</VAL></MAG>
  </ELEM>
</SERIES>
```

STS Limitations

- SimpleTimeSeries meets all of the IVOA science use cases for time series except for those where time is not the dependent variable, e.g., frequency with astroseismology data.
- SimpleTimeSeries cannot be used to represent power spectra.
- However, it can be argued that both of these are really spectra and so the Spectral DM serializations should be used to represent such data rather than a time series.

IVOA DM Compatibility

- *See Sec 3 of STS Note for details*
- However, generally good agreement in mapping
- Some issues with Spatial Axis, e.g. STS allows unit differences between values and their errors.

Alternatives

http://hea-www.harvard.edu/~arots/nvometa/STC/TimeSeriesTableFormats.pdf

STC-based representation, but lacks UCD/Utype attributes on values