

# THREDDS Data Server: OPeNDAP and Other Tales from the Server- Side

Sean Arms

UCAR/UCP/Unidata

2016-12-08 ESGF F2F

# What is THREDDS?

THREDDS is a *project*

**Thematic Real-time Environmental  
Data Distributed Services**

NSF #0121623 Division Of Undergraduate  
Education (DUE) and GEO  
September 15, 2001

# What is THREDDS?

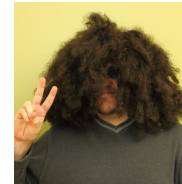
- Historically consisted of a server (TDS) and client (netCDF-Java)
  - New additions
    - Rosetta (Server Based Data Translation, Java)
    - Siphon (Client, Python)
- THREDDS 5.0
  - Next release of netCDF-Java and TDS

# Who is THREDDS?



# THREDDS Developers at Unidata

- Sean Arms  
*Boundary Layer Meteorology*
- Christian Ward-Garrison  
*Comp Sci, Hydrology*
- Dennis Heimbigner  
*Comp Sci*
- Ryan May  
*Radar Meteorology*
- Ethan Davis  
*Physics*



# External THREDDS Developers/Contributors



- John Caron: Chemistry, CS
- Tom Kunicki, Bob Simons, Rich Signell, Marcos Hermida, msdsoftware, barronh, danfruehauf, and 16+\* others
- Maybe you?

\* Only counts registered users on github, many other not registered or recognized by SVN -> Git commit messages

# TDS

- Long-standing demonstration server at Unidata  
<http://thredds.ucar.edu/thredds/catalog.html>
- Source code on GitHub:  
<https://github.com/unidata/thredds/>
- Dockerized (container on dockerhub)  
<https://hub.docker.com/r/unidata/thredds-docker/>  
<https://github.com/Unidata/thredds-docker>

# TDS v5.0

- The configuration catalogs and internal state of the TDS extensively reworked to scale to large numbers of catalogs, datasets, and internal objects



# TDS v5.0 Services

- No major changes outside of bug fixes and porting to Coverage (replaces GeoGrid)
  - HTTPServer
  - OPeNDAP (DAP2)
  - WCS
  - nclso\*

# TDS v5.0 Services

- DAP4

- New protocol jointly developed by Unidata and [OPeNDAP.org](http://OPeNDAP.org)
- Significantly enhanced [data model](#)
- Array concept from DAP2 has been replaced with a "Map" concept (variable <-> coordinate variables)
- The on-the-wire protocol has better error handling capabilities.

# TDS v5.0 Services

- DAP4
  - Separate DDS and DAS combined into single XML document
  - Client can negotiate with a server to utilize alternate (to XML) meta-data encodings: JSON, Protobuf, etc.

# TDS v5.0 Services

- NetcdfSubsetService
  - Request spatial, temporal, variable subset of CDM file (geophysical space)
    - Grid, Point, **GridAsPoint**
    - netCDF3, netCDF4, CSV, [GeoCSV](#), XML, WaterML - maybe [CovJSON](#)?
  - End-points changed a bit in 5.0 - minor

# TDS v5.0 Services

- ncWMS
  - New version based on edal-java
  - Supports UGRID
  - Can return [CovJSON](#)
  - Minimal TDS code (no longer maintain our own fork)
  - Includes new Godiva3 client

# TDS v5.0 Services

- CMDRemote, CDMRemoteFeature
  - Google Protobuff
  - Can result in faster access than DAP2
  - CDMRemote “Drop-in” replacement for DAP2
    - Siphon (has a pure Python client)
  - CDMRemoteFeature
    - Serialized Java Objects
    - Python client in the works
      - Access to CoordSys information

# TDS v5.0 - Service Status

HTTPService	Complete
OPeNDAP (DAP 2)	Complete
CDMRemote	Complete - with python client
CDMRemoteFeature	Complete - python client in the works
ncWMS (and Godiva3)	New version, supports UGRID
ncISO (iso, ncml, UDCC ACDD)	Same as ncISO in 4.x, update
DAP 4	Java <-> C iteration
NetcdfSubsetService	GridAsPoint
WCS	Same as WCS in 4.x
ncSOS	New addition to bundled services

# TDS v5.0 Super-duper Experimental

- TDS Jupyter Notebook Kernel
  - Adds Jupyter as a new service for TDS alongside existing services
  - Demonstrated using IPython kernel and Python implementation
    - could work with any Jupyter-compatible execution [kernel](#) (R, C/C++, NodeJS, Matlab, IDL, ...)
  - Achieves server-side processing with no writing of Java code



# THREDDDS 5.0 - Timeline

Server available for testing:  
[thredds-test.unidata.ucar.edu](http://thredds-test.unidata.ucar.edu)

Alpha netCDF-Java/Beta TDS  
 available: Jan 2017

Target release: Mid-to-late  
 Spring 2017



# THREDDS - Final Thoughts

- It's been a crazy year
- Supporting 4.x while pushing forward 5.x
  - Please ping us with request if you encounter silence - GitHub is best!
- Unidata 100% committed to THREDDS

Unidata is one of the University Corporation for Atmospheric Research (UCAR)'s Community Programs (UCP), and is funded primarily by the National Science Foundation (Grant NSF-1344155).

