

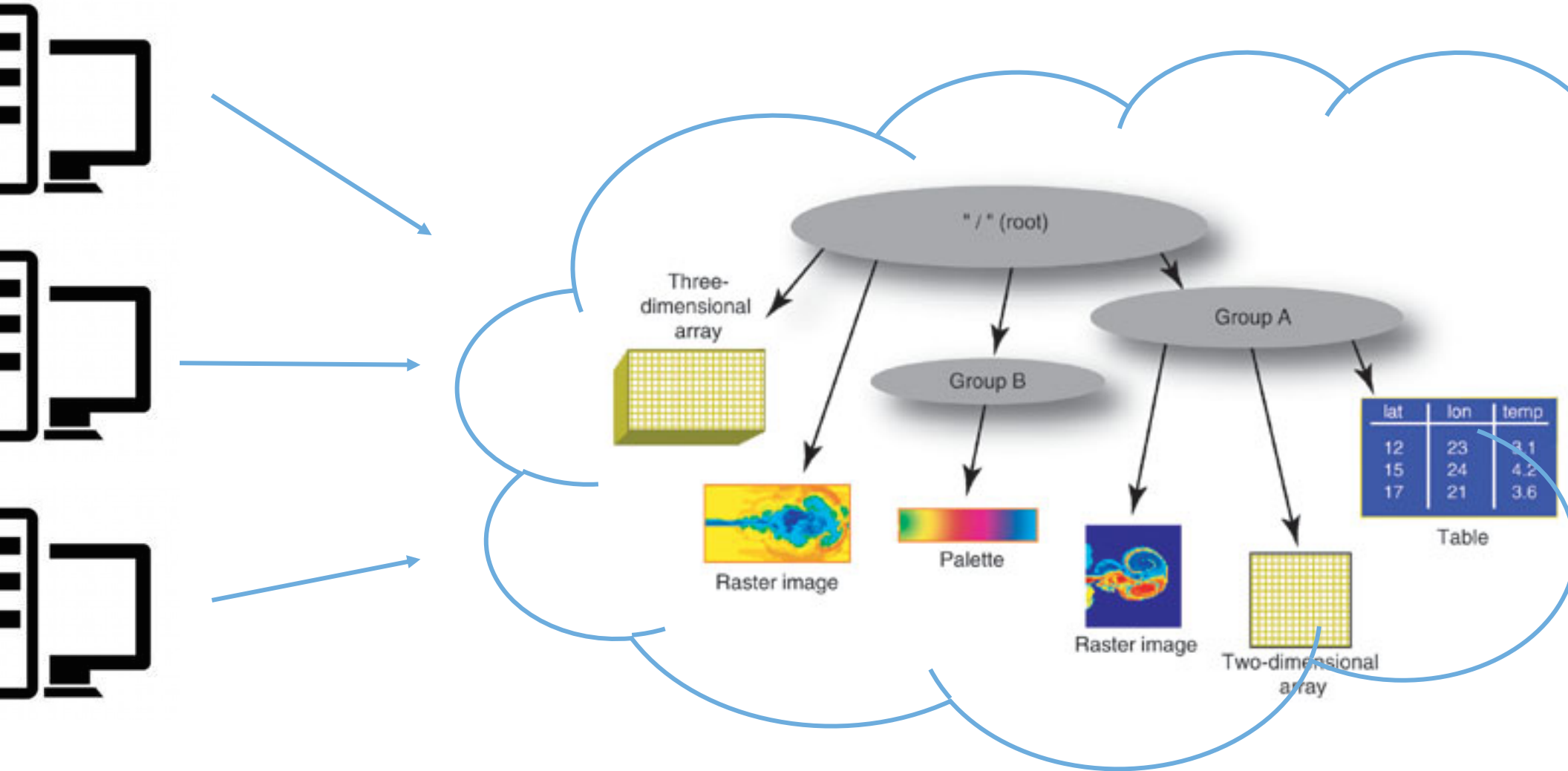
# New Directions for HDF5 Tools

HDF Server/HDF Compass/JSON Tools

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# HDF Server – A Web API for HDF



# Why an HDF5 Web API?

Motivation to create a web api:

Anywhere reference-able data – ie URI

Network Transparency

Clients can be lighter weight

Support Multiple Writer/Multiple Reader

Enable Web UIs (JavaScript access)

Increased scope for features/performance boosters

- E.g. in memory cache of recently used data

# HDF Server Highlights

Written in Python using Tornado Framework (uses h5py & PyTables)

REST-based API

HTTP request/responses in JSON

Full CRUD (create/read/update/delete) support

Most HDF5 features (Compound types, Compression, chunking, links)

Self-contained web server

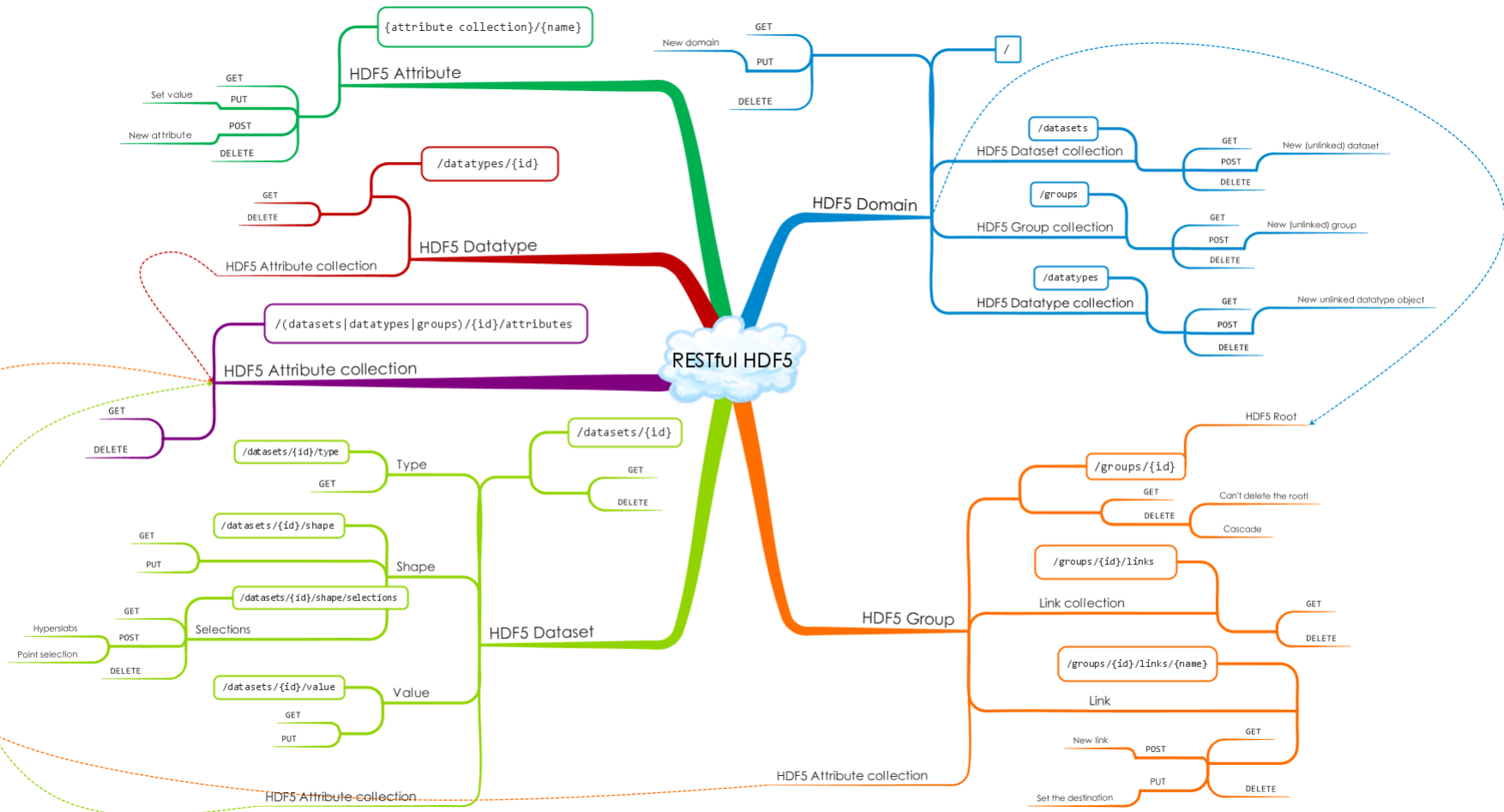
Open Source

UUID identifiers for Groups/Datasets/Datatypes

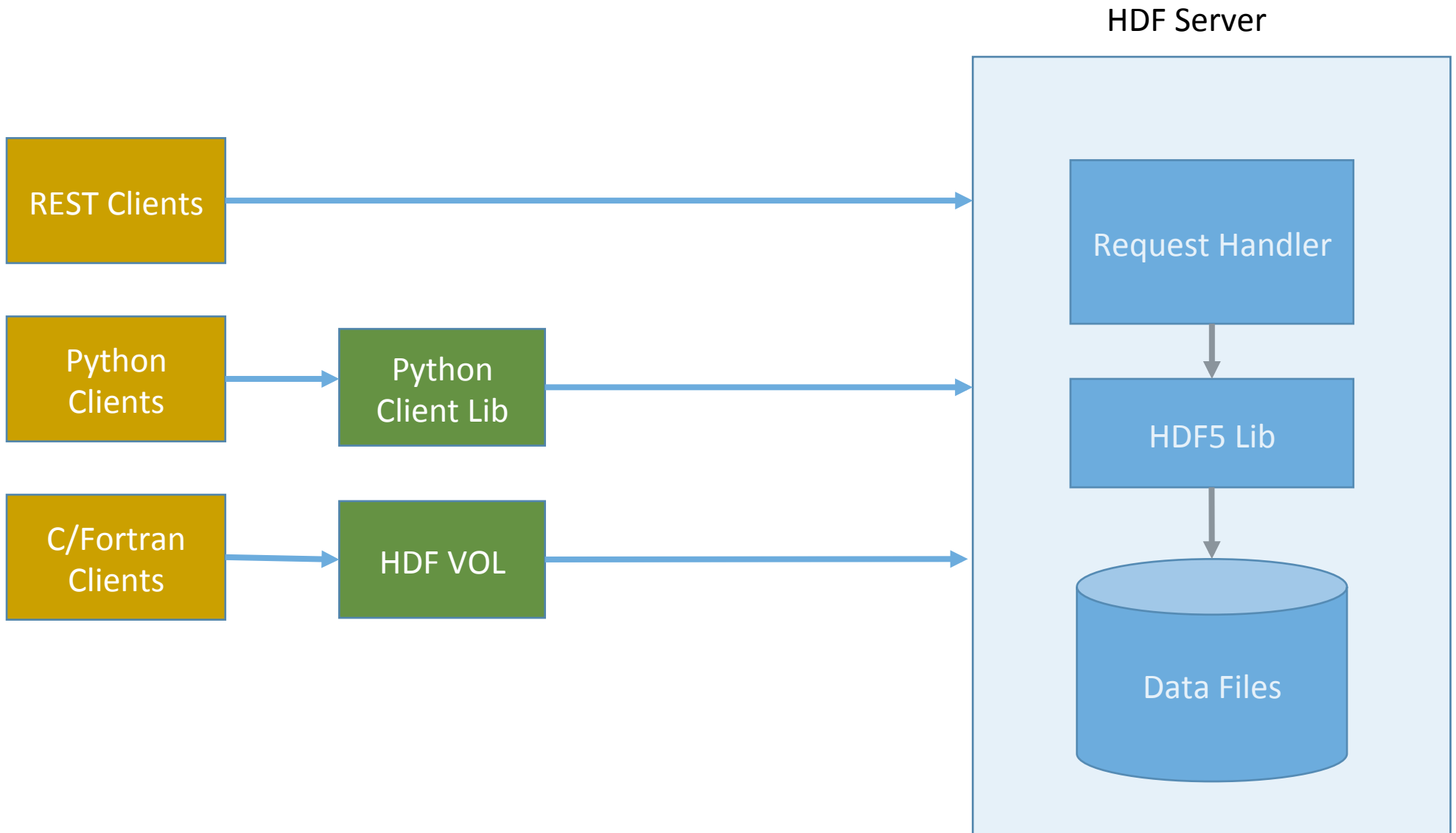
Very easy to install/run

Python client lib h5pyd (h5py-distributed)

# A simple diagram of the REST API...



# HDF Server Architecture



# What makes it RESTful?

Client-server model

Stateless – (no client context stored on server)

Cacheable – clients can cache responses

Resources identified by URIs (datasets, groups, attributes, etc)

Standard HTTP methods and behaviors (opposed to rpc-style):

Method	Safe	Idempotent	Description
GET	Y	Y	Get a description of a resource
POST	N	N	Create a new resource
PUT	N	Y	Create a new named resource
DELETE	N	Y	Delete a resource

# Example URI

[https://data.hdfgroup.org:7258/datasets/feef70e8-16a6-11e5-994e-06fc179afd5e?host=tall.data.hdfgroup.orgvalue?select=\[0](https://data.hdfgroup.org:7258/datasets/feef70e8-16a6-11e5-994e-06fc179afd5e?host=tall.data.hdfgroup.orgvalue?select=[0)

- Scheme: the connection protocol: “https”
- Domain: endpoint of the server: “data.hdfgroup.org”
- Port: the port the server is running on: 7258
- Resource: identifier for the resource (UUID of dataset)
- Query param: Modify how the data will be returned
  - (e.g. hyperslab selection)

**Note: no run time context!**



# What's next: – Web UI

The screenshot shows a web browser interface for <http://hdfgroup.org>. The interface is divided into several sections:

- Object Window:** A tree view showing a hierarchy of "HDFS Group" objects. The "group\_10000" object is selected and highlighted in blue. Arrows point from this object to the "Attribute Window" and the "Display Window".
- Attribute Window:** A list of parameters: "Parameter 1", "Parameter 2", "Parameter 3", and "...". "Parameter 3" is highlighted with a grey background.
- Display Window:** A table with two columns, "Column 1" and "Column 2", and three rows of content. The content changes based on the selected data type. Below the table is a line graph with two lines, one red and one blue, plotted on a coordinate system.

Column 1	Column 2
Content 1	Content 2
Content 3	Content 4

(Content changes with data type)

# What's next – access control

Security! Needed if the server is to be run on an open network

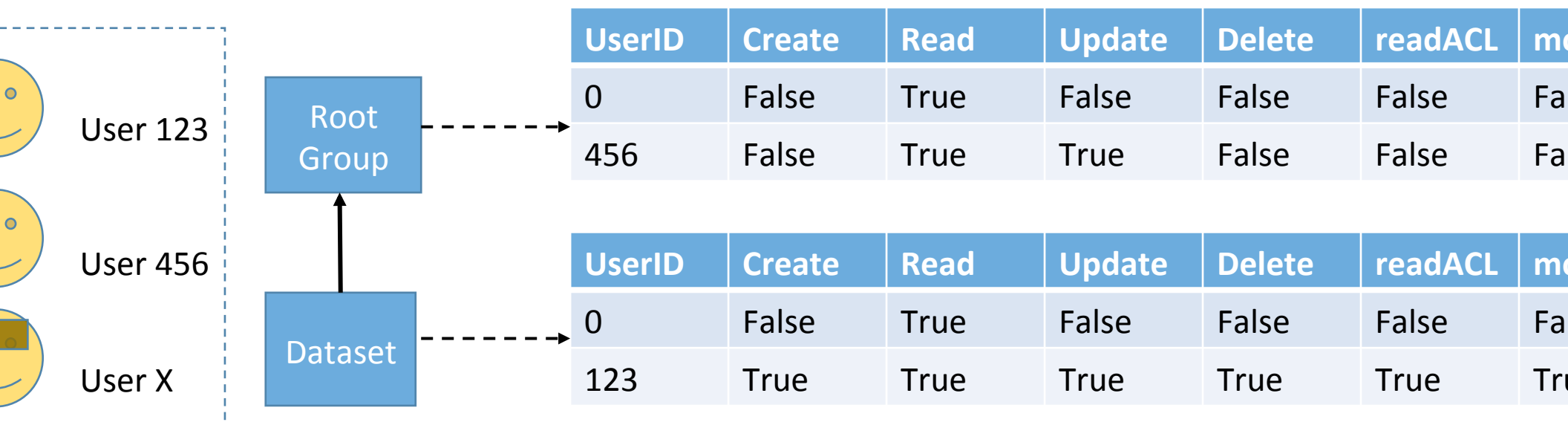


Authentication (you are who you say you are)

HTTPS (cut out the man in the middle)

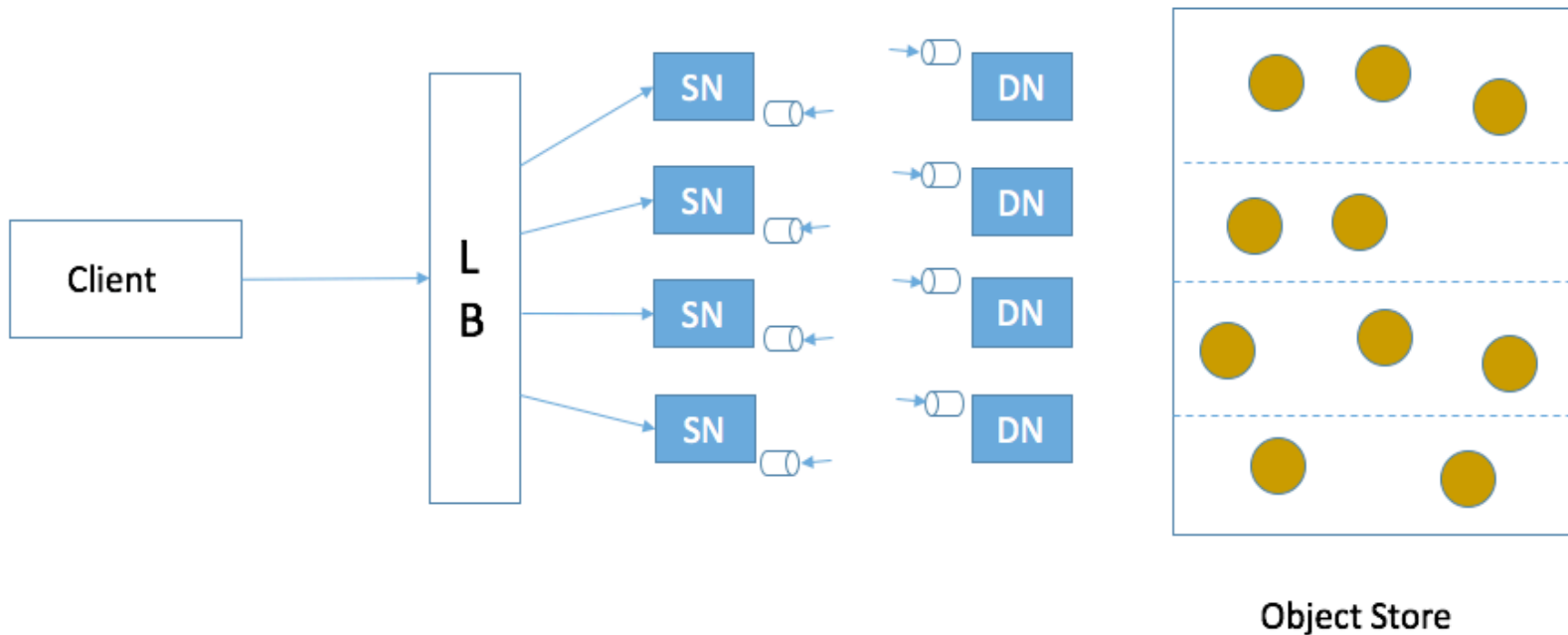
Authorization (who can do what)

- Per resource ACL's



# What's next: Scalable Server

- Support any sized repository
- Any number of users
- Any request volume
- Provide data as fast as the client can pull it in
- Targeted for public/private cloud



# Try it out!:

- Source Code: <https://github.com/HDFGroup/h5serv>
- AWS end point: <https://data.hdfgroup.org:7258/>
- Project Page:  
<https://www.hdfgroup.org/projects/hdfserver/>
- Documentation:  
<http://h5serv.readthedocs.org/en/latest/index.html>

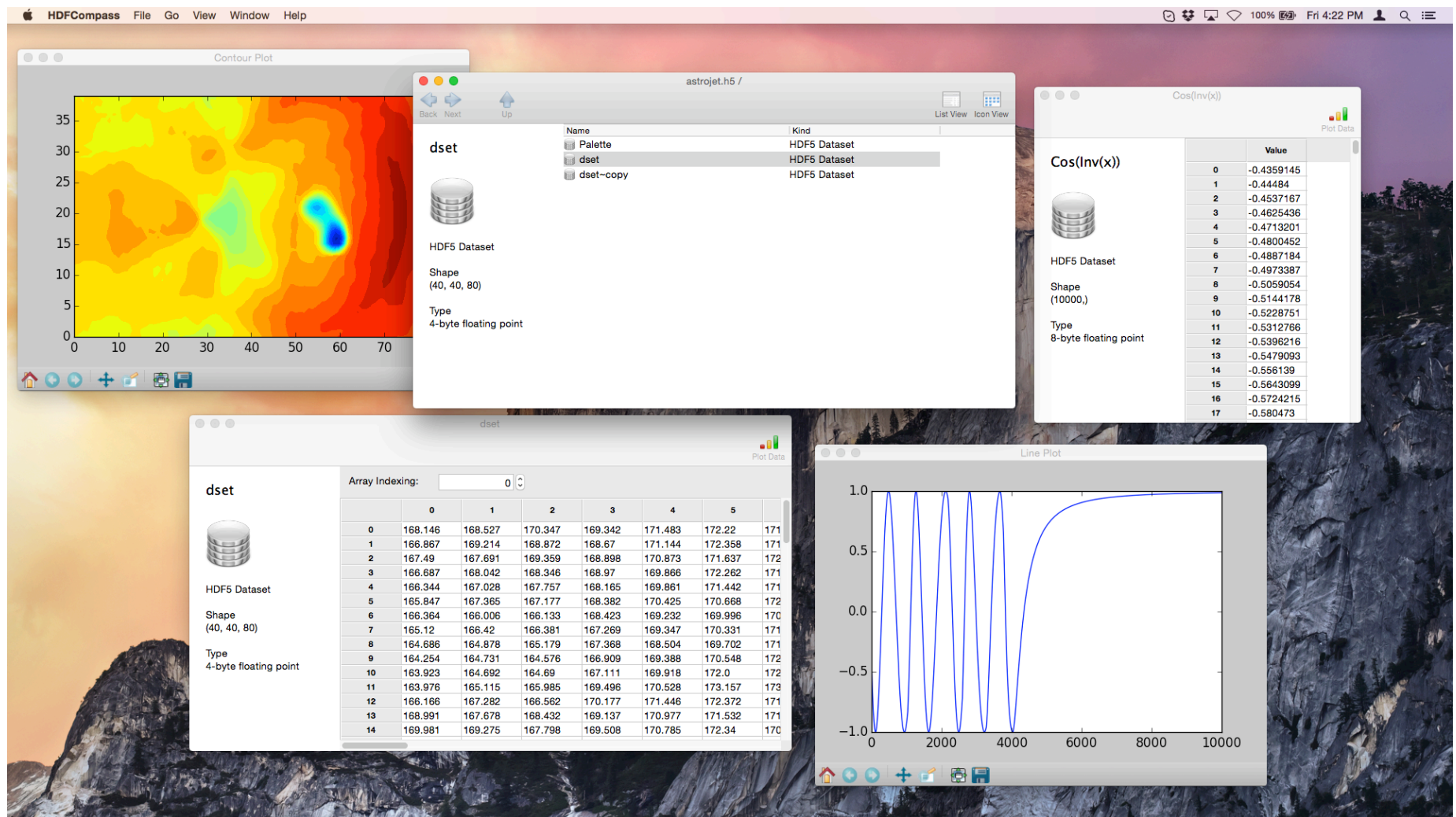


# Demo

HDF Server

# HDF Compass

## Simple HDF Viewer for Mac/Windows/Linux



# HDF Compass – Fact Sheet

Read-only by Design

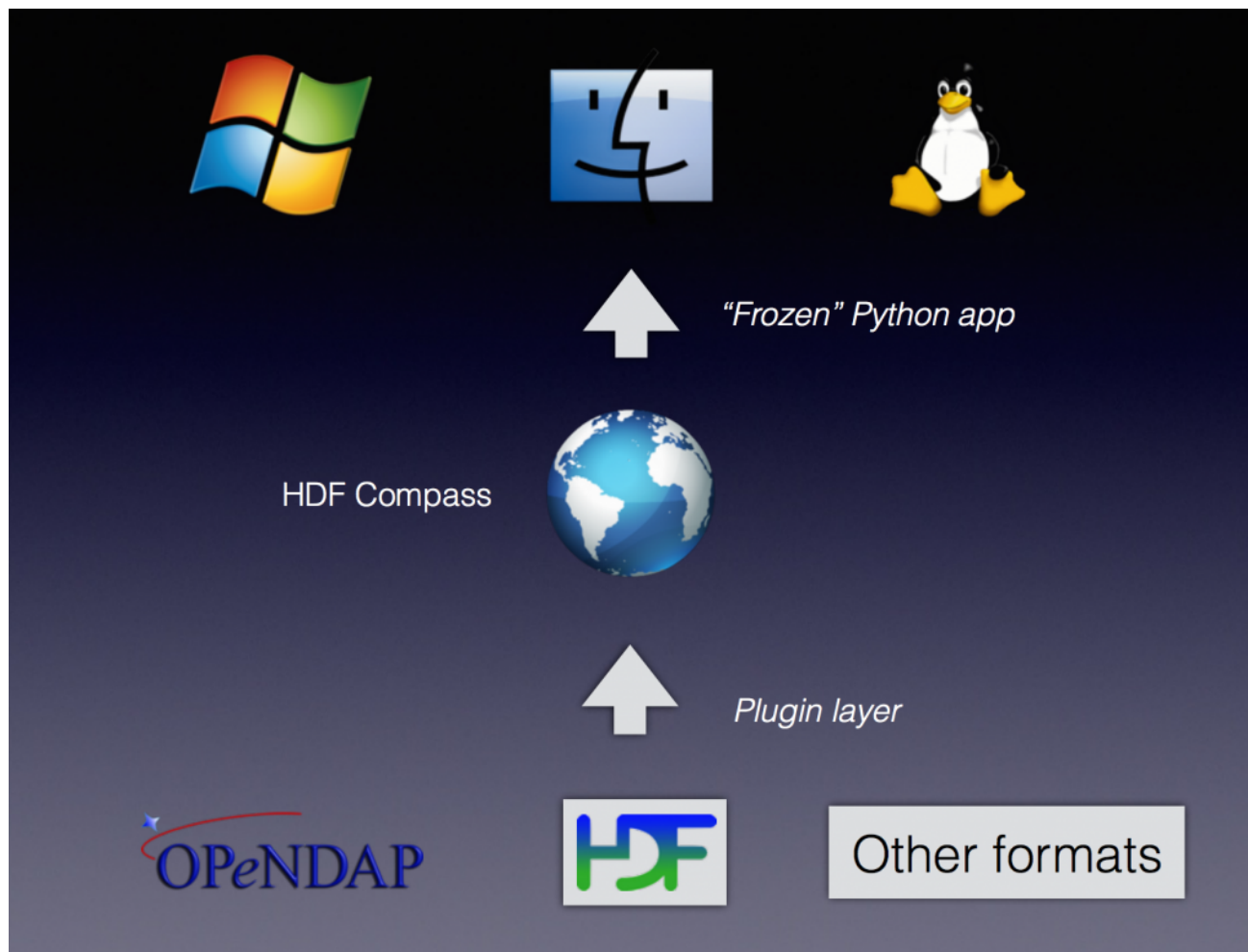
Native UI

Support largest HDF Files

Easy to develop plugin architecture

Written in Python

# HDF Compass Architecture





Try it out!

<https://www.hdfgroup.org/projects/compass/>

# Demo – HDF Compass

# HDF5-JSON

Specification and Tools to represent HDF5 in JSON

# HDF5/JSON Factsheet

“Full fidelity” representation of HDF5

Common line tools:

- H5tojson: convert HDF5 to JSON
- Jsontoh5: convert JSON to HDF5
- Jsontocode: code generator for Python/Fortran/IDL/Matlab

Available on github: <https://github.com/HDFGroup/hdf5-json>

Docs here: <http://hdf5-json.readthedocs.org/en/latest/index.html#>

# HDF5/JSON - Demo

Sample JSON file:

<https://github.com/HDFGroup/hdf5-json/blob/master/data/json/tall.json>

Questions?