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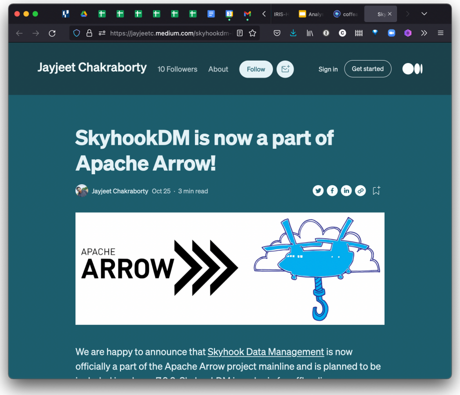
Skyhook Data Management

Carlos Maltzahn, 11/4/21

Analysis Grand Challenge Tools 2021 Workshop

What is Skyhook Data Management?

- Also known as SkyhookDM or just “Skyhook”
- Since 10/22/21 part of Apache Arrow (will be part of 7.0.0)
  - Columnar memory format for flat and hierarchical data
  - Large ecosystem of mapping Arrow data to storage, GPUs, FPGAs
- Offloads Apache Arrow *scans* into a storage system
  - Embeds the Apache Arrow library with minimal changes
- Reduces client-side resource utilization (CPU, memory, network)
  - Faster networks → more CPU and memory BW for data movement
  - Particularly good for data-intensive selection operations
- Storage systems can optimize dataset operations based on *local* info
  - Fewer “magic numbers” applications have to worry about



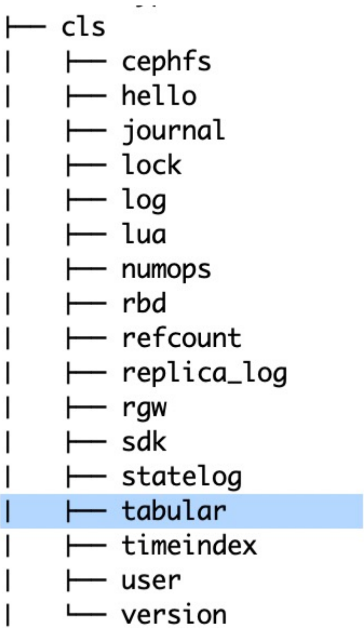
SkyhookDM is now a part of Apache Arrow!

Jayjeet Chakraborty Oct 25 · 3 min read

We are happy to announce that Skyhook Data Management is now officially a part of the Apache Arrow project mainline and is planned to be

Implementation

tree -d
ceph/src



```
├── cls
|   ├── cephfs
|   ├── hello
|   ├── journal
|   ├── lock
|   ├── log
|   ├── lua
|   ├── numops
|   ├── rbd
|   ├── refcount
|   ├── replica_log
|   ├── rgw
|   ├── sdk
|   ├── statelog
|   ├── tabular
|   ├── timeindex
|   ├── user
|   └── version
```

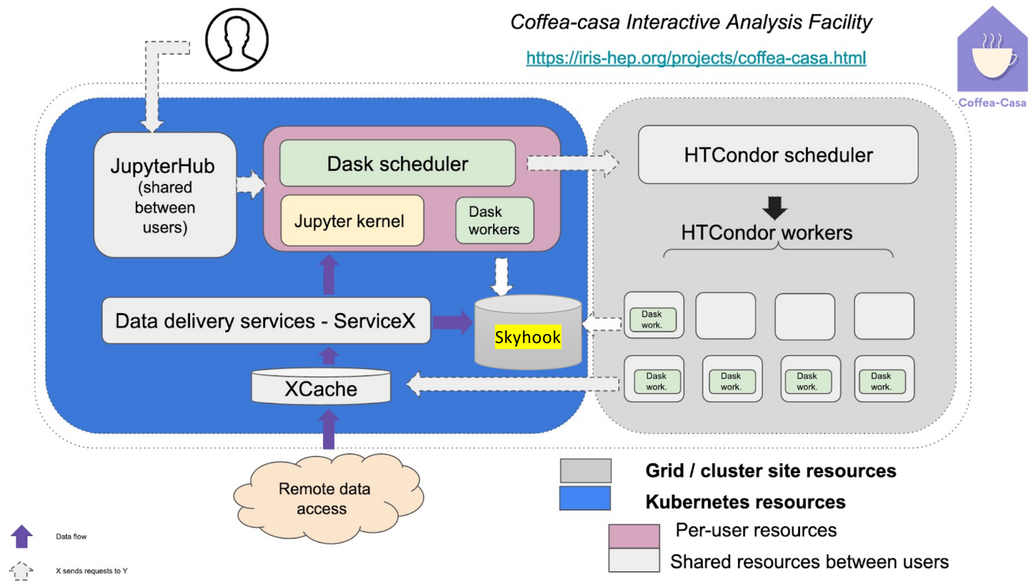
SkyhookDM

An object “class” for Ceph

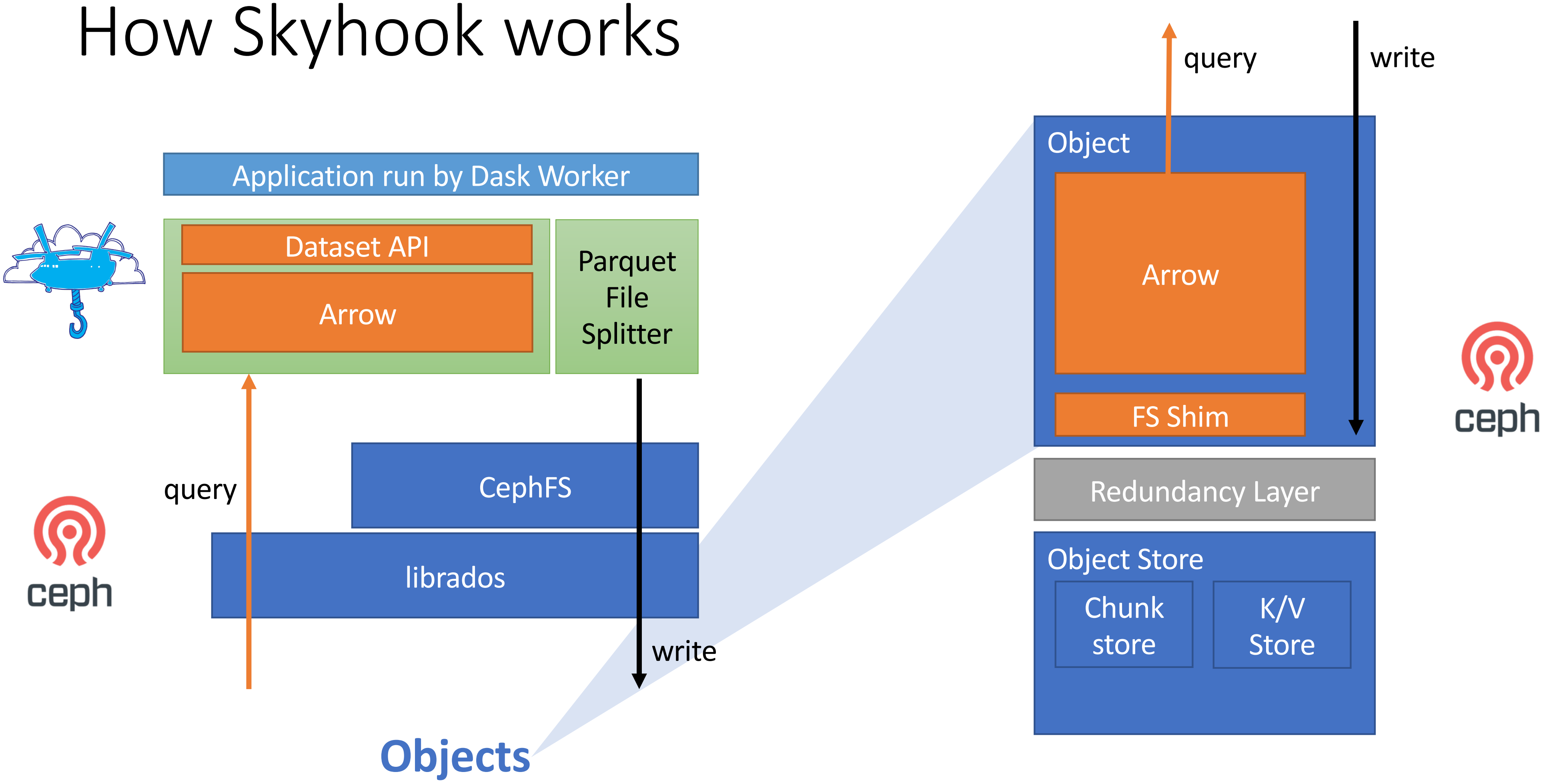
- No upstream modifications required
- Inherits Ceph’s properties now and in the future
- Can use all other object extensions
- **Not a database**

Role in Analysis Facility

- Data caching
- Database caching
- Persistent dataset views
- Friend Tree management
- Selection by trigger bits


Coffea-casa Interactive Analysis Facility
https://iris-hep.org/projects/coffea-casa.html
Coffea-Casa
JupyterHub (shared between users)
Dask scheduler
Jupyter kernel
Dask workers
HTCondor scheduler
HTCondor workers
Dask work.
Data delivery services - ServiceX
Skyhook
XCache
Remote data access
Grid / cluster site resources
Kubernetes resources
Per-user resources
Shared resources between users
Data flow
X sends requests to Y

How Skyhook works



(Old) example notebook

https://github.com/CoffeaTeam/coffea/blob/master/binder/nanoevents_pq.ipynb