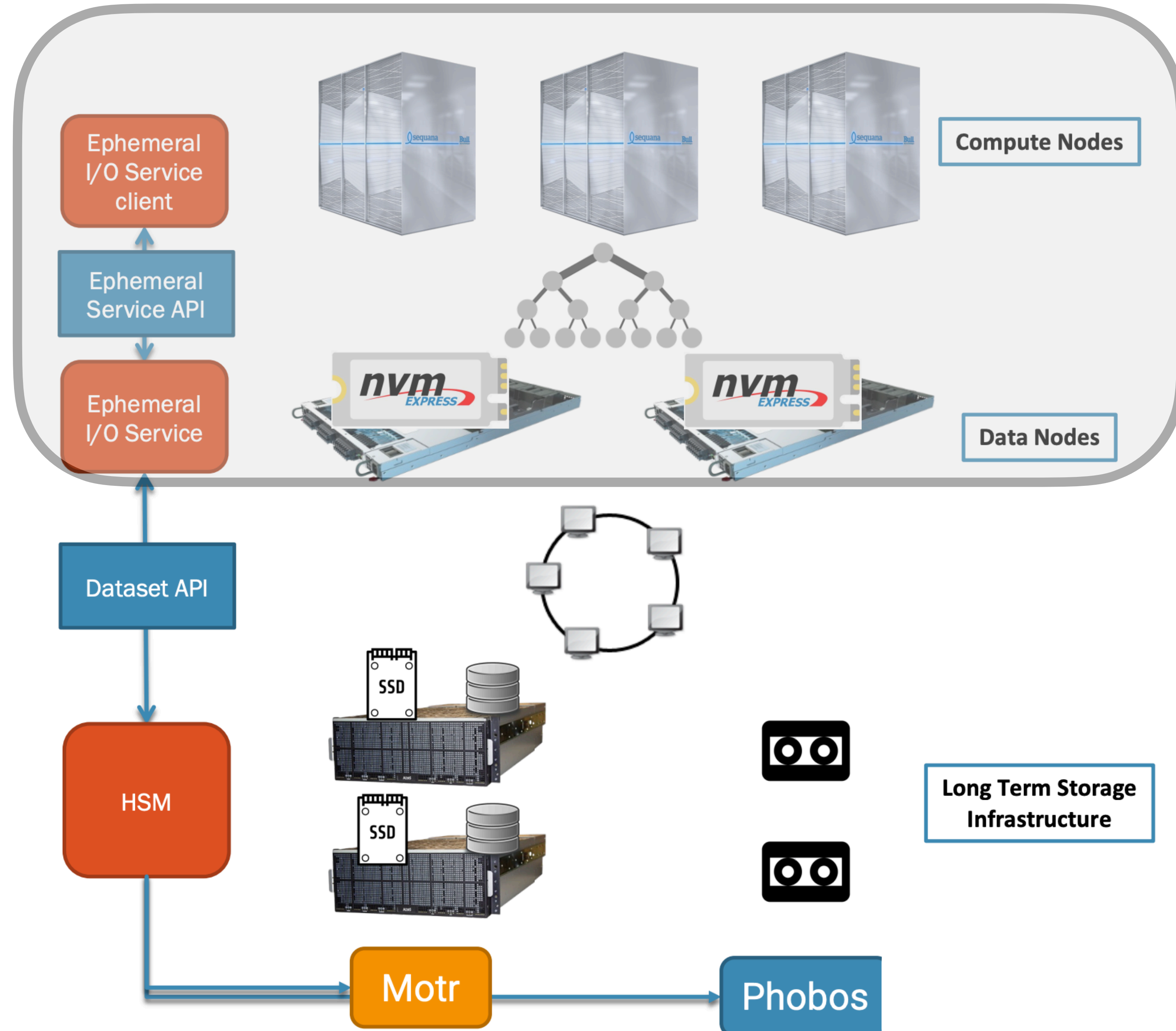# IO-SEA Stack

- Datanodes resources (cores, RAM, NVMe) are allocated for a **workflow** to run Ephemeral I/O services to give access to Datasets from compute nodes

  - POSIX, S3, DASI protocols

- Long Term Storage composed of different tiers unified by an HSM software solution

  - **Object Storage based**, no POSIX limitations

- Contrast to I/O service created as a perpetual resource (not dedicated to a compute job).

- Ephemeral service:
  - As each compute job starts, associated I/O server dedicated to the compute job will be started.
  - Compute uses a dedicated service, does not impact global storage services.
  - Runs on data nodes (MSA architecture, close to the compute nodes)
  - Lifecycle linked to compute job.

- Keystone part of the solution, with strong dependencies for other project deliverables.
- Architecture is still evolving as collaboration continues with other work packages.

- Plan to store data inside a massive object store:

  - Scalability/Performance requirements are met for exascale storage.

  - Objects stored in a flat name space. Two objects have no connection and are independent.

  - Stores data without organisation.

- Data organisation is very important to end users:

  - Files created from experiments/scientific studies will be made of bunches of records.

  - Simulation runs where pieces of data explicitly depend on each other.

  - **Datasets** and **namespaces** exist to provide organisation which does not exist in an object store.

- Dataset:
  - Group pieces of data that have reasons to stay together / used together.
- Namespaces:
  - Describes the way the data is seen by the end user.
  - Describes how the end user gives names to the pieces of data and organises them.
  - Always built on top of a dataset.
  - Exposes to the users an organised view of the data inside the dataset.

- Only feature to deal with both concepts.
- Datasets & namespaces work together.

Datasets/Namespaces
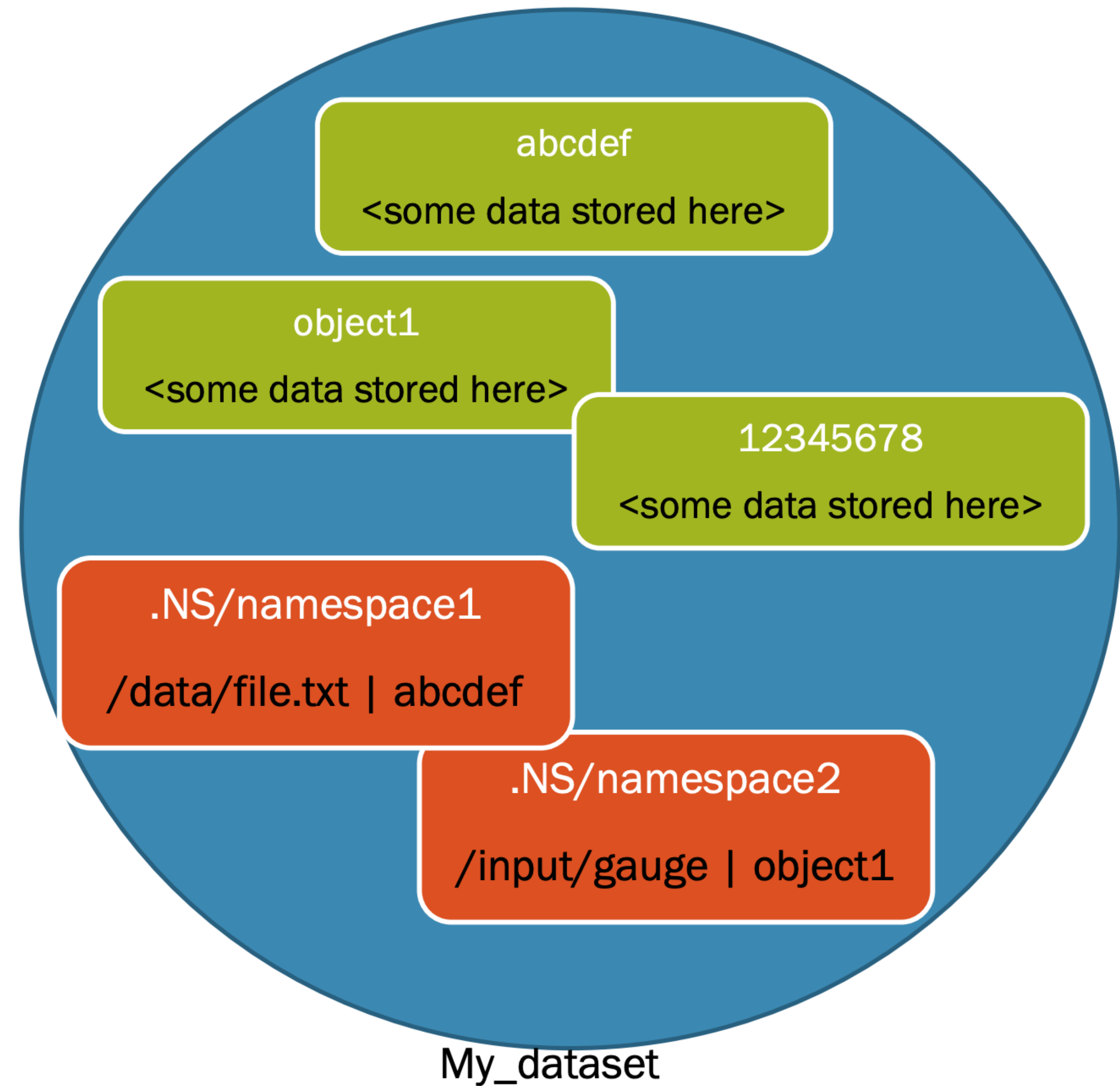
A Dataset is stored as 1 S3 Bucket

Files stored as S3 object

All namespaces stored in « metadata » objects

Think of it as a set of directories and symbolic links to objects in dataset

.NS/namespace1

.NS/namespace2

abcdef

<some data stored here>

object1

<some data stored here>

12345678

<some data stored here>

.NS/namespace1

/data/file.txt | abcdef

.NS/namespace2

/input/gauge | object1

My_dataset

- Users will be able to set up workflows, according to their needs in terms of:
  - Datasets
  - Namespaces
  - Data accessors
  - Ephemeral services:
    - Size
    - Type

Ephemeral I/O Services

- NFS, BB-NFS, S3, DASI, SBF, GBF