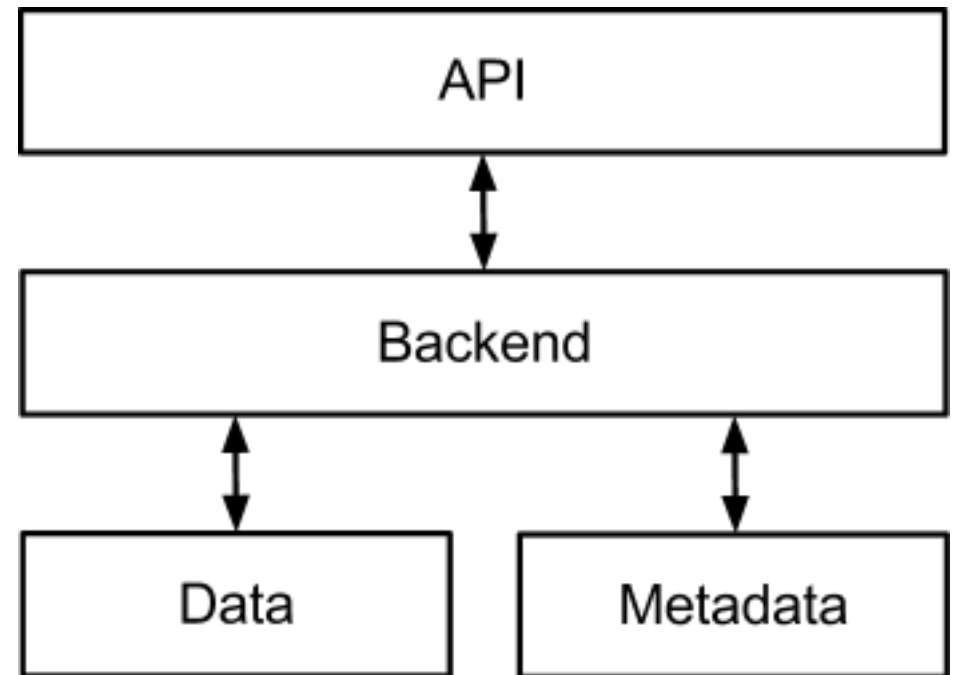# Pithos+

- Based on OpenStack Object Storage API
- Major extensions:
  - Block-based
    - No size limits
    - Deduplication (content hashed)
  - Permissions (sharing/public)
  - Versions (time-variant listings)
  - Metadata-based queries
  - Policies
- Other operations:
  - Partial upload/download
  - Object updates (data may come from other objects)
  - UUIDs
- Layered, modular implementation

Pithos+ layers

- API speaks HTTP (extended OpenStack)
- Backend is a library meant to be used by "internal" code (ex. meta domains)
- Data provides hashmap and block storage
- Metadata is a database of:
  - Nodes (local)
  - Permissions (global)

Now: data goes to filesystem, metadata to SQL
Future: data will be saved in some distributed block storage, metadata to NoSQL
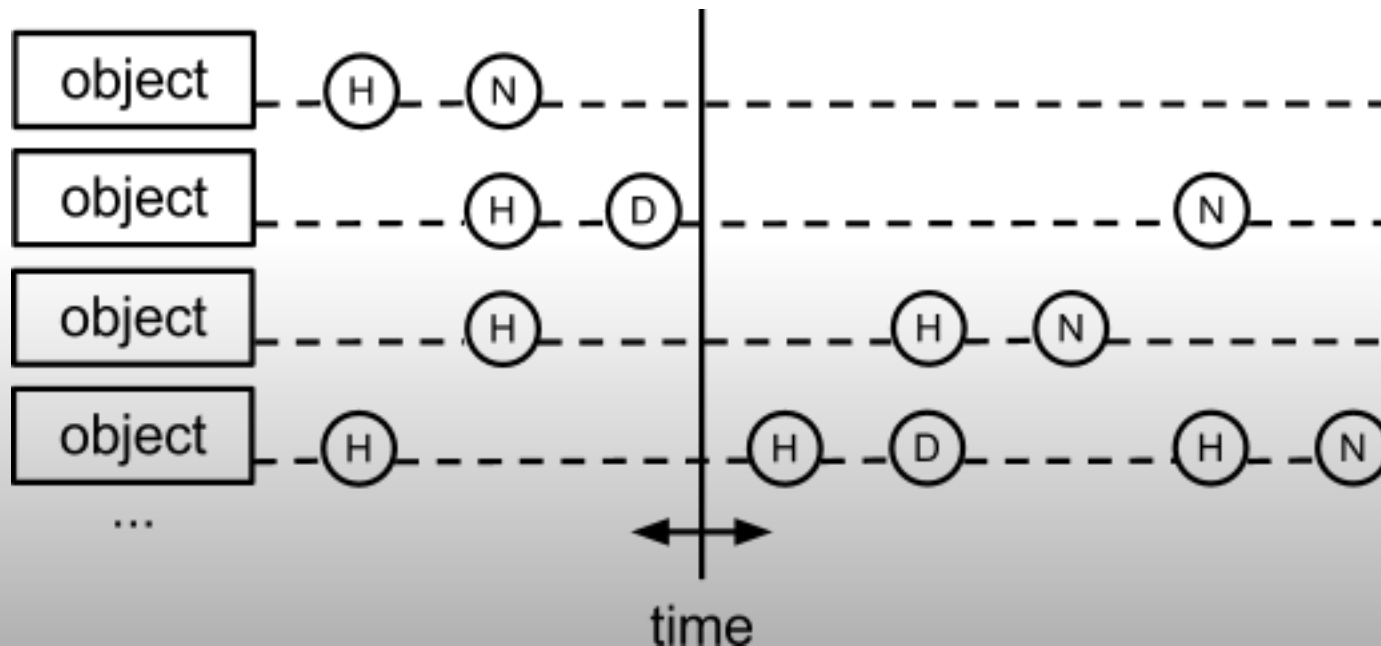
Pithos+ backend nodes

- Nodes are organized in a tree hierarchy (one node per path entry)
- Each node may have multiple versions
- Each version has properties (fixed metadata, like size and mtime) and arbitrary metadata
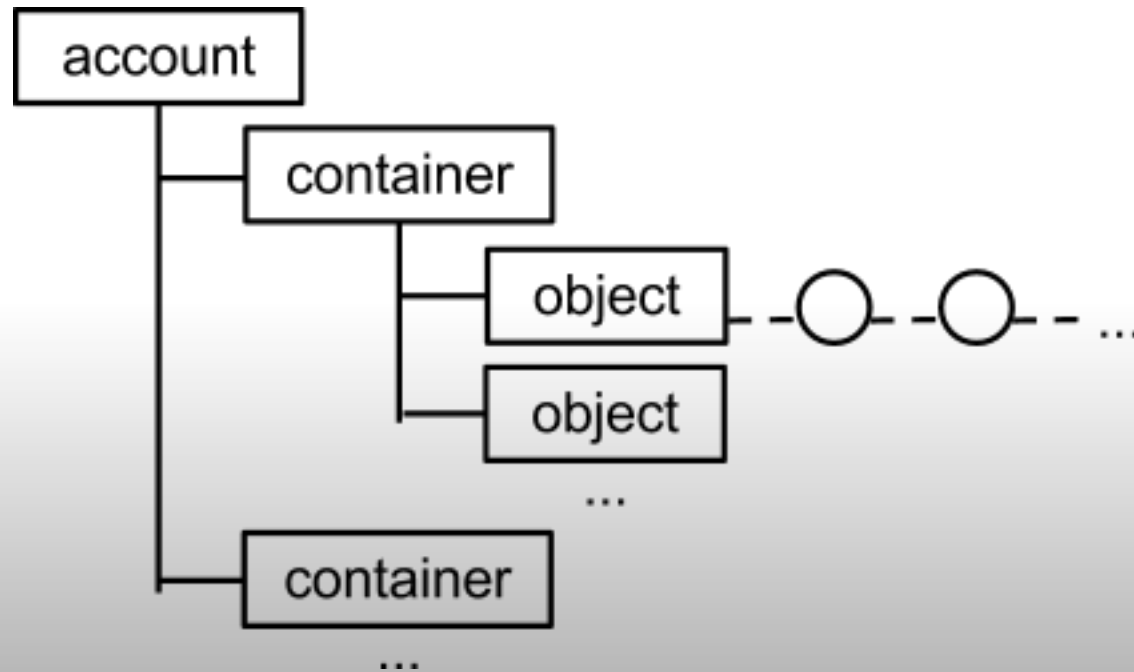
Pithos+ backend versions

- Each version belongs to a cluster:
  - Normal
  - History
  - Deleted
- For every node, keep statistics (size, population, latest mtime) per cluster

Pithos+ backend permissions

- Permissions supply paths to filter node listings
- The backend decides if the permission path is:
  - Exact
  - Prefix (apply for "path/*")
- Completely independent of nodes module