Sharing Access to iRODS Files

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Distributed Bio

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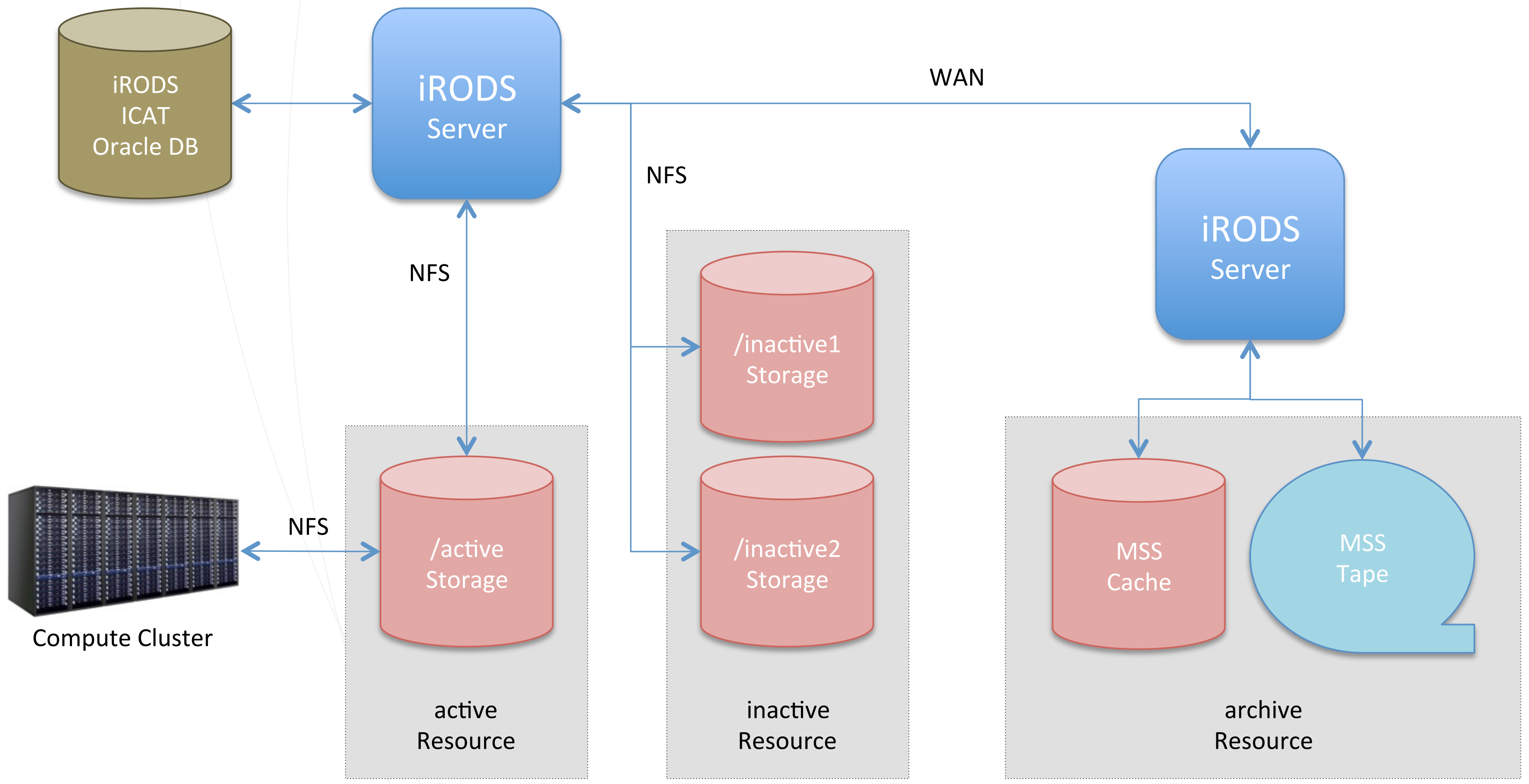
Pharma iRODS Implementation Goals

- Find projects through metadata
  - Collate metadata from disparate databases and files in single location
  - Owner, sample, organism, experiment etc..
  - Simple interface to search and find the right file
- Pro-actively manage high performance, but limited, cluster storage
  - ~50 million files, 250TB
  - Which projects should be off cluster storage
- Allow users to drive life cycle
  - Previously admins did all the heavy lifting moving data around
- Provide an archive tier
  - But still allow for querying and easy retrieval

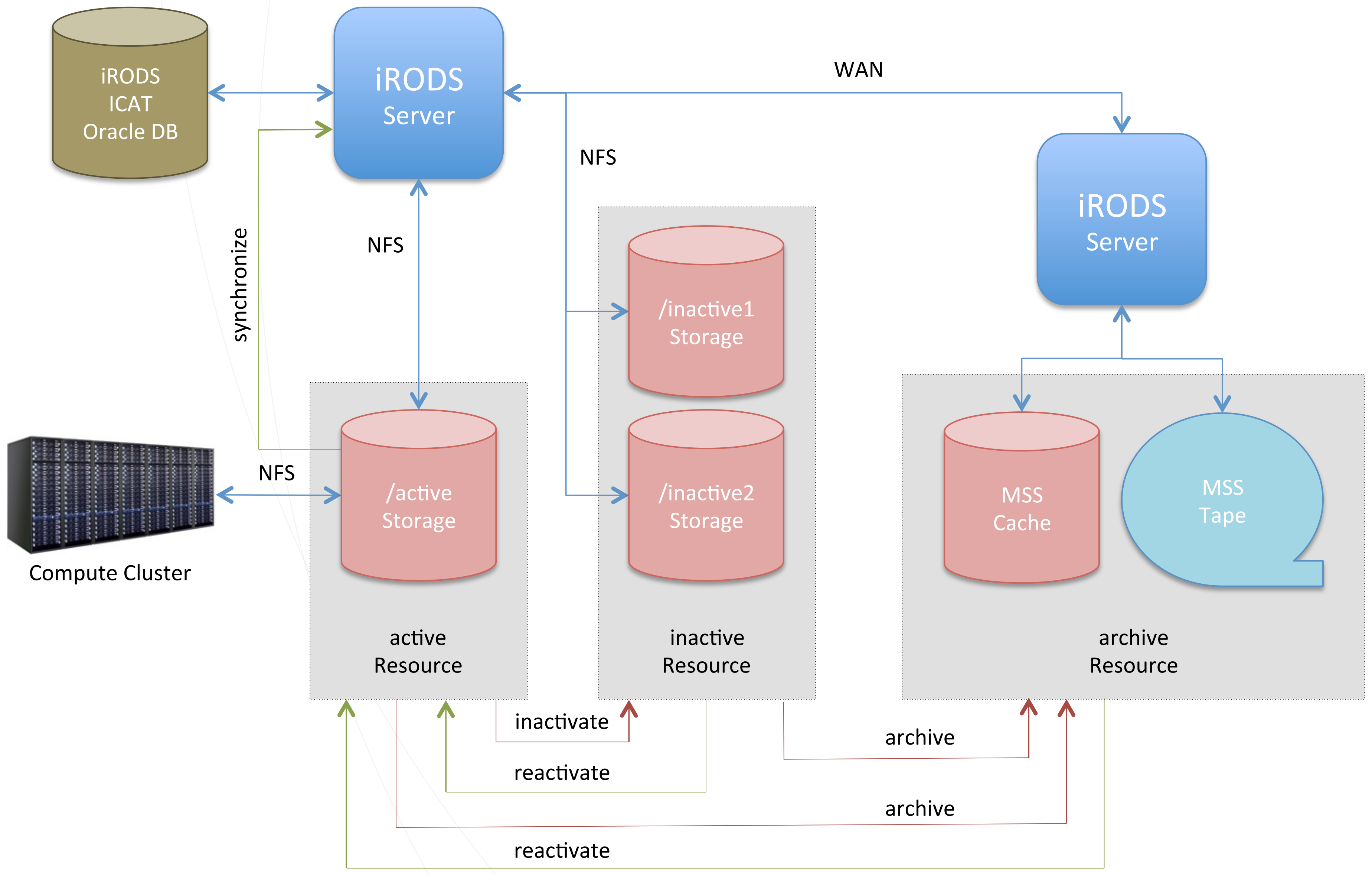
Pharma iRODS Implementation Requirements

- iRODS should not get between users and their normal data processing activities
  - or degrade performance … FUSE filesystem on cluster is not feasible
- Should not have to move data from the cluster storage in order to allow for querying
  - need to register it into iRODS “in place”
- The cluster storage represents “the truth”, and iRODS needs to reflect this truth
  - that includes when moving data from the second tier back to the cluster storage

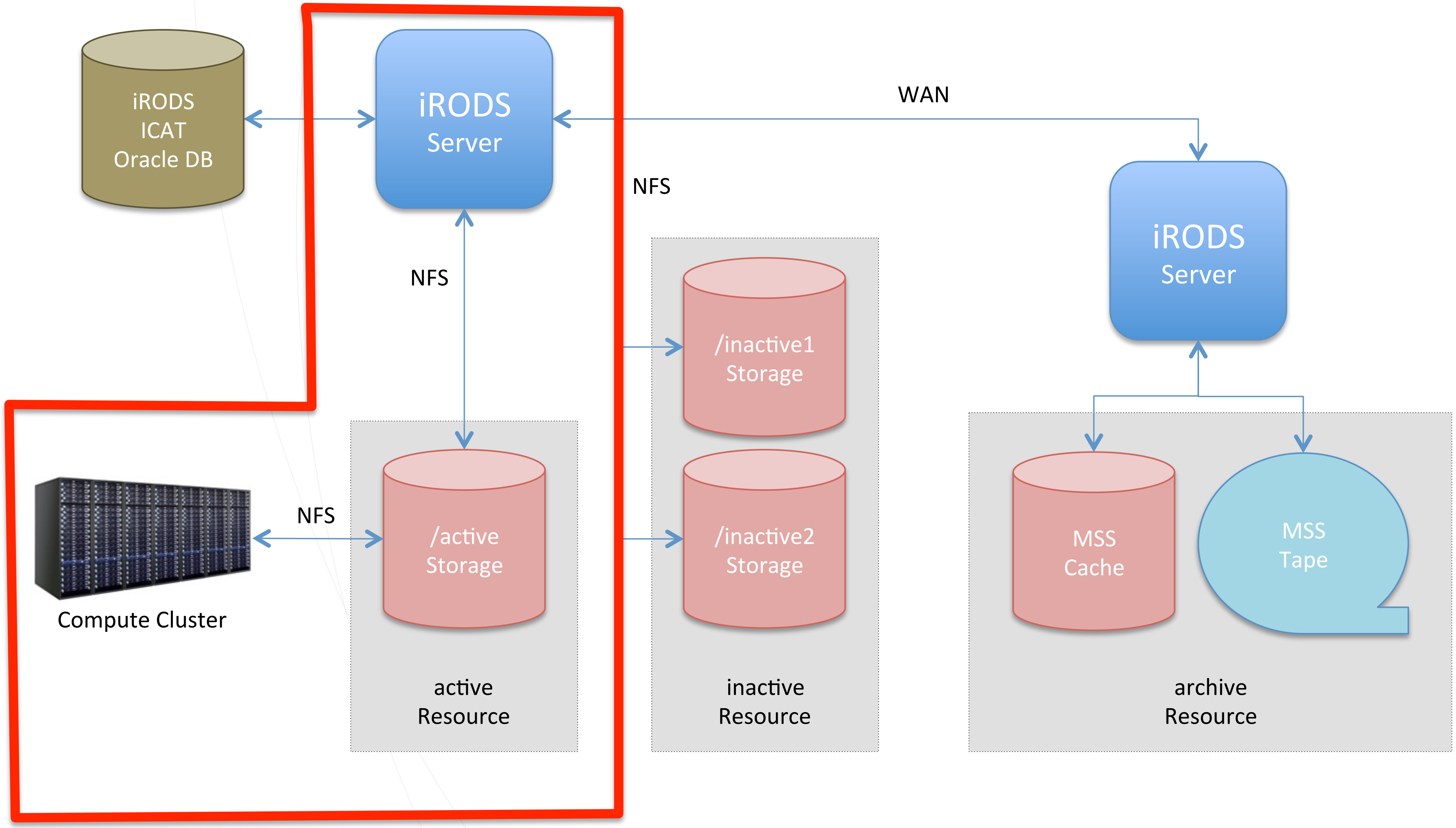
Pharma iRODS Architecture



Pharma Data Lifecycle Management



The Interesting Part…



The "Direct Access File Driver"

- Retains original user/group ownership and file mode for files in vaults of this type
- Basically wraps "unix file system" driver calls with changes of user/group context
  - performs actions as the "client user"
  - does require using the RUN_SERVER_AS_ROOT mode
  - iRODS and UNIX/Linux need to see the same namespace of usernames and groupnames
- Modified the function signature of some file driver routines (create, open, mkdir) to pass a structure containing filesystem meta-data information

Capturing Filesystem Meta-data

- iput, irsync, ireg need to capture meta-data for files/ directories
  - passes this using new key/value pairs: fileUid, fileOwner, fileGid, fileGroup, fileMode, fileCtime, fileMtime, fileSourcePath
  - new R_OBJT_FILESYSTEM_META table, indexed by object_id, that is parallel to R_DATA_MAIN and R_COLL_MAIN
- when file driver create/open/mkdir calls are made, this information is passed along to the drivers if available (although only the direct access driver will actually use it)

Current Issues and Limitations

- iget/irsync doesn’t use this information to restore permissions
  - would only make sense when running iget/irsync as root (much like the -p option to tar)
- Can’t set meta-data when calling imkdir, and can’t ireg or iput an empty directory (to force meta-data collection relative to a reference)
- When doing irepl to a “direct access” resource, there are sometimes issues creating sub-directories and files if the containing directory permissions are too restrictive
  - consistent semantics, but not always the desired behaviour
  - adopted this behaviour in lieu of performing operations as root, and then fixing up permissions

Future Directions

- Get the code into iRODS SVN (maybe in time for 3.2 release?)
- Address the limitations and harden the code
  - especially important when doing things with elevated privilege
- Needs some "best practice" documentation to help guide on it's use (e.g. keep usernames in sync, understanding limitations and their impact)
- Perhaps add a "read-only" mode to the driver
  - can manipulate ICAT information, but can't make any changes to the underlying filesystem