Flexible file access control for iRODS

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Subtitle:
iRODS as a social collaboration environment(!)

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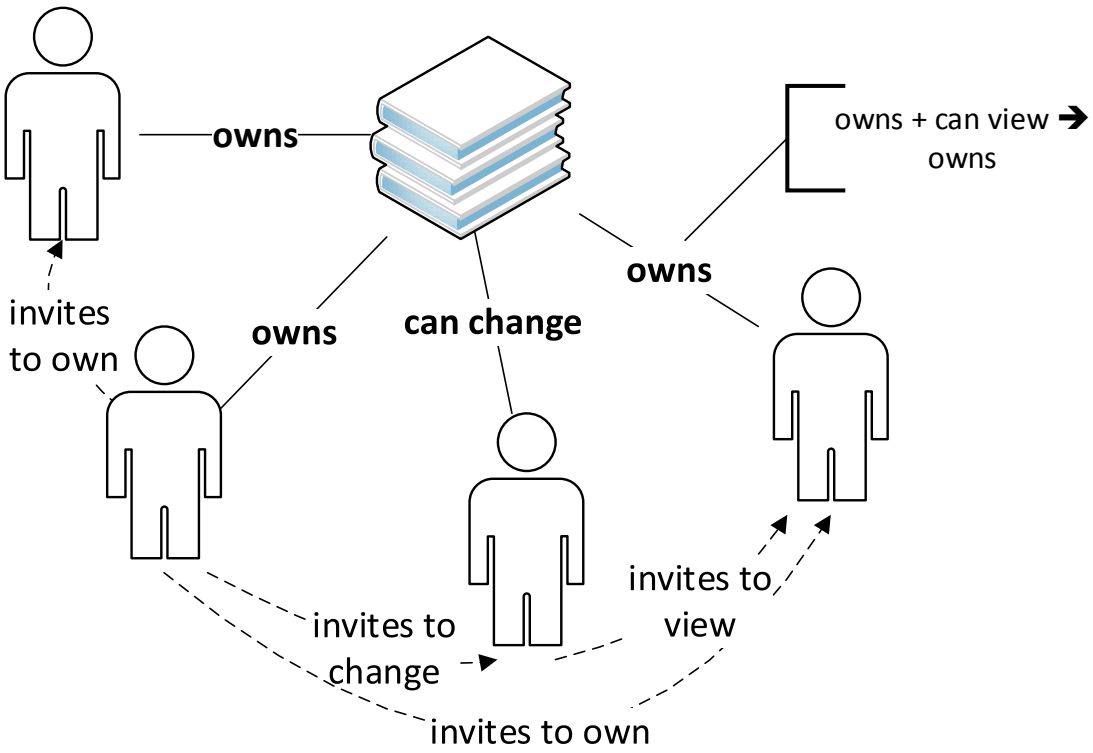
Data management versus collaboration

Data management	Social collaboration
Administrative control and management of user privilege over objects and user groups	**Unprivileged and transitive** user privilege and group management.
Only an owner can share an object.	**Anyone with a privilege** can grant that privilege to another.
Only an administrator can create a group.	**Anyone** can create and manage a group, including granting privilege to others.

The problem

- iRODS access control is designed around filesystem-like access.
  - Creating a user group requires administrative privilege.
  - Only owners can share files with others.
- We wanted a "social" access control in which:
  - Users can create and manage user groups at will.
  - Privileges can be delegated **without owning an object.**

Transitive privilege



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Why not do this inside iRODS itself?

- Websites support this kind of sharing all the time now.
- Can we implement the same kind of sharing consistently at the iRODS level?

Am I crazy?

- Probably. Social networking does that to people.
- But iRODS can do this. The rule engine is that powerful.

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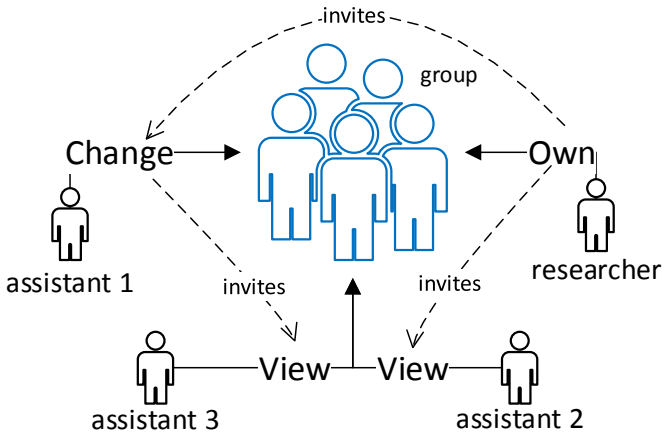
Two Use Cases

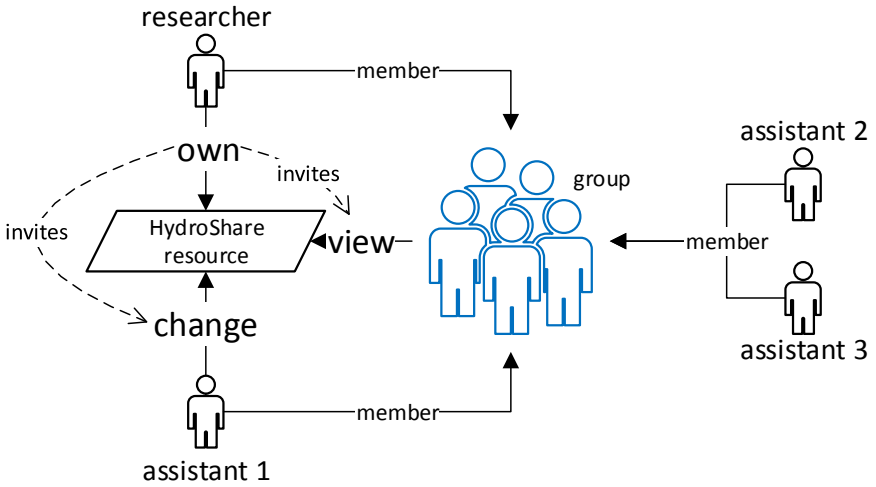
1. Researcher plus graduate students.
2. Researcher plus peer researchers at other institutions.

Researcher plus graduate students

- Researcher should "own" all files.
- Researcher "invites" graduate students to receive "view" or "change" permission for directories. Files in directory inherit directory privilege.
- When graduate student graduates, researcher retains ownership and control.
- Graduate students can delegate privileges they have to others, as needed.

Researcher plus graduate students

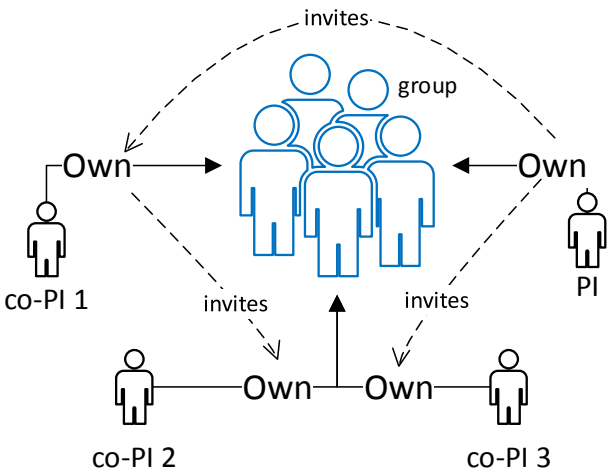


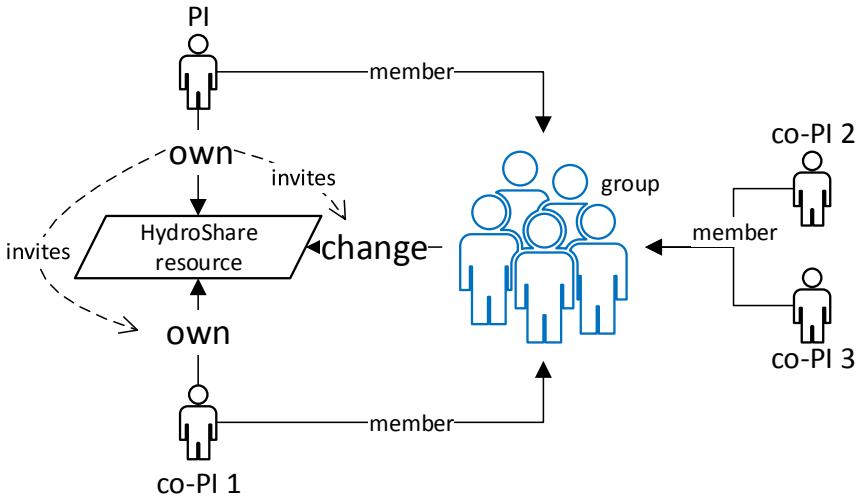


Researcher plus peers

- Each researcher can assign joint ownership to others for
  - iRODS objects.
  - IrodsShare user groups.
- Those, in turn, can delegate privilege to their assistants.

Researcher plus peers





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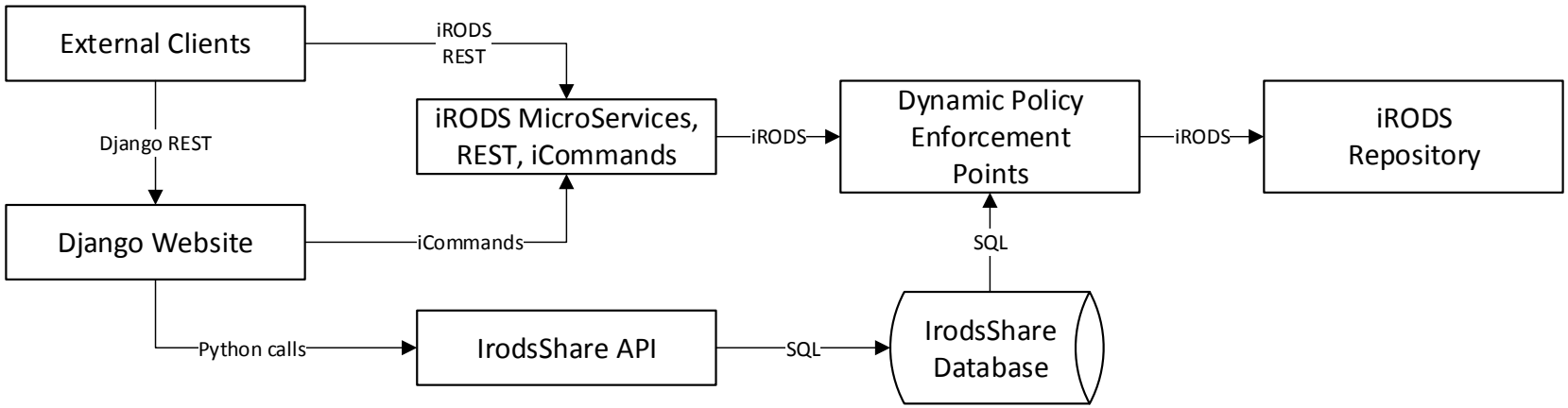
Options for implementation

- Strategy: use **dynamic policy enforcement points** to deny access by raising an error condition if user does not have appropriate privileges. Available in 4.1.
- Several options for authorization information
  - In iRODS AVUs: insufficiently secure at this time.
  - In iRODS ACLs: relatively difficult to manage without a provenance database to implement "undo" policies.
  - In the iCAT catalog as separate tables: too brittle and subject to disruption as iCAT is expanded.
  - **In a separate database parallel to iCAT.**

Present IrodsShare architecture



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Subtractive Access Control

- A user of IrodsShare is a member of the *HydroShare* iRODS group and by default is granted full change permission over all HydroShare group resources.
- Policy enforcement points deny access according to IrodsShare policies.
- Thus "all that is not denied is permitted".

Access control policies

- Any user who has a privilege can **grant that privilege or less** to another user.
- **Grantors can also revoke** privileges that they granted.
- **Privileges are additive:** if two users grant a third different privileges on the same object, the strongest privilege is granted.
- **Object owners can revoke any privilege,** and can set an object as unshareable, which turns off the main features of the sharing mechanism.
- This applies to folders, their contents, and groups.

Status and availability

- Access control logic and policy engine implemented, http://github.com/hydroshare/IrodsShare
- Policy enforcement not yet implemented.
- Plans for immediate future
  - Move API inside iRODS via Python Microservices.
  - Expose as REST.
- Considering several options for the future:
  - Reflecting policies into ACLs.
  - Using limited privilege policies to allow regular users to create and manage regular iRODS groups.

Conclusions

- iRODS is not just for data management.
- iRODS policies are powerful enough to allow very fluid data sharing and collaboration.
- These policies bring collaboration facilities normally thought of as UI features to the filesystem level.