Policy Based Preservation Environments

Reagan W. Moore

Arcot Rajasekar

Mike Wan

Mike Conway

Antoine de Torcy

Richard Marciano

Jewel Ward

{moore,sekar,mwan}@diceresearch.org

http://irods.diceresearch.org

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

Preservation Challenges

- Infrastructure independence
  - Manage properties of the archives independently of the choice of technology
- Communication with the future
  - Provide representation information for each record (provenance, descriptive metadata, data structure, parsing)
  - Provide representation information for the preservation environment (policies, procedures, state information)
  - Maintain ability to apply preservation procedures by migrating procedures onto new technology
- Assessment of communication from the past
  - Track application of all versions of preservation policies
  - Validate assertions about preservation properties

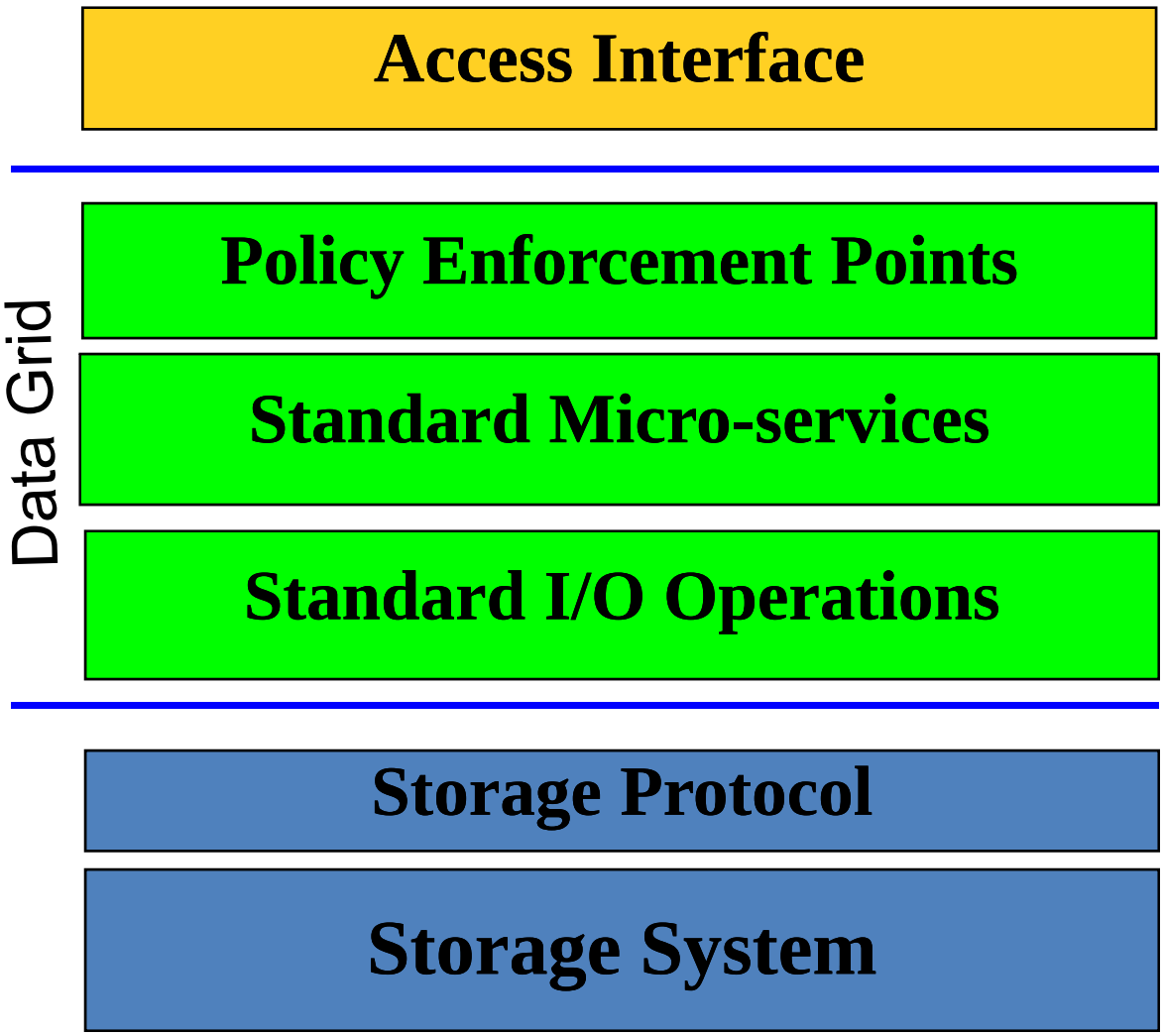

THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL
UCSD


Policy-based Data Preservation
integrated Rule Oriented Data System

- *Purpose* - reason a preservation environment is assembled
- *Properties* - attributes needed to ensure the **purpose**
- *Policies* - controls for enforcing desired **properties**
- *Procedures* - functions that implement the **policies**
- *State information* - results of applying the **procedures**
- *Assessment criteria* - validation that **state information** conforms to the desired **purpose**
- *Federation* - controlled sharing of **logical name spaces**

These are the essential elements for policy-based data preservation.

Infrastructure Independence



Map from the actions requested by the client to multiple policy enforcement points.

Map from policy to standard micro-services.

Map from micro-services to standard Posix I/O operations.

Map from standard Posix I/O operations to the protocol supported by the storage system

D·I·C·E i·R·O·D·S THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL UCSD NSF THE NATIONAL ARCHIVES ARCHIVES.GOV

iput ../src/irm.c **checks 10 policy enforcement points**

srbbrick14:10900:ApplyRule#116:: acChkHostAccessControl
srbbrick14:10900:GotRule#117:: acChkHostAccessControl
srbbrick14:10900:ApplyRule#118:: acSetPublicUserPolicy
srbbrick14:10900:GotRule#119:: acSetPublicUserPolicy
srbbrick14:10900:ApplyRule#120:: acAclPolicy
srbbrick14:10900:GotRule#121:: acAclPolicy
srbbrick14:10900:ApplyRule#122:: acSetRescSchemeForCreate
srbbrick14:10900:GotRule#123:: acSetRescSchemeForCreate
srbbrick14:10900:execMicroSrvc#124:: msiSetDefaultResc(demoResc,null)
srbbrick14:10900:ApplyRule#125:: acRescQuotaPolicy
srbbrick14:10900:GotRule#126:: acRescQuotaPolicy
srbbrick14:10900:execMicroSrvc#127:: msiSetRescQuotaPolicy(off)
srbbrick14:10900:ApplyRule#128:: acSetVaultPathPolicy
srbbrick14:10900:GotRule#129:: acSetVaultPathPolicy
srbbrick14:10900:execMicroSrvc#130:: msiSetGraftPathScheme(no,1)
srbbrick14:10900:ApplyRule#131:: acPreProcForModifyDataObjMeta
srbbrick14:10900:GotRule#132:: acPreProcForModifyDataObjMeta
srbbrick14:10900:ApplyRule#133:: acPostProcForModifyDataObjMeta
srbbrick14:10900:GotRule#134:: acPostProcForModifyDataObjMeta
srbbrick14:10900:ApplyRule#135:: acPostProcForCreate
srbbrick14:10900:GotRule#136:: acPostProcForCreate
srbbrick14:10900:ApplyRule#137:: acPostProcForPut
srbbrick14:10900:GotRule#138:: acPostProcForPut
srbbrick14:10900:GotRule#139:: acPostProcForPut
srbbrick14:10900:GotRule#140:: acPostProcForPut

Preservation Policies

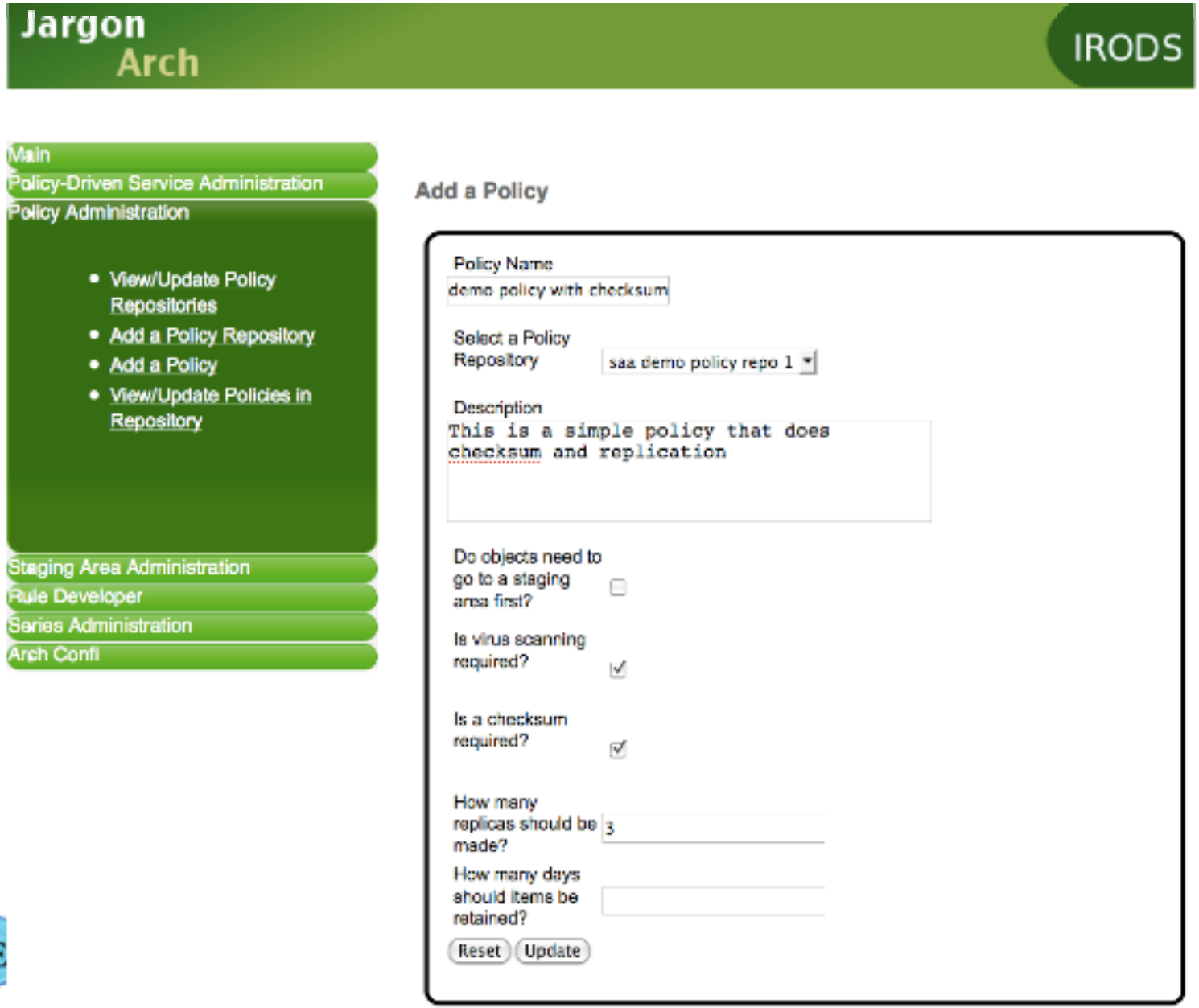
- Arrangement
  - Organize records in series, and manage policies on each series
- Authenticity
  - For every record, record provenance metadata
- Chain of custody
  - For every record, manage an audit trail
- Integrity
  - For every record, manage two replicas and verify checksums
  - For every record, enforce retention and disposition
- Trustworthiness
  - Fore each series, validate ISO MOIMS-rac assessment criteria


THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL

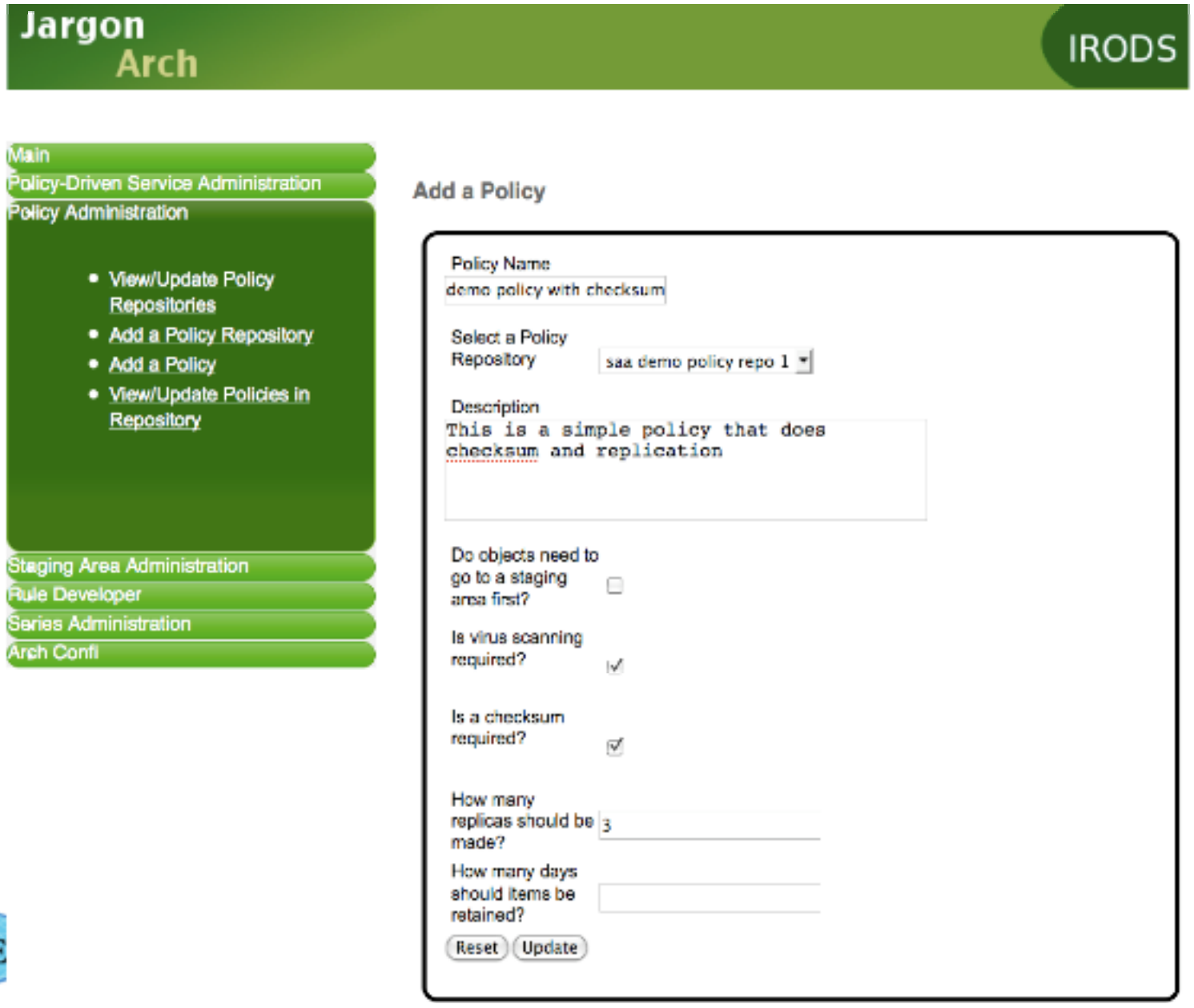

Applying Policy Sets

- Maintain a repository of policies in iRODS
  - Policies stored as XML files with input parameters explicitly characterized as policy attributes
- Map policies to a record series (collection)
  - Set collection attributes from policy attributes
- On ingestion of a file:
  - Check record series for policy attributes
  - Invoke associated policy and apply preservation procedure
  - Decouples choice of access interface from specification of preservation policies

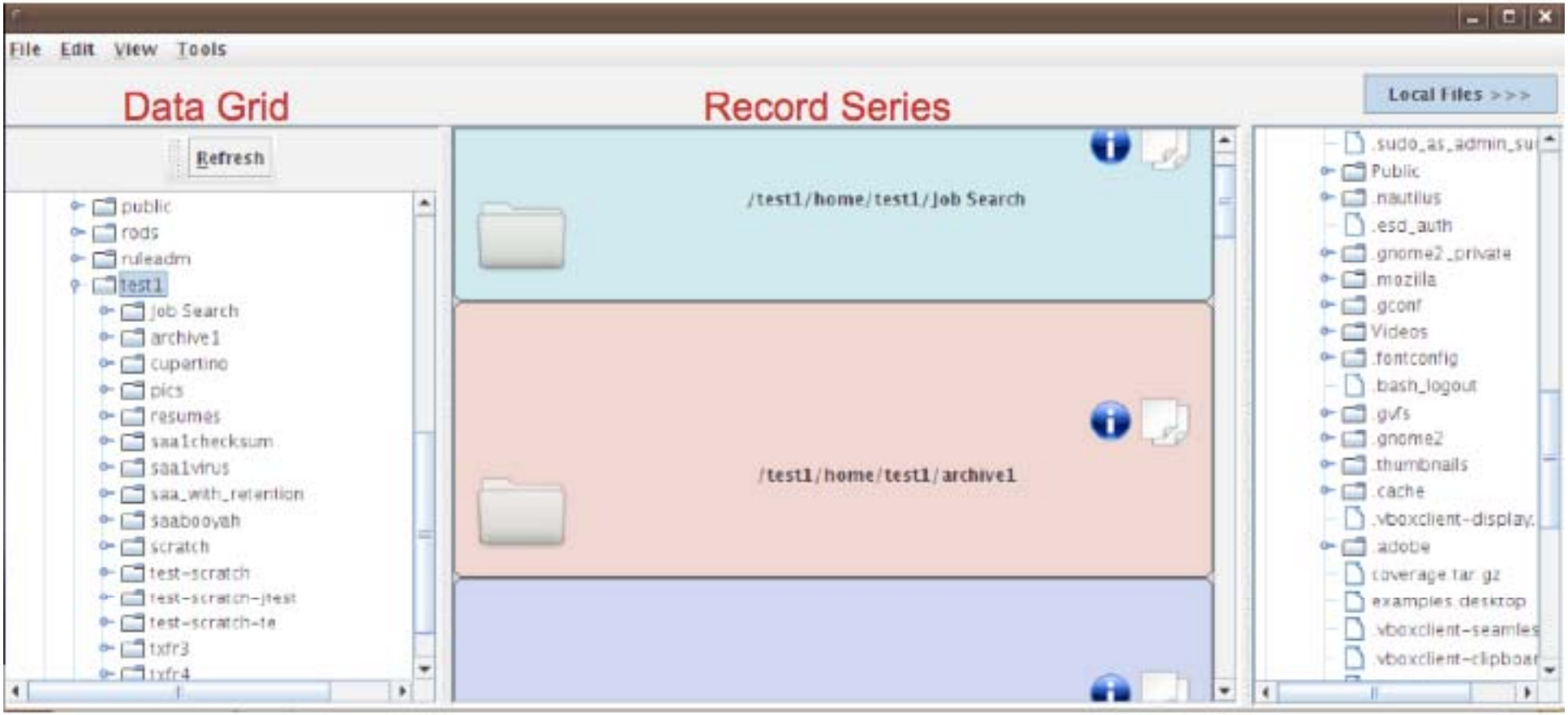
Arch - Defining a Policy



Adding Policies to a Record Series



iDrop Client - Ingesting a Record



D·I·C·E i·R·O·D·S THE UNIVERSITY of NORTH CAROLINA at CHAPEL HILL UCSD NSF THE NATIONAL ARCHIVES ARCHIVES.GOV

iRODS is a "coordinated NSF/OCI-Nat'l Archives research activity" under the auspices of the President's NITRD Program and is identified as among the priorities underlying the President's 2009 Budget Supplement in the area of Human and Computer Interaction Information Management technology research.

Reagan W. Moore

rwmoore@renci.org

http://irods.diceresearch.org

NSF OCI-0848296 "NARA Transcontinental Persistent Archives Prototype"

NSF SDCI-0721400 "Data Grids for Community Driven Applications"