



iRODS 4.0 and Beyond

Presented at the iRODS & DDN User Group Meeting 2014

September 8, 2014

Motivation and Goals

iRODS is open source middleware for:

- Data Discovery,
- Workflow Automation,
- Secure Collaboration, and
- Data Virtualization

We want it to be ***sustainable***.

That means it has to be:

- Reliable
- Supportable
- Usable
- Scalable

A Framework for Sustainable iRODS

- Consortium
- Messaging
- **Technology**

The Vision for iRODS Administration

- Knowing Your Requirements, Map Out Your Grid:
 - Where does the user interact with the system?
 - Where does the system interact with your storage?
 - What functionality is required from each node?
- Translate Your Map into a Configuration
- Updating the Configuration Updates Your Map
- When You Need Help...

A Technology Framework for Sustainable iRODS

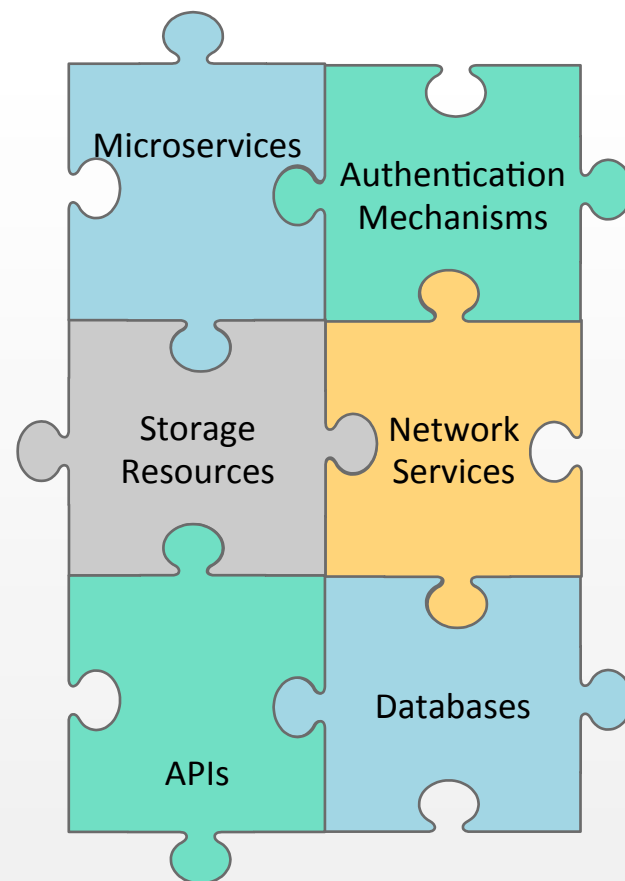
- Pluggable Architecture
- Configuration Management
- Grid Introspection
- Plugin Dependency Model

A Feature Set That Remains Relevant

iRODS 4.0: A First Step

- Pluggable Architecture
 - Simplifies development, testing, support
 - Broadens developer community

Makes long-term relevance more likely.



iRODS 4.0: Plugins, Presently

Resources:

- Compound
- Deferred
- Load Balanced
- MSO
- Non-Blocking
- Passthru
- Random
- Replication
- Round Robin
- Universal MSS
- Unix File System
- WOS
- HPSS
- S3

Authentication:

- Native
- PAM
- OSAuth
- GSI
- Kerberos

Network:

- TCP
- SSL

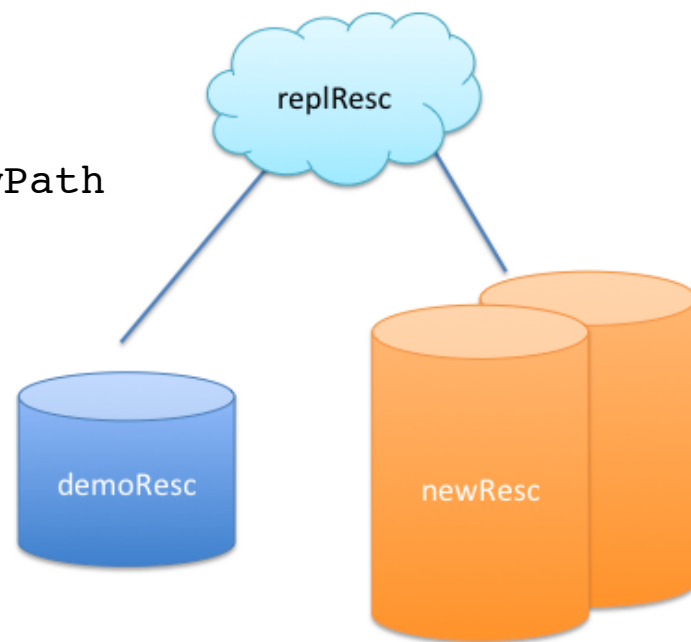
Database:

- PostgreSQL
- Oracle
- MySQL

iRODS 4.0: Look What You Can Do with Composable Resources!

Live storage migration

```
iadmin mkresc $newResc unixfilesystem $newPath
iadmin mkresc replResc replication
iadmin addchildtoresc replResc $demoResc
iadmin addchildtoresc replResc $newResc
iadmin modresc replResc rebalance
iadmin rmchildfromresc replResc $demoResc
iadmin rmchildfromresc replResc $newResc
iadmin rmresc replResc
itrim -rM -N 1 -S $demoResc /$zoneName
iadmin rmresc $demoResc
```



iRODS 4.0: Continuous Integration

Why Build and Test?

- Transparency (in both process and product)
- Use existing industry best practices
- Coverage -> Confidence in Refactoring
- Packaging -> Ease of installation and upgrade
- Test framework idempotency
- Test independence
- Topology awareness
- Automation, Automation, Automation

iRODS 4.0: Continuous Integration

iRODS 4.0 transitioned legacy Perl-based test framework to a Python-based framework using unittest.

- We have increased code coverage from ~20% to ~57%
- Status always visible at <http://ci-dev.renci.org/hudson/view/iRODS>
- Currently in Continuous Integration
 - OSes: Ubuntu 10 and 12, CentOS 5 and 6, SuSE 11 and 12
 - Databases: PostgreSQL, MySQL, Oracle
 - Microservice plugins
 - Authentication plugins: Native, PAM, OSAuth
 - Network plugins: TCP, SSL
 - Resource plugins: Compound, Random, Replication, RoundRobin, Passthru, Deferred, Unixfilesystem, UnivMSS, S3, WOS, MockArchive, NonBlocking

Continuous Integration: Coverity

Enterprise code defect analysis tool

- Catches memory leaks, potential attack vectors, and unintended behavior
- Assigns severity
- Not all detected defects are necessarily defective

We have addressed all high severity issues. Evaluating and eliminating remaining defects.

Status available at <https://scan.coverity.com/projects/2605>

iRODS 4.0.x: Point Releases

- Fixing things...
 - Security issues
 - Memory leaks
 - Bugs
- Implementing useful features...
 - Run-in-place and OSX support
 - Additional options on initial configuration
 - Microservice templates
 - C API support
 - Review and testing of system microservices

iRODS 4.1: More Groundwork

Operating roadmap:

<https://github.com/irods/irods/issues?q=is%3Aopen+is%3Aissue+milestone%3A4.1.0>

- First Hints of Configuration Management and Grid Introspection
 - JSON-based configuration describe a grid
 - Infrastructure to support grid report
- New API Interface
 - Easier implementation, support for more languages
- Specific User Community Requests
 - Data/metadata ingest as an atomic operation
 - Key-value passthrough btw. iCommands and plugins
 - Improved support for file streaming and PEPs
- Additional Useful Features
 - Pluggable parallel transfer
 - Inter-zone metadata copying
 - Making configuration more straightforward

iRODS 4.1: Enabling Grid Report

- Query the Entire Grid (Privileges Determine Level of Detail)
 - What nodes are connected?
 - What storage resources are connected?
 - Are the storage resources alive?
 - What plugins are installed?
 - What iRODS component versions are installed?
- Goes Hand-in-Hand with Configuration Management
 - Grid report can be used to replicate the grid

Beyond iRODS 4.1

Further steps toward the vision:

- Registry to track installed plugins
- Plugin dependency model
- Visual interfaces for configuration and reporting

Additional important features:

- Infrastructure to support metadata templating
- Bugfixes

The Vision

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The iRODS Ecosystem: DFC Contributions

The DataNet Federation Consortium is creating national-scale research data federations.

Ongoing iRODS Development:

- Clients and Client Interfaces
 - Jargon and iDrop Web 3
 - Modeshape (plus WebDAV) plugin
- Messaging Interface
 - Integration with Elastic Search
- Metadata Templating and Ontology Discovery

This material is based upon work supported by the National Science Foundation under Cooperative Agreement OCI-0940841.

Beyond Technical: Documentation

By Spring 2015...

Reference implementations:

- Genomics
- Research Library/Archive

System Architecture and Administration Manuals

System Administration Videos

Training and Certification Curriculum

- System Architect
- Datagrid Administrator
- Support Technician
- Developer

Beyond Technical: Consortium Activities

Products:

- Membership
- Professional Services
- Support Services
- Training and Certification

iRODS

— CONSORTIUM —

Thank you!

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