iRODS®

Technology Update

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Contributors

iRODS Release	Issues Closed
4.3.1	236
4.3.2	154

```
$ git shortlog --summary --numbered 4.3.0..4.3.2
   228   Kory Draughn                        7   Terrell Russell
   148   Alan King                           7   Violet White
    58   Markus Kitsinger (SwooshyCueb)      4   Felix A. Croes
    18   Martin Jaime Flores Jr              2   Phillip Davis
    15   Justin James                        1   Awab
    15   Nishant Dash                        1   Peter Verraedt
    11   Derek D                             1   june-releford
    10   d-w-moore                           1   lenocil
```

4.3.1 Release - Updates since UGM 2023 *(not exhaustive)*

- New `iadmin` subcommands
  - `get/set_grid_configuration`
    - Manage zone-wide settings stored in `R_GRID_CONFIGURATION`
- New APIs
  - `rc_get_library_features`
  - `rc_check_auth_credentials`
  - `rc_get_resource_info_for_operation`
- Includes options for controlling TCP keepalive
- Removed size limit on PAM password
- C++ User Administration library supports changing passwords just like `iadmin`
- C++ Connection Pool supports automatic refreshing of connections
- Added `modify_ts_millis` column to `R_RESC_MAIN`
  - Known in GenQuery as `RESC_MODIFY_TIME_MILLIS`

https://irods.org/2023/10/irods-4-3-1-is-released/

iRODS 4.3.2 is available!

The goals remain the same ...

- Clean implementation
- Clear semantics
- No magic
- Improved tooling
- **Focus on data management**

iRODS 4.3.2 is smaller than previous releases, but offers improved stability with some nice additions.

https://irods.org/2024/05/irods-4-3-2-is-released/

iRODS

- Improved multiple icommands

  - `irsync` and `iput` correctly ignore symlinks

  - `ibun` now uses the pax format when handling archive files

  - `iadmin rmuser/rmgroup` are no longer interchangeable

  - Help text is clearer and more detailed

- Setup script correctly handles configuration of local storage for

  iRODS Consumer servers

- **GenQuery2**

- **Replica Truncate API**

- Support for MariaDB

- **Serialization of more iRODS data types**

- Improved server stability

- Improved documentation
  - How to report security vulnerabilities
  - Updated dynamic PEP listing
- Replication
  - Good replicas overwriting good replicas is now a no-op rather than an error

https://github.com/irods/irods/milestone/40?closed=1

*** Bold items discussed in this talk ***

GenQuery2 is now shipped with the server.

It is still considered experimental, but use is encouraged.
Its implementation can change as a result of community feedback.

Not used by the server, yet.

GenQuery2 will be available in the next release of the Python iRODS Client and Jargon.

- https://github.com/irods/python-irodsclient/pull/555
- https://github.com/DICE-UNC/jargon/pull/443

https://docs.irods.org/4.3.2/doxygen/genquery2_8h.html#a2b7171a0bea5f65ab4ca7c67fc87b3fa

Allows applications to adjust the size of a single replica.

Motivated by NFSRODS.

- https://github.com/irods/irods_client_nfsrods/issues/178

Additional Information

- Modeled after POSIX `truncate(2)`
- Includes a microservice for policy
- Replaces **`rcDataObjTruncate`** *(deprecated)*

There are plans to add support for an **`ftruncate`**-style API as well.

- https://github.com/irods/irods/issues/7559

https://docs.irods.org/4.3.2/doxygen/replica__truncate_8h.html#a982a350e8933d32b4a81ba3053269a7f

iRODS 4.3.2 now serializes the following data types for the rule engine plugin framework.

- `StructFileExtAndRegInp` *(ibun)*
- `ExecMyRuleInp` *(irule)*
- `MsParamArray` *(irule)*

Policy implementers can now inspect the contents of requests dealing with archive files and rule execution, and react accordingly.

Modernize the startup/shutdown process for the iRODS server.

Things we are going to address ...

- Startup/Shutdown sequence is more deterministic
  - No mixing of fork[-exec] and multi-threading logic
  - No dependency on external Python code
- Server configuration is only loaded on startup
  - Supports live reloads via `SIGHUP` signal
  - Agents no longer reload the configuration
- Non-package installation is supported by design

We are considering ...

- Decoupling of hostnames from servers
  - Possibly the removal of hostnames altogether
    - May not be possible due to server-to-server redirects

Experimentation is now in progress. It's too early to assert anything about the design/implementation. Initial design is heavily influenced by the iRODS HTTP API.

At the moment, the plan is to honor the following ...

- Clear separation of concerns between components
- Plugins handle their own shared memory
- Multi-threaded code is constrained to leaf processes
- Runs as a normal application
  - Accepts a path to directory containing configuration files
  - Can be launched as a daemon process
- Control plane runs as a separate process
- Meets all requirements for working with systemd

Core Development Team Talks

- Not in This Talk / Separate Talks
  - Phil Owen
    - iRODS Build and Test v9: Automation via GitHub and Kubernetes
  - Markus Kitsinger
    - iRODS Build and Packaging: 2024 Update
  - Kory Draughn and Martin Flores
    - iRODS HTTP API v0.3.0 with OpenID Connect
  - Justin James
    - iRODS S3 API v0.2.0 with Multipart
  - Terrell Russell
    - DAViDD: Initial data management solution for UNC's READDI AViDD Center
    - iRODS Metadata Templates Working Group: Building Blocks and Lessions Learned

- Included in This Talk
  - Kory Draughn
    - Indexing Capability Plugin
    - Python Rule Engine Plugin
  - Derek Dong
    - Metadata Guard Rule Engine Plugin
  - Justin James
    - S3 Resource Plugin
    - Globus Connector
  - Daniel Moore
    - Python iRODS Client
  - Kory Draughn
    - NFSRODS

iRODS

- Requires Elasticsearch 7 or later

- Uses Boost.Beast library for communication with Elasticsearch

  - elasticlient and CPR replaced by Boost.Beast
  - No change in behavior

- Removed document type rule engine plugin

  - No longer serves a purpose due to changes in Elasticsearch

    - Removal of mapping types

- Supports TLS communication with Elasticsearch

- Supports Basic Authentication

- Modernized CMake

iRODS

`irods_rule_vars` now available in more contexts

- Accessible in imported python modules
- `irods_rule_vars` formerly known as `global_vars`
- Deprecated `global_vars`

Improved documentation

- Covers how to pass values back to the caller, across rule engine plugin boundaries
- Covers what happens to the output of `print()`

Resolved some holes in the implementation.

- Handles atomic metadata operations API PEPs

- Disallows renaming non-protected AVU to existing protected AVU

- Disallows use of deprecated `imeta rmw`

  - Wildcard operations can bypass plugin logic (e.g. `"irod%"`)

  - Wildcard operations make it difficult to cover all metadata cases

S3 Resource Plugin

- libs3 dependency absorbed into repository
  - libs3 no longer shipped as externals package
- Fixed streaming with decoupled mode after server redirect
- Fixed setting of open flags on PUT operation

Globus Connector

- Supports rename functionality
- Supports preservation of file modification time
- Added Docker-based testing framework
- `O_CREAT` flag is now set on the first open for write operations

Release	Issues Affected
1.1.9	6
2.0.0	20
2.0.1	9
Total	35

```
$ git shortlog --summary --numbered v1.1.9..v2.0.1
    25  d-w-moore
     7  Terrell Russell
     1  Raoul Schram
```

Bug fixes

- Tickets now work with parallel transfer
- Tickets are now applied to all connections within a session
- Regression in which `ssl_verify_server = 'none'` stopped working
- Data objects opened with append flag now seek to end

New features

- Now redirects to resource server for improved transfer performance
- Client-side configuration can now be loaded/saved
- Added auto-close option of data objects
- Added ability to manipulate and query user/group quotas
- Added support for case-insensitive queries

Deprecation and Removal

- `permissions` manager has been removed *(originally deprecated)*

  - Replaced by `acls` manager

    - Defaults to only raw listing of ACLs, per **ils –A**

Compatibility Updates

- 2.0.1 brings full compatibility with 4.3.2

- `pam_password` support since 2.0.0

  - Allows working alongside icommands environments in 4.3+

NFSRODS - from 2.1.0 to 2.3.0

Release	Issues Closed
2.2.0	14
2.3.0	6

Updates

- Reports its name to the iRODS server for `ips`
- **Resilient to restarts of the iRODS server**
    - No longer requires remounting
- Supports resizing of data objects *(requires iRODS 4.3.2)*
- Improved stability

Ongoing Investigations

- Improve performance of list operation

Convert existing web applications to our new HTTP API (ReactJS + HTTP)
The relatively new iRODS Zone Management Tool is due for its first refactor. Originally built to talk with a REST API, it needs to be converted to talk to the new iRODS HTTP API. If this work on the administrator tool proves pretty straightforward, we are interested in evaluating a similar refactor for our user-level GUI, Metalnx (or to even start designing a new webapp from scratch).

Create new client libraries around our new HTTP API (Various Languages)
Our new iRODS HTTP API is making it easier for developers to interact with the iRODS ecosystem. We would like to help them even more by providing new client libraries in various languages that wrap their native or library-provided http calls. We are most interested in Java, Python, and Javascript, but any language will provide a learning opportunity and help map out the space for other languages.

https://irods.org/2024/01/irods-internship-summer-2024/

Big Picture

Core

- 4.3 - Focus on stability, bug fixes, plugins, clients
- 5.0 - Modernize the deployment process, improve determinism, libstdc++

Clients

- GUIs (ZMT, Metalnx, et al.)
- Onboarding and Syncing (Automated Ingest)
- File System Integration (NFSRODS, SFTP)
- iRODS HTTP API
- iRODS S3 API

Continue building out policy components (Capabilities).

We want installation and management of iRODS to become about policy design, composition, and configuration.

Please share your ...

- Use cases
- Pain points
- Hopes and dreams

iRODS

Get Involved

- Working Groups

- GitHub Issues

- Pull Requests

- Chat List

- Consortium Membership

Tell Others

- Publish, Cite, Advocate, Refer