

IRODS

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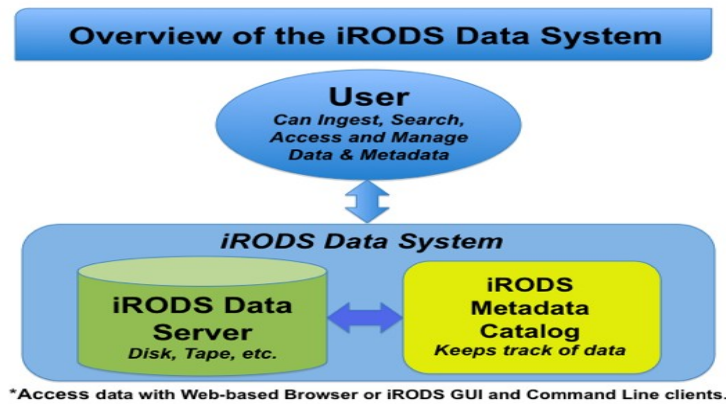
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INTRODUCTION

What is iRODS

In short the IRODS is an open source middle ware software for storing and managing data.



iRODS means “integrated Rule Oriented Data System”, and is a datagrid software system developed by DICE group(diceresearch.org). This group has its bases at the University of North Carolina and San Diego. The first release, beta v.0.5, came December 2006. Version 1.0 was released January 2008 and the last release is version 2.2 (Oct 2009). See www.irods.org.

Why iRODS?

Some benefits with iRODS compare to eg. scp (secure copy) is:

1. Normally; to copy a file you do not need command with long string of host and path
Ex.

Scp: `scp myfile.txt norstore-trd-app1.hpc.no:project/myproject/part1/` . And then password.

Irods: `iput myfile.txt`.

iRODS is more easy for client users because it is difficult to remember host and path, and then password. It is also easy to implement in batch scripts.

Note! The iRODS do not encrypt the files between client and server host and therefore the transfer speed is up to **4 time faster** than eg. scp.

2. iRODS organizing your storing space in a group structure:

Example: Project called Matgen.

`/norstore/project/matgen/home/matgen (common)`

“” `/john`

“” `/hansbr`

The irods client only see the home directory (see iCommands and Group Administrator),

`trdZone/home/matgen`

`trdZone/home/john`

3. You can manage your storing space as group administrator (See Group Administrator).
4. Group administrator can add and remove users for the group.
5. As a client you can store data from a computer (eg. njord) to norstore, and then do after work with this data on Norstore, started to run by iRODS via irods command (see Rules and microservices).
6. You can manage and store/load data via a File Browser(eg. iRODS Browser)
7. iRODS has often updates and a support/chat web page.
8. iRODS has lots of features for automatizing of storing, backup etc.

Other

iRODS functionality overview

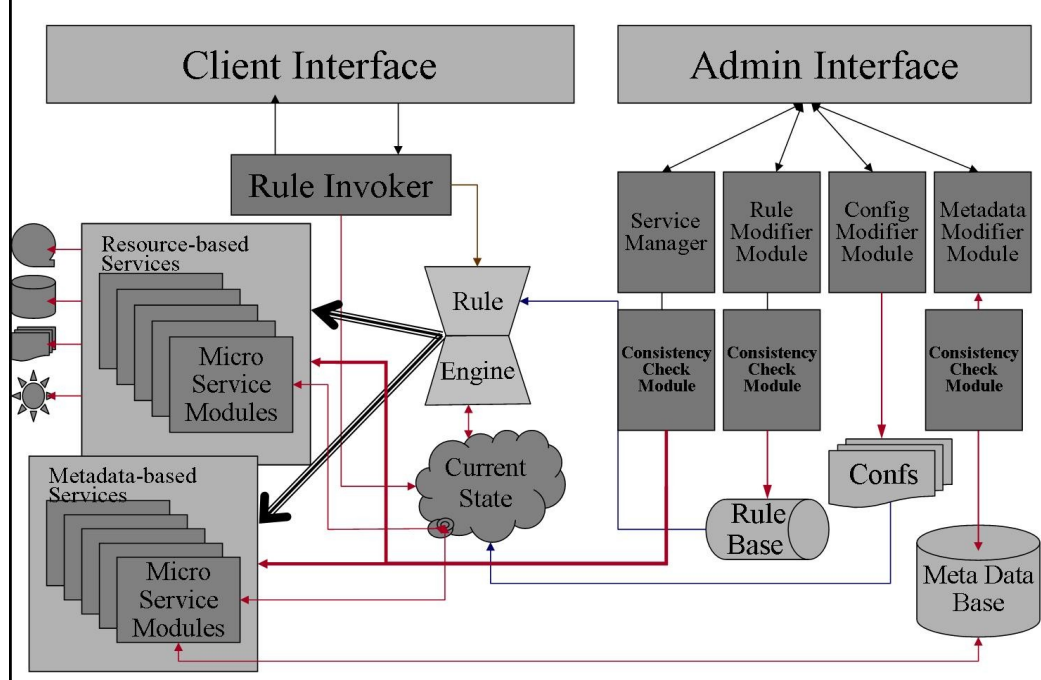


Figure 1. iRODS overview.

Pre-studies for Uninett.

iRODS was selected of 3 systems; iRODS, pNFS og Gfarm, because of

- easiest to understand,
- easy to install,
- new software updates (new versions),
- updated web site,
- support and a development group at google (groups.google.com/group/iROD-Chat).

(Accordance to a report for the Uninett (Student report (hovedoppgave) at HiST).

IRODS users.

SDSC. San Diego Supercomputing Center.

CC-IN2P3: The Computing Center of the National Institute of Nuclear and Particle Physics(France)

SHAMAN. Long term digital preservation.

SPARE. The National Library of France. Storage Abstraction Service.

TextGrid. is the first project in the humanities in Germany creating a community grid for the collaborative editing, annotation, analysis, and publication of specialist text resources.

VOSpace. International Observatory Alliance.

BioEmergences (SRB). EC funded project for biologist, math, engineers and computer scientists.

NTNU. Institute of Biology.

IRODS is integrated with.

Apache, postgresSQL, FUSE, Parrot, Jargon, GIS

GUI

IRODS Browser for Windows, iRODS web browser, JUX and Vbrowser

Client API

Jargon - Java

Prods - PHP

INSTALLATION

The iRODS has several installation options:

Client and server with PostgreSQL DB, FUSE, iCAT and GIS.

Install iRODS Client

iRODS Client is a client application for communication with the iRODS Server on Norstore.

iRODS Server is a daemon/service application running on Norstore.

Download irods v.2.2, or newer, from irods.org (<https://www.irods.org/index.php/Downloads>).

1. Make a directory under your user home directory: `home/myusername/irods`

2. Write “`tar -xvf irods.2.2.tgz`” to unzip the tgz file

3. Go to sub-directory: `cd iRODS`

4. Read the `INSTALL.txt` file

Write “`./irodssetup`”

Follow the setup wizard and select this options:

Include additional prompts for advanced settings [no]?enter [no] is default, press the enter button.

Build an iRODS server [yes]? no

Include GSI [no]? enter

Save configuration (`irods.config`) [yes]? enter

Start iRODS build [yes]? enter

The irods setup wizard will now start compiling the iRODS.

To get access to icommands then set the path as descript in the end of the setup wizard

Ex: `PATH=/home/username/irods/iRODS/clients/icommands/bin:$PATH`

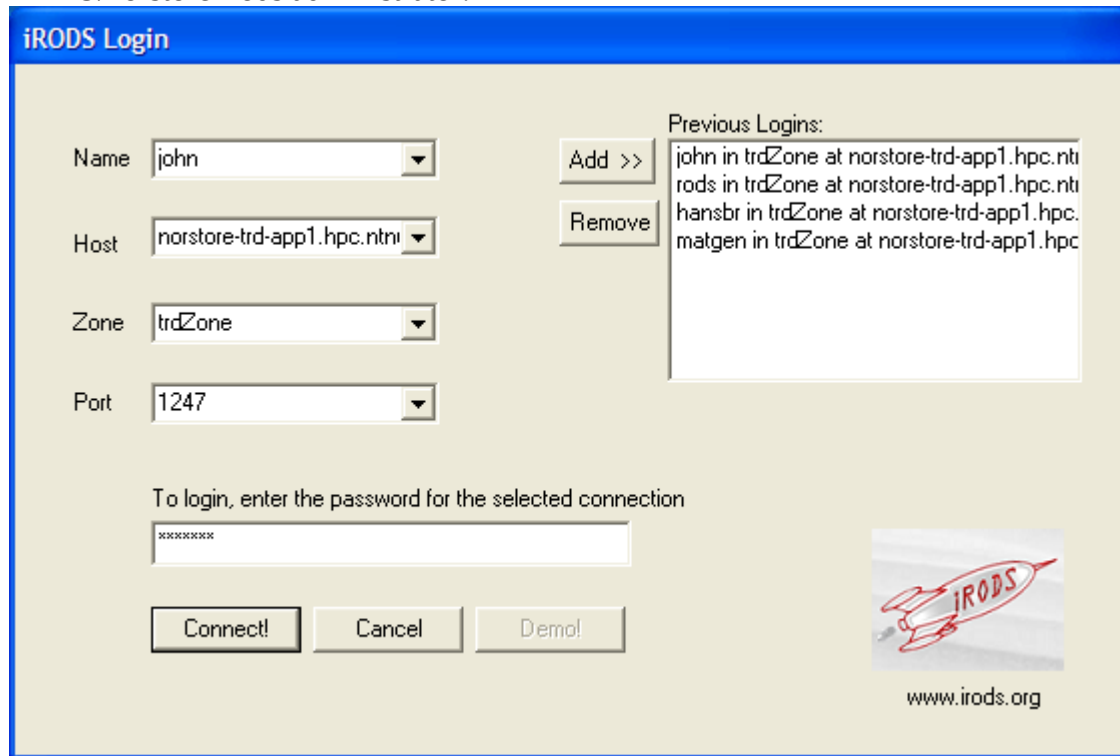
Create directory `mkdir /home/myusername/.irods`

Copy the file `.irodsEnv` into this directory. This file you get from iRODS administrator.

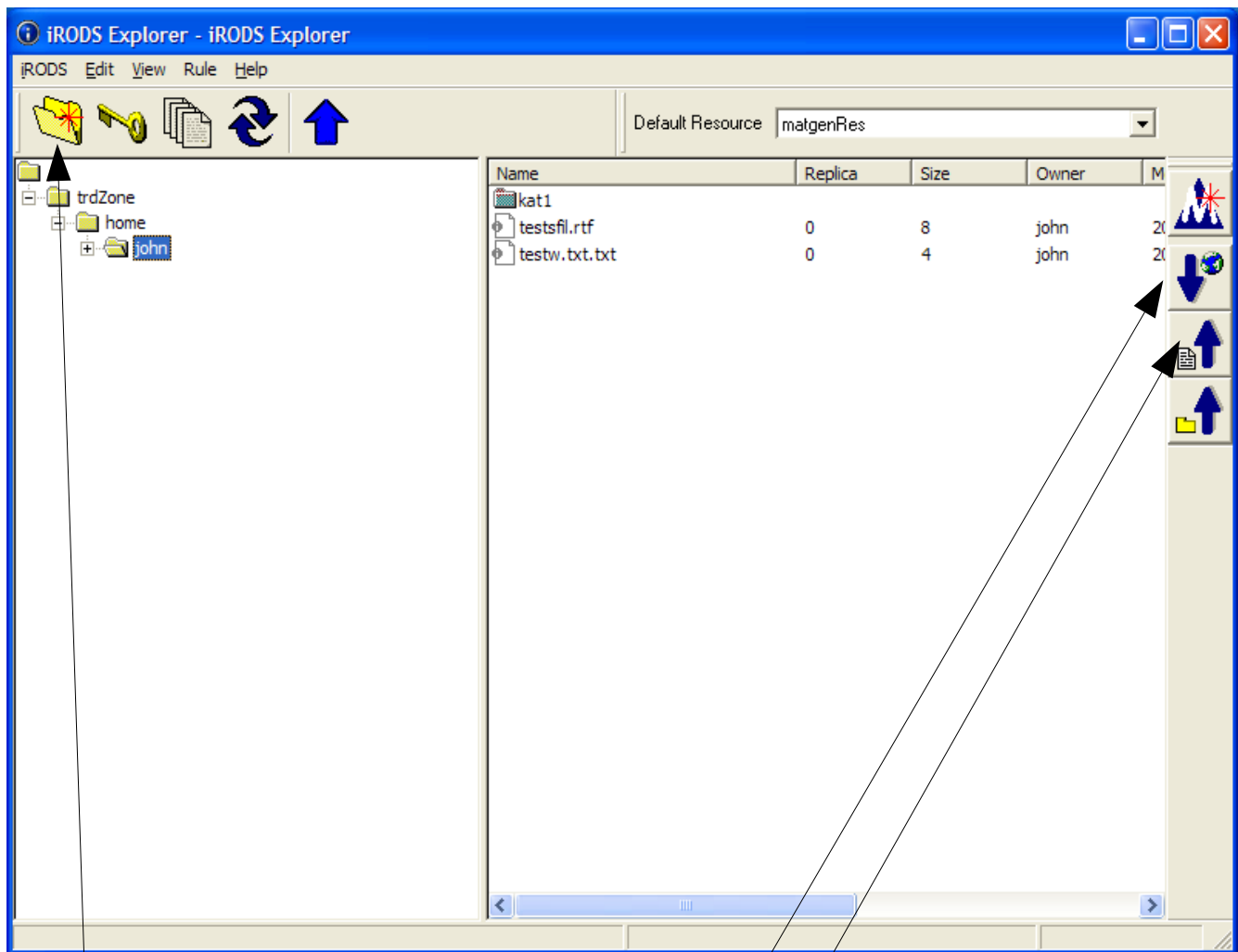
IRODS Explorer for Windows (GUI)

You find the zip file on www.irods.org and under client applications. User version 2.0.

1. Fill in your user data and click on add button. You get the user data and password from NTNU/norstore irods administrator.



2. Enter your password and press the “Connect” button.



3.Download (import) files from irods server to your laptop.

4.Upload (export) files from your laptop to irods server.

5.Create a new folder (Collection),

ICOMMANDS

Icommands are similar to linux/unix commands but with “i” before all commands as: ils, icd, iput, iget, imkdir, ... (See iRODS/clients/icommands/bin for all icommands).

Start with

```
iinit and enter the irods password.
(change your password with ipasswd newpassword)
```

To list the directory contents

```
ils
/trdZone/home/rods:
C- /trdZone/home/rods/test
C- /trdZone/home/rods/test2
```

Change directory:

```
icd test
```

List contents again:

```
ils
/trdZone/home/rods/test:
test1.txt
```

To list where files actually are stored:

```
ils -L
/trdZone/home/rods/test:
rods          0 demoResc          8 2009-02-19.15:14 & test1.txt
  /gpfs/norstore_trd/user/irods/iRODS/Vault/home/rods/test/test1.txt
```

To copy a file from client to server:

```
iput test2.txt
```

To copy a folder ,with its files, from client to server:

```
iput -r dir1
```

To get a file from server:

```
iget test2.txt
```

To get a folder, with its files, from server

```
iget -r dir1
```

To replicate file to other server (eg Norstore in Oslo) or other paths.

```
iput test.txt          Store to default storing place eg. Matgen Norestore TRD (NTNU Trondheim)
irepl -R matgenOSL test.txt      Replicate the same file to norstore OSL (UiO Oslo)
```

Note! With option -B (Backup): (irepl -B -R matgenOSL test.txt) it will skip update if a good copy already exist.
-R specifies the resource (storing place and path to storing space)

If you use irm (remove) file then this file go to the trash folder (/norstore/project/matgen/trash)

To remove trash use irmtrash

GROUP ADMINISTRATOR

With IRODS you can manage your storage space and users on Norstore:

1. Norstore administrator shall create a storage space on Norstore; as `norstore/project/`.
2. Then the iRODS administrator create a group on iRODS, named after the project name.
3. Then one person for this project or will be a iRODS group administrator, and he/she can add or remove users to this group.
 - To add a user to iRODS : `iadmin mkuser <username> <user type>`
 - To change the password: `iadmin moduser <username> password <password>`
 - To add the user to your group: `iadmin atg <groupname> <username>`

Example: Project Matgen.

1. IRODS administrator create a resource in iRODS and set the path to its physical storing space. In this case :
 - `/norstore/project/matgen/irods.`
2. iRODS administrator add a group Matgen in iRODS, and add a group administrator.
- 3 The group administator can now add new users to iRODS:
 - `iadmin mkuser john rodsuser`
 - `iadmin moduser john password 12345`
 - `iadmin atg matgen john`
4. iRODS will make a file structure on Norstore as:
 - (following the resource path `/norestore/project/matgen/irods`)
 - `/norstore/project/matgen/irods/home/`
 - `/hansbr (admin)`
 - `/john (user)`
 - `/matgen (common)`
5. The user client (john) will see this paths as:
 - `/trdZone/home/hansbr`
 - `/trdZone/home/john`
 - `/trdZone/home/matgen`
6. To remove a user from iRODS:
 - `iadmin rmuser john`

RULES AND MICROSERVICES

Micro services

Micro services are small, well-defined procedures/functions that perform a certain task. Micro-services are developed and made available by system programmers and application programmers and compiled into the iRODS server code. Users and administrators can *chain* these micro-services to implement a larger macro-level functionality that they want to use or provide for others.

To integrated the micro service or iRODS then create a new msi (micro service interface) under directory “module“

```

iRODS/modules/
  my_msi_module/
    Makefile
    microservices/
      include
      obj
      src/
      myMicroservice.c

```

Include the msi in the reAction table: server/re/include/reAction.table

(See <https://www.irods.org/index.php/Micro-Services>)

Rules

With iRODS rules you can activate several micro services and with conditions.

A user can change rule by editing in rule file, and do not have to recompiling the source code.

Format of the rules

```
Action | Condition | MS1,MS2,...,MSN | RMS1,RMS2,...,RMSN
```

MSx: Micro service x, RMSx Recovery micro service, Action is the name given to a rule, condition

Running a rule:

```
irule -vF ruleTest.ir
```

Examples: Use rule printHello in core.irb

```
printHello || print_hello_arg (HELLO $userNameClient) | nop
```

```
irule -- test printHello null null
```

APPENDIXES

Appendix A. Terminology

iRODS: integrated Rule Oriented Data System.

Apache: Web server.

iCAT:iRods Catalog.

PostgreSQL: Database

FUSE: Filesystem in Userspace

Parrot: is a tool for attaching existing programs to remote I/O systems through the filesystem interface.

Parrot "speaks" a variety of remote I/O services like HTTP, FTP, GridFTP, GFAL, RFIO, and has been extended to include iRODS.

Jargon:A Java client API for the DataGrid

GIS: Grid Security Infrastructure

DISC: Data Intensive Cyber Environments (DICE) group (developers of the iRODS and SRB, the Storage Resource Broker), and collaborators.

Resource: Physical path and host.

Zone: IRODS server.

Appendix B. Other iRODS Browsers

iRODS JUX Browser (GUI)

Jux is a other windows application for exploring iRODS.

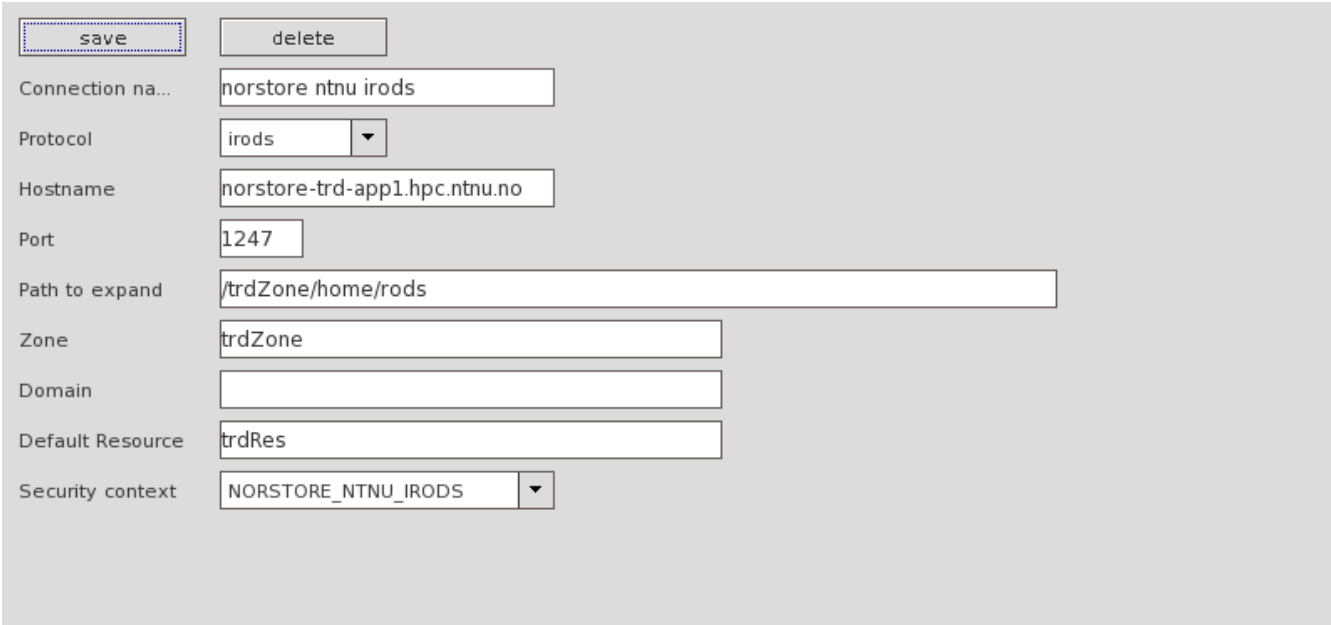
In this application you can drag and drop files, delete file and create new directories.

Installation guide and user guide see: <http://cc.in2p3.fr/docenligne/821>.

JUX need a security context file (jsaga-universe.xml) and this file you can get from me, and shall be stored in directory .../jux/etc.

Open the connection setting in Tools->connection manager

Select “new connection” and fill in the menu as below and save.



The screenshot shows a dialog box for configuring a new iRODS connection. At the top, there are two buttons: "save" (highlighted with a dashed border) and "delete". Below these are several input fields and dropdown menus:

- Connection na...: norstore ntnu irods
- Protocol: irods (dropdown menu)
- Hostname: norstore-trd-app1.hpc.ntnu.no
- Port: 1247
- Path to expand: /trdZone/home/rods
- Zone: trdZone
- Domain: (empty field)
- Default Resource: trdRes
- Security context: NORSTORE_NTNU_IRODS (dropdown menu)