Introduction to SweGrid

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Getting a certificate

- Terena eScience Portal
  - Issues personal certificates
  - Trusts the universities to validate the identity of the user
  - Login using normal university id
  - Certificate and private key stored in browser
  - Must be exported and converted to be used for accessing grid resources.

http://dl.dropbox.com/u/2888586/videos/terena1.mp4

Grid authorisation

- To use SweGrid resources
  - Must be member in SweGrid VO
  - Must be member of a SweGrid VO group
- Membership is aquired by clicking on the following link:
  - https://voms.ndgf.org:8443/voms/swegrid.se
  - Follow the instructions
- To be added to a SweGrid VO group please send an email to support@swegrid.se
  - Specify your DN as shown in the Terena portal or from the arcproxy –info command
  - Specify the SNIC project number

Creating a X509 grid certificate

- Convert PCKCS12 certificate from browser to a X509 certificate
- OpenSSL is used for conversion
- Results in 2 files
  - usercert.pem – Public certificate
  - userkey.pem – Private key

Creating a X509 grid certificate

```
$ openssl pkcs12 -nocerts -in usercert.p12 -out userkey.pem
Enter Import Password:
MAC verified OK
Enter PEM pass phrase:
Verifying - Enter PEM pass phrase:
```

→ userkey.pem

```
$ openssl pkcs12 -clcerts -nokeys -in usercert.p12 -out usercert.pem
Enter Import Password:
MAC verified OK
```

→ usercert.pem

chmod 400 userkey.pem

http://dl.dropbox.com/u/2888586/videos/export_convert_cert.mp4

Client installation

- A client software is required to use SweGrid resources
- SweGrid uses the NorduGrid ARC middleware
  - Available Linux/Mac OS X/ (Windows)
  - Latest version 11.05 (1.0.0)

http://dl.dropbox.com/u/2888586/videos/installing_arc_macosx.mp4

Client configuration

- The NorduGrid ARC client has to be configured to us the SweGrid Resources
  - Where, what?
- The configuration also specifies
  - Default timeouts
  - Logging levels
  - Blacklisting of resources
  - Resource aliases
- Configuration file at $HOME/.arc/client.conf

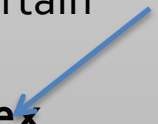
arc.conf

```
[common]
# Default services.
# Services to be used if none is given on the commandline can be
# specified using the 'defaultservices' attribute. Setting this here
# will override the default services set in the system configuration.
# The value of this attribute should follow the format:
# <service_type>:<flavour>:<service_url>
# where <service_type> is type of service (e.g. computing or index),
# <flavour> specifies type of middleware plugin to use when contacting
# the service (e.g. ARC0, ARC1, CREAM, UNICORE, etc.) and <service_url>
# is the URL used to contact the service.
defaultservices=index:ARC0:ldap://index1.swegrid.se:2135/Mds-Vo-
name=SweGrid,o=grid index:ARC0:ldap://index1.swegrid.se:2135/Mds-Vo-
name=SweGrid,o=grid

# Rejected services.
# The attribute 'rejectservices' can be used to indicate that a certain
# service should be rejected.
#rejectservices=computing:ARC1:https://bad.service.org/arex
```

Informationsystem entrypoints

Blacklisting of resources



arc.conf

```
# Specify the broker used in resource discovery. The default broker is
# the 'Random' broker.
#brokername=FastestQueue
# Some brokers takes arguments and these can be specified by using the
# 'brokerarguments' attribute.
#brokerarguments=

# Set the period of time the client should wait for a service to respond
# when communicating with it. The period should be given in seconds.
#timeout=50

# Path to the job list file can be specified with the joblistfile
# attribute. This file will be used by commands such as arcsub, arcstat,
# arcsync etc. to read and write information about jobs. The default
# location of the file is in home directory in the .arc directory with
# name jobs.xml
#joblist=/home/user/run/jobs.xml
#joblist=C:\\run\jobs.xml
```

arc.conf

```
# The location of credentials can be specified by using the 'proxypath',
# 'keypath' or 'certificatepath' attribute, in case they are located
# in a non-standard location.
#proxypath=/tmp/my-proxy
#keypath=/home/username/key.pem
#certificatepath=/home/username/cert.pem

# The location of the directory containing CA-certificates can also be
# specified.
#cacertificatesdirectory=/home/user/cacertificates

# Alias definition. Instead of typing the whole URL on the commandline use a alias
instead.
[alias]
#arco=computing:ARCo:ldap://grid.tsl.uu.se:2135/nordugrid-cluster-
name=grid.tsl.uu.se,Mds-Vo-name=local,o=grid
#arc1=computing:ARC1:https://interop.grid.niif.hu:2010/arex-x509
```

Non-default certificate locations

Non-default CA certificate locations

Client verification - arcinfo

```
host-95-193-81-219:~ jonas$ arcinfo
Execution Service: arc-ce01.pdc.kth.se
 URL: ARC0:ldap://arc-ce01.pdc.kth.se:2135/nordugrid-cluster-
name=arc-ce01.pdc.kth.se,Mds-Vo-name=local,o=Grid
 Queue: easy
 Hälsotillstånd: ok

…

Execution Service: siri.lunarc.lu.se
 URL: ARC0:ldap://siri.lunarc.lu.se:2135/nordugrid-cluster-
name=siri.lunarc.lu.se,Mds-Vo-name=local,o=Grid
 Queue: arc
 Hälsotillstånd: ok
```

Displays a list of authorised resources

Creating a proxy certificate

- **arcproxy** is used to create a shortlived proxy certificate for use with the SweGrid resources
- By default a 12 hour proxy is created
- Make sure proxy is long enough to cover any transfers to external sources
- ”-c” is used to set validity time
  - **arcproxy –c "validityPeriod=24 hours”**
  - Creates a 24 hour proxy certificate

Creating a proxy certificate

```
$ arcproxy -c "validityPeriod=24 hours"
Your identity: /O=Grid/O=NorduGrid/OU=lunarc.lu.se/CN=Jonas
Lindemann
Enter pass phrase for /Users/jonas/.globus/userkey.pem:
..++++++
.++++++
Proxy generation succeeded
Your proxy is valid until: 2011-06-30 07:30:33
```

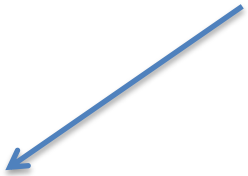
```
$ arcproxy --info
Subject: /O=Grid/O=NorduGrid/OU=lunarc.lu.se/CN=Jonas
Lindemann/CN=1236174628
Identity: /O=Grid/O=NorduGrid/OU=lunarc.lu.se/CN=Jonas Lindemann
Time left for proxy: 23 timmar 51 minuter 53 sekunder
Proxy path: /Users/jonas/x509_up501
Proxy type: X.509 Proxy Certificate Profile RFC compliant
restricted proxy
```

Beskrivning av jobb

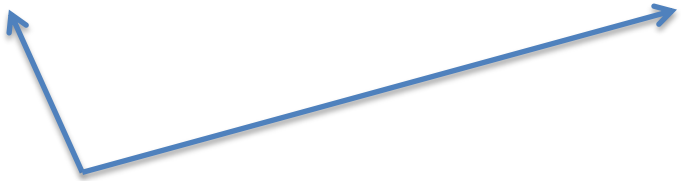
- Jobb beskrivs i "Extended Resource Specification Language" eller XRSL
- XRSL-files contains a set of attribute definitions
- All definitions enclosed in ( )
- Operators can be used to define attribute relationships
  - An XRSL file usually starts with an & (and) and defines the default relationship between all attributes in the file

XRSL exempel

Default relationship



&(executable="/bin/echo")(arguments="Hello, World!")



Attribute definitions

Specifying executable and arguments

- An executable specified without any directory separators is treated as a local file transferred to the remote system and executed
  - (executable="myexecutable")
- If executable begins with a leading "/" it is treated as a local file on the remote system
  - (executable="/bin/echo")

Handling job input and output

- Output from an application can be specified with the **stdout** and **stderr** attributes
- Input to an application is specified by the **stdin** attribute

Handling job input and output

```
&
(executable="/bin/ls")
(arguments="-la")
(stdout="stdout.txt")
(stderr="stderr.txt")
```

Stdin.txt has to be transferred to the resources, which is done in the **inputFiles** attribute.

```
&
(executable="myapp”)
(stdout="stdout.txt”)
(stderr="stderr.txt”)
(stdin="stdin.txt”)
(inputFiles=("stdin.txt" ""))
```

Naming jobs

- To make it easier to handle submitted jobs a job can be given a meaningful name using the **jobName** attribute
- This name can be used reference jobs from the command linde tools

```
&
(executable="myapp")
(stdout="stdout.txt")
(stderr="stderr.txt")
(stdin="stdin.txt")
(inputFiles=("stdin.txt" ""))
(jobName="job0001")
```

Input- and output files

- Most jobs need input files for running
- Jobs often produce output files that need some kind of handling
- Input files are defined using the **inputFiles** attribute
- Output files are defined using the **outputFiles** attribute
- Input/output files can reference external URL:s

Input and output files

```
&
(executable="myapp")
(stdout="stdout.txt")
(stderr="stderr.txt")
(stdin="stdin.txt")
(inputFiles=
    ("stdin.txt" "")
    ("datafile1.dat" "")
    ("datafile2.dat" "")
)
(outputFiles=
    ("outputfile1.dat" "")
    ("outputfile2.dat" "")
)
```

Input and output files

```
&
(executable="myapp")
(stdout="stdout.txt")
(stderr="stderr.txt")
(stdin="stdin.txt")
(inputFiles=
    ("stdin.txt" "http://www.swegrid.se/example/stdin.txt")
    ("datafile1.dat" "gsiftp://swegrid.se/storage/datafile1.dat")
    ("datafile2.dat" "rc://swegrid.se.se/datafile2.dat")
)
(outputFiles=
    ("outputfile1.dat" "srm://swegrid.se/storage/outputfile1.dat")
    ("outputfile2.dat" "srm://swegrid.se/storage/outputfile2.dat")
)
```

Input and output files

```
&
(executable="myapp")
(stdout="stdout.txt")
(stderr="stderr.txt")
(stdin="stdin.txt")
(inputFiles=
    ("/" "")
)
(outputFiles=
    ("/" "")
)
```

Upload all input files in submission directory

Download all files in session directory

Specifying resource usage

- To be able to choose the right resource attributes for walltime and memory and disk can be specified using **wallTime** and **memory** attributes
- Walltime can be specified using several units:
  - 1 week, 3 days, 2 days, 12 hours, 1 hour, 30 minutes, 36 hours, 9 days, 240 minutes, 240
  - If no unit is specified "minutes" is the default

Specifying resource usage

```
&
(executable="myapp")
(stdout="stdout.txt")
(stderr="stderr.txt")
(stdin="stdin.txt")
(wallTime=240)
(memory>=500)
(inputFiles=
    ("stdin.txt" "")
    ("datafile1.dat" "")
    ("datafile2.dat" "")
) (outputFiles=
    ("outputfile1.dat" "")
    ("outputfile2.dat" "")
)
```

Runtime-environments

- Runtime environment are special scripts that are executed on the resource to setup applications or special environments for jobs
  - Specified using the **runtimeEnvironment** attribute
- Shields users from differences between resources
- Can also be queried from the information system
- Supports versioning
  - Ask for a specific version x.y
  - Ask for at least version x.y

Runtime-environments

```
&
(executable=run.sh)
(arguments=inputfile.dat)
(inputFiles=(intputfile.dat ""))
(outputFiles=(outputfile.dat ""))
(wallTime=240)
(runTimeEnvironment>=MYAPP-1.42)
```

```
!/bin/sh
myapp $1
```

"myapp" is made available by the RE MYAPP-1.42

Require that MYAPP should be 1.42 or higher

Job debug information

- Sometimes more information about the job is required for debugging
- **gmlog** attribute can be used to specify that diagnostic information should be returned from the job.
- Information is stored in the directory specified by the attribute.

Job debug information

- **description** - contains the parsed and transformed XRSL description transferred to the resource.
- **diag** - front-end and job information.
- **errors** - complete log of job activity.
- **input** - job input files.
- **local** - local job information specific to resource management system.
- **output** - job output files.
- **status** - job status. FINISHED/FAILED etc.

Job debug information

```
&
(executable=run.sh)
(wallTime="5 minutes")
(stdout="stdout.txt")
(stderr="stderr.txt")
(gmlog="gmlog")
```

Creates a directory "gmlog" containing the files described earlier

Job submission

- When the job description has been created and the needed files are available the job can be submitted to a grid resource using the **arcsub** command
- Job submission procedure:
  - Parse XRSL definition.
  - Query information system for available resources taking in any constraints defined in the XRSL definition such as memory, wallTime and runtime environments.
  - Submit job to selected resource. Transferring any files local to the submission directory (if any).

arcsub

- General syntax:

  arcsub [options] [filename …]

  filename is xrsl-files for a single or many jobs

- Important switches

  --cluster=[-]cluster specifically select or reject a cluster (-)

  --debug=debuglevel set the desired debug output information

  --timeout=seconds set the timout value for when to give up on a resource or information resource.

Submission example

```
&
(executable=run.sh)
(wallTime="5 minutes")
(stdout="stdout.txt")
(stderr="stderr.txt")
```

```
#!/bin/sh
echo "Hello, grid"
```

```
$ arcsub job.xrsl
Jobb insänt med jobb-id:
gsiftp://jeannedarc.hpc2n.umu.se:2811/jobs/729413093046318779723 52
```

```
$ arcsub --debug=INFO job.xrsl
INFO: Loading configuration (/opt/local/nordugrid/etc/arc/client.conf)
INFO: Configuration (/opt/local/nordugrid/etc/arc/client.conf) loaded
INFO: Loading configuration (/Users/jonas/.arc/client.conf)
INFO: Configuration (/Users/jonas/.arc/client.conf) loaded
INFO: Använder proxyfil: /Users/jonas/x509_up501
INFO: Använder certifikatfil: /Users/jonas/.globus/usercert.pem
INFO: Använder nyckelfil: /Users/jonas/.globus/userkey.pem
INFO: Använder CA-certifikatkatalog: /opt/local/nordugrid/etc/grid-security/certificates
INFO: Proxy successfully verified.
INFO: Loaded JobDescriptionParser ARCJSDLParser
INFO: Loaded JobDescriptionParser JDLParser
INFO: Loaded JobDescriptionParser XRSLParser
INFO: String successfully parsed as nordugrid:xrsl.
INFO: Found 7 targets
INFO: Loaded Broker Random
INFO: Broker Random loaded
INFO: Överföring från file:/Users/jonas/testjobs/job1/run.sh till
gsiftp://svea.c3se.chalmers.se:2811/jobs/263771309305412188642257 8/run.sh
INFO: Reell överföring från file:/Users/jonas/testjobs/job1/run.sh till
gsiftp://svea.c3se.chalmers.se:2811/jobs/263771309305412188642257 8/run.sh
INFO: ftp_write_thread: eråll och registrera buffrar
INFO: buffer: läs filslut  : 1
INFO: buffer: skriv filslut: 1
INFO: buffer: fel        : 0
INFO: job.Resources.QueueName = svea
Jobb insänt med jobb-id: gsiftp://svea.c3se.chalmers.se:2811/jobs/263771309305412188642257 8
```

7 targets found in the information system

svea.c3se.chalmers.se chosen by broker

Job submission successful

```
host-95-193-81-219:job1 jonas$ arcsub --debug=INFO --cluster=siri.lunarc.lu.se job.xrsl
INFO: Loading configuration (/opt/local/nordugrid/etc/arc/client.conf)
INFO: Configuration (/opt/local/nordugrid/etc/arc/client.conf) loaded
INFO: Loading configuration (/Users/jonas/.arc/client.conf)
INFO: Configuration (/Users/jonas/.arc/client.conf) loaded
INFO: Använder proxyfil: /Users/jonas/x509_up501
INFO: Använder certifikatfil: /Users/jonas/.globus/usercert.pem
INFO: Använder nyckelfil: /Users/jonas/.globus/userkey.pem
INFO: Använder CA-certifikatkatalog: /opt/local/nordugrid/etc/grid-security/certificates
INFO: Proxy successfully verified.
INFO: Loaded JobDescriptionParser ARCJSDLParser
INFO: Loaded JobDescriptionParser JDLParser
INFO: Loaded JobDescriptionParser XRSLParser
INFO: String successfully parsed as nordugrid:xrsl.
INFO: Found 1 targets
INFO: Loaded Broker Random
INFO: Broker Random loaded
INFO: Överföring från file:/Users/jonas/testjobs/job1/run.sh till
gsiftp://siri.lunarc.lu.se:2811/jobs/3202613093055832039744533/run.sh
INFO: Reell överföring från file:/Users/jonas/testjobs/job1/run.sh till
gsiftp://siri.lunarc.lu.se:2811/jobs/3202613093055832039744533/run.sh
INFO: ftp_write_thread: eråll och registrera buffrar
INFO: buffer: läs filslut  : 1
INFO: buffer: skriv filslut: 1
INFO: buffer: fel          : 0
INFO: job.Resources.QueueName = arc
Jobb insänt med jobb-id: gsiftp://siri.lunarc.lu.se:2811/jobs/3202613093055832039744533
```

siri.lunarc.lu.se explicitely selected

Only 1 target available for brokering

Joblistfiles

- By default ARC stores information about submitted jobs in **$HOME/.arc/jobs.xml**
- Location of the joblist file can be changed using the **-j** or **--joblist=joblistfile** switches
- Useful when submitting parameter sweeps.
  - Single sweep stored in a special joblist file

Job status information

- Status of submitted jobs can be queried using the **arcstat** command
- Queries the status of the jobs in the **$HOME/.arc/jobs.xml** file
- Similar to the **qsub** and **showq** command on conventional HPC resources

Job status information

```
$ arcstat gsiftp://siri.lunarc.lu.se:2811/jobs/32026130930558320397445 33
Jobb: gsiftp://siri.lunarc.lu.se:2811/jobs/32026130930558320397445 33
 State: Finished (FINISHED)
 Avslutningskod: 0
```

Queries all jobs in jobs.xml file

```
$ arcstat -a
Jobb: gsiftp://jeannedarc.hpc2n.umu.se:2811/jobs/729413093046318779723 52
 State: Failed (FAILED)
 Job Error: Job submission to LRMS failed

Jobb: gsiftp://svea.c3se.chalmers.se:2811/jobs/263771309305412188642257 8
 State: Finished (FINISHED)
 Avslutningskod: 0

Jobb: gsiftp://siri.lunarc.lu.se:2811/jobs/32026130930558320397445 33
 State: Finished (FINISHED)
 Avslutningskod: 0
```

Job status information

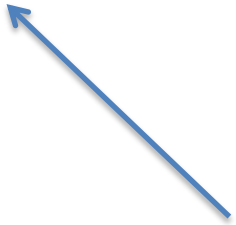
Use "--long" to display more job information

```
$ arcstat --long
gsiftp://siri.lunarc.lu.se:2811/jobs/32026130930558320397445 33
Jobb: gsiftp://siri.lunarc.lu.se:2811/jobs/32026130930558320397445 33
 State: Finished (FINISHED)
 Avslutningskod: 0
 Ägare: /O=Grid/O=NorduGrid/OU=lunarc.lu.se/CN=Jonas Lindemann
 Queue: arc
 Used Slots: 1
 Stdout: stdout.txt
 Stderr: stderr.txt
 Submitted: 2011-06-29 01:59:48
 End Time: 2011-06-29 02:05:34
 Submitted from: 95.193.81.219:56577;host-95-193-81-
219.mobileonline.telia.com
 Used CPU Time:
 Used Wall Time: 1 minut
 Results must be retrieved before: 2011-07-09 17:12:14
 Proxy valid until: 2011-06-29 11:45:20
 Entry valid from: 2011-06-29 02:11:13
 Entry valid for: 1 minut 30 sekunder
```

Job status information

- The **--joblist** switch can be used by the **arcstat** command as well

arcstat --joblist=job_sweep1



Query status of jobs contained in the "job_sweep1" file

Job status information

- Using the **--status=statusstring** switch only jobs with status = statusstring will be listed.

```
$ arcstat --all --status=FAILED
Jobb: gsiftp://jeannedarc.hpc2n.umu.se:2811/jobs/7294130930463187797235 2
 State: Failed (FAILED)
 Job Error: Job submission to LRMS failed
```

Retrieving finished jobs

- Finished jobs can be retrieved using the **arcget** command
- Syntax: **arcget [options] [job]**
- By default jobs are downloaded in a directory with the same name as the last part of the jobid
- Directory for download can be specified using the **--dir=downloaddir**

Retrieving finished jobs

Explicitely with job reference

```
$ arcget
gsiftp://siri.lunarc.lu.se:2811/jobs/3202613093055832039744533
host-95-193-81-219:job1 jonas$ ls
3202613093055832039744533 job.xrsl          run.sh
```

Using jobname from XRSL

```
$ arcget job0001
```

Retrieving finished jobs

```
$ arcget --all --dir ./job_sweep1
Results stored at ./job_sweep1/19851296510641144511 4039
Results stored at ./job_sweep1/22141296510642192602 8190
Results stored at ./job_sweep1/26581296510643162170 0746
Results stored at ./job_sweep1/29391296510645207634 4440
```

Storing jobs in special directory

```
$ arcget --all --usejobname --dir ./job_sweep2
Results stored at ./job_sweep2/job0001
Results stored at ./job_sweep2/job0002
Results stored at ./job_sweep2/job0003
Results stored at ./job_sweep2/job0004
```

Using job names and a separate directory

Killing running/queuing jobs

- **arckill** can be used to kill running or queuing jobs
- Same switches in principle as **arcstat**
- **-a/--all** kill all jobs
- **-j/--joblist** use specific joblist file when killing jobs
- **-s/--status** kill only jobs with a specific status

Killing jobs

```
$ arckill
gsiftp://siri.lunarc.lu.se:2811/jobs/32026130930558320397445 33
```

Killing job by jobname

```
$ arckill job0001
```

Killing all jobs

```
$ arckill --all
```

Killing all jobs queued from joblist job_sweep1

```
$ arckill --joblist=job_sweep1 --status=INLRMS:Q
```

Cleaning jobs

- Jobs kept on resources for some amount of time
- If job has failed it is not neccesary to download it with **arcget**, **arcclean** can then be used to initiate a job removal/cleanup
- Only finished jobs can be cleaned
- If a job exists in joblist file and can't be find on a resource **arcclean --force** can be used
- Same options such as **--joblist**, **--status**, **--all** applies to **arcclean**

Other commands

- **arcrenew**
  - Used to renew proxy certificate of submitted jobs
- **arcresub**
  - Resubmit already submitted jobs. Job descriptions from joblist file will be reused
  - Job will get a new jobid (of course)
- **arcmigrate**
  - Moving jobs between resources (currently only A-REX) Requires upgrading of SweGrid resources
- **arcsync**
  - Synchronises your joblist with information system. Queries information system on all your jobs on resources and updates joblist

Other commands

- **arctest**
  - Submit test jobs
- **arccat**
  - Display job output (stdout/stderr)
- **arcinfo**
  - Querying information on grid resources. **--long** provides additional information on a resource such as available runtime environments
- **arcsync**
  - Synchronises your joblist with information system. Queries information system on all your jobs on resources and updates joblist

Using storage resources

- SweGrid provides > 1 Petabyte of storage in the national storage infrastructure
- Available through dCache
- dCache is a distributed storage system
  - Central metadata repository
  - srm.swegrid.se
  - Protocol is srm:// and gsiftp://
- Distributed pools located on each SNIC centre

Using SweStore

- In the future storage allocation will be handled by SNAC
- Application for storage to
  - swestore-support@snic.vr.se
  - Purpose for storage, short descriptions of the project and which type of data.
  - Max volume in TiB of storage data.

SweStore and VOMS-proxies

- To use SweStore special VOMS signed proxies are required
- Some configuration needed

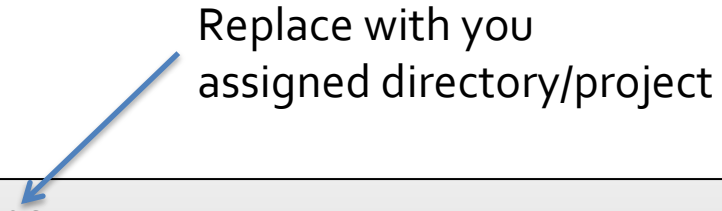
Configuring VOMS

- Create a file
  - **$HOME/.voms/vomses**
  - Should contain:

```
"swegrid.se" "voms.ndgf.org" "15009"
"/O=Grid/O=NorduGrid/CN=host/voms.ndgf.org" "swegrid.se"
```

On one line

Creating a VOMS proxy




```
$ arcproxy -S swegrid.se:/swegrid.se/ops
Your identity: /O=Grid/O=NorduGrid/OU=lunarc.lu.se/CN=Jonas Lindemann
Enter pass phrase for /Users/jonas/.globus/userkey.pem:
..............++++++
.........++++++
Contacting VOMS server (named swegrid.se): voms.ndgf.org on port: 15009
Proxy generation succeeded
Your proxy is valid until: 2011-06-29 20:09:25
```

Storage commands in ARC

- **arccp**
  - Copy files to and from storage resources
  - Handles most grid protocols such as: http, https, httpg, ftp, gsiftp, lfc, rls, srm
- **arcls**
  - List files and directories on storage resources
- **arcrm**
  - Removing files on resources
- Most commands are similar to corresponding Linux/Unix commands with “less functionality”

Copying single files

--debug=INFO is useful for dedbugging file transfers

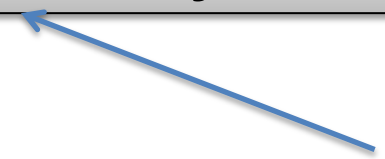
```
$ arccp archive.tar.gz srm://srm.swegrid.se/ops/
```

```
$ arccp --debug=INFO srm://srm.swegrid.se/ops/jonas/GridFTP-1.0.20-linux.gtk.x86.zip ./myzipfile.zip
INFO: Loading configuration (/opt/local/nordugrid/etc/arc/client.conf)
INFO: Configuration (/opt/local/nordugrid/etc/arc/client.conf) loaded
INFO: Loading configuration (/Users/jonas/.arc/client.conf)
INFO: Configuration (/Users/jonas/.arc/client.conf) loaded
INFO: Använder proxyfil: /Users/jonas/x509_up501
INFO: Använder certifikatfil: /Users/jonas/.globus/usercert.pem
INFO: Använder nyckelfil: /Users/jonas/.globus/userkey.pem
INFO: Använder CA-certifikatkatalog: /opt/local/nordugrid/etc/grid-security/certificates
INFO: Överföring från srm://srm.swegrid.se/ops/jonas/GridFTP-1.0.20-linux.gtk.x86.zip till
file:/Users/jonas/./myzipfile.zip
INFO: Reell överföring från srm://srm.swegrid.se/ops/jonas/GridFTP-1.0.20-linux.gtk.x86.zip till
file:/Users/jonas/./myzipfile.zip
INFO: Redirecting to new URL: gsiftp://philo.hpc2n.umu.se:2811/jonas/GridFTP-1.0.20-linux.gtk.x86.zip
INFO: ftp_read_thread: erhåll och registrerar buffrar
```

Destination file must be specified. Using "." does not work.

Recursive copying

```
arccp --recursive=3 jonas2/ srm://srm.swegrid.se/ops/jonas/jonas2/
```



Depth of recursion

Recursive copying can be a costly operation.
dCache not suitable for copying a lot of files.
Use larger files. Preferrable archives.

Creating directories

- No **arcmkdir** yet
  - Feature request pending
- Workaround

```
$ mkdir mydir
$ touch mydir/dummyfile
$ arccp ./mydir/ srm://srm.swegrid.se/ops/mydir/
$ arcls srm://srm.swegrid.se/ops/mydir
dummyfile
```

Listing files

```
$ arcls srm://srm.swegrid.se/ops/
motd.1
bla
generated
ops
motd.f343
GridFTP-1.0.20-linux.gtk.x86.zip
test23
test24
ronstestfile
ronstestfile3
testfile-put-1296854868-6468a2d5df07.txt
```

Listing files

```
$ arcls --long srm://srm.swegrid.se/ops
<Name> <Type> <Size> <Creation> <Validity> <CheckSum> <Latency>
motd.1 file 354 2008-06-05 12:28:23 (n/a) adler32:582d7718 NEARLINE
bla dir 512 2008-08-22 12:23:49 (n/a) (n/a) NEARLINE
generated dir 512 2008-11-17 15:07:39 (n/a) (n/a) NEARLINE
ops dir 512 2010-01-21 11:26:00 (n/a) (n/a) NEARLINE
motd.f343 file 436 2010-01-08 14:35:40 (n/a) adler32:0fed94f2 ONLINE
GridFTP-1.0.20-linux.gtk.x86.zip file 30479220 2011-03-09 09:49:20 (n/a)
adler32:5c67686b ONLINE
test23 file 0 2011-03-04 09:44:44 (n/a) adler32:00000001 ONLINE
test24 file 0 2011-03-04 09:45:07 (n/a) adler32:00000001 ONLINE
ronstestfile file 4 2010-11-23 17:46:13 (n/a) adler32:03cd014b ONLINE
ronstestfile3 file 4 2010-11-23 17:49:07 (n/a) adler32:03cd014b ONLINE
testfile-put-1296854868-6468a2d5df07.txt file 20 2011-02-04 22:28:47 (n/a)
adler32:1a400272 ONLINE
```

Improvements severly needed.
Feature request pending

Querying metadata

```
$ arcls --metadata srm://srm.swegrid.se/ops/test23
/ops/test23
accessperm:rw-r-----
checksum:adler32:00000001
ctime:2011-03-04 09:44:44
filestoragetype:PERMANENT
group:25001
latency:ONLINE
lifetimeassigned:PT1S
lifetimeleft:PT1S
mtime:2011-03-04 09:44:45
owner:25001
path:/ops/test23
size:0
spacetokens:
type:file
```

Removing files/directories

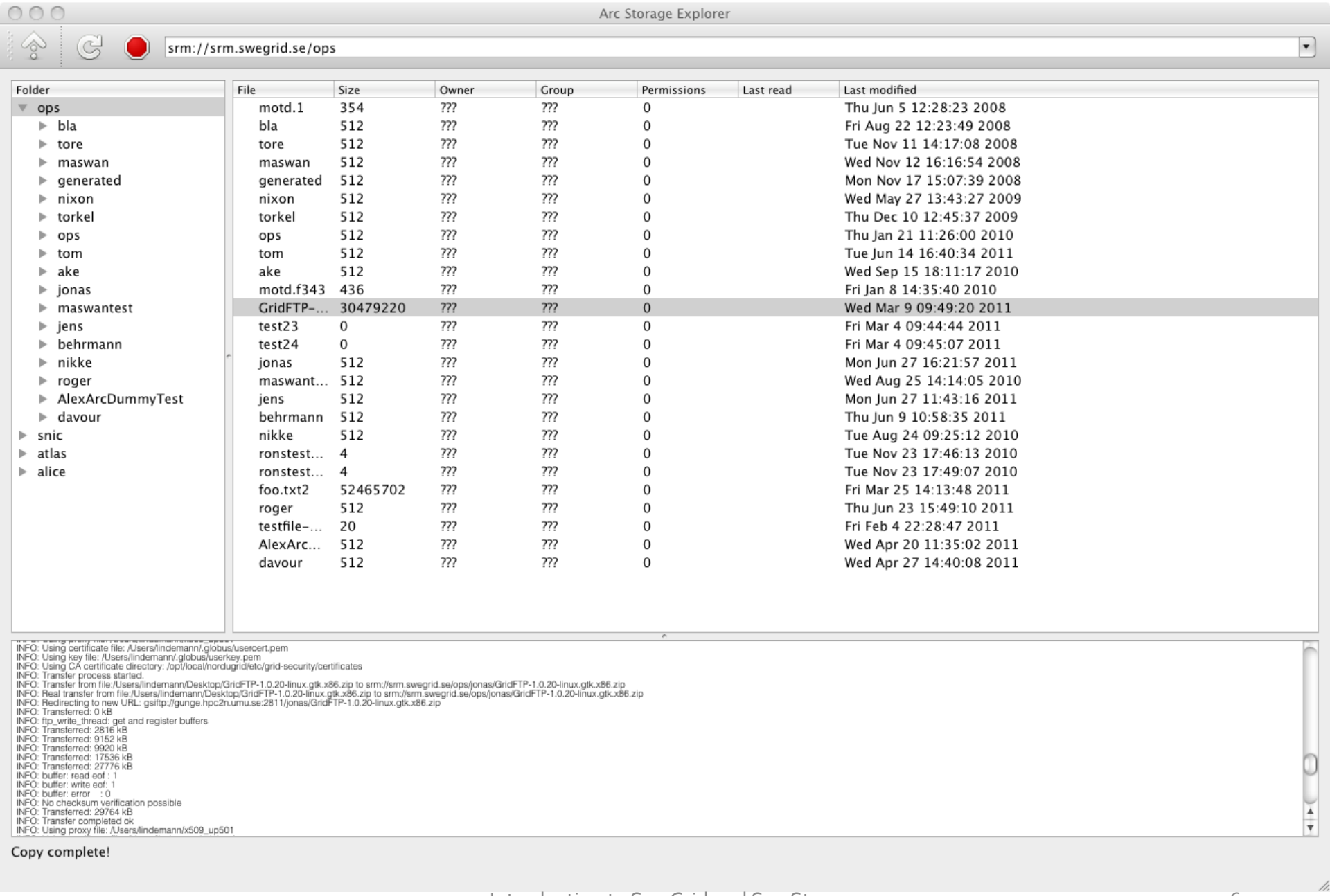
```
$ arcrm srm://srm.swegrid.se/ops/mydir/dummyfile
```

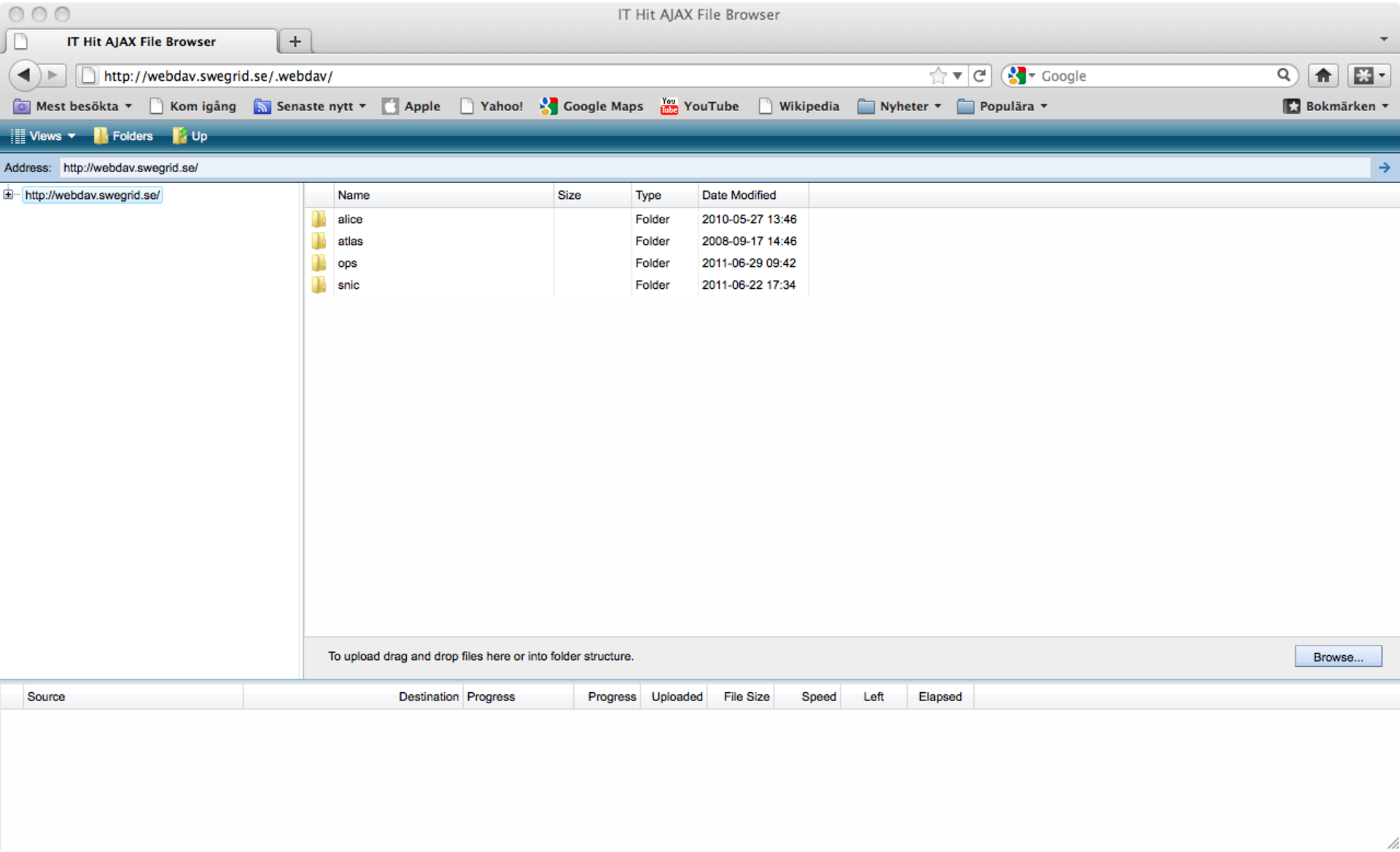
```
$ arcrm srm://srm.swegrid.se/ops/mydir/
```

Trailing slash needed

Upcoming developments

- ARC Storage Explorer
  - Graphical client for SweStore resources
  - Available on Linux, Mac OS X and Windows
- Webdav based interface to storage resources
  - Simple to use web interface
- ARC Setup and Configuration tool
  - Easy setup and configuration of a ARC Client
- Python-bindings
  - ARC 11.05 changed alot
  - Will provide information on this on SNIC knowledge base web pages


Arc Storage Explorer
srm://srm.swegrid.se/ops
Folder
ops
bla
tore
maswan
generated
nixon
torkel
ops
tom
ake
jonas
maswantest
jens
behrmann
nikke
roger
AlexArcDummyTest
davour
snic
atlas
alice
File Size Owner Group Permissions Last read Last modified
motd.1 354 ??? ??? 0 Thu Jun 5 12:28:23 2008
bla 512 ??? ??? 0 Fri Aug 22 12:23:49 2008
tore 512 ??? ??? 0 Tue Nov 11 14:17:08 2008
maswan 512 ??? ??? 0 Wed Nov 12 16:16:54 2008
generated 512 ??? ??? 0 Mon Nov 17 15:07:39 2008
nixon 512 ??? ??? 0 Wed May 27 13:43:27 2009
torkel 512 ??? ??? 0 Thu Dec 10 12:45:37 2009
ops 512 ??? ??? 0 Thu Jan 21 11:26:00 2010
tom 512 ??? ??? 0 Tue Jun 14 16:40:34 2011
ake 512 ??? ??? 0 Wed Sep 15 18:11:17 2010
motd.f343 436 ??? ??? 0 Fri Jan 8 14:35:40 2010
GridFTP-... 30479220 ??? ??? 0 Wed Mar 9 09:49:20 2011
test23 0 ??? ??? 0 Fri Mar 4 09:44:44 2011
test24 0 ??? ??? 0 Fri Mar 4 09:45:07 2011
jonas 512 ??? ??? 0 Mon Jun 27 16:21:57 2011
maswant... 512 ??? ??? 0 Wed Aug 25 14:14:05 2010
jens 512 ??? ??? 0 Mon Jun 27 11:43:16 2011
behrmann 512 ??? ??? 0 Thu Jun 9 10:58:35 2011
nikke 512 ??? ??? 0 Tue Aug 24 09:25:12 2010
ronstest... 4 ??? ??? 0 Tue Nov 23 17:46:13 2010
ronstest... 4 ??? ??? 0 Tue Nov 23 17:49:07 2010
foo.txt2 52465702 ??? ??? 0 Fri Mar 25 14:13:48 2011
roger 512 ??? ??? 0 Thu Jun 23 15:49:10 2011
testfile-... 20 ??? ??? 0 Fri Feb 4 22:28:47 2011
AlexArc... 512 ??? ??? 0 Wed Apr 20 11:35:02 2011
davour 512 ??? ??? 0 Wed Apr 27 14:40:08 2011
INFO: Using certificate file: /Users/lindemann/.globus/usercert.pem
INFO: Using key file: /Users/lindemann/.globus/userkey.pem
INFO: Using CA certificate directory: /opt/local/nordugrid/etc/grid-security/certificates
INFO: Transfer process started.
INFO: Transfer from file:/Users/lindemann/Desktop/GridFTP-1.0.20-linux.gtk.x86.zip to srm://srm.swegrid.se/ops/jonas/GridFTP-1.0.20-linux.gtk.x86.zip
INFO: Real transfer from file:/Users/lindemann/Desktop/GridFTP-1.0.20-linux.gtk.x86.zip to srm://srm.swegrid.se/ops/jonas/GridFTP-1.0.20-linux.gtk.x86.zip
INFO: Redirecting to new URL: gsiftp://gunge.hpc2n.umu.se:2811/jonas/GridFTP-1.0.20-linux.gtk.x86.zip
INFO: Transferred: 0 kB
INFO: ftp_write_thread: get and register buffers
INFO: Transferred: 2816 kB
INFO: Transferred: 9152 kB
INFO: Transferred: 9920 kB
INFO: Transferred: 17536 kB
INFO: Transferred: 27776 kB
INFO: buffer: read eof : 1
INFO: buffer: write eof: 1
INFO: buffer: error : 0
INFO: No checksum verification possible
INFO: Transferred: 29764 kB
INFO: Transfer completed ok
INFO: Using proxy file: /Users/lindemann/x509_up501
Copy complete!


IT Hit AJAX File Browser
IT Hit AJAX File Browser
http://webdav.swegrid.se/.webdav/
Google
Mest besökta
Kom igång
Senaste nytt
Apple
Yahoo!
Google Maps
YouTube
Wikipedia
Nyheter
Populära
Bokmärken
Views
Folders
Up
Address:
http://webdav.swegrid.se/
http://webdav.swegrid.se/
Name
Size
Type
Date Modified
alice
Folder
2010-05-27 13:46
atlas
Folder
2008-09-17 14:46
ops
Folder
2011-06-29 09:42
snic
Folder
2011-06-22 17:34
To upload drag and drop files here or into folder structure.
Browse...
Source
Destination
Progress
Progress
Uploaded
File Size
Speed
Left
Elapsed