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Introduction to SweStore

JONAS LINDEMANN, LUNARC



SweStore



SweStore

- Distributed storage architecture
- Based on the dCache storage system
- Central servers maintaining directory structure
 - srm.swegrid.se
- Distributed pools containing actual data
 - Distributed over all centers
 - connected to 10 GigE SUNET

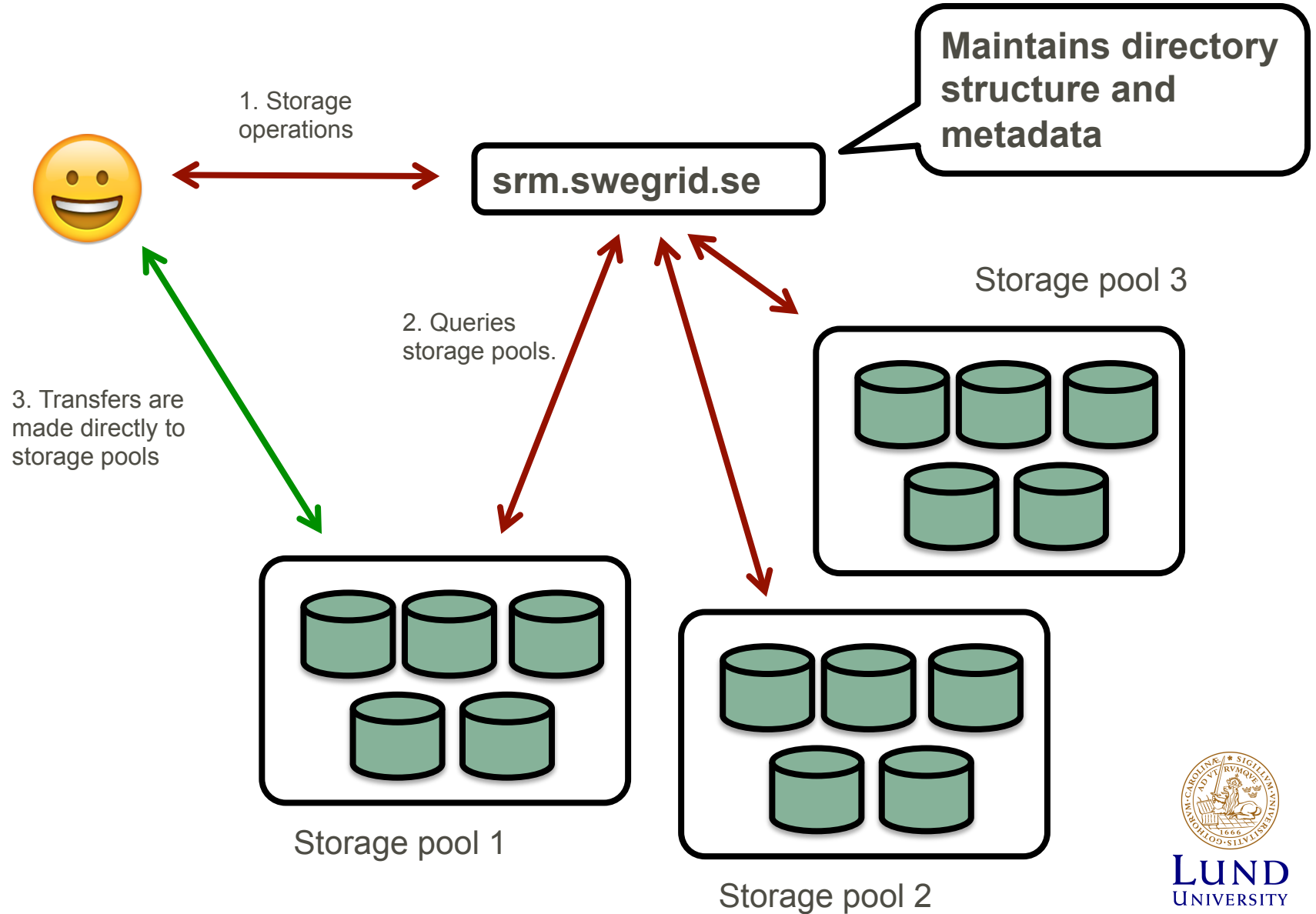


SweStore – Supported protocols

- GridFTP
 - <gsiftp://gsiftp.swegrid.se/>
- Storage Resource Manager
 - <srm://srm.swegrid.se/>
- Hypertext Transfer Protocol (readonly)
 - <http://webdav.swestore.se/>
- WebDAV (Read-Write)
 - <https://webdav.swestore.se/>



Architecture



Security

- Public Key authentication
- User passport = certificate
 - Signed by "Certificate Authority" CA
- Resources trust certificates signed by CA
- Authorisation is based on "Allowed certificates"

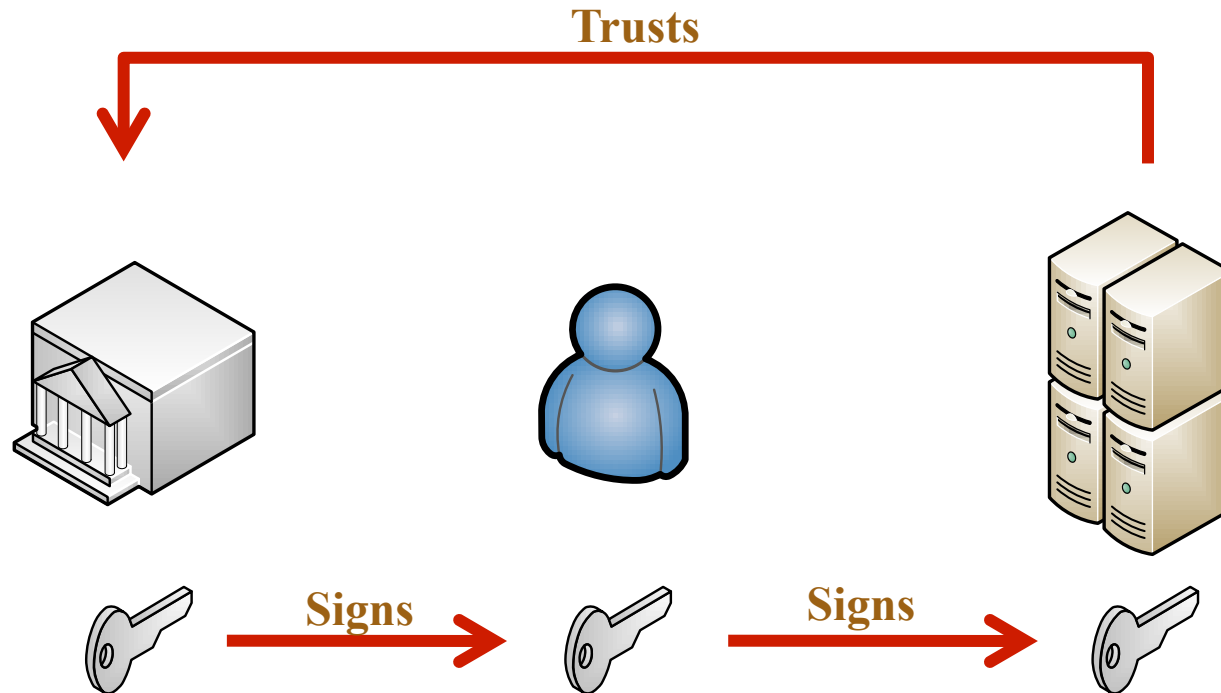


Logging in and out

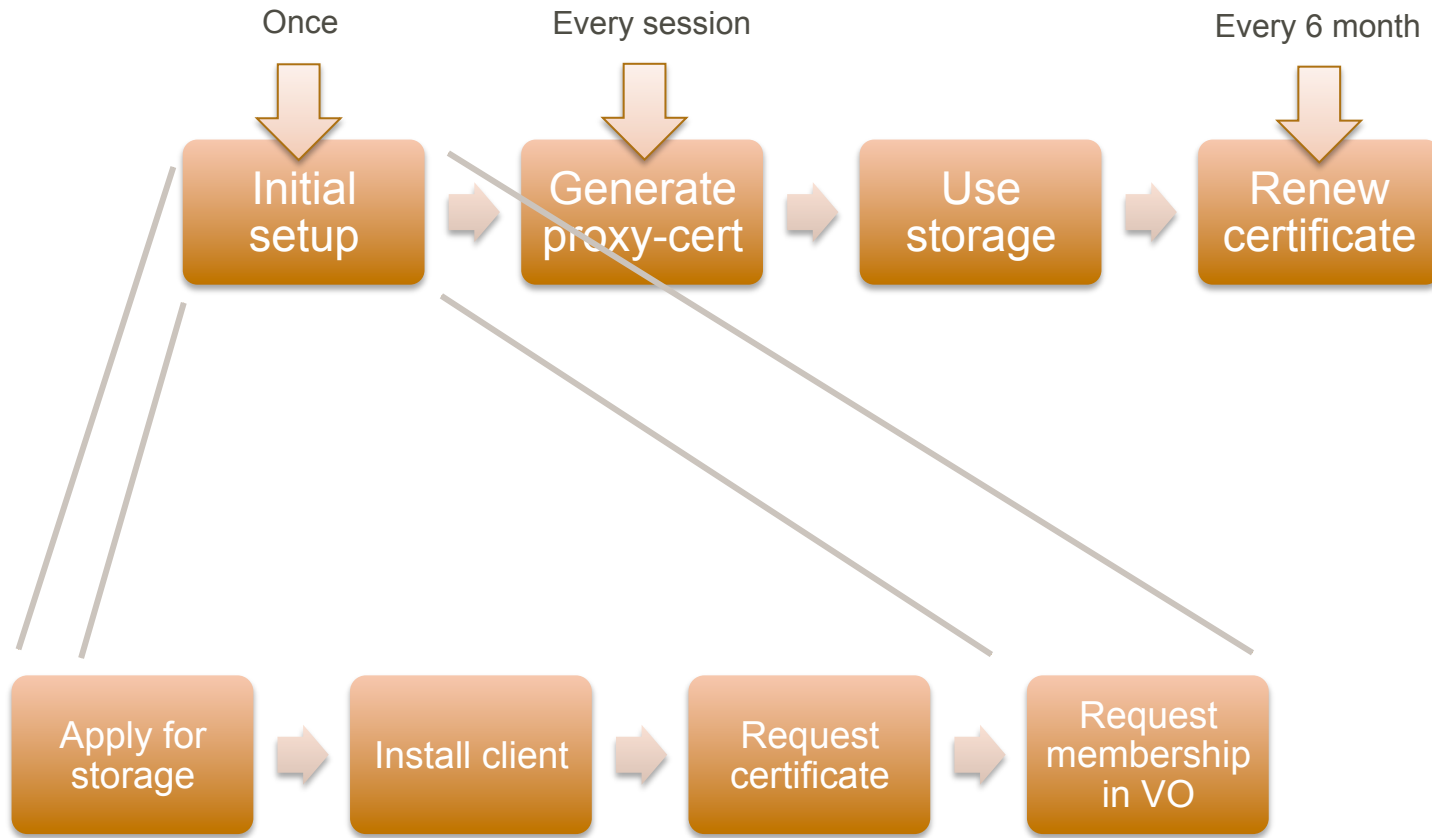
- During "Login" a time limited "ticket" is created (proxy certificate) for accessing the resources
- "Logout" by destroying the ticket
- **arcproxy** is used to create the proxy certificate
- By default a 12 hour proxy certificate is created



Security



Getting access – Needed steps



Applying for storage



Apply for storage

- Available for all researchers financed by VR and FORMAS
- SweStore is in collaboration with ECDS, SND, Bioimage, BILS, UPPNEX, WLCG, Naturhistoriska Riksmuseet.
 - If any of these cover your research area, first read their information on applying for SweStore storage.
- In the future, requests for storage will be handled by the research communities



Apply for storage

- Send email to swestore-support@snic.vr.se
- Include the following information
 - **Name of the principal investigator – PI**
 - **Purpose of the storage:** A short description of the project and type of data
 - **Required storage capacity.** Applications larger than 10 TB have a longer approval time
 - **Suggested project name:** Will be used as directory name in the storage system
 - » Long-lived, not coupled to the lifetime of SNIC storage allocations
 - » Limited to lower-case letters a-z, digits 0-9, hyphens - and underscores _



Client installation



Client installation

- A client software is required to use SweStore resources
- The preferred client is the NorduGrid ARC middleware
 - Available Linux/Mac OS X/ (Windows)
 - Latest version 13.02 (3.0)
- ARC is supported for
 - RHEL/CentOS/Fedora
 - Ubuntu
 - Mac OS X (experimental)
 - Windows (not yet...)



Installing on Fedora/RHEL/CentOS

Procedure is shown for CentOS 6

Import repository key for package validation

```
rpm --import http://download.nordugrid.org/RPM-GPG-KEY-nordugrid
```

Install nordugrid-release yum configuration package

```
http://download.nordugrid.org/packages/nordugrid-release/releases/13.02/centos/el6/x86\_64/nordugrid-release-13.02-1.el6.noarch.rpm  
rpm -ivh nordugrid-release-13.02-1.el6.noarch.rpm
```

Instructions for other distributions can be found at:

<http://download.nordugrid.org/repos-13.02.html>



Installing on Fedora/RHEL/CentOS

Install software using yum

```
yum install nordugrid-arc-client  
yum install nordugrid-arc-plugins*  
yum install ca_NorduGrid  
yum install ca_TER*  
yum install globus-gsi-cert-utils-progs
```



More support for installation

<http://www.nordugrid.org/arc/>

NORDUGRID
Grid Solution For Wide Area
Computing and Data Handling

ADVANCED RESOURCE CONNECTOR

About ARC | **Download** | Releases | Documentation | Support

Current release: ARC v11.05 update 1

For users and sysadmins

- ARC 11.05 client installation
- ARC 11.05 server installation
- [more...](#)

For developers

- Code repository
- Nightly build status
- [more...](#)

Notes

- Grid Manager enters End-of-life

NDGF
NORDIC DATA GRID FACILITY

EMI
EUROPEAN MICROGRID INITIATIVE

egi

NORDUGRID
Innovative Services
and Tools for

+1 2



Certificates and authorisation



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.





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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
- These files should be located in the .globus or .arc directories in your home directory.



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:
```

```
$ chmod 400 userkey.pem
```

→ **userkey.pem**

IMPORTANT!

chmod 400 userkey.pem

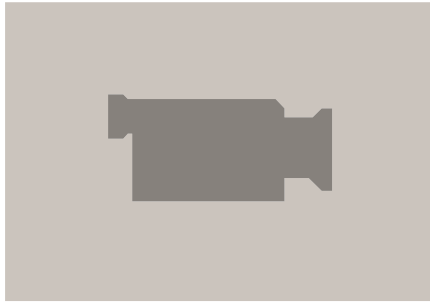
```
$ openssl pkcs12 -clcerts -nokeys -in usercert.p12 -out usercert.pem
```

```
Enter Import Password:
```

```
MAC verified OK
```

→ **usercert.pem**





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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
```

Using SweStore from other resources

- **userkey.pem** and **usercert.pem** should be kept in one location
- Move proxy certificate instead
- Transfer proxy certificate /tmp/x509up_uXXX to resource /tmp directory
- use arcXX commands normally.
- Use the **proxy_transfer** package



Using proxy_upload command

```
$ proxy_upload 192.168.0.20 jonas
Generating proxy certificate.
Enter pass phrase for private key:
Your identity: /O=Grid/O=NorduGrid/OU=lunarc.lu.se/CN=Jonas
Lindemann
Proxy generation succeeded
Your proxy is valid until: 2013-04-18 12:25:30
```

```
Found generated proxy certificate : /tmp/x509up_u501
```

```
Uploading proxy certificate to 192.168.0.20.
Password:
```

```
To use the uploaded proxy on 192.168.0.20, issue the
following command:
```

```
proxy_use
```

Using proxy_use command

```
$ proxy_use
```

```
No existing proxy certificate /tmp/x509up_u500 found.  
Created /tmp/x509up_u500 from uploaded proxy /tmp/  
x509_up_jonas_29599B12-369D-44EA-B9A2-79B003936BF5.
```

```
$ arcproxy -I
```

```
Subject: /O=Grid/O=NorduGrid/OU=lunarc.lu.se/CN=Jonas Lindemann/  
CN=1547994705
```

```
Issuer: /O=Grid/O=NorduGrid/OU=lunarc.lu.se/CN=Jonas Lindemann
```

```
Identity: /O=Grid/O=NorduGrid/OU=lunarc.lu.se/CN=Jonas Lindemann
```

```
Time left for proxy: 11 timmar 59 minuter 5 sekunder
```

```
Proxy path: /tmp/x509up_u500
```

```
Proxy type: X.509 Proxy Certificate Profile RFC compliant  
impersonation proxy - RFC inheritAll proxy
```



Requesting membership in SweGrid VO



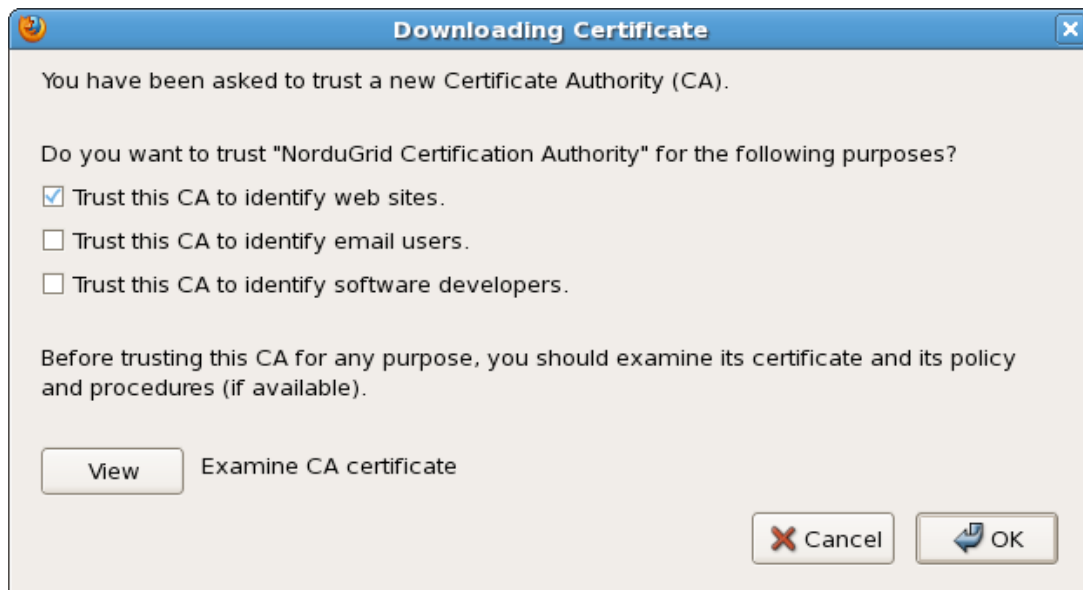
VO Membership

- Access control for SweStore is allocated for virtual organisations rather than individual users.
- A VO is basically a list of users.
- Access to storage requires membership in the SweGrid VO



VO Membership procedure

- Install the NorduGrid CA certificate by clicking on
 - <http://ca.nordugrid.org/cacrt.crt>
- Check "Trust this CA to identify web-sites"



VO Membership procedure

- When you have installed your terena-certificates in the browser goto:
 - <https://voms.ndgf.org:8443/voms/swegrid.se>
 - ... and follow the instructions
- To be added to the correct Swestore allocation:
 - send a mail to **swestore-support@snic.vr.se** and specify your DN as shown in the Terena portal or from the **arcproxy --info** command and which Swestore allocation to be added to.



Using Storage Resources



SweStore and VOMS-proxies

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



Configuring VOMS

- Create a file
 - \$HOME/.arc/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

Replace with you
assigned directory/
project

```
$ 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
- **arcrename**
 - Renames files and directories
- **arcrm**
 - Removing files on resources
- Most commands are similar to corresponding Linux/Unix commands



Copying single files


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



```
$ 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: Loading configuration (/Users/jonas/.globus/usercert.pem)
INFO: Configuration (/Users/jonas/.globus/usercert.pem) loaded
INFO: Loading configuration (/Users/jonas/.globus/userkey.pem)
INFO: Configuration (/Users/jonas/.globus/userkey.pem) loaded
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
```

--debug=INFO is useful for debugging file transfers



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. Preferable archives.



Using standard input / output

- **arccp** can use standard input and output for source or destination
- Enables efficient compression and archiving without the need for local storage
- A dash (-) operator for the source, arccp will use standard input for the source.
- A dash (-) operator for the destination, arccp will transfer source file to standard output



Using standard input / output

Source will be read
from standard input

```
$ tar cz src/ | arccp - srm://srm.swegrid.se/ops/jonas/test42.tar.gz
```

tar outputting archive
directly to standard output



More options

- p, --passive
use passive transfer (off by default if secure is on, on by default if secure is not requested)
- n, --nopassive
do not try to force passive transfer
- i, --indicate
show progress indicator
- u, --secure
use secure transfer (insecure by default)
- y, --cache=path
path to local cache (use to put file into cache)
- r, --recursive=level
operate recursively up to specified level
- R, --retries=number
number of retries before failing file transfer
- P, --listplugins
list the available plugins (protocols supported)
- t, --timeout=seconds
timeout in seconds (default 20)
- z, --conffile=filename
configuration file (default ~/.arc/client.conf)
- d, --debug=debuglevel
FATAL, ERROR, WARNING, INFO, VERBOSE or DEBUG



Creating directories

- **arcmkdir**
 - Creates a directory if possible on storage resource

```
$ arcmkdir srm://srm.swegrid.se/ops/jonas/mydir
$ arcls srm://srm.swegrid.se/ops/jonas
arc-gui-clients-0.2.1.1.tar.gz
autoconf-latest.tar.gz
calfem
examples
job_templates
mesh
mydir
test2
testfiles
```



Listing files

```
$ arc1s 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
```



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



Renaming files

```
$ arcrename srm://srm.swegrid.se/ops/mydir/oldname srm://srm.swegrid.se/ops/mydir/newname
```

**Not all protocols
support renaming.
Gsiftp does not.**



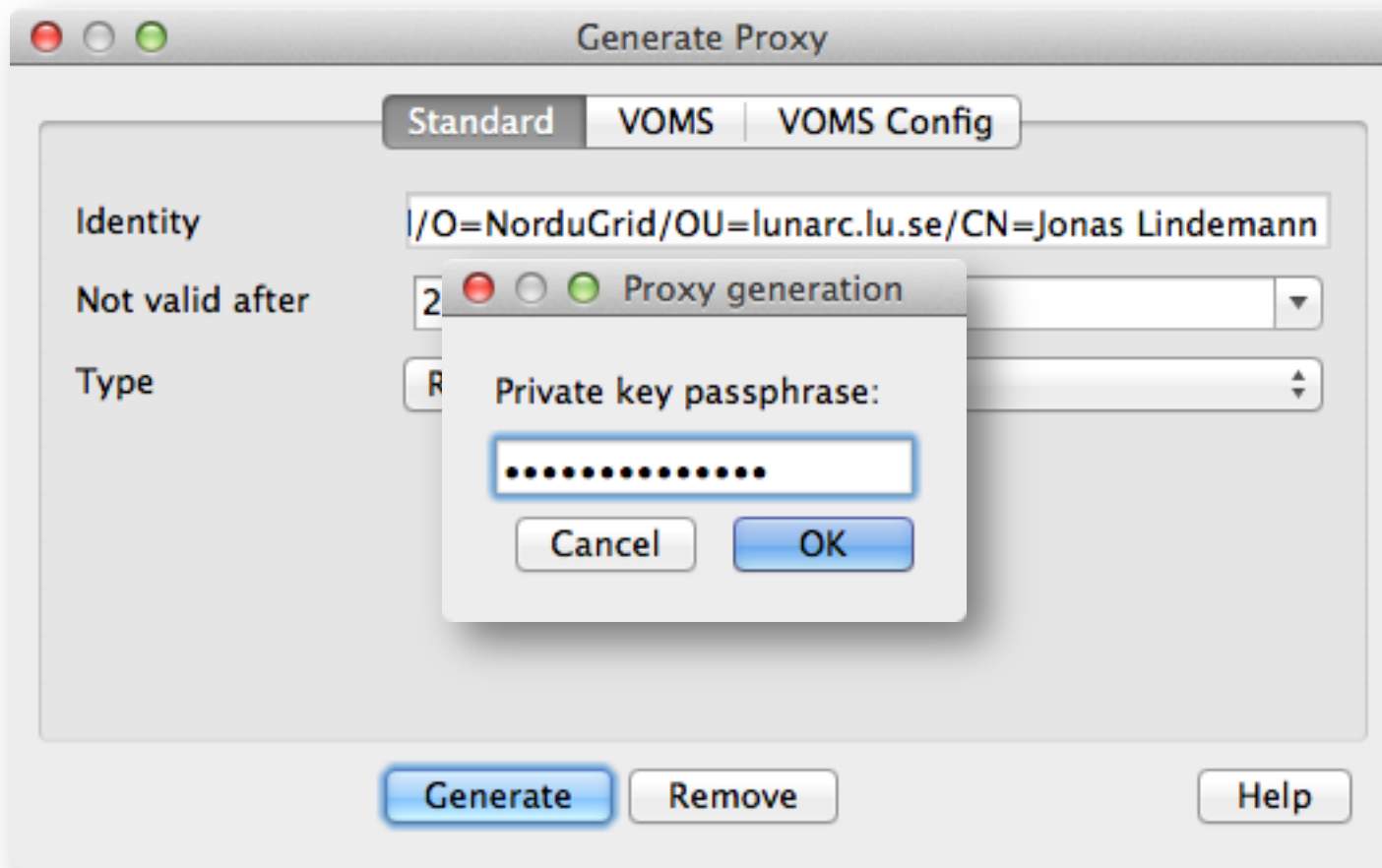
ARC Storage Explorer



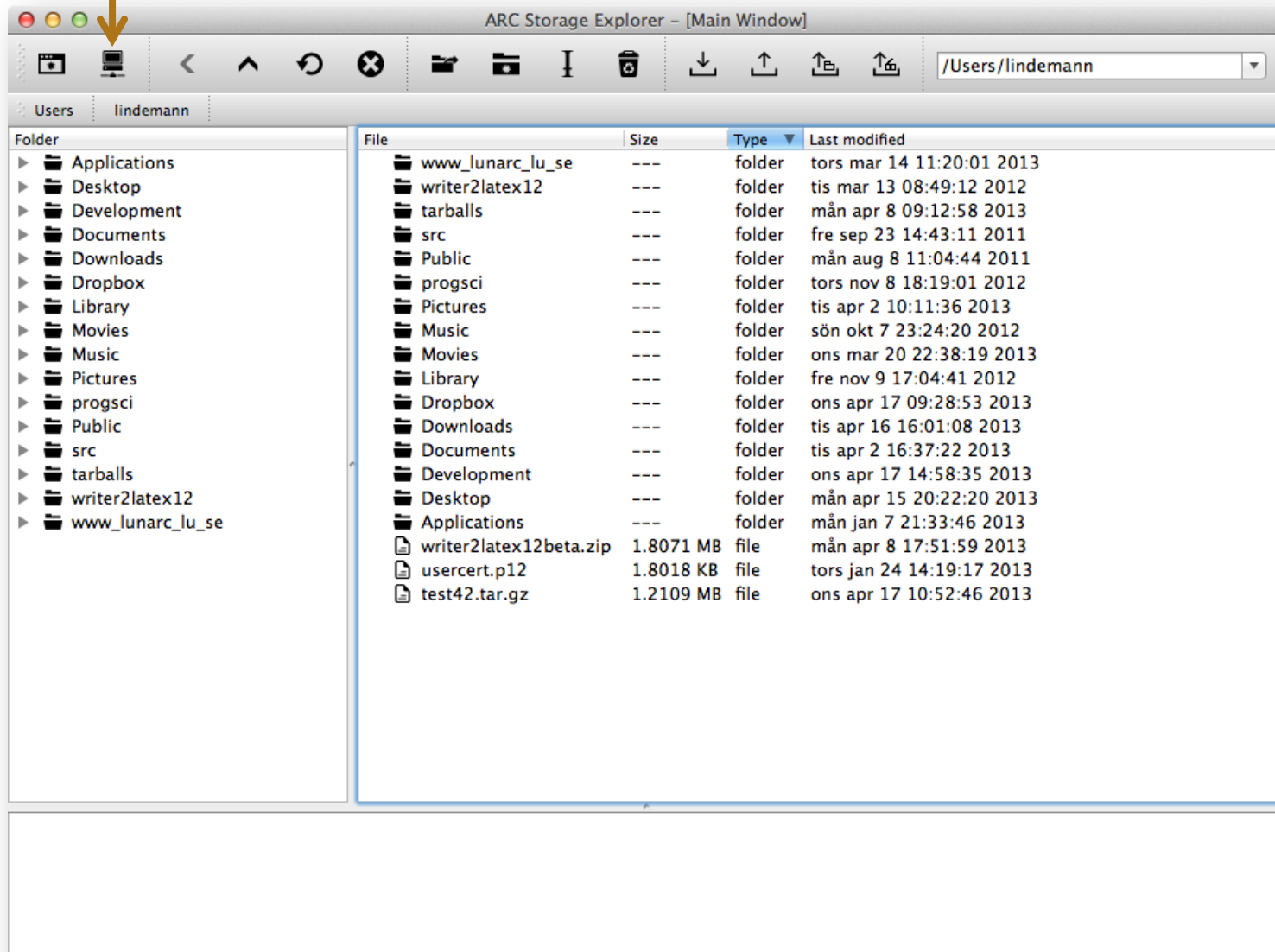
ARC Storage Explorer

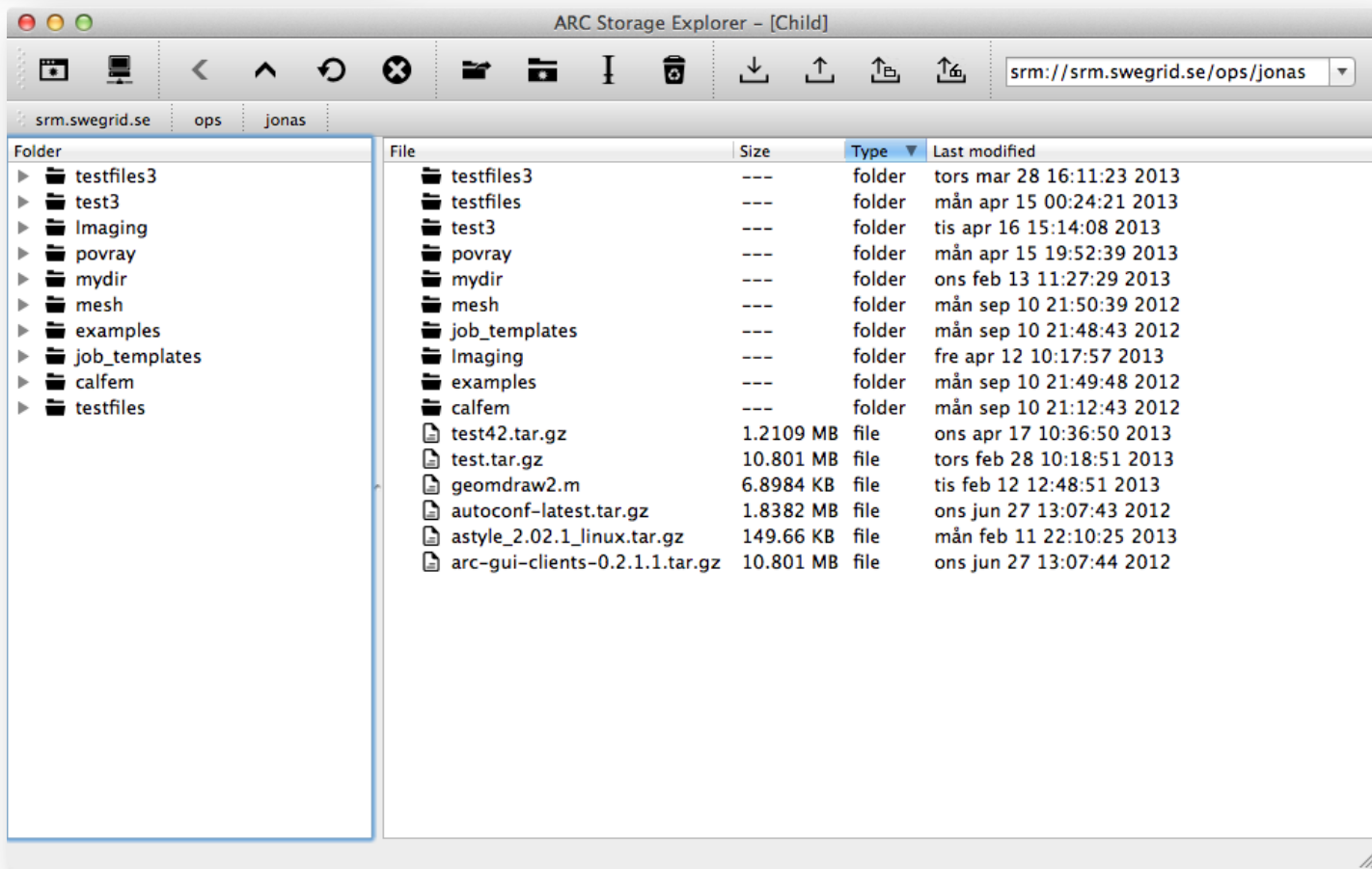
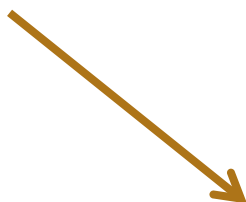
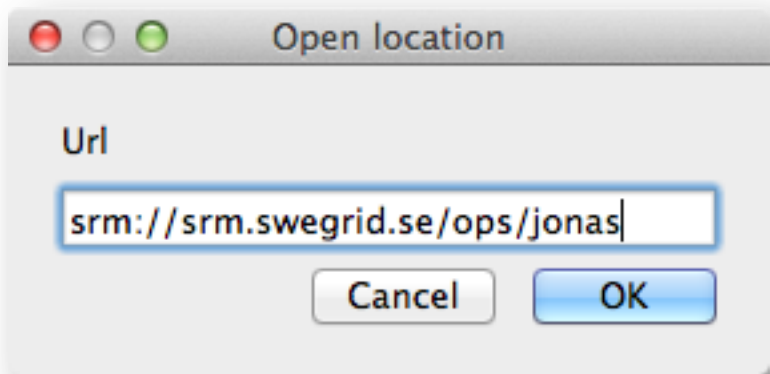
- Graphical client for accessing grid storage resources
- Implemented in Qt
- Currently available for all major Linux distributions
 - Fedora
 - RedHat EL 6
 - Ubuntu
- Windows and Mac OS X when ARC is ported
- Supports multiple windows
- Drag and drop between windows





Open location





ARC Storage Explorer - [Main Window]

Users: lindemann

Folder	File	Size	Type	Last modified
Applications	www_lunarc_lu_se	---	folder	tors mar 14 11:20:01 2013
Desktop	writer2latex12	---	folder	tis mar 13 08:49:12 2012
Development	tarballs	---	folder	mån apr 8 09:12:58 2013
Documents	src	---	folder	fre sep 23 14:43:11 2011
Downloads	Public	---	folder	mån aug 8 11:04:44 2011
Dropbox	progsci	---	folder	tors nov 8 18:19:01 2012
Library	Pictures	---	folder	tis apr 2 10:11:36 2013
Movies	Music	---	folder	sön okt 7 23:24:20 2012
Music	Movies	---	folder	ons mar 20 22:38:19 2013
Pictures	Library	---	folder	fre nov 9 17:04:41 2012
progsci	Dropbox	---	folder	ons apr 17 09:28:53 2013
Public	Downloads	---	folder	tis apr 16 16:01:08 2013
src	Documents	---	folder	tis apr 2 16:37:22 2013
tarballs	Development	---	folder	ons apr 17 14:09:35 2013
writer2latex12				
www_lunarc_lu_se				

Drag-n-drop

ARC Storage Explorer - [Child]

srm.swegrid.se ops jonas

Folder	File	Size	Type	Last modified
testfiles3	testfiles3	---	folder	tors mar 28 16:11:23 2013
test3	testfiles	---	folder	mån apr 15 00:24:21 2013
Imaging	test3	---	folder	tis apr 16 15:14:08 2013
povray	povray	---	folder	mån apr 15 19:52:39 2013
mydir	mydir	---	folder	ons feb 13 11:27:29 2013
mesh	mesh	---	folder	mån sep 10 21:50:39 2012
examples	job_templates	---	folder	mån sep 10 21:48:43 2012
job_templates	Imaging	---	folder	fre apr 12 10:17:57 2013
calfem	examples	---	folder	mån sep 10 21:49:48 2012
testfiles	calfem	---	folder	mån sep 10 21:12:43 2012
	test42.tar.gz	1.2109 MB	file	ons apr 17 10:36:50 2013
	test.tar.gz	10.801 MB	file	tors feb 28 10:18:51 2013
	geomdraw2.m	6.8984 KB	file	tis feb 12 12:48:51 2013
	autoconf-latest.tar.gz	1.8382 MB	file	ons jun 27 13:07:43 2012
	astyle_2.02.1_linux.tar.gz	149.66 KB	file	mån feb 11 22:10:25 2013
	arc-gui-clients-0.2.1.1.tar.gz	10.801 MB	file	ons jun 27 13:07:44 2012

Current file transfers

ID	Transfer	State	Status	Action
30837856	srm://srm.swegrid.se/ops/jonas/t...	Running	L1200kB/20480k	✕
35813184	srm://srm.swegrid.se/ops/jonas/t...	Running	L4144kB/20480k	✕
35793568	srm://srm.swegrid.se/ops/jonas/t...	Running	L7472kB/20480k	✕
35842176	srm://srm.swegrid.se/ops/jonas/t...	Running	L1776kB/20480k	✕
35860080	srm://srm.swegrid.se/ops/jonas/t...	Running	8960kB/20480k	✕
35747248	srm://srm.swegrid.se/ops/jonas/t...	Idle	0kB/1000kB	✕
35824944	srm://srm.swegrid.se/ops/jonas/t...	Idle	0kB/1000kB	✕
35903216	srm://srm.swegrid.se/ops/jonas/t...	Idle	0kB/1000kB	✕
35931504	srm://srm.swegrid.se/ops/jonas/t...	Idle	0kB/1000kB	✕



ARC Storage Explorer - Screencasts

- <http://www.youtube.com/watch?v=NhMA9FHSE5E>
- <http://www.youtube.com/watch?v=IO-wkJs-tX0>
- <http://www.youtube.com/watch?v=ErkN22il2fQ>



ARC Storage Explorer

- Will be available shortly from the nordugrid-repos
- For the daring with a Linux-distro. Build from source:
 - <http://arc-gui-clients.sourceforge.net>
- Mac OS X binaries för 10.7 and 10.8 will be available shortly



More access methods

- Access through **lftp**
 - Browse file
 - mirror directory structures
- Access through **cURL**
- Access through webdav
 - webdav.swegrid.se
 - Browse only
- Access through grid-url-copy
- For more information see
 - <http://docs.snic.se/wiki/Swestore>



Collected links

- General information on SweStore
 - <http://docs.snic.se/wiki/Swestore>
- Applying for storage
 - http://docs.snic.se/wiki/Apply_for_storage_on_SweStore
- Applying for certificate
 - http://docs.snic.se/wiki/Grid_certificates#Requesting_a_certificate
- Installing NorduGrid Client
 - <http://download.nordugrid.org/repos-13.02.html>



More links...

- Video - Generating a Terena certificate
 - <http://youtu.be/I-tNFvSlaRU>
- Video – Exporting Terena Certificate
 - Part 1 - http://youtu.be/E9D24PZDK_k
 - Part 2 - http://youtu.be/jDq774WeF_Y
- ARC Storage Explorer
 - <http://arc-gui-clients.sourceforge.net/>



????

- If you have any problems accessing SweStore – Contact us!
 - We have experience in configuring, troubleshooting and using SweStore
- Contact information
 - jonas.lindemann@lunarc.lu.se
 - support@lunarc.lu.se



Thanks!

