NERC Data Grid Security

Installation Guide

Version 1.1

Document Log

Version Number	Date	Comment
0.1	04/11/05	First Draft
0.2	21/02//06	Draft for installation at NOCS
0.3	07/04/06	Updates following installation at NOCS
0.4	25/07/06	Include deployment model and details about SysV style init scripts for web services.
0.5	16/01/07	Instructions for installation of python packages and associated C library dependencies from source and corrections for MyProxy installation. Installation instructions apply to NDG-Security Post Alpha release 0.72.
0.6	17/08/07	Updated for NDG Beta release. • Installation of python packages is now via distutils eggs. • Python services use Twisted.
0.7	03/10/07	Tidied headers for creation of HTML version
0.8	09/10/07	• Updates for mapConfig.xml, sessionMgrProperties.xml and attAuthorityProperties.xml config files • Configuration for logging
0.9	11//10/07	• Use of MyProxy with a SimpleCA and PAM callout

		for authentication • details for certificate requests for Session Manager and Attribute Authority
1.0	11/01/08	• More notes in Appendices about M2Crypto installation • re-ordered MyProxy and Python package headings
1.1	26/06/08	• fix link to Globus 4.0.5 download for MyProxy • add link for Postgres PAM • fixes to instructions following NOCS site upgrade • Reference to Single Sign On Service instructions on the NDG Trac Wiki. • Note in Appendix for M2Crypto build error on Redhat Enterprise with 64 bit architecture and for problems with omission of EC libraries on Redhat.

Contents

1. REFERENCES

1. http://grid.ncsa.uiuc.edu/myproxy/ - NCSA MyProxy site
2. http://grid.ncsa.uiuc.edu/myproxy/ca/ - MyProxy Certificate Authority
3. http://grid.ncsa.uiuc.edu/myproxy/pam.html MyProxy PAM Support
4. http://www-unix.globus.org/toolkit/docs/4.0/security/ - Globus 4.0 and Security
5. http://peak.telecommunity.com/DevCenter/setuptools - Python Eggs and Easy Install
6. http://pywebsvcs.sourceforge.net/ - Python ZSI SOAP Web Services package
7. http://chandlerproject.org/bin/view/Projects/MeTooCrypto - Python M2Crypto OpenSSL wrapper
8. http://twistedmatrix.com/trac/ - Python Twisted Application Server
9. NDG Security - Security Measures for Installation [v0.2, 7 September 2005], http://bscw.badc.rl.ac.uk/bscw/bscw.cgi/d77103/NDG%20Security%20-%20Security%20Measures%20for%20Installation

2. INTRODUCTION

This is a guide for system administrators and developers deploying NDG security at a data centre.

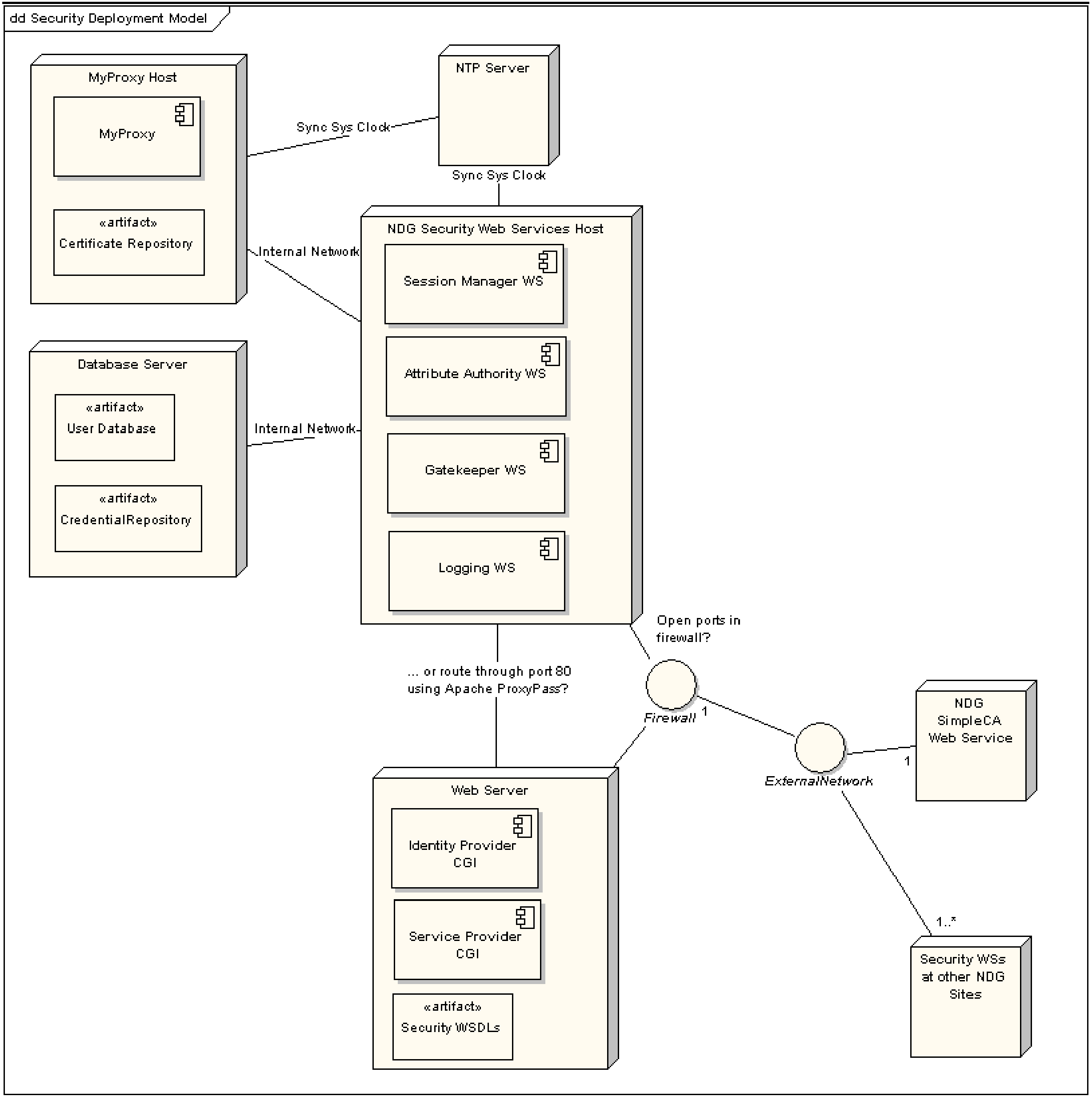
2.1 Pre-requisites

- For NDG Security Web Services: a host running RedHat Enterprise AS4 or later is recommended. Other Linux distributions may also be suitable.
- For MyProxy: a separate host machine (See MyProxy for details of operating systems supported). The host must be secure: if possible a dedicated machine with minimal other services running on it. It should be kept up to date with patches and system logs monitored regularly.
- MyProxy and Security web services hosts must be configured to link with an NTP server to enable clocks to be synchronised with security services running at other NDG sites.
- Access to a web server if security for web based applications is required. The web server must be able to be configured to support HTTPS.
- [MySQL 3.23 or greater or Postgres these are optional and are required for the NDG CredentialRepository only]
- Python 2.4 or later
- Python setuptools utility
- OpenSSL is required at version 0.9.8 or greater. Libraries and header files must be present in addition to executable(s)
- SWIG 1.3.24 or later (for M2Crypto Python OpenSSL wrapper)

Also note document NDG *Security - Security Measures for Installation* (see Ref 1 above).

2.2 Deployment Model

The following diagram gives an example deployment configuration for NDG security services.



All services are positioned behind the firewall. MyProxy is installed on a dedicated machine in order to make its repository as secure as possible. Connections to MyProxy may be made from the Session Manager web service only from within the internal network.

In the above, security web services are run together on the same host but this does not have to be the case. They can be run on separate servers. Similarly, the web server is on a separate host but could be run on the same machine as the web services if it was felt to be appropriate.

In the above diagram Attribute Authority accesses a user database. It is assumed that the target site has a database to store user and user role/access right information. This information needn t be stored by means of a database and could be represented in some other way. It is for the data provider to decide. Similarly, the Session Manager web service interfaces with a Credential Repository. This is a database in the above but could be some other kind of permanent store.

Databases are on a separate server to the web services host. Web services access the databases over the internal network. Finally, the web services have ports exposed in some way through the firewall to enable communication with other NDG security web services at other sites.

3. SOFTWARE INSTALLATION COMPONENTS

The NDG Security software can be divided into the categories of Python packages which implement NDG Security web services and third party packages Globus MyProxy and SimpleCA.

The Python software is package using setuptools eggs. These are divided into separate components to suit the particular installation required:

- ndg_security_server components required to run services
- ndg_security_common components required by both server and common eggs
- ndg_security_client components for building clients to NDG security services. For example, a data provider s web application server would these to enable the securing of access to resources or an organisation s Identity provider would need these to authenticate and allocate authorisation attributes to users.
- ndg_security_test unit tests for all components
- ndg_security install all: client, server and common components

Eggs rely on the distutils easy_install command to manage installation but NDG security uses an additional script ndg_security_install.py to install eggs and carry out the additional installation tasks to correctly configure the software.

The following additional packages are required:

- Globus MyProxy 4.0.5 (or later) source installer tar ball may be downloaded from the Globus site (http://www.globus.org/toolkit/downloads/4.0.1/)
- Globus SimpleCA to enable the MyProxy Certificate Authority.

These two packages should be installed on the target host for MyProxy.

4.INSTALLATION

This section is divided into the MyProxy and Python packages installations. Note that you will almost certainly wish to install MyProxy on a separate secure server to the other Python based security services.

4.1 Globus MyProxy and SimpleCA

4.1.1 MyProxy and NDG Security Background

NDG Security makes use of MyProxy from the Globus toolkit to enable the use of individual user X.509 certificates to secure messages in transactions. For example, to request an Attribute Certificate from an Attribute Authority the request can be signed using the user's certificate to enable the Attribute Authority to authenticate it.

MyProxy is flexible and can be configured to run in a number of different modes or combination of modes:

1. users can upload a proxy to their personal user certificate for storage in the MyProxy repository for later use in delegation

2. Personal user certificates issued by a CA can by stored in the repository.

3. MyProxy can be run with the Globus SimpleCA package issuing certificates dynamically based on a callout to some external authentication system. MyProxy has basic support for PAM (Pluggable Authentication Module) and SASL (Simple Authentication and Security Layer).

3) is the preferred mode for NDG deployments as typically NDG partners have existing user databases against which their users authenticate. MyProxy can be configured to query the database with username/password via PAM/SASL.

MyProxy runs as a service `myproxy-server` on its host machine and user credentials are held in a directory on the file system. It is important to secure the host to ensure the credentials are not compromised. It is recommended to install MyProxy on a separate host to the other NDG security services as a security measure. This host must be carefully secured and run minimal other services.

4.1.2 MyProxy user account and the repository location considerations

MyProxy may be installed as root or using a separate user account. The latter provides an extra degree of security but for use with PAM, the MyProxy must be installed and run as root. Note that the MyProxy repository will be in a standard location.

- If MyProxy is installed as root, this is `/var/myproxy`.

- If installed as under an alternative user account, `$GLOBUS_LOCATION/var/myproxy`.

When run in mode 3) the repository is not used since all credentials are generated dynamically on a successful MyProxy logon request. It is possible to explicitly define an alternate location but this can only be done by providing a command line argument to `myproxy-server`. Note that this might be visible in the process list of the host machine as output from `ps`. This could be avoided by running `myproxy-server` with `xinetd` (See 4.1.10.1).

This guide assumes installation as root.

4.1.3 Installation

MyProxy is available with Globus. Version 4.0.5 distribution is recommended for use with the NDG Security software. C and C++ development packages are needed for the build.

4.1.3.1 PAM Dependencies

A binary version is available but it is recommended to build and install from the source code to include PAM dependencies (http://grid.ncsa.uiuc.edu/myproxy/pam.html). To check, there should be a pam_appl.h header file either in /usr/include/security or /usr/include/pam.

If they are not present, they can be installed with the PAM development package for your Linux distribution e.g. pam-devel (Redhat) or libpam*-dev (Debian based).

Due to a limitation in PAM, MyProxy must be built and installed under the system root account.

4.1.3.2 Build

The code can be downloaded from http://www.globus.org/toolkit/downloads/4.0.5

Note that it is possible to set a target for `make` so that only the MyProxy components of Globus are built. Click on the link for the `gt4.0.5-all-source-installer` tarball. Extract the files and change to the `gt4.0.5-all-source-installer/` directory created.

Configure the build settings. The default installation location is /usr/local/globus-4.0.5. Use prefix=<dir path> command line option to specify an alternative location for the installation.

```
$ ./configure
```

Compile and install MyProxy:

```
$ make gsi-myproxy postinstall
```

When running `./configure` you may see an error if the `JAVA_HOME` environment variable is not set. This can be ignored because Java is not required for the MyProxy build.

If you encounter errors with the build you can trobuleshoot by checking config.log in the BUILD/globus_core-* or source-trees/core/source directories.

Verify myproxy has built with PAM support by running the command:

```
$ /usr/local/globus-4.0.5/sbin/myproxy-server -V
myproxy-server version MYPROXYv2 (v3.7 12 Dec 2006 PAM)
```

If 'PAM' is included in the output as above then the executable has built correctly to include PAM support.

4.1.4 SimpleCA Installation

Reference:

http://www-unix.globus.org/toolkit/docs/4.0/security/simpleca/admin-index.html#s-simpleca-admin-installing

The SimpleCA can be set up under a dedicated user account but this user must have read/write permissions to the Globus MyProxy installation location. For simplicity, this guide assumes installation for MyProxy and the SimpleCA under root.

To install first initialise the environment settings (These may be added to the appropriate start-up file e.g. .bashrc):

```
$ export GLOBUS_LOCATION=/usr/local/globus-4.0.5
$ export GPT_LOCATION=$GLOBUS_LOCATION
$ . $GLOBUS_LOCATION/etc/globus-user-env.sh
```

`Installation script:`

```
$ $GLOBUS_LOCATION/setup/globus/setup-simple-ca
```

You will be prompted for the following information:

1. Subject Name: When prompted, type 'n' to override the default and set an appropriate subject name for the CA for your organisation. O = Organisation Name, OU = Organisational Unit (you can set more than one), CN = the Common Name i.e. the name of the Certificate Authority. For example,

   /O=STFC/OU=Rutherford Appleton Laboratory/OU=Testing/CN=CA

   could be the Certificate Authority s subject for a CA for the Space Science and Technology Department at Rutherford Appleton Laboratory which is part of the Science and Technology Facilities Council.

2. e-mail Address: the contact address for certificate requests. If you are using the CA for MyProxy only you will probably not need this facility. You could enter globus@<target host> or some suitable administrative contact

3. CA Certificate Expiry Date: Press enter to accept the default of five years, otherwise override and enter your required period.

4. PEM Pass phrase: this is the password that will protect the CA's private key file. It will need to be entered in MyProxy's configuration file to enable MyProxy to dynamically issue certificates.

A message will appear indicating that the set-up has completed and confirming the subject chosen for your certificate and the location of certificate and private key:

```
$ $GLOBUS_LOCATION/setup/globus/setup-simple-ca

    C e r t i f i c a t e    A u t h o r i t y    S e t u p

This script will setup a Certificate Authority for signing Globus
users certificates.  It will also generate a simple CA package
that can be distributed to the users of the CA.

The CA information about the certificates it distributes will
be kept in:

/root/.globus/simpleCA/

The unique subject name for this CA is:

cn=Globus Simple CA, ou=simpleCA-gabriel, ou=GlobusTest, o=Grid

Do you want to keep this as the CA subject (y/n) [y]:n

Enter a unique subject name for this CA:cn=CA, ou=BADC, ou=Gabriel, o=NDG


Enter the email of the CA (this is the email where certificate
requests will be sent to be signed by the CA):p.j.kershaw@rl.ac.uk

The CA certificate has an expiration date. Keep in mind that
once the CA certificate has expired, all the certificates
signed by that CA become invalid.  A CA should regenerate
the CA certificate and start re-issuing ca-setup packages
before the actual CA certificate expires.  This can be done
by re-running this setup script.  Enter the number of DAYS
the CA certificate should last before it expires.
[default: 5 years (1825 days)]:

Enter PEM pass phrase:
Verifying - Enter PEM pass phrase:

creating CA config package...done.


A self-signed certificate has been generated
for the Certificate Authority with the subject:
```

```
/O=NDG/OU=Gabriel/OU=BADC/CN=CA

If this is invalid, rerun this script

/usr/local/gt4.0.5/setup/globus/setup-simple-ca

and enter the appropriate fields.

-------------------------------------------------------------------

The private key of the CA is stored
in /root/.globus/simpleCA//private/cakey.pem
The public CA certificate is stored in /root/.globus/simpleCA//cacert.pem

The distribution package built for this CA is stored in

/root/.globus/simpleCA//globus_simple_ca_2cba3376_setup-0.19.tar.gz

This file must be distributed to any host wishing to request
certificates from this CA.

CA setup complete.

The following commands will now be run to setup the security
configuration files for this CA:

$GLOBUS_LOCATION/sbin/gpt-
build /root/.globus/simpleCA//globus_simple_ca_2cba3376_setup-0.19.tar.gz

$GLOBUS_LOCATION/sbin/gpt-postinstall
-------------------------------------------------------------------


setup-ssl-utils: Configuring ssl-utils package
Running setup-ssl-utils-sh-scripts...

***************************************************************************
*

Note: To complete setup of the GSI software you need to run the
following script as root to configure your security configuration
directory:

/usr/local/gt4.0.5/setup/globus_simple_ca_2cba3376_setup/setup-gsi

For further information on using the setup-gsi script, use the -help
option.  The -default option sets this security configuration to be
the default, and -nonroot can be used on systems where root access is
not available.

***************************************************************************
*

setup-ssl-utils: Complete
```

The number in the file names 2cba3376 is a unique hash identifier for the CA. It will be different for for your installation when you run the setup. To complete the set-up run the setup-gsi script:

```
$ $GLOBUS_LOCATION/setup/globus_simple_ca_2cba3376_setup/setup-gsi
—default
```

If you encounter problems with the installation please check the troubleshooting section in the Appendices.

4.1.5 Host Certificate Creation

As root user to carry out these steps. First check the path to the command `grid-cert-request`:

```
$ which grid-cert-request
```

Should return something like: `/usr/local/globus-4.0.5/bin/grid-cert-request`

If not check the settings as made earlier for the SimpleCA:

```
$ export GLOBUS_LOCATION=/usr/local/globus-4.0.5
$ export GPT_LOCATION=$GLOBUS_LOCATION
$ . $GLOBUS_LOCATION/etc/globus-user-env.sh
```

To generate a host certificate request:

```
$ grid-cert-request -host <fully qualified hostname>
```

This creates the files `hostcert.pem`, `hostkey.pem` and `hostcert_request.pem` `in /etc/grid-security directory`. `hostcert.pem` is empty.

In order to obtain the certificate it must be signed by the CA:

```
$ grid-ca-sign -in  /etc/grid-security/hostcert_request.pem
-out  /etc/grid-security/hostcert.pem
```

`hostcert_request.pem` is no longer needed and can be deleted. Note that grid-ca-sign is a wrapper to the openssl ca command. You can append openssl arguments to the grid-ca-sign command line, for example, -enddate YYMMDDHHMMSSZ to set a specific expiry date for your certificate. The default expiry is one year from the date of issue.

4.1.6 MyProxy Configuration File

A MyProxy configuration file is normally kept in the Globus installation under the `etc` directory. If this file is not already present, copy the sample file:

```
$ cp $GLOBUS_LOCATION/share/myproxy/myproxy-server.config
$GLOBUS_LOCATION/etc
```

Edit `$GLOBUS_LOCATION/etc/myproxy-server.config` modifying the entries under the section `Complete Sample Policy` so that they are all uncommented (remove leading `#` character):

```
#
# Complete Sample Policy
#
# The following lines define a sample policy that enables all
# myproxy-server features.  See below for more examples.
accepted_credentials        "*"
authorized_retrievers        "*"
default_retrievers              "*"
authorized_renewers         "*"
default_renewers               "none"
authorized_key_retrievers "*"
default_key_retrievers       "none"
trusted_retrievers              “*”
default_trusted_retrievers “none”
```

Note that the wildcards for these fields may be modified such that only Distinguished Names of a given format are accepted e.g. `"/O=NDG/OU=BADC/*".`

4.1.7 MyProxy SimpleCA Configuration

NDG Security uses MyProxy to dynamically generate user certificates on user login. For this, MyProxy requires configuration details from the SimpleCA. Make these settings in $GLOBUS_LOCATION/etc/myproxy-server.config (Note that the sensitivity of this information and the need to secure this file carefully!)

1. enable any retriever   retrieval is based on the retrievers login credentials:

```
authorized_retrievers "*"
```

2. Set the path to the CA certificate. In this example the CA is installed in the root user's home directory:

```
certificate_issuer_cert /root/.globus/simpleCA/cacert.pem
```

3. Set the path to the CA private key:

```
certificate_issuer_key /root/.globus/simpleCA/private/cakey.pem
```

4. Provide the password to the CA's private key. (This was set when you created the SimpleCA with $GLOBUS_LOCATION/setup/globus/setup-simple-ca):

```
certificate_issuer_key_passphrase "password"
```

5. Set the path to the certificate serial file

```
certificate_serialfile /root/.globus/simpleCA/serial
```

6. Configure how MyProxy maps usernames to Distinguished Names in generated certificates. This can be done either with a grid mapfile or a script. A script is more flexible as you can use a wildcard match rather requiring a map entry for every single user. An example script is:

```
#!/bin/sh
username=$1
if [ X"$username" = X ]; then
    # no username given
    exit 1
fi
echo "/O=NDG/OU=Gabriel/OU=BADC/CN=${username}"

exit 0
```

In the example above, if a user logs in as pjkershaw, they will be issued with a certificate with the Distinguished Name /O=NDG/OU=Gabriel/OU=BADC/CN=pjkershaw. Copy the file above file into $GLOBUS_LOCATION/sbin/mapper.sh replacing
/O=NDG/OU=Gabriel/OU=BADC/CN= with the form of the Distinguished Name that you require for users for your site. Ensure that the file has execute permissions set e.g.

```
$ chmod 700 $GLOBUS_LOCATION/sbin/mapper.sh
```

Refer to the script in $GLOBUS_LOCATION/etc/myproxy-server.config with this setting:

```
certificate_mapapp /usr/local/globus-4.0.5/sbin/mapper.sh
```

4.1.8 MyProxy PAM Configuration

Reference: http://grid.ncsa.uiuc.edu/myproxy/pam.html

NDG Security makes use of MyProxy with PAM to enable MyProxy logon requests to be authenticated against a site's existing security infrastructure, for example a user database or LDAP repository. Linux systems have PAMs for login, ssh and other services. PAMs can be obtained for the major database varieties such as MySQL, Postgres and Oracle.

To configure MyProxy for PAM, settings are made via myproxy-server.config to two different fields:

- pam: may be set to disabled, required or sufficient . Set to required . With this setting, all MyProxy logon requests will be authenticated via PAM. The sufficient setting may be useful in some circumstances. It enables authentication via PAM and via credentials held in the MyProxy repository.
- pam_id: name that MyProxy uses to identify itself to PAM. This can correspond either to a file of the same name in /etc/pam.d or entries prefixed with that name in /etc/pam.conf. This setting determines the PAM used by MyProxy to authenticate.

The most straightforward way to set-up MyProxy with PAM is to try one of the existing PAMs such as login. If the pam_id is set to login, a myproxy-logon request will link to that user's Linux login.

Appendices are provided at the end of this document for some of the more common configurations.

4.1.9 Testing MyProxy

A simple way to test the MyProxy configuration to run the myproxy-logon client command. For initial testing set the pam_id in $GLOBUS_LOCATION/etc/myproxy-server.config to logon so that it uses the Linux user accounts for authentication.

Client error messages can be difficult to interpret but a -v verbose option is provided to give more information. In addition, MyProxy server can be run in debug mode using the -d command line switch. MyProxy should be run under the user account in which it was installed - root. Ensure that the environment is set correctly i.e. GLOBUS_LOCATION variable set and $GLOBUS_LOCATION/etc/globus-user-env.sh has been sourced:

```
$ export GLOBUS_LOCATION=/usr/local/globus-4.0.5
$ export GPT_LOCATION=$GLOBUS_LOCATION
$ . $GLOBUS_LOCATION/etc/globus-user-env.sh
```

If you already have MyProxy running via xinetd or as a process started from a SysV init script, it is possible to run a separate MyProxy server process on a different port with the -p flag.

```
$ myproxy-server -d -v -p 60000
myproxy-server v3.7 12 Dec 2006 PAM starting at Fri Dec 21 12:45:59 2007
reading configuration file /usr/local/globus-4.0.5/etc/myproxy-
server.config
CA enabled
using storage directory /var/myproxy
Starting myproxy-server on localhost: 60000...
```

Note that in debug mode, myproxy-server will exit after the first request made to it.

Run myproxy-logon in a separate window under a user account for which you know the Linux password. Provide the port number if myproxy-server was started on a different port to the default and give the full name of the server as set in the host certificate (/etc/grid-security/hostcert.pem)

```
$ myproxy-logon -v -s <fully qualified server hostname> -p 60000
MyProxy v3.7 12 Dec 2006 PAM
Attempting to connect to 127.0.0.1:60000
Enter MyProxy pass phrase:
using trusted certificates directory /etc/grid-security/certificates
no valid credentials found -- performing anonymous authentication
server name: /O=NDG/OU=Gabriel/OU=BADC/CN=gabriel<>
checking that server name is acceptable...
server name does not match "myproxy@gabriel<>"
server name matches "host@gabriel<>"
authenticated server name is acceptable
A credential has been received for user pjkershaw in /tmp/x509up_u1000.
```

The equivalent output from the server will be something like:

```
Connection from 127.0.0.1
using trusted certificates directory /etc/grid-security/certificates
Authenticated client <anonymous>
applying trusted_retrievers policy
applying authorized_retrievers policy
applying authorized_renewers policy
user_dn_lookup()
resolve_via_mapapp(/usr/local/globus-4.0.5/sbin/mapper.sh, pjkershaw)
Checking passphrase via PAM.  PAM policy: "sufficient"; PAM ID: "logon"
PAM authentication succeeded for pjkershaw
Received GET request from <anonymous>
Sending OK response to client <anonymous>
using CA callout
Calling CA Extensions
handle_certificate()
Cert request loaded.
Got a cert request for user "pjkershaw", with pubkey hash "282944311", and
lifetime "43200"
Using internal openssl/generate_certificate() code
Generating certificate internally.
user_dn_lookup()
using cached value
tokenizing: /O=NDG/OU=BADC/OU=Gabriel/CN=pjkershaw
adding: O = NDG
adding: OU = BADC
adding: OU = Gabriel
adding: CN = pjkershaw
Assigning serial number
Loaded serial number F6 from /root/.globus/simpleCA/serial
serial number assigned
cert lifetime: 43200
CAkey: /root/.globus/simpleCA/private/cakey.pem
Signing internally generated certificate.
Issued certificate for user "pjkershaw", with DN
"/O=NDG/OU=BADC/OU=Gabriel/CN=pjkershaw", lifetime "43200", and serial
number "246"
Sending OK response to client <anonymous>
Client <anonymous> disconnected
```

The certificate and private key are written to file in /tmp by myproxy-logon.   This takes the form x509up_<uid>.   It's possible to check the certificate generated using openssl e.g.:

```
$ openssl x509 -in /tmp/x509up_1001 -text
```

The output includes details including the certificate's DN, issuer and expiry time.   If you wish to run the test again delete or move this file as myproxy-logon will try to use it to authenticate to the MyProxy server.

If you encounter problems check the output from the client and server. commands. The system logs may contain useful additional information from the PAM used.

The Python MyProxy client unit tests can be used to test the server from a separate client machine where Python NDG services are installed but not MyProxy itself. The MyProxy unit tests are in the package ndg.security.test.myProxy.

4.1.10 Adding MyProxy Server to the system start up

Any of the standard mechanisms may be used such as adding a SysV style init script or using `inetd` or `xinetd`. `inetd`/`xinetd` are preferred:

- `myproxy-server` process will not show on `ps` command listing
- It s more efficient since it s only invoked when a request from a MyProxy client is received.
- It s easy to configure so that`myproxy-server` runs as an alternative user to `root`.

4.1.10.1 inetd / xinetd

To run the myproxy server using `inetd` or `xinetd`, as root user:

- Add the entries in `$GLOBUS_LOCATION/share/myproxy/etc.services.modifications` to the `/etc/services` or `/etc/inet/services` file:

```
myproxy-server  7512/tcp                          # MyProxy server
```

- Add the entries from `$GLOBUS_LOCATION/share/myproxy/etc.inetd.conf.modifications`
  - o For inetd add to `/etc/inetd.conf` or `/etc/inet/inetd.conf`, or &
  - o for `xinetd`, copy `$GLOBUS_LOCATION/share/myproxy/etc.xinetd.myproxy` to `/etc/xinetd.d/myproxy`. Modify the paths in the file according to your installation and set the user to the correct user name for running `myproxy-server` e.g.

```
service myproxy-server
{
  socket_type  = stream
  protocol     = tcp
  wait         = no
  user         = root
  server       = /usr/local/NDG/globus-4.0.1/sbin/myproxy-server
  env           = GLOBUS_LOCATION=/usr/local/globus-4.0.5
LD_LIBRARY_PATH=/usr/local/globus-4.0.5/lib
  disable      = no
  only_from    = localhost.localdomain <hostAddress1> <hostAddress2>
}
```

- Note also, the additional setting in this example for `only_from`. This a limit to be placed on which hosts clients can connect from to the server. In the above, clients can connect from the local machine (note the fully qualified name including `localdomain`) and from the hosts `<hostAddress1>` and `<hostAddress2>`. Care must be taken with these settings. Client requests will exit with an SSL error if set incorrectly.

- Reactivate the `inetd` / `xinetd`. This is typically accomplished by sending the `SIGHUP` signal to the server process. Redhat Linux machines include the GUI tool `redhat-config-services` to allow convenient management of services. Refer to the `inetd` or `xinetd` man page for your system.

4.1.10.2 SysV-style boot script
A sample SysV-style boot script for is available in the Globus installation at, `$GLOBUS_LOCATION/share/myproxy/etc.init.d.myproxy`.

To install:

```
$ cp
$GLOBUS_LOCATION/share/myproxy/etc.init.d.myproxy /etc/rc.d/init.d/myproxy
$ chkconfig --add myproxy
```

Edit the file to set the `GLOBUS_LOCATION` environment variable correctly.

4.2 NDG Security Python Packages

4.2.1 Dependencies

4.2.1.1 OpenSSL
Before proceeding with the installation check that an up to date version of OpenSSL is installed:

```
$ openssl version
```

0.9.8 or greater is required. Should you need to upgrade, OpenSSL is available from http://www.openssl.org/source/. Once downloaded, unpack the tarball and follow the installation intstructions.

4.2.1.2 SWIG
SWIG is a tool to help with bindings from C/C++ to interpreted languages such as Python. The Python OpenSSL wrapper M2Crypto uses it and version 1.3.24 or later is required. Downloads are available from, http://www.swig.org.

4.2.2 Installation Procedure

Log in to the target host as `root`. Change to a suitable directory to hold temporary installation files.

4.2.2.1 setuptools
The first step is to install Python setuptools, the package that enables the use of Python eggs. Download the setuptools bootstrap script:

```
$ wget http://peak.telecommunity.com/dist/ez_setup.py
```

You may need to set the environment for a http proxy at your site. For example,

```
$ export http_proxy=http://yourproxyurl.com:8080
```

Run the bootstrap script. Make sure to use the correct version of python in your system path. Some systems may have multiple python versions installed:

```
$ python ez_setup.py
```

Once completed, you can delete `ez_setup.py`.

4.2.2.2 Set-up Script

NDG security uses a wrapper to setuptools `easy_install` to enable custom installation steps to be correctly carried out. Download the script from the NDG distribution site:

```
$ wget http://ndg.nerc.ac.uk/dist/ndg-security-install.py
```

Now carry out the installation of the NDG security python packages:

```
$ python ./ndg-security-install.py -a
```

The script options can be checked using the h option. a selects all packages for installation. If there are problems with the installation, see the Troubleshooting Guide in the Appendices section 5.7.

4.2.3 NDG Web Services Configuration

4.2.3.1 NDG Security System Configuration Files

Properties files set the configuration settings for NDG security *server side* settings. Templates for these are contained within the `ndg_security_server` installed in your python distribution s site-packages directory. A future version of the `ndg-security-install.py` script will extract these and install at a suitable location on the file system. For the moment though, this is a manual process.

Create a configuration area under your servers `/etc` directory:

```
$ mkdir /etc/ndg
$ mkdir /etc/ndg/security
```

`/etc/ndg/security` is recognised by the Python security software by the `NDGSEC_DIR` environment variable. This variable can be set in the environment of the user account used to run the security services or can be set in the init scripts used to automatically start up the services from server boot up (See sections 4.2.4.2, 4.2.4.3 and 4.2.5.5).

Locate the `ndg_security_server` egg and copy its `conf/` directory into the configuration area. For example if you are using python installed in `/usr/local` then the `conf/` directory will be in:

```
/usr/local/lib/python<python version num>/site-
packages/ndg_security_server-<version info>.egg/ndg/security/server/conf
```

Copy as follows:

```
$ cp /usr/local/lib/python<python version num>/site-
packages/ndg_security_server-<version
info>.egg/ndg/security/server/conf /etc/ndg/security
```

The `conf/` directory will contain these important files:

- Session Manager and Attribute Authority properties XML files
- `openssl.conf` used by the Session Manager to configure client connections to MyProxy
- Special `.tac` configuration files loaded by the *Twisted* application server used to run Session Manager and Attribute Authority services
- `certs/` directory for storing X.509 certificates
- `mapConfig.xml` for role mapping and other trust configuration parameters to enable the Attribute Authority to operate with other trusted organisations within NDG
- `attCertLog/` directory for storing Attribute Certificates issued by the Attribute Authority.
- Logging configuration files: `sessionMgrLog.cfg` and `attAuthorityLog.cfg`

The default location for log files set in `sessionMgrLog.cfg` and `attAuthorityLog.cfg` is `$NDGSEC_DIR/log`. Create this directory as follows:

```
$ mkdir /etc/ndg/security/log
```

Note that it is possible to run security web services under any specified system account and group. Ensure that this user has full access to `/etc/ndg/security` e.g.

```
$ chmod ndg:ndggroup -R /etc/ndg/security
```

4.2.3.2 Certificate Generation

The Session Manager and Attribute Authority web services require individual X.509 certificates as a means to identify them in the various interactions required for user registration, authentication and authorisation. These may be created by similar means to the host certificate creation.

Change directory to `$NDGSEC_DIR/conf/certs`. The certificates will be stored here. Make a new private key and certificate request for the Session Manager:

```
$ openssl genrsa -out sm.key 2048
$ chmod 400 sm.key
$ openssl req -new -key sm.key -out sm.csr
```

The private key may be password protected if required by adding the des3 option to the genrsa command. Type in a password when prompted. The req command will prompt you for the components of the Distinguished Name for the new certificate. When prompted for the Common Name, enter SessionManager . The other fields can be set as required but by convention for NDG, the Organisation field has been set to NDG and the Organisation Unit to the individual data provider name e.g. BADC. All other fields have been omitted. You can skip individual fields by enter . When prompted.

Forward the request file to the appropriate CA. This could be your SimpleCA created for use with MyProxy see MyProxy installation. The CA will issue a certificate file. Copy this file as `$NDGSEC_DIR/conf/certs/sm.crt`. The request file can be deleted once a certificate has been obtained from the CA.

Repeat this process for the Attribute Authority, selecting AttributeAuthority for the Common Name:

```
$ openssl genrsa -out aa.key 2048
$ chmod 400 aa.key
$ openssl req -new -key aa.key -out aa.csr
```

As with the Session Manager certificate request, forward the Attribute Authority certificate request to the appropriate CA. On return, copy the file to `$NDGSEC_DIR/conf/certs/aa.crt`

It is recommended that the Session Manager is run over https to keep user login credentials secured. A server certificate and key will be required in addition to enable this.

If required, a certificate could be issued from your SimpleCA. Follow the same procedure as used for the Session Manager and Attirbute Authority above creating a private key and certificate request. The private key should be generated without a password. When generating the certificate request ensure that the Common Name is set to the fully qualified name of the server host.

Once available the certificate and private key can be added to the `$NDGSEC_DIR/conf/certs` directory and can be referenced by the Session Manager s properties file with the `sslCertFile` and `sslKeyFile` elements respectively.

A copy of your Certificate Authority s X.509 certificate is also required. If you have set up your own CA using the Globus SimpleCA, you can obtain this from /etc/grid-security/certificates/<ca hash>.0 or alternatively $GLOBUS_LOCATION/share/certificates/<ca hash>.0. <ca hash> is the unique ID assigned for your CA when the SimpleCA was generated.

Copy the certificate to `$NDGSEC_DIR/conf/certs/ca` directory. For example,

```
$ cp /etc/grid-security/certificates/2cba3376.0
$NDGSEC_DIR/conf/certs/ca/cacert.pem
```

Once copied, ensure that the file is readable by the user account under which the NDG security services will run. This may be root.

Note that all other trusted NDG partner organisations MUST have copies of your CA certificate. If they don't, partner organisations NDG Security infrastructures will reject requests from your security services. CA certificates are referenced in the Attribute Authority and Session Manager properties file settings `sslCACertDir` and `caCertFileList`. Configuration for Gatekeepers may also need to reference your CA certificate.

4.2.4 Session Manager Configuration

Configuration parameters may be set via a properties file. In addition, the Session Manager can optionally make use of a Credential Repository database. This enables the credentials that users acquire during a session to be stored so that they may be retrieved. When installed, the default configuration set in the Session Manager Properties file is to *not* use a Credential Repository. If this is the case, skip this section.

4.2.4.1 Session Manager Credential Repository

Create the Credential Repository database. In the example below a MySQL database is assumed. Notes on installing MySQL are given in the Appendices section 5.3.

```
$ mysql –u root –p
mysql> create database ndgCredRepos;
```

Use the script init-credrepos-db to create the tables. As the `globus` user, run the script. Enter the password for the `ndgUser` account when prompted and type `yes` to confirm creation of the tables:

```
$ init-credrepos-db –u root
Database password:
Are you sure you want to initialise the database tables? (yes/no) yes
Tables created
```

To check that the tables have been created, restart the database client:

```
$ mysql    u root    p    D ndgCredRepos
mysql> show tables;
+------------------------+
| Tables_in_ndgCredRepos |
+------------------------+
| UserCredential         |
| UserID                 |
+------------------------+
2 rows in set (0.00 sec)
```

A separate account should be created for the Session Manager to access the database. It should have sufficient permissions to be able to read and write records. For details of how to create an account in MySQL see the Appendices section 5.3.9.

4.2.4.2 Session Manager Properties File Settings

Edit `sessionMgrProperties.xml` in `$NDGSEC_DIR/conf` and modify the default settings:

```
<?xml version="1.0" encoding="utf-8"?>
<sessMgrProp>
    <portNum></portNum>
    <useSSL>Yes</useSSL> <!-- leave blank to use http -->
    <sslCertFile>$NDGSEC_DIR/conf/certs/server-cert.pem</sslCertFile>
    <sslKeyFile>>$NDGSEC_DIR/conf/certs/server-key.pem </sslKeyFile>
   <!--
    Directory containing CA cert.s to verify SSL peer cert against - ignored if
useSSL is blank -->
    <sslCACertDir>$NDGSEC_DIR/conf/certs/ca</sslCACertDir>
    <!--
    PKI settings for signature of outbound SOAP messages
    -->
    <useSignatureHandler>Yes</useSignatureHandler> <!-- leave blank for no signature
-->
    <certFile>>$NDGSEC_DIR/conf/certs/sm.crt</certFile>
    <keyFile>>$NDGSEC_DIR/conf/certs/server-key.pem</keyFile>
    <keyPwd></keyPwd>
    <!--
    Inclusive namespace prefixes for reference and SignedInfo sections of
    WS-Security digital signature
    -->
    <wssRefInclNS></wssRefInclNS>
    <wssSignedInfoInclNS></wssSignedInfoInclNS>
    <!--
    CA Certificates used to verify X.509 certs used in peer SOAP messages,
    SSL connections and Attribute Certificates
    -->
    <caCertFileList>
         <caCertFile>$NDGSEC_DIR/conf/certs/ca/cacert.pem</caCertFile>
    </caCertFileList>
    <!--

    Set the certificate used to verify the signature of messages from the
    client.  This can usually be left blank since the client is expected to
    include the cert with the signature in the inbound SOAP message
    -->
    <clntCertFile></clntCertFile>
    <sessMgrEncrKey></sessMgrEncrKey>
    <sessMgrURI></sessMgrURI>
    <cookieDomain></cookieDomain>
    <myProxyProp>
         <!--
         Delete this element and take setting from MYPROXY_SERVER environment
         variable if required
         -->
         <hostname>ENTER THE FULLY QUALIFIED HOSTNAME OF THE SERVER</hostname>
         <!--
         Delete this element to take default setting 7512 or read
         MYPROXY_SERVER_PORT setting
         -->
         <port>7512</port>
         <!--
         Useful if hostname and certificate CN don't match correctly.  Globus
         host DN is set to "host/<fqdn>".  Delete this element and set from
         MYPROXY_SERVER_DN environment variable if prefered
         <serverDN></serverDN>
         -->
         <!--
         Set "host/" prefix to host cert CN as is default with globus
         -->
         <serverCNprefix>host/</serverCNprefix>
         <!--
         This directory path is used to locate the OpenSSL configuration file

         The settings are used to set up the defaults for the Distinguished Name of
         the new proxy cert. issued

         GLOBUS_LOCATION or GRID_SECURITY_DIR environment variables may be used
         but the settings can be independent of any Globus installation

         -->
         <openSSLConfFilePath>$NDGSEC_DIR/conf/openssl.conf</openSSLConfFilePath>
         <tmpDir>/tmp</tmpDir>
         <!--
                Limit on maximum lifetime any proxy certificate can have -
                specified when a certificate is first created by store() method
         -->
         <proxyCertMaxLifetime>43200</proxyCertMaxLifetime> <!-- in seconds -->
         <!--
                Life time of a proxy certificate when issued from the Proxy Server
                with getDelegation() method
                -->
         <proxyCertLifetime>43200</proxyCertLifetime> <!-- in seconds -->
         <caCertFile>$NDGSEC_DIR/conf/certs/cacert.pem</caCertFile>
       </myProxyProp>
       <simpleCACltProp>
           <uri></uri>
        <xmlSigKeyFile></xmlSigKeyFile>
        <xmlSigCertFile></xmlSigCertFile>
        <xmlSigCertPwd></xmlSigCertPwd>
    </simpleCACltProp>
       <!--
       <simpleCASrvProp>
           <certExpiryDate></certExpiryDate>
           <certLifetimeDays></certLifetimeDays>
           <certTmpDir></certTmpDir>
           <caCertFile></caCertFile>
           <signExe></signExe>
           <path></path>
       </simpleCASrvProp>
       -->
    <credReposProp>
           <modFilePath></modFilePath>
           <modName>ndg.security.common.CredWallet</modName>
           <className>NullCredRepos</className>
           <propFile></propFile>
    </credReposProp>
</sessMgrProp>
```

Notes

- The property file reading software will expand any environment variables included in the file.
- `openssl.conf` file uses the standard OpenSSL configuration file format. It is used by the Session Manager MyProxy client to formulate a certificate request for a proxy certificate generated for a users session when they login. An example is given below. The important section to reference is `[ req_distinguished_name ]`

```
#
# SSLeay example configuration file.
# This is mostly being used for generation of certificate requests.
#

RANDFILE                = $ENV::HOME/.rnd

####################################################################
[ ca ]
default_ca      = CA_default            # The default ca section

####################################################################
[ CA_default ]

dir             = ./demoCA              # Where everything is kept
certs           = $dir/certs            # Where the issued certs are kept
crl_dir         = $dir/crl              # Where the issued crl are kept
database        = $dir/index.txt        # database index file.
new_certs_dir   = $dir/newcerts         # default place for new certs.

certificate     = $dir/cacert.pem       # The CA certificate
```

```
serial          = $dir/serial           # The current serial number
crl             = $dir/crl.pem          # The current CRL
private_key     = $dir/private/cakey.pem# The private key
RANDFILE        = $dir/private/.rand    # private random number file

x509_extensions = x509v3_extensions     # The extentions to add to the cert
default_days    = 365                   # how long to certify for
default_crl_days= 365 # DEE 30  # how long before next CRL
default_md      = md5                   # which md to use.
preserve        = no                    # keep passed DN ordering

# A few difference way of specifying how similar the request should look
# For type CA, the listed attributes must be the same, and the optional
# and supplied fields are just that :-)
policy          = policy_match

# For the CA policy
[ policy_match ]
countryName             = optional
stateOrProvinceName     = optional
organizationName        = match
organizationalUnitName  = optional
commonName              = supplied
emailAddress            = optional

# For the 'anything' policy
# At this point in time, you must list all acceptable 'object'
# types.
[ policy_anything ]
countryName             = optional
stateOrProvinceName     = optional
localityName            = optional
organizationName        = optional
organizationalUnitName  = optional
commonName              = supplied
emailAddress            = optional

####################################################################
[ req ]
default_bits            = 1024
default_keyfile         = privkey.pem
distinguished_name      = req_distinguished_name
req_extensions          = v3_req

[ req_distinguished_name ]
# BEGIN CONFIG
0.organizationName               = Level 0 Organization
0.organizationName_default       = NDG
0.organizationalUnitName          = Level 0 Organizational Unit
0.organizationalUnitName_default = BADC
#1.organizationalUnitName          = Level 1 Organizational Unit
#1.organizationalUnitName_default = localdomain
commonName                      = Name (e.g., John M. Smith)
commonName_max                  = 64
# END CONFIG

[ v3_req ]
nsCertType                      = objsign,email,server,client
basicConstraints                = critical,CA:false
```

4.2.4.3 SysV-style Boot Script

The Session Manager can be configured to start up at system boot of the host machine. A SysV style start up script `ndg-sm` is provided in the installation in:

`/usr/local/lib/python`<python version num>`/site-packages/ndg_security_server-`<version info>`.egg/ndg/security/server/share`

To configure, install this file:

```
$ cp /usr/local/lib/python<python version num>/site-
packages/ndg_security_server-<version
info>.egg/ndg/security/server/share/ndg-sm /etc/rc.d/init.d
$ chkconfig --add ndg-sm
```

Edit the `ndg-sm` so that it uses the `NDGSEC_DIR` environment variable to point to the correct location of the `.tac` file in the `conf/` directory. User and group ID settings can be made to run under alternative account to root. If used ensure that `$NDGSEC_DIR` is set with the necessary permissions to enable access.

If your site has a HTTP proxy, the http_proxy environment variable can be set here to enable web service client calls to be made to NDG services outside your site.

Note that the `chkconfig` command may not be available on your target machine. Please refer to instructions for your particular Linux distribution.

4.2.5 Attribute Authority Configuration

The Attribute Authority also has a properties file for the setting of configuration parameters.

4.2.5.1 Attribute Authority Properties File Settings

Edit `attAuthorityProperties.xml` in `$NDGSEC_DIR/conf` and modify the default settings:

```
<?xml version="1.0" encoding="utf-8"?>
<AAprop>
    <!--
    'name' setting MUST agree with map config file 'thisHost' name attribute
    -->
    <name>Organisation Identifier</name>
    <portNum>SELECT A SUITABLE PORT NUMBER FOR RUNNING THE SERVICE</portNum>
    <!--
    PKI settings for transport level encryption
    -->
    <useSSL></useSSL> <!-- leave blank to use http -->
    <sslCertFile></sslCertFile>
    <sslKeyFile></sslKeyFile>
    <sslKeyPwd></sslKeyPwd>
    <!--
       Directory containing CA cert.s to verify SSL peer cert against - ignored if
useSSL is blank -->
       <sslCACertDir>$NDGSEC_DIR/conf/certs/ca</sslCACertDir>
    <!--
    PKI settings for signature of outbound SOAP messages
    -->
    <useSignatureHandler>Yes</useSignatureHandler> <!-- leave blank for no signature
-->
    <!--
    CA Certificates used to verify X.509 certs used in peer SOAP messages,
    SSL connections and Attribute Certificates
    -->
    <caCertFileList>
        <caCertFile>$NDGSEC_DIR/conf/certs/cacert.pem</caCertFile>
    </caCertFileList>
    <keyFile>$NDGSEC_DIR/conf/certs/aa.key </keyFile>
    <keyPwd></keyPwd>
    <!--
    Inclusive namespace prefixes for reference and SignedInfo sections of
    WS-Security digital signature
    -->
    <wssRefInclNS></wssRefInclNS>
    <wssSignedInfoInclNS></wssSignedInfoInclNS>
    <!--
    Set the certificate used to verify the signature of messages from the
    client.  This can usually be left blank since the client is expected to
    include the cert with the signature in the inbound SOAP message
    -->
    <clntCertFile></clntCertFile>
    <attCertLifetime>86400</attCertLifetime> <!-- Measured in seconds -->
    <!--
    Allow an offset for clock skew between servers running
    security services.  - Use minus sign for time in the past
    -->
    <attCertNotBeforeOff>0</attCertNotBeforeOff>
    <!-- Location of role mapping file -->
    <mapConfigFile>$NDGSEC_DIR/conf/mapConfig.xml</mapConfigFile>
    <!-- All Attribute Certificates issued are recorded in this dir -->
    <attCertDir>$NDGSEC_DIR/conf/attCertLog</attCertDir>
    <!--
     Files in attCertDir are stored using a rotating file handler
     attCertFileLogCnt sets the max number of files created before the first is
     overwritten
     -->
    <attCertFileName>ac.xml</attCertFileName>
    <attCertFileLogCnt>1024</attCertFileLogCnt>
    <dnSeparator>/</dnSeparator>
    <!--
    Settings for custom AAUserRoles derived class to get user roles for
    given user ID
    -->
    <userRolesModFilePath>$NDGSEC_DIR/conf</userRolesModFilePath>
    <userRolesModName>userRoles</userRolesModName>
    <userRolesClassName>UserRoles</userRolesClassName>
    <userRolesPropFile>$NDGSEC_DIR/conf/userRoles.cfg</userRolesPropFile>
</AAprop>
```

4.2.5.2 User Roles Interface

The Attribute Authority given a valid user proxy certificate serves an attribute certificate containing authorisation roles for that user. It is for the data centre to determine how these roles map to the users identity as given by their Distinguished Name given in the proxy certificate. Typically, a data centre might have a user database which relates user id to authorisation roles.

The Attribute Authority provides a programmatic interface to determine the roles to user id relationship. A custom python class may be written to perform this task.   See the Appendices section 5.6.

4.2.5.3 Role Mapping

The role mapping file is stored in the `$NDGSEC_DIR/conf` directory as `mapConfig.xml`. This is an XML file which relates local roles at the target data centre to roles of other trusted data centres. These role mapping are made by agreement between data centres.

```
<?xml version="1.0" encoding="utf-8"?>
<AAmap>
     <thisHost name="yourSiteIdentifier">
          <aaURI>yourSiteAttAuthorityURI</aaURI>
          <aaDN>the DN for the Attribute Authority’s X.509 Cert.</aaDN>
          <loginURI>Your Site Login Page URI (https expected)</loginURI>
          <loginServerDN>The DN of loginURI’s SSL cert.</loginServerDN>
          <loginRequestServerDN>
              The cert. DN for SSL server making a request to loginURI
          </loginRequestServerDN>
     </thisHost>
    <trusted name="BODC">
          <aaURI>bodcAttAuthorityURI</aaURI>
          <aaDN>the DN for the Attribute Authority’s X.509 Cert.</aaDN>
          <loginURI>BODC’s Login Page URI</loginURI>
          <loginServerDN>The DN of loginURI’s SSL cert.</loginServerDN>
          <loginRequestServerDN>
              The cert. DN for SSL server making a request to loginURI
          </loginRequestServerDN>
          <role remote="aBODCrole" local="aLocalRole"/>
    </trusted>
    <trusted name="NOCS">
          <aaURI>nocsAttAuthorityURI</aaURI>
          <aaDN>the DN for the Attribute Authority’s X.509 Cert.</aaDN>
          <loginURI>nocsLoginPageURI</loginURI>
          <loginServerDN>The DN of loginURI’s SSL cert.</loginServerDN>
          <loginRequestServerDN>
              The cert. DN for SSL server making a request to loginURI
          </loginRequestServerDN>
          <role remote="aNOCSrole" local="anotherLocalRole"/>
    </trusted>
    <trusted name="NEODAAS">
          <aaURI>neodaasAttAuthorityURI</aaURI>
          <aaDN>the DN for the Attribute Authority’s X.509 Cert.</aaDN>
          <loginURI>neodaasLoginPageURI</loginURI>
          <loginServerDN>The DN of loginURI’s SSL cert.</loginServerDN>
          <loginRequestServerDN>
              The cert. DN for SSL server making a request to loginURI
          </loginRequestServerDN>
          <role remote="neodaasRole" local="yetAnotherLocalRole"/>
    </trusted>
</AAmap>
```

The map file contains an entry for each site that the Attribute Authority trusts. These are listed using the `trusted` element name. The Attribute Authority identifies itself with the similar `thisHost` element. Each uses a name attribute to uniquely identify the organisation. The example above shows a BADC map file which trusts the organisations BODC, NOCS and NEODAAS.

Note that the `thisHost` `name` attribute should match the name element in the corresponding `attAuthorityProperties.xml` file. `name` is copied as the `issuerName` used in Attribute Certificates issued by the Attribute Authority.

`thisHost` and trusted elements share all the same sub-elements barring role.

- `aaURI` this is the address of the Attribute Authority
- `aaDN` the Distinguished Name of the Attribute Authority s X.509 certificate (not currently used)
- `loginURI` the address of the Login Service
- `loginServerDN` the Distinguished Name of the X.509 certificate held by the Login Service for SSL connections. It is expected that the Login Service is run over https to protect the privacy of login credentials. This field is not currently used.
- `loginRequestServerDN` on request for secured credentials a service provider enables the user to redirect to their chosen Login Service at another trusted site. The on successful authentication the Login Service can return the user back to the service provider to enable them to continue with their request. This return to address must be over https to enable credentials to be encrypted for the transit but also to validate service provider host making the request. The Login Service carries this out by checking the SSL certificate of the service provider host and checking its Distinguished Name against the `loginRequestServerDN` entries for the organisations it trusts.
- `role` this element is used to express an individual role mapping. The`local` attribute refers to a role `thisHost` supports. The `remote` attribute is assigned to the role of the trusted organisation it maps to. It is possible to have multiple role entries. One local role may map to many remote roles and vice versa: one remote role may map to many local roles.

4.2.5.4 Twisted Python server .tac file

Copy this from the ndg_security_server to the NDG security conf/ area:

```
$ cp /usr/local/lib/python<python version num>/site-
packages/ndg_security_server-<version info>.egg/ndg/security/server/server-
config.tac $NDGSEC_DIR/conf
```

4.2.5.5 SysV-style Boot Script

As with the Session Manager, the Attribute Authority can be configured to start up at system boot of the host machine. A SysV style start up script `ndg-aa` is provided in the installation in:

/usr/local/lib/python<python version num>/site-packages/ndg_security_server-<version info>.egg/ndg/security/server/`share`

To configure, install this file:

```
$ cp /usr/local/lib/python<python version num>/site-
packages/ndg_security_server-<version
info>.egg/ndg/security/server/share/ndg-aa /etc/rc.d/init.d
$ chkconfig --add ndg-aa
```

Edit the ndg-aa so that it uses the NDGSEC_DIR environment variable to point to the correct location of the .tac file in the conf/ directory. User and group ID settings can be made to run under alternative account to root. If used ensure that $NDGSEC_DIR is set with the necessary permissions to enable access.

If your site has a HTTP proxy, the http_proxy environment variable can be set here to enable web service client calls to be made to NDG services outside your site.

If required, add any additional environment settings required to connect to a user database.

4.2.6 Securing Resources with the NDG Policy Enforcement Point and Policy Decision Point Components

The Policy Enforcement Point (PEP) and Policy Decision Point (PDP) are the building blocks to secure access to NDG resources.

The PDP makes an access control decision by matching user roles in a request to the roles controlling access to the resource. The PDP can also perform checks such as checking the validity of a user's Attribute Certificate.

A PEP or Gatekeeper enforces an access control decision made by a PDP with which it communicates.

The NDG PEP has a configurable interface to enable any compliant PDP implementation to be plugged in. For example, the interface could consist of a web service client call out to some remote PDP service.

The NDG Browse software has a PDP implementation to enable MOLES and CSML records to be secured. Installation details of this are given for this in the appendix.

4.2.7 Single Sign On Service

The Single Sign On service enables web based login across trusted NDG sites. It can be installed as part of the NDG Browse service. See the NDG Trac Wiki for installation and configuration instructions: http://proj.badc.rl.ac.uk/ndg/wiki/InstallDiscoveryBrowse

4.2.8 Python Unit Tests

Python unit test scripts are provided to enable the system to be checked to confirm that it is running correctly. These are located in the ndg_security_test egg in the site-packages/ directory of the python installation.

<todo: >

5.APPENDICES

5.1Configuration for NDG Browse

```
#

# NDG Security

#


# Security settings for configuration as a client to a Single Sign On Service

# i.e. Where Are You From, login and logout operations are handled by a

# separate standalone paster instance

#[NDG_SECURITY.ssoClient]

## THIS service's address for secure connections - the Single Sign On service

## returns security parameters to this service along this channel

#sslServer: https://localhost

##sslServer: https://ndgbeta.badc.rl.ac.uk

#

## THIS service's address for unencrypted connections - when login is complete,

## the BaseController redirects to an equivalent address under this host name.

## sslServer and server settings must match for the sharing of cookies.

#server: http://localhost

#

## WAYF running on Single Sign On Service - omit to default to WAYF running on

## THIS paster instance

#wayfURI:           https://localhost/sso/wayf

#

## Logout URI running on Single Sign On Service - omit to default to logout

## running on THIS paster instance

#logoutURI:         https://localhost/sso/logout


# Security settings for running a Single Sign On Service from this paster
# instance.  Either NDG_SECURITY.ssoClient or NDG_SECURITY.ssoService sections

# should be set but NOT both


# Single Sign On Service Settings

[NDG_SECURITY.ssoService]


# THIS service's address for secure connections - the Single Sign On service

# returns security parameters to this service along this channel

sslServer: https://localhost

#sslServer: https://ndgbeta.badc.rl.ac.uk


# THIS service's address for unencrypted connections - when login is complete,

# the BaseController redirects to an equivalent address under this host name.

# sslServer and server settings must match for the sharing of cookies.

server: http://localhost


enableOpenID: True


# Redirect SOAP output to a file e.g. open(<somefile>, 'w')

tracefile: None

#tracefile: sys.stderr


# Service addresses

sessionMgrURI: https://localhost/SessionManager

#sessionMgrURI: https://ndgbeta.badc.rl.ac.uk/SessionManager

attAuthorityURI: http://localhost:5000/AttributeAuthority

#attAuthorityURI: http://aa.ceda.rl.ac.uk


# SSL Connections

#
```

```
# Space separated list of CA cert. files.  The peer cert.

# must verify against at least one of these otherwise the connection is

# dropped.  Include CA certs for all the sites trusted

sslCACertFilePathList: certs/ndg-test-ca.crt


# Web Services HTTP Proxy fine tuning

#

# For most situations, these settings can be ignored and instead make use of

# the http_proxy environment variable.  They allow for the case where specific

# settings are needed just for the security web services calls


# Overrides the http_proxy environment variable setting - may be omitted

#httpProxyHost: wwwcache.rl.ac.uk:8080


# Web service clients pick up the http_proxy environment variable setting by

# default.  Set this flag to True to ignore http_proxy for web service

# connections.  To use the http_proxy setting, set this parameter to False or

# remove it completely from this file.

ignoreHttpProxyEnv: True


# WS-Security signature handler - set a config file with 'wssCfgFilePath'

# or omit and put the relevant content directly in here under

# 'NDG_SECURITY.wssecurity' section

#wssCfgFilePath: wssecurity.cfg


[NDG_SECURITY.wssecurity]


# Settings for signature of an outbound message ...


# Certificate associated with private key used to sign a message.  The sign
# method will add this to the BinarySecurityToken element of the WSSE header.
# binSecTokValType attribute must be set to 'X509' or 'X509v3' ValueType.
# As an alternative, use 'signingCertChain' parameter

# file path PEM encoded cert
signingCertFilePath=certs/clnt.crt

# file path to PEM encoded private key file
signingPriKeyFilePath=certs/clnt.key

# Password protecting private key.  Leave blank if there is no password.
signingPriKeyPwd=

# Provide a space separated list of file paths.  CA Certs should be included
# for all the sites this installation trusts
caCertFilePathList=certs/ndg-test-ca.crt

# Set the ValueType for the BinarySecurityToken added to the WSSE header for a
# signed message.
reqBinSecTokValType=X509v3

# Add a timestamp element to an outbound message
addTimestamp=True

# For WSSE 1.1 - service returns signature confirmation containing signature
# value sent by client
applySignatureConfirmation=False

#
# Gatekeeper settings
```

```
#
[NDG_SECURITY.gatekeeper]
#
# Policy Enforcement Point calls a Policy Decision Point interface:

# File path to Python module containing the PDP class - leave blank if the
# module is in PYTHONPATH env var
pdpModFilePath:

# Name of PDP Python module
pdpModName: ndg.security.common.authz.pdp.browse

# Name of PDP class used
pdpClassName: BrowsePDP

# File Path to configuration file used by PDP class (environment variables
# can be used in this path e.g. $PDP_CONFIG_DIR/pdp.cfg.  Omit this parameter
# to make the PEP read the PDP settings from THIS config file
#pdpCfgFilePath:

# Read PDP params from THIS section
pdpCfgSection: NDG_SECURITY.gatekeeper

#
# Settings for Policy Decision Point called by the PEP

# Address of Attribute Authority for Data Provider
#aaURI: http://aa.ceda.rl.ac.uk
aaURI: http://localhost:5000/AttributeAuthority
```

```
# CA certificates used to verify peer certs from Session Manager SSL

# connections - space delimited list

sslCACertFilePathList:


# Set to file object to dump SOAP message output for debugging

tracefile:


# CA certificates used to verify the signature of user Attribute Certificates

# - space delimited list but note that currently only the CA of this site

# is needed because only mapped Attribute Certificates may be accepted.

acCACertFilePathList: certs/ndg-test-ca.crt


# X.509 Distinguished Name for Attribute Certificate issuer - should match with

# the issuer element of the users Attribute Certificate submitted in order to

# gain access

acIssuer: /CN=AttributeAuthority/O=NDG Security Test/OU=Site A

#acIssuer: /CN=AttributeAuthority/O=NDG/OU=BADC


# WS-Security signature handler - set a config file with 'wssCfgFilePath'

# or omit and put the relevant content directly in here under the section name

# specified by 'wssCfgSection' below

#wssCfgFilePath: wssecurity.cfg


# Config file section for WS-Security settings - Nb. the gatekeeper shares the

# same settings as the Single Sign On Service.

wssCfgSection: NDG_SECURITY.wssecurity
```

5.2 Postgres PAM for MyProxy

This section is intended to provide the information needed to enable MyProxy to authenticate against tables in a Postgres database. Before, making these settings ensure that MyProxy is fully installed following the steps outlined in the MyProxy section. It's recommended to try out MyProxy with an existing PAM such as logon first to ensure it is working. See the section *Testing MyProxy*.

Obtain and install the latest libpam_pgsql. This can be installed from Debian or RPM packages or from source (http://sourceforge.net/projects/pam-pgsql/). For NDG Security, version 0.5.2-9 Debian and 0.6.3 source distributions have been tested. Check the documentation in the source tar ball for details of Postgres version requirements.

5.2.1 Configuration

Depending on your native system create either a /etc/pam.d/myproxy file or the relevant entry in /etc/pam.conf

For /etc/pam.d/myproxy:

```
auth         required   pam_pgsql.so
account    required   pam_pgsql.so
password required   pam_pgsql.so
```

or /etc/pam.conf:

```
myproxy auth         required   pam_pgsql.so
myproxy account    required   pam_pgsql.so
myproxy password required   pam_pgsql.so
```

Configure the database, and table the module should use with the configuration file /etc/pam_pgsql.conf. e.g.

```
database = userdb
user = admin
password = adminpassword
table = account
user_column = username
pwd_column = password
pw_type = md5
debug
```

In the above example, password in the database table account are MD5 encrypted. This field can also be set to Crypt or left out altogether if passwords are unencrypted.

Restart MyProxy and test it using the myproxy-logon client command as outlined in the section *Testing MyProxy.* To specify a database account name use the -l flag. If this omitted then the Linux account name is assumed e.g.

```
$ myproxy-logon -v -p 60000 -l mydbaccountid
```

Consult the myproxy-logon and myproxy-server output and the system logs to trouble shoot errors.

5.3 MySQL Installation

MySQL can be used to implement a Credential Repository for the SessionManager to stored user credentials as cached in their Credential Wallet held in their session.

This section describes how to make an installation from the MySQL binary package tarball. System administrators may wish to use an existing installation of MySQL or use an alternative installation method such as rpm. Installing from the binary package has the advantage that it doesn t interfere with any existing MySQL installation on the target machine. The instructions are adapted from the file `INSTALL-BINARY` provided in the tarball.

5.3.1Version

Version 3.23 or later is recommended. These instructions are for version 5.0.20a, the latest stable release at time of writing.

5.3.2 Getting the Binaries

The package can be obtained from the MySQL web site (http://dev.mysql.com/downloads/mysql/5.0.html). Scroll to the correct version - Linux (non RPM, Intel C/C++ compiled, glibc-X.X) downloads. The version of glibc on the target machine can be checked using same machine as the web server.

```
$ ls /lib/libc-*
```

5.3.3 New `mysql` User Account

Make a new account to run MySQL if it doesn t already exist:

```
$ groupadd mysql
$ useradd -g mysql mysql
```

5.3.4 Unpacking the tarball

As root copy the tarball to the target directory for installation e.g. /usr/local, unpack the file:

```
$ cd /usr/local
$ tar zxvf mysql-standard-5.0.20a-linux-i686-icc-glibc23.tar.gz
```

Make a symbolic link to the new directory and `cd` to it:

```
$ ln -s /usr/local/mysql-standard-5.0.20a-linux-i686-icc-glibc23 mysql
$ cd mysql
```

The `bin` directory contains client programs and the server. You should add the full pathname of this directory to your PATH environment variable so that your shell finds the MySQL programs properly.

5.3.5 Configuration File

Create a configuration file called `my.cnf` in the target directory (`/usr/local/mysql` in this example) to enable custom settings to be made for this installation. Note that if there is an existing installation of MySQL, there may be settings existing settings in a file `/etc/my.cnf`. To use the settings from this file, *ignore* this step.

```
[mysqld]
datadir=/usr/local/mysql-standard-5.0.20a-linux-i686-icc-glibc23/data
socket=/tmp/mysql.sock
# Default to using old password format for compatibility with mysql 3.x
# clients (those using the mysqlclient10 compatibility package).
old_passwords=1

[mysql.server]
user=mysql
basedir=/usr/local/mysql-standard-5.0.20a-linux-i686-icc-glibc23

[mysqld_safe]
err-log=/var/log/mysqld.log
pid-file=/tmp/mysql.pid
```

The settings above will mean that MySQL s tables and the Credential Repository database will be stored under `/usr/local/mysql/data`.

5.3.6 Create the Grant Tables

The `scripts` directory contains the `mysql_install_db` script used to initialize the `mysql` database containing the grant tables that store the server access permissions. If you have not installed MySQL before, you must create the MySQL grant tables:

```
$ scripts/mysql_install_db --user=mysql
```

If you run the command as `root`, you must use the `--user` option as shown. The value of the option should be the name of the login account that you created in the first step to use for running the server.

If you run the command while logged in as that user, you can omit the -user option. After creating or updating the grant tables, you need to restart the server manually.

5.3.7 File and Directory Permissions

Change the ownership of program binaries to `root` and ownership of the data directory `mysql`. Assuming that you are located in the installation directory (`/usr/local/mysql`), the commands look like this:

```
$ chown -R root  .
$ chown -R mysql data
$ chgrp -R mysql .
```

The first command changes the owner attribute of the files to the `root` user. The second changes the owner attribute of the data directory to the `mysql` user. The third changes the group attribute to the `mysql` group.

5.3.8 Starting the Server

If you want MySQL to start automatically when you boot your machine, you can copy `support-files/mysql.server` to the location where your system has its startup files. More information can be found in the `support-files/mysql.server` script itself.

To start the MySQL server, use the following command:

```
$ bin/mysqld_safe --user=mysql &
```

If that command fails immediately and prints `mysqld ended`, you can find some information in the <hostname>`.err` file in the `data` directory.

5.3.9 Securing MySQL Accounts

To delete the anonymous accounts:

```
$ mysql -u root
mysql> DELETE FROM mysql.user WHERE User = '';
mysql> FLUSH PRIVILEGES;
```

Set the password for the root account:

```
mysql> SET PASSWORD FOR 'root'@'localhost' = PASSWORD('newpwd');
mysql> SET PASSWORD FOR 'root'@'hostname' = PASSWORD('newpwd');
```

The hostname can be checked using the query:

```
mysql> SELECT Host, User FROM mysql.user;
```

Add a new account for use with the Credential Repository database e.g.

```
mysql> GRANT SELECT, UPDATE, INSERT, DELETE ON ndgCredRepos.* TO
'ndgUser'@'localhost' IDENTIFIED BY 'password' WITH GRANT OPTION;
```

The above statement grants the user, `ndgUser` with password, `password`, `select`, `update` and `insert` privileges on the tables of database `ndgCredRepos`. The user may only connect from the `localhost`. Hence, in this case the Session Manager and Credential Repository must be installed on the same machine. To allow the Credential Repository to run on a separate machine to the Session Manager, the account must have permission to connect remotely. This can be achieved by altering the `GRANT` statement above to:

```
mysql> GRANT SELECT, UPDATE, INSERT, DELETE ON ndgCredRepos.* TO
'ndgUser'@’%’ IDENTIFIED BY 'password' WITH GRANT OPTION;
```

You also can set up new accounts using the `bin/mysql_setpermission` script if you install the `DBI' and `DBD::mysql' Perl modules.

See section 4.2.4.1 for details about creation of the Credential Repository database.

5.3.10 Server Automated Start up

<todo: >

5.4 HTTPS set-up with Apache Web Server

NDG security requires HTTPS for the transfer of user credentials across cookie domains between a data provider web page requesting user credentials and a user s NDG home login page.

<todo: full explanation - incl. mod_ssl must be installed>

5.4.1 Web Server Host Certificate Generation

Generate a new private key and certificate request.

```
$ openssl genrsa –out server.key 2048
$ openssl req –new –key server.key –out server.csr
```

Send the certificate request to the relevant CA (NDG if appropriate) for signing.

5.4.2Apache Configuration File Settings

5.5 Apache Web Server Proxy Settings Configuration for Web Services

Apache provides a convenient mechanism to re-route web service ports through port 80 and so make them available to the outside world. This may be helpful if when deploying NDG Security you do not wish to open additional ports in your site firewall settings.

Edit the Apache configuration file. This should be located at `/etc/httpd/conf`

Add `ProxyPass` and `ProxyPassReverse` entries for the Session Manager and Attribute Authority web services. The first argument after the directive name itself is the directory that the service will be served from relative to the web server URL. So below, if the URL of the web server is http://www.badc.rl.ac.uk, then the Session Manager would be available at https://www.badc.rl.ac.uk/sessionMgr. The second argument is the actual location where the web service is running locally. In the example below, the Session Manager is running on port 5700 on the same machine as the web server.

```
# Session Manager and Attribute Authority settings
ProxyPass        /sessionMgr    https://localhost:5700
ProxyPassReverse /sessionMgr    https://localhost:5700

ProxyPass        /attAuthority  http://localhost:5000
ProxyPassReverse /attAuthority  http://localhost:5000
```

Restart the Apache web server. This can be done in a variety of ways. As root user:

1. On Redhat machines, using the command `redhat-config-services` or `system-config-services` In the GUI, click on httpd in the list and press the Restart button

```
$ redhat-config-services
```

2. service command

```
$ /sbin/service httpd restart
```

3. apache command

```
$ apachectl restart
```

4. Using kill

```
$ kill -HUP `cat /etc/httpd/run/httpd.pid`
```

Note in the last case that the location of the pid file will depend on your installation.

Once the changes have been made, ensure that `sessionMgr.wsdl` and `attAuthority.wsdl` contain the new locations for the web services in the tag `<soap:address location="…">`

5.6 An Example Attribute Authority AAUserRoles interface class

This interface is required in order to link the Attribute Authority to the data centre's system for identifying registered users and managing their roles. The installation comes with a simple test class which illustrates this. See ndg.security.server.conf.userRoles.

The class must inherit from the `AAUserRoles` interface class. It must override the `userIsRegistered` and `getRoles` methods:

- `userIsRegistered()` returns True if the user with the given input Distinguished Name is registered at the site. This method might contain an SQL query to the site s user database for example. This method is *optional* and is not part of the API to the Attribute Authority.

- `getRoles()` returns a list of roles to which the user with the given input Distinguished Name is enrolled. Again, this method could be implemented with an SQL query to retrieve the roles for a given user. Note, that if not roles are found, the method should return [].

- `__init__()` optionally, the initialisation method may be overridden to enable for example the setting up of a database connection. The path to a properties file may be passed in. This could contain database connection settings.

The custom class used by the BODC is a more detailed example:

```
"""NDG Attribute Authority User Roles class - acts as an interface between
the data centre's user roles configuration and the Attribute Authority

BODC User Roles Interface to Oracle database

@author: P J Kershaw 09/08/07
@copyright: (C) 2007 STFC & NERC
@licence: This software may be distributed under the terms of the Q Public
License, version 1.0 or later.
"""
__revision__ = '$Id:$'


from ConfigParser import SafeConfigParser

# Use a conditional import here because if the TestUserRoles class is used,
# cx_Oracle is not required
try:
    import cx_Oracle
except ImportError, e:
    from warnings import warn
    warn(str(e), RuntimeWarning)
    pass

from ndg.security.server.AttAuthority import AAUserRoles, AAUserRolesError
from ndg.security.common.X509 import X500DN


class TestUserRoles(AAUserRoles):
    """Test User Roles class dynamic import for Attribute Authority
    NOT for use on production system"""

    def __init__(self, propertiesFilePath=None):
        pass

    def getRoles(self, dn):
        """Test getRoles returns role attributes regardless of user Id!"""

        # Parse username from DN string
        # TODO: this may be e-mail address for BODC?
        try:
            cn = X500DN(dn)['CN']
            if len(cn) == 2:
                # Proxy cert has two common names set - assume extra common
                # name will be 'proxy' or a number
                username=[n for n in cn if n!="proxy" and not n.isdigit()]
[0]
            else:
                username = cn

        except Exception, e:
            raise AAUserRolesError, "Parsing username from DN %s: %s" %
(dn,e)

        return ['Public', 'Researcher']


class UserRoles(AAUserRoles):
    """User Roles class dynamically imported for Attribute Authority
    - see the Attribute Authority Properties file to make the correct
    settings"""

    def __init__(self, propertiesFilePath=None):
        if not propertiesFilePath:
            raise AAUserRolesError, "No user roles property file set"

          # Retrieve database connection and query settings from config file
        configParser = SafeConfigParser()
        configParser.read(propertiesFilePath)

        self.__conxnStr = configParser.get('Oracle', 'connection')

        # The Oracle connection could be made HERE to make getRoles method
        # more efficient but then AA would hog an Oracle connection as long
as

        # it is running.  There may be away to avoid this using a connection
          # pool
        self.__query =  configParser.get('Oracle', 'query')


    def getRoles(self, dn):
        '''Roles interface for BODC database'''

        # Parse username from DN string
        # TODO: this may be e-mail address for BODC?
        try:
            cn = X500DN(dn)['CN']
            if len(cn) == 2:
                # Proxy cert has two common names set - assume extra common
                # name will be 'prixy' or a number
                username=[n for n in cn if n!="proxy" and not n.isdigit()]
[0]
            else:
                username = cn

        except Exception, e:
            raise AAUserRolesError, "Parsing username from DN %s: %s" %
(dn,e)

        # It may be possible to use a connection pool and move this
        # connect call to __init__ see:
        #
        # http://www.python.net/crew/atuining/cx_Oracle/html/module.html
        #
        try:
            con = cx_Oracle.connect(self.__conxnStr)
            cursor = con.cursor()
        except Exception, e:
            raise AAUserRolesError, "Error connecting to Oracle database: "
+\
                                    str(e)

        # Substitute the username into the query - the query is expected to
        # have a "%s" to allow this
        #
        # Convert username to string type explicitly as the execute method
        # doesn't like unicode type
        try:
            try:
                query = self.__query % str(username)
                cursor.execute(query)
                result = cursor.fetchall()
            except Exception, e:
                raise AAUserRolesError, "Error executing query: " + str(e)
        finally:
            cursor.close()
            con.close()

        # Result is a list of tuples.  The first element of each tuple is a
        # role name -> Convert into a simple list of role names
        try:
            roleNames = [role[0] for role in result]
        except TypeError:
            # Catch non-iterable error with result var
            roleNames = []

        return roleNames
```

Note:

- It uses the Python library cx_`Oracle` to connect to an Oracle database.
- `ElementTree` Python library is used to parse an XML properties file.
- `ndg.security.common.X509` security python library is used to parse the user Distinguished Name passed into `getRoles` and `userIsRegistered` methods.
- Database connection and query settings are taken from a config file:

```
#
# BODC Attribute Authority - Oracle interface settings
#
# P J Kershaw 09/08/07
#
[Oracle]
# Database connection string
connection = user/password@dsn
# Query string "%%s" will be substituted by the username specified by the
code
query = select something from atable where username = '%%s'
```

5.7 Troubleshooting

5.7.1 SimpleCA Installation

The SimpleCA installation script may give an error message:

```
Error number 1 was returned by

   /usr/local/globus-4.0.5/bin/openssl
```

To check the actual OpenSSL look in the file, /tmp//root_tmp_ca_setup/openssl_req.log. A error can be caused for example by a miss-formatted Distinguished Name.

5.7.2 M2Crypto

5.7.2.1 SWIG

M2Crypto uses SWIG to bind C OpenSSL library code to the Python interface. If SWIG is not present on your system, the M2Crypto build will fail with an error such as:

```
unable to execute swig: No such file or directory
error: Setup script exited with error: command 'swig' failed with exit
status 1
```

Alternatively, compilation errors with swig `.i` files in the M2Crypto tar bundle can be caused by use of an earlier version of swig. This has been seen with the default swig on Redhat EL4. This comes with swig version 1.1. To check the SWIG version number type:

```
$ swig -version
```

Some version will build OK but then cause runtime errors e.g.

```
File ".../M2Crypto/SSL/Context.py", line 43, in __init__ map()
[long(self.ctx)] = self ValueError: invalid literal for long():
_480e1008_p_SSL_CTX
```

To fix update to a version >= 1.3.24 and re-run the installation script but also make sure to read the next section. SWIG is available from http://www.swig.org/ or alternatively may be installed as an rpm or with apt-get for a Debian package.

5.7.2.2 SWIG and Py_ssize_t build error

The combination SWIG version 1.3.30rc1 and Python < 2.5 can cause a build error:

```
_lib.h:5: error: redefinition of typedef 'Py_ssize_t'
```

Avoid this version of SWIG.

See: http://chandlerproject.org/Projects/MeTooCrypto#FAQ for reference and up to date details of any other M2Crypto related issues.

5.7.2.3 Unable to find 'opensslconf-x86_64.h'

This error has been encountered on Redhat Enterprise 64 bit. Run easy_install again but include the option to download, extract and build in a given directory that you specify:

```
$ easy_install -b ./tmp M2Crypto
```

Change directories and run with these extra build options:

```
$ cd ./tmp/m2crypto
$ python setup.py build_ext -L/usr/lib64 -I/usr/include/openssl
$ python setup.py install
```

In case of multiple python installations on your system be sure to specify the correct one by checking the system PATH. The ./tmp directory can be removed once the installation is complete.

5.7.2.4 OpenSSL Header files Missing

M2Crypto requires OpenSSL libraries and header files to link with when being built. On some systems, the openssl executable may be present but not the required header files or libraries. You may see an error like this:

```
SWIG/_m2crypto.i:23: Error: Unable to find 'openssl/opensslv.h'
SWIG/_ec.i:7: Error: Unable to find 'openssl/opensslconf.h'
error: Setup script exited with error: command 'swig' failed with exit
status 1
```

Depending on your system, install the openssl-devel RPM or libssl-dev Debian package or re-install OpenSSL from source (http://www.openssl.org)

5.7.2.5 Error: CPP #error ""This openssl-devel package does not work your architecture?""

This error has been encountered on RedHat systems, for example:

```
running build_ext
building 'M2Crypto.__m2crypto' extension
swigging SWIG/_m2crypto.i to SWIG/_m2crypto_wrap.c
swig -python -I/usr/include/openssl -I/usr/local/include/python2.5
-I/usr/include -includeall -o SWIG/_m2crypto_wrap.c SWIG/_m2crypto.i
/usr/include/openssl/opensslconf.h:27: Error: CPP #error ""This openssl-
devel package does not work your architecture?"". Use the -cpperraswarn
option to continue swig processing.
error: command 'swig' failed with exit status 1
```

First, run easy_install for M2Crypto again but keep a copy of the tarball content:

```
$ easy_install -b ./tmp M2Crypto
```

Edit ./tmp/m2crypto/setup.py and uncomment the lines:

```
        #self.swig_opts.append('-D__i386__') # Uncomment for early OpenSSL 
0.9.7 versions, or on Fedora Core if build fails
        #self.swig_opts.append('-DOPENSSL_NO_EC') # Try uncommenting if you 
can't build with EC disabled
```

Try building again and if successful run easy_install based on this build:

```
$ cd ./tmp/m2crypto
$ python setup.py build_ext
$ easy_install .
```

Nb. You may need to provide and an extra include path -I/usr/include/openssl to the build_ext command.

See https://bugzilla.osafoundation.org/show_bug.cgi?id=9404 for more background information.

5.7.3 PyXML

error: Could not find suitable distribution for Requirement.parse('PyXML>=0.8.3')

```
$ easy_install –f http://sourceforge.net/project/showfiles.php?group_id=6473 
PyXML
```

or f option with ndg-security-install.py

5.7.4 4Suite-XML Build error

Ft/Xml/src/expat/lib/xmlparse.c:89:2: #error memmove does not exist on this platform, nor is a substitute available

4Suite-XML 1.0.2

```
$ cat /proc/version
Linux version 2.4.21-32.0.1.ELsmp (bhcompile@bugs.build.redhat.com) (gcc version 20030502
(Red Hat Linux 3.2.3-52)) #1 SMP Tue May 17 17:52:23 EDT 2005
```

```
$ uname –a

Linux glue.badc.rl.ac.uk 2.4.21-32.0.1.ELsmp #1 SMP Tue May 17 17:52:23 EDT
2005 i686 i686 i386 GNU/Linux
```

Solution:

```
$ echo -e "[build_ext]\ndefine=HAVE_MMEMOVE" > ~/.pydistutils.cfg
$ easy_install 4Suite-XML
```