Troubleshooting Grid authentication from the client side

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The Grid @NIKHEF

- Tier-1 location of the Worldwide LHC Computing Grid
- Consists of multiple clusters of multi-core machines for parallel processing
- Intended for computation with data from LHC experiments at CERN
- Also used for other sciences such as bioinformatics and medicine
The Project

To what extent can authentication failures in the Grid be identified and resolved from the client side?

• What are the possible causes of GSI authentication failures?
• Which Grid components are involved in GSI authentication for standard job submission and execution?
• How can a client determine which systems are probable causes of authentication failure for a job?
• Is it possible for a client to test authentication by contacting such systems directly?
Grid components

Virtual Organisation Membership Service

VOMS

Request VOMS credentials

MyProxy

Request proxy

submit proxy

update status

LB

Request status

WMS

submit job

forward job

CE

run job

User Interface

Computing Element

Worker Node

Workload Management System

NIKIHEF

UvA

Universiteit van Amsterdam
X.509 certificates, proxies and delegation

• Proxy certificates are used for single sign-on and delegation
  – Not protected with a passphrase, but short-lived
  – Single sign-on: user can submit multiple jobs without re-entering passphrase
  – Delegation: a job can be sent further into the Grid on the user’s behalf
  – A MyProxy service can be used by a Grid component to renew a proxy
Possible authentication problems - 1

• Unknown CA
  – CA certificates not installed on UI, or environment variable missing

• (Proxy) certificate expired, or not yet valid
  – Really expired, or clock skew

• Certificate Revocation List (CRL) out of date
  – Failed to renew CRL, or clock skew
Possible authentication problems - 2

• VOMS attributes missing
  – Proxy not set up properly

• Misconfigured User Interface
  – Can cause all of the above…
Problem identification tool - 1

• No interactions with other systems, due to
  – Lack of support for proxy certificates in installed version of openssl
  – Involved systems are job-specific
  – Different communication methods used by different components, even between versions of the same component
Problem identification tool - 2

• Checks that are included
  – System time checked against NTP
  – Basic UI environment check
  – Trusted CA directory check
  – User certificate verification
  – Proxy certificate chain verification
  – Proxy contents check
bash-3.00$ ./grid-auth-verify.sh
INFO: Trying to check time difference with chime2.surfnet.nl
INFO: Local time differs 0 seconds from network time, which is within set limit of 60
INFO: Trying to locate directory with trusted certificates
INFO: Will use /global/ices/lcg/glite3.1.23/external/etc/gridsecurity/certificates
     from environment variable X509_CERT_DIR for trusted certificates
INFO: Trying to verify user certificate
INFO: Will use /user/adriaanz/.globus/usercert.pem as user certificate
INFO: User certificate verification succeeded
INFO: Trying to verify proxy certificate chain
INFO: Will use /tmp/x509up_u7899 as proxy certificate
INFO: Proxy certificate chain verified successfully
INFO: Trying to check proxy content
INFO: No irregularities found in proxy contents
bash-3.00$ ./grid-auth-verify.sh
INFO: Trying to check time difference with chime2.surfnet.nl
INFO: Local time differs 0 seconds from network time, which is within set limit of 60
INFO: Trying to locate directory with trusted certificates
INFO: Will use /global/ices/lcg/glite3.1.23/external/etc/gridsecurity/certificates
    from environment variable X509_CERT_DIR for trusted certificates
INFO: Trying to verify user certificate
INFO: Will use /user/adriaanz/.globus/usercert.pem as user certificate
INFO: User certificate verification succeeded
INFO: Trying to verify proxy certificate chain
INFO: Will use /tmp/x509up_u7899 as proxy certificate
ERROR: Verifying proxy: Proxy certificate expired.
ERROR: Verifying certificate chain: certificate has expired
bash-3.00$ ./grid-auth-verify.sh
INFO: Trying to check time difference with chime2.surfnet.nl
INFO: Local time differs 0 seconds from network time, which is within set limit of 60
INFO: Trying to locate directory with trusted certificates
ERROR: Cannot find trusted certificates directory in either the environment variable
        X509_CERT_DIR, or /etc/grid-security/certificates or
        /user/adriaanz/.globus/certificates