



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 bio-informatics and medicine



The Project

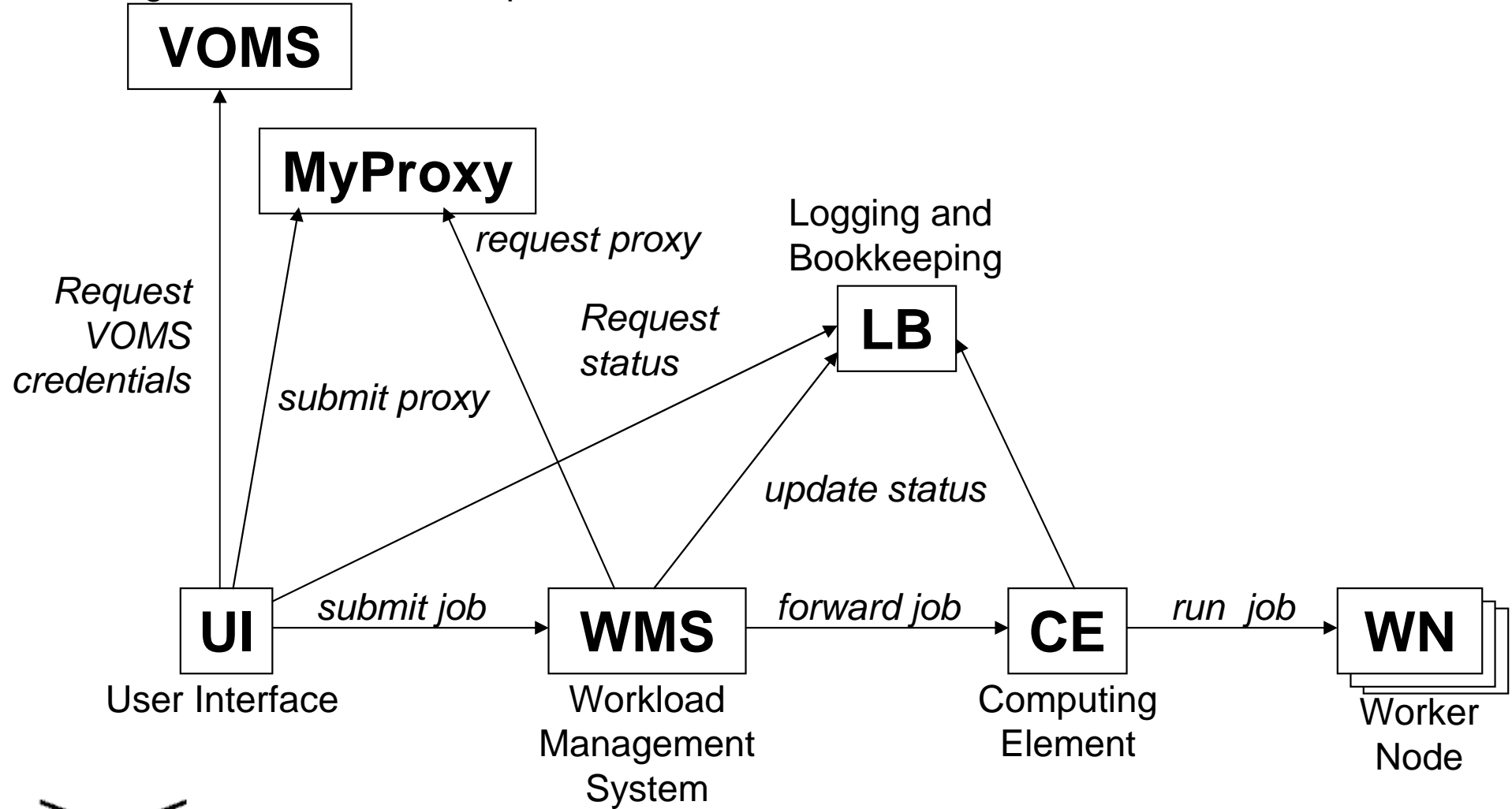
To what extent can authentication failures in the Grid be identified and resolved from the client side?

- 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



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- Certificate Revocation List (CRL) out of date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



Sample output - 1

```
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
```



Sample output - 2

```
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
```



Sample output - 3

```
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
```

