Latest updates on the WLCG Token Transition Planning

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Token Transition

• Recall we are in the middle of three (related) transitions.
  – Moving the bulk data protocol from GridFTP to HTTP-TPC.
  – Retiring the (former) Globus Toolkit from our software stack.
  – Moving from GSI authorization to tokens.
• The above is the approximate order too!
  – ATLAS is at 1/3 traffic over HTTP-TPC and 1/2 sites preferring HTTP-TPC.
  – The Toolkit retirement should happen next year.
  – Given the number of interlocking pieces, GSI-to-tokens will finish ~2024.
Toolkit Retirement

!=

GSI Retirement

Examples:

XRooD has its own GSI implementation – we will use it for years.

HTCondor’s SSL implementation can support client X.509 authentication (but not GSI proxies).

I expect some VOs will internally use GSI for much longer!
• Tuesday I had a talk that went through the interoperability scenarios. Summary:

- OSG 3.6 has no supported GridFTP implementation. Data transfers need to move to GridFTP before OSG 3.5 EOL.
  - OSG 3.6 does have GSI/VOMS support for HTTP-TPC transfers via XRootD.
- OSG 3.5 supports both token- and GSI-based pilot submissions to the HTCondor-CE.
  - OSG 3.6 only supports token-based submission.
  - More work to do on the pilot side currently!
Example Token Workflows

VO
VO maintains a token issuer & middleware

1. SciToken for CE
2. IDTOKEN for VO
3. SciToken for job

Pilot Factory

Pilot Job

Site HTCondor-CE

Payload

Pilot

Worker Node
• WLCG has selected the IAM software to do the identity and authorization management currently performed by VOMS-Admin.
  – Working to auto-sync from VOMS-Admin; right now, independent.
  – IAM serves as a VOMS server (voms-proxy-init works!) but also issues tokens.
  – Token issuer works well to integrate both webpages and command line flows.
A quick reminder of the OSG timeline:

- 2017: the SciTokens project was funded by NSF to support use of capability tokens for the authentication & authorization infrastructure.
- 2017: Globus announced the end-of-life for the Globus Toolkit.
- (late 2017): OSG helped fork the Globus Toolkit to the Grid Community Toolkit.
- 2019: OSG announced a timeline for transitioning to tokens for AAI.
- 2021 (6 days ago): OSG 3.6 released without any Globus Toolkit dependencies.
- February 2022 (planned): OSG 3.5 support ends – no Toolkit in supported projects.
• A few expected milestones coming up this year:
  – April 2021: OSG migrates hosted CE submission to SciTokens.
  – May 2021: (WLCG) LHC transfers migrate to HTTP-TPC.
  – June 2021: WLCG token issuers are available.
  – Oct 2021: (WLCG) LHC experiments give sites of receiving SciTokens-based pilots.

• We have been coordinating closely with FNAL SCD and WLCG.
  – Next few slides are part of the WLCG timeline draft (purposely left in various Google Doc markup!).
# WLCG Timeline

<table>
<thead>
<tr>
<th>Milestone ID</th>
<th>Date</th>
<th>Description</th>
<th>Dependencies</th>
<th>Teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>M.0</td>
<td>Feb 2021</td>
<td>Produce document with list of use cases for CMS VOMS-Admin API.</td>
<td>None</td>
<td>WLCG Ops</td>
</tr>
<tr>
<td>M.1</td>
<td>May 2021</td>
<td>WLCG baseline services include HTTP-TPC.</td>
<td>None</td>
<td>WLCG Ops, Storage providers</td>
</tr>
<tr>
<td>M.2</td>
<td>May 2021</td>
<td>WLCG hosts “CE and pilot factory hackathon”</td>
<td>None</td>
<td>Pilot framework providers</td>
</tr>
<tr>
<td>M.3</td>
<td>July 2021</td>
<td>Production IAM Instances Available</td>
<td>None</td>
<td>WLCG Ops, AAI, IAM, CERN IT</td>
</tr>
<tr>
<td>M.4</td>
<td>Oct 2021</td>
<td>Pilot job submissions may be performed with tokens</td>
<td>M.3</td>
<td>Experiments, pilot framework providers, OSG/EGI, sites</td>
</tr>
<tr>
<td>M.5</td>
<td>Dec 2021</td>
<td>VOMS-Admin shutoff. IAM is sole authz provider (including for VOMS server)</td>
<td>M.3</td>
<td>WLCG Ops, CERN ITAAI</td>
</tr>
<tr>
<td>M.6</td>
<td>Feb 2022</td>
<td>OSG ends support for the Grid Community Toolkit</td>
<td>M.1, M.4</td>
<td>OSG</td>
</tr>
<tr>
<td>M.7</td>
<td>Mar 2022</td>
<td>All storage services provide support for tokens</td>
<td>M.1</td>
<td>WLCG Ops, Storage providers</td>
</tr>
<tr>
<td>M.8</td>
<td>Oct 2022</td>
<td>Rucio transfers performed with token auth in production</td>
<td>M.7</td>
<td>Rucio, Experiments</td>
</tr>
<tr>
<td>M.9</td>
<td>Mar 2023</td>
<td>Experiments stageout &amp; data reads performed via tokens.</td>
<td>M.7</td>
<td>Experiments</td>
</tr>
<tr>
<td>M.10</td>
<td>Mar 2024</td>
<td>X.509 client auth becomes optional.</td>
<td>M.9, M.8, M.4</td>
<td>Experiments</td>
</tr>
</tbody>
</table>
Final Thoughts

• 2021 is an important transition year for both OSG and WLCG.
  – Fully acknowledge change isn’t easy: we will be replacing old battle-hardened code with new code.
  – Fully believe this is a worthwhile endeavor:
    ▪ E.g., this gives us opportunities in fine-grained security and capability-based systems.
    ▪ Keeps the community closer to the wider technology ecosystem (e.g., HTTP), making it more sustainable.

• It’s a fantastic time to help build the future – help is always welcome to test, debug, and provide feedback.
  – As they say, patches welcome!
Questions?

support@opensciencegrid.org

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Tokens – A Primer

- ‘GSI’ is based on using X.509 (“certificate”) credentials for authentication.
  - It has several extensions to allow delegation, impersonation, group assertions.
  - It is based on the concept of *identity mapping*. Sites map the global identity (the CA-issued X.509) credential and map it to a local identity.
    - The credential is authorized to do whatever the local identity can do.
- We use ‘capability-based bearer tokens’:
  - Capabilities: Describes a specific authorized operation.
  - Bearer tokens: Any holder of the token is authorized.
  - Example: Signed statement saying “The bearer of this token is authorized to write ATLAS files.”
  - We are using JSON Web Tokens (JWTs).
    - We support the ‘SciTokens Profile’ and the ‘WLCG Common Token Profile’; both are agreed-upon ways to interpret token contents.
Tokens – A Primer

Encoded

PASTE A TOKEN HERE

Decoded

EDIT THE PAYLOAD AND SECRET

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```
eyJraWQioiJyc2XiwiYWxnIoiU1MyNTYifQ.
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```