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.

IMPORTANT

Toolkit Retirement
!=
GSI Retirement

Examples:

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

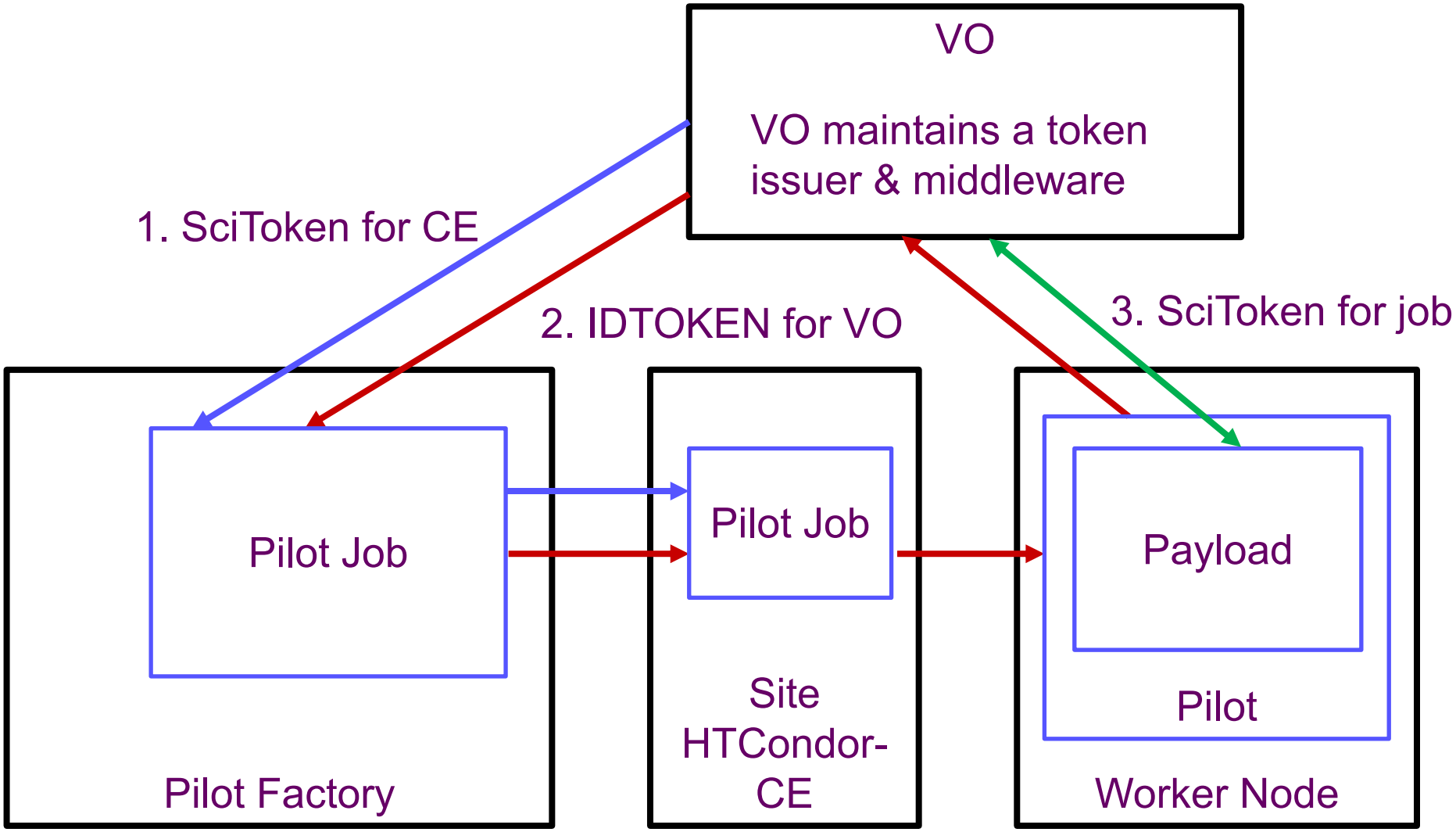
HTCondor's SSL implementation can support client X.509 authentication (but *not* GSI proxies).

I expect some VOs will internally use GSI for much longer!

OSG 3.6 Compatibility

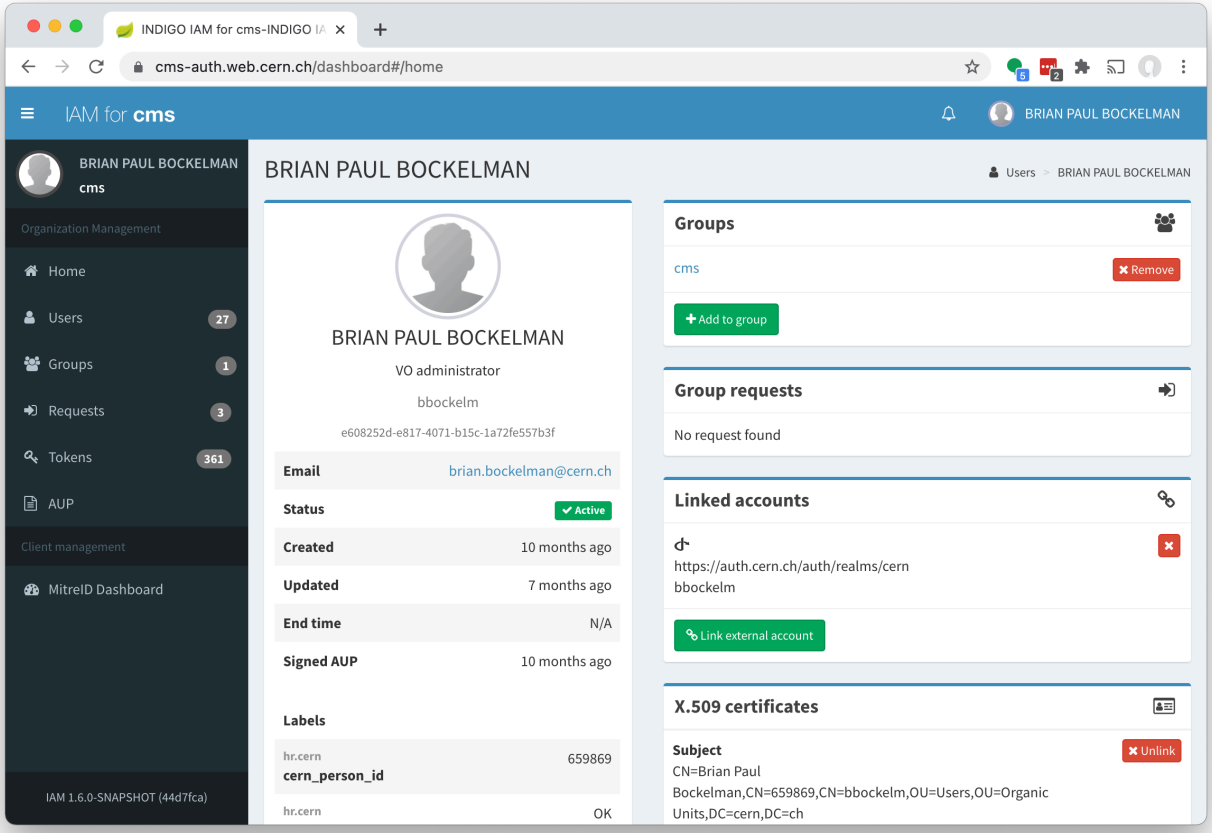
- Tuesday I had a talk that went through the interoperability scenarios. Summary:
  - OSG 3.6 has no supported GridFTP implementation. Data transfers need to move to GridFTP before OSG 3.5 EOL.
    - OSG 3.6 *does* have GSI/VOMS support for HTTP-TPC transfers via XRootD.
  - OSG 3.5 supports both token- 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



Token Issuer - IAM

- 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.



Token Transition

- 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.

OSG / OSG-LHC Timeline

- 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

Milestone ID	Date	Description	Dependencies	Teams
M.0	Feb 2021	Produce document with list of use cases for CMS VOMS-Admin API.	None	WLCG Ops
M.1	May 2021	WLCG baseline services include HTTP-TPC.	None	WLCG Ops, Storage providers
M.2	May 2021	WLCG hosts “CE and pilot factory hackathon”	None	Pilot framework providers
M.3	July 2021	Production IAM Instances Available	None	WLCG Ops~~AAI~~, IAM, CERN IT
M.4	Oct 2021	Pilot job submissions may be performed with tokens	M.3	Experiments, pilot framework providers, OSG/EGI, sites

	Nov 2021	Coordinate documentation update with VOMS Admins and VO secretariats		Experiments, IAM, CERN IT
M.5	Dec 2021	VOMS-Admin shutoff. IAM is sole authz provider (including for VOMS server)	M.3	WLCG Ops, CERN IT~~AAI~~
M.6	Feb 2022	OSG ends support for the Grid Community Toolkit	M.1, M.4	OSG
M.7	Mar 2022	All storage services provide support for tokens	M.1	WLCG Ops, Storage providers
M.8	Oct 2022	Rucio transfers performed with token auth in production	M.7	Rucio, Experiments
M.9	Mar 2023	Experiments stageout & data reads performed via tokens.	M.7	Experiments
M.10	Mar 2024	X.509 client auth becomes optional.	M.9, M.8, M.4	Experiments

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?

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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


```
eyJraWQiOiJyc2ExIiwiYWxnIjoiUlMyNTYifQ.
eyJ3bGNnLnZlciI6IjEuMCIsInN1YiI6IjI3MjM
0ODQzLWZlZGYtNDJjOC1iYjgxLWExNjk1YmJkN2
MyOCIsImF1ZCI6Imh0dHBzOlwvXC93bGNnLmNlc
m4uY2hcL2p3dFwvdjFcL2FueSIsIm5iZiI6MTYx
NDc0NDA4Miwic2NvcGUiOiJvcGVuaWQgb2ZmbGl
uZV9hY2Nlc3Mgc3RvcmFnZS5yZWFkOlwvIHN0b3
JhZ2UubW9kaWZ5OlwvIHdsY2ciLCJpc3MiOiJod
HRwczpcL1wvd2xjZy5jbG91ZC5jbmFmLmluZm4u
aXRcLyIsImV4cCI6MTYxNDc0NzY4MiwiaWF0Ijo
xNjE0NzQ0MDgyLCJqdGkiOiIyNjhjYmQ1OC0wZj
EwLTRmYjctOWU5Mi1kZmVlMjVlZmJhMTIiLCJjb
GllbnRfaWQiOiJiMGQ4N2Q0Yi0wMjFkLTRmN2Yt
OTc0Yy1iY2E2YThlM2JlNDgifQ.XR5NrLGvMWh_
rRmTuV60OyoJTL0mY7EoF1y2MgumAObWOh5KkCw
ojrsAYEtJjaCEFr63oEK3DGB7ykDUpprh3nJjXf
```


Decoded EDIT THE PAYLOAD AND SECRET

HEADER: ALGORITHM & TOKEN TYPE


```
{
  "kid": "rsa1",
  "alg": "RS256"
}
```


PAYLOAD: DATA


```
{
  "wlcg.ver": "1.0",
  "sub": "27234843-fedf-42c8-bb81-a1695bbd7c28",
  "aud": "https://wlcg.cern.ch/jwt/v1/any",
  "nbf": 1614744082,
  "scope": "openid offline_access storage.read:/
storage.modify:/ wlcg",
  "iss": "https://wlcg.cloud.cnaf.infn.it/",
  "exp": 1614747682,
  "iat": 1614744082,
  "jti": "268cbd58-0f10-4fb7-9e92-dfee25efba12",
  "client_id": "b0d87d4b-021d-4f7f-974c-bca6a8e3be48"
}
```