SCI TOKENS

SciTokens: Capability-Based Secure Access to Remote Scientific Data

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https://www.scitokens.org/

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SciTokens Project

- The SciTokens project:
  - Introduces a ***capabilities-based* authorization infrastructure** for distributed scientific computing,
  - Provides a **reference platform**, combining CILogon, HTCondor, CVMFS, and XRootD, and
  - **Implements specific use cases** to help our science stakeholders (LIGO and LSST) better achieve their scientific aims.

SciTokens uses standards

- RFC 6749: OAuth 2.0 Authorization Framework
  - token request, consent, refresh
- RFC 7519: JSON Web Token (JWT)
  - self-describing tokens, distributed validation
- RFC 8414: OAuth 2.0 Authorization Server Metadata
  - token signing keys, policies, endpoint URLs
- OAuth 2.0 Token Exchange (IETF OAuth WG I-D)
  - token delegation, drop privileges

Example Token, Decoded

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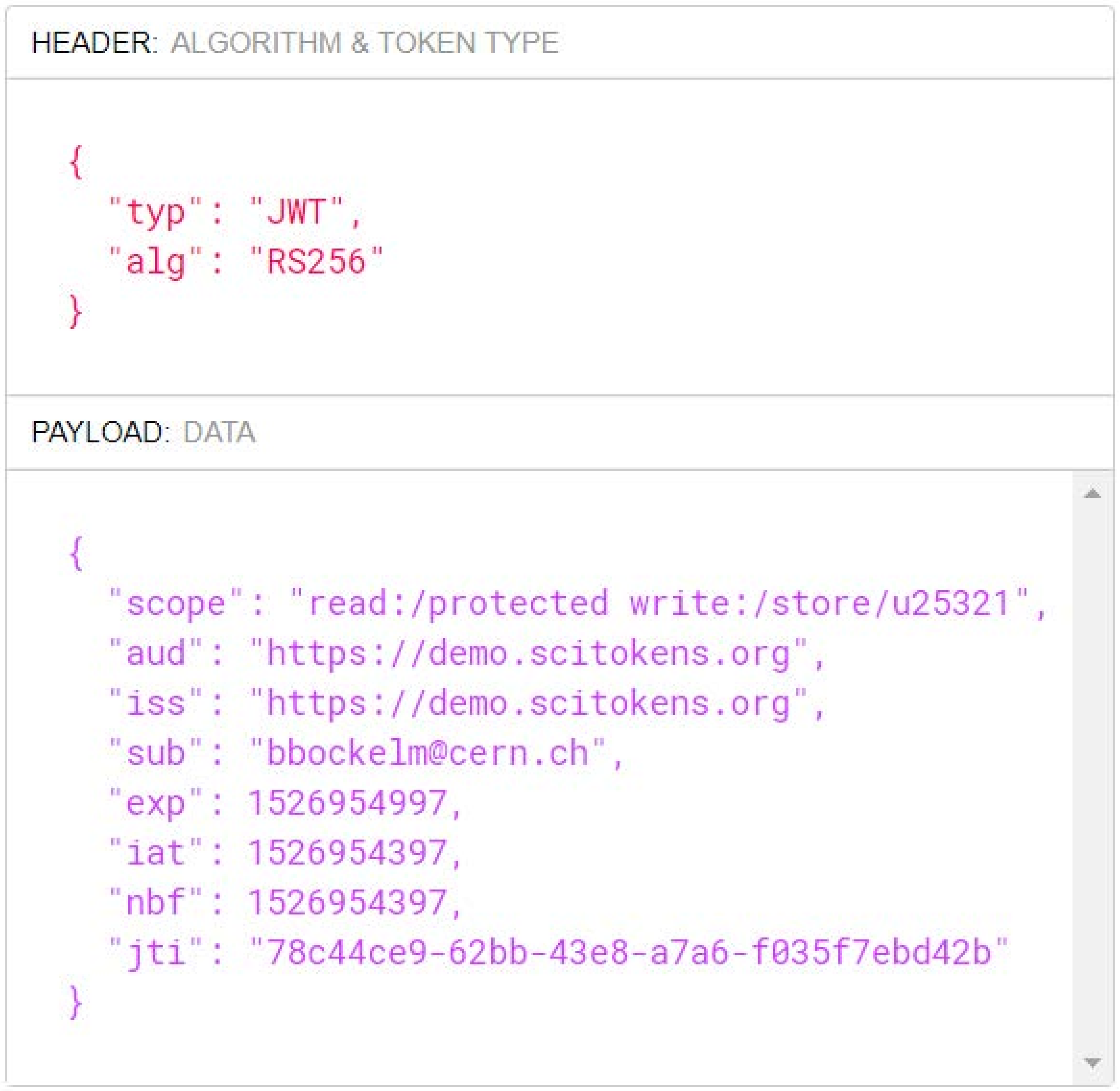
- The decoded token contains multiple scopes - basically filesystem authorizations.
- The audience narrows who the token is intended for.
- The issuer identifies who created the token; value used to locate the public keys needed to validate signature.
- The subject is an opaque identifier for the resource owner. In this case, it also happens to be the identity.
- The expiration is a Unix timestamp when the token expires. A typical lifetime is 10 minutes.



HEADER: ALGORITHM & TOKEN TYPE

```
{
  "typ": "JWT",
  "alg": "RS256"
}
```

PAYLOAD: DATA

```
{
  "scope": "read:/protected write:/store/u25321",
  "aud": "https://demo.scitokens.org",
  "iss": "https://demo.scitokens.org",
  "sub": "bbockelm@cern.ch",
  "exp": 1526954997,
  "iat": 1526954397,
  "nbf": 1526954397,
  "jti": "78c44ce9-62bb-43e8-a7a6-f035f7ebd42b"
}
```

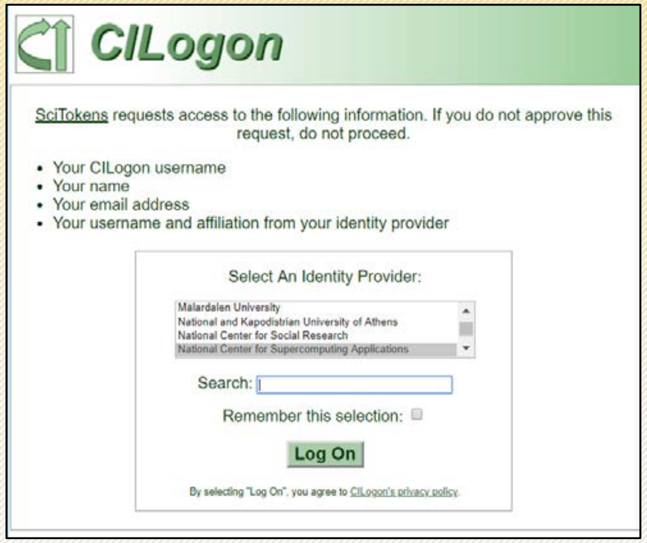
CILogon and SciTokens

<u>CILogon</u>

- Federated Identity Management
- OpenID Connect
- ID Tokens

<u>SciTokens</u>

- Federated Authorization
- OAuth 2.0
- Access Tokens



CILogon

SciTokens requests access to the following information. If you do not approve this request, do not proceed.

- Your CILogon username
- Your name
- Your email address
- Your username and affiliation from your identity provider

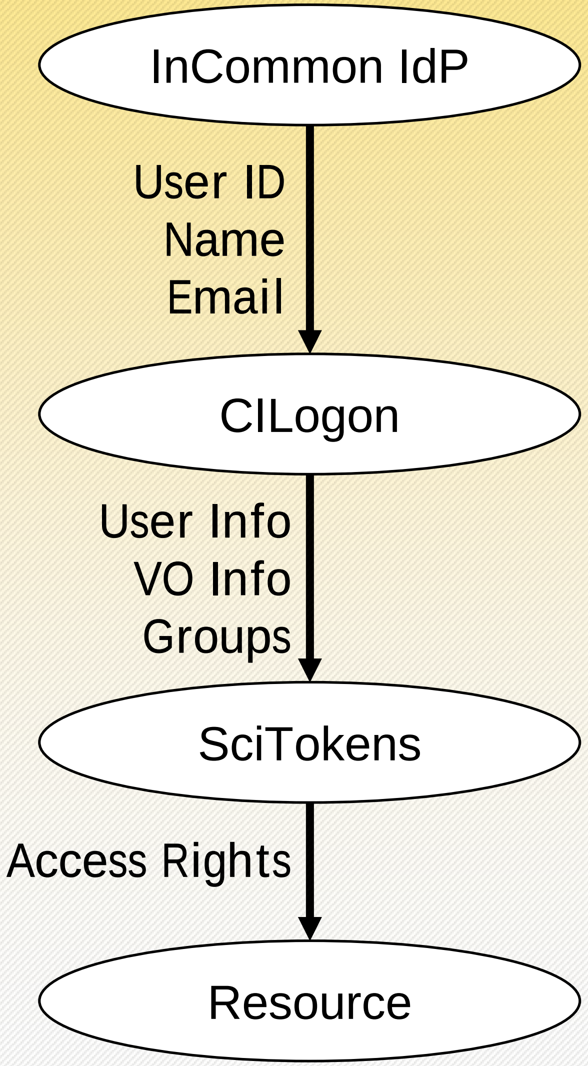
Select An Identity Provider:

Malardalen University
National and Kapodistrian University of Athens
National Center for Social Research
National Center for Supercomputing Applications

Search:

Remember this selection:

By selecting "Log On", you agree to CILogon's privacy policy.



SciTokens System Architecture

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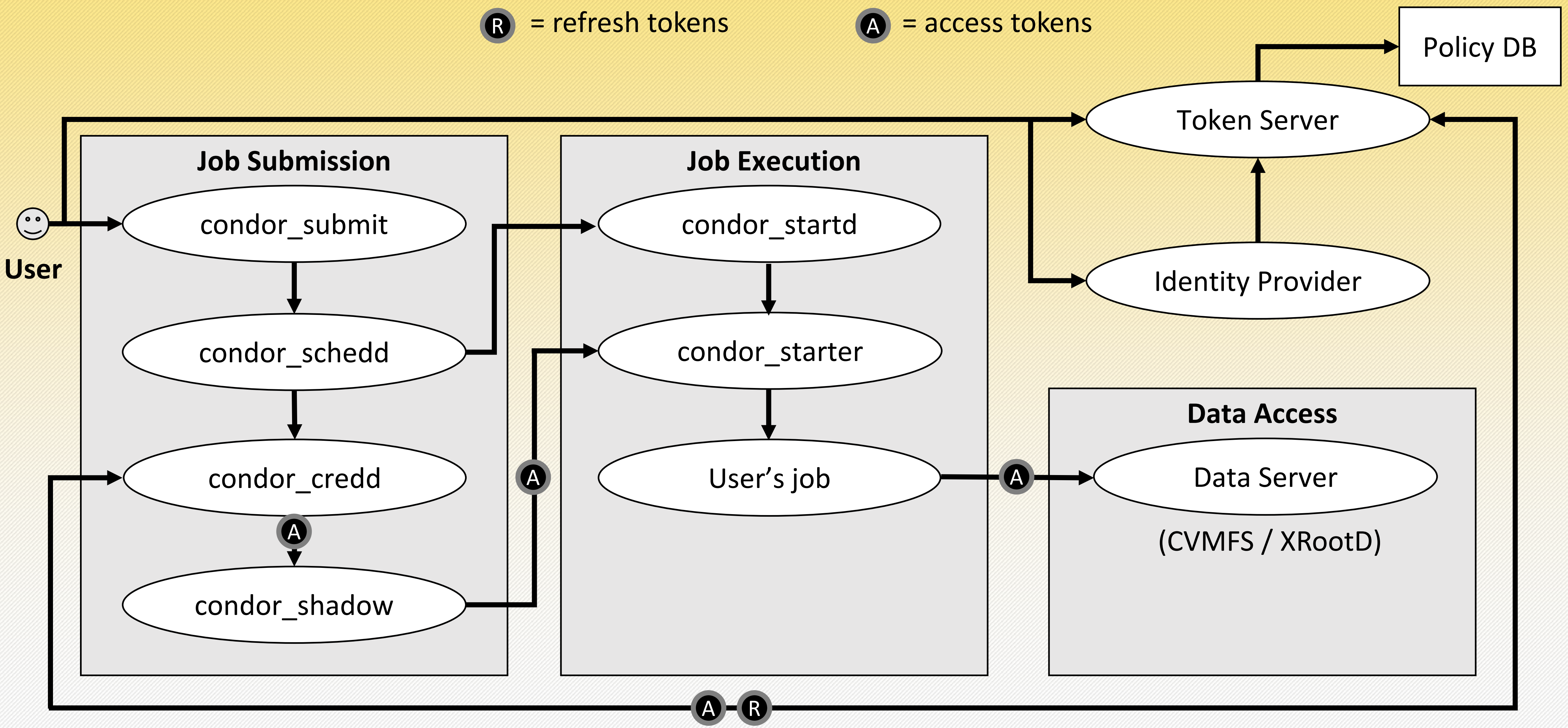
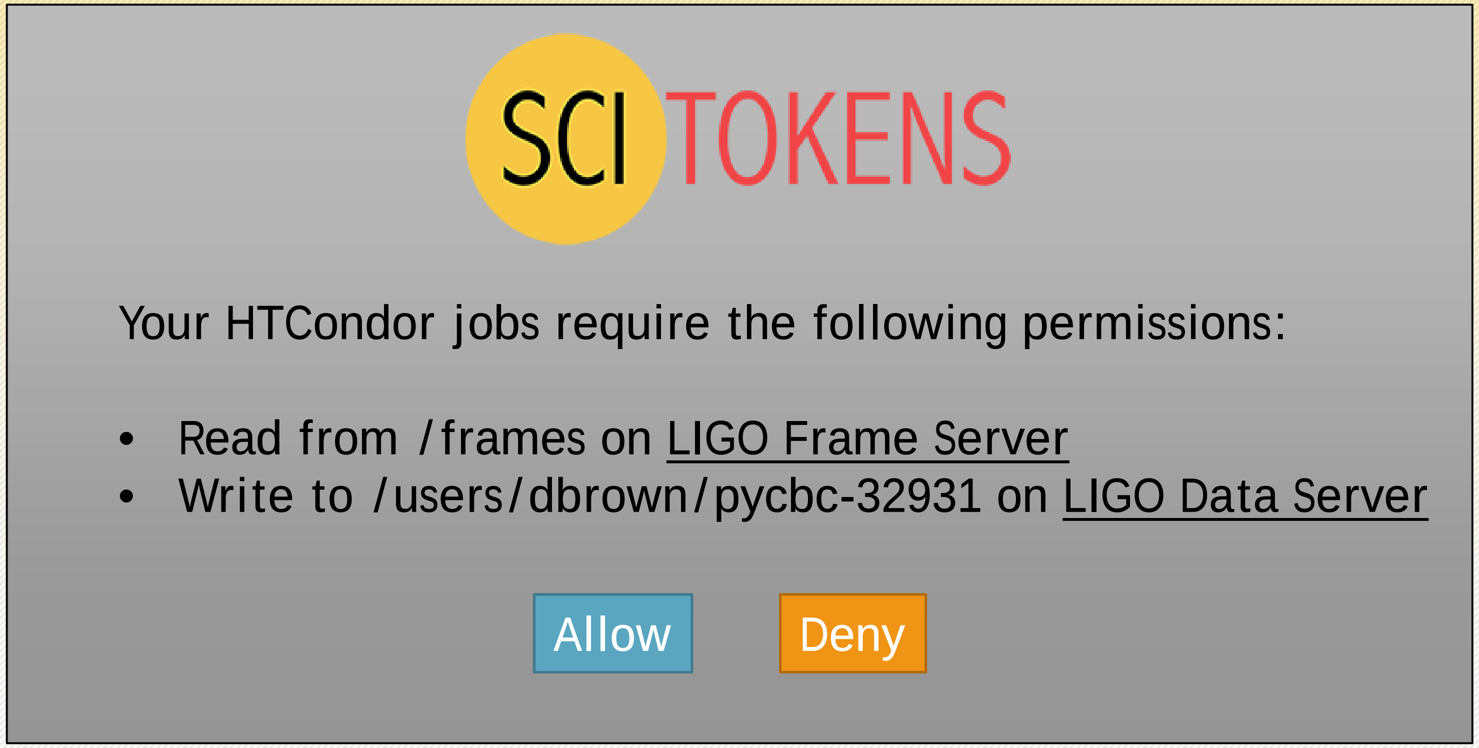


User Experience

```
user@chtc$ condor_submit workflow.jdl
Visit https://chtc.example.edu/authorize to authorize your jobs.
user@chtc$
```



Your HTCondor jobs require the following permissions:

- Read from /frames on LIGO Frame Server
- Write to /users/dbrown/pycbc-32931 on LIGO Data Server

Early results on OSG

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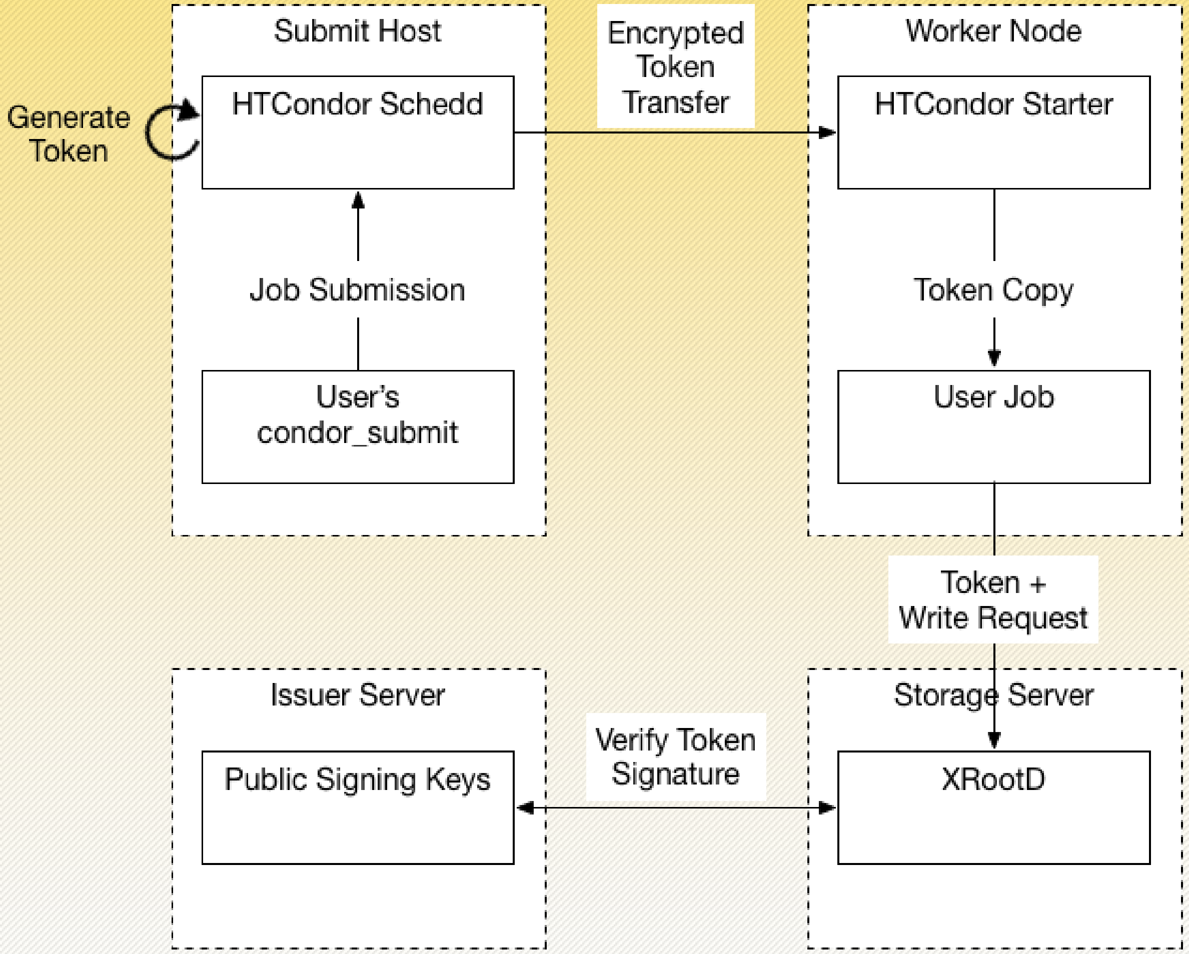
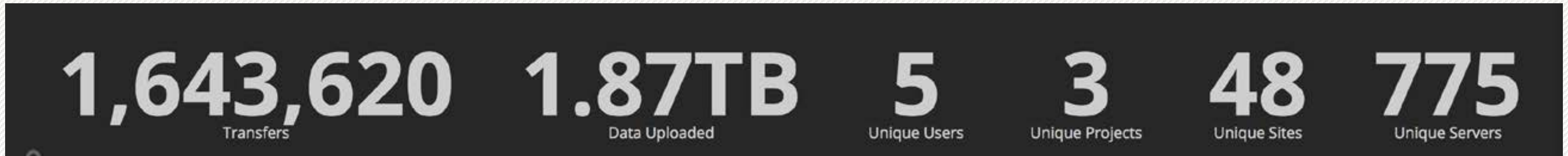
- End-to-end token-based auth{z,n} workflow for the OSG VO submit service
- Includes patches to Xrootd to validate tokens presented via HTTPS and to write files out with the correct Unix user permissions
- **Details**:
  - instead of using OAuth2 to generate the token, we keep a signing key on the submit host.
  - only one token needed.
  - submit host and storage server owned by OSG.





1,643,620	1.87TB	5	3	48	775
Transfers	Data Uploaded	Unique Users	Unique Projects	Unique Sites	Unique Servers

Give SciTokens a try!

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- **https://demo.scitokens.org/** - token generator

- **https://github.com/scitokens/** - open source software
  - Java and Python implementations
  - SciTokens-aware token server
  - CVMFS, Nginx, and XRootD plugins
  - Docker image for XRootD setup

- **https://scitokens.org/** - docs, email lists