SciTokens: Capability-Based Secure Access to Remote Scientific Data

Jim Basney <jbasney@ncsa.Illinois.edu>
https://www.scitokens.org/

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• 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
• 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.
**CILogon**
- Federated Identity Management
- OpenID Connect
- ID Tokens

**SciTokens**
- Federated Authorization
- OAuth 2.0
- Access Tokens
SciTokens System Architecture

**Job Submission**
- condor_submit
- condor_schedd
- condor_credd
- condor_shadow

**Job Execution**
- condor_startd
- condor_starter
- User’s job

**Data Access**
- Data Server (CVMFS / XRootD)

**Token Server**

**Identity Provider**

**Policy DB**

R = refresh tokens
A = access tokens
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/pcbc-32931 on LIGO Data Server
Early results on OSG

- 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.
Give SciTokens a try!

• **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