A Lightweight End-to-End Capability-Based Authorization Environment for Scientific Computing
Acknowledgements

This work is a collaboration between:

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Background: SciTokens

- Capability-based authorization system
- Based on OAuth and JSON Web Tokens (JWTs)
- Used by many software components and the Open Science Grid

```json
{
  "scope": "ssh:vt20",
  "aud": "martok.ncsa.Illinois.edu",
  "iss": "https://demo.scitokens.org",
  "exp": 1583855836,
  "iat": 1583855236,
  "jti": "073ac358-4f07-4090-ae5f-b5c5be273269"
}
```
The SciAuth Lightweight End-to-End Environment

Goal: To provide an environment for experimenting with SciTokens

Key features:

- Lightweight: Runs on a single host using Docker Compose
- End-to-End: Allows users to go through an entire workflow
- Incorporates well-known software (CILogon, GitHub, HTCondor, Jupyter)
- Novel components: Lightweight authorization server, JupyterHub service for tokens
- (Almost) Just works out-of-the-box
Architecture of the Lightweight Environment

- ID Token
- Access Token
- Refresh Token

Diagram: Jupyter Notebook connected to HTCondor, Token Management Service, JupyterHub, Authorization Server (Lab), and Authorization Server (GitHub). JupyterHub is connected to Web Browser, which is used by the User. GitHub is connected to Repo.
Architecture of the Lightweight Environment
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- ID Token
- Access Token
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Diagram:
- Web Browser
- User
- Jupyter Notebook
- Token Management Service
  - JupyterHub
  - Authorization Server (Lab)
  - Authorization Server (GitHub)
  - OIDC Provider (CIlogin)
- HTCondor
- GitHub
- Repo
- ACL

Connections:
- User to Web Browser
- Web Browser to Jupyter Notebook
- Jupyter Notebook to Token Management Service
- Token Management Service to Authorization Server (Lab)
- Authorization Server (Lab) to Authorization Server (GitHub)
- Authorization Server (GitHub) to OIDC Provider (CIlogin)
- OIDC Provider (CIlogin) to Token Management Service
JupyterHub Token Management Service

Provides a mechanism for users to obtain tokens:

- Allows JupyterHub to act as an OAuth client on behalf of users
- Provides a basic web page where users can authorize the service to fetch tokens
- Provides a simple API for retrieving tokens from the service
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Web Browser

User

Jupyter Notebook

Token Management Service

Authorization Server (Lab)

Authorization Server (GitHub)

OIDC Provider (CiLogon)

GitHub

HTCondor

ACL

Policy

Repo
Lightweight Authorization Server

Issues tokens according to some policy:

• Runs as a single Docker container
• Authenticares users with CILogon
• Policy configuration is a map from users to their authorizations:

```json
{
    "http://cilogon.org/serverA/users/123456": {
        "eduPersonEntitlement": ["condor:READ"],
        "audience": "htcondor.local"
    }
}
```
Architecture of the Lightweight Environment

1. ID Token
2. Access Token
3. Refresh Token

Diagram:
- User
  - Web Browser
    - Jupyter Notebook
      - Token Management Service
        - JupyterHub
          - Authorization Server (Lab)
            - Policy
          - Authorization Server (GitHub)
            - Policy
          - OIDC Provider (CiLogon)
        - ACL
      - HTCondor
        - GitHub
          - Repo
Architecture of the Lightweight Environment

1. ID Token
2. Access Token
3. Refresh Token

- Jupyter Notebook
- Token Management Service
- Authorization Server (Lab)
- Authorization Server (GitHub)
- OIDC Provider (CiLogon)
- HTCondor
- Web Browser
- User
- GitHub
- Repo
Looking Ahead

Download the end-to-end environment:
• 1.0 release by the end of the week

Learn more about the SciAuth Project:
• [https://sciauth.org/](https://sciauth.org/)

Encourage students to apply to the SciAuth student fellows program:
• [https://sciauth.org/fellows](https://sciauth.org/fellows)
• Currently accepting applications for Fall 2022
• Projects are related to authentication and authorization for scientific collaborations