SCITOKENS SSH

Token-Based Authentication for Remote Login

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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.

Using 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.

SciTokens SSH

- A token-based authentication method for remote login through SSH authentication via SciTokens
- Based on XSEDE OAuth SSH, SciTokens SSH routes SSH authentication requests to a PAM stack in which the module pam_oauth_ssh.so is used for sshd authentication.
- Can be configured to use Globus Auth and/or SciTokens for authentication.
- Verifies SciTokens using the SciTokens C++ Library, scitokens-cpp.

Authentication Flow

Example SciToken

```
{
  "scope": "ssh:vt20",
  "aud": "martok.ncsa.illinois.edu",
  "iss": "https://demo.scitokens.org",
  "exp": 1583855836,
  "iat": 1583855236,
  "nbf": 1583855236,
  "jti": "073ac358-4f07-4090-ae5f-b5c5be273269"
}
```

Example PAM modification (PAM Stack)

```
auth  required   pam_sepermit.so
auth  required   pam_env.so
auth  [success=done maxtries=die new_authtok_reqd=done default=ignore] pam_oauth_ssh.so
auth  requisite  pam_succeed_if.so uid >= 1000 quiet_success
auth  required   pam_deny.so
```

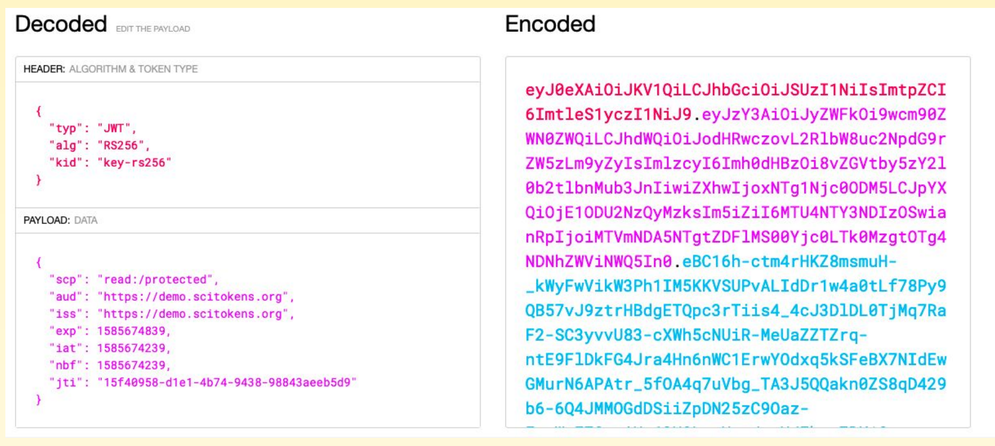
Using SciTokens SSH

```
[$ssh vt20@martok.ncsa.illinois.edu
[Enter your OAuth token:
 Last login: Wed Apr  8 15:57:57 2020 from vt20.security.ncsa.illinois.edu
 [vt20@martok ~]$
```

Authentication Succeeds

```
Enter your OAuth token:
Enter your OAuth token:
Enter your OAuth token:
vt20@martok.ncsa.illinois.edu's password:
Permission denied, please try again.
vt20@martok.ncsa.illinois.edu's password:
Received disconnect from 141.142.236.2 port 22:2: Too many authentication failures
Authentication failed.
```

Password prompt after token authentication fail



SciTokens Issuer

Related Work

- GSI-OpenSSH:
  Standard solution for remote login to scientific computing resource.
- Globus Auth SSH:
  Provides a pluggable authentication module (PAM) that accepts OAuth tokens for authentication.
- SciTokens:
  A JWT profile and associated open source implementation.

Evaluation and Security Analysis

- Eavesdropping access tokens:
  Attempt to obtain an access token when transported between the SSH client and server.
  - Countermeasure:
    Rely on the SSH protocol to encrypt the access token via an SSH public key encrypted channel.
- Leakage of tokens via log files:
  Access tokens may be logged.
  - Countermeasure:
    Log with just enough information to allow administrators and user to debug

Conclusions and Future Work

SciTokens SSH is a modification to Globus Auth SSH (a.k.a. XSEDE OAuth SSH) that adds support for SciTokens JWTs alongside the existing support for opaque Globus Auth tokens.

Future Work:

- Fine-grained access control:
  SciTokens can be issued with a restricted scope of claims. In the future, SciTokens SSH can integrate other SSH solutions that allow fine-grained access control.
- Automate authentication process:
  Currently, users will need to manually cut-n-paste the token to respond prompt.
- Account mapping and grouping:
  Globus Auth SSH allows mapping requested account to local account but currently, there is no need for SciTokens SSH to perform account mapping

https://scitokens.org/

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