MyProxy:
A Multi-Purpose Grid Authentication Service

Jim Basney
Senior Research Scientist
NCSA
jbasney@ncsa.uiuc.edu

What is MyProxy?

- A service for managing X.509 PKI credentials
  - A credential repository and certificate authority
- An Online Credential Repository
  - Issues short-lived X.509 Proxy Certificates
  - Long-lived private keys never leave the server
- An Online Certificate Authority
  - Issues short-lived X.509 End Entity Certificates
- Supporting multiple authentication methods
  - Passphrase, Certificate, PAM, SASL, Kerberos
- Open Source Software
  - Included in Globus Toolkit, VDT, and CoG Kits
  - C, Java, Python, and Perl clients available
  - Contributions from EDG, UVA, LBNL, and others

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MyProxy Logon

- Authenticate to retrieve PKI credentials
  - End Entity or Proxy Certificate
  - Trusted CA Certificates
  - Certificate Revocation Lists (CRLs)
- MyProxy maintains the user's PKI context
  - Users don't need to manage long-lived credentials
  - Enables server-side monitoring and policy enforcement (ex. passphrase quality checks)
  - CA certificates & CRLs updated automatically at login

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MyProxy Authentication

- Key Passphrase
- X.509 Certificate
  - Used for credential renewal
- Pluggable Authentication Modules (PAM)
  - Kerberos password
  - One Time Password (OTP)
  - Lightweight Directory Access Protocol (LDAP) password
- Simple Authentication and Security Layer (SASL)
  - Kerberos ticket (SASL GSSAPI)

MyProxy Online Certificate Authority

- Issues short-lived X.509 End Entity Certificates
  - Leverages MyProxy authentication mechanisms
  - Compatible with existing MyProxy clients
- Ties in to site authentication and accounting
  - Using PAM and/or Kerberos authentication
  - Map username to certificate subject via “gridmap” file or LDAP query
- Avoid need for long-lived user keys
- Server can function as both CA and repository
  - Issues certificate if no credentials for user are stored

MyProxy Online Credential Repository

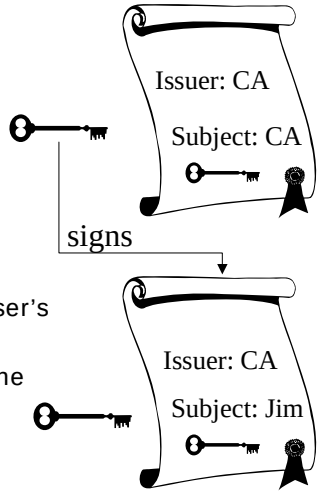
- Stores X.509 End Entity and Proxy credentials
  - Private keys encrypted with user-chosen passphrases
  - Credentials may be stored directly or via proxy delegation
  - Users can store multiple credentials from different CAs
- Access to credentials controlled by user and administrator policies
  - Set authentication requirements
  - Control whether credentials can be retrieved directly or if only proxy delegation is allowed
  - Restrict lifetime of retrieved proxy credentials
- Can be deployed for a single user, a site, a virtual organization, a resource provider, a CA, etc.

Talk Outline

- MyProxy Introduction
- PKI Introduction and MyProxy CA
- Proxy Certificates and MyProxy Repository
- MyProxy Scenarios
  - Administratively Loaded Credentials
  - Registration Portals
  - Web Portal Authentication and Delegation
  - Password-based Delegation
  - Credential Renewal
  - Web Single Sign-On (SSO)
- Demos
- Conclusion

PKI Overview

- Public Key Cryptography
  - Sign with private key, verify signature with public key
  - Encrypt with public key, decrypt with private key
- Key Distribution
  - Who does a public key belong to?
  - Certification Authority (CA) verifies user's identity and signs certificate
  - Certificate is a document that binds the user's identity to a public key
- Authentication
  - Signature [h (random, …)]



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PKI Authentication

Standard SSL/TLS Protocol (summarized)

Client — Server

$random_c$ →

← $certificate_s + random_s$

$certificate_c + \{ secret \}_{pubkey_s}$
$+ signature_c[h(random_c, random_s, \ldots)]$ →

← $\{ h(secret) \}_{secret}$

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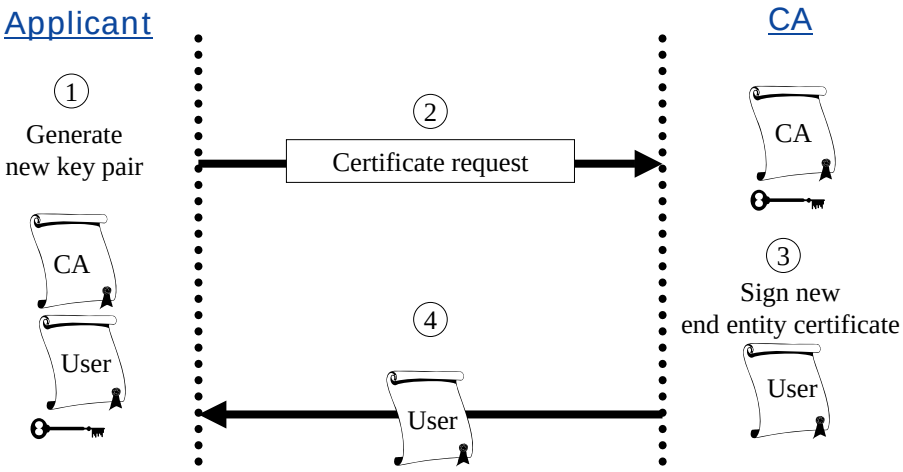
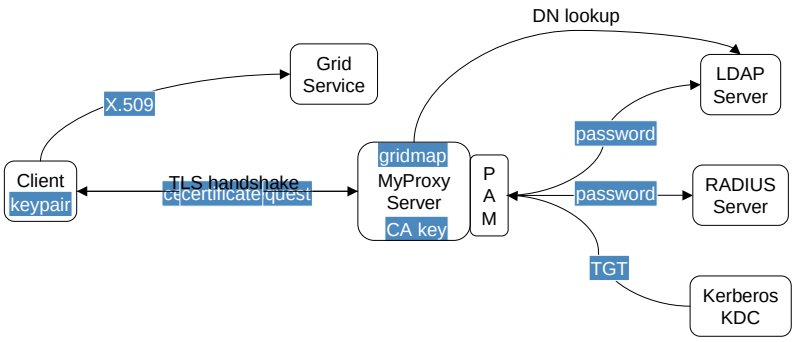
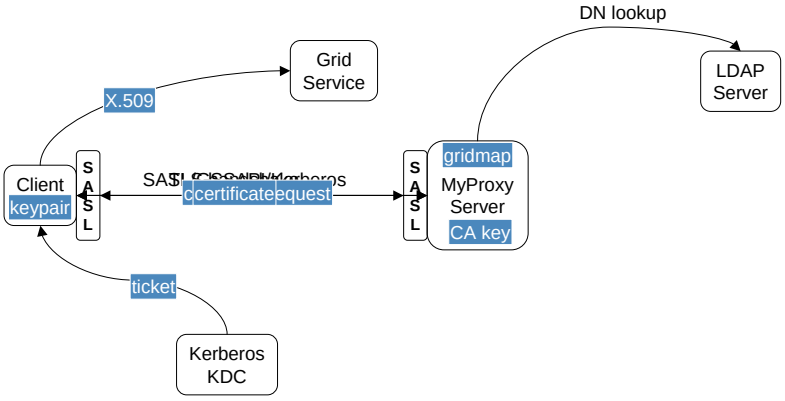
PKI Enrollment



MyProxy CA with PAM



MyProxy CA with Kerberos

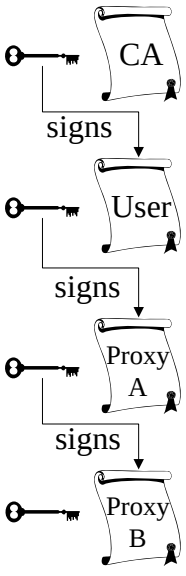


PAM/SASL Issues

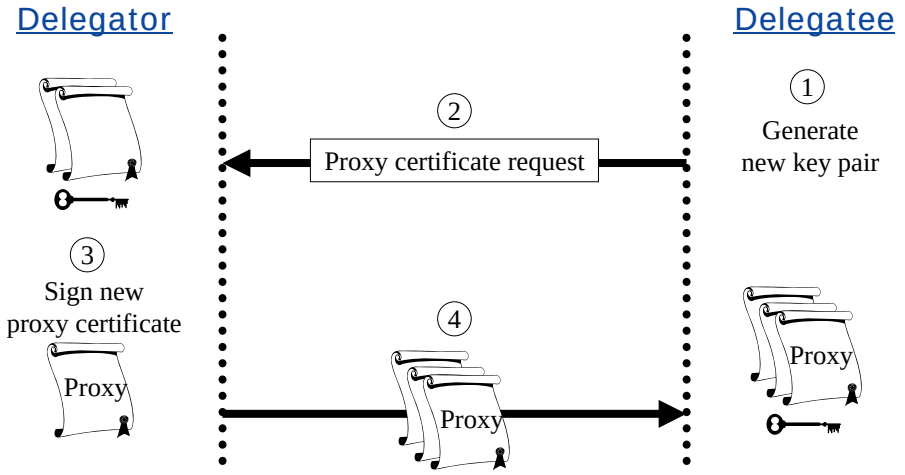
- PAM Conversation
  - PAM modules can require multiple rounds of user interaction
  - No standard protocol
    - SASL/PLAIN doesn't support multiple rounds
    - Need something like SSH keyboard-interactive protocol
- SASL client-side setup
  - Requires SASL library and configuration of SASL mechanisms
  - Alternative: native Kerberos protocol support

Proxy Credentials

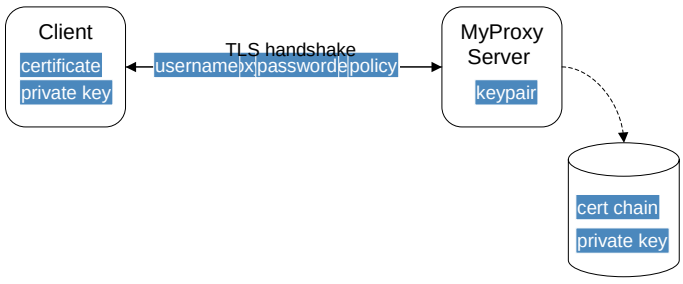
- RFC 3820: Proxy Certificate Profile
- Associate a new private key and certificate with existing credentials
- Short-lived, unencrypted credentials for multiple authentications in a session
  - Restricted lifetime in certificate limits vulnerability of unencrypted key
- Credential delegation (forwarding) without transferring private keys



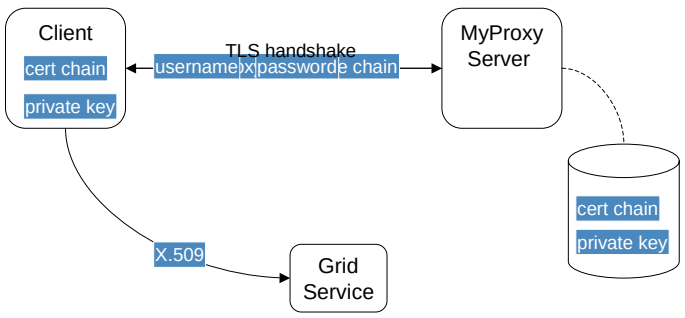
Proxy Delegation



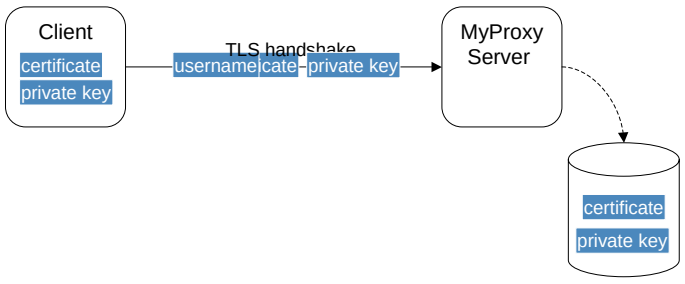
MyProxy Put



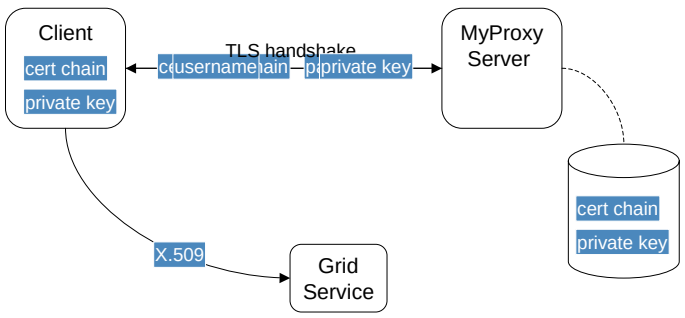
MyProxy Get



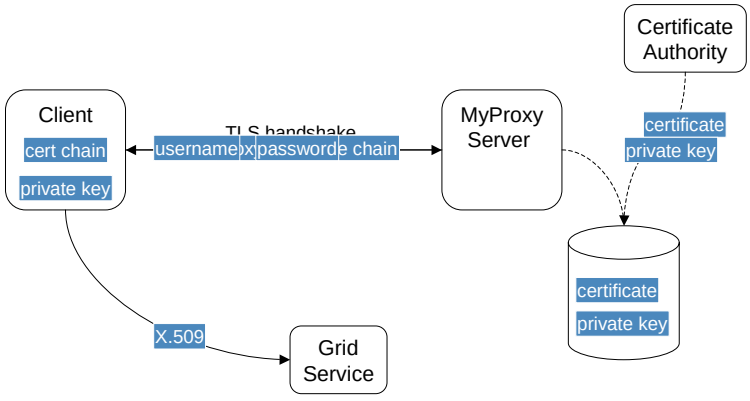
MyProxy Store



MyProxy Retrieve



Administratively Loaded Creds



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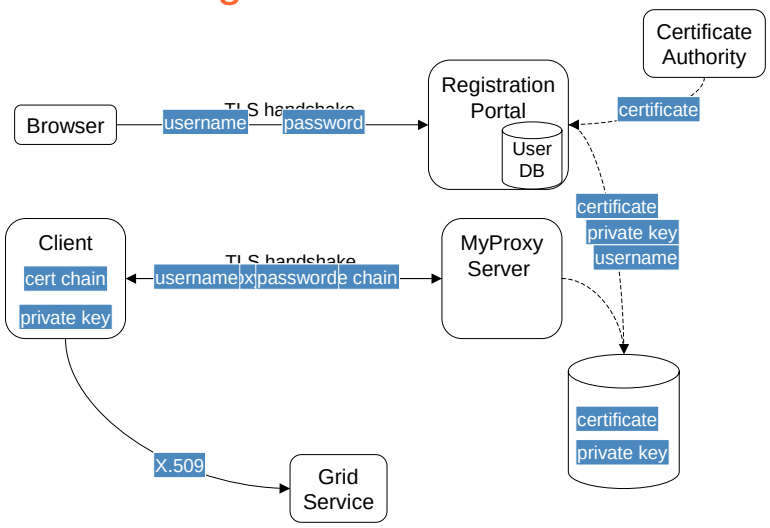
User Registration Portal



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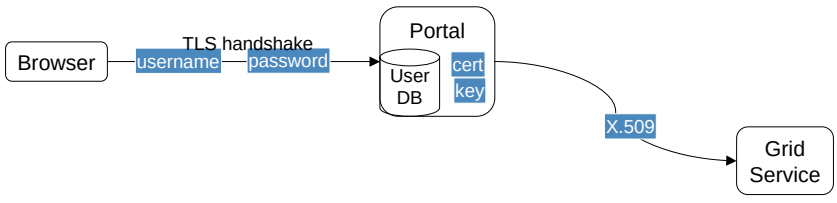
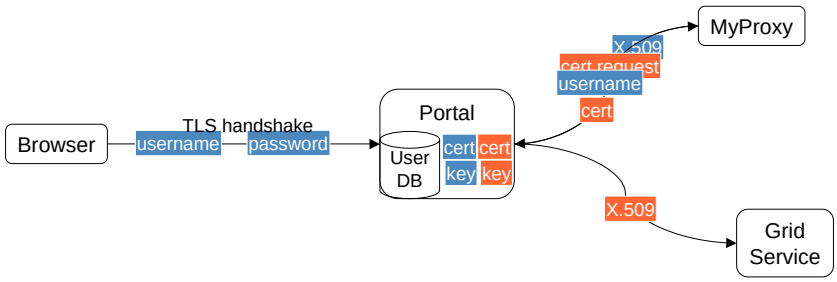
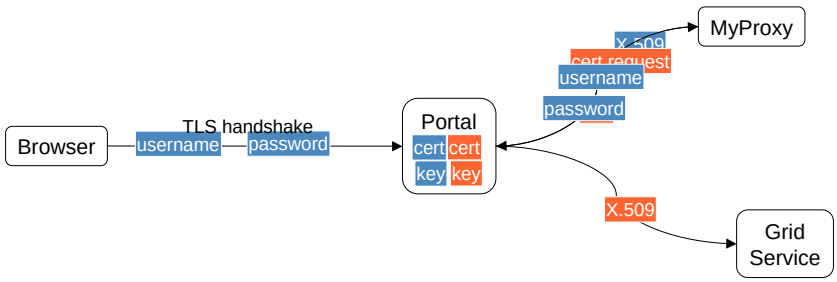
Gateway Portal



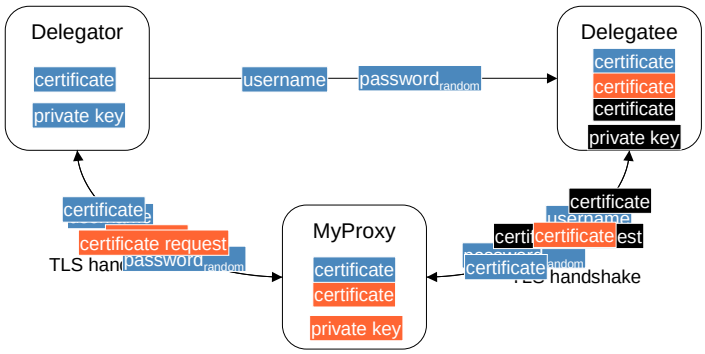
Trusted Portal



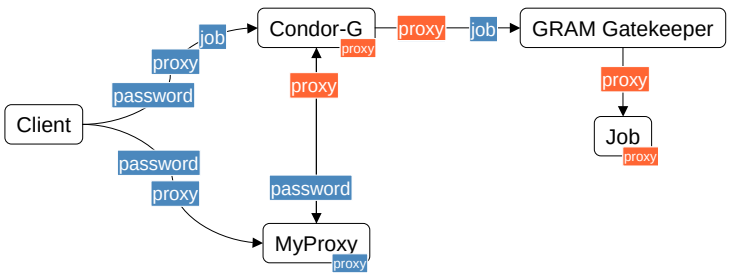
Password-based Portal Auth



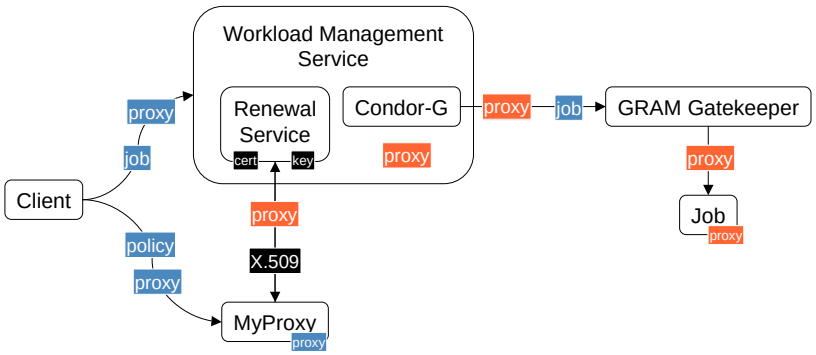
Password-based Delegation



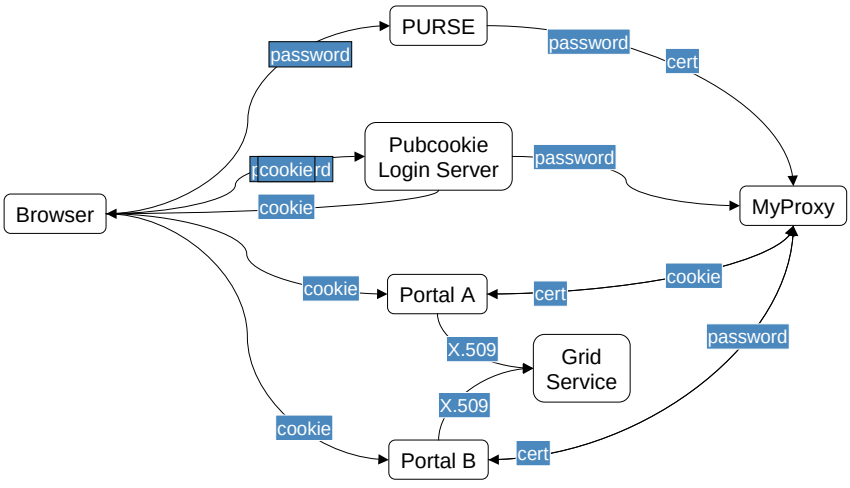
Password-based Renewal



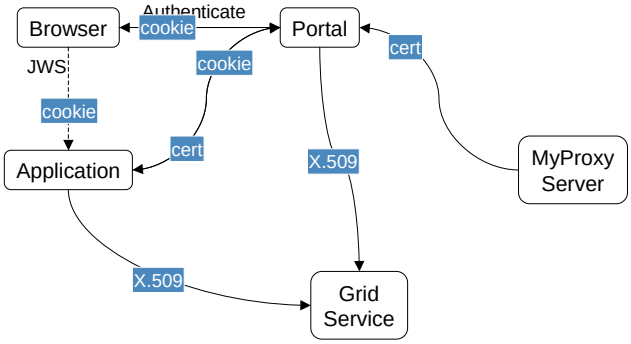
Certificate-based Renewal



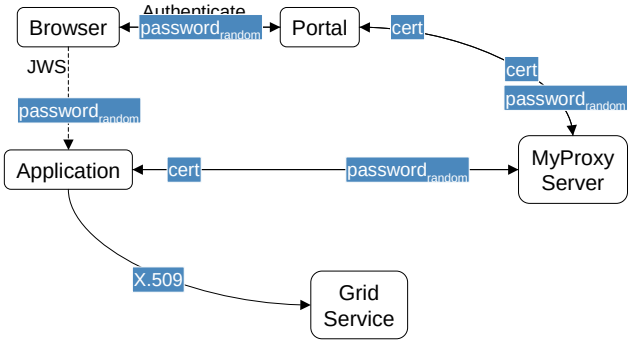
MyProxy and Web SSO



SSO for Browser and Application



SSO for Browser and Application



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Demonstrations

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Conclusion

- MyProxy: A Multi-Purpose Grid Authentication Service
  - Used in many delegation and single sign-on scenarios
- MyProxy provides practical authentication solutions
  - Minimize changes to existing software and protocols
  - Leverage community standards
    - PAM, SASL, Kerberos, LDAP, Pubcookie, Shibboleth
- Active MyProxy open source community
  - Deploy new developments via MyProxy
  - Benefit from the work of others

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