Using the **MyProxy** Online Credential Repository

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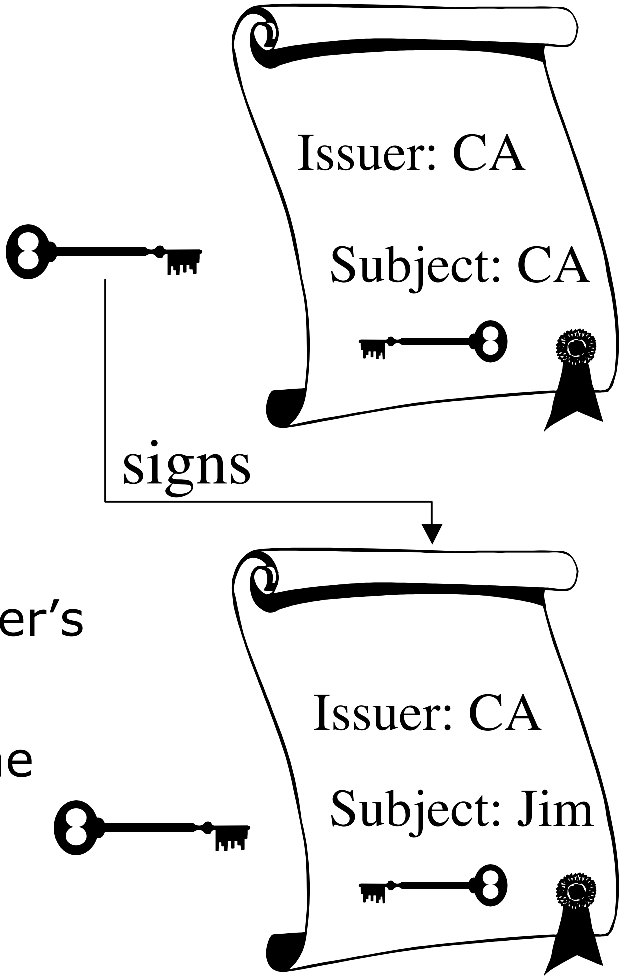
What is MyProxy?

- Independent Globus Toolkit add-on since 2000
  - To be included in Globus Toolkit 4.0
- A service for securing private keys
  - Keys stored encrypted with user-chosen password
  - Keys never leave the MyProxy server
- A service for retrieving proxy credentials
- A commonly-used service for grid portal security
  - Integrated with OGCE, GridSphere, and GridPort

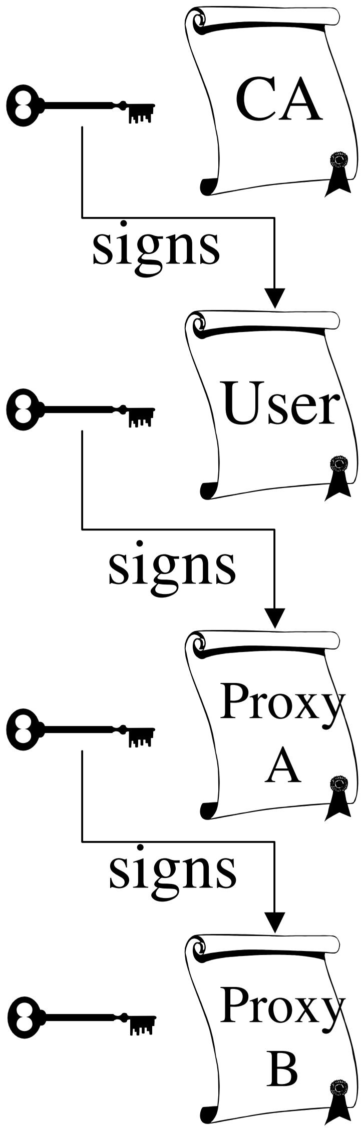
PKI Overview

- 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, …)]

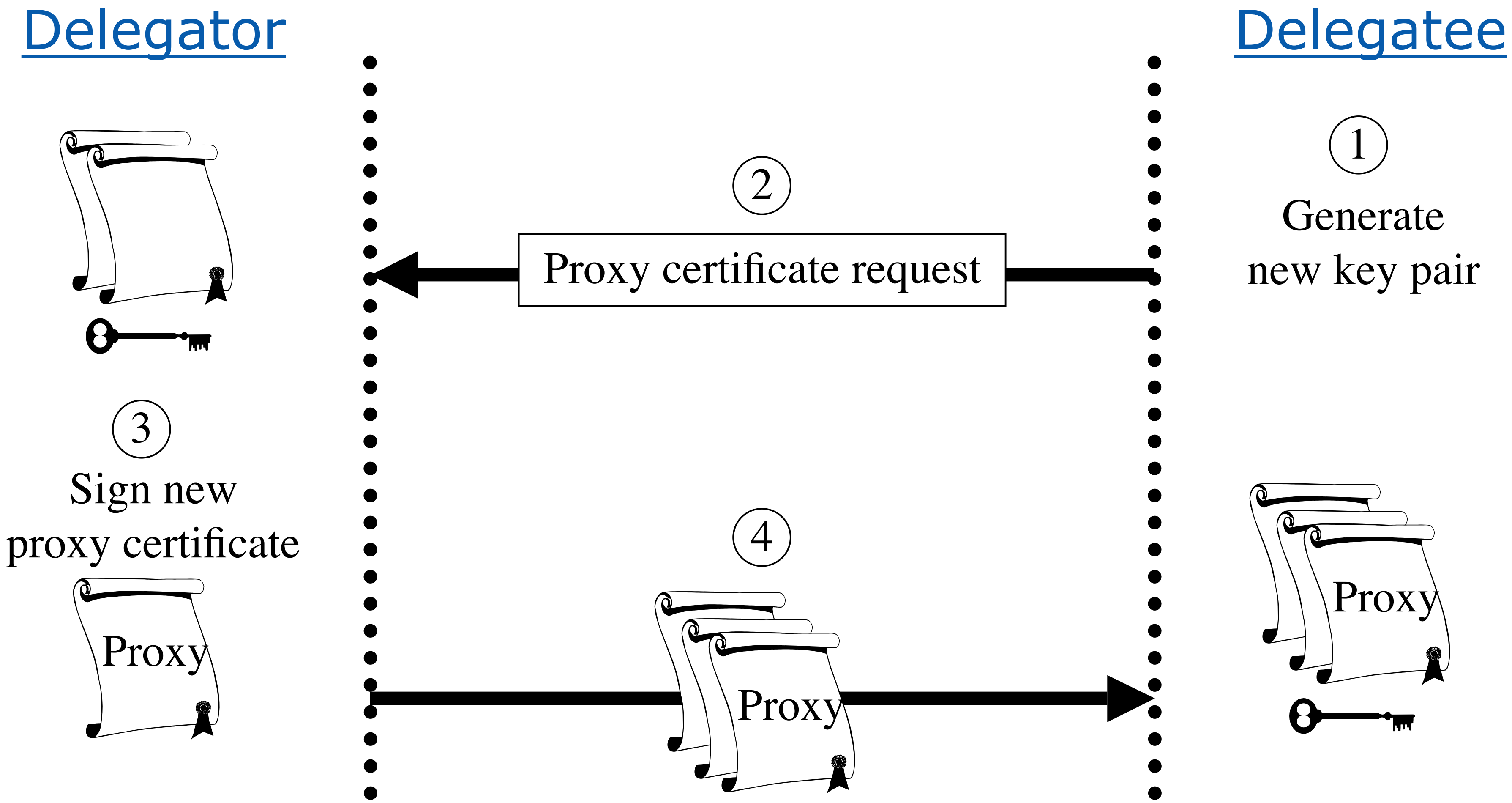


Proxy Credentials

- 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



Delegator

Delegatee

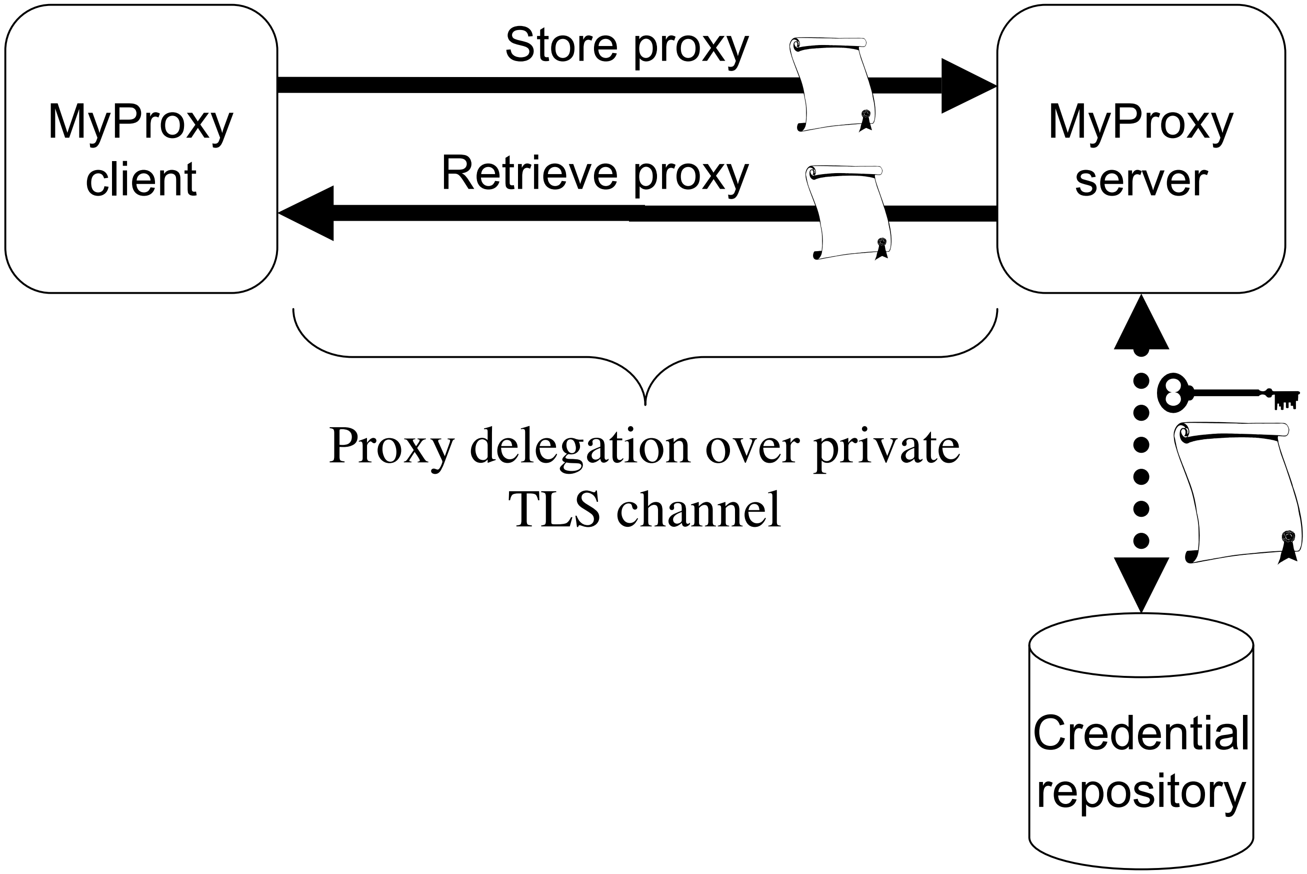
1 Generate new key pair

2 Proxy certificate request

3 Sign new proxy certificate

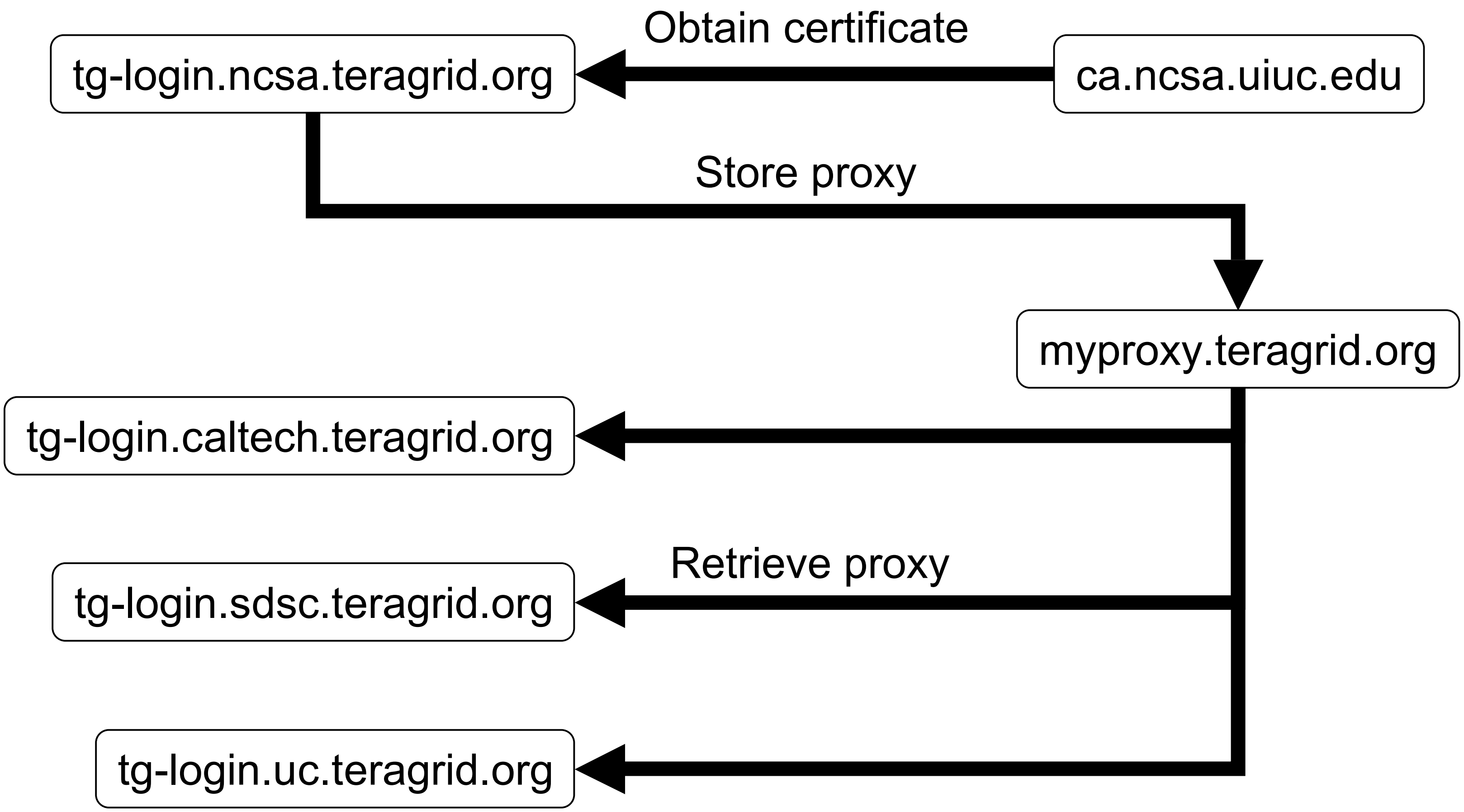
4

MyProxy System Architecture



Proxy delegation over private TLS channel

MyProxy: Credential Mobility



Obtain certificate

ca.ncsa.uiuc.edu

tg-login.ncsa.teragrid.org

Store proxy

myproxy.teragrid.org

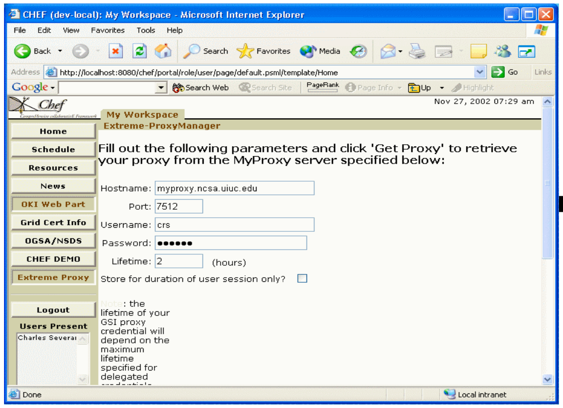
Retrieve proxy

tg-login.caltech.teragrid.org

tg-login.sdsc.teragrid.org

tg-login.uc.teragrid.org

MyProxy and Grid Portals



http://localhost:8080/chef/portal/role/user/page/default.psml/template/Home

Nov 27, 2002 07:29 am

Extreme-ProxyManager

Fill out the following parameters and click 'Get Proxy' to retrieve your proxy from the MyProxy server specified below:

Hostname: myproxy.ncsa.uiuc.edu

Port: 7512

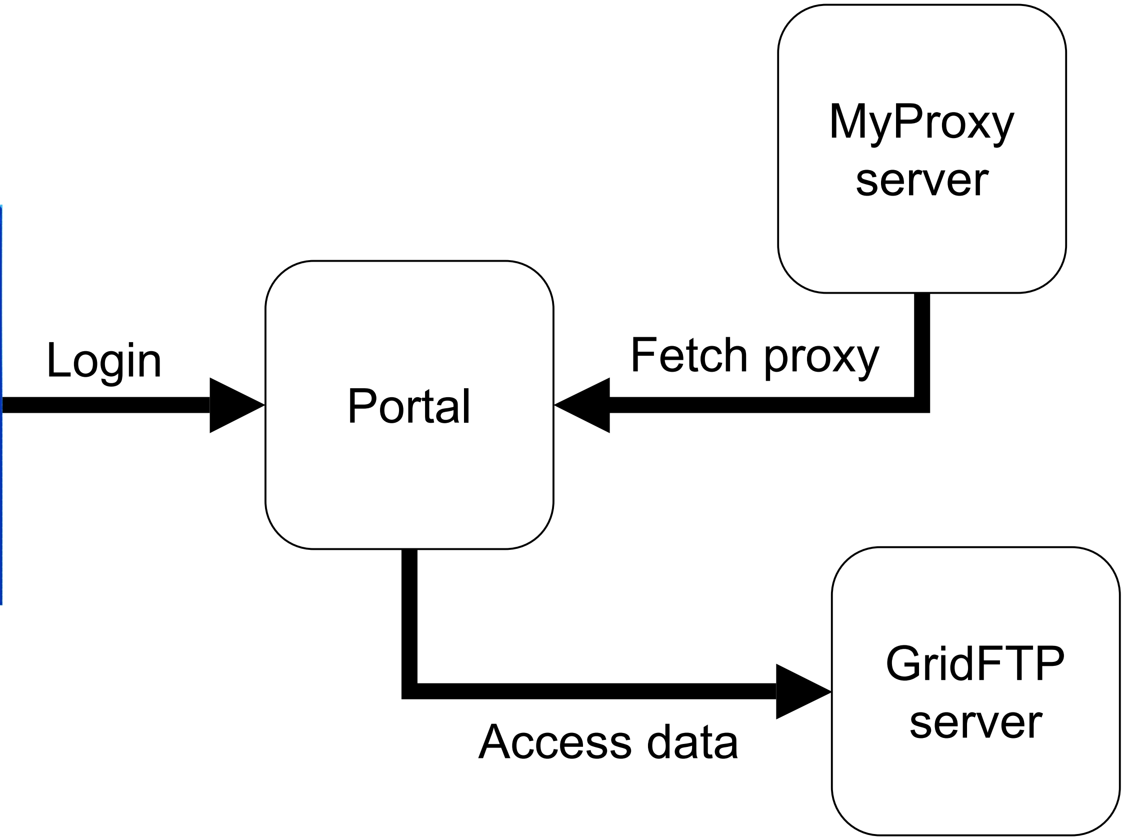
Username: crs

Password: ●●●●●●

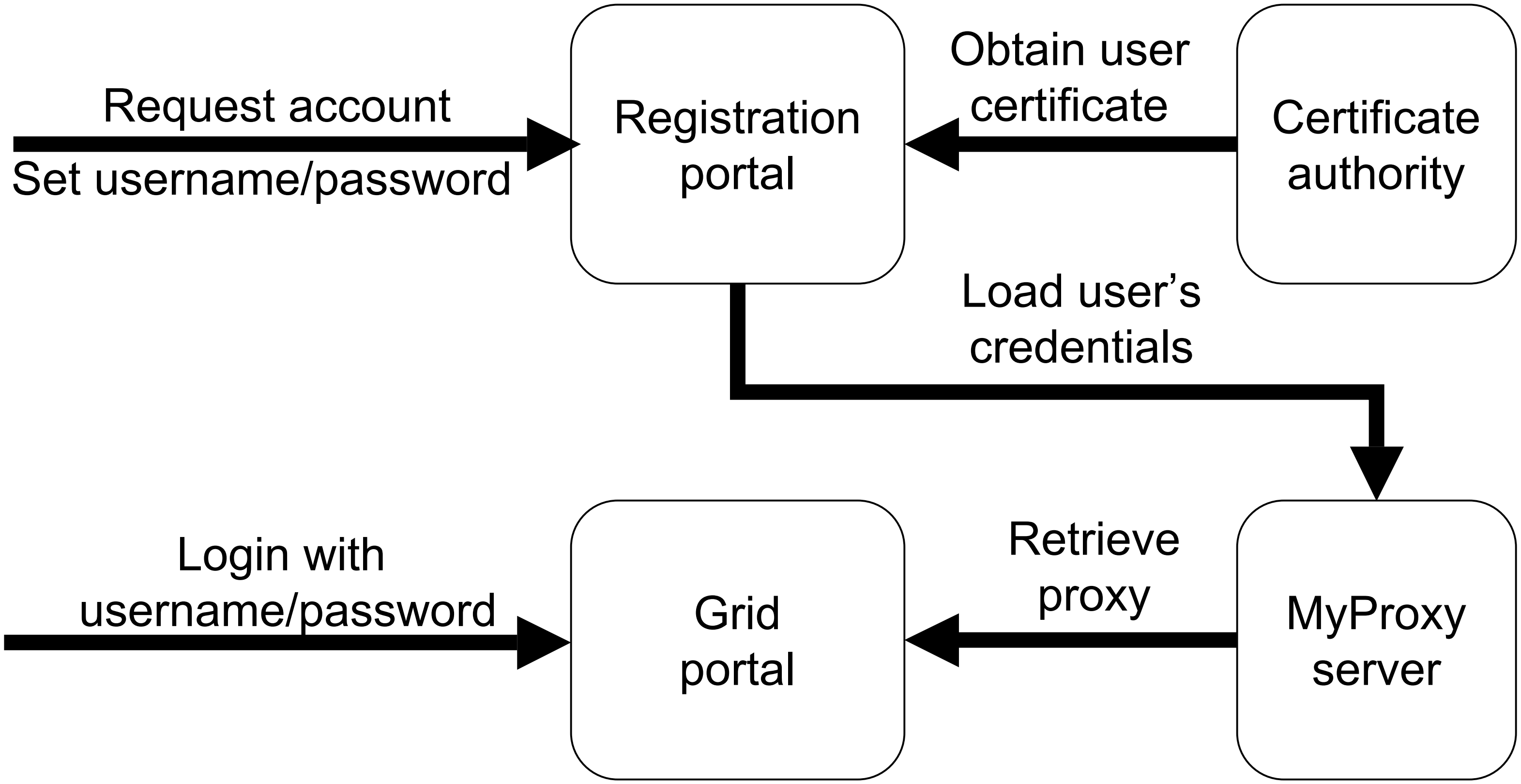
Lifetime: 2 (hours)

Store for duration of user session only? □

Note: the lifetime of your GSI proxy credential will depend on the maximum lifetime specified for delegated



MyProxy: User Registration



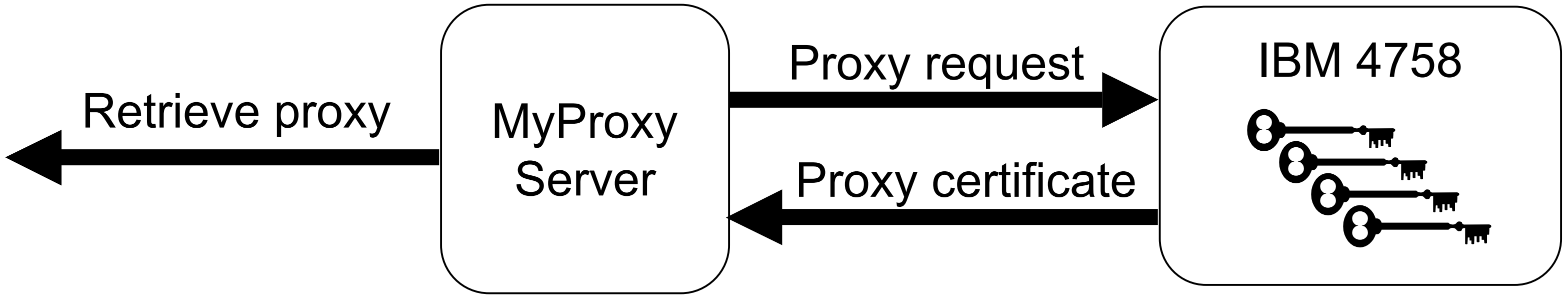
PURSE: Portal-based User Registration Service

MyProxy Security

- Keys encrypted with user-chosen passwords
  - Server enforces password quality
  - Passwords are not stored
- Dedicated server less vulnerable than desktop and general-purpose systems
  - Professionally managed, monitored, locked down
- Users retrieve short-lived credentials
  - Generating new proxy keys for every session
- All server operations logged to syslog
- Caveat: Private key database is an attack target
  - Compare with status quo

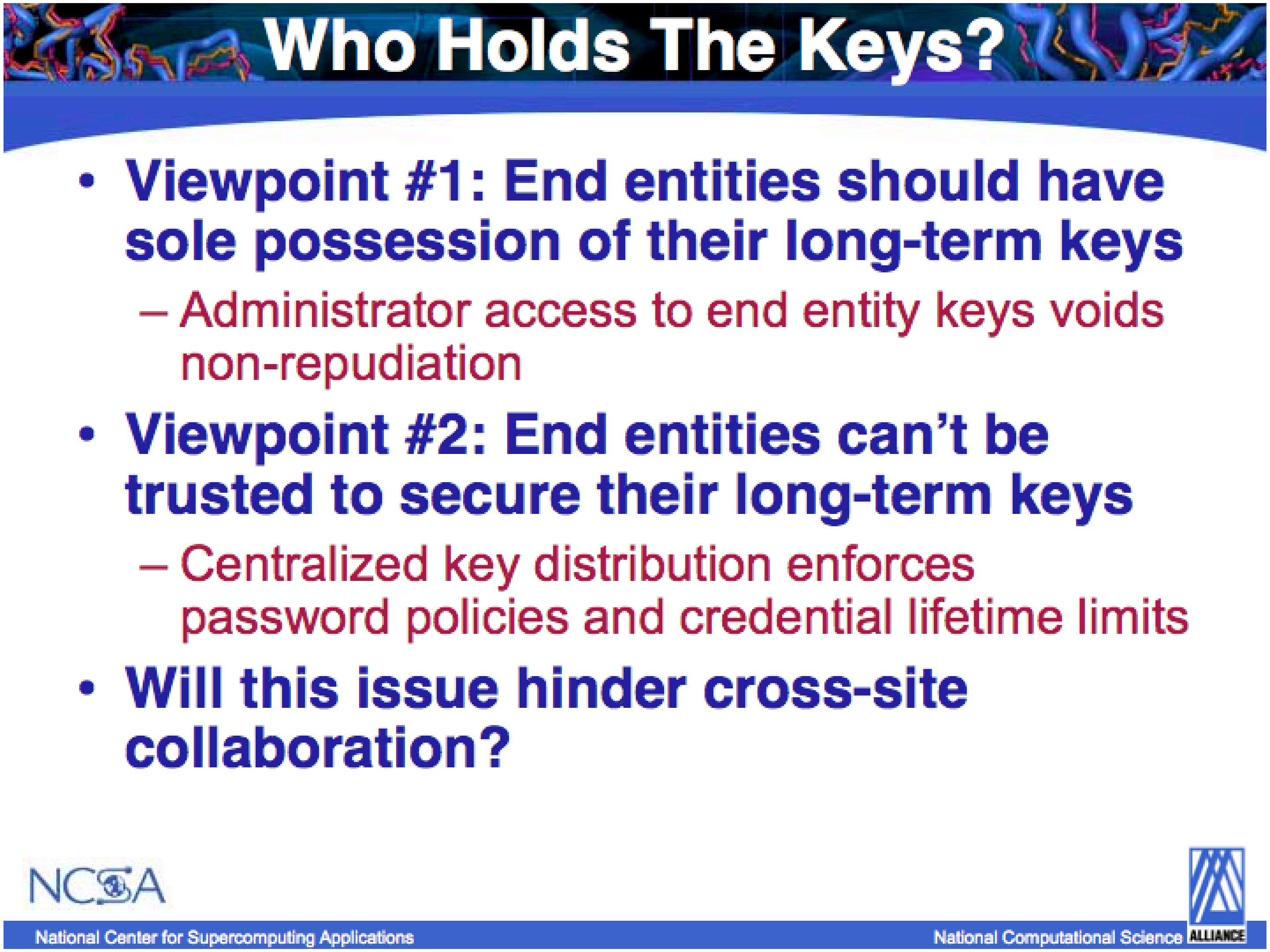
Hardware-Secured MyProxy

- Protect keys in tamper-resistant cryptographic hardware



M. Lorch, J. Basney, and D. Kafura, "A Hardware-secured Credential Repository for Grid PKIs," 4th IEEE/ACM International Symposium on Cluster Computing and the Grid (CCGrid), April 2004.

GlobusWORLD 2003 Flashback



Who Holds The Keys?

- Viewpoint #1: End entities should have sole possession of their long-term keys
  - Administrator access to end entity keys voids non-repudiation
- Viewpoint #2: End entities can’t be trusted to secure their long-term keys
  - Centralized key distribution enforces password policies and credential lifetime limits
- Will this issue hinder cross-site collaboration?

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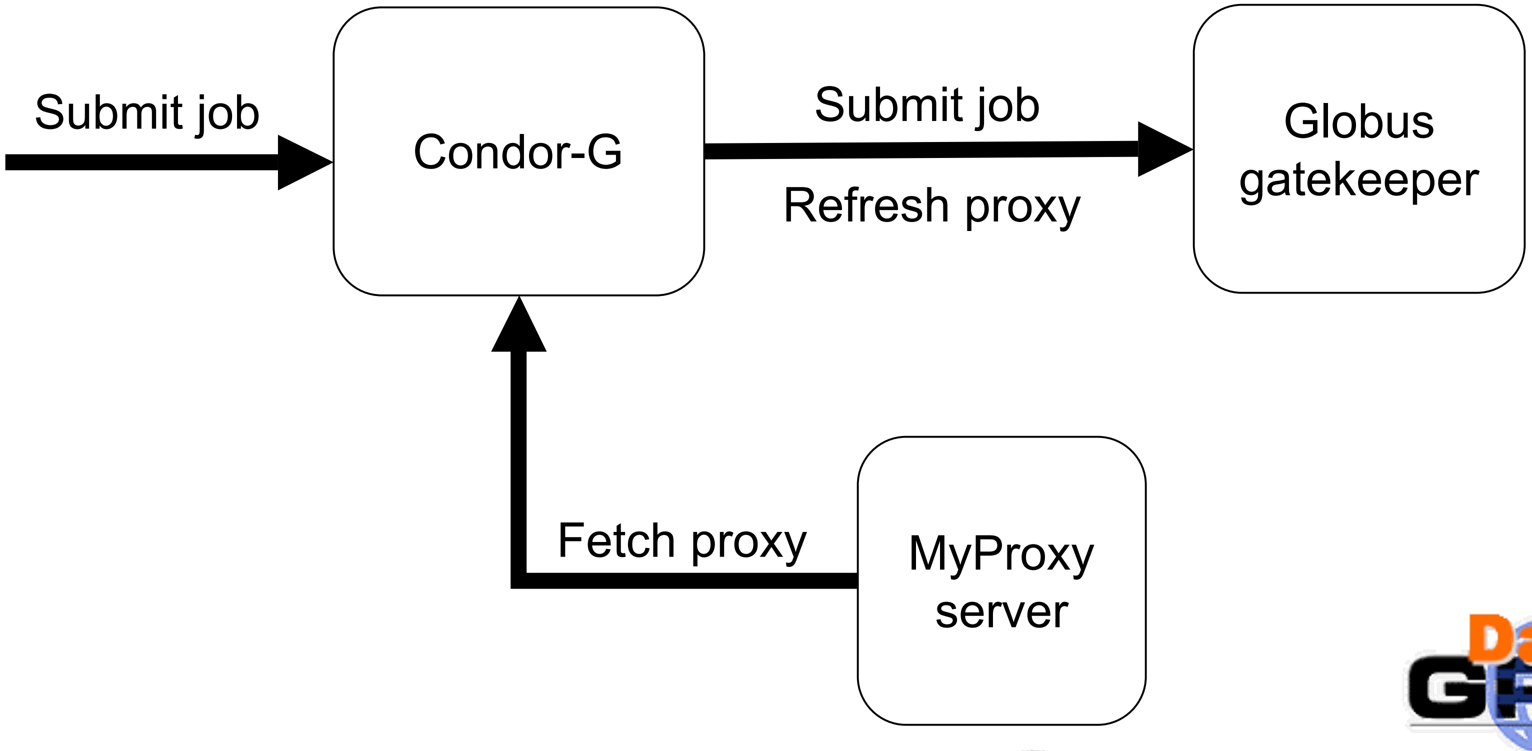
Credential Renewal

- Long-lived jobs or services need credentials
  - Task lifetime is difficult to predict
- Don’t want to delegate long-lived credentials
  - Fear of compromise
- Instead, renew credentials as needed during the job’s lifetime
  - Renewal service provides a single point of monitoring and control
- Renewal policy can be modified at any time
  - Disable renewals if compromise is detected or suspected
  - Disable renewals when jobs complete

MyProxy: Credential Renewal



MyProxy Installation (Unix)

- Included in GT 4.0
- As an add-on component to GT 3.x

```
$ gpt-build myproxy*.tar.gz <flavor>
```

- Set $MYPROXY_SERVER environment variable to myproxy-server hostname

```
$ export MYPROXY_SERVER=myproxy.ncsa.uiuc.edu
```

- Set Globus Toolkit environment

```
$ . $GLOBUS_LOCATION/etc/globus-user-env.sh
```

- Client installation/configuration complete!

MyProxy CoG Clients

- Commodity Grid (CoG) Kits
  - Provide portable (Java and Python) MyProxy client tools & APIs
  - Windows support
- For more information:
  - http://www.cogkit.org/

MyProxy Commands

- **myproxy-init**: store proxy
- **myproxy-get-delegation**: retrieve proxy
- **myproxy-info**: query stored credentials
- **myproxy-destroy**: remove credential
- **myproxy-change-pass-phrase**: change password encrypting private key

MyProxy Server Administration

- Install server certificate and CA certificate(s)
- Configure /etc/myproxy-server.config policy
  - Template provided with examples
- Optionally:
  - Configure password quality enforcement
  - Install cron script to delete expired credentials
- Install boot script and start server
  - Example boot script provided
- Use myproxy-admin commands to manage server
  - Reset passwords, query repository, lock credentials

MyProxy Server Policies

- Who can store credentials?
  - Restrict to specific users or CAs
  - Restrict to administrator only
- Who can retrieve credentials?
  - Allow anyone with correct password
  - Allow only trusted services / portals
- Maximum lifetime of retrieved credentials

server-wide
and
per-credential

MyProxy and SASL

- MyProxy supports additional authentication mechanisms via SASL (RFC 2222)
- One Time Passwords (SASL PLAIN with PAM)
  - Protect against stolen passwords
  - Hardware token generates OTP
  - Authenticate with OTP plus MyProxy password
  - Tested with CryptoCard tokens
- Kerberos (SASL GSSAPI)
  - Authenticate with Kerberos ticket plus MyProxy password

Related Work

- GT4 Delegation Service
  - Protocol based on WS-Trust and WSRF
- SACRED (RFC 3767) Credential Repository
  - http://sacred.sf.net/
- Kerberized Online CA (KX.509/KCA)
  - Kerberos -> PKI
- PKINIT for Heimdal Kerberos
  - PKI -> Kerberos

GridLogon

- Work in progress
- Inspired by Peter Gutmann's PKIBoot
  - "Plug-and-Play PKI:
    A PKI your Mother can Use"
- Password-based authentication to initialize user's security environment
  - Install identity/attribute/authorization credentials
  - Install CA certificates and CRLs
  - Install additional security configurations

MyProxy Community

- myproxy-users@ncsa.uiuc.edu mailing list
- Bug tracking: http://bugzilla.ncsa.uiuc.edu/
- Anonymous CVS access

  :pserver:anonymous@cvs.ncsa.uiuc.edu:/CVS/myproxy
- Contributions welcome!
  - Feature requests, bug reports, patches, etc.

Thank you!

Questions/Comments?

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