Security in Federated e-Infrastructure

and Identity Management

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Security Implications

Single-user vs. Federated Users

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Security Incident

- as it relates to federation's user management approach
- compromised appliances (images) out of scope here
- distinct possibilities:
  - compromised user account (credentials) $\rightsquigarrow$ malicious user
  - compromised virtual machine(s) $\rightsquigarrow$ malicious instance
  - often combined, malicious user(s) $\rightsquigarrow$ malicious instance(s)
- need for traceability user(s) $\leftrightarrow$ instance(s)
- need for dynamic and fine-grained access restrictions

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User Management

Single-user:

- incredibly simple to set up and maintain, little effort required
- can be created statically/manually by local administrators
- does not require synchronization, aside from the occasional change of credentials

Federated Users:

- requires considerable effort/development or an existing solution
- must be handled globally at the federation level
- frequent synchronization and consistency checks
- identity consolidation is a tricky business

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User Isolation

Single-user:

- high-level centralized tracking mechanism is required
- references between used resources and identities must be kept by the federation platform
- difficult to track a user with multiple personal identities

Federated Users:

- each site can use its own native tools
- no effort required at the federation platform level
- users with multiple identities are tracked by the user management platform

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Incident Handling

Single-user:

- difficult to trace an incident locally (owner? identity?)
- fine-grained/localized access restrictions cumbersome
- one compromised set of credentials can affect a lot of resources

Federated Users:

- easy to trace an incident to a particular user
- easy to restrict access just for the user in question
- compromised credentials affect only one "small" account

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Resource Allocation

Single-user:

- high-level centralized allocation & usage tracking mechanism is required
- enforcing quotas is difficult, existing local mechanisms are useless
- reservations/quotas "inside" the site nearly impossible

Federated Users:

- each site can use its own native tools
- quota enforcement usually already built-in
- relatively easy local per-group or per-user reservations/quotas

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Summary

- fully federated identity management is difficult to deploy
- in most cases, benefits outweigh the drawbacks in long-term
- especially when scaling the infrastructure
- offers ways to delegate responsibility (users, site admins, CMFs)

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Identity and Access Management System (IAM)

Perun

Perun manages

- Virtual organizations
- Users
- Groups
- Resources
- Attributes

VO and Group Management

Built-in support for virtual organizations

- Configurable enrollment form
- Delegation of rights to manage VO to the end users
- Access management for the VO resources

Group management

- Configurable application form
- Group manager role
- Automatic synchronization with external systems

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User Management

Identities

- User can have several existing identities
  - X.509 certificates, SAML, social identities, SSH keys, Kerberos principals, ...
- Identity consolidation
- Perun doesn't store user's password, private keys, ...

Enrollments

- Pre-filled information from external authN system

Service users

- Represents services

Access Management

Access Management

- Resources are assigned to the VOs
- Configuration of the access to the services
  - E.g. UNIX accounts, mailing lists, ACLs for web applications, OpenNebula

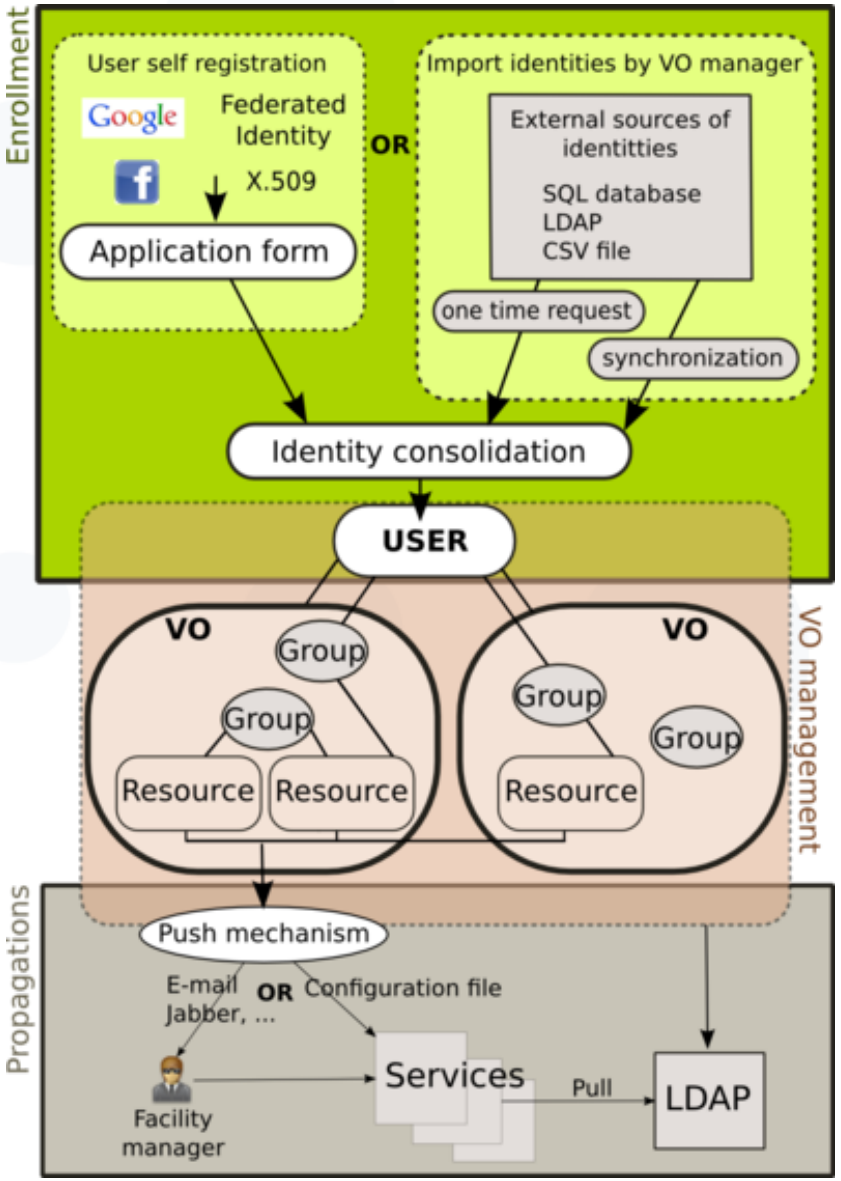
Push mechanism

- Omit online queries
- Push only on change (ideal for cloud platforms)

LDAP interface

- For LDAP compatible service

Enrollment and propagation



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Attributes Management

Attributes Management

- Every entity and also relationship can have assigned the attributes
- Different value types: string, number, list, array
- Access rights on attribute values

Attributes modules

- check proper value of the attribute
- fill default values
- check value of dependent attributes

Perun

Perun

- Identity and Access Management System (IAM)
- developed by CESNET and Masaryk University
- open source, available on github
- provided as virtual appliance

http://perun.cesnet.cz

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Thank you!

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