Perun

Perun Description

Michal Procházka, Michal Šťava,
Slávek Licehammer

History

- Perun v1
  - Supercomputing center in Brno
- Perun v2
  - local Grid computing site
- Perun v3
  - National Grid Infrastructure
  - Identity Federations
  - Global AAI
  - Joint development: CERIT-SC and CESNET

Motivation

- National Grid infrastructure
  - users from different institutions
  - different resource providers
- Difficult to manage distributed entities
- User registration is needed
  - users already have some digital identity
- Delegation of the rights to manage entities
- Configuration of the access rights
- Fill the gap between users and end services

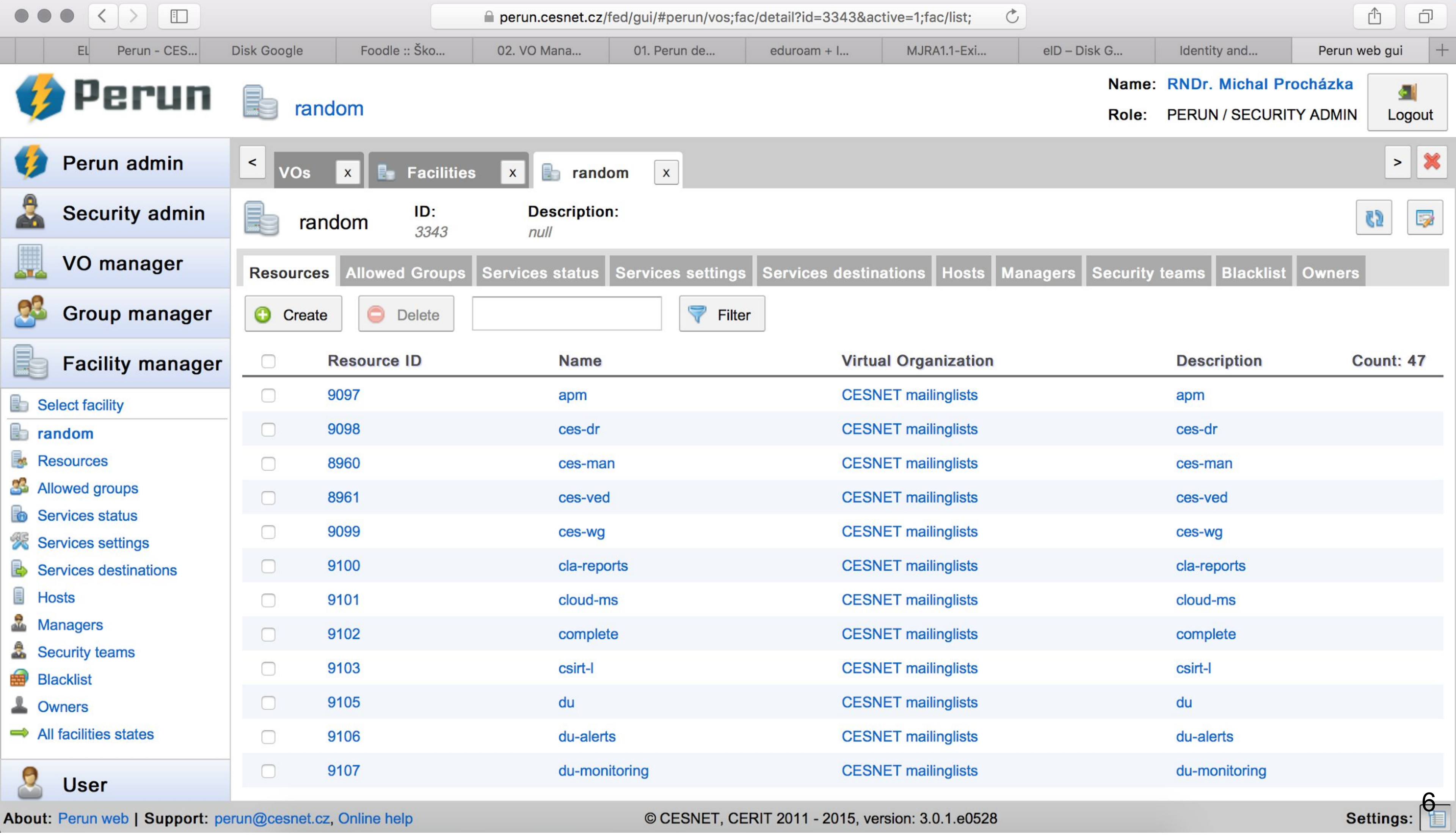
Perun Manages

- Virtual organizations
- Users
- Groups
- Resources
- Services
- Application forms
- Attributes, ...

What is it? (Shortly)

- IAM - Identity and Access Management
- Grab user identity -> categorize -> assign resources -> let them use the resources

Perun user interface



perun.cesnet.cz/fed/gui/#perun/vos;fac/detail?id=3343&active=1;fac/list;

random

Name: RNDr. Michal Procházka

Role: PERUN / SECURITY ADMIN

random

ID: *3343*

Description: *null*

☐	Resource ID	Name	Virtual Organization	Description	Count: 47
☐	9097	apm	CESNET mailinglists	apm	
☐	9098	ces-dr	CESNET mailinglists	ces-dr	
☐	8960	ces-man	CESNET mailinglists	ces-man	
☐	8961	ces-ved	CESNET mailinglists	ces-ved	
☐	9099	ces-wg	CESNET mailinglists	ces-wg	
☐	9100	cla-reports	CESNET mailinglists	cla-reports	
☐	9101	cloud-ms	CESNET mailinglists	cloud-ms	
☐	9102	complete	CESNET mailinglists	complete	
☐	9103	csirt-l	CESNET mailinglists	csirt-l	
☐	9105	du	CESNET mailinglists	du	
☐	9106	du-alerts	CESNET mailinglists	du-alerts	
☐	9107	du-monitoring	CESNET mailinglists	du-monitoring	

About: Perun web | **Support:** perun@cesnet.cz, Online help

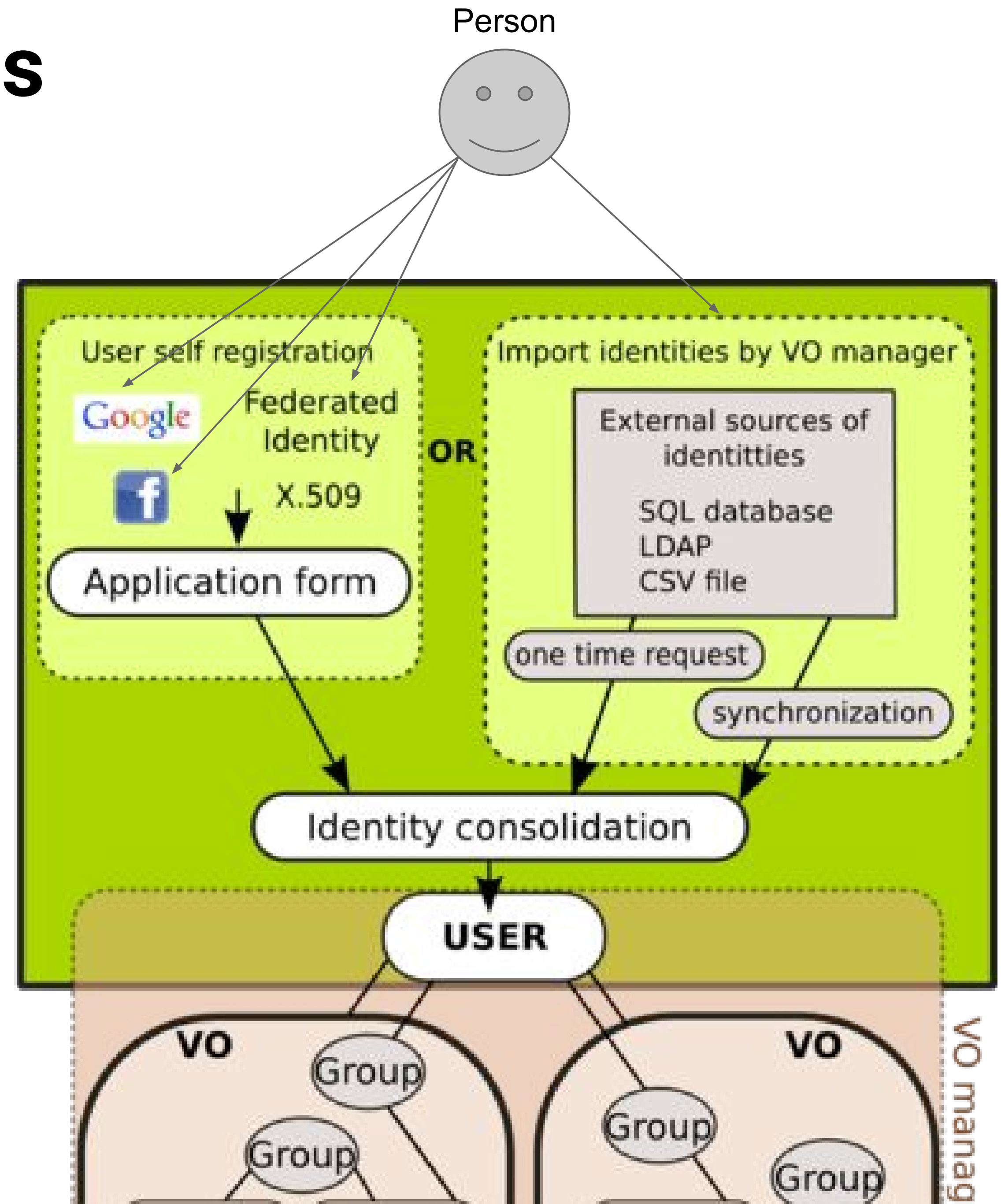
© CESNET, CERIT 2011 - 2015, version: 3.0.1.e0528

Perun

VO Administrator

Michal Procházka, Michal Šťava,
Slávek Licehammer

Entities



Person
User self registration
Google
Federated Identity
X.509
Application form
OR
Import identities by VO manager
External sources of identitties
SQL database
LDAP
CSV file
one time request
synchronization
Identity consolidation
USER
VO
Group
Group
VO
Group
Group
VO manag

User

- Represents physical person

- Ideally every person has only one user representation in Perun

- User can be identified using various digital identities
  - social/federated identity, digital certificate, ...

Virtual Organization (VO)

- Basic entity for users categorization
- Special type of a group
- Defined membership rules
- Defined purpose
- At least one VO administrator
- Entity which can have an agreement with service providers

Member

- Representation of user in VO
- Must obey VO membership rules
- Usually has limited lifetime
- One user can be member in several VOs

Group

- Categorization entity inside the VO
- Provides delegation support
- Basic entity used for access control

User lifecycle

1. Registration/import
2. Membership in VO
3. Membership in Groups
4. Access to the services
5. Membership renewal
6. Suspension/membership expiration

How to become a user

- Possess existing external identity supported by Perun
  - federated identity, social identity, digital certificate, …
  - user’s enrollment

- Import from existing identity management system
  - direct connection to the external system

Enrollment management

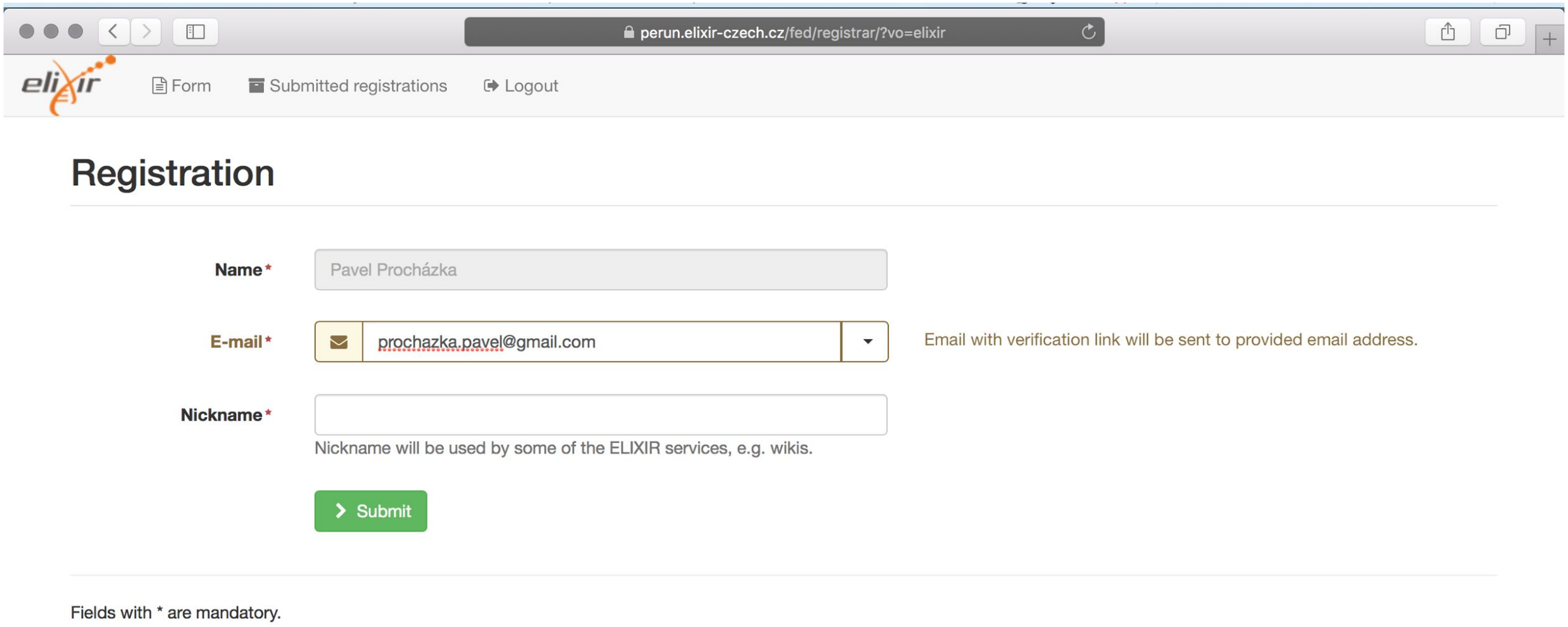
- Every VO can define its own application form
  - request various information from the users

- Initial vs. extension application form
- Automatic vs. manual approval

- Text and notification customization

- Multilingual support

Example of registration form



Registration

Name* Pavel Procházka

E-mail* prochazka.pavel@gmail.com

Email with verification link will be sent to provided email address.

Nickname*

Nickname will be used by some of the ELIXIR services, e.g. wikis.

Fields with * are mandatory.

Import

- Users import from existing identity management system (external source)
- Periodic vs. one time
- Mapping rules between Perun and external source
- Various protocols supported
  - LDAP, SQL, XML, CSV, AD, ...

Account linking

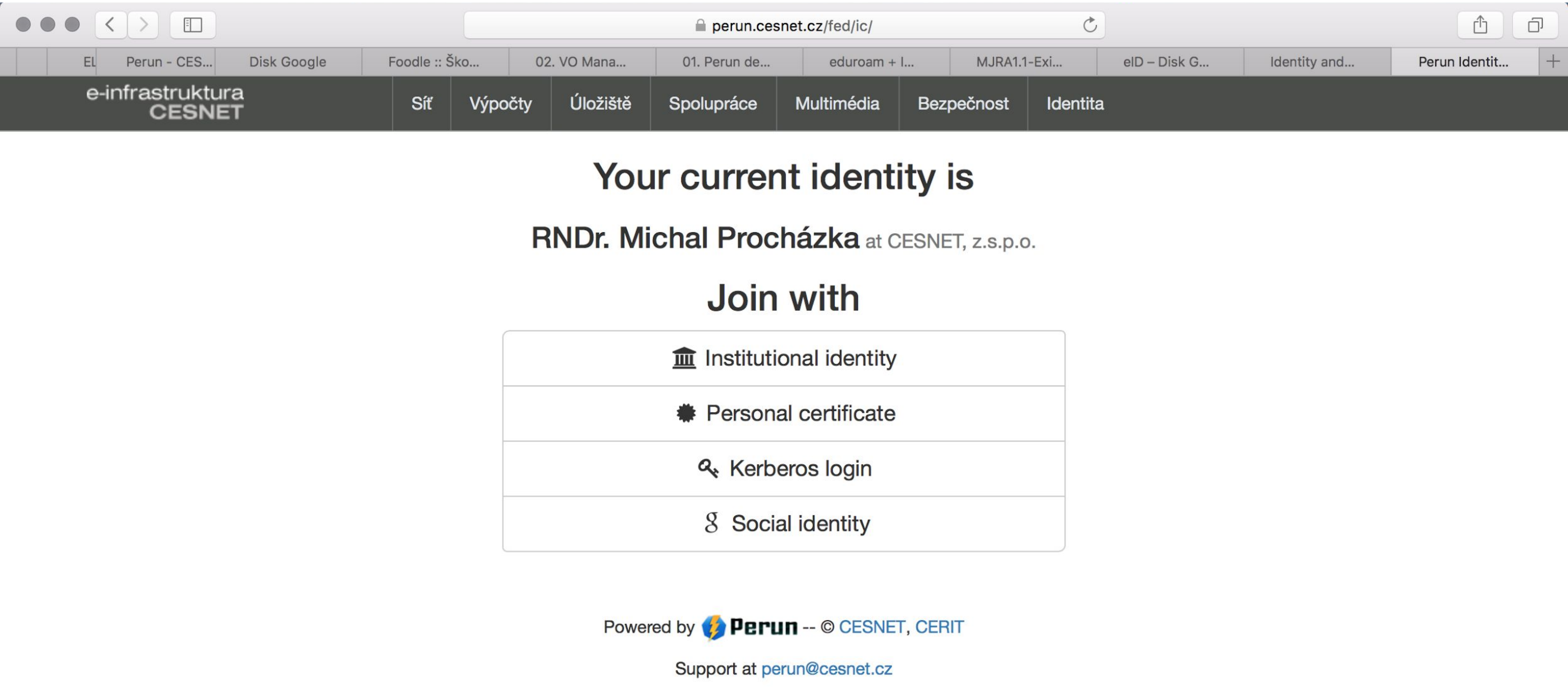
- User can possess more identities

- Perun is able to link/unlink those identities
    - Heuristic search

- User can access Perun and its components with any of linked identity

- Identities can be transferred to end services

Account linking example



Your current identity is

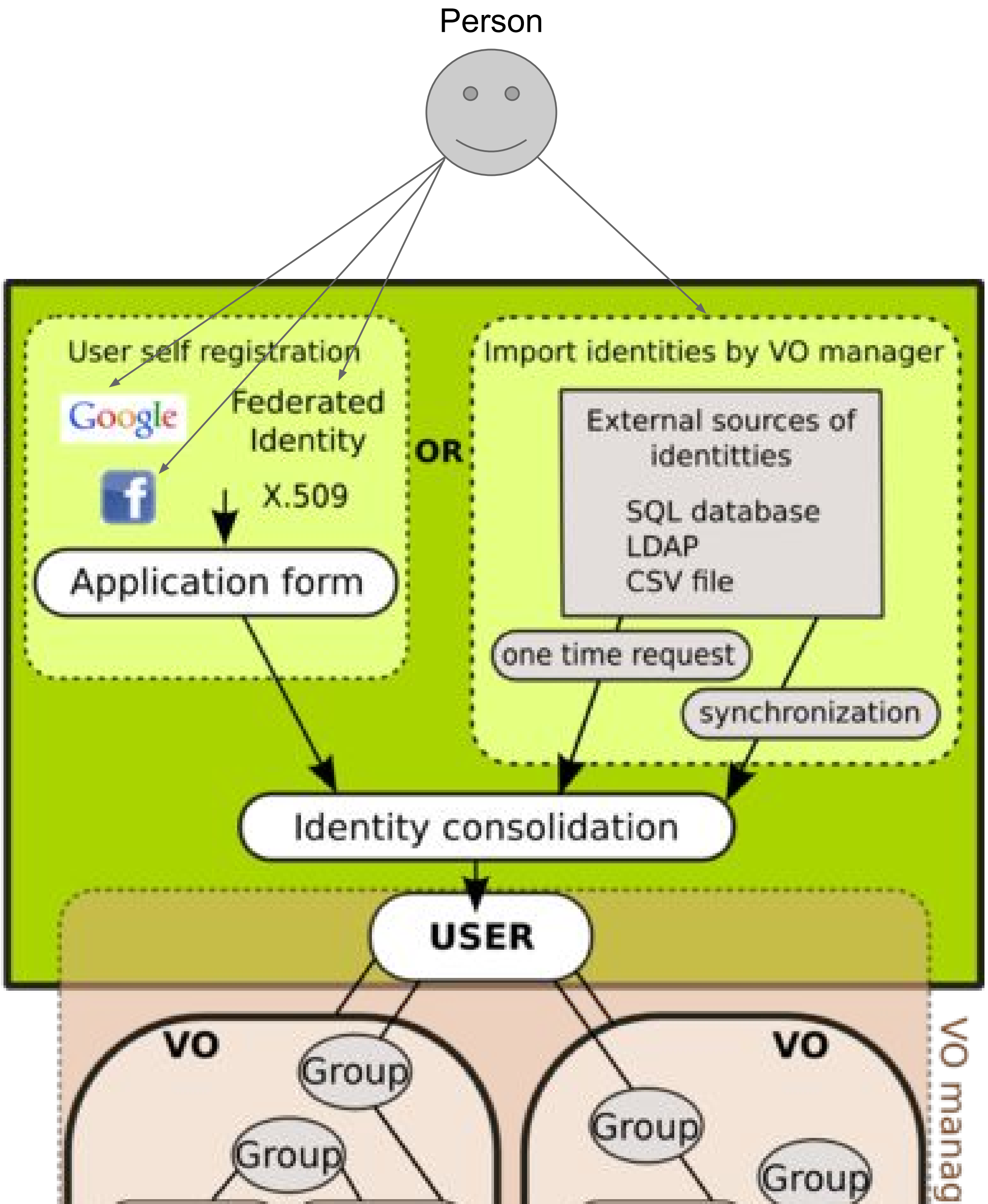
RNDr. Michal Procházka at CESNET, z.s.p.o.

Join with

- Institutional identity
- Personal certificate
- Kerberos login
- Social identity

Powered by Perun -- © CESNET, CERIT

Support at perun@cesnet.cz


Person
User self registration
Google
Federated Identity
X.509
Application form
OR
Import identities by VO manager
External sources of identitties
SQL database
LDAP
CSV file
one time request
synchronization
Identity consolidation
USER
VO
Group
Group
VO
Group
Group
VO manag

User’s roles

- Perun admin
  - God
- VO admin
  - manages whole VO including Group and all associated entities
- Group admin
  - manages group membership
- User
  - self-management

Live Demo

- Create a VO
- Invite member by an e-mail
- Add member from external source
- Create a group
- Add member to the group

Perun

Facility/Resource/Service Management

Michal Šťava, Michal Procházka,
Slávek Licehammer

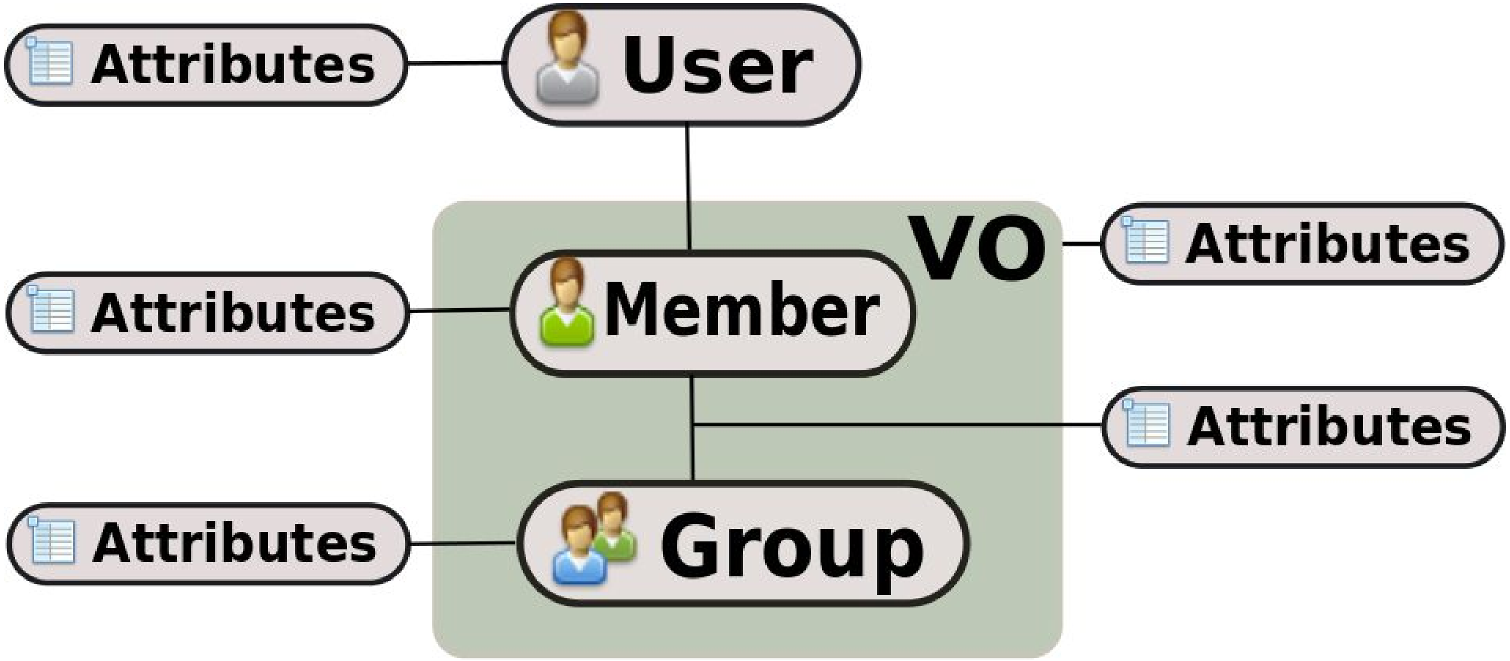
Outline

- Attributes
- Facility
- Resource
- Group
- Relationship between F/R/G
- Owners, Perun services and Destinations
- gen/send/slave vs LDAP
- Examples

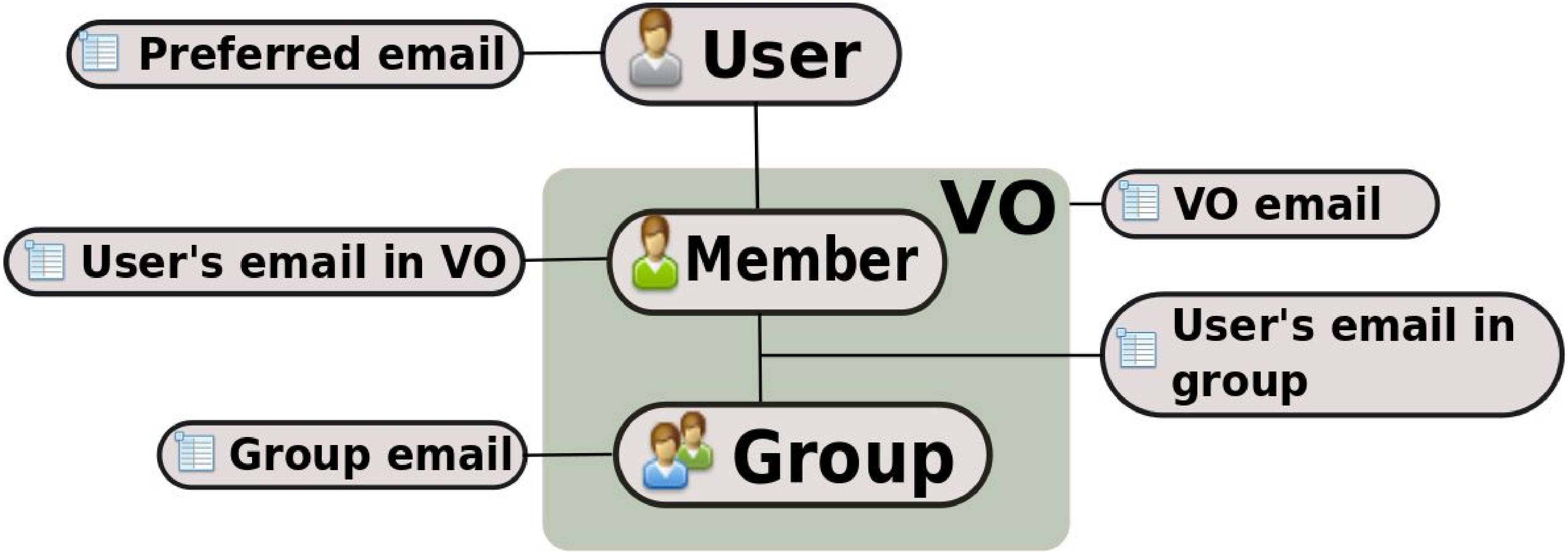
Attributes

- Piece of information attached to the entities and relations among entities
- Various formats (String, Integer, List, Map)
- Attribute modules
  - Syntax checks
  - Auto-fill
  - Dependency checking
- All data in Perun can be obtained via Attributes

Attributes


Attributes
User
VO
Attributes
Attributes
Member
Attributes
Attributes
Group

Attributes


Preferred email
User
VO
VO email
User's email in VO
Member
User's email in group
Group email
Group

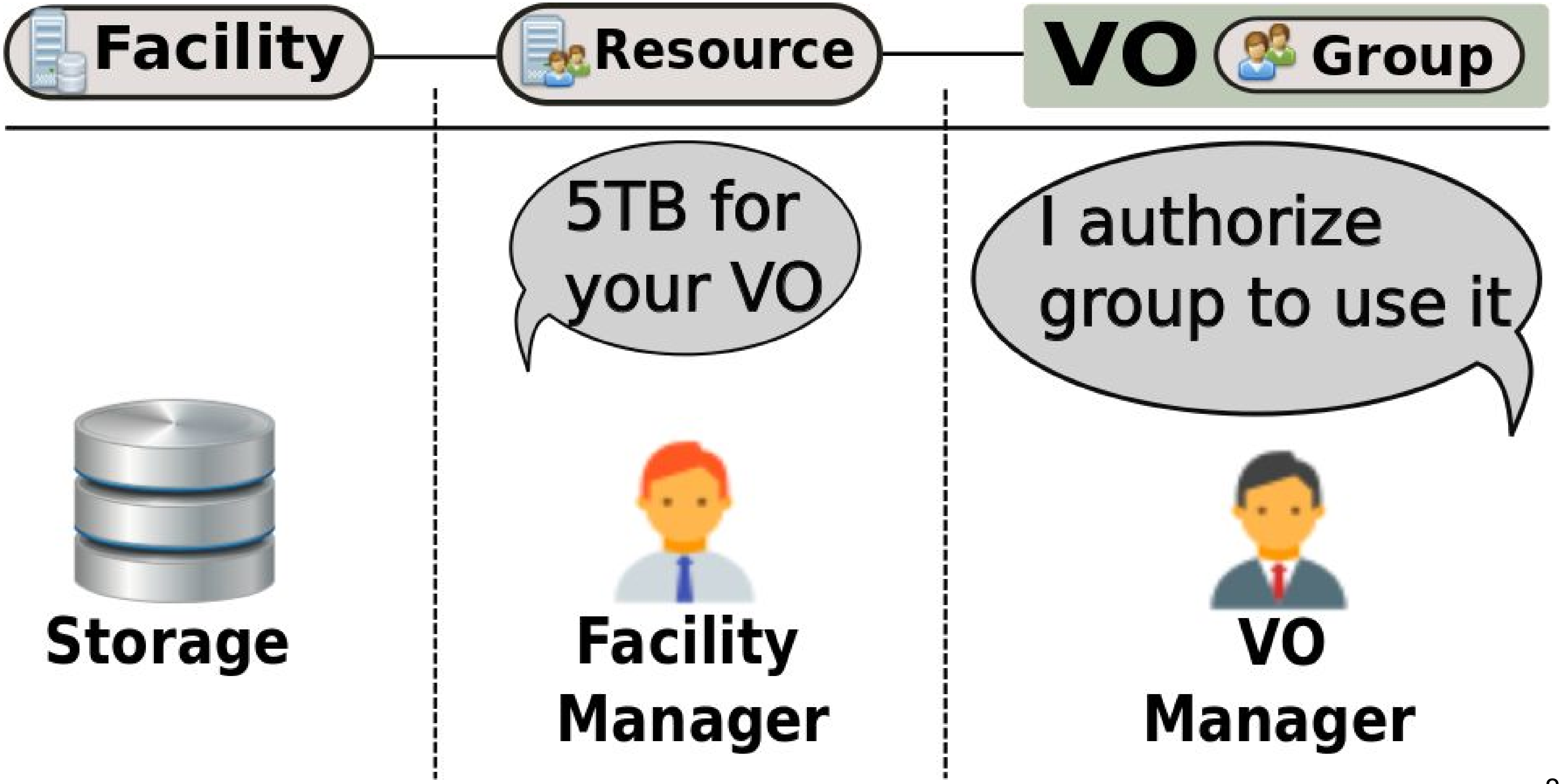
Facility

- Real world entity managed by Perun
    - physical or virtual (cluster vs mailing list)
    - homogenous configuration
- Has a set of specific attributes
- Can provide Resources to VOs
- Managed by Facility Manager

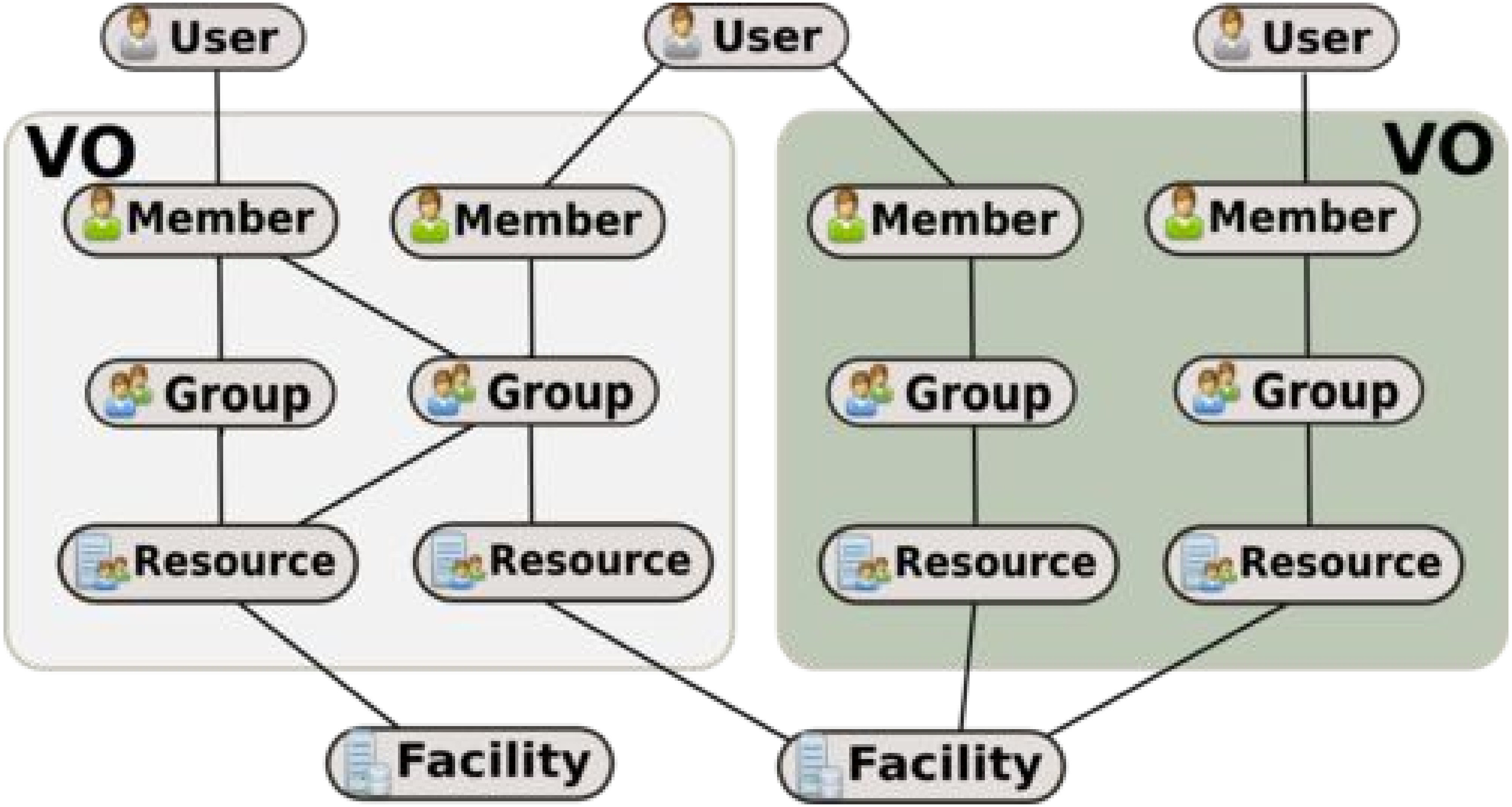
Resource

- Access to specified part of Facility for VO
- Resources are VO specific
- May restrict usage conditions (e.g.: disk quotas)
- Groups are assigned to Resources

Facility and Resource



Relationship



Responsibilities

- Facility Manager:
  - creates and manages Facilities
  - creates Resources
  - assigns them to VOs
  - prepare services and other settings
- VO Manager:
  - chooses and assigns people on provided Resources
  - manages selected Resources Attributes

Owners

- Owner is an administrative contact for Facility
- Contact to:
  - Person (not need to exists in Perun)
  - Organization
  - other
- Description or name with contact information (email, telephone number etc.)

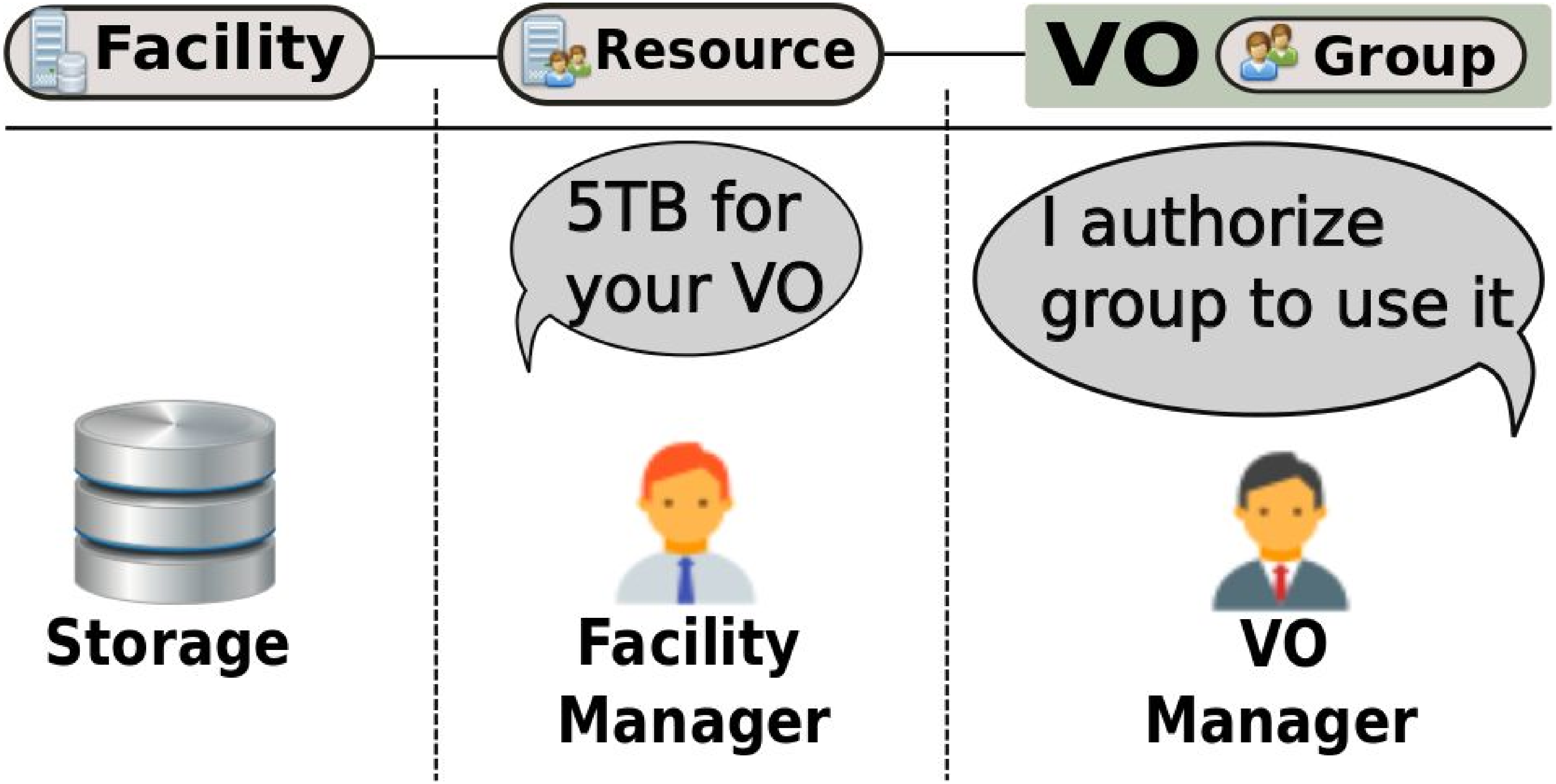
Perun services

- Representation of a service on the Facility
- Script (or program) obtaining data about Perun entities assigned to the Resource
  - gen, send, slave scripts (explain later)
  - data for authorization decision support
  - saved in Attributes (user, facility etc.)
- Data for authorization are propagated to end services
  - e.g.: set unix account for all authorized users

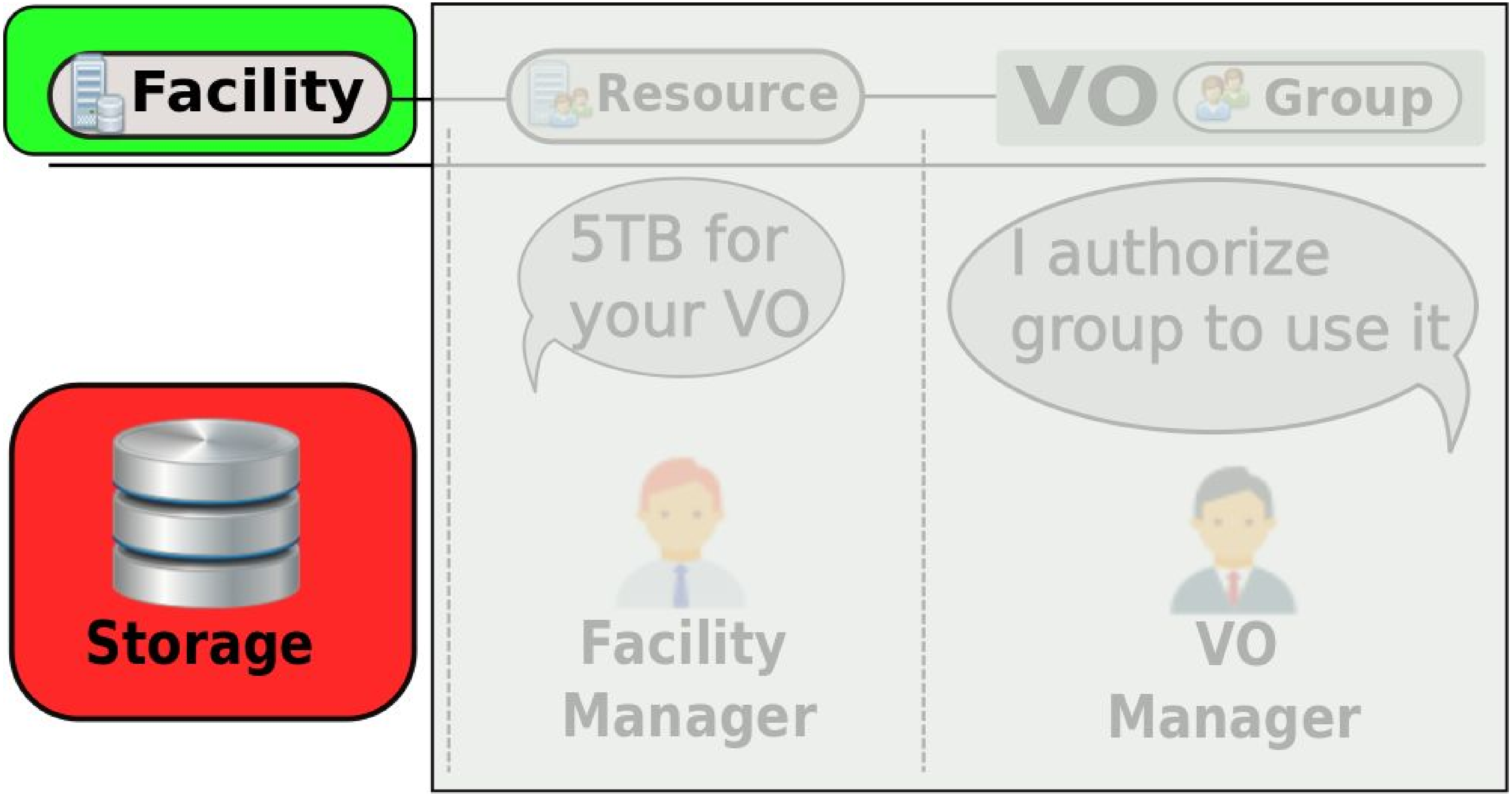
Destinations

- Describe way to transfer configuration from Perun to real world entities
- Target of authorization data propagation
- Assigned to the Facility
- It is pair:
    - Perun Service
    - definition of a target propagation
- Managed by Facility Manager

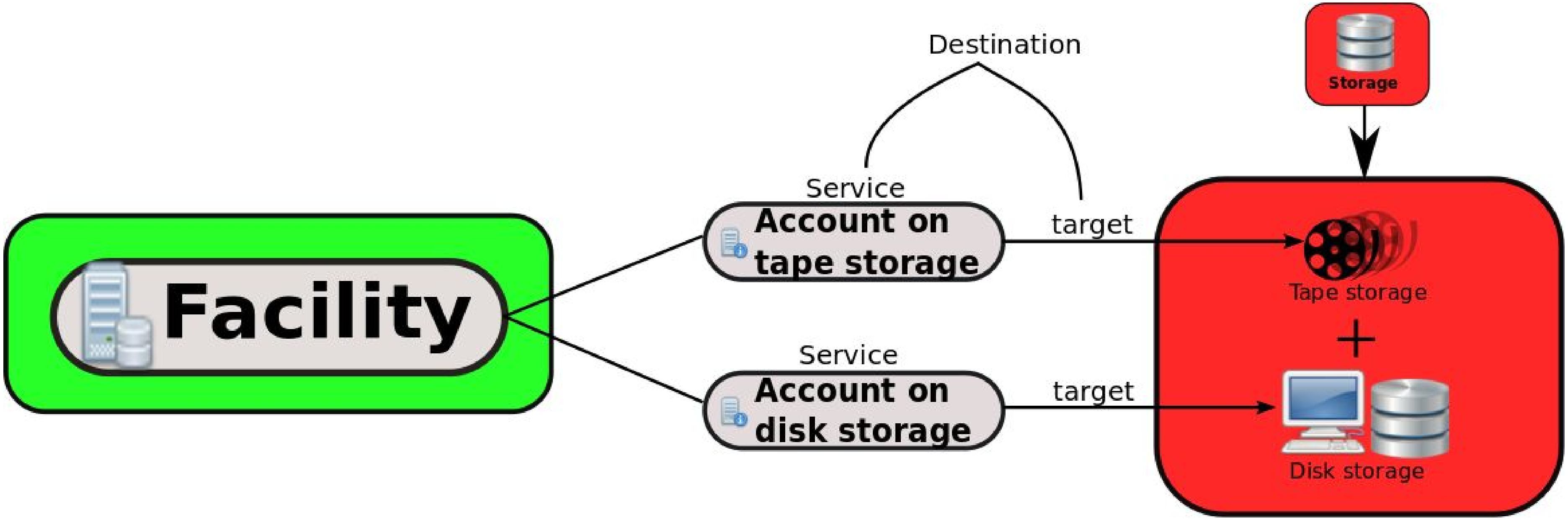
Perun to real world mapping



Perun to real world mapping



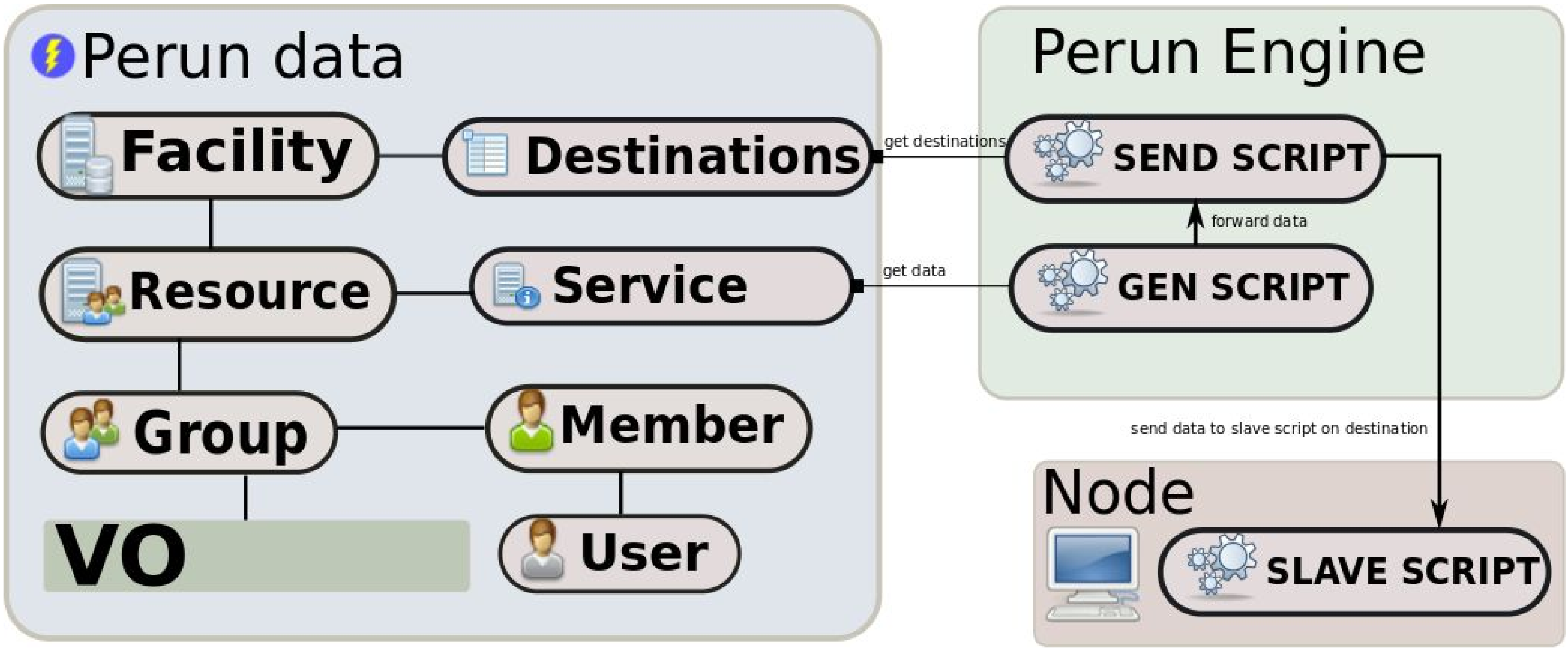
Perun to real world mapping



gen/send/slave

- Most frequent propagation process
- There are 3 types of script:
  - GENERATE: generates authorization data (about Users, Groups etc.)
  - SEND: send already generated data to destinations
  - SLAVE: sits on destination, receives data from send script and process them (update web ACL, restart service etc.)
- It takes some time

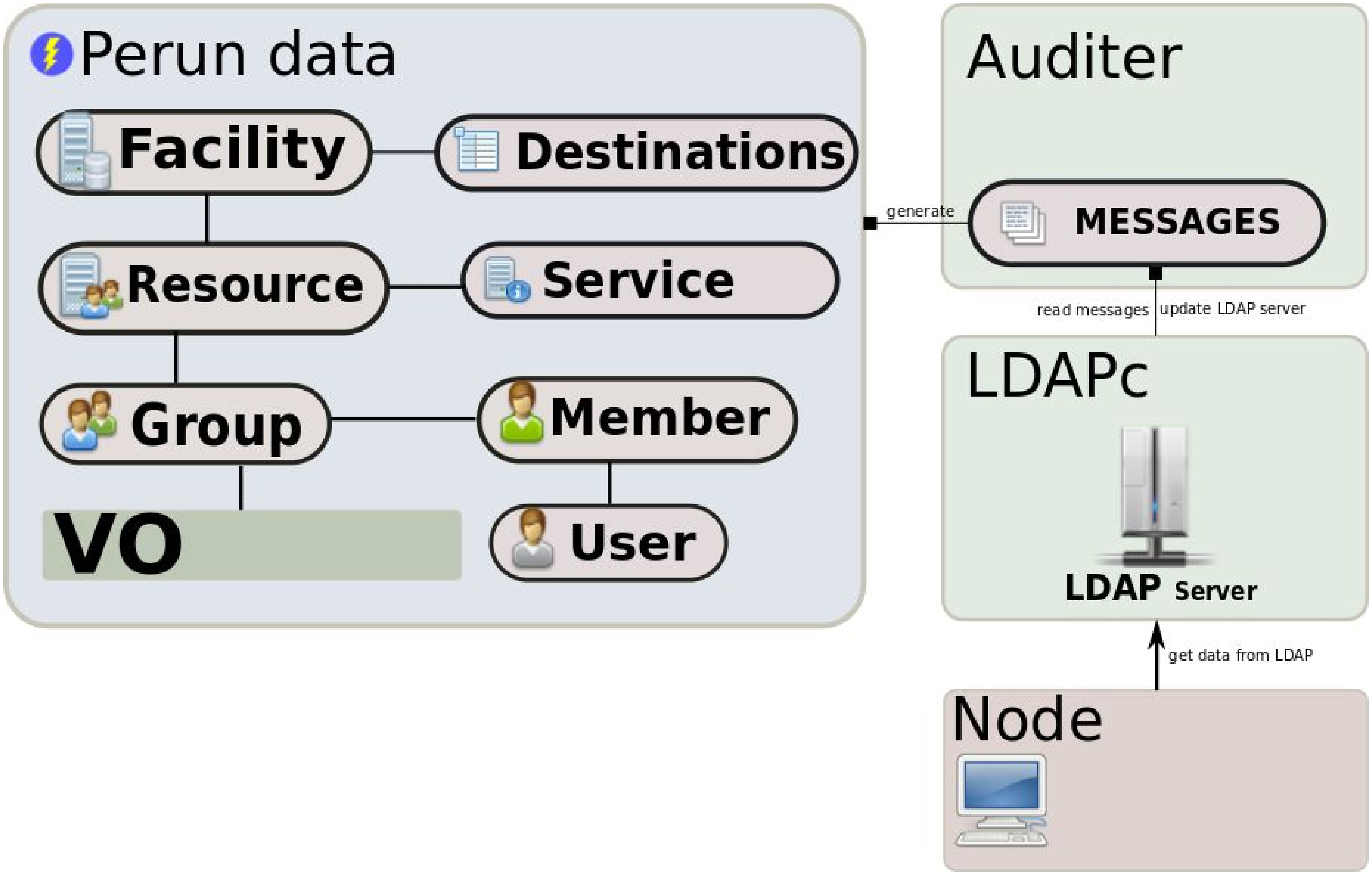
gen/send/slave



Perun LDAP

- Another interface to Perun data
    - changes are proceeded in real time
- Consumers get rights to read specific information from the Perun LDAP
- Real time access to data in LDAP

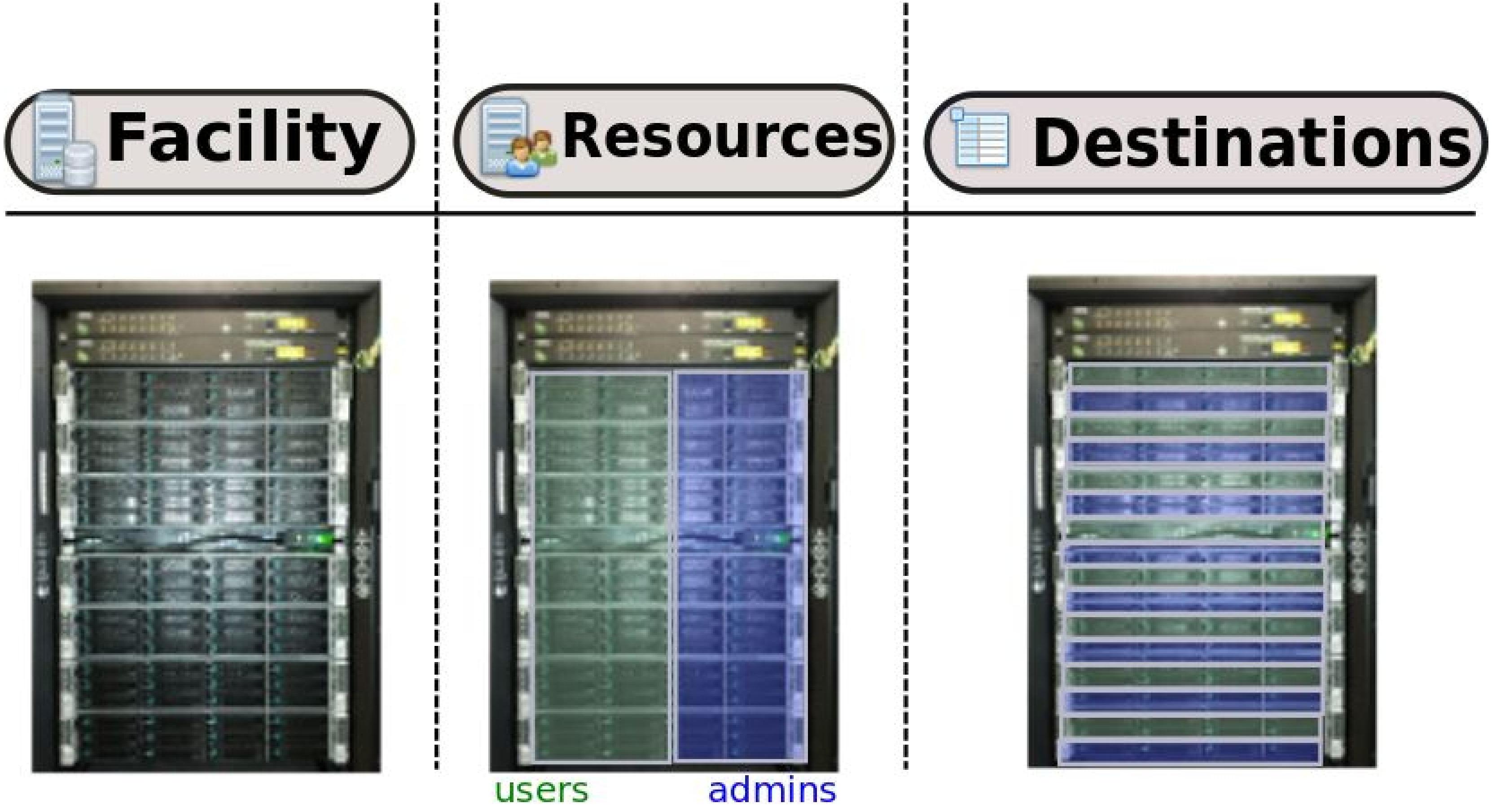
Perun LDAP


Perun data
Facility
Destinations
Resource
Service
Group
Member
VO
User
generate
Auditer
MESSAGES
read messages
update LDAP server
LDAPc
LDAP Server
get data from LDAP
Node

Example 1 - Cluster management

- Facility = whole cluster (homogenous)
- Resources: (2 per VO)
    - 1 for users (unix account)
    - 1 for admins (k5login_root)
- Destinations = all nodes of cluster
- Default options and limitations defined by Facility Manager
- Preferred options defined by Users itself
    - Using gen/send/slave mechanism

Example 1 - Cluster management



Facility

Resources

Destinations

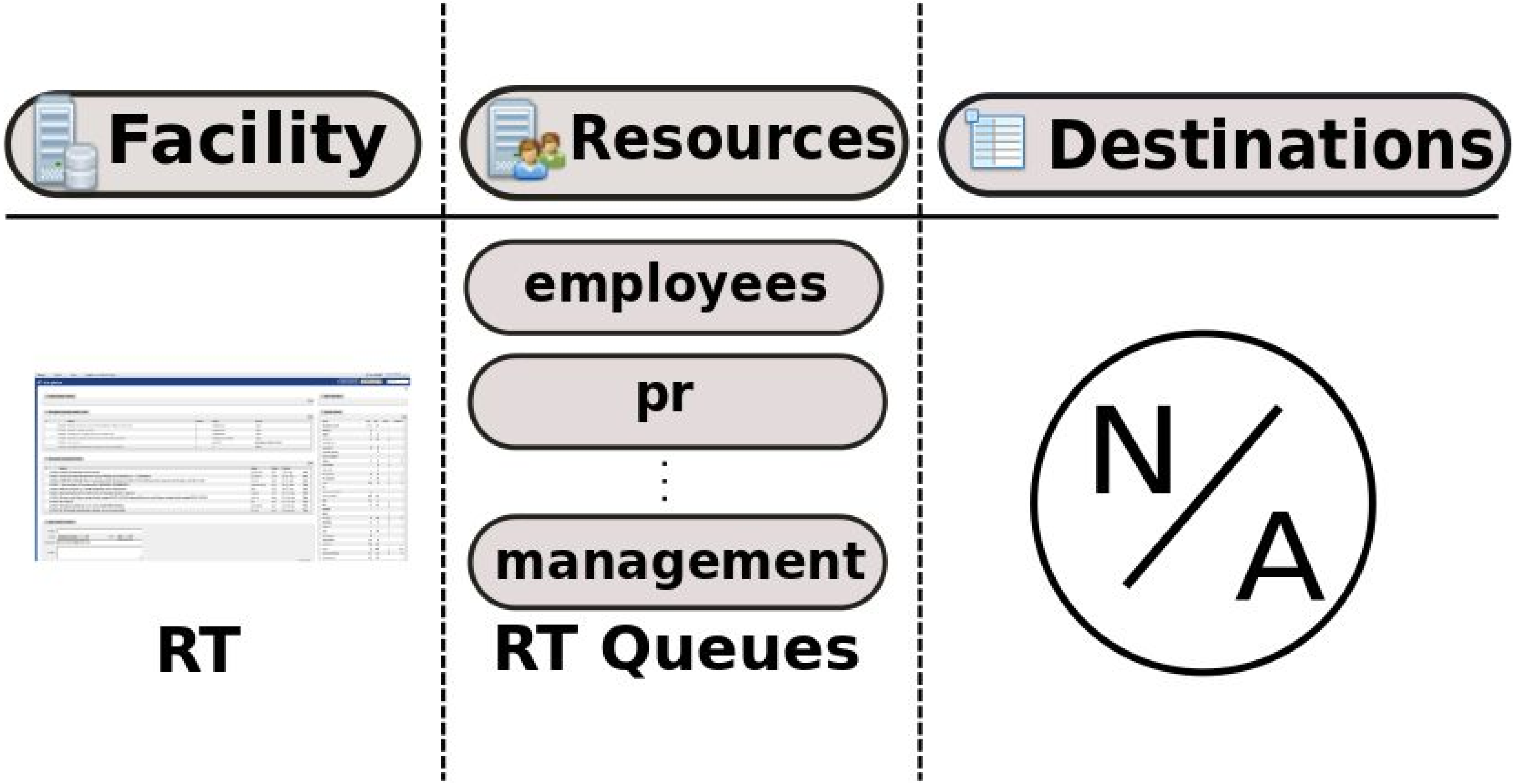
users

admins

Example 2 - RT management

- RT - Request Tracker (issue tracking system)
- Facility = RT
- Resources = Queues
- Facility Manager provides queues to chosen VO
- VO Manager can assign Groups only to provided queues
- Members from Perun are strictly synchronized with RT system
    - Using Perun LDAP mechanism

Example 2 - RT management



Facility

Resources

Destinations

employees

pr

⋮

management

RT

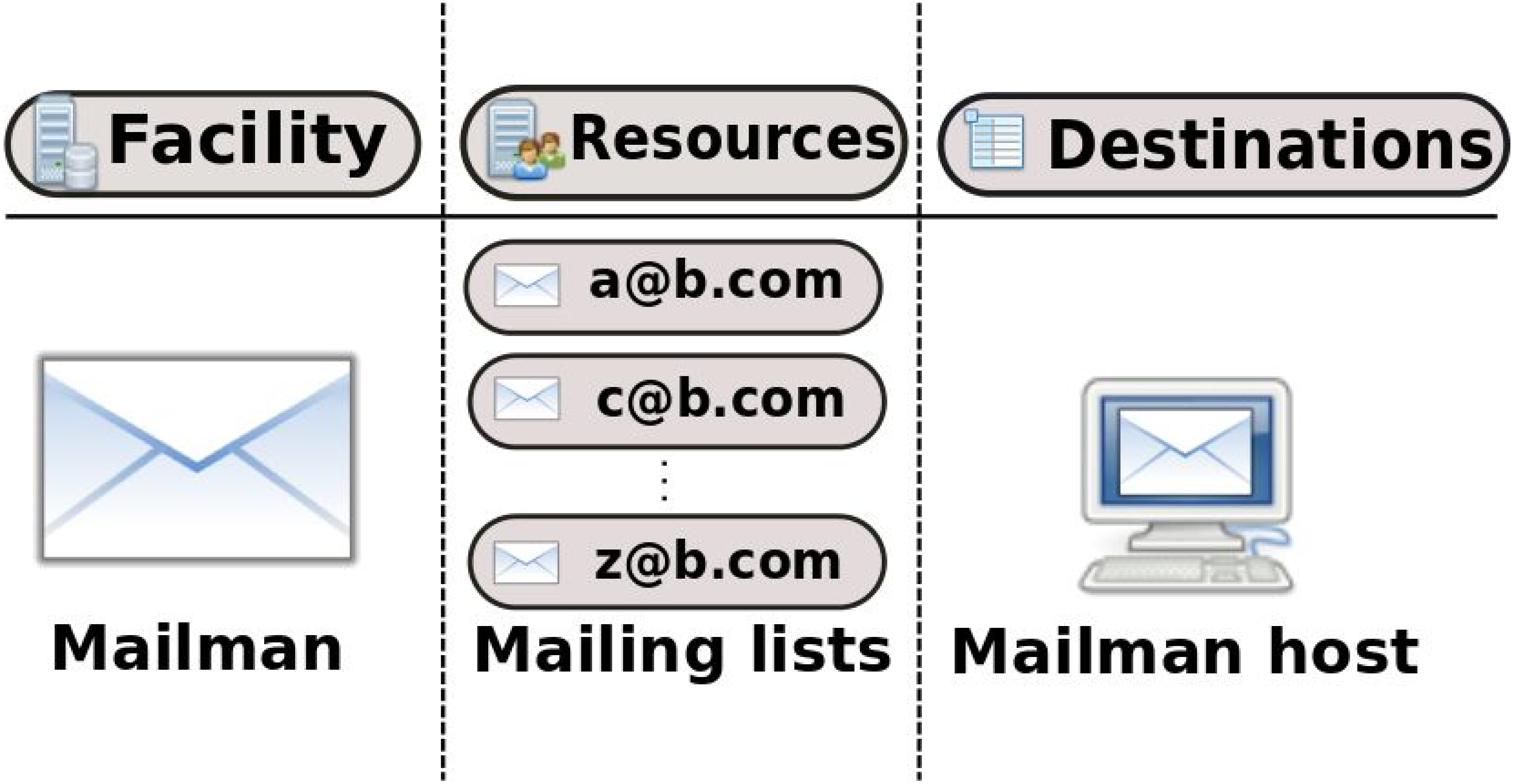
RT Queues

N/A

Example 3 - Mailing lists

- Facility = Mailman or Sympa
- Resources = mailing lists
- Destinations = host with Mailman or Sympa
- Attributes = email of mailing list manager
  - Using gen/send/slave mechanism

Example 3 - Mailing lists



Perun

Additional Features

Michal Šťava, Michal Procházka,
Slávek Licehammer

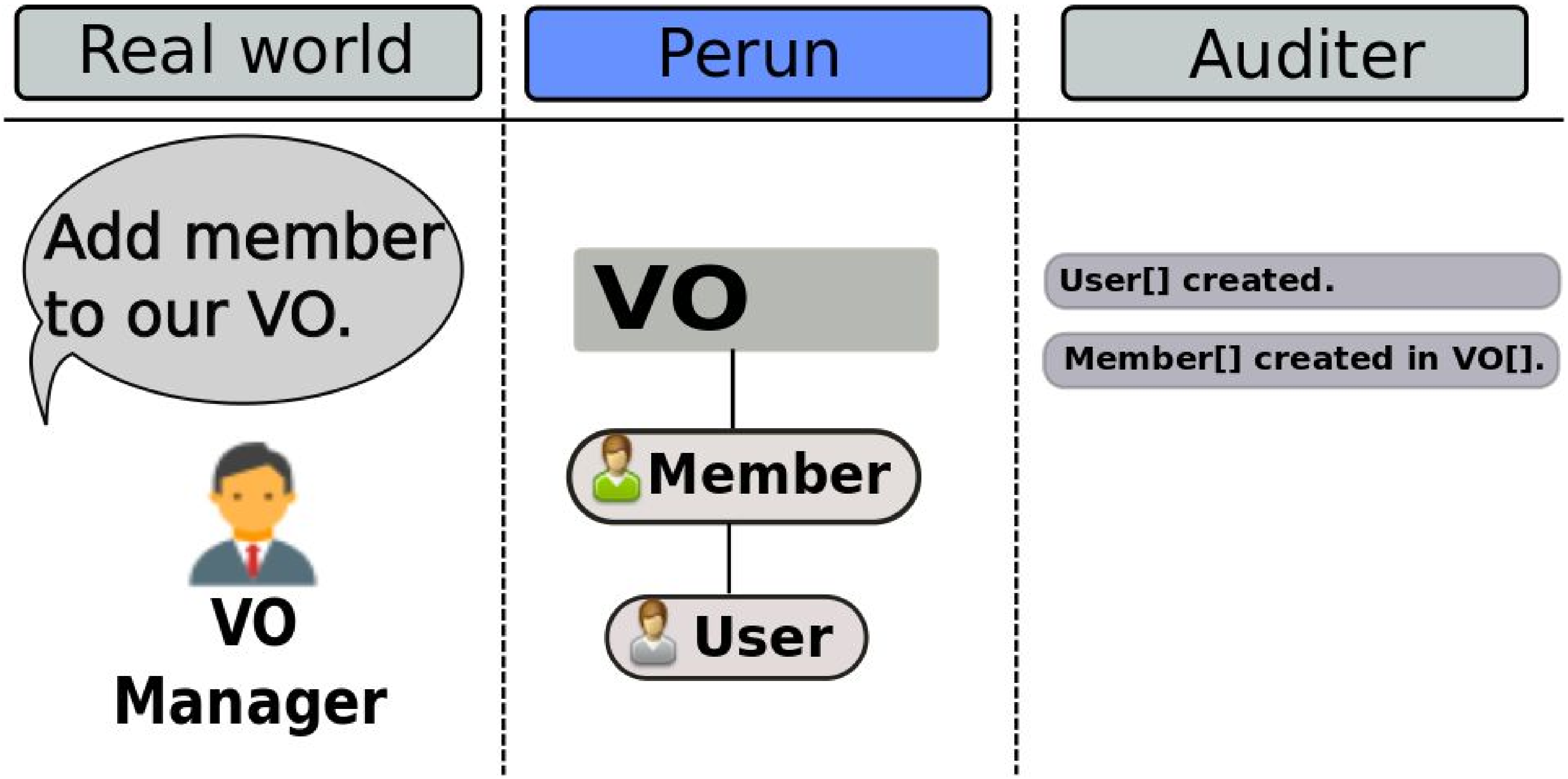
Outline

- Auditer
- Notifications
- API/Mini applications
- Service Users
- VO Observer
- Security Teams
- Facility contact groups
- Already managed by Perun

Auditer

- Every successful operation is audited
- Auditer produces audit logs: textual representation of operation and entities involved
- Audit log can be read by consumers
- Auditer tracks consumed messages by every consumer

Auditer

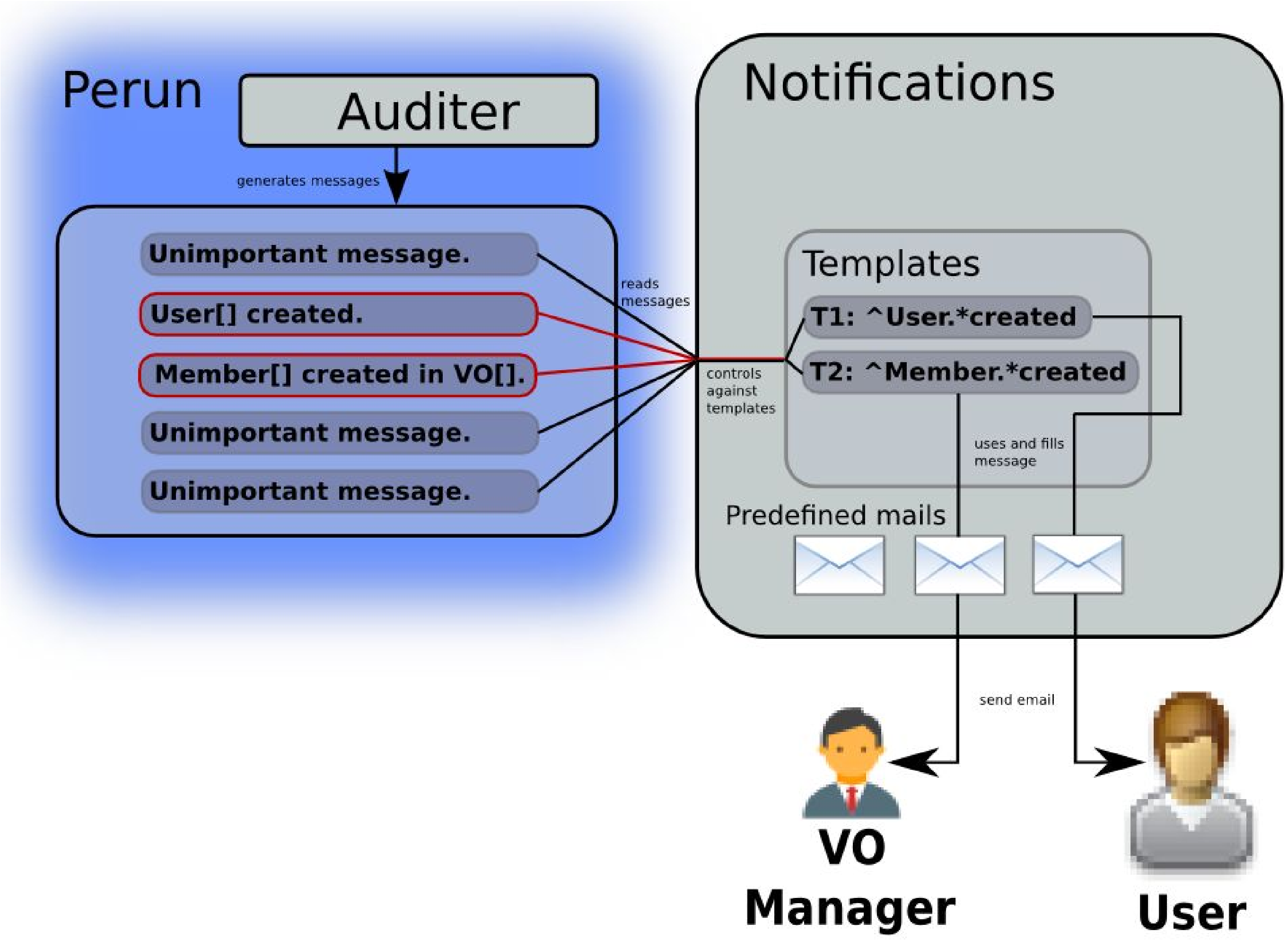


Real world
Perun
Auditer
Add member to our VO.
VO Manager
VO
Member
User
User[] created.
Member[] created in VO[].

Notifications

- Reads audit log
- Custom messages based on events occurred in audit log
- Multilingual support
- Notifications based on templates uses
  - Data from audit logs
  - Data from Perun
- Example:
  - Notification about membership expiration

Notifications



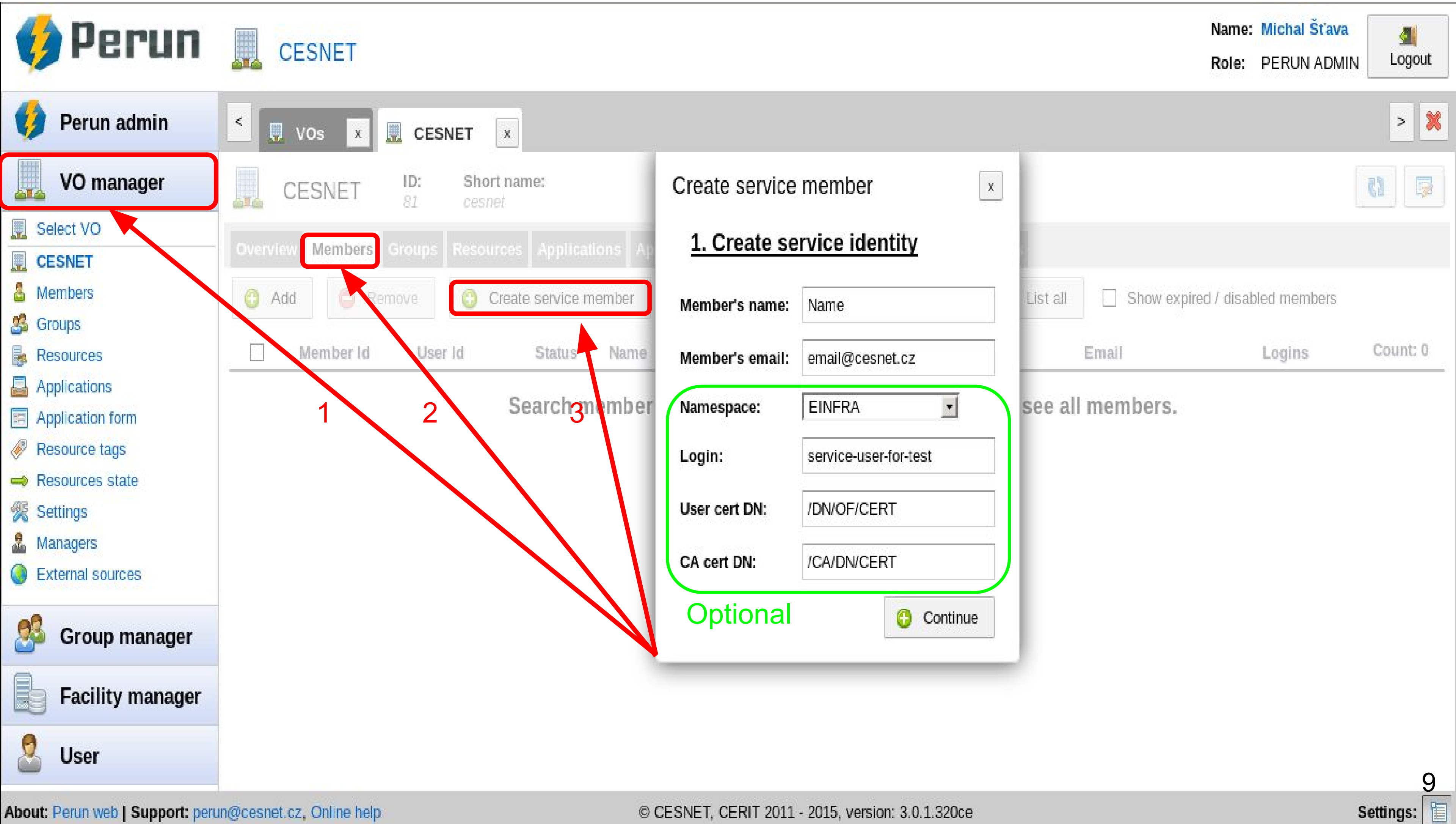
API/Mini applications

- Perun provides REST-like interface over HTTPs
- CLI
- Perl and PHP binding
- JavaScript library
  - Mini applications - dedicated web based applications
  - Example: user-profile

Service Users

- Special variant of normal user
- Usually used for automatic systems
  - backuping, nagios etc.
- Don’t want to lose this settings with a person is leaving (e.g.: nagios administrator)
- Normal Users are assigned to this Service User
  - they have rights to work with it, use it
  - have responsibility for this service User

Service Users



Create service member

1. Create service identity

Member's name:	Name
Member's email:	email@cesnet.cz
Namespace:	EINFRA
Login:	service-user-for-test
User cert DN:	/DN/OF/CERT
CA cert DN:	/CA/DN/CERT

About: Perun web | Support: perun@cesnet.cz, Online help

© CESNET, CERIT 2011 - 2015, version: 3.0.1.320ce

Settings:

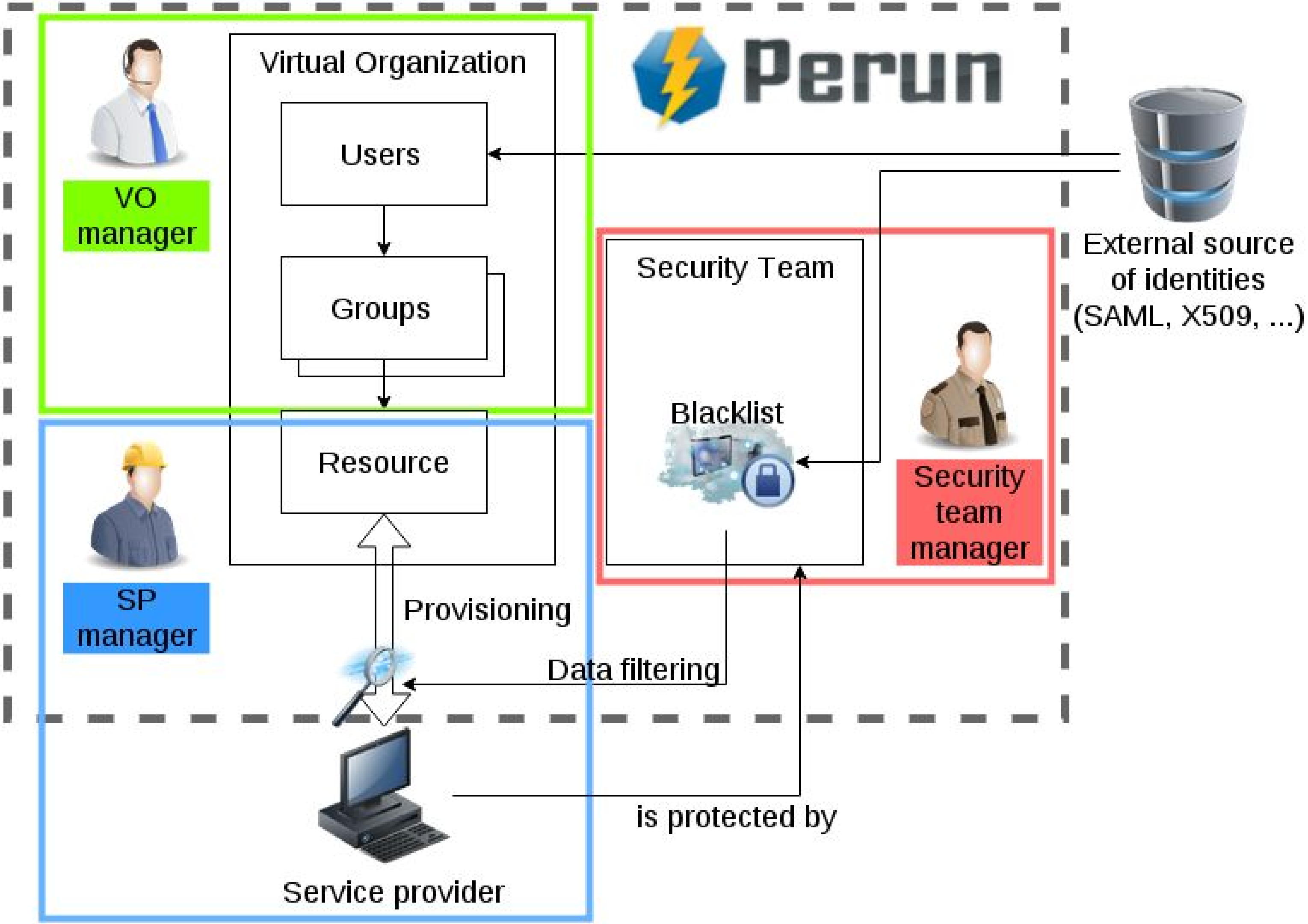
VO Observer

- Role in the Perun system
- Similar to VO Manager
- Can read the same data
- Can’t modify anything
- For the User support purpose
  - e.g.: bad settings of User’s attributes
- For the supervisors
  - statistics, overview etc.

Security Teams

- Entity in Perun
  - has managers
  - publish blacklist of users
- Every Facility can assign one or more Sec. Teams
  - has to trust in the Team
- Blacklisted users are:
  - not propagated by Services to Destinations
  - or marked there

Security Teams (2)



Facility contact groups

- For evidence and information purpose
- ‘group’ of contacts with description assigned to the Facility
- Contacts about:
  - Users
  - Groups
  - Owners
- Will enhance Owners (better linking with Perun Users)

Managed by CESNET’s Perun

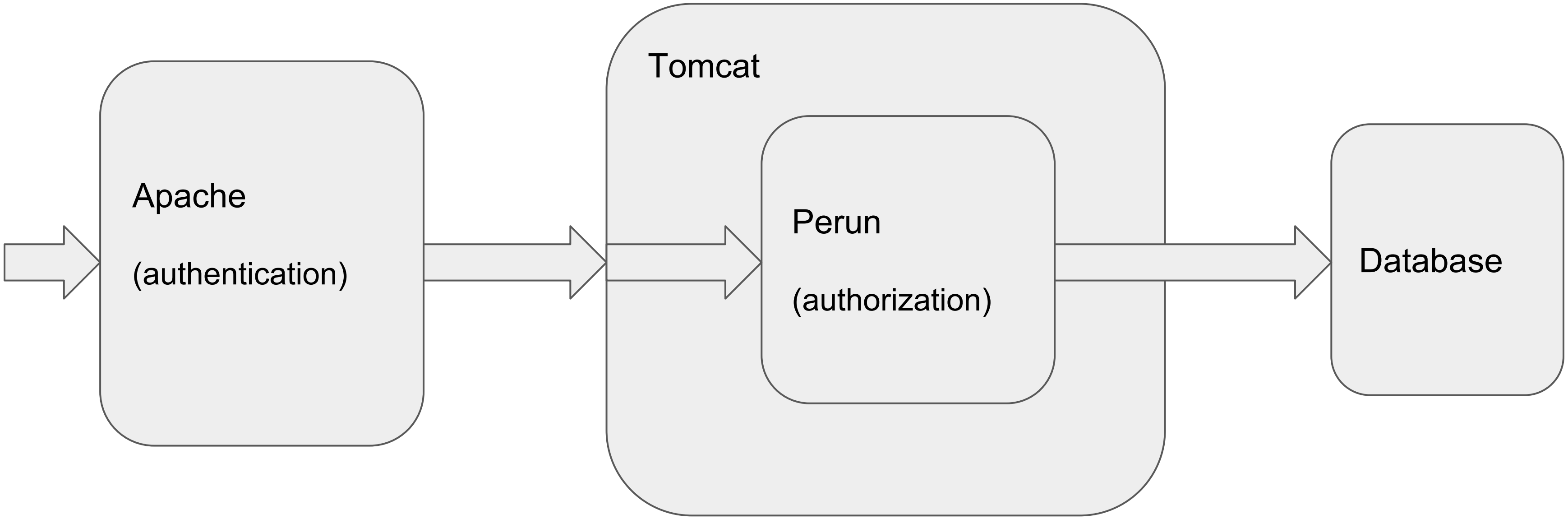
- Attribute Authority
- Mailing lists
- MetaCentrum (Czech NGI)
- DÚ
- VŠB VMware
- Alternative passwords
- Meetings
- EGI fedCloud
- RT

Perun

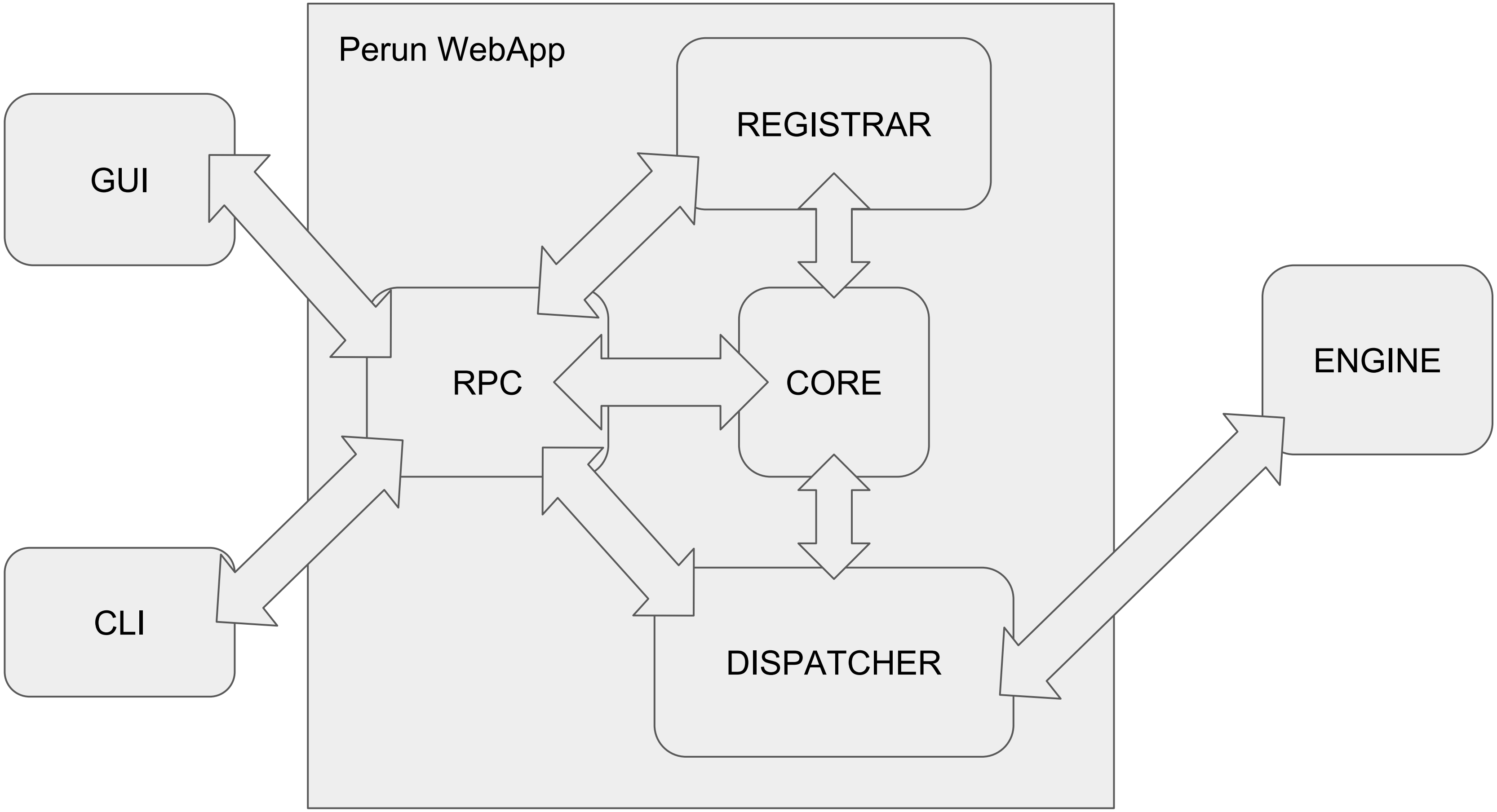
Components, Configuration and Deployment

Slávek Licehammer
Michal Procházka, Michal Šťava

Global Schema



Internal Schema



Perun WebApp contains

- Base (object definitions, utils)
- Core (users, groups, resources, services logic)
- Cabinet (publications management)
- Registrar (user enrollment management)
- Dispatcher (ACL provisioning planning)
- RPC (REST-like interface to Perun)

GUI component

- JavaScript based web application
- GUI contains
  - administration GUI
  - Registrar GUI
  - password reset GUI
- Mini-applications

Configuration

- Defined on build (*/etc/perun/*), can be overridden on runtime

- Each module can have own config (*/etc/perun/module-name.properties*)

Logging

- Logging defined in */etc/perun/log4j.xml*

- Default log files are in */var/log/perun/module-name.log*

Perun

Development and sustainability

Michal Šťava, Michal Procházka,
Slávek Licehammer

Outline

- Team development
- Methodology
- Development
- Deployment
- Documentation
- Bug reports and feature requests

Team development

- CESNET and Masaryk University cooperation
- 6 core team developers and some MU students
- Sharing responsibilities
- Service development with other people
  - Zdeněk Šustr, František Dvořák, Jiří Ráž, Michal Strnad, Jan Horníček etc.

Methodology

- Agile development
    - Iterative development
    - Extreme programming
    - Task/Feature Driven Development
- Rolling updates
- Weekly meetings (Jiří Bořík, Michal Voců)

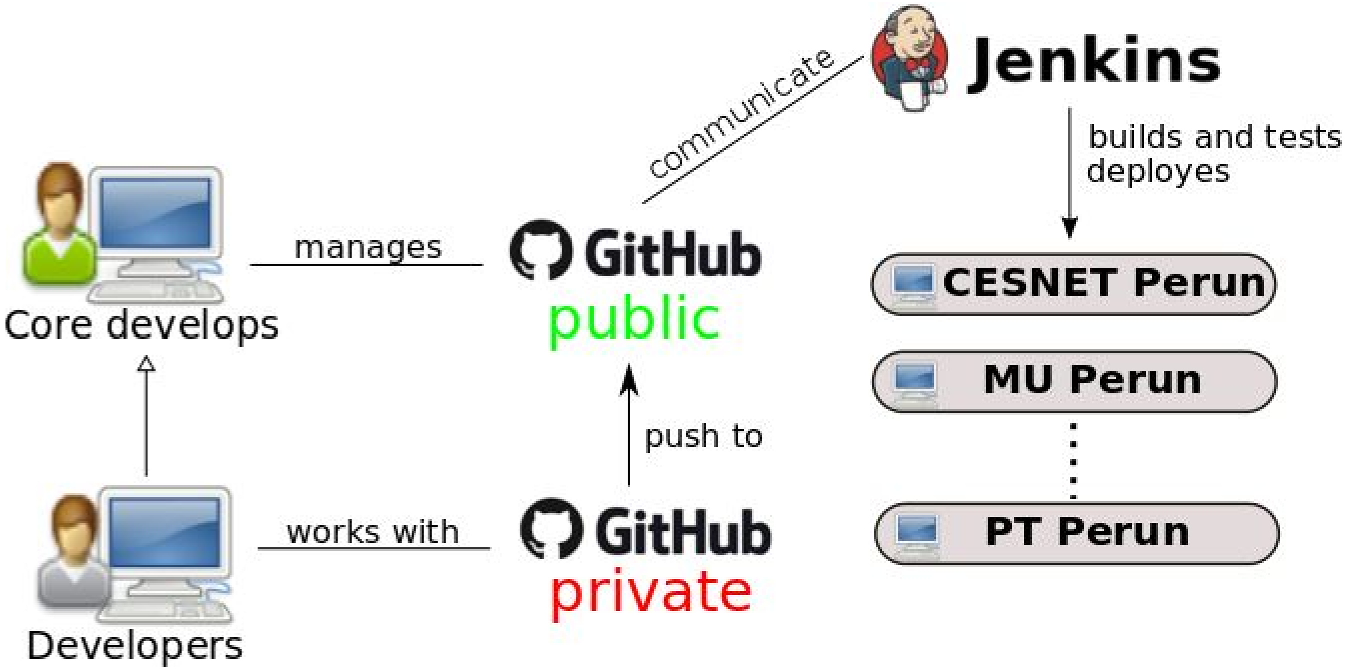
Development

- Driven by GIT
- Open GitHub repository
- Everyone can send pull request
    - validated by Perun core team
- Testing every pull request
    - connection between GIT and Jenkins
- Usage of advanced GIT features
    - branches, cherry picking, pull requests etc.

Deployment

- Driven by Jenkins
- Code is tested automatically
- Easy testing every build against:
  - Oracle DB
  - PostgreSQL
  - HSQLDB
- Automatic deployment
- Notify about failed builds
- Build history

Development diagram



Documentation

- For Users (perun.cesnet.cz)
  - basic use cases
  - advanced use cases
- For Technical purpose (perun.cesnet.cz)
  - API (CLI, GUI etc.)
- Internal (redmine)

Bug reports and feature requests

- Request Tracker (rt.cesnet.cz)
  - for users requests and issues
  - need of quick reaction
  - automatic reports of errors from GUI
- Redmine
  - internal tasks
  - development plan

Perun

Perun in the World

Slávek Licehammer
Michal Procházka, Michal Šťava

Production deployments

- CESNET’s eInfrastructure
- Masaryk University
- EGI fedCloud
- ELIXIR AAI
- SAGrid

Testing deployments

- Portuguese NREN
- VŠUP
- GARR CloudIdP
- Eko-Connect Nigeria
- SIFULAN Malaysia

Perun

http://perun.cesnet.cz

michalp@ics.muni.cz michal.stava@cesnet.cz