gPLAZMA: grid-aware Pluggable AuthoriZation Management

(Introducing Role-based Access Control in dCache)

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Outline

- OSG AuthZ approach
- gPlazma architecture
- gPlazma implementation
- Example of end-to-end AuthZ for CEs and SEs
- Status
- Future Work

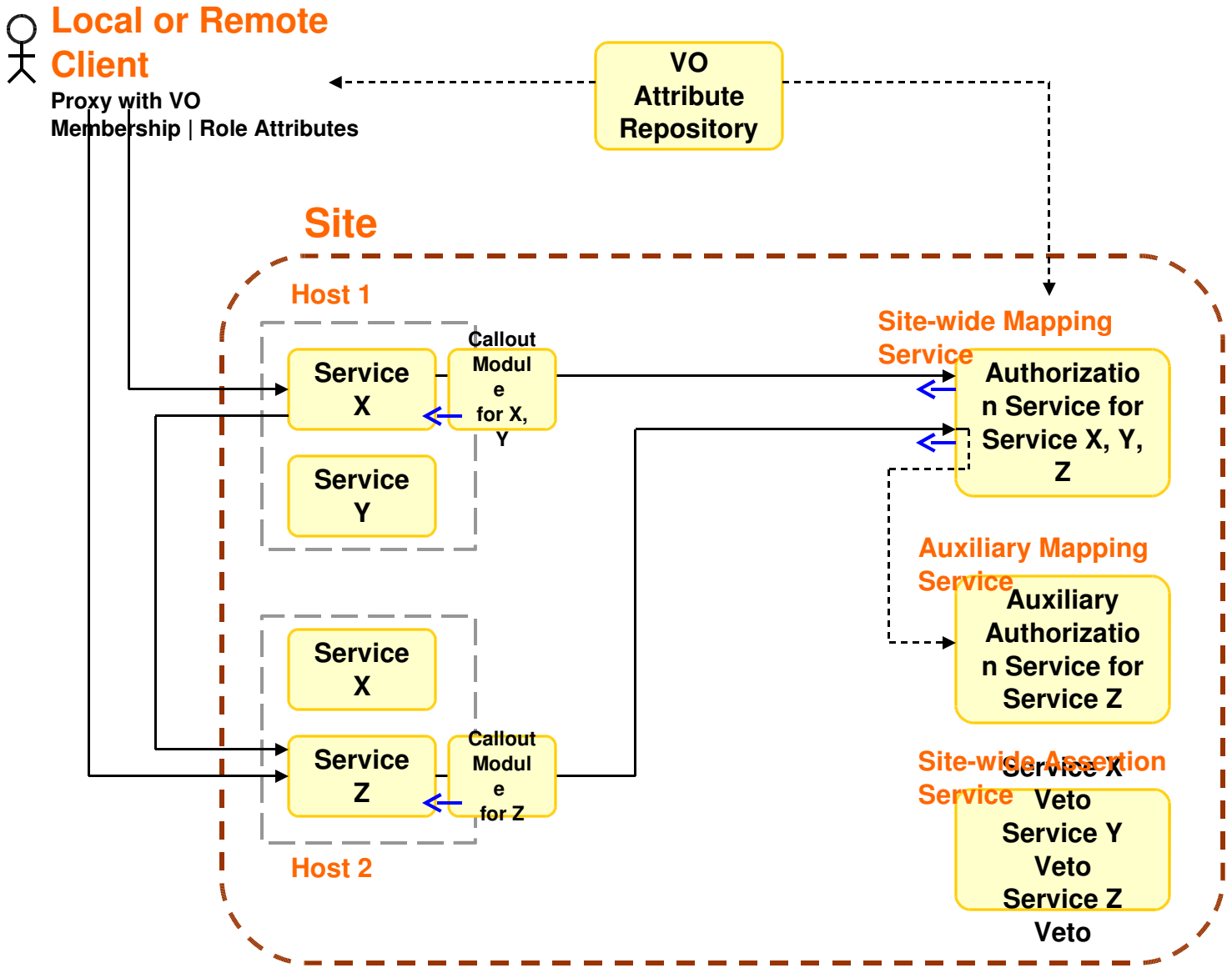
OSG AuthZ Approach

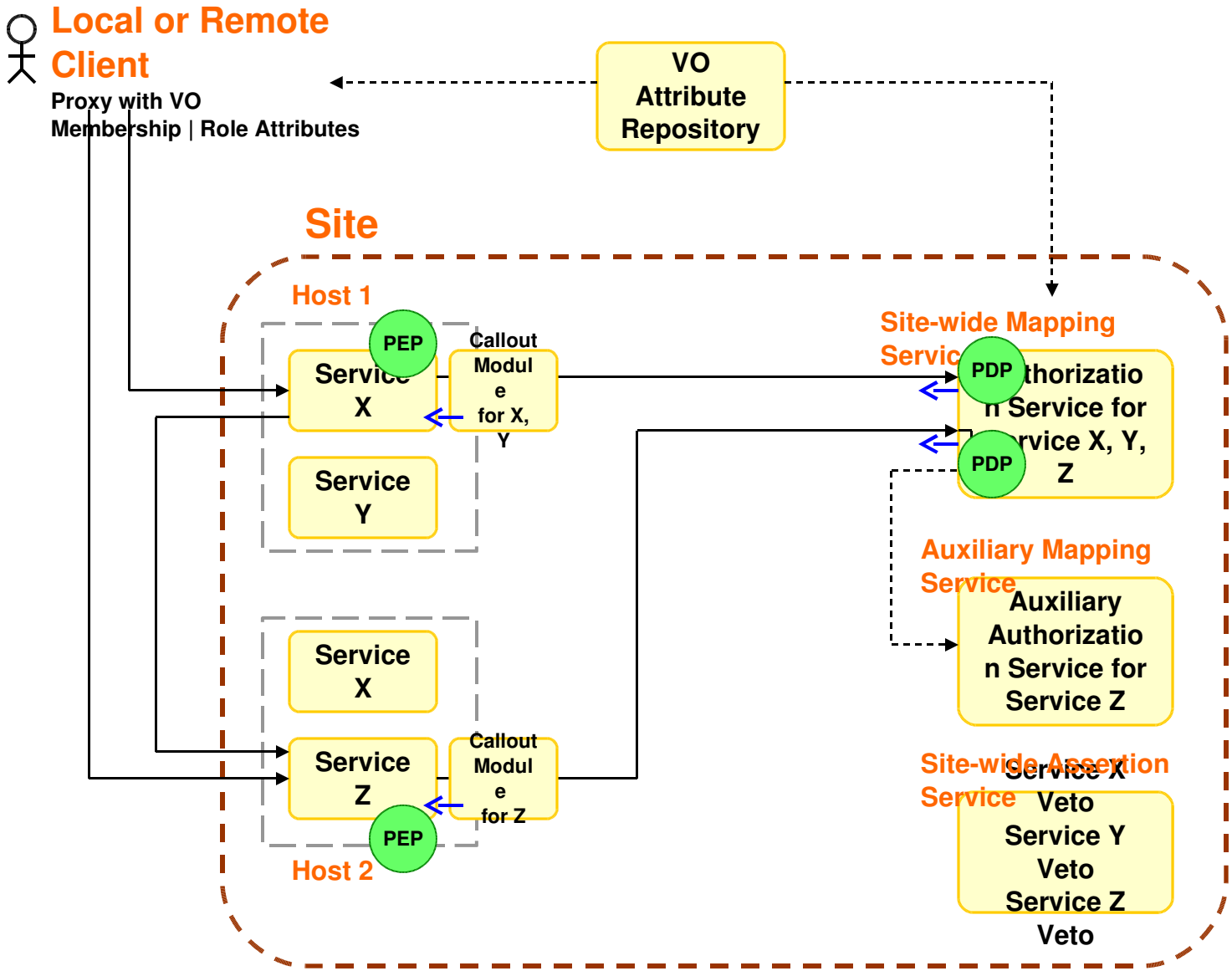
- VO-Global specification of privilege attributes per Role.
- Site central mapping of Role to site's implementation of privilege attributes.
- Local enforcement of privilege attributes.

- Use of VOMS extended X.509 Attribute Certificate specification for defining extra attributes (FQANs or Fully Qualified Attribute Names).
- Based on RFC-3281. FQANs contain Role and VO membership information for a User.

OSG AuthZ Approach

- VO defines Roles and associated privileges by specifying expected functionality.
  - E.g. ***cmssoft*** may install software in area that is read-only by all ***cmsuser*** jobs running on site/campus.
  - E.g. ***cmsphedex*** may have special access to SRM/dCache system.
- Site maps VO scope identities to local scope identities.
  - Site wide management of mapping.
  - Service level granularity of mapping.
- Site enforces VO privilege policies within local scope identities.
- Authorization = (VO-allowed) && !(Site-vetoed)

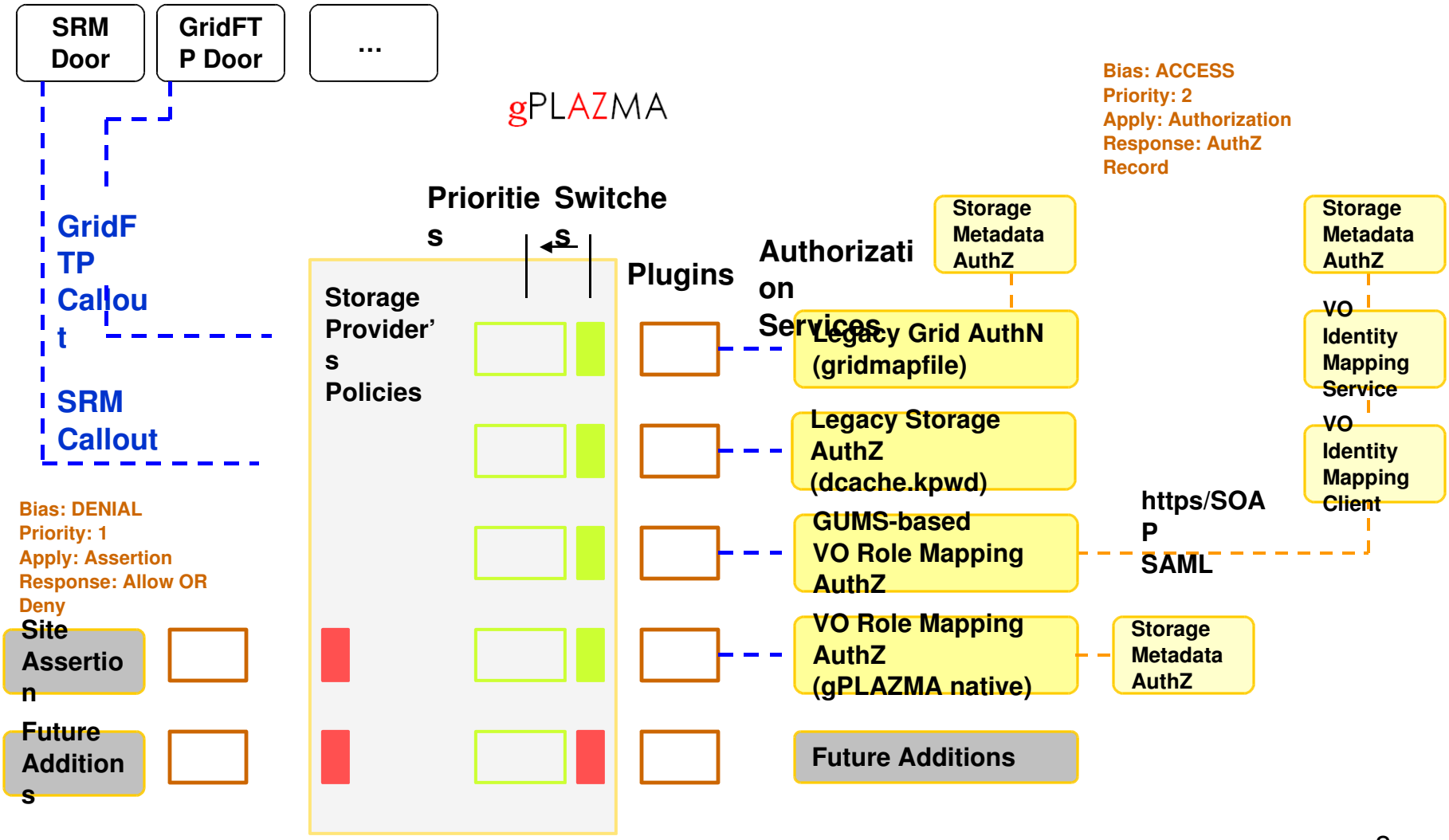

Local or Remote Client
Proxy with VO Membership | Role Attributes
VO Attribute Repository
Site
Host 1
Service X
Callout Module for X, Y
Service Y
Service X
Service Z
Callout Module for Z
Host 2
Site-wide Mapping Service
Authorization Service for Service X, Y, Z
Auxiliary Mapping Service
Auxiliary Authorization Service for Service Z
Site-wide Assertion Service
Service X Veto
Service Y Veto
Service Z Veto



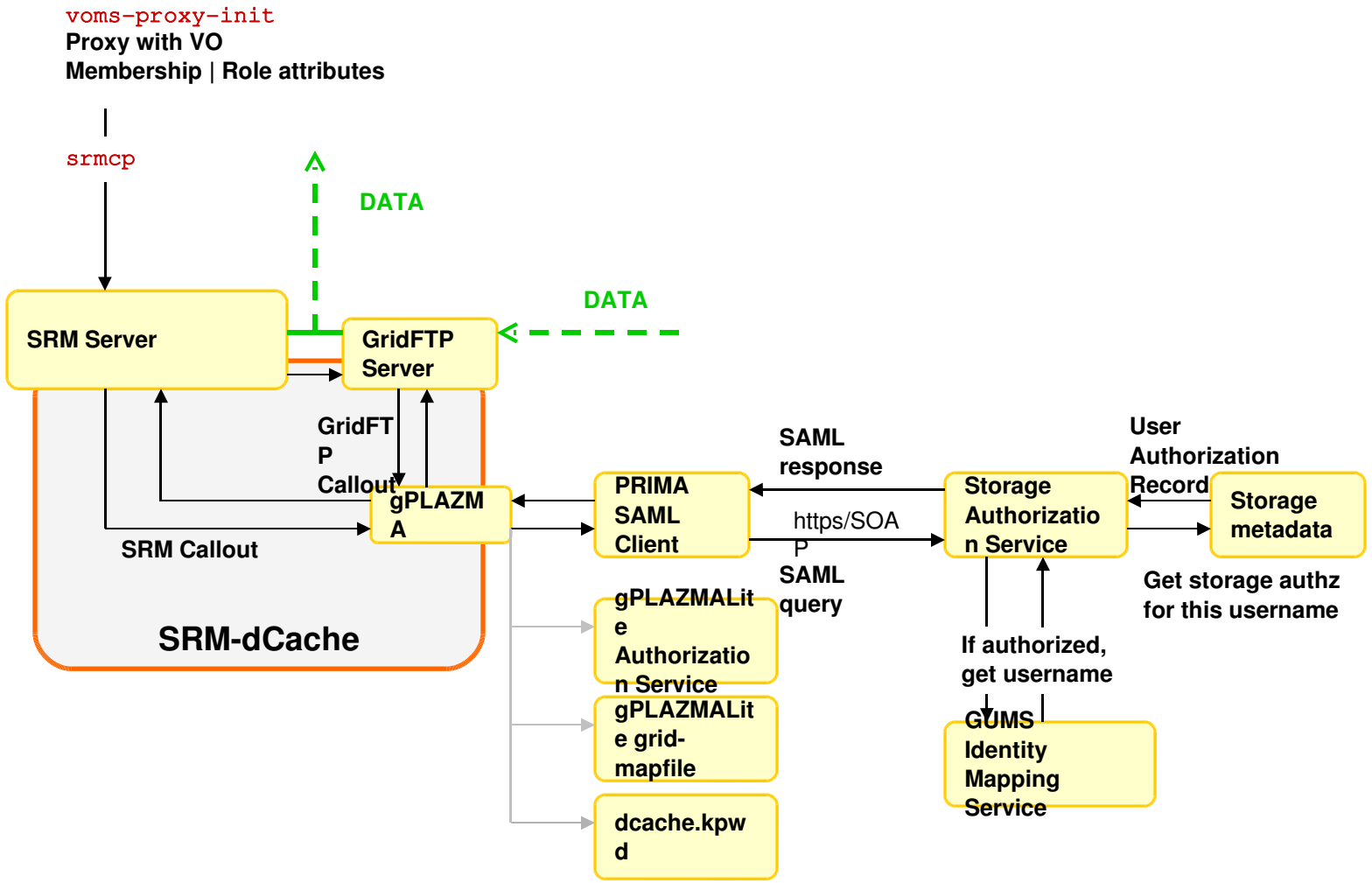
PEP Policy Enforcement Point

PDP Policy Decision Point

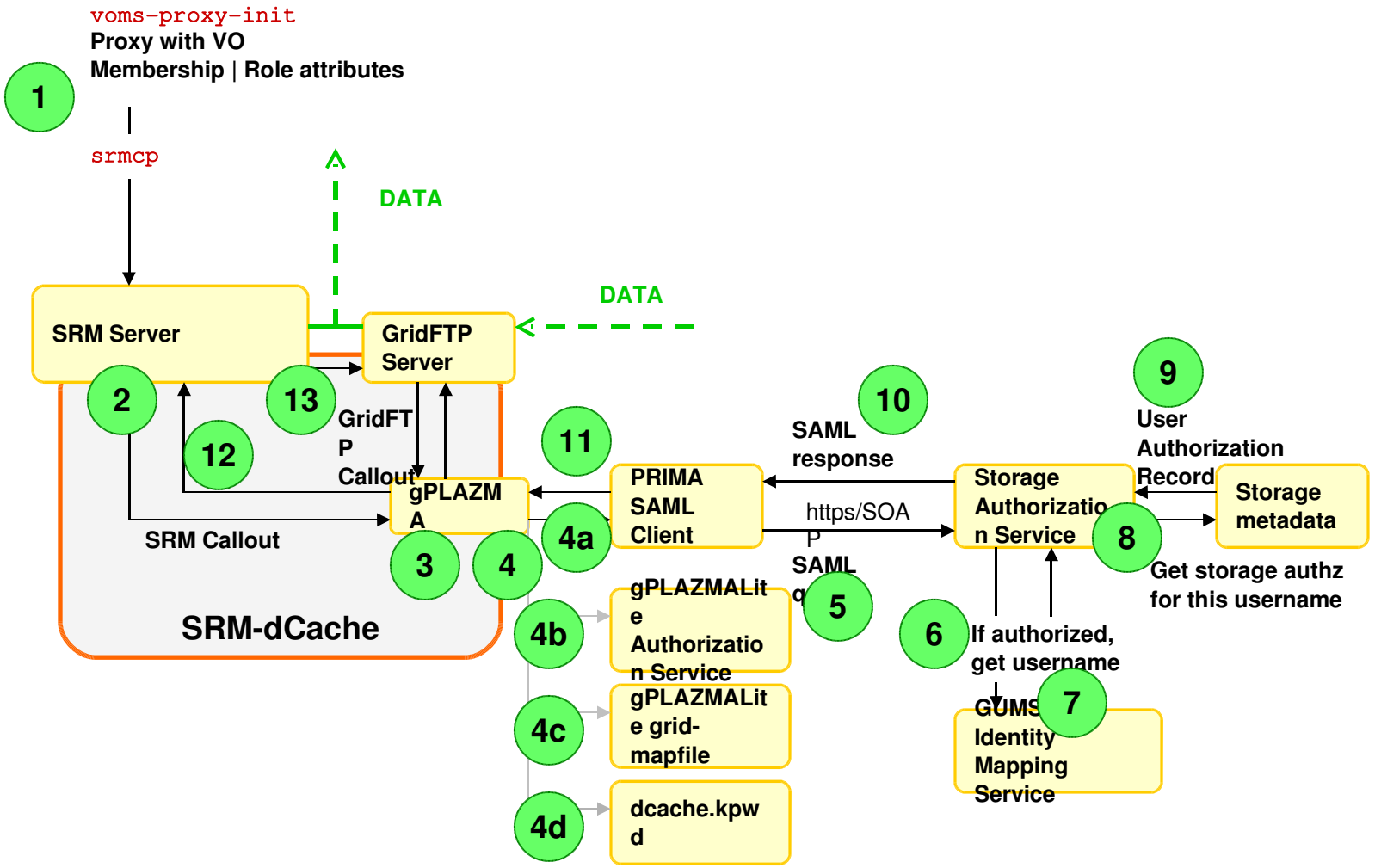
gPLAZMA Architecture



gPLAZMA Implementation



gPLAZMA Implementation



Example of end-to-end AuthZ for CEs and SEs

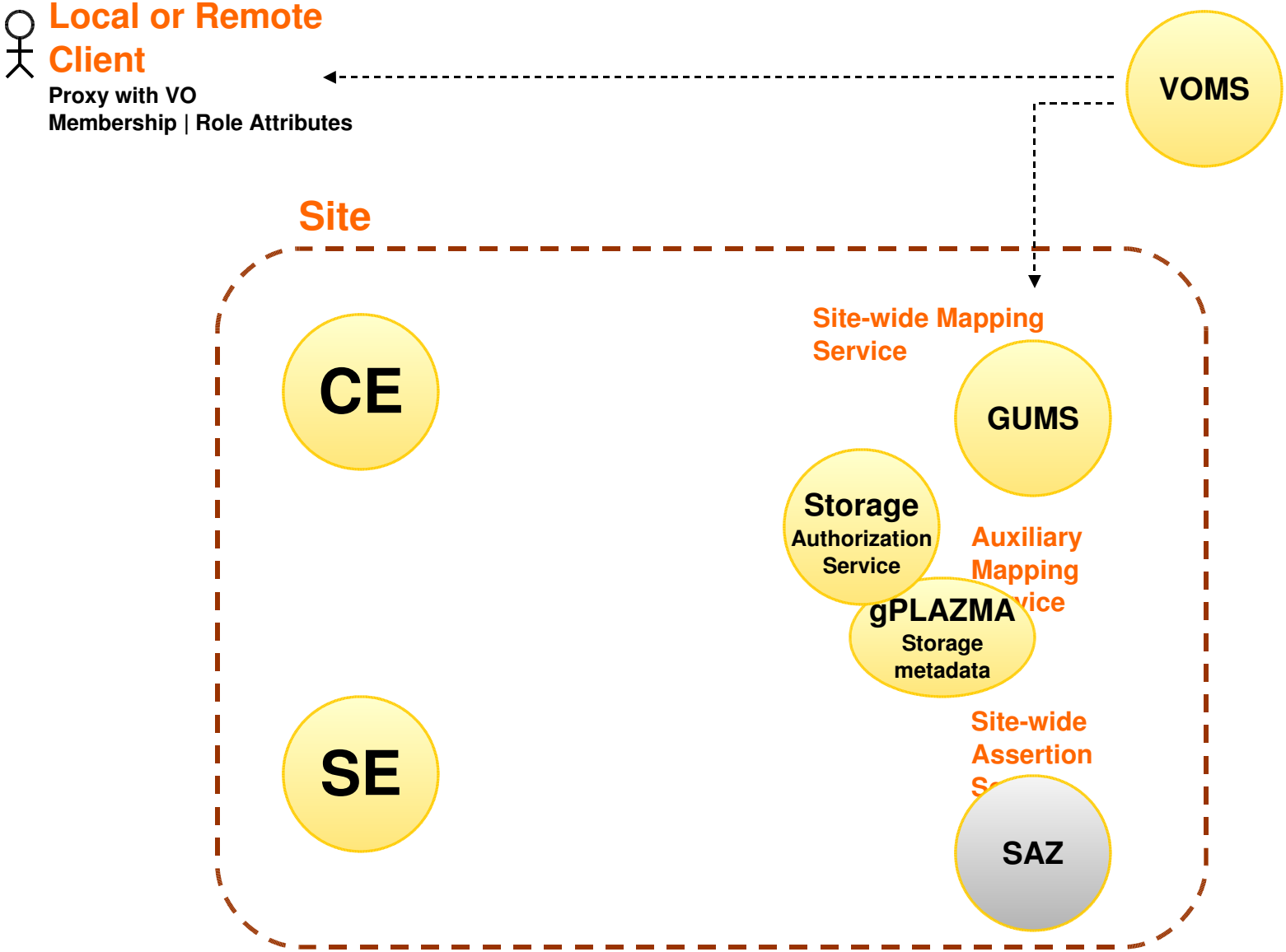
SE: SRM-dCache

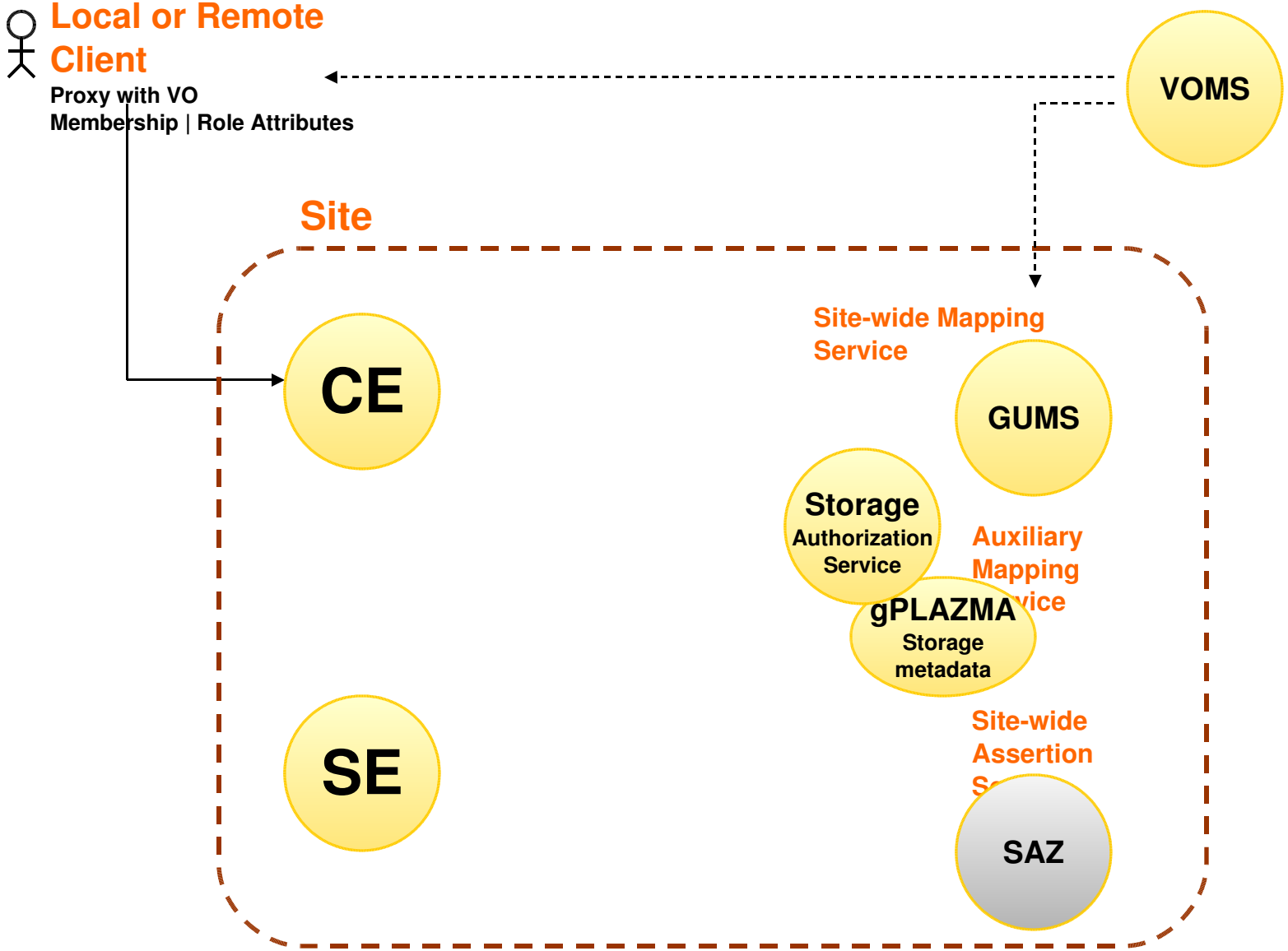
- Different *doors* for different authz methods.
- Same underlying local authz mechanism.
- Can be mapped to site's UID/GID domain.
- Or be restricted to SRM-dCache only.
- Examples:
  - USCMS-VO at FNAL: Site UID domain.
  - CDF-VO at FNAL: Site Kerberos domain.

SE: SRM-dCache

- gPLAZMA extends SRM-dCache separation of SE authz and CE authz to OSG approach.

  - gPLAZMA authenticates.
  - gPLAZMA uses PRIMA Java SAML libraries to form a SAML query and contacts Storage Authz Service.
  - Storage Authz Service contacts GUMS and Storage Metadata Service.
  - GUMS translates {DN, Membership, Role} to Username.
  - Storage Metadata Service translates Username to Storage-privilege Set.
  - Storage-privilege Set is {UID, GID, permitted storage area, R/W permissions}.
  - Storage-privilege Set is User-level ACL governed by {DN, Membership, Role}.
  - Storage Authz Service forms a User Authorization Record into a SAML response and sends it back to gPLAZMA at SE.


Local or Remote Client
Proxy with VO Membership | Role Attributes
VOMS
Site
CE
SE
Site-wide Mapping Service
GUMS
Storage Authorization Service
Auxiliary Mapping
gPLAZMA Storage metadata
Site-wide Assertion
SAZ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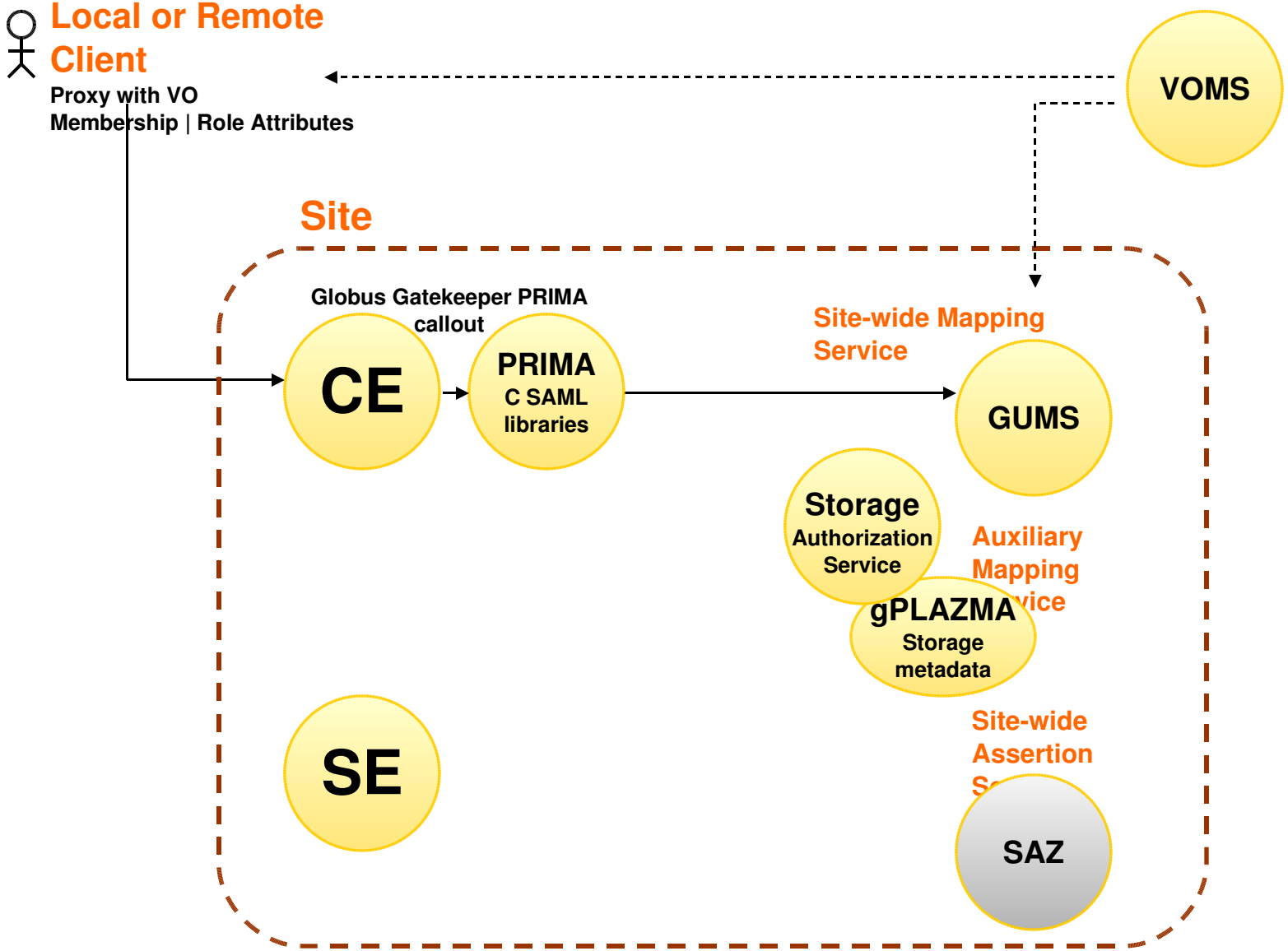
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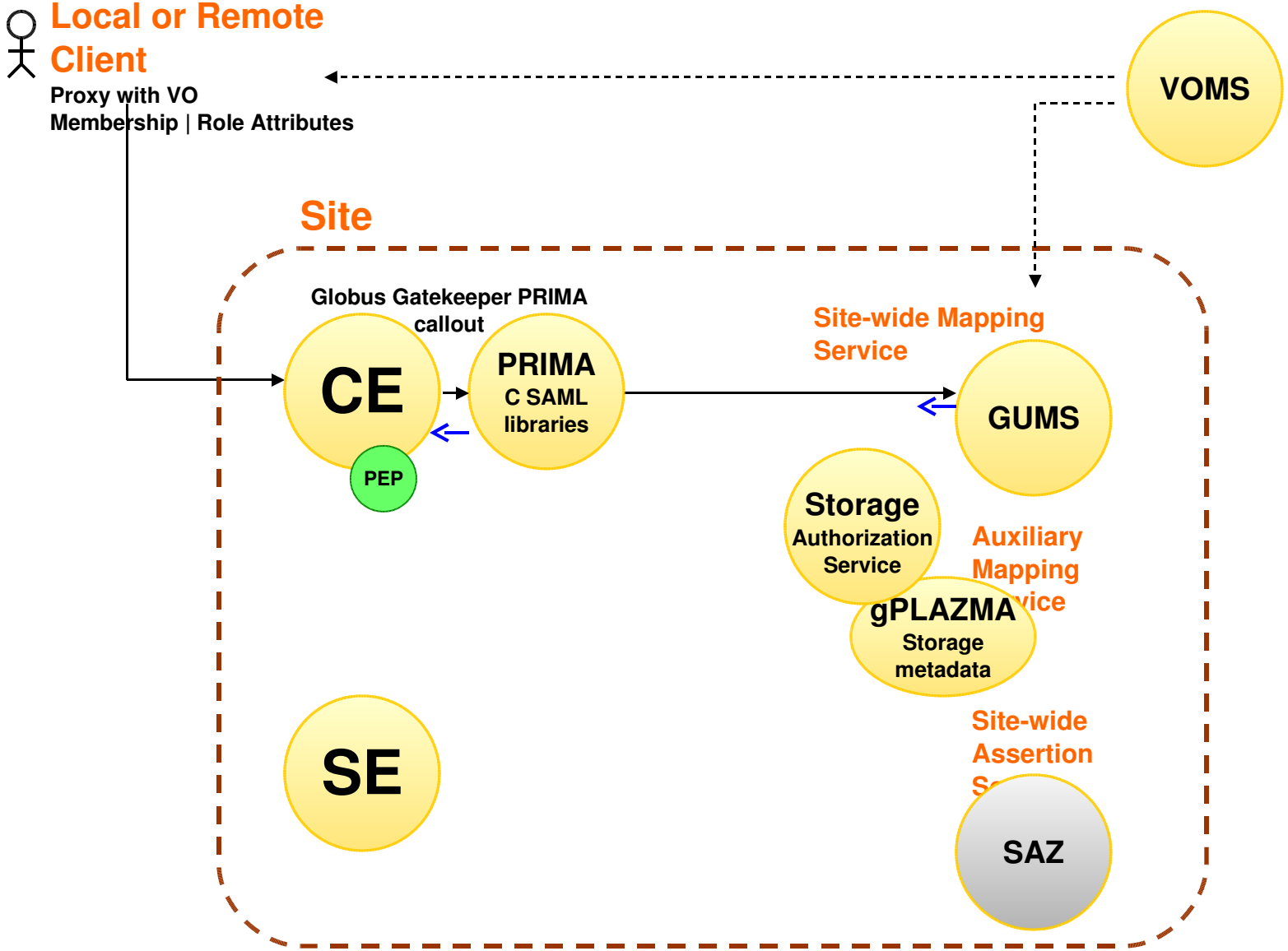
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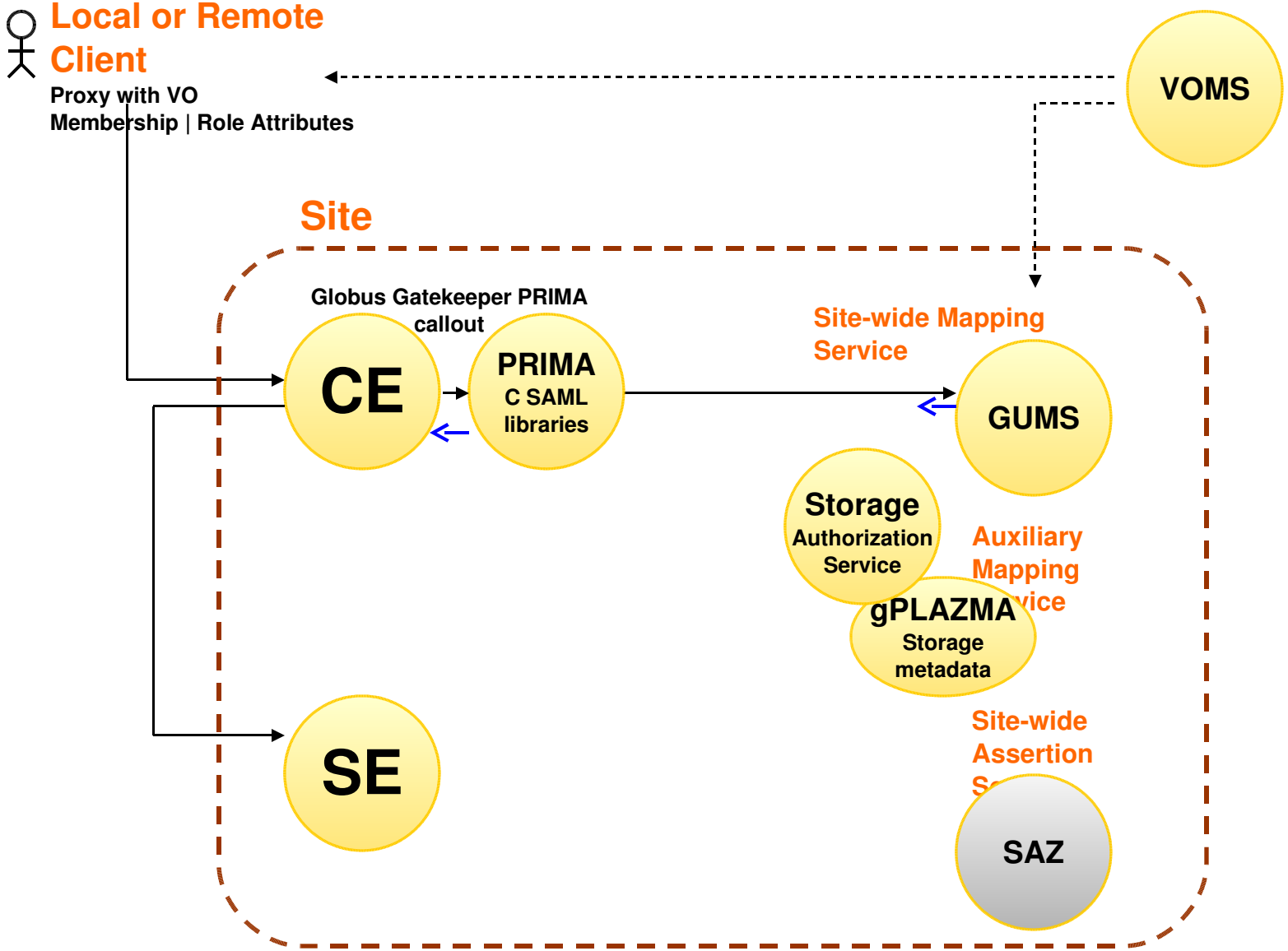
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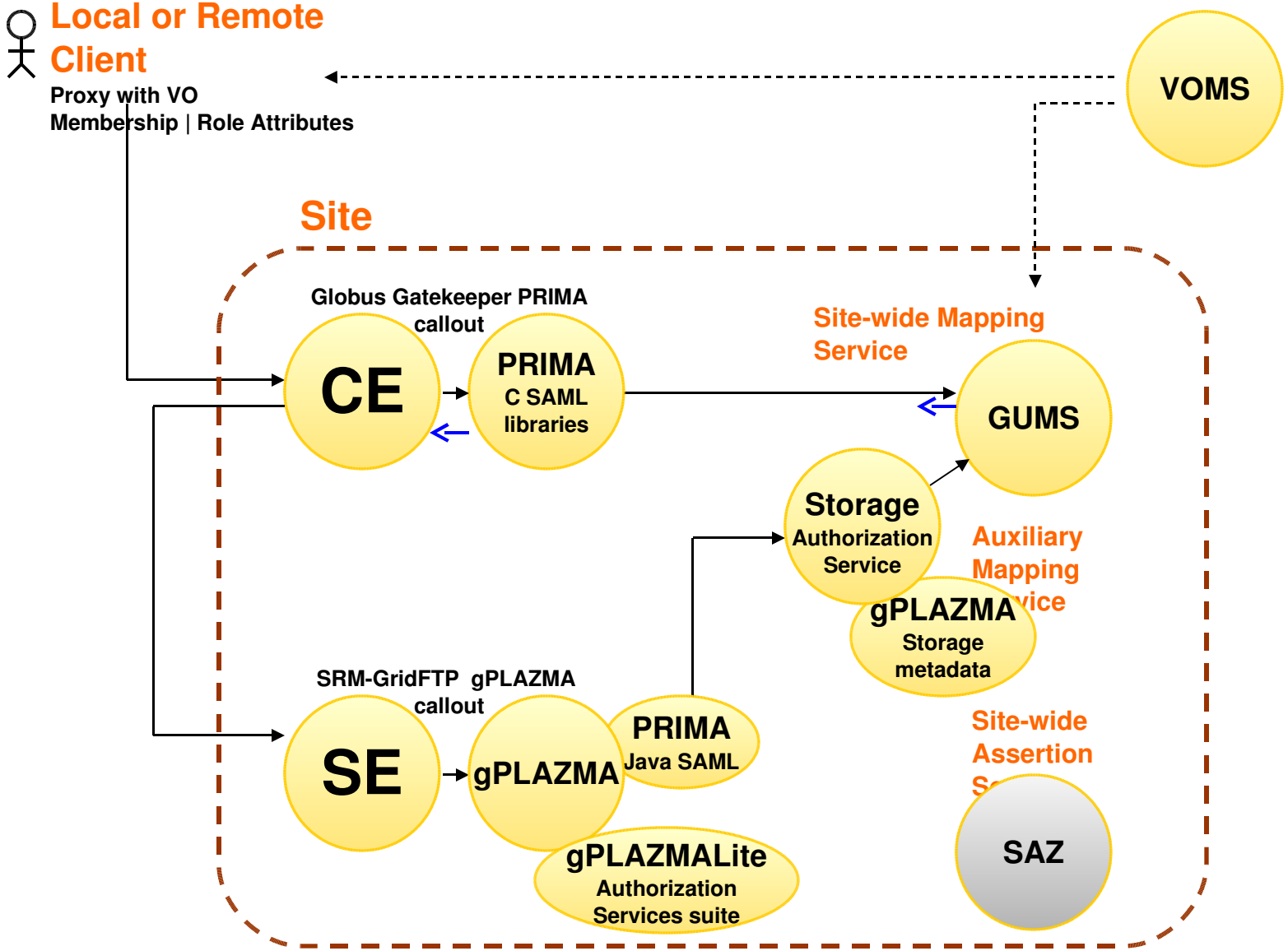
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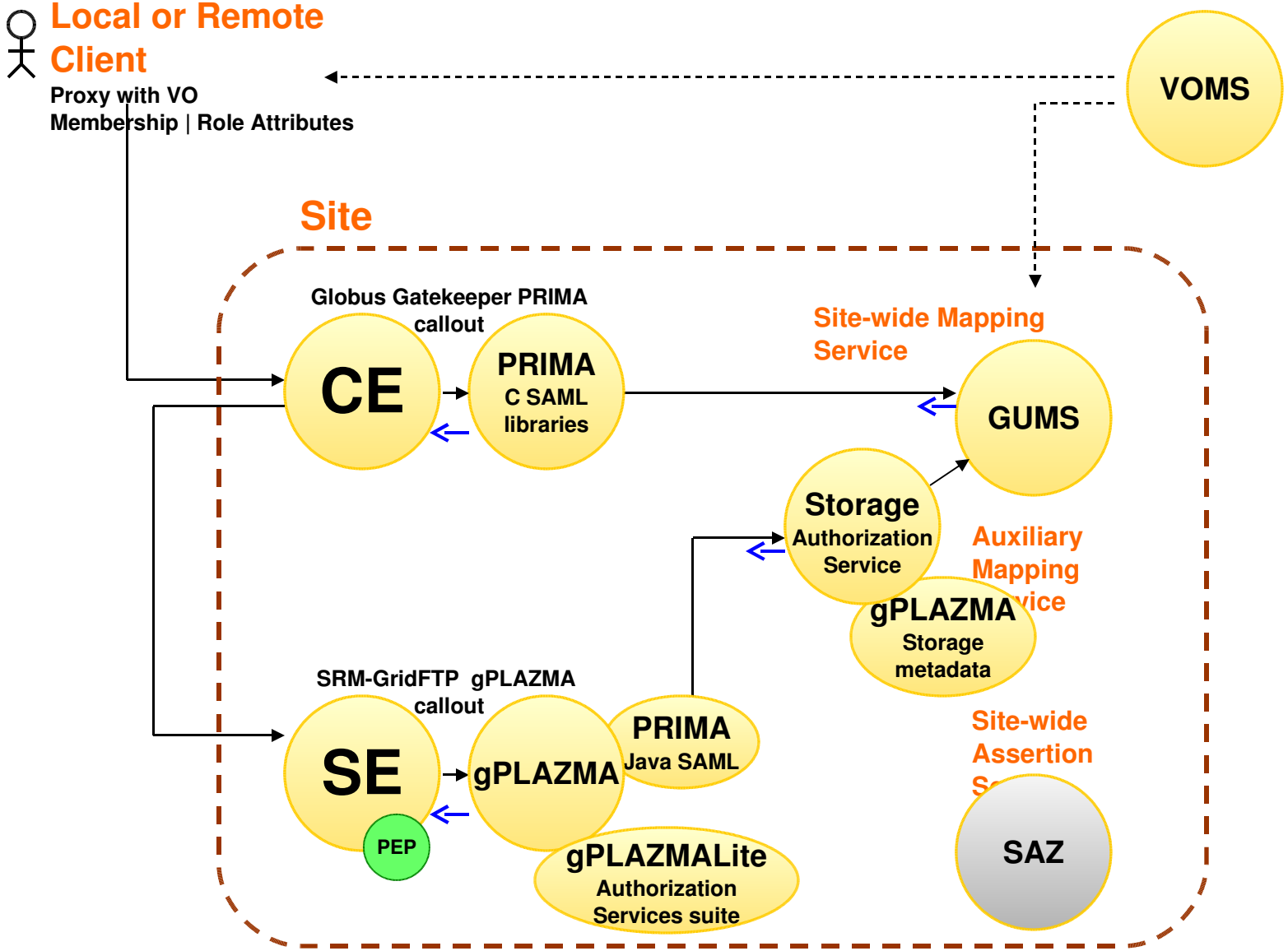
PRIMA
Java SAML
Site-wide Assertion Service
SAZ
gPLAZMALite
Authorization Services suite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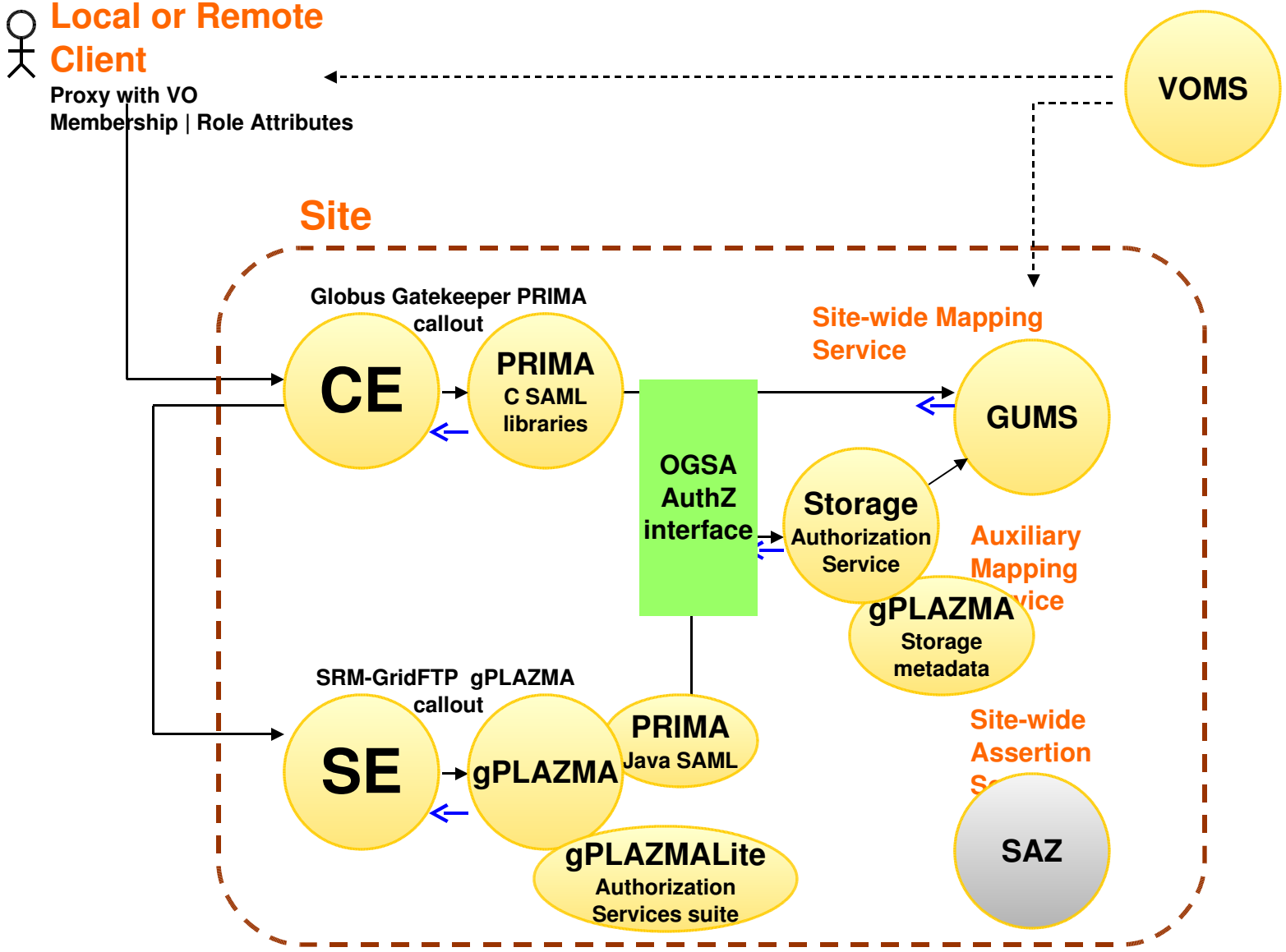
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PRIMA C SAML libraries
Site-wide Mapping Service
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OGSA AuthZ interface
Storage Authorization Service
Auxiliary Mapping Service
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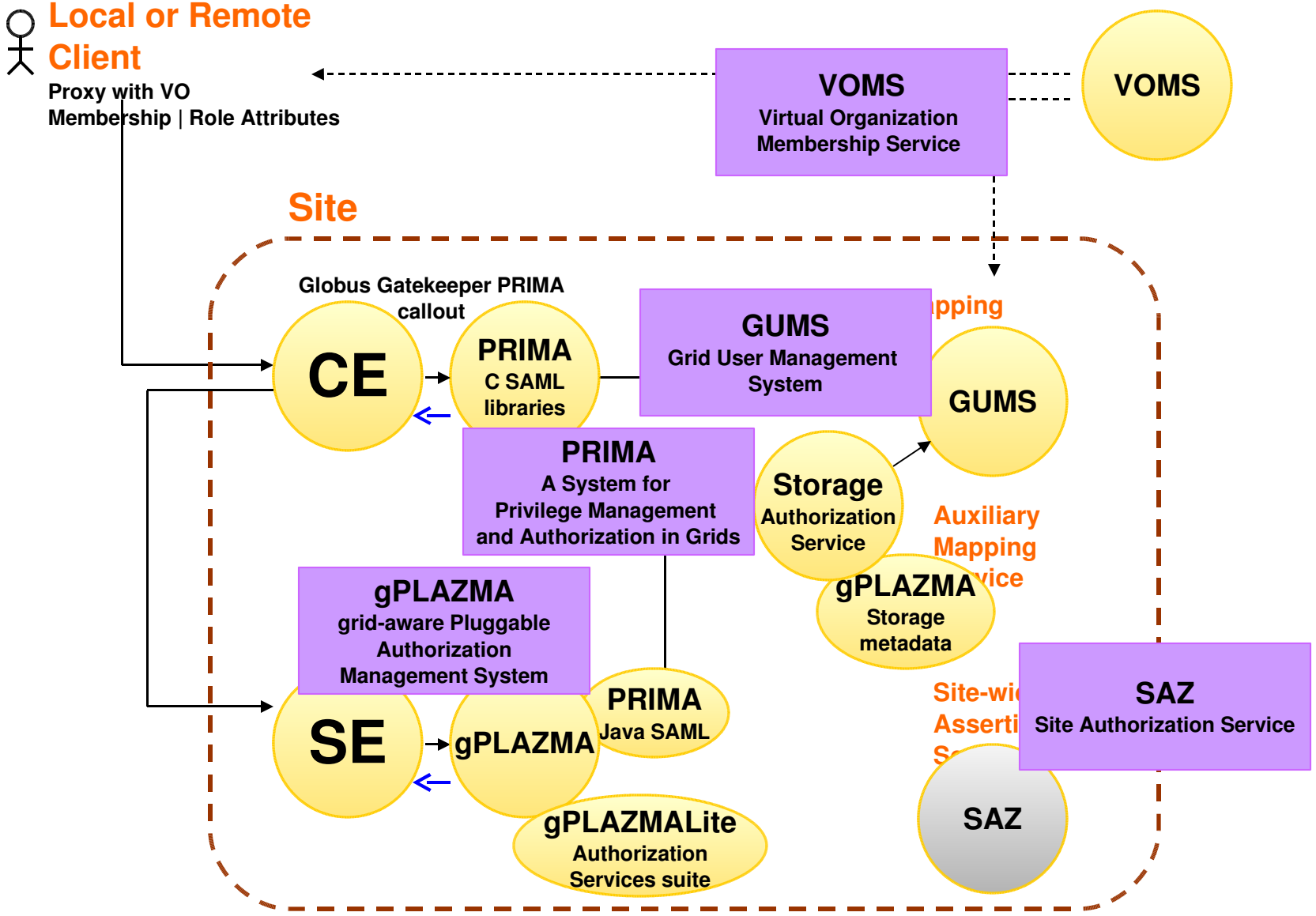
Local or Remote Client
Proxy with VO Membership | Role Attributes
VOMS
Virtual Organization Membership Service
VOMS
Site
Globus Gatekeeper PRIMA callout
CE
PRIMA
C SAML libraries
GUMS
Grid User Management System
GUMS
PRIMA
A System for Privilege Management and Authorization in Grids
Storage
Authorization Service
Auxiliary Mapping
gPLAZMA
Storage metadata
gPLAZMA
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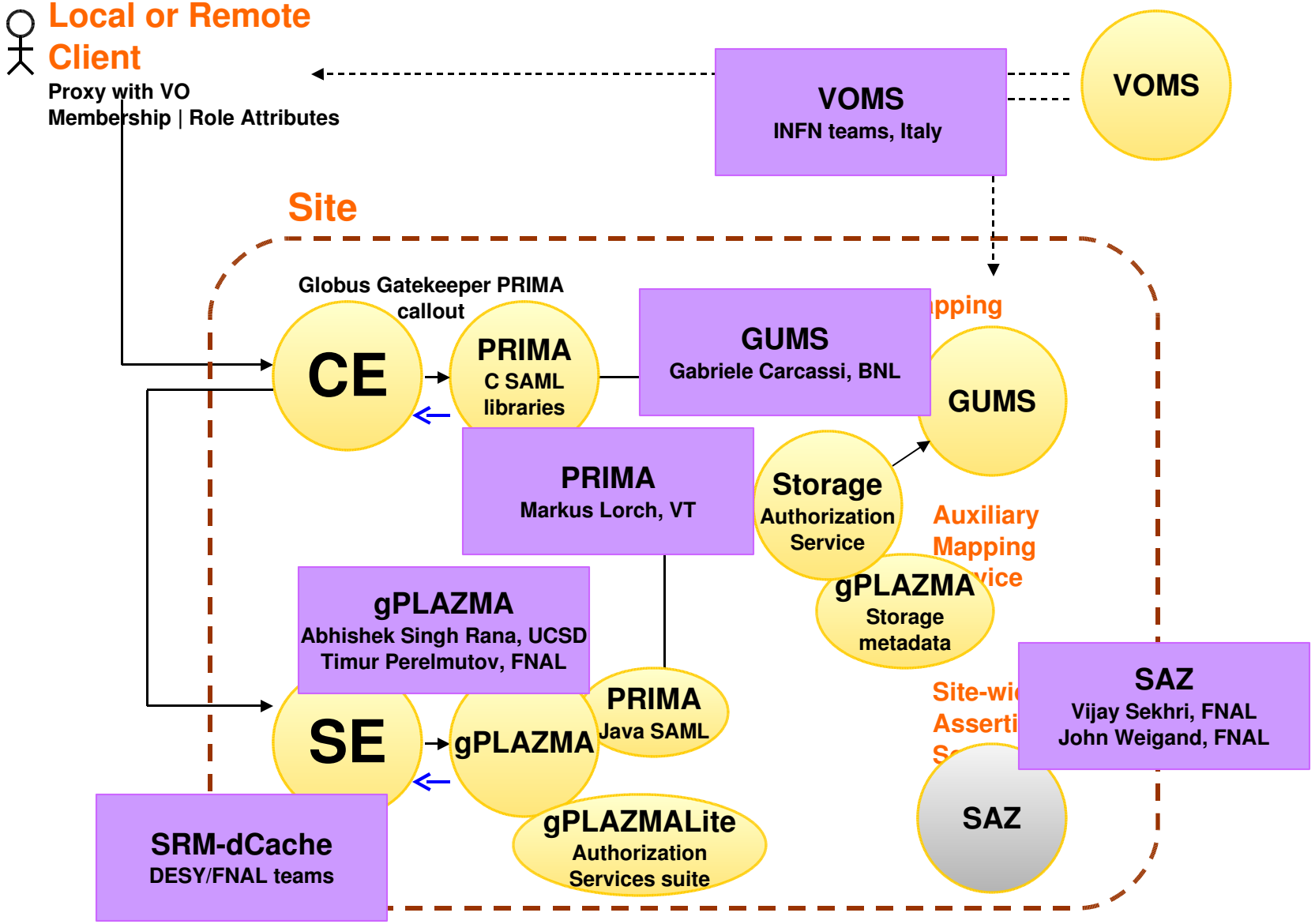
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INFN teams, Italy
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Gabriele Carcassi, BNL
GUMS
PRIMA
Markus Lorch, VT
Storage
Authorization Service
Auxiliary Mapping
gPLAZMA
Storage metadata
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Abhishek Singh Rana, UCSD
Timur Perelmutov, FNAL
SE
gPLAZMA
PRIMA
Java SAML
SAZ
Vijay Sekhri, FNAL
John Weigand, FNAL
SAZ
SRM-dCache
DESY/FNAL teams
gPLAZMALite
Authorization Services suite

Status

- gPLAZMA native role-based authz mode deployed at USCMS tier-2 production site at UCSD. Work in progress for deployment at tier-1 at FNAL.
- GUMS role-based authz mode in final stages of development/packaging.
- Deployment and usage of all modes on USCMS production dCache sites expected before Service Challenge 4.

Known Limitations

- Not (yet) implemented for dcap.
- Scalability of site central call-out not yet understood.(gPLAZMA native a viable fallback)
- vi/emacs is only administrative interface.
- Options for communicating desired policies from VO to site are less than satisfactory. (general problem of role based authz!)

Future Work

- Add MySQL based backend to replace *storage authz records* configuration file.
- Complete gPLAZMA for dcap.
- Understand scalability of site-wide call-out.
- Add XACML based authorization engine to dynamically assign storage authz mappings at Site.
- Explore XACML/SAML rule-based policy declaration (***VO-level***) and policy computation (***Site-level***).

Thank You.