Community-Based Secure Information and Resource Sharing in AWS Public Cloud

Cyber Incident Response

A Model for Information and Resource Sharing

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Public Cloud

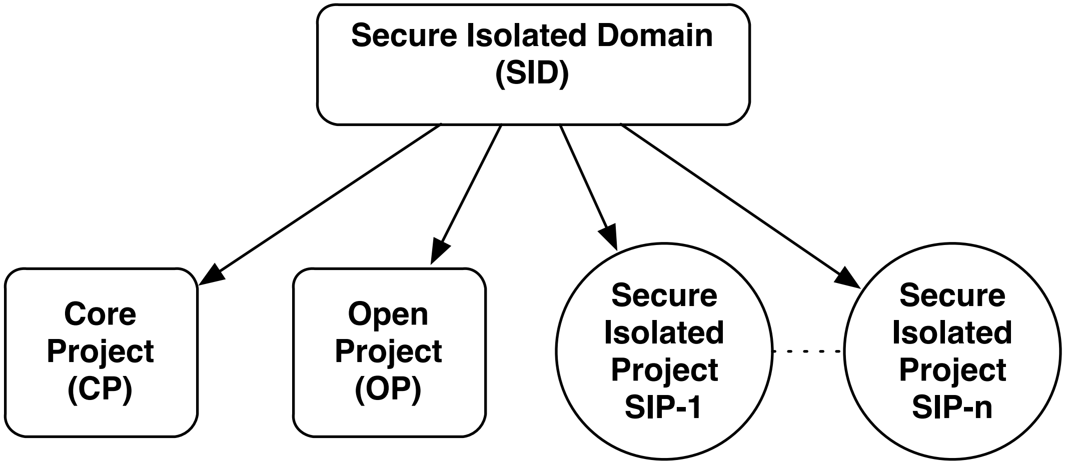
- Public cloud provides cloud services for self-service use by general public over the internet.
    - Amazon Web Service (AWS)
- Communities in public cloud
    - organizations with shared concern, such as mission, security requirements, business models, etc.
    - self-formed and self-organized.

Cyber Collaboration Initiatives

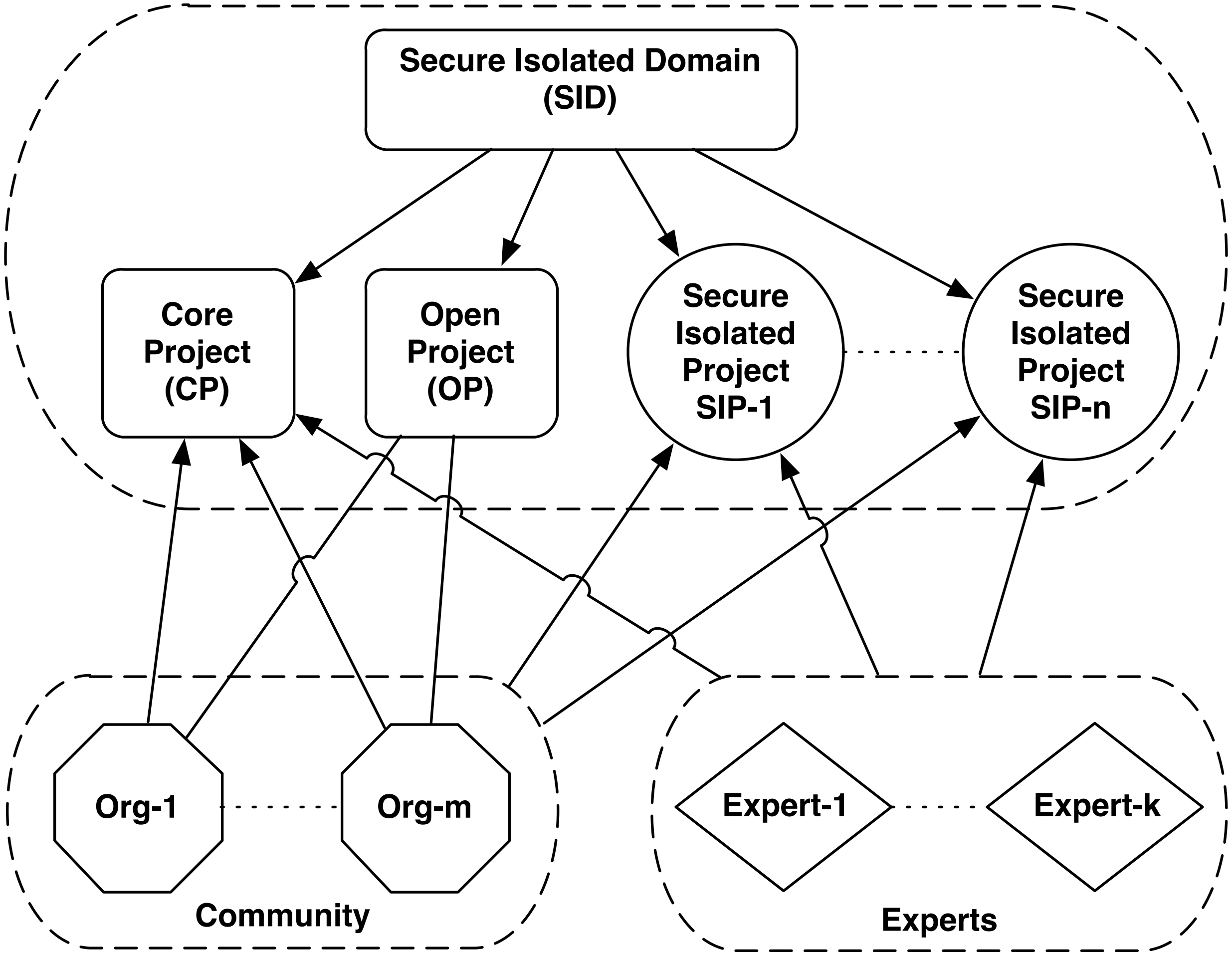
- Cyber attacks are becoming increasingly sophisticated.
  - Hard to defend by a single organization on its own.
- Collaborate to enhance situational awareness
  - Share cyber information in community
    - Malicious activities
    - Technologies, tools, procedures, analytics.

Ref: www.huffingtonpost.co.uk/2013/04/23/uk-government-faces-1000-cyber-attacks-a-day_n_3138164.html

Secure Isolated Domain (SID) Model


Secure Isolated Domain (SID)
Core Project (CP)
Open Project (OP)
Secure Isolated Project SIP-1
Secure Isolated Project SIP-n

SID Model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Org-1
Org-m
Community
Expert-1
Expert-k
Experts

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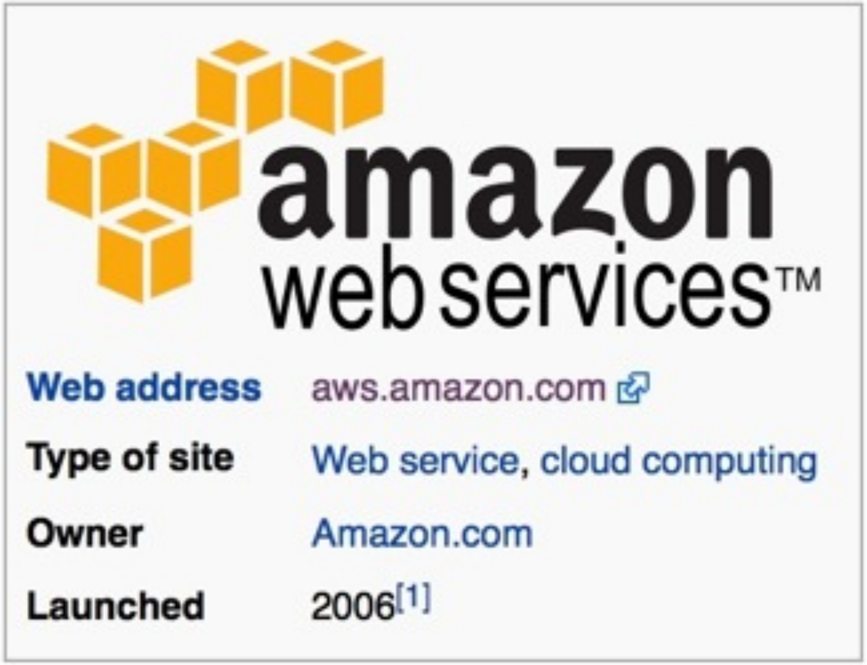
Assumptions and Scope

- In a public cloud platform
- Amazon Web Service (AWS)
- Sharing amongst a set of organizations
  - Sensitive cyber information, infrastructure, tools, analytics, etc.
  - May share malicious or infected code/systems (e.g. virus, worms, etc.)
- Focus on access control model

Amazon Web Service (AWS)

- Dominant public cloud software
  - **Amazon Web Services** (**AWS**), a collection of remote computing services, also called web services, make up a cloud-computing platform offered by Amazon.com.

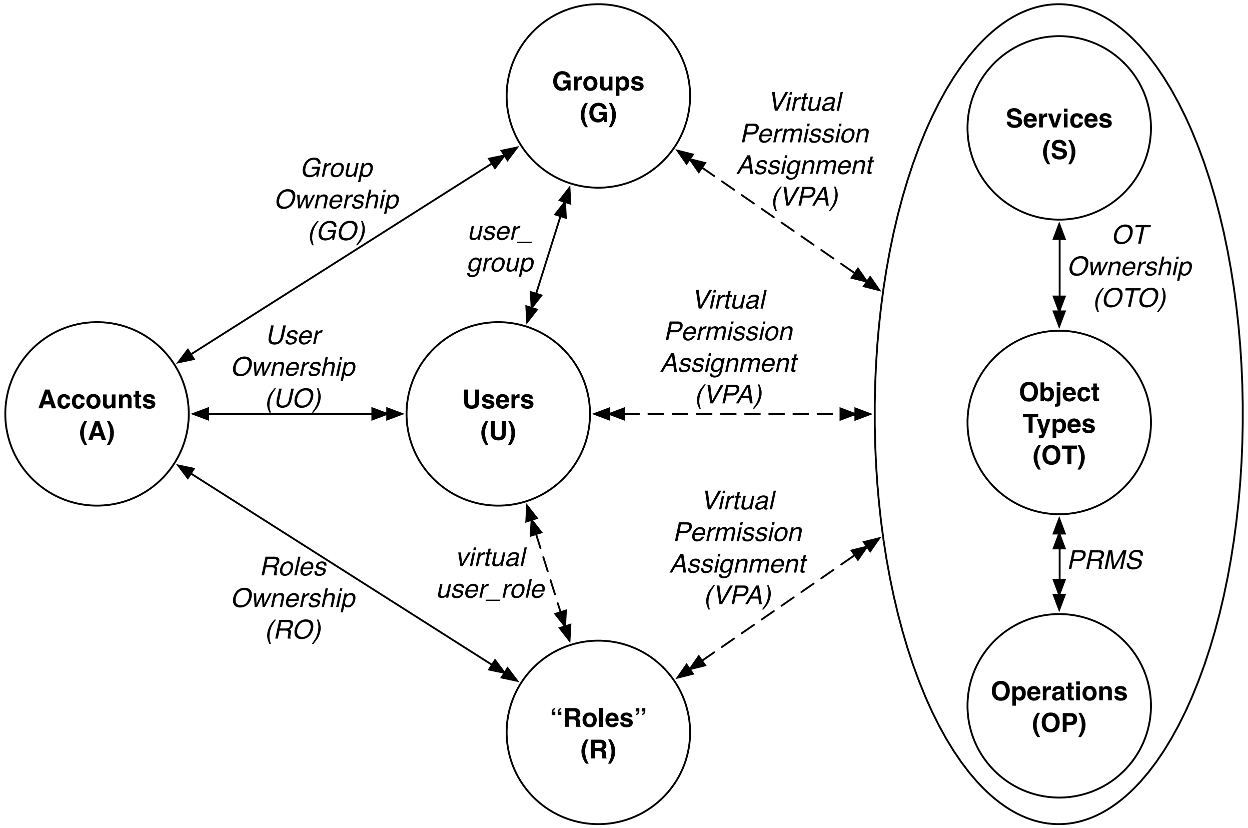


Web address	aws.amazon.com
Type of site	Web service, cloud computing
Owner	Amazon.com
Launched	2006[1]

Ref: https://en.wikipedia.org/wiki/Amazon_Web_Services

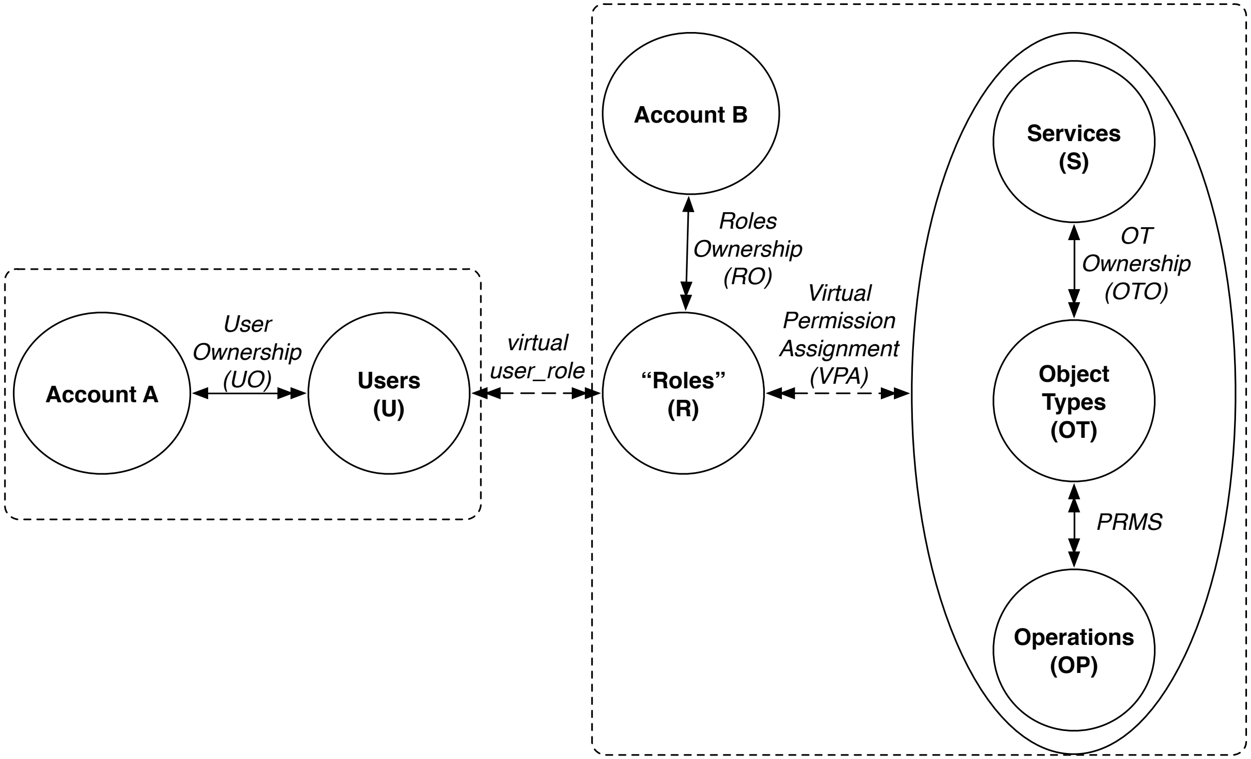
AWS Access Control Model

- AWS Access Control within a Single Account

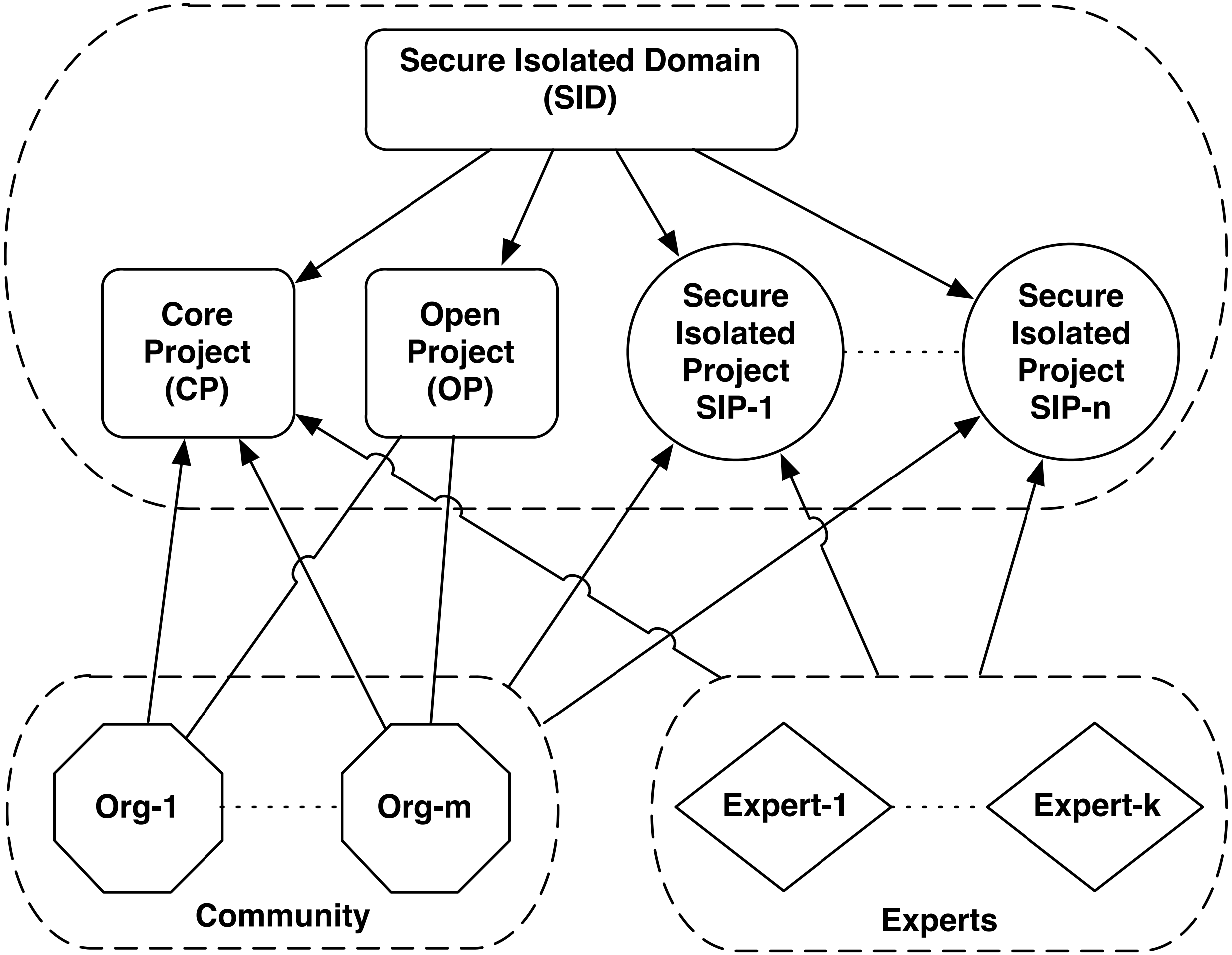


AWS Access Control Model

- AWS Access Control Across Accounts [Users in account A access services and resources in account B]



SID Model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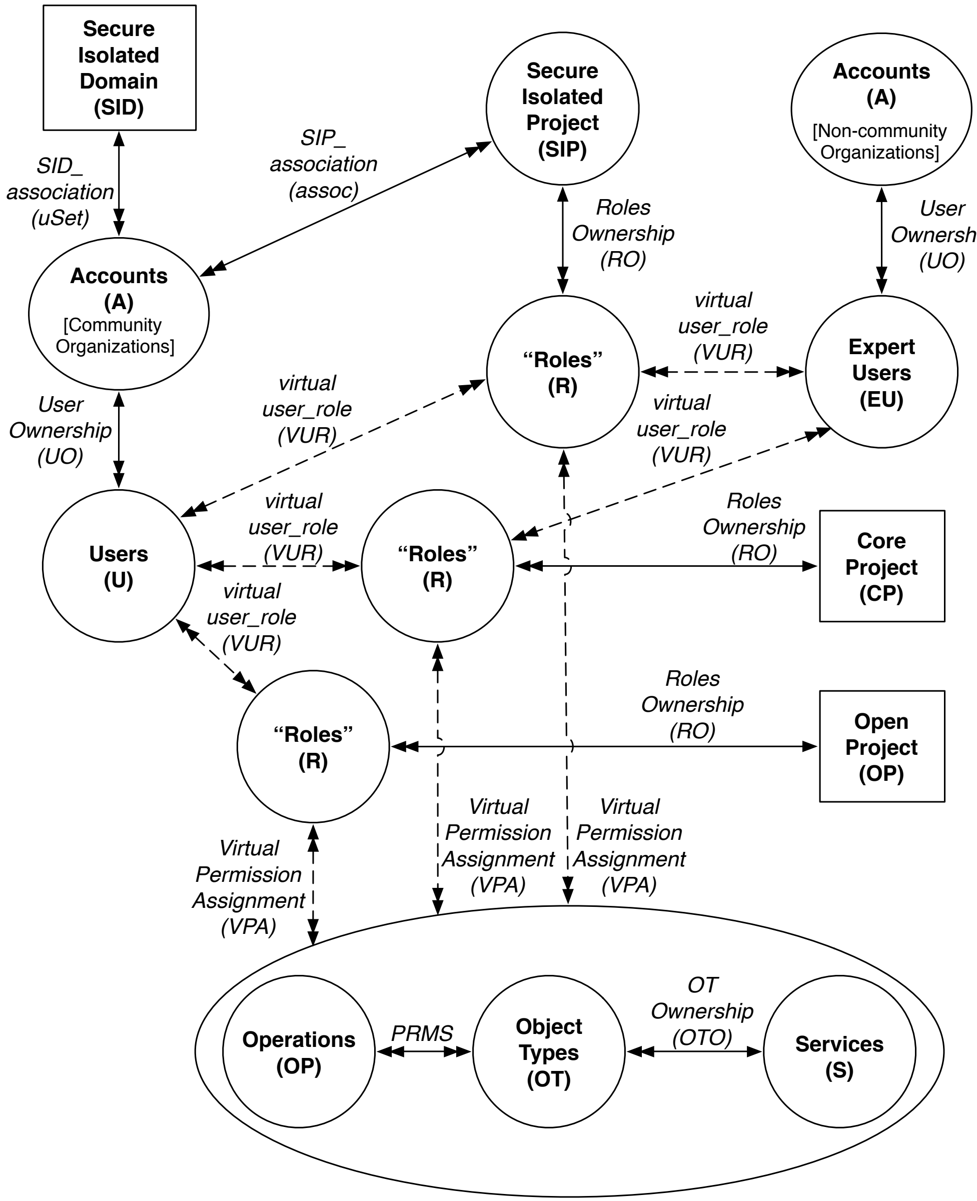
AWS Access Control Model with SID Extension



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AWSAC-SID Administrative Model

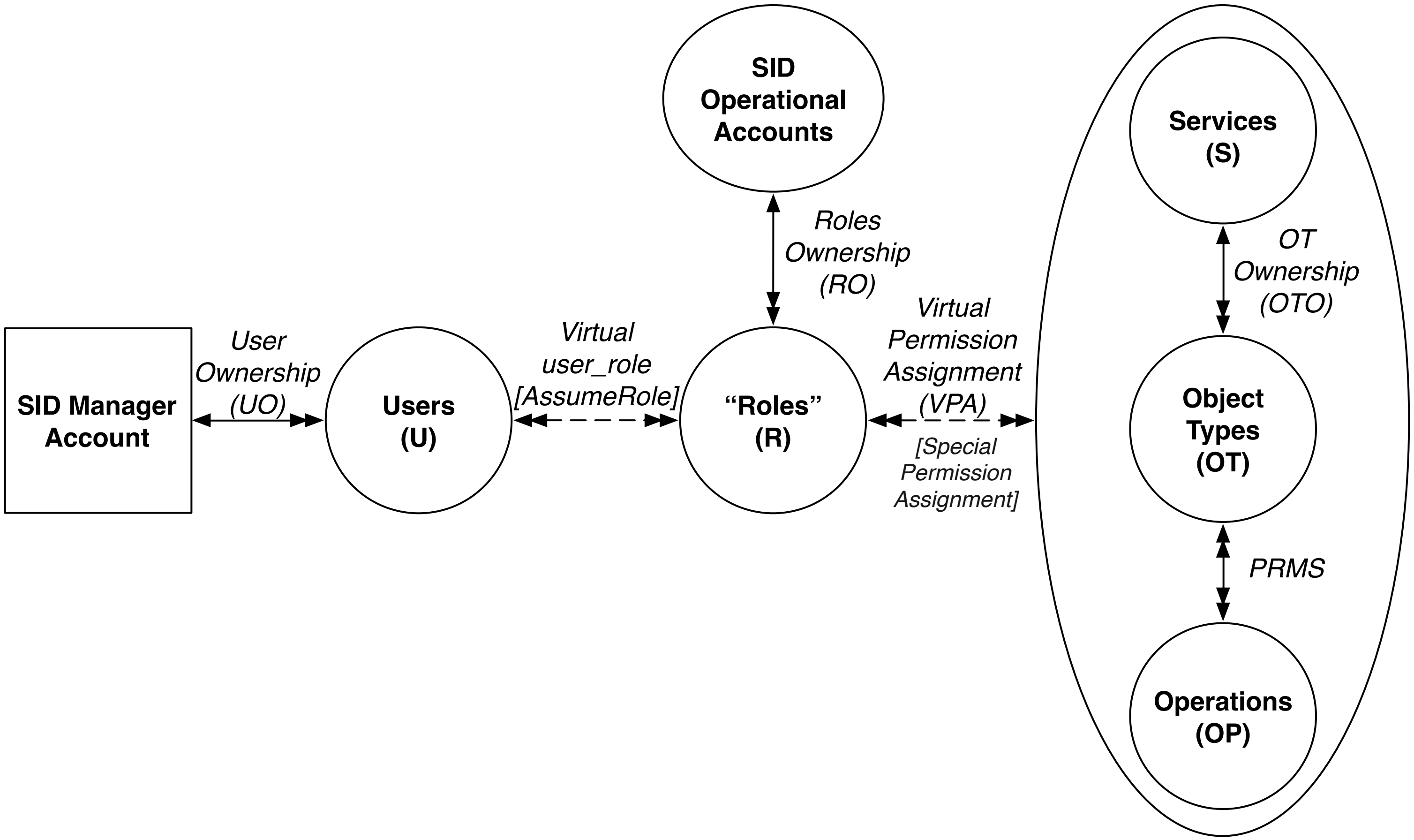
- **SipCreate(subuSet, sip)**
  /* A subset of organization security admin users together create a sip */
- **SipDelete(subuSet, sip)**
  /* The same subset of security admin users together delete a sip */
- **CpUserAdd(adminu, u)**
  /* CP admin add a user from his home account to CP */
- **CpUserRemove(adminu, u)**
  /* CP admin remove a user from CP */
- **SIPUserAdd(adminu, u, r, sip)**
  /* Sip admin add a user from his home account to SIP */
- **SIPUserRemove(adminu, u, r, sip)**
  /* Sip admin remove a user from SIP */
- **OpenUserAdd(u)**
  /* Users add themselves to OP */
- **OpenUserRemove(u)**
  /* Users remove themselves from OP */

AWSAC-SID Administrative Model

- **CpEUserAdd(adminu, eu)**
  /* CP admin add an expert user to CP */
- **CpEUserRemove(adminu, eu)**
  /* CP admin remove an expert user from CP */
- **SipEUserAdd(adminu, eu, r, sip)**
  /* SIP admin add an expert user to SIP */
- **SipEUserRemove(adminu, eu, r, sip)**
  /* SIP admin remove an expert user from SIP */
- **CpCopyObject(u, o1, o2)**
  /* Users copy object from organization accounts to CP */
- **CpExportObject(adminu, o1, o2)**
  /* Admin users export object from CP to organizations accounts */
- **SipCopyObject(u, r, o1, o2, sip)**
  /* Users copy object from organization accounts to a SIP */
- **SipExportObject(adminu, o1, o2, sip)**
  /* Admin users export object from SIP to organization accounts */

Enforcement

- SID Service Setting-up

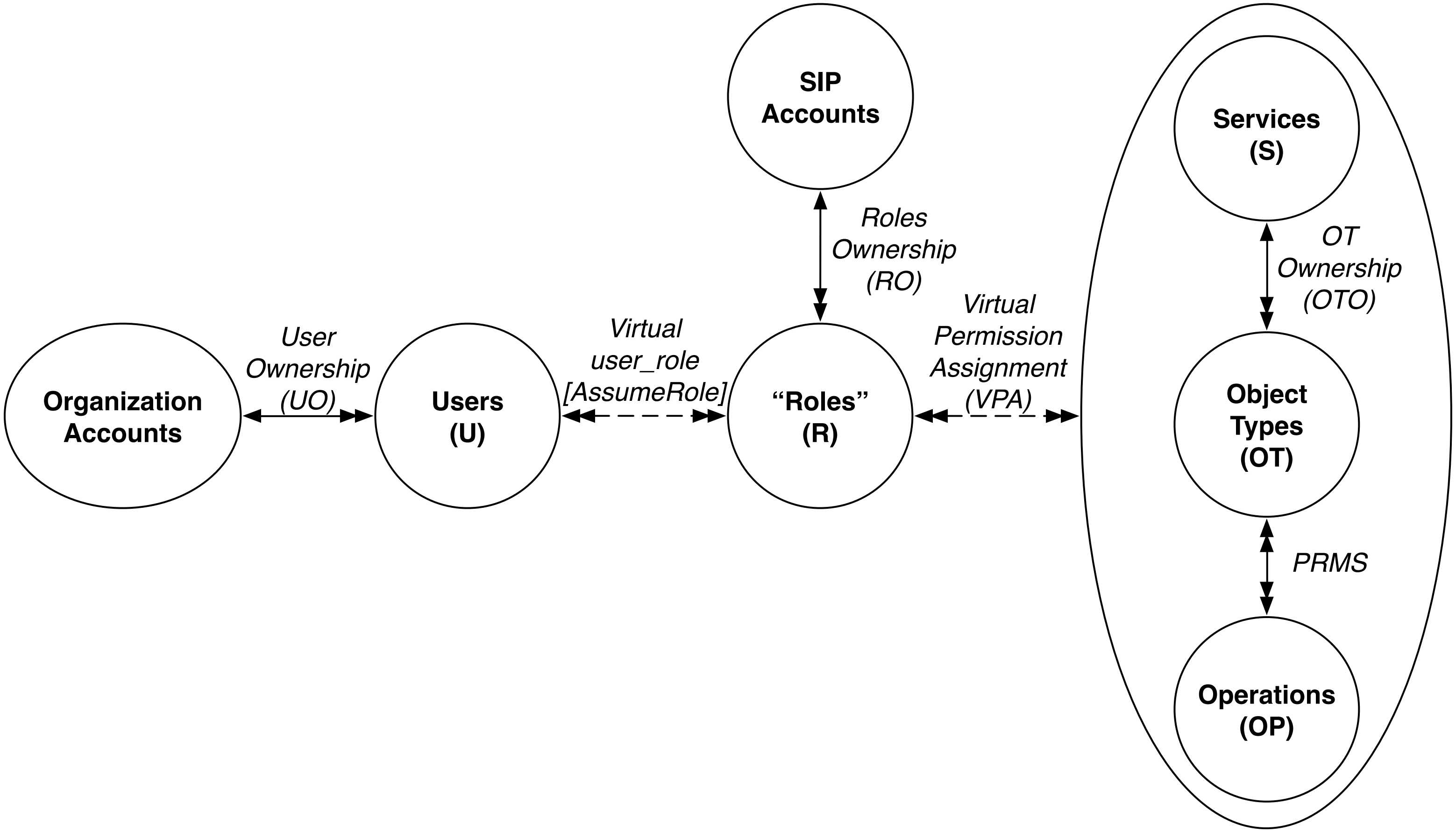


Enforcement

- Setting up SID service
  - Create two roles in the Core Project account: *CPadmin* and *CPmember*
    - *CPadmin* allows the user have limited administrative power to use the role *CPmember* and specify policies for users from his organization.
  - Create one role in the Open Project account: *OPmember*
    - *CPadmin* allows all users from the community to access the Open Project account.
  - SID manager maintains a list of security administrative users (*uSet*) from organizations.

Enforcement

- SIP User Assignment



Enforcement

- SIP request handling
  - Users from *uSet* send a SIP request to SID manager
  - SID manager creates a SIP
  - SID manager associates the group of organizations to the SIP
  - Two roles are created in the SIP account: *SIPadmin* and *SIPmember*
    - *SIPadmin* allows the user have limited administrative power to use the role *SIPmember* and specify policies for users from organizations to join the SIP
  - SID manager returns an SIP account number with the name of the *SIPadmin* role to each user from *uSet*.

Conclusion and future work

- Suggested AWSAC and AWSAC-SID models to AWS public cloud
  - Allow cyber collaboration across organizations
    - cyber incident response
    - Self-service
- Future work
  - Explore other model options.
  - Explore local roles in the model.
  - Explore models in other dominant cloud platforms.

Thanks!