A solution for Access Delegation based on SAML

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Access Delegation in distributed environments

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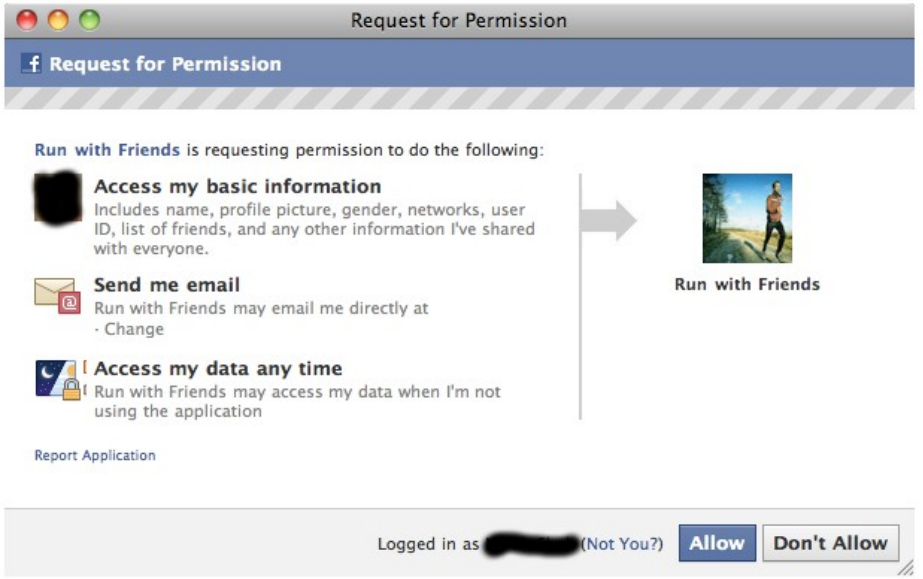
Access Delegation

- *Access Delegation* is the process by which an entity provides another entity with a subset of its privileges
  - Who provides the privileges is the *delegator*
  - Who is provided with the privileges is the *delegate*
  - Delegation is recursive: i.e. a delegate can provide another delegate with a subset of his/her/its privileges
- Delegator and delegate can be users or processes
  - In most cases the first delegator is a human user (but it is not mandatory)
- Delegator and delegate must be known by the involved identity domain(s)
- Delegation is time limited

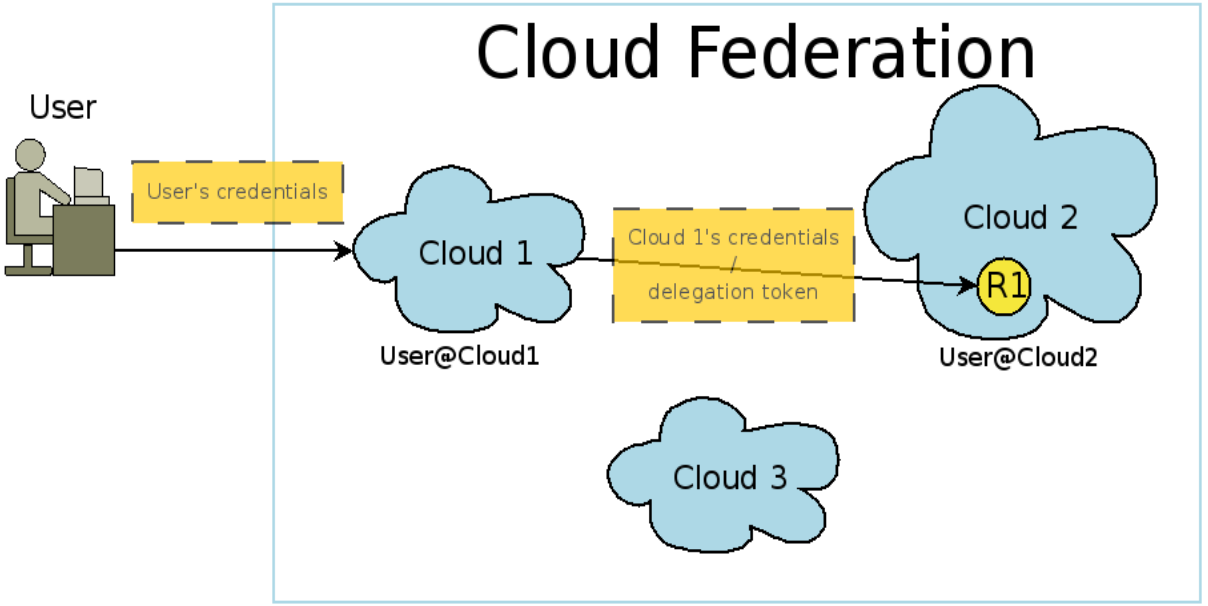
Use cases

- The delegate is a user
  - Someone provides someone with a power of attorney for some private affairs
  - The boss enables an employer to access certain data on his behalf
- The delegate is a process
  - A batch grid job started by a process authenticated by a proxy certificate
  - A Facebook user enables an application to access some data with his/her privileges



Delegation in a Cloud Federation

- The User has identities on the two Clouds (User@Cloud1 and User@Cloud2 who owns R1)
- Cloud 2 trusts Cloud 1 through its credentials (e.g. X509)
- User@Cloud2 delegates Cloud 1 to manage R1
- From this moment User@Cloud1 can safely manage his/her objects on Cloud 2 as they were on a single cloud
- Behind the scene Cloud 1, if needed, accesses Cloud 2 to manage data on behalf of User



Basic information to delegate

- The basic information needed for a delegation process, is:
  - The *delegation actors* (involved delegators, delegates, actions, roles and resources)
  - Delegation expiring time
- These pieces of information must be checked by the Identity and Access Management System:
  - The delegation is not expired
  - The caller must be be authenticated (through his/her/its credentials) and his/her identity must match with the identifier of the delegate
  - The delegator is associated with the delegated roles and actions on delegated resources and is able to delegate them

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SAML 2.0 Condition to Delegate

- OASIS Specification fully compliant with SAML 2.0
  - defines *DelegationRestrictionType, a subtype* of *Condition* containing a sequence of *Delegate* elements defining the delegation chain
  - The *Delegate* element includes attributes defining the delegation instant and the confirmation method
  - The identifier of the delegate is included in a child element of *Delegate*
- The produced Token is a valid SAML 2.0 Assertion
  - Contains all the mandatory elements
  - The Condition element of *DelegationRestrictionType* is ignored by Service Providers not compliant with the specification

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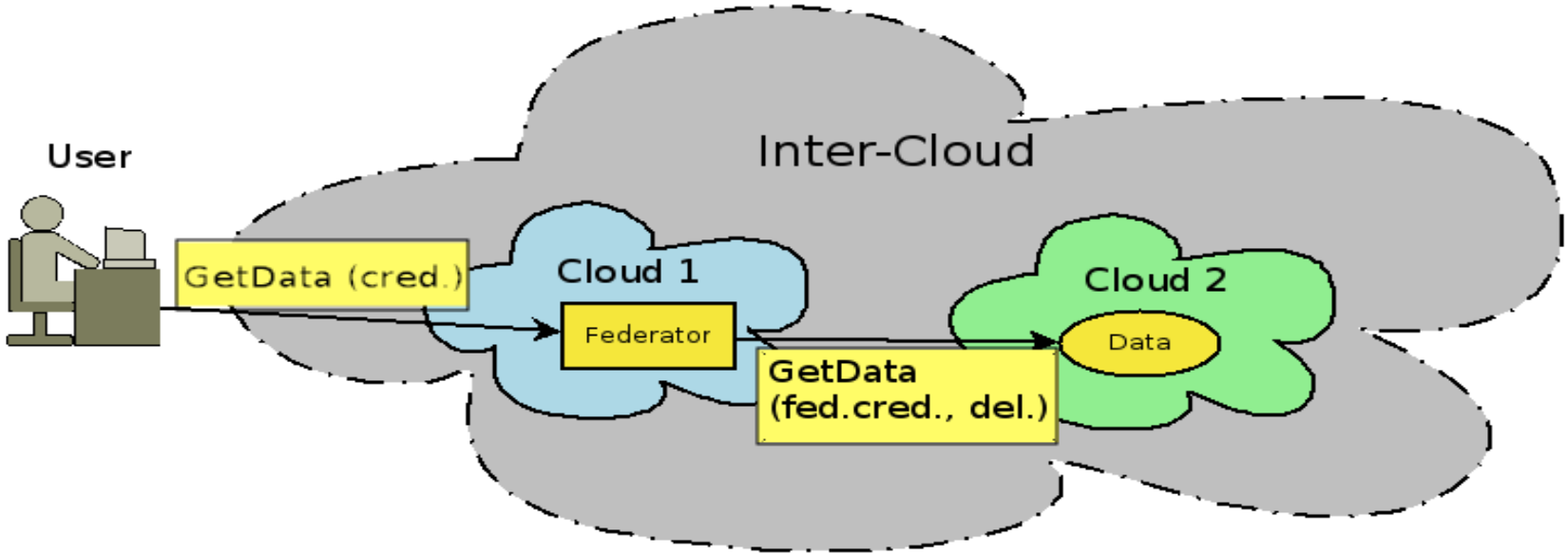
Complete Information set for delegation

- SAML 2.0 Condition to Delegate specification defines two pieces of information:
  - Delegation chain
  - Delegation instant
- A basic delegation process need further pieces of information, specified in the rest of the Assertion, in particular:
  - The Assertion subject defines the last delegator (also present in the chain)
  - Assertion attributes define delegated actions, roles and resources
  - *NotOnOrAfter* and *NotBefore* elements define the Assertion lifetime

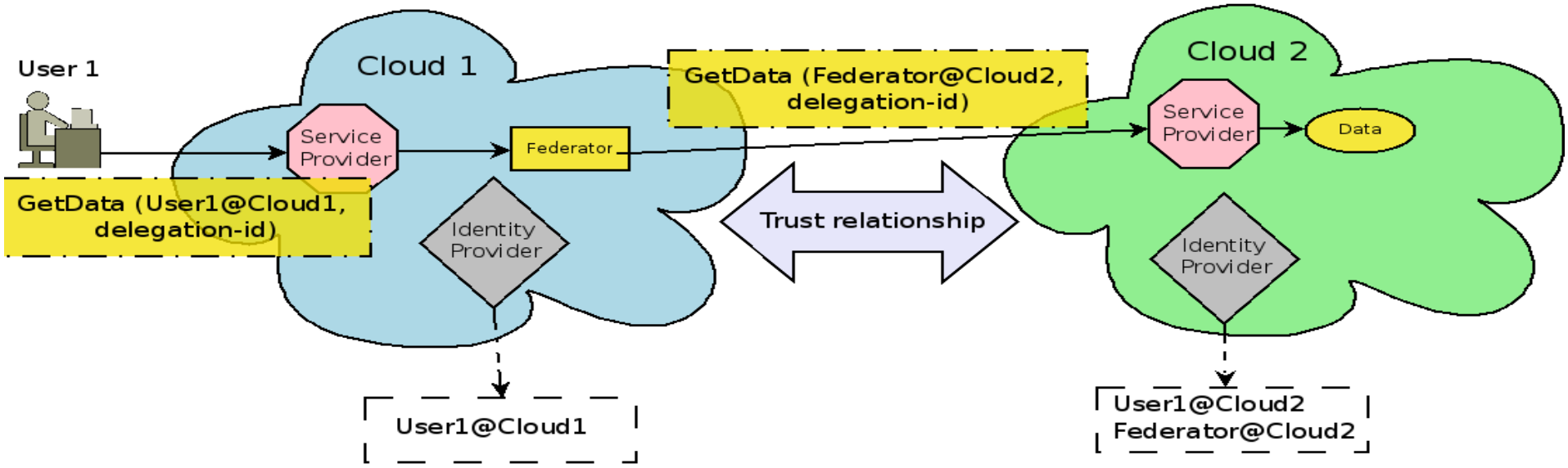
Use Case: data federation on a inter-cloud



Resources inside the federation should be accessed regardless their actual location

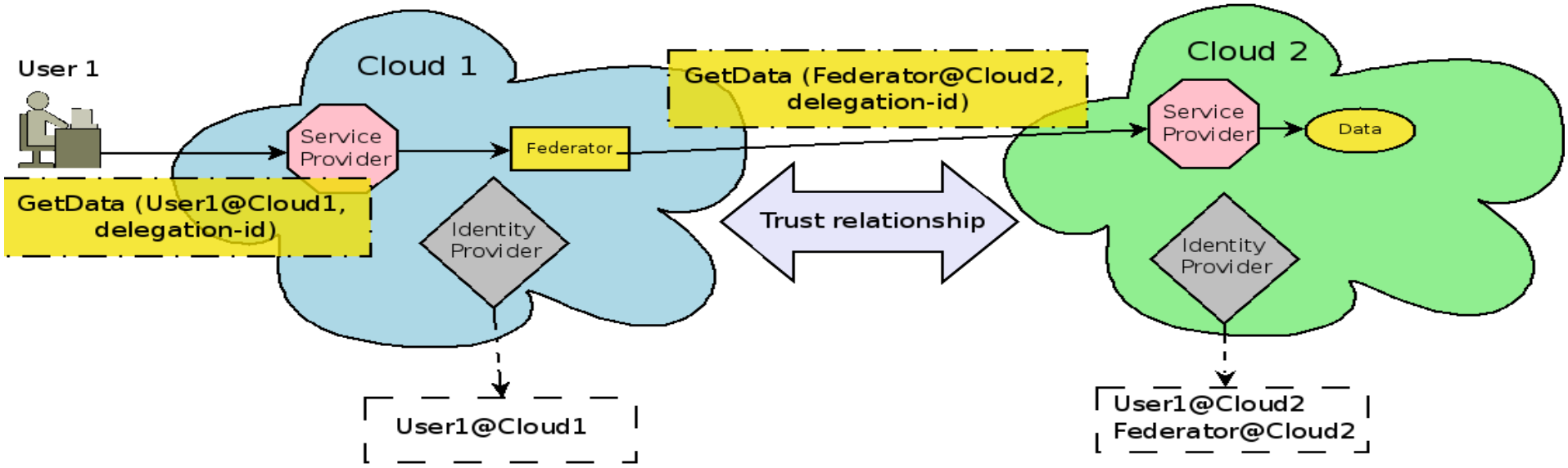
- A process called *Federator* dispatches every user request to the cloud where resources are
- The Federator Process is *delegated* by every user of the Cloud to access their data in the Federation

Resource Federation Process (1)



- The two clouds must trust each other
- User 1 owns an identity on Cloud 1 and an identity on Cloud 2
- The Federator owns an identity on Cloud 2
- User 1 provides the Federator with a delegation id to access his/her data on Cloud 2

Resource Federation Process (2)



- User 1 logs into Cloud 1 to request Data
- Cloud 1 discovers that requested data are on Cloud 2 and asks the Federator to retrieve them
- The Federator uses the delegation id to get the data with its identity

Developed components

- Shibboleth provides a plugin compliant with SAML 2.0 Condition to delegate
  - Shibboleth plugin is limited to uPortal use case
  - Shibboleth plugin does not enable direct Token management
- Implemented an extension to Shibboleth Service Provider and Identity Provider
  - Manages SAML Token Profile
  - Provides SAML 2.0 Condition to delegate at Token level

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Access Delegation Mechanisms will be part of a Federated Identity and Access Management Framework

- SAML Identity Federation will be integrated with SAML Delegation
  - SAML Identity Federation Module provides Shibboleth based web browser SSO and web services federation
  - will enable delegated access with identities valid in the whole Federation (no user1@Cloud1 and user1@Cloud2)
- A complete XACML based Federated Authorization framework
  - Multi-layer authorization, enabling to define and enforce attribute based authorization policies at federation layer and domain layer

Kiitos!

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