


Attribute-based Authorization for Science Gateways Using GridShib

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Overview

- GridShib Project Update
  - GridShib SAML Tools
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- The TeraGrid Science Gateway Use Case
  - Community Account Model
  - Grid Authorization Model for Science Gateways
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- Developers
  - Rachana Ananthakrishnan, Jim Basney, Tim Freeman, Raj Kettimuthu, Terry Fleury, Tom Scavo

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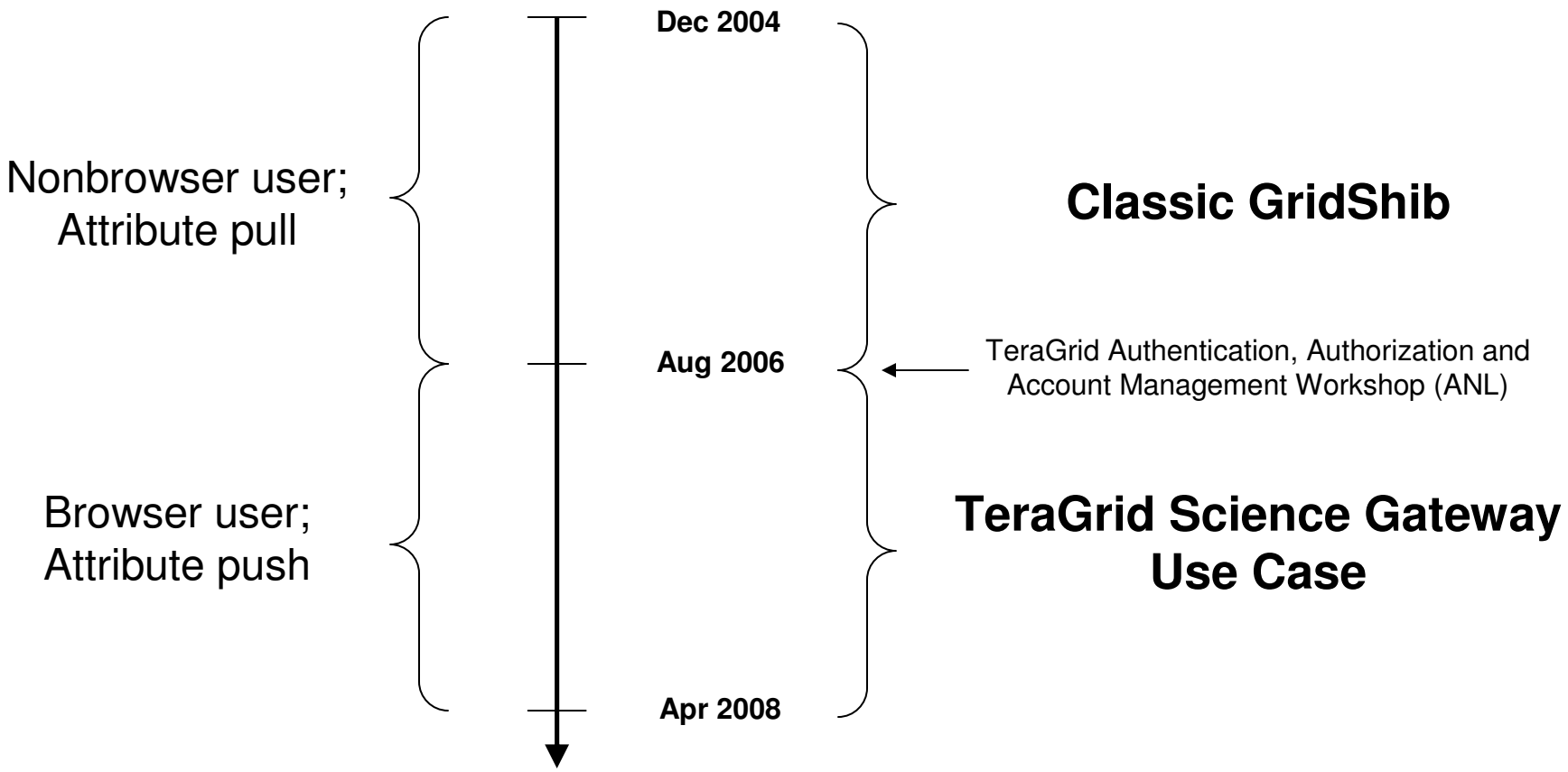
- The Science Gateway integration work is funded by the NSF TeraGrid Grid Integration Group through a sub-award to NCSA.


GridShib Project Update

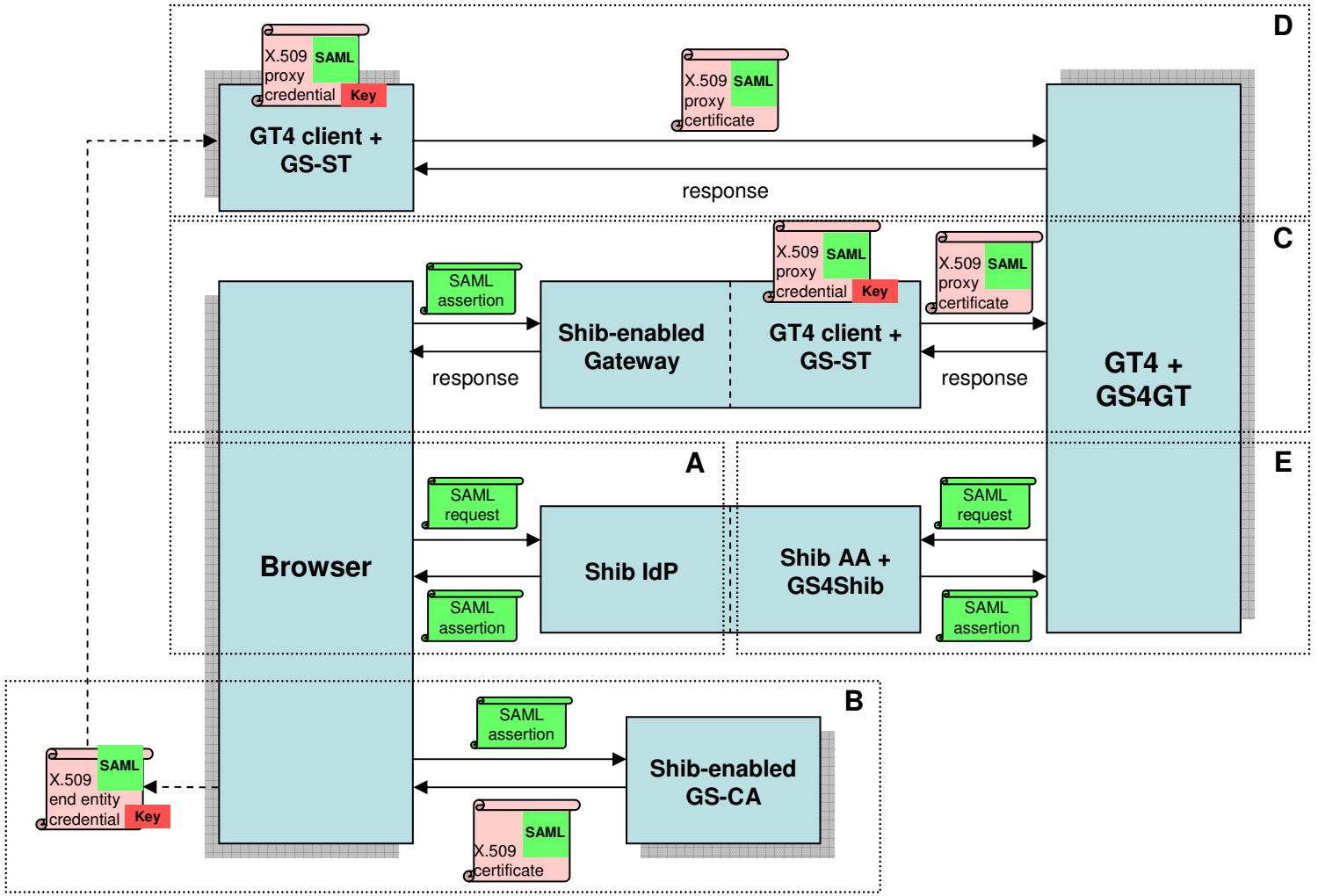
History of GridShib



GridShib Software

- *GridShib for GT*
  - Consumes X.509-bound SAML assertions issued by the GridShib CA or the GridShib SAML Tools. Issues SAML attribute queries to a Shibboleth IdP with GridShib for Shibboleth installed.
- *GridShib for Shibboleth*
  - Responds to attribute queries from GridShib for GT.
- *GridShib CA*
  - Issues short-lived X.509 credentials to browser users.
- *GridShib SAML Tools*
  - Issue or requests SAML assertions and optionally binds these assertions to X.509 proxy certificates.

Deployment Scenarios



http://gridshib.globus.org/docs/gridshib/deploy-scenarios.html


Recent Releases

- GridShib for Globus Toolkit v0.6.0
  - Released April 30, 2008
- GridShib SAML Tools v0.3.2
  - Released March 20, 2008
- http://gridshib.globus.org/download.html


GridShib SAML Tools

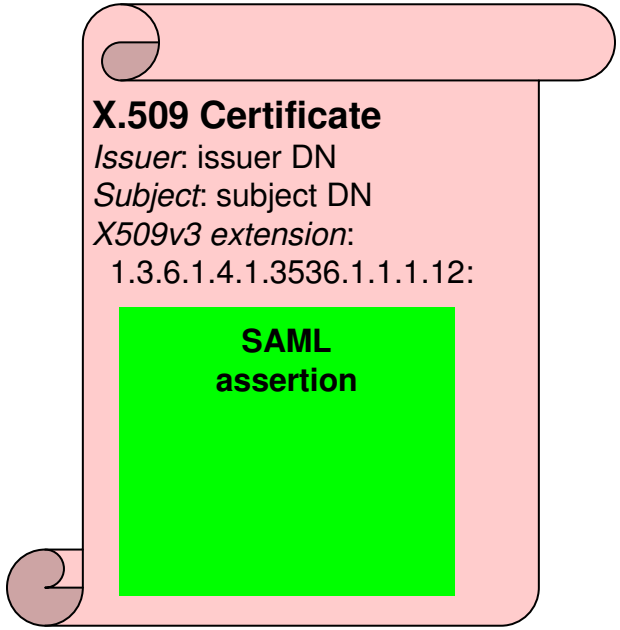
- The *GridShib SAML Tools* (GS-ST) are a standalone suite of Java-based client tools
  - Binds a SAML assertion to an X.509 proxy certificate
  - The same X.509-bound SAML token can be transmitted at the transport level or the message level (using WS-Security X.509 Token Profile)
- Includes the *GridShib Security Framework*, an API for producing and consuming X.509-bound SAML tokens
- GS-ST is a **SAML producer**

GS-ST Features

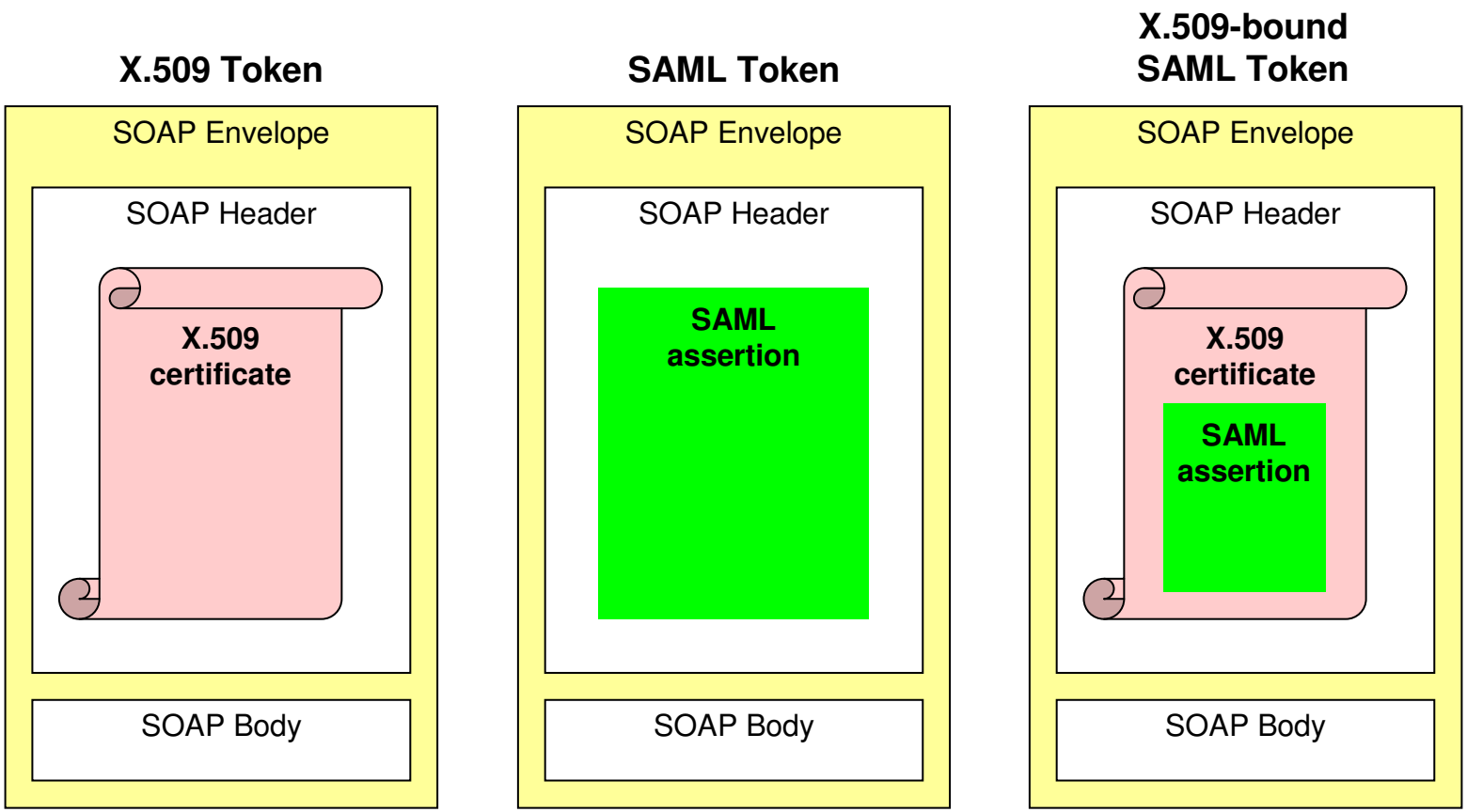
- Easily installed and configured
- Binds arbitrary content (e.g., SAML) to a non-critical certificate extension
- Multiple output options (SAML, X.509 proxy credential, DER-encoded ASN.1)
- CLI with shell scripts (UNIX and Windows)
- Includes a Java API for portal developers
- Leverages the *Globus SAML Library*, an enhanced version of OpenSAML 1.1

X.509-bound SAML Token

- GridShib SAML Tools produces *X.509-bound SAML tokens*, a new type of security token that enables attributed-based authorization in X.509-based Grids
- The SAML token is bound to a noncritical X.509v3 certificate extension



Security Tokens



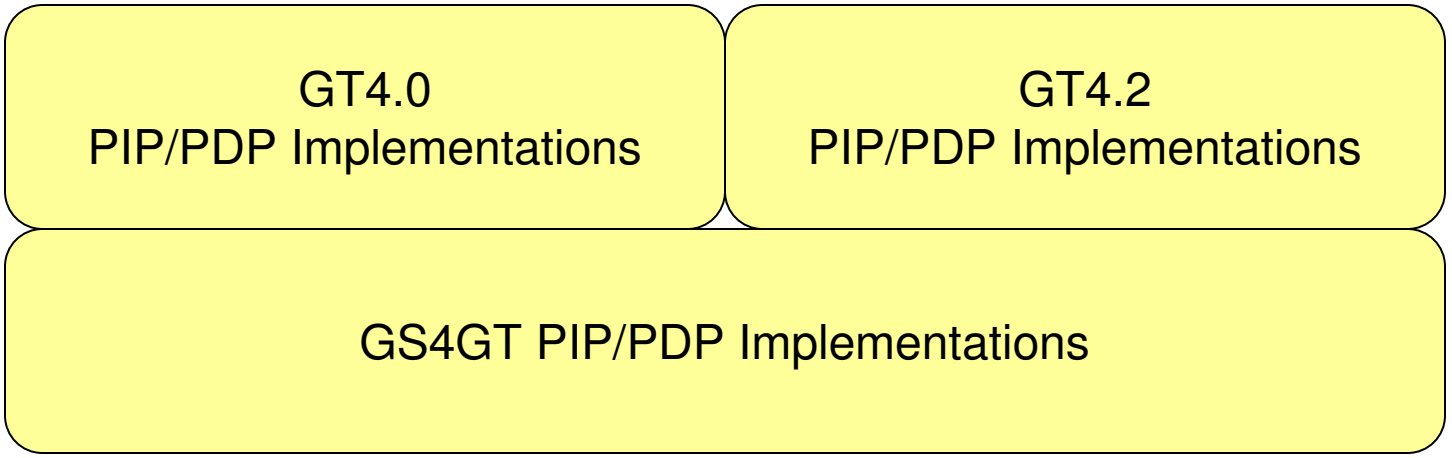
GridShib for GT

- GridShib for GT (GS4GT) is a plug-in for GT 4.x
  - GS4GT is compatible with both GT 4.0 and 4.2
- GS4GT is an implementation of a *Grid Service Provider* (analogous to a Shibboleth Service Provider)
- GS4GT is a **SAML consumer**

GS4GT Features

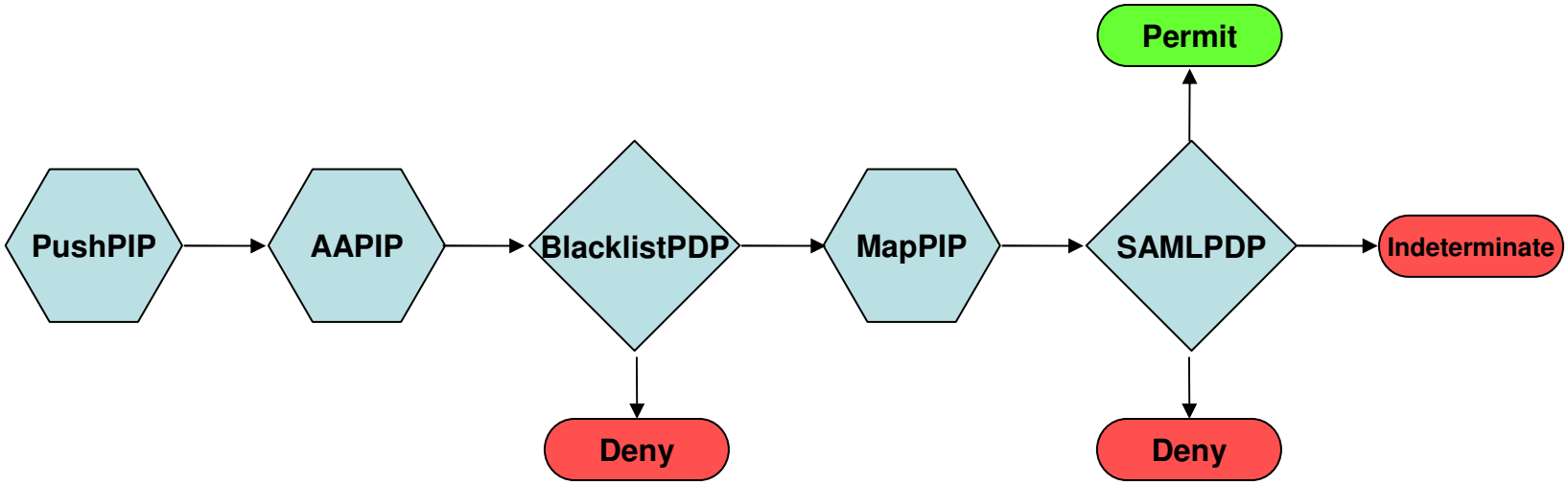
- Introduces *attribute-based authorization* into GT
- Exposes a single comprehensive *policy decision point* called the **`GridShibPDP`**
- Implements an *attribute push* model
- Restricts access based on *blacklists* of IP addresses and/or name identifiers
- Provides *attribute-based account mapping*
- Supports optional *gridmap short-circuiting*
- Defines an *attribute-based authorization policy* language (in XML)

GT4.0/4.2 Compatibility



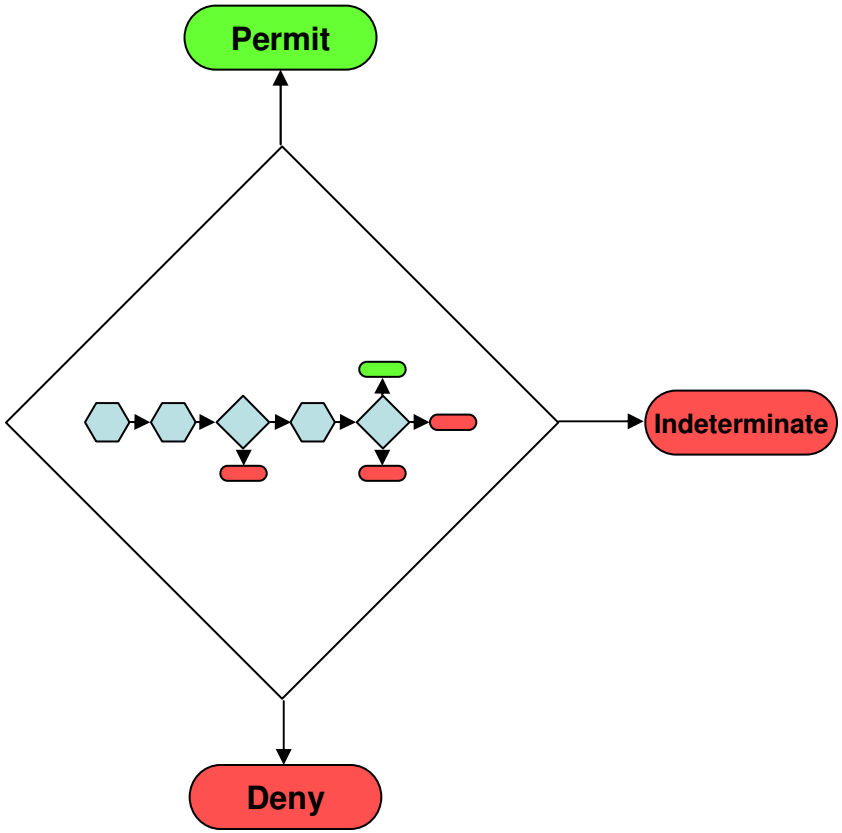
- GS4GT adds a layer of abstraction that permits both GT4.0 and GT4.2 to be supported simultaneously

GridShib Attribute Push

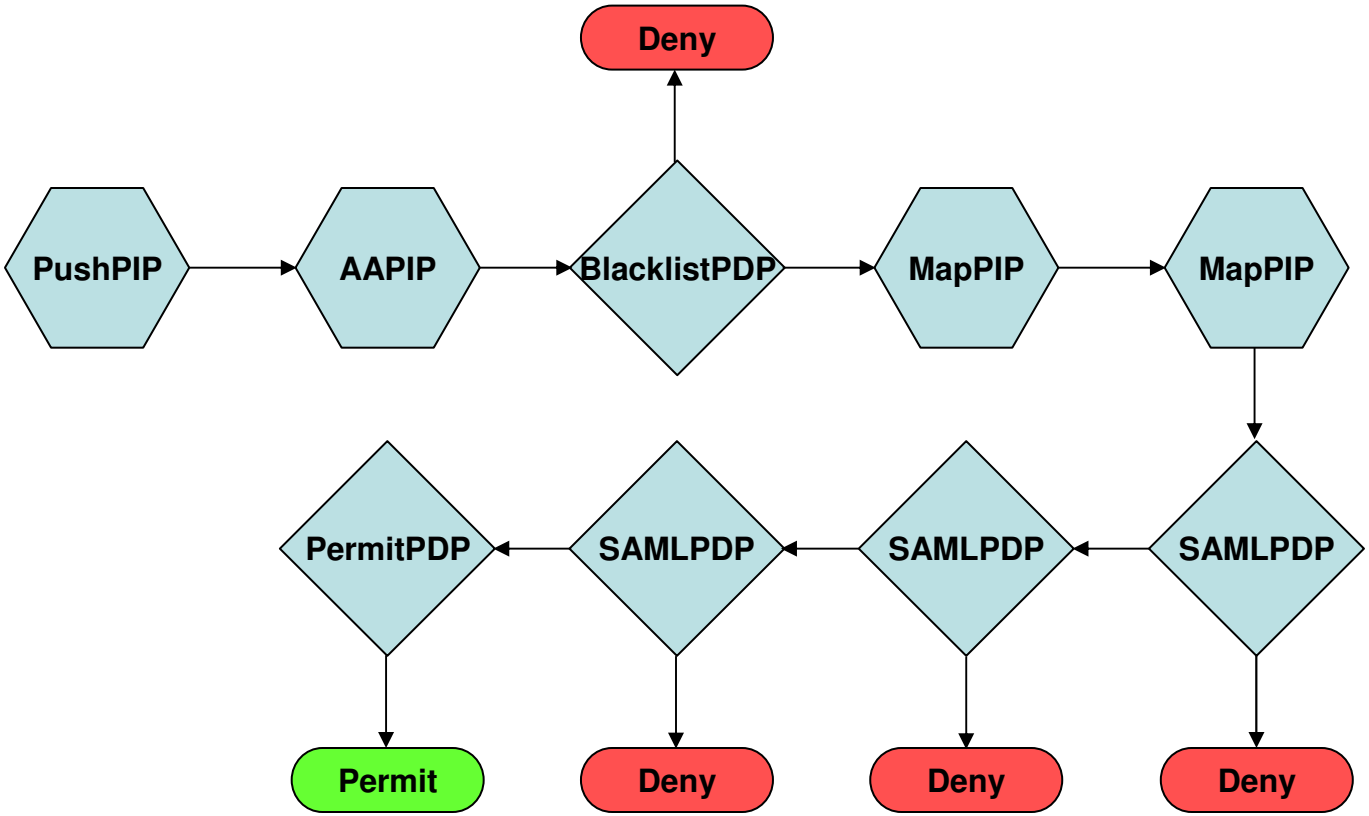


- In GT4.0 (deny-overrides), this works because the PDP is at the end of the chain
- In GT4.2 (permit-overrides), this authz chain does not honor SAMLBlacklistPDP

GridShibPDP



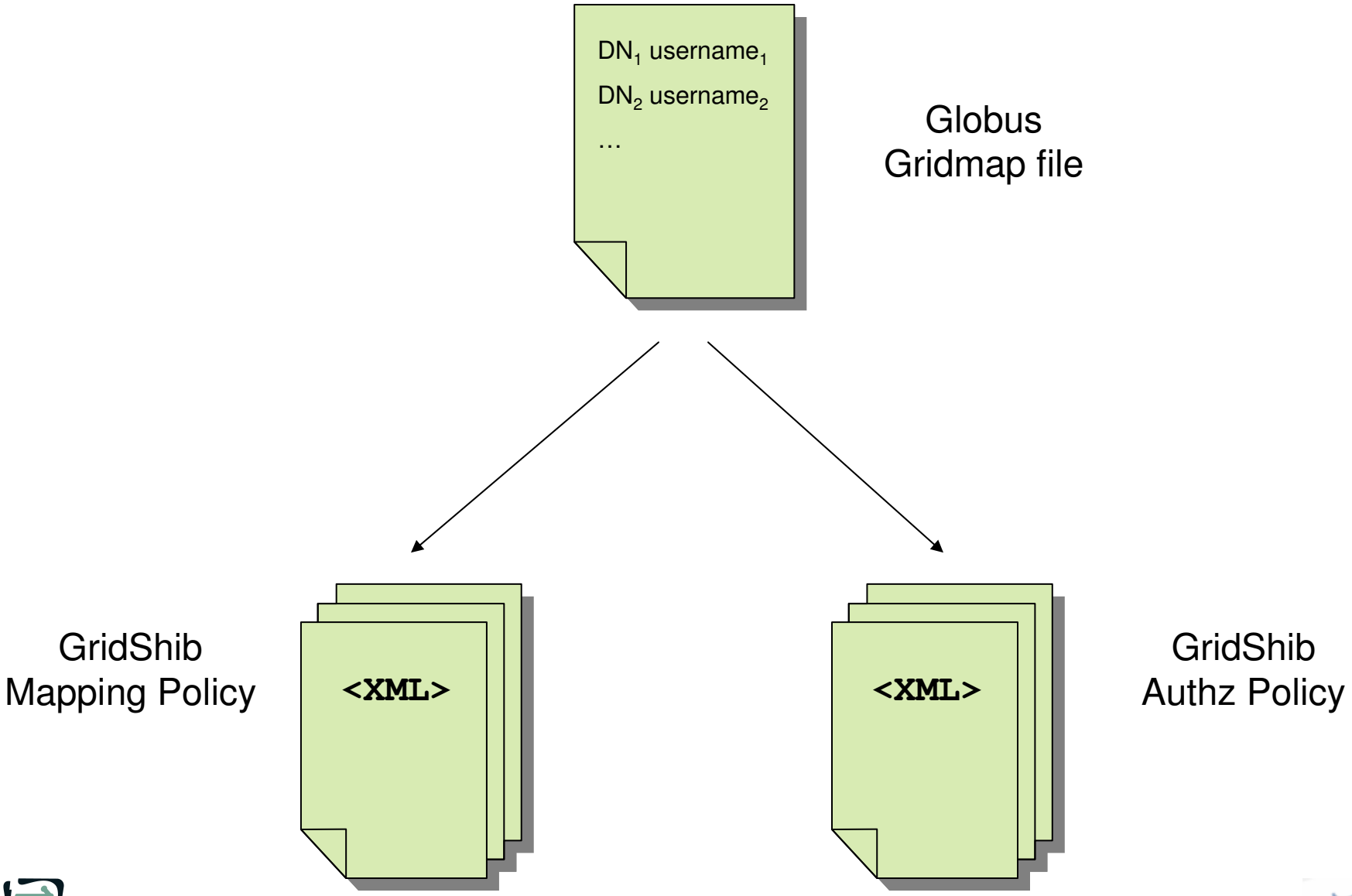
Complex Authz Policy



Gridmap File

- Flat file format:

  DN → [$user_0$, $user_1$, …, $user_{n-1}$]
- Dual function identity-based gridmap file:
  1. Authorization Policy
  2. Username Mapping Policy
- A single gridmap file serves both functions


DN1 username1
DN2 username2
...
Globus
Gridmap file
GridShib
Mapping Policy
<XML>
<XML>
GridShib
Authz Policy

GridShib Policy Files

- Two separate attribute-based policy files:
  1. Authorization Policy

     $[A_0, A_1, \ldots, A_{m\text{-}1}]$

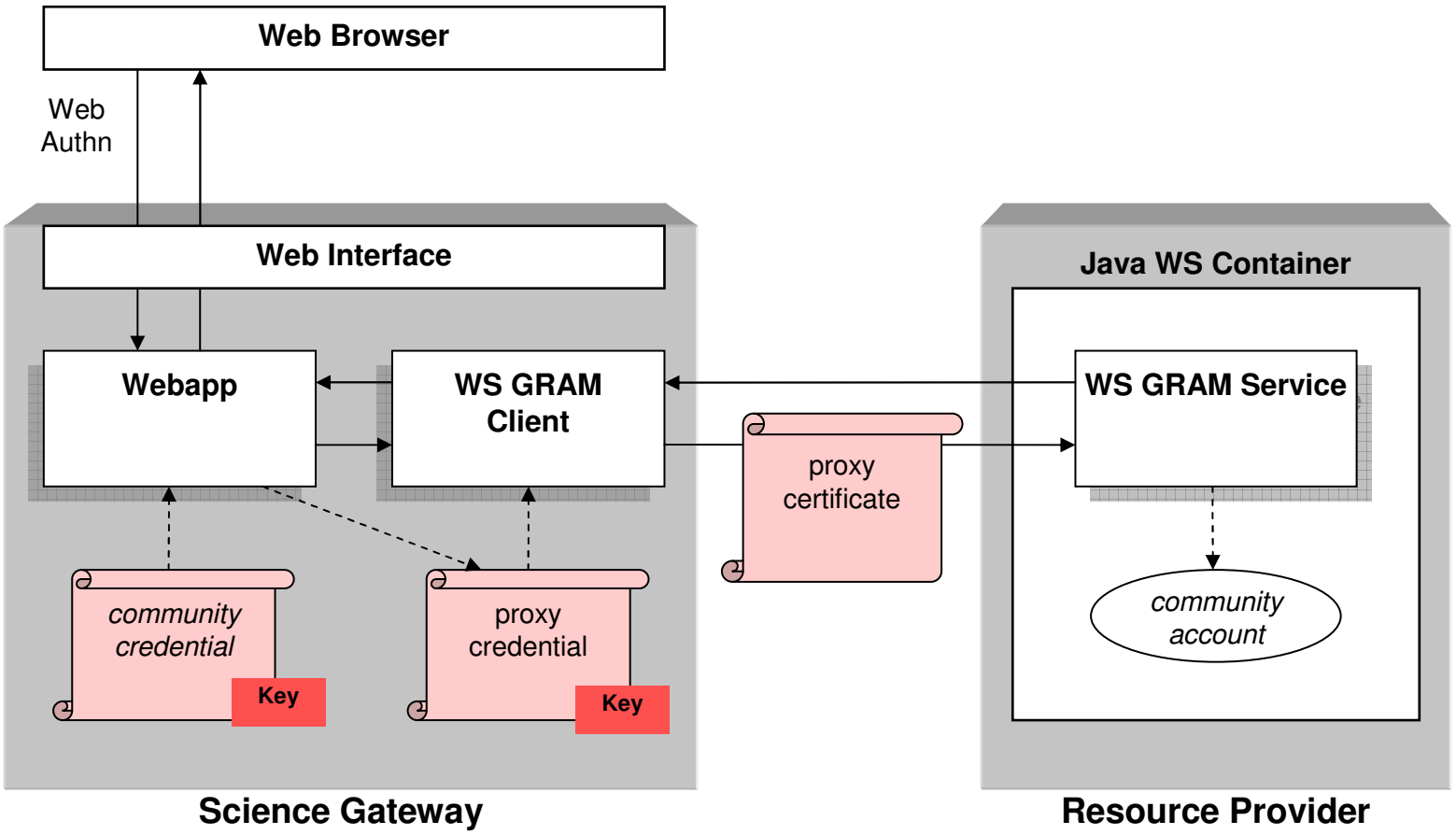
  2. Username Mapping Policy

     $[A_0, A_1, \ldots, A_{m_1\text{-}1}] \rightarrow [user_0, user_1, \ldots, user_{n_1\text{-}1}]$

     $[A_0, A_1, \ldots, A_{m_2\text{-}1}] \rightarrow [user_0, user_1, \ldots, user_{n_2\text{-}1}]$ …
- A single XML-based policy file *may* encapsulate both types of policies

The TeraGrid Science Gateway Use Case

Science Gateway



Community Account Model

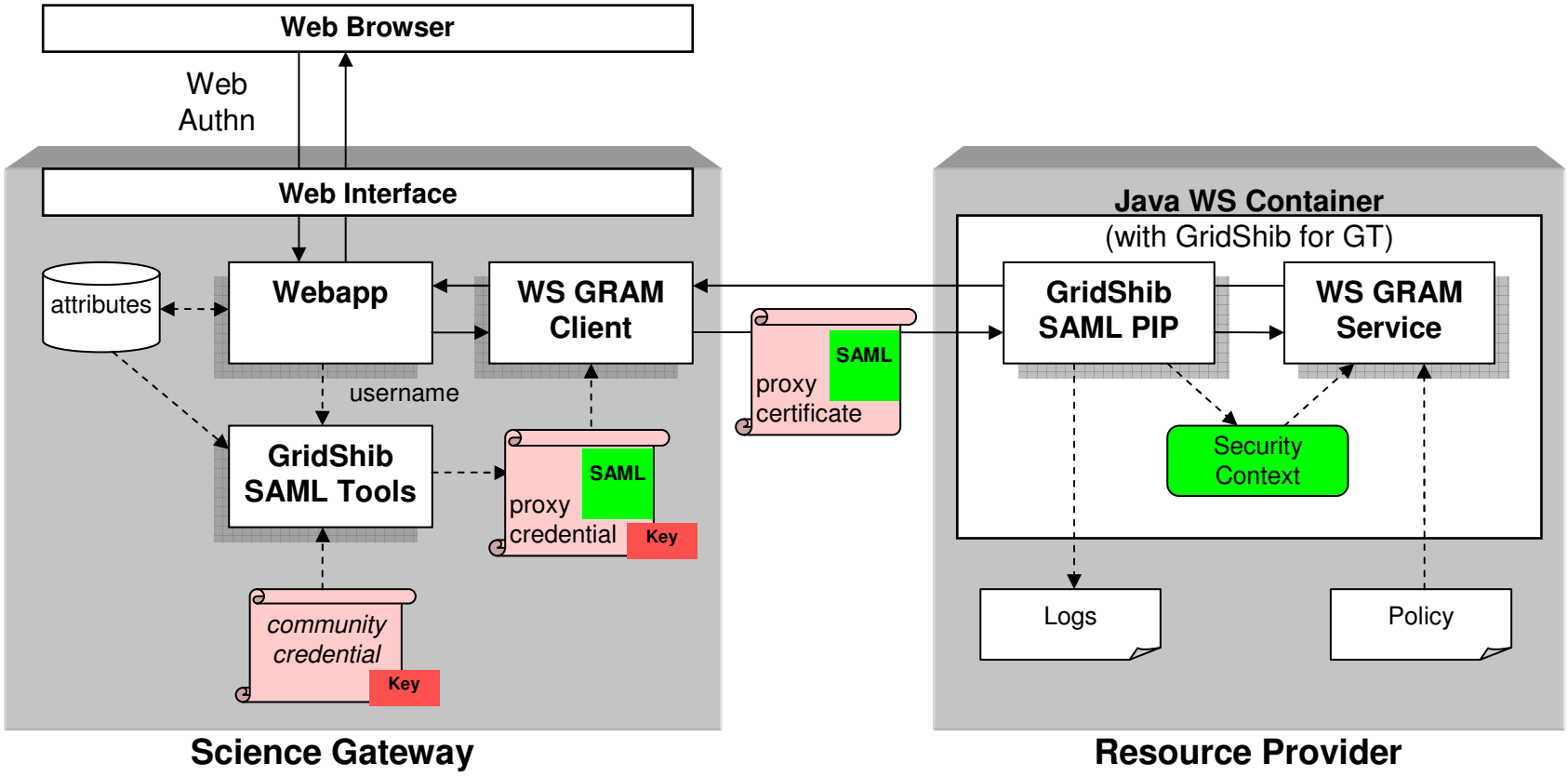
- A *community credential* is issued to each gateway
- The gateway issues proxy certificates (on-the-fly) and makes grid requests on behalf of the user
- This *community account model* is easy to implement but has some significant drawbacks
- **All requests look exactly the same to the resource provider**

Grid Authorization Model

- The proposed model incorporates GridShib SAML Tools at the gateway and GridShib for GT at the resource provider
- Using GridShib SAML Tools, the gateway
  1. issues a SAML assertion containing the user's authentication context and attributes
  2. binds the SAML assertion to a proxy certificate signed by the community credential
  3. authenticates to the resource by presenting the SAML-laden proxy certificate

http://gridfarm007.ucs.indiana.edu/gce07/images/e/e4/Scavo.pdf

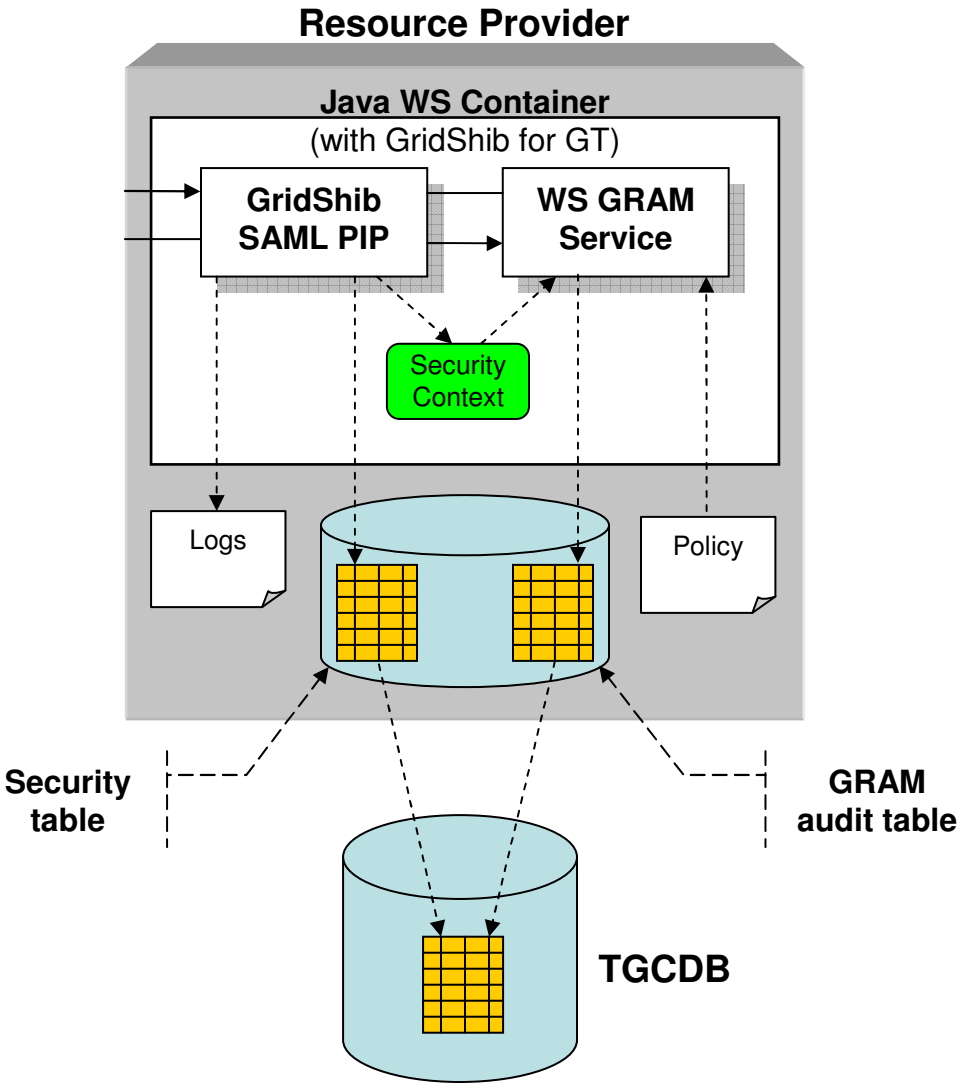
GridShib-enabled Gateway



User Attributes

- Gateway `entityID`:
  - **`https://gridshib.gisolve.org/idp`**
- Subject name identifier:
  - **`trscavo@gisolve.org`**
- Authentication statement
  - authentication method: **`urn:oasis:names:tc:SAML:1.0:am:password`**
  - authentication instant: **`2007-08-02T12:10:34-0400`**
  - IP address: **`10.81.193.244`**
- Attribute statement
  - `isMemberOf` attribute: **`group://gisolve.org/gisolve`**
  - `mail` attribute: **`trscavo@gmail.com`**

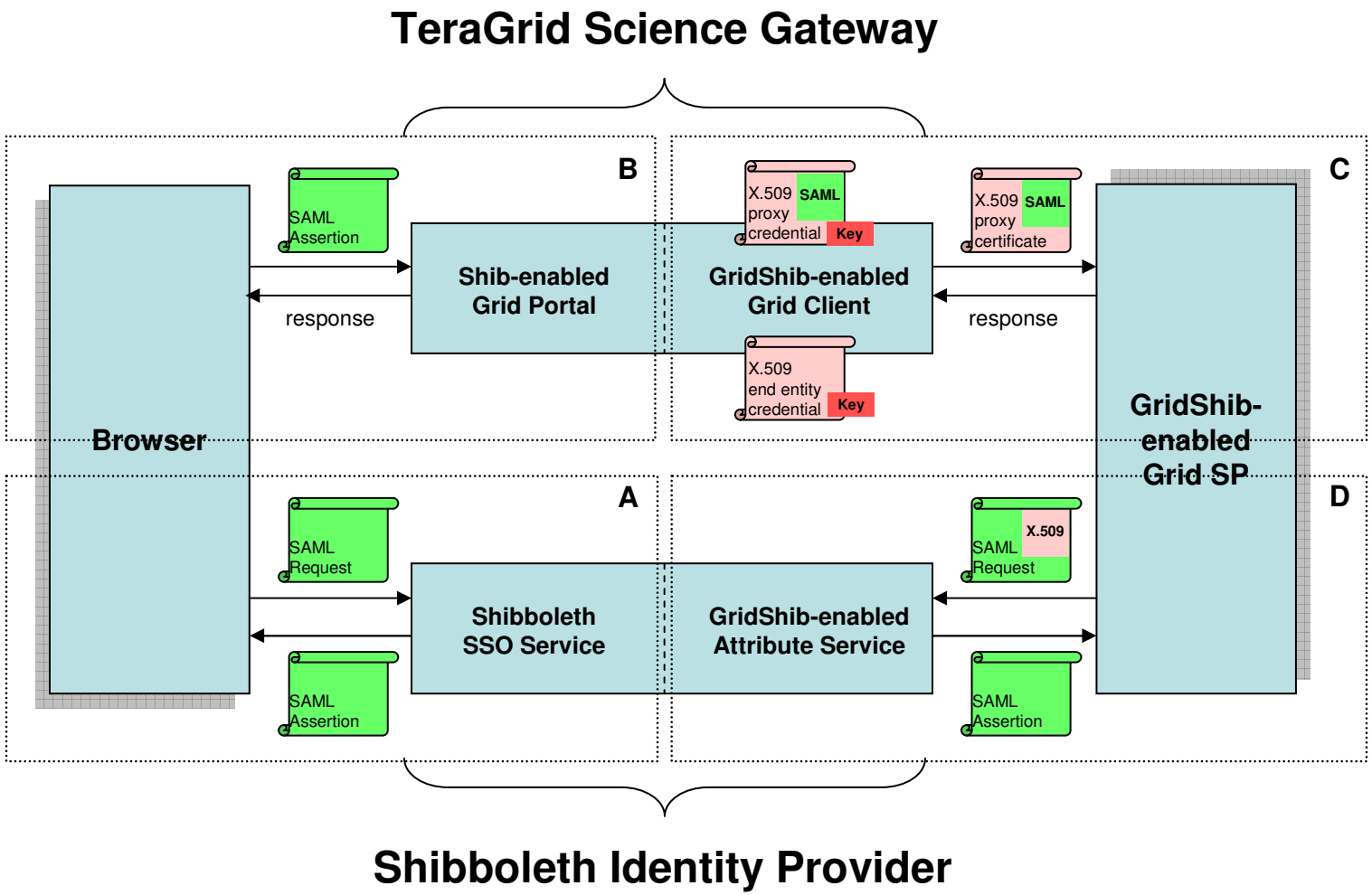
Current Work



TeraGrid Deployment Strategy

1. GridShib SAML Tools at the Gateway
   - http://www.teragridforum.org/mediawiki/index.php?title=Science_Gateway_Credential_with_Attributes
2. GridShib for GT at the RP
   - Integrate GS4GT into CTSS4
3. Evaluate Shibboleth as a browser-facing federated identity solution
   - Planned Shib work at the TG user portal
   - For the most part, Shibboleth has not yet entered the TeraGrid consciousness

Federated Identity Model




Thank you!

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GridShib
http://gridshib.globus.org/