Federate to Collaborate:
LIGO Use Cases for Federation

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LIGO Science Mission

LIGO, the Laser Interferometer Gravitational-wave Observatory, seeks to detect gravitational waves – ripples in the fabric of spacetime. First predicted by Einstein in his theory of general relativity, gravitational waves are produced by exotic events involving black holes, neutron stars and objects perhaps not yet discovered.
LIGO Hanford, WA
LIGO Livingston, LA
LIGO Laboratory =
LIGO Caltech + LIGO MIT +
LIGO Hanford Observatory +
LIGO Livingston Observatory
The LIGO Scientific Collaboration (LSC) is a self-governing collaboration seeking to detect gravitational waves, use them to explore the fundamental physics of gravity, and develop gravitational wave observations as a tool of astronomical discovery. The LIGO Scientific Collaboration was founded in 1997 and currently has more than 800 members from 70 institutions worldwide.
LIGO IdM: Status

No federation yet!

Current status:

- Production IdP with 2 distributed hot backups
  - Remote User login handler with mod_auth_kerb
  - Investigating migrating to Kerberos login handler
- “Poor man’s” IdP failover using custom discovery service
  - Each SP runs discovery service
  - Daemon pings IdPs directs to master or backup if down
- Obtained ASN from ARIN, research on anycasting IdP
- Migrating attributes to be properly scoped
  - eduPersonPrincipalName
  - isMemberOf
- Centrally signed and distributed metadata
  - Need to add validUntil
- 50 SPs
  - wide range of services
  - elog, wikis, analysis results, group management, ...
LIGO Use Cases for SAML Identity Federation

* not ordered by priority or timeline
Use case: Collaboration with Virgo

- Partner project with instrument in Cascina, Italy
- French and Italian collaboration
- Data sharing agreement between Virgo and LIGO
Use case: Collaboration with Virgo

- Currently Virgo users issued LIGO identities and vice versa
- Identities have similar form: `scott.koranda@[LIGO|VIRGO].org`
  - leads to user confusion
  - confusion leads to less security
  - extra helpdesk requests
- Plan to federate
  - Begin with LIGO joining InCommon
  - Virgo pursuing Fédération Éducation-Recherche and IDEM
  - Leverage federation memberships, drive inter-project federation
- Benefits:
  - Easier access to data analysis tools and results
  - Easier processes for joint work and writing
  - Less worry about where to put new pages
- Challenges and Risks:
  - Virgo AD FS based, LIGO SAML 2.0 based
  - Loss of local control over credential strength
Use case: Collaboration with LCGT

- Large-scale Cryogenic Gravitational wave Telescope
- University of Tokyo leadership
- Being built right now
- 3 km arms, builds on success of 300m prototype
Use case: Collaboration with LCGT

- Currently no formal agreement between projects
- Excellent opportunity to “get it right” from start and federate
- Informal work between LIGO IdP and U. Tokyo IdP
- Hoping to leverage InCommon and GakuNin
  - Exchange of metadata
  - Two users accessing a SP (wiki)!

- Benefits:
  - Enable joint work including negotiating any data sharing

- Challenges and Risks:
  - Expected language and cultural differences
  - Loss of local control over credential strength
Use case: Community Collaboration Spaces

- Collaboration spaces for GW, astronomy, astrophysics
- Neutral spaces help with “coopertition” (URLs matter!)
Use case: Community Collaboration Spaces

- Multi-messenger astronomy rich target of opportunity
- LIGO has already signed MOUs with number of projects
- Benefits:
  - Federation helps realize potential of existing MOUs
  - Enable more and faster collaboration as field matures
- Challenges and Risks:
  - Loss of local control over credential strength
  - Can everyone that needs to collaborate get an (acceptable) federated identity?
Use case: CILogon

See Jim Basney’s slides.
Use case: CILogon

- LIGO has large investment in X.509 and grid computing
- Need easier access to X.509 for users
- CILogon supports ECP enabling command-line
- Benefits:
  - Users no longer need to request, retrieve, manage X.509
  - LIGO leverages work already done by CILogon
  - Easier access to European grid resources
  - Easier access to OSG resources
  - Easier access to LIGO Data Grid resources
- Challenges and Risks:
  - Must assert InCommon Silver to access IGTF accredited CA
Use case: Globus Online
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- Globus Online File Transfer Service
- Enables “fire & forget” file transfer
- Globus Online team committed to SAML identity federation
- Benefits:
  - Simple service for managing files across clusters
  - Federation makes adoption easy
  - One more service LIGO does not have to run itself
- Challenges and Risks:
  - Long term business model?
  - How does LIGO pay for this service?
Use case: Important External People

- Access by NSF program managers
- Access for external advisory and review committees
- Benefits:
  - Faster access for our important friends
  - Much easier for the individual to “onboard”
- Challenges and Risks:
  - Infrastructure to make this “simple” still evolving
  - Transfer of complexity from user to admins
  - Will NSF ever run an IdP?
  - Loss of local control over credential strength
Use case: Consuming Federated Identity from Members
Use case: Consuming Federated Identity from Members

- Many collaboration members already have federated identity
- InCommon, DFN, UK AMFER, Australian Access Fed, ...

Benefits:
- Leverage existing IdPs throughout world
- Less work provisioning and supporting LIGO identities
- Faster onboarding into collaboration
- One less identity to manage for user

Challenges and Risks:
- Loss of local control over credential strength
- Still some without access to federated identities
- Cannot raise barriers for smaller institutions
- Highest risk access requires more than Silver

Expect LIGO to always run “IdP of last resort”