



# Internet2 middleware initiative: past, present and future

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Credit: thanks to Ken Klingenstein and the many people from Internet2 universities working on middleware for these slides

# Internet2 Middleware Initiative (I2MI)

- Work begun late 1998
- Ken Klingenstein (U. Colorado) hired to lead
  - April 1999
- Recognized network-enabled collaboration between individuals, institutions needed more than just network infrastructure
- NSF Middleware Initiative (NMI)
  - Internet2 as well as several others received some funding: enterprise + grid communities
  - Begun late 2001

# Internet2 and middleware

- Internet2 is university-driven, membership-organization
- Facilitate inter-institutional collaboration
  - Utilizing advanced network environment
- Focus on the enterprise
  - Organizations that, as part of your belonging, help you manage your information and access in an electronic world – faculty, researcher, administrator, student on campus
- Federated
  - 210 universities will never buy the same software

# Why enterprises are important

- Primary context for the Grid user
  - Logical – application contexts, auth n/z
  - Physical – firewalls, diagnostics
  - Policy - including auditability
- Key use cases are enterprise centric
- As potential deployers of enterprise Grids
- A large part of the users collaborations are based on enterprise tools – vc, calendaring, web access, listprocs, wikis, webdavs, etc...

# Scope of work

- Core middleware infrastructure
  - directories, authentication, authorization, etc.
  - in service to academic, administrative and research missions
- Virtual organization support
  - basic collaboration tools
  - platforms such as GridShib
- Deliverables
  - open source software (Shib, Signet, Grouper, etc.)
  - community standards (eduPerson, eduOrg)
  - best practices
  - dissemination and sharing
  - services (InCommon, USHER)

# Internet2 core middleware projects/results

- eduPerson, eduOrg attribute standards
- Shibboleth
  - An architecture and a software tool being adopted by several national, federated authentication and authorization infrastructures
- InCommon
  - A national federation for US higher education based on Shibboleth
- Authorization: Signet, Grouper tools
  - Signet – manages privileges (what can you do?)
  - Grouper – manages groups (who's in it?)

# Internet2 federation effort

- *InCommon* federation:
  - National authentication and authorization infrastructure
  - US universities (Internet2 members) join the federation, agree to trust each others' own campus authentication mechanisms
  - Federating software – Shibboleth 1.2 and above
  - Federation data schema - eduPerson200210 or later and eduOrg200210 or later
  - Federated approach to security and privacy, with policies posted by members in common formats
- Became fully operational 9/04
- <http://www.incommonfederation.org>

# InCommon Users

- Institutional users acquiring content from popular providers (Napster, etc.) and academic providers (Elsevier, JSTOR, EBSCO, Pro-Quest, etc.)
- Institutions working with outsourced service providers, e.g. grading services, scheduling systems, software sales
- Inter-institutional collaborations, including shared courses and students, research computing sharing, etc.
- (Shared network security monitoring, federal research trust peering, interactions between students and federal applications, wireless network access, peering with international activities, etc.)



## Why should APAN member networks be interested in middleware (AAIs?)

- In some places NRENs provide the AAI
- In many instances, NRENs will need to use the AAI
  - For network bandwidth control
    - E.g. access to a 'lightpath' type service
  - For network diagnostics and management
    - E.g. access to network measurement and monitoring data/equipment
  - Facilitate campuses' network access control
    - E.g. visiting faculty in "roaming" projects
- NRENs are in the business of ultimately supporting the end-user - researchers, faculty students engaged inter-institutional e-Science, accessing digital libraries and other resources

# Virtual Organizations

- Geographically distributed, enterprise distributed community that shares real resources as an organization
  - computational resources, scientific instruments, bandwidth, shared data and content, economic data, museum materials, cultural and artistic works
- Examples include team science (NEESGrid, HEP, BIRN, NEON), digital content managers (library cataloguers, curators, etc), a statebased life-long learning consortia, a group of researchers coordinating a launch vehicle payload, etc.
- Want to leverage enterprise middleware and external trust fabrics, as well as support centers
- Often the need to have some accounting and regulatory compliance

# What's next for Internet2 middleware

- Leverage middleware in network security work
  - using network authentication and authorization to help improve the security environment
  - E.g. role-based, policy-oriented personal firewalls
- Further build-out of InCommon federation
  - More universities join
  - Consulting services
- Moving developments into sustained maintenance mode
  - Shibboleth (a lot of international development now)
  - Signet, Grouper tools
- Continued engagement with other national federations (NRENs developing and running federations)
  - International “interconnection” of federations
  - w/European colleagues, w/APAN countries