Penn
Groups

PennGroups

Central Authorization System
January 2009

Penn Profile

- **Private research university founded in 1740**
- **259 buildings, 283 acres located in West Philadelphia**
- **10,345 undergraduates; 12,103 graduate and professional students (as of Fall 2007) enrolled into twelve graduate/professional schools**
- **Over 20,000 employees, including 14,000+ in University Health System**
- **University (including health system) operating budget of four billion dollars**
- **Central IT in a decentralized environment**
  - **Twelve schools and multiple administrative centers operate with autonomy**
  - **Most schools and centers have their own IT department**
  - **Central IT provides university-wide applications and infrastructure**

Identity Management at Penn

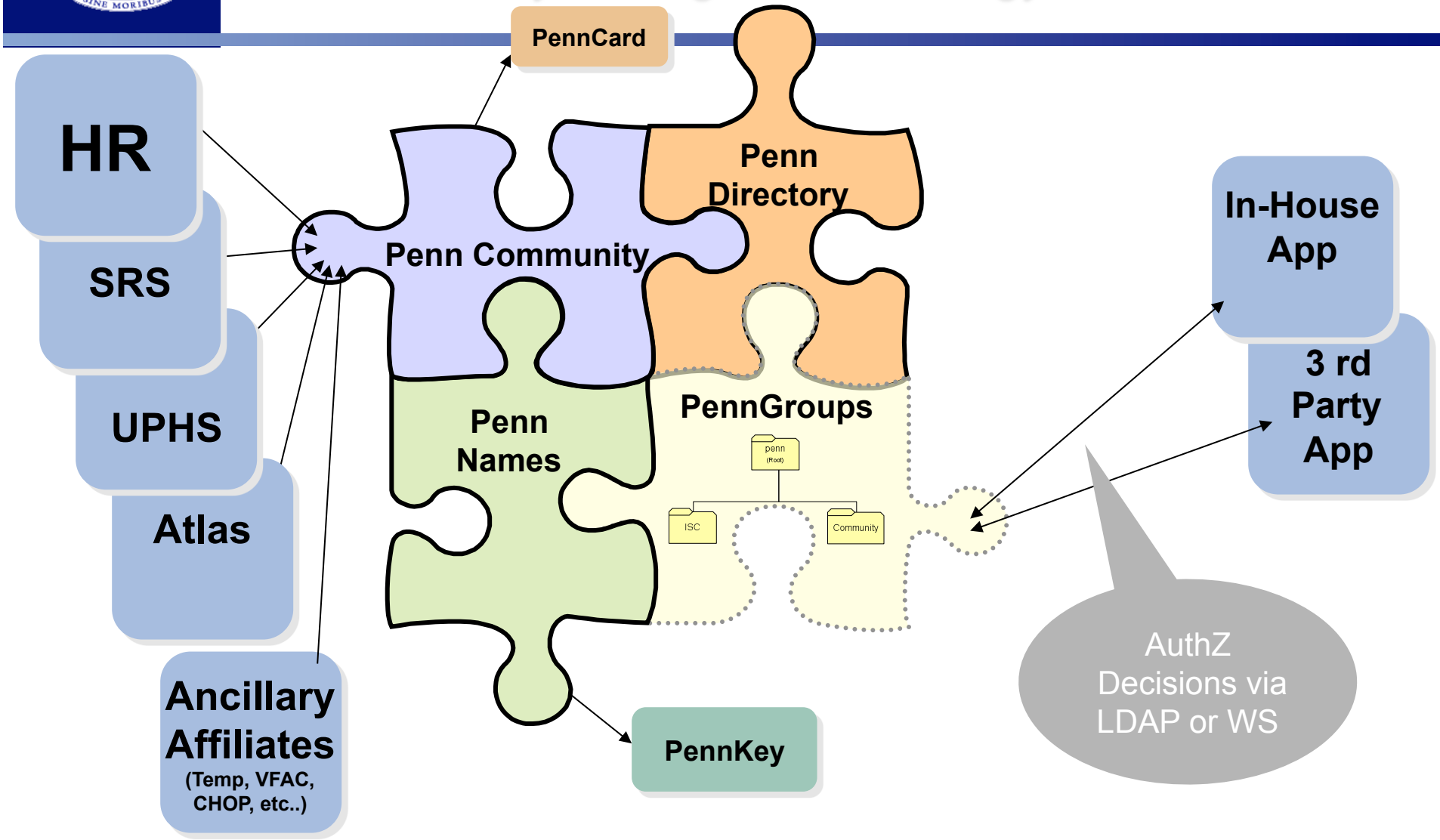
- Goal: To increase protection of the confidential and sensitive information at Penn by:
  - Uniquely identifying entities associated with Penn
  - Providing access to appropriate facilities, services, and systems
  - Preventing unauthorized access to facilities, services, and systems

Elements of Identity Management

Components of identity management

- Penn Community – central repository for a person's bio/demo data as fed by core business systems (SRS, HR/Payroll, Atlas, UPHS) and entered directly for ancillary affiliates
- Penn Directory – system that holds the preferred name and contact info for all Penn affiliates
- Penn Card – system used to generate the physical ID card that is used for building access and commercial transactions across the university
- PennNames - system used to associate a unique username to each individual at Penn, providing a common and consistent University namespace for online services
- PennKey – unique identifier for Penn's central authentication system; with associated password, provides an electronic means to authenticate an individual and provide access to systems across the university
- PennGroups – system for creating and managing groups to facilitate authorization decisions by applications with hooks to LDAP or web services

Penn's Identity Management Strategy



What Is PennGroups

- PennGroups is derived from the Internet2 open source Grouper initiative
- Has been adopted and deployed at many other universities (Brown, Cornell, Yale)
- Penn has worked with the Grouper team to enhance the baseline product (UI, web services, SQL loaded groups)
  - Better meets the needs of Penn
  - Provides additional useful functionality to other grouper users
  - Allows Penn to benefit from future grouper enhancements without maintaining a separate source code instance

Benefits

- Facilitates consistent application of University business rules
  - Managed through a common UI and web services
- Streamlines maintenance of authorization data
  - Brings scattered redundant groups together for re-use
  - Allows useful actions on these groups -- group math, group nesting, exclusion criteria
- Leverages Penn Community data for accurate, up to date authorization decisions
  - Can leverage existing attribute information
- Distributed/delegated model of control
  - Supports the creation of new groups by schools and centers

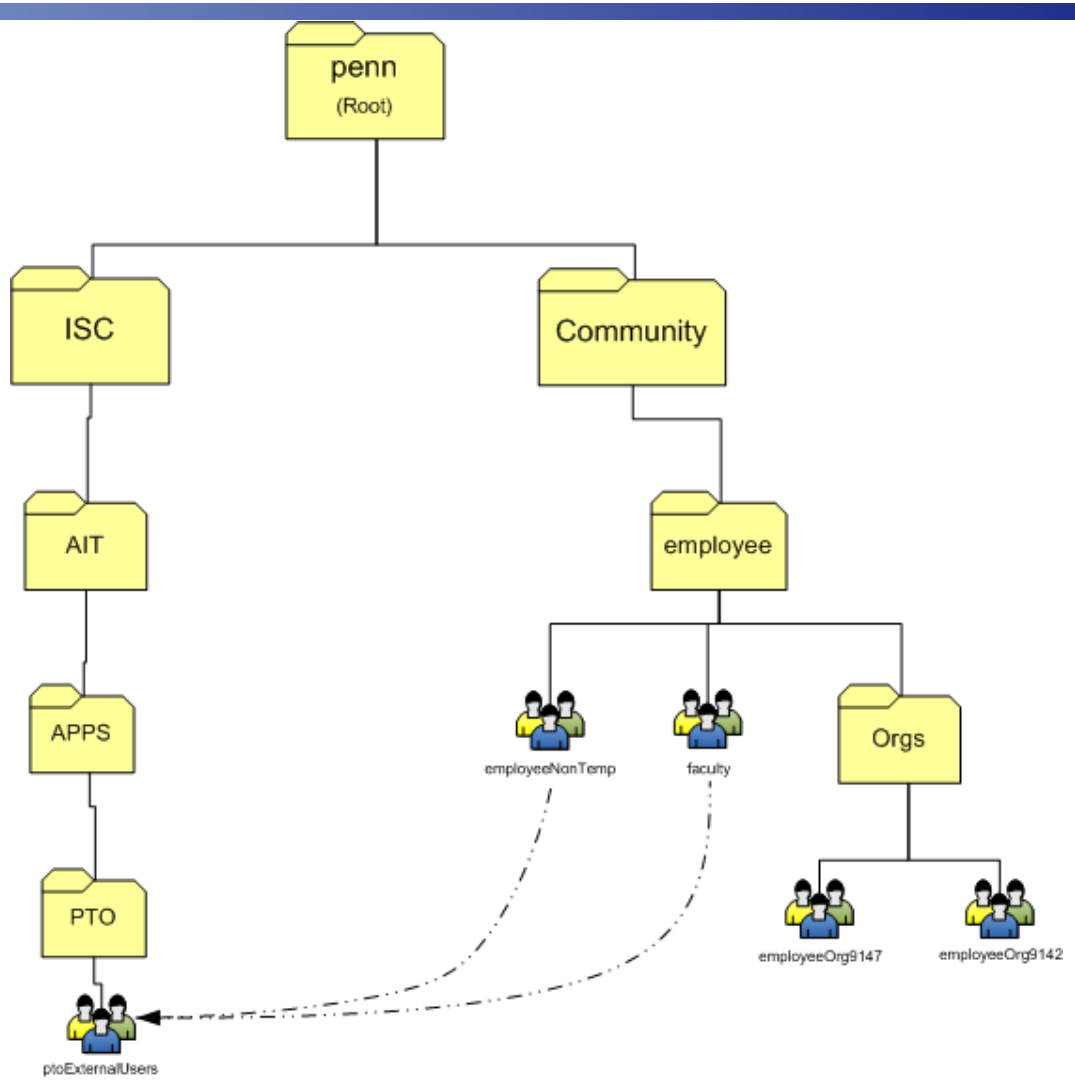
How It Works

- Authorization by application
- After authentication the application can interrogate PennGroups for access to group membership data
  - Web services
  - LDAP
- Changes to group membership are reflected automatically and propagate to the application dynamically

Managing PennGroups

- Two modes for creating and managing groups
  - Automated
    - Web services - build and run a query from your data store and send group membership information to PennGroups via the web service API
    - SQL loaded groups– Configure a SQL query within the PennGroups UI to run on a scheduled basis to modify group membership
  - Manual
    - UI – log onto the PennGroups UI to manually manage your group membership
      - You cannot manually add members to or remove members from a group that is managed in an automated fashion
      - You can simulate this with include/exclude composite groups

PennGroups Hierarchy



PennGroups in a Decentralized Environment

- When School/Center is purchasing or developing a new system
  - LSP (local support provider)/ application developer contacts Central IT
  - LSP/developer and Central IT collaborate to:
    - Establish authorization use cases for the specific application
    - Determine access method (LDAP or Web Services)
    - Determine best approach for group creation and maintenance
  - School/Center fills out access forms
  - Central IT consults with LSP/developer on group hierarchy structure

Use Cases

- PTO – Paid Time Off
  - Self service system used to request/track vacation/sick time
  - Penn Groups provides the flexibility so that the user selects their approver for time off.
  - Time off can be routed and approved by other than a direct supervisor
- Warehouse Apps
  - Penn groups provides a feed for org based security based on active status
- Abramson's Cancer Center
  - Builds custom research related applications and needs a means to confirm that users who log in currently have an active status
- School of Engineering and Applied Science
  - Affiliate level groups - faculty members, staff members, students, undergrads, grads, PhD students
  - Class level groups - everyone enrolled in every SEAS course, and several ad-hoc groups.
  - Kept up to date via a SEAS data store and propagated to PennGroups via the SQL loader
  - Group hierarchy (groups such as freshman, sophomore, etc are members in the group uGrad).
  - Ad hoc groups generated and maintained via specific applications and business rules.
  - Use of groups to determine access to various resources such as SSH (with different groups allowed to access different machines), IMAP, POP, SMTP, etc.

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Penn Groups

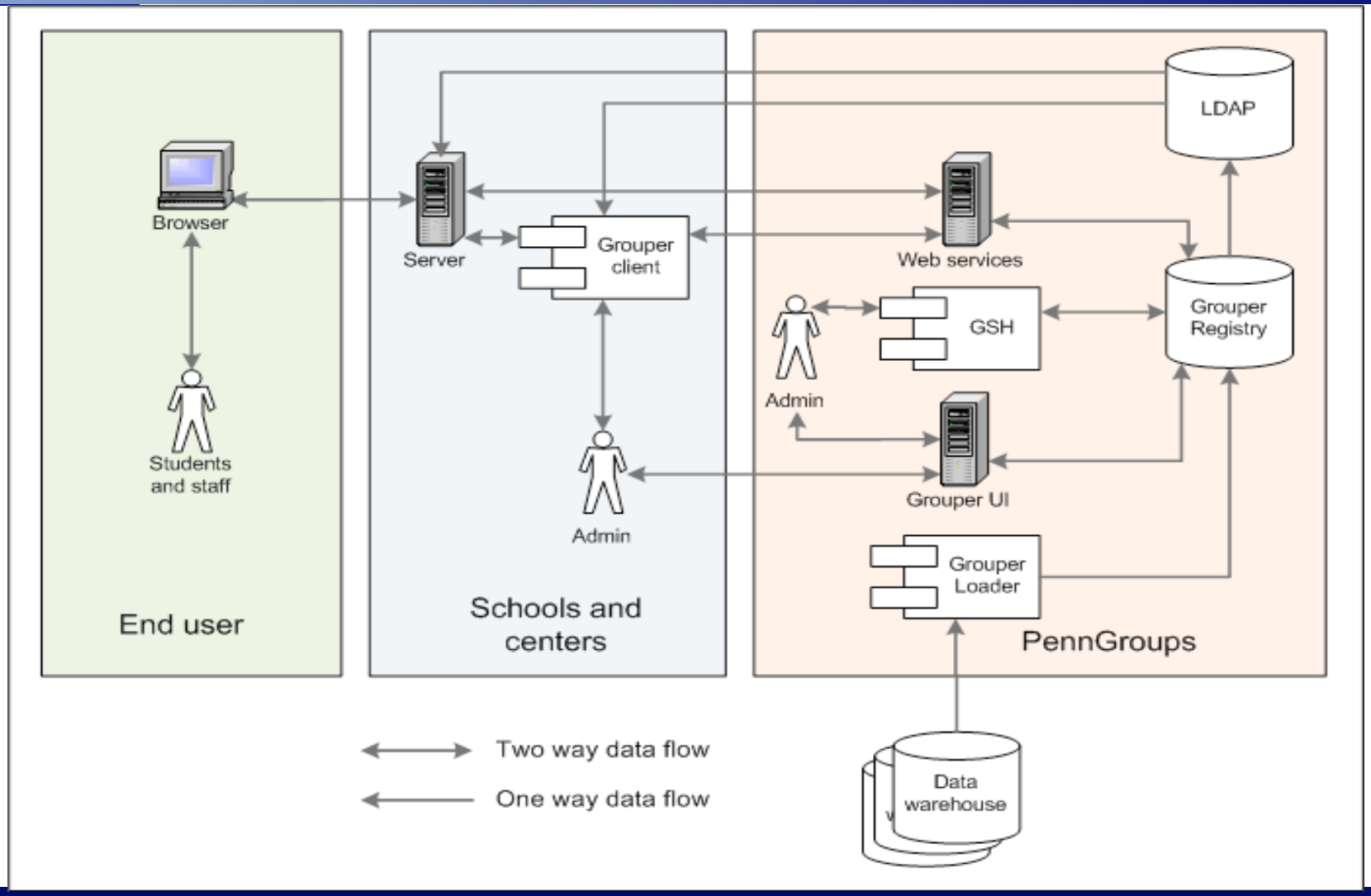
PennGroups

Technical Discussion

Agenda (note: additional information in slide notes)

- PennGroups architecture
- User interfaces
- Web services
- LDAP
- Grouper client
- Grouper loader
- What's new with Grouper in 1.4
  - Configuration checking
  - Daily report

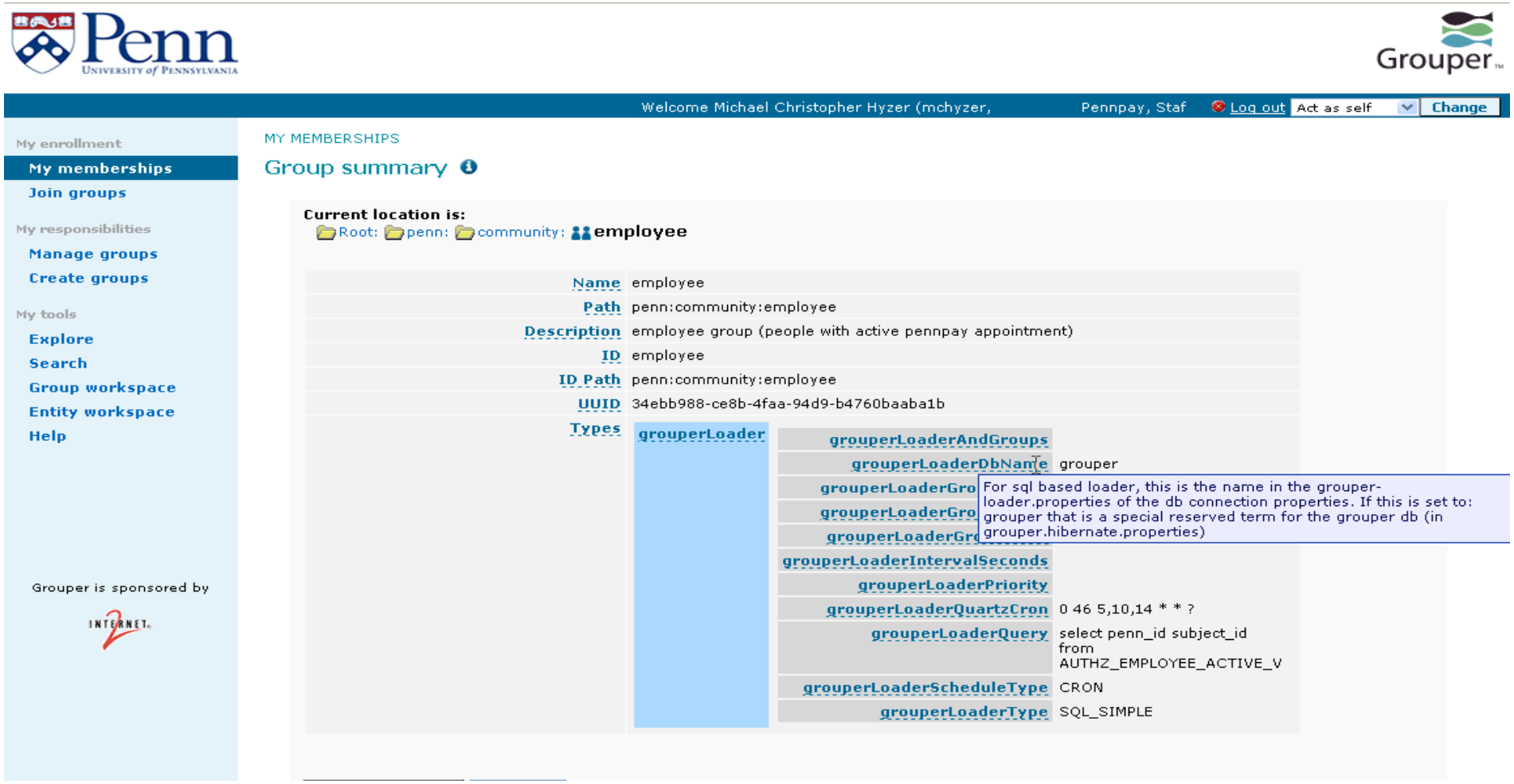
PennGroups architecture



Grouper user interface

- Grouper has a built in user interface
- Penn generally uses the default UI, though:
  - We customized the authentication to use Penn's single signon
  - We added custom code to require users to be in a grouper group to be able to log in (not everyone allowed)
- Penn did a facelift for the Grouper 1.3 release in Spring 2008, improving the usability and help documentation
- For Grouper 1.4 in January 2009, we added the ability to have tooltips on types and attributes

Grouper user interface (continued)



Grouper user interface (continued)

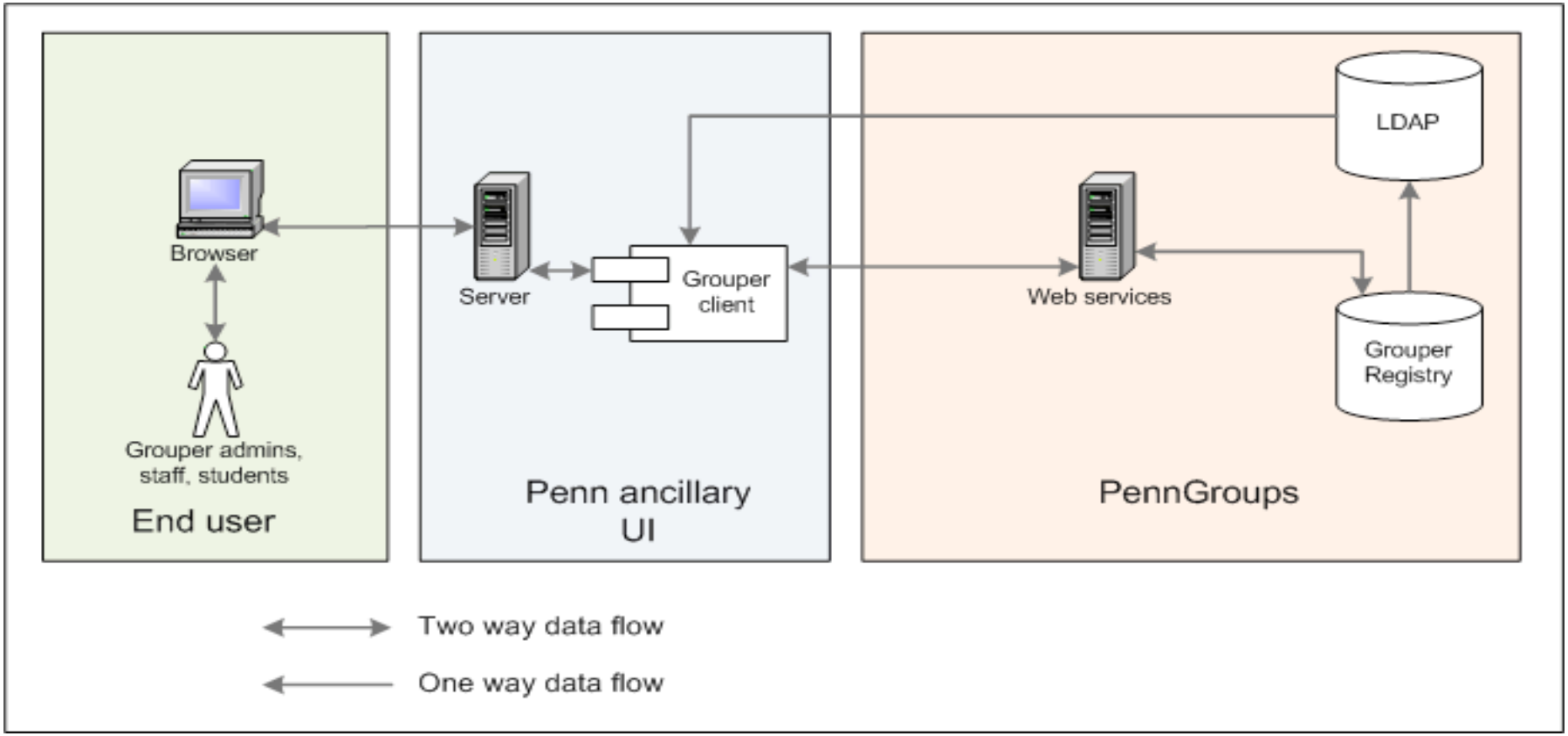
- Tooltips configured in nav.properties

nav.properties

```
groups.summary.types=Types

#prefixes for messages
message.Message=Note:
message.ErrorMessage=Error:
message.WarningMessage=Warning:

tooltipTargetted.groupTypes.grouperLoader=Group membership automatically manage
tooltipTargetted.groupFields.grouperLoaderDbName=For sql based loader, this is
tooltipTargetted.groupFields.grouperLoaderIntervalSeconds=If a START_TO_START_I
tooltipTargetted.groupFields.grouperLoaderPriority=The loader has a max number
tooltipTargetted.groupFields.grouperLoaderQuartzCron=Quartz cron-like string (:
tooltipTargetted.groupFields.grouperLoaderQuery=This is the query to run in the
tooltipTargetted.groupFields.grouperLoaderScheduleType=CRON: This is a cron-lik
tooltipTargetted.groupFields.grouperLoaderType=SQL_SIMPLE: a group whose member
tooltipTargetted.groupFields.grouperLoaderAndGroups=If you want to restrict mer
tooltipTargetted.groupFields.grouperLoaderGroupTypes=If you want types assigned
tooltipTargetted.groupFields.grouperLoaderGroupsLike=If you want the group (if
```

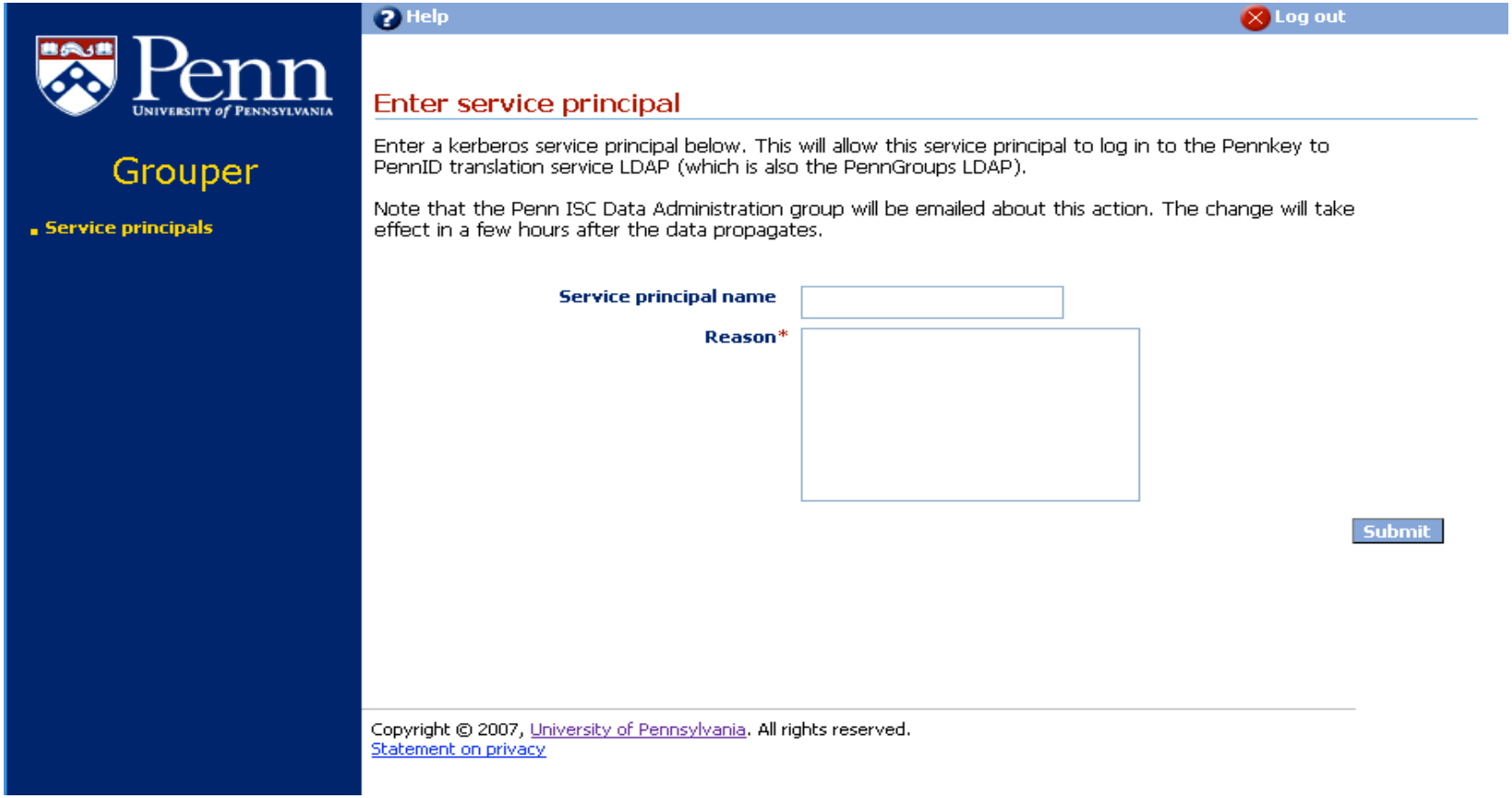
Penn's ancillary Grouper user interface

- For PennGroups tasks not included in Grouper, we have an ancillary UI for Grouper



Penn's ancillary Grouper user interface (continued)

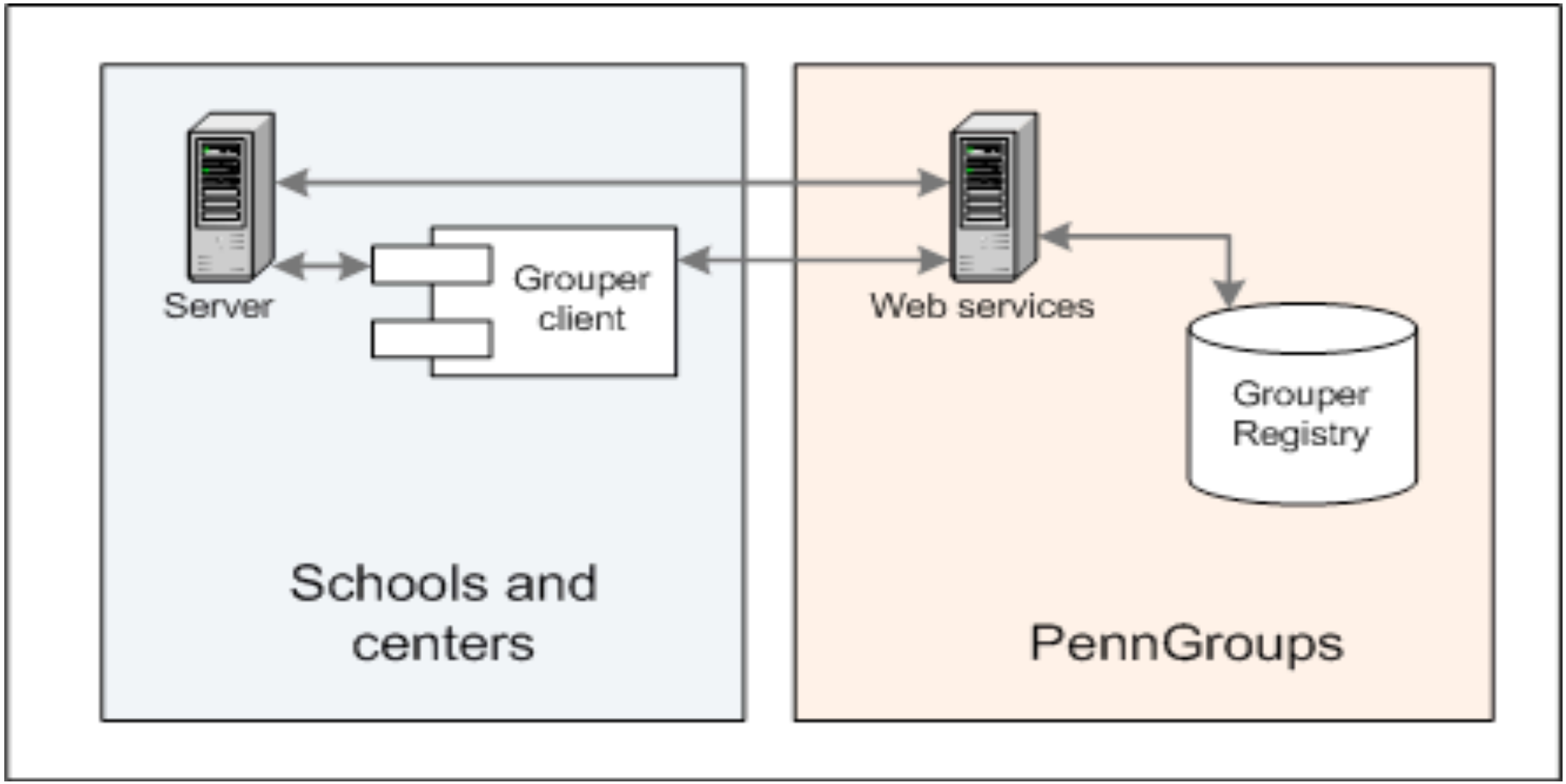
- Currently we only have one task, registering an LDAP login



Grouper web services

- Penn/Internet2 spent a lot of effort in winter/spring 2008 to help create the Grouper web services
- They can be REST or SOAP
- They can be simple “Lite” calls, or batched
- REST accepts formats: XML, XHTML, JSON, HTTP params
- There are a dozen operations exposed, including managing:
  - Groups
  - Memberships
  - Permissions
  - Folders
- Penn uses HTTP credentials sent to kerberos and penn:etc:webServiceUsers group required for authorization

Grouper web services (continued)



Grouper web services (continued)

- There are hundreds of samples to manage
- Custom sample generator is a harness which runs all samples, and stores them in CVS:
  - Listens on TCP port, forwards to web service
  - Makes web service request to the listener
  - Captures request and response
    - Indents the XML or JSON
    - Masks sensitive data (e.g. authentication credentials)
  - Captures stdout and stderr
  - Collates everything including source of sample, saves file in CVS
  - Runs each sample for all different formats, web service types, etc.
  - 163 total sample files

Grouper web services (continued)

[I2MI] / grouper-ws / grouper-ws / doc / samples / addMember Repository: I2MI

Index of /grouper-ws/grouper-ws/doc/samples/addMember

Files shown: **13** (Show 17 dead files)

Sticky Tag: Set

File	Rev.	Age	Author	L
Parent Directory				
WsSampleAddMemberLite_soap.txt	1.10	5 days	mchyzer	1
WsSampleAddMemberRestLite2_withInput_http_xhtml.txt	1.8	5 days	mchyzer	1
WsSampleAddMemberRestLite2_withInput_json.txt	1.8	5 days	mchyzer	1
WsSampleAddMemberRestLite2_withInput_xhtml.txt	1.8	5 days	mchyzer	1
WsSampleAddMemberRestLite2_withInput_xml.txt	1.8	5 days	mchyzer	1
WsSampleAddMemberRestLite_http_xhtml.txt	1.9	5 days	mchyzer	1
WsSampleAddMemberRestLite_json.txt	1.10	5 days	mchyzer	1
WsSampleAddMemberRestLite_xhtml.txt	1.10	5 days	mchyzer	1
WsSampleAddMemberRestLite_xml.txt	1.9	5 days	mchyzer	1
WsSampleAddMemberRest_json.txt	1.10	5 days	mchyzer	1
WsSampleAddMemberRest_xhtml.txt	1.10	5 days	mchyzer	1
WsSampleAddMemberRest_xml.txt	1.10	5 days	mchyzer	1
WsSampleAddMember_soap.txt	1.10	5 days	mchyzer	1

Grouper web services (continued)

Parent Directory | Revision Log

Revision **1.10** - (**download**) (**annotate**)
Mon Dec 15 09:07:26 2008 UTC (5 days, 21 hours ago) by *mchyzer*
Branch: **MAIN**
CVS Tags: **GROUPER_WS_1_4_0, HEAD**
Changes since **1.9: +34 -24 lines**

```
1.4

Grouper web service sample of service: addMember, WsSampleAddMemberLite, code generated classes,


##########################################
##
## HTTP request sample (could be formatted for view by
## indenting or changing dates or other data)
##
##########################################


POST /grouperWs/services/GrouperService HTTP/1.1
Content-Type: application/soap+xml; charset=UTF-8; action="urn:addMemberLite"
User-Agent: Axis2
Authorization: Basic xxxxxxxxxxxxxxxx==
Host: localhost:8092
Transfer-Encoding: chunked

3f2
<?xml version='1.0' encoding='UTF-8'?>
<soapenv:Envelope xmlns:soapenv="http://www.w3.org/2003/05/soap-envelope">
  <soapenv:Body>
    <ns1:addMemberLite xmlns:ns1="http://soap.ws.grouper.middleware.internet2.edu/xsd">
      <ns1:clientVersion>v1_4_000</ns1:clientVersion>
      <ns1:groupName>aStem:aGroup</ns1:groupName>
      <ns1:groupUuid></ns1:groupUuid>
      <ns1:subjectId></ns1:subjectId>
```

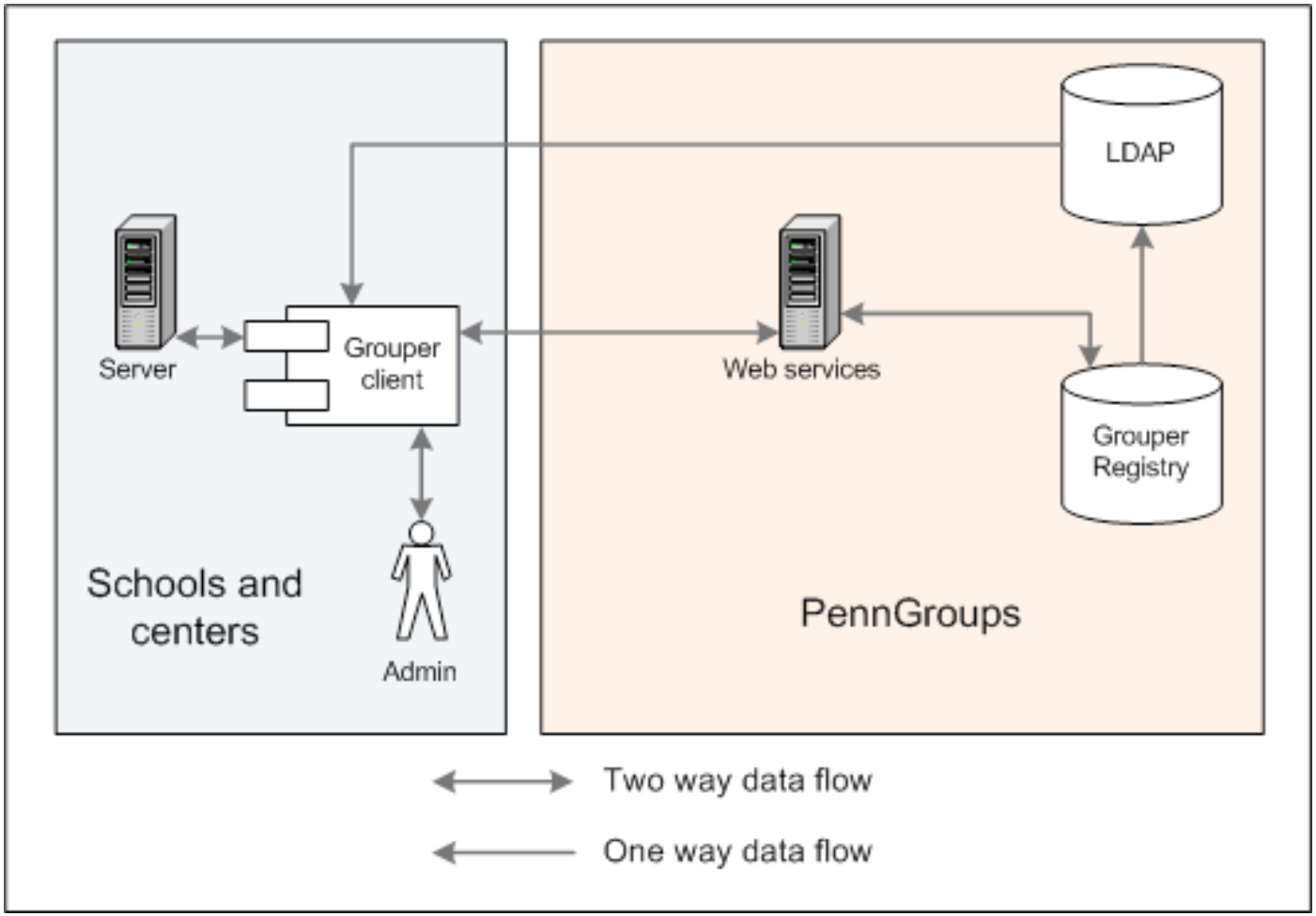
PennGroups LDAP

- There is a Grouper LDAP provisioning connector called LDAPPC, though Penn does not use this
- We have some simple triggers in Oracle which add records to a change log
- Then a process pulls records off of that table to sends diffs to openLDAP (runs every 10 minutes)
- Daily all records are refreshed
- Only users in penn:etc:ldapUsers can login to ldap
- Users can only read group membership lists they have privileges to read in Grouper

Grouper client

- LDAP and web services are low level
- Grouper client exposes Grouper LDAP and web services to a command line API or a Java library
- It can also be used to generate custom web service samples (can log requests and responses)
- Institutions can customize the client before distributing so the LDAP config is done (e.g. Penn allows ID lookups)
- Callers aren't tied to output, they can tell the client the output format that is expected

Grouper client (continued)



Grouper client (continued)

Sample LDAP config:

```
ldapSearchAttribute.operationName.2 = hasMemberLdap
ldapSearchAttribute.ldapName.2 = ou=groups
ldapSearchAttribute.matchingAttributes.2 = cn, hasMember
ldapSearchAttribute.matchingAttributeLabels.2 = groupName,
pennnameToCheck
ldapSearchAttribute.returningAttributes.2 = cn
ldapSearchAttribute.outputTemplate.2 = hasMember: ${resultBoolean}
ldapSearchAttribute.resultType.2 = BOOLEAN
```

- ## Sample LDAP command line call:

```
c:\grouper>  java -jar grouperClient.jar --operation=hasMemberLdap
--groupName=penn:myfolder:mygroup --pennnameToCheck=jsmith

hasMember: true

c:\grouper>
```

Grouper client (continued)

- Sample command line web service call:

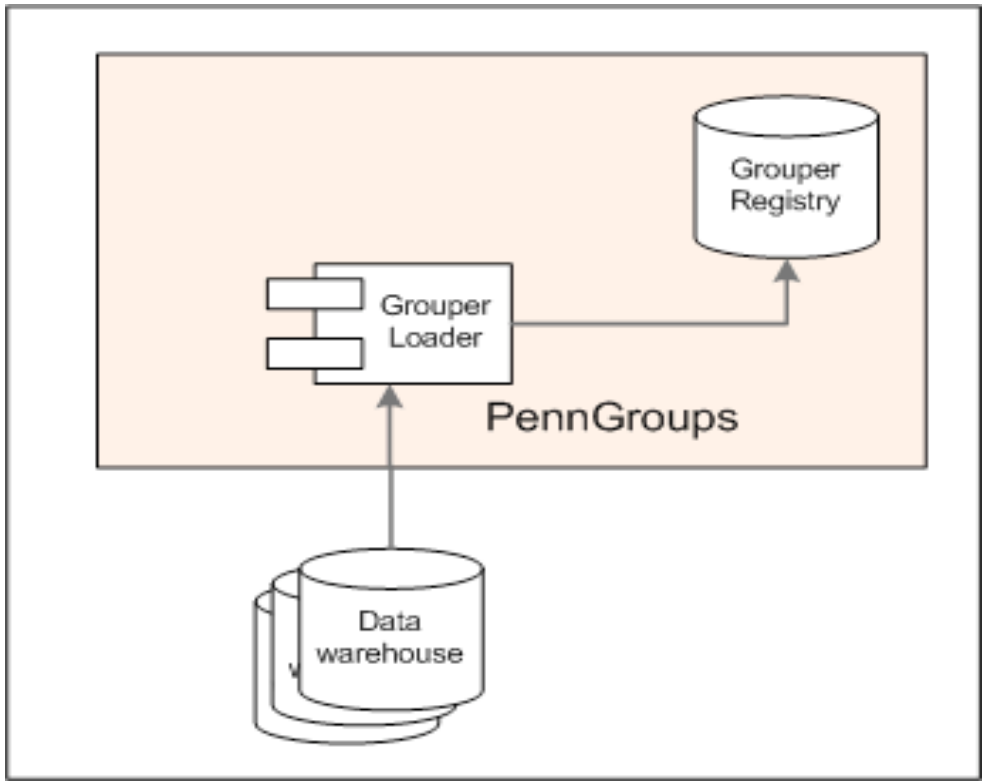
```
c:\grouper> java -jar grouperClient.jar --operation=getMembersWs
--groupNames=aStem:aGroup --outputTemplate=${index}: ${subject.id}

0: 12345
1: 23456

c:\grouper>
```

- Sample Java web service call:

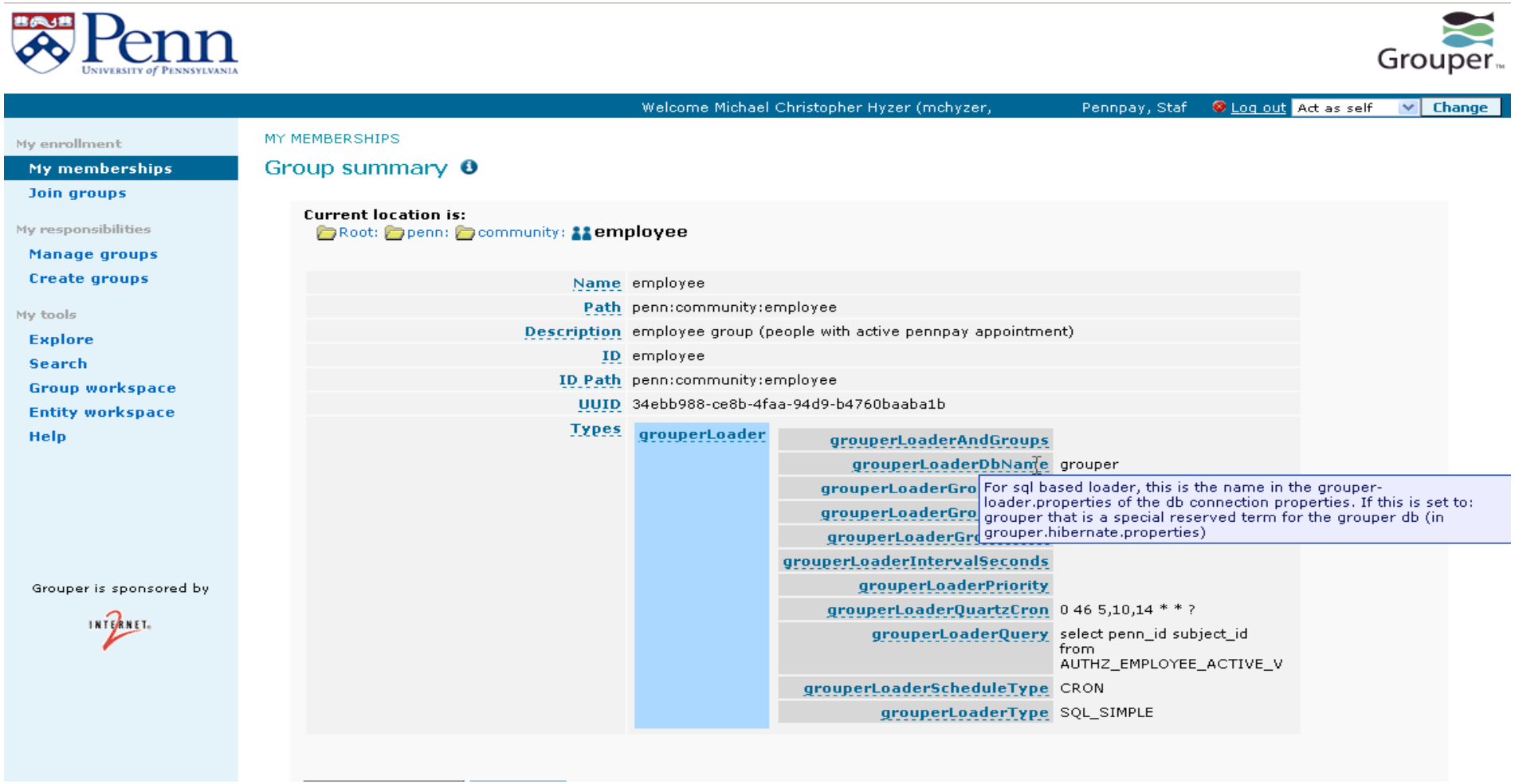
```
WsAddMemberResults wsAddMemberResults =
  new GcAddMember().assignGroupName("aStem:aGroup")
  .addSubjectId("12345").execute();
```

Grouper loader

- Penn contributed the “Grouper loader” in spring 2008
- This keeps groups in sync with results of sql queries



Grouper loader (continued)



Grouper loader (continued)

SQL> select * from authz_employee_active_v where rownum < 10

PENN_ID	PENN_NAME
12345	jsmith
12346	asmith
12347	bsmith
12348	rjohnson
12349	sjohnson
12350	tjohnson
12351	ajones
12352	bjones
12353	cjones

Grouper loader (continued)

Current location is:
Root: penn: community: employee: **orgGroups**

Name	orgGroups
Path	penn:community:employee:orgGroups
Description	dynamic group with configs for org groups (dont add members to this)
ID	orgGroups
ID Path	penn:community:employee:orgGroups
UUID	6f75f636-ad7c-4d50-a02f-c779b94c4aa8
Types	grouperLoader

grouperLoaderAndGroups	
grouperLoaderDbName	warehouse
grouperLoaderGroupQuery	
grouperLoaderGroupTypes	
grouperLoaderGroupsLike	
grouperLoaderIntervalSeconds	
grouperLoaderPriority	
grouperLoaderQuartzCron	0 8 9 * * ?
grouperLoaderQuery	select subject_id, group_name from EMPLOYEE_ORG_GROUPS_V
grouperLoaderScheduleType	CRON
grouperLoaderType	SQL_GROUP_LIST

Grouper loader (continued)

```
SQL> select * from employee_org_groups_v where rownum < 10
```

SUBJECT_ID	GROUP_NAME
12345	penn:community:employee:orgs:employeeOrg123
12346	penn:community:employee:orgs:employeeOrg123
12347	penn:community:employee:orgs:employeeOrg123
12348	penn:community:employee:orgs:employeeOrg124
12349	penn:community:employee:orgs:employeeOrg124
12350	penn:community:employee:orgs:employeeOrg124
12351	penn:community:employee:orgs:employeeOrg128
12352	penn:community:employee:orgs:employeeOrg128
12353	penn:community:employee:orgs:employeeOrg128

Grouper configuration checking

- If grouper is not configured correctly, it sometimes did not give descriptive errors
- With 1.4, on startup, it will verify its configuration and give descriptive errors
- It checks:
  - All DBs connectivity
  - Config file validity (including data types)
  - Subject API queries
  - System groups exist (auto-create)

Grouper configuration checking (continued)

- Print out useful grouper info on startup

```
Grouper starting up: version: 1.4.0, build date: 11/2/2008, env: DEV
grouper.properties read from: C:\grouper\build\grouper.properties
Grouper current directory is: C:\grouper
log4j.properties read from:   C:\grouper\build\log4j.properties
Grouper is logging to file:   console, at min level WARN for package:
   edu.internet2.middleware.grouper, based on log4j.properties
grouper.hibernate.properties: C:\grouper\grouper.hibernate.properties
grouper.hibernate.properties: jdbc:mysql://localhost:3306/grouper
sources.xml read from:        C:\grouper\build\sources.xml
sources.xml jdbc source id:   pennperson: GrouperJdbcConnectionProvider
sources.xml groupersource id: g:gsa
sources.xml jdbc source id:   jdbc: GrouperJdbcConnectionProvider
```

Grouper daily report

- With Grouper 1.4 there is a daily report
- This is emailed out every morning to grouper admins
- Includes a state of the registry:
  - E.g. number of new / total groups and memberships
- Loader job reports
  - Number of successes and failures, inserts/updates/deletes
- Registry health
  - Unresolvable subjects, bad memberships
- Stores history of reports on file system

Grouper daily report (continued)

```
Subject: Grouper report

OVERALL:

environment:            PROD

memberships:            135,280

groups:                 20

members:                56,207

folders:                17

unresolvable subjects: 1,197

bad memberships:        0

---------------

WITHIN LAST DAY:

new memberships:        66

new groups:             0

updated groups:         0

new folders:            0
```

Grouper binary distribution

- Grouper used to be distributed as source that needed to be built with ant and a java compiler
- Now with grouper 1.4 there is a binary build which is the java libraries
- All that is required is a java runtime
- An HSQL database is included, you can unzip, init the db, and run grouper shell (GSH)
- There is also a grouper client binary distribution

Grouper binary distribution (continued)

```
[mchyzer@ellis temp]$ tar xzf grouper.binary.1.4.0.tar.gz

[mchyzer@ellis bin]$ ./gsh.sh -registry -runscript

Grouper starting up: version: 1.4.0...

Are you sure you want to schemaexport db user 'sa', db url
   'jdbc:hsqldb:/temp/.../grouper;create=true'? (y|n):

y

Continuing...

Script was executed successfully

[mchyzer@ellis bin]$ ./gsh.sh

Grouper starting up: version: 1.4.0...

Type help() for instructions

gsh 1% addRootStem("myschool", "myschool");

stem: name='myschool' displayName='myschool' uuid='abcde'

gsh 2% addGroup("myschool", "agroup", "agroup");

group: name='myschool:agroup' displayName='myschool:agroup'
   uuid='abcdef'
```

Grouper encrypted passwords

- Grouper database passwords can now be encrypted and stored in external files to the normal config files
  - Grouper / loader DB's
  - Subject API
  - Grouper client LDAP and web service
- There is a stand-alone Internet2 library: morphString.jar (can easily be reused in other projects)
- Facilitates:
  - Non-cleartext passwords
  - Sanitized config files (for email or source control)
  - Separation between development and deployment

Grouper hooks

- Grouper 1.4 has 100 hook points built in to the data layer API
- You can get the data to do something (notification), add more queries to the transaction (audit), or veto the transaction
- Currently Grouper ships with some default implementations of hooks:
  - Group name and attribute validator regex (e.g. alphanumeric)
  - Group type edit security (e.g. only let admins edit grouper loader attributes)
  - Include/exclude auto-create
  - Require groups auto-create

More Information

- For technical documentation see the Internet2 Grouper wiki at:
  - Grouper product
    - https://wiki.internet2.edu/confluence/display/GrouperWG/Grouper+Project
  - Grouper project
    - https://wiki.internet2.edu/confluence/display/GrouperWG/Grouper+Project
  - Web services info
    - https://wiki.internet2.edu/confluence/display/GrouperWG/Grouper+-+Web+Services

Grouper DDL management

- Grouper used to use Hibernate schemaexport
- Switched to a custom method built on Jakarta ddlutils
- Supports hsql, oracle, mysql, and postgres (and probably other untested db's)
- Supports tables, views, comments, indices, foreign keys, data massaging
- Knows when the database is out of sync (keeps state in DB table), and logs to ERROR that update needed
- If you drop a column of a table, and run "deep" ddl registry check, it will generate DDL to recreate it

Grouper DDL management (continued)

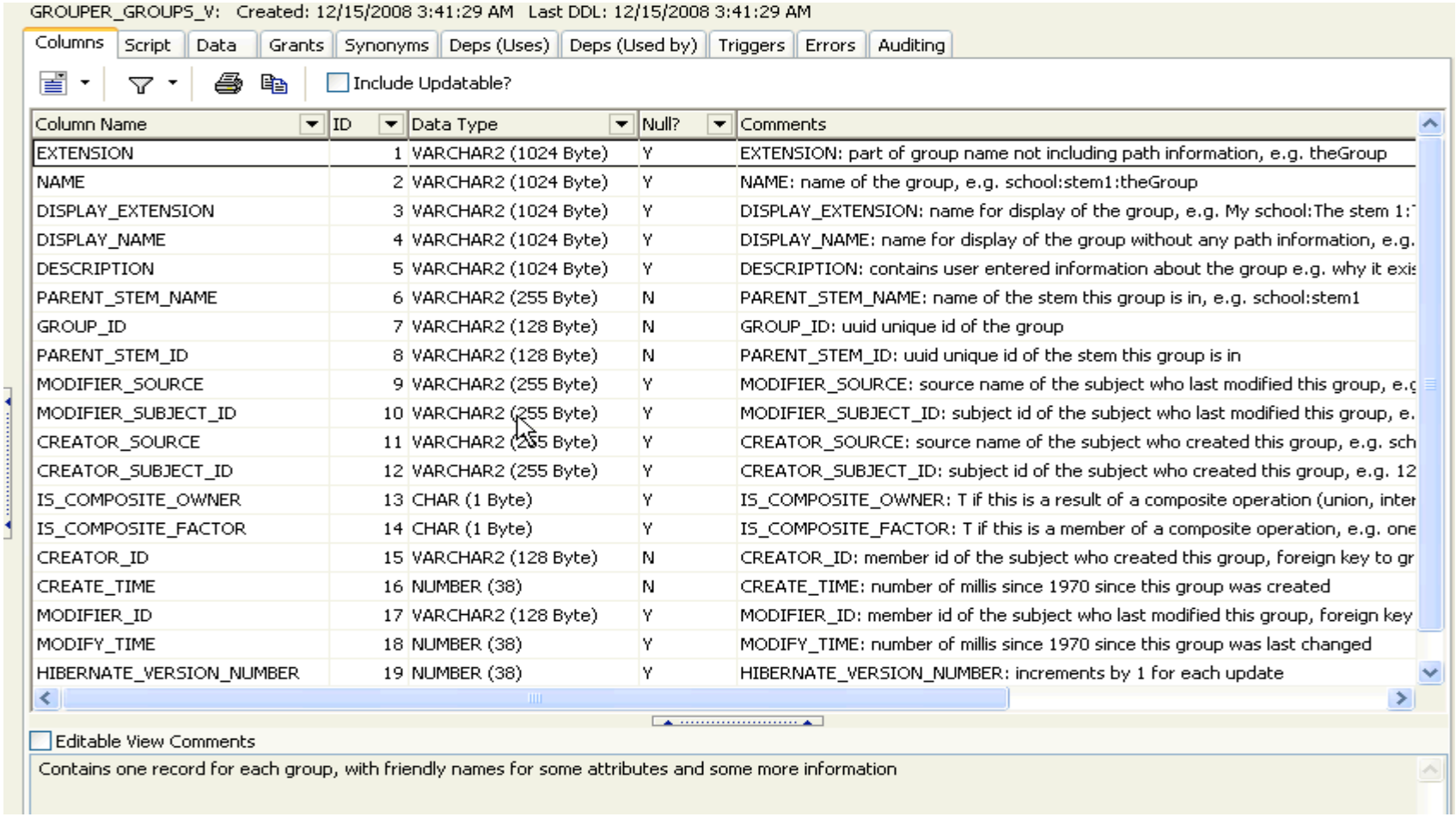
GROUPER_GROUPS: Created: 12/15/2008 3:41:18 AM Last DDL: 12/15/2008 3:41:22 AM

Columns | Indexes | Constraints | Triggers | Data | Scripts | Grants | Synonyms | Partitions | Subpartitions | Stats/Size | Referential | U

Sort by Primary Key
Read Only

ID	PARENT_STEM	CREATOR_ID
711a6173-2b45-4c5d-a814-e45669c13793	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
644e26b0-0295-4b54-b7e4-6e09b1e7716e	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
54e35f33-ab76-4894-9372-f807c1972a29	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
937a8933-e547-4039-8033-cb90eeb3cc2d	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
7fe9678c-e92b-48a8-91ab-82d0222ad38e	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
7f2f0d0f-eeb4-4[illegible]ba-a44e-c5503a6b5263	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
4813a3b3-7647-4956-a81d-8fa03cdf5a3d	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
53fe910a-057e-4291-9384-44a450a238ce	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
6a0954ac-feb1-4bb0-bfe9-eefdbeb09947	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
740f2098-0215-4756-9f8f-4f2563d7f20f	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
04c22387-e5a1-4858-9765-d7edefc256cf	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
ada0dc1f-7a3c-4e9c-a1eb-bf1780002d6b	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
913f96cb-0ceb-4bce-a1a6-15428810cc66	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
e81d3421-0f5d-4824-b229-16bff6113990	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d
093b398e-2cd4-46b0-89e5-0e78062d238c	42891ef7-74e6-4cbd-987e-451620b25988	540f6f10-784c-4396-a0d

Grouper DDL management (continued)



GROUPER_GROUPS_V: Created: 12/15/2008 3:41:29 AM Last DDL: 12/15/2008 3:41:29 AM

Columns | Script | Data | Grants | Synonyms | Deps (Uses) | Deps (Used by) | Triggers | Errors | Auditing

Include Updatable?

Column Name	ID	Data Type	Null?	Comments
EXTENSION	1	VARCHAR2 (1024 Byte)	Y	EXTENSION: part of group name not including path information, e.g. theGroup
NAME	2	VARCHAR2 (1024 Byte)	Y	NAME: name of the group, e.g. school:stem1:theGroup
DISPLAY_EXTENSION	3	VARCHAR2 (1024 Byte)	Y	DISPLAY_EXTENSION: name for display of the group, e.g. My school:The stem 1:
DISPLAY_NAME	4	VARCHAR2 (1024 Byte)	Y	DISPLAY_NAME: name for display of the group without any path information, e.g.
DESCRIPTION	5	VARCHAR2 (1024 Byte)	Y	DESCRIPTION: contains user entered information about the group e.g. why it exis
PARENT_STEM_NAME	6	VARCHAR2 (255 Byte)	N	PARENT_STEM_NAME: name of the stem this group is in, e.g. school:stem1
GROUP_ID	7	VARCHAR2 (128 Byte)	N	GROUP_ID: uuid unique id of the group
PARENT_STEM_ID	8	VARCHAR2 (128 Byte)	N	PARENT_STEM_ID: uuid unique id of the stem this group is in
MODIFIER_SOURCE	9	VARCHAR2 (255 Byte)	Y	MODIFIER_SOURCE: source name of the subject who last modified this group, e.g
MODIFIER_SUBJECT_ID	10	VARCHAR2 (255 Byte)	Y	MODIFIER_SUBJECT_ID: subject id of the subject who last modified this group, e.
CREATOR_SOURCE	11	VARCHAR2 (255 Byte)	Y	CREATOR_SOURCE: source name of the subject who created this group, e.g. sch
CREATOR_SUBJECT_ID	12	VARCHAR2 (255 Byte)	Y	CREATOR_SUBJECT_ID: subject id of the subject who created this group, e.g. 12
IS_COMPOSITE_OWNER	13	CHAR (1 Byte)	Y	IS_COMPOSITE_OWNER: T if this is a result of a composite operation (union, inter
IS_COMPOSITE_FACTOR	14	CHAR (1 Byte)	Y	IS_COMPOSITE_FACTOR: T if this is a member of a composite operation, e.g. one
CREATOR_ID	15	VARCHAR2 (128 Byte)	N	CREATOR_ID: member id of the subject who created this group, foreign key to gr
CREATE_TIME	16	NUMBER (38)	N	CREATE_TIME: number of millis since 1970 since this group was created
MODIFIER_ID	17	VARCHAR2 (128 Byte)	Y	MODIFIER_ID: member id of the subject who last modified this group, foreign key
MODIFY_TIME	18	NUMBER (38)	Y	MODIFY_TIME: number of millis since 1970 since this group was last changed
HIBERNATE_VERSION_NUMBER	19	NUMBER (38)	Y	HIBERNATE_VERSION_NUMBER: increments by 1 for each update

Editable View Comments

Contains one record for each group, with friendly names for some attributes and some more information

Grouper DDL management (continued)

- For the upgrade to Grouper 1.4, we removed some duplicate UUID's and normalized some tables
- Backups for columns are kept
- Columns are dropped
- SQL to update other cols
- All generated in a DB independent way
- Though can also grouper-export and import in new registry

Grouper DDL management (continued)

- Some versions of mysql cannot accept indices on cols longer than 1000 bytes
- Grouper can accommodate this (even though Jakarta ddlutils cannot)

```
// see if we have a custom script here, do this since some versions of mysql
// cant handle indexes on columns that large
String scriptOverride = ddlVersionBean.isMysql() ?
    "\nCREATE INDEX attribute_value_idx " +
    "ON grouper_attributes (value(333));\n" : null;

GrouperDdlUtils.ddlutilsFindOrCreateIndex(database, ddlVersionBean,
    attributeTable.getName(), "attribute_value_idx", scriptOverride, false,
    "value");
```