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# For Beginners

How to create a group for each course section and provision to Active Directory.



4



This is Grouper. It is delicious.



## Environment

ORACLE  
PeopleSoft



Microsoft  
Active Directory

ForgeRock Community   
Use Study Modify Distribute



CAS

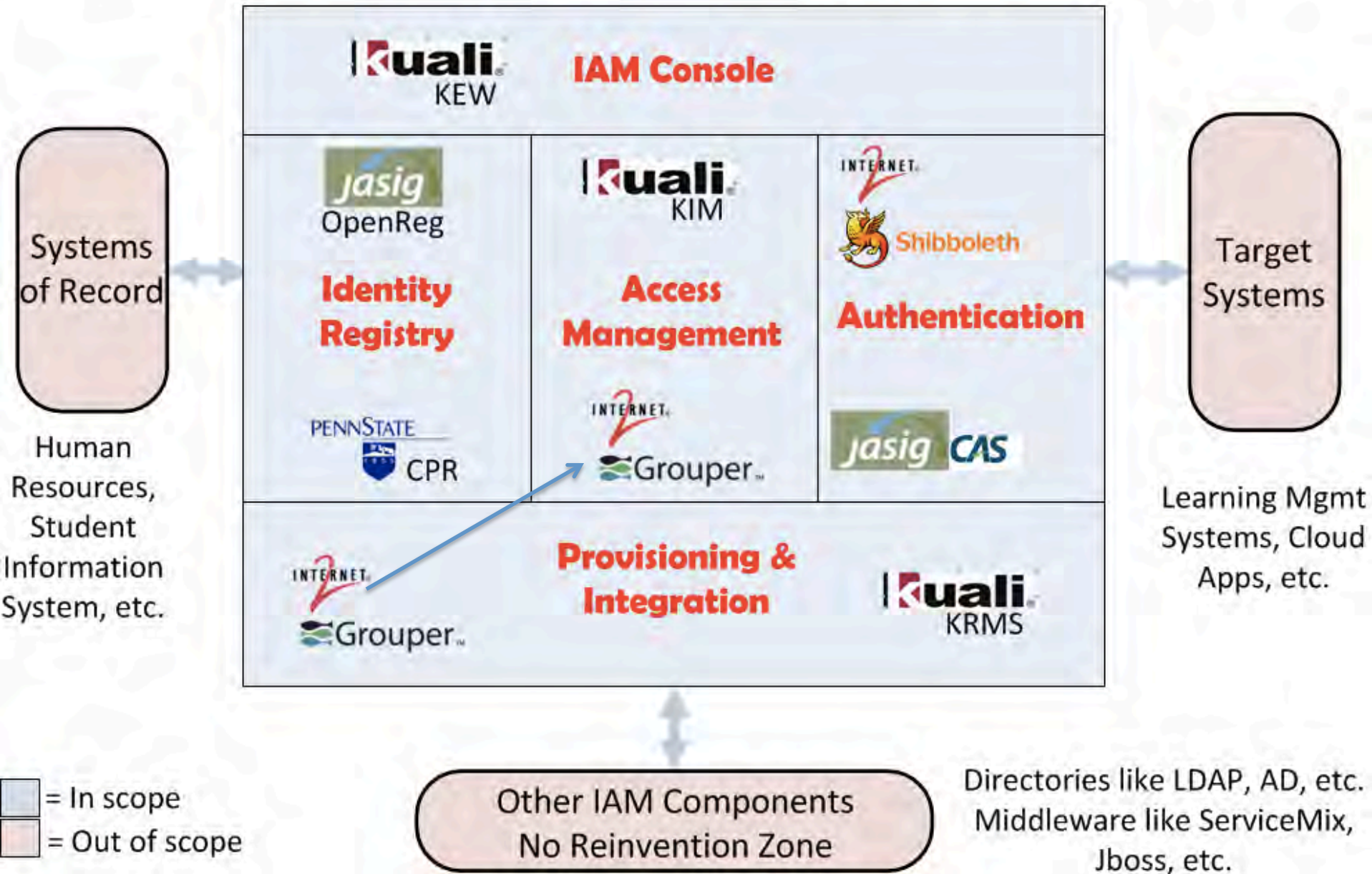


Shibboleth.

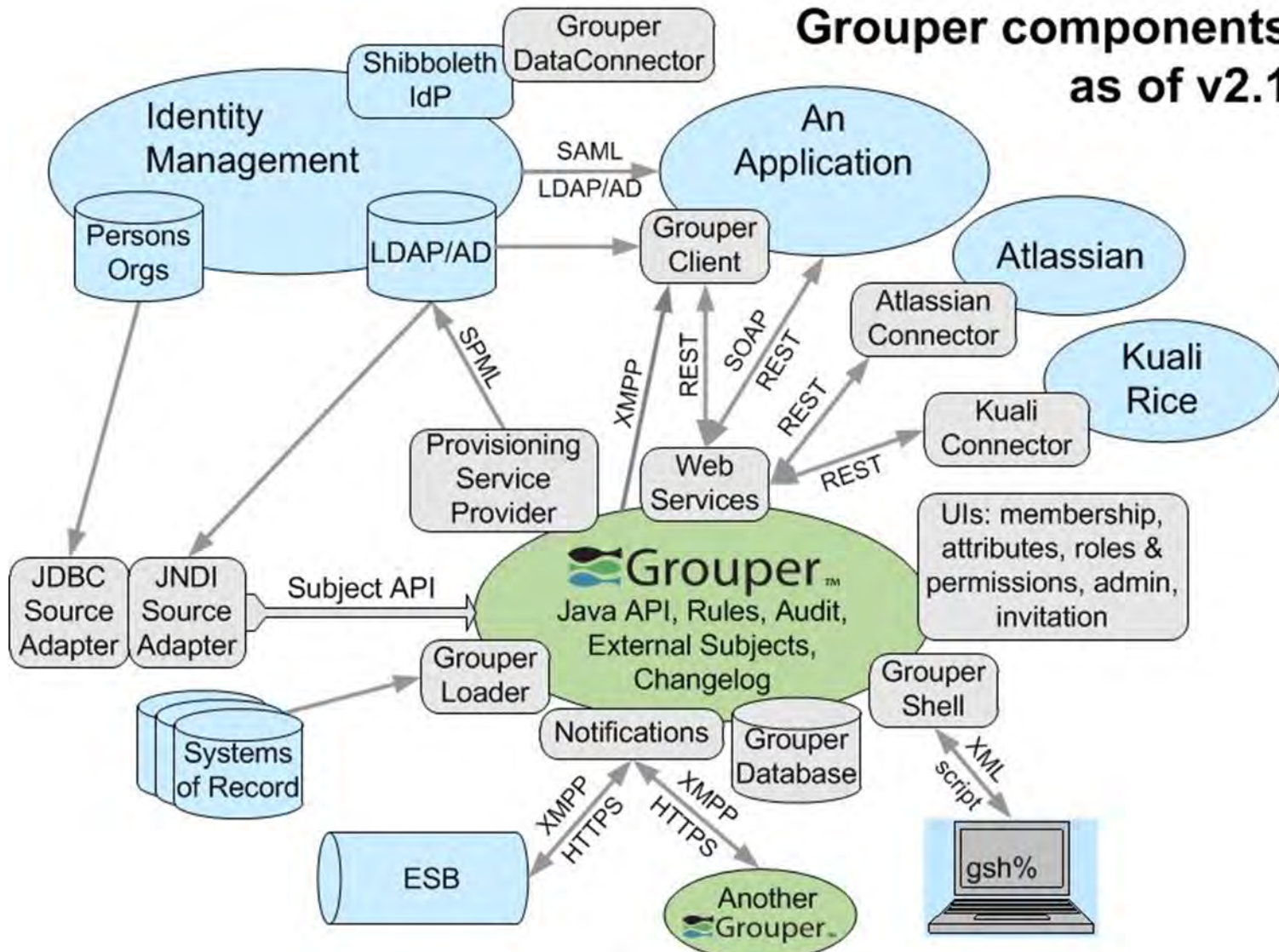


redhat

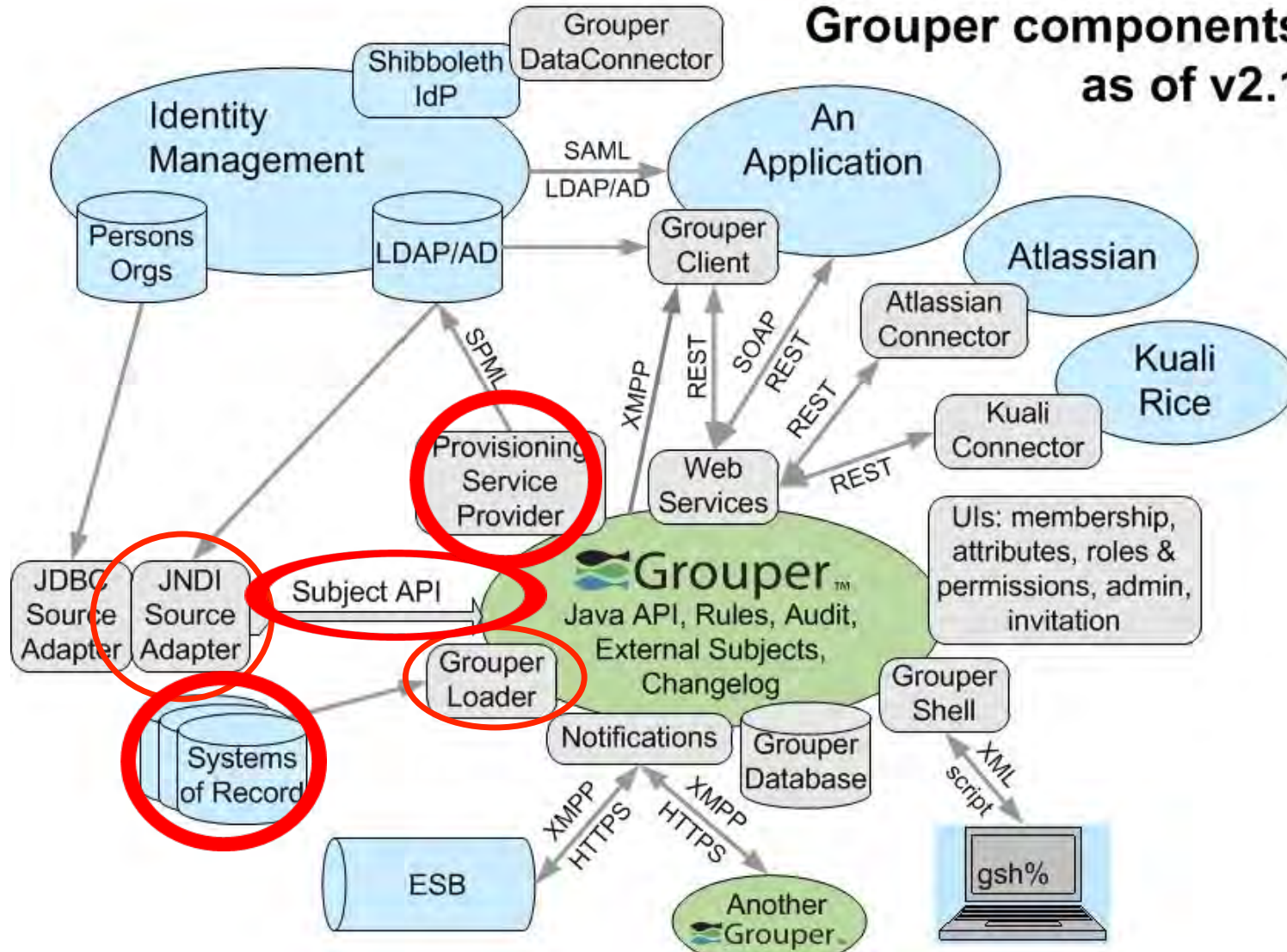
# CIFER – Community Identity Framework for Education and Research



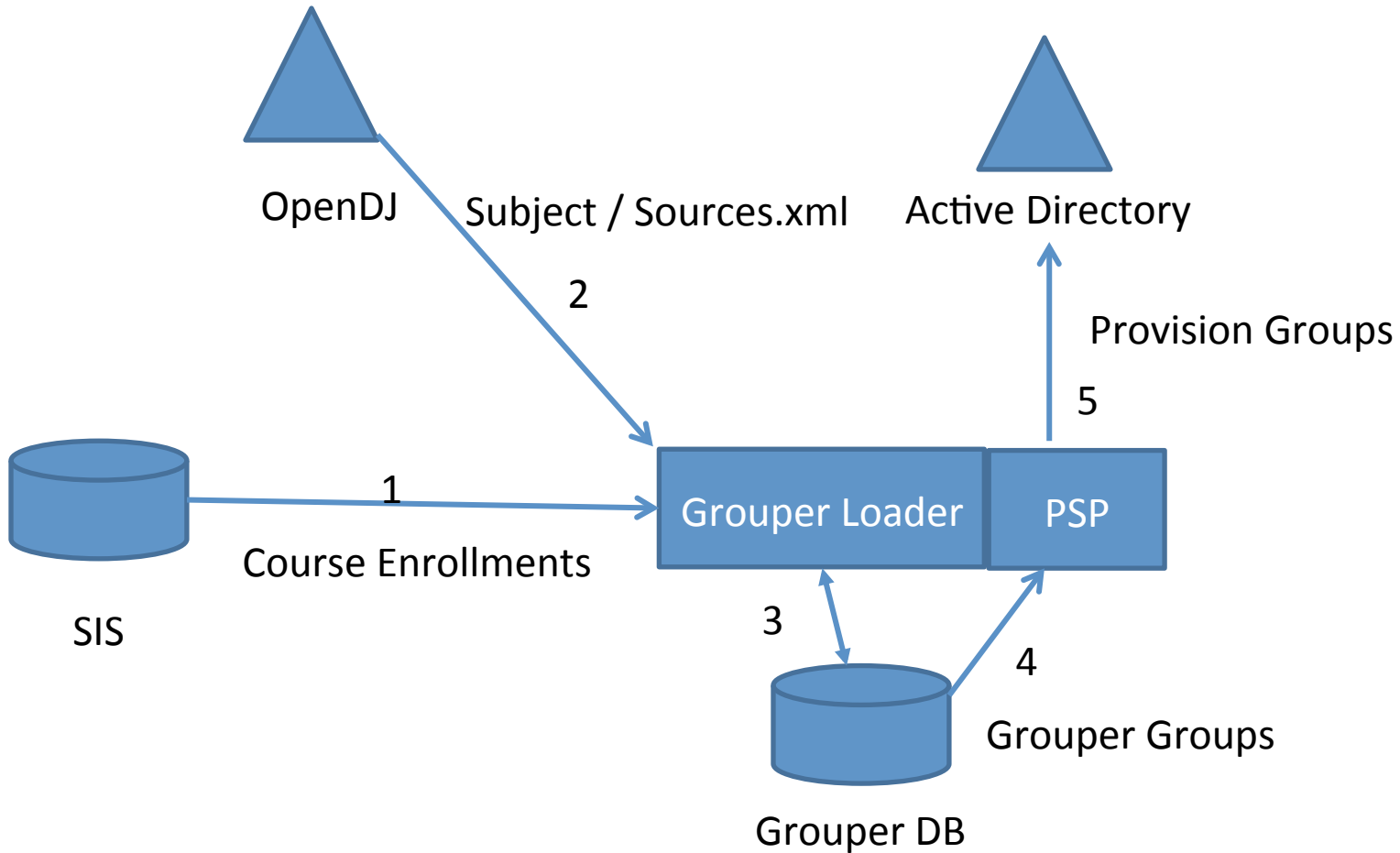
## Grouper components as of v2.1



## Grouper components as of v2.1







What “is” Grouper?

Components:

Daemon (Also called the API)

-Start nohup ./gsh.sh -loader&

Shell (command line) ([Java BeanShell](#))

./gsh

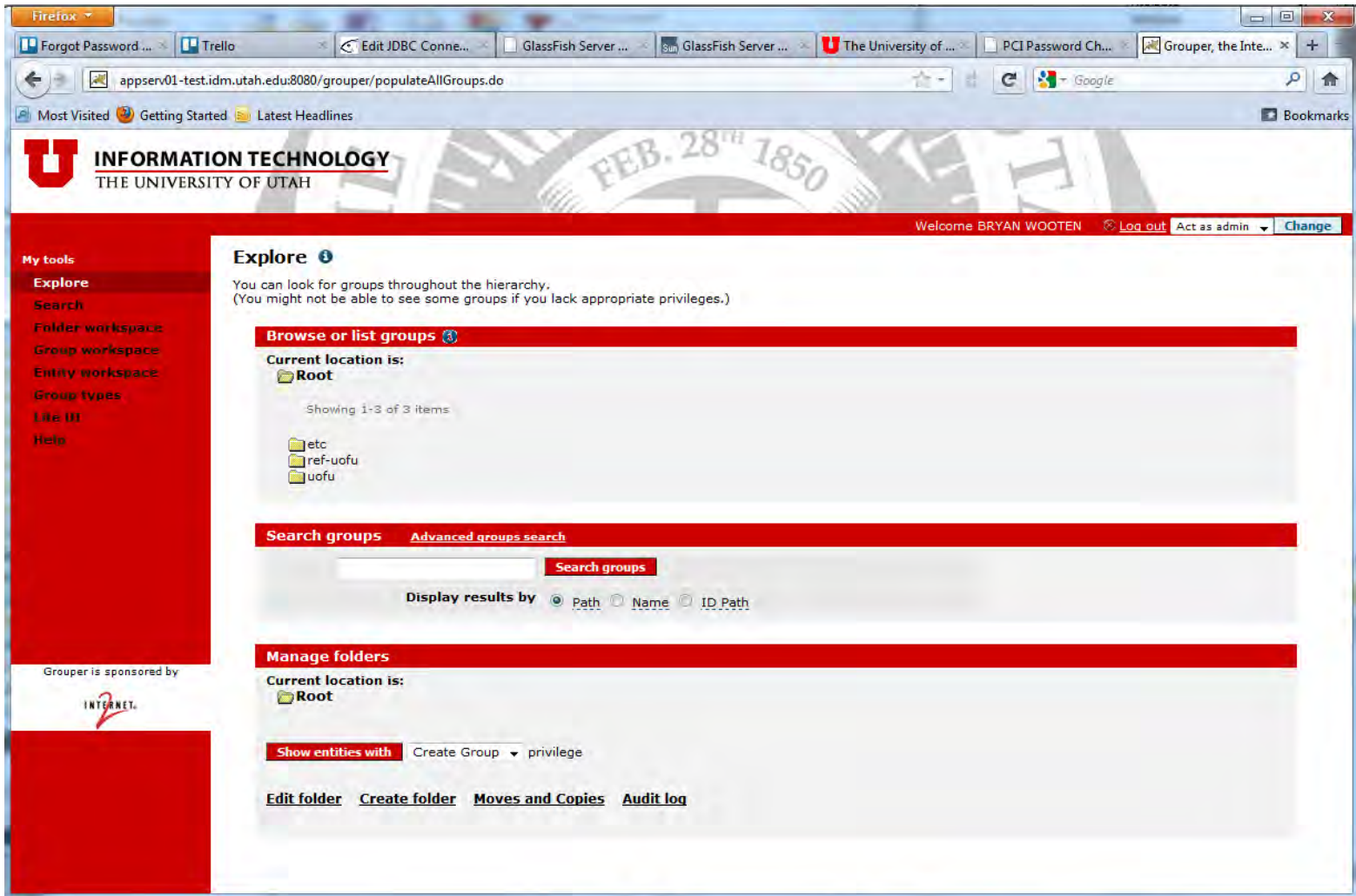
Web App / UI

<https://appserv01.idm.utah.edu/grouper>

## Grouper Shell

```
[idm@grouper01-test bin]$ ./gsh
Using GROUPER_HOME: /opt/grouper/grouper-2.1.4/grouper.api-2.1.4/bin/..
Using GROUPER_CONF: /opt/grouper/grouper-2.1.4/grouper.api-2.1.4/bin/./conf
Using JAVA: java
using MEMORY: 64m-4096m
Grouper starting up: version: 2.1.4, build date: 2014/02/07 12:03:09, env: <no label configured>
grouper.properties read from: /opt/grouper/grouper-2.1.4/grouper.api-2.1.4/conf/grouper.properties
Grouper current directory is: /opt/grouper/grouper-2.1.4/grouper.api-2.1.4/bin
log4j.properties read from: /opt/grouper/grouper-2.1.4/grouper.api-2.1.4/conf/log4j.properties
Grouper logs are not using log4j: class org.apache.commons.logging.impl.SLF4JLocationAwareLog
grouper.hibernate.properties: /opt/grouper/grouper-2.1.4/grouper.api-2.1.4/conf/grouper.hibernate.properties
grouper.hibernate.properties: grouper01@jdbc:oracle:thin:@testrac-scan.acs.utah.edu:1521/grouperusr.acs.utah.edu
sources.xml read from: /opt/grouper/grouper-2.1.4/grouper.api-2.1.4/conf/sources.xml
sources.xml grouper source id: g:gsa
sources.xml ldap source id: ldap: ldap.properties
sources.xml grouper source id: grouperEntities
Type help() for instructions
gsh 0% █
```

## Grouper WEB UI



The screenshot shows a Firefox browser window displaying the Grouper WEB UI. The address bar shows the URL: `appserv01-test.idm.utah.edu:8080/grouper/populateAllGroups.do`. The page header includes the University of Utah logo and the text "INFORMATION TECHNOLOGY THE UNIVERSITY OF UTAH". A navigation bar at the top right says "Welcome BRYAN WOOTEN" and includes links for "Log out", "Act as admin", and "Change".

The main content area is titled "Explore" and contains the following sections:

- My tools** (left sidebar):
  - Explore
  - Search
  - Folder workspace
  - Group workspace
  - Entity workspace
  - Group types
  - File UI
  - Help
- Explore** (main content):
  - Text: "You can look for groups throughout the hierarchy. (You might not be able to see some groups if you lack appropriate privileges.)"
  - Browse or list groups**:
    - Current location is: **Root**
    - Showing 1-3 of 3 items:
      - etc
      - ref-uofu
      - uofu
  - Search groups**:
    - Advanced groups search
    - Search groups button
    - Display results by:  Path  Name  ID Path
  - Manage folders**:
    - Current location is: **Root**
    - Show entities with: Create Group privilege
    - Links: [Edit folder](#), [Create folder](#), [Moves and Copies](#), [Audit log](#)

## Stems and Groups

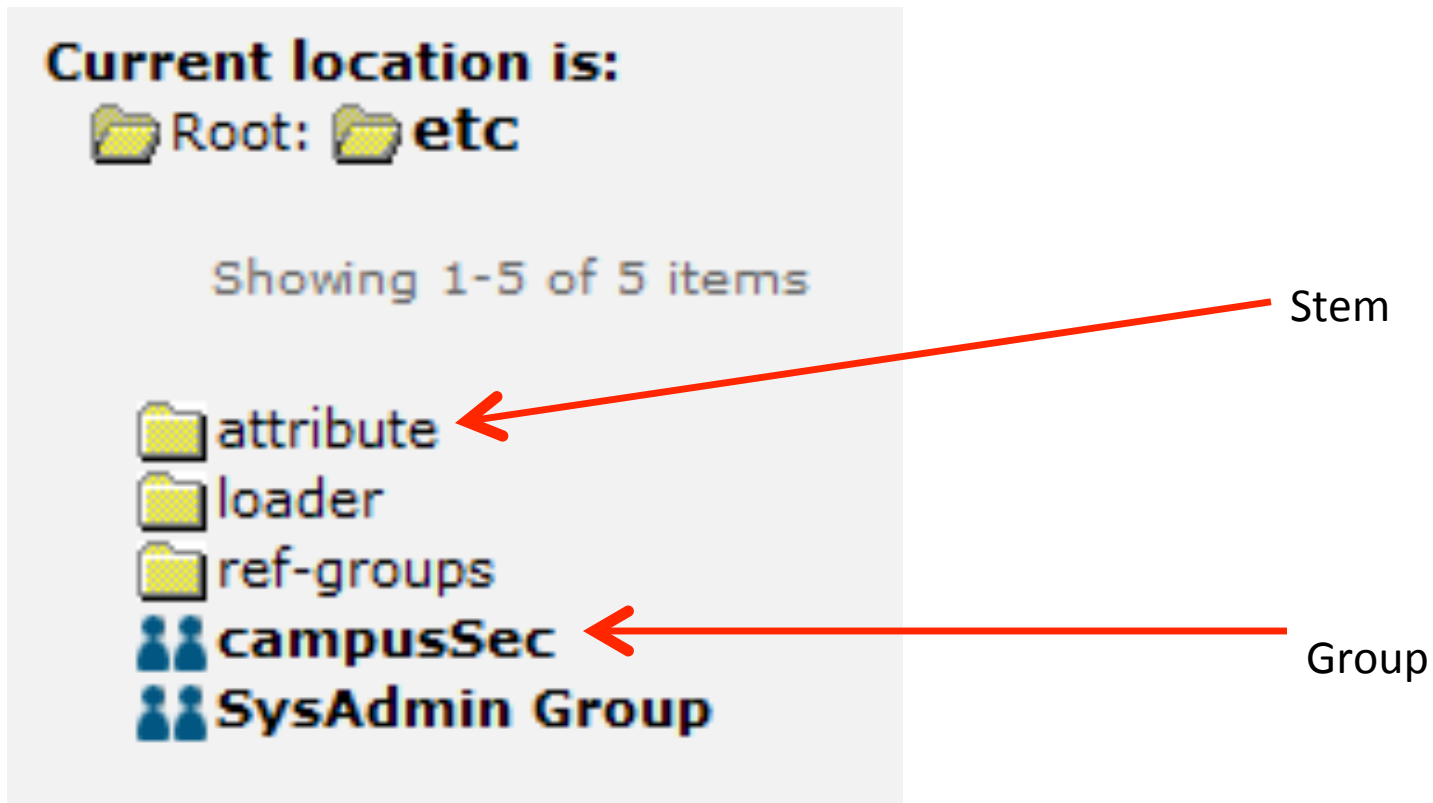
**Current location is:**  
📁 Root: 📁 etc

Showing 1-5 of 5 items

- 📁 attribute
- 📁 loader
- 📁 ref-groups
- 👤👤 campusSec
- 👤👤 SysAdmin Group

Stem

Group



## Grouper Loader Job VS Grouper Group

Both are created using “Create Group” in the UI.

A Loader Job Group has no members. It defines how one or more groups are created.

Grouper Groups have members / subjects.

**Current location is:**  
📁 Root: 📁 etc: 📁 loader

<b>Name</b>	<input type="text"/>
<b>ID</b>	<input type="text"/>
<b>Description</b>	<input type="text"/>
<b>Assign privileges to everyone</b>	<input type="checkbox"/> admin <input type="checkbox"/> update <input type="checkbox"/> read <input type="checkbox"/> view <input type="checkbox"/> optin <input type="checkbox"/> optout
<b>Select group types</b>	<input type="checkbox"/> addIncludeExclude <input type="checkbox"/> grouperLoader <input type="checkbox"/> requireInGroups

**Save** **Add members** **Make composite**

[Back to Manage folders](#)

## Grouper Loader Job






Current location is:  
 📁 Root: 📁 etc: 📁 loader: 👤 courseEnrollments

<b>Name</b>	courseEnrollments
<b>Path</b>	etc:loader:courseEnrollments
<b>Description</b>	courseEnrollments
<b>ID</b>	courseEnrollments
<b>ID Path</b>	etc:loader:courseEnrollments
<b>Alternate ID Path</b>	
<b>UUID</b>	c3dd838d48fd499d9bfe4e7550a002f6

<b>Types</b>	<b>base</b>	<b>members</b> <i>List field</i>
	<b>grouperLoader</b>	
	<b>grouperLoaderAndGroups</b>	
	<b>grouperLoaderDbName</b>	hetest
	<b>grouperLoaderGroupQuery</b>	
	<b>grouperLoaderGroupTypes</b>	
	<b>grouperLoaderGroupsLike</b>	
	<b>grouperLoaderIntervalSeconds</b>	
	<b>grouperLoaderPriority</b>	
	<b>grouperLoaderQuartzCron</b>	* * 0/10 * * ?
	<b>grouperLoaderQuery</b>	select group_name, subject_id, 'ldap' from UUIDM.UU_IDM_COURSES
	<b>grouperLoaderScheduleType</b>	CRON
	<b>grouperLoaderType</b>	SQL_GROUP_LIST

## Grouper Group

**Current location is:**

 Root: 
  ref-uofu: 
  campus: 
  departments: 
  **00001**

<b>Name</b>	00001
<b>Path</b>	ref-uofu:campus:departments:00001
<b>Description</b>	Group containing list of 00001 after adding the includes and subtracting the excludes
<b>ID</b>	00001
<b>ID Path</b>	ref-uofu:campus:departments:00001
<b>Alternate ID Path</b>	uofu-ref:campus:departments:00001
<b>UUID</b>	ccc53daa982c44089b99c6b5ac8e4361
<b>Types</b>	<span style="background-color: #ADD8E6; padding: 2px;">base</span> <span style="background-color: #D3D3D3; padding: 2px; margin-left: 10px;">members</span> <i>List field</i>

Show entities with

ADMIN  privilege

[Delete](#)  
 [Add to Group workspace](#)  
 [Edit group](#)  
 [Manage members](#)  
 [Move group](#)  
 [Copy group](#)  
 [Audit log](#)  
 [View entity details](#)



## Skills to build / configure Grouper:

ant

Xml

Java

Version control

SQL / know your DBA

## Groupier Installation – Non Quick Start

This is for building using the ANT build process on a linux machine. It assumes that ant 1.8.x is installed as well java 1.6.x.

1. Groupier UI (ANT Build Process)
  - a. Download grouper.api-2.1.4.tar.gz into working dir
    - i. Working dir for this example is idm-6:/root/sandbox
  - b. Download grouper.ui-2.1.4.tar.gz working dir
  - c. Untar both (tar -xvf \*.tar)
  - d. Edit \$workingdir/grouper.ui-2.1.4/build.properties
    - i. Set: grouper.folder = /workingdir/grouper.api-2.1.4 (NOTE this is the api directory!)
    - ii. Set: should.copy.context.xml.to.metainf=false
    - iii. Comment out: replace.grouper.home=true (this is needed to set log4j.properties correctly)
  - e. Test build: sh /grouper-2.1.4/apache-ant-1.8.2/bin/ant war
2. Configure for deployment
  - a. Include CAS client in the war. Copy cas-client-core-3.2.1.jar (or other newer version) to /workingdir/grouper.api-2.1.4/lib/grouper/ cas-client-core-3.2.1.jar. This jar will wind up in the WEB-INF/lib directory of the webapp.
3. Edit grouper.ui-2.1.4/webapp/WEB-INF/web.core.xml for CAS Login (Insert at top of file)
  - a. Remove Basic-Auth xml entry at bottom of file.
  - b. Edit web-xml-merge-tags.xml. Comment out or remove:

```
<tag name="security-constraint" key="url-pattern"/>
<tag name="login-config" type="single"/>
<tag name="security-role" key="role-name"/>
```
4. Edit grouper.api-2.1.4/conf/sources.xml (for ldap Subject Source)
5. Edit grouper.api-2.1.4/conf/ldap.properties (For subject source)
6. Edit grouper.api-2.1.4/conf/grouper.hibernate.properties (For Oracle DB)
7. Edit grouper.api-2.1.4/conf/grouper.properties: set groups.wheel.use = true
8. Edit grouper.api-2.1.4/conf/grouper.properties: (Don't allow just any user to see anything)
  - a. groups.create.grant.all.admin = false
  - b. groups.create.grant.all.optin = false
  - c. groups.create.grant.all.optout = false
  - d. groups.create.grant.all.read = false
  - e. groups.create.grant.all.update = false
  - f. groups.create.grant.all.view = false
  - g. grouperIncludeExclude = true
  - h. grouperIncludeExclude.requireGroups.use = true

Grouper UI Build Installation.docx

<https://uofu.box.com/s/5rnvzqvn8dq6kdho30ac>

<https://uofu.box.com/s/zrglcghfilao42kkz6ao>

conf/sources.xml

```
<!-- LDAP Subject Resolver -->  
<source adapterClass="edu.internet2.middleware.subject.provider.LdapSourceAdapter">  
  <id>ldap</id>  
  <name>LdapSourceAdapter</name>  
  <type>person</type>
```

```
<!-- Note that most of the ldap configuration is in the properties file.  
  The filename can be a file in your classpath or an absolute pathname. -->
```

```
<init-param>  
  <param-name>ldapProperties_file</param-name>  
  <param-value>ldap.properties</param-value>  
</init-param>
```

## Conf/sources.xml cont'd.

```
<init-param>  
  <param-  
name>SubjectID_AttributeTyp  
e</param-name>  
  <param-value>unid</  
param-value>  
</init-param>
```

Conf/sources.xml cont'd.

```
<search>
  <searchType>searchSubject</searchType>
  <param>
    <param-name>filter</param-name>
    <param-value>
      (& (unid=%TERM%)
      (objectClass=person))
    </param-value>
  </param>
  <param>
    <param-name>scope</param-name>
    <param-value>SUBTREE_SCOPE</param-
value>
  </param>
  <param>
    <param-name>base</param-name>
    <param-value>ou=people,o=utah.edu</
param-value>
  </param>
</search>
```

## ldap.properties

```
edu.vt.middleware.ldap.ldapUrl=ldap://idm-6.acs.utah.edu:389  
edu.vt.middleware.ldap.searchScope=SUBTREE
```

```
# authn if simple
```

```
edu.vt.middleware.ldap.bindDn=cn=Directory Manager  
edu.vt.middleware.ldap.bindCredential=password
```

EXPLORE

Edit attributes

Current location is:

Root: etc: loader: courseEnrollments

grouper-loader.properties:  
 db.hetest.user = uuidm  
 db.hetest.pass = passed  
 db.hetest.url = jdbc:oracle:thin:@testrac-scan.acs.utah.edu:1521/hetsgfs.acs.utah.edu

Group type	Attribute	Value
base	members	List field
<u>grouperLoader</u>	<u>grouperLoaderAndGroups</u>	<input type="text"/>
	<u>grouperLoaderDbName</u>	hetest
	<u>grouperLoaderGroupQuery</u>	<input type="text"/>
	<u>grouperLoaderGroupTypes</u>	<input type="text"/>
	<u>grouperLoaderGroupsLike</u>	<input type="text"/>
	<u>grouperLoaderIntervalSeconds</u>	<input type="text"/>
	<u>grouperLoaderPriority</u>	<input type="text"/>
	<u>grouperLoaderQuartzCron</u>	** 0/12 * * ?
	<u>grouperLoaderQuery</u>	select group_name, subject_id, 'ldap' from UUIDM.UU_IDM_COURSES
	<u>grouperLoaderScheduleType</u>	CRON
	<u>grouperLoaderType</u>	SQL_GROUP_LIST

Save attributes and finish    Save attributes and add members

sources

select group\_name, subject\_id, 'ldap' from UUIDM.UU\_IDM\_COURSES





-----  
-- DDL for View UU\_IDM\_COURSEINSTRUCTORS  
-----

```
CREATE OR REPLACE FORCE VIEW "UUIDM"."UU_IDM_COURSEINSTRUCTORS" ("GROUP_NAME", "SUBJECT_ID") AS
SELECT 'uofu:campus:courses:currTerm' ||
':' ||
CT1.ACAD_GROUP ||
':' ||
CT1.ACAD_ORG ||
':' ||
CT1.SUBJECT ||
':' ||
replace(CT1.DESCR,':','') ||
':' ||
CT1.CATALOG_NBR ||
':' ||
CT1.CLASS_SECTION ||
':instructors',
concat('u',SUBSTR(SE1.emplid,2))
FROM PS_CLASS_INSTR SE1,
PS_CLASS_TBL CT1
WHERE SE1.STRM in (SELECT DISTINCT T.STRM AS SELECTTERM
FROM PS_TERM_TBL T
WHERE T.INSTITUTION = 'UOFU'
AND (T.TERM_BEGIN_DT < add_months(SYSDATE,0) and t.term_end_dt > SYSDATE)
AND T.ACAD_CAREER IN ('L','U'))

AND SE1.CRSE_ID = CT1.CRSE_ID
AND SE1.CRSE_OFFER_NBR = CT1.CRSE_OFFER_NBR
AND SE1.SESSION_CODE = CT1.SESSION_CODE
AND SE1.CLASS_SECTION = CT1.CLASS_SECTION
AND SE1.STRM = CT1.STRM
AND CT1.CATALOG_NBR = '5510'

ORDER BY SE1.EMPLID, SE1.STRM, CT1.SUBJECT, CT1.CATALOG_NBR, CT1.CLASS_SECTION;
=====END=====
```

Dirty Data




## Grouper Loader Job Creates these Grouper Groups

### Browse or list groups

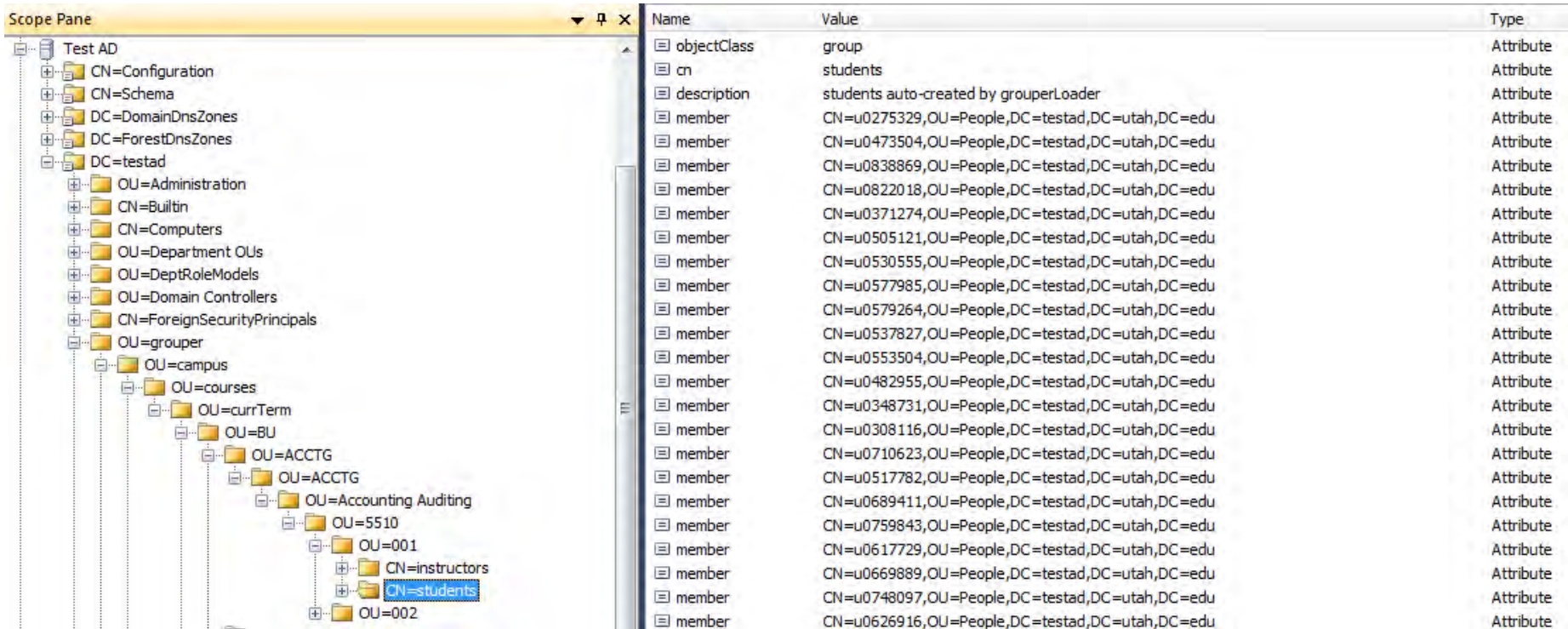
Current location is:

 Root:  uofu:  campus:  courses:  currTerm:  BU:  ACCTG:  ACCTG:  Accounting Auditing:  5510:  001

Showing 1-3 of 3 items

-  all
-  instructors
-  students

## We want this in Active Directory



The screenshot shows the Active Directory console with the following structure in the Scope Pane:

- Test AD
  - CN=Configuration
  - CN=Schema
  - DC=DomainDnsZones
  - DC=ForestDnsZones
  - DC=testad
    - OU=Administration
    - CN=Builtin
    - CN=Computers
    - OU=Department OUs
    - OU=DeptRoleModels
    - OU=Domain Controllers
    - CN=ForeignSecurityPrincipals
    - OU=grouper
      - OU=campus
        - OU=courses
          - OU=currTerm
            - OU=BU
              - OU=ACCTG
                - OU=ACCTG
                  - OU=Accounting Auditing
                    - OU=5510
                      - OU=001
                        - CN=instructors
                        - CN=students**
                        - OU=002

The Properties pane shows the following details for the selected group:




| Name        | Value  | Type      |
|-------------|--|-----------|
| objectClass | group  | Attribute |
| cn          | students                                       | Attribute |
| description | students auto-created by grouperLoader         | Attribute |
| member      | CN=u0275329,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0473504,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0838869,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0822018,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0371274,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0505121,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0530555,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0577985,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0579264,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0537827,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0553504,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0482955,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0348731,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0308116,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0710623,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0517782,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0689411,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0759843,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0617729,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0669889,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0748097,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0626916,OU=People,DC=testad,DC=utah,DC=edu | Attribute |

## Browse or list groups

Current location is:

Root: uofu: campus: courses: currTerm: BU: ACCTG: ACCTG: Accounting Auditing: 5510: 001

Showing 1-3 of 3 items

-  all
-  instructors
-  students

Scope Pane

- Test AD
  - CN=Configuration
  - CN=Schema
  - DC=DomainDnsZones
  - DC=ForestDnsZones
  - DC=testad
    - OU=Administration
    - CN=Builtin
    - CN=Computers
    - OU=Department OUs
    - OU=DeptRoleModels
    - OU=Domain Controllers
    - CN=ForeignSecurityPrincipals
    - OU=grouper
      - OU=campus
        - OU=courses
          - OU=currTerm
            - OU=BU
              - OU=ACCTG
                - OU=ACCTG
                  - OU=Accounting Auditing
                    - OU=5510
                      - OU=001
                        - CN=instructors
                        - CN=students
                        - OU=002

| Name        | Value  | Type      |
|-------------|--|-----------|
| objectClass | group  | Attribute |
| cn          | students                                       | Attribute |
| description | students auto-created by grouperLoader         | Attribute |
| member      | CN=u0275329,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0473504,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0838869,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0822018,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0371274,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0505121,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0530555,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0577985,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0579264,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0537827,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0553504,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0482955,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0348731,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0308116,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0710623,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0517782,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0689411,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0759843,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0617729,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0669889,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0748097,OU=People,DC=testad,DC=utah,DC=edu | Attribute |
| member      | CN=u0626916,OU=People,DC=testad,DC=utah,DC=edu | Attribute |

Last Step: Configure the PSP

Down load the Grouper Installer:

<https://spaces.internet2.edu/display/Grouper/Grouper+Downloads>

Contains PSP configuration examples

Sources

PSP! CASE SenSiTive!

Subject\_ID vs Subject\_Identifier?

# PSP Configuration Options – ldap.properties

- LDAP connection settings.

```
edu.vt.middleware.ldap.ldapUrl=ldap://127.0.0.1:389
```

```
edu.vt.middleware.ldap.bindDn=cn=Manager,dc=example,dc=edu
```

```
edu.vt.middleware.ldap.bindCredential=secret
```

```
edu.vt.middleware.ldap.ssl=false
```

```
edu.vt.middleware.ldap.tls=false
```

- Base DN's.

```
edu.vt.middleware.ldap.baseDn=dc=example,dc=edu
```

```
edu.internet2.middleware.psp.groupsBaseDn=ou=groups,dc=example,dc=edu
```

```
edu.internet2.middleware.psp.peopleBaseDn=ou=people,dc=example,dc=edu
```

- Base Grouper stem to provision.

```
edu.internet2.middleware.psp.baseStem=
```

# PSP Configuration Options – grouper-loader.properties.

- Configure incremental provisioning
  - changeLog.consumer.psp.class =  
edu.internet2.middleware.psp.grouper.PspChangeLogConsumer
  - changeLog.consumer.psp.quartzCron = 0 \* \* \* \* ?
  - changeLog.consumer.psp.retryOnError = false
- Configure bulk provisioning
  - changeLog.psp.fullSync.class =  
edu.internet2.middleware.psp.grouper.PspChangeLogConsumer
  - changeLog.psp.fullSync.quartzCron = 0 0 5 \* \* ?
  - changeLog.psp.fullSync.runAtStartup = false
  - changeLog.psp.fullSync.omitDiffResponses = true
  - changeLog.psp.fullSync.omitSyncResponses = true

## The PSP XML Files

1. psp-internal.xml
2. psp-resolver.xml
3. psp-services.xml
4. psp.xml
5. psp-vt-ldap.xml



## Psp-resolver.xml

```
<!-- The MemberDataConnector returns attributes representing the member whose
subject id or identifier is the principal
name. -->
<resolver:DataConnector
id="MemberDataConnector"
xsi:type="grouper:MemberDataConnector">
<!-- Return members from the "ldap" source only. -->
<grouper:Filter
xsi:type="grouper:MemberSource"
sourceId="ldap" />
<!-- Return the "dn" attribute of members whose subject source id is "ldap". -->
<grouper:Attribute
id="dn"
source="ldap" />
</resolver:DataConnector>
```

<!-- The GroupDataConnector returns attributes representing the group whose name is the principal name. The returned group must be a child of the stem whose name is the edu.internet2.middleware.psp.baseStem property. Groups under the "etc" stem are omitted. -->

```
<resolver:DataConnector
  id="GroupDataConnector"
  xsi:type="grouper:GroupDataConnector">
  <!-- The MINUS filter matches stems which match the first child filter and not the second. -->
  <grouper:Filter xsi:type="grouper:MINUS">
    <!-- The GroupInStem filter matches groups which are children of the given stem. -->
    <grouper:Filter
      xsi:type="grouper:GroupInStem"
      name="{edu.internet2.middleware.psp.baseStem}"
      scope="SUB" />
    <grouper:Filter
      xsi:type="grouper:GroupInStem"
      name="etc"
      scope="SUB" />
  </grouper:Filter>
```

# Psp.xml

The PSP is case SensiTivE!

```
<ps0 id="member">

  <!-- The ldap member DN. -->
  <!-- UofU - with AD as a target set the peopl base for AD -->
  <!--
  containerId="{edu.internet2.middleware.psp.peopleBaseDn}" />
  -->
  <identifier
    ref="memberDn"
    targetId="ldap"

    containerId="OU=people,DC=testad,DC=utah,DC=edu" />

  <!-- Identifies member objects which exist on the target by objectclass attribute value. -->
  <identifyingAttribute
    name="objectclass"
    value="person" />
```

<http://www.internet2.edu/products-services/trust-identity-middleware/grouper/>

<https://spaces.internet2.edu/display/groupertrain/Grouper+Training>

