Attribute based access control (ABAC) with scripted groups

Overview

To implement access policies, it has often been necessary to set up intermediate groups, include/exclude, requirement groups, and allow/deny manual groups. Grouper has features to help in this area including: rules, hooks, templates, move/copy, import/export, and GSH scripts.

The ABAC with scripted groups feature is designed to offer increased efficiency in implementing access policies. It's important for the common groups and policy language to be well documented and people to be properly trained.

JEXL loaded groups

In Grouper v2.6.6+ there is a first pass at JEXL loaded groups using memberships of groups only. In v5+ scripted groups can also be based on entity data fields. It is basic and can be built on. Note: this is subject to change as we see a working solution and discuss the optimal path forward.

> **See the blog!**
>
> For more info, see the February 2022 blog on Attribute Based Access Control with Grouper.

Video

Expression language (JEXL) scripts facilitate implementing the part of ABAC that defines who is included in a policy based on attributes of those users. Other parts of ABAC such as resource attributes or environment attributes can be taken into consideration with Grouper permissions or by the service which has protected resources.

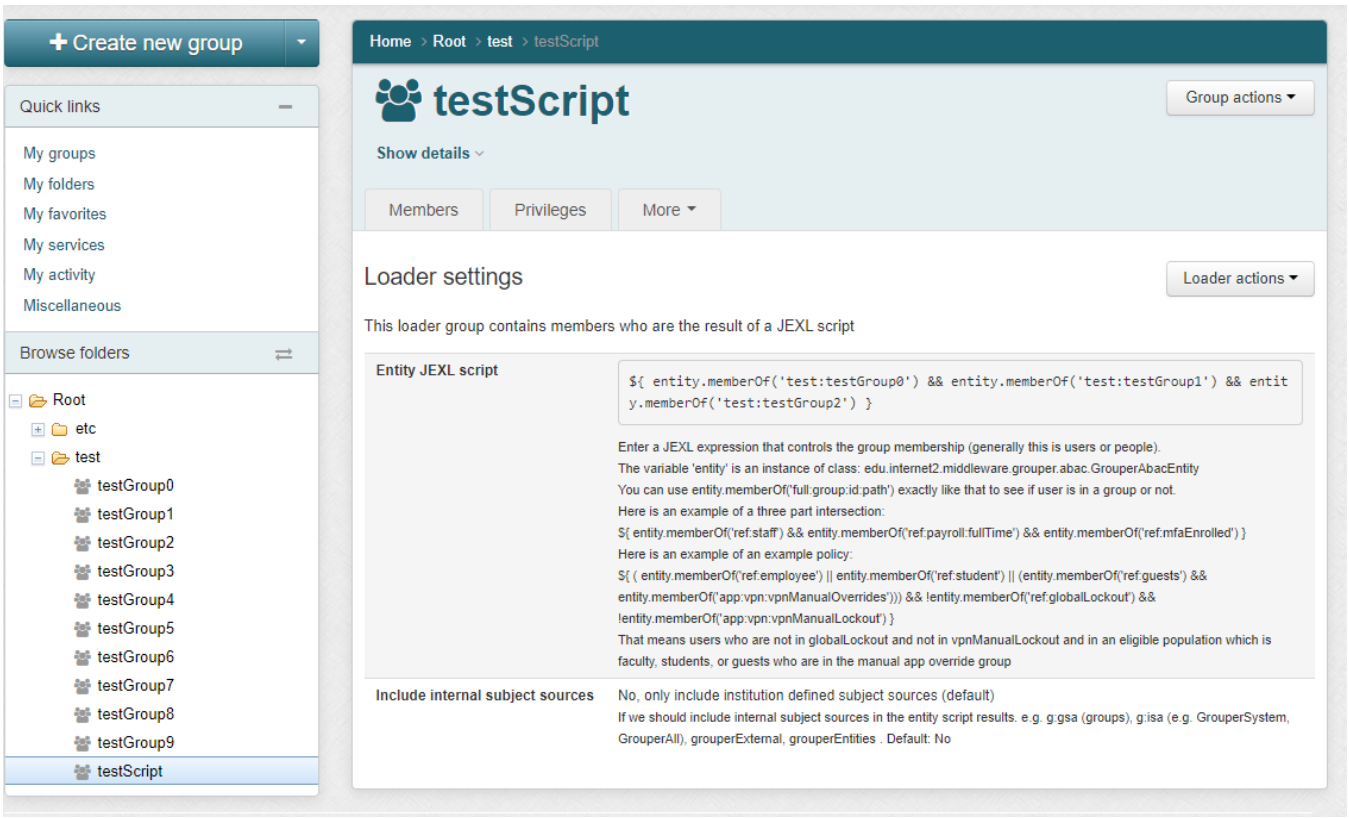
We want to be able to craft policies by an expression instead of creating loaders or tons of reference groups based on cartesian products of basis/ref groups.

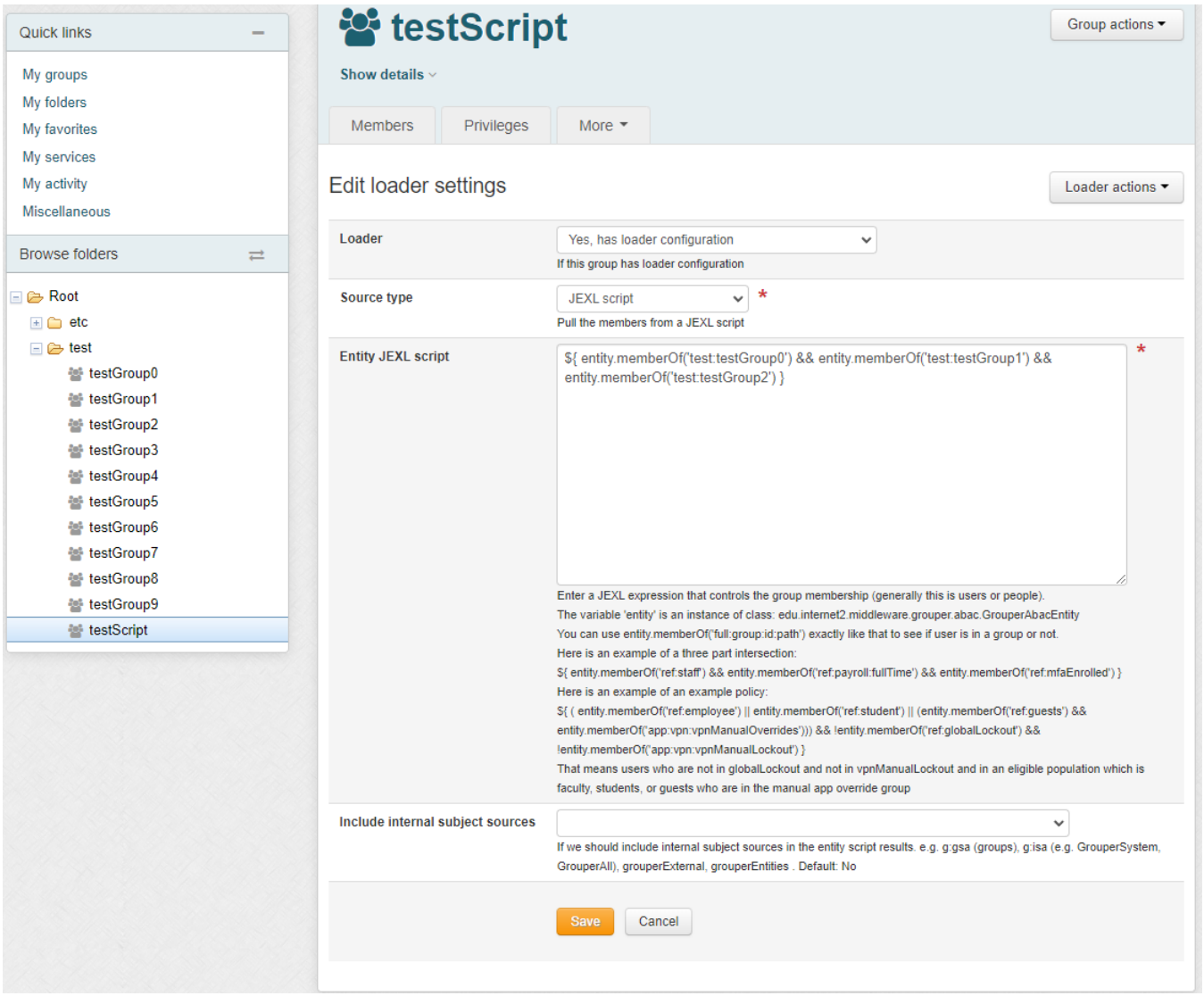
Individual groups can be configured to automatically have their membership managed with individual subjects (or in future groups as members)

Why do we need this feature?

- Reduces pre-loaded rollups that might not be used
- You don't need a loader job for each one of these groups
- Any Grouper user could edit the policies if they can READ underlying groups. The expressions are secure (future state)
- The memberships of the ABAC groups are near real time based on an intelligent change log consumer (future state)
- You can have a UI to help build it and give good error messages
- Could visualize the policies. Perhaps could be integrated into existing visualization (future state)
- This solves the issue of composites with any number of factors

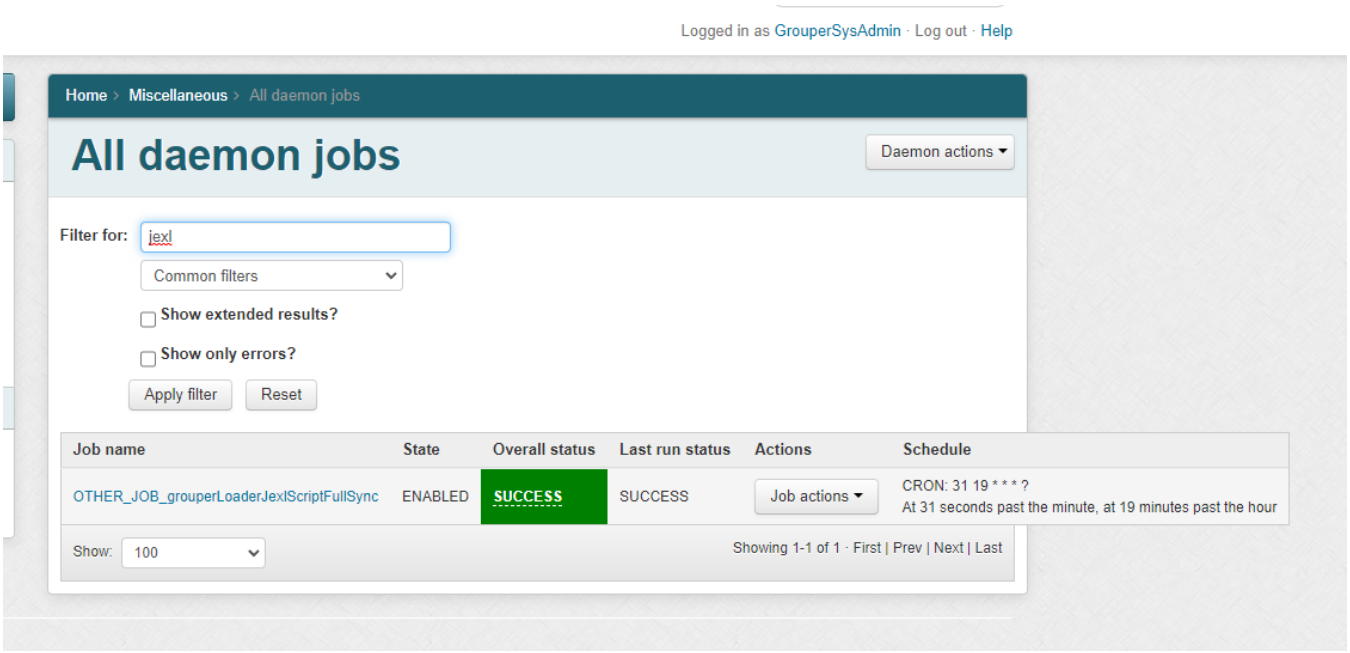
1.1. UI to configure

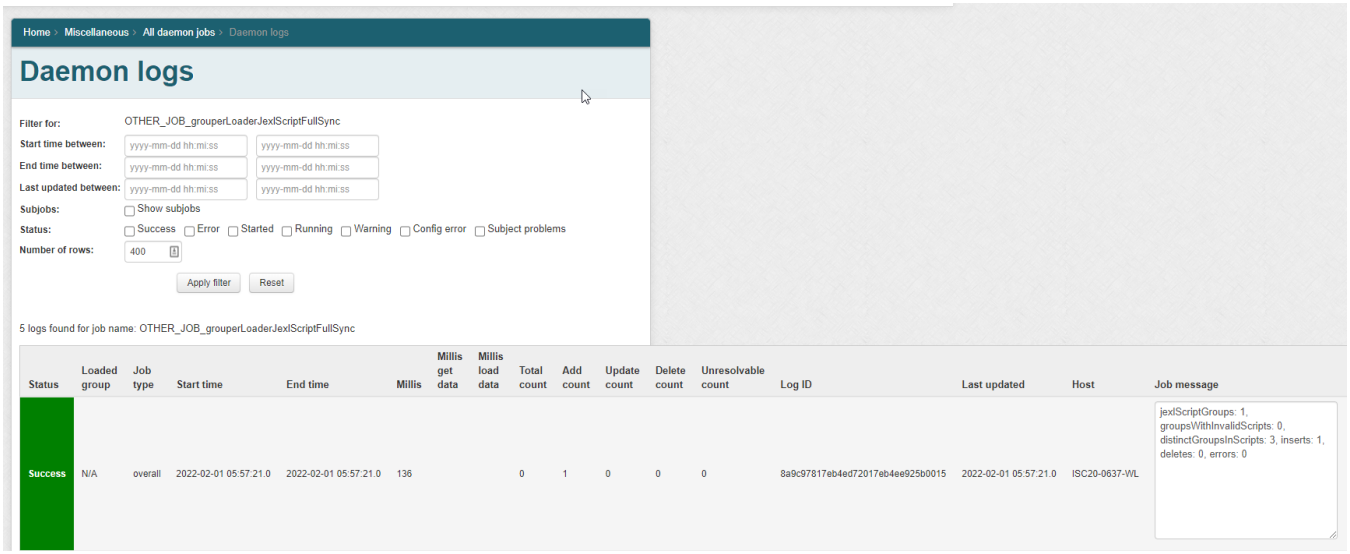

+ Create new group
Quick links
My groups
My folders
My favorites
My services
My activity
Miscellaneous
Browse folders
Root
etc
test
testGroup0
testGroup1
testGroup2
testGroup3
testGroup4
testGroup5
testGroup6
testGroup7
testGroup8
testGroup9
testScript
Home › Root › test › testScript
testScript
Group actions
Show details
Members
Privileges
More
Loader settings
Loader actions
This loader group contains members who are the result of a JEXL script
Entity JEXL script
${ entity.memberOf('test:testGroup0') && entity.memberOf('test:testGroup1') && entity.memberOf('test:testGroup2') }
Enter a JEXL expression that controls the group membership (generally this is users or people).
The variable 'entity' is an instance of class: edu.internet2.middleware.grouper.abac.GrouperAbacEntity
You can use entity.memberOf('full:group:id:path') exactly like that to see if user is in a group or not.
Here is an example of a three part intersection:
${ entity.memberOf('ref:staff') && entity.memberOf('ref:payroll:fullTime') && entity.memberOf('ref:mfaEnrolled') }
Here is an example of an example policy:
${ (entity.memberOf('ref:employee') || entity.memberOf('ref:student') || (entity.memberOf('ref:guests') && entity.memberOf('app:vpn:vpnManualOverrides'))) && !entity.memberOf('ref:globalLockout') && !entity.memberOf('app:vpn:vpnManualLockout') }
That means users who are not in globalLockout and not in vpnManualLockout and in an eligible population which is faculty, students, or guests who are in the manual app override group
Include internal subject sources
No, only include institution defined subject sources (default)
If we should include internal subject sources in the entity script results. e.g. g:gsa (groups), g:isa (e.g. GrouperSystem, GrouperAll), grouperExternal, grouperEntities . Default: No



1.2. Daemon screen

Note in Grouper v2.6.6 you need to wait an hour after changing a script, or run the JEXL script loader full job. In v5+ an incremental job will adjust the members quicker. Note: there is one full daemon and one incremental daemon that handles all of the JEXL script ABAC groups. You do not add this, it is built-in





1.3. Scripts

The script can only be written by people who can READ groups in the script and UPDATE the owner group. Since this is actually a JEXL script (not a JEXL expression), so you could have multiple lines, variables, conditionals, etc

In an entity script, the variable 'entity' is an instance of class: edu.internet2.middleware.grouper.abac.GrouperAbacEntity

You can use entity.memberOf('full:group:id:path') exactly like that to see if user is in a group or not.

Expression	Description
`${ entity.memberOf('ref:staff') && entity.memberOf('ref:payroll:fullTime') && entity.memberOf('ref:mfaEnrolled') }`	Three part intersection. Full time staff in MFA

`${ ( entity.memberOf('ref:employee')`
` || entity.memberOf('ref:student')  // employees or students`
`  || (entity.memberOf('ref:guests')`
`  && entity.memberOf('app:vpn:vpnManualOverrides'))) // or guests who are in manual allow`
`  && !entity.memberOf('ref:globalLockout')`
`  && !entity.memberOf('app:vpn:vpnManualLockout') }  // and not in either lockout group`
	Example policy
	
	That means users who are not in globalLockout and not in vpnManualLockout
	and in an eligible population which is faculty, students, or guests who are in the manual app override group

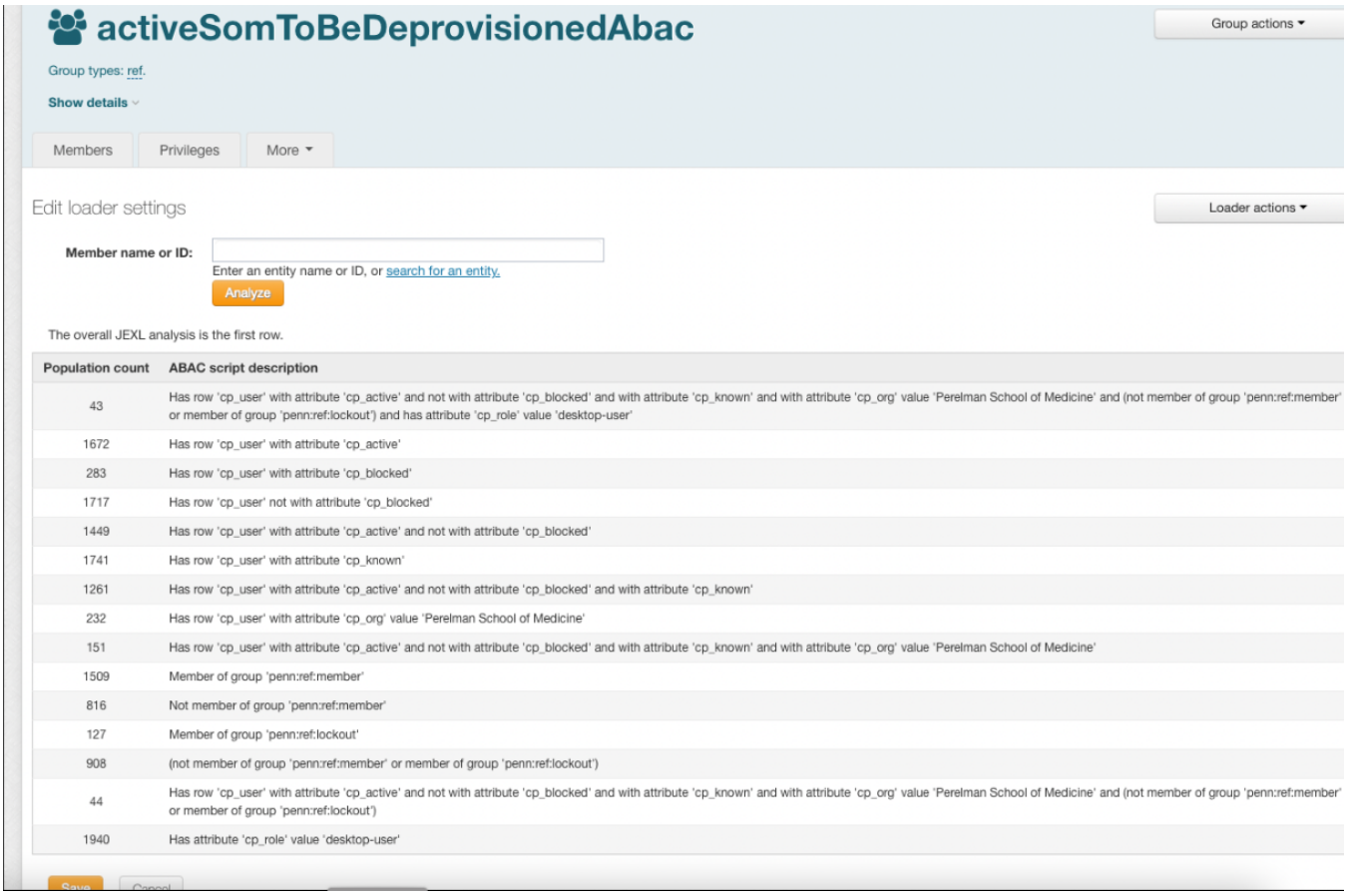
`${ entity.memberOf('app:vpn:users') != entity.memberOf('ref:mfaEnrolled') }`	Exclusive OR This is VPN users not in MFA and MFA users not in VPN:

1.4. How it works in v5+

The script is parsed and converted to SQL. The results represent the members of the group. The diffs will be added or removed from the group.

1.5. Analyze policy

To confirm a policy is correct, a long form translation of the policy can be displayed along with group names and group counts



1.6. Policy patterns

Your institution can make a GSH template that will help users setup policies

TODO document this

See Also

Access Management Features Overview