In the CLM 6.0.1 release, the number of users added explicitly as members of a project area can degrade performance. This effect is most noticeable in Rational Quality Manager and Rational Team Concert, and can have an impact as the number of project area members grows beyond 1000. In this article, I'll discuss the impact that project area membership has on performance, and describe some options that you have to reduce this impact. I'll also highlight performance improvements available starting in the 6.0.1 ifix stream, and additional improvements available in the 6.0.4 release.

Background - project and team area membership

The Jazz products support a rich model for access control. This is covered in depth in the product documentation (see https://jazz.net/help-dev/clm/index.jsp?topic=%2Fcom.ibm.jazz.repository.web.admin.doc%2Ftopics%2Fc_understand_user_access_control.html). What's important for this discussion is the "Members" section of the project area administration UI. You can add individual users as members of a project area and grant each user a set of roles. You can create customized roles in order to control the operations available to individuals.

If you are using the Eclipse client, the Members section looks like this:
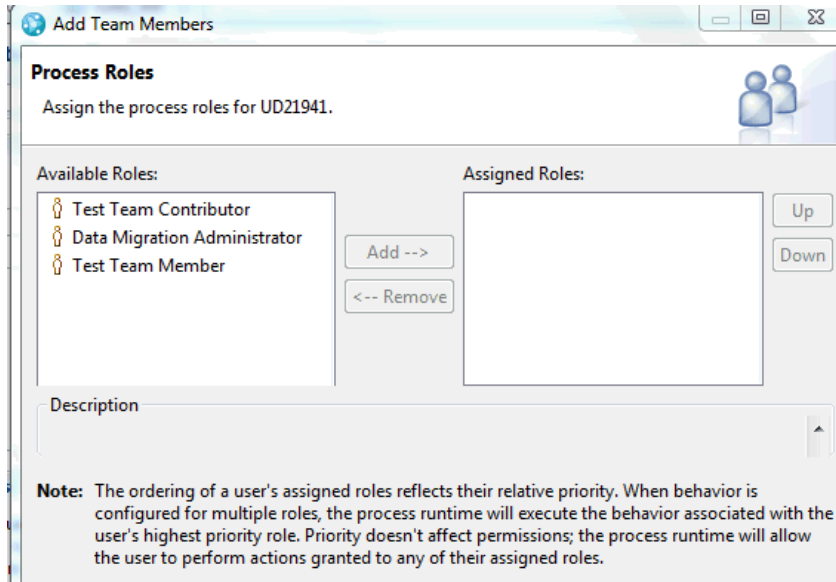
You can assign roles to users when you add them to the project area.   Here's what that looks like for a standard Rational Quality Manager project:

Each role specifies a list of operations and whether than role is allowed to execute the operation:

You can additionally create team areas within a project, which allows for finer-grained access control at the team level:
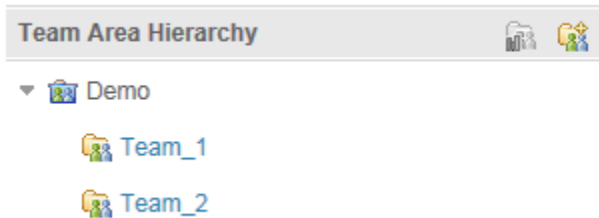
Each team area can have roles and permissions which apply to that team area.

Performance implications

In Jazz releases prior to 6.0.1 ifix9, performance is impacted by project and team area membership.   The following factors impact performance:
- The number of users added as members to a project area
- The number of users added as members to a team area
- The number of team areas.   This is a factor because the code that checks whether a user has permission to execute an operation iterates through the team areas.   The combination of a large number of team areas with large membership magnifies the performance impact.
- The number of roles

Under light load, the main symptom of degradation is an increase in response times.   Operations that take less than a second in a project area with few members can take several seconds or more as the mermbership increases past 1000 users.   Under heavier load, you can see much higher CPU utilization, with the server potentially reaching 100% CPU at low levels of concurrency.   If the system is at 100% CPU usage for sustained periods, the response times degrade significantly;   the system is effectively overloaded.

Issues in Rational Team Concert

In Rational Team Concert, membership impacts work item creation and modification.   One of the service calls returns all of the project or team area members.   This call degrades as the number of members grows.

Issues in Rational Quality Manager

The operations that are impacted by project area membership in Rational Quality Manager include:
- Opening a project (or refreshing the QM UI from the browser)
- Browsing artifacts (especially when displaying more than 10 elements per page)
- The Finish operation (when executing test suites) - especially as the number of test cases in the suite grows past 50
- Selecting Users from QM user drop downs (especially when assigning users to review or approve artifacts)
- Opening a test suite (especially suites with more than 50 test cases)

Workarounds

There are a number of improvements available in different releases that reduce the impact of project area membership.   If you cannot adopt later releases, there are some workarounds you can consider.

The obvious workaround is to reduce the number of users that are listed as project area members, or to reduce the number of team areas per project.   Once you know that there is a performance impact, you can potentially restructure your project areas to reduce the impact.   This may not be practical for existing projects, but you can keep it in mind as you set up new projects.

For existing projects, you can consider using the **Everyone** role to reduce the number of members.   If you enable the Everyone role, then anyone not explicitly listed as a project member will get the permissions granted to **Everyone**.   By default, Everyone has the roles you might grant to a read-only user, but you can configure this to be whatever you need.   If you can find a set of privileges that apply to the majority of your users, then you can grant access to those users via Everyone and then remove those users from the project membership list.   You can minimize the impact of membership by keeping the number of members below 1000.

There are some side effects to keep in mind.   First, users who have access to a project via Everyone will not see the project in their "My projects" view.   They will need to navigate to such projects using the "All projects" view. Secondly, in Rational Team Concert, users who have access to a project via Everyone will not show up properly in RTC Plan views.   The loading numbers for such users will not be correct.

For Rational Quality Manager, you will need 6.0.1 ifix12 or later to adopt the Everyone role.   Prior to ifix12, the Everyone role allows only read access, and it cannot be configured to allow users who get their access via Everyone to create or modify artifacts.   The fix for this was tracked in Users Not Added as Named Project Area Members not Granted Everyone Role Permissions (157503).

QM list limiter

Since project area membership impacts the performance of list views in Rational Quality Manager, an enhancement was introduced to limit the list views to a maximum of 10 entries per page.   This allows you to limit the amount of load which list views place on the system.   If the CPU usage on the QM server is high, and users are commonly viewing more than 10 entries per page in their list views, then you can reduce CPU usage by using this enhancement.   This enhancement is available in 6.0.1 ifix12 and later.

You can control this restriction in the QM Server Advanced Properties page.   Set "Enable the number of items per page option for list views" to false to restrict the list views to 10 entries per page.

RQM Server Settings Component

com.ibm.rqm.common.service.internal.SettingsService

Property	Current Value	Default Value
Display default is tabless	true	true
Enable INTERNAL Fine-Grained Components Explorer	false	false
Enable auto-refresh in the Test Suite Execution Console view	true	true
Enable the Number of Items Per Page option for list views	true	true
Maximum Saved Queries Entries in Menu	10	10
Menu default is vertical	false	false
Show dialog for concurrent editing warning	false	false
Show filtering options in list views	false	false

Performance improvements

For Rational Team Concert, the performance of work item creation and modification was improved by limiting the number of members returned to the UI.   Drop-downs that display user lists are now populated initially with a subset of users (although you can still search for any user by selecting the "Click for more values" option.
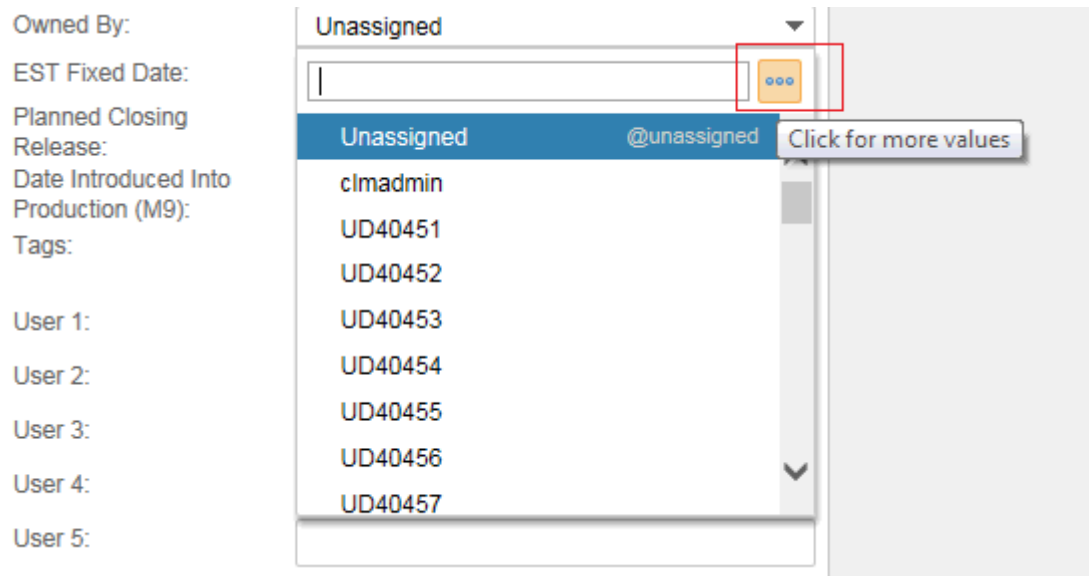
This issue was tracked by the following work items:
Fetching limited contributor value set resolves all contributors (405131)
Work Item getEditableProperties allValues for owner attribute load time grows proportionate to team size (374493)

Improvements in Rational Quality Manager are available starting in 6.0.1 ifix12.   Not all improvements have been backported, however, so plan on adopting the 6.0.4 release to pick up the full set of improvements.   The improvement work was tracked in the following work items:

 Improve performance for many users associated to a project area (158017).
 (Performance of checkAllTeamsPermissions degrades as project area membership grows (158028))
"Finish" operation (when executing a test suite) degrades as the number of test cases increases (161124)
Performance impact in test suites view page with thousands of users in the project. (160813)
Time taken to retrieve user is more than 2 minutes. (157790)
Performance impact when executing a test suite with hundreds of test cases with thousands of users in the project. (157755)
Performance impact when fetching configuration data with thousands of users in the project. (157483)
Performance impact when fetching contributors to populate contributor dropdowns with thousands of users in the project. (157394)
Performance impact when fetching all project/process area properties with thousands of users in the project. (157386)

Ongoing work for post-6.0.4

Continued improvements are planned for future releases, to reduce the impact of project area membership on performance.   These are tracked in the following plan item:
[CLM] Targeted performance improvements to address critical customer situations - Phase II (416318)