



Software Team Member Configurations: A Study of Team Effectiveness in Moodle

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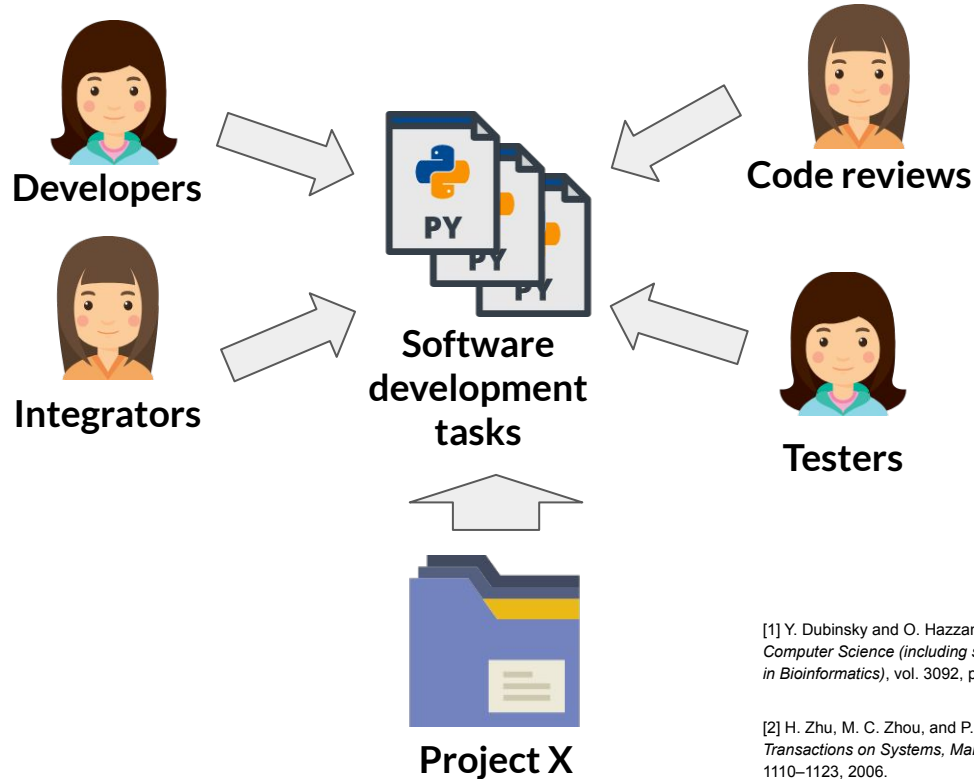


Agenda

- Introduction
- Background
- Dataset
- Research Questions and Discussions
- Future Works



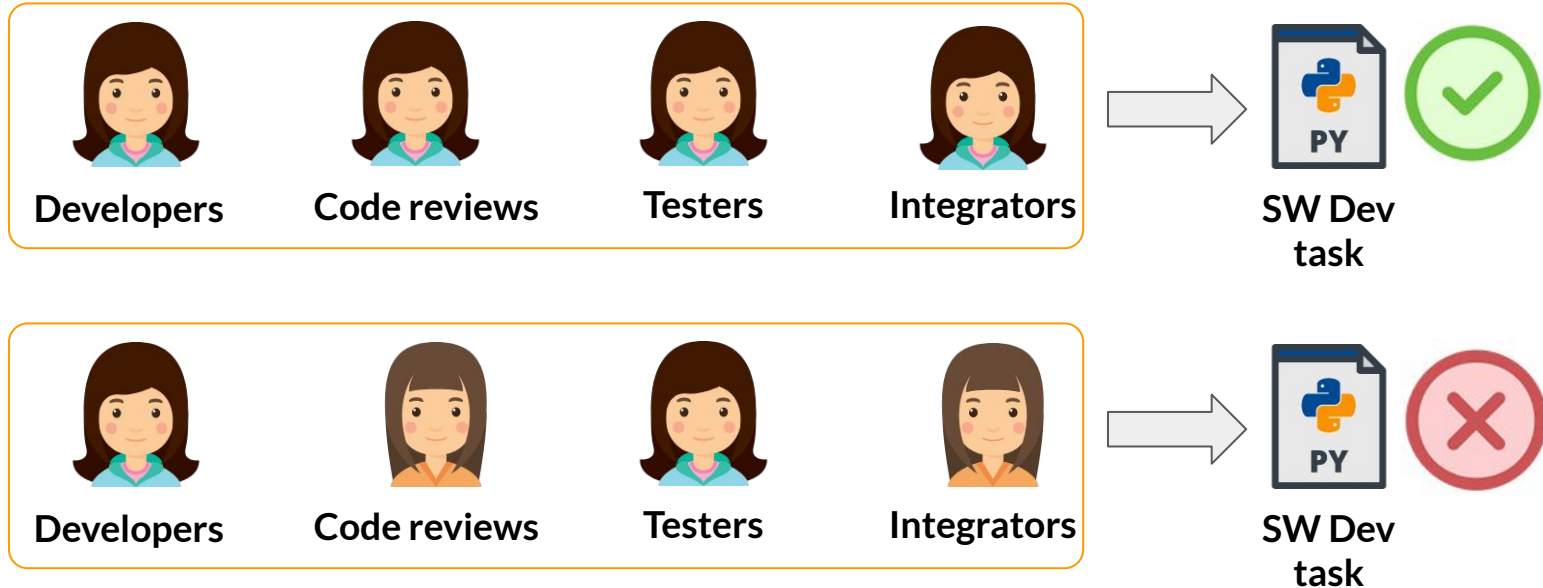
Software Team Member Configurations



[1] Y. Dubinsky and O. Hazzan, "Roles in agile software development teams," *Lecture Notes in Computer Science (including subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, vol. 3092, pp. 157–165, 2004.

[2] H. Zhu, M. C. Zhou, and P. Seguin, "Supporting software development with roles," *IEEE Transactions on Systems, Man, and Cybernetics Part A: Systems and Humans*, vol. 36, no. 6, pp. 1110–1123, 2006.

Software Team Member Configurations





Research Questions

RQ1: Can **effective team member configurations** be identified?

RQ2: Does the team member configuration be changed when issues require additional work (reopen)?

RQ3: Does the issue type affect the combinations of team members?



Moodle Issue Tracker

Moodle

- Group messaging
- Kanban board
- Releases
- Reports
- Issues
- Components
- Test sessions
- Configuration Management

PROJECT SHORTCUTS

Dev Docs

Moodle Tracker

Dashboards Projects Issues Capture Boards Links Create

Search

Moodle / MDL-10965

Add new capability to view the list of non-hidden courses

Comment Agile Board More

Details

Type: New Feature

Priority: Major

Affects Version/s: 1.9, 2.0, 2.6.3, 2.7, 3.7

Component/s: Course, Roles / Access

Labels: CatalystIT affects_workplace api_change ci partner release_notes triaged ui_change

Status: CLOSED

Resolution: Fixed

Fix Version/s: 3.7

Field Tab Scrum

Testing Instructions:

1. Login as admin
2. Access to "Site administration | Users | Permissions | Define roles" and remove capabilities 'moodle/course/browse' from Authenticated user role and from the Guest role
3. Access to the site home page and add the "Courses" block to all the users
4. Access to "Site administration | Front page settings | Edit settings" and enable all kinds of course listings on the site home page
5. Create some course categories and also some courses from "Site administration | Courses | Manage courses and categories". Add some of these courses to the new categories created
6. For some of these courses enable self enrolment and for some others, guest access
7. **Make sure** guests/users are not able to access course list but can go into the courses they are enrolled into
8. Make sure they are not able to self-enrol and use guest access
9. Access to "Site administration | Users | Permissions | Define roles" and create a role with a single cap allowed 'moodle/course/browse'. Make sure this role has, at least, the 'Category' checked in the 'Context types where this role may be assigned'
10. Access to "Site administration | Courses | Manage courses and categories" and for some of the categories created in the step #5, assign the new role created to some users using the "Assign roles" option in the category cog menu
11. Login as these users and **make sure** these users are able to browse only these categories on the site home page, on the "Courses" block added in the step #3 and on the /course/ page (the URL should be written directly in the browser).
12. **Make sure** they are able to self-enrol in applicable courses
13. Switch to "classic" theme and make sure that only available /enrolled courses appear in the navigation block and navigation items expand properly when you navigate inside the course, inside the section and inside the activity

People

Assignee: DevA

Reporter: DevB

Peer reviewer: DevC

Integrator: DevD

Tester: DevE

Participants: DevA,DevB,DevC,DevD,DevE

Component watchers:

Votes: 15 Vote for this issue

Watchers: 19 Start watching this issue

Favourite: Add to favourite issues

Dates

Created: 24/Aug/07 6:46 AM

Updated: 14/May/19 9:31 PM

Resolved: 13/Apr/19 3:58 AM

Fix Release Date: 20/May/19



Moodle Issue Tracker

The screenshot shows the Moodle Tracker interface. The top navigation bar includes 'Moodle Tracker', 'Dashboards', 'Projects', 'Issues', 'Capture', 'Boards', 'Links', and a 'Create' button. The left sidebar shows a list of project shortcuts, including 'Moodle', 'Group messaging', 'Kanban board', 'Releases', 'Reports', 'Issues' (selected), 'Components', 'Test sessions', and 'Configuration Management'. The main content area shows a new issue being created with the title 'Add new capability to view the list of non-hidden courses'. The issue details include: Type: New Feature, Priority: Major, Affects Version/s: 1.9, 2.0, 2.6.3, 2.7, 3.7, Component/s: Course, Roles / Access, and Labels: CatalystIT, affects_workplace, api_change, ci, partner, release_notes, tri. The 'Field Tab' section shows testing instructions for the issue.

People

Assignee: DevA
Reporter: DevB
Peer reviewer: DevC
Integrator: DevD
Tester: DevE
Participants: DevA, DevB, DevC, DevD, DevE

Component watchers:

Votes: 15 Vote for this issue
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Moodle Issue Tracker

Watchers: 19 Start watching this issue

Favourite: Add to favourite issues

Dates

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Resolved: 13/Apr/19 3:58 AM

Fix Release Date: 20/May/19

Time Tracking

Estimated: 0m

Remaining: 0m

Logged: 5w 1d

Development

1 branch

5 commits Latest 10/Apr/19 6:42 PM

1 pull request DECLINED Updated 31/Jan/19 11:27 PM

Agile

Active Sprint: Workplace for Moodle 3.7 ends 05/Apr/19

View on Board

Developers

MDL-10965: 5 unique commits

moodle

Author	Commit	Message	Date	Files
	11bfc07	Merge branch 'MDL-10965-master' of git://github.com/marinaglan.../moodle	10/Apr/19	46 files
	76f2d89	MDL-10965 course: search only courses with completion it is quite often when we need to...	07/Apr/19	8 files
	88d2677	MDL-10965 core: deprecate function get_courses_page	03/Apr/19	2 files
	2c8b8af	MDL-10965 tool_generator: use existing course element	03/Apr/19	3 files
	beff380	MDL-10965 courses: capability to browse course list	21/Jun/18	38 files



Reopen Issue

Moodle Tracker

Moodle / MDL-10965

Add new capability to view the list of non-hidden courses

Details

Type: New Feature

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Labels: Catalyst, affects_workplace, api_change, ci, partner, release_notes, triaged, ui_change

Status: CLOSED

Resolution: Fixed

Fix Version/s: 3.7

Field Tab Scrum

Testing Instructions:

1. Login as admin
2. Access to 'Site administration | Users | Permissions | Define roles' and remove capabilities 'moodle/coursebrowse' and 'moodle/coursecreate' from the 'Authenticated user' role and from the 'Guest' role
3. Access to the site home page and add the 'Courses' block to all the users
4. Access to 'Site administration | Front page settings | Edit settings' and enable all kinds of course listings on the page
5. Create some course categories and also some courses from 'Site administration | Courses | Manage courses and categories'. Add some of these courses to the new categories created
6. For some of these courses enable self enrolment and for some others, guest access
7. Make sure guests/users are not able to access course list but can go into the courses they are enrolled into.
8. Make sure they are not able to self-enrol and use guest access
9. Access to 'Site administration | Users | Permissions | Define roles' and create a role with a single cap allowed 'moodle/coursebrowse'. Make sure this role has, at least, the 'Category' checked in the 'Context types where it can be assigned'

OPEN

REOPENED

DEVELOPMENT IN PROGRESS

WAITING FOR PEER REVIEW

PROBLEM DURING TESTING

WAITING FOR INTEGRATION REVIEW

INTEGRATION REVIEW IN PROGRESS

WAITING FOR TESTING

RESOLVED

TESTING IN PROGRESS

An issue report can present different characteristics based on its type such as bug, new feature request, and task.

Once an issue has been resolved, it is **reopened** if the resolution does not meet the expectations (e.g. poor quality).



Moodle

Issues
Reports
Components
Test sessions
Configuration Management
PROJECT SHORTCUTS
Dev Docs

Moodle Tracker
Dashboards
Projects
Issues
Capture
Search
Log In

DevA made changes - 29/Jun/15 10:17 PM

Status: Waiting for integration review [10010] Integration review in progress [10004]

Integrator: David Monllaó [davmon]

DevA added a comment - 29/Jun/15 11:06 PM

Thanks for working on this Jetha.

1. I don't understand the point of using \$USER in the tests, I can only guessed that you took the test above as example. \$USER->id is 0 and it is not a "real" user, it is better to avoid dealing with that users unless you really need it (not in this case). I see that you match the returned users against 3. I understand that you expect \$USER to not be returned here, I don't even know if enrol_user has been able to assign that user to the course as it does not exist, so we are not checking that only the users that matches are being returned. I also see some conditions based on returneduserid == \$USER->id, we could reduce complexity by removing them.
2. Do we really need to compare all these user fields? We are comparing fields that we don't even set. I don't think we need to duplicate all that logic if we are just testing loose/strict
3. Shouldn't this be a PARAM_ALPHA like in *_parameters()? <https://github.com/jethac/moodle/compare/f1a415e...MDL-50508-master#diff-645232f82267673938f98e4d168e225a8620?>

DevA made changes - 01/Jul/15 6:53 PM

Status: Integration review in progress [10004] Reopened [4]

CiBoT made changes - 01/Jul/15 7:03 PM

Labels: ci triaged triaged

CiBoT made changes - 01/Jul/15 8:19 PM

Status: Reopened [4] Reopened [4]

Currently in integration: Yes [10041]

CiBoT added a comment - 01/Jul/15 8:19 PM

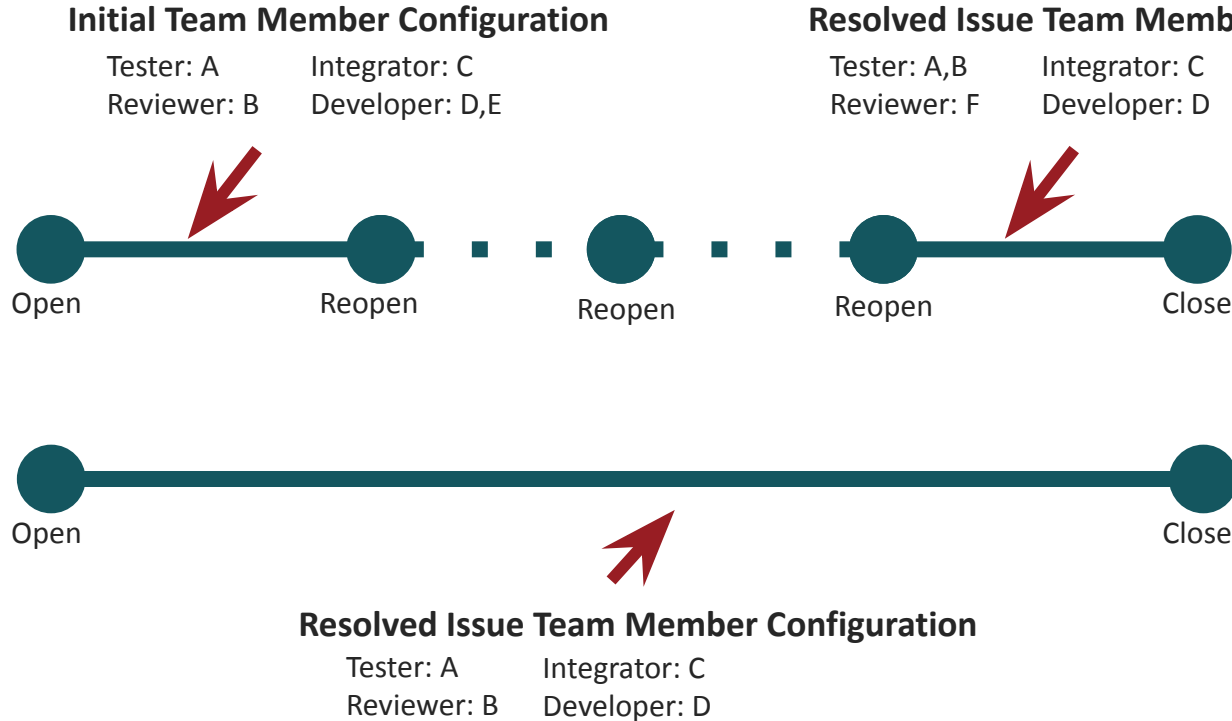
Moving this reopened issue out from current integration. Please, re-submit it for integration once ready.

Link Direction Issue Version Sprint Label Resolved Depth:

More

<https://tracker.moodle.org/browse/MDL-50508>

Team Member Configuration





Collect and Preprocessing Data

- Jira REST API (<https://tracker.moodle.org/rest/api/2/>)
- Extract Team from changelog
 - Remove bot and meaning less username e.g. cibot, nobody, etc.
 - Focus on only closed issue.

Dataset

- We performed the study on over **20,000 issues** from Moodle
- There are six types of issues: Bug, Epic, Improvement, New Feature, Sub-task, Task

Issue Types	#Issues	#Reopen	Mean No. of team member involved in	
			Resolved Issues	Reopened Issues
Bug	16,126	1,735	2.9	3.48
Epic	27	8	3.37	5.63
Improvement	4,059	649	3.16	4.14
New Feature	934	139	3.1	4.19
Sub-task	3,436	495	2.16	3.22
Task	1,328	147	2.92	3.62
Total	25,910	3,173	2.85	3.62



RQ1: Can effective team member configurations be identified?



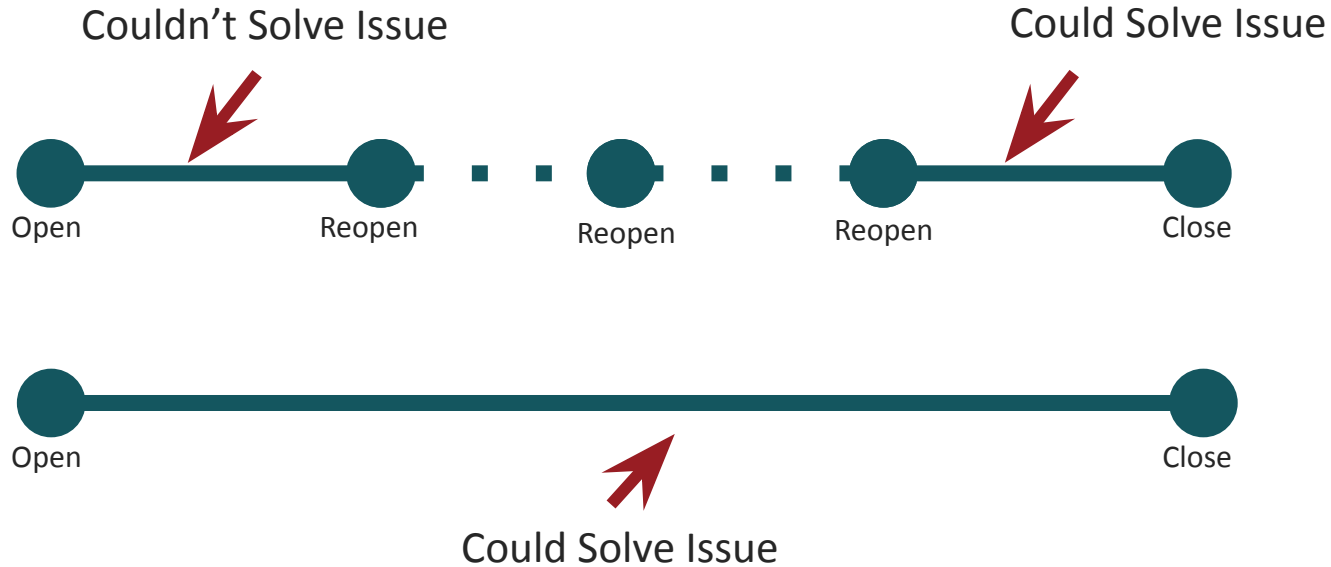
RQ1 Approach

- Association Rule Mining
 - Find Rules from a set of data
 - $\{A, B\} \rightarrow \{C\}$ (LHS: $\{A, B\}$ RHS: $\{C\}$)
 - Support show the joint probability of the LHS and RHS
- Apply Association Rule Mining on the different team member configuration in issues.

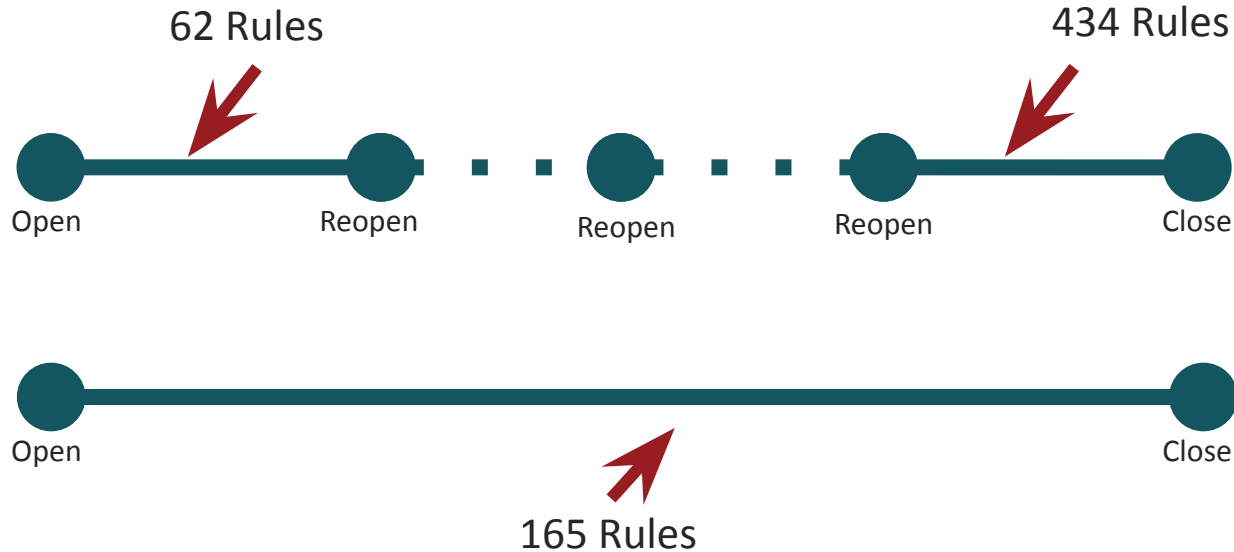
Issue	Team
1	{TestA, DevB, DevC, RevD}
2	{TestA, DevB, DevC}
3	{DevC, DevB}
4	{TestA, DevB, DevC, RevE}
...	...

LHS RHS
 $\{TestA, DevB\} \rightarrow \{DevC\}$

RQ1 Key Idea



RQ1 Result





RQ1 Result (cont.)

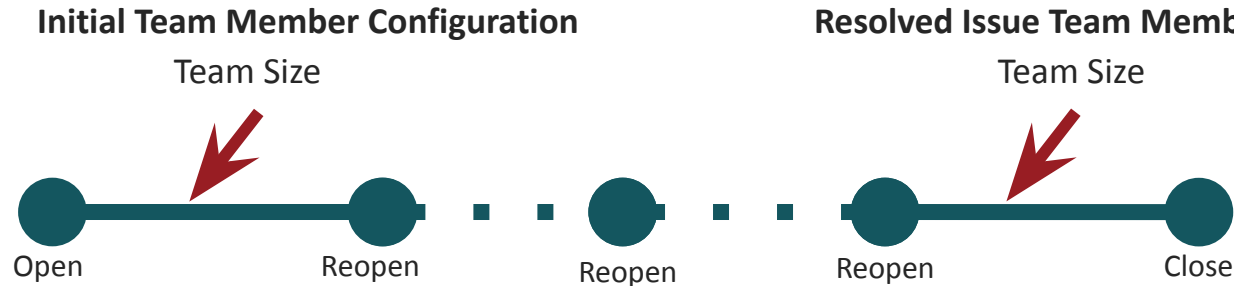
- The number of rules at the initial of an issue with reopen is lower than the time when the issue is resolved.
- The number of rules in the issue without reopen is higher than the initial of issue with reopen.
- There are differences between the team member configuration which could solve and couldn't solve the issue.



RQ2: Does the team member configuration be changed when issues require additional work (reopen)?

RQ2 Approach

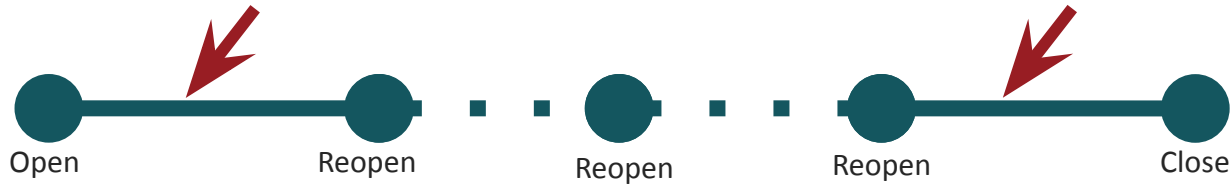
- Focusing on reopened issue
- Calculating **Size of Teams** in **Initial** Team Member Configuration and **Resolved** Issue Team Member Configuration
- Visualize the change in the size of the team



RQ2 Approach (cont.)

Initial Team Member Configuration
 $A = \{TestA, DevB, RevD\}$

Resolved Issue Team Member Configuration
 $B = \{TestA, DevC, RevD\}$



$$\text{Formular: } J(A, B) = \frac{|A \cap B|}{|A \cup B|}$$

$$J(A, B) = \frac{2}{4} = 0.5$$

The lower the Jaccard Coefficient, the higher the different is.

RQ2 Result

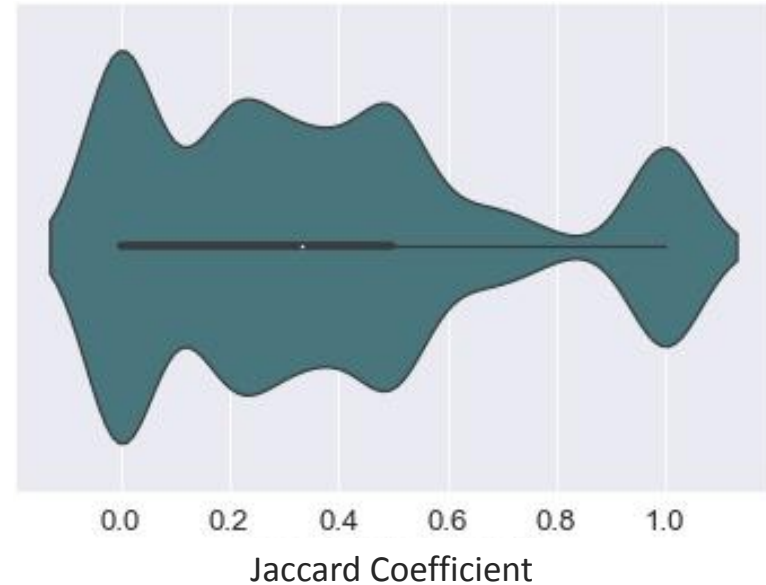
The Frequency of Size of Teams of Reopened Issue



Team Size Change

Team Size	Percentage
Bigger	54.817380
Same	30.667506
Smaller	14.515113

Distribution of Jaccard Coefficient between Initial and Resolved Issue Team Member Configuration



RQ2 Result (cont.)

We found that team member configurations have been changed significantly after issues were reopened.



RQ3: Does the issue type affect the combinations of team members?



RQ3 Approach

- Separate reopened issue into many types
- Calculate Jaccard Coefficient and difference in size of team member configuration for initial and resolved issue
- Perform Kruskal-Wallis test on the Jaccard Coefficient

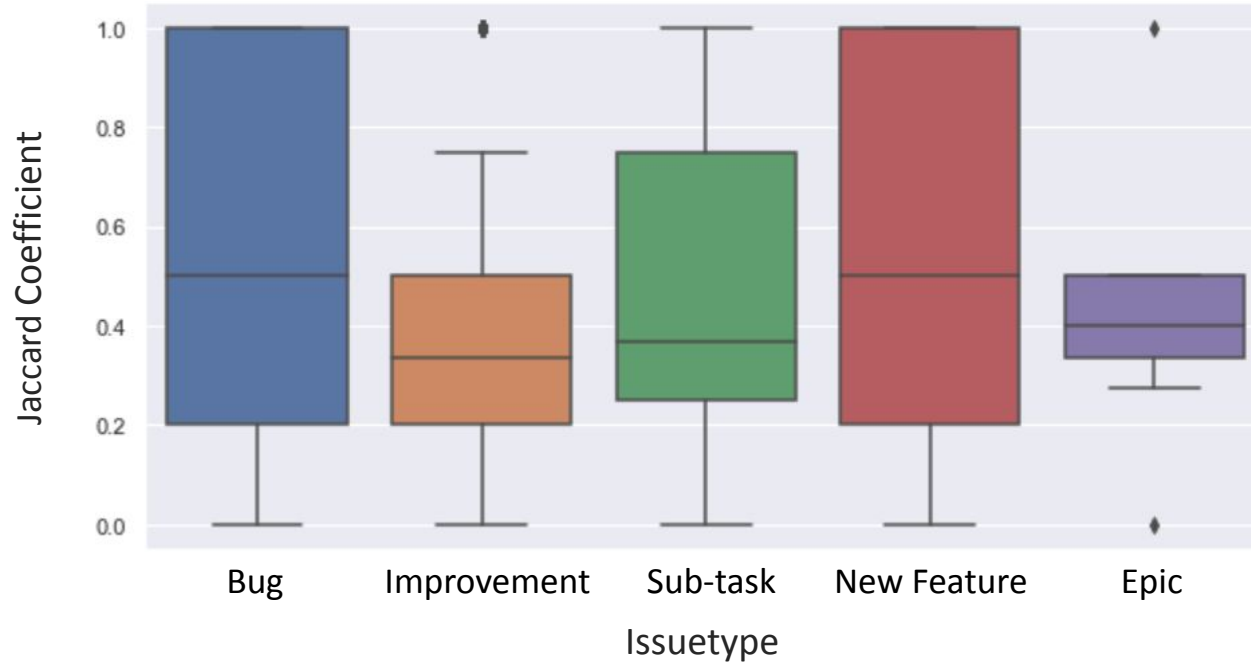
Reopened Issue

Type	Amount
Bug	2264
Improvement	692
Sub-task	552
New Feature	208
Epic	9

RQ3 Result

$$P\text{-value} = 7.783 \times 10^{-10}$$

Boxplots of Jaccard Coefficient of Each Issue Type





Research Questions

- RQ1: Can effective team member configurations be identified?
 - Yes, the teams which can resolve issues without reopening can be identified.
- RQ2: Does the team member configuration be changed when issues require additional work (reopen)?
 - Yes, the team size is changed when the prior resolution does not meet expectations.
- RQ3: Does the issue type affect the combinations of team members?
 - Yes, different types of issues involve with different sets of team members.

The team member configuration affect the solving of issue.



Future Works

- Investigate the possibility to develop an algorithm for recommending effective software teams for JIRA software projects.
- Perform extensive experiments on other projects on JIRA.



Mahidol University



Software Engineering Laboratory
Graduate School of Information Science
Nara Institute of Science and Technology

Thank You