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Assessing automated software testing with consideration of real-life incidents: A case study

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Roadmap

- Research gap
- Research questions
- Research approach
- Questionnaire set-up
- Questionnaire discussion

Research gap

- *Automated Testing: Insurance for quality*
- *BUT: studies show automated testing is not as widely used as expected*
- *=> Goal: Study how testing is used in real-life software projects*
- *Focus on the reasoning of developers*

Research Questions (TBD)

- Does the discovery of bugs push the writing of tests?
- What is the reasoning of developers when writing (or not writing) tests?
  - What?
  - How?
  - When?
- Explore the correlation of testing and
  - The natue of the bug
  - The architecture of the code
- Are there strategies to improve fault detection by unit tests in the use case context? (i.e. Mutation Testing, etc.)

Research Approach

- Bug Analysis
  - JIRA & Bitbucket Rest API
  - General statistics (i.e. time to fix, scope, etc.)
  - Presence of tests
- Guided Questionnaires
- (Provide different testing strategies addressing identified problems, i.e. mutation testing, TDD, etc.)

Questionnaire Set-Up

- 5 Developers
- Each gets a list of 5 bugs (**with tests**)
- Choose one & answer the questions
- Iteration on questionnaire
- Each gets a list of 5 bugs (**without tests**)
- Choose one & answer the questions
- Iteration on questionnaire
- Each gets a list of 5 bugs (**chosen to answer open questions**)
- Choose one & answer the questions

Questionnaire Discussion

- Read the questionnaire
- Explanation
- Give feedback
  - Blindness
  - Missing aspects
  - Wording/Structure
  - Implicit knowledge
- Afterwards: Anybody interested in answering? (Bribes!)

Questionnaire
Bug Description

Please look at the list of bugs provided and familiarize yourself with them. Choose the one that you thought to be the most interesting and answer the following questions.

Please provide a short description of the bug.

Why did it happen? What was the cause of error?

Questionnaire
Bug Scope

What was the impact of the bug for the organisation (i.e. number of affected users, urgency of the fix, impediments for productive workflows)?

What was the scope of the bug in the code/repostiory (i.e. how much code needed to change, impacts to architecture)? How did you know?

Questionnaire
Bug Categorization

Please categorize the bug. Does it fit on one of these categories?

Questionnaire
Bug Categories

Category	Explanation
Logic/Arithmetic	intention by the developer was right, but there is a mistake in the code
Structure	control flow/exception handling/architecture
Integration	interaction with external applications/resources is problematic
Data	cause was a problem in the data, not in the application
Function/ Requirements	cause was a missing or misunderstood requirement
Documentation	missing/incomplete documentation
Infrastructure	configuration problem (build pipeline, server, container, etc.)
Performance	the required performance was not reached
Presentation	data is not readable by consumer (GUI, validation, etc.)

Questionnaire
Existing Test Description

Did you write tests during the solution of the bug?

Have there been tests before?

If tests existed, why did they not catch the bug?

Questionnaire
Reasoning for new tests

Please provide a short description of what you tested.

How did you test it?

When did you write the tests? Why?

Please explain your criteria to decide whether or not more tests are needed? How did you decide that you do not need further testing?

Questionnaire Difficulty/Obstacles

How would you rate the difficulty of testing for this bug?

What obstacles needed to be overcome when writing these tests?

Questionnaire
No Tests present

Why not?

Possible?

Desired?

Necessary?

What would you have needed to write a test?

Discussion

- *I am looking forward to feedback!*

General Statistics

Issues (incl. Bugs): 1400 / with Commits: 620 / With changes of tests in the commits: 323

Bugs: 410 / with Commits: 232 / With changes of tests in the commits: 119

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