



Improving the Test Suite Using Mutation Testing

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Ali Parsai

Doctoral Researcher

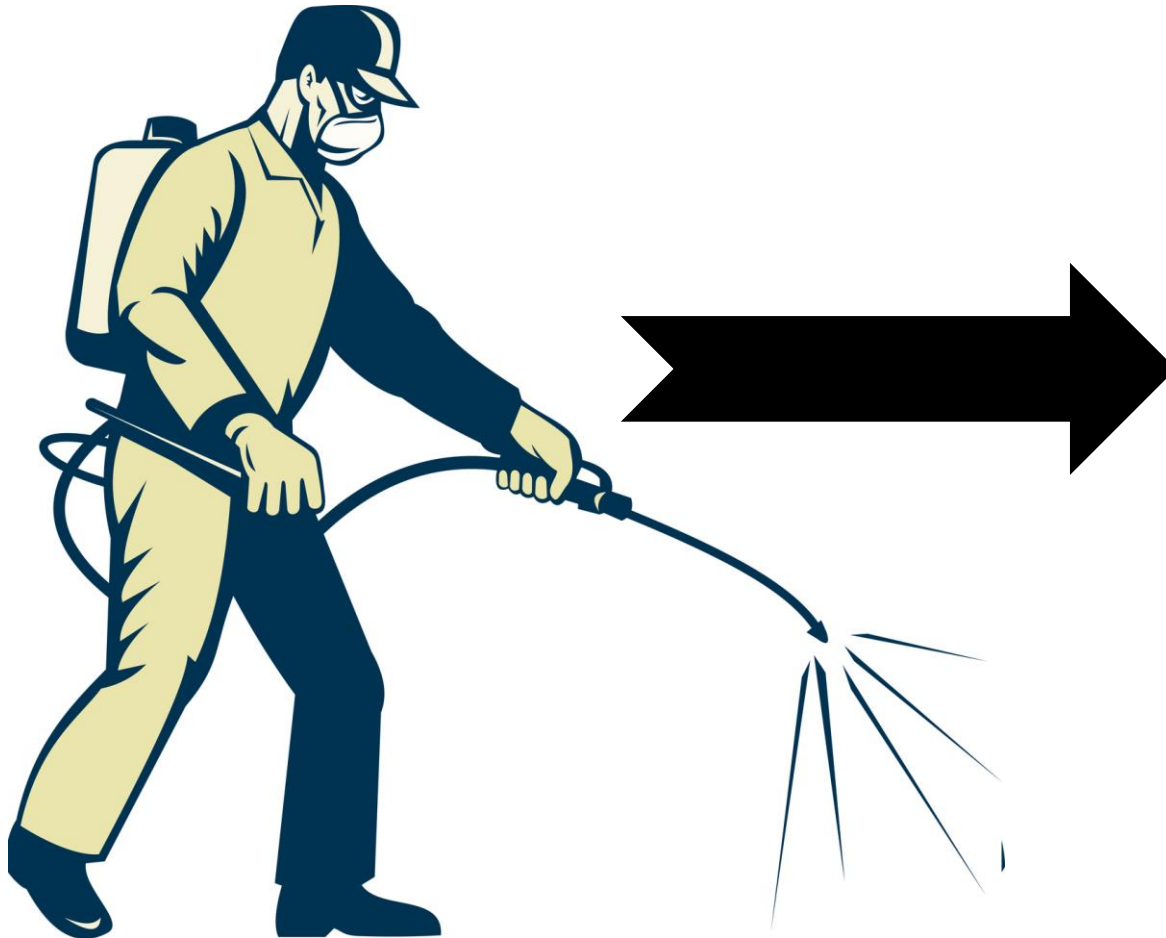


Dennis Wagelaar

Technical Architect

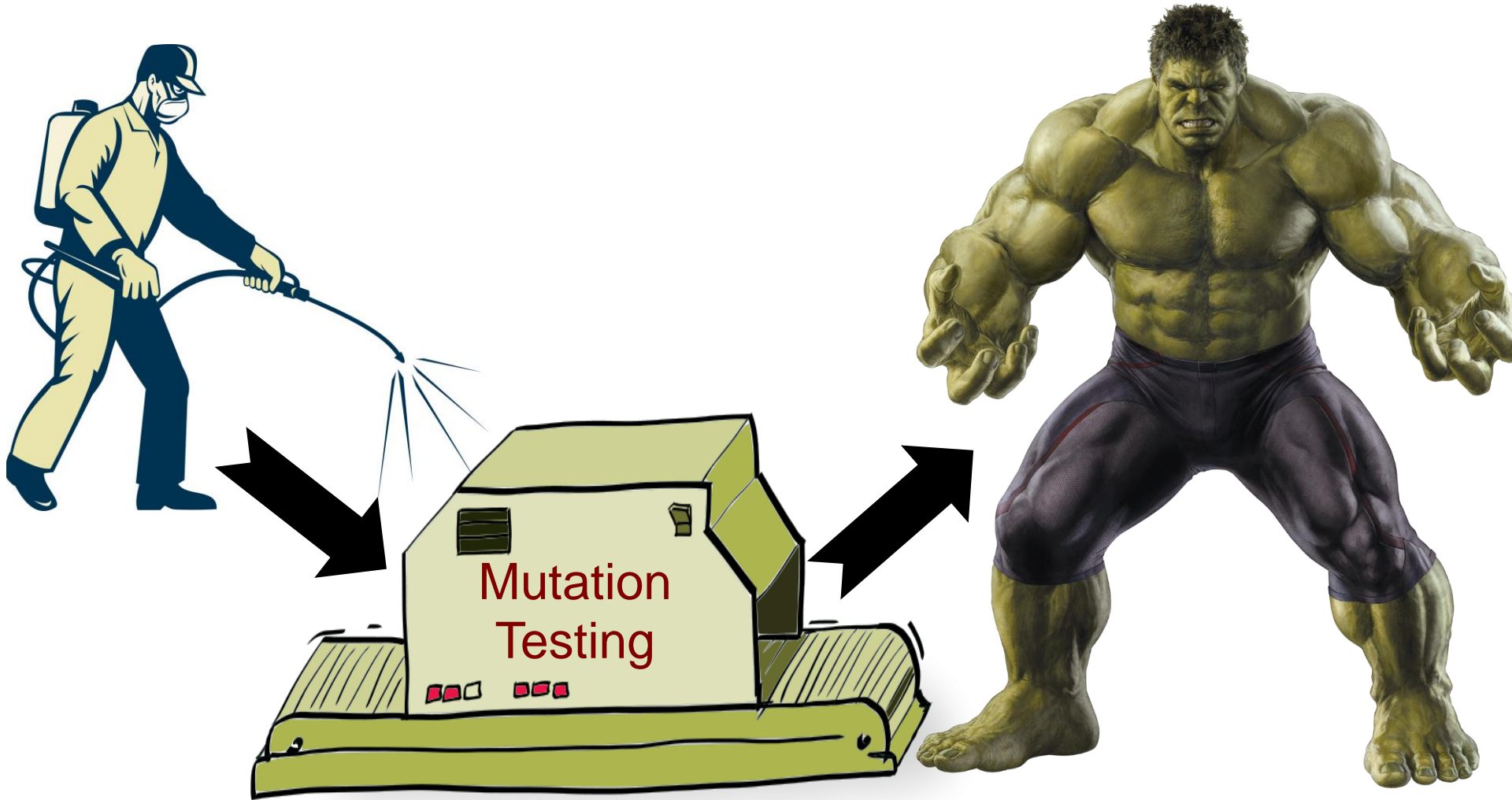
Introduction

Higher quality test suite

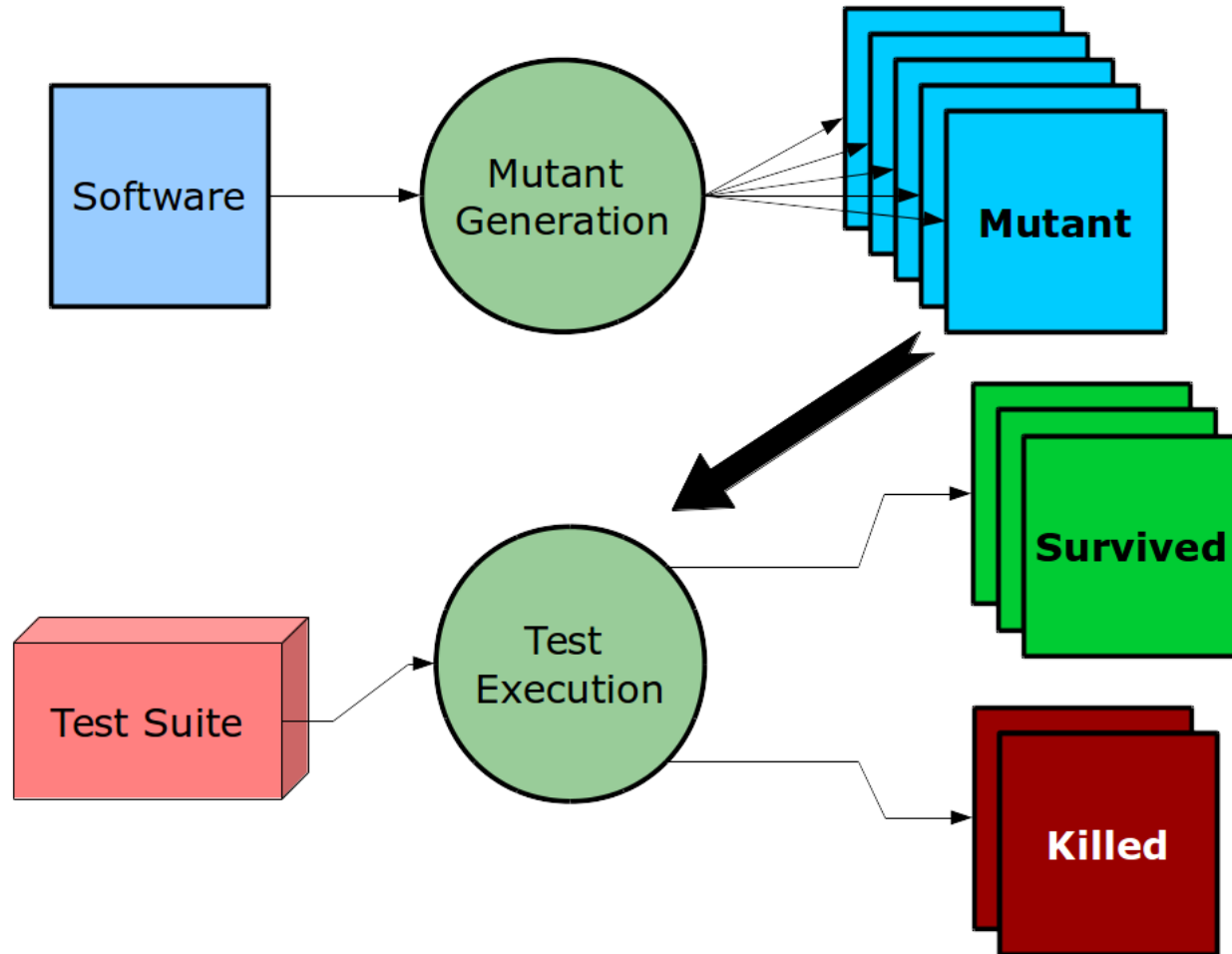


Fewer bugs

Mutation Testing



Mutation Testing



Mutation Testing

Mutation Testing
simulates real faults



Our Solution



- Much fewer mutants are created
- Analysis focuses on difficult bugs

Pilot Case

We looked for difficult bugs in the issue tracking system



JIRA Software

Teams in Space
Scrum: Teams in Space

Backlog

QUICK FILTERS: Product Recently updated Only my issues Server UI

VERSIONS

- EPICS
- All issues
- SeeSpaceEZ Plus
- Large Team Support
- Space Travel Partners
- Summer Saturn Sale
- Afterburner Plus
- Local Mars Office
- Hyper-speed shuttles
- New launch platforms
- Delicious Space Nutrition
- Spacetaintment

Sprint 1 14 issues

Sprint 2 6 issues
Start: 10 Aug 2015 — Release: 9 Oct 2015

- TIS-25 Engage Jupiter Express for outer solar system travel
- TIS-37 When requesting user details the service should return prior trip info
- TIS-9 After 100,000 requests the SeeSpaceEZ server dies
- TIS-7 500 Error when requesting a reservation
- TIS-10 Bad JSON data coming back from hotel API
- TIS-18 Enable Speedy SpaceCraft as the preferred individual transit provider

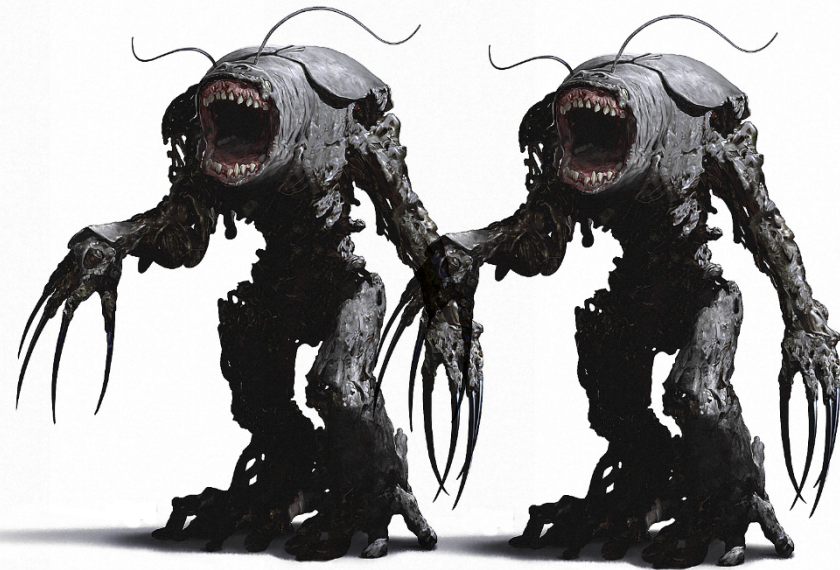
Backlog 49 issues

- TIS-25 Engage Jupiter Express for outer solar system travel
- TIS-37 When requesting user details the service should return prior trip info
- TIS-9 After 100,000 requests the SeeSpaceEZ server dies
- TIS-7 500 Error when requesting a reservation

Create sprint

Pilot Case

We create templates from difficult bugs to create similar bugs



Pilot Case

We use the generated mutants to analyze the test suite



Demo

The image shows a screenshot of an IDE interface. On the left, a project tree for 'videostore' is visible, containing folders like '.idea', 'src', and 'target', and files like '.gitignore', 'maven-build.properties', 'maven-build.xml', 'pom.xml', 'README.md', and 'videostore.iml'. The main workspace is currently empty, displaying a search menu with options: 'Search Everywhere Double ⇧', 'Go to File ⇧⌘O', 'Recent Files ⌘E', 'Navigation Bar ⌘↑', and 'Drop files here to open'. At the bottom, a terminal window shows the command: `python ../../LittleDarwin.py -m -b -p ./src/main/ -t ./ -c mvn,clean,test --null-check`. The terminal output is currently blank. The status bar at the bottom indicates '4 files committed: orig (today 14:39)', '79:1', and 'Git: master'.

Conclusion

- Mutation testing increases the test suite quality resulting in fewer bugs.
- The bugs are customized for each company based on the information from the issue tracker.
- We invite the interested companies for future pilot studies.



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A general mutation framework



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