sdmay18-09: Tool Support for Continuous Model-Based Verification of the Linux Kernel
Weekly Report 4
February 24 – March 9, 2018
Client: Suraj Kothari
Faculty Advisor: Suraj Kothari

Team Members:
Srinivas Dhanwada – Team Lead
Collin McIntyre – Tool Integration Lead
Benjamin Weno – Automation Lead
Matthew Wall – Web Lead

Summary of Progress this Report

With the majority of our solution for our project implemented, we're currently in the process of fixing bugs and cleaning up all of our implementations of the different steps of our verification pipeline. The patch generation algorithm can generate patched header files containing single definitions for both mutex lock and spinlock functions, and the algorithm is also able to remove existing definitions for kernel version 4.13. We're still working with our client to determine a more reliable method for identifying existing locking function locations for other versions of the kernel. We've also begun writing extensive tests for both the difference mapping and difference linking algorithms as well as the patch generation algorithm that we can use through our GitLab CI testing setup. The tests now execute whenever a commit is pushed to our repository, however our programs aren't passing our automated tests just yet. This is an issue that needs to be resolved since our programs are passing manual tests, but not the automated tests. We've also worked on integrating our website more closely with the rest of our automated pipeline, giving every member access to our Firebase project and finished moving the implementation from its own git repository into our team GitLab repository. The backend implementation of the website is still a work in progress at this point.

Pending Issues

- Locking function definition location needs to be generalized for all kernels.
- Automated tests need to be tweaked to reflect the results of manual testing.
- Methods for pipeline automation need to be refined.

Plans for Upcoming Reporting Period

In the upcoming reporting period, we plan to tweak our automated tests so they better reflect the results we receive through manual testing. This will allow for more reliable testing through our GitLab CI testing setup. We also plan to continue working with our client to identify a better pattern for determining locking function definition locations in different versions of the kernel, and expanding the patch generation algorithm to take this generalization into account. We also plan to begin linking the different parts of our solution together, allowing for a semi-automated pipeline until more bugs are worked out. Lastly, we plan to continue working on the scalability of the backend of our website, allowing us to display the data from LSAP wholly and accurately.

Individual Contributions

Team Member	Contribution	Hours This Period	Total Hours
Srinivas Dhanwada	• Wrote extensive tests for difference mapping and linking algorithms. • In the process of tweaking tests to better reflect actual results.	6	110
Collin McIntyre	• Expanded patch generation algorithm to remove existing locking function definitions from kernel version 4.13. • Currently working with the client to determine a more reliable way of identifying locking function locations in different versions of the kernel.	8	91.5
Benjamin Weno	• Tested the ability of the kernel release monitoring program to download kernel versions on release. • Due to health complications, Ben hasn't been able to work on much else. He should be fully recovered within a few days.	5	59
Matthew Wall	• Integrated our website's old repository into our existing GitLab repository. • Worked with the rest of the team to clean up and begin testing functionality of the new website.	6	59.5