sdmay18-09: Tool Support for Continuous Model-Based Verification of the Linux Kernel

Week 7 Report
October 25 - November 1

Team Members

Srinivas Dhanwada — *Team Lead*
Collin McIntyre — *Tool Integration Lead, Scribe*
Benjamin Weno — *Automation Lead*
Matthew Wall — *Web Lead*

Summary of Progress this Report

We've continued to make progress on our locking mechanism instance mapping algorithm, but have encountered more bugs as well. We improved our implementation of our current algorithm and significantly cut back on file opening and closing which drastically reduced runtime. We've also identified issues where significant changes before a lock instance is called can cause identification tags to be inserted incorrectly. We're still debugging our manual patch for version 4.13.7 of the kernel, and are running into some pretty significant issues, detailed below. We've continued to manually look through various locking instances across different versions of the kernel to help with creating a plan for the overall Difference Mapper. We've also improved our current RSS feed monitor by including release candidate support for detecting when a new version of the kernel is available to run the verification algorithm on.
Lastly, we've also continued fleshing out our design for our website.

Pending Issues

Our only significant roadblock is the testing of the patch we've created for the Linux kernel. When the kernel is compiled, the compiler will terminate early if there are errors in an individual module. These issues must be fixed and the kernel re-compiled, but we're running into problems with the amount of time it's taking to compile the kernel. We've been working to compile the kernel on a remote server which is resulting in compile times of roughly 20 hours. We have a plan to improve these compile times, detailed below.

Plans for Upcoming Reporting Period

We plan to continue to improve the instance mapping algorithm and removing the current bugs/handling the known edge cases. We also hope to review the results of our manual comparisons of locking instances to begin coming up with an algorithm that we can eventually implement to create an automated Difference Map solution. For our issue of compile times of the kernel, we plan to move our working directory from a remote server to a local machine, in hopes that compile times will be shortened drastically.

Individual Contributions

Team Member	Contribution	Weekly Hours	Total Hours
Srinivas Dhanwada	Srinu has continued working on cleaning up and finishing the implementation of the locking instance mapping algorithm. He fixed a bug that drastically reduced the runtime of the algorithm, but has also discovered more	10	57

	bugs and edge cases that need to be considered. He also manually looked through locking instances in different versions of the kernel to get a feel for how to implement an overall Difference Mapping algorithm.		
Collin McIntyre	Collin has continued to create a patch for version 4.13.7 of the kernel that will allow the verification algorithm to run properly on the kernel. He's identified the problem with compile times and plans to move the kernel from a remote server to his local machine to speed up compile times. He's also looked through different versions of the kernel at specific locking instances to help with the creation of the Difference Mapping algorithm.	6	41.5
Benjamin Weno	Ben improved the RSS feed monitor algorithm to include release candidate support. He has also continued to look through different versions of the kernel at specific locking instances to aid in the creation of the Difference Mapping algorithm.	5	27
Matthew Wall	Matt has continued to flesh out our design for the website.	5	23.5