

An Architecture for Producing Trustworthy Linux Programs

Michael Neises
ITTC and EECS Department, University of Kansas

August 22, 2021

Part I

Introduction

1 Research Statement

- 1.1 The seL4 Microkernel can be leveraged to create trustworthy systems.
- 1.2 An architecture can be developed to facilitate the creation of trustworthy systems.

2 Motivation

- 2.1 Trustworthy systems are desirable.

3 Contribution

- 3.1 I will provide an architecture to facilitate the creation of trustworthy systems.
- 3.2 Using my architecture, I will generate some non-trivial trustworthy system from simple source files.

4 Overview of Proposal

- 4.1 I will implement a single trustworthy system.
- 4.2 I will argue that the systems are trustworthy.
- 4.3 I will implemented an architecture for generation of trustworthy systems.
- 4.4 I will re-implement the first system using the architecture.

Part II

Related Work

5 Background Work

- 5.1 I paved the way for kernel module development as part of the seL4 build-system.

6 Related Work

- 6.1 Paul Rowe's paper "Confining"

Part III

2

Methodology

7 Building the Solution

7.1 It's a lot of system programming in C.

7.2 It's also a lot of CMake.

7.3 There are architectural camkes files.

8 Describing the Solution

8.1 Show the picture.

8.2 Paint a picture of the simple, trustworthy kernel hosting the feature-rich, vulnerable kernel as a guest.

9 Evaluating the Solution

9.1 This architecture should be resilient against kernel module attacks.

9.2 This architecture should be trivial to use.

Part IV

Research Plan

10 Work So Far

10.1 The simple kernel has already measured and judged the modules of the vulnerable kernel.

11 Work To Do

11.1 I must implement measurement and subsequent execution of binaries present in the Linux system.

11.2 The architecture must prove resilient to meaningful attacks.

11.3 The architecture must include automation tools.

11.4 The architecture would like to support many languages at the highest level.

Part V

Conclusions and Future Work

12 Summarize the Proposal

test

12.1 I will provide a foundation for trustworthy systems.

12.2 I will implement a trustworthy system on my foundation.

13 Identify What Needs Done

13.1 The architecture must be completed.

13.2 The argument must be completed.

13.3 The architecture must be automated.

14 Outline Research Plan

14.1 I must finish implementing.

14.2 I must read to connect with the literature.

14.3 I must write to explain what I've done.