Build Data Race Detection Finite State Machine Model via LLVM IR load/store Instruction

HAOXIN TU and ZHIDE ZHOU*

ABSTRACT

It is especially important to detect concurrent competition caused by interrupts since interrupt-driven embedded software is widely used in safety critical systems such as aerospace, rail transit, and medical equipment. In this paper, we designed a data race detection finite automaton model based on LLVM IR load/store instruction, which helps us to detect the defects in the single variable access sequence mode in the program. To verify the validity of our model, we designed a tool called xx. The first step of this tool is to compile the source code into LLVM IR code. The second step is to model according to the load/store instruction in IR, and output the processing result after running. The experimental results show that our tool can effectively detect the four defects caused by the single variable access pattern in the code.

Keywords: Interrupt-driven Program, Data Race, Finite State Machine, LLVM IR

1 INTRODUCTION

this is a introduction

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2 PROBLEM DEFINITION

3 MODEL CONSTRUCTION

4 EVALUATION

5 CONCLUSIONS

*Both authors contributed equally to this research.

Authors' address: Haoxin Tu, trovato@corporation.com; Zhide Zhou, trovato@corporation.com.

REFERENCES

[1] Patricia S. Abril and Robert Plant. 2007. The patent holder's dilemma: Buy, sell, or troll? *Commun. ACM* 50, 1 (Jan. 2007), 36–44. https://doi.org/10.1145/1188913.1188915