

Symbolic Execution(Working title)

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Abstract

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Chapter 1

Introduction

Chapter 2

Summary of theory

Chapter 3

Basic symbolic execution for the *SImPL* language

3.1 description

In this chapter we will describe the process of implementing symbolic execution for a simple imperative language called *SImPL*.

3.2 Introducing the *SImPL* language

SImPL (**S**imple **I**mpерative **P**rogramming **L**anguage) is a small imperative programming language, designed to highlight the interesting use cases of symbolic execution. The language supports only one type, namely the set integers \mathbb{N} . Furthermore we will interpret 0 as *false* and any other integer as *true*. *SImPL* supports basic variables that can be assigned the value of any expression, as well as basic branching functionality through an **If - Then - Else** statement. Furthermore it allows for looping through a **While - Do** statement.

We will describe the language formally, by the following Context Free Grammar:

$\langle int \rangle ::= 0 \mid 1 \mid -1 \mid 2 \mid -2 \mid \dots$

$\langle var \rangle ::= a \mid b \mid c \mid \dots$

$\langle exp \rangle ::= \langle int \rangle$
 $\mid \langle var \rangle$
 $\mid \langle exp \rangle + \langle exp \rangle \mid \langle exp \rangle - \langle exp \rangle \mid \langle exp \rangle * \langle exp \rangle \mid \langle exp \rangle / \langle exp \rangle$
 $\mid \langle exp \rangle > \langle exp \rangle \mid \langle exp \rangle == \langle exp \rangle$
 $\mid (\langle exp \rangle)$

$\langle stm \rangle ::= \langle exp \rangle$
 $\mid \langle var \rangle = \langle exp \rangle$
 $\mid \langle stm \rangle \langle stm \rangle$
 $\mid \text{if } \langle exp \rangle \text{ then } \langle stm \rangle \text{ else } \langle stm \rangle$
 $\mid \text{while } \langle exp \rangle \text{ do } \langle stm \rangle$
 $\mid \text{Print E}$

where $+$, $*$, $-$, $/$ denotes the usual arithmetic operators on integers, and $>$, $==$ denotes the comparison-operators of *greater-than* and *equal-to* respectively. When interpreting a comparison-operator we will return 0 for *false* and 1 for *true*.

Chapter 4

Further extensions

Chapter 5

Conclusion

Appendix A

Source code

Appendix B

Figures