Applying Genetic Programming to Bytecode and Assembly

Eric Collom

Division of Science and Mathematics
University of Minnesota, Morris
Morris, Minnesota, USA

29 April '14,
UMM Senior Seminar

The big picture

Outline

1 Background

2 Why Evolve Instruction-level Code

3 FINCH:Evolving Programs

4 Using Instruction-level code to automate bug repair

5 Conclusions

Outline

1 Background
- EC
- Java Bytecode and x86 Assembly

2 Why Evolve Instruction-level Code

3 FINCH:Evolving Programs

4 Using Instruction-level code to automate bug repair

5 Conclusions

Evolutionary Computation

Java Bytcode and x86 Assembly

Outline

1 Background

2 Why Evolve Instruction-level Code

3 FINCH:Evolving Programs

4 Using Instruction-level code to automate bug repair

5 Conclusions

Source Code Constraints

Flexibility

Outline

1 Background

2 Why Evolve Instruction-level Code

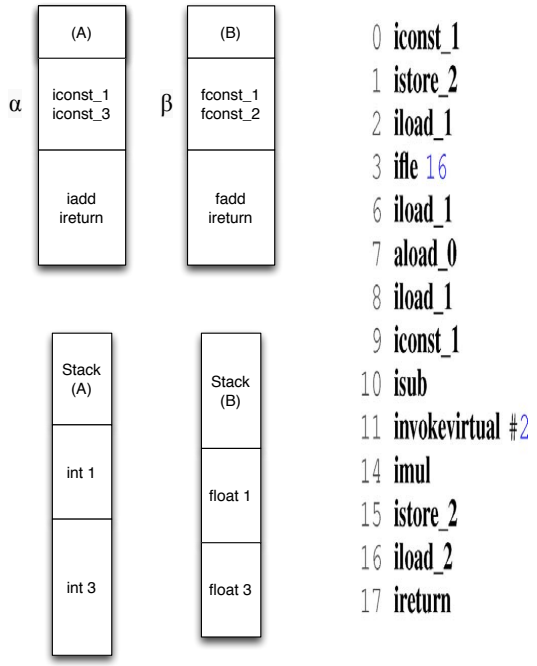
3 FINCH:Evolving Programs
- How it Works
- Results

4 Using Instruction-level code to automate bug repair

5 Conclusions

Selecting Offspring

- There is still a chance to produce non-compilable code
- Solution: Add restrictions to code selection.
- Stack and Frame Depth
- Variable Types
- Control Flow



Crossover

Non-Halting Offspring

Outline

1 Background

2 Why Evolve Instruction-level Code

3 FINCH:Evolving Programs

4 Using Instruction-level code to automate bug repair
- How it Works
- Results

5 Conclusions

Selecting Offspring

Genetic Operators

Non-Halting Offspring

Outline

1 Background

2 Why Evolve Instruction-level Code

3 FINCH:Evolving Programs

4 Using Instruction-level code to automate bug repair

5 Conclusions

Conclusions

References