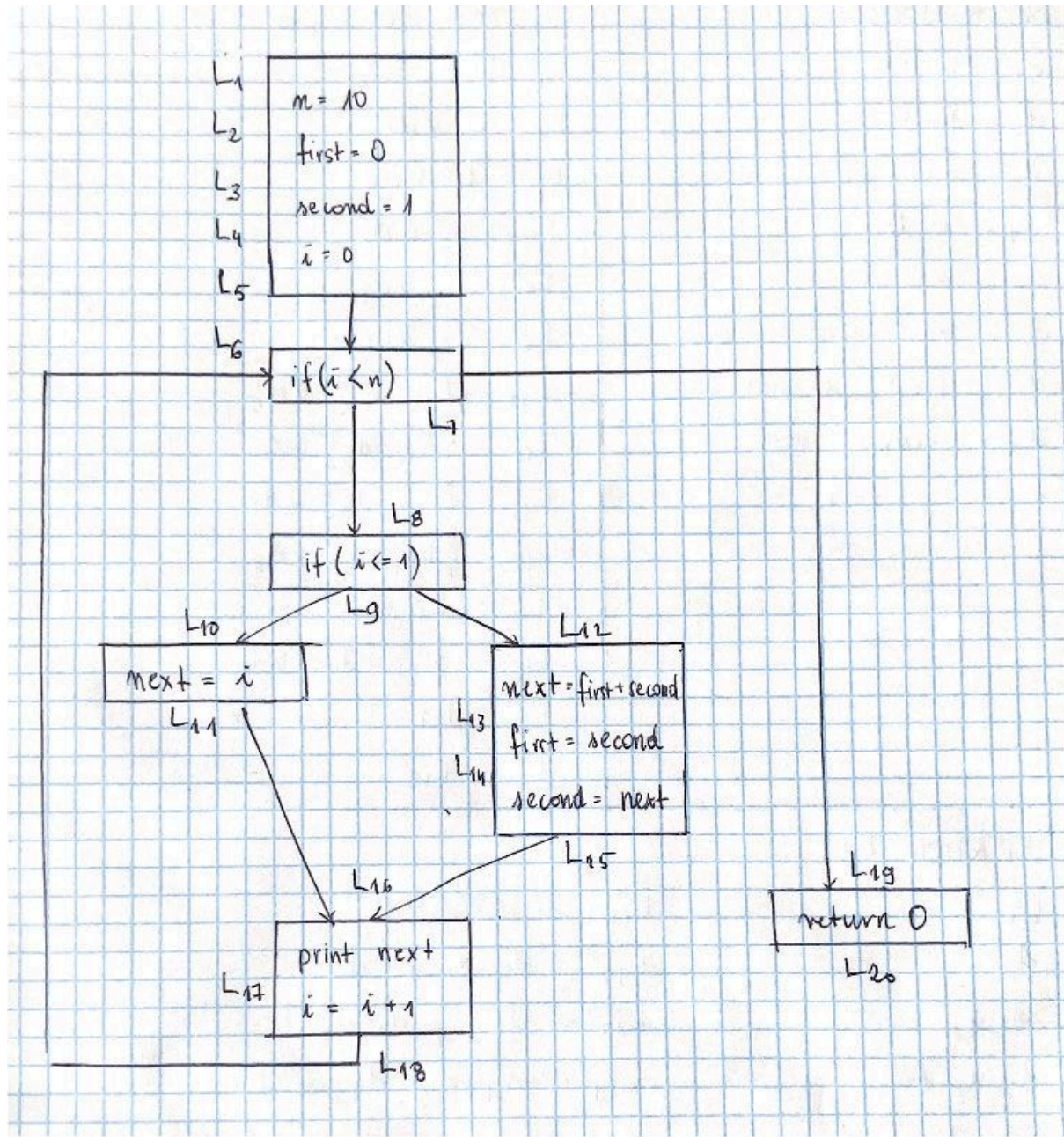


Compiler Construction
Problem Set 6
Alicja Jonczyk

1.1 Control flow graph (15%)



1.2 Reaching definitions (25%)

DEFINITIONS

$$d_1: m = 10$$

$$d_2: \text{first} = 0$$

$$d_3: \text{second} = 1$$

$$d_4: i = 0$$

$$d_5: \text{next} = i$$

$$d_6: \text{next} = \text{first} + \text{second}$$

$$d_7: \text{first} = \text{second}$$

$$d_8: \text{second} = \text{next}$$

$$d_9: i = i + 1$$

DATA FLOW EQUATIONS

$$L_1: \{\}$$

$$L_2: L_1 \vee d_1$$

$$L_3: L_2 \vee d_2$$

$$L_4: L_3 \vee d_3$$

$$L_5: L_4 \vee d_4$$

$$L_6: L_5 \vee d_5$$

$$L_{11}: \{L_{10} - d_6\} \vee d_5$$

$$L_{13}: \{L_{12} - d_5\} \vee d_6$$

$$L_{14}: \{L_{13} - d_2\} \vee d_7$$

$$L_{15}: \{L_{14} - d_3\} \vee d_8$$

$$L_{16}: L_{11} \vee L_{15}$$

$$L_{18}: \{L_{17} - d_4\} \vee d_9$$

$$L_{19}: L_7$$

$$L_{20}: L_{19}$$

ITERATION 1

$$L_1 = \{ \}$$

$$L_2 = d_1$$

$$L_3 = d_1, d_2$$

$$L_4 = d_1, d_2, d_3$$

$$L_5 = d_1, d_2, d_3, d_4$$

$$L_6 = d_1, d_2, d_3, d_4$$

$$L_7 = d_1, d_2, d_3, d_4$$

$$L_8 = d_1, d_2, d_3, d_4$$

$$L_9 = d_1, d_2, d_3, d_4$$

$$L_{10} = d_1, d_2, d_3, d_4$$

$$L_{11} = d_1, d_2, d_3, d_4, d_5$$

$$L_{12} = \{ \}$$

$$L_{13} = \{ \}$$

$$L_{14} = \{ \}$$

$$L_{15} = \{ \}$$

$$L_{16} = d_1, d_2, d_3, d_4, d_5$$

$$L_{17} = d_1, d_2, d_3, d_4, d_5$$

$$L_{18} = d_1, d_2, d_3, d_5, d_6$$

$$L_{19} = \{ \}$$

$$L_{20} = \{ \}$$

ITERATION 2

$$L_1 = \{ \}$$

$$L_2 = d_1$$

$$L_3 = d_1, d_2$$

$$L_4 = d_1, d_2, d_3$$

$$L_5 = d_1, d_2, d_3, d_4$$

$$L_6 = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_7 = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_8 = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_9 = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_{10} = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_{11} = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_{12} = \{ \}$$

$$L_{13} = \{ \}$$

$$L_{14} = \{ \}$$

$$L_{15} = \{ \}$$

$$L_{16} = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_{17} = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_{18} = d_1, d_2, d_3, d_5, d_6$$

$$L_{19} = \{ \}$$

$$L_{20} = \{ \}$$

ITERATION 3

$$L_1 = \{ \}$$

$$L_2 = d_1$$

$$L_3 = d_1, d_2$$

$$L_4 = d_1, d_2, d_3$$

$$L_5 = d_1, d_2, d_3, d_4$$

$$L_6 = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_7 = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_8 = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_9 = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_{10} = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_{11} = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_{12} = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_{13} = d_1, d_2, d_3, d_4, d_6, d_7$$

$$L_{14} = d_1, d_3, d_4, d_6, d_7, d_8$$

$$L_{15} = d_1, d_4, d_6, d_7, d_8, d_9$$

$$L_{16} = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$$

$$L_{17} = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$$

$$L_{18} = d_1, d_2, d_3, d_5, d_6, d_7, d_8, d_9$$

$$L_{19} = \{ \}$$

$$L_{20} = \{ \}$$

ITERATION 4

$$L_1 = \{ \}$$

$$L_2 = d_1$$

$$L_3 = d_1, d_2$$

$$L_4 = d_1, d_2, d_3$$

$$L_5 = d_1, d_2, d_3, d_4$$

$$L_6 = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$$

$$L_7 = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$$

$$L_8 = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$$

$$L_9 = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$$

$$L_{10} = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_{11} = d_1, d_2, d_3, d_4, d_5, d_6$$

$$L_{12} = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$$

$$L_{13} = d_1, d_3, d_4, d_6, d_7, d_8, d_9$$

$$L_{14} = d_1, d_3, d_4, d_6, d_7, d_8, d_9$$

$$L_{15} = d_1, d_4, d_6, d_7, d_8, d_9$$

$$L_{16} = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$$

$$L_{17} = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$$

$$L_{18} = d_1, d_2, d_3, d_5, d_6, d_7, d_8, d_9$$

$$L_{19} = \{ \}$$

$$L_{20} = \{ \}$$

THE ITERATIONS FROM 5 TO 10 (INCLUDED) ARE IDENTICAL AS
ITERATION 4.

ITERATION 11	
$L_1 = \{ \}$	$L_{11} = d_1, d_2, d_3, d_4, d_5, d_9$
$L_2 = d_1$	$L_{12} = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$
$L_3 = d_1, d_2$	$L_{13} = d_1, d_2, d_3, d_4, d_6, d_7, d_8, d_9$
$L_4 = d_1, d_2, d_3$	$L_{14} = d_1, d_3, d_4, d_6, d_7, d_8, d_9$
$L_5 = d_1, d_2, d_3, d_4$	$L_{15} = d_1, d_4, d_6, d_7, d_8, d_9$
$L_6 = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$	$L_{16} = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$
$L_7 = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$	$L_{17} = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$
$L_8 = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$	$L_{18} = d_1, d_2, d_3, d_5, d_6, d_7, d_8, d_9$
$L_9 = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$	$L_{19} = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$
$L_{10} = d_1, d_2, d_3, d_4, d_5, d_9$	$L_{20} = d_1, d_2, d_3, d_4, d_5, d_6, d_7, d_8, d_9$

2. Code generation II

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jonczyk@alicja:~/COMPILER_CONSTRUCTION/problem_set_6/vsl_programs$ make ps6-check
find ps6-codegen2 -wholename "*.vsl" | xargs -L 1 ./codegen-tester.py
Running 1 test cases for file ps6-codegen2/break.vsl
Running ps6-codegen2/break.out
Running 1 test cases for file ps6-codegen2/all_if_types.vsl
Running ps6-codegen2/all_if_types.out
Running 2 test cases for file ps6-codegen2/sieve.vsl
Running ps6-codegen2/sieve.out 600
Running ps6-codegen2/sieve.out 100
Running 1 test cases for file ps6-codegen2/simple_while.vsl
Running ps6-codegen2/simple_while.out 6
Running 3 test cases for file ps6-codegen2/simple_if.vsl
Running ps6-codegen2/simple_if.out 7
Running ps6-codegen2/simple_if.out 5
Running ps6-codegen2/simple_if.out -2
Running 4 test cases for file ps6-codegen2/if.vsl
Running ps6-codegen2/if.out 4
Running ps6-codegen2/if.out 0
Running ps6-codegen2/if.out 10
Running ps6-codegen2/if.out -20
Running 1 test cases for file ps6-codegen2/while.vsl
Running ps6-codegen2/while.out
Running 1 test cases for file ps6-codegen2/simple_break.vsl
Running ps6-codegen2/simple_break.out
No differences found in PS6!
jonczyk@alicja:~/COMPILER_CONSTRUCTION/problem_set_6/vsl_programs$

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