Report for Nature Loop Detector

Wei Zhang

The dominance relations are revealed in ‘runOnFunction’. I use the algorithm in the EAC textbook. Searching for back edges and natural loops are done in function ‘calallloops’. I set a queue and copy them to record the path and iteratively visit the successors of the current node. When a predecessor is also in the dominator of current node, I pop out all the nodes before that one and pop out the rest as the blocks in the loop. I have made sure that my answer is right by inferring manually.

I tried the adv test, but I’m not sure about the result. There are two loops in the program according to my result.

I remove the self-dominance relations intentionally because they are not included in the example output. And there are three makefiles(2,3) correspond to mytest.c and mytest1.c. All of them can compile the advtest.c.
Test Result:
test.c
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Number of loops: 2
Dominance relation: BB_ -> BB_1, BB_ -> BB_2, BB_1 -> BB_2, BB_ -> BB_3, BB_1 -> BB_3, BB_2 -> BB_3, BB_ -> BB_4, BB_1 -> BB_4, BB_ -> BB_5, BB_1 -> BB_5, BB_4 -> BB_5, BB_ -> BB_6, BB_1 -> BB_6, BB_4 -> BB_6, BB_5 -> BB_6, BB_ -> BB_7, BB_1 -> BB_7, BB_4 -> BB_7, BB_5 -> BB_7, BB_6 -> BB_7, BB_ -> BB_8, BB_1 -> BB_8, BB_4 -> BB_8, BB_5 -> BB_8, BB_6 -> BB_8, BB_ -> BB_9, BB_1 -> BB_9, BB_4 -> BB_9, BB_5 -> BB_9, BB_6 -> BB_9, BB_8 -> BB_9, BB_ -> BB_10, BB_1 -> BB_10, BB_4 -> BB_10, BB_5 -> BB_10,
Back edge: BB_3 -> BB_1, BB_9 -> BB_5,
Basic blocks in the loop 1: BB_1, BB_2, BB_3,
Basic blocks in the loop 2: BB_5, BB_6, BB_7, BB_8, BB_9,
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advtest.c
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Number of loops: 2
Dominance relation: BB_ -> BB_1, BB_1 -> BB_2, BB_ -> BB_2, BB_1 -> BB_3, BB_2 -> BB_3, BB_ -> BB_3, BB_1 -> BB_4, BB_2 -> BB_4, BB_3 -> BB_4, BB_ -> BB_4, BB_1 -> BB_5, BB_2 -> BB_5, BB_3 -> BB_5, BB_4 -> BB_5, BB_ -> BB_5, BB_1 -> BB_6, BB_2 -> BB_6, BB_3 -> BB_6, BB_ -> BB_6, BB_1 -> BB_7, BB_2 -> BB_7, BB_3 -> BB_7, BB_6 -> BB_7, BB_ -> BB_7, BB_1 -> BB_8, BB_ -> BB_8,
Back edge: BB_5 -> BB_3, BB_7 -> BB_1,
Basic blocks in the loop 1: BB_3, BB_4, BB_5,
Basic blocks in the loop 2: BB_1, BB_2, BB_3, BB_6, BB_7,
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mytest.c
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Number of loops: 3
Dominance relation: BB_ -> BB_1, BB_ -> BB_2, BB_1 -> BB_2, BB_2 -> BB_3, BB_ -> BB_3, BB_1 -> BB_3, BB_ -> BB_4, BB_1 -> BB_4, BB_4 -> BB_5, BB_ -> BB_5, BB_1 -> BB_5, BB_4 -> BB_6, BB_ -> BB_6, BB_1 -> BB_6, BB_4 -> BB_7, BB_6 -> BB_7, BB_ -> BB_7, BB_1 -> BB_7, BB_4 -> BB_8, BB_6 -> BB_8, BB_7 -> BB_8, BB_ -> BB_8, BB_1 -> BB_8, BB_4 -> BB_9, BB_6 -> BB_9, BB_7 -> BB_9, BB_8 -> BB_9, BB_ -> BB_9, BB_1 -> BB_9, BB_4 -> BB_10,

BB_6 -> BB_10, BB_7 -> BB_10, BB_ -> BB_10, BB_1 -> BB_10, BB_4 -> BB_11, BB_6 -> BB_11, BB_7 -> BB_11, BB_10 -> BB_11, BB_ -> BB_11, BB_1 -> BB_11, BB_4 -> BB_12, BB_6 -> BB_12, BB_7 -> BB_12, BB_10 -> BB_12, BB_11 -> BB_12, BB_ -> BB_12, BB_1 -> BB_12, BB_4 -> BB_13, BB_6 -> BB_13, BB_7 -> BB_13, BB_10 -> BB_13, BB_11 -> BB_13, BB_12 -> BB_13, BB_ -> BB_13, BB_1 -> BB_13, BB_4 -> BB_14, BB_6 -> BB_14, BB_7 -> BB_14, BB_10 -> BB_14, BB_11 -> BB_14, BB_12 -> BB_14, BB_ -> BB_14, BB_1 -> BB_14, BB_4 -> BB_15, BB_6 -> BB_15, BB_7 -> BB_15, BB_10 -> BB_15, BB_11 -> BB_15, BB_12 -> BB_15, BB_14 -> BB_15, BB_ -> BB_15, BB_1 -> BB_15, BB_4 -> BB_16, BB_6 -> BB_16, BB_7 -> BB_16, BB_10 -> BB_16, BB_11 -> BB_16, BB_ -> BB_16, BB_1 -> BB_16,
Back edge: BB_3 -> BB_1, BB_9 -> BB_7, BB_15 -> BB_11,
Basic blocks in the loop 1: BB_2, BB_3, BB_1,
Basic blocks in the loop 2: BB_7, BB_8, BB_9,
Basic blocks in the loop 3: BB_11, BB_12, BB_13, BB_14, BB_15,
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mytest1.c
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Number of loops: 2
Dominance relation: BB_ -> BB_1, BB_ -> BB_2, BB_1 -> BB_2, BB_ -> BB_3, BB_1 -> BB_3, BB_2 -> BB_3, BB_ -> BB_4, BB_1 -> BB_4, BB_2 -> BB_4, BB_3 -> BB_4, BB_ -> BB_5, BB_1 -> BB_5, BB_2 -> BB_5, BB_ -> BB_6, BB_ -> BB_7, BB_6 -> BB_7, BB_ -> BB_8, BB_6 -> BB_8, BB_7 -> BB_8, BB_ -> BB_9, BB_6 -> BB_9, BB_7 -> BB_9, BB_8 -> BB_9, BB_ -> BB_10, BB_6 -> BB_10, BB_7 -> BB_10, BB_ -> BB_11,
Back edge: BB_4 -> BB_2, BB_9 -> BB_7,
Basic blocks in the loop 1: BB_2, BB_3, BB_4,
Basic blocks in the loop 2: BB_7, BB_8, BB_9,
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