Overview

1. Class Summary

Variable is Odd (o), Even (e), or Odd/Even (oe) at each Program Point(PP)

PP	Program	Values (**Ideal**)
0	–	{(A,oe), (B,oe)}
1	A=evenPostiveInput()	{(A,e), (B,oe)}
2	B= oddPositiveInput()	{(A,e), (B,o)}
3	if (B≥A)	{(A,e), (B,o)}
4	B=B*2+A	{(A,e), (B,e)}
5	print(B)	{(A,e), (B,oe)}
6	if(B< A)	{(A,e), (B,o)}
7	B=B+1	{(A,e), (B,e)}
8	print(B)	{(A,e), (B,e)}
9	A=B+A	{(A,e), (B,e)}
10	print(B)	{(A,e), (B,e)}

Table: Ideal Value of variables at each Program Point (PP)

Multiplication and Addition over values o,e, oe

*	o	e	oe
o	o	e	oe
e	e	e	e

Table: Semantics of multiplication (*) Operator

+	o	e	oe
o	e	o	oe
e	o	e	oe

Table: Semantics of addition (+) Operator

Variable is Odd (o), Even (e), or Odd/Even (oe) at each Program Point(PP)?

PP	Program	Values (**Static Analysis**)
0	–	{(A,oe), (B,oe)}
1	A=evenPostiveInput()	{(A,e), (B,oe)}
2	B= oddPositiveInput()	{(A,e), (B,o)}
3	if (B≥A)	{(A,e), (B,o)}
4	B=B*2+A	{(A,e), (B,e)}
5	print(B)	{(A,e), (B,oe)}
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- The condition that only one of the if statements at PPs 3 and 6 will be executed is not inferred.

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- So on exit join of the values coming from two points is taken.
- If values coming are Odd (o) and Even (e), new join value is Odd/Even (oe)
- Static Analysis always gives overapproximation than the ideal values.

Variable is Odd (o), Even (e), or Odd/Even (oe) at each Program Point(PP)?

PP	Program	Values (**Static Analysis**)
0	–	{{(A,o), (B,o)}, {(A,o), (B,e)}}, {(A,e),(B,o)},{(A,e), (B,e)}}
1	A=evenPostiveInput()	{{(A,e), (B,o)}, {(A,e), (B,e)}}
2	B= oddPositiveInput()	{(A,e), (B,o)}
3	if (B≥A)	{(A,e), (B,o)}
4	B=B*2+A	{(A,e), (B,e)}
5	print(B)	{{(A,e), (B,o)}, {(A,e),(B,e)}}
6	if(B< A)	{{(A,e), (B,o)}, {(A,e), (B,e)}}
7	B=B+1	{({A,e}, (B,o)}, {(A,e), (B,e)}}
8	print(B)	{{(A,e), (B,o)}, {(A,e), (B,e)}}
9	A=B+A	{{(A,o), (B,o)}, {(A,e), (B,e)}}
10	print(B)	{{(A,o), (B,o)}, {(A,e), (B,e)}}

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- This is exponetail in number of variables.

Compiler Optimizations and Program Analysis

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