

Data flow analysis

B \rightarrow Basic Block

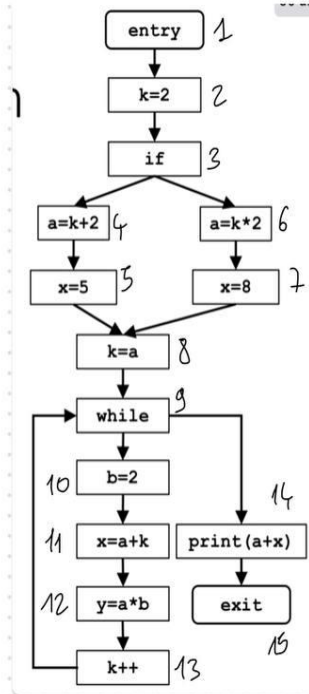
	Dominator Analysis	Very busy expression	Constant Propagation
Domain	Sets of B.B	Sets of expressions	Sets of <Variables; Values>
Direction	forward: $out[b] = f_b(in[b])$ $in[b] = \wedge out[pred[b]]$	backward: $in[b] = f_b(out[b])$ $out[b] = \wedge in[succ(b)]$	forward: $out[b] = f_b(in[b])$ $in[b] = \wedge out[pred[b]]$
Transfer function	$f_b(x) = B \cup x$	$f_b(x) = Use_b \cup (x - Def_b)$	$f_b(x) = DefConst_b \cup (x - kill_b)$
Meet operator	\wedge	\wedge	\wedge
Boundary Cond.	$out[entry] = \emptyset$	$in[exit] = \emptyset$	$out[entry] = \emptyset$
Initial interior points	$out[B_i] = u_{(u,s)}$	$in[B_i] = u$	$out[B_i] = u$

La tabella riporta la formalizzazione del framework per il Data-flow analysis dei problemi di Dominator Analysis, Very busy expression e Costant propagation.

Nelle pagine seguenti sono invece illustrati, per ogni problema di analisi, le iterazioni dell'algoritmo fino a convergenza.

Constant propagation

Constant Propagation	ITER. 1		ITER. 2	
	in [B]	out [B]	in [B]	out [B]
1	\emptyset	\emptyset	/	/
2	\emptyset	$k=2$	/	/
3	$k=2$	$k=2$	/	/
4	$k=2$	$\langle k=2, a=4 \rangle$	/	/
5	$\langle k=2, a=4 \rangle$	$\langle k=2, a=4, x=5 \rangle$	/	/
6	$k=2$	$\langle k=2, a=4 \rangle$	/	/
7	$\langle k=2, a=4 \rangle$	$\langle k=2, a=4, x=8 \rangle$	/	/
8	$\langle k=2, a=4 \rangle$	$\langle k=4, a=4 \rangle$	/	/
9	$\langle k=4, a=4 \rangle$	$\langle k=4, a=4 \rangle$	$a=4$	$a=4$
10	$\langle k=4, a=4 \rangle$	$\langle k=4, a=4, b=2 \rangle$	$a=4$	$a=4, b=2$
11	$\langle k=4, a=4, b=2 \rangle$	$\langle k=4, a=4, b=2, x=8 \rangle$	$a=4, b=2$	$a=4, b=2$
12	$\langle k=4, a=4, b=2, x=8 \rangle$	$k=4, a=4, b=2, x=8, y=8$	$a=4, b=2$	$a=4, b=2, y=8$
13	$k=4, a=4, b=2, x=8, y=8$	$k=5, a=4, b=2, x=8, y=8$	$a=4, b=2, y=8$	$a=4, b=2, y=8$
14	$\langle k=4, a=4 \rangle$	$\langle k=4, a=4 \rangle$	$a=4$	$a=4$
15	//	//	//	//



terza iterazione
uguale alla seconda.

Very busy expression

Very Busy Expr.	ITER. 1		ITER. 2	
	OUT[B]	IN[B]	IN[B]	OUT[B]
1	$b-a$	X		
2	$b-a$	$b-a$		
3	$a-b$	$b-a$ $a-b$		
4	Ø	$a-b$		
5	Ø	$b-a$		
6	$a-b$	Ø		
7	Ø	$a-b$		
8	X	Ø		

Dominator Analysis

Dominator Analysis	ITER. 1		ITER. 2	
	in[B]	out[B]	in[B]	out[B]
A	\emptyset	A		
B	A,	A, B		
C	A	A, C		
D	A, C	A, C, D		
E	A, C	A, C, E		
F	A, C	A, C, F		
G	A	A, G		