Assignment 2

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Esercizio 1: Very Busy Expressions

	Dataflow Problem of Very Busy Expressions
Domain	$Un'insieme\ di\ Espressioni$
Direction	$Backward:$ $in[B] = f_b(out[B])$ $out[B] = \wedge\ in[suc(B)]$
Transfer function	$Gen_b \cup (x - Kill_b)$
Meet Operator ($\wedge$)	$\cap$
Boundary Condition	$in[EXIT] = \varnothing$
Initial interior points	$out[B] = \mathbb{U}$

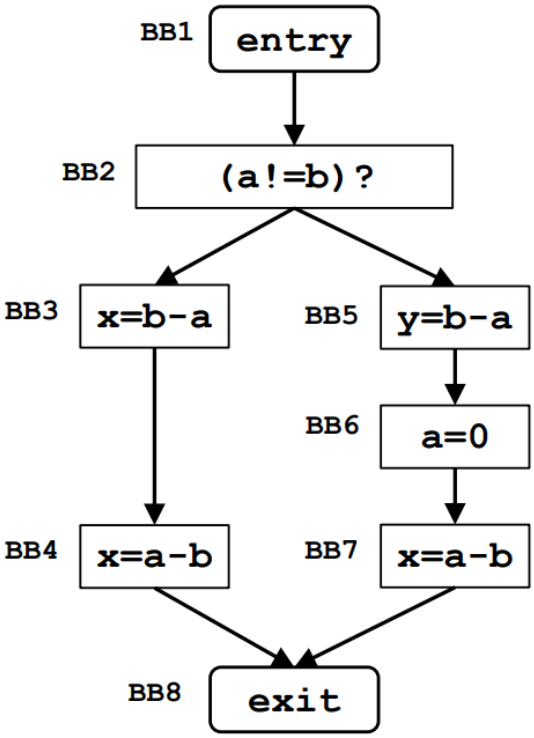

Figura 1: Very Busy Expressions

	1º PASSO	
	IN[B]	**OUT[B]**
EXIT	$\{\varnothing\}$	
BB7	$\{a-b\}$	$\{\varnothing\}$
BB6	$\{\varnothing\}$	$\{a-b\}$
BB5	$\{b-a\}$	$\{\varnothing\}$
BB4	$\{a-b\}$	$\{\varnothing\}$
BB3	$\{b-a, a-b\}$	$\{a-b\}$
BB2	$\{b-a, a \neq b\}$	$\{b-a\}$
ENTRY		$\{b-a, a \neq b\}$

Esercizio 2: Dominator Analysis

	Dataflow Problem of Domination Analysis
Domain	*Un'insieme di coppie Basic Blocks*
Direction	$Forward:$ $in[B] = \wedge\ out[pred(B)]$ $out[B] = f_b(in[B])$
Transfer function	$Gen_b \cup x$
Meet Operator ($\wedge$)	$\cap$
Boundary Condition	$out[ENTRY] = \varnothing$
Initial interior points	$out[B] = \mathbb{U}$

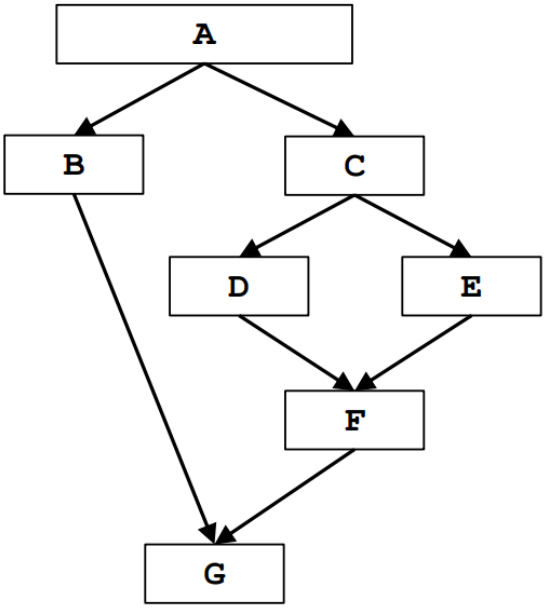

Figura 2: Dominator Analysis

	1º PASSO	
	IN[B]	**OUT[B]**
ENTRY		$\{\varnothing\}$
A	$\{\varnothing\}$	$\{A\}$
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	$\{A\}$	$\{A, G\}$
EXIT	$\{A, G\}$	

Esercizio 3: Constant Propagation

	Dataflow Problem of Constant Propagation
Domain	$Un'insieme\ di\ coppie\ (v, c)$
Direction	$Forward:$ $in[B] = \bigwedge\ out[pred(B)]$ $out[B] = f_b(in[B])$
Transfer function	$Gen_b \cup (x - Kill_b)$
Meet Operator ($\wedge$)	$\cap$
Boundary Condition	$out[ENTRY] = \varnothing$
Initial interior points	$out[B] = \mathbb{U}$

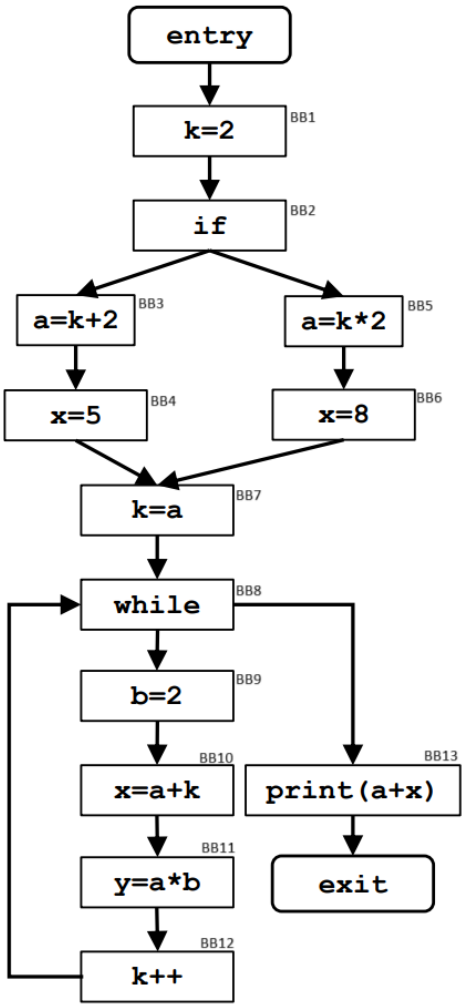

Figura 3: Constant Propagation

	1° PASSO		2° PASSO		3° PASSO	
	IN[B]	**OUT[B]**	**IN[B]**	**OUT[B]**	**IN[B]**	**OUT[B]**
ENTRY		$\{\varnothing\}$				
BB1	$\{\varnothing\}$	$\{(k,2)\}$				
BB2	$\{(k,2)\}$	$\{(k,2)\}$				
BB3	$\{(k,2)\}$	$\{(k,2),(a,4)\}$				
BB4	$\{(k,2),(a,4)\}$	$\{(k,2),(a,4),(x,5)\}$				
BB5	$\{(k,2)\}$	$\{(k,2),(a,4)\}$				
BB6	$\{(k,2),(a,4)\}$	$\{(k,2),(a,4),(x,8)\}$				
BB7	$\{(k,2),(a,4)\}$	$\{(k,4),(a,4)\}$				
BB8	$\{(k,4),(a,4)\}$	$\{(k,4),(a,4)\}$	$\{(a,4)\}$	$\{(a,4)\}$	$\{(a,4)\}$	$\{(a,4)\}$
BB9	$\{(k,4),(a,4)\}$	$\{(k,4),(a,4),(b,2)\}$	$\{(a,4)\}$	$\{(a,4),(b,2)\}$	$\{(a,4)\}$	$\{(a,4),(b,2)\}$
BB10	$\{(k,4),(a,4),(b,2)\}$	$\{(k,4),(a,4),(b,2),(x,8)\}$	$\{(a,4),(b,2)\}$	$\{(a,4),(b,2)\}$	$\{(a,4),(b,2)\}$	$\{(a,4),(b,2)\}$
BB11	$\{(k,4),(a,4),(b,2),(x,8)\}$	$\{(k,4),(a,4),(b,2),(x,8),(y,8)\}$	$\{(a,4),(b,2)\}$	$\{(a,4),(b,2),(y,8)\}$	$\{(a,4),(b,2)\}$	$\{(a,4),(b,2),(y,8)\}$
BB12	$\{(k,4),(a,4),(b,2),(x,8),(y,8)\}$	$\{(k,5),(a,4),(b,2),(x,8),(y,8)\}$	$\{(a,4),(b,2),(y,8)\}$	$\{(a,4),(b,2),(y,8)\}$	$\{(a,4),(b,2),(y,8)\}$	$\{(a,4),(b,2),(y,8)\}$
BB13	$\{(k,4),(a,4)\}$	$\{(k,4),(a,4)\}$	$\{(a,4)\}$	$\{(a,4)\}$	$\{(a,4)\}$	$\{(a,4)\}$
EXIT	$\{(k,4),(a,4)\}$		$\{(a,4)\}$		$\{(a,4)\}$	

I *Basic Block* da BB1 a BB7 nel 2° e 3° passo sono stati omessi, in quanto uguali a quelli del 1° passo; quindi è stato scritto solo l'insieme di coppie che potevano subire variazioni(BB8-EXIT) causa ciclo.