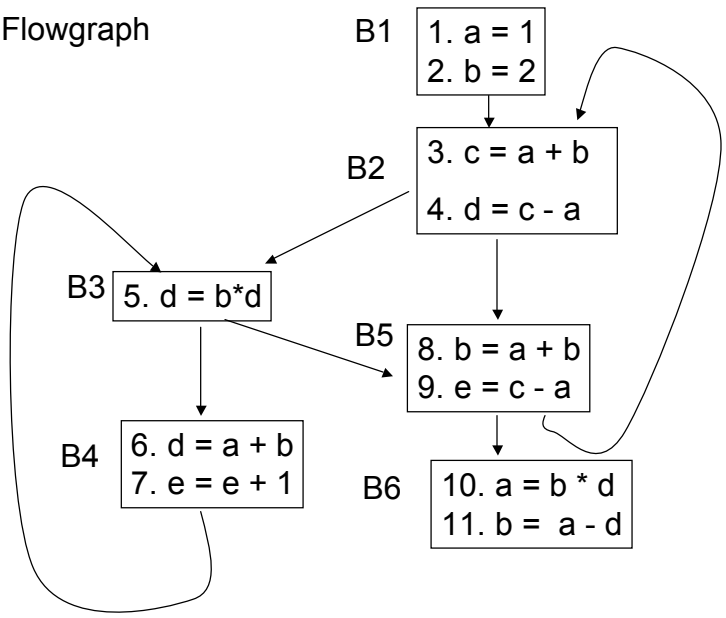
516 Sp'06: Homework 1

ASU 9.17, 10.5-10.7

(9.17 for discussion in class)

Flowgraph



10.5 Think of the different defns in the cfg arranged slotwise in a bitstring: a1, a6, b1, b5, b6, c2, d2, d3, d4, e4, e5

Then reaching definitions becomes:

	Initially(optimized)	Pass 1	Pass 2	Pass 3
B1	empty	empty	empty	empty
B2	a1, b1b5,e5	a1,b1,b5,e5	a1,b1,b5.c2, d2,d3,e5	a1,b1,b5,c2, d2,d3,e5
B3	c2, d2,d5,e4	c2,d2,d4,e4	a1,b1,b5,c2, d2,d4,e4,e5	a1.b1,b5,c2, d2,d4,e5,e4
B4	d3	c2,d3,e4	a1,b1,b5,c2, d2,d3,e5	a1,b1,b5,c2, d3,e4,e5
B5	c2,d2,d3	c2,d2,d3,e4	a1,b1,b5,c2, d2,d3,e4,e5	a1,b1,b5,c2, d2,d3,e4,e5
B6	b5, e5	b5,c2,d2,d3, e5	a1,b5,c2,d2, d3,e4,e5	a1,b5,c2,d2, d3,e4,e5

No change means fixed point reached

DU chains shown indexed by uses:

B2: =a (a1); =b (b1,b5); =c (c2)
B3: =b (b1,b5); =d (d2,d4)
B4: =a (a1); =b(b1,b5); =e (e4,e5)
B5: =a (a1); =b(b1,b5); =c (c2)
B6: =a (a1); =b(b1,b5); =d (d2)

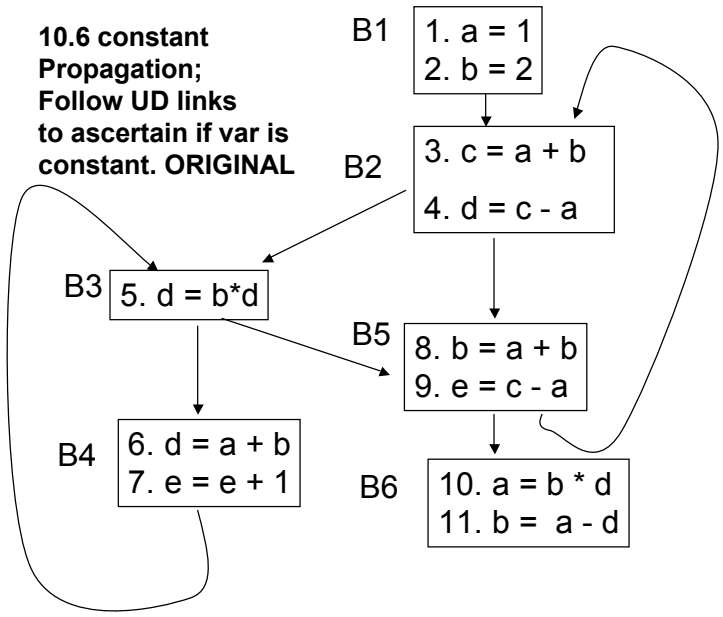
Note: UD chains are just these reversed.

Think of the upwards exposed live uses at each node:
a2,a4,a5,b2,b3,b4,b5,b6,c5,d3,d6,e4;

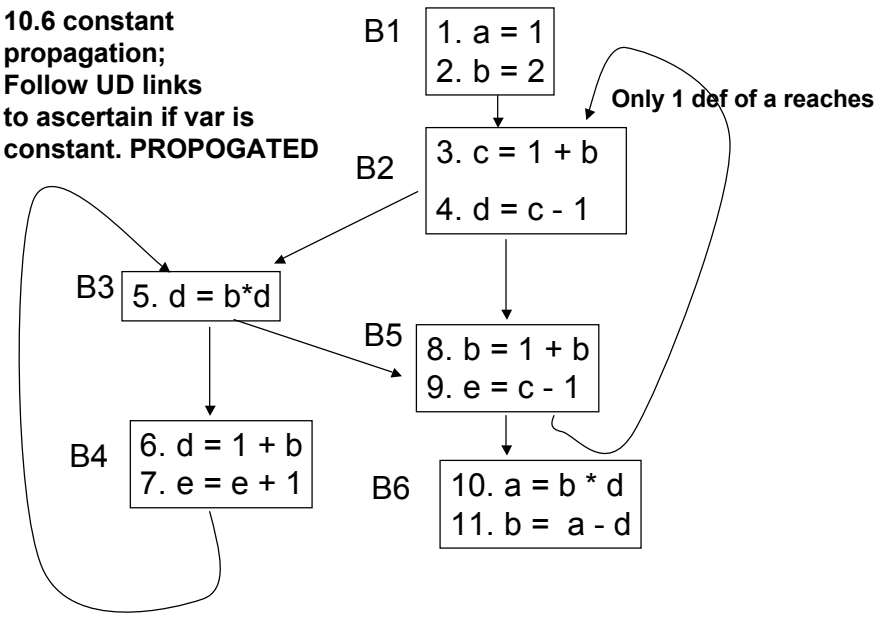
Looking at the graph, we see the preserve sets P(j):
P(1)={c5,d3,d6,e4}
P(2)={a2,a4,a5.b2,b3,b4,b5,b6,e4}
P(3)={a2,a4,a5,b2,b3,b4,b5,b6,c5,e4}
P(4)={a2,a4,a5,b2,b3,b4,b5,b6,c5}
P(5)={a2,a4,a5,c5,d3,d6}
P(6)={c5,d3,d6,e4}
Therefore, the LiveUses sets at the bottom of each node are:
LU(6)=empty; LU(5)={a4,a5,b3,b4,b6,d6,e4};
LU(4)={a4,a5,b3,b4,b5,c5,d3,e4)
LU(3)={a4,a5,b3,b4,b5,c5,e4};
LU(2)={a4,a5,b3,b4,b5,c5,d3,d6,e4},
LU(1)={a4,a5,b4,e4}

Think of the possibly available expressions:
a+b, a-d, b*d, c-a,e+1.
Preserve sets for the nodes are:
P(1)={e+1} ; P(2)={a+b,e+1}; P(3)={a+b,c-a,e+1};
P(4)={a+b,c-a}; P(5)={a-d,c-a}; P(6)={e+1};
Available expressions are:
AV(1)={empty}; AV(2)={empty}; AV(3)={a+b,c-a};
AV(4)={a+b,b*d,c-a}; AV(5)={a+b, c-a}; AV(6)={a+b, c-a}
Remember that available expressions is an intersection problem.

10.6 constant Propagation; Follow UD links to ascertain if var is constant. ORIGINAL



10.6 constant propagation; Follow UD links to ascertain if var is constant. PROPOGATED



10.7 common subexprs eliminated using results of available expressions