CS308 Homework 3

Exercises for Algorithm Design and Analysis by Li Jiang, 2016 Autumn Semester

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Coverage : Intermediate Code Generation.

1. (Section 6.1, Exercises 6.1.1) Construct the DAG for the expression

   ((x+y)-((x+y)*(x-y)))+((x+y)*(x-y))

   Solution.

   construction step

1)	p1 = Leaf(id, entry-x)
2)	p2 = Leaf(id, entry-y)
3)	p3 = Node('+', p1, p2)
4)	p4 = Leaf(id, entry-x) = p1
5)	p5 = Leaf(id, entry-y) = p2
6)	p6 = Node('+', p1, p2) = p3
7)	p7 = Leaf(id, entry-x) = p1
8)	p8 = Leaf(id, entry-y) = p2
9)	p9 = Node('-', p1, p2)
10)	p10 = Node('*', p3, p9)
11)	p11 = Node('-', p3, p10)
12)	p12 = Leaf(id, entry-x) = p1
13)	p13 = Leaf(id, entry-y) = p2
14)	p14 = Node('+', p1, p2) = p3
15)	p15 = Leaf(id, entry-x) = p1
16)	p16 = Leaf(id, entry-y) = p2
17)	p17 = Node('-', p1, p2) = p9
18)	p18 = Node('*', p3, p9) = p10
19)	p19 = Node('+', p11, p10)

表 1: DAG construction

   DAG

□

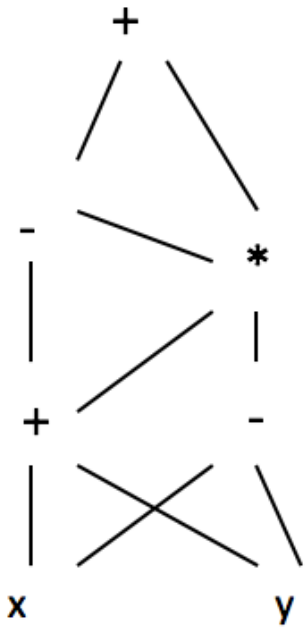

图 1: DAG

2. (Section 6.2, Exercises 6.2.2) Translate the following arithmetic expression into Triples.

   (a) a = b[i]+c[j]

   (b) a[i]=b*c-b*d

   (c) x=f(y+1)+2

   (d) x=*p+&y

Solution.

(a)

	op	arg1	arg2
0	=[ ]	b	i
1	=[ ]	c	j
2	+	(0)	(1)
3	=	a	(2)

表 2: triple of a = b[i]+c[j]

(b)

	op	arg1	arg2
0	*	b	c
1	*	b	d
2	-	(0)	(1)
3	[ ]=	a	i
4	=	(3)	(2)

表 3: triple of a[i]=b*c-b*d

(c)

	op	arg1	arg2
0	+	y	1
1	param	(0)	
2	call	f	(1)
3	+	(2)	2
4	=	x	(3)

表 4: triple of x=f(y+1)+2

(d)

	op	arg1	arg2
0	*	p	
1	&	y	
2	+	(0)	(1)
3	=	x	(2)

表 5: triple of x=*p+&y

□