编译原理作业 15

23.12.18

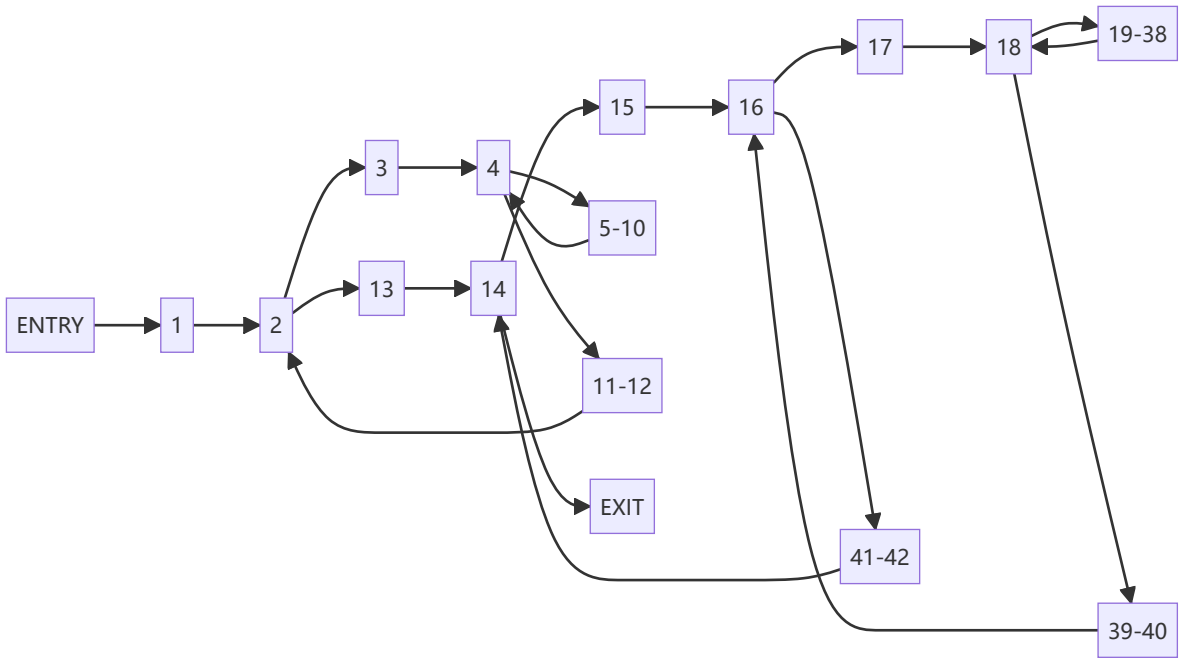
8.4.1

(1)

下面的三地址代码假定三个矩阵的第二维都含有 `n` 个元素.

```
i = 0
if i >= n goto (13)
j = 0
if j >= n goto (11)
t1 = n * i
t2 = t1 + j
t3 = t2 * 8
c[t3] = 0.0
j = j + 1
goto (4)
i = i + 1
goto (2)
i = 0
if i >= n goto (43)
j = 0
if j >= n goto (41)
k = 0
if k >= n goto (39)
t4 = n * i
t5 = t4 + j
t6 = t5 * 8
t7 = c[t6]
t8 = n * i
t9 = t8 + k
t10 = t9 * 8
t11 = a[t10]
t12 = n * k
t13 = t12 + j
t14 = t13 * 8
t15 = b[t14]
t16 = t11 * t15
t17 = t7 + t16
t18 = n * i
t18 = t18 + j
t20 = t19 * 8
c[t20] = t16
k = k + 1
goto (18)
j = j + 1
goto (16)
i = i + 1
goto (14)
EXIT
```

(2)



(3)

循环有:

- {4, 5-10}.
- {2, 3, 4, 5-10, 11-12}.
- {18, 19-38}.
- {16, 17, 18, 19-38, 39-40}.
- {14, 15, 16, 17, 18, 19-38, 39-40, 41-42}.

另一道作业题

(1)

冲突情况:

- R1: R2, R3, R4, R5, R6, R7, R8.
- R2: R1, R3, R4, R5, R6, R7.
- R3: R1, R2, R4, R5.
- R4: R1, R2, R3.
- R5: R1, R2, R3, R6.
- R6: R1, R2, R5.
- R7: R1, R2, R8.
- R8: R1, R7.

(2)

一种可能的方案为溢出 R2, 将 BB1 和 BB4 分别修改为

```
// BB1
LD R1, a
LD R2, b
ST 4(SP), R2

// BB4
LD R9, 4(SP)
MUL R7, R9, R4
ST g, R7
LD R8, #5
SUB R10, R2, R7
ST 4(SP), R10
```

然后就可以指派如下:

- 物理寄存器 1: R3, R6, R7, R9.
- 物理寄存器 2: R4, R5, R8, R10.
- 物理寄存器 3: R1.

(3)

至少要 4 个. R1 与所有其它符号寄存器冲突, 必须单独放在一个物理寄存器中, R2, R3, R4 互相冲突, 必须分别放在三个物理寄存器中, 因此至少要 4 个物理寄存器. 一种可能的方案为四个物理寄存器分别存放 {R3, R6, R7}, {R4, R5, R8}, {R2}, {R1}.