

## Basic Blocks and Leaders

Ex:  $a = x + y * z$

$$\begin{aligned}t_1 &= y * z \\t_2 &= x + t_1 \\a &= t_2\end{aligned}$$

Algorithm: Partition into basic blocks.

Input: Sequence of 3 address statements.

Output: A list of basic blocks.

Method:

1. Determine the set of leaders

Rules:

- (i) The first statement is a leader
- (ii) Target of conditional or unconditional goto is a leader
- (iii) statement that immediately follows goto or unconditional goto is a leader.

2. for each leader, its basic blocks consists of leader and all statements upto the next leader.

### Fragment of source code

```
begin
  p := 0 ;
  i := 1 ;
  to begin
    p = p + a[i] * b[i] ;
    i = i + 1
  end
  while i <= 20 ;
    j = j + 1
end
```

### Three address code

1.  $p = 0$   $B_1$   
2.  $i = 1$   $B_2$   
3.  $t_1 = 4 * i$   
4.  $t_2 = a[t_1]$   
5.  $t_3 = 4 * i$   
6.  $t_4 = b[t_3]$   
7.  $t_5 = t_2 * t_4$   
8.  $t_6 = p + t_5$   
9.  $p = t_6$   
10.  $t_1 = i + 1$   
11.  $i = t_1$   
12. if  $i <= 20$  goto (3)  
13.  $t_8 = j + 1$   $B_3$   
14.  $j = t_8$

### Set of leaders

leaders = 1, 3, 13

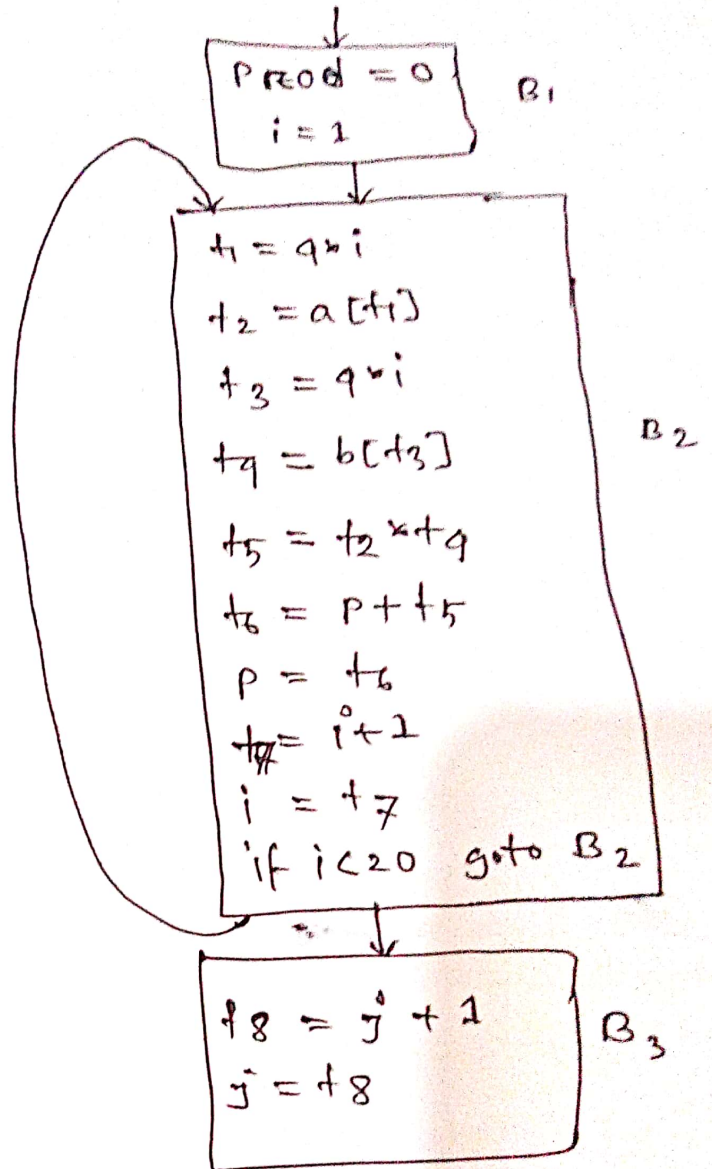


## Flow Graph

- Directed Graph
- Nodes → Basic Blocks
- Edges → flow of control

Directed edge from block  $B_1$  to  $B_2$ , if

1. Conditional or unconditional jump from  $B_1$  to  $B_2$
2.  $B_2$  immediately follows  $B_1$



## Note

যদি  $\text{goto } B_2$  থাকত তাহলে,  $B_3$  ত কোন edge নেই যা  $B_2$  থেকে আসবে। তাহলে তাহলে  $B_2$  থেকে  $B_2$  তেই যে লুপ ২য়।