BASIC BLOCKS & FLOW GRAPHS

Basic Blocks:

   A block of code means a block of intermediate code with *no jumps in* except at the beginning and *no jumps out* except at the end.

   A basic block is a sequence of consecutive statements in which flow of control enters at the beginning and leaves at the end without halt or possibility of branching except at the end.

Algorithm for Partition into Basic Blocks:-

Input: - A sequence of Three Address statements.

Output:- A basic blocks with each three address statement in exactly one block.

Method:-

   1. We first determine the set of leaders, the first statement of basic blocks.

    The rules we use are the following,

     (i) The first statement is a leader.

     (ii) Any statement that is the target of a conditional or unconditional GOTO is a leader.

     (iii) Any statement that immediately follows a GOTO or unconditional GOTO statement is a leader.

   2. For each leader, its basic block consists of the leader and all statements up to but not including the next leader or the end of the program.

Example:-

   Consider the fragment of code, it computes the dot product of two vectors A and B of length 20.

```
Begin
      PROD:=0
      I:=1
      Do
        Begin
            PROD:=PROD+A[I]*B[I]
            I:=I+1
        End
      While I<=20
End
```

A list of three address statements performing the computation of above program is, (for a machine with four bytes per word)

So the three address statements of the above Pascal code is,
1. PROD:=0
2. I:=1
3. t1:=4*I
4. t2:=A[t1]
5. t3:=4*I
6. t4:=B[t3]
7. t5:=t2*t4
8. t6:=PROD+t5
9. PROD:=t6
10. t7:=I+1
11. I:=t7
12. if I<=20 GOTO (3)

The Leaders are, 1 and 3. So there are two Basic Blocks

Block 1.

```
1.PROD:=0
 2.  I:=1
```

Block 2.

```
3    t1:=4*I
4    t2:=A[t1]
5    t3:=4*I
6    t4:=B[t3]
7    t5:=t2*t4
8    t6:=PROD+t5
9    PROD:=t6
10  t7:=I+1
11  I:=t7
12. If  I<=20  GOTO (3)
```

References

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