

# Three Address Code Generation for Control Statements

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- **INTRODUCTION :-**

- The basic idea of converting any flow of control statement to a three address code is to simulate the "branching" of the flow of control.
- This is done by skipping to different parts of the code (label) to mimic the different flow of control branches.
- Flow of control statements may be converted to three address code by use of the following functions:-
  - ✓ newlabel – returns a new symbolic label each time it is called.
  - ✓ gen () – "generates" the code (string) passed as a parameter to it.
- The following attributes are associated with the non-terminals for the code generation:-
  - ✓ code – contains the generated three address code.
  - ✓ true – contains the label to which a jump takes place if the Boolean expression associated (if any) evaluates to "true".
  - ✓ false – contains the label to which a jump takes place if the Boolean expression (if any) associated evaluates to "false".
  - ✓ begin – contains the label / address pointing to the beginning of the code chunk for the statement "generated" (if any) by the non-terminal.

- **EXAMPLES:-**

Lets try converting the following c code

## FOR LOOP

```
a=3;
b=4;
for(i=0;i<n;i++){
    a=b+1;
    a=a*a;
}
c=a;
```

## in 3 TA code

```
a=3;
b=4;
i=0;
L1:  VAR1=i<n;
     if(VAR1) goto L2;
     goto L3;
L4:  i++;    i = i + 1
     goto L1;
L2:  VAR2=b+1;
```



```

a=VAR2;
VAR3=a*a;
a=VAR3;
goto L4

```

```

L3: c=a;

```

### WHILE Loop

```

a=3;
b=4;
i=0;
while(i<n){
    a=b+1;
    a=a*a;
    i++;
}
c=a;

```

### in 3 TA code

```

a=3;
b=4;
i=0;

L1:  VAR1=i<n;
     if(VAR1) goto L2;
     goto L3;

L2:  VAR2=b+1;
     a=VAR2;
     VAR3=a*a;
     a=VAR3;
     i++;
     goto L1

L3:  c=a;

```

### DO WHILE Loop

```

a=3;
b=4;
i=0;
do{
    a=b+1;
    a=a*a;
    i++;
}while(i<n);
c=a;

```

### in 3 TA code

```

a=3;
b=4;
i=0;

L1:  VAR2=b+1;
     a=VAR2;
     VAR3=a*a;
     a=VAR3;
     i++;

     VAR1=i<n;
     if(VAR1) goto L1;
     goto L2;

L2:  c=a;

```