Covered Topics Under UNIT-3 of "CD- COMPILER DESIGN (KIT-052)"

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CD: UNIT-3

Syntax-Directed Translation

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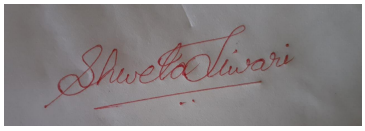

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TOPIC On : UNIT-3

3 Address Code for (IF then ELSE, BOOLEAN, WHILE and For LOOP)

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By SHWETA TIWARI

Under On: Syntax-Directed Translation

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Unit-3

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3-Address Code for [conditional statement, loops, switch case and boolean expression].

Here, we write 3-address code for [conditional statement, loops, switch case and boolean expression] like as (if then else, while and for loop, boolean expression (OR, AND, NOT) switch case as well.

The only 2 things are important for 3-address code for different cases.

(1) for condition we use only **if**
(2) for Jump we use **goto**

[1] 3-Address Code for (if-then else)

if (a < b) then x = y + z else p = q + r

(1) if (a < b) goto (3) — true
(2) goto (6) — false
(3) $t_1 = y + z$
(4) $x = t_1$
(5) goto --

6.
7. $t_2 = q + r$
8. $p = t_2$
   goto ---

2. 3- Addres code for while loop

while (a<b) do x = y+z

1. if (a<b) goto (3) — true
2. goto --- — false
3. $t_1 = y + z$
4. $x = t_1$
5. goto (1)

3. 3-Addres code for loop.

for (i=1; i<=20; i++)
x = y+z

1. i = 1
2. if (i<=20) goto (7) — true
3. goto --- — false
4. $t_1 = i + 1$
5. $i = t_1$
6. goto (2)
7. $t_2 = y + z$
8. $x = t_2$
9. goto (4)

(4) 3- Address code for boolean expression

if (a<b) AND (c>d) then p = q+r

(1) if (a<b) goto (3). true

(2) goto ---. false

(3) if (c>d) goto (5). true

(4) goto ---. false

(5) $t_1 = q + r$

(6) $p = t_1$

(7) goto --

(5) Switch Cases

```
switch (i+j)
{ case 1: x=y+z
  case 2: u=v+w
  default: p=q+r
}
```

(1) $t_1 = i + j$

(2) if $t_1 = 1$ goto (5)

(3) if $t_1 = 2$ goto (8)

(4) goto (11)

(5) $t_2 = y + z$

(6) $x = t_2$

(7) goto ---

(8) $t_3 = v + w$

(9) $u = t_3$

(10) goto ---

(11) $t_4 = q + r$

(12) $p = t_4$

(13) goto ---

Question Write 3-address code for (if-then else).

if (z > y) then z = z + 1

1. if (z > y) then goto (3) — true
2. goto ___ — false
3. $t_1 = z + 1$
4. $z = t_1$
5. goto ___

Question write 3-address code for (if-then else or nested if-else)

if (a < b) then x = y + z
else
if (d > c) then p = q + r
else
u = v + w

1. if (a < b) then goto (4) — true
2. goto (6) — false
3. $t_1 = y + z$
4. $x = t_1$
5. goto ___

(6) if (d>c) then goto (8) true

(7) goto (11)

(8) $t_2 = q + r$

(9) $p = t_2$

(10) goto ---

(11) $t_3 = v + w$

(12) $u = t_3$

(13) goto ---

Question

```
while (A<C) and (B>D) do
    if (A=1) then C=C+1
    else
        while (A<=D) do
            A=A+3
```

1. if (A<C) goto 3 — true
2. goto ___ — false
3. if B>D goto 5 — true
4. goto ___ — false
5. if (A=1) goto 7 — true
6. goto 10 — false
7. $t_1 = C+1$
8. $C = t_1$
9. goto 1
10. if (A<=D) goto 12 — true
11. goto ___ — false
12. $t_2 = A+3$
13. $A = t_2$
14. goto 10
15. goto 1

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