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Date: 07 Apr 2022

Subject Name: Compiler Design

Subject Code: SCSA1604

Total pages: 6

PART-B

(6) $A \rightarrow id := E$

$E \rightarrow E_1 + E_2$

$E \rightarrow E * E$

$E \rightarrow (E_1)$

$E \rightarrow -E$

$E \rightarrow id$

Production	Semantic Action
$A \rightarrow id : E$	$\{ p = lookup(id.\,place)$ $if\ (p\ != null)$ $gen(p := E.place)$ $else\ Error\ \}$
$E \rightarrow E' + E^2$	$\{ T = new\ Temp()$ $gen(T.place = E'.place + E^2.place)\ \}$
$E \rightarrow E' * E^2$	$\{ T = new\ Temp()$ $gen(T.place = E'.place * E^2.place)\ \}$

$E \to -E'$

{ T=new temp()
gen (T.place = ~~E'.place * E'.place~~) - E'.place
}

$E \to (E')$

{ E.place = E'.place }

$E \to id$

{ p=lookup (id.place)
    if (p! =null)
        E.place = id
    else error
}

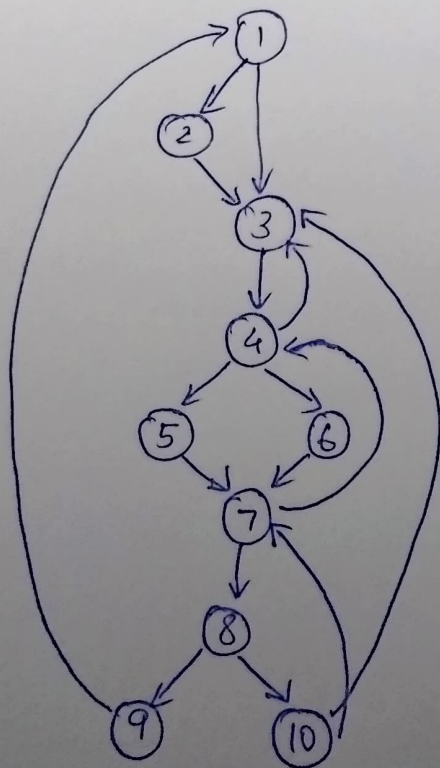eg: $x = -B * (C+D)$

$T_1 = -B$

$T_2 = C+D$

$T_3 = T_1 * T_2$

$x := T_3$

Input	state	place	Code Generated
$x = -B*(C+D)$			
$= -B* (C+D)$	id	A	
$- B* (C+D)$	id =	A -	
$B* (C+D)$	id=-	A --	
$* (C+D)$	id=-id	A --B	
$* (C+D)$	id=-E	A --B	$T_1 =-B$
$* (C+D)$	id = E	A -T_1	
$(C+D)$	id = E*	A -T_2 -	
$C+D)$	id=E*C	A -T_1 --	
$+D)$	id=E* (id	A -T_1 --C	
$+D)$	id=E* (E	A -T_1 -- c	

D)	$id = E * (E +$	$A - T_1 -- C$	
)	$id = E * (E + id$	$A - T_1 -- C - D$	
)	$id = E*(E + E$	$A - T_1 -- C - D$	$T_2 = C + D$
)	$id = E* (E$	$A - T_1 -- T_2$	
	$id = E* (E)$	$A - T_1 -- T_2^-$	
	$id = E* E$	$A - T_1 - T_2$	$T_3 = T_1 * T_2$
	$id = E$	$A - T_3$	$A = T_3$
	S	S	

⑨

Algorithm

```
begin
    D(n₀) = {n₀}
    for n in N-{n₀}
    do
    D(n) = {N}
CHANGE = True
while change do
begin
    CHANGE := false
    for n in N-{0} do
    begin
        NEWD = {n} U {∩ D(P)}
                    P as predecessor of n
        if D(n) ≠ NEWD then CHANGE = True;

        D(n) = NEWD
    end
end
end
```

$$D(n_0) = \{n_0\}$$

$$NEWD = \{n\} \cup \left\{ \bigcap_{P\ as\ predecessor\ of\ n} D(P) \right\}$$

$N = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$D(1) = 1$

$D(2) = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$D(3) = \{1, 2, 3, 4, 5, 6; 7, 8, 9, 10\}$

$D(4) = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$D(5) = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$D(6) = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$D(7) = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$D(8) = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$D(9) = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

$D(10) = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

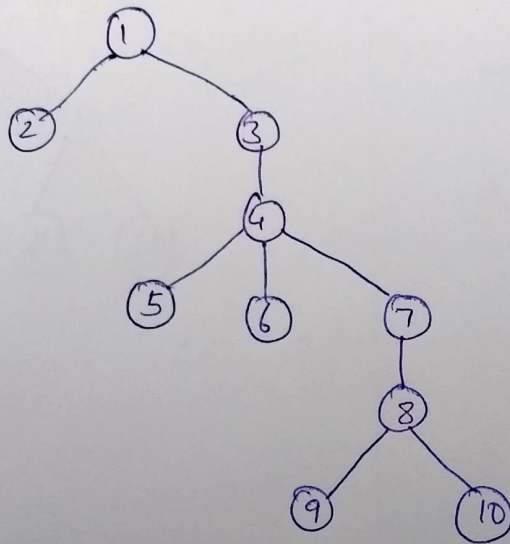$D(2) = \{2\} \cup \{D(1)\}$

$= \{2\} \cup \{1\} = \{1, 2\}$

$D(3) = \{3\} \cup \{D(1) \cap D(1) \cap D(8)\}$

$= \{3\} \cup \{1\} = \{1, 3\}$

$D(4) = \{4\} \cup \{D(3) \cap D(7)\}$

$= \{4\} \cup \{1, 3, 4\} = \{1, 3, 4\}$

$D(5) = \{5\} \cup \{D(4)\}$

$= \{5\} \cup \{1, 3, 4\} = \{1, 3, 4, 5\}$

$D(6) = \{6\} \cup \{D(4)\}$

$= \{6\} \cup \{1, 3, 4\} = \{1, 3, 4, 6\}$

$D(7) = \{7\} \cup \{D(5) \cap D(6) \cap D(10)\}$

$= \{7\} \cup \{1, 3, 4\} \cup \{1, 3, 4, 5\} = \{1, 3, 4, 5, 7\}$
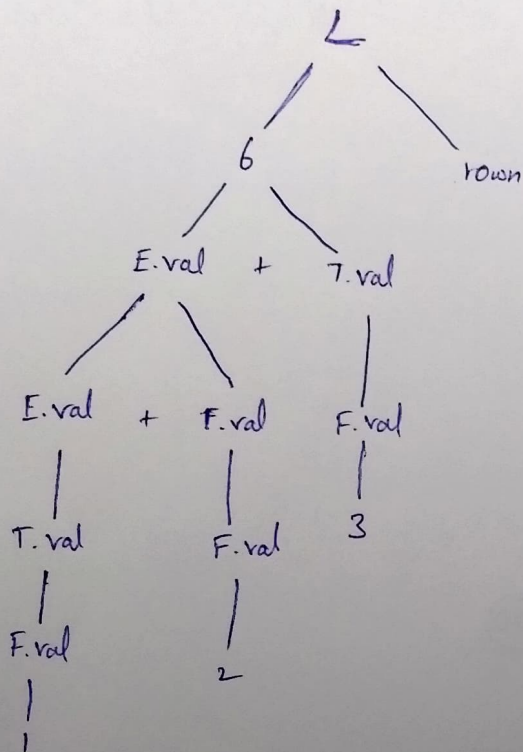

PART - A

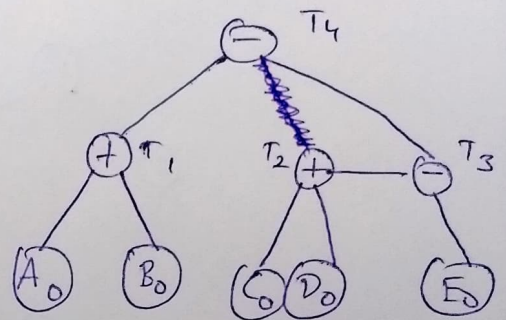① (1) if $(A < B)$ goto (4)

(2) $T1 = 0$

(3) goto (5)

(4) $T1 = 1$

(5) Exit

③ a) It is used to store the name of all entities in a structured form at one place.

b) It is used to verify if a variable has been declared.

c) It is used to determine the scope of a name

②

④

⑤ Dominance is a Reflexive partial order. It is

Reflexive (a DOM [a for all a])

Anti symmetric [a DOM b & b DOM a]

Transitive [a DOM b & Pb DOM c ⟹ a DOM c]