8/02/2023

Symbol Table

int a = 5 ;

In memory is it really like memory location is named as a. No it is not the case. There is a symbol table in which the variable name is mapped to address.

Hence we can say that symbol table will encorporate the mapping blw variable name & address. Symbol table is a data structure.

Note → Application of XOR operator can be like finding unique number i.e which appears only once

1 2 3 3 4 4 5 1 2

XOR all the values & by these 2 properties

a ^ a = 0

a ^ 0 = a

1 ^ 1 ^ 2 ^ 2 ^ 3 ^ 3 ^ 4 ^ 4 ^ 5

0 ^ 0 ^ 0 ^ 0 ^ 5

0 ^ 0 ^ 0 ^ 5

0 ^ 0 ^ 5

0 ^ 5 = 5 } This appears only once.

Ternary / Conditional operator

Another way of writing if-else statements.

Ex → int age = 15;

age >= 18 ? cout << "Vote" : cout << "Not vote";

Here the o/p will be Not Vote as the condition is false

Note → condition ? val1 : val2;

condition = true → val1 is executed
condition = false → val2 is executed.

Ex → int a = 5;
int b = 10;
int ans1 = (++a) * (--b)
6 x 9 = 54 a = 6, b = 9
int ans2 = (++a) * (b--)
7 x 9 = 63 a = 7, b = 8
in t ans3 = (a++) * (--b)
7 x 7 = 49 a = 8 b = 7
int ans4 = (a++) * (b--)
8 x 7 = 56 a = 9 b = 6

Infinite loop
Loop is infinite or never ending when the condition is always true.

```
for (int i=0 ; i>=0 ; i++){
        // Code
}
```

This is an example of infinite loop.

Ques 1 Print digits of a number

Let's say we have a number 623 & then we have to print 6, 2, 3 on the screen.

This can be done via modulus operator

* 1st iteration

623 % 10 = 3

623 / 10 = 62

* 2nd iteration

62 % 10 = 2

62 / 10 = 6

* 3rd iteration

6 % 10 = 6

6 / 10 = 0 not greater than 0 & hence end the loop. (Condition of termination of loop)

Code

```
int n = 623;
while (n > 0) {
    int digit = n % 10;
    cout << digit << " ";
    n = n / 10;
}
```

Output

3 2 6

Here we are not considering the ordering. Just print the digits.

While loop

```
int i = 0 ; → Initialization
while (i < 5) { → Condition
    cout << i << " " ;
    i++ ; → Updation
}
```

Output of above code

0 1 2 3 4

Similarly we can write the above code using for loop.

```
for (int i=0 ; i< 5 ; i++) {
        cout << i << " " ;
}
```

The output will be same as that of above done using while loop.

Difference in if & while loop

In if condition is checked only once but in while loop condition is checked again & again.

Ques2 Create a number using digits

We will be given digits

5 2 8 → ones

5 ← hundred, 2 → tens

ones → $8 \times 10^0 = 8$

tens → $2 \times 10^1 = 20$

hundred → $5 \times 10^2 = 500$

} Adding all $8 + 20 + 500 = 528$

Now we need to convert into formulae.

9 7 6 9

↓ ↓

$9 \times 10 = 90 + 7$

$= 97 \times 10$

$= 970 + 6$

$= 976 \times 10$

$= 9760 + 9$

$= 9769$ Hence we got the desired number.

Ex → 8,7,6

Initially ans = 0

ans ← $0 \times 10 + 8 = 8 \rightarrow$ ans

ans ← $8 \times 10 + 7 = 87 \rightarrow$ ans

ans ← $87 \times 10 + 6 = 876 \rightarrow$ ans

Formulae = ans × 10 + digit

We have to make an assumption that these digits are stored in array

8	2	3	7

digit [0] → 8

digit [1] → 2

digit [2] → 3

digit [3] → 7

Code

```
int digit [4] = {8, 2, 3, 7};
int ans = 0;
for (int i = 0; i < 4; i++) {
```

```
    ans = ans * 10 + digit[i];
}
cout << ans;  → 8237 will be o/p.
```

Ques 3 Count no of set bits in a number.
Set bits means 1.

n = 3 → 00----0011 (2 set bits)
n = 2 → 00----0010 (1 set bit)

If we want to know whether bit is 1 or not, then we can use bitwise AND as

1 & 1 = 1
0 & 1 = 0

We have to do AND of number with 1.

n = 3

00--0011 & 1 = 000--0001 Hence this is 1, we have found a set bit & increment value of count. Do right shift now.

00---0001 & 1 = 000--0001. Again we found set bit & just increment value of count. Do right shift.
Now n becomes 0, exit the loop.

Code

```
int n = 3;
int count = 0;
```

```
while (n != 0) {
    if (n & 1 == 1) {
        count++;
    }
    n = n >> 1;
}
cout << count;
```

Note → The above code will crash for negative numbers.

Ques 4 Convert km into miles

1 mile = 1.6 km

1 km = $\frac{1}{1.6}$ mile

Code

```
float dist_km = 16;                                   // exact is 1.609
float dist_mile = (dist_km * 1) / 1.6;
cout << dist_mile << endl;
```