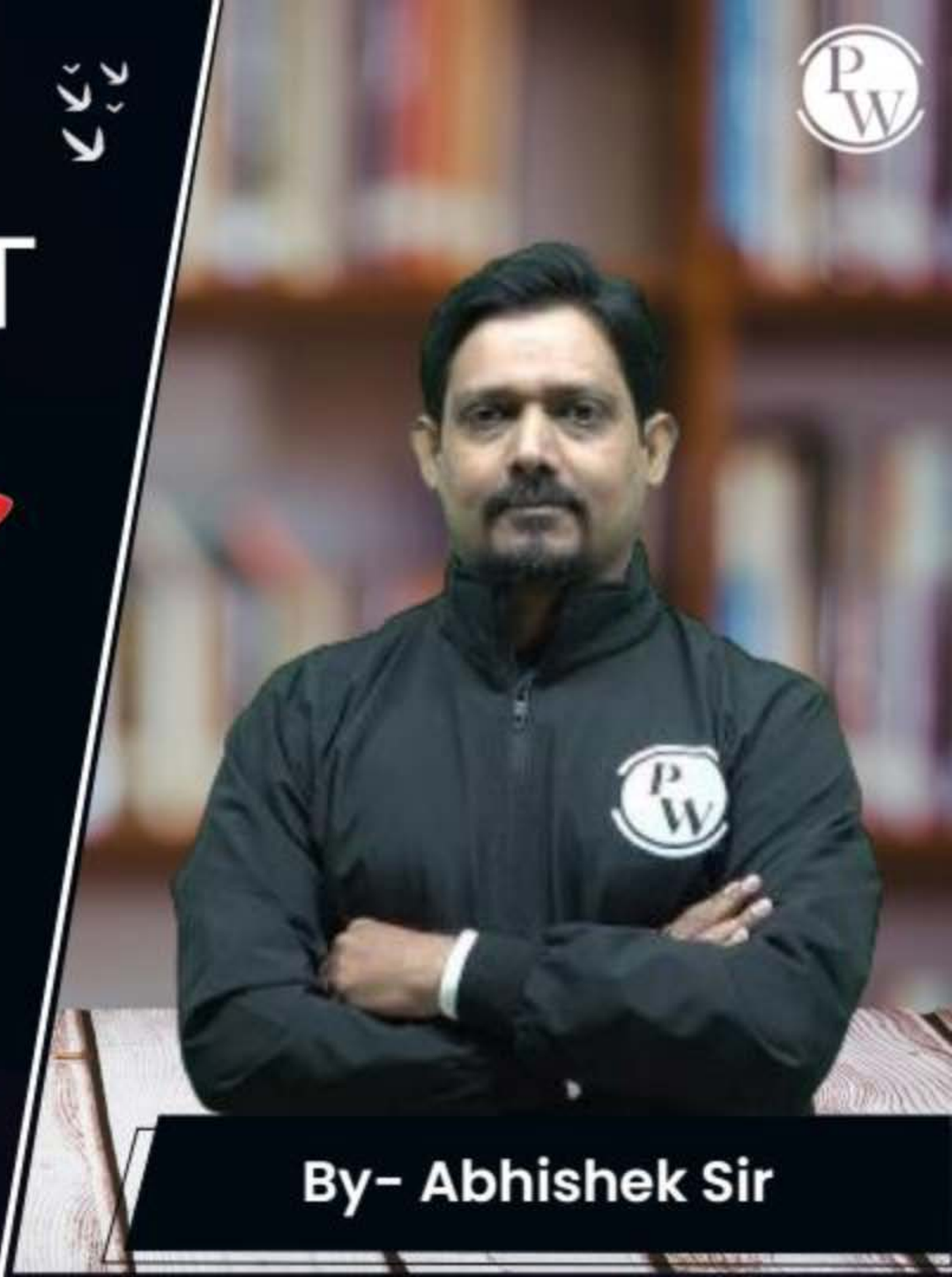
Computer Science & IT

C Programming

Control Flow Statement

Lecture No. 03



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Recap of Previous Lecture

Topic for Loop

Topic for (i = LB, i <= UB; i += k) = $\left\lceil \frac{UB - LB + 1}{k} \right\rceil$

Topic for (i = 2; i <= n; i *= 2)

Topic for (i = n; i >= 2; i /= 2)

} $\lfloor \log_2 n \rfloor$

Topic for (i = 1; i <= n; i *= 2) } $\lfloor \log_2 n \rfloor + 1$

Slide

Topics to be Covered

- Topic
- Topic
- Topic
- Topic
- Topic

while Loop / do while Loop

Slide

GATE 2015

```
#include<stdio.h>
int main()
{
    int i, j, k = 0;
    j=2 * 3 / 4 + 2.0 / 5 + 8 / 5;
    k-=--j;
    for (i=0; i<5; i++)
    {
        switch(i+k)
        {
            case 1:
            case 2: printf("\n%d", i+k);
            case 3: printf("\n%d", i+k);
            default: printf("\n%d", i+k);
        }
    }
    return 0;
}
```

Number of times printf will execute is _____

j integer

j = 2

expression

6/4 + 2.0/5 + 1

1 + 0.4 + 1 = 2.4

j = 2 / 1

k -= --j,

k = k - j 0 - 1 = k = -1

Slide

GATE 2015

```
#include<stdio.h>
int main()
{
    int i, j, k = 0;
    j=2 * 3 / 4 + 2.0 / 5 + 8 / 5;
    k-=--j;
    for (i=0; i<5; i++)
    {
        switch(i+k)
        {
            case 1:
            case 2: printf("\n%d", i+k);
            case 3: printf("\n%d", i+k);
            default: printf("\n%d", i+k);
        }
    }
    return 0;
}
```

Number of times printf will execute is _____

k = -1

i	switch(i+k)		
	k = -1		
	i+k		
i = 0	-1	default	1
i = 1	0	default	1
i = 2	1	case 1	3
i = 3	2	case 2	3
i = 4	3	case 3	2

[10]

Slide

Question

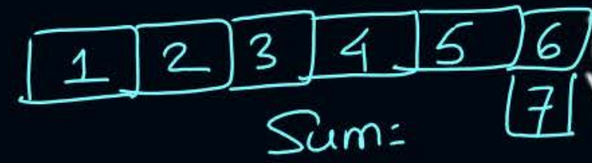
Consider the following Program

```
#include<stdio.h>
    int main(){
        int i=1, j=1, sum=0;
        for(; j; sum+=i*10+j)
            j=i++ <= 5;
        printf("%d", sum);
        return 0 ;
    }
```

Output of the program is

(a) 275
(b) 204
(c) 122
(d) Infinite loop

Slide



J=1 J=1<=5 0+20+1=21

J=1 J=2<=5 21+31=52

J=1 J=3<=5 52+41=93

J=1 J=4<=5 93+51=144

J=1 J=5<=5 144+61=205
J=1

J=1 J=6<=5 205+70=275
J=0

Question

#Q. consider the folllowing program

```
#include <stdio.h>
int main(){
    int i, j, count= 0;
    for(i=12;i<=211;i<<=2)
        for(j=2+4%6+9/10;j<=211;j+=2)
            count++;

    printf("%d", count);
        return 0;
}
```

The output of the program is 309

8 times

$12 <= 211$

$12 \times 2^2 : 48 <= 211$

$48 \times 4 : 192 <= 211$

$\left\lceil \frac{211 - 6 + 1}{2} \right\rceil$

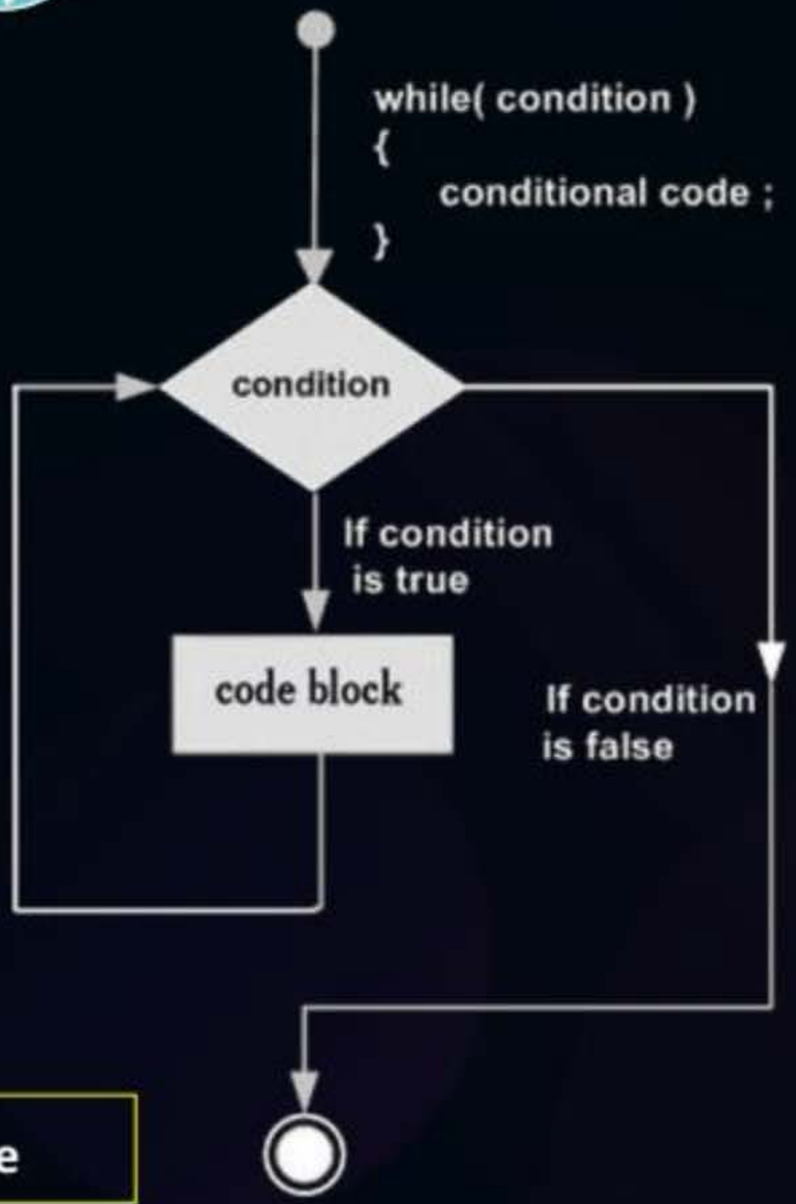
$j : 2 + 4 + 0$

$j : 6$

$\left\lceil \frac{206}{2} \right\rceil : 103$

Slide

While loop



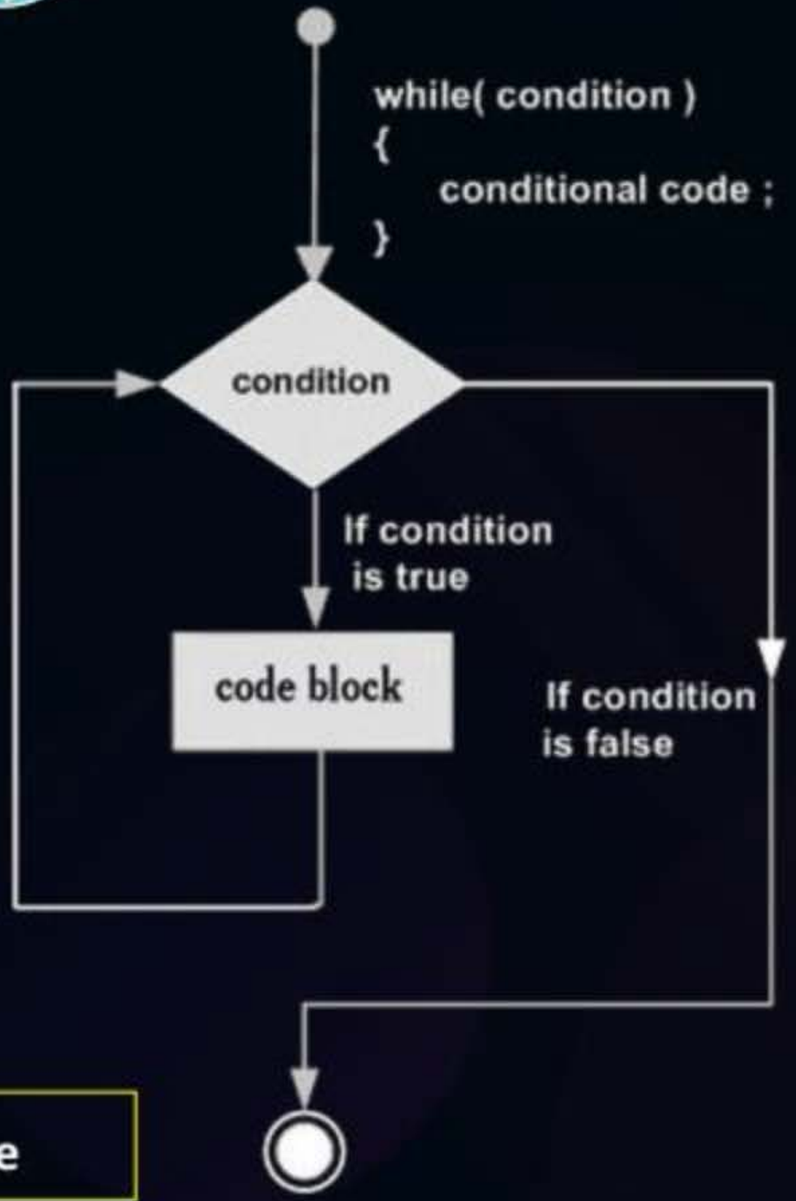
Speed ↑ Accuracy ↓

* while loop used when No of iteration depends upon condition.
* while (condition){

}

Slide

While loop



Array Algorithm : for loop

Linked list : while

* while ( ) → condition can't be blank
  error

* while(1) { Infinite loop
  }

Slide

Question

hello , hello, hello, hello

Consider the following program

```
#include<stdio.h>
     int main(){
          int x=5, y=5;
        while (x-=y++<10) {
            printf("hello ") ;
            }
          return 0 ;
     }
```

x -= 1

Number of times printf Executed is

5 < 10 = 1
6 < 10 = 1
7 < 10 = 1
8 < 10 = 1
9 < 10 =

x = 5 4 3 2 1
y = 5 6 7 8 9

x -= y < 10

x -= 1

x -= y++ < 10

6 < 10

x -= 1

x -= 7 < 10

x -= y++ < 10

x = 8 < 10

x -= y++ < 10

x -= 9 < 10

x = x - 1

x = 1 - 1

◎

Slide

Question

2024

Consider the following C program:

```
#include <stdio.h>
int main(){
      int a = 6;
      int b = 0;
      while(a < 10) {
            a = a / 12 + 1;
            a += b;
      }
      printf("%d", a);
      return 0;
}
```

Which one of the following statements is CORRECT?

(A) The program prints 9 as output
(B) The program prints 10 as output
(C) The program gets stuck in an infinite loop
(D) The program prints 6 as output

Question

2024

Consider the following C program:

```
#include <stdio.h>
int main(){
        int a = 6;
        int b = 0;
        while(a < 10) {
                a = a / 12 + 1;
                a += b;
        }
        printf("%d", a);
        return 0;
}
```

6<10

a = 6/12 + 1

= 0 + 1 = 1

a = a + b

1 | 0 = 1

while (1<10)

a = 1/12 + 1

= 1 0 + 1

a = a + b

1 + 0

= 1

while (1<10

Same thing will be repeated

Slide

Question

Consider the following C program

```
#include <stdio.h>
int main(){
float sum = 0.0, j = 1.0, i = 2.0;
while (i/j > 0.0625){
      j= j+j;
      sum = sum + i/j;
      printf("%f\n", sum);
}
return 0;
}
```

The number of times the variable sum will be printed, when the above program is executed, is _____.

Slide

Consider the function func 1 and func2 shown below:

```
int func1(unsigned int num) {
  int count = 0;
      while (num) {
          count++;
           num>>= 1;
  }
  return (count);
}

int func2(unsigned int num) {
  int count = 0;
      while (num>=0) {
          count++;
           num /= 2;
  }
  return (count);
}
```

MSQ

Which of the following is correct

(A) Both func1 and func2 produces the same output.

(B) func1 terminates for all value of num but func2 does not terminates for all value of num.

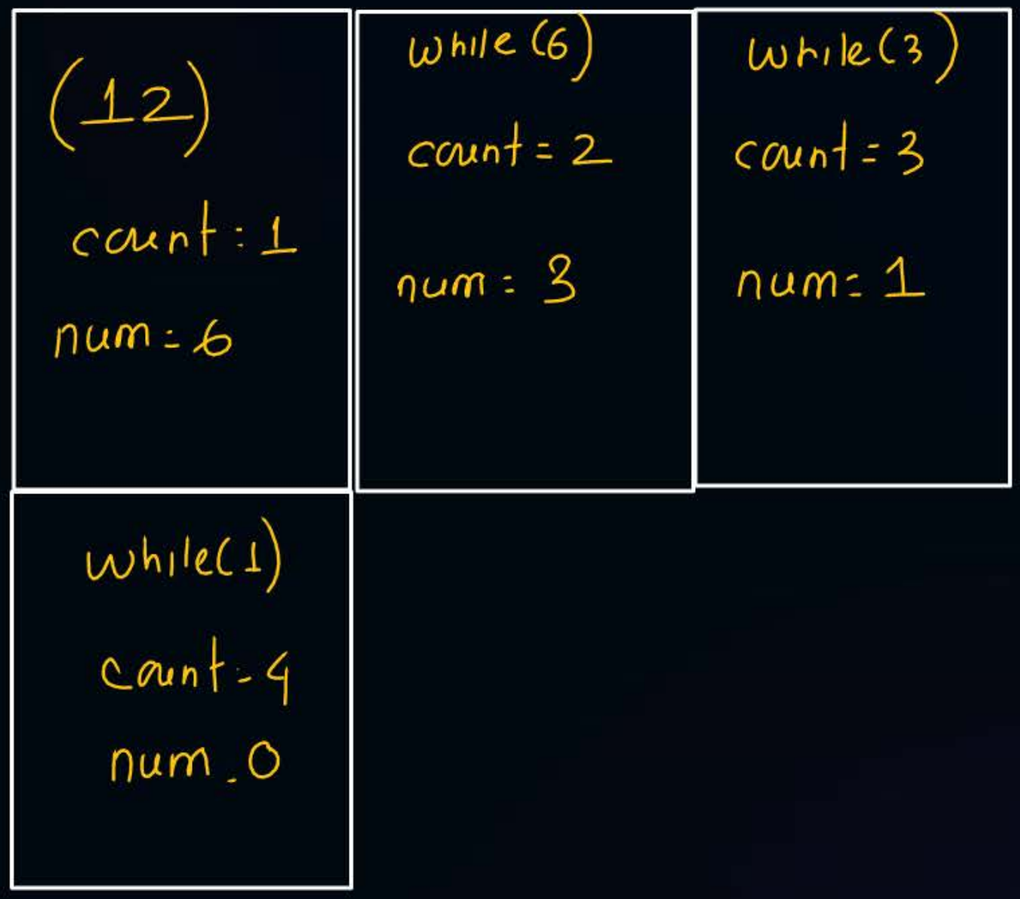
(C) func2 terminates for all value of num but func1 does not terminates for all value of num.

(D) Changing func2 statement to `while (num>0)` will make func1 and func2 to produce same output.

MSQ

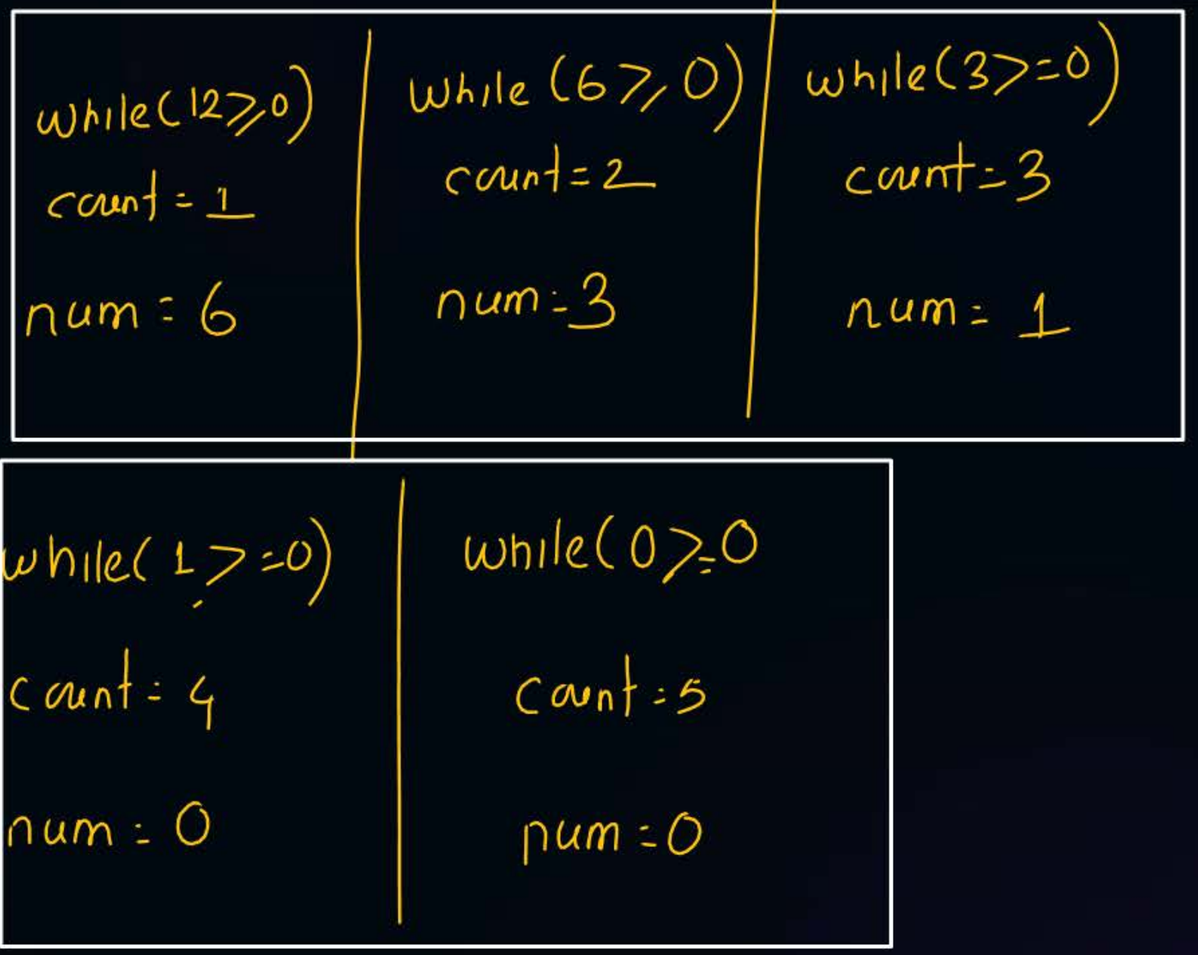
Consider the function func 1 and func2 shown below:

```
int func1(unsigned int num) {
  int count = 0;
      while (num) {
        count++;
         num>>= 1;
  }
  return (count);
}
```



MSQ

```
int func2(unsigned int num) {
  int count = 0;
      while (num>=0) {
        count++;
         num /= 2;
  }
  return (count);
}
```



Which of the following is correct

(A) Both func1 and func2 produces the same output.

(B) func1 terminates for all value of num but func2 does not terminates for all value of num.

(C) func2 terminates for all value of num but func1 does not terminates for all value of num.

(D) Changing func2 statement to `while (num>0)` will make func1 and func2 to produce same output.

Question MSQ

Consider the following c-program

```
#include <stdio.h>
int A(int n){
        static int num;
        num = n;
        return ++num;
}
int main(){
        int num = 15;
        A(num-=2);
        while(A(num-=2)){
            printf("%d ",A(num-=2));
            A(num-=2);
        }
  return 0;
}
```

The out put of the program is

A 10

B 10 4

C 4

D 10 4 1

Slide

Question MSQ

Consider the following c-program

```
#include <stdio.h>
int A(int n){
        static int num;
        num = n;
        return ++num;
}
int main(){
        int num = 15;
        A(num-=2);
        while(A(num-=2)){
            printf("%d ",A(num-=2));
            A(num-=2);
        }
    return 0;
}
```

The out put of the program is

Slide

num = 13, 11, 9, 7, 5, 3, 1, -1

A(13)

14

while(A(11))

while(12)

printf("%d", A(9))

10

A(7)

while(A(5))

6

printf("%d", A(3))

4

A(1)

2

while(A(-1))

while(0)

stop

12.

10, 4

Question

Consider the following program

```
#include <stdio.h>
int main(){
    int i = 3;
    while (i--){
        int i = 10;
        i--;
        printf("%d", i);
    }
    printf("%d", i);
}
```

Output of the program is

A 990

B 999-1

C 9990

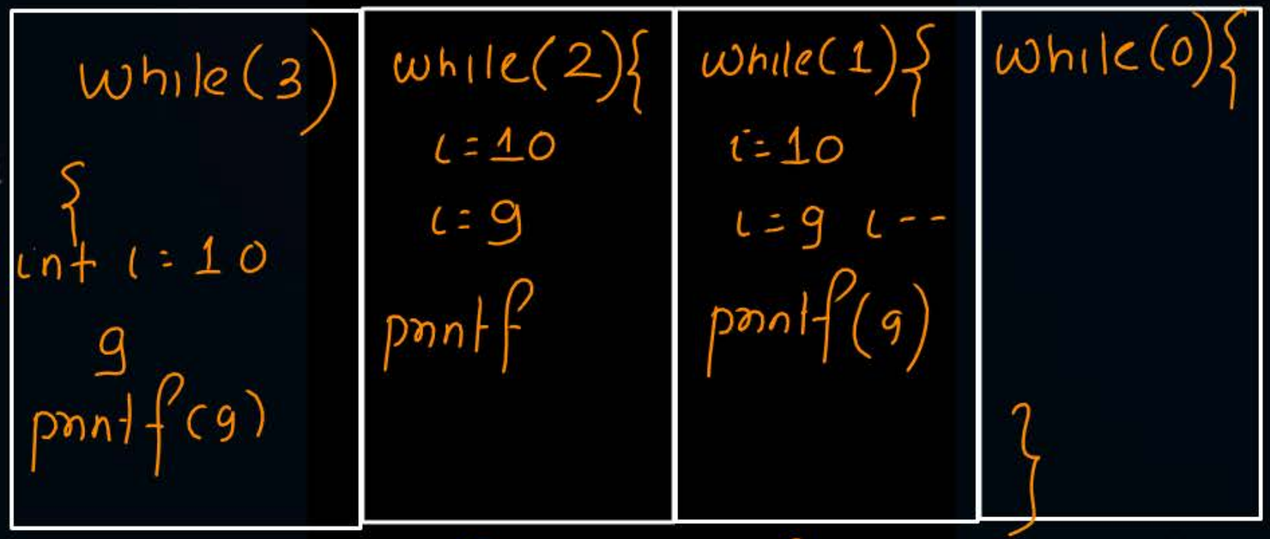
D 99-1

Question

Consider the following program

```
#include <stdio.h>
int main(){
    int i = 3;
    while (i--){
        int i = 10;
        i--;
        printf("%d", i);
    }
    printf("%d", i);
}
```

Output of the program is



Slide

chrome://flags

#Q. Consider the following C program:

```
#include <stdio.h>
int gate (int n) {
int d, t, newnum, turn;
newnum = turn = 0; t=1;
while (n>=t) t *= 10;
t /=10;
while (t>0) {
        d = n/t;
        n = n%t;
        t /= 10;
        if (turn) newnum = 10*newnum + d;
        turn = (turn + 1) % 2;
}
return newnum;
}
```

```
int main () {
        printf ("%d", gate(14362));
        return 0;
}
```

The value printed by the given C program is _____. (Answer in integer)

Slide

understand the question

14362

#Q. Consider the following C program:

```
#include <stdio.h>
int gate (int n) {
int d, t, newnum, turn;
newnum = turn = 0; t=1;
while (n>=t) t *= 10;
t /=10;
while (t>0) {
        d = n/t;
        n = n%t;
        t /= 10;
        if (turn) newnum = 10*newnum + d;
        turn = (turn + 1) % 2;
}
return newnum;
}
```

14362 >= t
t = 10
14362 >= 10
t = 100
t = 1000
14362 >= 1000
14362 >= 10000
t = 10000

t = 10,000
newnum = 0
turn = 0
t = 1
while (10,000 > 0)
d = 14362 / 10,000 = 1
n = n % t
14362 % 10
= 4362
t = 1000
turn = 1

while (1000 > 0) {
d = 4362 / 1000 = 4
n = 362
t = 100
if (1) =
newnum = 10 x 0 + 4
= 4
turn = 0

while (100 > 0)
d = 362 / 100 = 3
n = 62
t = 10
turn = 1

while (10 > 0)
d = 62 / 10 = 6
n = 2
t = 1
if (1) = 10 x 4 + 6 = 46
turn = 0

while (1 > 0)
d = 1
n = 0
t = 0
turn = 1

Slide

2 mins Summary

Topic While Loop

Topic problem Solving

Topic

Topic

Topic

Slide

THANK - YOU