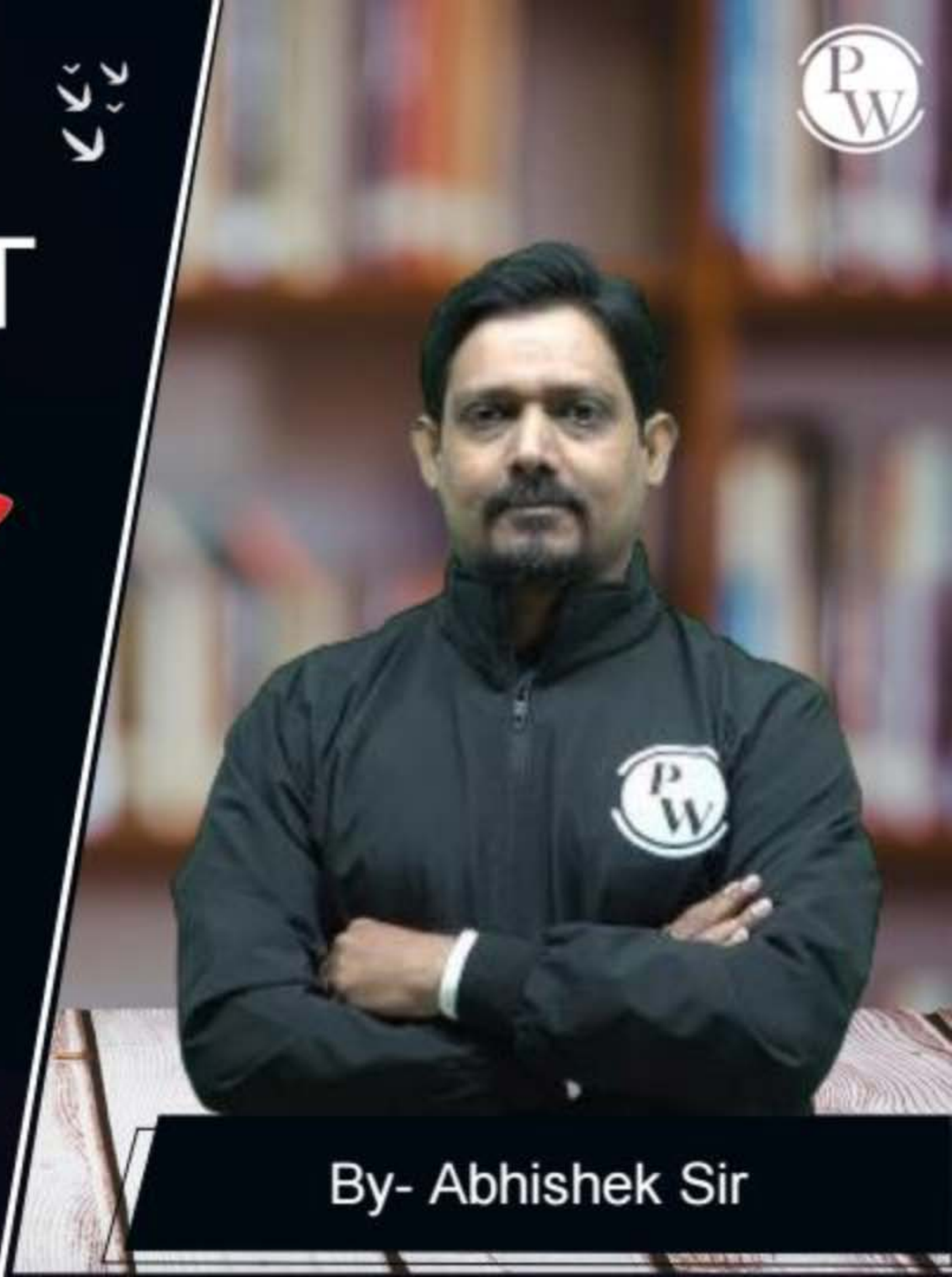
Computer Science & IT

C Programming

Function & Storage Class

Lecture No. 02



By- Abhishek Sir

Recap of Previous Lecture

- Topic — function
- Topic — Activation Record ~ (Local variable)
- Topic
- Topic
- Topic

Slide

Topics to be Covered

- Topic
- Topic
- Topic
- Topic
- Topic

problem ✓

Static storage (Imp)

Recursion (Imp)

Slide

Question

#Q The number of character printed by the code _____

```
#include<stdio.h>
void a();
void b();
void c();
int main(){
      a();
      b();
      return 0;
}
void a(){ printf("a"); b();}
void b(){ printf("a"); c();}
void c(){ printf("a");}
```

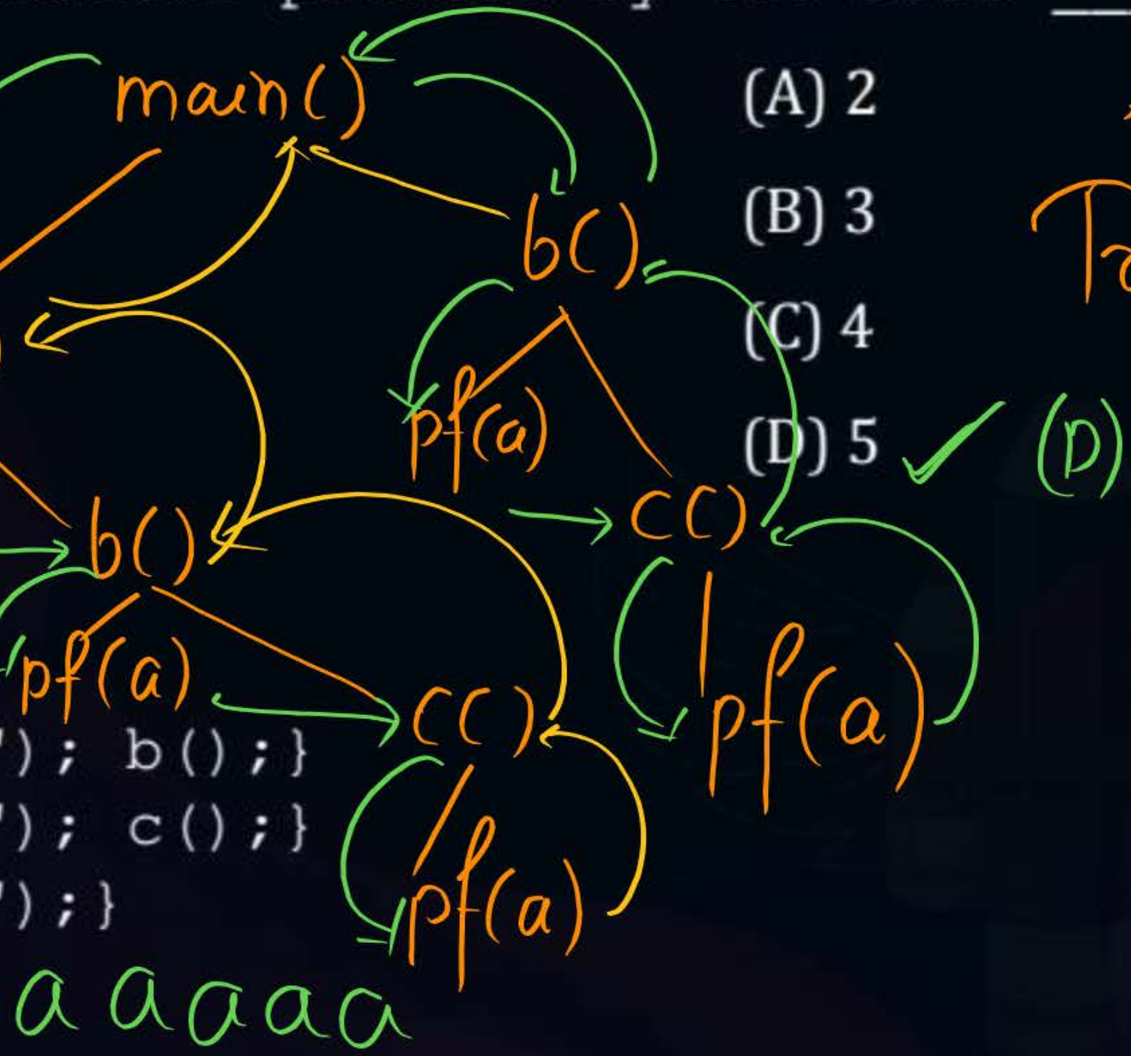
(A) 2

(B) 3

(C) 4

(D) 5 ✓ (D)

Activation Tree



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Activation Tree :- Activation Tree defines Transfer of control from one function to another and upon termination of function control Returns.

Question

```
#Q
Consider the following program
#include<stdio.h>
void a();
void b();
void c();

int main()
{
      a();
      b();
}
void a(){printf("a"); b();}
void b(){printf("b"); c();}
void c(){printf("c");}
```

What is the output of the following program

(A) abcabc

(B) abccb

(C) abcbc

(D) bcabc

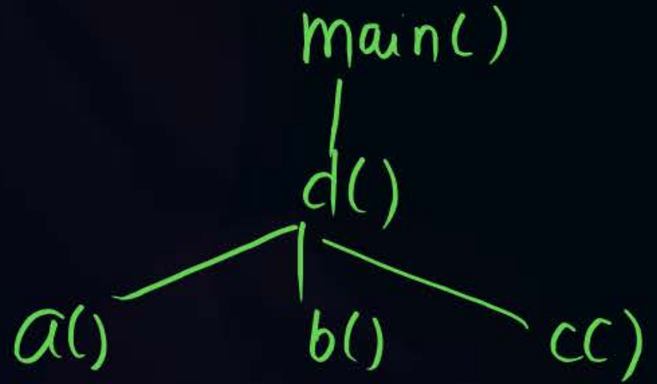
Slide

Question

#Q Consider the following program

```
#include <stdio.h>
void a(){printf("1");}
void b(){a();printf("2");}
void c(){a();b();printf("3");}
void d(){a();b();c();printf("4");}

int main(){
   d();
}
```



What is the output of the following program?

(A) 11211234

(B) 11211243

(C) 11212134

(D) 11211324

(A)

75%

Slide

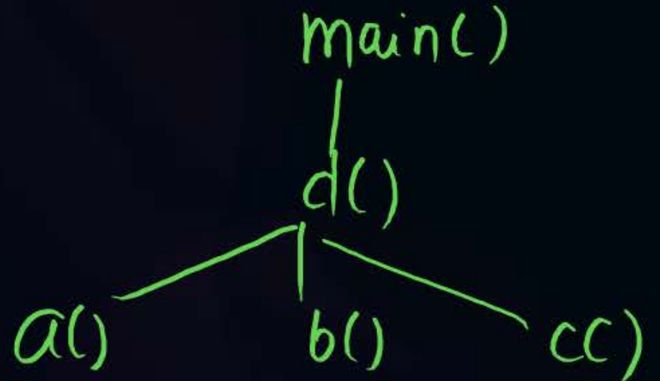
Question

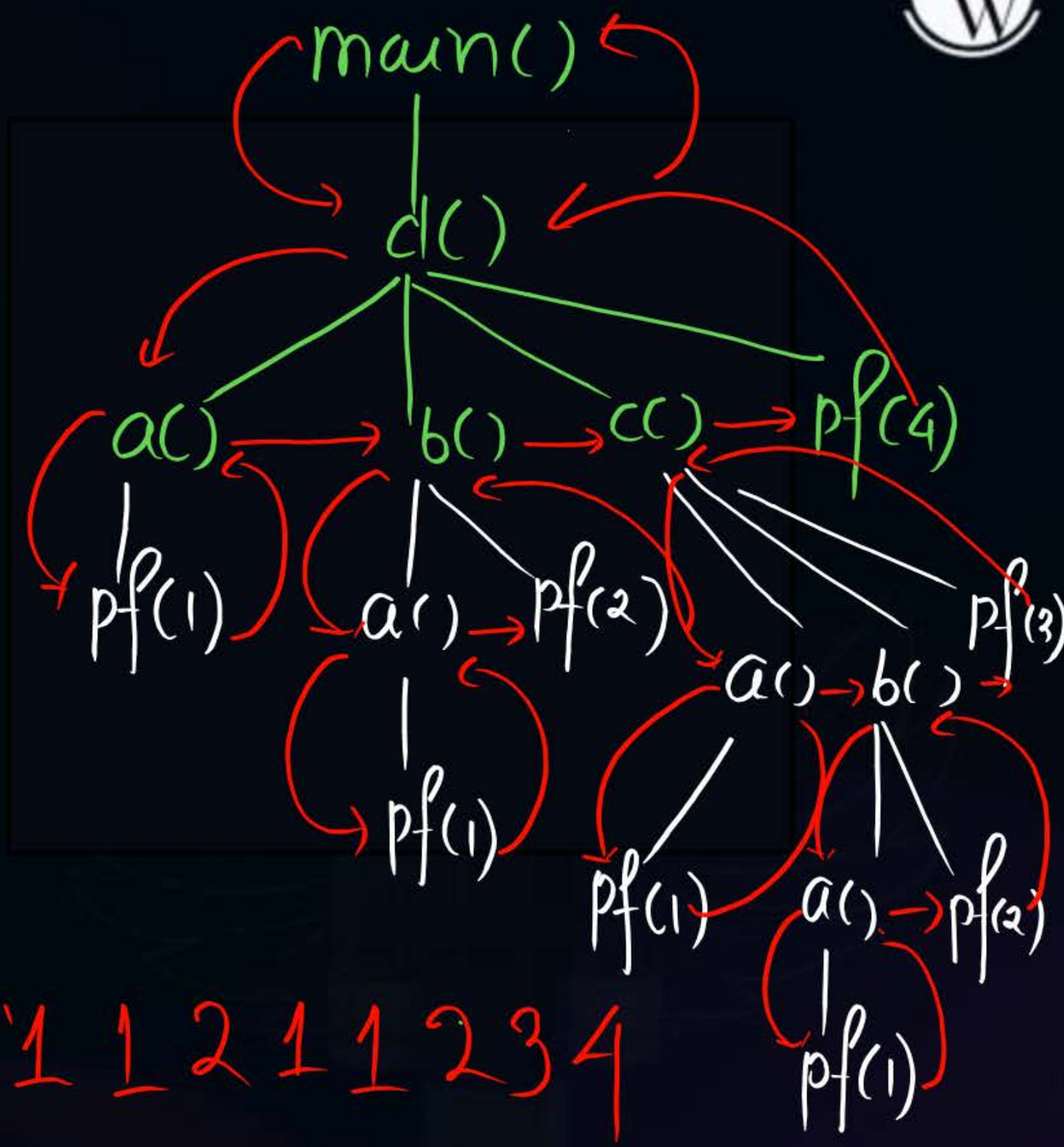
#Q Consider the following program

Sequential

```
#include <stdio.h>
void a(){printf("1");}
void b(){a();printf("2");}
void c(){a();b();printf("3");}
void d(){a();b();c();printf("4");}

int main(){
   d();
}
```





Slide

GATE 2024

Consider the following C program. Assume parameters to a function are evaluated from right to left.

```
#include <stdio.h>
    int g(int p) { printf("%d", p); return p; }
    int h(int q) { printf("%d", q); return q; }
    void f(int x, int y) {
        g(x);
        h(y);
    }
    int main() {
        f(g(10),h(20));
    }
```

Which one of the following options is the CORRECT output of the above C program?

(A) 20101020

(B) 10202010

(C) 20102010

(D) 10201020

Slide

There is No Rule in C Language

in which order parameters will passed or evaluated

GATE 2015 Set-3

#Q

Consider the following C program:

```
#include<stdio.h>
int f1(void);
int f2(void);
int f3(void);
int x=10;
int main()
{
    int x=1;
    x += f1() + f2 () + f3() +
f2();
    printf("%d", x);
    return 0;
}
```

```
int f1() { int x = 25; x++; return x;}
int f2() {int x = 50; x++; return x;}
int f3() { x *= 10; return x;}
The output of the program is _____.
```

Local

(A) 88

(B) 178

(C) 229

(D) 225

x = x+

1 + 26 + 51 + 100 + 51

= 229

Slide

GATE 2015 Set-3

#Q

Consider the following C program:

```
#include<stdio.h>
int f1(void);
int f2(void);
int f3(void);
int x=10;
int main()
{
    int x=1;
    x += f1() + f2 () + f3() +
f2();
    printf("%d", x);
    return 0;
}
```

Slide

Static ✗ 51 52

```
int f1() { int x = 25; x++; return x;}
int f2() {int x = 50; x++; return x;}
int f3() { x *= 10; return x;}
```

The output of the program is _____.

int f2(){ static int x = 50 x++; return x; }

x = x + f1() + f2() + f3() + f2()

1 + 26 + 51 + 100 + 52

= 230

Storage Class

Storage class in C Language defines in which memory part variable will be allocated

Life time of variable, Scope of variable & visibility of variable.

1. auto
2. static
3. Extern
4. Register

Slide

```
int i=1, j=0, Sum=0
for (i=1; i<=10; i++){
    Sum = Sum + j*j;
    j=j+1
}
printf("%d", Sum);
```

385

$$Sum = 1^2+2^2+3^2+ \quad +10^2$$

$$1^2+2^2+3^2+\cdots+n^2$$

$$\frac{n(n+1)(2n+1)}{6}$$

$$\frac{\cancel{10}^{5}\times 11\times \cancel{21}^{7}}{\cancel{6}\cancel{2}_{3}} = 55\times 7 = 385$$

{

int a;

}

Storage Class

auto is default storage for local variable

```
int main(){
    int x;   <- x is local
}
```

```
int main(){
    auto int x;
}
```

stack

both are same

Slide

Storage Class

Local variable by default stores in stack

As long as function is active (In stack)

Local variable alive

Storage Class

Static is default storage class for global variable

```
int x=10;
int main(){

}
```

```
Static int x=10;
int main(){

}
```

Slide

Storage Class

```
#include<stdio.h>
int x;
int main(){
printf("%d", x);
}
```

Not Initialized

→ 0

Static variable automatically initialized to 0

Storage Class

* Can we make local variable static — yes
* Can we make global variable auto — No
* Static variable initialized only once.
* local static variable preserve old value during various call to function

Recursion

```
#include<stdio.h>
int fun();
int main(){
    int i, sum=0;
    for(i=1; i<=3; i++)
        sum=sum+fun();
    printf("%d", sum);
    return 0;
}
```

i=1 - Sum = 0+20 = 20

```
int fun(){
    static int a=10;
    a=a+10;
    return a;
}
```

i=2 = 20+30 = 50

i=3 - 50+40 = 90

a | 20 | 30 | 40

a will not go in stack

20+10 = 30

Slide

Recursion

```
#include<stdio.h>
int fun();
int main() {
    int i, sum=0;
    for (i=1; i<=2 ; i++)
        sum=sum+fun();
    printf("%d", sum);
    return 0;
}
```

Sum = 20

Sum = Sum + fun()
= 0 + 20 = 20

Sum = Sum + fun()
= 20 + 30 = 50

```
int fun() {
    static int a=10;
    a=a+10;
    return a;
}
```

a = 10 20 30

a = 20 + 10 = 30

Slide

GATE 2017

#Q The value of j at the end of the execution of the following C program

```
int incr (int i)
{
        static int count = 0;
        count = count + i;
        return (count);
}
main () {
        int i,j;
        for (i = 0; i <=4; i++)
          j = incr(i);
}
```

is

(a) 10

(b) 4

(c) 6

(d) 7

count | 0 | 1 | 3 | 6 | 10

j = incr(i)

i = 0 j = incr(0) = 0

i = 1 j = incr(1) = 1

i = 2 j = incr(2) = 3

i = 3 j = incr(3) = 6

i = 4 j = incr(4) = 10

Slide

2 mins Summary

Topic — poachre

Topic — Storageclass

Topic — Stahc

Topic

Topic

THANK - YOU