Video No.: 74

Topic Name: Static and Dynamic Scoping - Solved Question 2

Question 01:

What will be the output of the following pseudocode when parameters are passed by reference and dynamic scoping is assumed.

a) 6, 2
b) 6, 6
c) 4, 2
d) **4, 4**

```
a = 3;
void n(x){
        x = x * a;
        print(x);
}
void m(y){
        a = 1;
        a = y – a;
        n(a);
        print(a);
}
void main(){
m(a);
}
```

```
a = 3; (Step_1)
void n(x){ // *x = &a(200)
        *x = *x(=2) * a(=2); // &a(200) = 4
        print(x); // x = 4 (Step_3)
}
void m(y){ // y = &a(100)
        *a = 1; // local &a(200) contain 1 (Step_1)
        *a = *y – *a; //&a(200) contain
        // &a(100) - &a(200) = 2 (Step_2)
        n(&a);
        print(*a); // *a = 4 (Step_3)
}
void main(){
m(&a); // calling the address of a
}
```

Step_01:

Global a	Local a
3	1
&a=100	&a=200

Step_02:

Global a	Local a
3	2
&a=100	&a=200

Step_03:

Global a	Local a
3	4
&a=100	&a=200

Here first this we need to notice is in the question it is said that every thing is called by reference and dynamic scoping is used.

As call by reference so here we aren't using values but the address of the values.

And for dynamic scoping we know variable we always look into the callee function.

Step_01:

In the main() function we call m(a)

Which is nothing but m(&a) a global variable

Let Global &a is 100.

Global a

3

&a=100

Now we jump into m(y) function which is actually m(*y) and &a is the argument

means *y contains the address (&a = 100) of value 3(Global Variable)

So *y = 100

Now, in 2nd line we declare another local variable *a = 1;

Which means the address of local a (say 200) contain a value 1.

Local a

1

&a=200

Step_02:

In 3rd line we say,

$$*a = *y - *a;$$

Which means,

    value of local a address (200) = value of a address (200) – value of local a address (200)

$$= 3 - 1 = 2$$

So, the value of local a address (200) is 2.

Local a

2

&a=200

Step_03:

In line 4, we call n(address of local a) function.

So, we jump into void n(x) = n(*x) [*x = address of local a which contain value 2]

In 2 line,

$$*x = *x * *a;$$

Which means,

Value of address local a = Value of address local a * Value of address local a

$$= 2 * 2 = 4$$

Local a
4
&a=200

So, basically the value of local a is updated.

And so print value of x is 4.

Then, we return to the function m(y) and print the value of address of local a which is also updated to 4.

So, the answer is **4, 4**