

K. J. Somaiya College of Engineering, Mumbai-77

(A Constituent College of Somaiya Vidyavihar University)

Batch: C2-1 Roll No.: 16010122104

Experiment / assignment / tutorial No. 7

Grade: AA / AB / BB / BC / CC / CD /DD

Signature of the Staff In-charge with date

TITLE: Using virtual labs to understand the concept of matrix multiplication, call by reference

AIM: Use of virtual labs to understand the concepts and theory with examples and verify the same with practice questions.

Expected OUTCOME of Experiment:

To swap two numbers without using third variable, using call by reference.

Books/ Journals/ Websites referred:

1. Programming in ANSI C, E. Balagurusamy, 7 th Edition, 2016, McGraw-Hill Education, India.
2. Structured Programming Approach, Pradeep Dey and Manas Ghosh, 1 st Edition, 2016, Oxford University Press, India.
3. Let Us C, Yashwant Kanetkar, 15th Edition, 2016, BPB Publications, India.

Problem Definition:

Virtual Lab experiment on matrix multiplication

<https://cse02-iiith.vlabs.ac.in/exp/arrays/simulation.html>

Virtual Lab experiment on Call by reference

<https://cse02-iiith.vlabs.ac.in/exp/pointers/procedure.html>

Program to swap two number without using third variable using Call by reference.

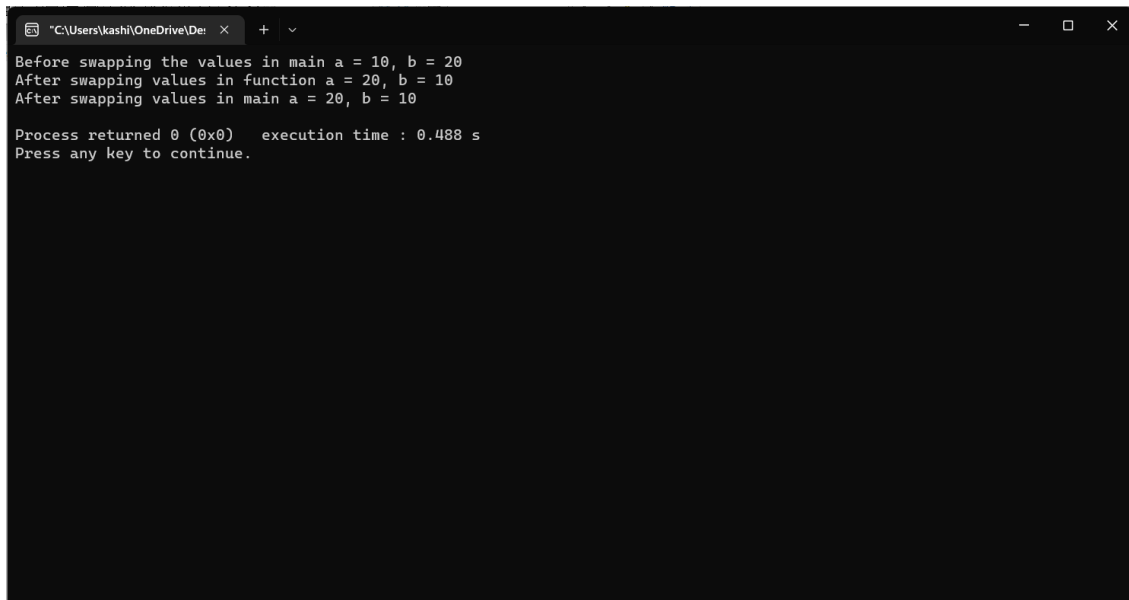
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Implementation details/ Simulation screenshots:

```
#include <stdio.h>
void swap(int *, int *); //prototype of the function
int main()
{
    int a = 10;
    int b = 20;
    printf("Before swapping the values in main a = %d, b = %d\n",a,b); // printing the
value of a and b in main
    swap(&a,&b);
    printf("After swapping values in main a = %d, b = %d\n",a,b); // The values of actual
parameters do change in call by reference, a = 10, b = 20
}
void swap (int *a, int *b)
{
    *a=*a+*b;//a=30 (10+20)
    *b=*a-*b;//b=10 (30-20)
    *a=*a-*b;//a=20 (30-10)
    printf("After swapping values in function a = %d, b = %d\n",*a,*b); // Formal
parameters, a = 20, b = 10
}
```

Output(s)/Post-test Screenshots:



```
"C:\Users\kashi\OneDrive\Desktop"
Before swapping the values in main a = 10, b = 20
After swapping values in function a = 20, b = 10
After swapping values in main a = 20, b = 10

Process returned 0 (0x0)   execution time : 0.488 s
Press any key to continue.
```

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Conclusion and your take away after performing the virtual lab experiment: -

We can swap two numbers without using third variable, and learn the use of call by reference.

Post Lab Descriptive Questions

1. Differentiate between Call by Value and Call by Reference.

Answer:

Parameter	Call By Value	Call By Reference
Convention of Naming	In this case, the parameter's value passes for invoking the function. In the case of calling a function, we pass the values of variables directly to a function. Thus, it has its name as Call by Value.	In this case, the parameter's reference passes for the function invocation. Whenever calling a function, rather than passing the variables' values, we pass its address instead (location of variables) to the function. Thus, it has its name as Call by Reference.
Effects of Changes	It copies the value of a passed parameter into the function's argument. Thus, any changes that occur in any argument inside the function have no reflection on the passed parameter.	Both the passed parameter and the argument refer to a similar location. Thus, any changes occurring in any argument inside the function also reflect in the passed parameter.
Type of Passing	The method of Call by Value passes a copy of the variable . Here, the values of all the variables copy into their corresponding dummy variables, also called functions.	The method of Call by Reference passes the variable itself . Here, it copies the address of the actual variables in the calling function into the dummy variables called functions.
Memory Location (Referred)	The memory location referred to by the actual arguments and passed parameters of a function are different. Meaning, it creates the formal and actual arguments in	The memory location referred to by the actual arguments and passed parameters of a function are the same. Meaning, it creates the formal and actual arguments in the very same

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	different memory locations.	memory location.
Language Supported	Languages like C++, C#. PHP, Visual Basic NET, etc., provide support to the Call by Value and use it as their default method.	Only the JAVA language supports the Call by Reference method in programming.
Value Modification	In the Call by Value method, there is no modification in the original value.	In the Call by Reference method, there is a modification in the original value.
Internal Implementation	In the case of Call by Value, when we pass the value of the parameter during the calling of the function, it copies them to the function's actual local argument.	In the case of Call by Reference, when we pass the parameter's location reference/address, it copies and assigns them to the function's local argument. Thus, both the actual argument and passed parameters refer to one similar location.
Method of Passing	The values of the variables in a Call by Value method pass using a straightforward method or a Simple technique.	Defining the pointer variables in a Call by Reference method is a prerequisite for storing the address of all the variables.
Manipulation of Variables	Using this method, any changes occurring to the dummy variables in any called function have no effect on the actual variable's values in the calling function. Thus, you cannot alter or manipulate the actual variables' values using the function calls.	Using this method, one can directly use the addresses to access the actual variables. Thus, any user can easily alter or manipulate the variables' values through the function calls.

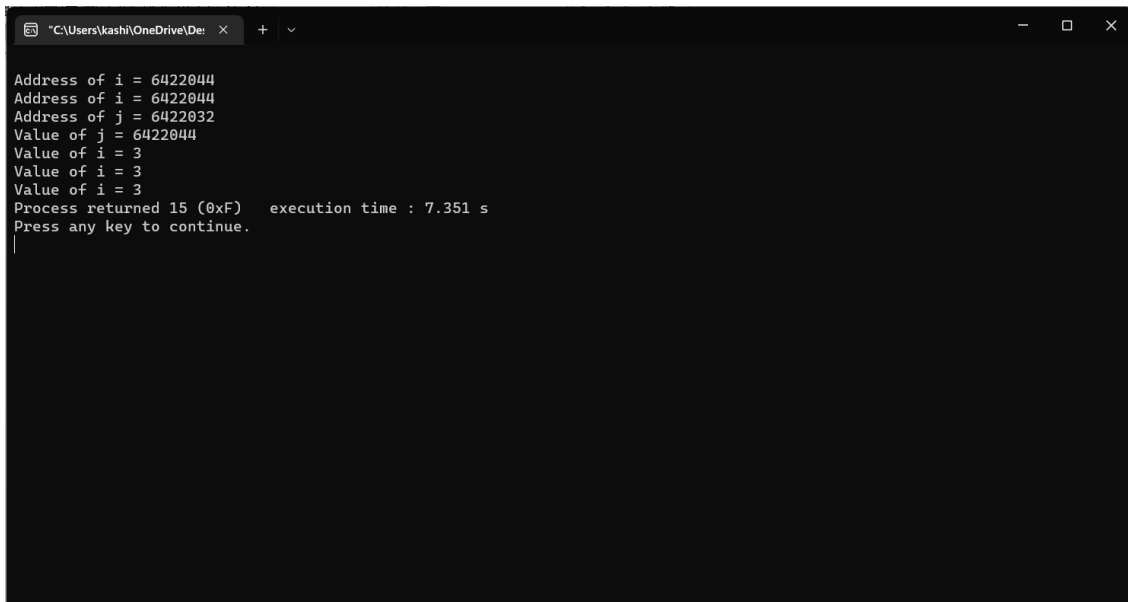
2. Try to understand the working of pointers by Running the following code and noting down the output.

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```
main( )
{
int i = 3 ;
int *j ;
j = &i ;
printf ( "\nAddress of i = %u", &i ) ;
printf ( "\nAddress of i = %u", j ) ;
printf ( "\nAddress of j = %u", &j ) ;
printf ( "\nValue of j = %u", j ) ;
printf ( "\nValue of i = %d", i ) ;
printf ( "\nValue of i = %d", *( &i ) ) ;
printf ( "\nValue of i = %d", *j ) ;
}
```

Output:



```
*C:\Users\kashi\OneDrive\Der  x + v
Address of i = 6422044
Address of i = 6422044
Address of j = 6422032
Value of j = 6422044
Value of i = 3
Value of i = 3
Value of i = 3
Process returned 15 (0xF)   execution time : 7.351 s
Press any key to continue.
```

Date: _____

Signature of faculty in-charge

Department of Science and Humanities