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SUBJECT: PPL
ASSIGNMENT NO:-04

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PROGRAM:

```c
#include <stdio.h>

// Function to swap values by value
void swapByValue(int a, int b) {
    int temp = a;
    a = b;
    b = temp;
}

// Function to swap values by reference
void swapByReference(int *a, int *b) {
    int temp = *a;
    *a = *b;
    *b = temp;
}

int main() {
    int num1, num2;

    // Input the two numbers
    printf("Enter the first number: ");
    scanf("%d", &num1);
    printf("Enter the second number: ");
    scanf("%d", &num2);

    // Display the original values
    printf("Original values: num1 = %d, num2 = %d\n", num1, num2);

    // Swap values by value
    swapByValue(num1, num2);

    // Display the swapped values
    printf("After swapping by value: num1 = %d, num2 = %d\n", num1, num2);

    // Swap values by reference
    swapByReference(&num1, &num2);

    // Display the swapped values
    printf("After swapping by reference: num1 = %d, num2 = %d\n", num1, num2);

    return 0;
}
```

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OUTPUT:

```
student@cc-91:~$ gcc swap.c
student@cc-91:~$ ./a.out
Enter the first number: 22
Enter the second number: 44
Original values: num1 = 22, num2 = 44
After swapping by value: num1 = 22, num2 = 44
After swapping by reference: num1 = 44, num2 = 22
```

```
student@cc-91:~$ cat swap.s
        .file   "swap.c"
        .text
        .globl  swapByValue
        .type   swapByValue, @function
swapByValue:
.LFB0:
        .cfi_startproc
        endbr64
        pushq   %rbp
        .cfi_def_cfa_offset 16
        .cfi_offset 6, -16
        movq    %rsp, %rbp
        .cfi_def_cfa_register 6
        movl    %edi, -20(%rbp)
        movl    %esi, -24(%rbp)
        movl    -20(%rbp), %eax
        movl    %eax, -4(%rbp)
        movl    -24(%rbp), %eax
        movl    %eax, -20(%rbp)
        movl    -4(%rbp), %eax
        movl    %eax, -24(%rbp)
        nop
        popq    %rbp
        .cfi_def_cfa 7, 8
        ret
        .cfi_endproc
.LFE0:
        .size   swapByValue, .-swapByValue
        .globl  swapByReference
        .type   swapByReference, @function
```

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```
swapByReference:
.LFB1:
        .cfi_startproc
        endbr64
        pushq   %rbp
        .cfi_def_cfa_offset 16
        .cfi_offset 6, -16
        movq    %rsp, %rbp
        .cfi_def_cfa_register 6
        movq    %rdi, -24(%rbp)
        movq    %rsi, -32(%rbp)
        movq    -24(%rbp), %rax
        movl    (%rax), %eax
        movl    %eax, -4(%rbp)
        movq    -32(%rbp), %rax
        movl    (%rax), %edx
        movq    -24(%rbp), %rax
        movl    %edx, (%rax)
        movq    -32(%rbp), %rax
        movl    -4(%rbp), %edx
        movl    %edx, (%rax)
        nop
        popq    %rbp
        .cfi_def_cfa 7, 8
        ret
        .cfi_endproc
```

DIFFERENCE BETWEEN CALL BY VALUE AND CALL BY REFERENCE:

1. "swapByValue" receives two 32-bit integers as arguments and stores them in local stack variables using movl instructions.

2. "swapByReference" receives two 64-bit pointers as arguments and stores them in local stack variables using movq instructions.

3. In "swapByValue," the integers are moved into and out of local stack variables, while in "swapByReference," pointer dereferencing is used to load and store values in memory.