Pass by Value and Pass by Reference

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A closer look to functions

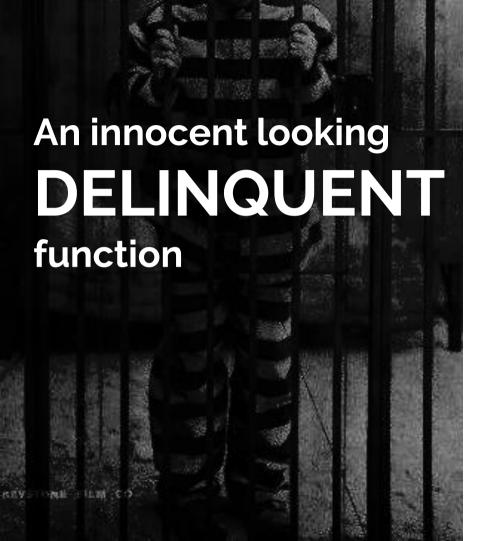
$$f(x) = x^2$$

```
// C, C++, C#, Java....

int square(int num)
{
    return num * num;
}
```

```
# Python

def square(num):
    return num**2
```



```
void main(void)
{
   int a = 10;
   int b = 20;
   swap(a, b);

   printf("a is %d and b is %d", a, b);
}
```

```
void swap(int a, int b)
{
   int temp = a;
   a = b;
   b = temp;
}
```

Can you guess, what is wrong here?

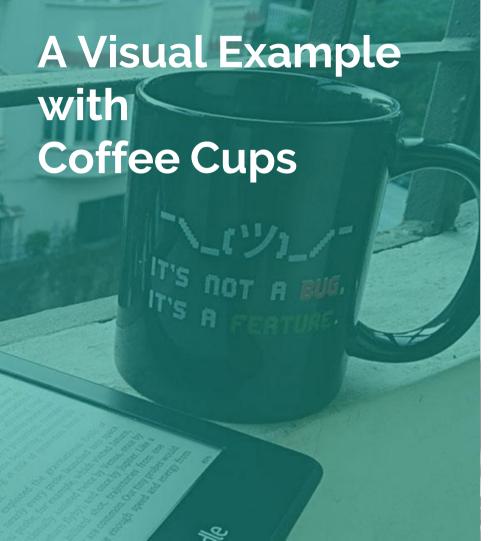


Pass by Value

The caller and the callee have two independent variables with the same value.

Pass by Reference

The caller and the callee use the same variable.



pass by **reference**

fillCup(

pass by value

fillCup()

```
// Pass by reference

void fillCup(int *cup)
{
     *cup++;
}

void main (void)
{
    int cup = 0;
    fillCup(&cup);
}
```

```
// Pass by value

void fillCup(int cup)
{
    cup++;
}

void main (void)
{
    int cup = 0;
    fillCup(cup);
}
```

Fixing our swap () function

(Watch me code on the board)



```
1 #include <stdio.h>
 3 void swap(int *a, int *b)
   int temp = *a;
   *a = *b;
      *b = temp;
8 }
 9
10 int main(void)
11 {
12
  int a = 10;
   int b = 20;
13
     swap(&a, &b);
14
15
16
     printf("a is %d and b is %d", a, b);
17
18
      return 0;
19 }
```

a is 20 and b is 10

Process returned 0 (0x0) execution time: 0.105 s Press any key to continue.

Thank you!

Got any questions?

Meanwhile swapping in python



a,b = b,a

*Just an easter egg. & no, Python developers are not paying us for putting it here

Picture Credits

- 1. Slide 3, Man in prison: https://www.pinterest.com/pin/687784174321520109/
- **2.** Slide 5, The animation: https://www.mathwarehouse.com/programming/passing-by-value-vs-by-reference-visual-explanation.php