

Assignment Project Exam Help

# Functions

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# Passing variables

- Passing by value:

```
#include<stdio.h>
int multiply(int a, int b)
{
    //multiplies values of a and b
    return a*b;
}

int main()
{
    int a=3;
    int b=4;
    printf("The product of %d and %d is %d\n",a,b,multiply(a,b));
}
```

The product of 3 and 4 is 12

# Issues about c

- C wants to see a function declared before it's invoked

```
#include<stdio.h>
int main()
{
    int a=3;
    int b=4;
    printf("The product of %d and %d is %d\n",a,b,multiply(a,b));
}

int multiply(int a, int b)
{
    //multiplies values of a and b
    return a*b;
}
```

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```
multiply2.c: In function 'main':
multiply2.c:2:514: warning: implicit declaration of function 'multiply' [-Wimplicit-function-declaration]
    2 |                                     printf("The product of %d and %d is %d\n",a,b,multipl
(a,b));
    |
```

# How to fix this

- If you warn c by providing a function template it will stop panicking

```
#include<stdio.h>

//this is the function prototype or function declaration for multiply
int multiply(int a, int b);

int main()
{
    int a=3;
    int b=4;
    printf("The product of %d and %d is %d\n",a,b,multiply(a,b));
}

int multiply(int a, int b)
{
    //multiplies values of a and b
    return a*b;
}
```

The product of 3 and 4 is 12

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# Passing by reference

- Sometimes you want your code modify the original variables.
- Passing by reference can do this

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```
#include<stdio.h>
void swap(int *a, int *b)
{
    //swaps a and b by reference;
    int c=*a;
    *a=*b;
    *b=c;
}

int main()
{
    int a=3;
    int b=4;
    //prints a and b
    printf("%d and %d", a,b);
    //passes addresses of a and b to swap
    swap(&a,&b);
    //prints the new contents of variables a and b
    printf(" swapped is %d and %d\n",a,b);
}
```

3 and 4 swapped is 4 and 3

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# Scope of variables

- What happens if we try to print "c" from main?

```
#include<stdio.h>

(base) nawiebe@DESKTOP-ITUK0IR:~/209-shares/notes/20211/W02/demo$ gcc -o swap_error swap_error.c
swap_error.c: In function 'main':
swap_error.c:22:35: error: 'c' undeclared (first use in this function)
 22 |     printf("The value of c is %d\n",c);
    |                                   ^
swap_error.c:22:35: note: each undeclared identifier is reported only once for each function it appears in

int main()
{
    int a=3;
    int b=4;
    //prints a and b
    printf("%d and %d", a,b);
    //passes addresses of a and b to swap
    swap(&a,&b);
    //prints the new contents of variables a and b
    printf(" swapped is %d and %d\n",a,b);

    //Attempts to print the integer "c" declared in swap
    printf("The value of c is %d\n",c);
}
```

# Why is this?

- Every function has its own stack frame.

```
#include <stdio.h>
```

```
void lie(int age) {  
    printf("You are %d years old\n", age);  
    age += 1;  
    printf("You are %d years old\n", age);  
}
```

```
int main() {  
    int age = 18;  
    lie(age);  
    printf("But your age is still %d\n", age);  
    return 0;  
}
```

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Section	Address	Value	Label
stack frame for lie	0x23c		
	0x240		
	0x244		
	0x248		
	0x24c		age
stack frame for main	0x250		
	0x254		
	0x258		
	0x25c		
	0x260		
	0x264		age