

Functions

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Functions

A program is just a set of definitions of variables and functions.

Communication between the functions is by arguments and values returned by the functions, and through external variables.

```
1 return-type function-name(argument declarations)
2 {
3   declarations and statements
4
5   return expression;
6 }
```

```
1  #include<stdio.h>
2  long int factorial(int n){
3      int i, fac = 1;
4      for(i=1; i<=n; i++)
5          fac = fac*i;
6      return fac;
7  }
8  int main(){
9      int n;
10     long int result;
11     printf("Enter a positive integer: ");
12     scanf("%d", &n);
13     if(n < 0){
14         printf("Enter a non-negative number.\n");
15         return 0;
16     }
17     result = factorial(n);
18     printf("Factorial of %d = %ld", n, result);
19     return 0;
20 }
```

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Automatic variables are internal to a function; they come into existence when the function is entered, and disappear when it is left. External variables, on the other hand, are permanent, so they can retain values from one function invocation to the next.

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Local variables of the same name in different functions are unrelated. The same is true of the parameters of the function, which are in effect local variables.

The scope of an external variable or a function lasts from the point at which it is declared to the end of the file being compiled.

How to update a local variable

```
1 #include<stdio.h>
2
3 void increase(int);
4 int increase_a(int);
5 int main()
6 {
7     int i;
8     i = 1;
9     printf("value = %d \n", i);
10
11     increase(i);
12     printf("value = %d \n", i);
13
14     i = increase_a(i);
15     printf("value = %d \n", i);
16
17     return 0;
18 }
```

How to update a local variable

```
1 void increase(int n)
2 {
3     n++;
4     printf("value (inside function) = %d \n", n);
5 }
6
7 int increase_a(int n)
8 {
9     n++;
10    printf("value (inside function) = %d \n", n);
11    return n;
12 }
```

How to NOT update a global variable

```
1 #include<stdio.h>
2 void increase(int);
3 int j;
4
5 int main()
6 {
7     j = 1;
8     printf("value = %d \n", j);
9
10    increase(j);
11    printf("value = %d \n", j);
12    return 0;
13 }
14 void increase(int n)
15 {
16     n++;
17     printf("value (inside function) = %d \n", n);
18 }
```

How to update a global variable

```
1  #include<stdio.h>
2  void increase_a();
3  int j;
4
5  int main()
6  {
7      j = 1;
8      printf("value = %d \n", j);
9
10     increase_a();
11     printf("value = %d \n", j);
12     return 0;
13 }
14 void increase_a()
15 {
16     j++;
17     printf("value (inside function) = %d \n", j);
18 }
```

Recursion

C functions may be used recursively; that is, a function may call itself either directly or indirectly.

```
1 #include<stdio.h>
2 long int factorialRec(int n)
3 {
4     if (n>=1)
5         return n*factorialRec(n-1);
6     else
7         return 1;
8 }
9 int main()
10 {
11     int n;
12     long int result;
13
14     printf("Enter a positive integer: ");
15     scanf("%d", &n);
16
17     result = factorialRec(n);
18     printf("Factorial of %d = %ld", n, result);
19     return 0;
20 }
```