C - Variable Arguments

Sometimes, you may come across a situation, when you want to have a function, which can take variable number of arguments, i.e., parameters, instead of predefined number of parameters. The C programming language provides a solution for this situation and you are allowed to define a function which can accept variable number of parameters based on your requirement. The following example shows the definition of such a function.

int func(int, ... ) {

.

.

.

}

int main() {

func(1, 2, 3);

func(1, 2, 3, 4);

}

It should be noted that the function **func()** has its last argument as ellipses, i.e. three dotes (**...**) and the one just before the ellipses is always an **int** which will represent the total number variable arguments passed. To use such functionality, you need to make use of **stdarg.h** header file which provides the functions and macros to implement the functionality of variable arguments and follow the given steps −

* Define a function with its last parameter as ellipses and the one just before the ellipses is always an **int** which will represent the number of arguments.
* Create a **va\_list** type variable in the function definition. This type is defined in stdarg.h header file.
* Use **int** parameter and **va\_start** macro to initialize the **va\_list** variable to an argument list. The macro va\_start is defined in stdarg.h header file.
* Use **va\_arg** macro and **va\_list** variable to access each item in argument list.
* Use a macro **va\_end** to clean up the memory assigned to **va\_list** variable.

Now let us follow the above steps and write down a simple function which can take the variable number of parameters and return their average −

[Live Demo](http://tpcg.io/lljlXP)

#include <stdio.h>

#include <stdarg.h>

double average(int num,...) {

va\_list valist;

double sum = 0.0;

int i;

/\* initialize valist for num number of arguments \*/

va\_start(valist, num);

/\* access all the arguments assigned to valist \*/

for (i = 0; i < num; i++) {

sum += va\_arg(valist, int);

}

/\* clean memory reserved for valist \*/

va\_end(valist);

return sum/num;

}

int main() {

printf("Average of 2, 3, 4, 5 = %f\n", average(4, 2,3,4,5));

printf("Average of 5, 10, 15 = %f\n", average(3, 5,10,15));

}

When the above code is compiled and executed, it produces the following result. It should be noted that the function **average()** has been called twice and each time the first argument represents the total number of variable arguments being passed. Only ellipses will be used to pass variable number of arguments.

Average of 2, 3, 4, 5 = 3.500000

Average of 5, 10, 15 = 10.000000