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Write your own printf() function in c

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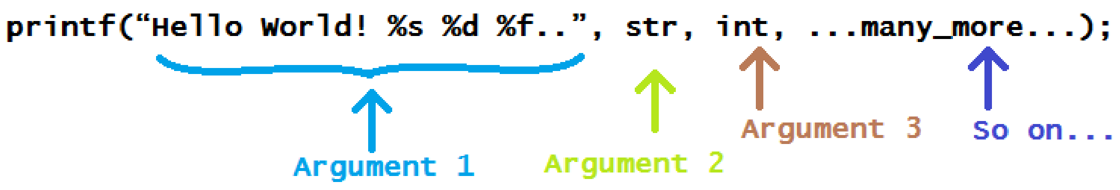
I was wondering where I can find the C code that's used so that when I write printf("Hello World!") in my C program to know that it has to print that string to standard output(i.e. monitor screen). I looked in <stdio.h>, but there I could only find its prototype int printf(const char *format, …), but not how it looks like internally.

Then i start googling for that but i hardly find a solution for which i am looking for. So after long time spend on net, i found this nice formal C Program.

Before implementation of printf( ) function we have to deal with unusual problem which is variable arguments. As we know that printf can take many arguments besides string, like


printf("Hello World! %s %d %f..", str, int, ...many_more...);
Argument 1
Argument 2
Argument 3
So on...

So we have to use a standard library called **stdarg.h** to handle this variable argument problem. In this implementation context, we don't need learn whole **stdarg.h** library because we use some macro functions of these library which is understandable directly by our C program.

Code to implement printf( )

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

void Myprintf(char *,...);      //Our printf function
char* convert(unsigned int, int);    //Convert integer number into octal, hex, etc.


int main()
{
 Myprintf(" WWW.FIRMCODES.COM \n %d", 9);

 return 0;
}


void Myprintf(char* format,...)
{
 char *traverse;
 unsigned int i;
 char *s;

 //Module 1: Initializing Myprintf's arguments
 va_list arg;
 va_start(arg, format);

 for(traverse = format; *traverse != '\0'; traverse++)
 {
  while( *traverse != '%' )
  {
   putchar(*traverse);
   traverse++;
  }

  traverse++;

  //Module 2: Fetching and executing arguments
  switch(*traverse)
  {
   case 'c' : i = va_arg(arg,int);  //Fetch char argument
      putchar(i);
      break;

   case 'd' : i = va_arg(arg,int);   //Fetch Decimal/Integer argument
      if(i<0)
      {
       i = -i;
       putchar('-');
      }
      puts(convert(i,10));
      break;

   case 'o': i = va_arg(arg,unsigned int); //Fetch Octal representation
      puts(convert(i,8));
      break;

   case 's': s = va_arg(arg,char *);   //Fetch string
      puts(s);
      break;

   case 'x': i = va_arg(arg,unsigned int); //Fetch Hexadecimal representation
      puts(convert(i,16));
      break;
  }
 }

 //Module 3: Closing argument list to necessary clean-up
 va_end(arg);
}

char *convert(unsigned int num, int base)
{
 static char Representation[]= "0123456789ABCDEF";
 static char buffer[50];
 char *ptr;

 ptr = &buffer[49];
 *ptr = '\0';

 do
 {
  *--ptr = Representation[num%base];
  num /= base;
 }while(num != 0);

 return(ptr);
}
```

Pseudocode

Module 1: Initializing Myprintf's arguments

In this section, we initialize the arguments of Myprintf( ) function by using standard argument library.

```
va_list arg;
```

This line declares a variable, **arg**, which we use to manipulating the argument list containing variable arguments of Myprintf( ). The data type of the variable is va_list, a special type defined by <stdarg.h>.

```
va_start(arg, format);
```

This line initializes **arg variable with** function's last fixed argument i.e. **format**. va_start() uses this to figure out where the variable arguments begin.

Module 2: Fetching and executing arguments

```
i = va_arg(arg,int);
```

va_arg() fetches the next argument from the argument list. The second parameter to va_arg() is the **data type** of the argument we expect.

Note: va_arg( ) function will never receive arguments of type char, short int, or float. va_arg( ) function only accept arguments of type char *, unsigned int, int or double.

Module 3: Closing argument list to necessary clean-up

```
 va_end(arg);
```

Finally, when we're finished processing the all arguments, we call **va_end()**, which performs any necessary cleanup.

Original standard printf( )

Here's the GNU version of printf… you can see it passing in stdout to vfprintf:

```
__printf (const char *format, ...)
{
   va_list arg;
   int done;

   va_start (arg, format);
   done = vfprintf (stdout, format, arg);
   va_end (arg);

   return done;
}
```

Here's a link to vfprintf… all the formatting 'magic' happens here.

This is the same thing as we use varargs(stdarg.h library) to get parameters in a variable argument list. Other than that, they're just traditional C.

Limitation of standard variable argument functions is described in another post named "How can I write a function that takes a variable number of arguments ? " which you can see below in suggested reading.

Source

1. http://www.eskimo.com/
2. http://sourceware.org/
3. http://stackoverflow.com/
4. https://www.google.com/

Suggested Reading

1. C/C++ program to shutdown or turn off computer
2. Function Pointers in C/C++
3. How can I write a function that takes a variable number of arguments?

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