**Input/Output**

**printf**

int printf ( const char \* format, ... );

**Parameters**

format

C string that contains the text to be written to [stdout](http://www.cplusplus.com/stdout).  
It can optionally contain embedded *format specifiers* that are replaced by the values specified in subsequent additional arguments and formatted as requested.  
  
A *format specifier* follows this prototype:   
**%[flags][width][.precision][length]specifier**  
  
Where the *specifier character* at the end is the most significant component, since it defines the type and the interpretation of its corresponding argument:

|  |  |  |
| --- | --- | --- |
| ***specifier*** | **Output** | **Example** |
| d *or* i | Signed decimal integer | 392 |
| u | Unsigned decimal integer | 7235 |
| o | Unsigned octal | 610 |
| x | Unsigned hexadecimal integer | 7fa |
| X | Unsigned hexadecimal integer (uppercase) | 7FA |
| f | Decimal floating point, lowercase | 392.65 |
| F | Decimal floating point, uppercase | 392.65 |
| e | Scientific notation (mantissa/exponent), lowercase | 3.9265e+2 |
| E | Scientific notation (mantissa/exponent), uppercase | 3.9265E+2 |
| g | Use the shortest representation: %e or %f | 392.65 |
| G | Use the shortest representation: %E or %F | 392.65 |
| a | Hexadecimal floating point, lowercase | -0xc.90fep-2 |
| A | Hexadecimal floating point, uppercase | -0XC.90FEP-2 |
| c | Character | a |
| s | String of characters | sample |
| p | Pointer address | b8000000 |
| n | Nothing printed. The corresponding argument must be a pointer to a signed int. The number of characters written so far is stored in the pointed location. |  |
| % | A % followed by another % character will write a single % to the stream. | % |

The *format specifier* can also contain sub-specifiers: *flags*, *width*, *.precision* and *modifiers* (in that order), which are optional and follow these specifications:

|  |  |
| --- | --- |
| ***flags*** | **description** |
| - | Left-justify within the given field width; Right justification is the default (see *width* sub-specifier). |
| + | Forces to preceed the result with a plus or minus sign (+ or -) even for positive numbers. By default, only negative numbers are preceded with a - sign. |
| *(space)* | If no sign is going to be written, a blank space is inserted before the value. |
| # | Used with o, x or X specifiers the value is preceeded with 0, 0x or 0X respectively for values different than zero. Used with a, A, e, E, f, F, g or G it forces the written output to contain a decimal point even if no more digits follow. By default, if no digits follow, no decimal point is written. |
| 0 | Left-pads the number with zeroes (0) instead of spaces when padding is specified (see *width* sub-specifier). |

|  |  |
| --- | --- |
| ***width*** | **description** |
| *(number)* | Minimum number of characters to be printed. If the value to be printed is shorter than this number, the result is padded with blank spaces. The value is not truncated even if the result is larger. |
| \* | The *width* is not specified in the *format* string, but as an additional integer value argument preceding the argument that has to be formatted. |

|  |  |
| --- | --- |
| ***.precision*** | **description** |
| .*number* | For integer specifiers (d, i, o, u, x, X): *precision* specifies the minimum number of digits to be written. If the value to be written is shorter than this number, the result is padded with leading zeros. The value is not truncated even if the result is longer. A *precision* of 0 means that no character is written for the value 0. For a, A, e, E, f and F specifiers: this is the number of digits to be printed **after** the decimal point (by default, this is 6). For g and G specifiers: This is the maximum number of significant digits to be printed. For s: this is the maximum number of characters to be printed. By default all characters are printed until the ending null character is encountered. If the period is specified without an explicit value for *precision*, 0 is assumed. |
| .\* | The *precision* is not specified in the *format* string, but as an additional integer value argument preceding the argument that has to be formatted. |

The *length* sub-specifier modifies the length of the data type. This is a chart showing the types used to interpret the corresponding arguments with and without *length* specifier (if a different type is used, the proper type promotion or conversion is performed, if allowed):

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **specifiers** | | | | | | |
| ***length*** | **d i** | **u o x X** | **f F e E g G a A** | **c** | **s** | **p** | **n** |
| *(none)* | int | unsigned int | double | int | char\* | void\* | int\* |
| hh | signed char | unsigned char |  |  |  |  | signed char\* |
| h | short int | unsigned short int |  |  |  |  | short int\* |
| l | long int | unsigned long int |  | [wint\_t](http://www.cplusplus.com/wint_t) | wchar\_t\* |  | long int\* |
| ll | long long int | unsigned long long int |  |  |  |  | long long int\* |
| j | [intmax\_t](http://www.cplusplus.com/intmax_t) | [uintmax\_t](http://www.cplusplus.com/uintmax_t) |  |  |  |  | [intmax\_t](http://www.cplusplus.com/intmax_t)\* |
| z | [size\_t](http://www.cplusplus.com/size_t) | [size\_t](http://www.cplusplus.com/size_t) |  |  |  |  | [size\_t](http://www.cplusplus.com/size_t)\* |
| t | [ptrdiff\_t](http://www.cplusplus.com/ptrdiff_t) | [ptrdiff\_t](http://www.cplusplus.com/ptrdiff_t) |  |  |  |  | [ptrdiff\_t](http://www.cplusplus.com/ptrdiff_t)\* |
| L |  |  | long double |  |  |  |  |

Note regarding the c specifier: it takes an int (or [wint\_t](http://www.cplusplus.com/wint_t)) as argument, but performs the proper conversion to a char value (or a wchar\_t) before formatting it for output.

**Return Value**

On success, the total number of characters written is returned.  
  
If a writing error occurs, the *error indicator* ([ferror](http://www.cplusplus.com/ferror)) is set and a negative number is returned.  
  
If a multibyte character encoding error occurs while writing wide characters, [errno](http://www.cplusplus.com/errno) is set to EILSEQ and a negative number is returned.

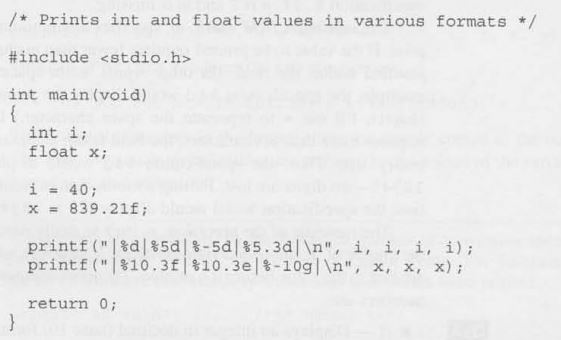
**Example**

|  |  |  |
| --- | --- | --- |
| 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 | /\* printf example \*/  #include <stdio.h>  int main()  {  printf ("Characters: %c %c \n", 'a', 65);  printf ("Decimals: %d %ld\n", 1977, 650000L);  printf ("Preceding with blanks: %10d \n", 1977);  printf ("Preceding with zeros: %010d \n", 1977);  printf ("Some different radices: %d %x %o %#x %#o \n", 100, 100, 100, 100, 100);  printf ("floats: %4.2f %+.0e %E \n", 3.1416, 3.1416, 3.1416);  printf ("Width trick: %\*d \n", 5, 10);  printf ("%s \n", "A string");  return 0;  } | [Edit & Run](http://www.cplusplus.com/reference/cstdio/printf/) |

Output:

|  |
| --- |
| Characters: a A  Decimals: 1977 650000  Preceding with blanks: 1977  Preceding with zeros: 0000001977  Some different radices: 100 64 144 0x64 0144  floats: 3.14 +3e+000 3.141600E+000  Width trick: 10  A string |

**Example:**



# Output:

# 

# scanf

int scanf ( const char \* format, ... );

**Read formatted data from stdin**

### Parameters

format

C string that contains a sequence of characters that control how characters extracted from the stream are treated:

* **Whitespace character:** the function will read and ignore any whitespace characters encountered before the next non-whitespace character (whitespace characters include spaces, newline and tab characters -- see [isspace](http://www.cplusplus.com/isspace)). A single whitespace in the *format* string validates any quantity of whitespace characters extracted from the *stream* (including none).
* **Non-whitespace character, except format specifier (%):** Any character that is not either a whitespace character (blank, newline or tab) or part of a *format specifier* (which begin with a % character) causes the function to read the next character from the stream, compare it to this non-whitespace character and if it matches, it is discarded and the function continues with the next character of *format*. If the character does not match, the function fails, returning and leaving subsequent characters of the stream unread.
* **Format specifiers:** A sequence formed by an initial percentage sign (%) indicates a format specifier, which is used to specify the type and format of the data to be retrieved from the *stream* and stored into the locations pointed by the additional arguments.

A *format specifier* for scanf follows this prototype:  
  
%[\*][width][length]specifier   
  
Where the *specifier* character at the end is the most significant component, since it defines which characters are extracted, their interpretation and the type of its corresponding argument:

|  |  |  |
| --- | --- | --- |
| ***specifier*** | **Description** | **Characters extracted** |
| i | Integer | Any number of digits, optionally preceded by a sign (+ or -). [Decimal digits](http://www.cplusplus.com/isdigit) assumed by default (0-9), but a 0 prefix introduces octal digits (0-7), and 0x [hexadecimal digits](http://www.cplusplus.com/isxdigit) (0-f). *Signed* argument. |
| d *or* u | Decimal integer | Any number of [decimal digits](http://www.cplusplus.com/isdigit) (0-9), optionally preceded by a sign (+ or -). d is for a *signed* argument, and u for an *unsigned*. |
| o | Octal integer | Any number of octal digits (0-7), optionally preceded by a sign (+ or -). *Unsigned* argument. |
| x | Hexadecimal integer | Any number of [hexadecimal digits](http://www.cplusplus.com/isxdigit) (0-9, a-f, A-F), optionally preceded by 0x or 0X, and all optionally preceded by a sign (+ or -). *Unsigned* argument. |
| f, e, g | Floating point number | A series of [decimal](http://www.cplusplus.com/isdigit) digits, optionally containing a decimal point, optionally preceeded by a sign (+ or -) and optionally followed by the e or E character and a decimal integer (or some of the other sequences supported by [strtod](http://www.cplusplus.com/strtod)). Implementations complying with C99 also support hexadecimal floating-point format when preceded by 0x or 0X. |
| a |
| c | Character | The next character. If a *width* other than 1 is specified, the function reads exactly *width* characters and stores them in the successive locations of the array passed as argument. No null character is appended at the end. |
| s | String of characters | Any number of non-whitespace characters, stopping at the first [whitespace](http://www.cplusplus.com/isspace) character found. A terminating null character is automatically added at the end of the stored sequence. |
| p | Pointer address | A sequence of characters representing a pointer. The particular format used depends on the system and library implementation, but it is the same as the one used to format %p in [fprintf](http://www.cplusplus.com/fprintf). |
| [*characters*] | Scanset | Any number of the characters specified between the brackets. A dash (-) that is not the first character may produce non-portable behavior in some library implementations. |
| [^*characters*] | Negated scanset | Any number of characters none of them specified as *characters* between the brackets. |
| n | Count | No input is consumed. The number of characters read so far from [stdin](http://www.cplusplus.com/stdin) is stored in the pointed location. |
| % | % | A % followed by another % matches a single %. |

Except for n, at least one character shall be consumed by any specifier. Otherwise the match fails, and the scan ends there.  
  
The *format specifier* can also contain sub-specifiers: *asterisk* (\*), *width* and *length* (in that order), which are optional and follow these specifications:

|  |  |
| --- | --- |
| ***sub-specifier*** | **description** |
| \* | An optional starting asterisk indicates that the data is to be read from the stream but ignored (i.e. it is not stored in the location pointed by an argument). |
| *width* | Specifies the maximum number of characters to be read in the current reading operation (optional). |
| *length* | One of hh, h, l, ll, j, z, t, L (optional). This alters the expected type of the storage pointed by the corresponding argument (see below). |

This is a chart showing the types expected for the corresponding arguments where input is stored (both with and without a *length* sub-specifier):

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **specifiers** | | | | | | |
| ***length*** | **d i** | **u o x** | **f e g a** | **c s [] [^]** | **p** | **n** |  |
| *(none)* | int\* | unsigned int\* | float\* | char\* | void\*\* | int\* |  |
| hh | signed char\* | unsigned char\* |  |  |  | signed char\* |  |
| h | short int\* | unsigned short int\* |  |  |  | short int\* |  |
| l | long int\* | unsigned long int\* | double\* | wchar\_t\* |  | long int\* |  |
| ll | long long int\* | unsigned long long int\* |  |  |  | long long int\* |  |
| j | [intmax\_t](http://www.cplusplus.com/intmax_t)\* | [uintmax\_t](http://www.cplusplus.com/uintmax_t)\* |  |  |  | [intmax\_t](http://www.cplusplus.com/intmax_t)\* |  |
| z | [size\_t](http://www.cplusplus.com/size_t)\* | [size\_t](http://www.cplusplus.com/size_t)\* |  |  |  | [size\_t](http://www.cplusplus.com/size_t)\* |  |
| t | [ptrdiff\_t](http://www.cplusplus.com/ptrdiff_t)\* | [ptrdiff\_t](http://www.cplusplus.com/ptrdiff_t)\* |  |  |  | [ptrdiff\_t](http://www.cplusplus.com/ptrdiff_t)\* |  |
| L |  |  | long double\* |  |  |  |  |

**Note:** Yellow rows indicate specifiers and sub-specifiers introduced by C99.

... *(additional arguments)*

### Return Value

On success, the function returns the number of items of the argument list successfully filled. This count can match the expected number of items or be less (even zero) due to a matching failure, a reading error, or the reach of the *end-of-file*.  
  
If a reading error happens or the *end-of-file* is reached while reading, the proper indicator is set ([feof](http://www.cplusplus.com/feof) or [ferror](http://www.cplusplus.com/ferror)). And, if either happens before any data could be successfully read, [EOF](http://www.cplusplus.com/EOF) is returned.  
  
If an encoding error happens interpreting wide characters, the function sets [errno](http://www.cplusplus.com/errno) to EILSEQ.

### Example

|  |  |  |
| --- | --- | --- |
| 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 | /\* scanf example \*/  #include <stdio.h>  int main ()  {  char str [80];  int i;  printf ("Enter your family name: ");  scanf ("%79s",str);  printf ("Enter your age: ");  scanf ("%d",&i);  printf ("Mr. %s , %d years old.\n",str,i);  printf ("Enter a hexadecimal number: ");  scanf ("%x",&i);  printf ("You have entered %#x (%d).\n",i,i);    return 0;  } | [Edit & Run](http://www.cplusplus.com/reference/cstdio/scanf/) |

This example demonstrates some of the types that can be read with scanf:

|  |
| --- |
| Enter your family name: Soulie  Enter your age: 29  Mr. Soulie , 29 years old.  Enter a hexadecimal number: ff  You have entered 0xff (255). |

**Example:**

|  |  |
| --- | --- |
| 1  2  3  4  5  6  7  8  9  10  11  12  13  14  15  16  17  18  19 | #include<stdio.h>  **int** main()  {  **char** ch1,ch2,ch3,ch4;  ch1 = getchar();  putchar(ch1);  ch2 = getchar();  putchar(ch2);  ch3 = getchar();  putchar(ch3);  ch4 = getchar();  putchar(ch4);  **return** 0;  } |

**Here, how input will be taken and print the taken input?**