

# File input/output

The `<stdio.h>` header provides generic file operation support and supplies functions with narrow character input/output capabilities.

The `<wchar.h>` header supplies functions with wide character input/output capabilities.

I/O streams are denoted by objects of type `FILE` that can only be accessed and manipulated through pointers of type `FILE*`. Each stream is associated with an external physical device (file, standard input stream, printer, serial port, etc).

## Types

Defined in header `<stdio.h>`

<b>FILE</b>	object type, capable of holding all information needed to control a C I/O stream (typedef)
<b>fpos_t</b>	non-array complete object type, capable of uniquely specifying a position and multibyte parser state in a file (typedef)

## Predefined standard streams

Defined in header `<stdio.h>`

<b>stdin</b>	expression of type <code>FILE*</code> associated with the input stream
<b>stdout</b>	expression of type <code>FILE*</code> associated with the output stream
<b>stderr</b>	expression of type <code>FILE*</code> associated with the error output stream (macro constant)

## Functions

### File access

Defined in header `<stdio.h>`

<b>fopen</b>	opens a file (function)
<b>fopen_s (C11)</b>	
<b>freopen</b>	open an existing stream with a different name (function)
<b>freopen_s (C11)</b>	
<b>fclose</b>	closes a file (function)
<b>fflush</b>	synchronizes an output stream with the actual file (function)
<b>setbuf</b>	sets the buffer for a file stream (function)
<b>setvbuf</b>	sets the buffer and its size for a file stream (function)

Defined in header `<wchar.h>`

<b>fwide (C95)</b>	switches a file stream between wide character I/O and narrow character I/O (function)
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### Direct input/output

Defined in header `<stdio.h>`

<b>fread</b>	reads from a file (function)
<b>fwrite</b>	writes to a file (function)

### Unformatted input/output

#### Narrow character

Defined in header `<stdio.h>`

<b>fgetc</b>	gets a character from a file stream (function)
<b>getc</b>	
<b>fgets</b>	gets a character string from a file stream (function)

<b>fputc</b> <b>putc</b>	writes a character to a file stream (function)
<b>fputs</b>	writes a character string to a file stream (function)
<b>getchar</b>	reads a character from stdin (function)
<b>gets</b> (removed in C11) <b>gets_s</b> (C11)	reads a character string from stdin (function)
<b>putchar</b>	writes a character to stdout (function)
<b>puts</b>	writes a character string to stdout (function)
<b>ungetc</b>	puts a character back into a file stream (function)

## Wide character

Defined in header &lt;wchar.h&gt;

<b>fgetwc</b> <b>getwc</b> (C95)	gets a wide character from a file stream (function)
<b>fgetws</b> (C95)	gets a wide string from a file stream (function)
<b>fputwc</b> <b>putwc</b> (C95)	writes a wide character to a file stream (function)
<b>fputws</b> (C95)	writes a wide string to a file stream (function)
<b>getwchar</b> (C95)	reads a wide character from stdin (function)
<b>putwchar</b> (C95)	writes a wide character to stdout (function)
<b>ungetwc</b> (C95)	puts a wide character back into a file stream (function)

## Formatted input/output

## Narrow character

Defined in header &lt;stdio.h&gt;

<b>scanf</b> <b>fscanf</b> <b>sscanf</b> <b>scanf_s</b> (C11) <b>fscanf_s</b> (C11) <b>sscanf_s</b> (C11)	reads formatted input from stdin, a file stream or a buffer (function)
<b>vscanf</b> (C99) <b>vfscanf</b> (C99) <b>vsscanf</b> (C99) <b>vscanf_s</b> (C11) <b>vfscanf_s</b> (C11) <b>vsscanf_s</b> (C11)	reads formatted input from stdin, a file stream or a buffer using variable argument list (function)
<b>printf</b> <b>fprintf</b> <b>sprintf</b> <b>snprintf</b> (C99) <b>printf_s</b> (C11) <b>fprintf_s</b> (C11) <b>sprintf_s</b> (C11) <b>snprintf_s</b> (C11)	prints formatted output to stdout, a file stream or a buffer (function)
<b>vprintf</b> <b>vfprintf</b> <b>vsprintf</b> <b>vsnprintf</b> (C99) <b>vprintf_s</b> (C11) <b>vfprintf_s</b> (C11) <b>vsprintf_s</b> (C11) <b>vsnprintf_s</b> (C11)	prints formatted output to stdout, a file stream or a buffer using variable argument list (function)

## Wide character

Defined in header &lt;wchar.h&gt;

reads formatted wide character input from stdin, a file stream or a buffer

<b>wscanf</b>	(C95)	(function)
<b>fwscanf</b>	(C95)	
<b>swscanf</b>	(C95)	
<b>wscanf_s</b>	(C11)	
<b>fwscanf_s</b>	(C11)	
<b>swscanf_s</b>	(C11)	
<b>vwscanf</b>	(C99)	
<b>vfwscanf</b>	(C99)	
<b>vswscanf</b>	(C99)	reads formatted wide character input from stdin, a file stream or a buffer using variable argument list
<b>vwscanf_s</b>	(C11)	(function)
<b>vfwscanf_s</b>	(C11)	
<b>vswscanf_s</b>	(C11)	
<b>wprintf</b>	(C95)	
<b>fwprintf</b>	(C95)	
<b>swprintf</b>	(C95)	prints formatted wide character output to stdout, a file stream or a buffer
<b>wprintf_s</b>	(C11)	(function)
<b>fwprintf_s</b>	(C11)	
<b>swprintf_s</b>	(C11)	
<b>snwprintf_s</b>	(C11)	
<b>vwprintf</b>	(C95)	
<b>vfwprintf</b>	(C95)	
<b>vswprintf</b>	(C95)	prints formatted wide character output to stdout, a file stream or a buffer using variable argument list
<b>vwprintf_s</b>	(C11)	(function)
<b>vfwprintf_s</b>	(C11)	
<b>vswprintf_s</b>	(C11)	
<b>vsnwprintf_s</b>	(C11)	

### File positioning

Defined in header <stdio.h>

<b>ftell</b>	returns the current file position indicator (function)
<b>fgetpos</b>	gets the file position indicator (function)
<b>fseek</b>	moves the file position indicator to a specific location in a file (function)
<b>fsetpos</b>	moves the file position indicator to a specific location in a file (function)
<b>rewind</b>	moves the file position indicator to the beginning in a file (function)

### Error handling

Defined in header <stdio.h>

<b>clearerr</b>	clears errors (function)
<b>feof</b>	checks for the end-of-file (function)
<b>ferror</b>	checks for a file error (function)
<b>perror</b>	displays a character string corresponding of the current error to stderr (function)

### Operations on files

Defined in header <stdio.h>

<b>remove</b>	erases a file (function)
<b>rename</b>	renames a file (function)
<b>tmpfile</b>	returns a pointer to a temporary file (function)
<b>tmpfile_s</b>	(C11)
<b>tmpnam</b>	returns a unique filename (function)
<b>tmpnam_s</b>	(C11)

### Macro constants

Defined in header <stdio.h>

<b>EOF</b>	integer constant expression of type <code>int</code> and negative value (macro constant)
<b>FOPEN_MAX</b>	maximum number of files that can be open simultaneously (macro constant)

<b>FILENAME_MAX</b>	size needed for an array of <code>char</code> to hold the longest supported file name (macro constant)
<b>BUFSIZ</b>	size of the buffer used by <code>setbuf()</code> (macro constant)
<b>_IOFBF</b> <b>_IOLBF</b> <b>_IONBF</b>	argument to <code>setvbuf()</code> indicating fully buffered I/O argument to <code>setvbuf()</code> indicating line buffered I/O argument to <code>setvbuf()</code> indicating unbuffered I/O (macro constant)
<b>SEEK_SET</b> <b>SEEK_CUR</b> <b>SEEK_END</b>	argument to <code>fseek()</code> indicating seeking from beginning of the file argument to <code>fseek()</code> indicating seeking from the current file position argument to <code>fseek()</code> indicating seeking from end of the file (macro constant)
<b>TMP_MAX</b> <b>TMP_MAX_S</b> (C11)	maximum number of unique filenames that can be generated by <code>tmpnam</code> maximum number of unique filenames that can be generated by <code>tmpnam_s</code> (macro constant)
<b>L_tmpnam</b> <b>L_tmpnam_s</b> (C11)	size needed for an array of <code>char</code> to hold the result of <code>tmpnam</code> size needed for an array of <code>char</code> to hold the result of <code>tmpnam_s</code> (macro constant)

## References

- C11 standard (ISO/IEC 9899:2011):
  - 7.21 Input/output `<stdio.h>` (p: 296–339)
  - 7.29 Extended multibyte and wide character utilities `<wchar.h>` (p: 402–446)
  - 7.31.11 Input/output `<stdio.h>` (p: 456)
  - 7.31.16 Extended multibyte and wide character utilities `<wchar.h>` (p: 456)
  - K.3.5 Input/output `<stdio.h>` (p: 586–603)
- C99 standard (ISO/IEC 9899:1999):
  - 7.19 Input/output `<stdio.h>` (p: 262–305)
  - 7.24 Extended multibyte and wide character utilities `<wchar.h>` (p: 348–392)
  - 7.26.9 Input/output `<stdio.h>` (p: 402)
  - 7.26.12 Extended multibyte and wide character utilities `<wchar.h>` (p: 402)
- C89/C90 standard (ISO/IEC 9899:1990):
  - 4.9 INPUT/OUTPUT `<stdio.h>`
  - 4.13.6 Input/output `<stdio.h>`

## See also

C++ documentation for C-style file input/output

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