NAME

accept – accept a connection on a socket

SYNOPSIS

```
#include <sys/types.h>
#include <sys/socket.h>

int accept(int s, struct sockaddr *addr, int *addrlen);
```

DESCRIPTION

The argument *s* is a socket that has been created with **socket**(3N) and bound to an address with **bind**(3N), and that is listening for connections after a call to **listen**(3N). The **accept**( ) function extracts the first connection on the queue of pending connections, creates a new socket with the properties of *s*, and allocates a new file descriptor, *ns*, for the socket. If no pending connections are present on the queue and the socket is not marked as non-blocking, **accept**( ) blocks the caller until a connection is present. If the socket is marked as non-blocking and no pending connections are present on the queue, **accept**( ) returns an error as described below. The **accept**( ) function uses the **netconfig**(4) file to determine the STREAMS device file name associated with *s*. This is the device on which the connect indication will be accepted. The accepted socket, *ns*, is used to read and write data to and from the socket that connected to *ns*; it is not used to accept more connections. The original socket (*s*) remains open for accepting further connections.

The argument *addr* is a result parameter that is filled in with the address of the connecting entity as it is known to the communications layer. The exact format of the *addr* parameter is determined by the domain in which the communication occurs.

The argument *addrlen* is a value-result parameter. Initially, it contains the amount of space pointed to by *addr*; on return it contains the length in bytes of the address returned.

The **accept**( ) function is used with connection-based socket types, currently with **SOCK_STREAM**.

It is possible to **select**(3C) or **poll**(2) a socket for the purpose of an **accept**( ) by selecting or polling it for a read. However, this will only indicate when a connect indication is pending; it is still necessary to call **accept**( ).

RETURN VALUE

On success, these system calls return a nonnegative integer that is a file descriptor for the accepted socket. On error, −1 is returned, and *errno* is set appropriately.

ERRORS

accept( ) will fail if:

EBADF	The descriptor is invalid.
EINTR	The accept attempt was interrupted by the delivery of a signal.
EMFILE	The per-process descriptor table is full.
ENODEV	The protocol family and type corresponding to *s* could not be found in the **netconfig** file.
ENOMEM	There was insufficient user memory available to complete the operation.
EPROTO	A protocol error has occurred; for example, the STREAMS protocol stack has not been initialized or the connection has already been released.
EWOULDBLOCK	The socket is marked as non-blocking and no connections are present to be accepted.

SEE ALSO

poll(2), **bind**(3N), **connect**(3N), **listen**(3N), **select**(3C), **socket**(3N), **netconfig**(4), **attributes**(5), **socket**(5)

NAME

bind – bind a name to a socket

SYNOPSIS

```
#include <sys/types.h>
#include <sys/socket.h>

int bind(int s, const struct sockaddr *name, int namelen);
```

DESCRIPTION

bind( ) assigns a name to an unnamed socket *s* . When a socket is created with **socket**(3N), it exists in a name space (address family) but has no name assigned. **bind**( ) requests that the name pointed to by *name* be assigned to the socket.

RETURN VALUE

On success, zero is returned. On error, −1 is returned, and *errno* is set appropriately.

ERRORS

The **bind**( ) call will fail if:

EACCES	The requested address is protected and the current user has inadequate permission to access it.
EADDRINUSE	The specified address is already in use.
EADDRNOTAVAIL	The specified address is not available on the local machine.
EBADF	*s* is not a valid descriptor.
EINVAL	*namelen* is not the size of a valid address for the specified address family.
EINVAL	The socket is already bound to an address.
ENOSR	There were insufficient STREAMS resources for the operation to complete.
ENOTSOCK	*s* is a descriptor for a file, not a socket.

The following errors are specific to binding names in the UNIX domain:

EACCES	Search permission is denied for a component of the path prefix of the pathname in *name*.
EIO	An I/O error occurred while making the directory entry or allocating the inode.
EISDIR	A null pathname was specified.
ELOOP	Too many symbolic links were encountered in translating the pathname in *name*.
ENOENT	A component of the path prefix of the pathname in *name* does not exist.
ENOTDIR	A component of the path prefix of the pathname in *name* is not a directory.
EROFS	The inode would reside on a read-only file system.

SEE ALSO

unlink(2), **socket**(3N), **attributes**(5), **socket**(5)

NOTES

Binding a name in the UNIX domain creates a socket in the file system that must be deleted by the caller when it is no longer needed (using **unlink**(2)).

The rules used in name binding vary between communication domains.

NAME

close – close a file descriptor

SYNOPSIS

#include <unistd.h>

int close(int *fd***);**

DESCRIPTION

close() closes a file descriptor, so that it no longer refers to any file and may be reused. Any record locks (see **fcntl**(2)) held on the file it was associated with, and owned by the process, are removed (regardless of the file descriptor that was used to obtain the lock).

If *fd* is the last file descriptor referring to the underlying open file description (see **open**(2)), the resources associated with the open file description are freed; if the file descriptor was the last reference to a file which has been removed using **unlink**(2), the file is deleted.

RETURN VALUE

close() returns zero on success. On error, −1 is returned, and *errno* is set appropriately.

ERRORS

EBADF
fd isn't a valid open file descriptor.

EINTR
The **close**() call was interrupted by a signal; see **signal**(7).

EIO An I/O error occurred.

ENOSPC, **EDQUOT**
On NFS, these errors are not normally reported against the first write which exceeds the available storage space, but instead against a subsequent **write**(2), **fsync**(2), or **close**(2).

NAME

dup, dup2 – duplicate a file descriptor

SYNOPSIS

#include <unistd.h>

int dup(int *oldfd***);**
int dup2(int *oldfd***, int** *newfd***);**

DESCRIPTION

dup() and **dup2**() create a copy of the file descriptor *oldfd*.

dup() uses the lowest-numbered unused descriptor for the new descriptor.

dup2() makes *newfd* be the copy of *oldfd*, closing *newfd* first if necessary, but note the following:

* If *oldfd* is not a valid file descriptor, then the call fails, and *newfd* is not closed.
* If *oldfd* is a valid file descriptor, and *newfd* has the same value as *oldfd*, then **dup2**() does nothing, and returns *newfd*.

After a successful return from **dup**() or **dup2**(), the old and new file descriptors may be used interchangeably. They refer to the same open file description (see **open**(2)) and thus share file offset and file status flags; for example, if the file offset is modified by using **lseek**(2) on one of the descriptors, the offset is also changed for the other.

The two descriptors do not share file descriptor flags (the close-on-exec flag). The close-on-exec flag (**FD_CLOEXEC**; see **fcntl**(2)) for the duplicate descriptor is off.

RETURN VALUE

dup() and **dup2**() return the new descriptor, or −1 if an error occurred (in which case, *errno* is set appropriately).

ERRORS

EBADF
oldfd isn't an open file descriptor, or *newfd* is out of the allowed range for file descriptors.

EBUSY
(Linux only) This may be returned by **dup2**() during a race condition with **open**(2) and **dup**().

EINTR
The **dup2**() call was interrupted by a signal; see **signal**(7).

EMFILE
The process already has the maximum number of file descriptors open and tried to open a new one.

SEE ALSO

close(2), **fcntl**(2), **open**(2)

NAME

clearerr, feof, ferror, fileno – check and reset stream status

SYNOPSIS

```
#include <stdio.h>

void clearerr(FILE *stream);
int feof(FILE *stream);
int ferror(FILE *stream);
int fileno(FILE *stream);
```

DESCRIPTION

The function **clearerr**() clears the end-of-file and error indicators for the stream pointed to by *stream*.

The function **feof**() tests the end-of-file indicator for the stream pointed to by *stream*, returning non-zero if it is set. The end-of-file indicator can only be cleared by the function **clearerr**().

The function **ferror**() tests the error indicator for the stream pointed to by *stream*, returning non-zero if it is set. The error indicator can only be reset by the **clearerr**() function.

The function **fileno**() examines the argument *stream* and returns its integer descriptor.

For non-locking counterparts, see **unlocked_stdio**(3).

ERRORS

These functions should not fail and do not set the external variable *errno*. (However, in case **fileno**() detects that its argument is not a valid stream, it must return −1 and set *errno* to **EBADF**.)

CONFORMING TO

The functions **clearerr**(), **feof**(), and **ferror**() conform to C89 and C99.

SEE ALSO

open(2), **fdopen**(3), **stdio**(3), **unlocked_stdio**(3)

NAME

fopen, fdopen, fileno – stream open functions

SYNOPSIS

```
#include <stdio.h>

FILE *fopen(const char *path, const char *mode);
FILE *fdopen(int fildes, const char *mode);
int fileno(FILE *stream);
```

DESCRIPTION

The **fopen** function opens the file whose name is the string pointed to by *path* and associates a stream with it.

The argument *mode* points to a string beginning with one of the following sequences (Additional characters may follow these sequences.):

r Open text file for reading. The stream is positioned at the beginning of the file.

r+ Open for reading and writing. The stream is positioned at the beginning of the file.

w Truncate file to zero length or create text file for writing. The stream is positioned at the beginning of the file.

w+ Open for reading and writing. The file is created if it does not exist, otherwise it is truncated. The stream is positioned at the beginning of the file.

a Open for appending (writing at end of file). The file is created if it does not exist. The stream is positioned at the end of the file.

a+ Open for reading and appending (writing at end of file). The file is created if it does not exist. The stream is positioned at the end of the file.

The **fdopen** function associates a stream with the existing file descriptor, *fildes*. The *mode* of the stream (one of the values "r", "r+", "w", "w+", "a", "a+") must be compatible with the mode of the file descriptor. The file position indicator of the new stream is set to that belonging to *fildes*, and the error and end-of-file indicators are cleared. Modes "w" or "w+" do not cause truncation of the file. The file descriptor is not dup'ed, and will be closed when the stream created by **fdopen** is closed. The result of applying **fdopen** to a shared memory object is undefined.

The function **fileno**() examines the argument *stream* and returns its integer descriptor.

RETURN VALUE

Upon successful completion **fopen**, **fdopen** and **freopen** return a **FILE** pointer. Otherwise, **NULL** is returned and the global variable *errno* is set to indicate the error.

ERRORS

EINVAL

The *mode* provided to **fopen**, **fdopen**, or **freopen** was invalid.

The **fopen**, **fdopen** and **freopen** functions may also fail and set *errno* for any of the errors specified for the routine **malloc**(3).

The **fopen** function may also fail and set *errno* for any of the errors specified for the routine **open**(2).

The **fdopen** function may also fail and set *errno* for any of the errors specified for the routine **fcntl**(2).

SEE ALSO

open(2), **fclose**(3), **fileno**(3)

NAME

fgetc, fgets, getc, getchar, fputc, fputs, putc, putchar – input and output of characters and strings

SYNOPSIS

```
#include <stdio.h>

int fgetc(FILE *stream);
char *fgets(char *s, int size, FILE *stream);
int getc(FILE *stream);
int getchar(void);
int fputc(int c, FILE *stream);
int fputs(const char *s, FILE *stream);
int putc(int c, FILE *stream);
int putchar(int c);
```

DESCRIPTION

fgetc() reads the next character from *stream* and returns it as an *unsigned char* cast to an *int*, or **EOF** on end of file or error.

getc() is equivalent to **fgetc**() except that it may be implemented as a macro which evaluates *stream* more than once.

getchar() is equivalent to **getc**(*stdin*).

fgets() reads in at most one less than *size* characters from *stream* and stores them into the buffer pointed to by *s*. Reading stops after an **EOF** or a newline. If a newline is read, it is stored into the buffer. A **'\0'** is stored after the last character in the buffer.

fputc() writes the character *c*, cast to an *unsigned char*, to *stream*.

fputs() writes the string *s* to *stream*, without its terminating null byte ('\0').

putc() is equivalent to **fputc**() except that it may be implemented as a macro which evaluates *stream* more than once.

putchar(*c*); is equivalent to **putc**(*c*, *stdout*).

Calls to the functions described here can be mixed with each other and with calls to other output functions from the *stdio* library for the same output stream.

RETURN VALUE

fgetc(), **getc**() and **getchar**() return the character read as an *unsigned char* cast to an *int* or **EOF** on end of file or error.

fgets() returns *s* on success, and NULL on error or when end of file occurs while no characters have been read. **fputc**(), **putc**() and **putchar**() return the character written as an *unsigned char* cast to an *int* or **EOF** on error.

fputs() returns a nonnegative number on success, or **EOF** on error.

SEE ALSO

read(2), **write**(2), **ferror**(3), **fgetwc**(3), **fgetws**(3), **fopen**(3), **fread**(3), **fseek**(3), **getline**(3), **getwchar**(3), **scanf**(3), **ungetwc**(3), **write**(2), **ferror**(3), **fopen**(3), **fputwc**(3), **fputws**(3), **fseek**(3), **fwrite**(3), **gets**(3), **putwchar**(3), **scanf**(3), **unlocked_stdio**(3)

NAME

ipv6, AF_INET6 – Linux IPv6 protocol implementation

SYNOPSIS

```
#include <sys/socket.h>
#include <netinet/in.h>

tcp6_socket = socket(AF_INET6, SOCK_STREAM, 0);
raw6_socket = socket(AF_INET6, SOCK_RAW, protocol);
udp6_socket = socket(AF_INET6, SOCK_DGRAM, protocol);
```

DESCRIPTION

Linux 2.2 optionally implements the Internet Protocol, version 6. This man page contains a description of the IPv6 basic API as implemented by the Linux kernel and glibc 2.1. The interface is based on the BSD sockets interface; see **socket**(7).

The IPv6 API aims to be mostly compatible with the **ip**(7) v4 API. Only differences are described in this man page.

To bind an **AF_INET6** socket to any process the local address should be copied from the *in6addr_any* variable which has *in6_addr* type. In static initializations **IN6ADDR_ANY_INIT** may also be used, which expands to a constant expression. Both of them are in network order.

IPv4 connections can be handled with the v6 API by using the v4-mapped-on-v6 address type; thus a program only needs only to support this API type to support both protocols. This is handled transparently by the address handling functions in libc.

IPv4 and IPv6 share the local port space. When you get an IPv4 connection or packet to a IPv6 socket its source address will be mapped to v6 and it will be mapped to v6.

Address Format

```
struct sockaddr_in6 {
    uint16_t      sin6_family;   /* AF_INET6 */
    uint16_t      sin6_port;     /* port number */
    uint32_t      sin6_flowinfo; /* IPv6 flow information */
    struct in6_addr sin6_addr;   /* IPv6 address */
    uint32_t      sin6_scope_id; /* Scope ID (new in 2.4) */
};

struct in6_addr {
    unsigned char   s6_addr[16]; /* IPv6 address */
};
```

sin6_family is always set to **AF_INET6**; *sin6_port* is the protocol port (see *sin_port* in **ip**(7)); *sin6_flowinfo* is the IPv6 flow identifier; *sin6_addr* is the 128-bit IPv6 address. *sin6_scope_id* is an ID of depending of on the scope of the address. It is new in Linux 2.4. Linux only supports it for link scope addresses, in that case *sin6_scope_id* contains the interface index (see **netdevice**(7))

RETURN VALUES

−1 is returned if an error occurs. Otherwise the return value is a descriptor referencing the socket.

NOTES

The *sockaddr_in6* structure is bigger than the generic *sockaddr*. Programs that assume that all address types can be stored safely in a *struct sockaddr* need to be changed to use *struct sockaddr_storage* for that instead.

SEE ALSO

cmsg(3), **ip**(7)

NAME

listen – listen for connections on a socket

SYNOPSIS

#include <sys/types.h> /* See NOTES */
#include <sys/socket.h>

int listen(int *sockfd***, int** *backlog***);**

DESCRIPTION

listen() marks the socket referred to by *sockfd* as a passive socket, that is, as a socket that will be used to accept incoming connection requests using **accept**(2).

The *sockfd* argument is a file descriptor that refers to a socket of type **SOCK_STREAM** or **SOCK_SEQPACKET**.

The *backlog* argument defines the maximum length to which the queue of pending connections for *sockfd* may grow. If a connection request arrives when the queue is full, the client may receive an error with an indication of **ECONNREFUSED** or, if the underlying protocol supports retransmission, the request may be ignored so that a later reattempt at connection succeeds.

RETURN VALUE

On success, zero is returned. On error, −1 is returned, and *errno* is set appropriately.

ERRORS

EADDRINUSE
Another socket is already listening on the same port.

EBADF
The argument *sockfd* is not a valid descriptor.

ENOTSOCK
The argument *sockfd* is not a socket.

NOTES

To accept connections, the following steps are performed:

1. A socket is created with **socket**(2).
2. The socket is bound to a local address using **bind**(2), so that other sockets may be **connect**(2)ed to it.
3. A willingness to accept incoming connections and a queue limit for incoming connections are specified with **listen**().
4. Connections are accepted with **accept**(2).

If the *backlog* argument is greater than the value in */proc/sys/net/core/somaxconn*, then it is silently truncated to that value; the default value in this file is 128.

EXAMPLE

See **bind**(2).

SEE ALSO

accept(2), **bind**(2), **connect**(2), **socket**(2), **socket**(7)

NAME

printf, fprintf, sprintf, snprintf, vprintf, vfprintf, vsprintf, vsnprintf – formatted output conversion

SYNOPSIS

#include <stdio.h>

int printf(const char * *format***, ...);**
int fprintf(FILE * *stream***, const char *** *format***, ...);**
int sprintf(char * *str***, const char *** *format***, ...);**
int snprintf(char * *str***, size_t** *size***, const char *** *format***, ...);**
...

DESCRIPTION

The functions in the **printf**() family produce output according to a *format* as described below. The function **printf**() writes output to *stdout*, the standard output stream; **fprintf**() writes output to the given output *stream*; **sprintf**() and **snprintf**(), write to the character string *str*.

The function **snprintf**() writes at most *size* bytes (including the trailing null byte ('\0')) to *str*.

These functions write the output under the control of a *format* string that specifies how subsequent arguments (or arguments accessed via the variable-length argument facilities of **stdarg**(3)) are converted for output.

Return value

Upon successful return, these functions return the number of characters printed (not including the trailing '\0' used to end output to strings).

The functions **snprintf**() and **vsnprintf**() do not write more than *size* bytes (including the trailing '\0'). If the output was truncated due to this limit then the return value is the number of characters (not including the trailing '\0') which would have been written to the final string if enough space had been available. Thus, a return value of *size* or more means that the output was truncated.

If an output error is encountered, a negative value is returned.

Format of the format string

The format string is a character string, beginning and ending in its initial shift state, if any. The format string is composed of zero or more directives: ordinary characters (not **%**), which are copied unchanged to the output stream; and conversion specifications, each of which results in fetching zero or more subsequent arguments. Each conversion specification is introduced by the character **%**, and ends with a *conversion specifier*. In between there may be (in this order) zero or more *flags*, an optional minimum *field width*, an optional *precision* and an optional *length modifier*.

The conversion specifier

A character that specifies the type of conversion to be applied. An example for a conversion specifier is:

o, **u**, **x**, **X**
The *unsigned int* argument is converted to unsigned octal (**o**), unsigned decimal (**u**), or unsigned hexadecimal (**x** and **X**) notation.

s
The *const char* * argument is expected to be a pointer to an array of character type (pointer to a string). Characters from the array are written up to (but not including) a terminating null byte ('\0'); if a precision is specified, no more than the number specified are written. If a precision is given, no null byte need be present; if the precision is not specified, or is greater than the size of the array, the array must contain a terminating null byte.

SEE ALSO

printf(1), **asprintf**(3), **dprintf**(3), **scanf**(3), **setlocale**(3), **wcrtomb**(3), **wprintf**(3), **locale**(5)

NAME

pthread_create – create a new thread / pthread_exit – terminate the calling thread

SYNOPSIS

#include <pthread.h>

int pthread_create(pthread_t * *thread*, **pthread_attr_t** * *attr*, **void** * (**start_routine*)(**void** *), **void** * *arg*);

void pthread_exit(void **retval*);

DESCRIPTION

pthread_create creates a new thread of control that executes concurrently with the calling thread. The new thread applies the function *start_routine* passing it *arg* as first argument. The new thread terminates either explicitly, by calling **pthread_exit**(3), or implicitly, by returning from the *start_routine* function. The latter case is equivalent to calling **pthread_exit**(3) with the result returned by *start_routine* as exit code.

The *attr* argument specifies thread attributes to be applied to the new thread. See **pthread_attr_init**(3) for a complete list of thread attributes. The *attr* argument can also be **NULL**, in which case default attributes are used: the created thread is joinable (not detached) and has default (non real-time) scheduling policy.

pthread_exit terminates the execution of the calling thread. All cleanup handlers that have been set for the calling thread with **pthread_cleanup_push**(3) are executed in reverse order (the most recently pushed handler is executed first). Finalization functions for thread-specific data are then called for all keys that have non- **NULL** values associated with them in the calling thread (see **pthread_key_create**(3)). Finally, execution of the calling thread is stopped.

The *retval* argument is the return value of the thread. It can be consulted from another thread using **pthread_join**(3).

RETURN VALUE

On success, the identifier of the newly created thread is stored in the location pointed by the *thread* argument, and a 0 is returned. On error, a non-zero error code is returned.

The **pthread_exit** function never returns.

ERRORS

EAGAIN
not enough system resources to create a process for the new thread.

EAGAIN
more than **PTHREAD_THREADS_MAX** threads are already active.

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SEE ALSO

pthread_join(3), **pthread_detach**(3), **pthread_attr_init**(3).

NAME

pthread_join – join with a terminated thread

SYNOPSIS

#include <pthread.h>

int pthread_join(pthread_t *thread*, **void** ***retval*);

Compile and link with *–pthread.*

DESCRIPTION

The **pthread_join**() function waits for the thread specified by *thread* to terminate. If that thread has already terminated, then **pthread_join**() returns immediately. The thread specified by *thread* must be joinable.

If *retval* is not NULL, then **pthread_join**() copies the exit status of the target thread (i.e., the value that the target thread supplied to **pthread_exit**(3)) into the location pointed to by *retval*. If the target thread was canceled, then **PTHREAD_CANCELED** is placed in the location pointed to by *retval*.

If multiple threads simultaneously try to join with the same thread, the results are undefined. If the thread calling **pthread_join**() is canceled, then the target thread will remain joinable (i.e., it will not be detached).

RETURN VALUE

On success, **pthread_join**() returns 0; on error, it returns an error number.

ERRORS

EDEADLK
A deadlock was detected (e.g., two threads tried to join with each other); or *thread* specifies the calling thread.

EINVAL
thread is not a joinable thread.

EINVAL
Another thread is already waiting to join with this thread.

ESRCH
No thread with the ID *thread* could be found.

NOTES

After a successful call to **pthread_join**(), the caller is guaranteed that the target thread has terminated. The caller may then choose to do any clean-up that is required after termination of the thread (e.g., freeing memory or other resources that were allocated to the target thread).

Joining with a thread that has previously been joined results in undefined behavior.

Failure to join with a thread that is joinable (i.e., one that is not detached), produces a "zombie thread". Avoid doing this, since each zombie thread consumes some system resources, and when enough zombie threads have accumulated, it will no longer be possible to create new threads (or processes).

There is no pthreads analog of *waitpid(-1, &status, 0)*, that is, "join with any terminated thread". If you believe you need this functionality, you probably need to rethink your application design.

All of the threads in a process are peers: any thread can join with any other thread in the process.

EXAMPLE

See **pthread_create**(3).

SEE ALSO

pthread_cancel(3), **pthread_create**(3), **pthread_detach**(3), **pthread_exit**(3), **pthreads**(7)

NAME

pthread_sigmask – examine and change mask of blocked signals

SYNOPSIS

#include <signal.h>

int pthread_sigmask(int *how*, **const sigset_t** **set*, **sigset_t** **oset*);

DESCRIPTION

The **pthread_sigmask()** function is just like **sigprocmask(),** with the difference that its use in multithreaded programs is explicitly specified by POSIX.1.

The **sigprocmask( )** function is used to examine and/or change the caller's signal mask. If the value is **SIG_BLOCK**, the set pointed to by the argument *set* is added to the current signal mask. If the value is **SIG_UNBLOCK**, the set pointed by the argument *set* is removed from the current signal mask. If the value is **SIG_SETMASK**, the current signal mask is replaced by the set pointed to by the argument *set*. If the argument *oset* is not NULL, the previous mask is stored in the space pointed to by *oset*. If the value of the argument *set* is NULL, the value *how* is not significant and the caller's signal mask is unchanged; thus, the call can be used to inquire about currently blocked signals.

If there are any pending unblocked signals after the call to **sigprocmask( )**, at least one of those signals will be delivered before the call to **sigprocmask( )** returns.

It is not possible to block those signals that cannot be ignored this restriction is silently imposed by the system. See **sigaction**(2).

If **sigprocmask( )** fails, the caller's signal mask is not changed.

RETURN VALUES

On success, **pthread_sigmask( )** returns **0**. On failure, it returns an error number.

ERRORS

pthread_sigmask( ) fails if any of the following is true:

EFAULT *set* or *oset* points to an illegal address.

EINVAL The value of the *how* argument is not equal to one of the defined values.

NAME

sigaction – POSIX signal handling functions.

SYNOPSIS

#include <signal.h>

int sigaction(int *signum*, **const struct sigaction** **act*, **struct sigaction** **oldact*);

DESCRIPTION

The **sigaction** system call is used to change the action taken by a process on receipt of a specific signal.

signum specifies the signal and can be any valid signal except **SIGKILL** and **SIGSTOP**.

If *act* is non−null, the new action for signal *signum* is installed from *act*. If *oldact* is non−null, the previous action is saved in *oldact*.

The **sigaction** structure is defined as something like

```
struct sigaction {
    void     (*sa_handler)(int signal_number);
    sigset_t sa_mask;
    int      sa_flags;
}
```

sa_handler specifies the action to be associated with *signum* and may be **SIG_DFL** for the default action, **SIG_IGN** to ignore this signal, or a pointer to a signal handling function.

sa_mask gives a mask of signals which should be blocked during execution of the signal handler. In addition, the signal which triggered the handler will be blocked, unless the **SA_NODEFER** or **SA_NOMASK** flags are used.

sa_flags specifies a set of flags which modify the behaviour of the signal handling process. It is formed by the bitwise OR of zero or more of the following:

SA_NOCLDSTOP
If *signum* is **SIGCHLD**, do not receive notification when child processes stop (i.e., when child processes receive one of **SIGSTOP**, **SIGTSTP**, **SIGTTIN** or **SIGTTOU**).

SA_RESTART
Provide behaviour compatible with BSD signal semantics by making certain system calls restartable across signals. Without **SA_RESTART** the system calls return an error and set errno to EINTR when interrupted by a signal.

RETURN VALUES

sigaction() returns 0 on success; on error, −1 is returned, and *errno* is set to indicate the error.

ERRORS

EINVAL
An invalid signal was specified. This will also be generated if an attempt is made to change the action for **SIGKILL** or **SIGSTOP**, which cannot be caught.

SEE ALSO

kill(1), **kill**(2), **killpg**(2), **pause**(2), **sigsetops**(3),

NAME

sigsetops, sigemptyset, sigfillset, sigaddset, sigdelset, sigismember – manipulate sets of signals

SYNOPSIS

#include <signal.h>

int sigemptyset(sigset_t ****set*);**

int sigfillset(sigset_t ****set*);**

int sigaddset(sigset_t ****set*, int** *signo***);**

int sigdelset(sigset_t ****set*, int** *signo***);**

int sigismember(sigset_t ****set*, int** *signo***);**

DESCRIPTION

These functions manipulate *sigset_t* data types, representing the set of signals supported by the implementation.

sigemptyset( ) initializes the set pointed to by *set* to exclude all signals defined by the system.

sigfillset( ) initializes the set pointed to by *set* to include all signals defined by the system.

sigaddset( ) adds the individual signal specified by the value of *signo* to the set pointed to by *set.*

sigdelset( ) deletes the individual signal specified by the value of *signo* from the set pointed to by *set*.

sigismember( ) checks whether the signal specified by the value of *signo* is a member of the set pointed to by *set*.

Any object of type *sigset_t* must be initialized by applying either **sigemptyset( )** or **sigfillset( )** before applying any other operation.

RETURN VALUES

Upon successful completion, the **sigismember( )** function returns a value of one if the specified signal is a member of the specified set, or a value of 0 if it is not. Upon successful completion, the other functions return a value of 0. Otherwise a value of −1 is returned and **errno** is set to indicate the error.

ERRORS

sigaddset( ), **sigdelset( )**, and **sigismember( )** will fail if the following is true:

EINVAL The value of the *signo* argument is not a valid signal number.

sigfillset( ) will fail if the following is true:

EFAULT The *set* argument specifies an invalid address.

SEE ALSO

sigaction(2), **sigpending**(2), **sigprocmask**(2), **sigsuspend**(2), **attributes**(5), **signal**(5)

NAME

strcat, strchr, strcmp, strcpy, strdup, strlen, strncat, strncmp, strncpy, strstr, strtok – string operations

SYNOPSIS

#include <string.h>

char *strcat(char ****dest*, const char ****src***);**
Append the string *src* to the string *dest*, returning a pointer *dest*.

char *strchr(const char ****s*, int** *c***);**
Return a pointer to the first occurrence of the character *c* in the string *s*.

int strcmp(const char ****s1*, const char ****s2***);**
Compare the strings *s1* with *s2*. It returns an integer less than, equal to, or greater than zero if *s1* is found, respectively, to be less than, to match, or be greater than *s2*.

char *strcpy(char ****dest*, const char ****src***);**
Copy the string *src* to *dest*, returning a pointer to the start of *dest*.

char *strdup(const char ****s*);**
Return a duplicate of the string *s* in memory allocated using **malloc**(3).

size_t strlen(const char ****s*);**
Return the length of the string *s*.

char *strncat(char ****dest*, const char ****src***, size_t** *n***);**
Append at most *n* characters from the string *src* to the string *dest*, returning a pointer to *dest*.

int strncmp(const char ****s1*, const char ****s2***, size_t** *n***);**
Compare at most *n* bytes of the strings *s1* and *s2*. It returns an integer less than, equal to, or greater than zero if *s1* is found, respectively, to be less than, to match, or be greater than *s2*.

char *strncpy(char ****dest*, const char ****src***, size_t** *n***);**
Copy at most *n* bytes from string *src* to *dest*, returning a pointer to the start of *dest*.

char *strstr(const char ****haystack*, const char ****needle***);**
Find the first occurrence of the substring *needle* in the string *haystack*, returning a pointer to the found substring.

char *strtok(char ****s*, const char ****delim***);**
Extract tokens from the string *s* that are delimited by one of the bytes in *delim*.

DESCRIPTION

The string functions perform operations on null-terminated strings.