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## Red Hat Enterprise Linux Release 9.2 Manual Pages on 'clnt\_perror.3' command

## \$ man clnt\_perror.3

RPC(3)

Linux Programmer's Manual

RPC(3)

NAME

rpc - library routines for remote procedure calls

## SYNOPSIS AND DESCRIPTION

These routines allow C programs to make procedure calls on other ma? chines across the network. First, the client calls a procedure to send a data packet to the server. Upon receipt of the packet, the server calls a dispatch routine to perform the requested service, and then sends back a reply. Finally, the procedure call returns to the client.

To take use of these routines, include the header file <pc/rpc.h>.

The prototypes below make use of the following types:

typedef int bool\_t;

typedef bool\_t (\*xdrproc\_t) (XDR \*, void \*, ...);

typedef bool\_t (\*resultproc\_t) (caddr\_t resp,

struct sockaddr\_in \*raddr);

See the header files for the declarations of the AUTH, CLIENT, SVCXPRT, and XDR types.

void auth\_destroy(AUTH \*auth);

A macro that destroys the authentication information associated with auth. Destruction usually involves deallocation of private data structures. The use of auth is undefined after calling auth\_destroy().

Create and return an RPC authentication handle that passes nonusable authentication information with each remote procedure call. This is the default authentication used by RPC.

AUTH \*authunix\_create(char \*host, int uid, int gid,

int len, int \*aup\_gids);

Create and return an RPC authentication handle that contains au? thentication information. The parameter host is the name of the machine on which the information was created; uid is the user's user ID; gid is the user's current group ID; len and aup\_gids refer to a counted array of groups to which the user belongs. It is easy to impersonate a user.

AUTH \*authunix\_create\_default(void);

Calls authunix\_create() with the appropriate parameters.

int callrpc(char \*host, unsigned long prognum,

unsigned long versnum, unsigned long procnum,

xdrproc\_t inproc, char \*in,

xdrproc\_t outproc, char \*out);

Call the remote procedure associated with prognum, versnum, and procnum on the machine, host. The parameter in is the address of the procedure's argument(s), and out is the address of where to place the result(s); inproc is used to encode the procedure's parameters, and outproc is used to decode the procedure's re? sults. This routine returns zero if it succeeds, or the value of enum clnt\_stat cast to an integer if it fails. The routine clnt\_perrno() is handy for translating failure statuses into messages.

Warning: calling remote procedures with this routine uses UDP/IP as a transport; see clntudp\_create() for restrictions. You do not have control of timeouts or authentication using this rou? tine.

enum clnt\_stat clnt\_broadcast(unsigned long prognum,

unsigned long versnum, unsigned long procnum,

xdrproc\_t inproc, char \*in,

xdrproc\_t outproc, char \*out,
resultproc\_t eachresult);

Like callrpc(), except the call message is broadcast to all lo? cally connected broadcast nets. Each time it receives a re? sponse, this routine calls each result(), whose form is:

eachresult(char \*out, struct sockaddr\_in \*addr);

where out is the same as out passed to clnt\_broadcast(), except that the remote procedure's output is decoded there; addr points to the address of the machine that sent the results. If eachre? sult() returns zero, clnt\_broadcast() waits for more replies; otherwise it returns with appropriate status.

Warning: broadcast sockets are limited in size to the maximum transfer unit of the data link. For ethernet, this value is 1500 bytes.

enum clnt\_stat clnt\_call(CLIENT \*clnt, unsigned long procnum,

xdrproc\_t inproc, char \*in,
xdrproc\_t outproc, char \*out,
struct timeval tout);

A macro that calls the remote procedure procnum associated with the client handle, clnt, which is obtained with an RPC client creation routine such as clnt\_create(). The parameter in is the address of the procedure's argument(s), and out is the address of where to place the result(s); inproc is used to encode the procedure's parameters, and outproc is used to decode the proce? dure's results; tout is the time allowed for results to come back.

clnt\_destroy(CLIENT \*clnt);

A macro that destroys the client's RPC handle. Destruction usu? ally involves deallocation of private data structures, including clnt itself. Use of clnt is undefined after calling clnt\_de? stroy(). If the RPC library opened the associated socket, it will close it also. Otherwise, the socket remains open.

unsigned long vers, char \*proto);

Generic client creation routine. host identifies the name of the remote host where the server is located. proto indicates which kind of transport protocol to use. The currently sup? ported values for this field are ?udp? and ?tcp?. Default time? outs are set, but can be modified using clnt\_control(). Warning: using UDP has its shortcomings. Since UDP-based RPC messages can hold only up to 8 Kbytes of encoded data, this transport cannot be used for procedures that take large argu? ments or return huge results.

bool\_t clnt\_control(CLIENT \*cl, int req, char \*info);

A macro used to change or retrieve various information about a client object. req indicates the type of operation, and info is a pointer to the information. For both UDP and TCP, the sup? ported values of req and their argument types and what they do are:

CLSET\_TIMEOUT struct timeval // set total timeout

CLGET\_TIMEOUT struct timeval // get total timeout

Note: if you set the timeout using clnt\_control(), the timeout

parameter passed to clnt\_call() will be ignored in all future

calls.

CLGET\_SERVER\_ADDR struct sockaddr\_in // get server's address
The following operations are valid for UDP only:

CLSET\_RETRY\_TIMEOUT struct timeval // set the retry timeout CLGET\_RETRY\_TIMEOUT struct timeval // get the retry timeout The retry timeout is the time that "UDP RPC" waits for the server to reply before retransmitting the request.

clnt\_freeres(CLIENT \* clnt, xdrproc\_t outproc, char \*out);

A macro that frees any data allocated by the RPC/XDR system when it decoded the results of an RPC call. The parameter out is the address of the results, and outproc is the XDR routine describ? ing the results. This routine returns one if the results were successfully freed, and zero otherwise.

void clnt\_geterr(CLIENT \*clnt, struct rpc\_err \*errp);

A macro that copies the error structure out of the client handle to the structure at address errp.

void clnt\_pcreateerror(char \*s);

Print a message to standard error indicating why a client RPC handle could not be created. The message is prepended with string s and a colon. Used when a clnt\_create(), clntraw\_cre? ate(), clnttcp\_create(), or clntudp\_create() call fails.

void clnt\_perrno(enum clnt\_stat stat);

Print a message to standard error corresponding to the condition indicated by stat. Used after callrpc().

clnt\_perror(CLIENT \*clnt, char \*s);

Print a message to standard error indicating why an RPC call failed; clnt is the handle used to do the call. The message is prepended with string s and a colon. Used after clnt\_call().

char \*cInt\_spcreateerror(char \*s);

Like clnt\_pcreateerror(), except that it returns a string in? stead of printing to the standard error.

Bugs: returns pointer to static data that is overwritten on each call.

char \*clnt\_sperrno(enum clnt\_stat stat);

Take the same arguments as clnt\_perrno(), but instead of sending a message to the standard error indicating why an RPC call failed, return a pointer to a string which contains the message.

The string ends with a NEWLINE.

clnt\_sperrno() is used instead of clnt\_perrno() if the program does not have a standard error (as a program running as a server quite likely does not), or if the programmer does not want the message to be output with printf(3), or if a message format dif? ferent than that supported by clnt\_perrno() is to be used.

Note: unlike clnt\_sperror() and clnt\_spcreateerror(), clnt\_sper? rno() returns pointer to static data, but the result will not get overwritten on each call.

char \*clnt sperror(CLIENT \*rpch, char \*s);

Like clnt\_perror(), except that (like clnt\_sperrno()) it returns a string instead of printing to standard error.

Bugs: returns pointer to static data that is overwritten on each call.

CLIENT \*cIntraw\_create(unsigned long prognum, unsigned long versnum);

This routine creates a toy RPC client for the remote program prognum, version versnum. The transport used to pass messages to the service is actually a buffer within the process's address space, so the corresponding RPC server should live in the same address space; see svcraw\_create(). This allows simulation of RPC and acquisition of RPC overheads, such as round trip times, without any kernel interference. This routine returns NULL if it fails.

CLIENT \*cInttcp\_create(struct sockaddr\_in \*addr,

unsigned long prognum, unsigned long versnum,

int \*sockp, unsigned int sendsz, unsigned int recvsz);

This routine creates an RPC client for the remote program prognum, version versnum; the client uses TCP/IP as a transport.

The remote program is located at Internet address \*addr. If addr->sin\_port is zero, then it is set to the actual port that the remote program is listening on (the remote portmap service is consulted for this information). The parameter sockp is a socket; if it is RPC\_ANYSOCK, then this routine opens a new one and sets sockp. Since TCP-based RPC uses buffered I/O, the user may specify the size of the send and receive buffers with the parameters sendsz and recvsz; values of zero choose suitable de? faults. This routine returns NULL if it fails.

CLIENT \*cIntudp\_create(struct sockaddr\_in \*addr,

unsigned long prognum, unsigned long versnum,

struct timeval wait, int \*sockp);

This routine creates an RPC client for the remote program prognum, version versnum; the client uses use UDP/IP as a trans?

port. The remote program is located at Internet address addr.

If addr->sin\_port is zero, then it is set to actual port that
the remote program is listening on (the remote portmap service
is consulted for this information). The parameter sockp is a
socket; if it is RPC\_ANYSOCK, then this routine opens a new one
and sets sockp. The UDP transport resends the call message in
intervals of wait time until a response is received or until the
call times out. The total time for the call to time out is
specified by clnt\_call().

Warning: since UDP-based RPC messages can hold only up to 8 Kbytes of encoded data, this transport cannot be used for proce? dures that take large arguments or return huge results.

CLIENT \*cIntudp\_bufcreate(struct sockaddr\_in \*addr,

unsigned long prognum, unsigned long versnum, struct timeval wait, int \*sockp,

This routine creates an RPC client for the remote program

unsigned int sendsize, unsigned int recosize);

prognum, on versnum; the client uses use UDP/IP as a transport. The remote program is located at Internet address addr. If addr->sin\_port is zero, then it is set to actual port that the remote program is listening on (the remote portmap service is consulted for this information). The parameter sockp is a socket; if it is RPC\_ANYSOCK, then this routine opens a new one and sets sockp. The UDP transport resends the call message in intervals of wait time until a response is received or until the call times out. The total time for the call to time out is specified by clnt\_call().

This allows the user to specify the maximum packet size for sending and receiving UDP-based RPC messages.

void get myaddress(struct sockaddr in \*addr);

Stuff the machine's IP address into \*addr, without consulting the library routines that deal with /etc/hosts. The port number is always set to htons(PMAPPORT).

struct pmaplist \*pmap\_getmaps(struct sockaddr\_in \*addr);

A user interface to the portmap service, which returns a list of the current RPC program-to-port mappings on the host located at IP address \*addr. This routine can return NULL. The command rpcinfo -p uses this routine.

unsigned short pmap\_getport(struct sockaddr\_in \*addr,

unsigned long prognum, unsigned long versnum, unsigned int protocol);

A user interface to the portmap service, which returns the port number on which waits a service that supports program number prognum, version versnum, and speaks the transport protocol as? sociated with protocol. The value of protocol is most likely IPPROTO\_UDP or IPPROTO\_TCP. A return value of zero means that the mapping does not exist or that the RPC system failed to con? tact the remote portmap service. In the latter case, the global variable rpc\_createerr contains the RPC status.

enum clnt\_stat pmap\_rmtcall(struct sockaddr\_in \*addr,

unsigned long prognum, unsigned long versnum, unsigned long procnum,

xdrproc\_t inproc, char \*in,

xdrproc\_t outproc, char \*out,

struct timeval tout, unsigned long \*portp);

A user interface to the portmap service, which instructs portmap on the host at IP address \*addr to make an RPC call on your be? half to a procedure on that host. The parameter \*portp will be modified to the program's port number if the procedure succeeds. The definitions of other parameters are discussed in callrpc() and clnt\_call(). This procedure should be used for a ?ping? and nothing else. See also clnt\_broadcast().

bool\_t pmap\_set(unsigned long prognum, unsigned long versnum, unsigned int protocol, unsigned short port);

A user interface to the portmap service, which establishes a mapping between the triple [prognum,versnum,protocol] and port

on the machine's portmap service. The value of protocol is most likely IPPROTO\_UDP or IPPROTO\_TCP. This routine returns one if it succeeds, zero otherwise. Automatically done by svc\_regis? ter().

bool\_t pmap\_unset(unsigned long prognum, unsigned long versnum);

A user interface to the portmap service, which destroys all map?

ping between the triple [prognum,versnum,\*] and ports on the ma?

chine's portmap service. This routine returns one if it suc?

ceeds, zero otherwise.

Register procedure procname with the RPC service package. If a request arrives for program prognum, version versnum, and proce? dure procnum, procname is called with a pointer to its parame? ter(s); procname should return a pointer to its static re? sult(s); inproc is used to decode the parameters while outproc is used to encode the results. This routine returns zero if the registration succeeded, -1 otherwise.

Warning: remote procedures registered in this form are accessed using the UDP/IP transport; see svcudp\_create() for restric? tions.

struct rpc\_createerr rpc\_createerr;

A global variable whose value is set by any RPC client creation routine that does not succeed. Use the routine clnt\_pcreateer? ror() to print the reason why.

void svc\_destroy(SVCXPRT \*xprt);

A macro that destroys the RPC service transport handle, xprt.

Destruction usually involves deallocation of private data struc?

tures, including xprt itself. Use of xprt is undefined after

calling this routine.

fd\_set svc\_fdset;

descriptor bit mask; it is suitable as a parameter to the se?

lect(2) system call. This is of interest only if a service im?

plementor does their own asynchronous event processing, instead of calling svc\_run(). This variable is read-only (do not pass its address to select(2)!), yet it may change after calls to svc\_getreqset() or any creation routines.

int svc\_fds;

Similar to svc\_fdset, but limited to 32 file descriptors. This interface is obsoleted by svc\_fdset.

svc freeargs(SVCXPRT \*xprt, xdrproc t inproc, char \*in);

A macro that frees any data allocated by the RPC/XDR system when it decoded the arguments to a service procedure using svc\_getargs(). This routine returns 1 if the results were suc? cessfully freed, and zero otherwise.

svc\_getargs(SVCXPRT \*xprt, xdrproc\_t inproc, char \*in);

A macro that decodes the arguments of an RPC request associated with the RPC service transport handle, xprt. The parameter in is the address where the arguments will be placed; inproc is the XDR routine used to decode the arguments. This routine returns one if decoding succeeds, and zero otherwise.

struct sockaddr\_in \*svc\_getcaller(SVCXPRT \*xprt);

The approved way of getting the network address of the caller of a procedure associated with the RPC service transport handle, xprt.

void svc\_getreqset(fd\_set \*rdfds);

This routine is of interest only if a service implementor does not call svc\_run(), but instead implements custom asynchronous event processing. It is called when the select(2) system call has determined that an RPC request has arrived on some RPC socket(s); rdfds is the resultant read file descriptor bit mask.

The routine returns when all sockets associated with the value

of rdfds have been serviced.

Similar to svc\_getreqset(), but limited to 32 file descriptors.

This interface is obsoleted by svc\_getreqset().

bool\_t svc\_register(SVCXPRT \*xprt, unsigned long prognum,

unsigned long versnum,

void (\*dispatch)(svc\_req \*, SVCXPRT \*),

unsigned long protocol);

Associates prognum and versnum with the service dispatch proce?

dure, dispatch. If protocol is zero, the service is not regis?

tered with the portmap service. If protocol is nonzero, then a

mapping of the triple [prognum,versnum,protocol] to

xprt->xp\_port is established with the local portmap service

(generally protocol is zero, IPPROTO\_UDP or IPPROTO\_TCP). The

procedure dispatch has the following form:

dispatch(struct svc\_req \*request, SVCXPRT \*xprt);

The svc\_register() routine returns one if it succeeds, and zero otherwise.

void svc\_run(void);

This routine never returns. It waits for RPC requests to ar? rive, and calls the appropriate service procedure using svc\_ge? treq() when one arrives. This procedure is usually waiting for a select(2) system call to return.

bool\_t svc\_sendreply(SVCXPRT \*xprt, xdrproc\_t outproc, char \*out);

Called by an RPC service's dispatch routine to send the results

of a remote procedure call. The parameter xprt is the request's

associated transport handle; outproc is the XDR routine which is

used to encode the results; and out is the address of the re?

sults. This routine returns one if it succeeds, zero otherwise.

void svc\_unregister(unsigned long prognum, unsigned long versnum);

Remove all mapping of the double [prognum,versnum] to dispatch routines, and of the triple [prognum,versnum,\*] to port number.

void svcerr\_auth(SVCXPRT \*xprt, enum auth\_stat why);

Called by a service dispatch routine that refuses to perform a remote procedure call due to an authentication error.

void svcerr decode(SVCXPRT \*xprt);

Called by a service dispatch routine that cannot successfully decode its parameters. See also svc\_getargs().

void svcerr\_noproc(SVCXPRT \*xprt);

Called by a service dispatch routine that does not implement the procedure number that the caller requests.

void svcerr\_noprog(SVCXPRT \*xprt);

Called when the desired program is not registered with the RPC package. Service implementors usually do not need this routine.

void svcerr\_progvers(SVCXPRT \*xprt);

Called when the desired version of a program is not registered with the RPC package. Service implementors usually do not need this routine.

void svcerr\_systemerr(SVCXPRT \*xprt);

Called by a service dispatch routine when it detects a system error not covered by any particular protocol. For example, if a service can no longer allocate storage, it may call this rou? tine.

void svcerr\_weakauth(SVCXPRT \*xprt);

Called by a service dispatch routine that refuses to perform a remote procedure call due to insufficient authentication parame? ters. The routine calls svcerr\_auth(xprt, AUTH\_TOOWEAK).

SVCXPRT \*svcfd\_create(int fd, unsigned int sendsize,

unsigned int recvsize);

Create a service on top of any open file descriptor. Typically, this file descriptor is a connected socket for a stream protocol such as TCP. sendsize and recvsize indicate sizes for the send and receive buffers. If they are zero, a reasonable default is chosen.

SVCXPRT \*svcraw\_create(void);

This routine creates a toy RPC service transport, to which it returns a pointer. The transport is really a buffer within the process's address space, so the corresponding RPC client should

live in the same address space; see clntraw\_create(). This rou? tine allows simulation of RPC and acquisition of RPC overheads (such as round trip times), without any kernel interference. This routine returns NULL if it fails.

SVCXPRT \*svctcp\_create(int sock, unsigned int send\_buf\_size, unsigned int recv\_buf\_size);

This routine creates a TCP/IP-based RPC service transport, to which it returns a pointer. The transport is associated with the socket sock, which may be RPC\_ANYSOCK, in which case a new socket is created. If the socket is not bound to a local TCP port, then this routine binds it to an arbitrary port. Upon completion, xprt->xp\_sock is the transport's socket descriptor, and xprt->xp\_port is the transport's port number. This routine returns NULL if it fails. Since TCP-based RPC uses buffered I/O, users may specify the size of buffers; values of zero choose suitable defaults.

SVCXPRT \*svcudp\_bufcreate(int sock, unsigned int sendsize, unsigned int recosize);

This routine creates a UDP/IP-based RPC service transport, to which it returns a pointer. The transport is associated with the socket sock, which may be RPC\_ANYSOCK, in which case a new socket is created. If the socket is not bound to a local UDP port, then this routine binds it to an arbitrary port. Upon completion, xprt->xp\_sock is the transport's socket descriptor, and xprt->xp\_port is the transport's port number. This routine returns NULL if it fails.

This allows the user to specify the maximum packet size for sending and receiving UDP-based RPC messages.

SVCXPRT \*svcudp\_create(int sock);

This call is equivalent to svcudp\_bufcreate(sock,SZ,SZ) for some default size SZ.

bool\_t xdr\_accepted\_reply(XDR \*xdrs, struct accepted\_reply \*ar);

Used for encoding RPC reply messages. This routine is useful

for users who wish to generate RPC-style messages without using the RPC package.

bool\_t xdr\_authunix\_parms(XDR \*xdrs, struct authunix\_parms \*aupp);

Used for describing UNIX credentials. This routine is useful

for users who wish to generate these credentials without using
the RPC authentication package.

void xdr\_callhdr(XDR \*xdrs, struct rpc\_msg \*chdr);

Used for describing RPC call header messages. This routine is useful for users who wish to generate RPC-style messages without using the RPC package.

bool\_t xdr\_callmsg(XDR \*xdrs, struct rpc\_msg \*cmsg);

Used for describing RPC call messages. This routine is useful
for users who wish to generate RPC-style messages without using
the RPC package.

bool\_t xdr\_opaque\_auth(XDR \*xdrs, struct opaque\_auth \*ap);

Used for describing RPC authentication information messages.

This routine is useful for users who wish to generate RPC-style messages without using the RPC package.

bool\_t xdr\_pmap(XDR \*xdrs, struct pmap \*regs);

Used for describing parameters to various portmap procedures,
externally. This routine is useful for users who wish to gener?

ate these parameters without using the pmap interface.

bool\_t xdr\_pmaplist(XDR \*xdrs, struct pmaplist \*\*rp);

Used for describing a list of port mappings, externally. This routine is useful for users who wish to generate these parame? ters without using the pmap interface.

bool\_t xdr\_rejected\_reply(XDR \*xdrs, struct rejected\_reply \*rr);

Used for describing RPC reply messages. This routine is useful
for users who wish to generate RPC-style messages without using
the RPC package.

bool\_t xdr\_replymsg(XDR \*xdrs, struct rpc\_msg \*rmsg);

Used for describing RPC reply messages. This routine is useful

for users who wish to generate RPC style messages without using

the RPC package.

void xprt\_register(SVCXPRT \*xprt);

After RPC service transport handles are created, they should register themselves with the RPC service package. This routine modifies the global variable svc\_fds. Service implementors usu? ally do not need this routine.

void xprt\_unregister(SVCXPRT \*xprt);

Before an RPC service transport handle is destroyed, it should unregister itself with the RPC service package. This routine modifies the global variable svc\_fds. Service implementors usu? ally do not need this routine.

## **ATTRIBUTES**

For an explanation of the terms used in this section, see at? tributes(7).

?cInt\_create(), cInt\_control(), ? ? ?
?cInt\_freeres(), cInt\_geterr(), ? ? ?
?cInt\_pcreateerror(), cInt\_perrno(), ? ? ?

?cInt\_perror(), ? ? ?

?cInt\_spcreateerror(), ? ? ?

?cInt\_sperrno(), cInt\_sperror(), ? ? ?

?cIntraw\_create(), cInttcp\_create(), ? ?

?cIntudp\_create(), ? ? ?

?cIntudp\_bufcreate(), ? ? ?

?get\_myaddress(), pmap\_getmaps(), ? ? ?

?pmap\_getport(), pmap\_rmtcall(), ? ? ?

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?
    ?pmap set(), pmap unset(),
    ?registerrpc(), svc_destroy(),
                                 ?
                                                 ?
    ?svc_freeargs(), svc_getargs(),
                                                  ?
   ?svc_getcaller(), svc_getreqset(), ?
                                                 ?
    ?svc_getreq(), svc_register(),
                                                 ?
    ?svc_run(), svc_sendreply(),
   ?svc_unregister(), svcerr_auth(), ?
    ?svcerr_decode(), svcerr_noproc(), ?
   ?svcerr noprog(), svcerr progvers(), ?
                                              ?
                                                    ?
    ?svcerr_systemerr(),
                                               ?
   ?svcerr_weakauth(),
    ?svcfd_create(), svcraw_create(), ?
                                             ?
                                                   ?
                                              ?
    ?svctcp_create(),
   ?svcudp_bufcreate(),
                               ?
    ?svcudp_create(), xdr_accepted_re? ?
                          ?
                                   ?
   ?ply(),
   ?xdr_authunix_parms(),
                                 ?
                            ?
                                      ?
                                            ?
   ?xdr callhdr(),
                                                    ?
   ?xdr_callmsg(), xdr_opaque_auth(), ?
                                                  ?
   ?xdr_pmap(), xdr_pmaplist(),
                               ?
                                               ?
   ?xdr_rejected_reply(),
                              ?
   ?xdr_replymsg(),
   ?xprt_register(), xprt_unregister() ?
   SEE ALSO
   xdr(3)
   The following manuals:
       Remote Procedure Calls: Protocol Specification
       Remote Procedure Call Programming Guide
       rpcgen Programming Guide
   RPC: Remote Procedure Call Protocol Specification, RFC 1050, Sun Mi?
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crosystems, Inc., USC-ISI.

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This page is part of release 5.10 of the Linux man-pages project. A description of the project, information about reporting bugs, and the latest version of this page, can be found at https://www.kernel.org/doc/man-pages/.

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