

\$SPAD/src/lib sockio-c.c

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**Abstract**

# Contents

1	License	3
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# 1 License

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— \* —

/\* socket i/o primitives \*/

#include <stdio.h>  
#include <stdlib.h>

—————  
The MACOSX platform is broken because no matter what you do it seems to  
include files from `[[/usr/include/sys]]` ahead of `[[/usr/include]]`. On linux systems  
these files include themselves which causes an infinite regression of includes that  
fails. GCC gracefully steps over that problem but the build fails anyway. On

MACOSX the `[[/usr/include/sys]]` versions of files are badly broken with respect to the `[[/usr/include]]` versions.

```
— * —

#if defined(MACOSXplatform)
#include "/usr/include/unistd.h"
#else
#include <unistd.h>
#endif
#include <sys/time.h>
#include <sys/stat.h>
#include <errno.h>
#include <string.h>
#if defined(MACOSXplatform)
#include "/usr/include/signal.h"
#else
#include <signal.h>
#endif

#if defined(SGIplatform)
#include <bstring.h>
#endif

#include "com.h"
#include "bsdsignal.h"

#define TotalMaxPurposes 50
#define MaxServerNumbers 100
#define accept_if_needed(purpose) \
    ( purpose_table[purpose] == NULL ? sock_accept_connection(purpose) : 1 )

Sock clients[MaxClients];      /* socket description of spad clients */
Sock server[2];                /* AF_UNIX and AF_INET sockets for server */
Sock *purpose_table[TotalMaxPurposes]; /* table of dedicated socket types */
fd_set socket_mask;            /* bit mask of active sockets */
fd_set server_mask;            /* bit mask of server sockets */
int socket_closed;              /* used to identify closed socket on SIGPIPE */
int spad_server_number = -1;    /* spad server number used in sman */
int str_len = 0;
int still_reading = 0;

#include "bsdsignal.h1"
#include "sockio-c.h1"

void
sigpipe_handler(int sig)
```

```

{
    socket_closed = 1;
}

int
wait_for_client_read(Sock *sock,char *buf,int buf_size,char *msg)
{
    int ret_val;
    switch(sock->purpose) {
    case SessionManager:
    case ViewportServer:
        sock_accept_connection(sock->purpose);
        ret_val = sread(purpose_table[sock->purpose], buf, buf_size, msg);
        sock->socket = 0;
        return ret_val;
    default:
        sock->socket = 0;
        return -1;
    }
}

int
wait_for_client_write(Sock *sock,char *buf,int buf_size,char *msg)
{
    int ret_val;
    switch(sock->purpose) {
    case SessionManager:
    case ViewportServer:
        sock_accept_connection(sock->purpose);
        ret_val = swrite(purpose_table[sock->purpose], buf, buf_size, msg);
        sock->socket = 0;
        return ret_val;
    default:
        sock->socket = 0;
        return -1;
    }
}

int
sread(Sock *sock,char *buf,int buf_size,char *msg)
{
    int ret_val;
    char err_msg[256];
    errno = 0;
    do {
        ret_val = read(sock->socket, buf, buf_size);
    } while (ret_val == -1 && errno == EINTR);
    if (ret_val == 0) {
        FD_CLR(sock->socket, &socket_mask);
        purpose_table[sock->purpose] = NULL;
    }
}

```

```

        close(sock->socket);
        return wait_for_client_read(sock, buf, buf_size, msg);
    }
    if (ret_val == -1) {
        if (msg) {
            sprintf(err_msg, "reading: %s", msg);
            perror(err_msg);
        }
        return -1;
    }
    return ret_val;
}

int
swrite(Socket *sock, char *buf, int buf_size, char *msg)
{
    int ret_val;
    char err_msg[256];
    errno = 0;
    socket_closed = 0;
    ret_val = write(sock->socket, buf, buf_size);
    if (ret_val == -1) {
        if (socket_closed) {
            FD_CLR(sock->socket, &socket_mask);
            purpose_table[sock->purpose] = NULL;
            /*      printf("    closing socket %d\n", sock->socket); */
            close(sock->socket);
            return wait_for_client_write(sock, buf, buf_size, msg);
        } else {
            if (msg) {
                sprintf(err_msg, "writing: %s", msg);
                perror(err_msg);
            }
            return -1;
        }
    }
    return ret_val;
}

int
sselect(int n, fd_set *rd, fd_set *wr, fd_set *ex, void *timeout)
{
    int ret_val;
    do {
        ret_val = select(n, (void *)rd, (void *)wr, (void *)ex, (struct timeval *) timeout);
    } while (ret_val == -1 && errno == EINTR);
    return ret_val;
}

int

```

```

fill_buf(Sock *sock, char *buf, int len, char *msg)
{
    int bytes = 0, ret_val;
    while(bytes < len) {
        ret_val = sread(sock, buf + bytes, len - bytes, msg);
        if (ret_val == -1) return -1;
        bytes += ret_val;
    }
    return bytes;
}

int
get_int(Sock *sock)
{
    int val = -1, len;
    len = fill_buf(sock, (char *)&val, sizeof(int), "integer");
    if (len != sizeof(int)) {
#ifdef DEBUG
        fprintf(stderr, "get_int: caught error\n", val);
#endif
        return -1;
    }
#ifdef DEBUG
    fprintf(stderr, "get_int: received %d\n", val);
#endif
    return val;
}

int
sock_get_int(int purpose)
{
    if (accept_if_needed(purpose) != -1)
        return get_int(purpose_table[purpose]);
    else return -1;
}

int
get_ints(Sock *sock, int *vals, int num)
{
    int i;
    for(i=0; i<num; i++)
        *vals++ = get_int(sock);
    return 0;
}

int
sock_get_ints(int purpose, int *vals, int num)
{
    if (accept_if_needed(purpose) != -1)
        return get_ints(purpose_table[purpose], vals, num);
}

```

```

    return -1;
}

int
send_int(Sock *sock,int val)
{
    int ret_val;
    ret_val = swrite(sock, (char *)&val, sizeof(int), NULL);
    if (ret_val == -1) {
        return -1;
    }
    return 0;
}

int
sock_send_int(int purpose,int val)
{
    if (accept_if_needed(purpose) != -1)
        return send_int(purpose_table[purpose], val);
    return -1;
}

int
send_ints(Sock *sock, int *vals, int num)
{
    int i;
    for(i=0; i<num; i++)
        if (send_int(sock, *vals++) == -1)
            return -1;
    return 0;
}

int
sock_send_ints(int purpose, int *vals, int num)
{
    if (accept_if_needed(purpose) != -1)
        return send_ints(purpose_table[purpose], vals, num);
    return -1;
}

int
send_string_len(Sock *sock,char *str,int len)
{
    int val;
    if (len > 1023) {
        char *buf;
        buf = malloc(len+1);
        strncpy(buf,str,len);
        buf[len]='\0';
        send_int(sock,len+1);
    }
}

```



```

        val = swrite(sock, buf, len+1, NULL);
        free(buf);
    } else {
        static char buf[1024];
        strncpy(buf, str, len);
        buf[len] = '\0';
        send_int(sock, len+1);
        val = swrite(sock, buf, len+1, NULL);
    }
    if (val == -1) {
        return -1;
    }
    return 0;
}

```

```

int
send_string(Sock *sock, char *str)
{
    int val, len = strlen(str);
    send_int(sock, len+1);
    val = swrite(sock, str, len+1, NULL);
    if (val == -1) {
        return -1;
    }
    return 0;
}

```

```

int
sock_send_string(int purpose, char *str)
{
    if (accept_if_needed(purpose) != -1)
        return send_string(purpose_table[purpose], str);
    return -1;
}

```

```

int
sock_send_string_len(int purpose, char * str, int len)
{
    if (accept_if_needed(purpose) != -1)
        return send_string_len(purpose_table[purpose], str, len);
    return -1;
}

```

```

int
send_strings(Sock *sock, char ** vals, int num)
{
    int i;
    for(i=0; i<num; i++)
        if (send_string(sock, *vals++) == -1)

```

```

        return -1;
    return 0;
}

int
sock_send_strings(int purpose, char **vals, int num)
{
    if (accept_if_needed(purpose) != -1)
        return send_strings(purpose_table[purpose], vals, num);
    return -1;
}

char *
get_string(Sock *sock)
{
    int val, len;
    char *buf;
    len = get_int(sock);
    if (len < 0) return NULL;
    buf = malloc(len*sizeof(char));
    val = fill_buf(sock, buf, len, "string");
    if (val == -1){
free(buf);
return NULL;
}
#ifdef DEBUG
    fprintf(stderr, "get_string: received \"%s\" \n", buf);
#endif
    return buf;
}

char *
sock_get_string(int purpose)
{
    if (accept_if_needed(purpose) != -1)
        return get_string(purpose_table[purpose]);
    else return NULL;
}

char *
get_string_buf(Sock *sock, char *buf, int buf_len)
{
    int val;
    if(!str_len) str_len = get_int(sock);
    if (str_len > buf_len) {
        val = fill_buf(sock, buf, buf_len, "buffered string");
        str_len = str_len - buf_len;
        if (val == -1)
            return NULL;
    }

```

```

        return buf;
    }
    else {
        val = fill_buf(sock, buf, str_len, "buffered string");
        str_len = 0;
        if (val == -1)
            return NULL;
        return NULL;
    }
}

char *
sock_get_string_buf(int purpose, char * buf, int buf_len)
{
    if (accept_if_needed(purpose) != -1)
        return get_string_buf(purpose_table[purpose], buf, buf_len);
    return NULL;
}

int
get_strings(Socket *sock, char **vals, int num)
{
    int i;
    for(i=0; i<num; i++)
        *vals++ = get_string(sock);
    return 0;
}

int
sock_get_strings(int purpose, char ** vals, int num)
{
    if (accept_if_needed(purpose) != -1)
        return get_strings(purpose_table[purpose], vals, num);
    return -1;
}

int
send_float(Socket *sock, double num)
{
    int val;
    val = swrite(sock, (char *)&num, sizeof(double), NULL);
    if (val == -1) {
        return -1;
    }
    return 0;
}

int
sock_send_float(int purpose, double num)
{

```

```

    if (accept_if_needed(purpose) != -1)
        return send_float(purpose_table[purpose], num);
    return -1;
}

int
send_sfloats(Sock *sock, float *vals, int num)
{
    int i;
    for(i=0; i<num; i++)
        if (send_float(sock, (double) *vals++) == -1)
            return -1;
    return 0;
}

int
sock_send_sfloats(int purpose, float * vals, int num)
{
    if (accept_if_needed(purpose) != -1)
        return send_sfloats(purpose_table[purpose], vals, num);
    return -1;
}

int
send_floats(Sock *sock, double *vals, int num)
{
    int i;
    for(i=0; i<num; i++)
        if (send_float(sock, *vals++) == -1)
            return -1;
    return 0;
}

int
sock_send_floats(int purpose, double *vals, int num)
{
    if (accept_if_needed(purpose) != -1)
        return send_floats(purpose_table[purpose], vals, num);
    return -1;
}

double
get_float(Sock *sock)
{
    double num = -1.0;
    fill_buf(sock, (char *)&num, sizeof(double), "double");
#ifdef DEBUG
    fprintf(stderr, "get_float: received %f\n", num);
#endif
    return num;
}

```

```

}

double
sock_get_float(int purpose)
{
    if (accept_if_needed(purpose) != -1)
        return get_float(purpose_table[purpose]);
    else return 0.0;
}

int
get_sfloats(Sock *sock, float *vals, int num)
{
    int i;
    for(i=0; i<num; i++)
        *vals++ = (float) get_float(sock);
    return 0;
}

int
sock_get_sfloats(int purpose, float * vals, int num)
{
    if (accept_if_needed(purpose) != -1)
        return get_sfloats(purpose_table[purpose], vals, num);
    return -1;
}

int
get_floats(Sock *sock, double *vals, int num)
{
    int i;
    for(i=0; i<num; i++)
        *vals++ = get_float(sock);
    return 0;
}

int
sock_get_floats(int purpose, double *vals, int num)
{
    if (accept_if_needed(purpose) != -1)
        return get_floats(purpose_table[purpose], vals, num);
    return -1;
}

int
wait_for_client_kill(Sock *sock, int sig)
{
    int ret_val;

```

```

switch(sock->purpose) {
case SessionManager:
case ViewportServer:
    sock_accept_connection(sock->purpose);
    ret_val = send_signal(purpose_table[sock->purpose], sig);
    sock->socket = 0;
    return ret_val;
default:
    sock->socket = 0;
    return -1;
}
}

int
sock_get_remote_fd(int purpose)
{
    if (accept_if_needed(purpose) != -1)
        return purpose_table[purpose]->remote_fd;
    return -1;
}

int
send_signal(Sock *sock, int sig)
{
    int ret_val;
    ret_val = kill(sock->pid, sig);
    if (ret_val == -1 && errno == ESRCH) {
        FD_CLR(sock->socket, &socket_mask);
        purpose_table[sock->purpose] = NULL;
/*    printf("    closing socket %d\n", sock->socket); */
        close(sock->socket);
        return wait_for_client_kill(sock, sig);
    }
    return ret_val;
}

int
sock_send_signal(int purpose,int sig)
{
    if (accept_if_needed(purpose) != -1)
        return send_signal(purpose_table[purpose], sig);
    return -1;
}

int
send_wakeup(Sock *sock)
{
    return send_signal(sock, SIGUSR1);
}

```

```

int
sock_send_wakeup(int purpose)
{
    if (accept_if_needed(purpose) != -1)
        return send_wakeup(purpose_table[purpose]);
    return -1;
}

Sock *
connect_to_local_server_new(char *server_name, int purpose, int time_out)
{
    int max_con=(time_out == 0 ? 1000000 : time_out), i, code=-1;
    Sock *sock;
    char name[256];

    make_server_name(name, server_name);
    sock = (Sock *) calloc(sizeof(Sock), 1);
    if (sock == NULL) {
        perror("allocating socket space");
        return NULL;
    }
    sock->socket = socket(AF_UNIX, SOCK_STREAM, 0);
    if (sock->socket < 0) {
        perror("opening client socket");
        return NULL;
    }
    memset(server[1].addr.u_addr.sa_data, 0,
            sizeof(server[1].addr.u_addr.sa_data));
    sock->addr.u_addr.sa_family = AF_UNIX;
    strcpy(sock->addr.u_addr.sa_data, name);
    for(i=0; i<max_con; i++) {
        code = connect(sock->socket, &sock->addr.u_addr,
                        sizeof(sock->addr.u_addr));
        if (code == -1) {
            if (errno != ENOENT && errno != ECONNREFUSED) {
                perror("connecting server stream socket");
                return NULL;
            } else {
                if (i != max_con - 1) sleep(1);
                continue;
            }
        } else break;
    }
    if (code == -1) {
        return NULL;
    }
    send_int(sock, getpid());
    send_int(sock, purpose);
    send_int(sock, sock->socket);
}

```

```

    sock->pid = get_int(sock);
    sock->remote_fd = get_int(sock);
    return sock;
}

Sock *
connect_to_local_server(char *server_name, int purpose, int time_out)
{
    int max_con=(time_out == 0 ? 1000000 : time_out), i, code=-1;
    Sock *sock;
    char name[256];

    make_server_name(name, server_name);
    sock = (Sock *) calloc(sizeof(Sock), 1);
    if (sock == NULL) {
        perror("allocating socket space");
        return NULL;
    }
    sock->purpose = purpose;
    /* create the socket */
    sock->socket = socket(AF_UNIX, SOCK_STREAM, 0);
    if (sock->socket < 0) {
        perror("opening client socket");
        return NULL;
    }
    /* connect socket using name specified in command line */
    memset(server[1].addr.u_addr.sa_data, 0,
           sizeof(server[1].addr.u_addr.sa_data));
    sock->addr.u_addr.sa_family = AF_UNIX;
    strcpy(sock->addr.u_addr.sa_data, name);
    for(i=0; i<max_con; i++) {
        code = connect(sock->socket, &sock->addr.u_addr,
                      sizeof(sock->addr.u_addr));
        if (code == -1) {
            if (errno != ENOENT && errno != ECONNREFUSED) {
                perror("connecting server stream socket");
                return NULL;
            } else {
                if (i != max_con - 1) sleep(1);
                continue;
            }
        } else break;
    }
    if (code == -1) {
        return NULL;
    }
    send_int(sock, getpid());
    send_int(sock, sock->purpose);
    send_int(sock, sock->socket);
    sock->pid = get_int(sock);
}

```



```

/* fprintf(stderr, "Got int form socket\n"); */
sock->remote_fd = get_int(sock);
return sock;
}

/* act as terminal session for sock connected to stdin and stdout of another
process */
void
remote_stdio(Sock *sock)
{
    char buf[1024];
    fd_set rd;
    int len;
    while (1) {
        FD_ZERO(&rd);
        FD_SET(sock->socket,&rd);
        FD_SET(0, &rd);
        len = sselect(FD_SETSIZE, (fd_set *)&rd, (fd_set *)0, (fd_set *)0, NULL);
        if (len == -1) {
            perror("stdio select");
            return;
        }
        if (FD_ISSET(0, &rd)) {
            fgets(buf,1024,stdin);
            len = strlen(buf);
            /*
             * gets(buf);
             * len = strlen(buf);
             * (buf+len) = '\n';
             * (buf+len+1) = '\0';
             */
            swrite(sock, buf, len, "writing to remote stdin");
        }
        if (FD_ISSET(sock->socket, &rd)) {
            len = sread(sock, buf, 1024, "stdio");
            if (len == -1)
                return;
            else {
                *(buf + len) = '\0';
                fputs(buf, stdout);
                fflush(stdout);
            }
        }
    }
}

/* initialize the table of dedicated sockets */
void
init_purpose_table(void)
{

```

```

    int i;
    for(i=0; i<TotalMaxPurposes; i++) {
        purpose_table[i] = NULL;
    }
}

int
make_server_number(void )
{
    spad_server_number = getpid();
    return spad_server_number;
}

void
close_socket(int socket_num, char *name)
{
    close(socket_num);
#ifdef RTplatform
    unlink(name);
#endif
}

int
make_server_name(char *name, char * base)
{
    char *num;
    if (spad_server_number != -1) {
        sprintf(name, "%s%d", base, spad_server_number);
        return 0;
    }
    num = getenv("SPADNUM");
    if (num == NULL) {
        /* fprintf(stderr,
            "\n(AXIOM Sockets) The AXIOM server number is undefined.\n");
        */
        return -1;
    }
    sprintf(name, "%s%s", base, num);
    return 0;
}

/* client Spad server sockets. Two sockets are created: server[0]
   is the internet server socket, and server[1] is a UNIX domain socket. */
int
open_server(char *server_name)
{
    char *s, name[256];

    init_socks();

```

```

bsdSignal(SIGPIPE, sigpipe_handler, RestartSystemCalls);
if (make_server_name(name, server_name) == -1)
    return -2;
/* create the socket internet socket */
server[0].socket = 0;
/* server[0].socket = socket(AF_INET, SOCK_STREAM, 0);
if (server[0].socket < 0) {
    server[0].socket = 0;
} else {
    server[0].addr.i_addr.sin_family = AF_INET;
    server[0].addr.i_addr.sin_addr.s_addr = INADDR_ANY;
    server[0].addr.i_addr.sin_port = 0;
    if (bind(server[0].socket, &server[0].addr.i_addr,
              sizeof(server[0].addr.i_addr))) {
        perror("binding INET stream socket");
        server[0].socket = 0;
        return -1;
    }
    length = sizeof(server[0].addr.i_addr);
    if (getsockname(server[0].socket, &server[0].addr.i_addr, &length)) {
        perror("getting INET server socket name");
        server[0].socket = 0;
        return -1;
    }
    server_port = ntohs(server[0].addr.i_addr.sin_port);
    FD_SET(server[0].socket, &socket_mask);
    FD_SET(server[0].socket, &server_mask);
    listen(server[0].socket, 5);
} */
/* Next create the UNIX domain socket */
server[1].socket = socket(AF_UNIX, SOCK_STREAM, 0);
if (server[1].socket < 0) {
    perror("opening UNIX server socket");
    server[1].socket = 0;
    return -2;
} else {
    server[1].addr.u_addr.sa_family = AF_UNIX;
    memset(server[1].addr.u_addr.sa_data, 0,
           sizeof(server[1].addr.u_addr.sa_data));
    strcpy(server[1].addr.u_addr.sa_data, name);
    if (bind(server[1].socket, &server[1].addr.u_addr,
             sizeof(server[1].addr.u_addr))) {
        perror("binding UNIX server socket");
        server[1].socket = 0;
        return -2;
    }
    FD_SET(server[1].socket, &socket_mask);
    FD_SET(server[1].socket, &server_mask);
    listen(server[1].socket, 5);
}

```

```

    s = getenv("SPADSERVER");
    if (s == NULL) {
/*      fprintf(stderr, "Not a spad server system\n"); */
        return -1;
    }
    return 0;
}

int
accept_connection(Sock *sock)
{
    int client;
    for(client=0; client<MaxClients && clients[client].socket != 0; client++);
    if (client == MaxClients) {
        printf("Ran out of client Sock structures\n");
        return -1;
    }
    clients[client].socket = accept(sock->socket, 0, 0);
    if (clients[client].socket == -1) {
        perror("accept");
        clients[client].socket = 0;
        return -1;
    }
    FD_SET(clients[client].socket, &socket_mask);
    get_socket_type(clients+client);
    return clients[client].purpose;
}

/* reads a the socket purpose declaration for classification */
void
get_socket_type(Sock *sock)
{
    sock->pid = get_int(sock);
    sock->purpose = get_int(sock);
    sock->remote_fd = get_int(sock);
    send_int(sock, getpid());
    send_int(sock, sock->socket);
    purpose_table[sock->purpose] = sock;
    switch (sock->purpose) {
    case SessionManager:
        break;
    case ViewportServer:
        break;
    case MenuServer:
        break;
    case SessionIO:
/*      redirect_stdio(sock); */
        break;
    }
}

```

```

int
sock_accept_connection(int purpose)
{
    fd_set rd;
    int ret_val, i, p;
    if (getenv("SPADNUM") == NULL) return -1;
    while (1) {
        rd = server_mask;
        ret_val = sselect(FD_SETSIZE, (fd_set *)&rd, (fd_set *)0, (fd_set *)0, NULL);
        if (ret_val == -1) {
            /* perror ("Select"); */
            return -1;
        }
        for(i=0; i<2; i++) {
            if (server[i].socket > 0 && FD_ISSET(server[i].socket, &rd)) {
                p = accept_connection(server+i);
                if (p == purpose) return 1;
            }
        }
    }
}

/* direct stdin and stdout from the given socket */
void
redirect_stdio(Sock *sock)
{
    int fd;
    /* setbuf(stdout, NULL); */
    fd = dup2(sock->socket, 1);
    if (fd != 1) {
        fprintf(stderr, "Error connecting stdout to socket\n");
        return;
    }
    fd = dup2(sock->socket, 0);
    if (fd != 0) {
        fprintf(stderr, "Error connecting stdin to socket\n");
        return;
    }
    fprintf(stderr, "Redirected standard IO\n");
    FD_CLR(sock->socket, &socket_mask);
}

void
init_socks(void)
{
    int i;
    FD_ZERO(&socket_mask);
    FD_ZERO(&server_mask);
    init_purpose_table();
}

```

```

    for(i=0; i<2; i++) server[i].socket = 0;
    for(i=0; i<MaxClients; i++) clients[i].socket = 0;
}

/* Socket I/O selection called from the BOOT serverLoop function */

int
server_switch(void)
{
    int ret_val, i, cmd = 0;
    fd_set rd, wr, ex, fds_mask;
    FD_ZERO(&rd);
    FD_ZERO(&wr);
    FD_ZERO(&ex);
    fds_mask = server_mask;
    cmd = 0;
    if (purpose_table[SessionManager] != NULL) {
        FD_SET(0, &fds_mask);
        FD_SET(purpose_table[SessionManager]->socket, &fds_mask);
    }
    while (1) {
        do {
            if (purpose_table[MenuServer] != NULL) {
                FD_SET(purpose_table[MenuServer]->socket, &fds_mask);
            }
            rd = fds_mask;
            ret_val = select(FD_SETSIZE, (void *) &rd, (void *) 0, (void *) 0, (void *) 0);
            if (ret_val == -1) {
                /* perror ("Select in switch"); */
                return -1;
            }
            for(i=0; i<2; i++) {
                if (server[i].socket > 0 && (FD_ISSET(server[i].socket, &rd)))
                    accept_connection(server+i);
            }
        } while (purpose_table[SessionManager] == NULL);
        FD_SET(purpose_table[SessionManager]->socket, &fds_mask);
        if (FD_ISSET(purpose_table[SessionManager]->socket, &rd)) {
            cmd = get_int(purpose_table[SessionManager]);
            return cmd;
        }
        if (FD_ISSET(0, &rd)) {
            return CallInterp;
        }
        if (purpose_table[MenuServer] != NULL &&
            (FD_ISSET(purpose_table[MenuServer]->socket, &rd))) {
            cmd = get_int(purpose_table[MenuServer]);
            return cmd;
        }
    }
}

```

```

}

void
flush_stdout(void)
{
    static FILE *fp = NULL;
    if (fp == NULL) {
        fp = fdopen(purpose_table[SessionIO]->socket, "w");
        if (fp == NULL) {
            perror("fdopen");
            return;
        }
    }
    fflush(fp);
}

void
print_line(char *s)
{
    printf("%s\n", s);
}

typedef union {
    double      f;
    long        l[2];
} DoubleFloat;

double
plus_infinity(void )
{
    static int init = 0;
    static DoubleFloat pinf;
    if (! init) {
        pinf.l[0] = 0x7ff00000;
        pinf.l[1] = 0;
        init = 1;
    }
    return pinf.f;
}

double
minus_infinity(void)
{
    static int init = 0;
    static DoubleFloat minf;
    if (! init) {
        minf.l[0] = 0xfff00000L;
        minf.l[1] = 0;
        init = 1;
    }

```

```
    }  
    return minf.f;  
}  
  
double  
NaNQ(void)  
{  
    static int init = 0;  
    static DoubleFloat nanq;  
    if (! init) {  
        nanq.l[0] = 0x7ff80000L;  
        nanq.l[1] = 0;  
        init = 1;  
    }  
    return nanq.f;  
}
```

—————→



## References

- [1] nothing