



```
#include <unistd.h>
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <netdb.h>
#define PORT 58000
...
int fd, newfd;
struct hostent *hostptr;
struct sockaddr_in serveraddr, clientaddr;
int clientlen;
...
```

## TCP Client

```
fd=socket(AF_INET,SOCK_STREAM,0);
```

```
hostptr=gethostbyname("tejo.tecnico.ulisboa.pt");
```

```
memset((void*)&serveraddr,(int)'\0',
        sizeof(serveraddr));
serveraddr.sin_family = AF_INET;
serveraddr.sin_addr.s_addr = ((struct in_addr *)
    (hostptr->h_addr_list[0]))->s_addr;
serveraddr.sin_port = htons((u_short)PORT);
```

```
connect(fd,(struct sockaddr*)&serveraddr,
        sizeof(serveraddr));
```

```
write(fd,...);
```

```
...
```

```
read(fd,...);
```

```
...
```

```
close(fd);
```

## TCP Server

```
fd = socket(AF_INET,SOCK_STREAM,0);
```

```
memset((void*)&serveraddr,(int)'\0',
        sizeof(serveraddr));
serveraddr.sin_family = AF_INET;
serveraddr.sin_addr.s_addr = htonl(INADDR_ANY);
serveraddr.sin_port = htons((u_short)PORT);
```

```
bind(fd,(struct sockaddr*)&serveraddr,
      sizeof(serveraddr));
```

```
listen(fd,5);
```

```
clientlen = sizeof(clientaddr);
newfd = accept(fd,(struct sockaddr*)&clientaddr,
               &clientlen);
```

blocks until connection  
from client

connection establishment  
TCP three-way handshake

```
read(newfd,...);
```

```
...
```

```
write(newfd,...);
```

```
...
```

```
close(fd); close(newfd);
```



```
#include <unistd.h>
#include <sys/types.h>
#include <sys/socket.h>
#include <netinet/in.h>
#include <netdb.h>
#define PORT 58000

...
int fd;
struct hostent *hostptr;
struct sockaddr_in serveraddr, clientaddr;
int addrlen;
char msg[80], buffer[80];
...
```

## UDP Client

```
fd=socket(AF_INET,SOCK_DGRAM,0);
```

```
hostptr=gethostbyname("tejo.tecnico.ulisboa.pt");

memset((void*)&serveraddr,(int)'\0',
        sizeof(serveraddr));
serveraddr.sin_family = AF_INET;
serveraddr.sin_addr.s_addr = ((struct in_addr *)
    (hostptr->h_addr_list[0]))->s_addr;
serveraddr.sin_port = htons((u_short)PORT);

addrlen = sizeof(serveraddr);
```

```
sendto(fd, msg, strlen(msg), 0,
        (struct sockaddr*)&serveraddr,addrlen);
...
addrlen = sizeof(serveraddr);
recvfrom(fd, buffer, sizeof(buffer),0,
        (struct sockaddr*)&serveraddr,&addrlen);
...
close(fd);
```

## UDP Server

```
fd = socket(AF_INET,SOCK_DGRAM,0);
```

```
memset((void*)&serveraddr,(int)'\0',
        sizeof(serveraddr));
serveraddr.sin_family = AF_INET;
serveraddr.sin_addr.s_addr = htonl(INADDR_ANY);
serveraddr.sin_port = htons((u_short)PORT);
```

```
bind(fd,(struct sockaddr*)&serveraddr,
        sizeof(serveraddr));
```

```
addrlen = sizeof(clientaddr);
recvfrom(fd, buffer, sizeof(buffer),0,
        (struct sockaddr*)&clientaddr,
        &addrlen);
```

blocks until datagram  
received from a client

```
...
sendto(fd, msg, strlen(msg), 0,
        (struct sockaddr*)&clientaddr,addrlen);
...
close(fd);
```