



After the first remote-control command has been sent, the instrument is in the "REMOTE" state, i.e. instrument control from the front panel or via mouse and keyboard is disabled and "REMOTE" is displayed in the status line.

Telnet program examples

The following program example shows a simple TcpClient class that is intended to explain on how to get started with programming of sockets.

The example sets up a socket communication to R&S SMB and opens a simple user interface, very similar to the telnet, which allows input of commands. To enable real automation, further development of the program is required.

TcpClient.h

```
#include <string>
//defines structs for socket handling
#include <netinet/in.h>
using namespace std;
typedef struct sockaddr_in SockAddrStruct;
typedef struct hostent      HostInfoStruct;
class TcpClient
{
public:
    TcpClient();
    ~TcpClient();
    void connectToServer( string &hostname, int port );
    void disconnect( );
    void transmit( string &txString );
    void receive( string &rxString );
    string getCurrentHostName( ) const;
    int     getCurrentPort( ) const;
private:
    string          currentHostName;
    int             currentPort;
```

```
    int          currentSocketDescr;
    SockAddrStruct serverAddress;
    HostInfoStruct * currentHostInfo;
    bool         clientIsConnected;
    int          receiveBufferSize;
};

};
```

TcpClient.cpp

```
#include <string>
//defines structs for socket handling
#include <netinet/in.h>
using namespace std;
typedef struct sockaddr_in SockAddrStruct;
typedef struct hostent      HostInfoStruct;
class TcpClient
{
public:
    TcpClient();
    ~TcpClient();
    void connectToServer( string &hostname, int port );
    void disconnect( );
    void transmit( string &txString );
    void receive( string &rxString );
    string getCurrentHostName( ) const;
    int    getCurrentPort( ) const;
private:
    string          currentHostName;
    int             currentPort;
    int             currentSocketDescr;
    SockAddrStruct  serverAddress;
    HostInfoStruct * currentHostInfo;
    bool            clientIsConnected;
    int             receiveBufferSize;
};

#include <netdb.h>
#include <netinet/in.h>
#include <unistd.h>
#include "TcpClient.h"
TcpClient::TcpClient()
: currentHostName( "" )
, currentPort( 0 )
, currentSocketDescr( 0 )
, serverAddress ( )
, currentHostInfo( NULL )
, clientIsConnected( false )
, receiveBufferSize( 1024 )
{}
```

```
TcpClient::~TcpClient()
{
    currentHostInfo = NULL;
}

void TcpClient::connectToServer( string &hostname, int port )
{
    currentHostInfo = gethostbyname( hostname.c_str( ) );
    if( currentHostInfo == NULL )
    {
        currentHostName    = "";
        currentPort        = 0;
        currentHostInfo   = NULL;
        clientIsConnected = false;
        printf("error connecting host\n" );
    }
    currentHostName = hostname;
    currentPort     = port;
    currentSocketDescr = socket(AF_INET, SOCK_STREAM, 0);
    if( currentSocketDescr == 0 )
    {
        currentHostName    = "";
        currentPort        = 0;
        currentHostInfo   = NULL;
        clientIsConnected = false;
        printf("can't create socket\n" );
    }
    serverAddress.sin_family = currentHostInfo->h_addrtype;
    serverAddress.sin_port   = htons( currentPort );
    memcpy( (char *) &serverAddress.sin_addr.s_addr,
            currentHostInfo->h_addr_list[0], currentHostInfo->h_length );
    if( connect( currentSocketDescr, ( struct sockaddr * ) &serverAddress,
                sizeof( serverAddress ) ) < 0 )
    {
        throw string("can't connect server\n" );
    }
    clientIsConnected = true;
}
void TcpClient::disconnect( )
{
    if( clientIsConnected )
    {
        close( currentSocketDescr );
    }
    currentSocketDescr = 0;
    currentHostName   = "";
    currentPort        = 0;
    currentHostInfo   = NULL;
    clientIsConnected = false;
}
```

```
void TcpClient::transmit( string &txString )
{
    if( !clientIsConnected )
    {
        throw string("connection must be established before any data can be sent\n");
    }
    char * transmitBuffer = new char[txString.length() +1];
    memcpy( transmitBuffer, txString.c_str(), txString.length() );
    transmitBuffer[txString.length()] = '\n'; //newline is needed!
    if( send( currentSocketDescr, transmitBuffer, txString.length() + 1, 0 ) < 0 )
    {
        throw string("can't transmit data\n");
    }
    delete [] transmitBuffer;
}

void TcpClient::receive( string &rxString )
{
    if( !clientIsConnected )
    {
        throw string("connection must be established before any data can be received\n");
    }
    char * receiveBuffer = new char[receiveBufferSize];
    memset( receiveBuffer, 0, receiveBufferSize );
    bool receiving = true;
    while( receiving )
    {
        int receivedByteCount = recv( currentSocketDescr,
            receiveBuffer, receiveBufferSize, 0 );
        if( receivedByteCount < 0 )
        {
            throw string("error while receiving data\n");
        }
        rxString += string( receiveBuffer );
        receiving = ( receivedByteCount == receiveBufferSize );
    }
    delete [] receiveBuffer;
}

string TcpClient::getCurrentHostName( ) const
{
    return currentHostName;
}

int TcpClient::getCurrentPort( ) const
{
    return currentPort;
}
```

TelnetClient.cpp

```
#include <iostream>
#include "TcpClient.h"
```

```
void printUsage()
{
    cout<<"usage: EthernetRawCommand <server-ip> [scpi-command]"<<endl;
}

int main( int argc, char *argv[] )
{
    int errorCode          = 0; //no error
    bool useSingleCommand = false;
    string singleCommand  = "";
    string hostname        = "";
    int    port             = 5025;
    string input            = "";
    TcpClient client;
    switch( argc )
    {
        case 3:
            useSingleCommand = true;
            singleCommand   = argv[2];
        case 2:
            hostname        = argv[1];
            break;
        default:
            printUsage();
            return(-1);
    }
    try
    {
        client.connectToServer( hostname, port );
        bool terminate = false;
        while( !terminate )
        {
            char buffer[1024];
            if( useSingleCommand )
            {
                input = singleCommand; //send string
            }
            else
            {
                cin.getline( buffer, 1024 );
                input = buffer;
                if( input == "end" )
                {
                    terminate = true;
                }
            }
            if( !terminate )
            {
                client.transmit( input ); //send string
                int qPos = input.find( "?", 0 );
                //receive string only when needed
            }
        }
    }
}
```