

Using libcurl with SSH support in Visual Studio 2008

Version 1.4

© Andrei Jakab (andrei.jakab@tut.fi)

Revision History

Revision	Date	By	Comment
1.0	08 Dec. 2008	Andrei Jakab	Initial version
1.1	07 Jan. 2009	Andrei Jakab	<ul style="list-style-type: none">• section 3.4, item 3.b.ii:<ul style="list-style-type: none">◦ replaced <code>CURL_STATIC</code> by <code>CURL_STATICLIB</code>◦ added <code>CURL_DISABLE_LDAP</code>• section 4.3.2, item 4.b:<ul style="list-style-type: none">◦ removed <i>wldap32.lib</i>
1.2	10 Mar. 2009	Andrei Jakab	Updated the guide to reflect the latest versions of libcurl (7.19.4), libSSH2 (1.0) and OpenSSL (0.9.8j).
1.3	07 May 2009	Andrei Jakab	Updated the guide to reflect the latest versions of libSSH2 (1.1) and OpenSSL (1.0.0 Beta 2).
1.4	18 May 2009	Andrei Jakab	Updated the guide for libcurl 7.19.5.

Table of Contents

REVISION HISTORY	2
CONVENTIONS	4
1. INTRODUCTION	5
2. DOWNLOADING THE LATEST SOFTWARE	6
3. INSTALLATION / COMPILATION	7
3.1 ActivePerl	7
3.2 Netwide Assembler	8
3.3 OpenSSL	8
3.4 libSSH2	10
3.5 libcurl	12
4. USING THE LIBCURL LIBRARY IN YOUR VISUAL STUDIO PROJECT	15
4.1 Preparing the project's file structure	15
4.2 Creating the test project	16
4.3 How to use the libcurl library	19
4.3.1 Sample source code	19
4.3.2 Adding libcurl to the list of libraries	22
4.3.3 The test-drive	24
5. FINAL NOTES	25

Conventions

The following font conventions are used in this document:

- *italic* is used for filenames, directory names, and URLs
- `constant width` is used to indicate commands and code sections
- **red, bold and underlined text** indicates important items
- **bold** is used to represent GUI items (e.g. menus, menu items, list nodes etc.)

1. Introduction

Libcurl is a widely-used open-source library for transferring files. It supports many protocols (e.g. FTP, HTTP, SFTP etc.) and it is very well designed.

One of libcurl's strengths is its portability. You can build it on numerous platforms and you can be sure that it will work the same way on all of them. This wide support also means that the developers cannot constantly update the readme files for all the supported platforms. Thus, I have decided to create this document in order to share my experiences while compiling a static version of the curl library with SSH support in Visual Studio 2008.

This guide is inspired from Rosso Salmanzadeh's excellent "Using libcurl in Visual Studio" guide.

2. Downloading the latest software

Libcurl requires two additional open-source libraries in order to provide the SSH functionality: libSSH2 and OpenSSL. Also, since the compilation of OpenSSL makes use of Perl scripts, you need to have a Perl distribution installed on your machine. I have chosen ActivePerl, a free distribution by ActiveState, for this purpose. OpenSSL also requires the Netwide Assembler to be present on your computer.

The OpenSSL and libSSH2 libraries are distributed as tarballs compressed using gzip. Hence, you will need a utility to uncompress and subsequently open the tar file. I recommend the open-source archiver 7-Zip.

In order to obtain the latest version of the Netwide Assembler, click on the link in the table below and, on the webpage that appears, follow the link that takes you to the latest stable version of NASM. You have the choice between downloading the source code or pre-compiled binaries. I strongly encourage you to download the binary files since I will not cover the compilation of NASM in this guide. The archives that contain the binary distributions have the intended architecture in their name e.g. win32, dos, os2 etc.



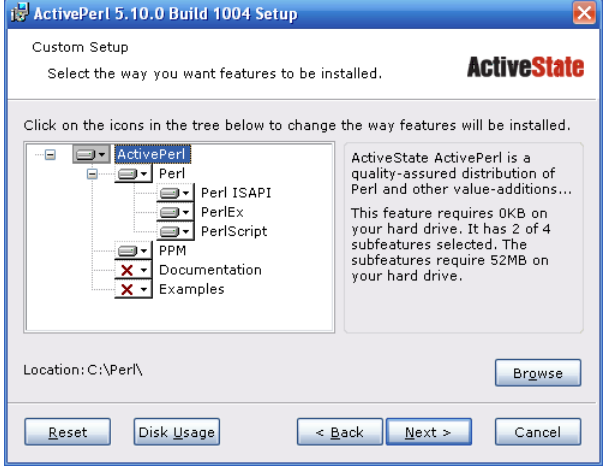
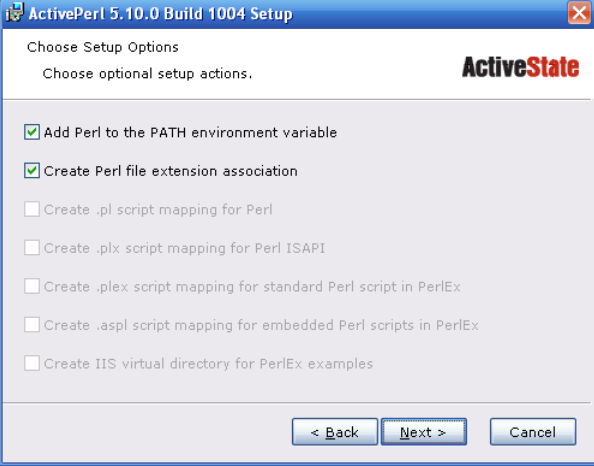
Software	URL	Current Version
ActivePerl	http://www.activestate.com/downloads/index.mhtml	5.10.0.1004
OpenSSL	http://www.openssl.org/source	1.0.0 Beta 2
libSSH2	http://www.libssh2.org	1.1
libcurl	http://curl.haxx.se/download.html	7.19.5
Netwide Assembler	http://www.nasm.us	2.05.01
7-Zip	http://www.7-zip.org	4.65

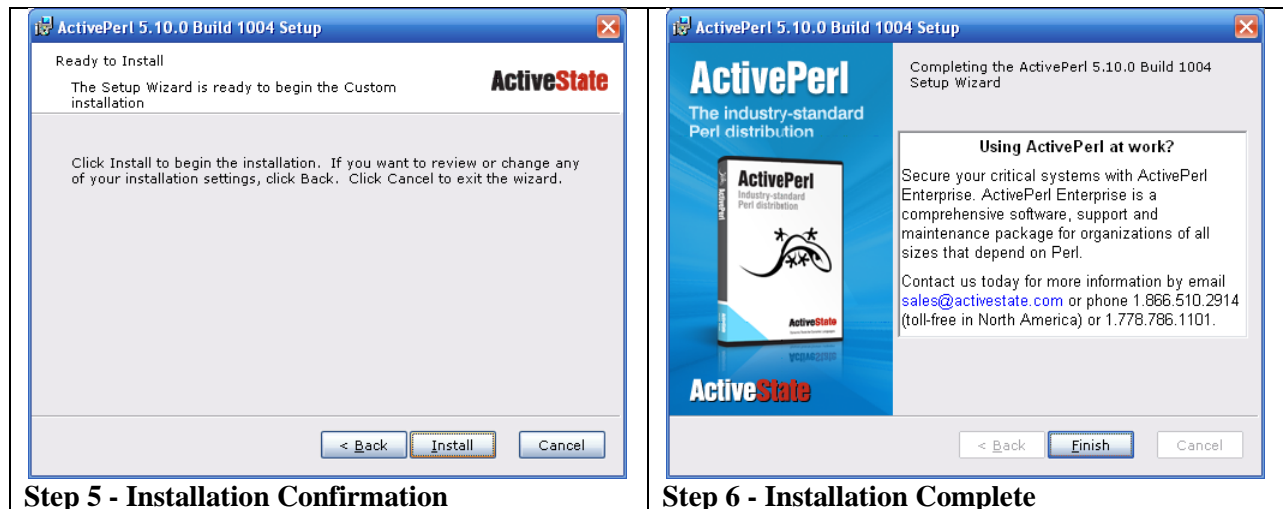
NOTE: This guide assumes that you already have successfully installed Microsoft Visual Studio 2008 (VS2008) and the Windows SDK. The examples in this document were built using version 9.0.30729.1 SP of VS2008 and Version 6.1 of the Windows SDK.

3. Installation / Compilation

3.1 ActivePerl

Installing ActivePerl is fairly straightforward as long as you are logged in with an Administrator account. Below are screenshots from each step of the installation process. Please pay particular attention to Step 4 because choosing the wrong option there will make your life harder later.

	
Step 1 - Introduction	Step 2 - EULA
	
Step 3 - Customization 1	Step 4 - Customization 2
<p><u>Note 1:</u> The “Documentation” and “Examples” are only useful if you wish to learn how to use ActivePerl; for the purposes of this document, these items are not needed.</p> <p><u>Note 2:</u> The default installation location is not in the Program Files” Some clean freaks (such as yours truly) might take offence to this.</p>	<p><u>NOTE:</u> Make sure that there’s a checkmark besides the “Add Perl to the PATH environment variable” option.</p>



3.2 Netwide Assembler

1. Extract the *nasm-2.05.01* folder from the zip file and place it in the C: root directory
2. Open the *nasm-2.05.01* folder in Windows Explorer and make a copy of the *nasm.exe* file (make sure to leave it in the same folder).
3. Rename the freshly created copy to *nasmw.exe*.

3.3 OpenSSL

Compiling the OpenSSL library is a bit tricky. The following step-by-step guide should help you get through the compilation process as quickly and as painlessly as possible.

1. Extract the *openssl-1.0.0-beta2.tar* file from the gzip file to a temporary directory
2. Extract the *openssl-1.0.0-beta2* folder from the tar file and place it in the C: root directory
3. A quick code edit is required before we can compile the library. Open the file *C:\openssl-1.0.0-beta2\crypto\bio\bio_lcl.h* in the Visual Studio 2008 IDE and replace lines 24 - 27 with the following:

```
#define UP_read      _read
#define UP_write    _write
#define UP_lseek    _lseek
#define UP_close    _close
```

After this edit, lines 23 - 28 should look like this:

```
23 #define UP_open    open
24 #define UP_read    _read
25 #define UP_write   _write
26 #define UP_lseek   _lseek
27 #define UP_close   _close
28 #endif
29
```


4. Close the VS2008 IDE and open a Visual Studio 2008 command prompt (if you've installed VS 2008 with the default settings, the command prompt shortcut should be located in **Start -> All Programs -> Microsoft Visual Studio 2008 -> Visual Studio Tools -> Visual Studio 2008 Command Prompt**)
 5. Add the NASM executable to the PATH environment variable:
path = %PATH%;C:\nasm-2.05.01
 6. Create the directory where the output of the compilation process will be stored:
mkdir c:\openssl_lib
 7. Change the working directory to the OpenSSL directory:
cd /D c:\openssl-1.0.0-beta2
 8. Configure the OpenSSL installation with:
perl Configure VC-WIN32 --prefix=c:/openssl_lib
where the --prefix argument specifies where OpenSSL header and library files will be copied at the end of the compilation process.
- NOTE:** The path that is passed to the --prefix argument must be in the UNIX format i.e. forward slashes are used to separate directories and not backward slashes like it is customary in Windows.

The output of this command should look like this:

```
d:\openssl-1.0.0-beta2>C:\Perl\bin\perl Configure VC-WIN32 --prefix=d:/openssl_lib
lib
Configuring for VC-WIN32
no-gmp [default] OPENSSL_NO_GMP <skip dir>
no-jpake [experimental] OPENSSL_NO_JPAKE <skip dir>
no-krb5 [krb5-flavor not specified] OPENSSL_NO_KRB5
no-mdc2 [default] OPENSSL_NO_MDC2 <skip dir>
no-rc5 [default] OPENSSL_NO_RC5 <skip dir>
no-rfc3779 [default] OPENSSL_NO_RFC3779 <skip dir>
no-shared [default]
no-store [experimental] OPENSSL_NO_STORE <skip dir>
no-zlib [default]
no-zlib-dynamic [default]
IsMK1MF=1
CC =cl
CFLAG =-DOPENSSL_THREADS -D_DOS_WIN32 -W3 -WX -Gs0 -GF -Gy -nologo -DOPENSSL_SYSNAME_WIN32 -DWIN32_LEAN_AND_MEAN -DL_ENDIAN -D_CRT_SECURE_NO_DEPRECATED -DOPENSSL_BN_ASM_PART_WORDS -DOPENSSL_IA32_SSE2 -DOPENSSL_BN_ASM_MONT -DSHA1_ASM -DSHA256_ASM -DSHA512_ASM -DMD5_ASM -DRMD160_ASM -DAES_ASM -DWHIRLPOOL_ASM
EX_LIBS =
CPUID_OBJ =x86cpuid.o
BN_ASM =bn-586.o co-586.o x86-mont.o
DES_ENC =des-586.o crypt586.o
AES_ENC =aes-586.o
BF_ENC =bf-586.o
CAST_ENC =cast-586.o
RC4_ENC =rc4-586.o
RC5_ENC =rc5-586.o
MD5_OBJ_ASM =md5-586.o
SHA1_OBJ_ASM =sha1-586.o sha256-586.o sha512-586.o
RMD160_OBJ_ASM =rmd-586.o
CMLL_ENC =cmll-x86.o
PROCESSOR =
RANLIB =true
ARFLAGS =
PERL =perl
THIRTY_TWO_BIT mode
BN_LLONG mode
RC4_INDEX mode
RC4_CHUNK is undefined
Configured for VC-WIN32.
```

9. Create the required assembly files:

```
ms\do_nasm
```

Note: Using assembly files makes the execution of library functions much faster. If you do not wish to use assembly files, use the following command instead and jump to step 8:

```
ms\do_ms
```

10. Compile the static library:

```
nmake -f ms\nt.mak
```

11. The compilation process takes a while so you can go grab some coffee/tea at this point.

12. If all is well, at the end of the compilation you will have some libraries and a number of executables in *C:\openssl-1.0.0-beta2\out32*

13. The library contains some built in tests that allow you to check if everything has compiled properly and if the library is in working order:

```
nmake -f ms\nt.mak test
```

If the library has compiled properly, you should obtain a “passed all tests” message once the command finishes executing.

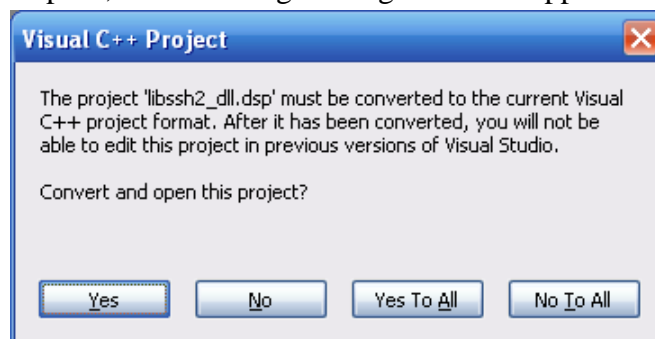
14. To install OpenSSL to the location you specified in step 6, run:

```
nmake -f ms\nt.mak install
```

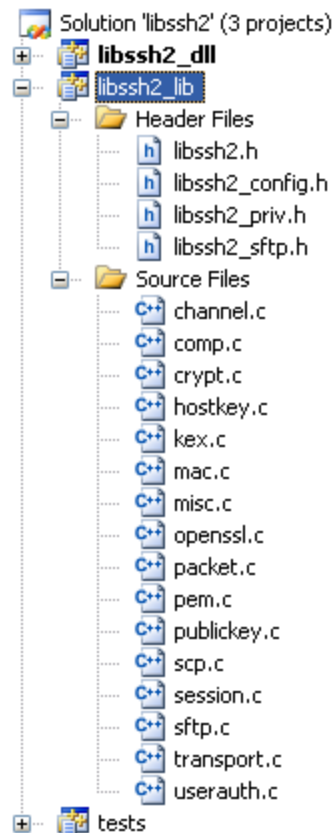
Note: You can find additional compiling instructions in *C:\openssl-1.0.0-beta2\INSTALL.W32*; this file also contains a troubleshooting section that could help you out if something goes wrong during the compilation process.

3.4 libSSH2

1. Extract the *libssh2-1.1.tar* file from the gzip file to a temporary directory.
2. Extract the *libssh2-1.1* directory from the tar file and place it in the C: root directory.
3. Open *C:\libssh2-1.1\win32\libssh2.dsw* in the Visual Studio 2008 IDE. Since this is a Visual Studio 6 workspace, the following message box will appear:



Click on “Yes To All”. Once the conversion is completed, you should see the following in the **Solution Explorer** window:



4. If you do not wish to use the zlib compression library, open libssh2_config.h and comment out line 37:

```
//#define LIBSSH2_HAVE_ZLIB 1
```

5. Open libssh2.h and add the following after line 50:

```
#define LIBSSH2_API
```

After this edit, lines 50 - 62 should look like this:

```
50 /* Allow alternate API prefix from CFLAGS or calling app */
51 #define LIBSSH2_API
52 #ifndef LIBSSH2_API
53 #   ifdef LIBSSH2_WIN32
54 #       ifdef LIBSSH2_LIBRARY
55 #           define LIBSSH2_API __declspec(dllexport)
56 #       else
57 #           define LIBSSH2_API __declspec(dllimport)
58 #       endif /* LIBSSH2_LIBRARY */
59 #   else /* !LIBSSH2_WIN32 */
60 #       define LIBSSH2_API
61 #   endif /* LIBSSH2_WIN32 */
62 #endif /* LIBSSH2_API */
```

6. Next, you must tell the compiler and the librarian where the OpenSSL library is located.
 - a. Right-click on the libssh2_lib project in the **Solution Explorer** window and select **Properties** from the pop-up menu.
 - b. Expand the **Configuration Properties** node, then the **C/C++** node, and select **General**. Choose the **Additional Include Directories** property and add the following:
,C:\openssl_lib\include
(the comma is needed since there are other paths already present)
 - c. In the **Configuration Properties** node, expand the **Librarian** node, and select **General**.
 - i. Change the **Output File** property to:
Debug_lib\libssh2.lib
 - ii. Click on the **Additional Dependencies** property and set it to:
libeay32.lib ssleay32.lib
 - iii. Choose the **Additional Library Directories** and add the following path:
C:\openssl_lib\lib
 - d. Click on the **OK** button.
7. Now we are ready to compile. Right-click on the libssh2_lib project and select **Build** from the pop-up menu.
8. The compiler will display a couple of security warnings since the authors of the libSSH2 library did not use the security-enhanced versions of the Visual Studio CRT functions. There will also be some “possible loss of data” warnings. For our purposes, both of these types of warnings can be safely ignored.

3.5 libcurl

1. Extract the *curl-7.19.5* folder from the archive and place it in the C: root directory. For our purposes, we will need the files located in the *lib* and *include* directories.
2. Open *C:\curl-7.19.5\lib\libcurl.vcproj* in the Visual Studio 2008 IDE. Since this is a Visual Studio 2005 project file, the “Visual Studio Conversion Wizard” will appear. The wizard should not encounter any problems converting the project to the VS2008 format. You will only get a warning concerning the User Account Control (UAC) feature of Windows Vista. Since we are building a library and not an executable, we can safely ignore this warning.
3. Next, you must tell the compiler and the librarian to use the libSSH2 library and where this library is located:
 - a. Right-click on the libcurl project in the **Solution Explorer** window and select **Properties** from the pop-up menu.

- b. Expand the **Configuration Properties** node, then the **C/C++** node.
 - i. Click on the **General** node. Next to **Additional Include Directories**, type in the following:
`,C:\libssh2-1.1\include`
 (the comma is needed since there are already two additional include directories specified)
 - ii. Select the **Preprocessor** node and click on the **Preprocessor Definitions** property. Add in the following to the existing definitions:
`;CURL_STATICLIB;USE_LIBSSH2;CURL_DISABLE_LDAP;HAVE_LIBSSH2;HAVE_LIBSSH2_H;LIBSSH2_WIN32 ;LIBSSH2_LIBRARY`
 - c. In the **Configuration Properties** node, expand the **Librarian** node, and select **General**.
 - i. Select **Additional Dependencies** and type in: `libssh2.lib`
 - ii. Next to **Additional Library Directories**, type in the path: `C:\libssh2-1.1\win32\Debug_lib`
 - d. Click on the **OK** button.
 4. After all this work, we are finally ready to compile the libcurl library. Right-click on the `curl.lib` project in the **Solution Explorer** and select **Build** from the pop-up menu. VS2008 will prompt you to save the solution file that was created for this project. Once you save it, compilation will begin:

```

1>----- Build started: Project: libcurl, Configuration: Debug Win32 -----
1>Compiling...
1>connect.c
1>content_encoding.c
1>cookie.c
...
1>timeval.c
1>transfer.c
1>url.c
1>version.c
1>base64.c
1>Generating Code...
1>Creating library...
1>Creating browse information file...
1>Microsoft Browse Information Maintenance Utility Version 9.00.21022
1>Copyright (C) Microsoft Corporation. All rights reserved.
1>Build log was saved at file://c:\curl-7.19.4\lib\Debug\BuildLog.htm
1>libcurl - 0 error(s), 1 warning(s)
===== Build: 1 succeeded, 0 failed, 0 up-to-date, 0 skipped =====

```

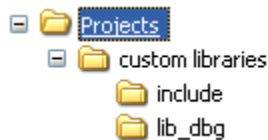
By default, the output directory is `C:\curl-7.19.5\lib\Debug`. In order to create an application that uses the libcurl library, we only need the `libcurl.lib` file from the output directory and the `C:\curl-7.19.5\include\curl` directory, which contains the library's header files.

4. Using the libcurl library in your Visual Studio project














In this section we will create a test project, which will at the same time test the library's functionality and demonstrate how to integrate libcurl into one of your projects. I suggest that you follow the example step by step (i.e. use the same project names, paths etc.) so that you obtain the same figures as the ones shown below. This will make your life easier in case you encounter any problems along the way.

4.1 Preparing the project's file structure

Create the following folder structure in you C: root directory:



Copy the *curl* folder from the *C:\curl-7.19.5\include* directory into the *C:\Projects\custom libraries\include* directory. The *curl* directory should contain the following files:

 curl.h	66 KB	C/C++ Header
 curlbuild.h	18 KB	C/C++ Header
 curlbuild.h.in	6 KB	IN File
 curlrules.h	8 KB	C/C++ Header
 curlver.h	3 KB	C/C++ Header
 easy.h	4 KB	C/C++ Header
 Makefile.am	1 KB	AM File
 Makefile.in	15 KB	IN File
 mprintf.h	3 KB	C/C++ Header
 multi.h	13 KB	C/C++ Header
 stdcheaders.h	2 KB	C/C++ Header
 typecheck-gcc.h	33 KB	C/C++ Header
 types.h	1 KB	C/C++ Header

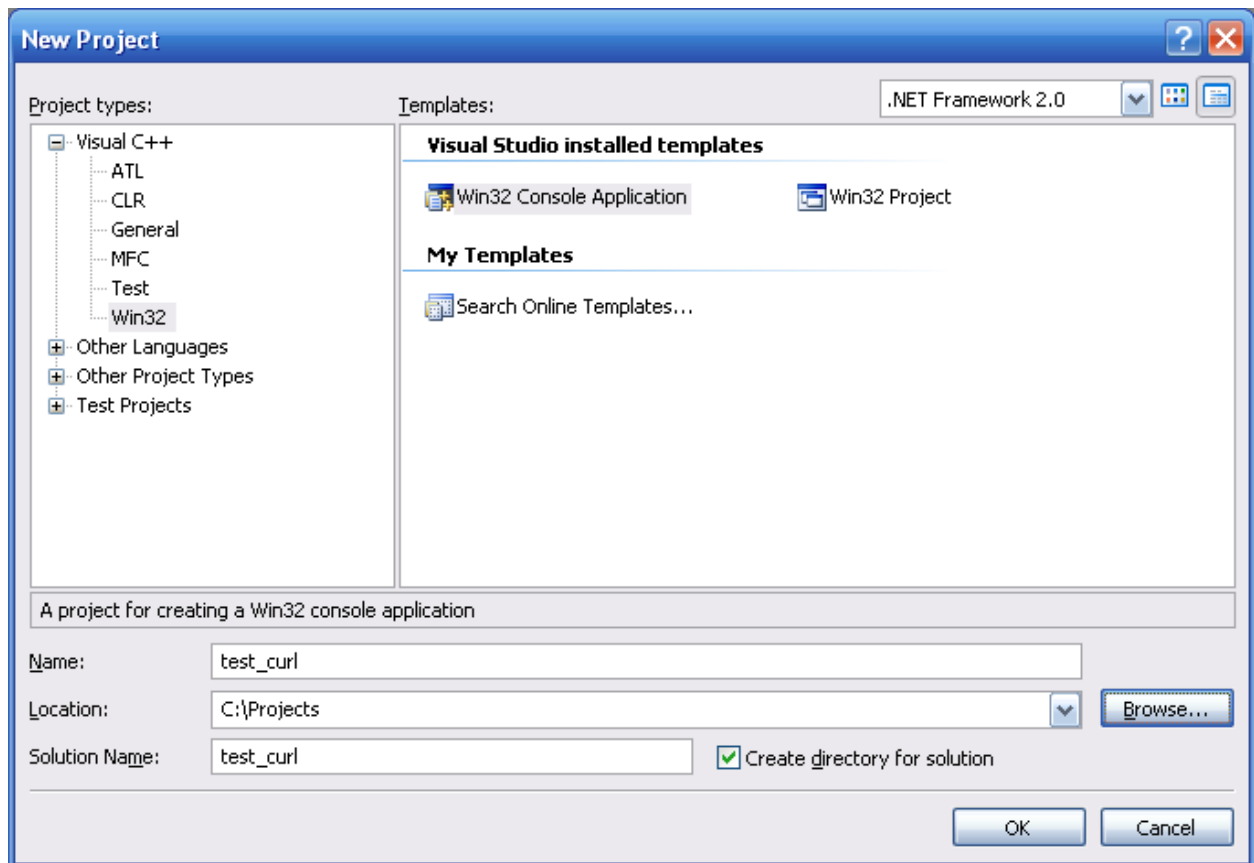
Notice that there are also 2 make files in this directory. We won't need them so they can be safely deleted, if you wish.

Finally, you need to copy *liburl.lib* from *C:\curl-7.19.5\lib\Debug* to *C:\Projects\custom libraries\lib_dbg*.

4.2 Creating the test project

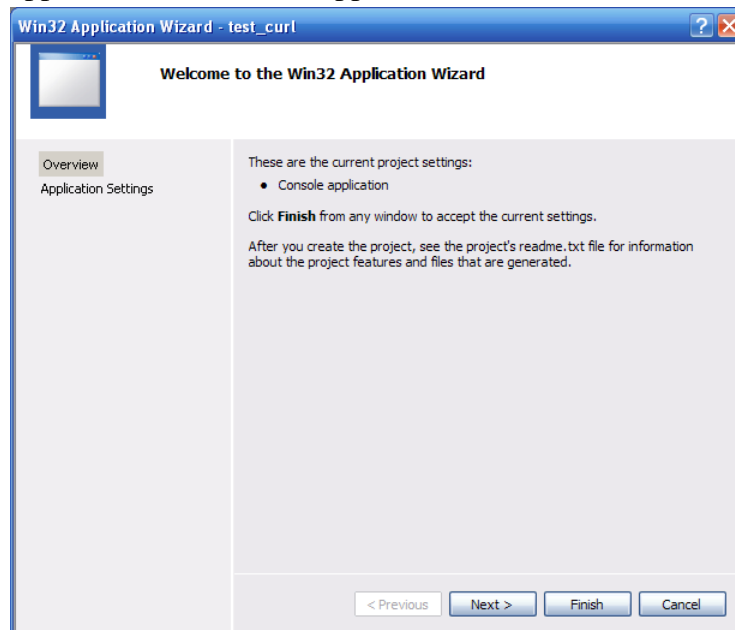
The libcurl library can be used in any type of application. In order to keep things simple, we will create a simple Win32 console application.

1. Fire up VS2008 and go to: **File -> New -> Project...**
2. First expand the **Visual C++** node, then select the **Win32** node and click on the **Win32 Console Application** item in the **Templates** panel:



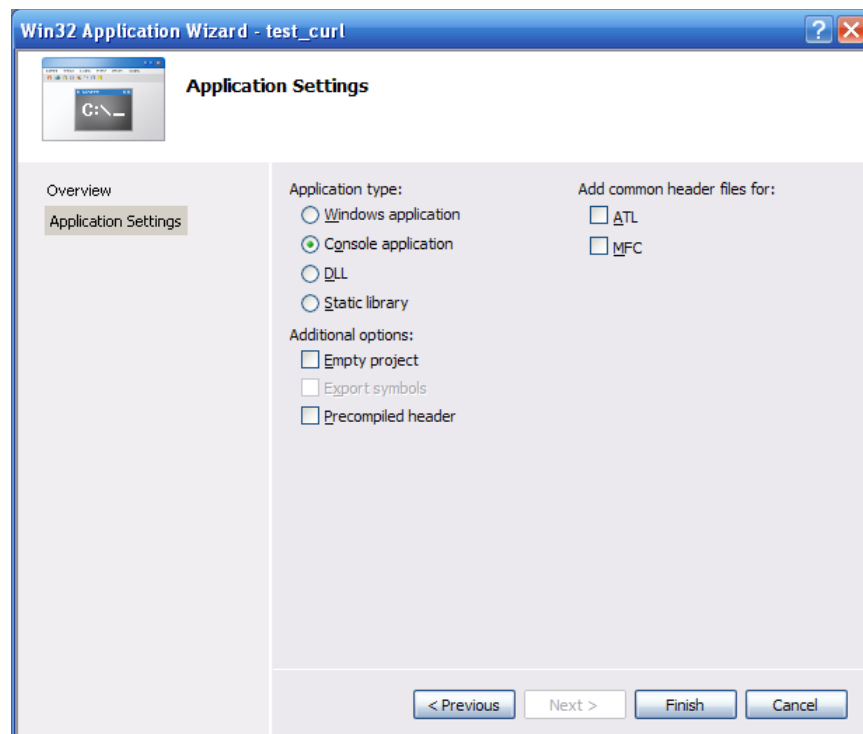
3. Type in “test_curl” for the project name. The project location should be:
C:\Projects
Make sure that the checkbox **Create directory for solution** is checked and click on **OK**.

4. The Win32 Application Wizard will appear. In the first window click on **Next**:

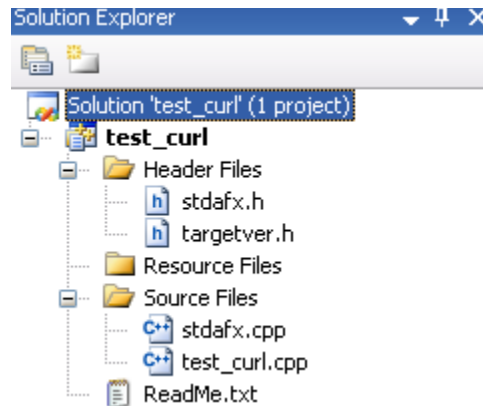


5. In the following window:
- Make sure that **Console application** is selected from the **Application type**: list
 - In **Additional options**, uncheck the **Precompiled header** option.
 - Ensure that both **ATL** and **MFC** are unchecked in the **Add common header files for**: list.

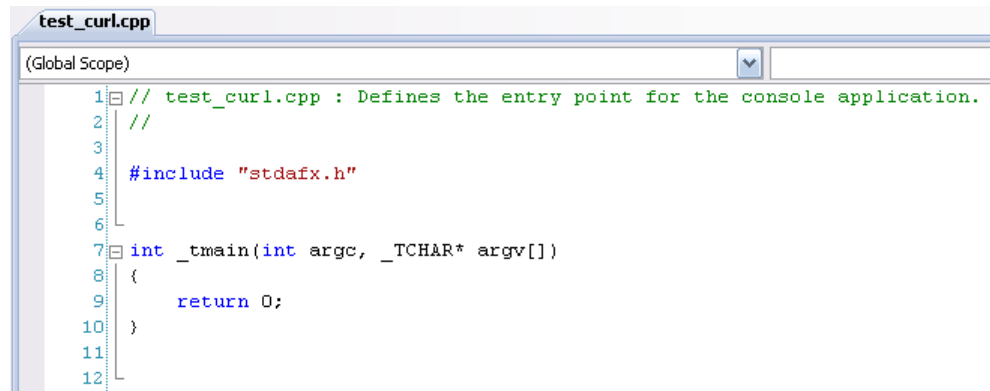
Now you can press on the **Finish** button and wait for VS2008 to set up your project.



6. In the **Solution Explorer** window you should see the following project structure:



Double-click on test_curl.cpp to open it (if VS2008 didn't already do so for you). The source code should look like this:



```
1 // test_curl.cpp : Defines the entry point for the console application.
2 //
3
4 #include "stdafx.h"
5
6
7 int _tmain(int argc, _TCHAR* argv[])
8 {
9     return 0;
10 }
11
12
```

4.3 How to use the libcurl library

4.3.1 Sample source code

Replace all the code in *test_curl.cpp* with this code:

```
// headers
#include "stdafx.h"
#include <conio.h>
#include <curl/curl.h>
#include <windows.h>

// prototypes
int libcurl_progress_callback (void * clientp, double dltotal,
                                double dlnow, double ultotal,
                                double ulnow);
size_t libcurl_read_callback(void * pBuffer, size_t size, size_t nmemb,
                              void * hFile);
void SSHUpload(char * strFileName, char * strFilePath);

int _tmain(int argc, _TCHAR* argv[])
{
    SSHUpload("test.txt", "C:\\");
    printf("Press any key to continue...");
    _getch();

    return 0;
}

void SSHUpload(char * strFileName, char * strFilePath)
{
    char strBuffer[1024];
    CURL * hCurl;
    CURLcode ccCurlResult = CURL_LAST;
    curl_off_t cotFileSize;
    HANDLE hFile;
    LARGE_INTEGER liFileSize;

    // check parameters
    if((strFileName == NULL || strlen(strFileName) == 0) ||
        (strFilePath == NULL || strlen(strFilePath) == 0))
        return;

    // parse file path
    if(strFilePath[strlen(strFilePath) - 1] == '\\')
        sprintf_s(strBuffer, 1024, "%s%s", strFilePath, strFileName);
    else
        sprintf_s(strBuffer, 1024, "%s\\%s", strFilePath, strFileName);

    // create a handle to the file
    hFile = CreateFileA(strBuffer,                                // file to open
                        GENERIC_READ,                             // open for reading
                        FILE_SHARE_READ,                          // share for reading
                        NULL,                                       // default security
                        OPEN_EXISTING,                              // existing file only
                        FILE_ATTRIBUTE_NORMAL,                    // normal file
                        NULL);                                     // no attr. template
```

```

if(hFile != INVALID_HANDLE_VALUE)
{
    // global libcurl initialisation
    ccCurlResult = curl_global_init(CURL_GLOBAL_WIN32);
    if(ccCurlResult == 0)
    {
        // start libcurl easy session
        hCurl = curl_easy_init();
        if(hCurl)
        {
            // enable verbose operation
            curl_easy_setopt(hCurl, CURLOPT_VERBOSE, TRUE);

            // enable uploading
            curl_easy_setopt(hCurl, CURLOPT_UPLOAD, TRUE);

            // inform libcurl of the file's size
            GetFileSizeEx(hFile, &liFileSize);
            cotFileSize = liFileSize.QuadPart;
            curl_easy_setopt(hCurl,
                            CURLOPT_INFILESIZE_LARGE,
                            cotFileSize);

            // enable progress report function
            curl_easy_setopt(hCurl, CURLOPT_NOPROGRESS, FALSE);
            curl_easy_setopt(hCurl,
                            CURLOPT_PROGRESSFUNCTION,
                            libcurl_progress_callback);

            // use custom read function
            curl_easy_setopt(hCurl,
                            CURLOPT_READFUNCTION,
                            libcurl_read_callback);

            // specify which file to upload
            curl_easy_setopt(hCurl, CURLOPT_READDATA, hFile);

            // specify full path of uploaded file (i.e. server
            // address plus remote path)
            sprintf_s(strBuffer,
                    1024,
                    "sftp://123.123.123.123/home/user/%s",
                    strFileName);
            curl_easy_setopt(hCurl, CURLOPT_URL, strBuffer);

            // set SSH server port
            curl_easy_setopt(hCurl, CURLOPT_PORT, 22);

            // set SSH user name and password in libcurl in this
            // format "user:password"
            curl_easy_setopt(hCurl,
                            CURLOPT_USERPWD,
                            "user:password");

            // set SSH authentication to user name and password

```

```

        curl_easy_setopt(hCurl,
                        CURLOPT_SSH_AUTH_TYPES,
                        CURLSSH_AUTH_PASSWORD);

        // execute command
        ccCurlResult = curl_easy_perform(hCurl);

        // end libcurl easy session
        curl_easy_cleanup(hCurl);
    }

    // release file handle
    CloseHandle(hFile);

    // global libcurl cleanup
    curl_global_cleanup();

    if (ccCurlResult == CURLE_OK)
        printf("File uploaded successfully.\n");
    else
        printf("File upload failed. Curl error: %d\n",
                ccCurlResult);
}
else
    printf("File upload failed! Could not open local file");
}

size_t libcurl_read_callback(void * pBuffer, size_t size,
                            size_t nmemb, void * hFile)
{
    DWORD dwNumberOfBytesRead = 0;

    BOOL bResult = ReadFile((HANDLE) hFile, pBuffer, size * nmemb,
                            &dwNumberOfBytesRead, NULL);

    return dwNumberOfBytesRead;
}

int libcurl_progress_callback (void * clientp, double dltotal, double dlnow,
                              double ultotal, double ulnow)
{
    printf("Uploaded: %d / %d\n", (int) ulnow, (int) ultotal);

    return 0;
}

```

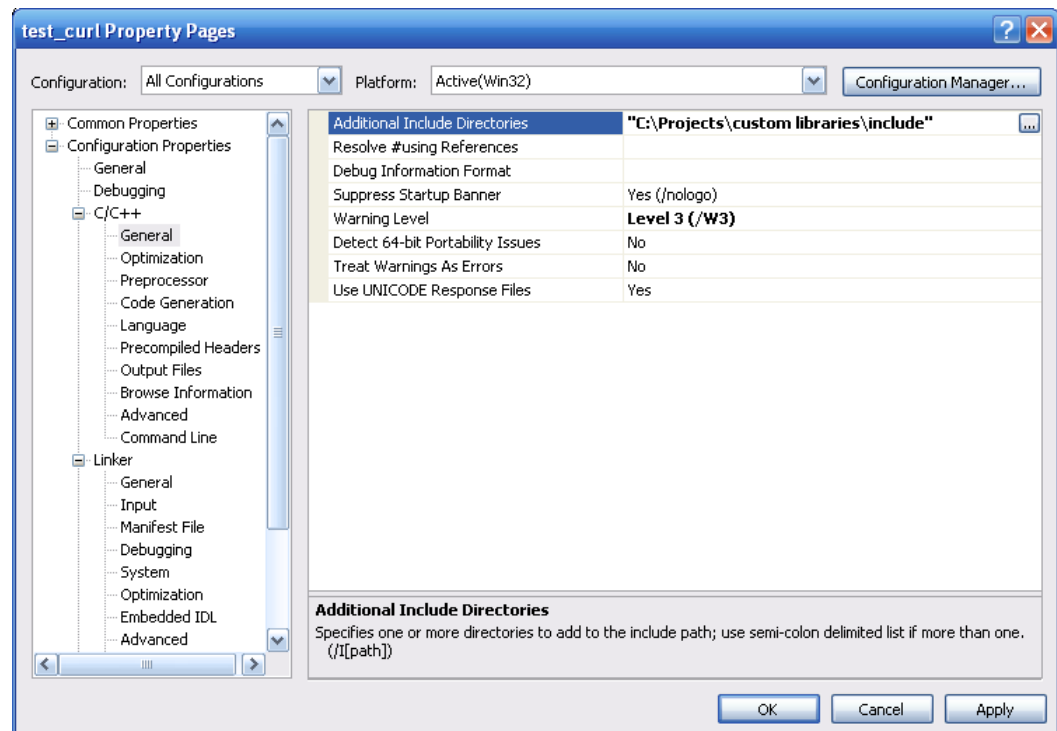
NOTE: You must replace some of the information in the sample code:

- line 17: enter a file name to be uploaded and its location on your computer
- line 93: type in your server's IP address and the remote path where the file should be stored (here I assume that you have access to a computer that is running a SSH server)
- line 104: the login credentials for the SSH server

4.3.2 Adding libcurl to the list of libraries

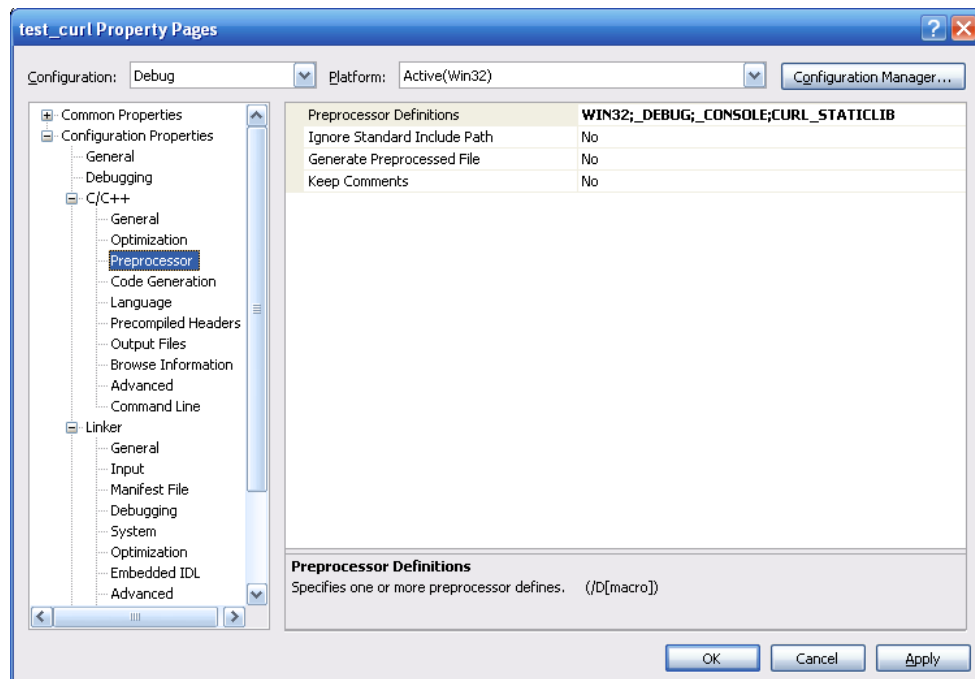
Now let's tell the compiler where to find the libcurl header files and the library itself:

1. In the **Solution Explorer** window, right-click on the test_curl project window and select **Properties** from the pop-up menu.
2. Expand the **Configuration Properties** node.
3. Expand the **C/C++** node
 - a. Select the **General** node, choose the **Additional Include Directories** property and add the path:
"C:\Projects\custom libraries\include"

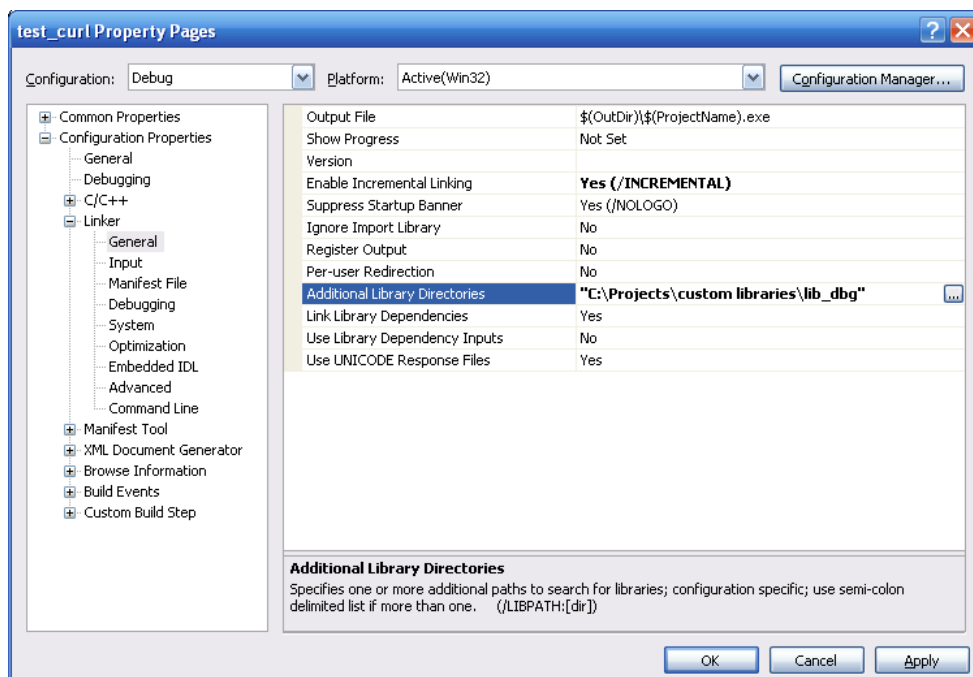


NOTE: While you might be tempted to include the *"C:\Projects\custom libraries\include\curl"* directory instead, we must add the parent directory since some libcurl files use `#include` statements like this one: `"#include <curl/curlbuild.h>"`.

- b. Select the **Preprocessor** node and click on the **Preprocessor Definitions** property. Add in the following to the existing definitions:
`;CURL_STATICLIB`

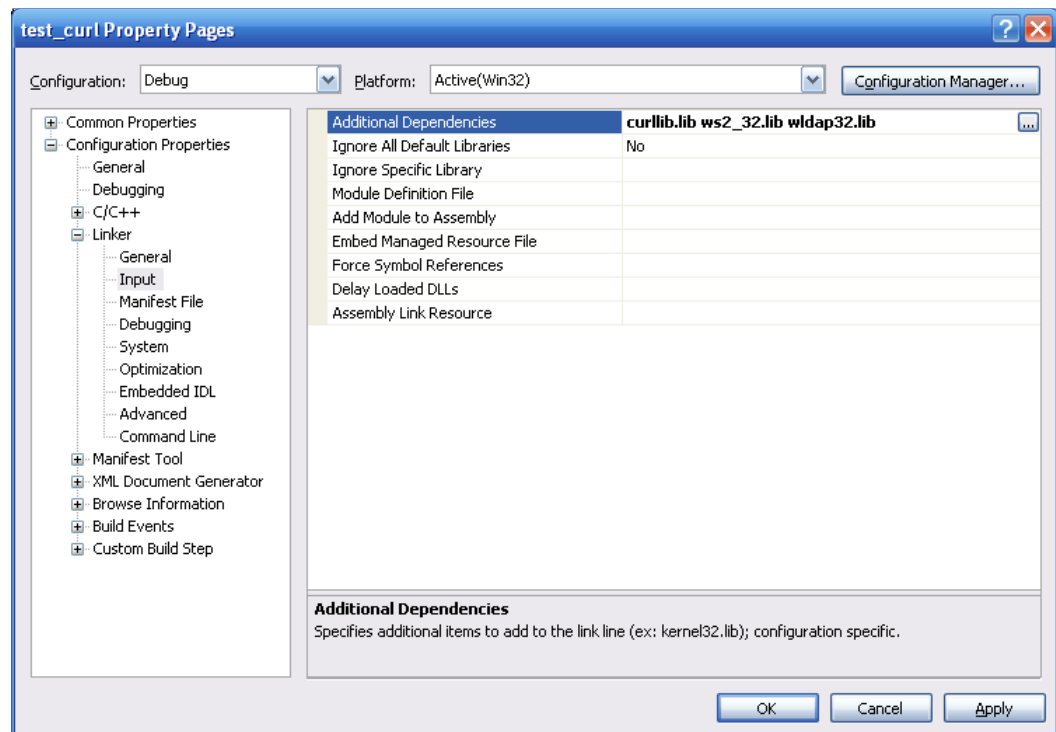


4. Expand the **Linker** node.
 - a. Select the **General** node, chose the **Additional Library Directories** property and add the path:
`"C:\Projects\custom libraries\lib_dbg"`



- b. Select the **Input** node, click on the **Additional Dependencies** property and set it to:

libcurl.lib ws2_32.lib



5. Click on the **OK** button.

4.3.3 The test-drive

Now we are finally ready to reap the fruits of our labor: compile and run the program. Depending on the size of the file you chose to upload, the output should look similar to this:

```
C:\> c:\Projects\test_curl\Debug\test_curl.exe
* About to connect() to [redacted] port 22 (#0)
* Trying [redacted] * connected
* Connected to [redacted] ([redacted]) port 22 (#0)
* SSH authentication methods available: publickey,password
* Initialized password authentication
* Authentication complete
Uploaded: 0 / 4893
Uploaded: 4893 / 4893
Uploaded: 4893 / 4893
Uploaded: 4893 / 4893
Uploaded: 4893 / 4893
Uploaded: 4893 / 4893
* Connection #0 to host [redacted] left intact
* Closing connection #0
File uploaded successfully.
Press any key to continue...
```


5. Final Notes

Congratulations! You are now ready to use libcurl in your own projects. If you run into trouble down the road, don't hesitate to post a message on libcurl's very active mailing list: <http://cool.haxx.se/mailman/listinfo/curl-library>. However, please take a moment and read the mailing list etiquette (<http://curl.haxx.se/mail/etiquette.html>) before posting.