



Лекция 5: COM-СЕРВЕР “OUT-OF-PROCESS”

- регистрация фабричных классов
- маршалинг
- язык определения интерфейсов
- настройка DCOM



Контейнер COM-сервера “OUT-OF-PROCESS”

```
#include <windows.h>
#include <objbase.h>
#include <stdio.h>
#include "guid.h"
#include "CFunction.h"

//extern ULONG g_cObj;
//extern ULONG g_cLock;

IClassFactory* g_pClassFactory;
DWORD g_dwRegister = 0;
HWND g_hWnd;

LRESULT CALLBACK WndProc (HWND, UINT, WPARAM, LPARAM) ;
BOOL Init();
void UnInit();
```



Контейнер COM-сервера “OUT-OF-PROCESS” (продолжение)

```
int APIENTRY WinMain (HINSTANCE hInstance, HINSTANCE hPrevInstance,
                      LPSTR lpszCmdLine, int nCmdShow)
{
    HWND    hwnd ;
    MSG      msg ;
    WNDCLASS wndclass ;
    Init();

    if (!hPrevInstance) {
        wndclass.style      = CS_HREDRAW | CS_VREDRAW ;
        wndclass.lpfnWndProc = WndProc ;
        wndclass.cbClsExtra  = 0 ;
        wndclass.cbWndExtra  = 0 ;
        wndclass.hInstance   = hInstance ;
        wndclass.hIcon       = LoadIcon (NULL, IDI_APPLICATION) ;
        wndclass.hCursor     = LoadCursor (NULL, IDC_ARROW) ;
        wndclass.hbrBackground = (HBRUSH) GetStockObject (WHITE_BRUSH) ;
        wndclass.lpszMenuName = NULL;
        wndclass.lpszClassName = "Class CFunction" ;
        RegisterClass (&wndclass) ;
    }
}
```



Контейнер COM-сервера “OUT-OF-PROCESS” (продолжение)

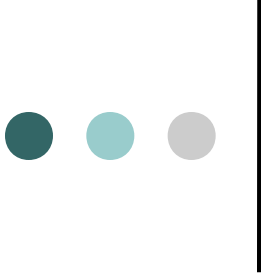
```
hwnd = CreateWindow ("Class CFunction", "Exe COM CFunction",  
                    WS_OVERLAPPEDWINDOW,  
                    CW_USEDEFAULT, 0,  
                    CW_USEDEFAULT, 0,  
                    NULL, NULL, hInstance, NULL) ;  
  
g_hWnd = hwnd;  
  
ShowWindow (hwnd, nCmdShow) ;  
UpdateWindow (hwnd) ;  
  
while (GetMessage (&msg, NULL, 0, 0))  
{  
    TranslateMessage (&msg) ;  
    DispatchMessage (&msg) ;  
}  
return msg.wParam ;  
}
```



Контейнер COM-сервера “OUT-OF-PROCESS” (процедура окна)

```
LRESULT CALLBACK WndProc (HWND hwnd, UINT message, WPARAM wParam, LPARAM lParam){

    static char str[80] = "It is an Exe Server";
    HDC hDC;
    PAINTSTRUCT ps;
    switch (message)
    {
    case WM_PAINT:
        hDC = BeginPaint (hwnd, &ps);
        TextOut (hDC, 0, 0, str, lstrlen (str));
        EndPaint (hwnd, &ps);
        return 0;
    case WM_DESTROY :
        PostQuitMessage (0) ;
        return 0;
    case WM_CLOSE:
        UnInit();
    default:
        break;
    }
    return DefWindowProc (hwnd, message, wParam, lParam) ;
}
```



Контейнер COM-сервера “OUT-OF-PROCESS” (инициализация COM и регистрация фабрики класса)

```
BOOL Init(){
    HRESULT hr;
    hr = CoInitialize(NULL);
    if (FAILED(hr)){
        MessageBox(NULL, "CoInitialize failed", "CFunction", MB_OK);
        return FALSE;
    }
    g_pClassFactory = new CFunctionClassFactory;

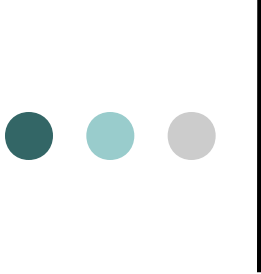
    if (g_pClassFactory == NULL)
        return FALSE;

    g_pClassFactory->AddRef();

    hr = CoRegisterClassObject(CLSID_Function, g_pClassFactory, CLSCTX_LOCAL_SERVER,
                               REGCLS_MULTIPLEUSE, &g_dwRegister);

    if (FAILED(hr))
        return FALSE;

    return TRUE;
}
```



Контейнер COM-сервера “OUT-OF-PROCESS” (остановка фабрики класса и деинициализация COM)

```
void UnInit()
{
    if (g_dwRegister != 0)
        CoRevokeClassObject(g_dwRegister);

    if (g_pClassFactory != NULL){
        g_pClassFactory->Release();
        g_pClassFactory->LockServer(false);
    }

    CoUninitialize();
}
```



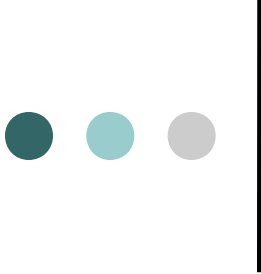
Изменения, внесенные в реализацию метода LockServer

```
void ObjectDestroyed()
{
if (g_cObj == 0 && g_cLock == 0 && IsWindow(g_hWnd))
PostMessage(g_hWnd, WM_CLOSE, 0, 0);
}

STDMETHODIMP CFunctionClassFactory::LockServer(BOOL fLock)
{
    if (fLock)
        g_cLock++;
    else
        g_cLock--;

    if(g_cLock==0)
        ObjectDestroyed();

    return NOERROR;
}
```

```
C:\Windows\system32\cmd.exe

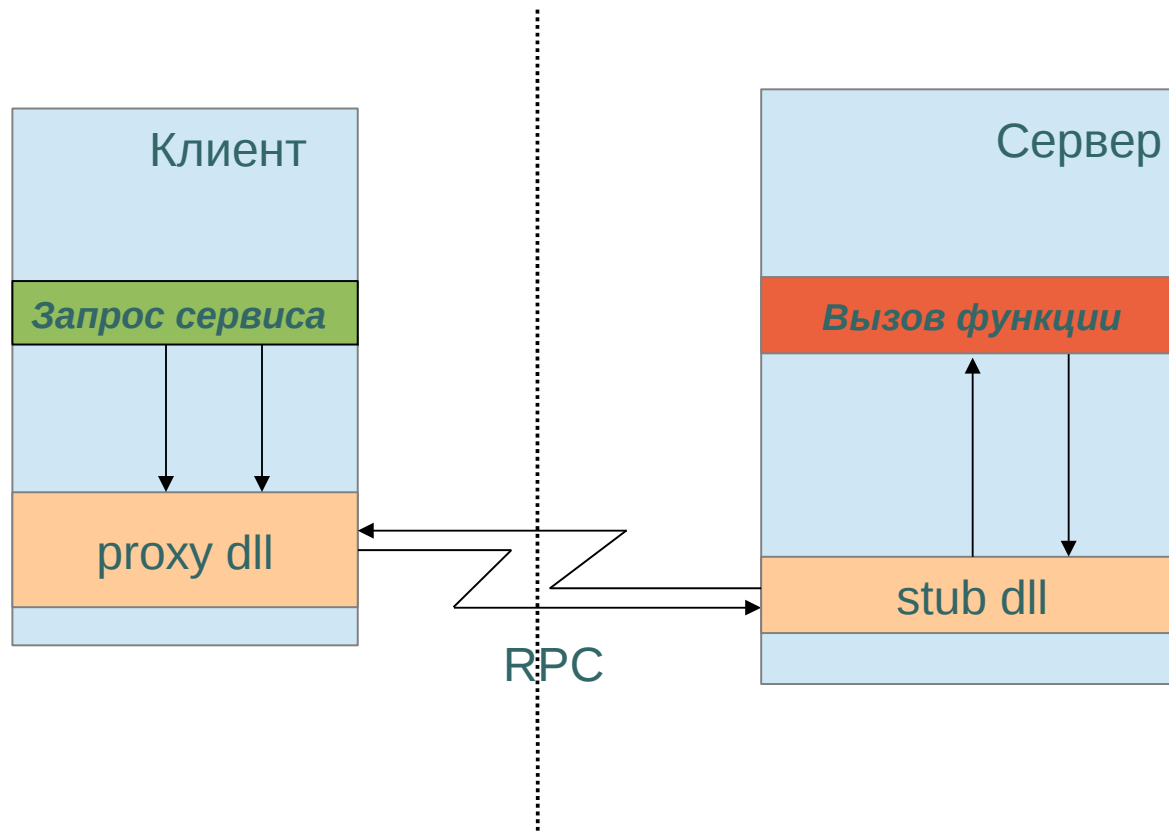
C:\Users\ewgenij\Documents\WORKSHOP\СибГУТИ\2013(PROGRAM DESIGN)\work\Lecture5\Practical5\server>cl just_for_fun_exe.cpp CFunction.cpp ole32.lib user32.lib gdi32.lib
Microsoft (R) 32-bit C/C++ Optimizing Compiler Version 12.00.8168 for 80x86
Copyright (C) Microsoft Corp 1984-1998. All rights reserved.

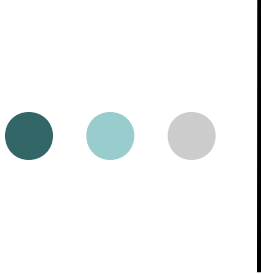
just_for_fun_exe.cpp
CFunction.cpp
Generating Code...
Microsoft (R) Incremental Linker Version 6.00.8168
Copyright (C) Microsoft Corp 1992-1998. All rights reserved.

/out:just_for_fun_exe.exe
just_for_fun_exe.obj
CFunction.obj
ole32.lib
user32.lib
gdi32.lib

C:\Users\ewgenij\Documents\WORKSHOP\СибГУТИ\2013(PROGRAM DESIGN)\work\Lecture5\Practical5\server>
```

Маршалинг (демаршалинг)

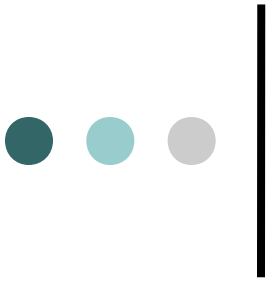




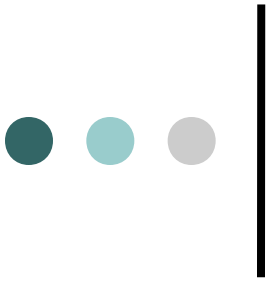
Создание библиотеки динамической компоновки, реализующей заглушки

IDL - язык определения интерфейса (*Interface Definition Language*)

```
import "unknown.idl";
//Interface IFunction
[
    object,
    uuid(3DC9017D-10E4-4D83-8097-E0FC0497B9AA),
    helpstring("IFunction Interface"),
    pointer_default(unique)
]
interface IFunction : IUnknown
{
    HRESULT GetValue([out] double * d);
    HRESULT SetValue([in] double d);
};
```

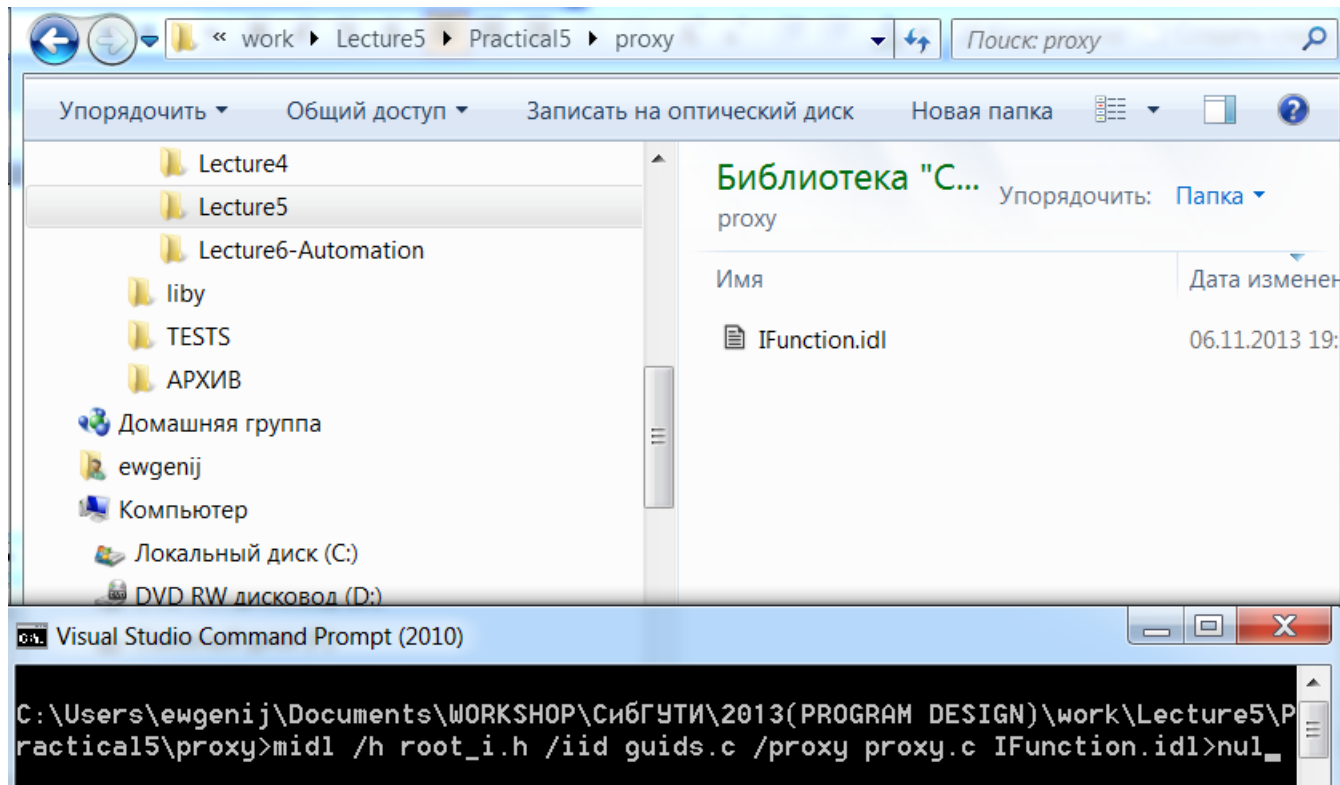


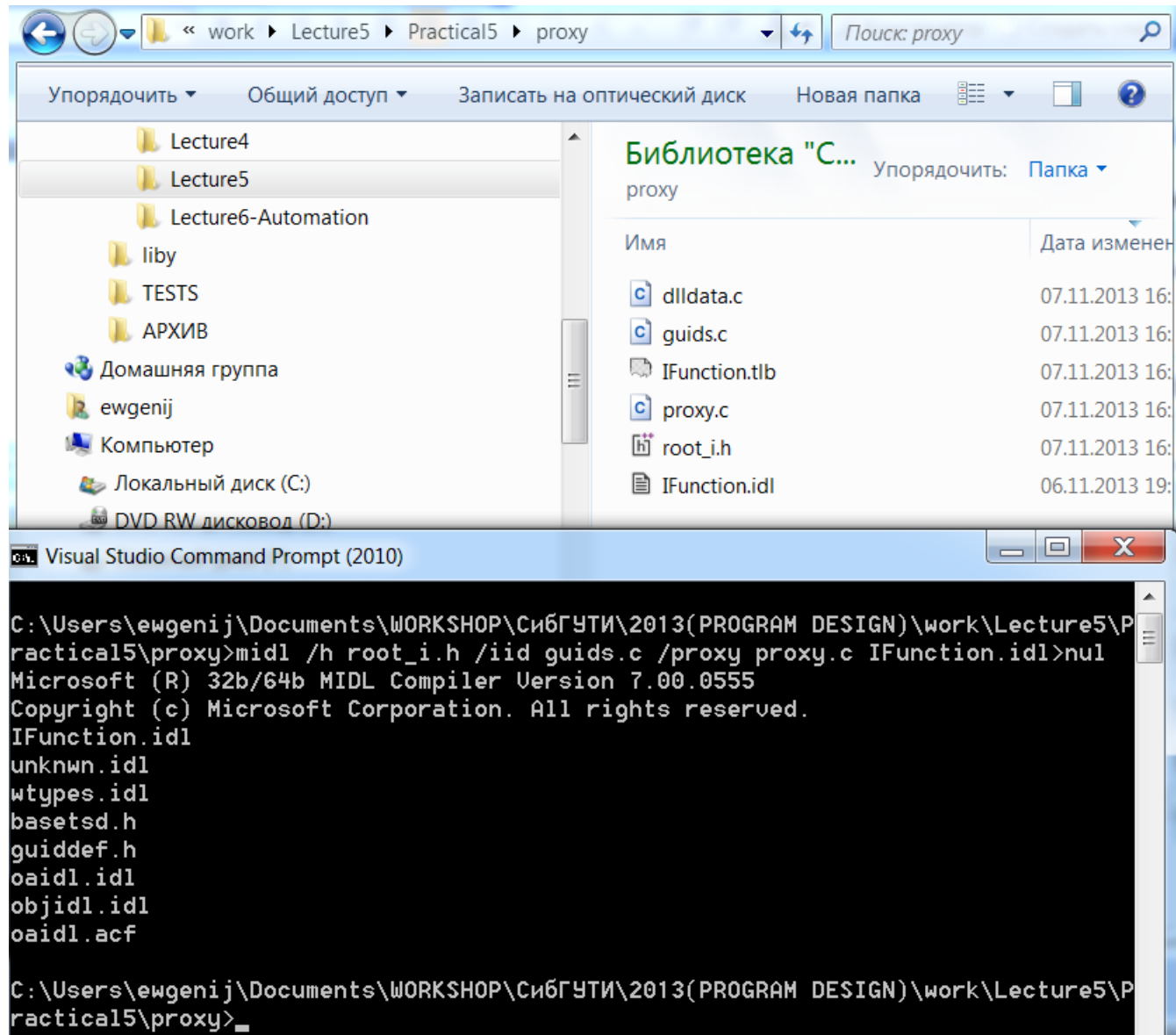
```
//Interface ISerialization
[
    object,
    uuid(048C493E-A924-4345-8650-18BE597B41AA),
    helpstring("ISerialization Interface"),
    pointer_default(unique)
]
interface ISerialization : IUnknown
{
    HRESULT Load();
    HRESULT Store();
};
```



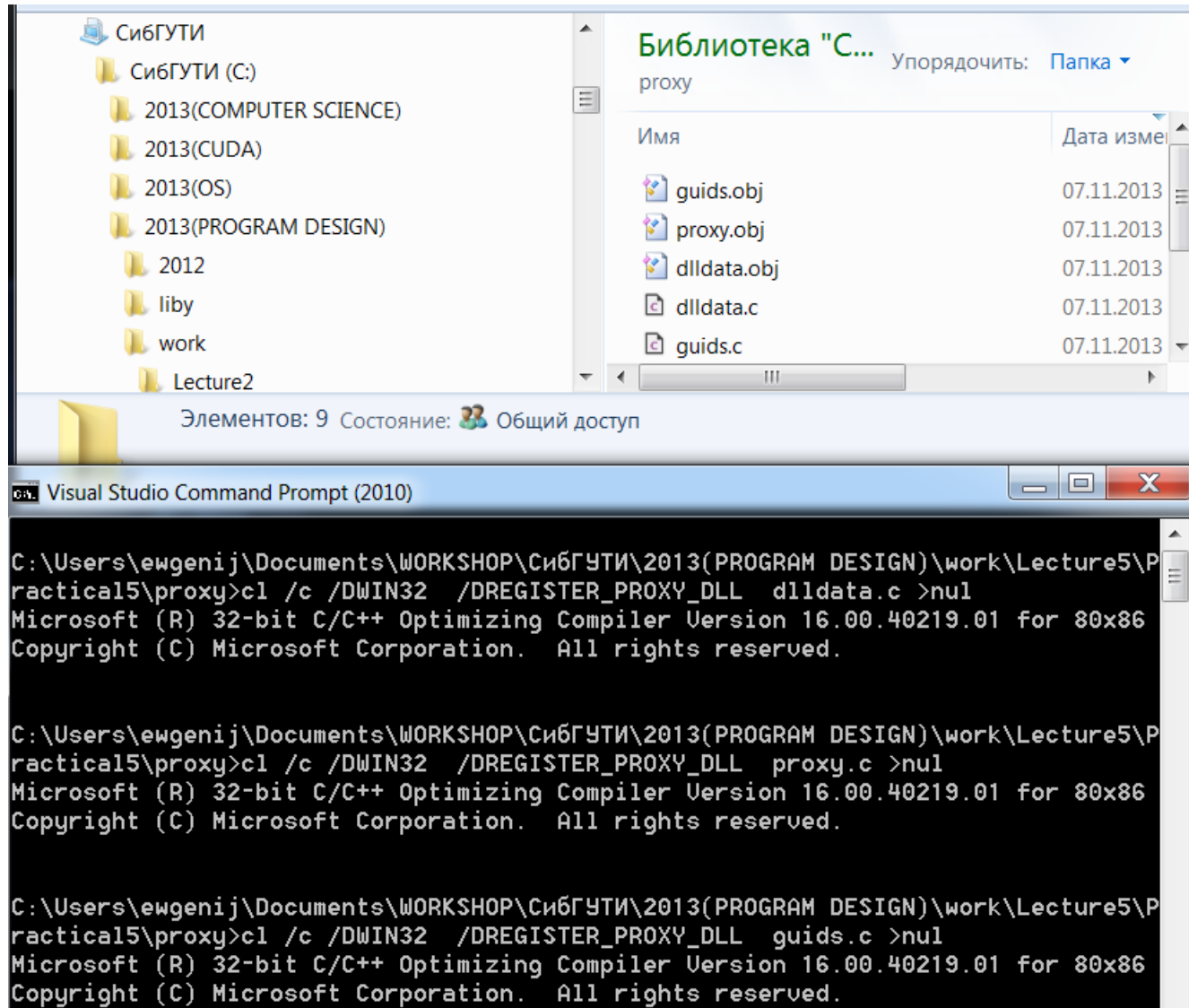
```
[
  uuid(10C1D956-B61A-4B2C-8795-58CA53298AAA),
  version(1.0),
  helpstring("CFunction 1.0 Type Library")
]
library FunctionLib
{
  importlib("stdole32.tlb");
  importlib("stdole2.tlb");
  //Component
  [
    uuid(36C1D956-B61A-4B2C-8795-58CA53298AAA),
    helpstring("Component class")
  ]
  coclass CFunction
  {
    [default] interface IFunction;
    interface ISerialization;
  };
};
```

Компилятор midl





Компоновка proxy.dll



The image shows a Windows File Explorer window displaying the directory structure of a project. The left pane shows the folder hierarchy, and the right pane shows the contents of the selected folder, 'Библиотека "С...'.

File Explorer - Left Pane (Folders):

- СибГУТИ
- СибГУТИ (C:)
 - 2013(COMPUTER SCIENCE)
 - 2013(CUDA)
 - 2013(OS)
 - 2013(PROGRAM DESIGN)
 - 2012
 - liby
 - work
 - Lecture2

File Explorer - Right Pane (Files):

Имя	Дата изме
guids.obj	07.11.2013
proxy.obj	07.11.2013
dlldata.obj	07.11.2013
dlldata.c	07.11.2013
guids.c	07.11.2013

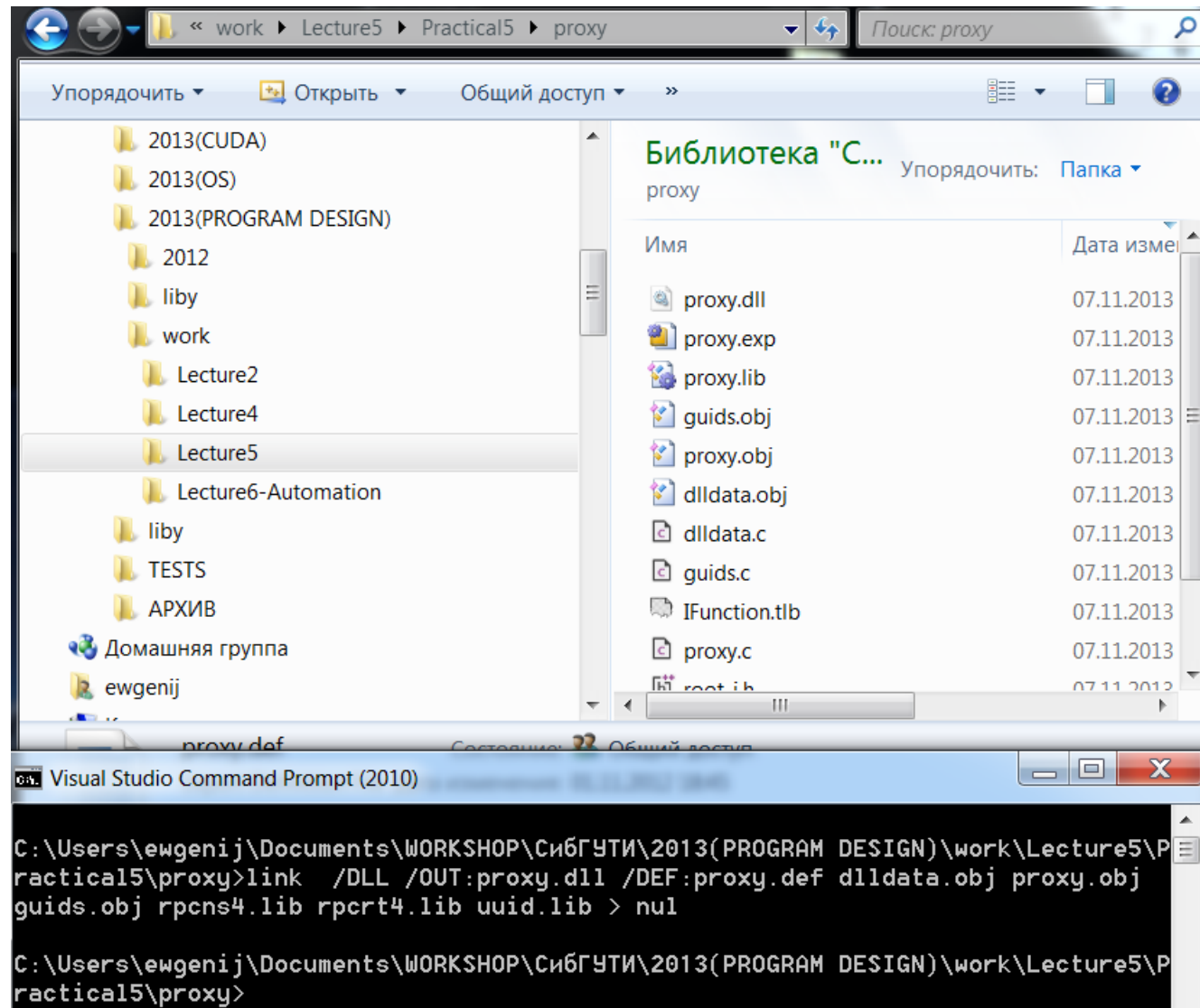
Visual Studio Command Prompt (2010) Output:

```
C:\Users\ewgenij\Documents\WORKSHOP\СибГУТИ\2013(PROGRAM DESIGN)\work\Lecture5\Practical5\proxy>cl /c /DWIN32 /DREGISTER_PROXY_DLL dlldata.c >nul
Microsoft (R) 32-bit C/C++ Optimizing Compiler Version 16.00.40219.01 for 80x86
Copyright (C) Microsoft Corporation. All rights reserved.

C:\Users\ewgenij\Documents\WORKSHOP\СибГУТИ\2013(PROGRAM DESIGN)\work\Lecture5\Practical5\proxy>cl /c /DWIN32 /DREGISTER_PROXY_DLL proxy.c >nul
Microsoft (R) 32-bit C/C++ Optimizing Compiler Version 16.00.40219.01 for 80x86
Copyright (C) Microsoft Corporation. All rights reserved.

C:\Users\ewgenij\Documents\WORKSHOP\СибГУТИ\2013(PROGRAM DESIGN)\work\Lecture5\Practical5\proxy>cl /c /DWIN32 /DREGISTER_PROXY_DLL guids.c >nul
Microsoft (R) 32-bit C/C++ Optimizing Compiler Version 16.00.40219.01 for 80x86
Copyright (C) Microsoft Corporation. All rights reserved.
```


Компоновка proxy.dll (продолжение)





Программа клиент COM-сервера “OUT-OF-PROCESS”

```
#include <windows.h>
#include <stdio.h>
#include <objbase.h>
#include "guids.c"
#include "root_i.h"

int main(){
    IClassFactory* pcf=NULL;
    IFunction* pii=NULL;
    ISerialization* pif=NULL;
    DWORD dwContext = CLSCTX_LOCAL_SERVER;

    CoInitialize(NULL);

    HRESULT hr = CoGetClassObject(
        CLSID_CFunction,
        dwContext,
        NULL,
        IID_IClassFactory,
        (void**) &pcf);

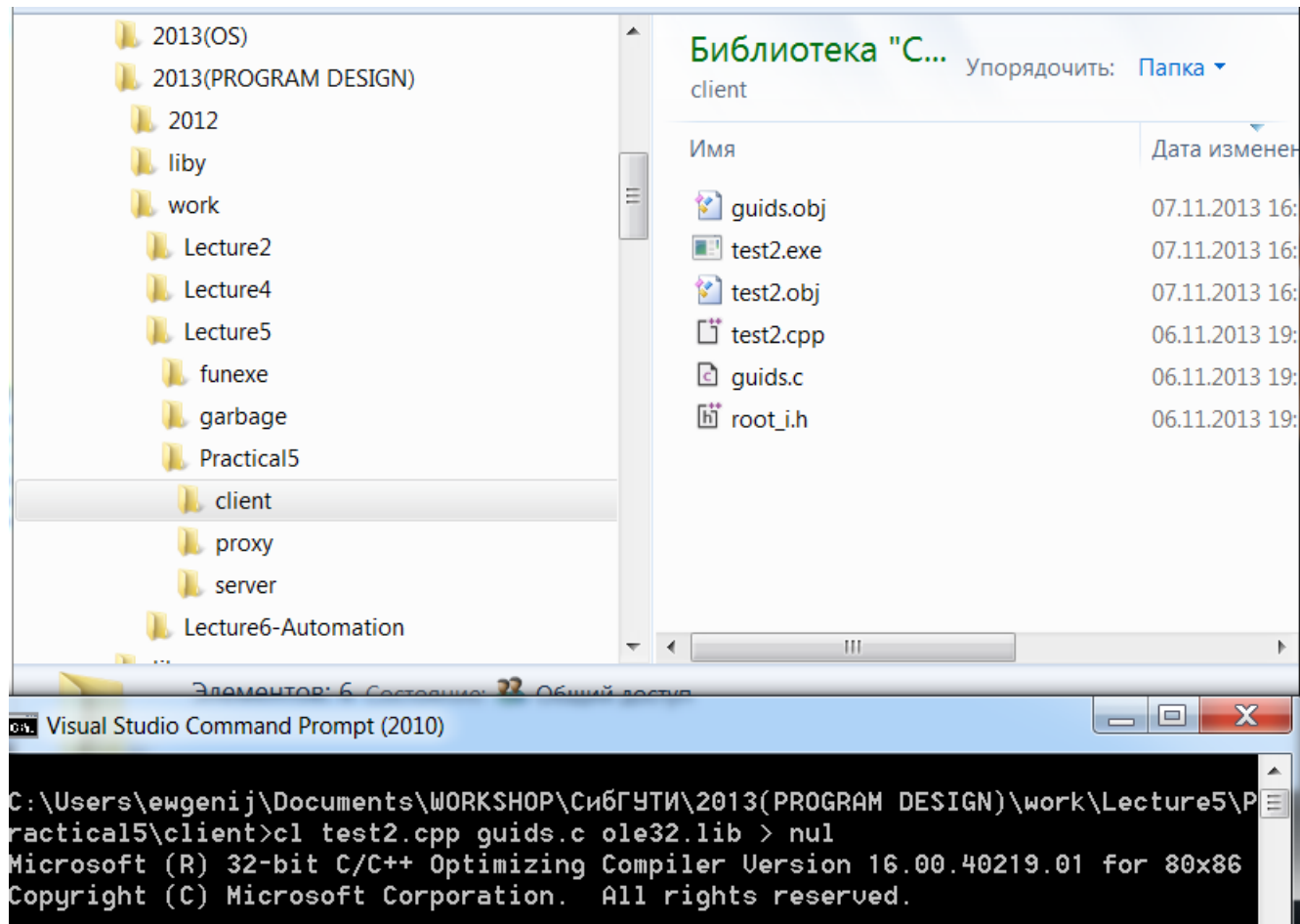
    pcf->LockServer(TRUE);
    pcf->CreateInstance(NULL, IID_IFunction, (void**)&pii);
```



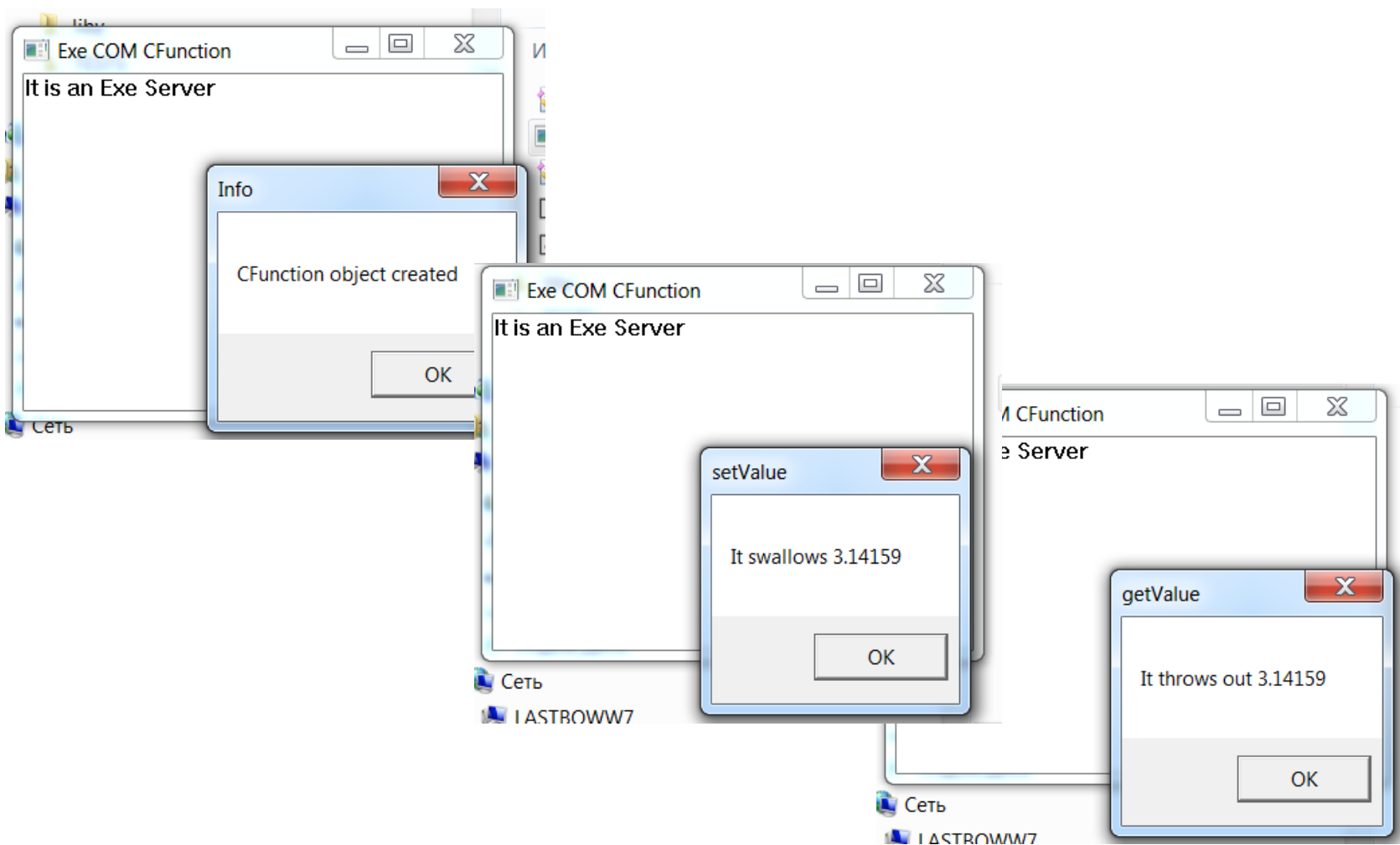
Программа – клиент (*продолжение*)

```
pii->setValue(3.141592);  
double d;  
pii->getValue(&d);  
printf("It's thrown out %g\n", d);  
  
pii->QueryInterface(IID_Initialization, (void**)&pif);  
  
pif->Load();  
pif->Store();  
  
pii->Release();  
pif->Release();  
  
pcf->LockServer(FALSE);  
pcf->Release();  
  
CoUninitialize();  
  
return 0;  
}
```

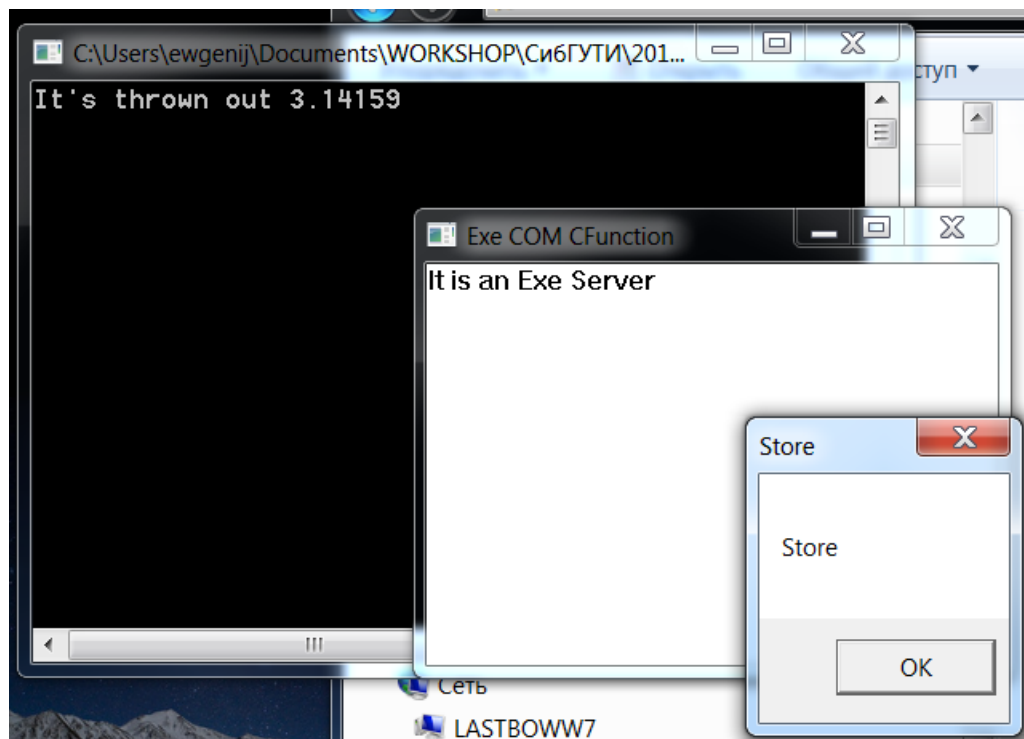
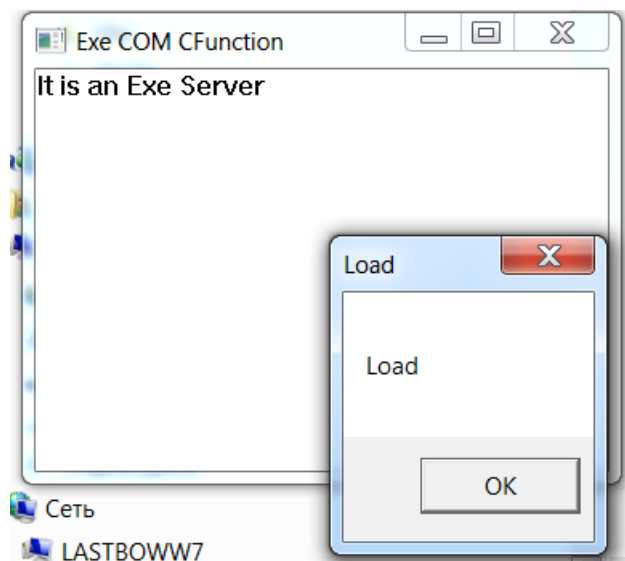
Компиляция программы - клиента СОМ-сервера



Тестирование программы-клиента COM-сервера “OUT-OF-PROCESS”



Тестирование программы-клиента COM-сервера “OUT-OF-PROCESS” (продолжение)



Фрагмент настройки DCOM

