СЕВАСТОПОЛЬСКИЙ
ГОСУДАРСТВЕННЫЙ
УНИВЕРСИТЕТ

# Лекция № 3

## «MATLAB. C++ Builder»

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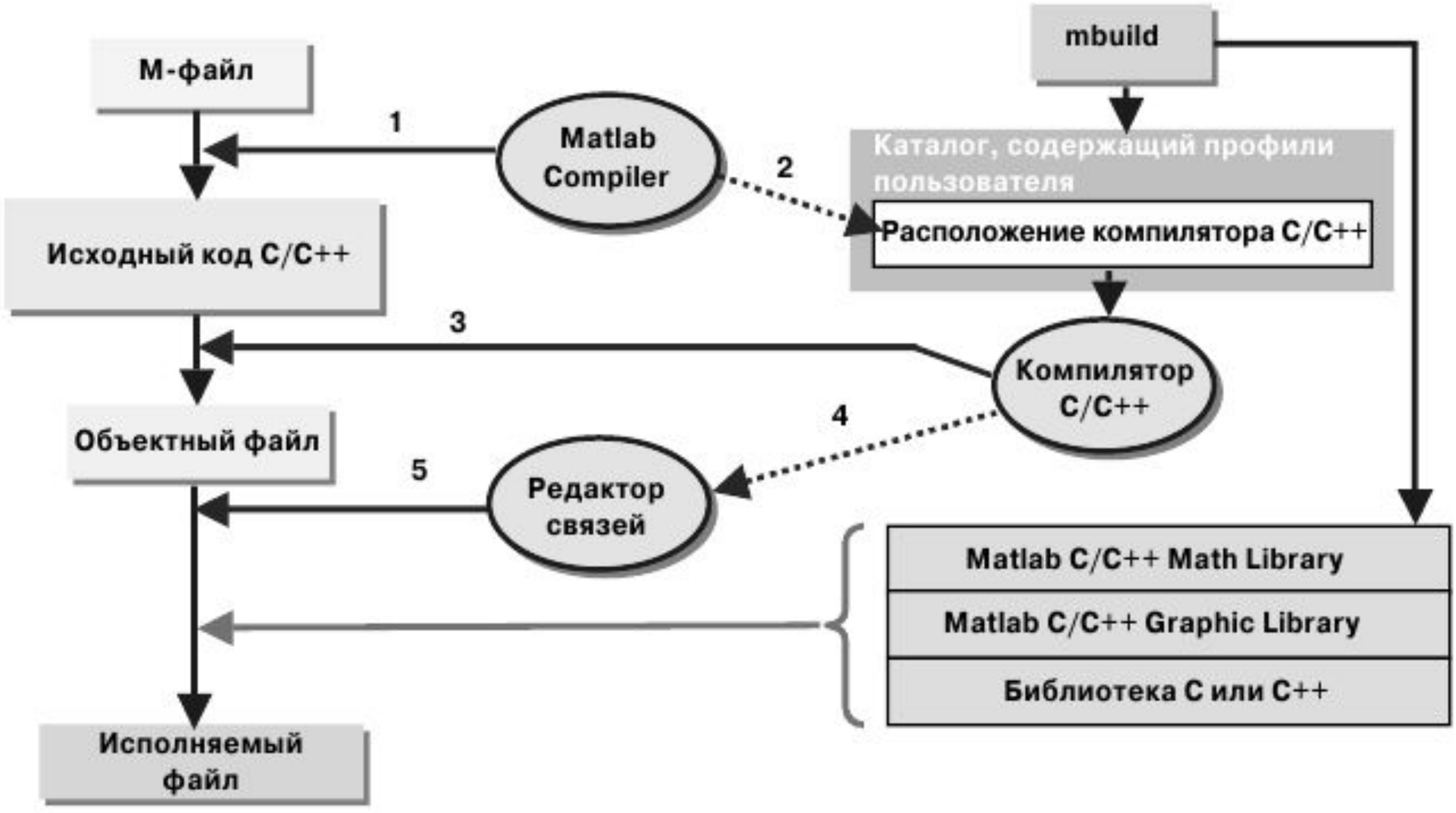
# 2 Этапы создания приложения

## Основные этапы



# 3 Этапы создания приложения

## Основные команды

```
>> mbuild -setup

Welcome to mbuild -setup.  This utility will help you set up
a default compiler.  For a list of supported compilers, see
http://www.mathworks.com/support/compilers/R2013a/win64.html

Please choose your compiler for building shared libraries or COM components:

Would you like mbuild to locate installed compilers [y]/n?
```

# 4 Этапы создания приложения

## Основные команды

```
Select a compiler:
[1] Microsoft Visual C++ 2012 in C:\Program Files (x86)\Microsoft Visual Studio 11.0

[0] None

Compiler: 1

Please verify your choices:

Compiler: Microsoft Visual C++ 2012
Location: C:\Program Files (x86)\Microsoft Visual Studio 11.0

Are these correct [y]/n? y
```

# 5 Этапы создания приложения

## Основные команды

```
********************************************************************************
  Warning: Applications/components generated using Microsoft Visual C++
           2012 require that the Microsoft Visual Studio 2012 run-time
           libraries be available on the computer used for deployment.
           To redistribute your applications/components, be sure that the
           deployment machine has these run-time libraries.
********************************************************************************


Trying to update options file: C:\Users\VA\AppData\Roaming\MathWorks\MATLAB\R2013a\compopts.bat
From template:                 C:\PROGRA~1\MATLAB\R2013a\bin\win64\mbuildopts\msvc110compp.bat

Done . . .
```

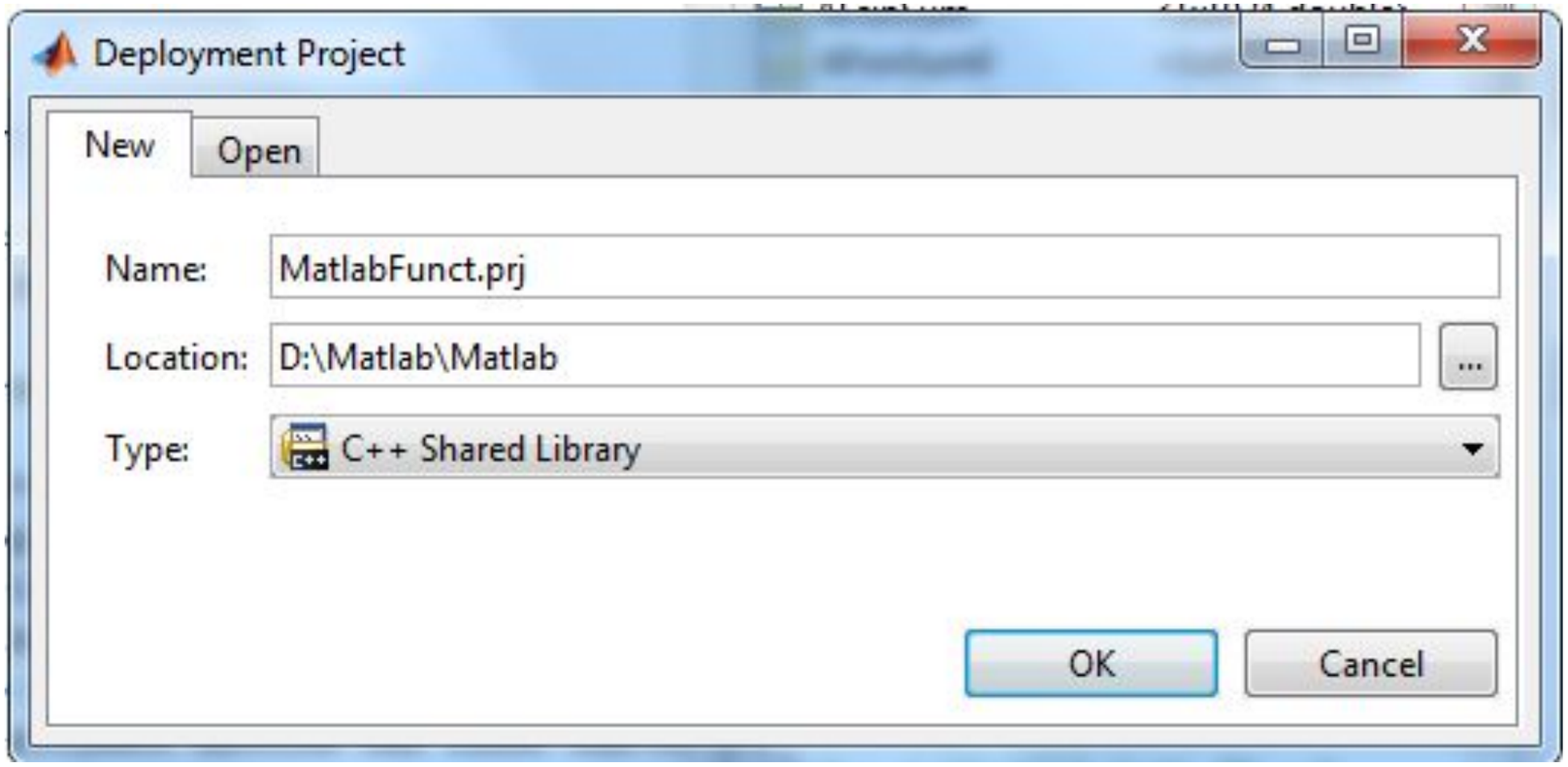
# 6 Этапы создания приложения

## Подготовка m-файла

```
function [ res ] = Sin2SQRT( x )
    res = sin(x)*sin(x)*sqrt(x);
end
```

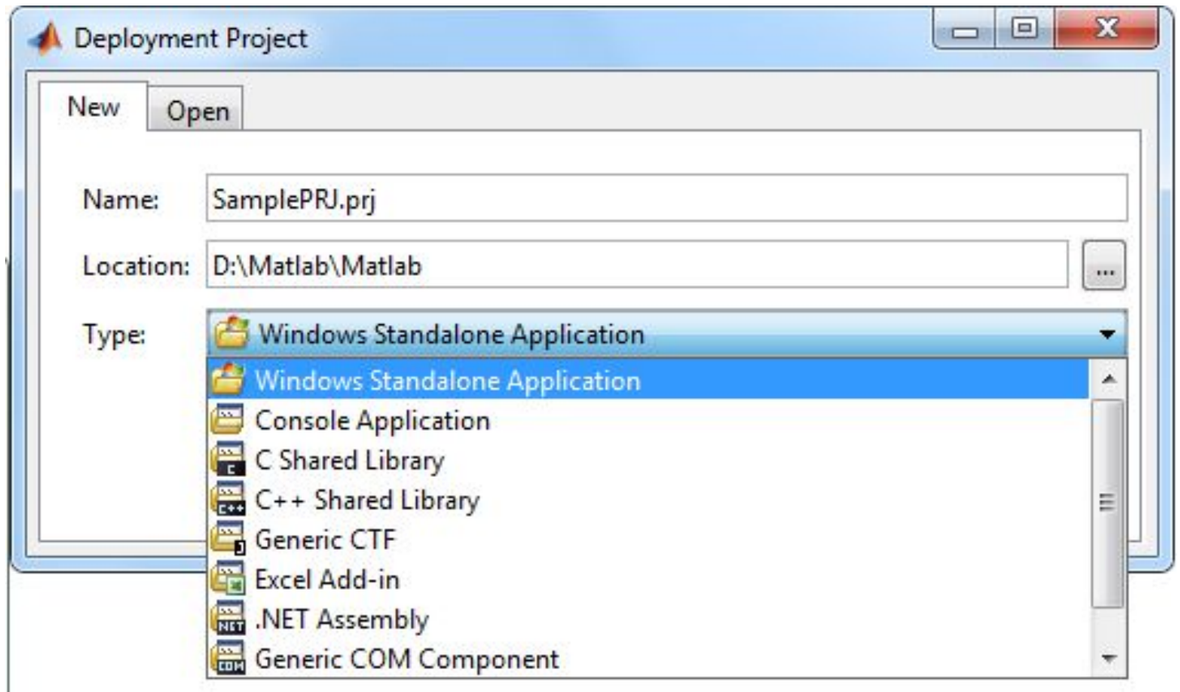
## Запуск deploy проекта

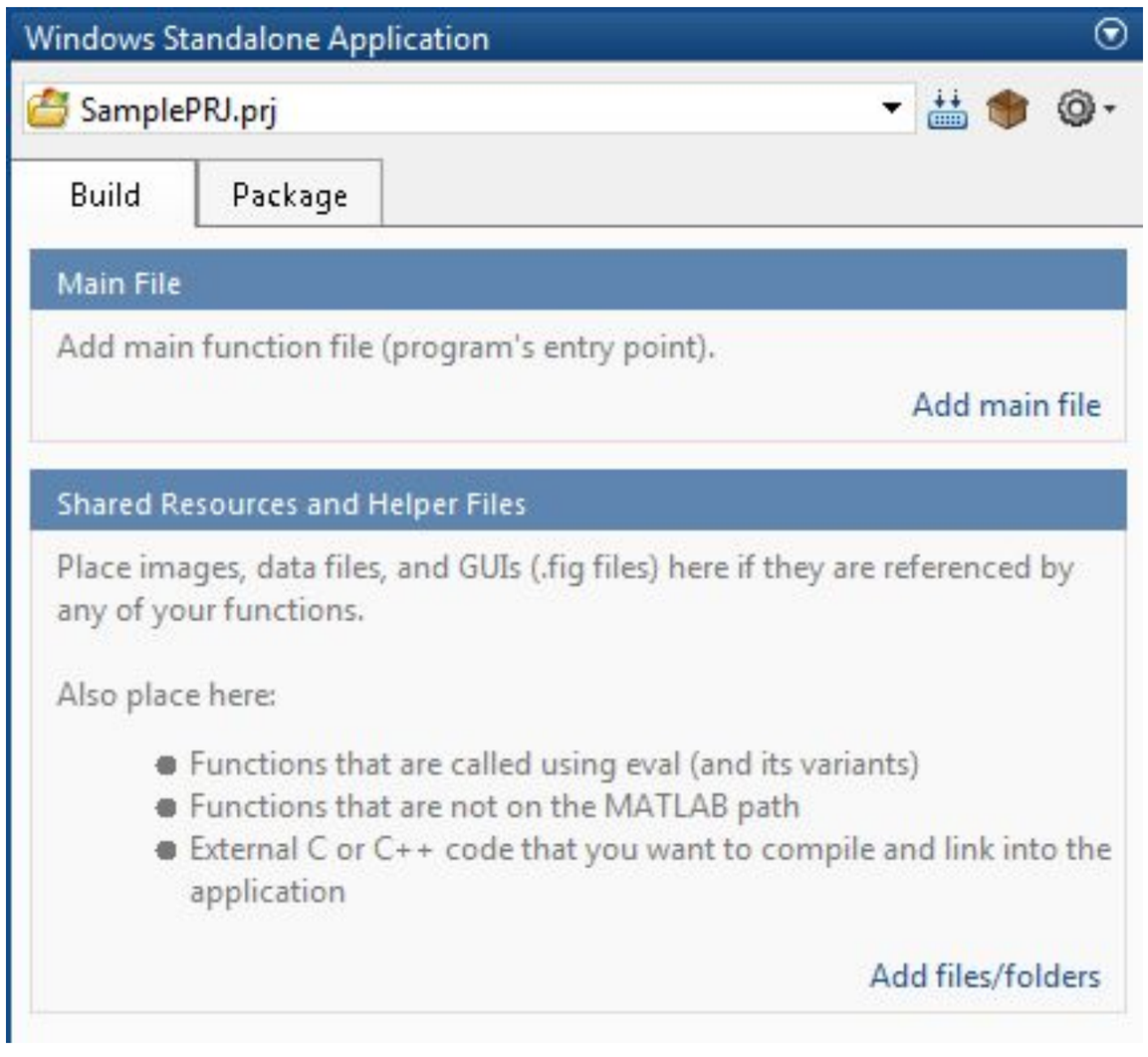
```
>> deploytool
```



# 7 Этапы создания приложения

## Deployment Project

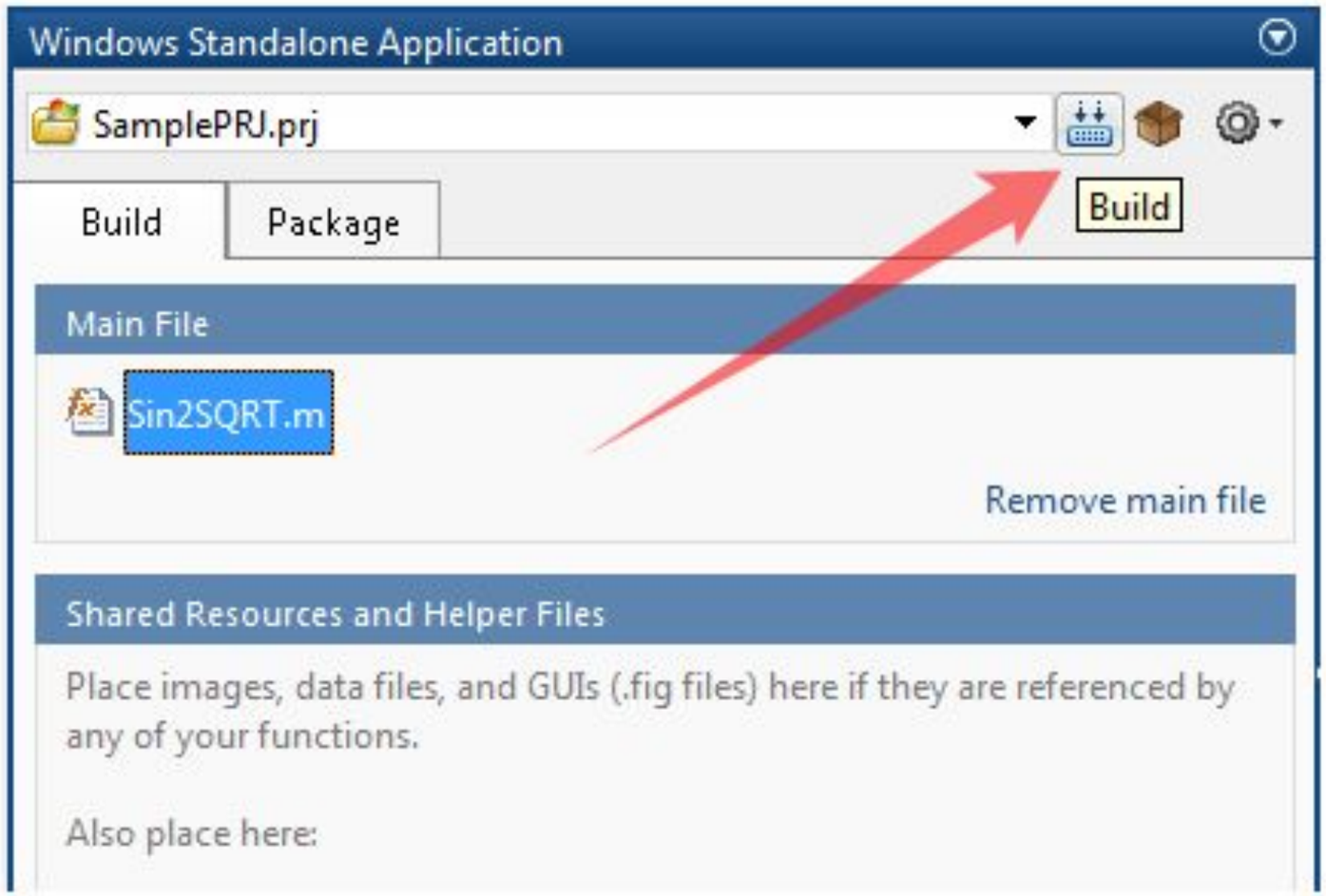


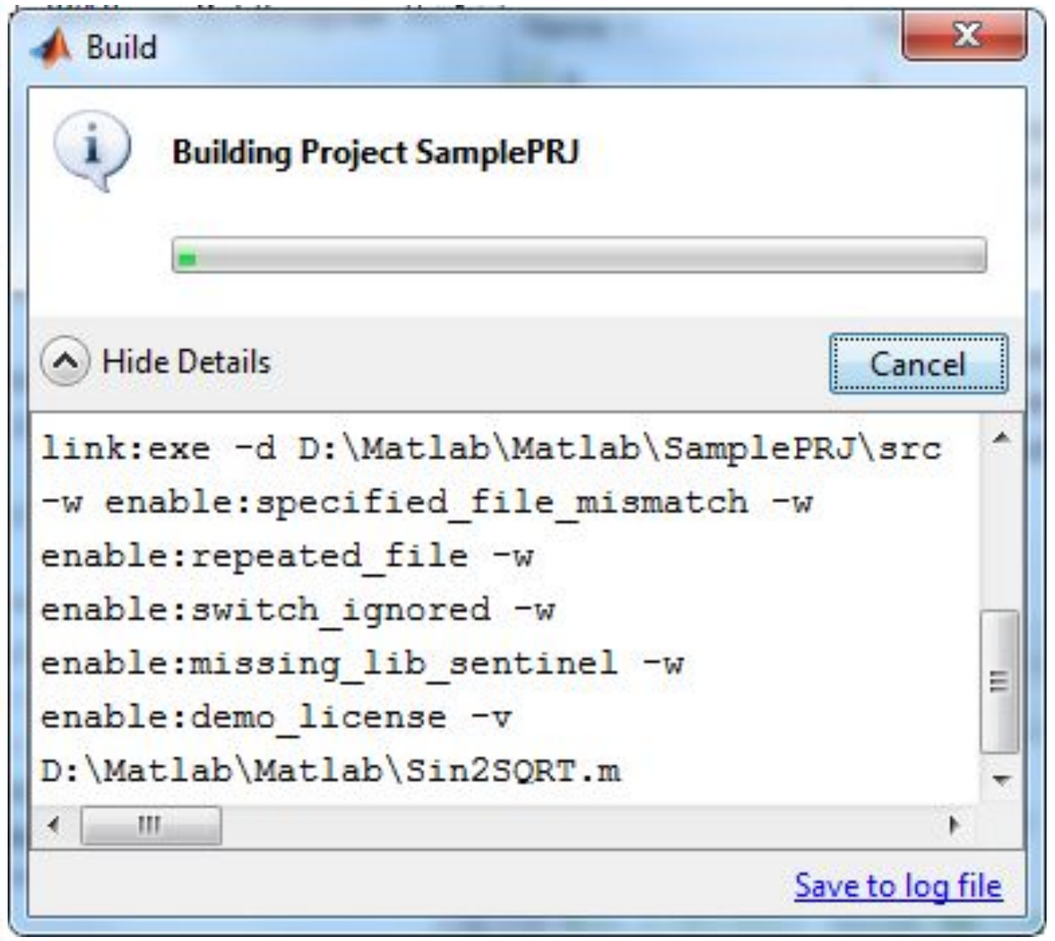




- Windows Standalone Application
- Console Application
- C Shared Library
- C++ Shared Library
- Generic CTF
- Excel Add-in
- .NET Assembly
- Generic COM Component

# 8 Этапы создания приложения

## Deployment Project



# 9 Этапы создания приложения

## Deployment Project

| Name | Date modified | Type | Size |
|---|---|---|---|
| MatlabFunct | 1/31/2017 10:24 AM | File folder | |
| MatlabFunct.prj | 1/31/2017 10:25 AM | PRJ File | 58 KB |
| Sin2SQRT.m | 1/31/2017 10:23 AM | M File | 1 KB |

DATA (D:) ▸ Matlab ▸ Matlab ▸ MatlabFunct ▸ src

ibrary ▾ Share with ▾ Burn New folder

| Name | Date modified | Type | Size |
|---|---|---|---|
| MatlabFunct | 1/31/2017 10:24 AM | C++ Source | 4 KB |
| MatlabFunct.dll | 1/31/2017 10:25 AM | Application extens... | 56 KB |
| MatlabFunct | 1/31/2017 10:25 AM | Exports Library File | 2 KB |
| MatlabFunct.exports | 1/31/2017 10:24 AM | EXPORTS File | 1 KB |
| MatlabFunct | 1/31/2017 10:24 AM | C/C++ Header | 3 KB |
| MatlabFunct | 1/31/2017 10:25 AM | Object File Library | 4 KB |
| mccExcludedFiles | 1/31/2017 10:24 AM | Text Document | 659 KB |
| readme | 1/31/2017 10:24 AM | Text Document | 2 KB |

DATA (D:) ▸ Matlab ▸ Matlab ▸ MatlabFunct ▸ distrib

brary ▾ Share with ▾ Burn New folder

| Name | Date modified | Type | Size |
|---|---|---|---|
| MatlabFunct.dll | 1/31/2017 10:25 AM | Application extens... | 56 KB |
| MatlabFunct | 1/31/2017 10:24 AM | C/C++ Header | 3 KB |
| MatlabFunct | 1/31/2017 10:25 AM | Object File Library | 4 KB |
| readme | 1/31/2017 10:24 AM | Text Document | 2 KB |

# ВСЕ ПРОПАЛО!!!

**Deployment Project**

C++Builder x32

DLL x64

# 11 Этапы создания приложения

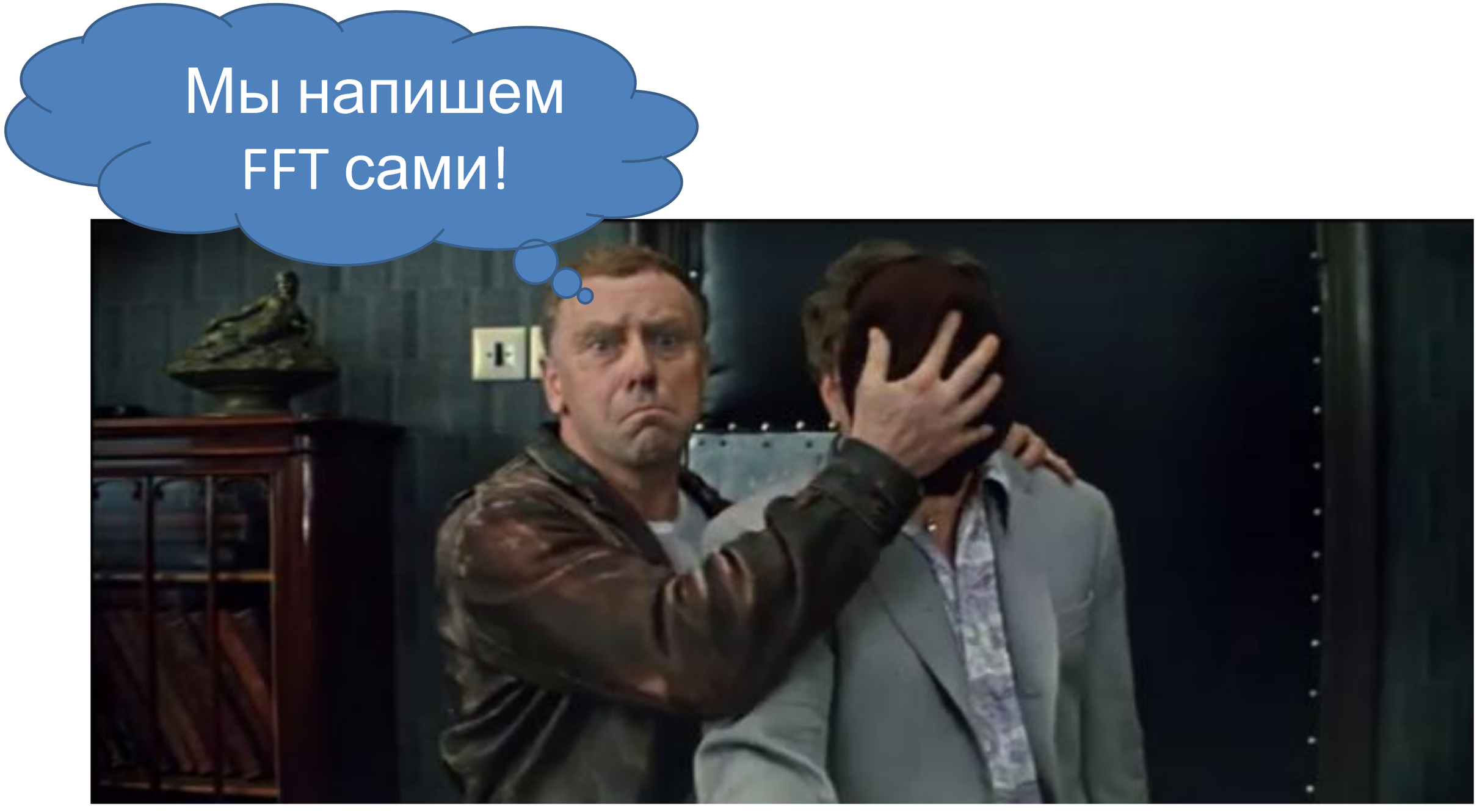
## Определение версии библиотеки

Developer Command Prompt for VS2012

```
C:\Program Files (x86)\Microsoft Visual Studio 11.0>link.exe /dump /headers D:\M
atlabSin2SQRT.dll
Microsoft (R) COFF/PE Dumper Version 11.00.61030.0
Copyright (C) Microsoft Corporation.  All rights reserved.


Dump of file D:\MatlabSin2SQRT.dll

PE signature found

File Type: DLL

FILE HEADER VALUES
            8664 machine (x64)
               6 number of sections
        588FA220 time date stamp Mon Jan 30 23:29:20 2017
               0 file pointer to symbol table
               0 number of symbols
              F0 size of optional header
            2022 characteristics
                   Executable
                   Application can handle large (>2GB) addresses
                   DLL

OPTIONAL HEADER VALUES
```

# 12 БУДЕМ КОДИРОВАТЬ FFT

**Deployment Project**



# 13 Дискретное преобразование Фурье

## Прямое преобразование

$$X(k) = T\sum_{i=0}^{N-1} x(i)\exp\left(-j2\pi\frac{ik}{N}\right)$$

$$X(k) = C(k) - jS(k)$$

$$\left.\begin{aligned} C(k) &= T\sum_{i=0}^{N-1} x(i)\cos(2\pi ik/N) \\ S(k) &= T\sum_{i=0}^{N-1} x(i)\sin(2\pi ik/N) \end{aligned}\right\}$$

# 14 Дискретное преобразование Фурье

## Обратное преобразование

$$x(i) = \frac{1}{NT} \sum_{k=0}^{N-1} X(k) \exp\left( j2\pi \frac{ik}{N} \right)$$

$$x(i) = c(i) + js(i)$$

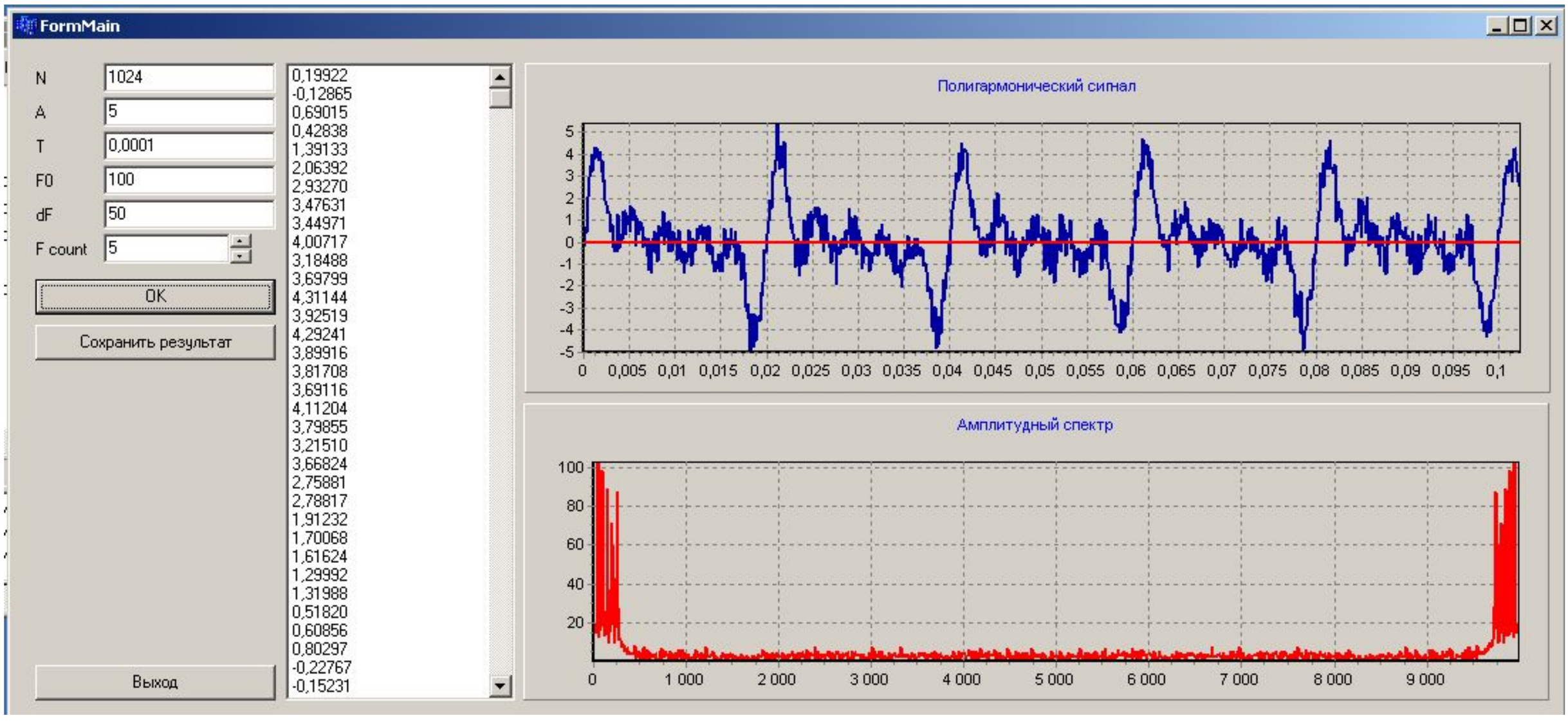
$$\left.\begin{aligned} c(i) &= \frac{1}{NT} \sum_{i=0}^{N-1} C(k) \cos(2\pi ik/N) + \frac{1}{NT} \sum_{i=0}^{N-1} S(k) \sin(2\pi ik/N), \\ s(i) &= -\frac{1}{NT} \sum_{i=0}^{N-1} S(k) \cos(2\pi ik/N) + \frac{1}{NT} \sum_{i=0}^{N-1} C(k) \sin(2\pi ik/N) \end{aligned}\right\}$$

# 15 Дискретное преобразование Фурье

```
#include <vcl.h>
#include <math.h>
#include <Math.hpp>
```

## Реализация

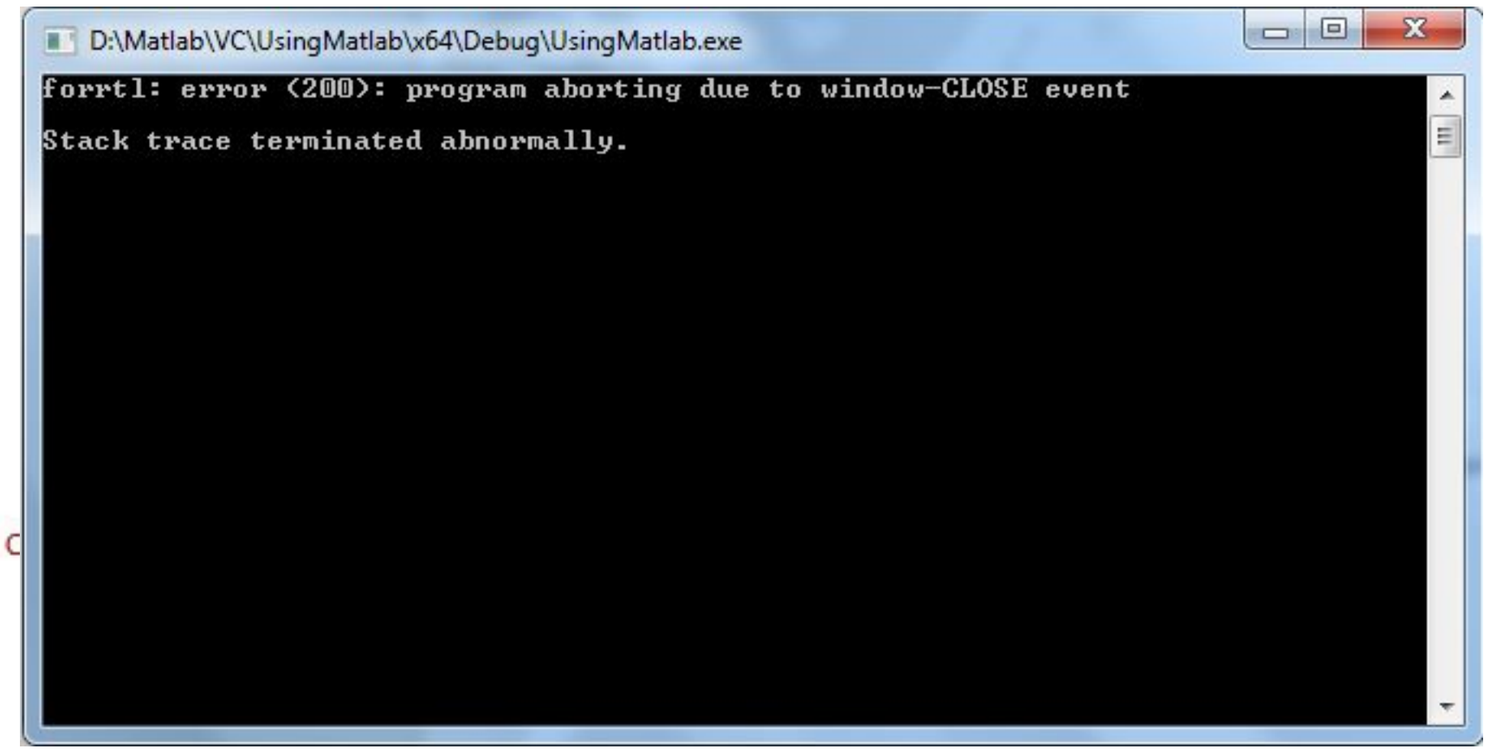
```
summa *= A/Fcount;
y[i] = summa + RandG(0,0.5);
```



# 16 Дискретное преобразование Фурье

## Реализация

```
1  // UsingMatlab.cpp : Defines the entry point for the console application.
2  //
3
4
5  #include "stdafx.h"
6  #include <conio.h>
7  #include <iostream>
8  #include "MatlabSin2SQRT.h"
9
10 #pragma comment(lib, "MatlabSin2SQRT.lib")
11
12 int _tmain(int argc, _TCHAR* argv[])
13 {
14     bool ret = MatlabSin2SQRTInitialize();
15     if (!ret)
16     {
17         std::cout << "Error initializing MATLAB C
18         system("PAUSE");
19         return 0;
20     }
21     mxArray *x_ptr;
22     mxArray *y_ptr = NULL;
23     x_ptr = mxCreateDoubleScalar(1);
24     mlxSin2SQRT(1, &x_ptr, 1, &y_ptr);
25     MatlabSin2SQRTTerminate();
26     mxDestroyArray(x_ptr);
27     mxDestroyArray(y_ptr);
28
29     std::cout << "Done" << std::endl;
30     getch();
31     return 0;
32 }
```

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