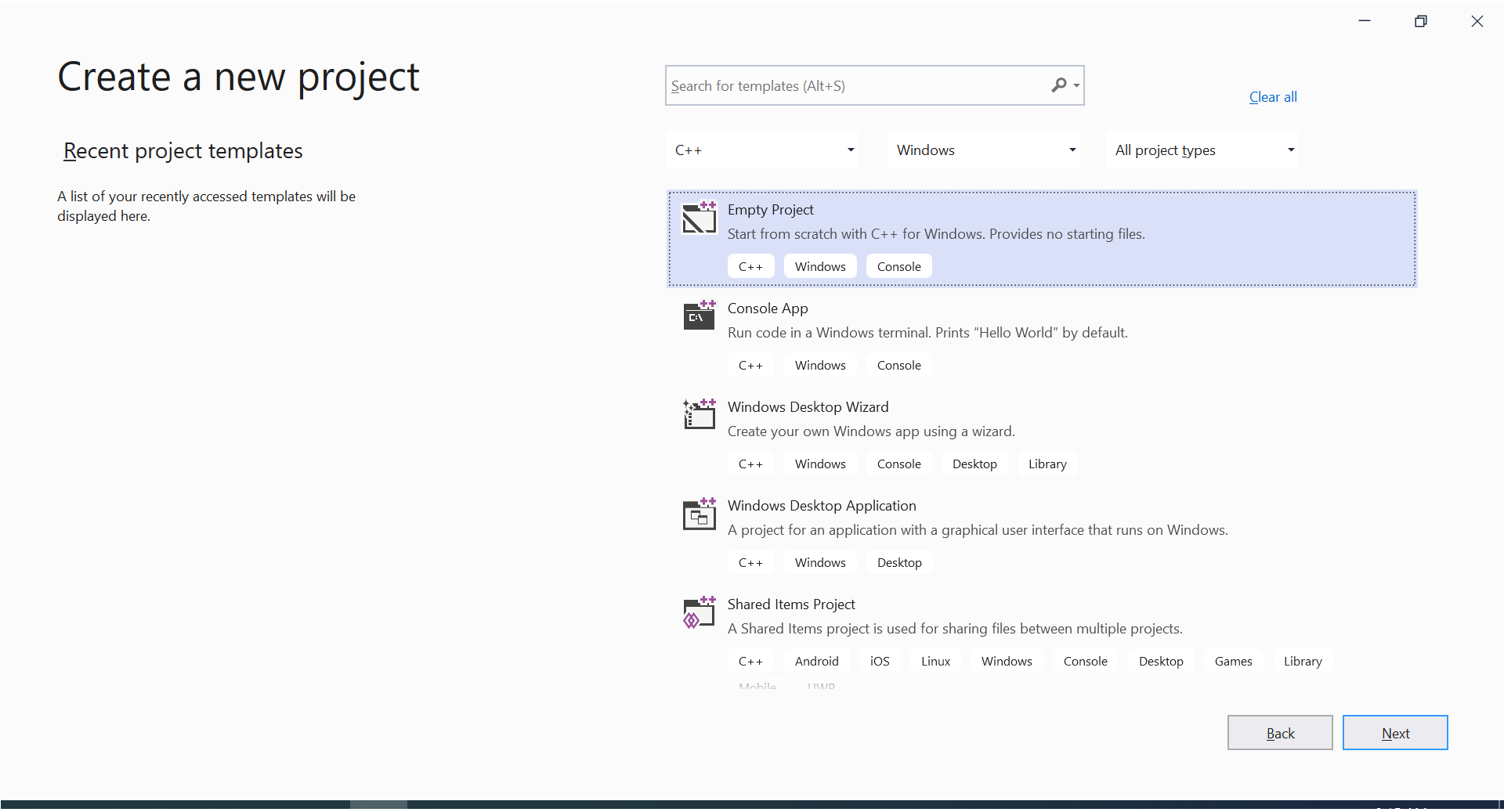
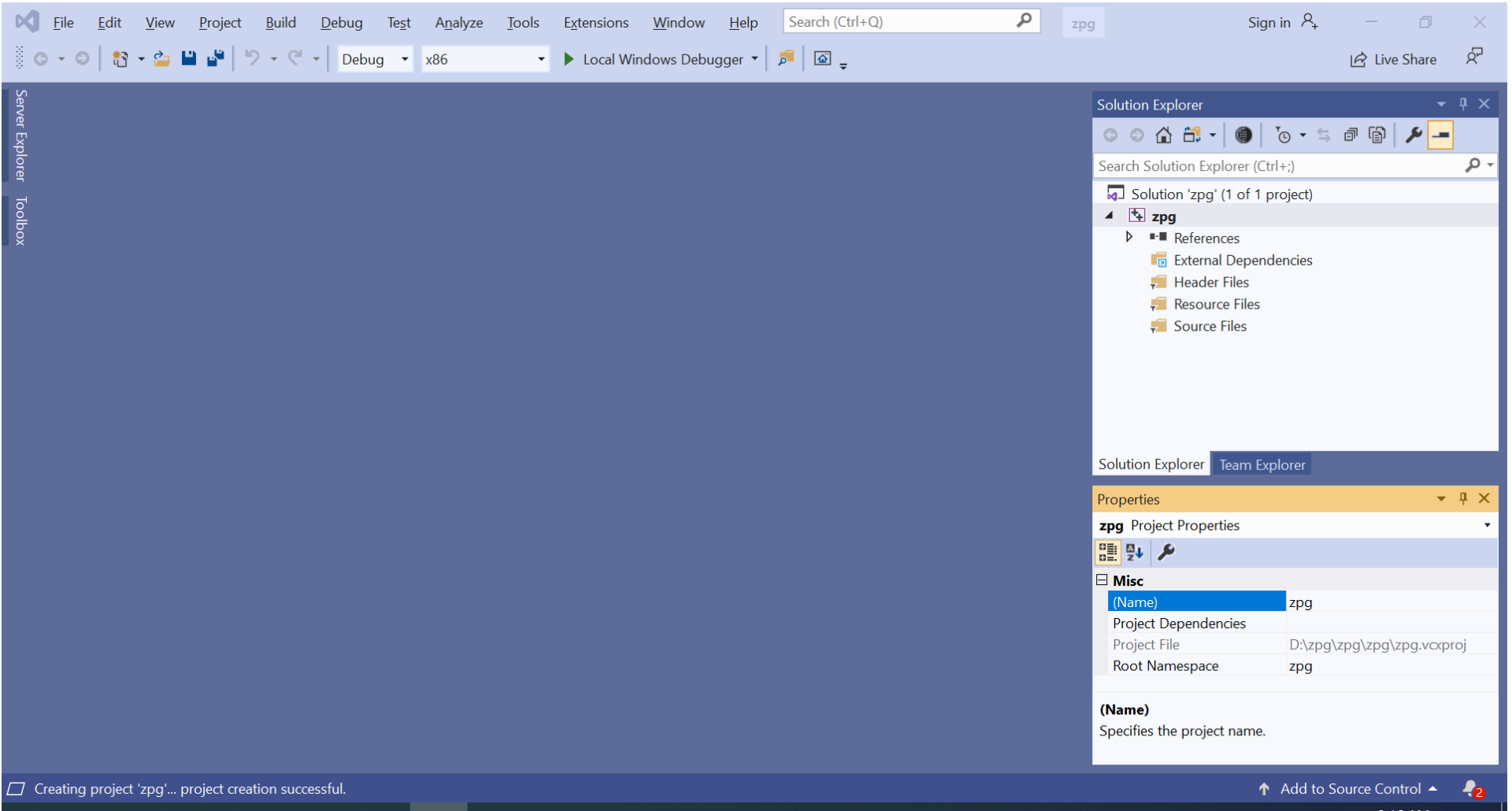
Základy počítačové grafiky

Martin Němec

Nový projekt

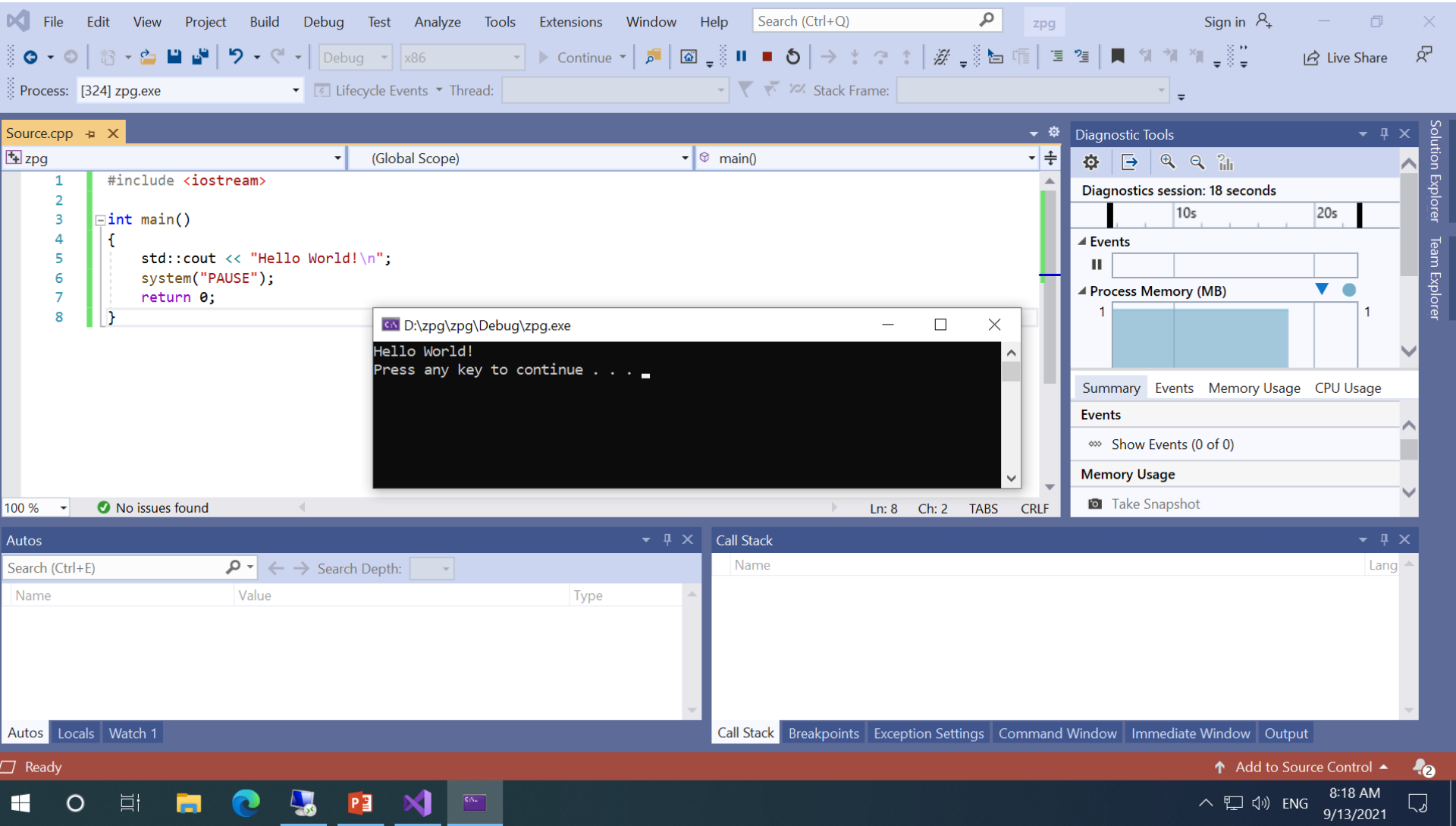


Nový projekt



Hello World

```
#include <iostream>

int main()
{
    std::cout << "Hello World!\n";
    system("PAUSE");
    return 0;
}
```

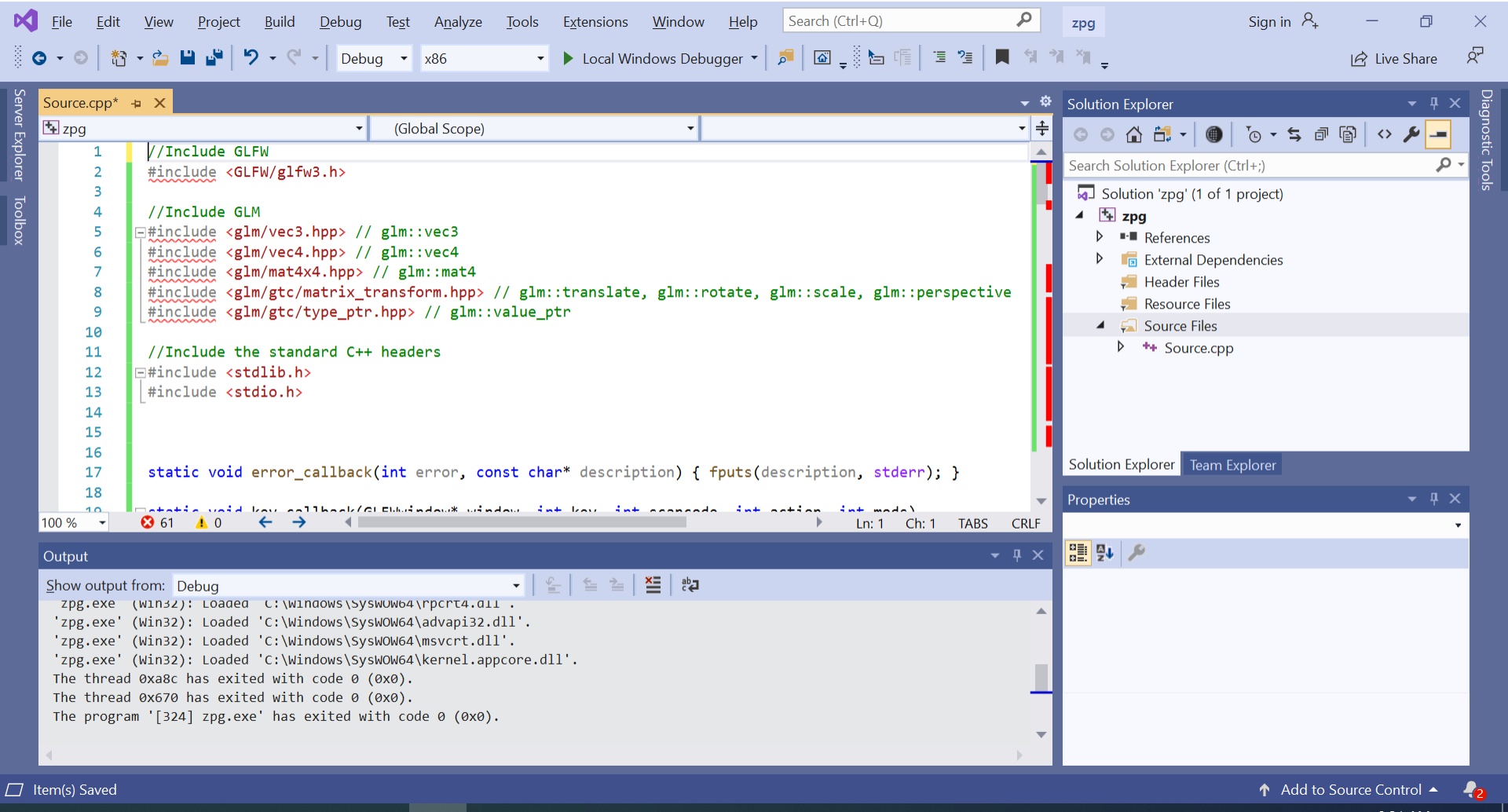

File Edit View Project Build Debug Test Analyze Tools Extensions Window Help
Search (Ctrl+Q)
zpg
Sign in
Debug
x86
Continue
Live Share
Process: [324] zpg.exe
Lifecycle Events
Thread:
Stack Frame:
Source.cpp
zpg
(Global Scope)
main()
#include <iostream>
int main()
{
std::cout << "Hello World!\n";
system("PAUSE");
return 0;
}
D:\zpg\zpg\Debug\zpg.exe
Hello World!
Press any key to continue . . .
100 %
No issues found
Ln: 8
Ch: 2
TABS
CRLF
Diagnostic Tools
Diagnostics session: 18 seconds
10s
20s
Events
Process Memory (MB)
Summary
Events
Memory Usage
CPU Usage
Events
Show Events (0 of 0)
Memory Usage
Take Snapshot
Solution Explorer
Team Explorer
Autos
Search (Ctrl+E)
Search Depth:
Name
Value
Type
Autos
Locals
Watch 1
Call Stack
Name
Lang
Call Stack
Breakpoints
Exception Settings
Command Window
Immediate Window
Output
Ready
Add to Source Control
ENG
8:18 AM
9/13/2021

OpenGL – main.cpp

https://blender.vsb.cz/download/zpg/main.cpp

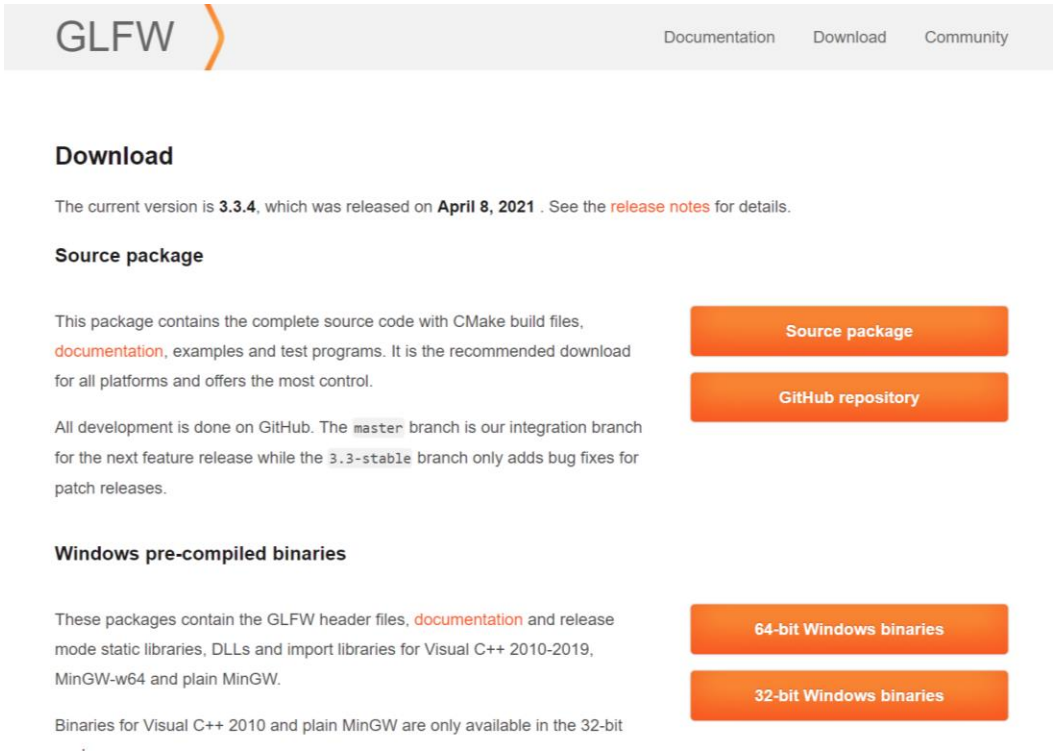
```
//Include GLFW
#include <GLFW/glfw3.h>

//Include GLM
#include <glm/vec3.hpp> // glm::vec3
#include <glm/vec4.hpp> // glm::vec4
#include <glm/mat4x4.hpp> // glm::mat4
#include <glm/gtc/matrix_transform.hpp> //
glm::translate, glm::rotate, glm::scale,
glm::perspective
#include <glm/gtc/type_ptr.hpp> // glm::value_ptr

//Include the standard C++ headers
#include <stdlib.h>
#include <stdio.h>
```

OpenGL – main.cpp



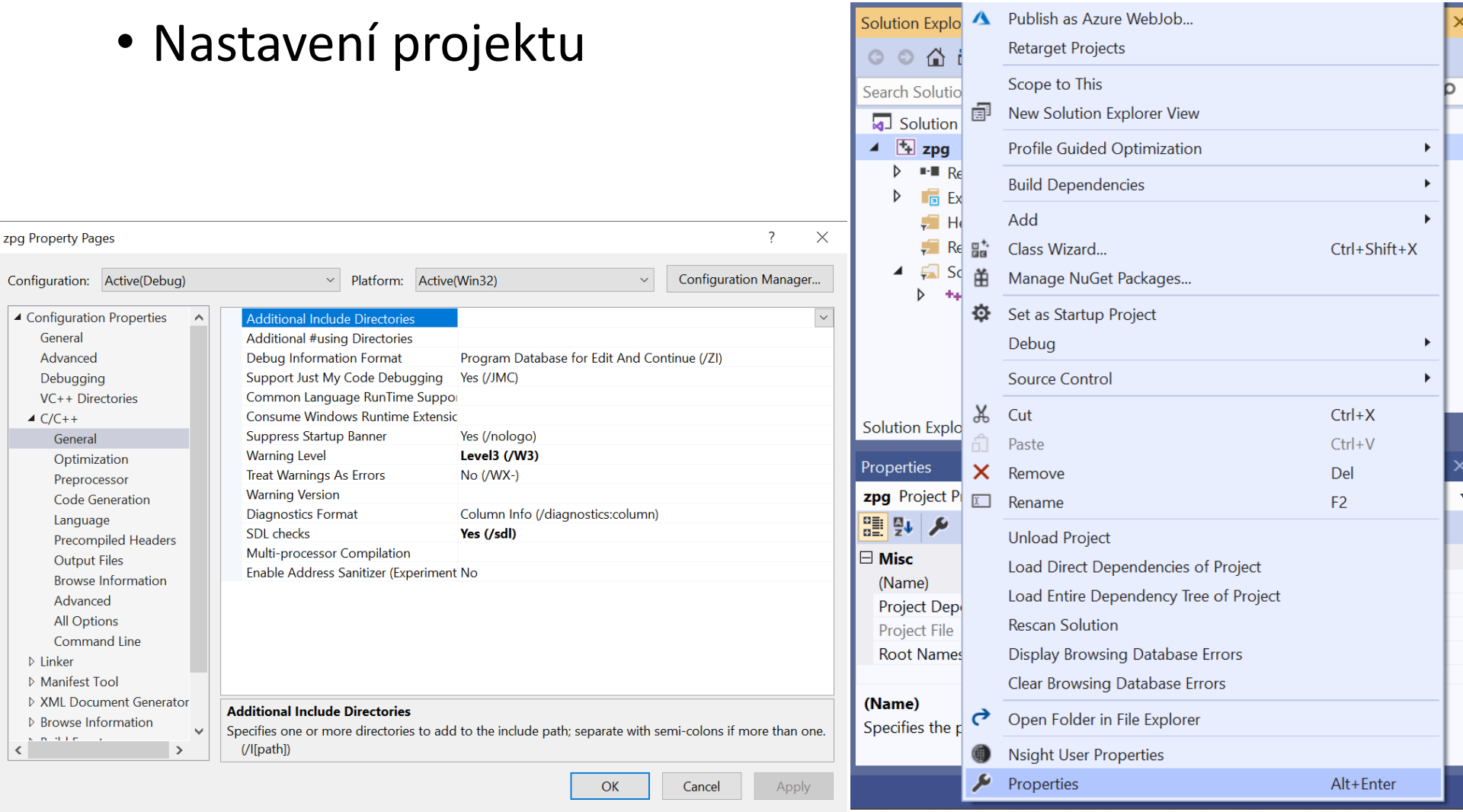
Budeme potřebovat knihovny

- https://www.glfw.org/download
- Source vs. binaries?
- Dodržet verze (32bit vs. 64bit)

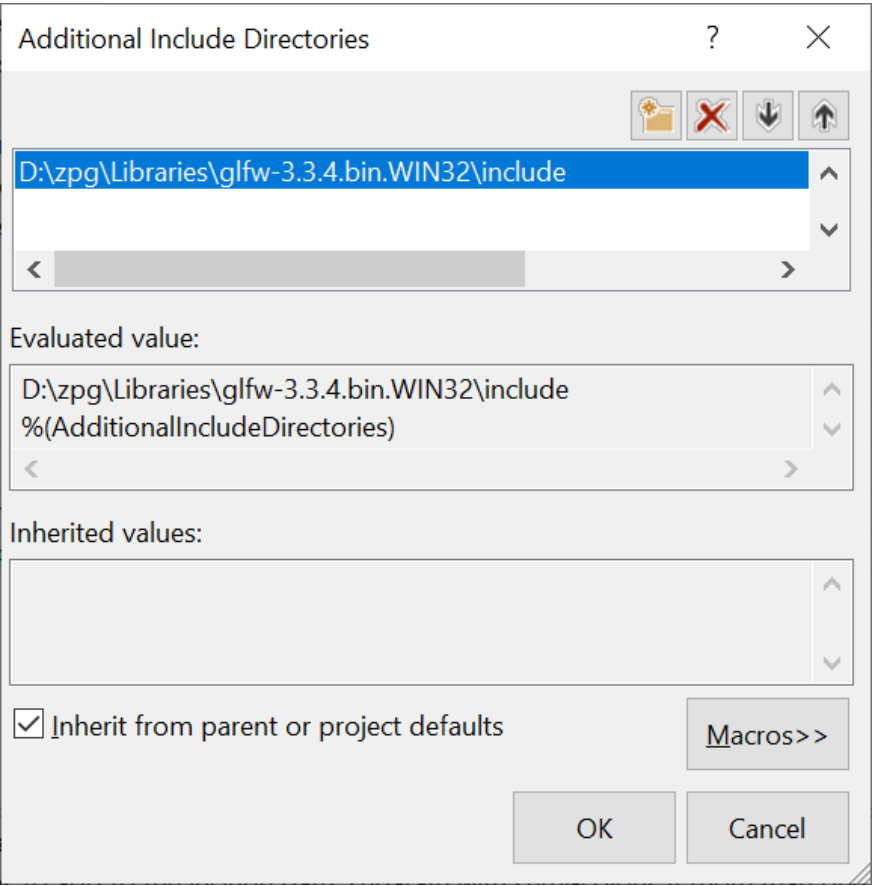


GLFW

- Nastavení projektu



Statická vs. dynamická část




```
1   //Include GLFW
2   #include <GLFW/glfw3.h>
3
4   //Include GLM
5   #include <glm/vec3.hpp> // glm::vec3
6   #include <glm/vec4.hpp> // glm::vec4
7   #include <glm/mat4x4.hpp> // glm::mat4
8   #include <glm/gtc/matrix_transform.hpp> // glm::tr
9   #include <glm/gtc/type_ptr.hpp> // glm::value_ptr
10
11  //Include the standard C++ headers
12  #include <stdlib.h>
13  #include <stdio.h>
```

```
1   //Include GLFW
2   #include <GLFW/glfw3.h>
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8   #include <glm/gtc/matrix_transform.hpp> // glm::tra
9   #include <glm/gtc/type_ptr.hpp> // glm::value_ptr
10
11  //Include the standard C++ headers
12  #include <stdlib.h>
13  #include <stdio.h>
14
```
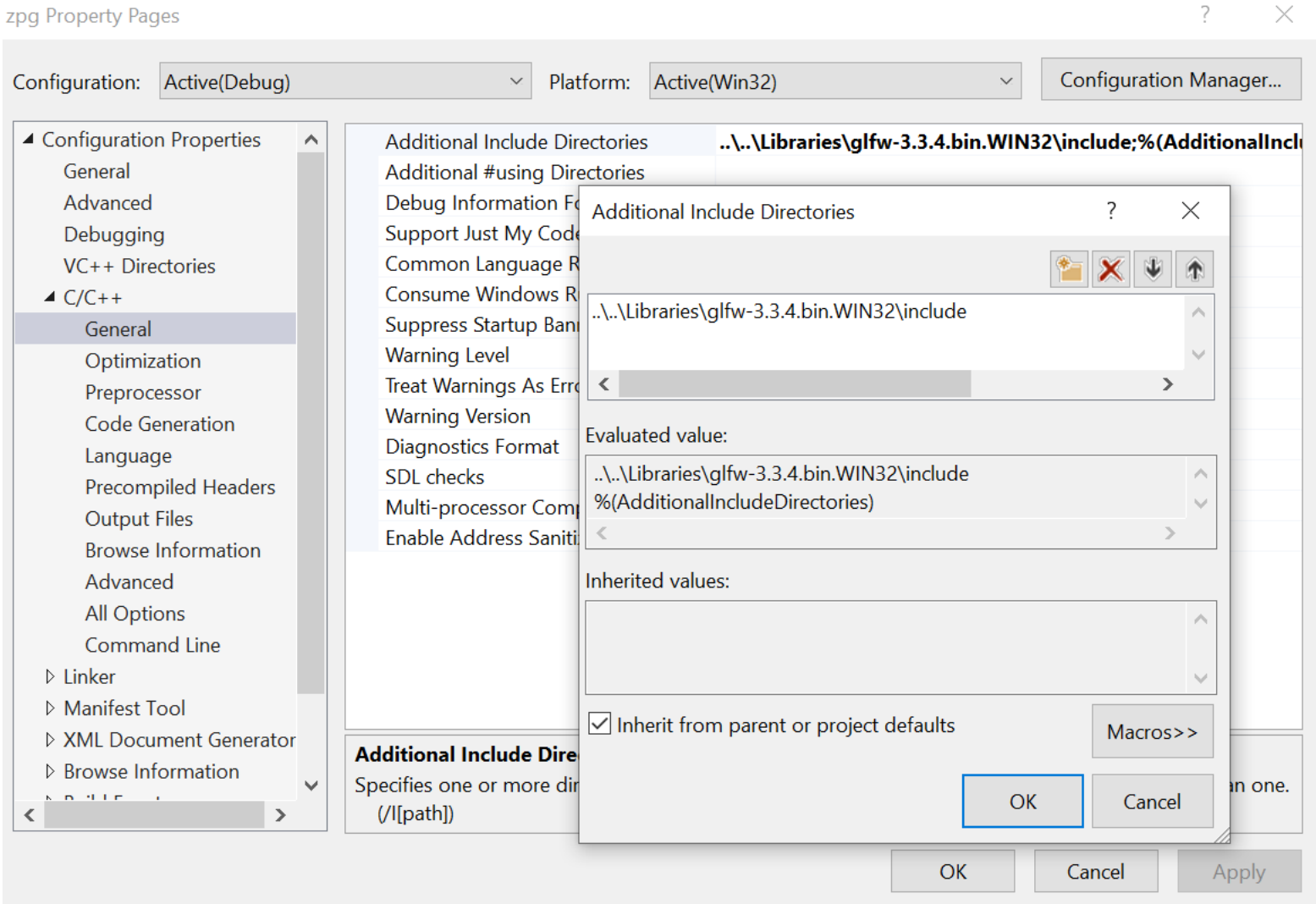
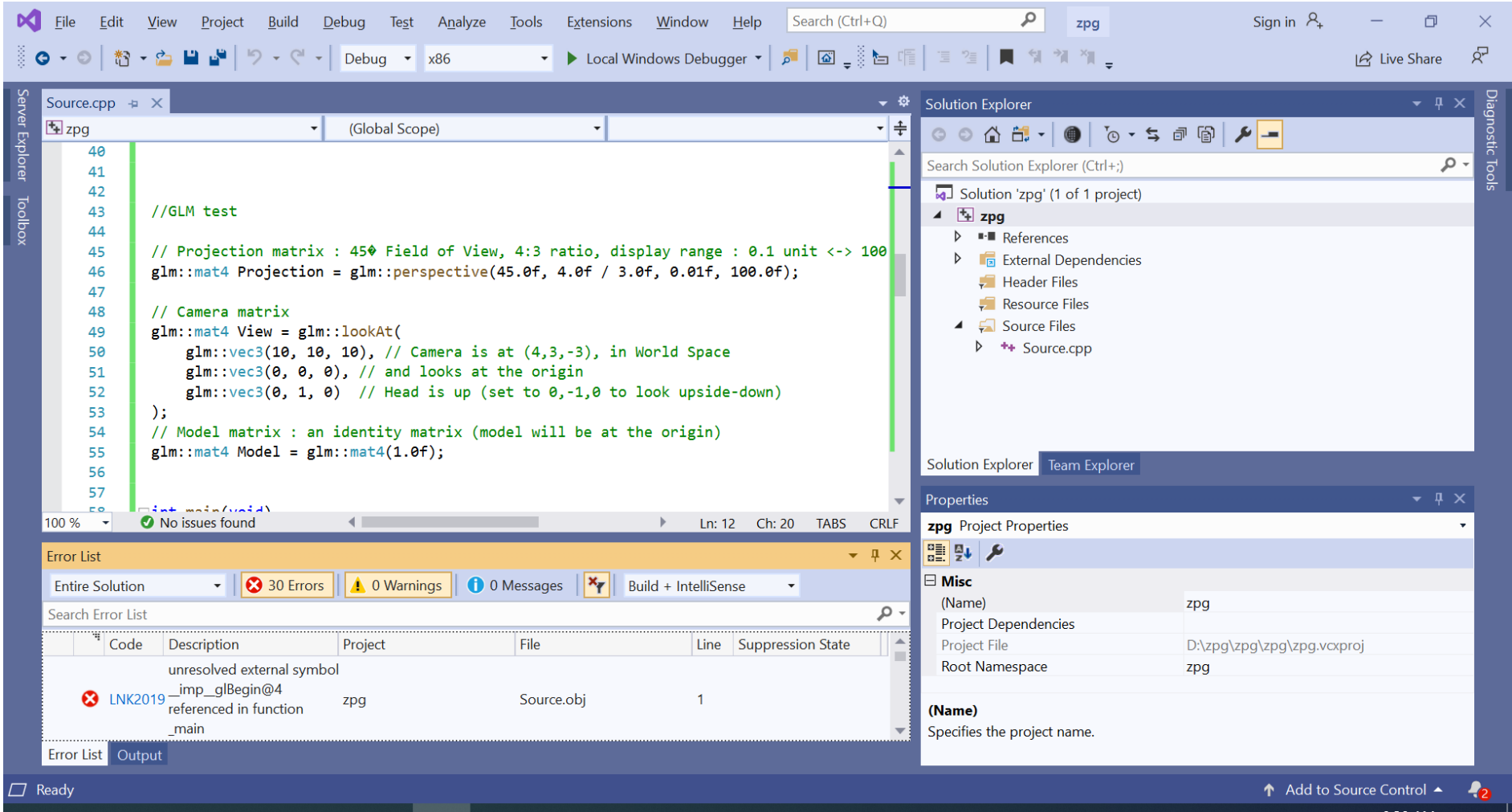
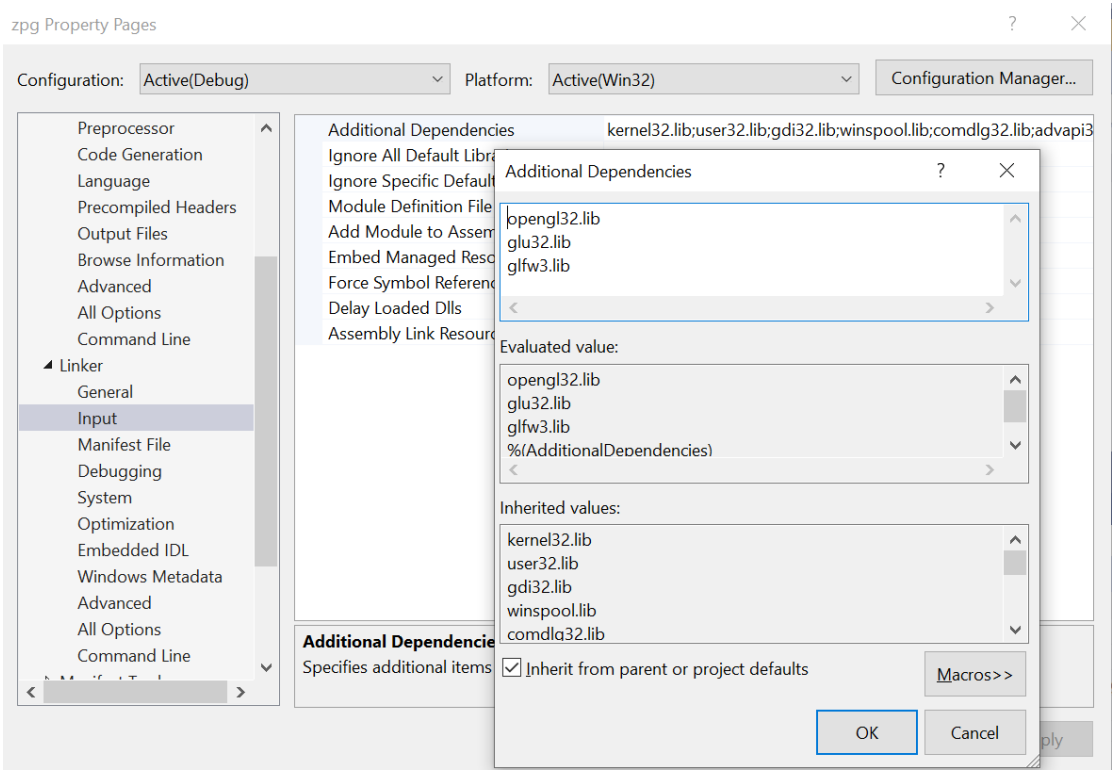

Relativní vs. absolutní cesta

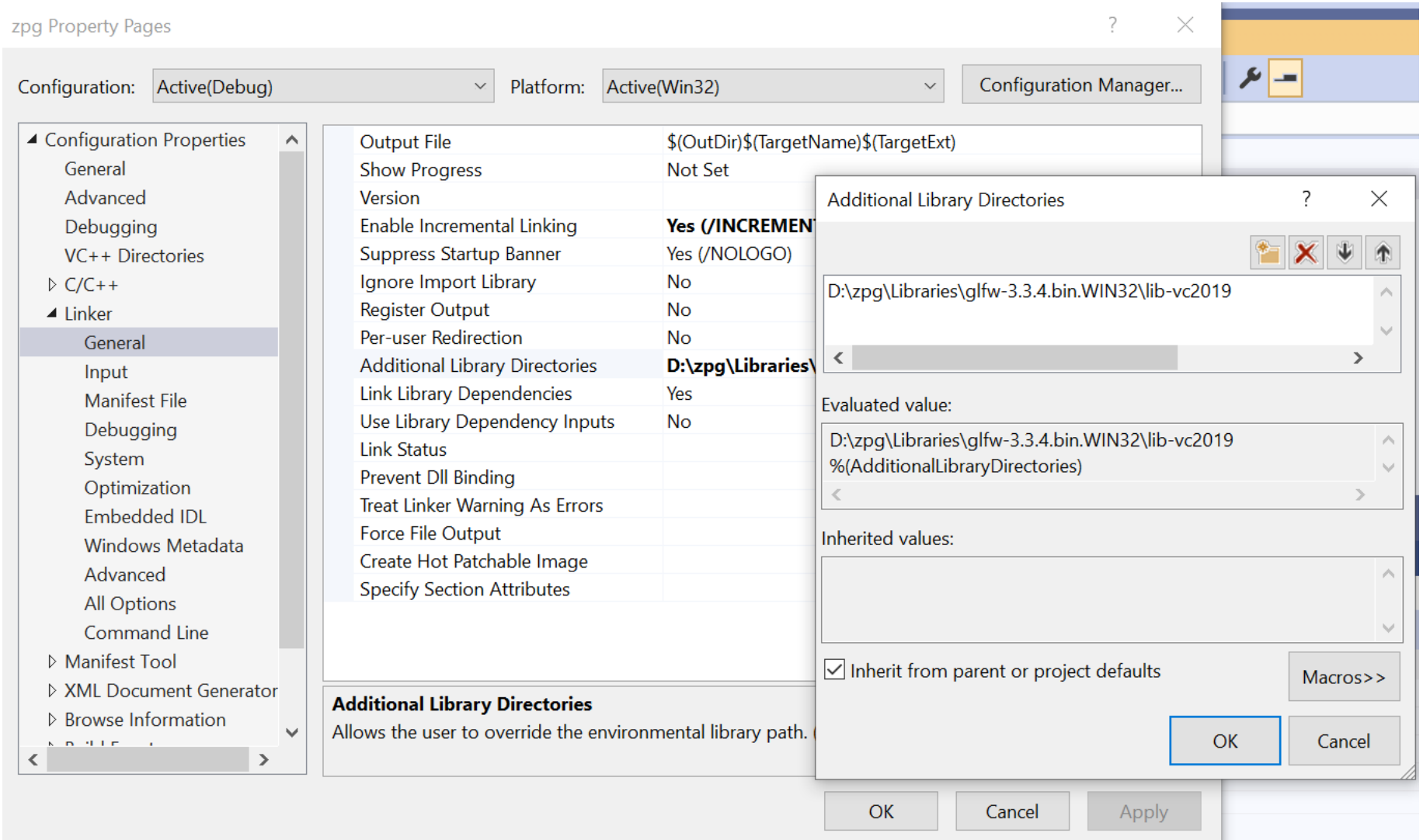


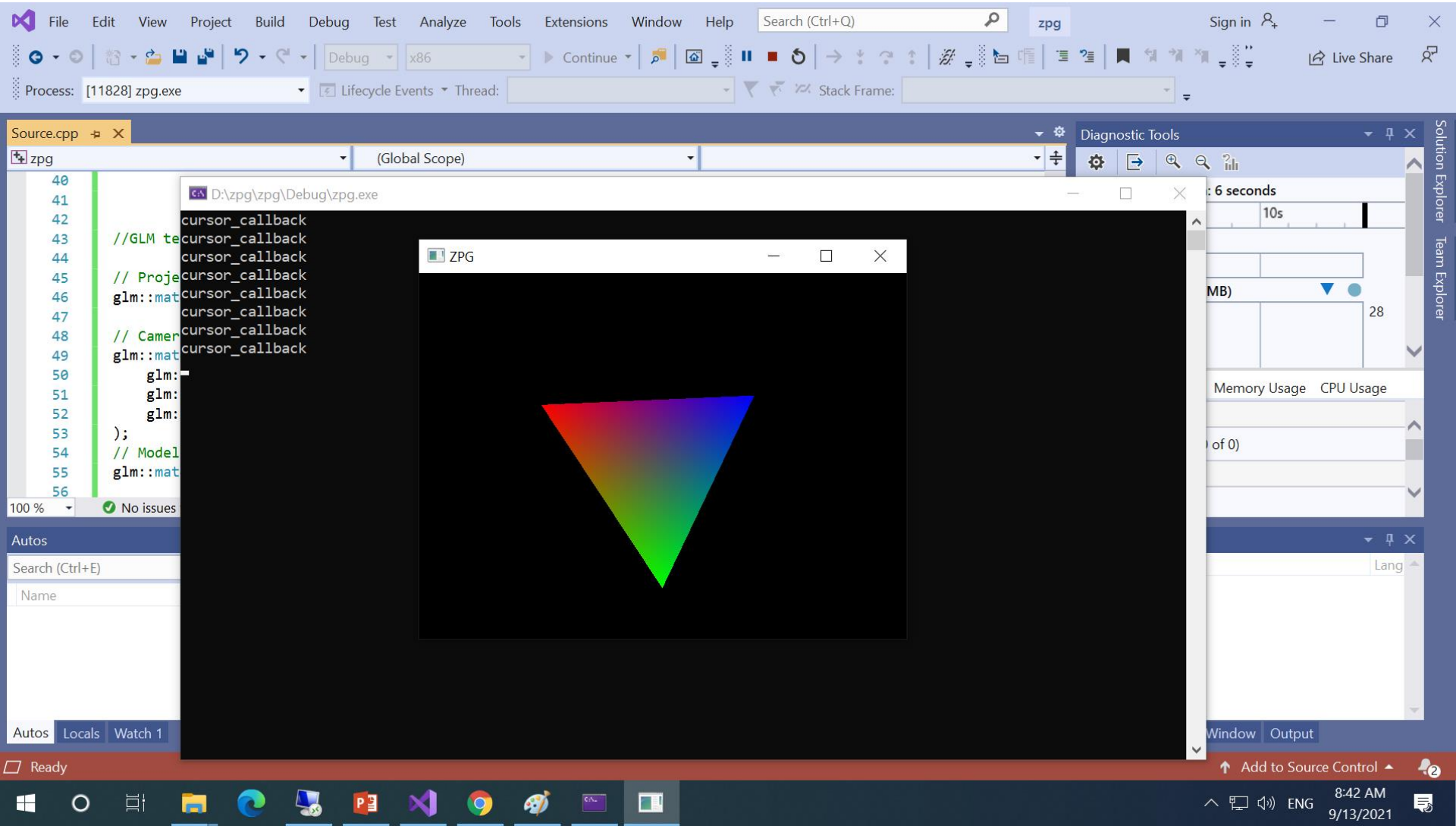
unresolved external symbol



- Ve Windows mají statické knihovny obvykle příponu .lib (static library) a dynamické knihovny mají příponu .dll (dynamic linked library).




zpg Property Pages
Configuration: Active(Debug)
Platform: Active(Win32)
Configuration Manager...
Configuration Properties
General
Advanced
Debugging
VC++ Directories
C/C++
Linker
General
Input
Manifest File
Debugging
System
Optimization
Embedded IDL
Windows Metadata
Advanced
All Options
Command Line
Manifest Tool
XML Document Generator
Browse Information
Output File $(OutDir)$(TargetName)$(TargetExt)
Show Progress Not Set
Version
Enable Incremental Linking Yes (/INCREMENT
Suppress Startup Banner Yes (/NOLOGO)
Ignore Import Library No
Register Output No
Per-user Redirection No
Additional Library Directories D:\zpg\Libraries\
Link Library Dependencies Yes
Use Library Dependency Inputs No
Link Status
Prevent Dll Binding
Treat Linker Warning As Errors
Force File Output
Create Hot Patchable Image
Specify Section Attributes
Additional Library Directories
Allows the user to override the environmental library path.
OK
Cancel
Apply
Additional Library Directories
D:\zpg\Libraries\glfw-3.3.4.bin.WIN32\lib-vc2019
Evaluated value:
D:\zpg\Libraries\glfw-3.3.4.bin.WIN32\lib-vc2019
%(AdditionalLibraryDirectories)
Inherited values:
Inherit from parent or project defaults
Macros>>
OK
Cancel


File Edit View Project Build Debug Test Analyze Tools Extensions Window Help
Search (Ctrl+Q)
zpg
Sign in
Debug
x86
Continue
Live Share
Process: [11828] zpg.exe
Lifecycle Events
Thread:
Stack Frame:
Source.cpp
zpg
(Global Scope)
40
41
42
43 //GLM te
44
45 // Proje
46 glm::mat
47
48 // Camer
49 glm::mat
50 glm:
51 glm:
52 glm:
53);
54 // Model
55 glm::mat
56
100 %
No issues
D:\zpg\zpg\Debug\zpg.exe
cursor_callback
cursor_callback
cursor_callback
cursor_callback
cursor_callback
cursor_callback
cursor_callback
cursor_callback
ZPG
Diagnostic Tools
: 6 seconds
10s
MB)
28
Memory Usage
CPU Usage
of 0)
Autos
Search (Ctrl+E)
Name
Lang
Autos
Locals
Watch 1
Window
Output
Ready
Add to Source Control
Solution Explorer
Team Explorer
ENG
8:42 AM
9/13/2021

Volitelné úkoly na cvičení

- Seznamte se s kódem, podívejte se na základní příkazy, najděte si je v dokumentaci.
- Vytvořte čtverec, kde poslední vrchol bude mít žlutou barvu.
- Přidejte možnost ovládání rotace (směr, rychlost atd.)