

# Beef up your Server Object Extensions with C++

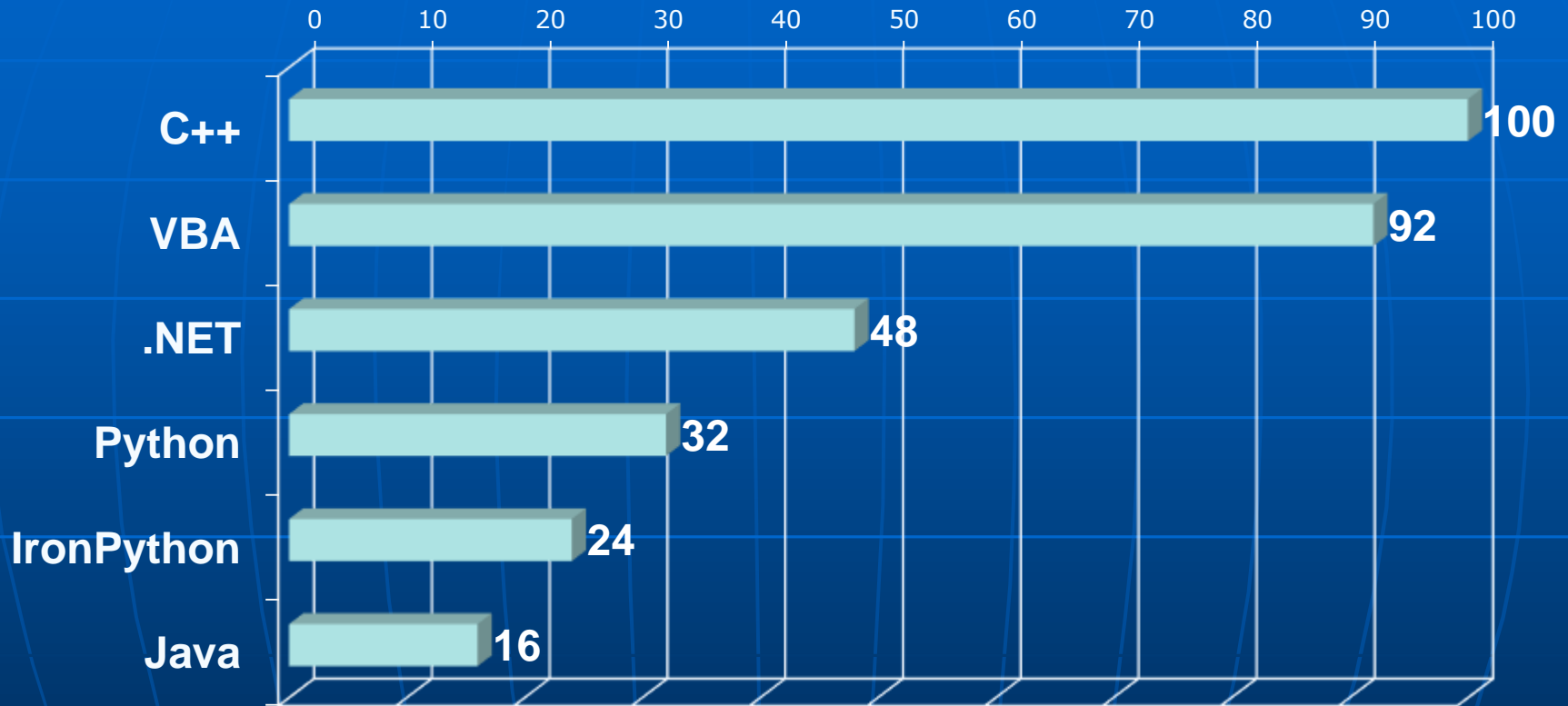
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# Server Object Extensions

- Allow more advanced custom GIS functionality in a map service
- Faster and more responsive than geoprocessing services
- Require developing with ArcObjects
- ArcObjects are COM objects
- Developing for COM has unique challenges

# COM Interop: relative speed

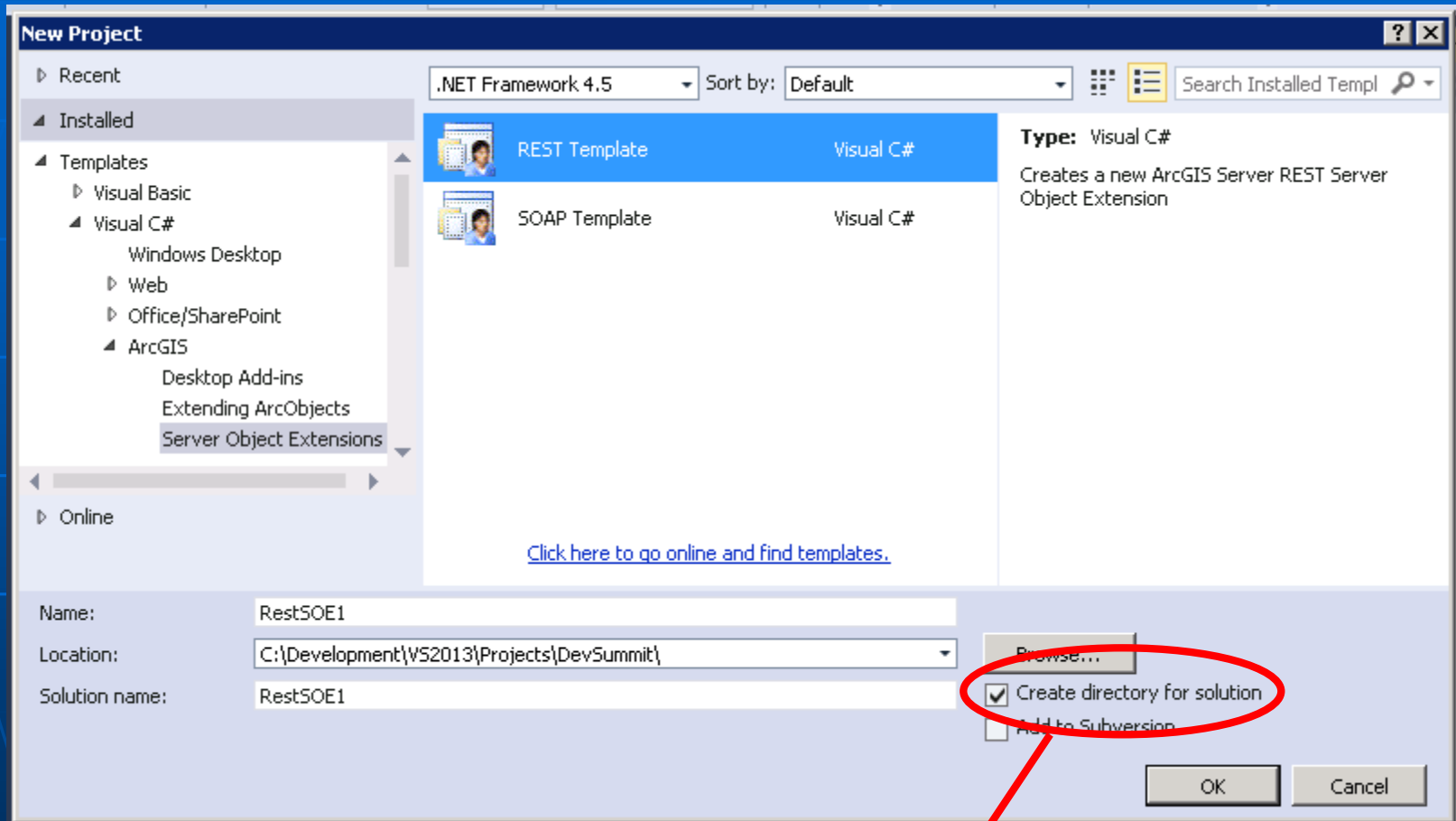


Benchmark = 500+K ShapeCopy operations

# Creating a Native DLL using ArcObjects

- Unlike Desktop, ArcObjects for Server are compiled for 64-bit
- No need to create a COM DLL!
- Instead, export C-style functions that can be accessed from .NET using Platform Invoke

# Creating the .NET SOE Project



☒ Create directory for solution

# Adding a C++ Project

The image shows a screenshot of the Visual Studio IDE. On the left, the 'Add' menu is open, showing options like 'Build Solution', 'Rebuild Solution', 'Clean Solution', 'Run Code Analysis on Solution', 'Batch Build...', 'Configuration Manager...', 'Manage NuGet Packages for Solution...', 'Enable NuGet Package Restore', 'New Solution Explorer View', 'Calculate Code Metrics', and 'Add'. The 'Add' option is highlighted in yellow. A red circle highlights the 'New Project...' option in the 'Add' menu. In the background, the 'Add New Project' dialog is open. The 'Installed' tab is selected, showing a list of project templates. The 'Win32 Project' template is selected. The 'Name' field is set to 'SOEHelperC'. The 'Application type' section shows 'DLL' selected. The 'Add common header files for:' section shows 'ATL' checked and 'MFC' unchecked.

**Add New Project**

Recent

Installed

- Visual Basic
- Visual C#
- Visual C++
- Visual F#
- SQL Server
- PowerShell
- JavaScript
- Python
- TypeScript
- Other Project Types

Online

Search Solution Explorer (Ctrl+;) (1 project)

Build Solution Ctrl+Shift+B

Rebuild Solution

Clean Solution

Run Code Analysis on Solution Alt+F11

Batch Build...

Configuration Manager...

Manage NuGet Packages for Solution...

Enable NuGet Package Restore

New Solution Explorer View

Calculate Code Metrics

Add

New Project...

Win32 Project

Win32 Console Application Visual C++

MFC Application Visual C++

Empty Project Visual C++

Makefile Project Visual C++

Click here to go online and find templates.

Name: SOEHelperC

Application type:

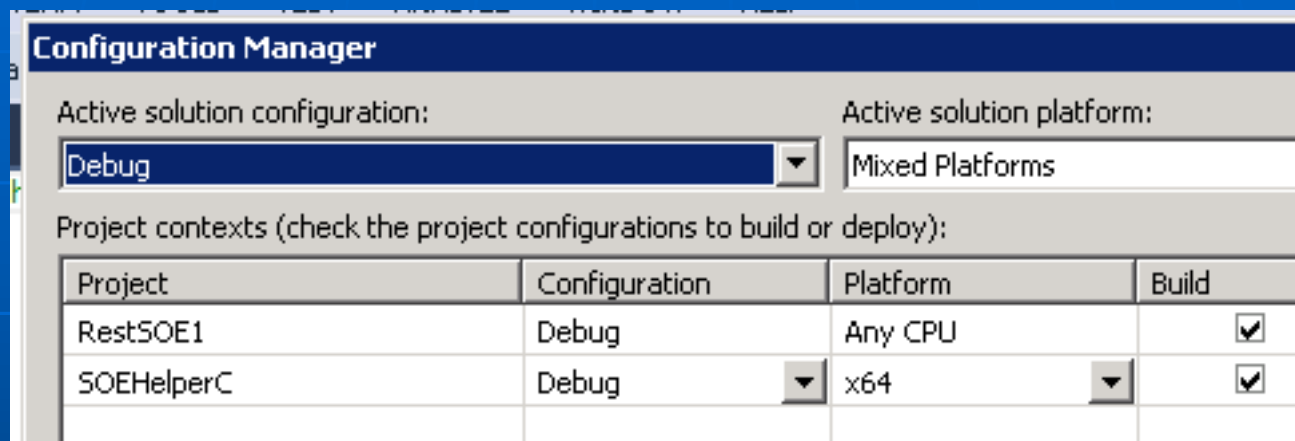
- ☐ Windows application
- ☐ Console application
- ☒ DLL

Add common header files for:

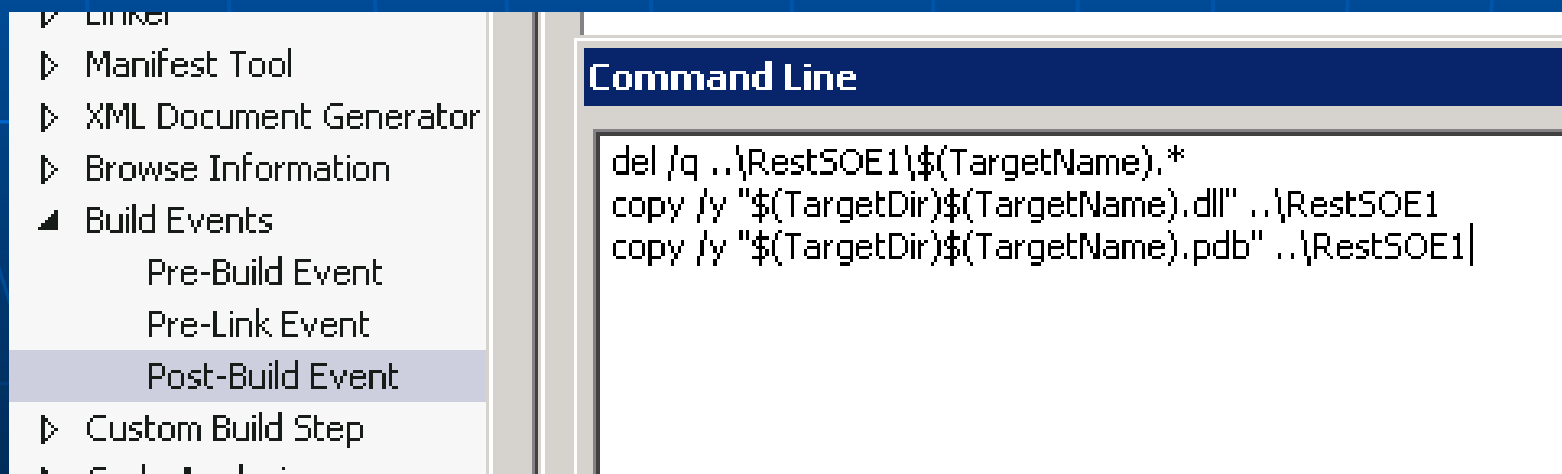
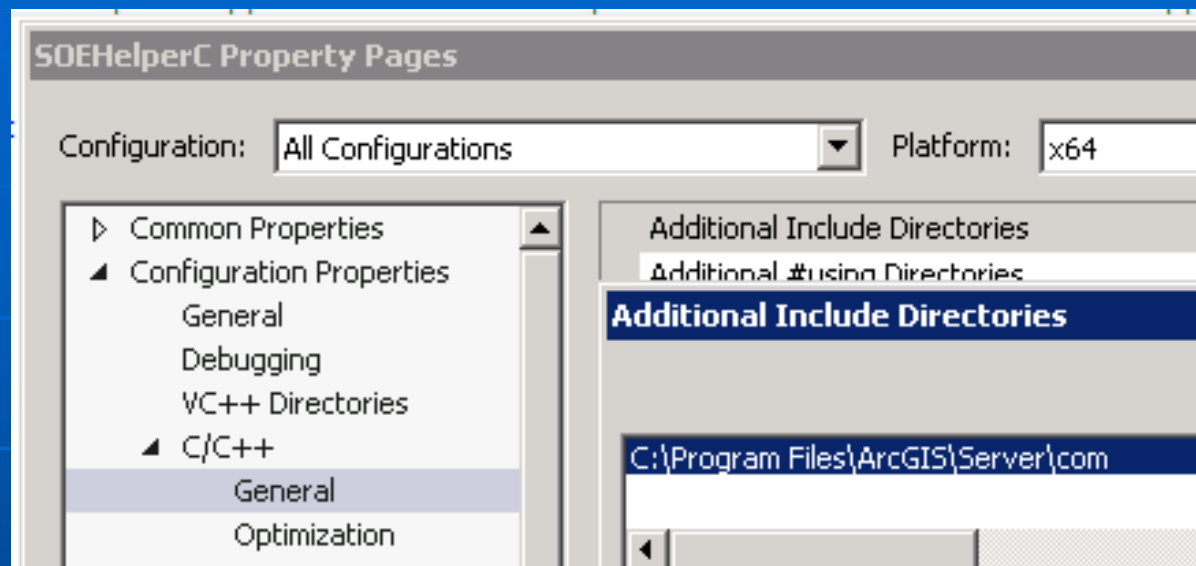
- ☒ ATL
- ☐ MFC

(ATL is optional)

# Configuring for 64-bit

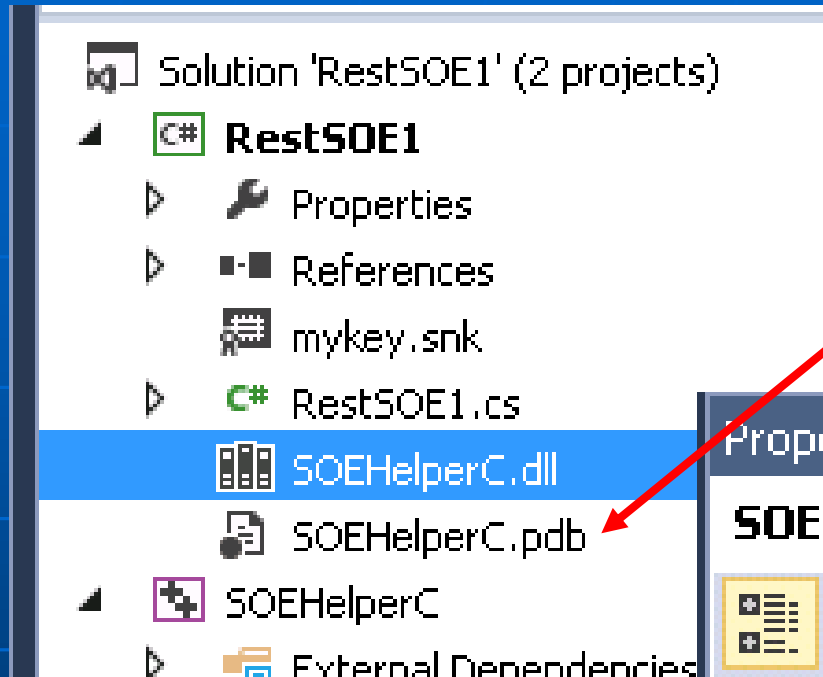


# Additional Project Properties

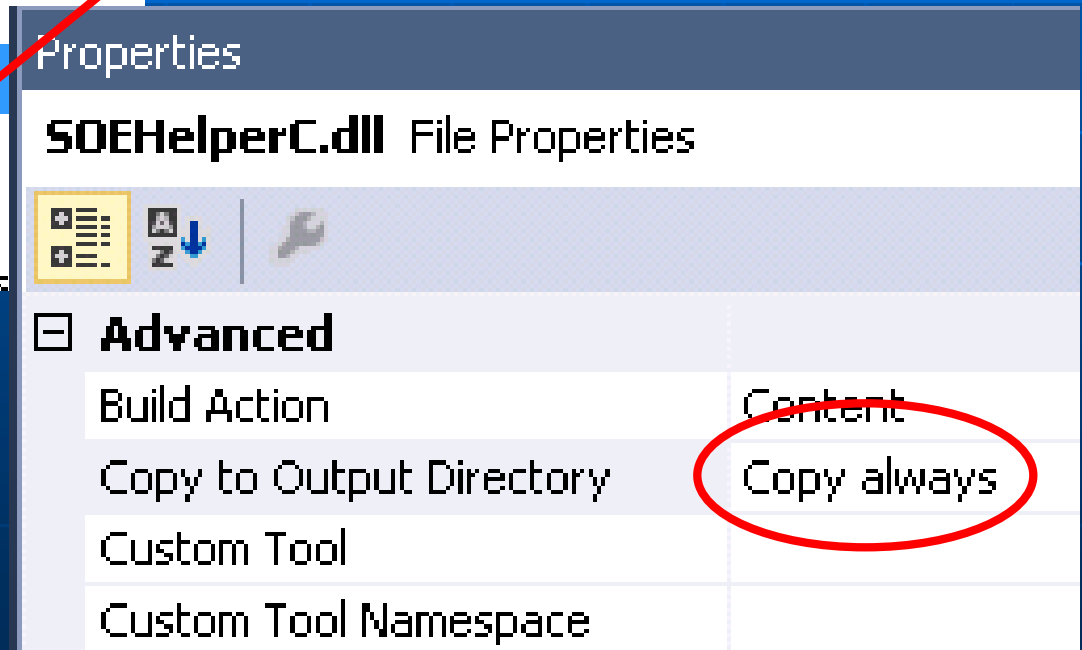




# Add Output to SOE



Include the PDB for debugging,  
but exclude it for the release



# Platform Invoke

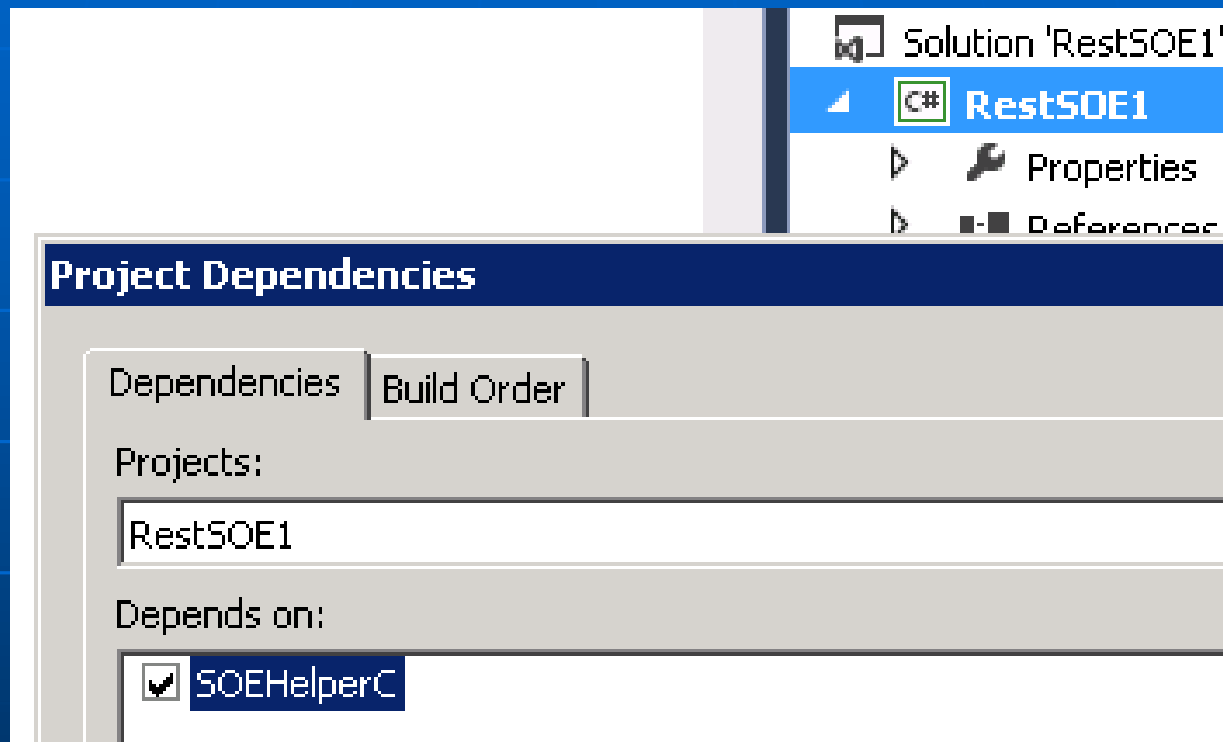
```
#region Helper DLL wrappers
[DllImport("SOEHelperC", CallingConvention = CallingConvention.Cdecl)]
private static extern bool InitializeHelper(IServerObject ServerObject);

[DllImport("SOEHelperC", CallingConvention = CallingConvention.Cdecl)]
private static extern IJSONObject FindNetworkFeature(IPoint InPoint, double Distance, esriFe

[DllImport("SOEHelperC", CallingConvention = CallingConvention.Cdecl)]
private static extern IJSONObject ProtectiveTrace(int FlagEID, esriElementType FlagType);

[DllImport("SOEHelperC", CallingConvention = CallingConvention.Cdecl)]
private static extern void ShutdownHelper();
#endregion
```

# Project Dependencies

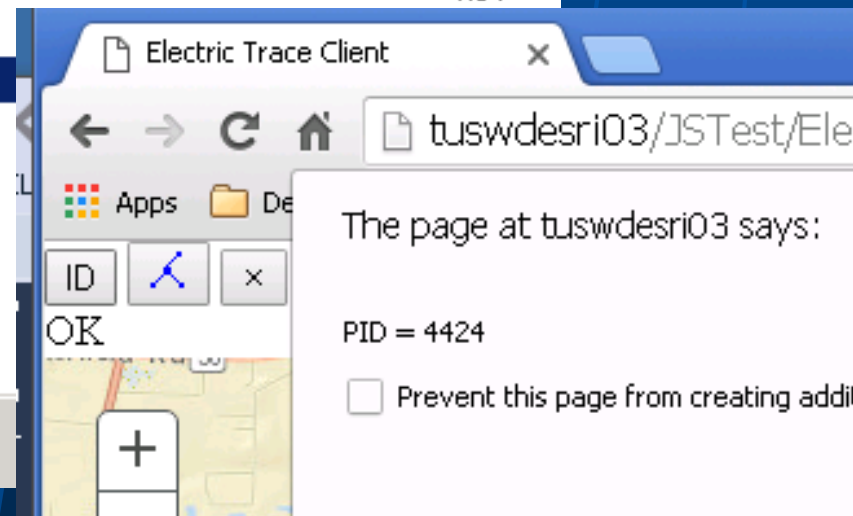
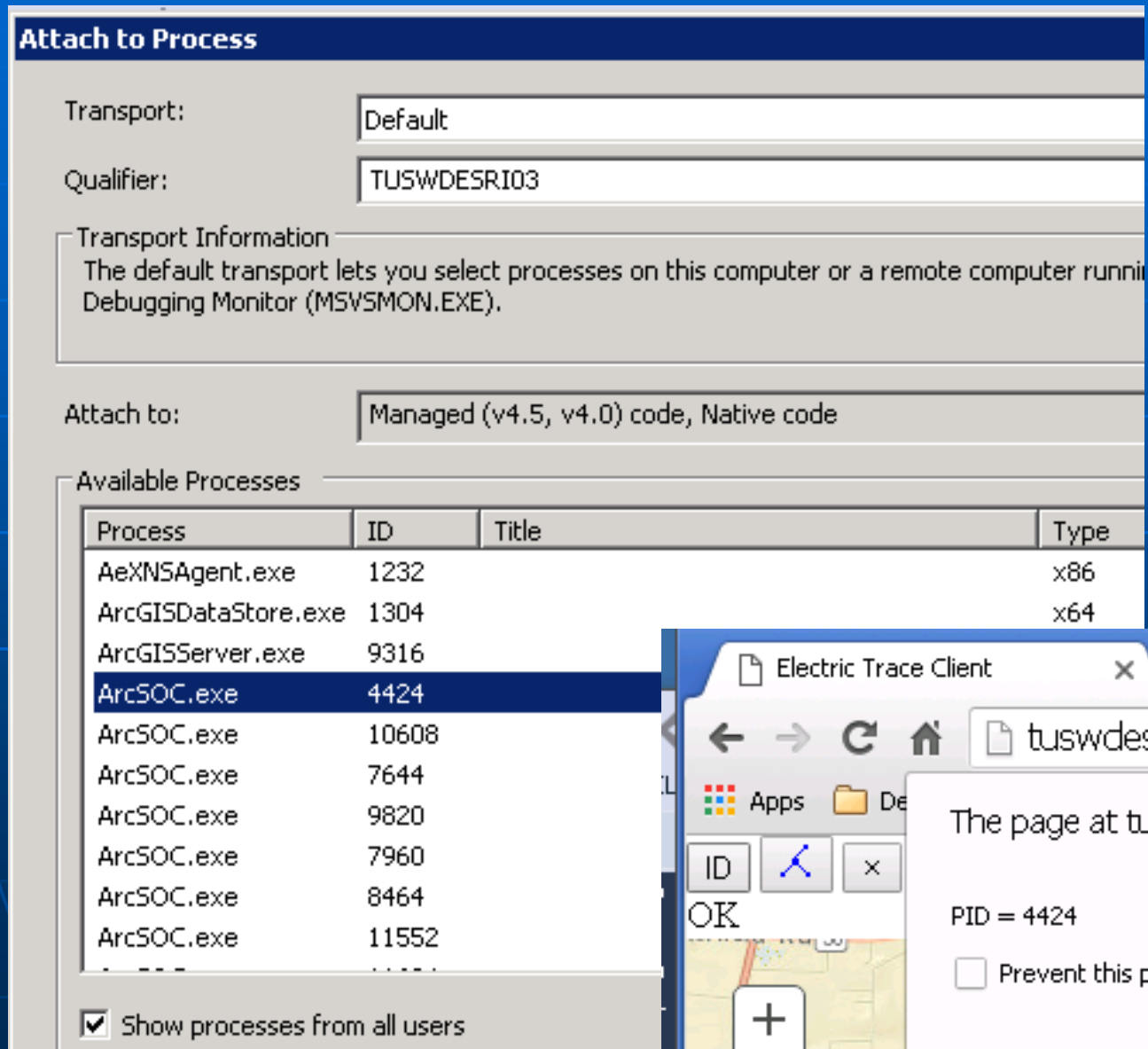


Setting the project dependency maintains proper build order

# Debugging Tips

- Limit test service to one instance
- Add an operation to the SOE to display the process ID
- Attach to the ArcSOC process with both Managed and Native options
- Be aware that stopping the debug session will kill the ArcSOC process
- Using tasklist /m can be helpful

# Attaching to a Process



# Lesson Learned

- If an operation returns existing features, don't use ArcObjects to package them into JSON!
- Instead, return **ObjectIDs**, and have the client app use the map service itself to obtain features!

# Download:

- This presentation and sample code may be downloaded at:

<http://www.pierssen.com/arccgis10/server.htm>

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