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Cristian Adam, 19 Aug 2008 Zlib 147.3K 6.1K 83 Rate:

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This tool will spy on COM registration process and create side by side (SxS) manifest file(s)

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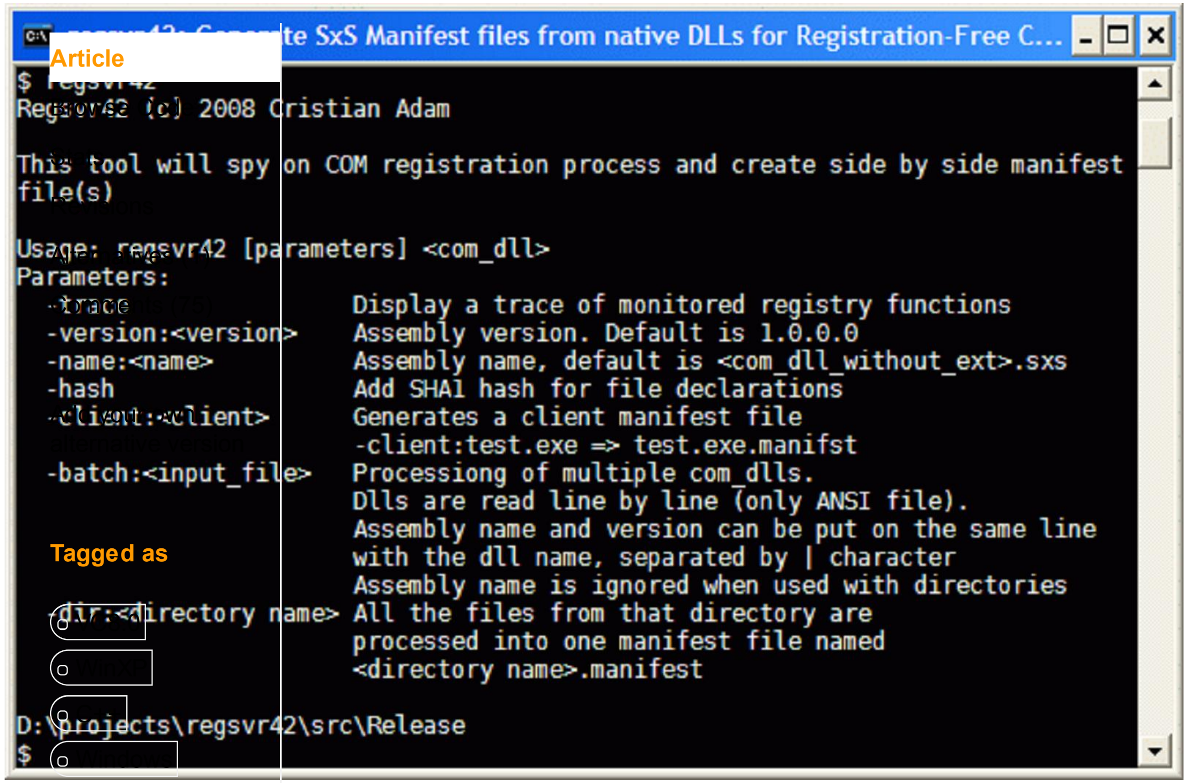

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```
$ regsvr42
Regsvr42 (c) 2008 Cristian Adam

This tool will spy on COM registration process and create side by side manifest
file(s)

Usage: regsvr42 [parameters] <com_dll>
Parameters:
  -trace                  Display a trace of monitored registry functions
  -version:<version>      Assembly version. Default is 1.0.0.0
  -name:<name>            Assembly name, default is <com_dll_without_ext>.sxs
  -hash                   Add SHA1 hash for file declarations
  -client:<client>        Generates a client manifest file
                          -client:test.exe => test.exe.manifst
  -batch:<input_file>     Processiong of multiple com_dlls.
                          Dlls are read line by line (only ANSI file).
                          Assembly name and version can be put on the same line
                          with the dll name, separated by | character
                          Assembly name is ignored when used with directories
  -dir:<directory name>   All the files from that directory are
                          processed into one manifest file named
                          <directory name>.manifest

D:\projects\regsvr42\src\Release
$
```

Introduction

Windows XP introduced a new COM activation model called Registration-Free COM activation. The Registration-Free COM activation is a registry replacement for COM components. The registry information will reside in a DotManifest file that can be stored in the same folder as the application itself.

This means that you don't have to have information into registry, information which is normally stored into *HKEY_LOCAL_MACHINE*, thus enabling regular user accounts to use COM DLLs without registering them into the system.

The problem with these DotManifest files is that they are pretty hard to write by hand. For managed assemblies there is GenMan32 - A tool to generate Sxs manifest for managed assembly for Registration Free COM/.NET Interop, but there is no tool for native DLLs, this is why I've decided to write such a tool.

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Background

The following MSDN article will give the proper background information: Registration-Free Activation of COM Components: A Walkthrough by Steve White and Leslie Muller. Also of great help is the MSDN Side-by-side Assemblies Reference.

A DotManifest file is a XML file — you probably have heard about these in conjunction with Common Controls version 6, or with Windows Vista elevation privileges and not to mention the (in)famous `Microsoft.VC[8|9]0.CRT.manifest` and `Microsoft.VC[8|9]0.MFC.manifest` files. These days every application has embedded a DotManifest file inside by the Manifest Tool as a resource type 24 (RT_MANIFEST). A typical DotManifest file looks like:

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```
<?xml version='1.0' encoding='UTF-8' standalone='yes'?>
<assembly xmlns='urn:schemas-microsoft-com:asm.v1' manifestVersion='1.0'>
  <trustInfo xmlns="urn:schemas-microsoft-com:asm.v3">
    <security>
      <requestedPrivileges>
        <requestedExecutionLevel level='asInvoker' uiAccess='false' />
      </requestedPrivileges>
    </security>

  </trustInfo>
  <dependency>
    <dependentAssembly>
      <assemblyIdentity type='win32' name='Microsoft.VC90.CRT' version='9.0.21022.8'
          processorArchitecture='x86' publicKeyToken='1fc8b3b9a1e18e3b' />
    </dependentAssembly>
  </dependency>
  <dependency>
    <dependentAssembly>
      <assemblyIdentity type='win32' name='Microsoft.VC90.MFC' version='9.0.21022.8'
          processorArchitecture='x86' publicKeyToken='1fc8b3b9a1e18e3b' />

    </dependentAssembly>
  </dependency>
  <dependency>
    <dependentAssembly>
      <assemblyIdentity type='win32' name='Microsoft.Windows.Common-Controls'
          version='6.0.0.0' processorArchitecture='x86' publicKeyToken='6595b64144ccf1df'
          language="'*'" />
    </dependentAssembly>
  </dependency>
```

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```
</assembly>
```

The Spying

In order to get the the information about the COM registration process I had to "intercept" the following registry access functions:

- RegCreateKeyA
- RegCreateKeyW
- RegCreateKeyExA
- RegCreateKeyExW
- RegSetValueA
- RegSetValueW
- RegSetValueExA
- RegSetValueExW
- RegOpenKeyA
- RegOpenKeyW
- RegOpenKeyExA
- RegOpenKeyExW
- RegCloseKey

The interception was done by using the class CAPIHook presented in *Chapter 22: DLL Injection and API Hooking* of the book **Windows via C/C++, Fifth Edition** written *by Jeffrey Richter and Christophe Nasarre*, Microsoft Press (c) 2008. One can use the Detours library from Microsoft Research instead of CAPIHook. I've decided for the latter because of simpler deployment (just the executable, no signature DLL).

Setting up a CAPIHook is being done like this

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```
std::auto_ptr<CAPIHook> Interceptor::m_RegCreateKeyA;

...

    if (!m_RegCreateKeyA.get())
    {
        m_RegCreateKeyA.reset(new CAPIHook("Advapi32.dll", "RegCreateKeyA",
            (PROC)RegCreateKeyA));
    }
```

The upper code will redirect RegCreateKeyA through Interceptor::RegCreateKeyA, the original function can

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be reached through m_RegCreateKeyA. Interceptor::RegCreateKeyA, like this:

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```
LONG WINAPI Interceptor::RegCreateKeyA(HKEY hKey, LPCSTR lpSubKey, PHKEY phkResult)
{
    if (m_doTrace)
    {
        PrintKeyStats(hKey, lpSubKey, __FUNCTIONW__);
    }

    // just to have it initialized
    LONG result = ERROR_ARENA_TRASHED;
    try
    {
        result = ((PFNREGCREATEKEYA)(PROC)*m_RegCreateKeyA)(hKey, lpSubKey, phkResult);
    }
    catch (...)
    {
    }

    if (result == ERROR_SUCCESS)
    {
        InsertSubkeyIntoUserKeyMap(hKey, *phkResult, lpSubKey, __FUNCTIONW__);
    }

    return result;
}
```

After all the information was acquired then the information is processed and written into DotManifest files. The manifest files are encoded as UTF-8. I would like to point fprintf's ccs=<encoding> parameter which was used to save the manifest files as UTF-8.

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```
void ManifestWriter::WriteToFile(const std::wstring& outputManifestFile)
{
    FILE* file = _wfopen(outputManifestFile.c_str(), L"w, ccs=utf-8");
    if (file)
    {
        fwrite(&m_data.str().begin(), 1, m_data.str().size() * 2, file);
        fclose(file);
    }
}
```

In order to get all the information possible, first DllUnregisterServer function is called, then DllRegisterServer and at the end again DllUnregisterServer. If you use **regsvr42** on a system where

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you already have the COM DLL registered and still want to use it normally don't forget to run **regsvr32** for that CO

Tool Usage

The basic usage is:

regsvr42 com.dll

which will generate a file named *com.sxs.manifest*. You can find out what interfaces and coclasses the COM DLL exports.

When used with a client application the usage is:

regsvr42 -client:client.exe com.dll

which will generate besides *com.sxs.manifest* another manifest file named *client.exe.manifest*. If *client.exe* already has a manifest file embedded, the contents of that manifest file are preserved into *client.exe.manifest* alongside with the reference to *com.sxs* assembly.

If you have more than one COM DLLs you want to use can use the tool in batch mode like:

regsvr42 -client:client.exe -batch:file_containing_com_dll_file_names

You can put all the COM DLLs inside one directory and there will be just one manifest file inside the directory named *directory_name.manifest*

regsvr42 -client:client.exe -dir:directory_with_com_dlls

If you have more than one directories with COM DLLs you can use the *-batch* function with all the names of the directories written in the batch file.

regsvr42 -client:client.exe -batch:file_containing_directory_names

DirectShow Filters

DirectShow filters are COM DLLs. They come in three flavours: source filters, transform filters and render filters.

The source filters add extra information into registry to support DirectShow's intelligent connect, this extra information cannot be stored into a DotManifest file. If your application relays on Intelligent Connect for a source

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filter, it will not work correctly.

There is one solution for this problem. For example instead of using `IGraphBuilder::RenderFile` one should:

- Add the source filter in to the DirectShow graph
- Acquire the `IFileSourceFilter` interface and call the `Load` method
- Acquire the output pin of the source filter and call `IPin::Render`

Test Application

I have made a test application which uses a source filter as described above. The test application will try to play an aacPlus radio station by the use of Orban/Coding Technologies AAC/aacPlus Player Plugin

To test the application you need to have the Orban Plugin installed and the just run *playradio.exe*.

To test the Registration-Free COM mechanism first you have to unregister the Orban Plugin like:

regsvr32 /u "%ProgramFiles%\Orban\AAC-aacPlus Plugin\aacpParser.dll"

After that check to see that *playradio.exe* displays *Class not registered. ErrorCode: 0x80040154*.

Then run *make_manifest.cmd*, a convenience batch file, which does the DotManifest creation like *regsvr42 -client:playradio.exe "%ProgramFiles%\Orban\AAC-aacPlus Plugin\aacpParser.dll"*. Two DotManifest files will be created:

aacpParser.sxs.manifest

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```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<assembly xmlns="urn:schemas-microsoft-com:asm.v1" manifestVersion="1.0">

<assemblyIdentity
    type="win32"
    name="aacpParser.sxs"
    version="1.0.0.0" />

<file name="C:\\Program Files\\Orban\\AAC-aacPlus Plugin\\aacpParser.dll">

    <comClass
        description="ORBAN-CT AAC/aacPlus Stream Parser"
        clsid="{301F7BDA-B1F8-4453-82B2-0B9187DF3F3F}"
        threadingModel="Both" />
```

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```
              description="ORBAN-CT AAC/aacPlus Stream Parser About Page"
              clsid="{CA920EED-F427-41B8-838F-33FCF47D5306}"
              threadingModel="Both" />
</file>
</assembly>
```

playradio.exe.manifest

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```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<assembly xmlns="urn:schemas-microsoft-com:asm.v1" manifestVersion="1.0">
  <trustInfo xmlns="urn:schemas-microsoft-com:asm.v3">
    <security>
      <requestedPrivileges>
        <requestedExecutionLevel level="asInvoker" uiAccess="false">
        </requestedExecutionLevel>

      </requestedPrivileges>
    </security>
  </trustInfo>
  <dependency>
        <dependentAssembly>
            <assemblyIdentity
                type="win32"
                name="aacpParser.sxs"
                version="1.0.0.0" />
        </dependentAssembly>
  </dependency>
</assembly>
```

File Hash

By using the command *-hash* the *file* sections will contain a SHA1 hash. To compute the hash I have used CodeProject's CSHA1 by Dominik Reichl. I have verified the validity of the hash by using OpenSSL like this *openssl dgst -sha1 <com.dll>*.

The problem is that the Manifest Tool *mt.exe* doesn't think that the hash is valid! The command used was *mt -manifest aacpParser.sxs.manifest -validate_file_hashes*

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The solution to this problem is to use the Manifest Tool to update the file hash, which renders the *-hash* function use [illegible] *manifest aacpParser.sxs.manifest -hashupdate* If anybody knows how to adapt the `CSHA1` to produce valid Manifest Tool SHA1 hashes please let me know.

Debugging

In case you encounter the following MessageBox:

This application has failed to start because the application configuration is incorrect. Reinstalling the application may fix this problem.

The *Event Viewer - System* category contains information about the loading errors of side by side assemblies.

History

2008-08-17 Initial release.

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