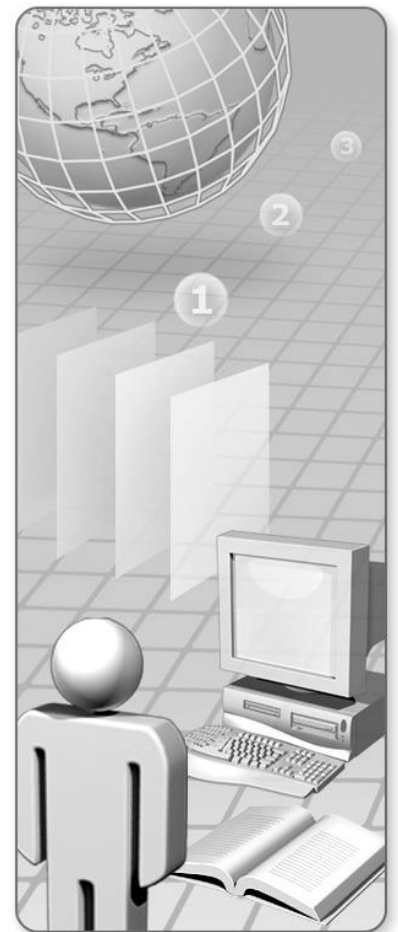


Troubleshooting Exceptions



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Troubleshooting Exceptions

Objectives

After completing this lab, you will be able to:

- Recognize a managed exception.
- Use SOS, Adplus, and WinDbg to troubleshoot and resolve managed exception issues.

Estimated time to complete this lab: 90 minutes

Note: This lab focuses on the concepts in this module and as a result might not comply with Microsoft® security recommendations.

Exercise 1: Exception Issues

In this exercise, you will use WinDbg and SOS to attach to a live process to determine the root cause (as well as a possible resolution) of the problem. In addition, you will learn how to raise information about an inner exception to the user so that the application developer and tech support personnel will have better initial information.

Note that you may wish to pair-up with a co-worker on these exercises. Sometimes you can solve a problem faster when you work in small groups.

Scenario

Once this application is in production, you start getting reports of error messages. You are unable to reproduce the problem in a development environment, but can reproduce it on a lab computer. Now you will attempt to debug the problem.

Task Description

1. Start FotoVision.exe and send an album or picture to a friend.
 - A. Start FotoVision.exe.
 - B. On the toolbar, click the **Email** button.
 - C. *What error message do you see?*
Error type: _____
 - D. Click **OK** to close the dialog box.
2. Reproduce the problem and attach WinDbg:
 - A. In FotoVision, click the **Email** button on the toolbar. Once the dialog box appears in FotoVision, do not click OK.
 - B. With FotoVision.exe open, attach WinDbg and load SOS.
3. Start your investigation by determining what threads are present and which one you should pay attention to.
 - A. To start, get the native stack of the current thread.

```
0:008> k
ChildEBP RetAddr
0520fc24 776ed279 ntdll!DbgBreakPoint
0520fc54 777f1194 ntdll!DbgUiRemoteBreakin+0x3c
0520fc60 776ab3f5 KERNEL32!BaseThreadInitThunk+0xe
0520fca0 776ab3c8 ntdll!__RtlUserThreadStart+0x70
0520fcb8 00000000 ntdll!_RtlUserThreadStart+0x1b
```

What is the purpose of this thread?

- B. Run the SOS command that lists the managed threads (**!threads**). Because the exception occurred in an application you know is written in managed code, there's a fair chance that it was thrown on a managed thread, so this is a good place to start troubleshooting.

```
0:008>!threads
ThreadCount:      3
UnstartedThread:  0
BackgroundThread: 1
PendingThread:    0
DeadThread:       0
Hosted Runtime:   no
```

	ID	OSID	ThreadOBJ	State	GC Mode	GC Alloc	Context	Domain	Lock Count	Apt
Exception	0	1	5e8 009f68b0	26020	Preemptive	0259B820:00000000	009be518	0	0	STA
FotoVisionDesktop.InternalFotoException 02583560										
	2	2	467c 009c5268	2b220	Preemptive	00000000:00000000	009be518	0	0	MTA
(Finalizer)										
	7	3	2d94 07310678	202b020	Preemptive	0248E268:00000000	009be518	0	0	MTA

Note: Thread 0 is showing a FotoVisionDesktop.InternalFotoException. This is the last thrown exception on this thread, which indicates that this might be the thread we are looking for.

- C. There are only two managed threads. OK, let's look at their stacks. By running the “**~*e!clrstack**” command, we can see that only thread 0 has a managed stack and that the stack has an exception. Look at thread 0's stack to see where the exception was thrown:

```
0:008>~*E !clrstack
OS Thread Id: 0x5e8 (0)
Child SP      IP Call Site
0078dfa0 750abfbc [InlinedCallFrame: 0078dfa0]
System.Windows.Forms.UnsafeNativeMethods.WaitMessage()
0078df9c 7a594cb8 *** WARNING: Unable to verify checksum for
C:\WINDOWS\assembly\NativeImages_v4.0.30319_32\System.Windows.Forms\70c6bf4a51d18b
4a9a1805cd48d1caad\System.Windows.Forms.ni.dll
System.Windows.Forms.Application+ComponentManager.System.Windows.Forms.UnsafeNativ
eMethods.IMsoComponentManager.FPushMessageLoop(IntPtr, Int32, Int32)
0078e028 7a594749
System.Windows.Forms.Application+ThreadContext.RunMessageLoopInner(Int32,
System.Windows.Forms.ApplicationContext)
0078e078 7a5945c2
System.Windows.Forms.Application+ThreadContext.RunMessageLoop(Int32,
System.Windows.Forms.ApplicationContext)
0078e0a4 7ab04be3
System.Windows.Forms.Application.RunDialog(System.Windows.Forms.Form)
0078e0b8 7ab286e4
System.Windows.Forms.Form.ShowDialog(System.Windows.Forms.IWin32Window)
0078e0bc 7ab283b7 [InlinedCallFrame: 0078e0bc]
0078e158 7ab283b7 System.Windows.Forms.Form.ShowDialog()
0078e15c 04ecc3df *** WARNING: Unable to verify checksum for
C:\LabFiles\FotoVision\4.0\C#\Desktop\Bin\FotoVision.exe
```

```

FotoVisionDesktop.Global.DisplayError(System.String, System.Exception)
[C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\Global.cs @ 192]
0078e17c 04ecc30e FotoVisionDesktop.MainForm.menuEmailChanges_Click(System.Object,
System.EventArgs) [C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\MainForm.cs @
2200]
0078e2ac 04ecc1ab FotoVisionDesktop.MainForm.toolBar_ButtonClick(System.Object,
System.Windows.Forms.ToolBarButtonClickEventArgs)
[C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\MainForm.cs @ 1268]
0078e2f4 7ad00a5d
System.Windows.Forms.ToolBar.OnButtonClick(System.Windows.Forms.ToolBarButtonClick
EventArgs)
0078e2fc 7ad021a1
System.Windows.Forms.ToolBar.WmReflectCommand(System.Windows.Forms.Message ByRef)
0078e314 7ad00dec
System.Windows.Forms.ToolBar.WndProc(System.Windows.Forms.Message ByRef)
0078e3e0 7a585fa1
System.Windows.Forms.Control+ControlNativeWindow.OnMessage(System.Windows.Forms.Me
ssage ByRef)
0078e3e8 7a585f89
System.Windows.Forms.Control+ControlNativeWindow.WndProc(System.Windows.Forms.Mess
age ByRef)
0078e3fc 7a585ed0 System.Windows.Forms.NativeWindow.Callback(IntPtr, Int32,
IntPtr, IntPtr)
0078e6cc 008ca08e [InlinedCallFrame: 0078e6cc]...
...

```

4. Investigate the exception to see if it occurred on the main thread of the process:
 - A. Currently, you are concentrating your efforts on thread 0, the main thread in the application. Make it the active thread (~0s).
 - B. Let's look at the objects on the stack—the exception may still be there. Run the **!dso** command:

```

0:000> !dso
OS Thread Id: 0x5e8 (0)
ESP/REG  Object  Name
esi      0259b7fc System.Collections.Hashtable+HashtableEnumerator
0078DFB8 0258ebec System.Windows.Forms.NativeMethods+MSG[]
0078DFBC 023b7b2c System.Windows.Forms.Application+ThreadContext
0078DFC0 023b7b2c System.Windows.Forms.Application+ThreadContext
0078DFC4 023b7b2c System.Windows.Forms.Application+ThreadContext
0078DFC8 024c1390 System.Windows.Forms.Application+ComponentManager
0078E00C 0258370c FotoVisionDesktop.ErrorForm
0078E030 0258370c FotoVisionDesktop.ErrorForm
0078E034 0258370c FotoVisionDesktop.ErrorForm
0078E038 023b66e4 FotoVisionDesktop.MainForm
0078E03C 023b7b2c System.Windows.Forms.Application+ThreadContext
0078E064 023b7b2c System.Windows.Forms.Application+ThreadContext
0078E074 0258d61c System.Windows.Forms.Application+ModalApplicationContext
0078E090 0258d61c System.Windows.Forms.Application+ModalApplicationContext
0078E094 023b7b2c System.Windows.Forms.Application+ThreadContext
0078E0A0 0258d61c System.Windows.Forms.Application+ModalApplicationContext
0078E0A4 02581c8c System.Windows.Forms.ToolBarButtonClickEventArgs
0078E0DC 0258370c FotoVisionDesktop.ErrorForm
0078E110 0258370c FotoVisionDesktop.ErrorForm
0078E118 0258370c FotoVisionDesktop.ErrorForm

```

```
0078E140 0258370c FotoVisionDesktop.ErrorForm
0078E144 02581c8c System.Windows.Forms.ToolBarButtonClickEventArgs
0078E148 023b66e4 FotoVisionDesktop.MainForm
0078E15C 0258370c FotoVisionDesktop.ErrorForm
0078E160 024a689c System.Windows.Forms.Cursor
0078E164 0258370c FotoVisionDesktop.ErrorForm
0078E168 02583560 FotoVisionDesktop.InternalFotoException
0078E16C 02581c98 System.String The email message could not be created.
0078E200 023dde64 System.String EmailBody
0078E204 023de5d0 System.Collections.Hashtable
0078E208 02581d18 FotoVisionDesktop.SettingKey
0078E244 02583560 FotoVisionDesktop.InternalFotoException
0078E25C 023de5b8 FotoVisionDesktop.Settings
0078E260 023e40c8 System.String New photos are available
0078E264 023de5b8 FotoVisionDesktop.Settings
0078E268 02583560 FotoVisionDesktop.InternalFotoException
0078E270 023e40c8 System.String New photos are available
0078E27C 023b66e4 FotoVisionDesktop.MainForm
0078E280 023b66e4 FotoVisionDesktop.MainForm
0078E298 023b66e4 FotoVisionDesktop.MainForm
0078E2A8 023b89cc System.EventArgs
0078E2B4 02434880 System.Int32
0078E2B8 0240cebc System.Windows.Forms.ToolBarButton
0078E2BC 023b66e4 FotoVisionDesktop.MainForm
0078E2DC 0240cb30 System.Windows.Forms.ToolBar
0078E2E0 02581c8c System.Windows.Forms.ToolBarButtonClickEventArgs
0078E2F0 02581c8c System.Windows.Forms.ToolBarButtonClickEventArgs
0078E2F4 0240cb30 System.Windows.Forms.ToolBar
0078E2FC 0240cebc System.Windows.Forms.ToolBarButton
0078E304 0240cb30 System.Windows.Forms.ToolBar
0078E3D4 0240cbec System.Windows.Forms.Control+ControlNativeWindow
0078E3EC 0240cbec System.Windows.Forms.Control+ControlNativeWindow
0078E3FC 0240cbec System.Windows.Forms.Control+ControlNativeWindow
0078E6A0 023b66e4 FotoVisionDesktop.MainForm
0078E6EC 0240cb30 System.Windows.Forms.ToolBar
0078E700 0240cb30 System.Windows.Forms.ToolBar
0078E724 023b66e4 FotoVisionDesktop.MainForm
0078E764 023b66e4 FotoVisionDesktop.MainForm
0078E77C 023b66e4 FotoVisionDesktop.MainForm
0078E780 023b66e4 FotoVisionDesktop.MainForm
0078E79C 023b66e4 FotoVisionDesktop.MainForm
0078E7B0 023b66e4 FotoVisionDesktop.MainForm
0078E7E4 023b6e78 System.Windows.Forms.Control+ControlNativeWindow
0078E7FC 023b6e78 System.Windows.Forms.Control+ControlNativeWindow
0078E80C 023b6e78 System.Windows.Forms.Control+ControlNativeWindow
0078EDC0 0240cb30 System.Windows.Forms.ToolBar
0078EE44 0240cb30 System.Windows.Forms.ToolBar
0078EE5C 0240cb30 System.Windows.Forms.ToolBar
0078EF2C 0240cbec System.Windows.Forms.Control+ControlNativeWindow
0078EF44 0240cbec System.Windows.Forms.Control+ControlNativeWindow
0078EF54 0240cbec System.Windows.Forms.Control+ControlNativeWindow
0078F0E8 023b7b2c System.Windows.Forms.Application+ThreadContext
0078F168 024c20b4 System.Windows.Forms.NativeMethods+MSG[]
0078F16C 023b7b2c System.Windows.Forms.Application+ThreadContext
0078F170 023b7b2c System.Windows.Forms.Application+ThreadContext
0078F178 024c1390 System.Windows.Forms.Application+ComponentManager
0078F1B8 024c1390 System.Windows.Forms.Application+ComponentManager
0078F1BC 023b66e4 FotoVisionDesktop.MainForm
```

```

0078F1EC 023b7b2c System.Windows.Forms.Application+ThreadContext
0078F214 023b7b2c System.Windows.Forms.Application+ThreadContext
0078F224 02434910 System.Windows.Forms.ApplicationContext
0078F240 02434910 System.Windows.Forms.ApplicationContext
0078F244 023b7b2c System.Windows.Forms.Application+ThreadContext
0078F250 02434910 System.Windows.Forms.ApplicationContext
0078F268 023b66e4 FotoVisionDesktop.MainForm
0078F26C 023b664c System.Threading.Mutex
0078F270 023b661c System.String FotoVisionsingle
0078F274 023b2b5c System.String FotoVision
0078F278 023b664c System.Threading.Mutex
0078F29C 023b2c7c System.Threading.Mutex
0078F2A0 023b2c48 System.String FotoVisionmanifest
0078F2A4 023b2b5c System.String FotoVision
0078F2AC 023b2c7c System.Threading.Mutex
..

```

View the output to find an exception that should look familiar to you. Do you remember the type of the exception that FotoVision threw? Review your notes if you're not sure.

What is the address of the exception object?

- C. Now run the **!pe** command to dump the exceptions still alive in the process.
- D. To find the address of the **FotoVisionDesktop.InternalFotoException** take the Method Table address listed in the **!dumpeheap** output, run **!dumpeheap -mt <mt address>**
- E. Choose one of the exceptions and dump it to learn more.

Note: Exceptions are also objects so you can use **!do** to dump to get more details about a specific exception object. However SOS provides a separate command (**!pe** or **!printexception**) for dumping exceptions and display details in a much more readable format.

```

0:000> !pe 02583560
Exception object: 02583560
Exception type: FotoVisionDesktop.InternalFotoException
Message: An Internal Exception has ocured. Please restart the
application and try your operation again.
InnerException: System.NullReferenceException, Use !PrintException 02e563ec to
see more.
StackTrace (generated):
   SP      IP      Function
00FACD54 064D6AD9
FotoVision!FotoVisionDesktop.Settings.GetString(FotoVisionDesktop.SettingKey)+0xc1
00FADDA4 064DC2B4
FotoVision!FotoVisionDesktop.MainForm.menuEmailChanges_Click(System.Object,
System.EventArgs)+0xa4

StackTraceString: <none>
HRESULT: 80131600

```

Note that this exception has an inner exception.

What is the relationship between an inner and outer exception?

Dump the inner exception. Sample output is below

```
0:000> !PrintException 02e563ec
Exception object: 02e563ec
Exception type: System.NullReferenceException
Message: Object reference not set to an instance of an object.
InnerException: <none>
StackTrace (generated):
   SP      IP      Function
   00FADD50 064D6A9B
FotoVision!FotoVisionDesktop.Settings.GetString(FotoVisionDesktop.SettingKey)+0x83

StackTraceString: <none>
HRESULT: 80004003
```

What is the type of the inner exception?

Note that it's not uncommon for access violations, to result in NullReference exceptions.

We now know that the exception that caused the dialog to appear in FotoVision occurred on this thread. Let's proceed to find the root cause.

5. Disassemble the inner exception:

- A. Use the **!u** command to disassemble the function in which the inner exception occurred.

!u IP disassembles the function where Issue occurred. The address given to **!u** is marked with ">>>"

```
!u 064D6A9B
Normal JIT generated code
FotoVisionDesktop.Settings.GetString(FotoVisionDesktop.SettingKey)
Begin 064d6a18, size cb
*** WARNING: Unable to verify checksum for
C:\LabFiles\FotoVision\4.0\C#\Desktop\Bin\FotoVision.exe

C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\util\Settings.cs @ 102:
064d6a18 55          push     ebp
064d6a19 8bec        mov      ebp,esp
064d6a1b 57          push     edi
064d6a1c 56          push     esi
064d6a1d 83ec44      sub      esp,44h
064d6a20 8bf1        mov      esi,ecx
064d6a22 8d7db4      lea      edi,[ebp-4Ch]
064d6a25 b910000000 mov      ecx,10h
064d6a2a 33c0        xor      eax,eax
064d6a2c f3ab        rep stos dword ptr es:[edi]
064d6a2e 8bce        mov      ecx,esi
064d6a30 894ddc      mov      dword ptr [ebp-24h],ecx
064d6a33 8955e0      mov      dword ptr [ebp-20h],edx
064d6a36 833d7831140100 cmp      dword ptr ds:[1143178h],0
064d6a3d 7405        je       064d6a44
064d6a3f e8cc58d66d call     clr!JIT_DbgIsJustMyCode (7423c310)
```

```

064d6a44 33d2      xor     edx,edx
064d6a46 8955d4      mov     dword ptr [ebp-2Ch],edx
064d6a49 33d2      xor     edx,edx
064d6a4b 8955d8      mov     dword ptr [ebp-28h],edx
064d6a4e 33d2      xor     edx,edx
064d6a50 8955d0      mov     dword ptr [ebp-30h],edx
064d6a53 90         nop

```

C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\util\Settings.cs @ 103:

```

064d6a54 b9b8414501  mov     ecx,14541B8h (MT: FotoVisionDesktop.SettingKey)
064d6a59 e876b6c5fa  call    011320d4 (JitHelp: CORINFO_HELP_NEWSFAST)
064d6a5e 8945cc      mov     dword ptr [ebp-34h],eax
064d6a61 8b45dc      mov     eax,dword ptr [ebp-24h]
064d6a64 8b4004      mov     eax,dword ptr [eax+4]
064d6a67 8945c8      mov     dword ptr [ebp-38h],eax
064d6a6a 8b45cc      mov     eax,dword ptr [ebp-34h]
064d6a6d 8b55e0      mov     edx,dword ptr [ebp-20h]
064d6a70 895004      mov     dword ptr [eax+4],edx
064d6a73 8b4dcc      mov     ecx,dword ptr [ebp-34h]
064d6a76 8b01       mov     eax,dword ptr [ecx]
064d6a78 8b4028      mov     eax,dword ptr [eax+28h]
064d6a7b ff10       call    dword ptr [eax]
064d6a7d 8945c4      mov     dword ptr [ebp-3Ch],eax
064d6a80 8b4dc8      mov     ecx,dword ptr [ebp-38h]
064d6a83 8b55c4      mov     edx,dword ptr [ebp-3Ch]
064d6a86 8b01       mov     eax,dword ptr [ecx]
064d6a88 8b402c      mov     eax,dword ptr [eax+2Ch]
064d6a8b ff5010     call    dword ptr [eax+10h]
064d6a8e 8945c0      mov     dword ptr [ebp-40h],eax
064d6a91 8b45c0      mov     eax,dword ptr [ebp-40h]
064d6a94 8945d8      mov     dword ptr [ebp-28h],eax

```

C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\util\Settings.cs @ 105:

```

064d6a97 90         nop

```

C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\util\Settings.cs @ 106:

```

064d6a98 8b4dd8      mov     ecx,dword ptr [ebp-28h]
>>> 064d6a9b 8b01       mov     eax,dword ptr [ecx]
064d6a9d 8b4028      mov     eax,dword ptr [eax+28h]
064d6aa0 ff10       call    dword ptr [eax]
064d6aa2 8945bc      mov     dword ptr [ebp-44h],eax
064d6aa5 8b45bc      mov     eax,dword ptr [ebp-44h]
064d6aa8 8945d4      mov     dword ptr [ebp-2Ch],eax
064d6aab 90         nop
064d6aac eb2b       jmp     064d6ad9

```

C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\util\Settings.cs @ 108:

```

064d6aae 8945b8      mov     dword ptr [ebp-48h],eax
064d6ab1 8b45b8      mov     eax,dword ptr [ebp-48h]
064d6ab4 8945d0      mov     dword ptr [ebp-30h],eax

```

C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\util\Settings.cs @ 109:

```

064d6ab7 90         nop

```

C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\util\Settings.cs @ 110:

```

064d6ab8 b9b8984501  mov     ecx,14598B8h (MT:
FotoVisionDesktop.InternalFotoException)
064d6abd e812b6c5fa  call    011320d4 (JitHelp: CORINFO_HELP_NEWSFAST)

```

```

064d6ac2 8945b4      mov     dword ptr [ebp-4Ch],eax
064d6ac5 8b4db4      mov     ecx,dword ptr [ebp-4Ch]
064d6ac8 8b55d0      mov     edx,dword ptr [ebp-30h]
064d6acb ff15a8984501 call    dword ptr ds:[14598A8h]
(FotoVisionDesktop.InternalFotoException..ctor(System.Exception), mdToken:
060000ae)
064d6ad1 8b4db4      mov     ecx,dword ptr [ebp-4Ch]
064d6ad4 e82bf9bc6d  call   clr!IL_Throw (740a6404)

C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\util\Settings.cs @ 113:
064d6ad9 8b45d4      mov     eax,dword ptr [ebp-2Ch]
064d6adc 8d65f8      lea     esp,[ebp-8]
064d6adf 5e         pop     esi
064d6ae0 5f         pop     edi
064d6ae1 5d         pop     ebp
064d6ae2 c3         ret

```

Does this help you find the root cause?

Try the same using the `sosex` extension – this should give you more details.

```

.load sosex
!sosex.muf 064D6A9B
...

```

If this was not helping, proceed to the next step and let's try and see if there was an Access Violation before we look at the code.

6. Reproduce the problem, but analyze the first first-chance exception to see if that helps you to find the root cause:

- A. At the WinDbg command prompt, type “g”.
- B. Click **OK** on the error message in FotoVision.
- C. On the toolbar, click the **Email** button and note that WinDbg breaks in again.

```

0:000> g
(104c.150): Access violation - code c0000005 (first chance)
First chance exceptions are reported before any exception handling.
This exception may be expected and handled.
eax=00000000 ebx=01f01dd0 ecx=00000000 edx=01ef73b4 esi=01f01a78 edi=0023e5b4
eip=00983442 esp=0023e380 ebp=0023e3d4 iopl=0         nv up ei pl zr na pe nc
cs=001b  ss=0023  ds=0023  es=0023  fs=003b  gs=0000             efl=00010246
00983442 8b01      mov     eax,dword ptr [ecx]  ds:0023:00000000=????????

```

- D. Look at the managed stack. *What does the first frame indicate?*

Find the line of source code indicated by this frame and look it up:

The `!clrstack` command will not provide line and source file information even with symbols so you will need to look at where in the disassembly we are to map what instruction in the function was executing when the failure occurred.

The source line and source file will only be shown if the .dll file is compiled in debug mode. In a released product the .dll and .exe files should be compiled in release mode; in that case, we need to use the function names along with the disassembly to determine where in the code the failure occurred.

7. Find the problem source line and suggest a fix:

What line of code does the managed call stack indicate causes the problem that results in an `InternalFotoException` exception?

A common cause of an access violation is access a variable that is `NULL`. Is this the case here?

What is one possible way to code around this problem?

Do not implement a fix—at least, not yet.

8. Perform an alternative fix by using a config file.

IMPORTANT - Shut down WinDbg, which will also shut down FotoVision. Make sure that FotoVision has shutdown before moving to the next step.

- A. Go to `<FotoVisionDir>\C#\Application Data\`.
- B. Rename the original **config** file as **.config.orig**.
- C. Remove the “.1” from the config file with the name that ends with .1.
- D. Start a new instance of FotoVision.
- E. On the toolbar, click the **Email** button.
Did the exception occur?
- F. Investigate the contents of the new config file to determine why by comparing the 2 config files to file the differences.
- G. After your investigation, rename the config file back to **Config.1**. Then delete the “.orig” extension from the .config.orig file to restore the original config file.

9. Supply extra information about the exception at run time.

- A. In the source code for FotoVision, open **ErrorForm.cs** since this is the form that displays the dialog
- B. Go to the constructor for this class and find the line near the end that reads **textDetails.Text = ex.Message;**
- C. After that line, but before the closure if the if statement, add the following two lines:
textDetails.Text += "\r\nInner Exception Details = ";
textDetails.Text += ex.InnerException.ToString();
- D. Save, recompile, and reproduce the problem. Note the additional exception information that is thrown this time.

Note: In order for the next lab exercise to work, you must complete steps A to D above!

- E. Once you've reached this point, you've achieved your goal! Continue on to the next exercise.

Exercise 2: Debug a Fatal Exception

In this exercise, you will use WinDbg, SOS, and Procdump to troubleshoot and resolve an exception that is fatal to the application.

Task Description

1. Replace the FotoVision config file.

IMPORTANT - Make sure that FotoVision is shut down before moving to the next step.

- A. Go to <FotoVisionDir>\C#\Application Data\.
- B. Rename the original **config** file as **.config.orig**.
- C. Remove the “.2” from the config file with the name that ends with .2.

2. View the Web site:

- A. Start FotoVision.exe.
- B. On the toolbar, click the **My Site** button to load the Web site.

What was the result?

What kind of exception occurred?

Exception type: _____

- C. Click **Quit**.

3. Reproduce the problem, but first attach a debugger to generate a dump file when the exception occurs.

- A. Start FotoVision.exe.
- B. On the Start menu, type **cmd**, right-click on it and choose **Run as Administrator**.
- C. In the Command Prompt window, enter the following command to attach procdump to FotoVision and get full dumps on first-chance exceptions:

procdump.exe -e 1 -n 10 -ma -w FotoVision.exe c:\temp

-e 1 dump first chance exceptions

-n 10 up to 10 dumps

-ma full dumps

-w wait for the process to start if it's not already started (optional for our scenario)

procdump can be found on <https://technet.microsoft.com/de-de/sysinternals/dd996900> and is part of the Microsoft Sysinternals Suite <https://technet.microsoft.com/de-de/sysinternals>

Note: Create **C:\Temp** folder if it doesn't exist before running the command

- D. In FotoVision, click the **My Site** button to reproduce the problem.
4. What is happening to FotoVision—why does it take so long for the error message to appear the second time?
 - A. After you click the My Site button, you may notice that the error message doesn't immediately appear.
Any guesses as to why?
 - B. If you look in the output directory where the dump gets created, you'll see some dump files. These are full dumps of first-chance exceptions, and it takes several seconds to produce a dump file that's 180 MB or so in size.
5. Does the error message appear in FotoVision?
 - A. When the error message appears from FotoVision, click **Quit**.
 - B. In the dump output location, note that another full dump was created.
6. Open the first dump file:
 - A. In the folder that contains the dump files, find the second dump file created from your latest reproduction of the problem. You can determine this by looking at the time stamps in the dumps' file names.

Depending on the type of issue it makes sense to investigate all dumps gathered

- B. Open the dump file in WinDbg.
- C. Load SOS.
Which thread is the faulting one?
- D. Dump the managed call stack using **!clrstack**.
Do you see some frames at the top of the stack that look like they might be helpful in finding the root cause from within FotoVision?
7. View the callstack of the faulting thread. Also, view the disassembly to make sure you understand the problem:
 - A. As in the previous exercise, run some basic SOS commands to do some "information gathering"! **DumpStackObjects**, **!DumpHeap -type Exception**,

and so forth.

Does any of the output help you to know what the problem is? Does any of the output pinpoint exactly where the problem occurred in the code? If not, proceed to the next step.

- B. Dump the managed call stack.

Do you see some frames at the top of the stack that look like they might be helpful in finding the root cause from within FotoVision?

- C. Because you have compiled FotoVision with symbols, you should have the source line at which the problem occurred. But you may not always have access to the source or have the symbols needed to provide the exact line number. Before looking at the source, proceed to the next step.

- D. Unassemble (!u <EIP>) the faulting function by using the EIP address of the faulting call (according to the output of the “!clrstack” command):

Child SP = ESP = Stack Pointer (pointer to the data we currently use on the stack)
IP = EIP = Instruction Pointer (pointer to the code currently gets executed)

```
0:000> !clrstack
OS Thread Id: 0x351c (0)
Child SP      IP Call Site
00d3e830 779ec97c [InlinedCallFrame: 00d3e830]
00d3e254 0761c960 *** WARNING: Unable to verify checksum for FotoVision.exe
FotoVisionDesktop.ErrorForm..ctor(System.String, System.Exception)
[C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\ErrorForm.cs @ 210]
00d3e2cc 0761c717 FotoVisionDesktop.Global.DisplayError(System.String,
System.Exception) [C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\Global.cs @ 191]
00d3e2ec 0761c65b FotoVisionDesktop.MainForm.menuWebsite_Click(System.Object,
System.EventArgs) [C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\MainForm.cs @
2178]
00d3e420 0761c4ae FotoVisionDesktop.MainForm.toolBar_ButtonClick(System.Object,
System.Windows.Forms.ToolBarButtonClickEventArgs)
[C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\MainForm.cs @ 1266]
00d3e468 528d0a5d *** WARNING: Unable to verify checksum for
System.Windows.Forms.ni.dll
System.Windows.Forms.ToolBar.OnButtonClick(System.Windows.Forms.ToolBarButtonClick
EventArgs)
00d3e470 528d21a1
System.Windows.Forms.ToolBar.WmReflectCommand(System.Windows.Forms.Message ByRef)
00d3e488 528d0dec
System.Windows.Forms.ToolBar.WndProc(System.Windows.Forms.Message ByRef)
00d3e554 52155fa1
System.Windows.Forms.Control+ControlNativeWindow.OnMessage(System.Windows.Forms.Me
ssage ByRef)
00d3e55c 52155f89
System.Windows.Forms.Control+ControlNativeWindow.WndProc(System.Windows.Forms.Mess
age ByRef)
```



```

00d3e570 526df8e6 System.Windows.Forms.NativeWindow.DebuggableCallback(IntPtr,
IntPtr, IntPtr, IntPtr)
00d3e830 00e5a08e [InlinedCallFrame: 00d3e830]
00d3e82c 521a8aac
DomainBoundILStubClass.IL_STUB_PInvoke(System.Runtime.InteropServices.HandleRef,
IntPtr, IntPtr, IntPtr)
00d3e830 5215ffd1 [InlinedCallFrame: 00d3e830]
System.Windows.Forms.UnsafeNativeMethods.SendMessage(System.Runtime.InteropServices.HandleRef, IntPtr, IntPtr, IntPtr)
00d3e86c 5215ffd1 System.Windows.Forms.Control.SendMessage(IntPtr, IntPtr, IntPtr)
00d3e884 5215f98b System.Windows.Forms.Control.ReflectMessageInternal(IntPtr,
System.Windows.Forms.Message ByRef)
00d3e894 5216787b
System.Windows.Forms.Control.WmCommand(System.Windows.Forms.Message ByRef)
00d3e8a4 52156308
System.Windows.Forms.Control.WndProc(System.Windows.Forms.Message ByRef)
00d3e8a8 5215e71a [InlinedCallFrame: 00d3e8a8]
00d3e8f0 5215e71a
System.Windows.Forms.ScrollableControl.WndProc(System.Windows.Forms.Message ByRef)
00d3e8fc 5215e3fe System.Windows.Forms.Form.WndProc(System.Windows.Forms.Message
ByRef)
00d3e910 07614d0e FotoVisionDesktop.MainForm.WndProc(System.Windows.Forms.Message
ByRef) [C:\LabFiles\FotoVision\4.0\C#\Desktop\Source\MainForm.cs @ 2116]
00d3e954 52155fa1
System.Windows.Forms.Control+ControlNativeWindow.OnMessage(System.Windows.Forms.Me
ssage ByRef)

```

...

0:000> !u -n 0761c960

Normal JIT generated code

FotoVisionDesktop.ErrorForm..ctor(System.String, System.Exception)

Begin 0761c740, size 251

```

0761c740 55          push     ebp
0761c741 8bec         mov     ebp,esp
0761c743 57          push     edi
0761c744 56          push     esi
0761c745 83ec64       sub     esp,64h
0761c748 8bf1        mov     esi,ecx
0761c74a 8d7d94       lea     edi,[ebp-6Ch]
0761c74d b916000000  mov     ecx,16h
0761c752 33c0        xor     eax,eax
0761c754 f3ab        rep stos dword ptr es:[edi]
0761c756 8bce        mov     ecx,esi
0761c758 894ddc       mov     dword ptr [ebp-24h],ecx
0761c75b 8955d8       mov     dword ptr [ebp-28h],edx
0761c75e 833d7831e50000 cmp     dword ptr ds:[0E53178h],0
0761c765 7405        je      0761c76c
0761c767 e8a4fb466d  call   clr!JIT_DbgIsJustMyCode (74a8c310)
0761c76c 33d2        xor     edx,edx
0761c76e 8955d4       mov     dword ptr [ebp-2Ch],edx
0761c771 c745ec00000000 mov     dword ptr [ebp-14h],0
0761c778 33d2        xor     edx,edx
0761c77a 8955f4       mov     dword ptr [ebp-0Ch],edx
0761c77d 33d2        xor     edx,edx
0761c77f 8955f0       mov     dword ptr [ebp-10h],edx
0761c782 8b4ddc       mov     ecx,dword ptr [ebp-24h]

```

```

0761c785 e8b236ae4a    call    System_Windows_Forms_ni+0x14fe3c (520ffe3c)
(System.Windows.Forms.Form..ctor(), mdToken: 06002c8d)
0761c78a 90              nop
0761c78b 90              nop
0761c78c 8b4ddc          mov     ecx,dword ptr [ebp-24h]
0761c78f e8bc1d84f9      call    00e5e550
(FotoVisionDesktop.ErrorForm.InitializeComponent(), mdToken: 060000a5)
0761c794 90              nop
0761c795 e84ea0ffff      call    076167e8
(FotoVisionDesktop.Global.get_Settings(), mdToken: 060000b2)
0761c79a 8945d0          mov     dword ptr [ebp-30h],eax
0761c79d 8b4dd0          mov     ecx,dword ptr [ebp-30h]
0761c7a0 ba13000000      mov     edx,13h
0761c7a5 3909            cmp     dword ptr [ecx],ecx
0761c7a7 e84ca3ffff      call    07616af8
(FotoVisionDesktop.Settings.GetInt(FotoVisionDesktop.SettingKey), mdToken:
06000369)
0761c7ac 8945e8          mov     dword ptr [ebp-18h],eax
0761c7af 8b45e8          mov     eax,dword ptr [ebp-18h]
0761c7b2 8945f4          mov     dword ptr [ebp-0Ch],eax
0761c7b5 e82ea0ffff      call    076167e8
(FotoVisionDesktop.Global.get_Settings(), mdToken: 060000b2)
0761c7ba 8945cc          mov     dword ptr [ebp-34h],eax
0761c7bd 8b4dcc          mov     ecx,dword ptr [ebp-34h]
0761c7c0 ba14000000      mov     edx,14h
0761c7c5 3909            cmp     dword ptr [ecx],ecx
0761c7c7 e82ca3ffff      call    07616af8
(FotoVisionDesktop.Settings.GetInt(FotoVisionDesktop.SettingKey), mdToken:
06000369)
0761c7cc 8945e4          mov     dword ptr [ebp-1Ch],eax
0761c7cf 8b45e4          mov     eax,dword ptr [ebp-1Ch]
0761c7d2 8945f0          mov     dword ptr [ebp-10h],eax
0761c7d5 837df400        cmp     dword ptr [ebp-0Ch],0
0761c7d9 7410            je      0761c7eb
0761c7db 90              nop
0761c7dc 837df000        cmp     dword ptr [ebp-10h],0
0761c7e0 0f94c0          sete    al
0761c7e3 0fb6c0          movzx   eax,al
0761c7e6 8945e0          mov     dword ptr [ebp-20h],eax
0761c7e9 eb07            jmp     0761c7f2
0761c7eb c745e001000000 mov     dword ptr [ebp-20h],1
0761c7f2 0fb645e0        movzx   eax,byte ptr [ebp-20h]
0761c7f6 8945ec          mov     dword ptr [ebp-14h],eax
0761c7f9 837dec00        cmp     dword ptr [ebp-14h],0
0761c7fd 751a            jne     0761c819
0761c7ff 90              nop
0761c800 8b4ddc          mov     ecx,dword ptr [ebp-24h]
0761c803 8b55f4          mov     edx,dword ptr [ebp-0Ch]
0761c806 e8d977ae4a      call    System_Windows_Forms_ni+0x153fe4 (52103fe4)
(System.Windows.Forms.Control.set_Width(Int32), mdToken: 0600072f)
0761c80b 90              nop
0761c80c 8b4ddc          mov     ecx,dword ptr [ebp-24h]
0761c80f 8b55f0          mov     edx,dword ptr [ebp-10h]
0761c812 e8ed78ae4a      call    System_Windows_Forms_ni+0x154104 (52104104)
(System.Windows.Forms.Control.set_Height(Int32), mdToken: 060006d8)
0761c817 90              nop
0761c818 90              nop

```

```

0761c819 b924679054      mov     ecx,offset System_Drawing_ni+0x56724 (54906724)
(MT: System.Drawing.StringFormat)
0761c81e e814dc146d      call   clr!JIT_NewCrossContext (7476a437)
0761c823 8945c8          mov     dword ptr [ebp-38h],eax
0761c826 8b4dc8          mov     ecx,dword ptr [ebp-38h]
0761c829 e86e7f2c4d      call   System_Drawing_ni+0x3479c (548e479c)
(System.Drawing.StringFormat..ctor(), mdToken: 06000b84)
0761c82e 8b55dc          mov     edx,dword ptr [ebp-24h]
0761c831 8b45c8          mov     eax,dword ptr [ebp-38h]
0761c834 8d9240010000     lea     edx,[edx+140h]
0761c83a e83153136d      call   clr!JIT_WriteBarrierEAX (74751b70)
0761c83f 8b45dc          mov     eax,dword ptr [ebp-24h]
0761c842 8b8840010000     mov     ecx,dword ptr [eax+140h]
0761c848 ba00100000       mov     edx,1000h
0761c84d 3909            cmp     dword ptr [ecx],ecx
0761c84f e8d87f2c4d      call   System_Drawing_ni+0x3482c (548e482c)
(System.Drawing.StringFormat.set_FormatFlags(System.Drawing.StringFormatFlags),
mdToken: 06000b8b)
0761c854 90              nop
0761c855 8b45dc          mov     eax,dword ptr [ebp-24h]
0761c858 8b8840010000     mov     ecx,dword ptr [eax+140h]
0761c85e ba03000000       mov     edx,3
0761c863 3909            cmp     dword ptr [ecx],ecx
0761c865 e8d27f2c4d      call   System_Drawing_ni+0x3483c (548e483c)
(System.Drawing.StringFormat.set_Trimming(System.Drawing.StringTrimming), mdToken:
06000b96)
0761c86a 90              nop
0761c86b 8b55dc          mov     edx,dword ptr [ebp-24h]
0761c86e 8b45d8          mov     eax,dword ptr [ebp-28h]
0761c871 8d923c010000     lea     edx,[edx+13Ch]
0761c877 e8f452136d      call   clr!JIT_WriteBarrierEAX (74751b70)
0761c87c 837d0800         cmp     dword ptr [ebp+8],0
0761c880 0f94c0           sete    al
0761c883 0fb6c0           movzx   eax,al
0761c886 8945ec          mov     dword ptr [ebp-14h],eax
0761c889 837dec00         cmp     dword ptr [ebp-14h],0
0761c88d 0f85f4000000     jne     0761c987
0761c893 90              nop
0761c894 8b45dc          mov     eax,dword ptr [ebp-24h]
0761c897 8b804c010000     mov     eax,dword ptr [eax+14Ch]
0761c89d 8945c4          mov     dword ptr [ebp-3Ch],eax
0761c8a0 8b4d08          mov     ecx,dword ptr [ebp+8]
0761c8a3 3909            cmp     dword ptr [ecx],ecx
0761c8a5 e876ac2e6c      call   mscorlib_ni+0x337520 (73907520)
(System.Exception.GetType(), mdToken: 06000042)
0761c8aa 8945c0          mov     dword ptr [ebp-40h],eax
0761c8ad 8b4dc0          mov     ecx,dword ptr [ebp-40h]
0761c8b0 8b01            mov     eax,dword ptr [ecx]
0761c8b2 8b4038          mov     eax,dword ptr [eax+38h]
0761c8b5 ff5018          call   dword ptr [eax+18h]
0761c8b8 8945bc          mov     dword ptr [ebp-44h],eax
0761c8bb 8b4dc4          mov     ecx,dword ptr [ebp-3Ch]
0761c8be 8b55bc          mov     edx,dword ptr [ebp-44h]
0761c8c1 8b01            mov     eax,dword ptr [ecx]
0761c8c3 8b4050          mov     eax,dword ptr [eax+50h]
0761c8c6 ff10            call   dword ptr [eax]
0761c8c8 90              nop
0761c8c9 8b45dc          mov     eax,dword ptr [ebp-24h]

```

```

0761c8cc 8b8048010000    mov     eax,dword ptr [eax+148h]
0761c8d2 8945b8            mov     dword ptr [ebp-48h],eax
0761c8d5 8b4d08            mov     ecx,dword ptr [ebp+8]
0761c8d8 8b01              mov     eax,dword ptr [ecx]
0761c8da 8b4028            mov     eax,dword ptr [eax+28h]
0761c8dd ff5010            call    dword ptr [eax+10h]
0761c8e0 8945b4            mov     dword ptr [ebp-4Ch],eax
0761c8e3 8b4db8            mov     ecx,dword ptr [ebp-48h]
0761c8e6 8b55b4            mov     edx,dword ptr [ebp-4Ch]
0761c8e9 8b01              mov     eax,dword ptr [ecx]
0761c8eb 8b4050            mov     eax,dword ptr [eax+50h]
0761c8ee ff10              call    dword ptr [eax]
0761c8f0 90                nop
0761c8f1 8b45dc            mov     eax,dword ptr [ebp-24h]
0761c8f4 8b8048010000    mov     eax,dword ptr [eax+148h]
0761c8fa 8945d4            mov     dword ptr [ebp-2Ch],eax
0761c8fd 8b45d4            mov     eax,dword ptr [ebp-2Ch]
0761c900 8945b0            mov     dword ptr [ebp-50h],eax
0761c903 8b4dd4            mov     ecx,dword ptr [ebp-2Ch]
0761c906 8b01              mov     eax,dword ptr [ecx]
0761c908 8b404c            mov     eax,dword ptr [eax+4Ch]
0761c90b ff501c            call    dword ptr [eax+1Ch]
0761c90e 8945ac            mov     dword ptr [ebp-54h],eax
0761c911 8b1584959403    mov     edx,dword ptr ds:[3949584h] ("\\r\\nInner Exception
Details = ")
0761c917 8b4dac            mov     ecx,dword ptr [ebp-54h]
0761c91a e8515b306c       call    mscorlib_ni+0x352470 (73922470)
(System.String.Concat(System.String, System.String), mdToken: 0600037f)
0761c91f 8945a8            mov     dword ptr [ebp-58h],eax
0761c922 8b4db0            mov     ecx,dword ptr [ebp-50h]
0761c925 8b55a8            mov     edx,dword ptr [ebp-58h]
0761c928 8b01              mov     eax,dword ptr [ecx]
0761c92a 8b4050            mov     eax,dword ptr [eax+50h]
0761c92d ff10              call    dword ptr [eax]
0761c92f 90                nop
0761c930 8b45dc            mov     eax,dword ptr [ebp-24h]
0761c933 8b8048010000    mov     eax,dword ptr [eax+148h]
0761c939 8945d4            mov     dword ptr [ebp-2Ch],eax
0761c93c 8b45d4            mov     eax,dword ptr [ebp-2Ch]
0761c93f 8945a4            mov     dword ptr [ebp-5Ch],eax
0761c942 8b4dd4            mov     ecx,dword ptr [ebp-2Ch]
0761c945 8b01              mov     eax,dword ptr [ecx]
0761c947 8b404c            mov     eax,dword ptr [eax+4Ch]
0761c94a ff501c            call    dword ptr [eax+1Ch]
0761c94d 8945a0            mov     dword ptr [ebp-60h],eax
0761c950 8b4d08            mov     ecx,dword ptr [ebp+8]
0761c953 3909              cmp     dword ptr [ecx],ecx
0761c955 e846ab2e6c       call    mscorlib_ni+0x3374a0 (739074a0)
(System.Exception.get_InnerException(), mdToken: 06000025)
0761c95a 89459c            mov     dword ptr [ebp-64h],eax
0761c95d 8b4d9c            mov     ecx,dword ptr [ebp-64h]
>>> 0761c960 8b01              mov     eax,dword ptr [ecx]
0761c962 8b4028            mov     eax,dword ptr [eax+28h]
0761c965 ff10              call    dword ptr [eax]
0761c967 894598            mov     dword ptr [ebp-68h],eax
0761c96a 8b4da0            mov     ecx,dword ptr [ebp-60h]
0761c96d 8b5598            mov     edx,dword ptr [ebp-68h]

```

```
0761c970 e8fb5a306c    call     mscorlib_ni+0x352470 (73922470)
(System.String.Concat(System.String, System.String), mdToken: 0600037f)
0761c975 894594        mov     dword ptr [ebp-6Ch],eax
0761c978 8b4da4        mov     ecx,dword ptr [ebp-5Ch]
0761c97b 8b5594        mov     edx,dword ptr [ebp-6Ch]
0761c97e 8b01         mov     eax,dword ptr [ecx]
0761c980 8b4050        mov     eax,dword ptr [eax+50h]
0761c983 ff10         call    dword ptr [eax]
0761c985 90           nop
0761c986 90           nop
0761c987 90           nop
0761c988 8d65f8        lea     esp,[ebp-8]
0761c98b 5e           pop     esi
0761c98c 5f           pop     edi
0761c98d 5d           pop     ebp
0761c98e c20400        ret     4
```

Can you determine, from the disassembly, what caused the problem?

Note: If you want to see how the lines from the disassembly map to the lines in the source code remove the `-n` switch and use: `!u 0761c960`.

The output above is shown using the `-n` switch to make the disassembly more readable.

Now can you see what's causing the problem—that is, why our concatenation step would fail?

- E. Back in WinDbg, dump out the `InnerException` to get more insight as to what may be causing the problem.
8. Code a resolution.

What would be an easy coding solution for this problem?

- A. Implement your code resolution.
- B. Save and rebuild the project.
- C. Now start FotoVision and see if your coding fixed the Exception.
- D. If you are unable to resolve the problem please ask the instructor to help brainstorm some additional ideas for resolution.

Exercise 3: One More Exception (non-Fatal)

In the previous exercise, you resolved an application crash by inserting just a few lines of code. However, when you click the My Site button, you're still getting an exception that prevents you from opening the site. In this exercise, you'll debug and resolve the problem.

Scenario

Now that you have added more robust error logging it should be easier to troubleshoot any other problems. However, you are now hearing reports of unhandled exceptions. So let's collect dump files from our "production" environment and analyze them.

Task Description

1. Load the Web site from FotoVision.exe.
 - A. If you closed Fotovision in the previous exercise, open it now.
 - B. On the toolbar in FotoVision', click the **My Site** button to load the Web site.
What exception occurs?
Exception type:_____.
 - C. Click **OK** in the error dialog box.
2. Attach WinDbg and set up your debug session:
 - A. On the Start menu, click **Run**, and type **c:\Debuggers\Windbg -pn FotoVision.exe**.
 - B. Load SOS.
 - C. Use the **sxe** command to instruct WinDbg to break on any managed exception:

```
0:008> sxe clr
```
 - D. In the debugger, type **g**.
3. Reproduce the problem.
 - A. In FotoVision, click the **My Site** button to reproduce the exception.
 - B. Note that WinDbg breaks.
 - C. Switch to WinDbg.
4. Let's Review 2 different ways to locate the exception:
 - A. Let's get some information about the exception. We know about the **"!DumpStackObjects"** command. If there is only one exception type on the stack, then because this is a live attach we can be sure that exception is the one that was just thrown.

```

0:000> !dso
OS Thread Id: 0x4bb0 (0)
ESP/REG  Object  Name
0052DD34 0224a72c FotoVisionDesktop.InternalFotoException
0052DD78 0224a72c FotoVisionDesktop.InternalFotoException
0052DDC8 020f63d8 FotoVisionDesktop.MainForm
0052DDCC 0224a5f8 System.Windows.Forms.ToolBarButtonClickEventArgs
0052DDF8 0224a72c FotoVisionDesktop.InternalFotoException
0052DDFC 020f63d8 FotoVisionDesktop.MainForm
0052DE34 0224a6bc System.Object[] (System.String[])
0052DE3C 0212399c System.String https://localhost/FotoVision20
0052DE40 020f63d8 FotoVisionDesktop.MainForm
0052DE4C 0212399c System.String https://localhost/FotoVision20
0052DE50 0224a628 System.Char[]
0052DE70 0224a72c FotoVisionDesktop.InternalFotoException
0052DE74 0224a72c FotoVisionDesktop.InternalFotoException
0052DE90 021ffc74 System.String Foto currently does not support the use of
https!
0052DE98 0224a72c FotoVisionDesktop.InternalFotoException
0052DEA8 0224a6bc System.Object[] (System.String[])
0052DEAC 0224a628 System.Char[]
0052DEB0 0212399c System.String https://localhost/FotoVision20
0052DEB4 0211e0dc FotoVisionDesktop.Settings
0052DEBC 0224a6bc System.Object[] (System.String[])
0052DECO 021ffa80 System.String :
0052DECC 020f63d8 FotoVisionDesktop.MainForm
0052DED0 020f63d8 FotoVisionDesktop.MainForm
0052DEE8 020f63d8 FotoVisionDesktop.MainForm
0052DEF8 020f86c0 System.EventArgs
0052DF04 02174154 System.Int32
0052DF08 0214c71c System.Windows.Forms.ToolBarButton
0052DF0C 020f63d8 FotoVisionDesktop.MainForm
0052DF2C 0214c410 System.Windows.Forms.ToolBar
0052DF30 0224a5f8 System.Windows.Forms.ToolBarButtonClickEventArgs
0052DF40 0224a5f8 System.Windows.Forms.ToolBarButtonClickEventArgs
0052DF44 0214c410 System.Windows.Forms.ToolBar
0052DF4C 0214c71c System.Windows.Forms.ToolBarButton
0052DF54 0214c410 System.Windows.Forms.ToolBar
...
...

```

How many exception types are on the stack? .

What is the address of the exception? .

Does this address agree with the address in the native stack?

- B. One other way to get information on the current exception is with an SOS command. Run “**!PrintException**” command with no parameters.

```

0:000> !pe
Exception object: 0224a72c
Exception type: FotoVisionDesktop.InternalFotoException
Message: Foto currently does not support the use of https!
InnerException: <none>
StackTrace (generated):

```



```
<none>
StackTraceString: <none>
HRESULT: 80131600
```

- C. Compare this exception's name and address with the names and addresses from the previous methods.

Are they the same?

5. Set WinDbg to break only on this type of exception:
 - A. To make your debugging session easier, you sometimes may want WinDbg to break only on a particular type of managed exception. SOS has a command for that. But before we execute it, let's overwrite our existing command that tells WinDbg to break on all managed exceptions:

```
0:000> sxn clr
```

6. For help on the “sxn” command, type the following in WinDbg's command line:

```
.hh sxn
```

- A. Use the SOS “!StopOnException” command to instruct WinDbg to break only on FotoVisionDesktop.InternalFotoException exceptions:

```
0:000> !soe -create FotoVisionDesktop.InternalFotoException 1
Breakpoint set
```

Note: For more information on the “!SOE” command, use the SOS command-specific help command.

```
!help StopOnException
```

7. Resume application execution and test your breakpoint.
 - A. In the debugger, type **g**.
 - B. In FotoVision, click **OK** on the error dialog.
 - C. Click the **My Site** button to confirm that the breakpoint works. Note that with the current settings, we will not break on any managed exception other than this one.
8. Investigate to find the root cause of the exception.
 - A. Once WinDbg breaks, look at the managed stack.
 - B. From the source file and line number that are given at the top of the stack, investigate the source to find the reason for the exception. Do not implement any fixes.

Note for .NET Framework 2.0: The **!clrstack** command will not provide line and source file information even with symbols so you will need to look at where in the disassembly we are to map what instruction in the function was executing

when the failure occurred.

What is the cause of this exception?