Tech Note 880

Capturing a Memory Dump Using the ADPlus.vbs

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Introduction

When InTouch Viewer or AppSever crashes or hangs during runtime, the SMC Logger only tells you that an unhandled exception occurred during runtime. There is no supporting information in the Log files to trace back what caused the crash unless it occurs again. This means that if the issue only occurs once, WW Support is not able to trace back the reason for the crash.

To determine the root cause of the crash, WW Support needs to debug the exception live in a debugger, or debug exported dumps in the crash's duration to determine what led to the crash. WW Support will ask to generate the dump files.

This *Tech Note* provides a basic introduction to Windows Processes and Memory Management. It explains memory dumps and how they can be used to identify software bugs. This Tech Note provides a download link to the Microsoft Debugging Tools for Windows.

Application Versions

- All Wonderware Product versions

About Memory Dumps

A memory dump is a file that a debugger creates to archive a snapshot of the memory resources owned by a given process (User Memory Dump), or the operating system (Kernel Memory Dump). A process is a data structure that groups system resources necessary to execute a certain task. Its most important data fields are:

- **Process id**: This number uniquely identifies a process.
- **A list of threads**: A thread is actually in charge of executing the code of a process.
- **Virtual Memory**: A data structure that tracks of all the memory resources referenced by a process.

ADPlus.vbs (ADPlus) is a tool from Microsoft Product Support Services (PSS) that can troubleshoot any process or application that stops responding (hangs) or fails (crashes). This tool that PSS frequently uses to isolate what causes a process to stop responding (hang) or quit unexpectedly (crash) in a Microsoft Windows DNA environment. ADPlus is included with the latest Microsoft Debugging Tools for Windows. To obtain the latest Microsoft Debugging Tools for Windows, visit the following Microsoft website:
http://www.microsoft.com/whdc/devtools/debugging/default.mspx

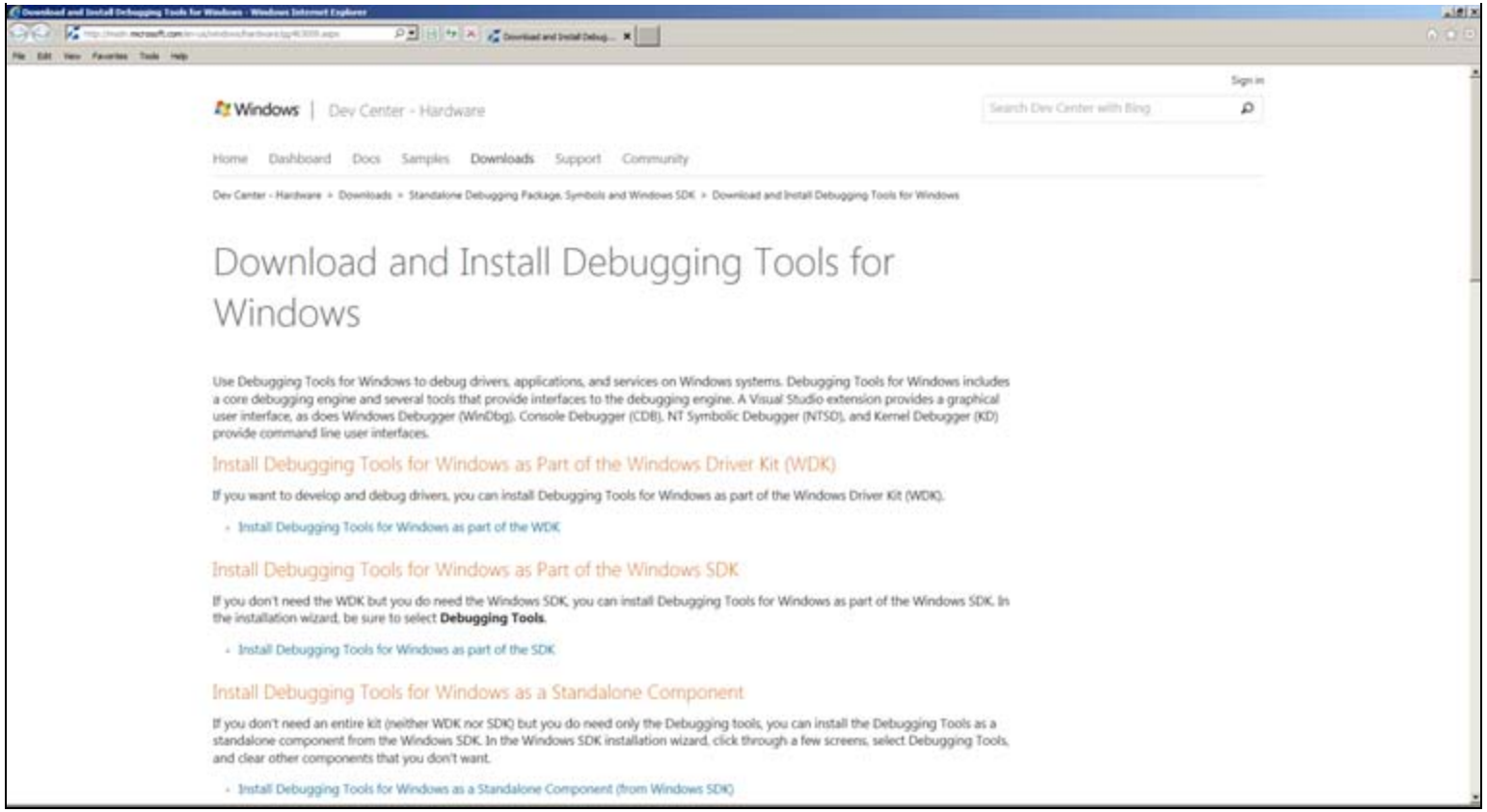

FIGURE 1: WINDOWS DEBUGGING TOOLS SITE UI

Note: The most recent version of Microsoft Debugging Tools for Windows is provided as part of the Windows SDK.

What does ADPlus Do?

ADPlus is console-based Microsoft Visual Basic script. It automates the Microsoft CDB debugger to produce memory dumps and log files that contain debug output from one or more processes. Each time that you run ADPlus, debugging information (memory dumps and text files that contain debug information) is put in a new, uniquely-named folder (such as C:\Temp\Crash_Mode__Date_01-22-2001__Time_09-41-08AM) on the local file system.

Use ADPlus to capture debugging information if you are experiencing the following problems:

- Processes that stop responding.
- Processes that consume 100 percent CPU on a single processor computer, 50 percent CPU on a dual processor computer, 25 percent CPU on a quad processor computer, and so on.
- Processes that crash or shut down unexpectedly.

Crash Mode

Crash mode is used to troubleshoot crashes that result in type of error that causes a program to quit unexpectedly. When you use ADPlus in crash mode, you must start ADPlus before the crash occurs. You can configure ADPlus to notify an administrator or a computer of a crash through the -notify switch.

```
adplus -crash -pn view.exe -o c:\Crashfolder –NoDumpOnFirst
```

First and Second Chance Exceptions

A first chance exception is "non-fatal" unless it is not handled correctly by using an error handler. If this problem occurs, the exception is raised again as a second chance exception (only a debugger can handle these). If no debugger handles a second chance exception, the application quits.

- ADPlus detects a first chance (non-fatal) exception for all types of exceptions *except* unknown and EH exceptions.
- ADPlus detects a second chance (fatal) exception for *all* types of exceptions (including EH and unknown exceptions.

Procedure: Creating an On-crash Memory Dump for InTouch WindowViewer

1. Download and install Microsoft Debugging Tools for Windows from the following link: <**http://www.microsoft.com/whdc/devtools/debugging/installx86.mspx**>
2. Install Microsoft Debugging Tools on target machine.
3. Open command prompt (from Stat menu /Run then type **cmd**).

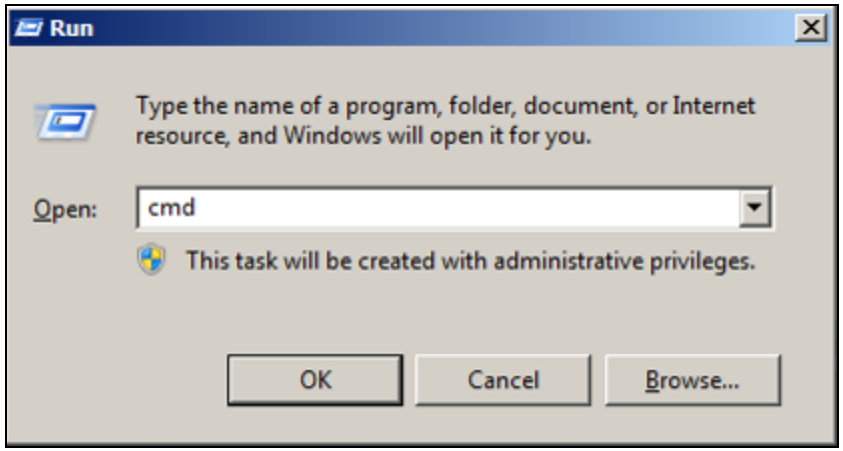

FIGURE 2: CMD

4. From the cmd window, navigate to the debugger tools installation directory. In this example the path is **C:\Program Files\Debugging Tools for Windows (x86)** as shown in Figure 3 (below).
5. Run the **Cscript** command one time and check the result (Figure 3 below).

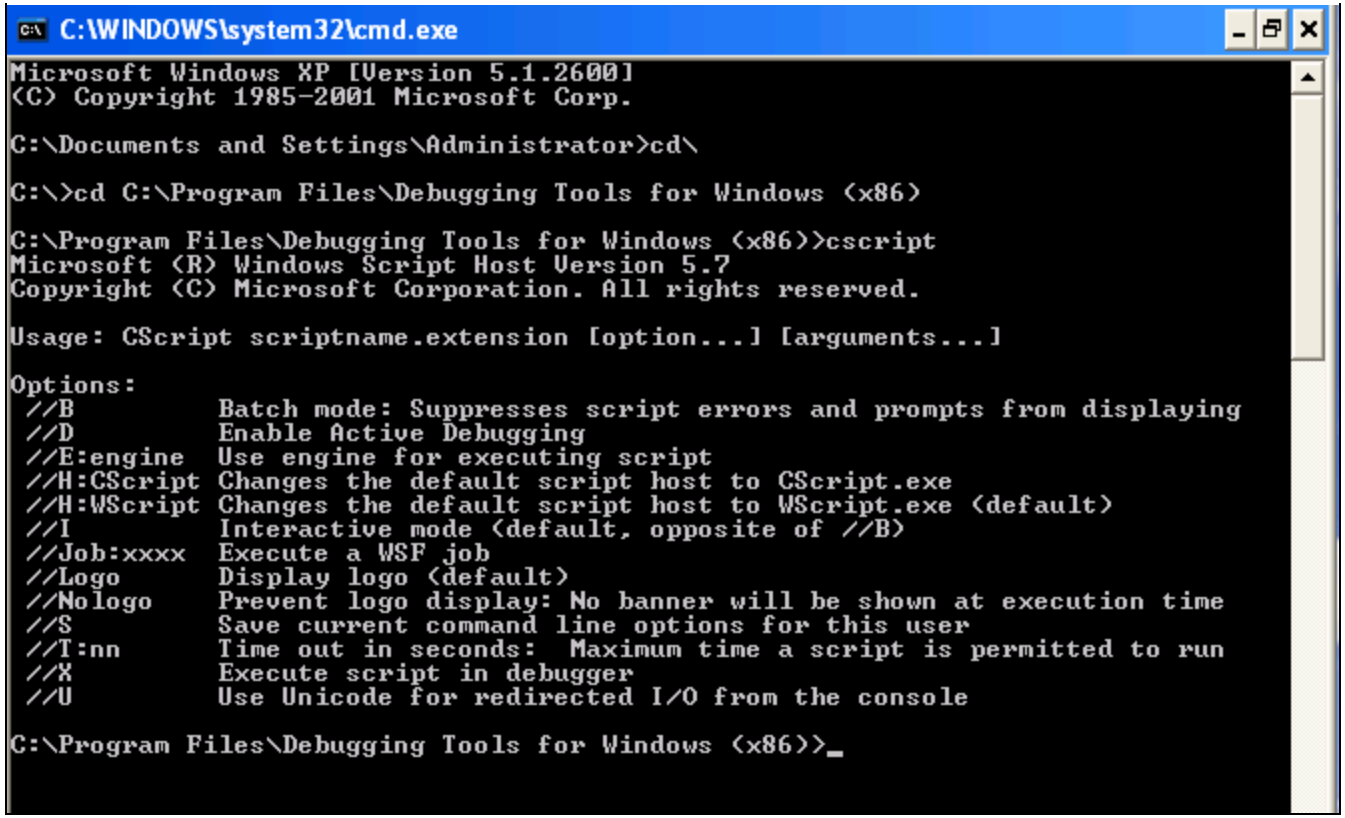

FIGURE 3: CSCRIPT COMMAND RETURN

6. Create a new folder on your **C** Drive and name it **Crashfolder**, to store the generated dump files.
7. Type the following command to attach debugger to the target process:

   ```
   adplus -crash -pn view.exe -o c:\Crashfolder –NoDumpOnFirst
   ```

   Dump files will be stored in **C:\Crashfolder**.

8. Check the confirmation message.

   If it's in red there is something wrong, and you need to fix it before you continue. In this example **View.exe** was not running (Figure 4 below).

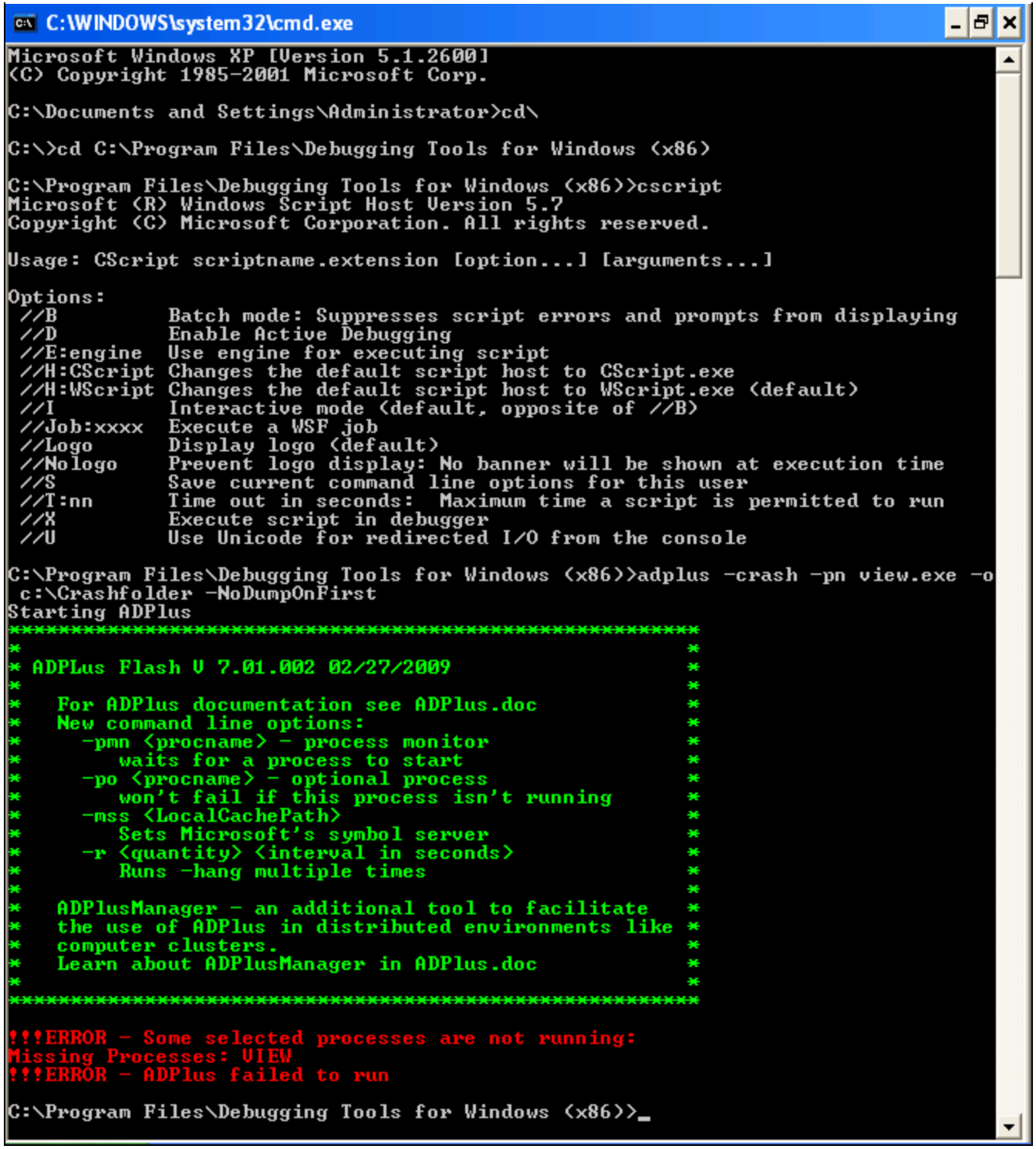

Figure 4: View.exe is not Running

9. Make sure your target process is running (in this example InTouch Viewer is running) and run the command again.

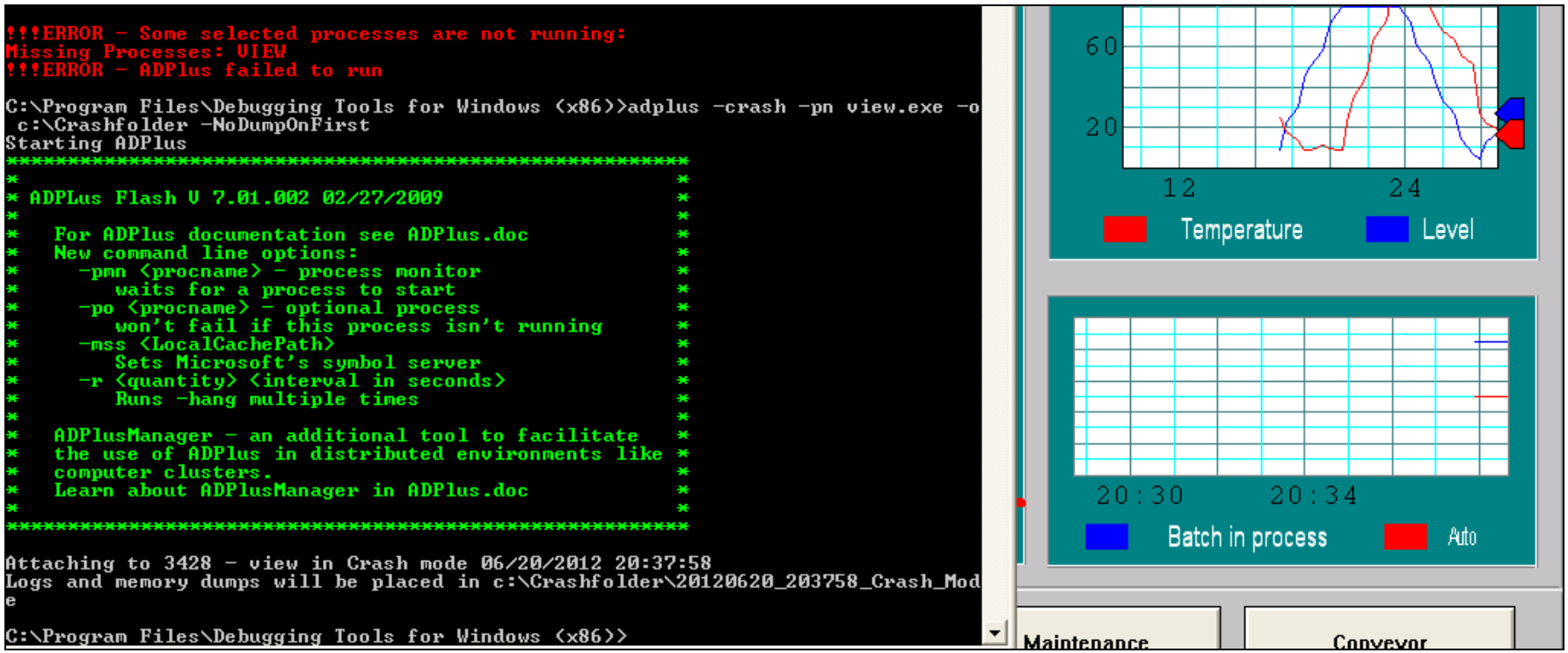

FIGURE 5: COMMAND SUCCESSFUL AND PROCESS ATTACHED

10. Check the confirmation message and make sure the View.exe process shows as attaching. A new **cdb.exe** window opens to indicate the starting of crash mode.

11. Resize the CDB window so that it is smaller (Figure 6 below).

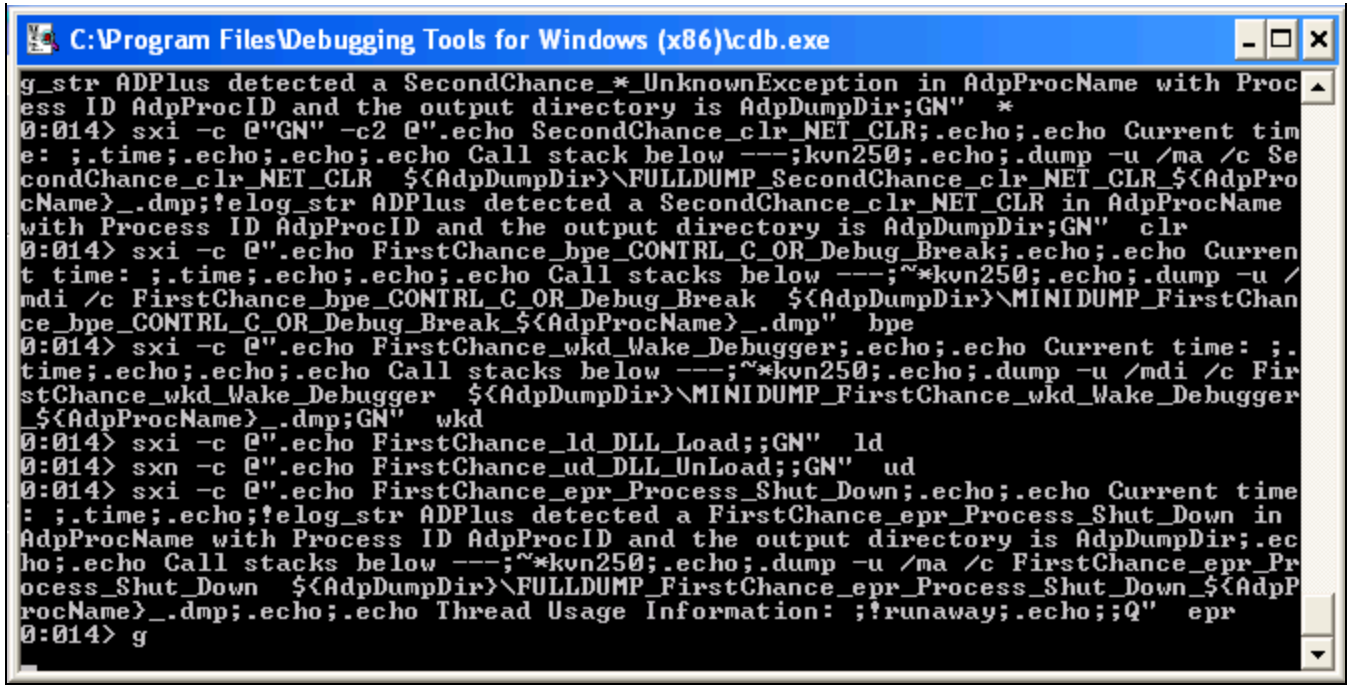

FIGURE 6: RESIZE THE CDB.EXE WINDOW

Once the process crashes, dumps will be collected in **C:\Crashfolder**.

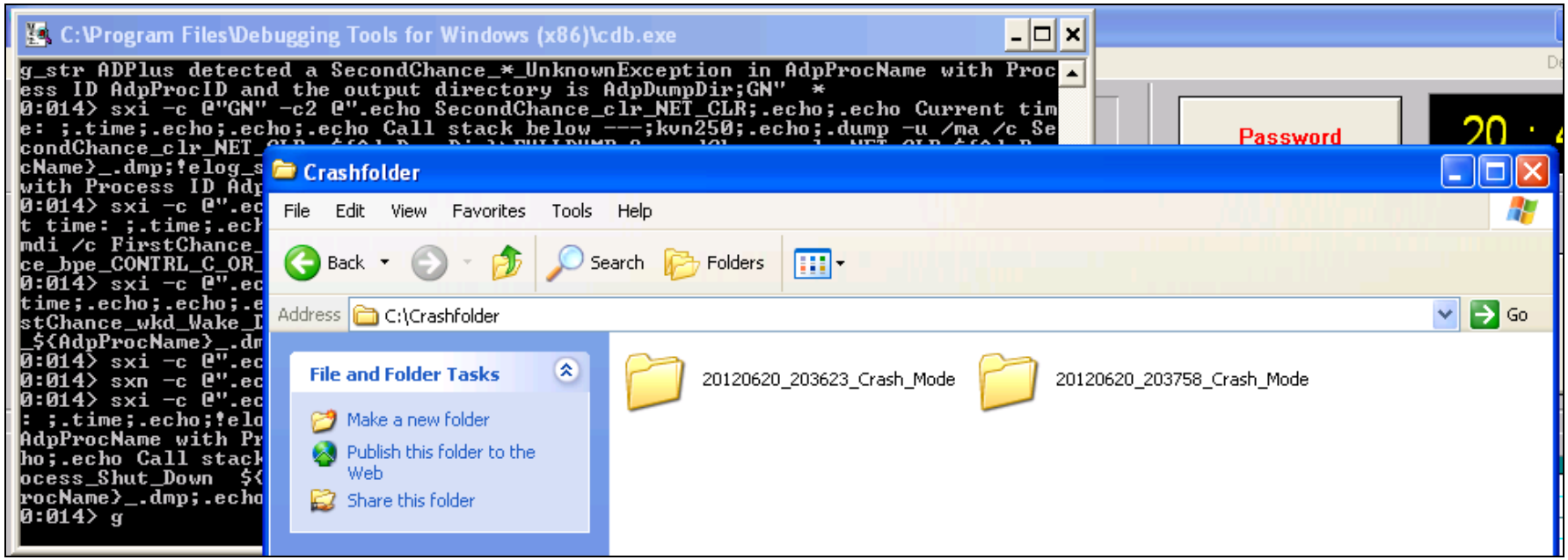

FIGURE 7: CRASHFOLDER FILE LOCATION

Note: When ADPlus is running in crash mode, a debugger remains attached to each process that is specified on the command line for the lifetime of that process until:

- A fatal exception is trapped and the process quits unexpectedly, or
- Until you press the **CTRL+C** keys to detach the debugger from that process.

- To manually detach the debugger from the process, maximize the debugger window, and then press **CTRL + C** to break into the debugger.

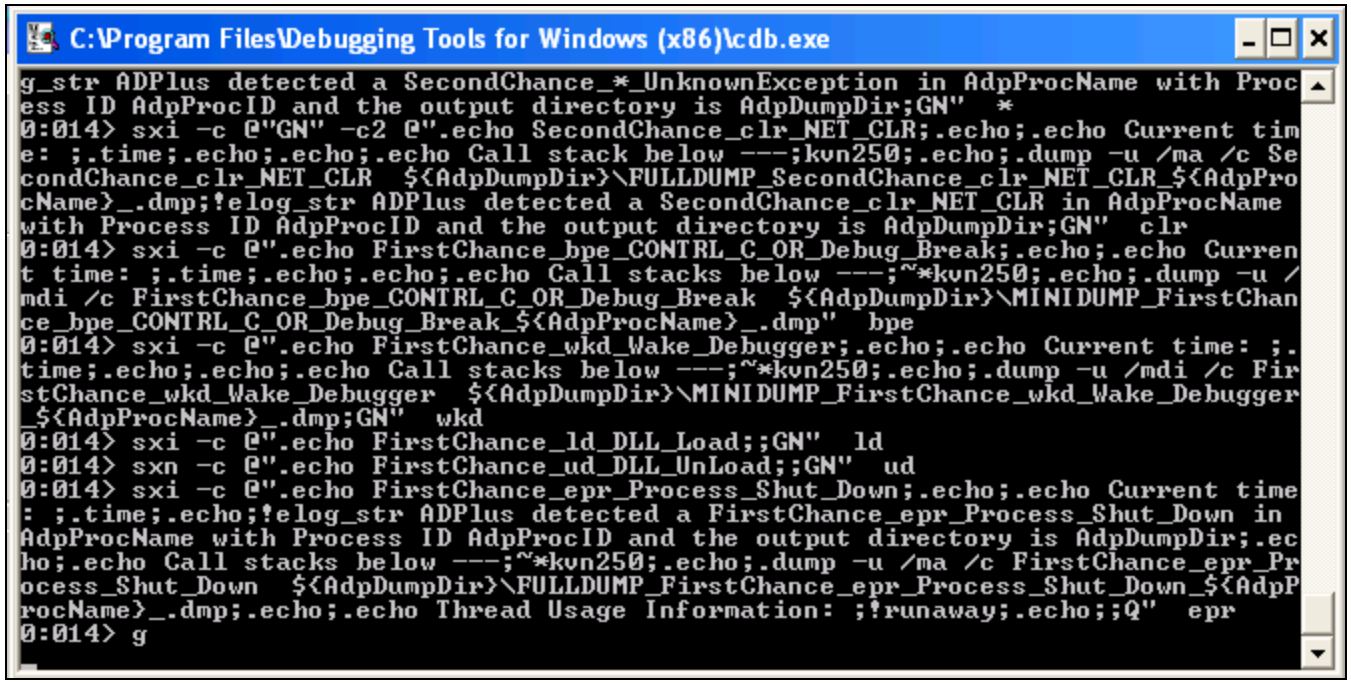

Figure 8: Break the Debugger

- When you press **CTRL + C**, ADPlus traps this command, starts to list the stacks for all threads to a log file, and then produces a mini memory dump record of the process before it detaches from the debugger (Figure 9 below).

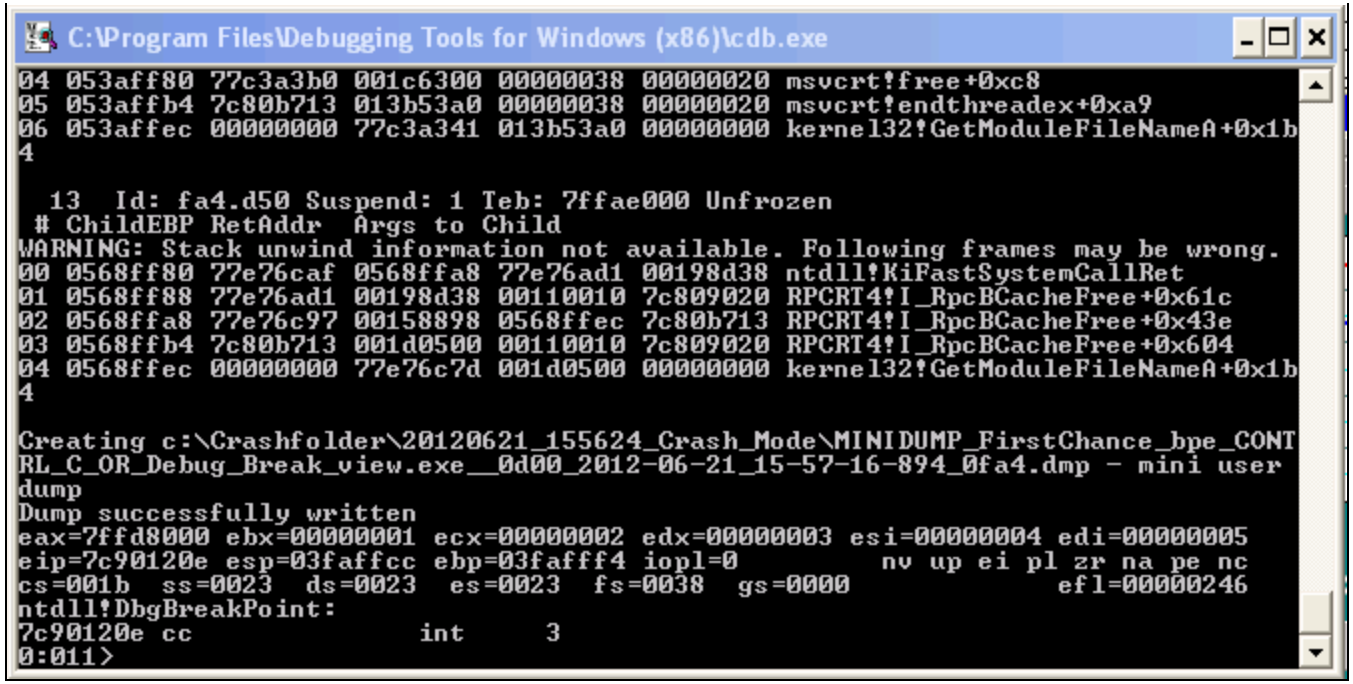

Figure 9: Stack and Mini User Dump

Hang Mode

Hang mode is used to troubleshoot process hangs, 100 percent CPU utilization, and other problems that do not involve a crash. When you use ADPlus in hang mode, you must wait until the process or processes stop responding before you run the script.

Unlike crash mode, the hang mode is not persistent.

adplus - hang -pn view.exe -o c:\Crashfolder –NoDumpOnFirst

Procedure: Creating an On-Hang Memory Dump for InTouch WindowViewer

1. Repeat steps of the Crash Example **from 1 to 6 (above)**.
2. On the 8th step type the following command to attach debugger to the target process:

```
adplus -hang -pn view.exe -o c:\Crashfolder –NoDumpOnFirst
```

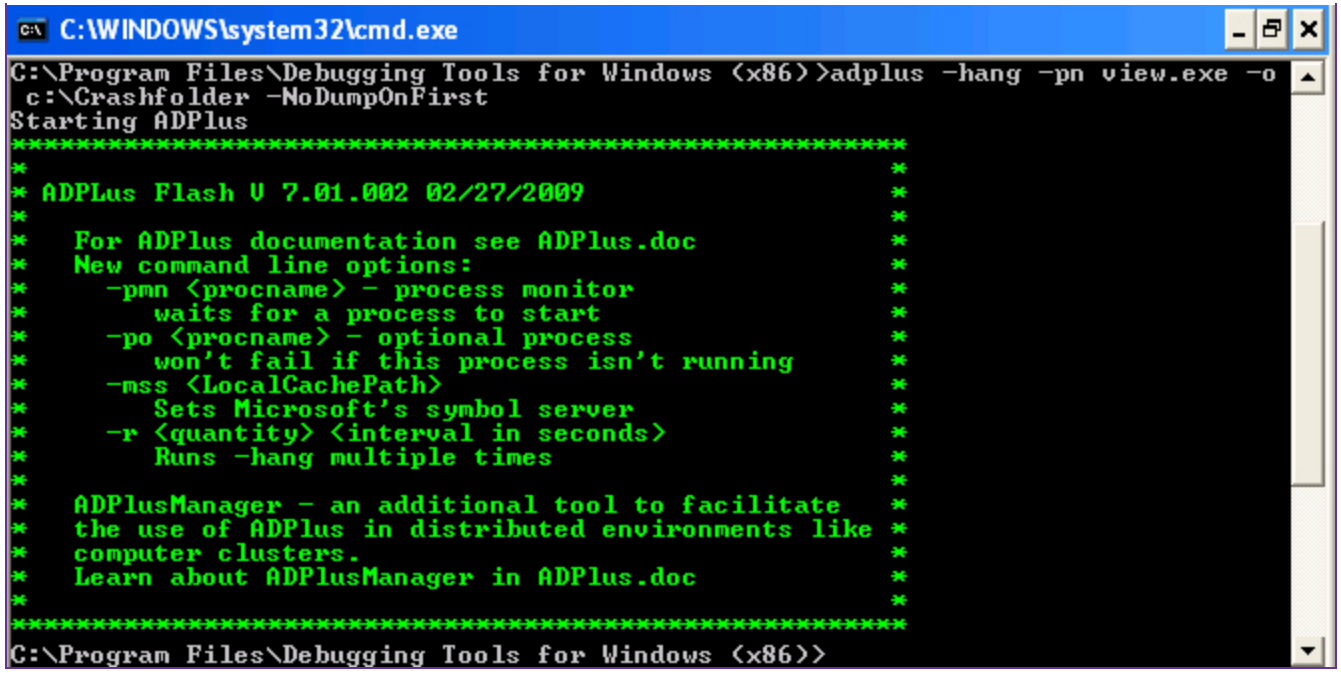

FIGURE 10: -HANG COMMAND

Note: To run ADPlus in **hang** mode, you must run the command while the process is hanging, and not before it hangs.

3. Continue with steps **8 to 11 from the Crash example (above)**.

Analyzing the Dump Files

When you launch the debugger it creates the necessary root folder and some log files. The memory dumps are created in subfolders under the **C:\Dumps** directory. The subfolders are named automatically with the process name and date/time to identify the debugging sessions.

In most cases the memory dump file should be sent to **Wonderware Technical Support** where it will be analyzed.

You can also do the following:

- If you are interested in doing some basic analysis, search the **debugger.chm** help file for **Analyzing a User-Mode Dump File with WinDbg**. This topic includes the basic steps for opening a memory dump file using WinDbg.
- Search for the debugger extension commands **!dlls** and **!analyze**.

  • **!dlls** creates a report about the DLLs that the process loaded just before the memory dump capture.

  • **!analyze** runs a set of basic analysis scripts and then prints out a basic report. The report explains the type of problem the process might have encountered before the memory dump was generated.

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Back to top