Welcome to the Virtual CICS user group newsletter. The Virtual CICS user group at virtualcics.hostbridge.com is an independently-operated vendor-neutral site run by and for the CICS user community.

Virtual CICS user group presentation

The latest webinar from the Virtual CICS user group was entitled, “Taking the pain out of CICS application debugging”. It was presented by Wendell Lovewell, product manager and systems programmer for MacKinney Systems.

Wendell Lovewell is a product manager and systems programmer for MacKinney Systems. For more than 40 years, he has been providing product support for CICS, ISPF, and batch products, and system programming support for z/OS, z/VSE, z/VM, Windows Server, and Linux. His favourite programming languages include REXX, COBOL, and Assembler.

Wendell Lovewell started his presentation by looking at three qualities of a good programmer (which he got from Larry Wall, original author of the Perl Programming Languages):

1. Laziness. You’ll go to great lengths to reduce overall energy expenditure.

Figure 1: System console message that an abend has occurred

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Impatience. The anger you feel when the computer is being lazy.

Hubris. Excessive pride that makes you write/maintain programs.

Wendell went on to look at how to be a ‘better’ programmer, reminding us that our computer can do a gazillion things a second, and asking how many we can do? He suggested that we should let the computer do more, so we can do more! He said that we should stop doing time-consuming stuff ourselves.

Wendell went on to ask: when it comes to diagnosing CICS application problems, what is most painful about the way you resolve them? His answer was:

- Reading Dumps
- Analyzing Traces
- Stepping through with Debuggers.

A transaction abending is probably one of the more common indicators that something went wrong. Depending on the system settings, a ‘dump’ can be created. A dump contains the contents of memory used by the program, and some indication of what instruction the program was trying to execute.

Messages notifying you of an abend can appear:

- On the terminal
- On the system console (see Figure 1)
- In one of the ‘MSGUSR’ Transient Data destinations.

The first thing you have to know to read a dump is where it is and what kind of dump (if any) was produced for the problem. There are two types of CICS dump:

- Transaction Dump, which contains memory (data and code) used by a single CICS transaction. Messages will be sent to the CDUL* transient data destination if a transaction dump was produced.
  - System Dump, which contains most of the memory allocated to an entire CICS region. Because of their large size, system dumps are often suppressed by CICS.

There are two dump datasets, DFHDMPA and DFHDMPB. Both are defined in the JCL for the CICS region, but only one is active at a time. The CEMT SET DUMP SWITCH command is used to control which is active. You need to know the transaction ID and which dump data set (A or B) was used. You also need JCL to ‘print’ the dump. The suffix for DFHDUXxx is the 3-digit CICS release level (TS5.5 = 720, TS5.6 = 730, etc). DFHDMPDS must
specify the correct (A or B) dataset. You can specify inclusion criteria, such as the transaction ID to be printed.

Wendell said that printing a dump is the easy part, and then went on to look at what you have to know to read a dump.

Figure 2 shows an example of a transaction dump. You need to know lots of information to read one, for example that offset x'1AE' goes to instruction x'1D05'.

When it comes to system dumps, if you really need one, you'll probably have to enable CICS for it. There are many types including an SR0001 dump. You need to use CEMT SET SYDUMPCODE to set the MAX count higher than the Cur count. You need to recreate the problem. The console should indicate that a system dump was taken. The second thing to know about system dumps is that they are BIG! Wendell did not recommend using them unless IBM or a software vendor asks for one.

The advantage of using dumps is that they are free (every z/OS system can produce a dump). And, with training, IPCS can be used to speed the process. No setup is needed prior to the problem, but you do need to ensure that your system has space available for the dump. And, sometimes, they are the only way to resolve an issue.

The disadvantages of using dumps are that reading a dump is usually very labour-intensive and time-consuming. (There are vendor products, and IBM’s IPCS, which can be used to simplify using a dump.) A great deal of technical knowledge is required to read dumps. They are ‘point in time’ only. That means it can be difficult to determine program flow prior to the abend. However, the trace table entries included in the dump can help.

CICS has an integrated tracing facility that can record every interaction your program has with CICS. Trace entries are recorded in two locations: Internal and External. The internal trace is usually active but tends to wrap quickly. There are two external (AUX) trace files: DFHAUXT and DFHBUXT. The CETR transaction is used to control the Trace Facility. You usually have to start it, and note which dataset is used. You then run your test, and stop the trace as soon as possible. The trace dataset, DFHAUXT, now contains records for your trace. They can be ‘printed’ using program DFHTUunn, where nnn = system release (eg TS5.6 = ‘730’).
Using an AUXTRACE listing is like looking for a needle in a really big haystack! Almost everything CICS does under the covers is exposed. Each domain call is shown with the matching ENTRY and EXIT displays. With an editor (or IPCS), you can find *EXC* entries for the exception, but it is hard.

There are products, including IPCS, that help you decipher the trace data, but without a lot of knowledge (ie experience), you may find trace data, like system dumps, something you only send to IBM or a vendor. One thing also to note, DFHDUnnn (the dump 'print' program) includes an abbreviated trace table following the dump of memory.

The advantages of using AUXTRACE are that it’s free (built into every version of CICS). And, with training, IPCS can be used to speed the process. No setup is needed prior to the problem, although, depending on the application, you may need large trace datasets. And, sometimes, using CICS trace is the only way to resolve an issue.

The disadvantages to using AUXTRACE are that a great deal of technical knowledge is required to use them, although there are products that make it easier. Lots of data generated, which means that it's likely to take a long time to identify a problem.

A third application diagnosis tool is the Debugger. This is an add-on product that allows you to step through your program, generally one statement at a time. You can display and change the program’s data, and alter the sequence of statements that get executed.

Debuggers work by matching a program’s executable code with the matching compile or assembly listing. When the machine code for a particular statement is about to be executed, the debugger will position your display to that statement in the compile/assembly listing. This requires that the debugger has access to either the ADATA generated by the compiler/assembler, or the

Figure 4: Example Task Recorder screen
listing. There is often a step added to the compiler JCL to make it ready for debugging.

Debuggers are real-time: you can’t use a debugger to diagnose a problem that occurred previously. The debugger must be told to start debugging a program. Each debugger has its own way to do this. The user interface can be a 3270 session or web browser. An example of using a debugger is shown in Figure 3. You can step through the code one line at a time, or continue to selected “halt points” to avoid stepping through each line. Variables can be displayed and changed in three ways, as they change, on request, or all the time. If the program is abending, you can just continue until the abend occurs. You can also change the order of the program statements.

The advantages of using debuggers are that you can watch your program executing. You can also change data on-the-fly to test exceptions. You can verify the results of every statement (or you can skip to the interesting parts). And it’s fairly easy to use. If you can code, you will understand the debugger output.

The disadvantages of using debuggers are that it can take a very long time to observe every line of code! However, functions like ‘continue’ and ‘halt’ can reduce this, but debugging sessions tend to take a long time. Sometimes, observing the program changes the results, particularly timing-sensitive issues. And, generally, you have to be ‘live and in person’. If something fails when you’re not there, a debugger won’t show you what happened, and you may have to read a dump anyway.

Wendell went on to suggest that there could be a better way of doing things. Something that could combine the ability to capture everything that happened, like a trace, with the ability to display the contents of any or all variables, like a dump (where you could see not only all the variables in every ‘step’, but let the tool compare and point out the differences each step made!). Plus, have the ability to display every step, like a debugger, but not have to wait for it. He then went on to describe a new product called CICS Task Recorder (see Figure 4).

A copy of Wendell Lovewell’s presentation is available for download from the Virtual CICS user group website at virtualcics.hostbridge.com/presentations/CICSSDebugJan22.pdf.

You can see and hear the whole user group meeting at https://youtu.be/bOK1fgHtu3w.

Meeting dates

The following meeting dates have been arranged for the Virtual CICS user group:

- On 18 March we have Joe Winchester, IBM Senior Technical Staff Member from Hursley, who will be discussing, “CICS and open source tooling, with a focus on Zowe”.

- The following meeting is on 10 May, when Robert Barnes, CEO Jazz Software, will be discussing “CICS Web services – bridging two worlds”.

We are using Zoom for the user group meetings.

CICS news

IntelliMagic has announced IntelliMagic Vision for z/OS release 10.9.0, which includes major enhancements to reporting on CICS SMF data that lets users monitor the performance and resource usage of applications and transactions. New functionality includes support for 19 fields in the Statistics data, and more than 70
automated Health Insights for the CICS 110 SMF data.

More information can be found at: https://www.intellimagic.com/resources/zos/news/intellimagic-vision-adds-cics-statistics-automated-analysis/.

CICS articles and blogs

CICS VR - Executing batch backout when the RCDSs are unavailable by Dionne A Nerissa in the CICS part of the IBM Z and LinuxONE Community (24 November 2021). You can find the article at: https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/dionne-a-nerissa/2021/11/24/cics-vr-executing-batch-backout-when-the-rcdss-are.


The Arcati Mainframe Yearbook 2022

Many members of the Virtual CICS user group contributed to this year’s user survey in the Arcati Mainframe Yearbook. The 2022 edition of the Yearbook is now available. It includes an annual user survey, an up-to-date directory of vendors and consultants, a resources guide, a strategy section with papers on mainframe trends and directions, a glossary of terminology, and a mainframe evolution section. The Yearbook is available in PDF format and is completely FREE to download from itech-ed.com/arcati/

About the Virtual CICS user group

The Virtual CICS user group was established as a way for individuals using IBM’s CICS TS systems to exchange information, learn new techniques, and advance their skills with the product.

The Web site at virtualcics.hostbridge.com provides a central point for coordinating periodic meetings (which contain technically-oriented topics presented in a webinar format), and provides articles, discussions, links, and other resources of interest to IBM CICS practitioners. Anyone with an interest in CICS is welcome to join the Virtual CICS user group and share in the knowledge exchange.

To share ideas, and for further information, contact trevor@itech-ed.com.

The Virtual CICS user group is free to its members.