



IBM Software Group

# Collecting Debugging Information Made Easy for TXSeries

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WebSphere® Support Technical Exchange



# Agenda

- Describe what debugging information is
- Explain why is documentation needed
- Explain when to collect documentation for a problem
- Describe the different collection scenarios
- Show how to collect the documentation
- Show where to send the documentation

# What is Debugging Information?

- Debugging information is the data produced by the region when a problem happens. It may be additional messages in the logs, additional files like system dumps, core dumps, stack dumps, traceback files, ring buffers, and trace files.
- Debugging information is more commonly referred to as “problem documentation” or just “doc” for short.

# Why is Doc Needed?

- Doc is the only way to do root cause analysis. Root cause analysis reveals the specific cause of the the problem experienced.
- TXSeries is a complex transaction processing environment. A set of problem symptoms could have many different causes. To find the root cause the doc produced is reviewed. After the review the cause may be known. For more complex problems additional doc is usually requested.

# When to Collect Doc

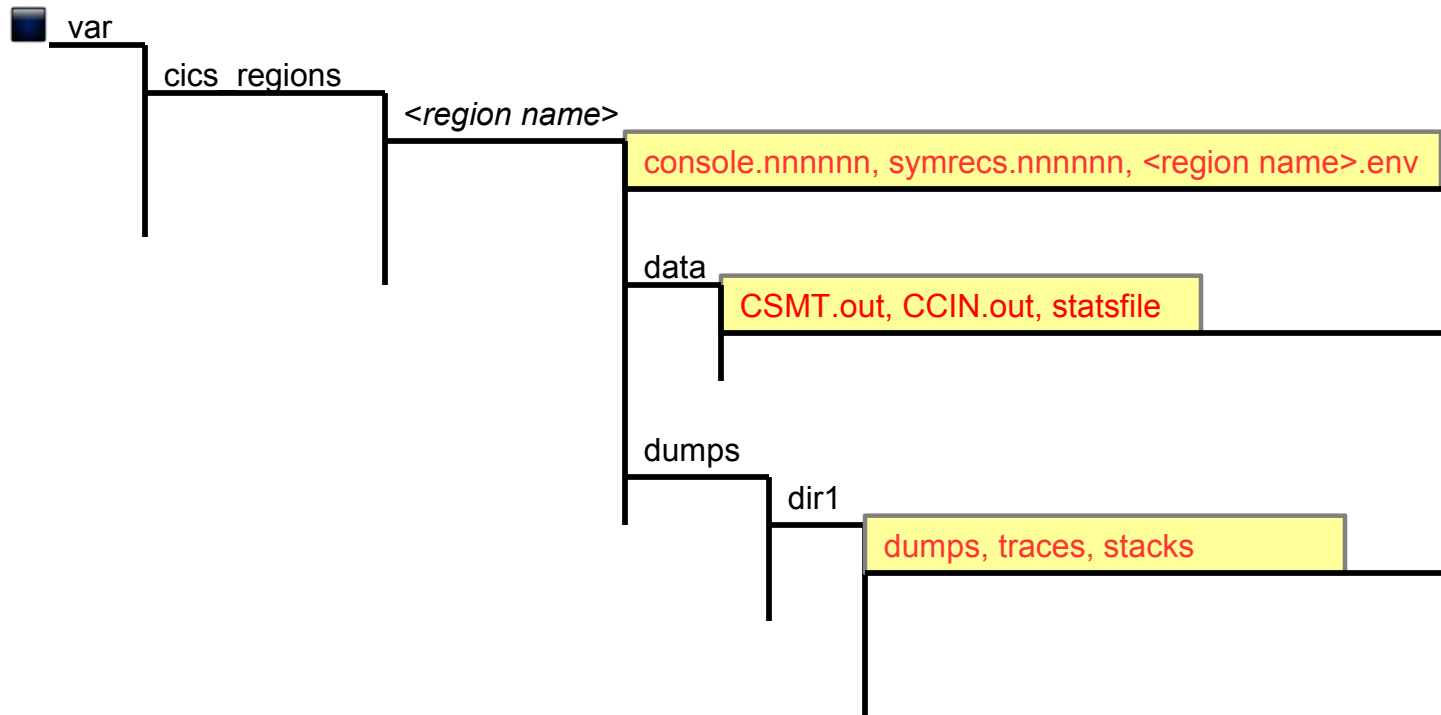
- The time to collect the doc is at the time a problem is noticed. Collecting the doc right away allows you to capture files before they are deleted or over written. A lost message or dump could be the key to resolving the problem.
- Ensure the timestamps in the files collected match up to the time of the incident.
- Some problems are noticed right away and some are not so apparent. A periodic review of the console, symrecs, CSMT.out and the dumps/dir1 directory will help in detecting a problem.

# Collecting the Doc - MustGather

- The MustGather document was built to guide you through the initial doc collection process. The document is located on the web at <http://www.ibm.com/support/docview.wss?uid=swg21229652#generalMustGather>
- Contents of the MustGather
  - ▶ List of question
  - ▶ Table for additional software details
  - ▶ List of standard items to collect
  - ▶ Pointers to additional docs for specific abends
    - Hangs, loops or waits
    - Abends or crashes
    - XA errors

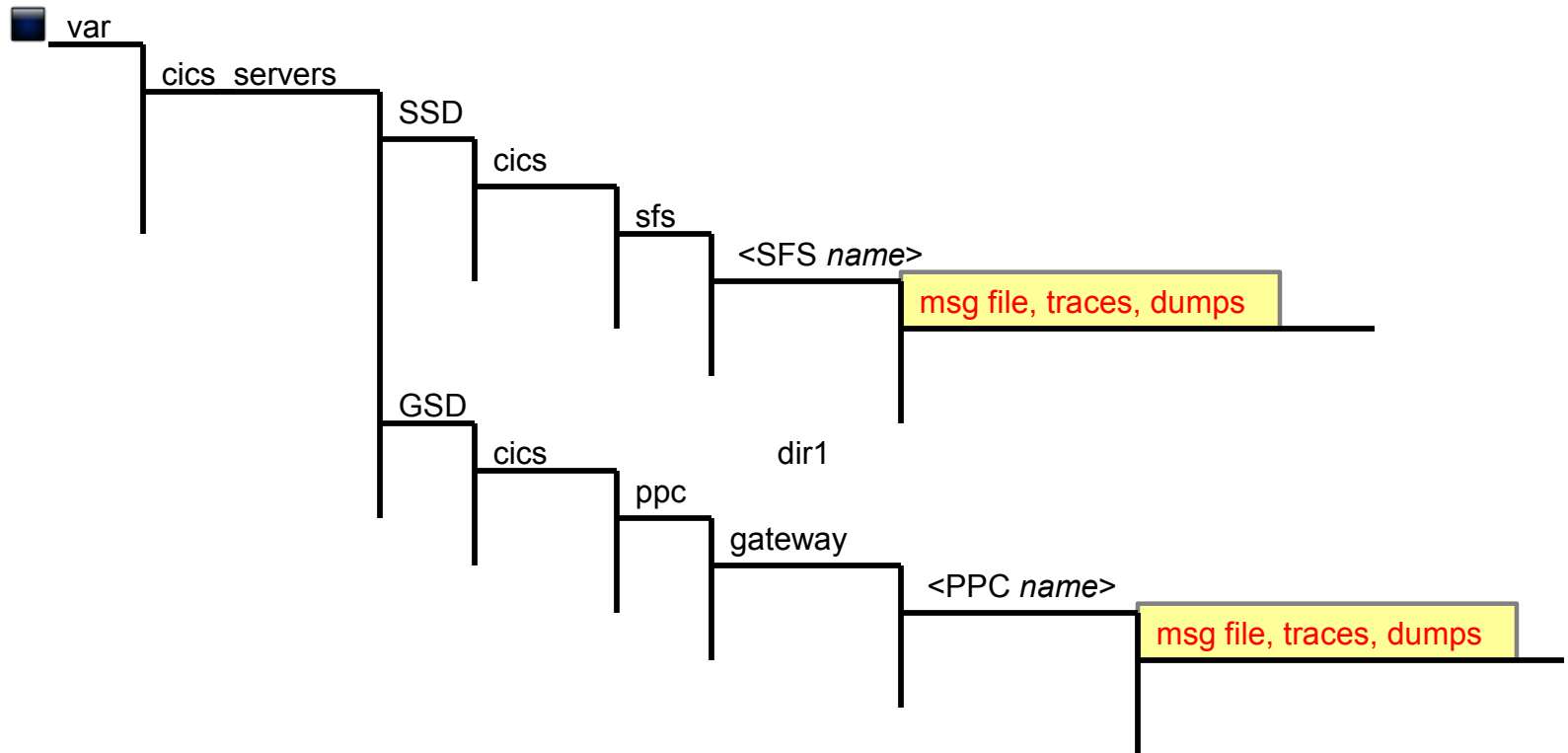
# Location of region files

- Default location



# Location of SFS and PPC files

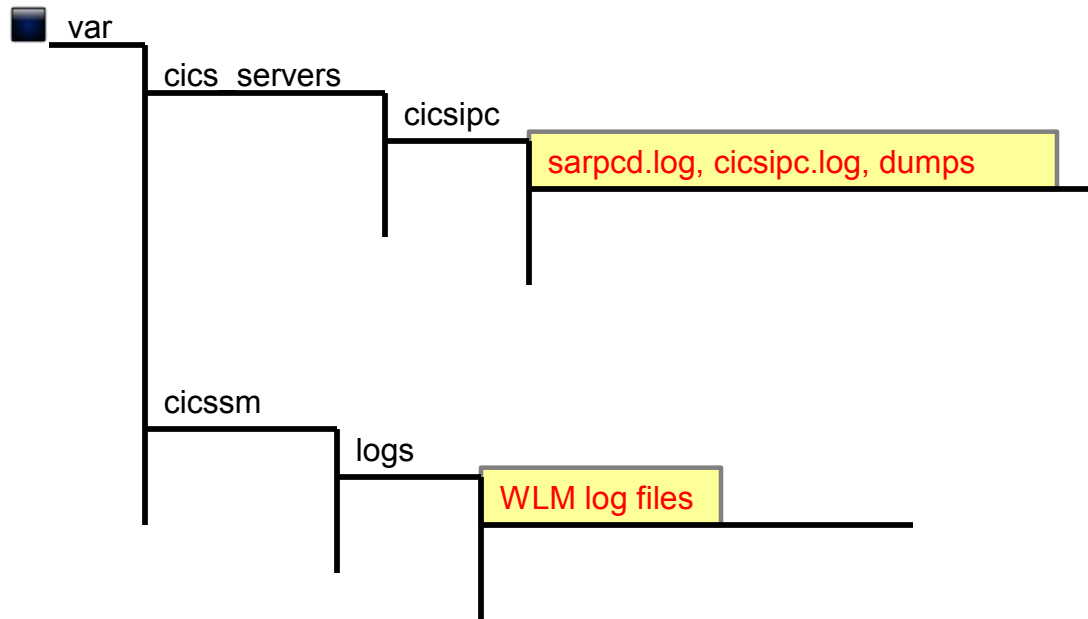
- Default location





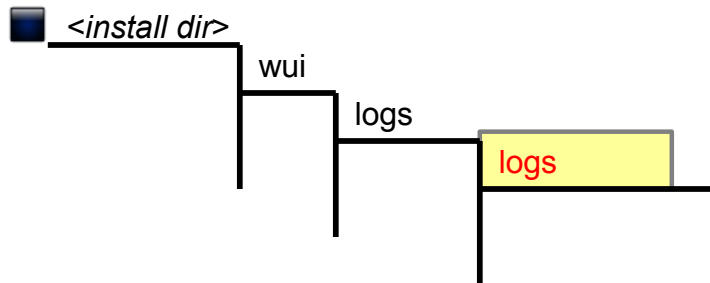
# Location of SARPC and WLM files

- Default location



# Location of Admin Console and WIU files

- Default location



- Default Install Directory Locations:

- ▶ AIX - `/usr/lpp/cics`
- ▶ Sun, HP - `/opt/cics`
- ▶ Windows - `c:\opt\cics`

# When a Region is Hung

- A region is hung, or stops processing work:
  - ▶ No transactions are processing
  - ▶ No CPU is used by any of the region processes
  - ▶ Can not open a terminal session
  
- Collect:
  - ▶ cicsedump – will produce a sysadump
    - `cicsedump <region name>`
  - ▶ One set of stack dumps.
    - For UNIX systems:  
`dumpcicsthreads1 -n 1 -r <region name>`
    - For windows the:  
`cspi.exe <region name>`
  - ▶ The required doc for the region



# When Looping is Detected

- Looping is when a process or a number of processes are using large amounts of CPU
- Collect:
  - ▶ Three sets of stack dumps:
    - For UNIX systems  
`dumpcicsthreads1 -n 3 -i 30 -r <region name>`
    - For Windows systems  
`cspi.exe <region name>`
  - ▶ The required doc for the region

# Stack Dump Scripts

- Scripts were built to automate collecting stack dumps of the CICS region processes. Unix systems use the utility `dumppcicsthreads1`. On AIX and Sun the `dbx` debugger is required. If your AIX system has the `procstack` utility instead of `dbx` use the `dumppcicsproc1` script.
- For HP, use script `dumppcicsthreads1_HP`. The GDB debugger is used.
- Windows systems require a different script called `CSPI`. It uses the native Windows utilities and a Resource Toolkit utility called `sleep`.
  
- The scripts are located under the TXSeries Support Page and can be found with a search.
  - ▶ For UNIX systems - `dumppcicsthreads` utilities:  
<http://www-01.ibm.com/support/docview.wss?uid=swg21218807>
  - ▶ For Windows - `CSPI` utility:  
<http://www-01.ibm.com/support/docview.wss?uid=swg21438051>

# Core Dumps are Needed

- Some problems in TXSeries will cause a core dump to be generated. Core dumps can be an important tool in determining the root cause of a problem. Much work has been done over the years to generate core dumps for certain problems to capture the needed information.
- There have been some issues in the past with systems having the core file facility restricted. Doing this will restrict the generation of core files or make them incomplete which eliminates the ability to resolve the problem. It is important for problem resolution to allow core files to generate.



# Enabling Core Dumps

- Verify the facility is enabled with command:  
`lsattr -El sys0 | grep fullcore`
- The result will look like this when enabled:  
`fullcore true Enable full CORE dump True`
- Enable the fullcore file with command:  
`chdev -l sys0 -a fullcore=true`
- The hard and soft ulimit for cores has to be set to unlimited. Verify with”  
`ulimit -a` Shows the soft limits  
`ulimit -a -H` Shows the hard limits
- Set the ulimits:  
`ulimit -c unlimited`  
`ulimit -c -H unlimited`

# Collecting Trace

- Some problems require a trace to determine the problem. TXSeries has a few different types of traces depending on the issue.
  - ▶ Region tracing for problems with the region internals.
  - ▶ Command Line tracing for issues with external commands like cicscp.
  - ▶ Toolkit tracing for issues with the SFS and PPC.
  - ▶ SARPC tracing for problems related to the sarpcd daemon and interprocess communications.



# Region Tracing

- To start a trace at region start up put “CICSTRACE=1” in the environment file for the region.
- To start the trace while the region is up, execute these commands at a CICS terminal for the region
  - CEMT SET TRACE ON
  - CECI TRACE SYSTEM ON
  - CEMT SET AUXTRACE ON
- The trace will be in the data directory under the region.
- The other trace available is an “EI” trace. It captures the EXEC CICS API calls from the application programs. An EI trace is an alternative to using the EDF facility under some circumstances.
- Formatting the traces is done with the cicstfmt command. Go to the directory the trace is in and use command
  - `cicstfmt -f tracefile -o tracefile.fmt`

# Command Line Tracing

- Set environment variable

```
set CICSTRACE=1
export CICSTRACE
```
- Verify it is set properly with command

```
env | grep CICSTRACE
```
- When a script, such as `cicscp`, is run with this variable set, you will find files in the `/tmp` directory name in the format

```
cics*.<pid>.cicstrc
```
- The files must be formatted. From the `/tmp` dir do:

```
cicstfmt <trace_file_name> or
cicstfmt * to format all files at once
```

# Toolkit Tracing

- Toolkit tracing is for problems in the SFS or PPC. This trace is dynamic and requires the server to be active.
- The trace will generate ringbuffer files internally. They are dumped to a file if requested. The file will be in the directory with the msg file.
- A trace specification is needed to have the different internal components generate trace.
- The support team will supply a trace spec when requesting this type of trace.
- A sample of turning on the trace in the PPC Gateway:
  - ▶ tkadmin trace specification -s ./:/cics/ppc/gateway/cicsgwy1  
ppc=ppc\_svr=ppc\_sna=ppc\_tcp=ppc\_cplic=all
  - ▶ tkadmin redirect trace -s ./:/cics/ppc/gateway/cicsgwy1 trace -dest /tmp/kevin.tmp
- Turn off the trace with:
  - ▶ tkadmin redirect trace -s ./:/cics/ppc/gateway/cicsgwy1 trace
  - ▶ tkadmin trace specification -s ./:/cics/ppc/gateway/cicsgwy1 all=default

# Toolkit Tracing cont.

- The tracing can be started when the server starts by setting environment variables in the shell before starting the server. The environment variables can be set at the system level depending on the need. Setting them at the system level will affect every process using the toolkit libraries, like the region.
- `CICS_TK_TRACE_RING_SIZE=1048576`
- `CICS_TK_TRACE=ppc_common=ppc_cplic=ppc_gwy=ppc_tcp=trpc=all`
- `CICS_TK_TRACE_REDIRECT=all=FILE:ppcfail.trace`
- Stopping the trace requires the environment variables be removed and the servers restarted.



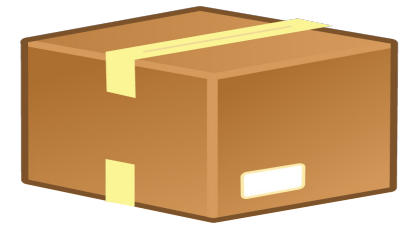
# Review RD.stanza Settings

- When the console shows dumps are produced but they are not found  
DumpName="dumps"  
CoreDumpName="dir1"
- When trace is requested and is not produced, check  
TraceSystemSpec="all=4"  
TraceDirectorySystem="/var/cics\_regions/%R/dumps/dir1"
- When the region reports memory was over written or there are abends for memory corruption make this change.  
SafetyLevel=normal
- When the stats file is not in the data directory  
StatFile="statsfile"

# Additional Environment Variables

- `CICS_CORE_ON_ASRA=1`  
Generates a core for signal 11 errors and some application program problems.

# Submitting Problem Documentation to IBM



- A PMR has to be open
- Bundle all the files into one file
  - ▶ zip, bzip, tar and compress – Not rar
  - ▶ First part of file name is the PMR number
- Upload by FTP, Secure FTP, HTTP(s) or email
- Details at  
<http://www.ibm.com/de/support/ecurep/index.html>

# Summary

- What is debugging information
- Why documentation is needed
- When to collect documentation
- Different collection situations
- How to collect the documentation
- Where to send the documentation



# Additional WebSphere Product Resources

- Learn about upcoming WebSphere Support Technical Exchange webcasts, and access previously recorded presentations at:  
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