Debugging Web Services for CICS System Programmers

Charlie Wiese, CICS Early Programs
IBM Corporation

August 9th, 2011
Session 09615
Acknowledgements

• The following are trademarks of International Business Machines Corporation in the United States, other countries, or both: IBM, CICS, CICS TS, CICS Transaction Server, DB2, MQ, OS/390, S/390, WebSphere, z/OS, zSeries.

• Java, and all Java-based trademarks and logos, are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

• Microsoft, Windows, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

• Other company, product, and service names and logos may be trademarks or service marks of others.
Agenda

• Avoiding Problems and Dodging Pitfalls
  • Testing your Web services with Eclipse

• Identifying Problems and Getting Documentation

• Diagnosis Techniques
  • Verbexit displays
  • Working with Traces

• Sample Problems
CICS WEB SERVICES
Avoiding Problems and Dodging Pitfalls
Avoid Common Problems

• See WSTE presentation, “Web Services Problems and Pitfalls” for further details – Technote #7012643
  http://www.ibm.com/support/docview.wss?rs=1083&uid=swg27012643
• Check your maintenance levels
  • This includes both CICS modules, as well as the “mapping-level” parameter in Web Services Assistant utilities
• Ensure you have sufficient HFS dataset access
  • WSBIND, Pipeline CONFIGFILE, WSDIR
• Install and test the supplied sample Web service application
• Search the CICS Support pages to see if you’ve encountered a ‘known problem’
  http://www.ibm.com/cics/tserver/support/
Recommendations: Web services Assistant (WSA)

- Use the latest MAPPING-LEVEL to ensure the most recent WSA support

<table>
<thead>
<tr>
<th>MAPPING-LEVEL</th>
<th>PTF/Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>CICS/TS 3.1 base</td>
</tr>
<tr>
<td>1.1</td>
<td>PK15904</td>
</tr>
<tr>
<td>1.2</td>
<td>PK23547</td>
</tr>
<tr>
<td>2.0</td>
<td>CICS/TS 3.2 base</td>
</tr>
<tr>
<td>2.1</td>
<td>PK59794</td>
</tr>
<tr>
<td>2.2</td>
<td>PK69738</td>
</tr>
<tr>
<td>3.0</td>
<td>CICS/TS 4.1 base</td>
</tr>
</tbody>
</table>

- Unlike other CICS maintenance, WSA support enhancements are NOT automatically incorporated into WSAs
- Caution is advised, as this may result in unintended changes to the generated artifacts (WSBind, Copybook, and WSDL files)
- Refer to CICS InfoCenter, “Mapping levels for the CICS assistants” for more details

- Verify you’re using the correct input parameters
  - For example, it’s invalid to specify PGMNAME for a Web service requester
  - Be aware of the case-sensitive parameters
Common Problems: Deployment

- Performance problems with the CICS WSA
  - Check your LE configuration
  - Additional details available in Technote #1249544
    http://www.ibm.com/support/docview.wss?rs=1083&uid=swg21249544

- WSDL or WSBind errors ("deployment errors")
  - Unusable WSDL
  - Unsupported features
  - Unable to install PIPELINE or WEBSERVICE resource
    - Just because an INSTALL completed, doesn’t mean it was successful!
    - Use CEMT to inquire against the status of the appropriate resources
    - Diagnosis: Messages in Logs, and Trace of the install with PI=1-2
Common Problems: Runtime

• Access from a Browser
  • (not appropriate for Web Services)

• Response time is longer than expected
  • Can be caused by the TCP/IP “DELAYACKS” parameter
  • Code NODELAYACKS on the TCPCONFIG statement
    • DELAYACKS can still override this setting for specific PORT, PORTRANGE, BEGINROUTES, or GATEWAY statements
  • Refer to Technote #1250026 for further details
Common Problems: CICS and HFS

- Insufficient HFS dataset access
  - Example showing an error accessing the Pickup shelf in a PIPELINE resource definition:
    DFHPI0705 E 13/01/2006 23:10:54 DBDCCICS CICSUSER PIPELINE EXPIPE02 encountered an error writing the configuration to the derived shelf /var/cicsts/DBDCCICS/PIPELINE/EXPIPE02/. The response code from the HFS write was X'00000081' and the reason code was 'X'0594003D'.

- Corrupt WSBIND file
  - Symptom: DFHPI0914 WEBSERVICE *webservice* is unusable because the WSBIND file is corrupt
  - If you generated your WSBIND file on a distributed platform -- for example, Rational Developer for z (RD/z) -- make sure you transferred the file to z/OS in BIN (binary) mode
Testing A Web Service Provider with Eclipse

• Eclipse provides a native method for testing a Web Services application. This can be used to exercise your application, and to observe the data flow between your distributed workstation and CICS.

• For an excellent narrative of this technique, see “Testing CICS Web services (Technote #1268824)”
Testing your Provider with Eclipse: A look at the SOAP Response envelope

```xml
xmlns:q0="http://www.DFH0XCMN.DFH0XCP4.Request.com"
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <SOAP-ENV:Body>
    <DFH0XCMNOperationResponse
      xmlns="http://www.DFH0XCMN.DFH0XCP4.Response.com">
      <ca_request_id>01INQS</ca_request_id>
      <ca_return_code>20</ca_return_code>
      <ca_response_message>ITEM NOT FOUND</ca_response_message>
      <ca_inquire_single>
        <ca_item_ref_req>41</ca_item_ref_req>
        <filler1>0</filler1>
        <filler2>0</filler2>
      </ca_inquire_single>
      <ca_single_item>
        <ca_sngl_item_ref>0</ca_sngl_item_ref>
        <ca_sngl_description />
        <ca_sngl_department>0</ca_sngl_department>
        <ca_sngl_cost />
        <in_sngl_stock>0</in_sngl_stock>
        <on_sngl_order>0</on_sngl_order>
      </ca_single_item>
      <ca_inquire_single>
    </DFH0XCMNOperationResponse>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```
CICS WEB SERVICES

Identifying Problems and Getting Documentation
Identifying Problems (Runtime)

- Abends

- MSGUSR log
  - CICS-supplied messages: Use these to learn about errors you’re receiving, and to assist with problem determination
  - Messages here may also give you the opportunity to capture documentation at a key point in Web Services processing

- SOAPFAULT message
  - Useful for both Requesters and Providers
Identifying Problems (Tooling)

- Batch Job
  - Joblog
  - SYSPRINT
  - HFS error log (specified by the LOGFILE parameter)
- Did you validate your WSDL with Eclipse?
  - If your WSDL isn’t valid from ECLIPSE’s viewpoint, the CICS tooling isn’t going to have any better luck with it!
Getting Documentation

- CICS dumps
  - System dumps can be triggered by using System Dump table:
    `CEMT SET SYD(ddnnnn) MAX(1) ADD`
    (for example, use “WB0723” when message DFHWWB0723 is most closely related to the observed problem)
  - As an alternative, you can set a SLIP trap to capture an SVCDUMP on a specific message
  - Or manually request a dump with a console command similar to:
    - `DUMP COMM=(dumpname)`
    - `R yy,JOBNAME=(cicsjob),CONT`
    - `R yy,SDATA=(RGN,CSA,LSQA,LPA,LSQA,SWA,PSA,ALLNUC,TRT,GRSZ,SUM),END`
Getting Documentation cont’d

• CICS Internal or Auxiliary Trace
  • Trace should be active ("Started"), sized to at least 4000K
  • Use Standard Level=1-2 tracing for EI, PG, PI, SO, WB components
    • Use Standard Level=ALL tracing for PG at CICS TS 3.1
  • Use Standard Level=1 tracing for all other components

• MustGather publications
  • General overview CICS “MustGather” is located at http://www.ibm.com/support/docview.wss?rs=1083&uid=swg21208053
  • Specific MustGather articles are linked from this document, such as
    • Web Services (#1220283)
    • SOAP for CICS (#1197886)
CICS WEB SERVICES
Diagnosis Techniques
Diagnosis Techniques: Non-standard methods

- WSDL validation tools
  - WD/z or RD/z
  - Eclipse
- WSDL Formatting
  - Web Browser (Firefox)
- CEDX (CEDF) transaction
  - HTTP transport: Tran(CPIH)
  - WMQ transport: Tran(CPIQ)
Diagnosis Techniques – VERBEXIT displays

- Use DFHPDvrr to format release-specific information
  - DFHPD640 CICS TS 3.1
  - DFHPD650 CICS TS 3.2
  - DFHPD660 CICS TS 4.1
  - DFHPD670 CICS TS 4.2

- KE=3 for Kernel-related data
  - Display tasks present in dumped region
  - Show STACK for each task, to determine what point in processing
  - KERR display will reveal if your dump symptom cascaded from an earlier error (remember to keep focused on the ROOT CAUSE!)

- DS=3 for Dispatch information
  - Helpful for observing and diagnosing HANG and Performance-related problems

- WB=3 for Web Interface data
  - SO=3 for Sockets
  - PI=3 for Pipelines
  - PG=3 for Program Manager (includes Container information)
Diagnosis: Trace techniques

• Trace listings can be formatted with various utilities, depending on where the trace data resides
  • Sample Trace request using IPCS Verbexit:
    DFHPD670 ‘tr=2,trs=<typetr=(so0201-0202,xm1101,ds0002)>’
  • Sample Trace request using CICS Trace Utility program DFHTUnnn:
    //DFHAXPRM DD *
    FULL
    TYPETR=(SO0201-0202)
    TYPETR=(XM1101,DS0002)

• Internal Trace is typically associated with a particular abend or identifying situation such as an error message that can trigger a dump

• Auxiliary Trace can be used for problems that produce no (known) external symptoms

• Trace space (datasets and the internal table) fill quickly
  • Sizing considerations: Better “too big”, than “not big enough”
Dissecting a Trace:
Getting your bearings

- Specify limited trace entry types
  **ABBREV or TR=1, TYPETR=(XM1101,DS0002,PG0901-0902,PG1101-1102)**
  to display the transactions, task numbers, and linked-to programs

<table>
<thead>
<tr>
<th>Time</th>
<th>Task</th>
<th>Program</th>
<th>Type</th>
<th>Command</th>
<th>Parameters</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>00004</td>
<td>SL</td>
<td>XM1101</td>
<td>XMAT</td>
<td>ENTRY</td>
<td>ATTACH</td>
<td></td>
</tr>
<tr>
<td>00004</td>
<td>SL</td>
<td>DS0002</td>
<td>DSAT</td>
<td>ENTRY</td>
<td>ATTACH</td>
<td></td>
</tr>
<tr>
<td>00428</td>
<td>QR</td>
<td>DS0002</td>
<td>DSAT</td>
<td>ENTRY</td>
<td>SET_PRIORITY</td>
<td>1</td>
</tr>
<tr>
<td>00428</td>
<td>QR</td>
<td>PG0901</td>
<td>PGPG</td>
<td>ENTRY</td>
<td>INITIAL_LINK</td>
<td></td>
</tr>
<tr>
<td>00428</td>
<td>QR</td>
<td>XM1101</td>
<td>XMAT</td>
<td>ENTRY</td>
<td>ATTACH</td>
<td></td>
</tr>
<tr>
<td>00428</td>
<td>QR</td>
<td>DS0002</td>
<td>DSAT</td>
<td>ENTRY</td>
<td>ATTACH</td>
<td></td>
</tr>
<tr>
<td>00428</td>
<td>QR</td>
<td>PG0902</td>
<td>PGPG</td>
<td>EXIT</td>
<td>INITIAL_LINK/OK</td>
<td>1</td>
</tr>
<tr>
<td>00428</td>
<td>QR</td>
<td>PG0901</td>
<td>PGPG</td>
<td>ENTRY</td>
<td>INITIAL_LINK</td>
<td></td>
</tr>
<tr>
<td>00429</td>
<td>QR</td>
<td>PG0902</td>
<td>PGPG</td>
<td>ENTRY</td>
<td>INITIAL_LINK</td>
<td></td>
</tr>
<tr>
<td>00429</td>
<td>QR</td>
<td>PG0901</td>
<td>PGPG</td>
<td>EXIT</td>
<td>LINK_EXEC/OK</td>
<td></td>
</tr>
<tr>
<td>00429</td>
<td>QR</td>
<td>L8000</td>
<td>PG1101</td>
<td>PGLE</td>
<td>ENTRY</td>
<td></td>
</tr>
<tr>
<td>00429</td>
<td>L8000</td>
<td>PG1102</td>
<td>PGLE</td>
<td>EXIT</td>
<td>LINK_EXEC/OK</td>
<td></td>
</tr>
<tr>
<td>00429</td>
<td>L8000</td>
<td>PG1101</td>
<td>PGLE</td>
<td>ENTRY</td>
<td>LINK_EXEC</td>
<td></td>
</tr>
<tr>
<td>00429</td>
<td>L8000</td>
<td>PG1102</td>
<td>PGLE</td>
<td>ENTRY</td>
<td>LINK_EXEC</td>
<td></td>
</tr>
<tr>
<td>00429</td>
<td>QR</td>
<td>PG1101</td>
<td>PGLE</td>
<td>ENTRY</td>
<td>LINK_EXEC</td>
<td></td>
</tr>
<tr>
<td>00429</td>
<td>QR</td>
<td>PG1102</td>
<td>PGLE</td>
<td>EXIT</td>
<td>LINK_EXEC/OK</td>
<td></td>
</tr>
<tr>
<td>00429</td>
<td>QR</td>
<td>L8000</td>
<td>PG1102</td>
<td>EXIT</td>
<td>LINK_EXEC/OK</td>
<td></td>
</tr>
<tr>
<td>00429</td>
<td>QR</td>
<td>L8000</td>
<td>PG1102</td>
<td>EXIT</td>
<td>LINK_EXEC/OK</td>
<td></td>
</tr>
<tr>
<td>00429</td>
<td>QR</td>
<td>PG0902</td>
<td>PGPG</td>
<td>EXIT</td>
<td>INITIAL_LINK/OK</td>
<td></td>
</tr>
</tbody>
</table>
Dissecting a Web Services Trace: Sockets Domain

- SO (Sockets Domain) entries display capture inbound and outbound datastreams. This can be useful for
  - Pinpointing the task(s) that need further investigation,
  - Identifying Performance characteristics of Web Services processing, and
  - Displaying the SOAPFAULT information associated with both Providers and Requesters

- Datastream focus: Consider requesting both SO 0201 and SO 0202 entries
  - Outgoing Socket data (SEND) is visible in SO 0201 ENTRY records
  - Incoming Socket data (RECEIVE) is visible in SO 0202 EXIT records
SOCKET Domain Trace entries sample
TYPETR=SO0000-FFFF

00428 SO  SO 0D01 SOSO ENTRY INQUIRE_CONNECTION
00428 SO  SO 0D02 SOSO EXIT INQUIRE_CONNECTION
00428 QR SO 0402 SOIS EXIT INQUIRE/OK EXMPPORT,NONE,925F887,9147A47,C,9.37.248.135,B,9.20.122.71,77ED,NO,,2
00428 QR SO 0D01 SOCO ENTRY RECEIVE 16310000 , 00000000 , 00001000,DEFAULT,SYNC,0,YES
00428 QR SO 0D0B SOSO ENTRY RECEIVE
00428 SO  SO 0D23 SOSO ENTRY TAKE_SOCKET
00428 SO  SO 0E0A SOUS EVENT TAKESOCKET_ENTRY 01417101
00428 SO  SO 0E0B SOUS EVENT TAKESOCKET_EXIT 0,0,00000000
00428 SO  SO 0D24 SOSO EXIT TAKE_SOCKET
00428 SO  SO 0E00 SOUS EVENT ASYNCIO_ENTRY 00000000
00428 SO  SO 0E01 SOUS EVENT ASYNCIO_EXIT 1,0,00000000
00428 QR SO 0D0C SOSO EXIT RECEIVE
00428 QR SO 0D01 SOSO EXIT RECEIVE/OK 16310000 , 00000140 , 00001000
00428 QR SO 0D0B SOSO ENTRY RECEIVE
00428 QR SO 0D0C SOSO EXIT RECEIVE
00428 QR SO 0D02 SOSO EXIT RECEIVE/OK 16310000 , 00000140 , 00000140
00428 QR SO 0D01 SOSO ENTRY RECEIVE 151F3500 , 00000000 , 00000000,SOCKETCLOSE,SYNC,140,NO
00428 QR SO 0D0B SOSO ENTRY RECEIVE
00428 QR SO 0D0C SOSO EXIT RECEIVE
00428 QR SO 0D00 SOUS EVENT ASYNCIO_ENTRY 00000000
00428 QR SO 0D01 SOUS EVENT ASYNCIO_EXIT 0,0,00000000
00428 QR SO 0D0C SOSO EXIT RECEIVE
00428 QR SO 0D02 SOSO EXIT RECEIVE/OK 151F3500 , 000003D2 , 000003D2
00429 L8000 SO 0201 SOCK ENTRY SEND 152FA544 , 00000002
00429 L8000 SO 0D09 SOSO ENTRY SEND
00429 SO  SO 0E00 SOUS EVENT ASYNCIO_ENTRY 00000000
00429 SO  SO 0E01 SOUS EVENT ASYNCIO_EXIT 1,0,00000000
00429 L8000 SO 0D0A SOSO EXIT SEND
00429 L8000 SO 0202 SOCK EXIT SEND/OK 4FB
00429 L8000 SO 0201 SOCK ENTRY CLOSE
00429 L8000 SO 0D0F SOSO EXIT CLOSE
00429 SO  SO 0E04 SOUS EVENT CLOSE_ENTRY 00000000
00429 SO  SO 0E05 SOUS EVENT CLOSE_EXIT 0,0,00000000
00429 L8000 SO 0D10 SOSO EXIT CLOSE
00429 L8000 SO 0298 SOCK EVENT CONNECTIONS_DECREMENTED EXMPPORT,0
00429 L8000 SO 0202 SOCK EXIT CLOSE/OK
SOCKET Domain Trace entries sample
ABBRREV SO0201 and SO0202 entries

Specify trace entry types
**ABBRREV,TYPETR=(SO0201-0202)**
to display the Socket SEND and RECEIVE data (along with CONNECT, etc.)

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>00004 SL</td>
<td>SO 0201 SOCKET ENTRY RESERVE</td>
<td>01010000D,0000428C</td>
</tr>
<tr>
<td>00004 SL</td>
<td>SO 0202 SOCKET EXIT RESERVE/OK</td>
<td>-000205-</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0201 SOCKET ENTRY ESTABLISH</td>
<td>01010000D</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0202 SOCKET EXIT ESTABLISH/OK</td>
<td>-000294-</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0201 SOCKET ENTRY RECEIVE</td>
<td>16310000, 00000000, 00001000, DEFAULT, SYNC, 0, YES</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0202 SOCKET EXIT RECEIVE/OK</td>
<td>-000343-</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0201 SOCKET ENTRY RECEIVE</td>
<td>16310000, 00000000, 00001400, 00001000</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0202 SOCKET EXIT RECEIVE/OK</td>
<td>-000354-</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0201 SOCKET ENTRY RECEIVE</td>
<td>16310000, 00000000, 00001400, SOCKETCLOSE, SYNC, 140, NO</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0202 SOCKET EXIT RECEIVE/OK</td>
<td>-000355-</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0201 SOCKET ENTRY RECEIVE</td>
<td>16310000, 00000000, 00001400</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0202 SOCKET EXIT RECEIVE/OK</td>
<td>-000356-</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0201 SOCKET ENTRY RECEIVE</td>
<td>151F3500, 00000000, 00003D2, SOCKETCLOSE, SYNC, 3D2</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0202 SOCKET EXIT RECEIVE/OK</td>
<td>-000363-</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0201 SOCKET ENTRY RECEIVE</td>
<td>151F3500, 000003D2, 000003D2</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0202 SOCKET EXIT RECEIVE/OK</td>
<td>-000370-</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0201 SOCKET ENTRY RESERVE</td>
<td>01010000D,0000429C</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0202 SOCKET EXIT RESERVE/OK</td>
<td>-000413-</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0201 SOCKET ENTRY PERFORM_COMMIT</td>
<td>01010000D, NO, NO, NO, NO, FORWARD, NOTHING, UNNECESSARY</td>
</tr>
<tr>
<td>00428 QR</td>
<td>SO 0202 SOCKET EXIT PERFORM_COMMIT/OK</td>
<td>-000439-</td>
</tr>
<tr>
<td>00429 QR</td>
<td>SO 0201 SOCKET ENTRY ESTABLISH</td>
<td>01010000D</td>
</tr>
<tr>
<td>00429 QR</td>
<td>SO 0202 SOCKET EXIT ESTABLISH/OK</td>
<td>-000561-</td>
</tr>
<tr>
<td>00429 L8000</td>
<td>SO 0201 SOCKET ENTRY SEND</td>
<td>152FA544, 00000002</td>
</tr>
<tr>
<td>00429 L8000</td>
<td>SO 0202 SOCKET EXIT SEND/OK</td>
<td>-001597-</td>
</tr>
<tr>
<td>00429 L8000</td>
<td>SO 0201 SOCKET ENTRY CLOSE</td>
<td>4FB</td>
</tr>
<tr>
<td>00429 L8000</td>
<td>SO 0202 SOCKET EXIT CLOSE/OK</td>
<td>-001602-</td>
</tr>
<tr>
<td>00429 L8000</td>
<td>SO 0201 SOCKET ENTRY PERFORM_COMMIT</td>
<td>01010000D, NO, NO, NO, FORWARD, NOTHING, UNNECESSARY</td>
</tr>
<tr>
<td>00429 QR</td>
<td>SO 0202 SOCKET EXIT PERFORM_COMMIT/OK</td>
<td>-001767-</td>
</tr>
<tr>
<td>00429 QR</td>
<td>SO 0201 SOCKET EXIT PERFORM_COMMIT/OK</td>
<td>YES, YES, NO, NO,</td>
</tr>
<tr>
<td>00429 QR</td>
<td>SO 0202 SOCKET EXIT PERFORM_COMMIT/OK</td>
<td>-001768-</td>
</tr>
</tbody>
</table>
Sample SO 0202 (RECEIVE) Trace entry

SO 0202 SOCK EXIT - FUNCTION(RECEIVE) RESPONSE(OK) RECEIVE_BUFFER(16310000 , 00000140 , 00001000)
TASK-00428 KE_NUM-0049 TCB-QR /007D5328 RET-9499F86 TIME-23:03:03.0753144592 INTERVAL-00.0003325156 =052169=
1-0000  01000000 0000019B 00000000 00000000  B3080004 04000000 03000100 00000000
*........................*

SO 0202 SOCK EXIT - FUNCTION(RECEIVE) RESPONSE(OK) RECEIVE_BUFFER(151F3500 , 000003D2 , 000003D2)
TASK-00428 KE_NUM-0049 TCB-QR /007D5328 RET-9499F86 TIME-23:03:03.3942695976 INTERVAL-00.0000065000 =052185=
1-0000  01000000 0000019B 00000000 00000000  B3080004 04000000 03000100 00000000
*........................*
Sample SO 0201 (SEND) Trace entry

SO 0201 SOCK ENTRY - FUNCTION(SEND) BUFFER_LIST(152FA544 , 00000002)

TASK-00429 KE_NUM-0047 TCB-L8000/007ABE88 RET-94998D2E TIME-23:03:03.4295566447 INTERVAL-00.0000038750 =001597=

1-0000  01000000 0000019B 00000000 00000000  B0000000 00180000 01000000 00000000

*........................*

2-0000  15661000 000000E1 151F38E0 0000041A

3-0000  48545450 2F312E31 20323030 204F4B20  20202020 20202020 20202020 20202020

*...........................................................................................................

...
Working with Trace: Revealing Container contents

- **TYPETR=(WBFF60,PG1900,PG1910,PG1912)**

  WB FF60 WBQM ENTRY - FUNCTION(PUT_CONTAINER) RECORD_BUFFER(16310000 , 00000000 , 0000140) CONTAINER_POOL_TOKEN(15645030) CONTAINER_NAME(SERVER_HDR_IN) APPEND(NO)

  TASK-00428 KE_NUM-0049 TCB-QR /007D5328 RET-949A40DA TIME-23:03:03.3947961132 INTERVAL-00.0000016562 =000379=
  1-0000 00700000 000001B0 00000000 00000000 B5060000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  0020 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  0040 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  0060 D9E5C5D9 6DC8C4D9 6DC9D540 40400033

  PG 1900 PGCR ENTRY - FUNCTION(PUT_CONTAINER) POOL_TOKEN(15645030) CONTAINER_NAME(SERVER_HDR_IN) TYPE(CICS) DATATYPE(BIT) CONVERT(NO)
  PUT_TYPE(REPLACE) ITEM_DATA(16310000 , 00000140)

  TASK-00428 KE_NUM-0049 TCB-QR /007D5328 RET-949A40DA TIME-23:03:03.3947983320 INTERVAL-00.0000022187 =000380=
  1-0000 00C00000 0000022E 00000000 00000000 B68E4000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  0020 15645030 E2C5D9E5 C5D96DC8 C4D96DC9 D5404040 00100000 00000000 02020100 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  0040 00000000 16310000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  0060 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  0080 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  00A0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  00C0 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000 00000000
  00E0 D9E5C5D9 6DC8C4D9 6DC9D540 40400033

  PG 1910 PGCR EVENT - PUT_CONTAINER_DATA

  TASK-00428 KE_NUM-0049 TCB-QR /007D5328 RET-949A40DA TIME-23:03:03.3948129882 INTERVAL-00.0000005625 =000386=
  1-0000 D7D6E2E3 406185A7 81949793 85C19797 61899958 A4899985 E2899587 938540C8 *POST /exampleApp/inquireSingle H*
  0020 E3ED761 F14BF1D 25C896A2 A37A40F9 4BF2F04B F1F2F24B F7F17AF3 F0F7F0F1 *TPP/1.1..Host: 9.20.122.71:30701*
  0040 0D25C39E 95A38595 A360E3A8 97857A40 A385A7A3 61A79493 SE048388 8199A285 *..Content-Type: text/xml; charse*
  0060 A37EA4A3 8660F80D 25C39695 83595A3A 60D38595 87A3887A 40F9F7F8 0D25C183 *t=utc-8..Content-Length: 978..Ac* 0800 83595A3A 7A408197 97938983 81A38996 9561A296 81974EA7 94936B40 81979793 *cept: application/soap+xml, appl*
  00A0 8983A1A3 89969561 84899448 6B4094A4 93A38997 8199A361 99859381 A385846B *ication/dime, multipart/related,* 00C0 40A385A7 A3615COD 25E4A285 9960C187 8595A37A 40C9C2D4 40E68582 40E28599 *text/*..User-Agent: IBM Web Ser*
  00E0 A5898385 A240C5A7 97939699 85990D25 C3818388 8560C396 95A39996 937A4095 *vices Explorer..Cache-Control: n*
Working with Trace:
Other Important Entries

- TYPETR=(AP4800)
  - Data conversion information
- TYPETR=(PI0000-PIFFFF)
  - Pipeline details: Nodes, execution, parsing
- TYPETR=(WB0410)
  - HTTP Data
CICS WEB SERVICES
Sample Problems
Sample Problems

- Web Services failure
- Data conversion error
- Real-world example
Problem 1: Web Services failure
Background and Symptoms

• Attempting to configure and use a new Web Service
• Web Service isn’t functional, requester receives “500 Internal Server Error”
• CICS MSGUSR log reports this message after a user tries to call the Web Service:
  DFHWEB0725 30/01/2009 16:58:08 IYNX32 CWXN CICS Web attach processing detected an error linking to the analyzer user replaceable module NONE. Host IP address: 9.20.122.71. Client IP address: 9.37.248.135. TCPIP SERVICE: EXMP Port
• WEBSERVICE(*) and URIMAP(*) definitions weren’t automatically generated with CEDA INSTALL PIPELINE request.
Problem 1: Web Service failure Diagnosis

• Check CICS System Log
  • No messages in Console Log, but MSGUSR contained the following information when the PIPELINE install was requested:
    
    DFHPI0701 I 29/01/2009 15:36:53 IYNX32 CICSUSER PIPELINE EXPIPE01 has been created.
    DFHRD0124 I 29/01/2009 15:36:53 IYNX32 IYCNTC57 CICSUSER CEDA INSTALL PIPELINE(EXPIPE01)
    TC57 CEDA CICSUSER 29/01/09 15:36:53 INSTALL PIPELINE(EXPIPE01) GROUP(WEBSVCS)
    DFHPI0705 E 29/01/2009 15:36:53 IYNX32 CICSUSER PIPELINE EXPIPE01 encountered an error writing the configuration to the derived shelf /var/cicsts/IYNX32/PIPELINE/EXPIPE01/. The response code from the HFS write was X'0000006F' and the reason code was 'X'EF086015'.
    DFHPI0709 E 29/01/2009 15:36:53 IYNX32 CICSUSER PIPELINE EXPIPE01 resolution failed because the XML configuration file cannot be copied to the derived shelf.
  
  • The z/OS UNIX System Services Messages and Codes manual shows the uss-response code in message DFHPI0705: X'0000006F' = Permission is denied
Problem 1: Web Service failure Diagnosis (cont’d)

- **Digging Deeper:**

  CICS Trace is most helpful in this instance, for identifying the specific problem we’ve encountered:

  ```
  DH 0E00 DHFS ENTRY - FUNCTION(MAKE_HFS_DIRECTORY) PATHNAME(1454FBE0, 00000025)
  TASK-00052 KE_NUM-001A TCB-L8003/007AB358 RET-9464F82E TIME-15:36:53.5902507788 INTERVAL-00.0000780781 =069504=
  2-0000 61A58199 61838983 A2A3A261 C9E8D5E7 F3F261D7 C9D7C5D3 C9D5C561 C5E7D7C9 */var/cicsts/IYNX32/PIPELINE/EXPI*
  0020 D7C5F0F1 61

  DH 0E01 DHFS EXIT - FUNCTION(MAKE_HFS_DIRECTORY) RESPONSE(EXCEPTION) REASON(NOTAUTH)
  TASK-00052 KE_NUM-001A TCB-L8003/007AB358 RET-9464F82E TIME-15:36:53.5906541381 INTERVAL-00.0004033593 =069505=

  DH 0E01 DHFS EXIT - FUNCTION(WRITE_HFS_FILE) RESPONSE(EXCEPTION) REASON(NOTAUTH) USS_RESPONSE(0000006F)
  USS_REASON(EF086015) CONTENT(155FF890, 00000116, 00000000)
  TASK-00052 KE_NUM-001A TCB-QR /007D5328 RET-948C7A4C TIME-15:36:53.5929455881 INTERVAL-00.0022908874 =069507=
  ```
Problem 1: Web Service failure Diagnosis (cont’d)

• More about Diagnosis Approach:
  • The MSGUSR log entries show that the original error was recognized by CICS, when the Pipeline was initially Installed – even though the Install itself ‘worked’

```
EX G(WEBSVCS)
ENTER COMMANDS
NAME TYPE GROUP DATE TIME
EXPIPE01 PIPELINE WEBSVCS *n INSTALL SUCCESSFUL
```

• And, as you can see from the Master Terminal (CEMT) inquiry, the Pipeline was in fact installed, but the status was set to Disabled due to the errors encountered during the Pipeline Scan:

```
I PIPE
STATUS: RESULTS - OVERTYPE TO MODIFY
Pip(EXPIPE01) Dis Unk
Soa(NOTSOAP ) Con(/MV23/cicsts/cics650/sampl)
```
Problem 1: Web Service failure Resolution and Lessons Learned

- Resolving the error:
  - Address the problem identified in the error messages and trace
  - Request a new “Scan” of the Pipeline resource, either by
    - Re-installing the PIPELINE: CEDA INSTALL GROUP(groupname)
    - Scan the existing PIPELINE: CEMT PERFORM PIPELINE(pipeline) SCAN

- Lessons Learned:
  - Just because CEDA reports a Pipeline “INSTALL SUCCESSFUL”, doesn’t mean it was complete!
  - MSGUSR can be a valuable source of diagnostic information, but you may still need TRACE to learn important details
Problem 2: Data Conversion Error
Background and Symptoms

- CICS Message Log contains message
  
  DFHPI1009 02/02/2009 20:50:48 IYNX32 00166 SOAP message processing failed. A conversion error (INVALID_CHARACTER) occurred when converting field ca_item_ref_req.
Problem 2: Data Conversion Error Diagnosis

- Stack for the CPIH task attempting to provide the Web Service:

```
<table>
<thead>
<tr>
<th>KE_NUM</th>
<th>@STACK</th>
<th>LEN</th>
<th>TYPE</th>
<th>ADDRESS</th>
<th>LINK REG</th>
<th>OFFSET</th>
<th>ERR</th>
<th>NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+0002DC</td>
<td>9480BB02</td>
<td>000192</td>
<td>INITIAL_LINK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>152EF250</td>
<td>0AD0</td>
<td>Dom</td>
<td>94A05700</td>
<td>9505BE98</td>
<td>000000</td>
<td>DFHAPLI1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+0023EE</td>
<td>94A061AC</td>
<td>000AAC</td>
<td>CICS_INTERFACE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>152EFD20</td>
<td>0B90</td>
<td>Dom</td>
<td>94843400</td>
<td>94846554</td>
<td>003154</td>
<td>DFHPIM</td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>152F08B0</td>
<td>07A0</td>
<td>Dom</td>
<td>94800000</td>
<td>948013A0</td>
<td>0013A0</td>
<td>DFHPGLE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+0004FC</td>
<td>948001C0</td>
<td>0001C0</td>
<td>LINK_EXEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>152F1050</td>
<td>0AD0</td>
<td>Dom</td>
<td>94A05700</td>
<td>947FFED2</td>
<td>000000</td>
<td>DFHAPLI1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+0023EE</td>
<td>94A061AC</td>
<td>000AAC</td>
<td>CICS_INTERFACE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>152F1B20</td>
<td>1230</td>
<td>Dom</td>
<td>9489BFE8</td>
<td>948A0A6E</td>
<td>004A86</td>
<td>DFHPISN</td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>152F2D50</td>
<td>0B90</td>
<td>Dom</td>
<td>94843400</td>
<td>948483FC</td>
<td>004FFC</td>
<td>DFHPIM</td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>152F38E0</td>
<td>07A0</td>
<td>Dom</td>
<td>94800000</td>
<td>948013A0</td>
<td>0013A0</td>
<td>DFHPGLE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+0004FC</td>
<td>948001C0</td>
<td>0001C0</td>
<td>LINK_EXEC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>152F4080</td>
<td>0AD0</td>
<td>Dom</td>
<td>94A05700</td>
<td>95077350</td>
<td>000000</td>
<td>DFHAPLI1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+0023EE</td>
<td>94A061AC</td>
<td>000AAC</td>
<td>CICS_INTERFACE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>15226020</td>
<td>0FA0</td>
<td>Dom</td>
<td>948761F8</td>
<td>94877462</td>
<td>00126A</td>
<td>DFHPITL</td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>15224020</td>
<td>1830</td>
<td>Dom</td>
<td>94859728</td>
<td>9485F354</td>
<td>005C2C</td>
<td>DFHPICC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+00067E</td>
<td>94859A28</td>
<td>003000</td>
<td>PICC_PARSE_XML</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+00350C</td>
<td>9485A3D6</td>
<td>000CAE</td>
<td>CLOSE_ELEMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+00238A</td>
<td>9485CC48</td>
<td>003520</td>
<td>HANDLE_END_ELEMENT</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+005026</td>
<td>9485BDAE</td>
<td>002686</td>
<td>CONVERT_DATA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>15222020</td>
<td>0E50</td>
<td>Dom</td>
<td>9398CED0</td>
<td>93990B34</td>
<td>003C64</td>
<td>DFHMEME</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+003222</td>
<td>9398D136</td>
<td>000266</td>
<td>SEND</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+00146E</td>
<td>939901C8</td>
<td>0032F8</td>
<td>CONTINUE_SEND</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+003B98</td>
<td>9398E448</td>
<td>001578</td>
<td>TAKE_A_DUMP_FOR_CALLER</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0046</td>
<td>15222E70</td>
<td>0620</td>
<td>Dom</td>
<td>93A2EAD0</td>
<td>93A2F754</td>
<td>000C84</td>
<td>DFHDUDU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+000B26</td>
<td>93A2ECD0</td>
<td>000200</td>
<td>SYSTEM_DUMP</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Int</td>
<td>0</td>
<td>+001934</td>
<td>93A2FA24</td>
<td>000F54</td>
<td>TAKE_SYSTEM_DUMP</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```
Problem 2: Data Conversion Error Diagnosis (cont’d)

• SOAPFAULT container returned by CICS:

```xml
xmlns:q0="http://www.DFH0XCMN.DFH0XCP4.Request.com"
xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <SOAP-ENV:Body>
    <SOAP-ENV:Fault xmlns="">
      <faultcode>SOAP-ENV:Server</faultcode>
      <faultstring>Conversion from SOAP failed</faultstring>
      <detail>
        <CICSFault xmlns="http://www.ibm.com/software/htp/cics/WSFault">
          DFHPI1009 30/01/2009 19:17:46 IYNX32 00059 SOAP message processing failed. A conversion error (INVALID_CHARACTER) occurred when converting field ca_item_ref_req.</CICSFault>
      </detail>
    </SOAP-ENV:Fault>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```
### Problem 2: Data Conversion Error

Aside: IPCS EBCDIC and ASCII feature

<table>
<thead>
<tr>
<th>Raw Data</th>
<th>EBCDIC format----</th>
<th>ASCII format----</th>
</tr>
</thead>
<tbody>
<tr>
<td>D7D6E2E3 406185A7 81949793 85C19797</td>
<td>POST /exampleApp</td>
<td>.@a............</td>
</tr>
<tr>
<td>61899598 A4899885 E2899587 938540C8</td>
<td>/inquireSingle H</td>
<td>....a............@.</td>
</tr>
<tr>
<td>E3E3D761 F14BF10D 25C896A2 A37A40F9</td>
<td>TTP/1.1..Host: 9</td>
<td>...a.K..%..^..z@.</td>
</tr>
<tr>
<td>4BF2F04B F1F2F24B F7F17AF3 F0F7F0F1</td>
<td>.20.122.71:30701</td>
<td>f.k.K..k..z......</td>
</tr>
<tr>
<td>0D25C396 95A38595 A360E3A8 97857A40</td>
<td>..Content-Type:</td>
<td>.%............z@</td>
</tr>
<tr>
<td>A385A7A3 61A79493 5E408388 8199A285</td>
<td>text/xml; charge</td>
<td>..a..........^..</td>
</tr>
<tr>
<td>A37EA4A3 8660F80D 25C39695 A38595A3</td>
<td>t=utf-8..Content</td>
<td>.........%........</td>
</tr>
<tr>
<td>6D38595 87A3887A 40F9F8F3 0D25C183</td>
<td>-Length: 983..Ac</td>
<td>......z@....%..</td>
</tr>
<tr>
<td>838597A3 7A408197 97939699 8599D025</td>
<td>cept: applicatio</td>
<td>..z@................</td>
</tr>
<tr>
<td>9561A296 81974EA7 94936B40 81979793</td>
<td>n/soap+xml, appl</td>
<td>..a^..N..k@.....</td>
</tr>
<tr>
<td>898381A3 89969561 84899485 6B4099A4</td>
<td>ication/dime, mu</td>
<td>......a.....k@.</td>
</tr>
<tr>
<td>93A88997 8199A361 9985946B A385846B</td>
<td>ltipart/related,</td>
<td>........a........k</td>
</tr>
<tr>
<td>40A385A7 A3615C0D 25E4A285 9960C187</td>
<td>text/..User-Ag</td>
<td>....@a%.^..</td>
</tr>
<tr>
<td>8595A37A 40C9C2D4 40B68582 40E28599</td>
<td>ent: IBM Web Ser</td>
<td>....z@&lt;&gt;@...@..</td>
</tr>
<tr>
<td>A5893835 A240C5A7 97939699 8599D025</td>
<td>vices Explorer..</td>
<td>...^........%..</td>
</tr>
<tr>
<td>C3813888 8560C396 95A39996 937A4095</td>
<td>Cache-Control: n</td>
<td>.................z@.</td>
</tr>
<tr>
<td>96608381 8388850D 25D79981 8794817A</td>
<td>o-cache..Pragma:</td>
<td>............%....z</td>
</tr>
<tr>
<td>40959660 83818388 850D25E2 D6C1D7C1</td>
<td>no-cache..SOAPA</td>
<td>..............%....</td>
</tr>
<tr>
<td>83A38996 957A407F 7F0D25C3 96959585</td>
<td>ction: &quot;&quot;..Conne</td>
<td>......z@.....</td>
</tr>
<tr>
<td>83A38996 957A4083 9396A285 0D25D025</td>
<td>ction: close....</td>
<td>......z@...^..%</td>
</tr>
<tr>
<td>3C736F61 70656E76 3A456E76 656C67F0</td>
<td>..?/../&gt;..%...%..</td>
<td>&lt;soapenv:Envelop</td>
</tr>
<tr>
<td>6520786D 6C6E733A 7130D22 68747470</td>
<td>....%&gt;................</td>
<td>e xmlns:q0=&quot;http</td>
</tr>
<tr>
<td>3A2F2F77 77772E44 46483058 43D4E2E2</td>
<td>..........(+..</td>
<td>://www.DFH0XCMN.</td>
</tr>
<tr>
<td>44464830 58435034 2E526571 75657374</td>
<td>..........&amp;.......</td>
<td>DFH0XCP4.Request</td>
</tr>
<tr>
<td>2E636F6D 2220786D 6C6E733A 736F6170</td>
<td>..?.....%&gt;.../..</td>
<td>.com&quot; xmlns:soap</td>
</tr>
</tbody>
</table>
Problem 2: Data Conversion Error Resolution (cont’d)

The PG domain includes information about the Channels and Containers associated with a task, as well as the program link levels.

The data within a container is located at the address specified +x‘30’ into the CRCB.

To display the contents of container DFHWS-BODY (length = x’2D9’), use the IPCS command L 15649818+30? Length(x’2D9’)
Problem 2: Data Conversion Error Resolution (cont’d)

- Displaying the DFHWS-BODY container:

```
LIST 15435A98. ASID(X'003B') LENGTH(X'03E7') AREA
ASID(X'003B') ADDRESS(15435A98.) KEY(90) ABSOLUTE(EB446A98.)
15435A98.
15435AA0. 7AC29684 A86E0D25 40404040 4C98F07A
15435AAC. 956E0D25 40404040 40404C98 F07A8381
15435AEO. D8E24C61 98F07A83 816D9985 98A485A2
15435B00. 7A83816D 9885A3A4 99956D83 9684856E
15435B20. 83968485 6E0D2540 40404040 404C98F0
15435B40. A2818785 61E6ED25 40404040 404C98F0
15435B60. 8793856E 0D254040 40404040 404C98F0
15435B80. 986EC289 93934C61 98F07A83 816D989A
15435B40. 7A83816D 9885A3A4 99956D83 9684856E
15435B00. 7A83816D 9885A3A4 99956D83 9684856E
```
Problem 2: Data Conversion Error Resolution (cont’d)

- A quick review of the WSDL that describes this element reveals the inconsistency that triggered this error:

```xml
<xsd:element name="ca_item_ref_req" nillable="false">
  <xsd:simpleType>
    <xsd:annotation>
    </xsd:annotation>
    <xsd:restriction base="xsd:unsignedShort">
      <xsd:maxInclusive value="9999"/>
      <xsd:minInclusive value="0"/>
    </xsd:restriction>
  </xsd:simpleType>
</xsd:element>
```
Real-World Example: DFHPI1008
Background and Symptoms

- Customer attempting to upgrade CICS TS 3.1 => 3.2
- Nearly all Web Services functions migrated without error
- A single Web Service PROVIDER application encountered consistent failures, identified by message DFHPI1008:
  DFHPI1008 03/10/2009 11:27:04 CICSABCD 00077
  SOAP message generation failed because of incorrect input (INPUT_STRUCTURE_TOO_SMALL).
- Customer provided system dump triggered by this message, requesting assistance with problem analysis
Real-World Example: DFHPI1008 Diagnosis

- “Getting my bearings” with Trace: Which task? TR=2, then search for symptom code PI1008:
  DU 0600 DUTM ENTRY - FUNCTION(LOCATE_SYSTEM_DUMPCODE) SYSTEM_DUMPCODE(PI1008)
  TASK-00350 KE_NUM-003C TCB-L8002/009ACD70 RET-9682E18C TIME-12:42:13.5301526250

- Now let’s take a closer look at this task
  00350 L8002 PI 0F00 PIII ENTRY PARSE_ICM
  00350 L8002 PI 0F06 PIII DATA OUTBOUND_COMMAREA_DATA
  00350 L8002 PI 0F0B PIII *EXC* INPUT_ERROR           INPUT_STRUCTURE_TOO_SMALL

- Description of INPUT_STRUCTURE_TOO_SMALL:
  The container passed to CICS does not hold sufficient data given the length of the language structure.

- What is the data being passed for Parsing?
  PI 0F06 PIII DATA - OUTBOUND_COMMAREA_DATA
  *Unique UserData1            *
  44
Real-World Example: DFHPI1008 Diagnosis (cont’d)

- What’s the overall task flow?

```
TR=1,TRS=<TASKID=350,TYPETR=(XM1101,DS0002,PG0901-0902,PG1101-1102)>
00350 QR  PG 0901 PGPG ENTRY INITIAL_LINK  DFHPIDSH
00350 QR  PG 1101 PGLE ENTRY LINK_EXEC  DFHPISN1,YES,DFHNODE
00350 L8002 PG 1101 PGLE ENTRY LINK_EXEC  DFHPIEP,177A3A18,00000010,YES
00350 L8002 PG 1102 PGLE EXIT LINK_EXEC/OK
00350 L8002 PG 1101 PGLE ENTRY LINK_EXEC  PEBCAK01,NO,DFHAHC-V1
00350 QR  PG 1101 PGLE ENTRY LINK_EXEC  PEBCAK02,NO,NO,PULL-CHANNEL
00350 QR  PG 1102 PGLE EXIT LINK_EXEC/EXCEPTION  REMOTE_PROGRAM,PEBZ,PEBCAK02,PEB1,
00350 QR  PG 1102 PGLE EXIT LINK_EXEC/OK
```

- What data was passed TO the program that had a Link failure?

```
*Unique UserData1*
```

- A theory emerges:

```
PG 1102 PGLE EXIT - FUNCTION(LINK_EXEC) RESPONSE(EXCEPTION)
  REASON(REMOTE_PROGRAM) REMOTE_SYSID(PEBZ)
  REMOTE_PROGRAM_NAME(PEBCAK02)
  REMOTE_TRANID(PEB1) ABEND_CODE()
  TASK-00350 KE_NUM-003C TCB-QR /009C3D98 RET-96FF3E98
  TIME-12:42:04.8614592187 INTERVAL-00.0000004687 =048740=
```
Real-World Example: DFHPI1008 Diagnosis (cont’d)

- **What is Program Autoinstall status?**
  
  ==PG: GLOBAL STATE SUMMARY
  
  PG domain status: initialised
  Autoinstall status: inactive

- **Is the PEBCAK02 program already defined?**

<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>TYPE</th>
<th>DED</th>
<th>STAT</th>
<th>LOC</th>
<th>SUBS</th>
<th>STAT</th>
<th>COUNT</th>
<th>CHAIN</th>
<th>SYSID</th>
<th>STAT</th>
<th>PROFILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>17B5A3F8 PEBCAK01 PG COB CO2 G CED E B U F N L T</td>
<td>N</td>
<td>N</td>
<td>C</td>
<td>LE370</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17B5A3A0 PEBCAK02 PG COB NDD G CED E B U F N ND T</td>
<td>N PEBCAK02 PEB Z PEB1</td>
<td>N</td>
<td>N</td>
<td>C</td>
<td>UNKNOWN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Real-World Example: DFHPI1008 Resolution and Lessons Learned

• Called customer to ask about remote program PEBCAK02
• Explained what the dump’s internal trace showed us, our working theory, and requirements for new doc if analysis to this point didn’t identify the error
• Customer reported a missing resource Group was discovered, which included the program in question
• Lessons Learned:
  • Worthwhile to get the lay of the land (overview-type trace listings)
  • ASK Questions!
CICS WEB SERVICES DEBUGGING

References
Reference: Handy Tracing Tricks for Web Services

- XM1101 Attached Transids
- DS0002 Attached Taskids
- PG0901-0902 Program linkage
  - PG1101-1102
- SO0201 Socket Send
- SO0202 Socket Receive
- PG1900
  - PG1910 Show CONTAINER
  - PG1912 contents
  - WBFF60
- AP4800 Data conversion information
- WB0410 HTTP Data
References:
CICS Support Page and Technotes

• CICS Support Web Page
  http://www.ibm.com/software/htp/cics/tserver/support/
  • Helpful references and links to CICS Info Center, Technotes, Flashes, “Must Gather” documents for defect support, SupportPacs, Redbooks, and more!

• Technote Highlights
  http://www.ibm.com/support/docview.wss?rs=1083&uid=swg2nnnnnnnn
  • Knowledge Collection: Web services for CICS (#7010507)
  • Support for white space and variable length values (#1248612)
  • How to read WSDL – A bottom-up approach (#1199529)
  • Testing CICS Web services (#1268824)
  • Diagnosing DFHPI0602 error messages (#1264885)
  • Diagnosing data conversion errors with CICS Web Services (#1211424)

• Related Technotes
  • Answer common questions
  • Describe known problems and limitations
  • Warn of migration issues and requirements
  • Describe performance recommendations
  • Provide how-to and example implementation instructions
References: Web Services related Redbooks and Redpapers

- Implementing CICS Web Services
  http://www.redbooks.ibm.com/abstracts/sg247657.html
- Application Development for CICS Web Services
  http://www.redbooks.ibm.com/abstracts/sg247126.html
- Securing CICS Web Services
  http://www.redbooks.ibm.com/redpieces/abstracts/sg247658.html
- CICS Web Services Workload Management and Availability
  http://www.redbooks.ibm.com/abstracts/sg247144.html
- SOAP Message Size Performance Considerations
- Developing Web Services Using CICS, WMQ, and WMB
  http://www.redbooks.ibm.com/abstracts/sg247425.html
References: Additional Publications

- Sockets Domain – AIOCB embedded in the Sockets Listener Table Entry
  z/OS V1R12.0 UNIX System Services Programming: Assembler Callable Services Reference (SA22-7803)

- HFS File activity – return codes
  z/OS V1R12.0 UNIX System Services Messages and Codes (SA22-7807)
Numerous Technical presentations are cataloged online, and available for on-demand viewing:

http://www.ibm.com/support/docview.wss?rs=1083&uid=swg27007244

Presentations are categorized by Topic:

- Web Services
- CICSPlex SM (CPSM)
- File Control
- Java
- Storage
- Other topics (CICS Explorer, Debugging, etc.)