IBM Software Group

Diagnosing a Timeout in WebSphere z/OS

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ON DEMAND BUSINESS

Agenda

- General Information on WebSphere z/OS Timeout
- WebSphere provided IPCS Formatters
- Debugging a Timeout / Example
- Reference Links

General Information on WebSphere z/OS Timeout

General Timeout Information

- Can be a particular ‘worker thread’ which takes more time than the timeout value or could be a throughput issue
  - Timer starts when work queued to the Control Region
  - **NOT** when the work is dispatched in the Servant Region
- Problem Determination Manual (V5.1)
  - Chapter 9: Troubleshooting by task: What are you trying to do > Resolving Timeout conditions
- Administering applications and their environment Manual (V6.0)
  - Chapter 8: Troubleshooting administration > Resolving timeout conditions

Control number of worker threads

server_region_workload_profile

- Set this variable, from the admin console:
  - V6 - click Servers > Application Servers > *server*. Under Container Settings, click Container Services > ORB Service
  - V5 - click Servers > Application Servers > server > ORB Service > Workload profile

Setting	# of Worker Threads
ISOLATE	1
IOBOUND	(# of CPU's * 3)
CPUBOUND	((#CPU's -1) *3)
LONGWAIT	40

- To see what it is set to in the job output, search for
  - server_region_workload_profile

General Timeout Information

- ABENDEC3, REASON=0413000x in WebSphere ASID
- SVC Dump SHOULD be generated
  - If not, check for DAE Suppression
  - Set SLIP on EC3 ABEND
  - protocol_http_timeout_output_recovery =SERVANT | SESSION

    Application Servers > *server* > Custom Properties
- SLIP SET,A=SVCD,COMP=EC3,JOBNAME=aaaa*, JOBLIST=aaaa*,SDATA=(ALLNUC,CSA,GRSQ,LPA,LSQA,PSA, RGN,SQA,SUM,SWA,TRT),END
  - Where ‘aaaa’ is the jobname of the WebSphere asid
  - Incude the ‘asterisk’ to capture the CR and SR
- Can include REASON=0413000x in SLIP
- Can include ASIDLST=(CU,H,P,S) in SLIP

Debugging a Timeout (Reason Codes)

Reason Code	Explanation
* 04130002 *	The controller issued an ABTERM for this servant region because a transaction timeout occurred. Code under dispatch could have been in a tight loop.
04130003	The controller issued an ABTERM for this servant region because it was hung trying to move a controller request into the servant region. The target request was timed out, but the servant was currently copying the request. The controller checked the servant for progress at regular intervals, before taking action by issuing an ABTERM.
04130004	The controller issued a ABTERM for this servant region because the WLM queue timeout occurred. Code under dispatch could have been in a tight loop.

Debugging a Timeout (Reason Codes)

Reason Code	Explanation
04130005	The controller issued an ABTERM for this servant region because a transaction timeout occurred. The transaction has timed out, but no current request associated with the transaction was found. The servant associated with the transaction will be terminated.
04130006	A controller thread encountered a problem while processing a request. The request has been queued to WLM and associated with a servant region. The termination of the associated servant region is needed to complete cleanup for the request.
* 04130007 *	The controller issued a ABTERM for this servant region because the HTTP OUTPUT timeout occurred. Code under dispatch could have been in a tight loop
* 04130008 *	Control region issued a ABTERM for this server region because the MDB Request timeout occurred. Code under dispatch could have been in a tight loop

WebSphere IPCS Formatters

WebSphere IPCS Formatters

- Formatters are in the SBBOMIG dataset
  - Formatters are updated periodically, and ARE level specific
  - Must have the SBBOMIG dataset in the IPCS concatenation
- Chapter 7 of the Problem Determination Guide has more information on the IPCS formatters
- We will use some of the IPCS commands in the 'Timeout Debug section'

WebSphere IPCS Formatters

- IP VERBX CBDATA ‘asid(xxxx) config ’
  - XXXX is the ‘hex number’ of the address space
  - Look for ‘BGVTPTR.. 134C8840’

    (you will need the BGVT address for the ‘GLOBAL’ parameter in subsequent commands)
  - The ‘config’ parameter will cause the WebSphere environment variables to be included in the output (at the bottom)
    - useful if you are looking for a particular environment setting

WebSphere IPCS Formatters

IP VERBX CBDATA 'asid(xxxx)'

- BBOR0012I Formatting BBO3BACB
- BBO3BACB: 134CE488
- +0000 BACBID... BBO3BACB LENGTH... 00000210
  VERSION.. 01 CAPLEV... 00000002
  FUNCLEV.. 00000001 SCHVER... 00000000
- ..
- ..
- +018C ENVVVPTR. 164A7BE8 RUNASPOL. 00000000
  OSSECURP. 7F258EE0 OTSNXECB. 00000000
  BGVTPTR.. 134C8840 PBCBPTR.. 00000000

WebSphere IPCS Formatters

- IP VERBX CBDATA ‘GLOBAL(bgvtaddr) SUMMARY’
  - Gives All WebSphere Servers in the CELL, across a SYSPLEX, including DAEMONS, that were ACTIVE at the time of the dump
  - ASID’s register with the DAEMON, and it keeps a table of active servers
  - Note from the example that the system name is in the display so if you are in a sysplex, it will show the servers across the plex since the Daemons keep in sync as far as which servers have registered with them

WebSphere IPCS Formatters

IP VERBX CBDATA 'GLOBAL(bgvtaddr) SUMMARY'

- BBOR0026I SERVER NAME ASID SYSNAME LEVEL
- BBOR0027I TSCELL../TST1.... 0098 TST1 W510227
- BBOR0027I TSDMGR../TSDMGR.. 0354 TST1 W510227
- BBOR0027I TSNAGNT./TSNAGNT. 0094 TST1 W510227
- BBOR0027I TSTSR01./TSTSR01. 008F TST1 W510227
- BBOR0027I TSDSR01./TSDSR01. 0361 TST1 W510227
- BBOR0027I TSDSR02./TSDSR02. 035F TST1 W510227
- BBOR0027I TSTSR02./TSTSR02. 009A TST1 W510227
- **********
- BBOR0017I CBDATA ended processing Ok
- **********

WebSphere IPCS Formatters

- IP VERBX CBDATA ‘ASID(xxx) TCB(yyyy)’
  - xxx is the WebSphere Address space (in hex)
  - yyyy is the WebSphere Worker thread (in hex)
  - Must be entered for each ‘Worker Thread TCB’
  - There are multiple worker threads
    - configurable (previous foil)
  - Useful command in diagnosing a Timeout
  - Shows the type of request that is running
    - Timer values
    - Times queued to Control Region and Servant Region
  - Also in the output of IP VERBX CBDATA ‘ASID(xxx) CONFIG’
    - Output includes all ‘worker threads’

WebSphere IPCS Formatters

- IP VERBX CBDATA ‘asid(xxx) tcb(yyy)’

First half of the output

BBOR0012I Formatting Clssname: 1BBAF5E1

+0000 D9859496 A385E685 82C39695 A3818995 |RemoteWebContain|

+0010 859900 |er. |

BBOR0012I Formatting MethodNm: 1BBAF5D5

+0000 88A3A397 998598A4 85A2A300 00000000 |httprequest.....|

BBOR0012I Formatting ComRtInf: 1BBAF21E

+0000 89974081 8484997E F1F7F24B F1F64BF2 |ip addr=172.16.2|

+0010 F4F34BF5 F0409796 99A37EF4 F5F8F2F8 |43.50 port=45828|

WebSphere IPCS Formatters

IP VERBX CBDATA ‘asid(xxx) tcb(yyy)’

Second half of output

BBOR0031I GMT Time Request was received into CTL region

07/21/2005 16:47:26.377604

BBOR0031I GMT Time Request was Queued to WLM in CTL region

07/21/2005 16:47:26.377658

BBOR0031I GMT Time Request will be Expired (approximated)

07/21/2005 16:52:26.270340

BBOR0031I GMT Time Request was received into SR region

07/21/2005 16:47:26.379804

****

BBOR0017I CBDATA ended processing Ok

****

Debugging a Timeout / Example

Debugging a Timeout (example 1)

Initialize the SVC Dump

IP STATUS

* * * DIAGNOSTIC DATA REPORT * * *

Symptom	Description
PIDS/5655I3500	Program id: 5655I3500
RIDS/CBSERIES#L	Load module name: CBSERIES
RIDS/CBSERIES	Csect name: CBSERIES
AB/S0EC3	System abend code: 0EC3
PRCS/04130008	Abend reason code: 04130008
REGS/03090	Register/PSW difference for R03: 090

Home ASID: 0264 Primary ASID: 0264 Secondary ASID: 0264

Debugging a Timeout (example 1)

IP SUMM FORMAT ASID(x'###')

is the hex number of the WebSphere Servant Region that ABENDED

Max to the bottom and look for the TCB(s) that have an ABENDEC3 in their completion code:

JOB BBAS02GS ASID 0264 ASCB 00F2CD00 FWDP 00F4E280

TCB AT	CMP	NTC	OTC	LTC
009FE0A8	00000000	00000000	00000000	009FFBF8
009FFE88	00000000	00000000	009FE0A8	00000000
..				
..				
009B3088	00000000	009B5088	009E1B60	00000000
009BC0E0	**4FEC3000**	**009B3088**	**009E1B60**	**00000000**
009B9E88	00000000	009BC0E0	009E1B60	00000000

Debugging a Timeout (example 1)

IP VERBX LEDATA 'ASID(xxx) TCB(yyy) CEEDUMP'

IP VERBX LEDATA 'ASID(xxx) NTHREADS(*)'

Will give you ALL TCB's in the output

Bottom of Stack trace for WebSphere worker threads

```
threadDispatch(BOSS_Object_Key*,Internal_CORBA_Request&,ORB_
                    2B91B9B8  +00000EC6                          Call
SR_ExecutionThread::RemoveAndProcessWork(ThreadCleanUp*,TCB
                    2B931E50  +00001410                          Call
SR_ExecutionRoutine
                    2B91B698  +00000100                          Call
CEEPGTFN      070E97F0  +0000005A        CEEPLPKA        Call
CEEOPCMM      0000D6D0  +00000932        JOBBBAS0  UQ73599
```

Debugging a Timeout (example 1)

IP VERBX LEDATA ‘ASID(xxx) TCB(yyy) CEEDUMP’

Top of Stack trace for WebSphere worker thread

com/pkga/b/c/d/e/fRespHandler.checkResp

mmipSelectInvokeJavaMethod

mmipSelectInvokeJavaMethod

xeRunJavaVarArgMethod

JVM_DoPrivileged

Java_java_security_AccessController_doPrivileged__Ljava_sec

java/security/AccessController.doPrivileged(Ljava/security/P

Debugging a Timeout (example 1)

How long was thread running ? (1)

- IP VERBX CBDATA ‘ASID(xxx) TCB(yyy)’

BBOR0012I Formatting Clssname

Clssname: 2BF14271

+0000 94848283 9381A2A2 00000000 00000000
|mdbclass........|......¢¢........|

BBOR0012I Formatting MethodNm

MethodNm: 2BF14266

+0000 94848299 8598A485 A2A30000 00000000
|mdbrequest......|........¢.......|

Debugging a Timeout (example 1)
How long was thread running ? (2)

- IP VERBX CBDATA 'ASID(xxx) TCB(yyy)'

BBOR0031I GMT Time Request was received into CTL region
05/20/2005 19:02:16.839607

BBOR0031I GMT Time Request was Queued to WLM in CTL region
05/20/2005 19:02:16.839827

BBOR0031I GMT Time Request will be Expired (approximated)
05/20/2005 20:02:09.260983

BBOR0031I GMT Time Request was received into SR region
05/20/2005 19:56:32.565268

Debugging a Timeout (example 1)
How long was thread running ? (3)

- IP STATUS

SYSTEM STATUS:

Nucleus member name: IEANUC01

I/O configuration data:

IODF data set name: SYS0.IODF01

IODF configuration ID: EFAG

EDT ID: 00

Sysplex name: ISOPLEX

TIME OF DAY CLOCK: BB3ED954 AA825A21 05/20/2005 16:02:17.136165 local

TIME OF DAY CLOCK: BB3F0EF9 93825A21 05/20/2005 20:02:17.136165 GMT

Debugging a Timeout (example 1)
How long was thread running ? (4)

- Time queued to CR 19:02:16.839827 GMT
- Time Received in SR 19:56:32.565268 GMT
- Time Req. will be Expired 20:02:09.260983 GMT
- Time of Dump 20:02:17.136165 GMT
- NOTE that it took 54 Minutes for the request to be received into the SR
- This is a ‘throughput’ problem, WHY did it take so long for the thread to get dispatched in SR
  - Need to look at system status, RMF Data, WLM Classification of work, etc.
  - Performance Tuning and Monitoring Manual can help

Debugging a Timeout (example 1)

- control_region_mdb_request_timeout=3600

- control_region_mdb_request_timeout
  - Specifies the time, in seconds, that the server will wait for a message driven bean (MDB) request to receive a response. If the response is not received within the specified amount of time, the servant (region) may abend with ABEND EC3 RSN=04130008. Set this value to zero to disable the function. **Default:** 120
  - **How to specify:** Specify this custom property in the administrative console using the path **Application Servers** > *server* > **Custom Properties**.

Debugging a Timeout (example 1)

What was the thread doing ?

- We can use svcdump.jar (aka SVC Dump Analyzer)
- Pull SVC Dump to workstation
  - FTP in ‘bin’
- Run svcdump.jar against ‘bin file’
  - java –cp c:\fileloc\svcdump.jar com.ibm.jvm.svcdump.Dump d1.bin > d1.out
  - Pointer to svcdump.jar in WebSphere Related Reference Links at end of presentation
- Results in text file
  - Will format ALL ASID’s in the SVCDUMP
  - Search on TCB that timed out (in the ASID)
  - Will give ‘java view’ of the thread that timed out

Debugging a Timeout (example 1)

svcdump.jar ouptut (1)

com/pkga/b/c/d/e/fRespHandler.checkResp

com/pkga/b/c/d/e/fRespHandler.validateResp

com/pkga/b/c/d/e/fRespHandler.identifyResp

com/pkga/b/g/hRespHandler.idResp

com/pkga/b/j/kProcessorBean.processResp

com/pkga/b/j/lLclStatelessProcessor.processResp

com/pkga/b/c/msg/route/MsgDispatcherBean.onMessage

com/ibm/ejs/jms/listener/MDBWrapper$PriviledgedOnMessage.
run

java/security/AccessController.doPrivileged

com/ibm/ejs/jms/listener/MDBWrapper.callOnMessage

Debugging a Timeout (example 1)
svcdump.jar ouptut (2)

com/ibm/ejs/jms/listener/MDBWrapper.onMessage

com/ibm/ejs/jms/listener/WS390ServerSession.onMessage

com/ibm/ejs/jms/listener/ServerSession.dispatch

java/lang/reflect/Method.invoke

com/ibm/ejs/jms/listener/ServerSessionDispatcher.dispatch

com/ibm/ejs/container/MDBWrapper.onMessage

com/ibm/ejs/jms/listener/WS390ServerSession.runMR

com/ibm/ejs/jms/listener/MDBCppUtilitiesInterfaceImpl.onMessageReference

com/ibm/ws390/mdb/MDBCppUtilities.onMessageReference

Debugging a Timeout (example 1)
summary

- Application code is running MDB's
- Requests are not getting to the SR in a reasonable time
- System Throughput issue ?
- Need more 'worker threads' ?
- Need more Servant Regions ?
- WebSphere APAR PQ84981 (PTF UQ88747) ?
  - Service Level W502009
- Any number of apars listed in Info APAR II13776 ?

Debugging a Timeout / Example V6

Debugging a Timeout (example 2)

```
VERBX CBDATA 'GLOBAL(239B44D0) SUMMARY'
 BBOR0026I SERVER NAME          ASID  SYSNAME   LEVEL
 BBOR0027I P1....../WSP1DB..    02DE  JB0       CF10533.
 BBOR0027I P1....../J80.....    0301  J80       CF10533.
 BBOR0027I P1....../WSP1DF..    01AA  JF0       CF10533.
 BBOR0027I WSP1AB../WSP1AB..    03B2  JB0       CF10533.
 BBOR0027I WSP1A8../WSP1A8..    02EE  J80       CF10533.
 BBOR0027I WSP1AF../WSP1AF..    0193  JF0       CF10533.
 BBOR0027I WSP1R3../WSP1R3B.    03B7  JB0       CF10533.
 BBOR0027I WSP1S6../WSP1S68.    02BE  J80       CF10533.
 BBOR0027I WSP1S4../WSP1S48.    03A8  J80       CF10533.
 BBOR0027I WSP1S1../WSP1S18.    02FF  J80       CF10533.
 BBOR0027I WSP1S3../WSP1S38.    01AE  J80       CF10533.
 BBOR0027I WSP1S2../WSP1S28.    02F4  J80       CF10533.
 BBOR0027I WSP1S4../WSP1S4F.    0197  JF0       CF10533.
 BBOR0027I WSP1S4../WSP1S4B.    0374  JB0       CF10533.
 BBOR0027I WSP1S6../WSP1S6B.    0366  JB0       CF10533.
 BBOR0027I WSP1S1../WSP1S1F.    0194  JF0       CF10533.
```

Debugging a Timeout (example 2)

```
* * *  DIAGNOSTIC DATA REPORT  * * *
PIDS/5655I3500 RIDS/BBOOWORK#L RIDS/BBOOWORK AB/S0EC3
   PRCS/04130002 REGS/0C660  RIDS/BBOOWORK#R
 Symptom                  Description
    ----------------------  --------------------------
  PIDS/5655I3500           Program id: 5655I3500
  RIDS/BBOOWORK#L          Load module name: BBOOWORK
  RIDS/BBOOWORK            Csect name: BBOOWORK
  AB/S0EC3                 System abend code: 0EC3
  PRCS/04130002            Abend reason code: 04130002
  REGS/0C660               Register/PSW difference for R0C: 660
  RIDS/BBOOWORK#R          Recovery routine csect name: BBOOWORK

OTHER SERVICEABILITY INFORMATION
  Recovery Routine Label:  BBOOWORK
   Date Assembled:         05228
   Module Level:           CF10533.
   Subfunction:            WORK SERVICES
```

Debugging a Timeout (example 2)

- IP ST

  Information at time of entry to SVCDUMP

  HASID: 03B4 PASID: 0374 SASID: 0374

- IP CBF RTCT / IP SELECT ALL

  ASTB

SDAS	SDF4	ASID	NAME
03B4	F8	WSP1S4BS	WebSphere Servant Region
0374	F8	WSP1S4B	WebSphere Control Region

Debugging a Timeout (example 2)

IP VERBX LEDATA 'ASID(3B4) TCB(7AE718) CEEDUMP'

```
Entry          E Addr    E  Offset   Statement  Load Mod  Service  Stat
BBOT_NativeContext_rollback                                          Call
JVM2JNI        2DA80360  +000001FE               *PATHNAM            Call
mmipInvokeJniMethod                             *PATHNAM           Call
               2DD76820  +0000024E               *PATHNAM            Call
mmipExecuteJava
               2DD68D38  +00005C6A               *PATHNAM            Call
mmijExecuteJavaFromJIT
               2DD819C8  +000002DC               *PATHNAM            Call
SINFRJIT       50BA6218  +000004E8               *PATHNAM            Call
com/ibm/ejs/csi/TranStrategy.postInvoke(Lcom/ibm/websphere/c
               58E97B00  +000002C6                                   Call
com/ibm/ejs/csi/TransactionControlImpl.postInvoke(Lcom/ibm/w
               58E85F28  +000000DE                                   Call
com/ibm/ejs/container/EJSContainer.postInvoke(Lcom/ibm/ejs/c
               57C629C0  +0000248C                                   Call
pet/rtw/db2/ejb/session/EJSLocalStatelessSc1_cbe1ee7c.Sc1Tra
               5B944F70  +000009FA                                   Call
pet/rtw/db2/web/base/Sc1.callLocalSc1Tran(Lpet/rtw/db2/commo
               5B651438  +00000230                                   Call
```

Debugging a Timeout (example 2)
svcdump.jar output for TCB(7AE718)

Method

---

com/ibm/ws390/tx/NativeGlobalTransactionContext.rollback
com/ibm/ws390/tx/NativeGlobalTransactionContext.rollback
com/ibm/ws/Transaction/JTA/TransactionImpl.rollbackRRS
com/ibm/ws/Transaction/JTA/TransactionImpl.internalRollback
com/ibm/ws/Transaction/JTA/TransactionImpl.rollback
com/ibm/ws/Transaction/JTA/TranManagerImpl.rollback
com/ibm/ws/Transaction/JTA/TranManagerSet.rollback
com/ibm/ejs/csi/TranStrategy.rollback
com/ibm/ejs/csi/TranStrategy.postInvoke
com/ibm/ejs/csi/TransactionControlImpl.postInvoke
com/ibm/ejs/container/EJSContainer.postInvoke
pet/rtw/db2/ejb/session/EJSLocalStatelessSc1_cbe1ee7c.Sc1Tran
pet/rtw/db2/web/base/Sc1.callLocalSc1Tran
pet/rtw/db2/web/base/Sc1.runTran
pet/rtw/db2/web/base/Sc1.runTest
pet/rtw/db2/web/BaseServlet.performTask

Debugging a Timeout (example 2)
summary

- 04130002 - The controller issued an ABTERM for this servant region because a transaction timeout occurred. Code under dispatch could have been in a tight loop.
- Application code drove StatelessSessionBean
- Drove into Transaction ‘rollback’ processing
  - Involved RRS for Transaction processing
- Was off to RRS when timeout occurred
- In this case, the RRS call was ‘waiting’ on response from another intersted party, that was involved in the transaction.
  - Worked with RRS L2, needed to re-create, gather additional asid’s in the dump (RRS, RRS Dataspaces, ASID1) to determine who else was interested in the transaction.

WebSphere Reference Links

Reference Documents

- InfoCenter:
  - V5.0: http://publib.boulder.ibm.com/infocenter/wasinfo/v5r0
  - V5.1: http://publib.boulder.ibm.com/infocenter/wasinfo/v5r1
  - V6.0: http://publib.boulder.ibm.com/infocenter/wasinfo/v6r0
  - just have to remember to go into 'WebSphere z/OS'
- WebSphere z/OS Support
  - http://www.ibm.com/software/webservers/appserv/zos_os390/support/
  - Consider signing up for email notification for 'hot' issues => MySupport
- IBM Support Assistant
  - http://www.ibm.com/software/support/isa
- IBM Education Assistant:
  - http://www.ibm.com/software/info/education/assistant

WebSphere Related Reference Links

- Info Apars:
  - MQ/WebSphere - II13776
  - SAF Security known issues with CA / Top Secret / ACF2 - II13427
  - DB2 – II13299 , II13309
- INFO APAR Table:
  - http://www.ibm.com/support/docview.wss?rs=404&context=SS7K4U&q1=ii13776&uid=swg21170395
  - Or from the main WebSphere support page, search for "Informational APARS for WebSphere Application Server for z/OS"
- APAR / PTF / Service level Table
  - On the eSupport web page, under "Self Help", the "Download" categor
  - Tables for all releases of WebSphere and WebSphere Business Integrator / WBI
  - Quick link to apar description / Quick link to 'order' the maintenance

WebSphere Related Reference Links

- svcdump.jar
  - https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?source=diagjava
- Java 131,141and 142 Diagnostic Guides
  - http://www.ibm.com/developerworks/java/jdk/diagnosis
  - Pointers to ‘HeapRoots’ and ‘HeapAnalyzer’ on Alphaworks
- RedBook(s) / RedPaper(s)
  - http://www.redbooks.ibm.com/
  - Search for ‘websphere and z/os’
- WhitePapers: http://www.ibm.com/support/techdocs
  - WP100292 “Understanding the IBM Java Garbage Collector”
  - WP100678 “Diagnosing Performance Problems with WebSphere Application Server on z/OS – extended checklist

Additional WebSphere Product Resources

- Discover the latest trends in WebSphere Technology and implementation, participate in technically-focused briefings, webcasts and podcasts at: www.ibm.com/developerworks/websphere/community/
- Learn about other upcoming webcasts, conferences and events: www.ibm.com/software/websphere/events_1.html
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QUESTION TIME