IBM Software Group

Workload Management (WLM) Overview and Problem Determination

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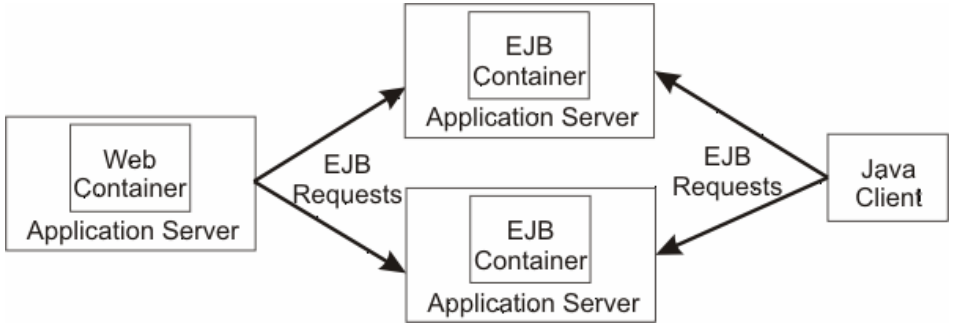
Agenda

- WLM Overview
- Types of Clients
- WLM Routing
- Common WLM Problems
- Diagnosing Routing Problems
- Routing Patterns
- WLM Exceptions and Meanings
- Other Factors
- Summary

WLM Overview

- Two types of Workload Management (WLM) in WebSphere® Application Server
  - Web Server Plug-In WLM
  - Enterprise Java Bean (EJB) WLM
    - Discussed in this presentation
- EJB WLM balances WLM enabled RMI/IIOP requests between clients and clusters
  - JNDI Lookups
  - EJB creates
  - EJB business methods
  - EJB removes

Type of Clients



- Types of clients that support EJB WLM
  - AppServers hosting client application
  - WebSphere managed Application clients
  - Stand alone Java™ clients
    - Requires IBM® SDK and WLM jars in classpath

WLM Routing

- Routing is based on weights associated with cluster members
  - Round Robin routing when weights are equal
  - Weights can be modified to send more requests to a particular cluster member or members
  - More Information about WLM routing from the v6.1 Information Center

    http://publib.boulder.ibm.com/infocenter/wasinfo/v6r1/topic/com.ibm.websphere.nd.multiplatform.doc/info/ae/ae/crun_srvgrp.html

- If the client is on the same physical box as the cluster, the "Prefer Local" setting will ensure that all requests from the client go to the local cluster member

Common WLM Problems

- Commonly reported problems to Support
  - EJB requests not load balanced between cluster members
    - Uneven routing
    - No requests sent to a particular member
  - NO_IMPLMENT errors
    - No Available Target
    - No Cluster Data Available
    - Forward Limit Reached/Retry Limit Reached

Diagnosing Routing Problems

1. Gather ORB/WLM tracing on client where routing problem occurs (ORBRas=all:WLM*=all)
2. Find all of the three parameter getConnection() lines (Example below)
3. Determine if the host/port (Red) for each similar operation (Blue) are rotating between the cluster members

```
[3/27/08 11:01:34:671 CDT] 00000036 ORBRas         3
     com.ibm.ws.orbimpl.transport.WSTransport getConnection(Profile,
     ClientDelegate, operationName) WebContainer : 0  method entry:
     host=bullis1.austin.ibm.com port=1329
     clientDelegate=IOR:00bdbdbd00000022524d493a656a62732e574c4d546573743a303
     030303030303030303030303030303000bdbd0000000100000000000001dc000102bd00000
     01662756c6c69732e61757374696e2e69626d2e636f6d0023900000006f4a4d424900000
     0126ec064d23737306565633036346432643263633000000024000000 4b49454a5002015
     5b702bd0b74657374436c757374657203454a420000002dacac000200010122000000574
     c4d546573745f636c757374657223574c4d454a422e6a617223574c4d54657374bd00000
     00c0000000100000001400bdbdbd05010001000000000001010000000000049424d0a00000
     00800bd000115000002000000260000000020002bdbd49424d040000000500050201 02bdb
     dbd0000001f0000000400bd000300000020000000400bd000149424d0b0000007f00000
     004000c62756c6c697343656c6c3031000b74657374436c7573746572000000124c924c
     8001562756c6c69732e61757374696e2e69626d2e636f6d2390000000037000000000 2000
     b434c55535445524e414d45000b74657374436c75737465720008434 54c4c4e414d45000
     c62756c6c697343656c6c303100000000bd000000030000002000bdbdbd0000001662756
     c6c69732e61757374696e2e69626d2e636f6d00239049424d040000000500050201 02bdb
     dbd0000001f0000000400bd000300000020000000400bd000100000025000000 0400bd0
     003 operationName=whichServer
```

Diagnosing Routing Problems contd.

- Example of proper routing between cluster members (clientDelegate IOR removed)

```
[3/27/08 11:02:50:703 CDT] 00000036 ORBRas         3
   com.ibm.ws.orbimpl.transport.WSTransport getConnection(Profile,
   ClientDelegate, operationName) host=bullis1.austin.ibm.com port=1329
   operationName=whichServer
[3/27/08 11:02:50:734 CDT] 00000036 ORBRas         3
   com.ibm.ws.orbimpl.transport.WSTransport getConnection(Profile,
   ClientDelegate, operationName) host=bullis2.austin.ibm.com port=1327
   operationName=whichServer
[3/27/08 11:02:50:796 CDT] 00000036 ORBRas         3
   com.ibm.ws.orbimpl.transport.WSTransport getConnection(Profile,
   ClientDelegate, operationName) host=bullis1.austin.ibm.com port=1329
   operationName=whichServer
[3/27/08 11:02:50:828 CDT] 00000036 ORBRas         3
   com.ibm.ws.orbimpl.transport.WSTransport getConnection(Profile,
   ClientDelegate, operationName) host=bullis2.austin.ibm.com port=1327
   operationName=whichServer
[3/27/08 11:02:50:859 CDT] 00000036 ORBRas         3
   com.ibm.ws.orbimpl.transport.WSTransport getConnection(Profile,
   ClientDelegate, operationName) host=bullis1.austin.ibm.com port=1329
   operationName=whichServer
[3/27/08 11:02:50:890 CDT] 00000036 ORBRas         3
   com.ibm.ws.orbimpl.transport.WSTransport getConnection(Profile,
   ClientDelegate, operationName) host=bullis2.austin.ibm.com port=1327
   operationName=whichServer
```

Diagnosing Routing Problems contd.

- WLM trace points
  - Keyword “Unexpected”
    - Trace point to indicate things that should not be happening
  - popServerForInvocation()
    - Selected cluster member target printed during trace exit
    - Can be used to confirm WLM routing

```
[3/27/08 11:02:03:765 CDT] 00000036 SelectionMana <  popServerForInvocation
  Exit                              {CELLNAME=bullisCell01 ,
  CLUSTERNAME=testCluster} :
  [[[[ProcessDescriptionImpl#1688364194{CELLNAME=bullisCell01,
  MEMBERNAME=clustermember1, NODENAME=bullisNode01}]{}] available:0
  reachable:0 leaf:true version:]nil:nil]
```

Diagnosing Routing Problems contd.

- setObservedWeight()
  - Used to decrement weight of cluster member during request routing
  - Check to ensure maximum observed weight is n-1 of the configured value for the cluster member

```
[3/27/08 11:02:51:078 CDT] 00000036 RouterMediato >  setObservedWeight Entry
      {CELLNAME=bullisCell01, CLUSTERNAME=testCluster}
      {CELLNAME=bullisCell01, MEMBERNAME=clustermember1,NODENAME=bullisNode01} 1
[3/27/08 11:02:51:078 CDT] 00000036 RouterMediato 3   ObservedWeight: 1
[3/27/08 11:02:51:078 CDT] 00000036 RouterMediato <  setObservedWeight Exit
```

Diagnosing Routing Problems contd.

- Next steps if requests are not being routed properly
  - Check the configured Weights for each cluster member under Servers > Clusters > NAME > Cluster Members
  - Check for a static routing table in the cluster config directory on the target EJB cell:

<PROFILE_ROOT>/config/cells/cell_name/clusters/cluster_name/cluster_name.wsrttbl

  - Check the Prefer Local setting for the cluster if the client and cluster member receiving all the requests are on the same host

Routing Patterns

- Consider the following code snippet...

```
ctx = new InitialContext(env);
WLMTestHome home = (WLMTestHome)     PortableRemoteObject.narrow(ctx.lookup("ejb/ejbs/WLMTestHome"),
WLMTestHome.class);
WLMTest bean = home.create();
String servername = bean.whichServer();
bean.remove()
```

- There are 4 WLM calls in the code above (JNDI Lookup, EJB Create, EJB Method, EJB Remove)
- If there were two cluster members in the cluster with the same weight, the following routing would occur…

```
Member1 – JNDI Lookup
Member2 – EJB Create
Member1 – EJB Method
Member2 – EJB Remove
```

- If this same rotation continued, the EJB method call would always occur on Member1
- **Solution:** Ensure that the number of WLMable requests is not the same as the number of cluster members. Alternatively, cache the EJB create and only perform the EJB method call during each request

WLM Exceptions

- CORBA.NO_IMPLEMENT: No Cluster Data
  - Occurs on a Nodeagent
  - Indicates that the process does not have WLM data for the target cluster and is unable to gather any
  - Next Steps: Check HA Manager configuration to ensure Nodeagent is in the same core group. If HA config is correct, gather ORB/WLM trace on both client and Nodeagent
- CORBA.NO_IMPLEMENT: No Available Target
  - Occurs on Nodeagents and clients
  - WLM attempted to route a request, but based on the current cluster data, there was not a target which would be able to service that request
  - Next Steps: Check for known APARs at your WebSphere version (most common problem fixed). Gather ORB/WLM traces on client and Nodeagent if no solution found

WLM Exceptions contd.

- CORBA.NO_IMPLEMENT: Forward Limit Reached and CORBA.NO_IMPLEMENT: Retry Limit Reached
  - Occurs on a Nodeagent (Forward Limit) or a client (Retry Limit)
  - Error thrown when 10 consecutive errors occur while trying route a request
  - Next Steps: Check for known APARs at your WebSphere version. Gather ORB/WLM traces on client and Nodeagent to determine what underlying exception is leading to the retries
- CORBA.TRANSIENT: SIGNAL_RETRY
  - Occurs on a client
  - The ORB attempts to send a request out to a target that WLM chooses and then never receives a reply whether the request was successful or not. Usually caused by CORBA.NO_RESPONSE exception
  - Next Steps: Gather ORB/WLM trace on the client to determine where request was sent. Next, a trace should be gathered on the target server to determine why request did not complete. The client should retry the request if this exception is caught

Other Factors

- HA Manager
  - HA Manager Service **required** to be enabled by WLM in v6 and v6.1
    - WLM uses information from the HA Manager Bulletin Board
  - Check for DCS view exceptions or warnings in the SystemOut.log
  - Check Core Group configuration
    - EJB client, EJB cluster, and cluster Nodeagents should be in same core group

Other Factors contd.

- ORB Problems
  - Base ORB part of SDK and layer under WLM
    - Try latest SDK cumulative fixpack for your WebSphere version to rule out known defects
    - Use ORB/WLM traces to determine if there is an underlying ORB exception leading to WLM problem

WLM Resources

- WLM Troubleshooting Guide
  - Common exceptions and solutions
    http://www-1.ibm.com/support/docview.wss?rs=180&uid=swg21250664
- WLM Mustgather
  - ORB/WLM tracing instructions
    http://www-1.ibm.com/support/docview.wss?rs=180&uid=swg21052165

Summary

- Discussed EJB WLM and how WLM routing works
- Learned about the types of requests that are workload managed
- Walked through the steps to diagnose routing problems using an ORB/WLM trace
- Reviewed an example of Pattern routing
- Talked about other factors affecting WLM routing

Additional WebSphere Product Resources

- Discover the latest trends in WebSphere Technology and implementation, participate in technically-focused briefings, webcasts and podcasts at: http://www.ibm.com/developerworks/websphere/community/
- Learn about other upcoming webcasts, conferences and events: http://www.ibm.com/software/websphere/events_1.html
- Join the Global WebSphere User Group Community: http://www.websphere.org
- Access key product show-me demos and tutorials by visiting IBM Education Assistant: http://www.ibm.com/software/info/education/assistant
- View a Flash replay with step-by-step instructions for using the Electronic Service Request (ESR) tool for submitting problems electronically: http://www.ibm.com/software/websphere/support/d2w.html
- Sign up to receive weekly technical My support emails: http://www.ibm.com/software/support/einfo.html

Questions and Answers