IBM Software Group

WebSphere Plug-in Requests, Session Affinity, Load Balancing and Failover

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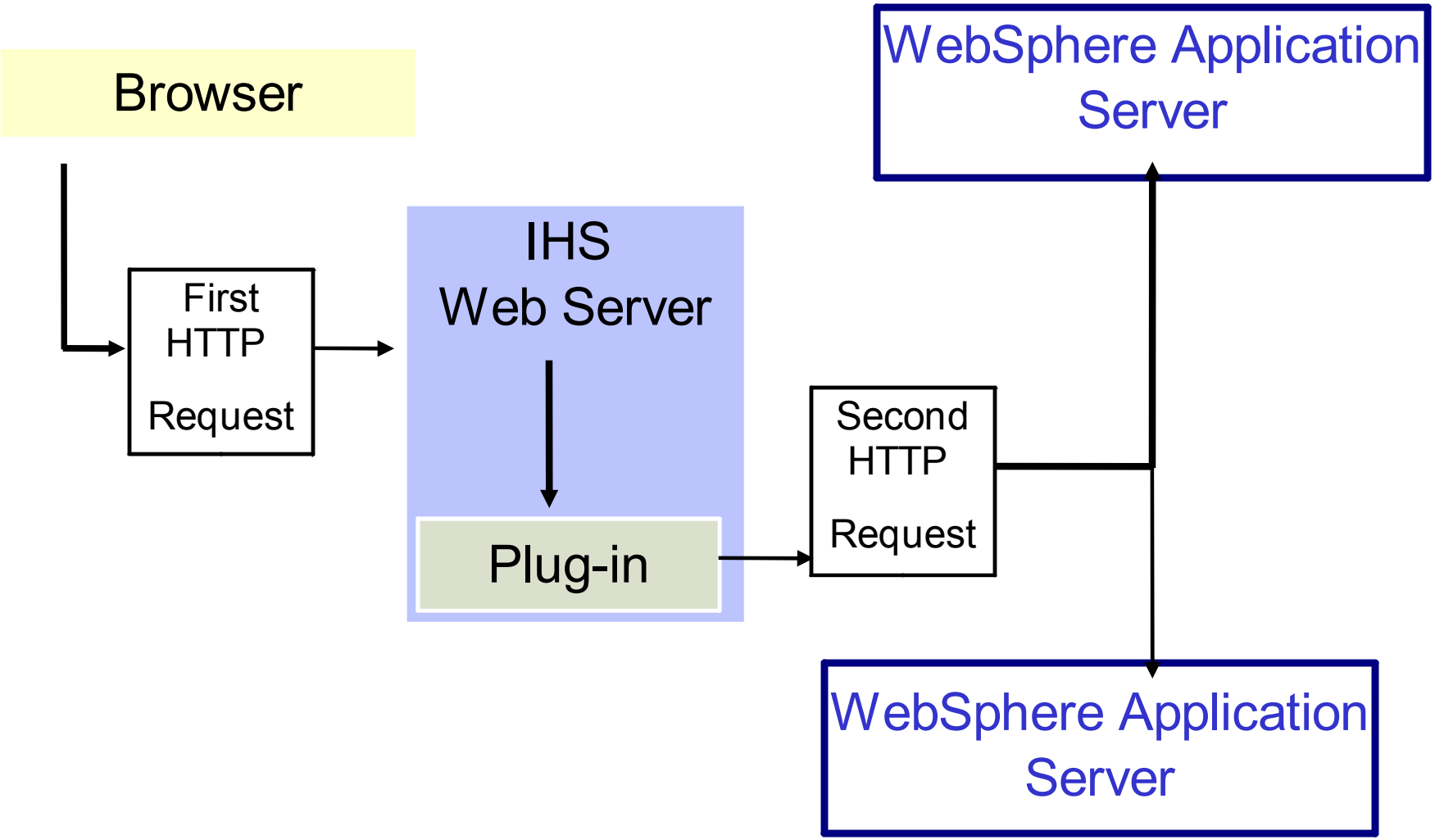
Agenda

- Plug-in Introduction
- Plug-in Properties
- Plug-in-in SSL considerations
- Plug-in Request Processing
- Plug-in Session Affinity
- Plug-in LoadBalancing
- Plug-in Failover
- Plug-in ESi cache


Browser
First HTTP Request
IHS Web Server
Plug-in
Second HTTP Request
WebSphere Application Server
WebSphere Application Server

Plug-in Overview

- WebSphere Plug-in Main Components
  - Plug-in configuration file (plugin-cfg.xml)
    - Generated and Propagated through WebSphere Administration console
  - Plug-in LoadModules
    - Loaded by IBM® HTTP Server at Web Server startup (mod_was_ap33_http.si)
- WebSphere Plug-in Function
  - Map, Route and LoadBalance requests through Web server to the Application Server(s)

Plug-in Properties

- Plug-in properties used for mapping WebSphere servlet request:
  - Route
  - VirtualHost is contained in a VirtualHostGroup
  - URI is contained in a URIGroup
  - Transport is contained in a Server

Plug-in Properties

- ROUTE
  - Identifies the Server or Cluster target for Plug-in to send a request
  - <Route ServerCluster="Cluster1“VirtualHostGroup="default_host"UriGroup="Cluster_URIs"/>
  - Multiple Routes in the Plugin-cfg.xml
  - Plug-in will check each Route in the Plugin-cfg.xml to find appropriate route for the request

Plug-in Properties

- VirtualHostGroup
  - Contains multiple VirtualHosts which define Hostname and Ports pairs for the Web servers and Application Server.
  - VirtualHostGroup is generated from the Application and Application server VirtualHost -> Host Aliases.
  - Example of VirtualHosts in Plugin-cfg.xml
    - <VirtualHost Name="<hostName>:9080"/>
    - <VirtualHost Name="*:80"/>
  - Wildcards are commonly used for HostName

Plug-in Properties

- VirtualHost property is generated from the VirtualHost Host Alias
- Managed through WebSphere Administration Console
  - Environment-> VirtualHost -> Host Aliases
- If you change the Host Aliases associated with Application Server you must:
  - 1. Generate and Propagate the Plugin-cfg.xml to reflect the new VirtualHost (HostName and Port)
  - 2. Restart the Application Server.

Plug-in Properties

- URIGroup
  - Contains URI properties in plugin-cfg.xml which are mapped to request URI
- Server
  - Contains Transports with HTTP and HTTPS protocols which identify the Hostname and Port of the mapped Application Server.

Plug-in Properties

- Transport (HTTP)
  - <Transport Hostname=“myhost.com" Port="9082" Protocol="http"/>
- Transport (HTTPS)
  - <Transport Hostname=“myhost.com" Port="9445" Protocol="https">

Plug-in Properties

- Transport (HTTPS)
  - Includes “keyring” and “stashfile”
    - Used for SSL configuration between Plug-in and Application Server
  - <Property Name="keyring" Value="/opt/IBM/WebSphere/Plugins/config/<webserverName>/plugin-key.kdb"/>
  - <Property Name="stashfile" Value="/opt/IBM/WebSphere/Plugins1/config/<webserverName>/plugin-key.sth"/>

Plug-in SSL Considerations

- SSL between the Plug-in and Application Server may not be necessary if Plug-in is running on the same machine as the application Server
- SSL setup requires
  - Extract Application Server Personal Certificate from key.p12
  - Plug-in KDB file (plugin-key.kdb) must add the Personal Certificate from each Application Server node as a “Signer Certificate”

Plug-in SSL Considerations

- Technote to set up SSL between Plug-in and Application Server
  - http://www-01.ibm.com/support/docview.wss?rs=177&dc=DB560&dc=DB520&q1=plugin+ssl+414&uid=swg21264477&loc=en_US&cs=utf-8&lang=en

Plug-in SSL Considerations

- To disable HTTPS transport
  - <Transport Hostname="myhost.com" Port="9445" Protocol="https">
  - Servers-> Application Servers -> <ServerName> -> Web Container settings -> Web Container Transport Chains
  - Click "WCInboundDefaultSecure" for HTTPS transport
  - Uncheck Checkbox " "Enabled"
  - Save and Generate Plugin-cfg.xml

Plug-in Request Processing

- All Requests received by Web server are FIRST processed by Plug-in before Web server handling
  - Modification of the Web server requests like alias will not be handled before Plug-in process
  - Must use RewriteRule with [PT] or [R] flags for web server to modify request URL before Plug-in processing

Plug-in Request Processing

- [PT] flag will passthrough directly to Plug-in
  - Example RewriteRule using [PT]
    - RewriteEngine on
    - RewriteRule /servlet/URI/Example.do [PT]
    - RewriteLogLevel 9
    - RewriteLog logs/<fileName>

Plug-in Request Processing

- [R] flag does a full redirect back to the client with location: header containing new URL.
  - Example RewriteRule using [R]
    - RewriteEngine on
    - RewriteRule ^/$ http://hosname/uri [R]
    - RewriteLogLevel 9
    - RewriteLog logs/<fileName>
- Redirect may also be used instead of RewriteRule [R]

Plug-in Request Processing

- Using WebSphere Plug-in with Mod_alias and mod _rewrite
  - http://publib.boulder.ibm.com/httpserv/ihsdiag/plugin_alter_uri.html

Plug-in Request Processing

- Request Flow –input URL http://hostname:port/uri

1. **Loop through all ROUTE plug-in properties**
2. Create Request and Response headers
3. **Check for ESI caching**
4. **Checking for Session Affinity**
5. **Check for Round Robin or Random**
6. Check for number of Primary Application Server
7. **Check for Plug-in failover**
8. Check Status and select server if available update Request Counts
9. Find Transport based on scheme (HTTP/HTTPS)
10. Open Socket

Plug-in Session Affinity

- **Session Affinity** allows returning requests to be routed back to the same server in a cluster that handled the initial request, if that same server is available.
- Plug-in Session Affinity is handled by the WebSphere Plug-in through a special cookie enabled and configured by the Application Server
- Default name for the Application Server session cookie is JSESSIONID
- Application Server Session **JSESSIONID** cookie is enabled and set through WebSphere Administration console
  - Application servers -> <Application ServerName> -> Session management -> Cookies

Plug-in Session Affinity

- JSESSIONID cookie contains
  - CacheID
  - SessionID
  - CloneID
- Only CloneID is used by WebSphere Plug-in for Session Affinity

Plug-in Session Affinity

- For Session Affinity to work a few things must be setup
  1. Cluster environment is created
  2. JSESSIONID Cookie is enabled by the Application Server
  3. CloneID is generate to the Plugin-cfg.xml , after Cookie has been setup and Enabled in the Application Server

Plug-in Session Affinity

- Plugn-cfg.xml CLONEID

```
<ServerCluster .>
  <Server CloneID="15d2hi0gn" ConnectTimeout="0"
  ExtendedHandshake="false" LoadBalanceWeight="2"
  MaxConnections="-1" Name="rjrNode07_server1"
  ServerIOTimeout="0" WaitForContinue="false">/
  Server>
  <Server CloneID="15d2hi3ic" ConnectTimeout="0"
  ExtendedHandshake="false" LoadBalanceWeight="2"
  MaxConnections="-1" Name="rjrNode07_server2"
  ServerIOTimeout="0" WaitForContinue="false">
```

Plug-in Session Affinity

- Plug-in log entry of an Application Server response with CLONEID
  - [Fri Sep 24 14:59:45 2010] 00002d30 00002298 - DETAIL: HTTP/1.1 200 OK
  - [Fri Sep 24 14:59:45 2010] 00002d30 00002298 - DETAIL: **Set-Cookie:** **JSESSIONID**=0000A0-ItRd37WYeiLGHKH_kcFp:**15d2hi3ic**; Path=/
- CloneID is set on the response from Application Server
- Once CloneID (**15d2hi3ic**) is set in JSESSIONID Cookie then affinity to this particular server will be observed by the plug-in routing.

Plug-in Session Affinity

- CLONEID is parsed from JSESSIONID cookie and compared to the CLONEID in the Plugin-cfg.xml
- Plug-in "Trace" level log entries compare request CloneID to the Application Server CloneId in Plugin-cfg.xml
  - [Fri Sep 24 14:59:56 2010] 00002d30 00002298 - TRACE: ws_server_group: serverGroupFindClone: Comparing curCloneID **'15d2hi3ic'** to server clone id **'15d2hi0gn'**
  - [Fri Sep 24 14:59:56 2010] 00002d30 00002298 - TRACE: ws_server_group: serverGroupFindClone: Comparing curCloneID **'15d2hi3ic'** to server clone id **'15d2hi3ic'**

Plug-in Session Affinity

- Match CloneID in JSESSIONID cookie to plugin-cfg.xml CLONEID and Application Server is selected
  - Server is selected base on CloneID match
  - [Fri Sep 24 14:59:56 2010] 00002d30 00002298 - TRACE: ws_server_group: serverGroupFindClone: **Match for clone** 'rjrNode07_server2‘
  - Application Server rjrNode07_server2 is selected

Plug-in Session Affinity

- Plug-in request from client must contain the JSESSIONID cookie with the cloneID for Session Affinity to be observed.
- Plug-in "detail" log level entry, POST request and JSESSIONID cookie with CLONEID.
  - [Fri Sep 24 14:59:56 2010] 00002d30 00002298 - **DETAIL**: POST /PlantsByWebSphere/servlet/AccountServlet?action=login&updating=false HTTP/1.1
  - [Fri Sep 24 14:59:56 2010] 00002d30 00002298 - **DETAIL**: **Cookie: JSESSIONID** =0000A0-ItRd37WYeiLGHKH_kcFp:**15d2hi3ic**

Plug-in Session Affinity

- Monitor Session Affinity by enabling plug-in loglevel="Stats"
  - Plug-in "Stats" log level entries shows the affinityRequests and totalRequests for each Application Server Per Plug-in Process
    - [Tue Sep 28 09:16:58 2010] **00002d30** 000020c0 - STATS: ws_server: serverSetFailoverStatus: **Server rjrNode07_server1** : pendingRequests 0 failedRequests 5 **affinityRequests 79 totalRequests 111**
    - [Tue Sep 28 09:16:00 2010] **00002d30** 00002608 - STATS: ws_server: serverSetFailoverStatus: **Server rjrNode07_server2** : pendingRequests 0 failedRequests 2 **affinityRequests 89 totalRequests 114**

Plug-in Session Affinity

- Session Affinity can interfere with an even distribution of requests.
  - An even distribution of requests should not always be expected with Session Affinity
- If an Application Server is **not available** then All new requests will be assigned affinity to the available Application Servers
- Session Affinity will be broken when the Application Server on which the affinity has been set is not available.
- An Application Server may be marked down and a request can Failover to the next available Application Server.

Plug-in Fail-over

- Plug-in Failover, in cluster environment, occurs when the Plug-in can no longer connect or receive responses from a specific Application Server
  - The HTTP plug-in is unable to establish a connection to a cluster member's Application Server transport.
  - The HTTP plug-in detects via timeout that there has not been a response from the Application Server from previous submitted request.
  - The HTTP plug-in detects a newly connected socket that was prematurely closed by a cluster member during an active read or write.

Plug-in Fail-over

- Plug-in properties that directly affect Failover
  - ServerIOTimeout
  - ConnectTimout
  - RetryInterval
- Application Server Markdown
  - Means Plug-in will no longer attempt to route requests to an Application Server
  - Application Server is not included in routing process

Plug-in Fail-over

- ServerIOTimeout
  - Number in seconds which specifies how long the Plug-in will wait for a response from the application before timeout of the request
  - Recommended value 120 seconds
  - ZERO we are relying on the OS TCP timeout
  - +Number Plug-in will not mark down that server, but just fail over to the next one.
  - -Number Plug-in will mark down that server and Failover to the next one.

Plug-in Fail-over

- ConnectTimeout
  - Number in seconds which specifies how long the plug-in should wait for a response when trying to open a socket to the Application Server
  - Recommended Value is very small (5)
  - The default is (0) which means never time-out. In that case, the time-out is left up to the OS TCP layer, which is NOT ideal.

Plug-in Fail-over

- RetryInterval
  - value is a number in seconds which specifies how long the Plug-in should wait before attempting to route requests to an Application Server that was previously “Marked Down
  - Recommended value 60 seconds.
  - Most Mark Downs are recoverable scenarios
  - If the problem was terminal, then the time it takes to restart the Application Server could be a factor.

Plug-in Fail-over - Links

- How do the properties ServerIOTimeout and PostBufferSize affect plug-in behavior?
  - http://www-01.ibm.com/support/docview.wss?rs=180&uid=swg21408884
- Recommend Values for Plug-in Properties
  - http://www-01.ibm.com/support/docview.wss?rs=180&uid=swg21318463
- Understanding HTTP Plug-in Failover in a Clustered Environment
  - http://www-01.ibm.com/support/docview.wss?uid=swg21219808

Session Affinity Vs Session Persistence

- **What happens during Session Affinity Failover to another Server in the cluster?**
  - Session Affinity is replaced on Failover to a new Application Server
  - If you have no Session Persistence Mechanism then the request will be redirected to a new affinity Application Server but without **Session Data** the request will either require re-login or fail.

Session Affinity Vs Session Persistence

- CloneID will be replaced with a NEW Application Server CLONEID via Set-Cookie on Failover
  - [Fri Sep 24 14:59:45 2010] 00002d30 00002298 - DETAIL: **Set-Cookie:** **JSESSIONID**=0000A0-ItRd37WYeiLGHKH_kcFp:**15d2hi3ic**; Path=/
- Old CloneID 15d2h13ic for Server1 is replaced with CloneID **15d2hi0gn** for server2
- SessionID is not changed.

Plug-in Session Affinity

- **Session Persistence** is the means by which the Plug-in will maintain session integrity (NOT affinity) after the Plug-in has failed over to the next available Application Server.
  - As requests Failover to next Application Server if there **is persistent data shared** between Application Servers in the cluster the Failover request **will not** fail or require login

Plug-in Session Affinity

- Session Persistence - Application Server and Plug-in handle the Failover over a little differently
  - Request is routed to next available Application Server
  - New Application Server ADDs a new CloneID
  - The OLD CloneID is NOT replaced:
  - Set-Cookie: JSESSIONID=0002O9Ra5SyRIRoycNXAnKusKEb: **15d2hi0gn** :**15d2hi3ic**; path=/
- Since we have 2 CloneIDs the Plugin will always match on the initial CloneID and check Server status
- If the initial Server status is still “Markdown” then the 2nd CloneID is matched and the second Server will be selected

Plug-in Session Affinity

- Session Persistence Mechanism - 2 methods:
  - Memory to Memory
    - Session data is distributed between the configured Application Servers using Memory-to-Memory Replication
    - Must Configure memory to memory at time of creating Cluster
      - http://publib.boulder.ibm.com/infocenter/wasinfo/v6r1/index.jsp?topic=/com.ibm.websphere.nd.doc/info/ae/ae/tprs_config_p2p_default.html
  - DataBase Session Sharing
    - Session data is written to the database

Plug-in Load Balancing

- Random – Not much to discuss
- Round Robin
  - Evenly distribute work across cluster members.
  - Round Robin works best with Web servers that have a single process.
  - If the Web server is using multiple processes to run the WebSphere Plug-in, the Random option can sometimes yield a more even distribution of work across the cluster.

Plug-in Load Balancing

- Factors that affect load balance:
  - Application Server resource contention
  - Session Affinity
  - Application Server availability
- Main direct factor that affects Plug-in Round Robin Load Balancing
  - Configured LoadBalanceWeight for each Application Server
    - Managed independently in each Web server process running Plug-in

Plug-in Load Balancing

- **LoadBalanceWeight**
  - Static weights initially configured by Administrator in the plugin-cfg.xml
  - WebSphere Administration Console
    - Servers -> Clusters-> cluster Members
  - The weight associated with each server in cluster when the Plug-in distributes requests using Round Robin load balancing
    - LoadBalanceWeight="8"

Plug-in Load Balancing

- Terms and factor related to Round Robin LoadBalancing
  - Greatest Common Divisor (GCD)
  - Internal Routing Table Weights
  - Sticky and Non-Sticky requests
  - Algorithm

Plug-in Load Balancing

- **Greatest Common Divisor (GCD)**
  - Uses to determine the Plug-in Internal Routing Table Weights from the configured LoadBalanceWeights.
  - For Example LoadBalanceWeight (8,6,18)
    - GCD = 2
- **Internal Routing Table Weights**
  - Derived from LoadBalanceWeight and GCD
  - For example LoadBalanceWeights (8,6,18) GCD 2
    - Internal Routing Table Weights(4,3,9)
  - Internal router table weights are scaled down LoadBalanceWeights

Plug-in Load Balancing

- **Sticky and Non-Sticky requests**
  - Sticky request
    - Session Affinity is established and request needs to be route to affinity Server
  - Non-Sticky Request
    - Session Affinity is NOT established
    - New request
- **Algorithm** for balancing based on historic distribution of requests
  - [(w + m * s) > 0]

Plug-in Load Balancing - Process

- Plug-in LoadBalance Processing
  - Initial Internal Router Tables Weights are set using GCD and LoadBalanceWeights
  - As each request is routed to a cluster member (application server)
    - Internal router table weight of the application server gets decremented by 1.
  - Non-sticky requests are not routed to any cluster member whose present Internal Router Table Weight is ≤ 0.
  - Sticky request <u>are routed</u> to a cluster member whose Internal Router Table Weight is ≤ 0
    - Potentially decreases the cluster member weight to a negative value (-).

Plug-in Load Balancing – Process (Cont'd)

- When the Internal Router Table Weights of **all** the cluster members are ≤ 0
  - Plug-in component **resets** ALL cluster members Internal Router Table Weights (when all weights are ≤ 0)
  - Plug-in resetting of Internal Router Table Weights may **not** take the Internal Table Router Weights to their original starting values!

Plug-in Load Balancing – Process (Cont'd)

- Algorithm is used to recalculate the Internal Router Table Weights
  - Goal - adjust the Internal Router Table Weights to overcome any current uneven distributions
- Find minimum number "m" such that equation is true for all Application Servers
  - $(w + m * s) > 0$
    - w = current Internal Router Table Weight
    - s = starting Internal Router Table Weight

Plug-in Load Balancing - Example

- Round Robin LoadBalanceWeight example using 3 servers in cluster (server1, server2 , server3)
  - Configured Weights
    - Server1 (8)
    - Server2 (6)
    - Serve 3 (18)
  - Router Table Weights (4,3,9)
    - Server1 (4)
    - Server2 (3)
    - Server3 (9)
  - GCD=2
- Requests are routed over a period of time but based on affinity, resources and other factors the current Internal Router Table Weights are:
  - Server1 (-20) - Negative because we continued to decrement for each request after “0”
  - Server2 (-40) - Negative because we continued to decrement for each request after “0”
  - Server3 (0)
- Note: Based on the current Internal Route Table Weights, we can see that we routed more requests to server1 and server2 than server3

Plug-in Load Balancing - Example

- Algorithm (w + m *s) > 0
  - Find minimal number “m”
  - w is the current Internal Router Table Weight (-20,-40,0)
  - S is the starting Internal Router Table Weight (4,3,9)
  - M=14
- Internal Router Table Weights are recalculated using the algorithm
- Results are new weights
  - Server 1 (-20 + 14 * 4) = 36
  - Server2 (-40 + 14 * 3) = 2
  - Server 3 (0 + 14 * 9) = 126

Plug-in Load Balancing - Summary

- Example Summary
  - Initial desired Internal Router Table Weight was (4, 3,9)
  - Actual distributions shows (-20 , -40 , 0)
    - This means the most number of request went to
      - Server1 -20 (+ 4 initial Router Weight) = 24 requests)
      - Server2 -40 (+3 Initial Router Weight) = 43 requests)
      - Server3 0 (+9 Initial Router Weight) = 9 requests)
- To adjust for the unbalanced actual requests we will now
  - Favor Server 3 - new Weight 126
  - Then Server 1 - new Weight 36
  - Last Server2 - New Weight 2

Plug-in Load Balancing (Round Robin)

- General Reference for setting up clusters and Workload Management
  - http://publib.boulder.ibm.com/infocenter/wasinfo/v6r0/index.jsp?topic=/com.ibm.websphere.nd.doc/info/ae/ae/crun_srvgrp.html
  - http://publib.boulder.ibm.com/infocenter/wasinfo/v6r0/index.jsp?topic=/com.ibm.websphere.express.doc/info/exp/ae/tprf_tunewebserv.html

Plug-in Load Balancing

- Plug-in specific links on Round Robin Load Balance
  - http://www-01.ibm.com/support/docview.wss?rs=0&uid=swg21219567
  - http://www-01.ibm.com/support/docview.wss?rs=180&uid=swg21318463
- Redbook old but good
  - http://www.redbooks.ibm.com/abstracts/TIPS0235.html

Plug-in Load Balancing

- **Taking Application Server in Cluster Gracefully Offline**
  - When LoadBalanceWeight is set to zero, this is a signal to the Plug-in to stop sending **new** requests to that Application Server
  - This has the effect of taking an Application Server in cluster gracefully offline.
  - Sticky requests on that server will continue
    - As those sessions get terminated (because the user explicitly logs out or because the session idle timeout is triggered), the server, in time, will no longer have any active sessions.
- See this Technote for details:
  - http://www-01.ibm.com/support/docview.wss?uid=swg21247728

ESI – Edge Side Include Caching

- The ESI Cache is a cache within the Web server Plug-in that is used to cache static content being served from an application in WebSphere Application Server.
  - Static Content ONLY
    - gif, css, js
  - Dynamic Content (servlets, JSPs) are not cached in the ESI cache

ESI – Edge Side Include Caching

- To enable ESI Cache
  - <Property Name="esiEnable" Value="true"/>
    - ESI Cache is enabled by default
  - <Property Name="esiMaxCacheSize" Value="1024"/>
    - Maximum size of the cache in 1K byte units
    - default is 1M or (1024k)

Plug-in ESI – Edge Side Include Caching

- Each Web server process has a separate plug-in instance with a separate ESI cache
  - Can be variables hits and misses
  - Extra memory
- Monitor static caching in the Plug-in ESI cache using WebSphere Application CacheMonitor
- To Clear Plug-in ESI cache contents
  - Web server is restarted
  - Default Timeout of 300 seconds
  - Through the CacheMonitor WebSphere Application

Plug-in ESI – Edge Side Include Caching

- To install and configure CacheMonitor
  - Both the CacheMonitor.ear (Dynamic Cache Monitor) and DyncCacheEsi.ear (DyncCacheEsi) applications must be installed.
  - Set esiInvalidationMonitor =true in Plugin-cfg.xml
    - Servers-> <WebServerName> -> Plug-in Properties
    - Specifies if the ESI processor should receive invalidation from the application server
    - Generate and Propagate the Web server Plugin-cfg.xml
- NOTE: **cachespec.xml** is not necessary for enabling of the monitoring and managing of static content in the Plug-in ESI cache

Plug-in ESI – Edge Side Include Caching

- To display the static Plug-in ESI cache:
- http://<hostName>:port/cachemonitor/ where
  - Hostname is hostname of the Application Server
  - Port is the port of the Application Sever
- For Statistics
  - Click “Edge Statistics”
  - Click button “Refresh Statistics
- For Content
  - Click Edge Statistics
  - Click button “Contents” (at the bottom of panel)
  - Click button “Refresh Contents”

Plug-in ESI – Edge Side Include Caching

- To clear cache content and reset statistics using CacheMonitor
  - Click Edge Statistics
  - Click button “Clear cache”
  - Click button “Reset Statistics”
- NOTE: Always Click
  - “Refresh Statistics”
    - For Current Stats
  - “Refresh Content
    - For Current Contents

Plug-in ESI – Edge Side Include Caching

- To customize the timeout interval to clear ESI cache, use custom properties:
  - **com.ibm.ws.cache.CacheConfig.alwaysSetSurrogateControlHdr=true**
  - **com.ibm.servlet.file.esi.timeOut=120**
- To add JVM custom property go to WebSphere Administration Console task:
  - Application servers > <Application Server name > Process Definition > Java™ Virtual Machine > Custom Properties
- NOTE: Some documentation indicates this should be added to JVM arguments. This does not appear to be correct.

ESI – Edge Side Include Caching

- Check this technote for potential Limitations and performance considerations:
  - http://www-01.ibm.com/support/docview.wss?rs=180&context=SSEQTP&dc=DA400&uid=swg27015501&loc=en_US&cs=UTF-8&lang=en&rss=ct180websphere

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Questions and Answers

Additional WebSphere Product Resources

- **Plug-in propagation fails with PLGC0063E and PLGC0049E when copying to remote Web server**
  http://www-01.ibm.com/support/docview.wss?uid=swg21231515
- **TroubleShooting: Plug-in generation and propagation for V6.0 and V6.1**
  http://www-01.ibm.com/support/docview.wss?uid=swg21207587
- **MustGather: IBM HTTP Server V6.0 and V6.1 administrative problems**
  http://www-01.ibm.com/support/docview.wss?rs=177&context=SSEQTJ&dc=DB520&dc=DB560&uid=swg21285057&loc=en_US&cs=UTF-8&lang=en&rss=ct177websphere
- **MustGather: Plug-in propagation problems in WebSphere Application Server V6.0 and 6.1**
  http://www-01.ibm.com/support/docview.wss?uid=swg21254319
- **TroubleShooting: IBM HTTP Server Administrative Server for V6.0**
  http://www-01.ibm.com/support/docview.wss?uid=swg21229375
- **TroubleShooting: WebSphere HTTP Server administrative console problems for V6.1 and V6.0**
  http://www-01.ibm.com/support/docview.wss?rs=180&uid=swg21261119

ESI Links

- **Potential limitations and considerations when downloading static content from the WebSphere Application Server**
  - http://www.ibm.com/support/docview.wss?uid=swg27015501
- **Configuring Edge Side Include caching**
  - http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/index.jsp?topic=/com.ibm.websphere.soafep.multiplatform.doc/info/ae/ae/tdyn_esiedgecaching.html
- **How does mod_cache interact with the WebSphere Plug-in?**
  - http://publib.boulder.ibm.com/httpserv/ihsdiag/questions.html#cacplugint
- **Dynamic Caching**
  - http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/index.jsp?topic=/com.ibm.websphere.zseries.doc/info/zseries/ae/welc6tech_dyn.html
- **Troubleshooting the dynamic cache service**
  - http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/index.jsp?topic=/com.ibm.websphere.zseries.doc/info/zseries/ae/tdyn_probd.html
- **Toubleshooting tips for the dynamic cache service**
  - http://publib.boulder.ibm.com/infocenter/wasinfo/v7r0/topic/com.ibm.websphere.zseries.doc/info/zseries/ae/rdyn_trb.html

Performance/Tuning links references

- Recommended values for Web server plug-in config
  - http://www.ibm.com/support/docview.wss?rs=180&uid=swg21318463
- Tuning IBM HTTP Server to maximize the number of client connections to WebSphere Application Server
  - http://www.ibm.com/support/docview.wss?rs=0&uid=swg21167658

Appendix:
Plug-in Administration

Plug-in Administration

- Plug-in GENERATE – Plugin-cfg.xml
  - All plug-in properties are GENERATED from the Application Server or the Deployment Manager repository files.
  - Maps Web servers and Application Servers to Applications
  - Defines Application Server and Web server virtual Hosts
  - Defines Application URIs

Plug-in Administration

- Plug-in is Generated to WebSphere repository usually associated with Web server
  - Servers -> Web Servers -> click Generate button
    - Config/cells/<cellName>/nodes/<nodeName>/servers/<WebServerName>
- There is a Global Plugin-cfg.xml but the administration of this file is limited and not strategic.
  - “Update Global Web server Plug-in configuration”
    - Directory-> config/cells
  - Update to some Plug-in properties is not supported
  - No Propagation is supported for Global Plugin-cfg.xml

Plug-in Administration

- To Update Global Plugin-cfg.xml properties
  - In order to update plugin-in property values in the existing global plugin-cfg.xml:
    - First DELETE the Global Plugin-cfg.xml located in config/cells directory.
    - Issue GenPluginCfg.sh(bat).

Plug-in Administration

- Plug-in Propagation COPIES the plugin-cfg.xml for associated Web server to target Web server directory
  - Httpd.conf Directive **WebSpherePluginConfig**
  - Default location of plugin-cfg.xml
    - Plug-in InstallRoot/config/<WebServerName>
- Plug-in property "**RefreshInterval**"
  - Plugin-cfg.xml is reloaded value set for this property.
  - Default is 60 seconds.
  - Checks for File TimeStamp to change every 60 seconds, if changed , then reloads

Plug-in Administration

- AUTO GENERATE (default) setting in the PluginProperties panel for plugin-cfg.xml:
  - **No external notification is made** when Generate fails as result of AUTO GENERATE.
  - Auto GENERATE of the plugin-cfg.xml will only log errors in the deployment Manager log
- AUTO PROPAGATE (default) setting in PluginProperties panel for plugin-cfg.xml:
  - **No external notification is made** when Propagate fails as result of AUTO PROPAGATE.
  - Auto Propagate of the plugin-cfg.xml will only log errors in the deployment Manager log

Merge Multiple Plug-in configuration files

- Merging two or more Plug-ins
  - http://www-01.ibm.com/support/docview.wss?rs=180&context=SSEQTP&q1=plug+merge&uid=swg21139573&loc=en_US&cs=utf-8&lang=en