IBM Software Group

Intelligent Management for Web Servers in IBM WebSphere Application Server v8.5.5

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WebSphere® Support Technical Exchange

Agenda

- Overview of Intelligent Management and its features
- WebSphere plugin
- Intelligent Management for webservers plugin
- IM plugin troubleshooting

Where did Intelligent Management come from?

- Started as WebSphere Extended Deployment (XD)
  - Operations Optimization → Virtual Enterprise → Intelligent Management
  - Business Grid → Compute Grid → WebSphere Batch
  - Data Grid → Object Grid → eXtreme Scale
- Used to be installed on top of WAS and needed to "augment" the WAS profile
- Starting in v8.5, Virtual Enterprise was integrated into WAS ND v8.5 as "Intelligent Management".
- Intelligent Management for web servers (Intelligent Management Plug-in) was introduced in v8.5.5

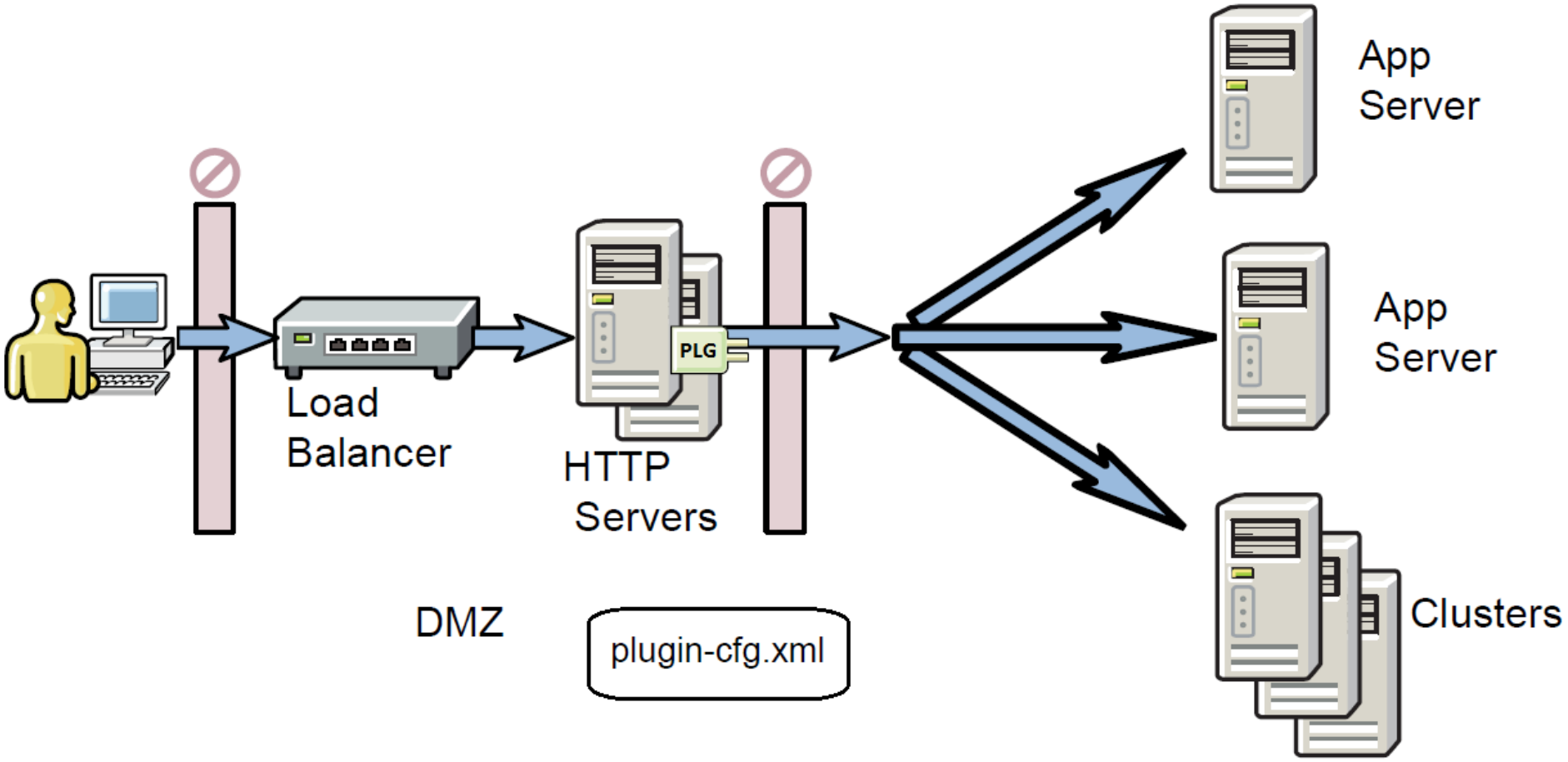
What is Intelligent Management in WAS v8.5?

Features of Intelligent Management in WAS v8.5 include:

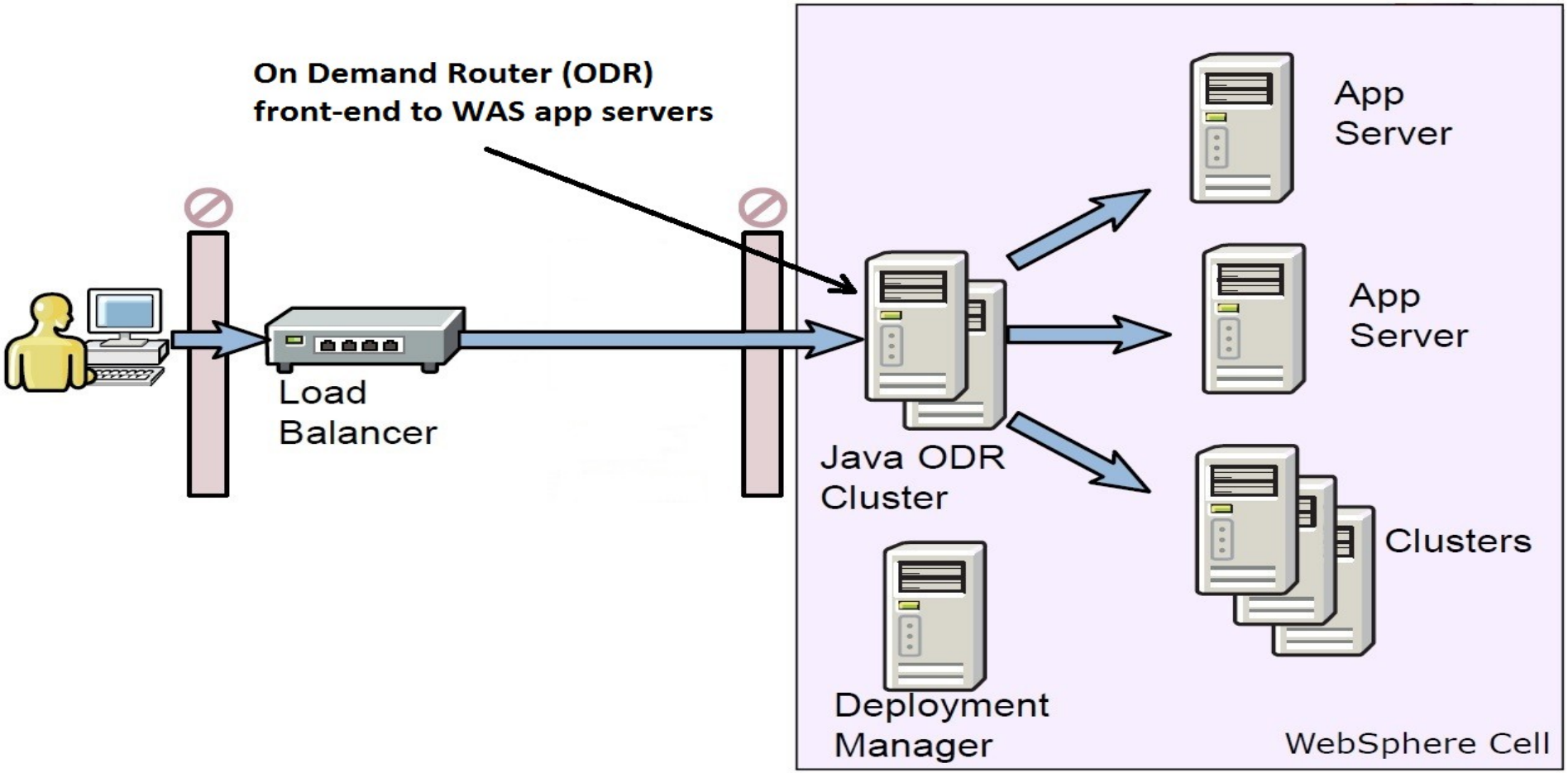
- On Demand Router (ODR)
- On Demand Configuration (ODC)
- Application Editions
- Application Routing Rules
- Dynamic Cluster
- Health Policies
- Service Policies

Intelligent Management overview:
http://www.ibm.com/support/knowledgecenter/api/content/nl/en-us/SSAW57_8.5.5/com.ibm.websphere.nd.doc/ae/cwve_xdovrvw.html

Review of traditional web server Plug-in

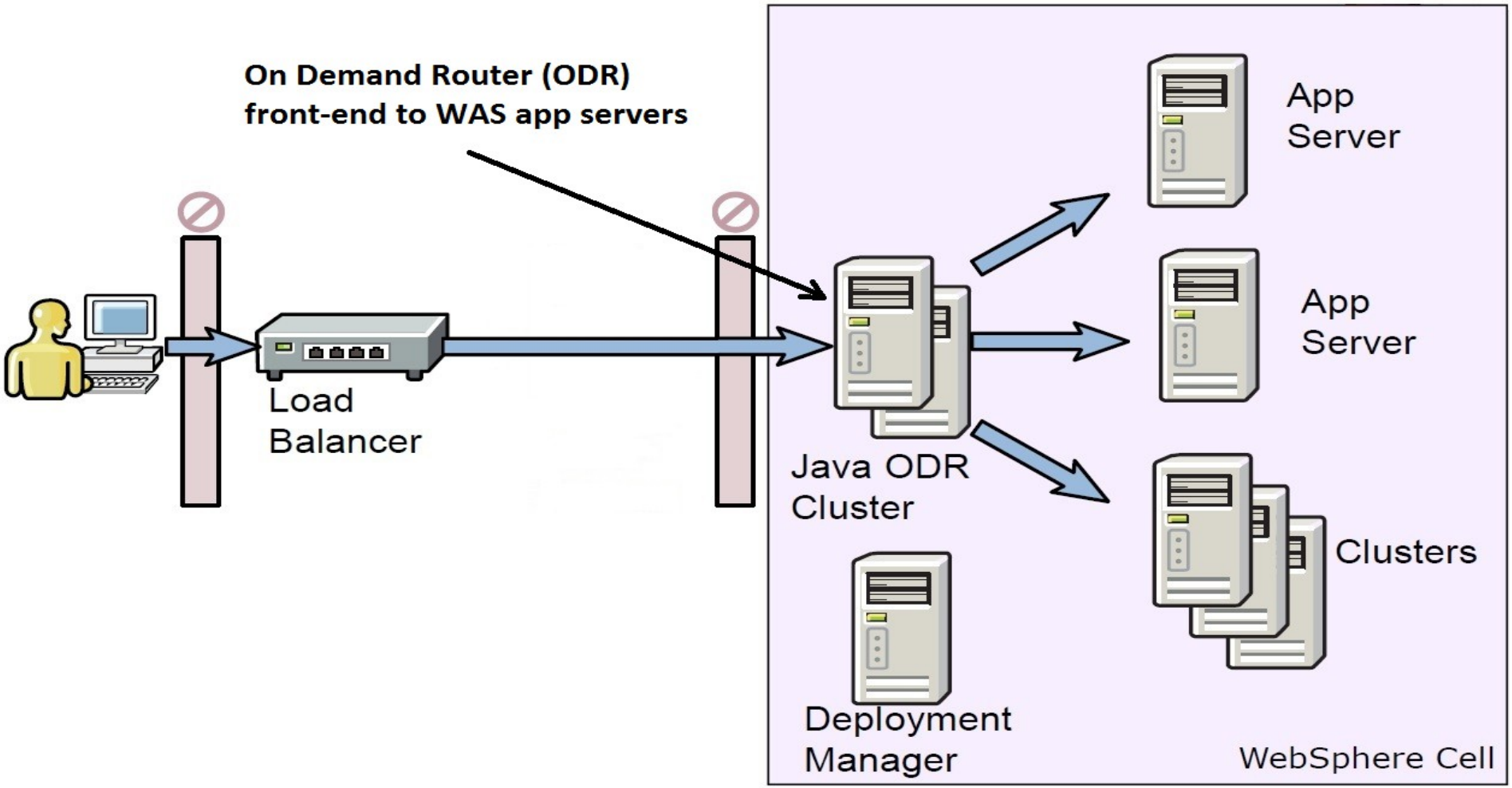


Review of ODR in WAS XD / VE

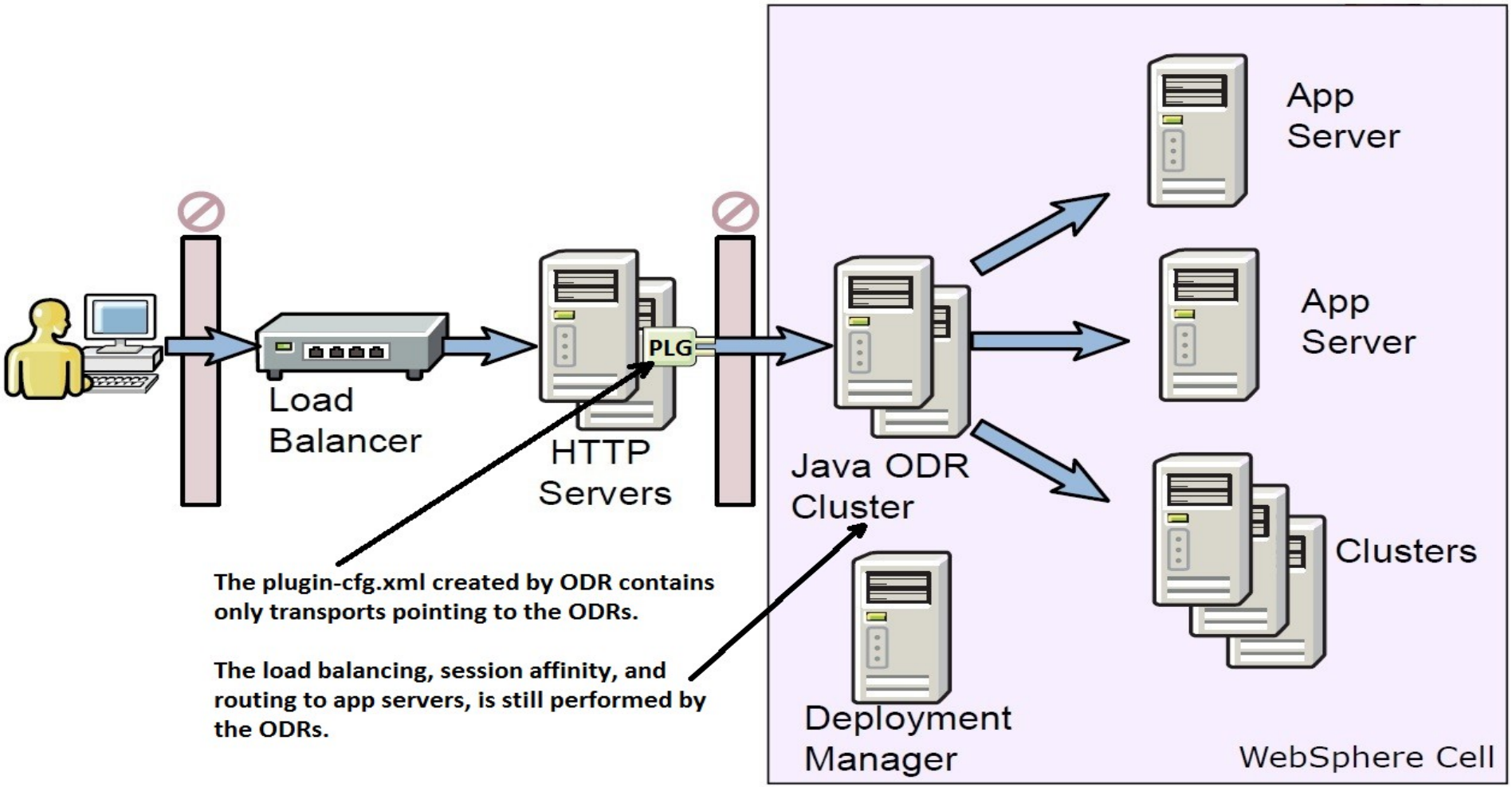


Java™

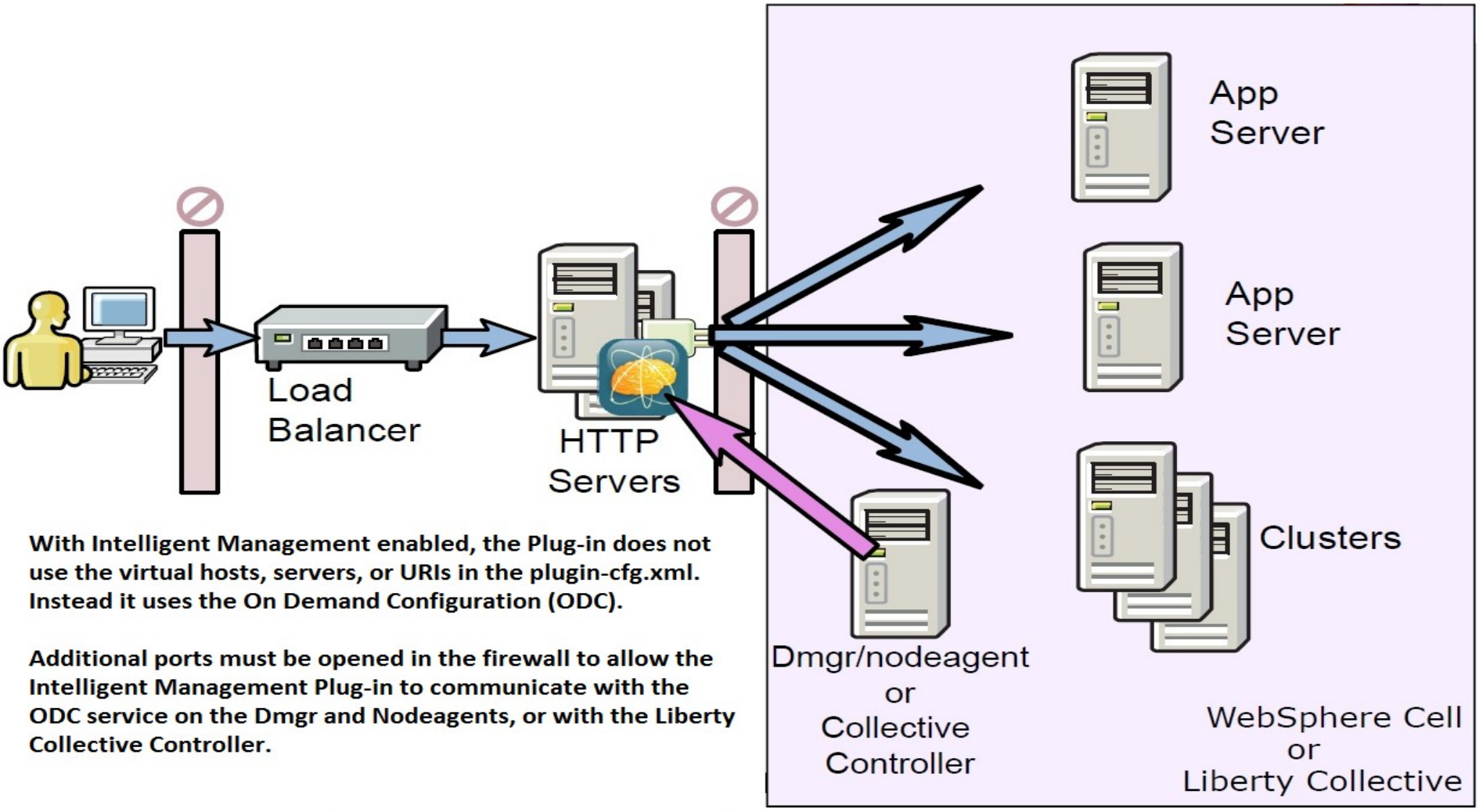
Review of ODR in WAS XD / VE



Using a web server plug-in in-front of ODR



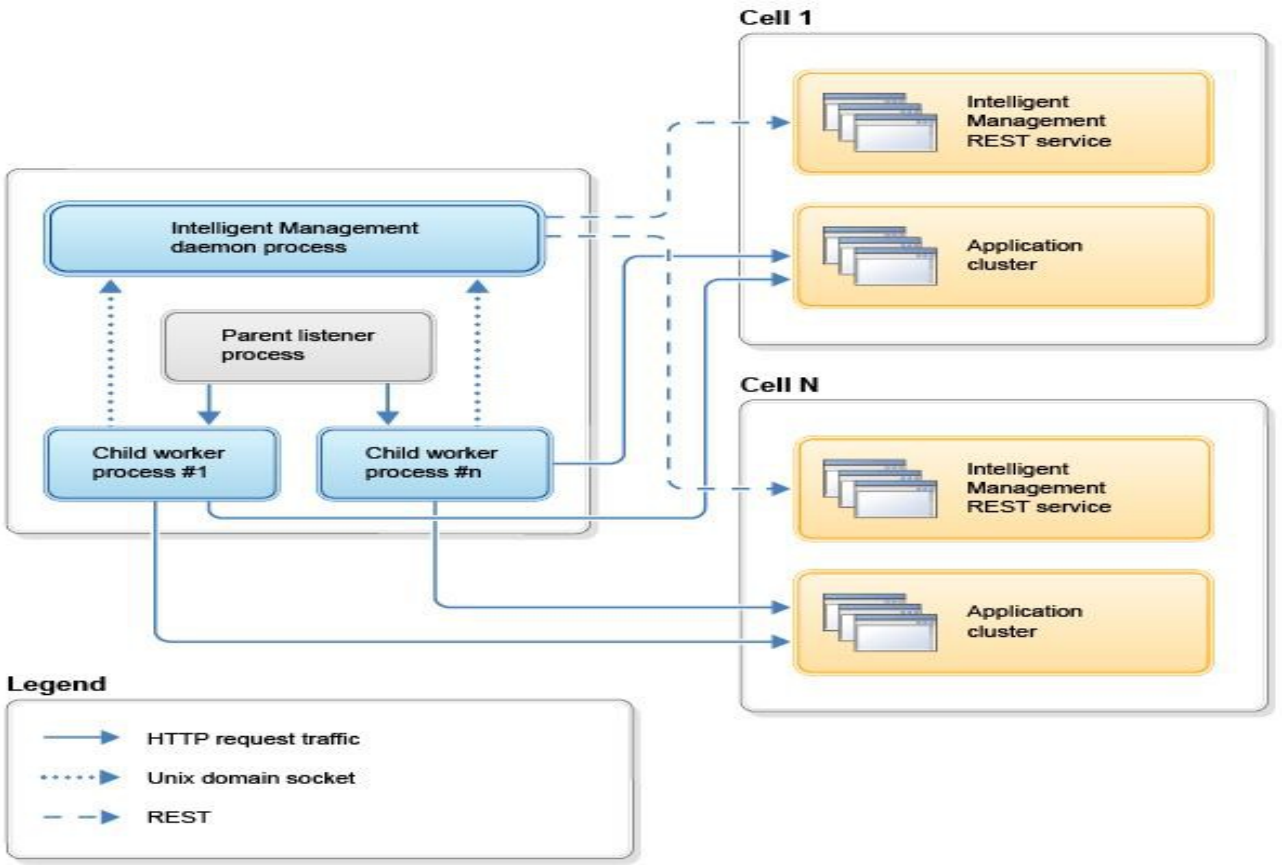
Intelligent Management web server Plug-in



With Intelligent Management enabled, the Plug-in does not use the virtual hosts, servers, or URIs in the plugin-cfg.xml. Instead it uses the On Demand Configuration (ODC).

Additional ports must be opened in the firewall to allow the Intelligent Management Plug-in to communicate with the ODC service on the Dmgr and Nodeagents, or with the Liberty Collective Controller.

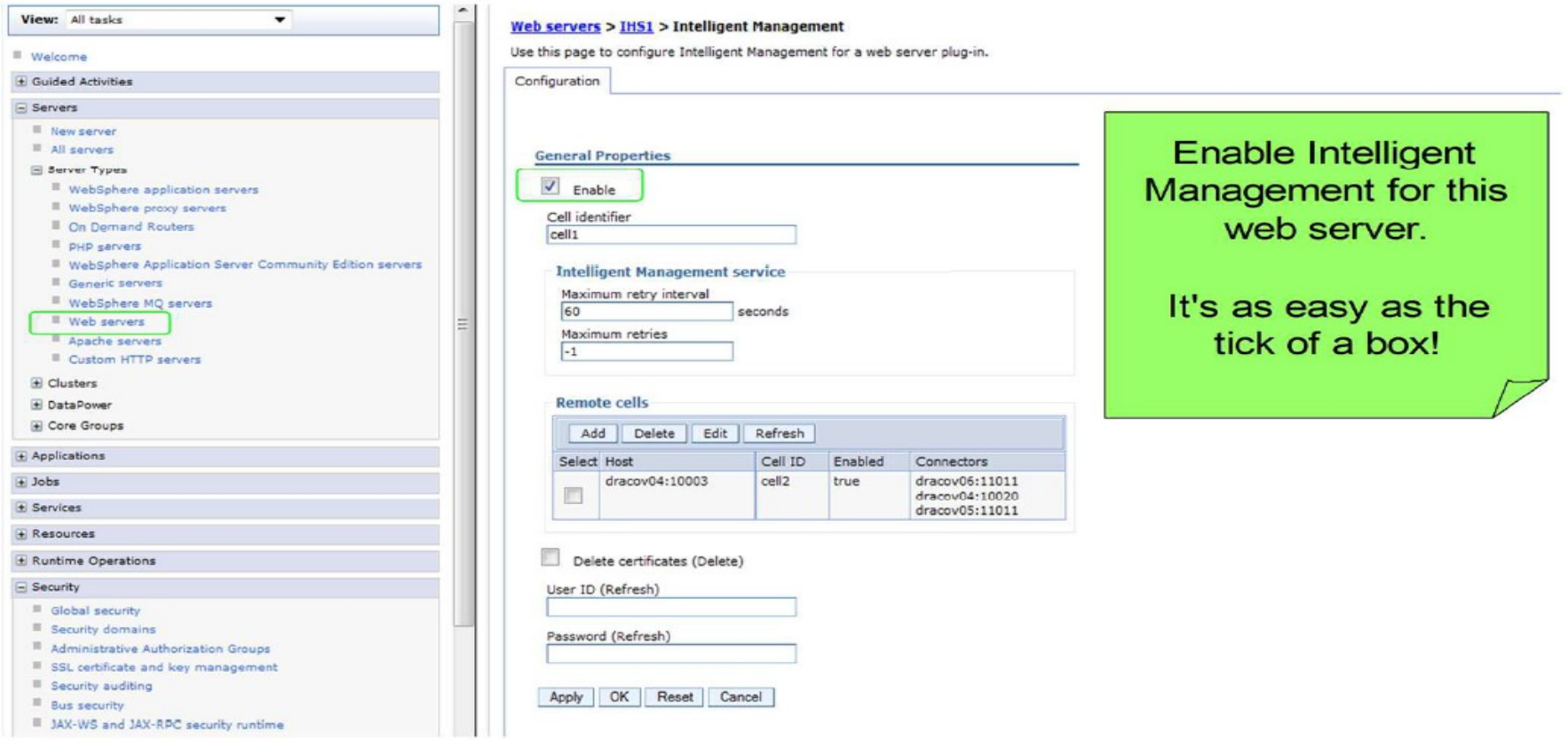
Intelligent Management – Schematic



IM – Supported Features

- Automatic discovery of routing information
- Weighted least outstanding request (WLOR) LB
- Respond to dynamically-changing server weights
- Retrieve routing information and per-app statistics
- Health policies: timeouts and response times
- Application-edition routing rules
- Per-request conditional tracing
- Edition-aware routing; rollout continuous availability
- Node and server maintenance mode routing

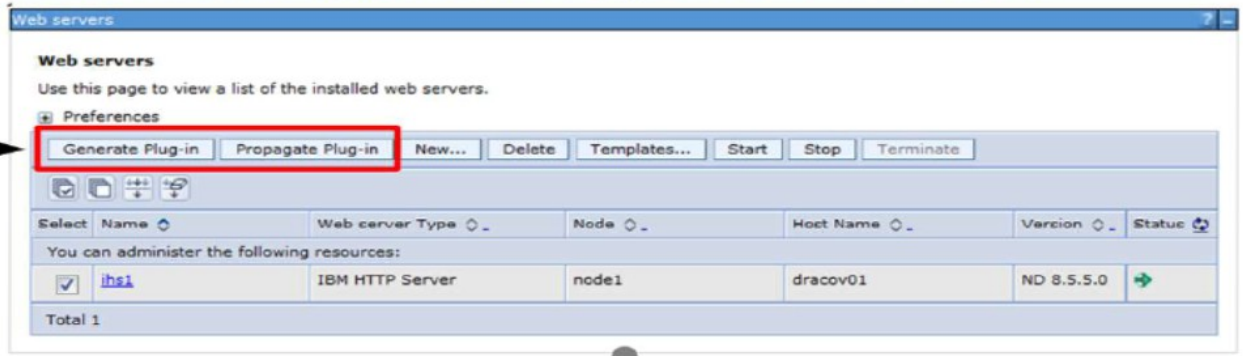
Configuring IM for Apache/IHS WebServer



plugin-cfg.xml example with IM enabled

plug-in-cfg.xml example with Intelligent Management enabled

Generate and propagate the plugin-cfg.xml as usual



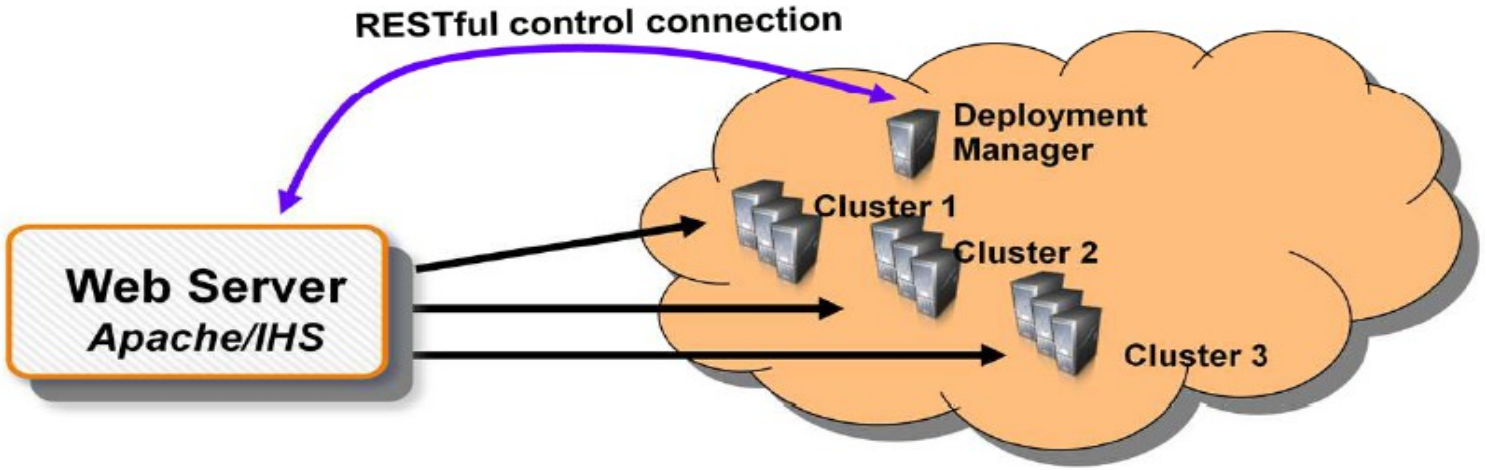
The plugin-cfg.xml file does not contain application or application server information. It contains host and port information for the REST services in the cell, for deployment manager and each node agent.

The WebSphere plugin connects to only one REST service at a time, but will fail over when necessary.

```
<IntelligentManagement>
   <Property name="webserverName" value="cell1_node1_ihs1"/>
   <ConnectorCluster enabled="true" maxRetries="-1" name="cell1" retryInterval="60000">
      <Connector host="deploymentManagerHost" port="7060" protocol="https">
         <Property name="keyring" value="/opt/IBM/HTTPServer/Plugins/config/ihs1/plugin-key.kdb"/>
      </Connector>
      <Connector host="node1Host" port="7060" protocol="http">
         <Property name="keyring" value="/opt/IBM/HTTPServer/Plugins/config/ihs1/plugin-key.kdb"/>
      </Connector>
      <Connector host="node2Host" port="7060" protocol="http">
         <Property name="keyring" value="/opt/IBM/HTTPServer/Plugins/config/ihs1/plugin-key.kdb"/>
      </Connector>
```

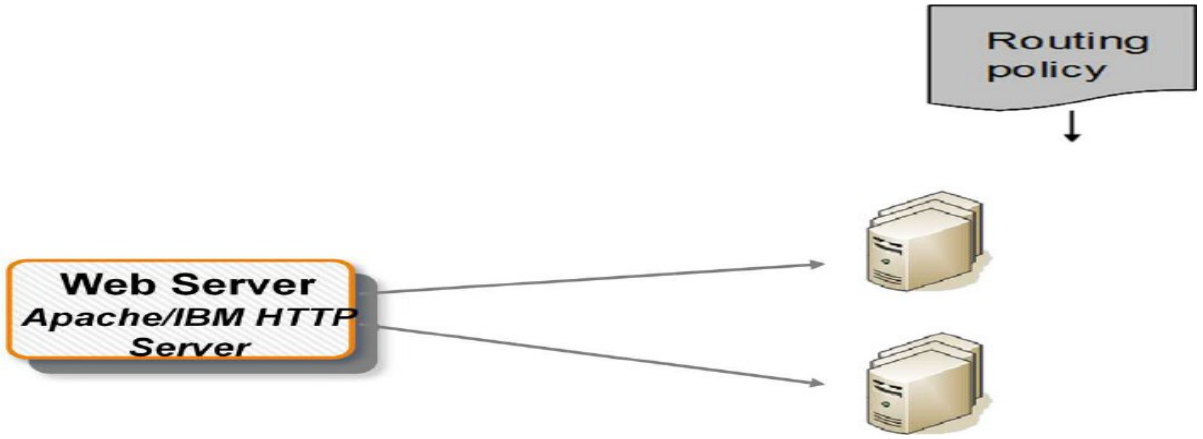
IM Features – Automatic routing

- Automatically discovers and recognizes all changes that affect routing, such as:
  - Server/cluster create/start/stop/delete
  - Application install/start/stop/uninstall
  - Virtual host updates
  - Session affinity configuration changes
  - Dynamic server weight changes
- Lower administrative overhead. Simply connect to a cell and go. When new clusters are created in target cells, no change is made or needed to the plug-in-cfg.xml file.
- Efficient and responsive delta processing by plug-in when changes occur in a WebSphere Application Server cell



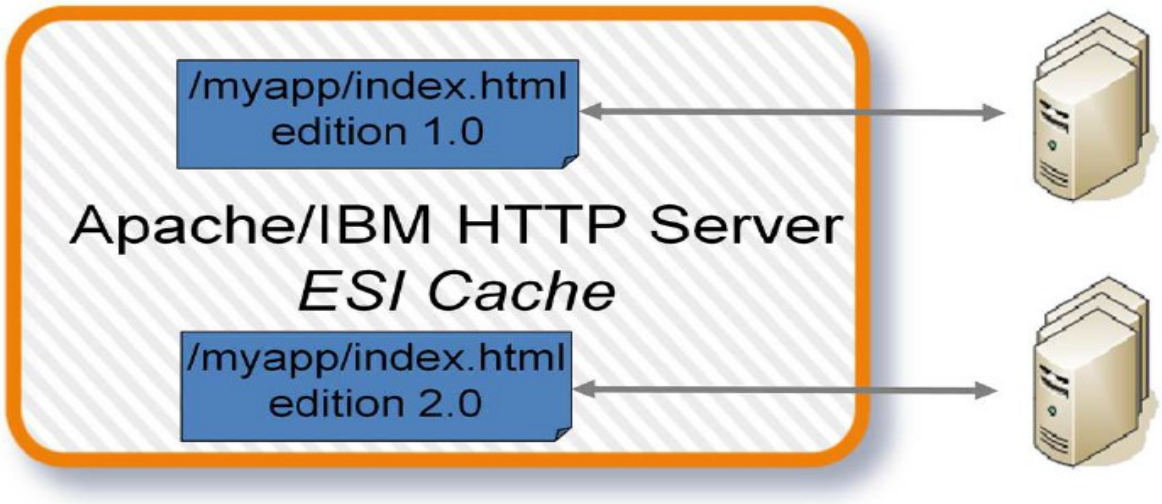
IM features: Application Editions

- Upgrade applications without interruption to users
- Easy-to-use validation mode allows you to validate new versions of application without them sending production traffic
- Concurrently run multiple editions of a single application, using routing policy to route users to the appropriate edition



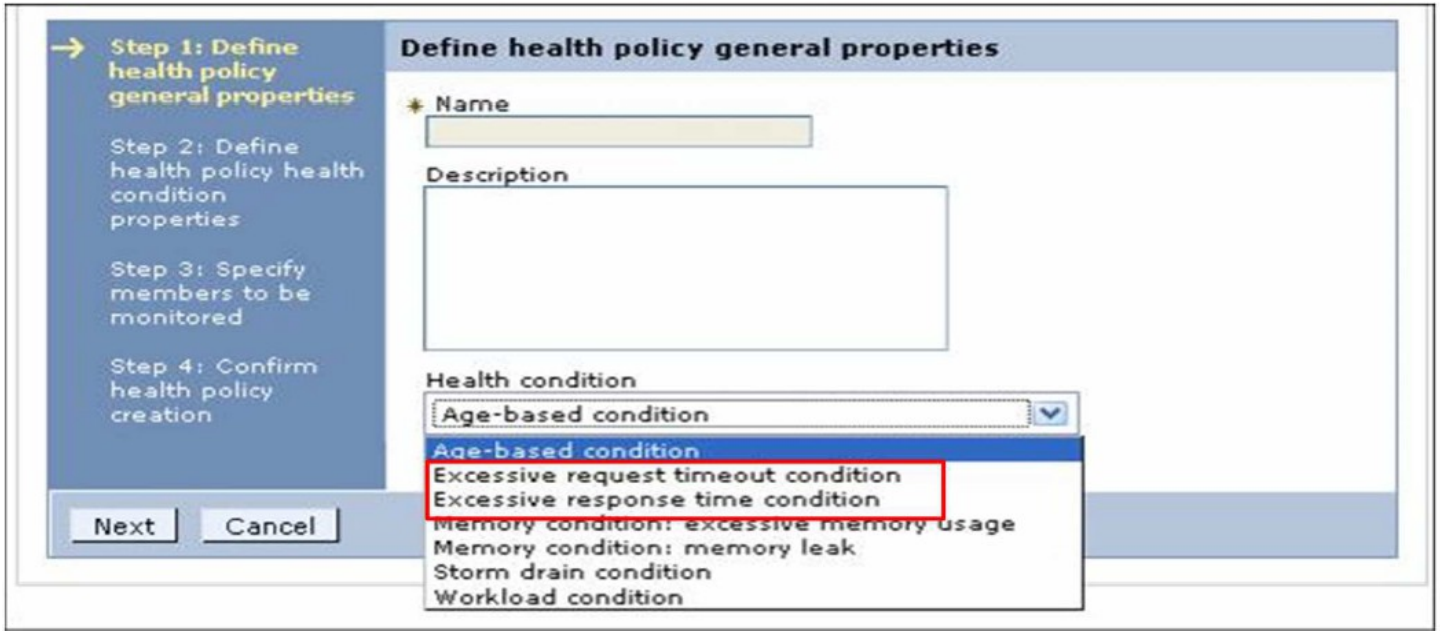
IM Features: Application edition caching

- Edge Side include (ESI) cache of the plug-in is edition-aware
  - Contents of different App editions are stored separately in the cache.



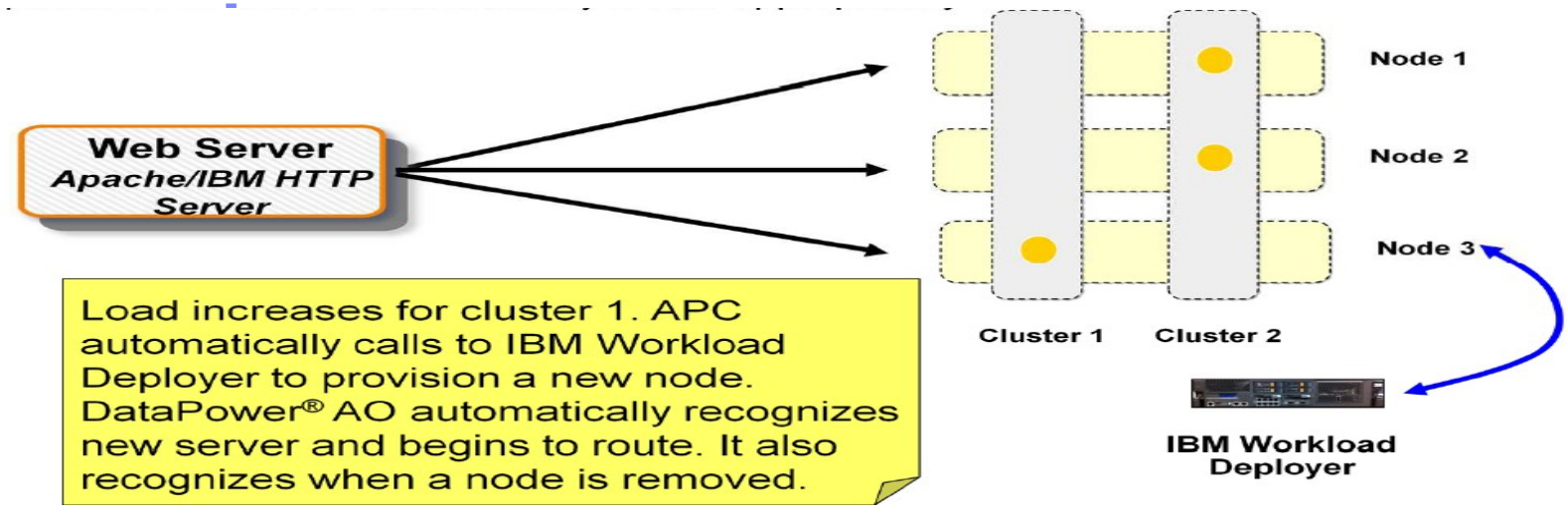
IM Features: Health policies

- Recognize a sick server and automatically take corrective action
- Excessive response time and Excessive request timeout health policies

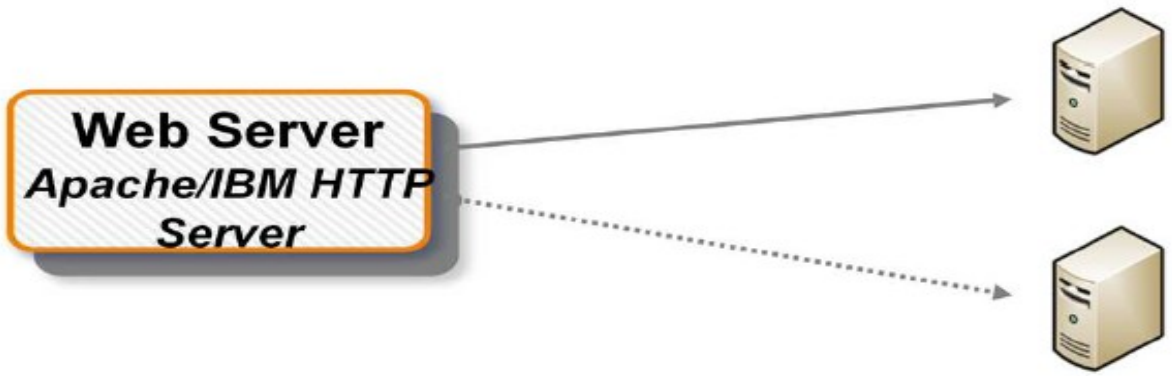


IM features: Dynamic Clusters

- JVM™ and VM elasticity
- To meet demand, the application placement controller (APC) component...
  - Dynamically starts/stops servers
  - Calls IBM Workload Deployer to provision/de-provision servers
- IBM/Apache HTTP server automatically routes appropriately



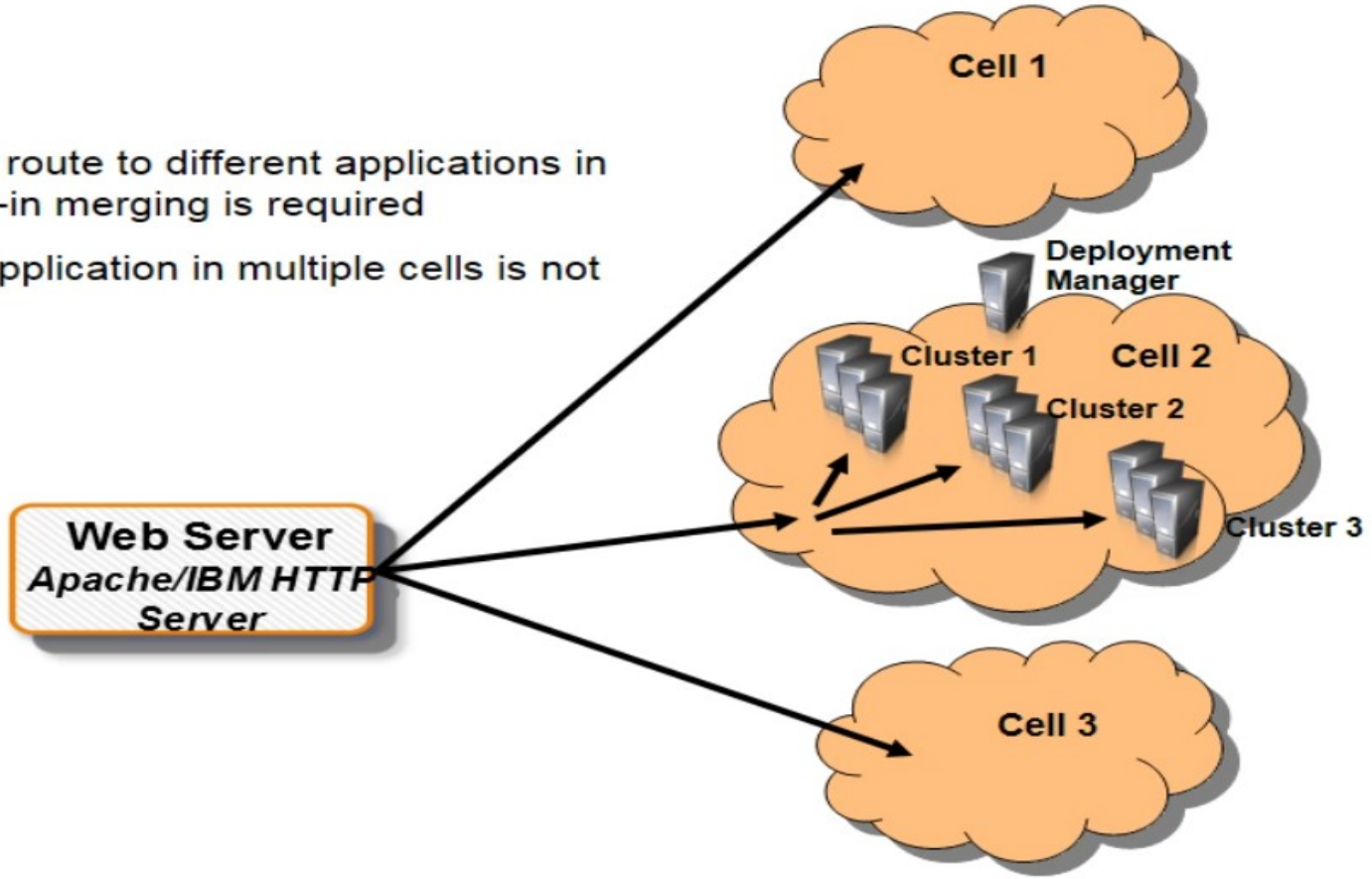
IM features: Maintenance mode



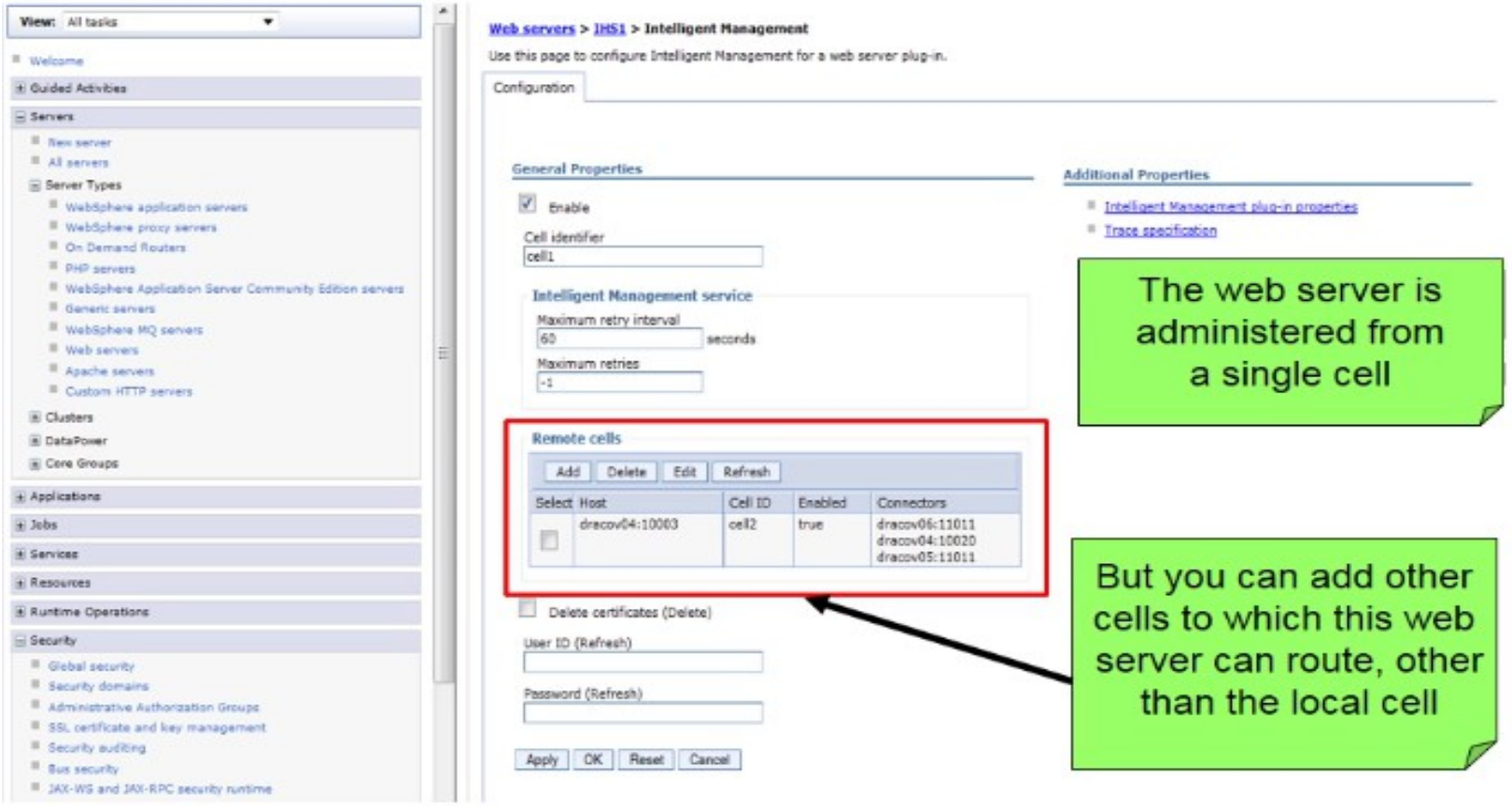
Route only requests with affinity to node two while in maintenance mode. Also observe server maintenance mode

IM Features: Multi-cell routing (1 of 2)

- Plug-ins automatically route to different applications in different cells; no plug-in merging is required
- Routing to the same application in multiple cells is not supported



IM Features: Multi-cell routing (2 of 2)



plugin-cfg.xml example with multiple cells

New IM Stanza

Cell 1 connectors

There is a single control connection per cell, but with failover. A REST service runs in the deployment manager and each node agent for high availability.

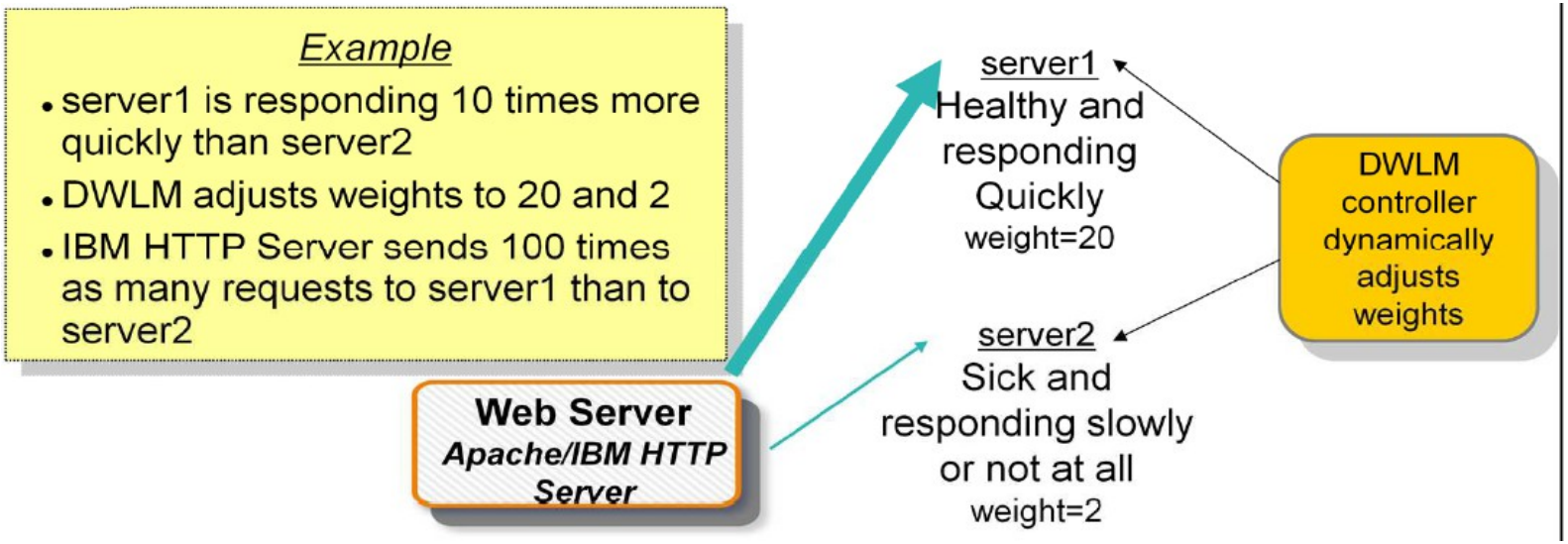
Cell 2 connectors

All of the routing information is obtained dynamically, so there is no application or application server information in the plug-in-cfg.xml

```
<IntelligentManagement>
   <Property name="webserverName" value="cell1 node1 IHS1"/>
   <ConnectorCluster enabled="true" maxRetries="-1" name="cell1" retryInterval="60000">
      <Connector host="dracov01" port="10020" protocol="http">
         <Property name="keyring" value="/opt/IBM/HTTPServer/Plugins/config/IHS1/plugin-key.kdb"/>
      </Connector>
      <Connector host="dracov03" port="11011" protocol="http">
         <Property name="keyring" value="/opt/IBM/HTTPServer/Plugins/config/IHS1/plugin-key.kdb"/>
      </Connector>
      <Connector host="dracov02" port="11011" protocol="http">
         <Property name="keyring" value="/opt/IBM/HTTPServer/Plugins/config/IHS1/plugin-key.kdb"/>
      </Connector>
   </ConnectorCluster>
   <ConnectorCluster enabled="true" maxRetries="-1" name="cell2" retryInterval="60000">
      <Connector host="dracov06" port="11011" protocol="http">
         <Property name="keyring" value="/opt/IBM/HTTPServer/Plugins/config/IHS1/plugin-key.kdb"/>
      </Connector>
      <Connector host="dracov04" port="10020" protocol="http">
         <Property name="keyring" value="/opt/IBM/HTTPServer/Plugins/config/IHS1/plugin-key.kdb"/>
      </Connector>
      <Connector host="dracov05" port="11011" protocol="http">
         <Property name="keyring" value="/opt/IBM/HTTPServer/Plugins/config/IHS1/plugin-key.kdb"/>
      </Connector>
   </ConnectorCluster>
</IntelligentManagement>
```

IM features: WLOR

- Weighted least outstanding request (WLOR) load balancing
- Evens out response times by dynamically changing weights
- Quick to send less traffic to slow or hung servers



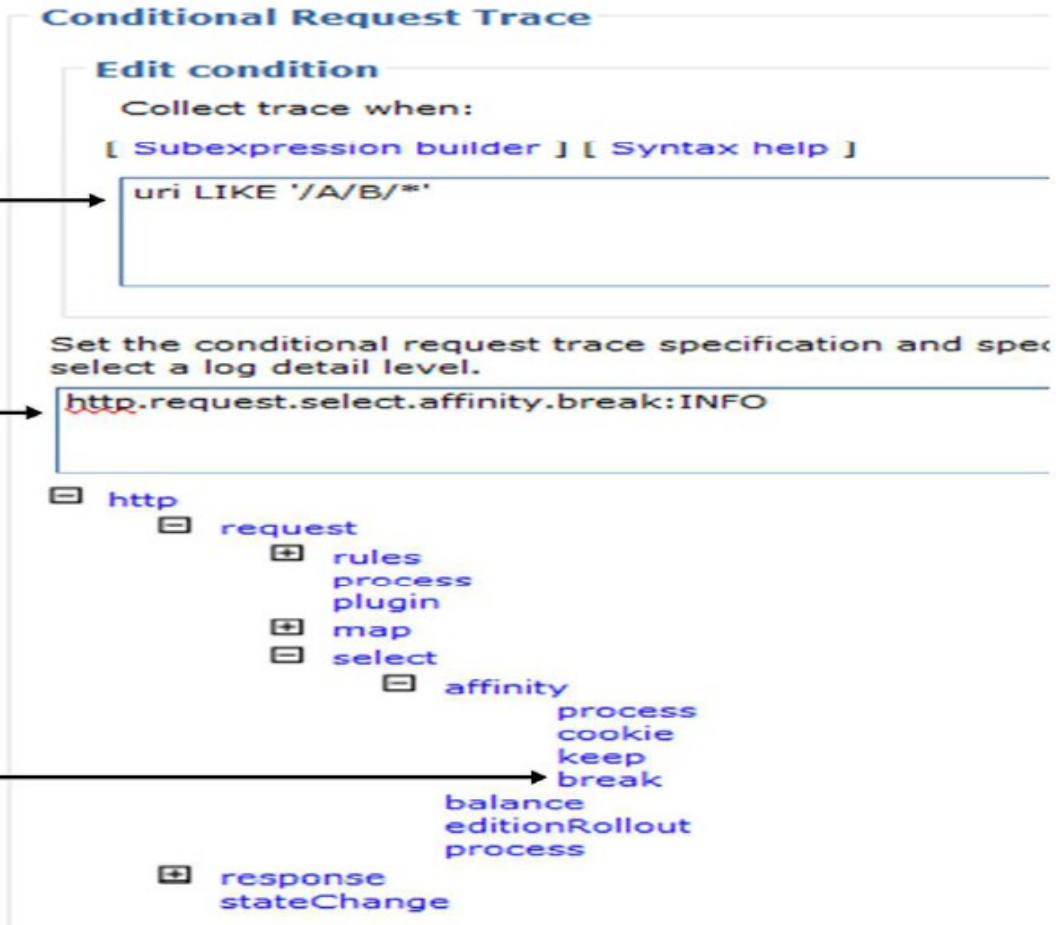
IM Features: mod_status

- Retrieve plug-in routing information from Apache's mod-status
- Available in JSON format for consumption by monitoring tools
- To view mod-status: http://webserver/server-status
- Types of information returned:
  - Application
  - Clusters and servers (for example, average response time)
  - Connector groups show status of the control connection to the REST service


```
{"applications": {
   "/cell/cell1/application/app1": {
      "editions": {
         "": {
            "webModules": {
               "/cell/cell1/application/app1/webModule/webModule1.war": {
                  "contextRoot": "/app1"
               }
            }
         }
      }
   },
"clusters": {
   "/cell/cell1/cluster/cluster1": {
      "servers": {
         "/cell/was85/node/node1/server/server1": {
            "state": "STARTED",
            "weight": 20,
            "maintenanceMode": "normal",
            "cloneID": "17hkrksgf",
            "averageResponseTimeInMillis": 78,
            "sessionAffinityCookies": "JSESSIONID",
            "outstandingRequests": 3,
            "applications": {app1}
         }
      }
   },
},
"version": "855rtc-20130315-1",
"connectorGroups": {
   "cell1": {
      "state": "STARTED",
      "failures": 0,
      "connectors": {
         "http://dmgr:7060": {
            "state": "STARTED",
            "failures": 0
         },
         "http://node1:7060": {
            "state": "STOPPED",
            "failures": 0
         },
      }
   }
}
```

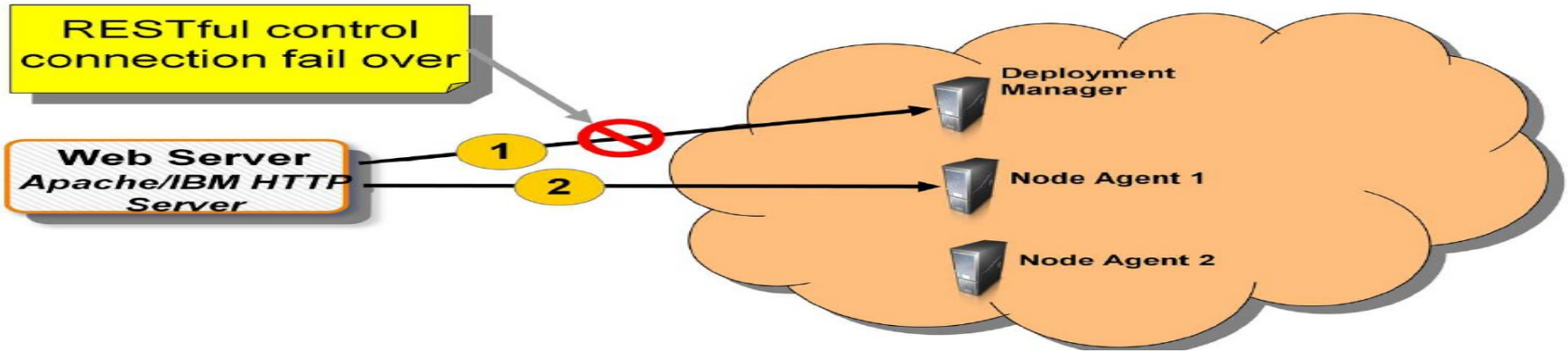
IM features: Per request conditional tracing

- Enable trace for only the requests that match the specified condition
- Fine-grained trace enablement; both hierarchical and level-based
- Allows selective trace enablement for problem determination (for example, just when breaking affinity)



IM features: HA capabilities

- Highly-available (HA) REST-based control connection to WebSphere Application Server
  - DMZ-friendly
  - No application to install or additional configuration required
  - REST-based service available automatically in WebSphere Application Server 8.5.5 deployment manager and node agent
  - Plug-in fails over when needed



ODR features not supported by IM plug-in

- On demand router (ODR) routing rules
  - No load balancing or fail over for the same application in multiple cells
  - Different applications in different cells is supported.
- Processor/memory overload protection
- Request prioritization
  - No queuing and re-ordering of request based on service policies
  - (Dynamic cluster are supported)
- Highly-available deployment manager
- Lazy start for dynamic clusters

ODR/Plug-in comparisons

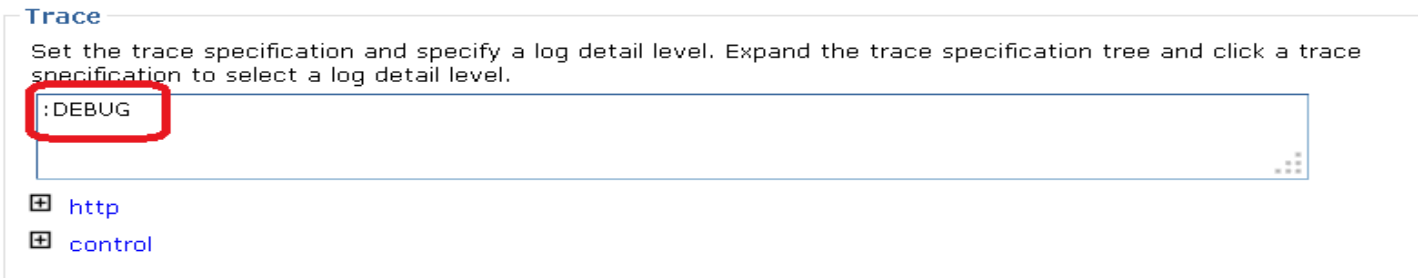
Capability	Java ODR	Plug-in full profile	Plug-in Liberty
Automatically learns routing information	Yes	Yes	Yes
Dynamically recognizes when routing information changes	Yes	Yes	Yes
Very quickly routes around slow or hung servers	Yes	Yes	Yes
Reacts to server starts and stops without retries	Yes	Yes	Yes
Supports auto scaling based on server metrics	Yes	Yes	Yes
Per-request conditional tracing	Yes	Yes	Yes
Node maintenance mode	Yes	Yes	No *
Server maintenance mode	Yes	Yes	No *
Uses dynamically adjusted server weights	Yes	Yes	No
Application edition-aware routing.	Yes	Yes	No
Health policies based on ODR metrics	Yes – many	Yes -two	No *
Content-based routing rules	Yes	No	No **
Performs HTTP session re-balancing	Yes	No	No
CPU and heap overload protection	Yes	No	No
Prioritizes requests	Yes	No	No
Supports Auto scaling based on service policies	Yes	No	No
Highly available deployment Manager	Yes	No	No

Mustgather for Troubleshooting

- To debug/diagnose potential IM plugin issues, set the appropriate trace:
  - Set the Plugin-in LogLevel to “Trace:
    - In the WAS Admin Console go to...
    - Servers →
    - Server Types →
    - Web Servers →
    - Webserver1 (name of your webserver here) →
    - Plug-in Properties →
    - In the Plug-in logging section, set Log Level to **Trace**

Mustgather for Troubleshooting

- Set the Intelligent Management trace spec to “DEBUG”:
  - In the WAS Admin Console, go here:
  - Servers →
  - Server Types →
  - Web Servers →
  - Webserver1 (name of your webserver here) →
  - Intelligent Management →
  - Trace specification →
  - In the first box at the top, enter **:DEBUG**



Mustgather for Troubleshooting

- On the WAS side, take the below steps on the REST server specified as the started connector in the server-status...
- Set the following trace on the server:
  - *=info:com.ibm.ws.odc.*=all:com.ibm.ws.wsgroup.*=all:com.ibm.ws.xd.agent.odc.*=all
- Provide the dumpIMPState output to give us the ODC tree:
  - wsadmin.sh -lang jython -f dumpIMPState.py --auto > IPMState.txt
- On the webserver, provide the server-status output. Generate this by putting the following URL in your browser:
  - http://<http_server_hostname>/server-status
- Provide all plugin logs, plugin-cfg.xml, server-status output from the plugin side. From the WAS side, provide the dumpIMPState output, server logs and FFDC folders from the connected REST server.

503s through IM for webservers

- It's necessary to provide all of the information requested in the IM for webservers mustgather for 503s.
- Usually seen because IM sees that there is an app that will match the URI that comes in, but it cannot route the request. Could potentially be due to no severs being available.
- Investigating requires reviewing the trace, but also the server-status to correlate the URI with the routing information IM has available.
- The dumpIMPState from the REST service is also required. The server-status will reflect the information of the ODC tree from the dumpIMPState, so it's important to make sure the information is mirrored and that there is no issue with REST updating the IM for webservers plugin.

503 Trace Example

[Mon Mar 10 03:37:01 2014] 00002084 00000ef4 - ODR:DEBUG: tsSelect: no server was found; Error Status Code=503
[Mon Mar 10 03:37:01 2014] 00002084 00000ef4 - ODR:DEBUG: odrHttpContextGetTargetEndpoint: exit - tep=null
[Mon Mar 10 03:37:01 2014] 00002084 00000ef4 - ERROR: ws_common: websphereWriteRequestReadResponse: Failed to find a server

- Also be sure to look out for network connectivity problems, gskit errors or any other issues at the time the problem happened.

Server-status


```
{
   "applications": {app1},
   "clusters": {
      "/cell/testCell/cluster/AppNode1:server1": {
         "servers": {

"/cell/testCell/node/AppNode1/server/server1": {
               "state": "STOPPED",
               "weight": 0,
               "maintenanceMode": "normal",
               "noAffinity": "server is not started",
               "noLoadBalancing": "server is not
started",
               "cloneID": "8dbcaca5",
               "averageResponseTimeInMillis": 0,
               "sessionAffinityCookies":
"JSESSIONID",
               "outstandingRequests": 0,
               "applications": {app1}
            }
         }
      }
   },
"version": "ODRLIB855.ODRLIB_a1338.01",
"connectorGroups": {
   "routlawCell": {
      "state": "STARTED",
      "failures": 0,
      "connectors": {
         "http://localhost:7061": {
            "state": "STARTED",
            "failures": 0
         },
         "http://localhost:7060": {
            "state": "STOPPED",
            "failures": 0
         },
         "http://localhost:7061/": {
            "state": "STOPPED",
            "failures": 0
         }
      }
   }
}
```


- Check server status for stopped servers or apps when debugging 503s

404s through IM for webservers

- It's necessary to provide all of the information requested in the IM for webservers mustgather for 404s as well.
- Most 404s will be the result of virtual host issues. It's recommended to make sure all vhosts and ports are properly configured. Checking this first can save a lot of time!
- Review the server-status output to make sure the applications and app servers' information are properly recognized by IM. If they are not, check the dumpIMPState on the REST server to compare ODC with what the plugin sees.
- If the application and server information is missing in the dumpIMPState output, ODC may be having connectivity issues with the cell, be it network or otherwise.

Summary

- The Intelligent Management plugin for webservers brings features of the On Demand Router to the web server.
- While not all functionality is available, the ability to route requests to application editions, multiple cells and more is available at this time.
- Using the IM plugin mustgather, you can get started with investigating routing issues and getting the documentation needed for IBM support.

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- View a webcast replay with step-by-step instructions for using the Service Request (SR) tool for submitting problems electronically:
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