WebSphere® DataPower® SOA Appliances
Application Optimization Usage Note

Improved Utilization and Robustness in SOA

Operational excellence in distributed applications requires moment-by-moment feedback. Incoming network traffic should map to resource availability. IBM WebSphere DataPower Appliances’ Option for Application Optimization (AO) is designed to provide dynamic load balancing functions for the most demanding cases. By evenly distributing load across DataPower appliances and onward to intelligently-selected servers, AO enhances uptime, user visible responsiveness, and capital utilization.

WebSphere DataPower Advantage
Building successful SOA solutions requires an in-depth knowledge of how real customers make use of Web Services and SOA to achieve their business goals. DataPower is a component to the broad WebSphere Smart SOA portfolio. DataPower customers span diverse fields including finance, insurance, telecom, federal and state government, energy, publishing. DataPower is field-proven to deliver an all-in-one security, management, and performance SOA solution.

Standards-Based Interoperability
The DataPower family is designed to integrate with existing XML and Web Services infrastructure through WSDL, UDDI, SOAP, SNMP, and other standards. The appliances interoperate with the following security standards: WS-Security, WS-Security Policy, WS-Policy, SSL, TLS, SAML, Kerberos, XML-Enc, XML-Dsig, X.509 certificates (DER, PEM, PKCS #8, #12), CRL’s, OCSP, LDAP, CSR, PKCS #7 S/MIME, and others.

Ease of Use
DataPower’s WebGUI and interoperability with WebSphere Registry and Repository make it easy to implement sophisticated management and security policies without custom code.

Front and Back Load Management

DataPower appliances are typically used as smart intermediaries between service requestors (nominally “client”) and service providers (“servers”). As such there are two architectural control points for managing load: the client-facing front of the appliance and the outbound server-facing back.

DataPower appliances have historically supported back load balancing through a variety of popular algorithms. AO functions augment DataPower’s standard load management capabilities in two important ways:

1) AO load balances the front of DataPower across a cluster of appropriately configured DataPower appliances (aka “self” load balancing)

2) AO enhances back load balancing by redirecting traffic based on individual server characteristics (compared with the server’s peers which are also reporting these data).

Used in concert with DataPower message routing, service level monitoring, inspection and security features, the AO capabilities enhance an already outstanding capability portfolio in an easy-to-deploy package.

Front: DataPower “Self” Load Balancing

With AO, a DataPower cluster is self load-balancing with one appliance designated as the distributor of traffic across the front of the cluster. Without AO, a DataPower cluster is most often paired with one or more network load balancing devices. This configuration, while effective, ties up resources and capital. AO simplifies the architecture by eliminating the need for separate load balancers.

Note that AO is fault-tolerant. In the event of a failure of the distributor, another cluster member will assume the role of the distributor, providing for high availability. Incremental overhead for the distributor appliance is minimal.

Back: Intelligent Server Load Distribution

AO intelligent load distribution enhances DataPower’s internal back load balancing by dynamically adapting loads across application servers based on feedback received from those servers. For example, WebSphere Network Deployment presents server availability and configured capability information to the DataPower cluster. Intelligent load distribution uses this to adjust traffic to improve server utilization and response time. Additionally, session affinity provides continuity between an application server and a client during a particular session. Any application server that requires session affinity through cookies is supported via a variety of different session affinity modes. Session affinity, dynamic load balancing and a new load balancing algorithm make intelligent load distribution the intelligent choice.

Learn how the Option for Application Optimization provides intelligent load management that enhances business responsiveness, saves capital and boosts uptime.
Operational Example Use Case

Front “Self” Load Balancing
A cluster of DataPower XI50’s with the Option for Application Optimization installed is configured so that each appliance is in a Group which shares a Virtual IP address (VIP). Each device has a unique weight that is used to determine the active distributor appliance that will initially receive traffic on the VIP. Upon message arrival, the distributor will select a cluster member to do the actual processing. If so configured, the distributor could select itself. In this self load balancing case, a round-robin algorithm is used because each of the devices is exactly equal in performance, assuming the same models are used.

Back Intelligent Load Distribution
Behind a DataPower cluster stands a dynamic cluster of WebSphere Application Server ND nodes. These are configured to report load information to the DataPower cluster through a Deployment Manager so that more intelligent weightings can be applied to the load balancing algorithms Weighted Least Connections (WLC) or Weighted Round Robin (WRR). Other algorithms will sense membership updates as servers arrive and depart a cluster. Session affinity, if turned on, overrides the WLC/WRR directive for subsequent requests from the same user or client thereby giving the user a consistent experience.

An Example: A typical SOAP Web Services case
1. Inbound requests arrive at the front of the DataPower cluster from a client request, for example using SOAP.
2. The active distributor appliance is the one with the highest priority as set across the cluster. It receives the request labeled “A” on the Virtual IP.
3. The message is forwarded to the next DataPower appliance in the cluster, in this case the bottom one. In round-robin fashion the request labeled “B” would fall to the following appliance. The distributor generally also functions as an active member of the cluster.
4. The cluster of WebSphere Application Server Network Deployment servers at this point has a number of running nodes, some of which are more capable than others. Capability and up/down characteristics are polled by the DataPower cluster through the Manager intermediary (not shown) to dynamically weight the load distribution algorithm.
5. The DataPower device, after processing the message as needed according to its policy, sends the message on to the next application server according to the weights. Note that with WAS Virtual Enterprise, certain load characteristics can provide weightings.

Summary
- IBM WebSphere DataPower Option for Application Optimization (AO) improves distributed application performance and availability at a lower cost than manual management of operations.
- By working in conjunction with the autonomic capabilities in the WebSphere family of application servers, AO can provide a robust, simplified, dynamic application infrastructure to serve the most critical of business applications.

Product Information
- The WebSphere DataPower Option for Application Optimization is available on the DataPower XML Security Gateway XS40 or DataPower Integration Appliance XI50.
- It is available only on the MT 9235 (also know as the “9004”) running firmware version 3.8.0 or higher. Specifically the following US models can support the Option for Application Optimization: MT 9235-32X, 34X, 3BX, 3DX, 42X, 43X, 44X, 45X, 4BX, 4CX, 4DX, 4FX.
- The Option for Application Optimization is an additional cost item and is available as both a field-upgradable firmware load and as a factory-installed option.

For more examples and information contact your IBM WebSphere representative or IBM Business Partner.

Or visit www-01.ibm.com/software/integration/datapower/index.html