



Health Care Solution

Management Summary & Technical Overview

Version 1



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Management Summary

High volume applications are an exercise in redundancy. In particular, how can the systems be put together to minimize an outage of the critical application. When there are 4 million transactions flowing per day, even a two minute outage (or 10,000 transactions) can be painful. This project was such an exercise. It not only required a high degree of redundancy but also a high degree of automated health checks that would reconfigure data paths on the fly depending on the results of the health check.

Backstory

- The transaction processing landscape had changed significantly over the last ten years:
 - Transaction volume grew to over 4 million transaction per day.
 - Server and mainframes technology changed significantly.
- The challenge was to advance the core applications while at the same time advancing the network and hardware infrastructures without disrupting the transaction processing environment:
 - Back-end mainframes were replaced.
 - Front-end terminal server technology was replaced.
 - Old TCP enterprise bus technology was replaced.
- Applications residing on the above technologies just kept growing both in terms of volume and complexity.
- The philosophy was to make small but continued upgrades to all aspects of the computing environment with the central theme of not disrupting the transaction processing.

Business Objective

- Implement a fault-tolerant messaging service that interfaced the legacy front-end server technology to the new back-end transaction processing technology

Functional Requirements

- Connect 3,000 TCP sessions to back-end IBM server
- Support sustained 300 transactions per second
- Support bursts to 500 transactions per second
- Ensure ultra-high availability

Technical Requirements

- Convert all messaging to common format
- Convert Linux TCP messaging to IBM MQSeries® messaging
- Convert WebSphere® Message Broker messages to an internal proprietary message format
- Correlate request and response messages
- Implement transaction security auditing
- Provide continuous end-to-end data path health check
- Load balance transactions based on data path health check

Outcome

By the development of a number of Filters, the Plexus Message Broker was enhanced to convert messages between the Linux systems and the IBM system. Two instances of the Plexus Message Broker were installed on each of three servers to provide the required redundancy and resiliency.

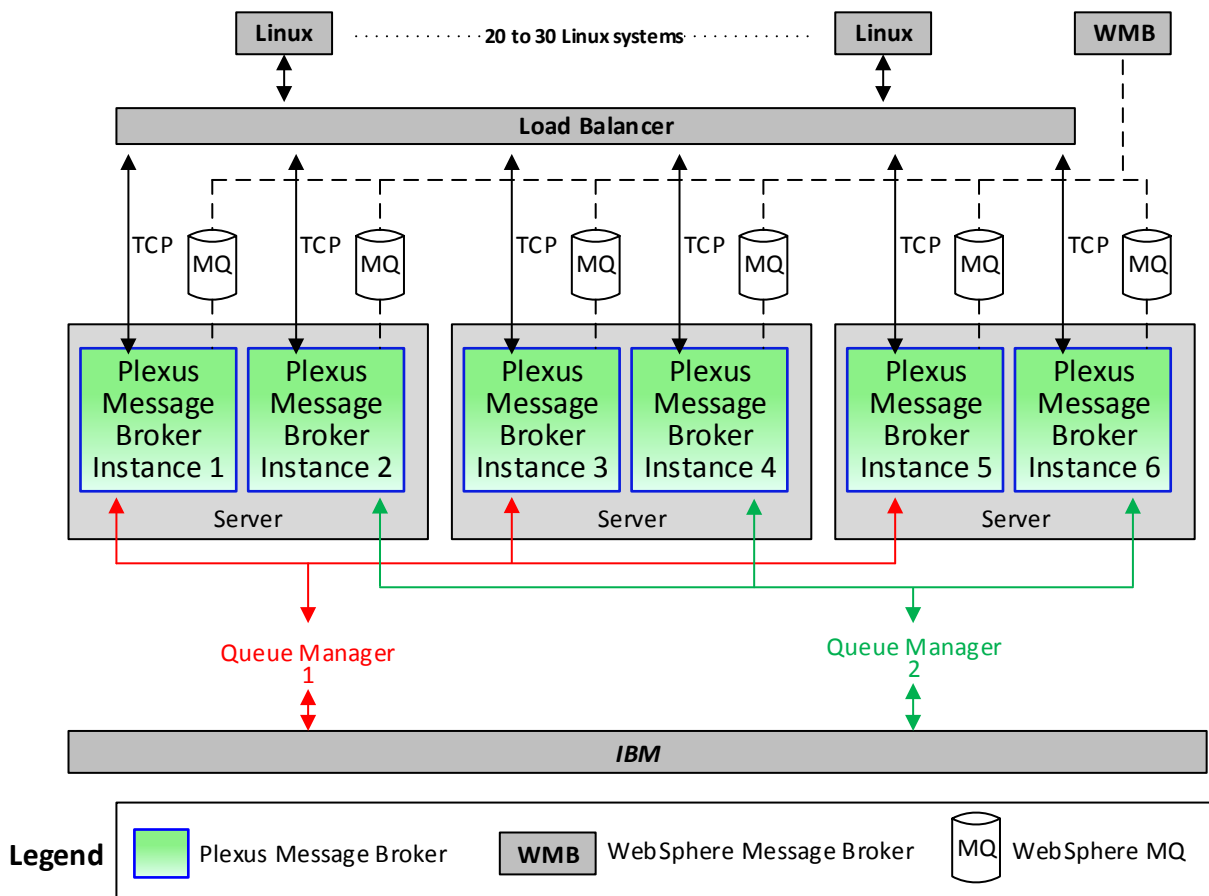
The software supports the average message flow of 200 messages per second with bursts of 500 messages per second.

Technical Overview

This Plexus Message Broker solution features the following technology: WebSphere® MQ, bursts of 500 transactions per second, local and geographic redundancy, message routing, and message translation. This solution's site and Plexus Message Broker configurations touch on these features below.

Site Configuration

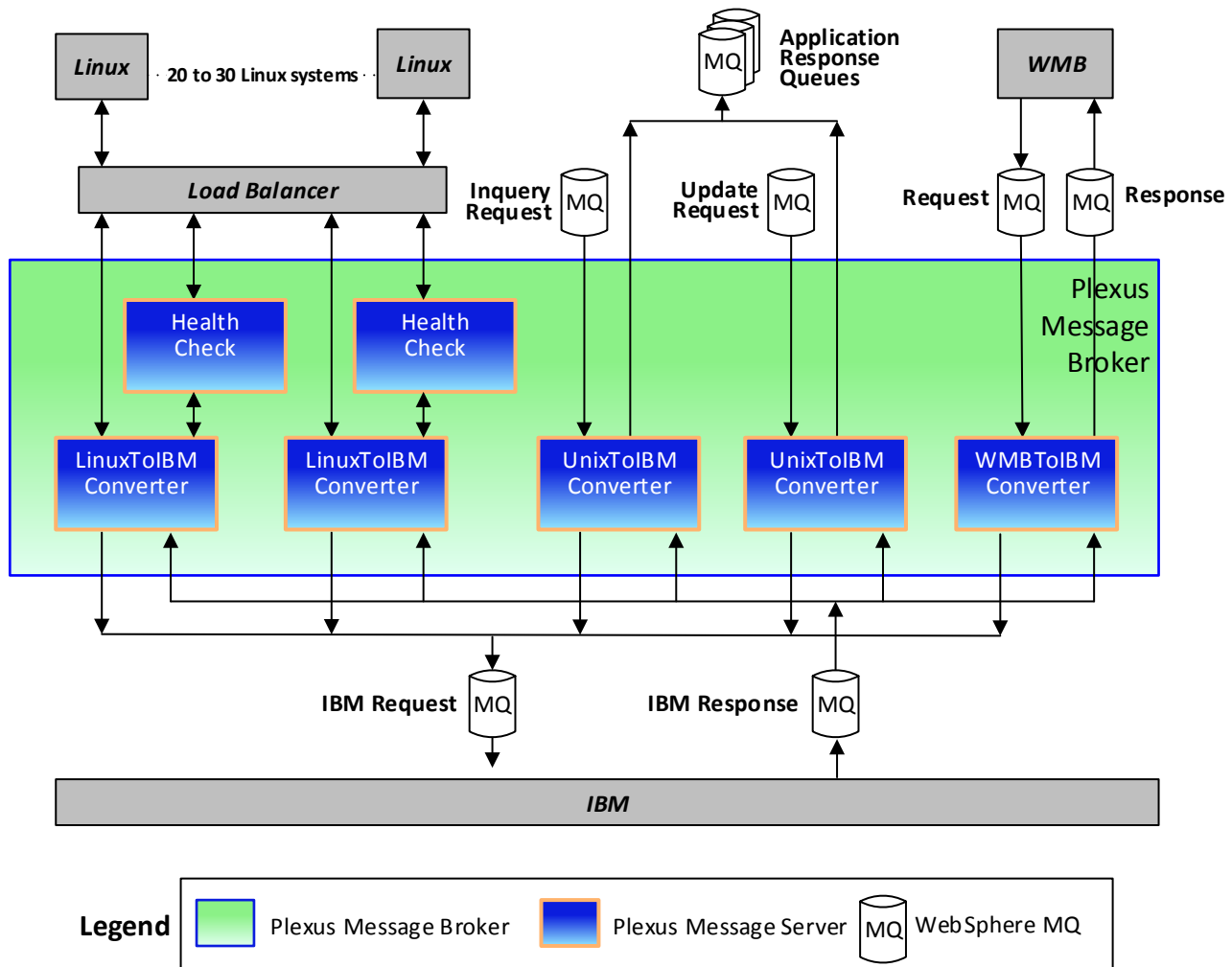
As illustrated below, there are three physical servers at the primary site. Each physical server contains two instances of the Plexus Message Broker. A load balancer is used to distribute the message traffic between all instances of the Plexus Message Broker. For redundancy there are two queue managers that handle the message to the IBM system. A similar configuration is maintained at the back-up site.



Steps have been taken at this site to ensure high message volume as well as local redundancy. A health check facility has been added wherein the Plexus Message Broker tests the critical data paths to ensure functionality in two respects: 1) validate that the data path is clear all the way to the IBM application and 2) validate that the response time performance of the data is within acceptable metrics. If either test fails, the health check mechanism signals the Load Balancer that the compromised data path is out of commission.

Plexus Message Broker Configuration

Due to the high volume of terminal traffic emanating from the Linux servers, there are redundant Linux message servers (*LinuxToIBMConverter*) as illustrated below. Each Linux message server is paired with a HealthCheck Message Server that continually tests the data path of that Linux message server. There are also separate inquiry and update transactions message servers (*UnixToIBMConverter*). Finally, there is a separate message server (*WMBToIBMConverter*) to handle WebSphere® Message Broker (WMB) traffic.

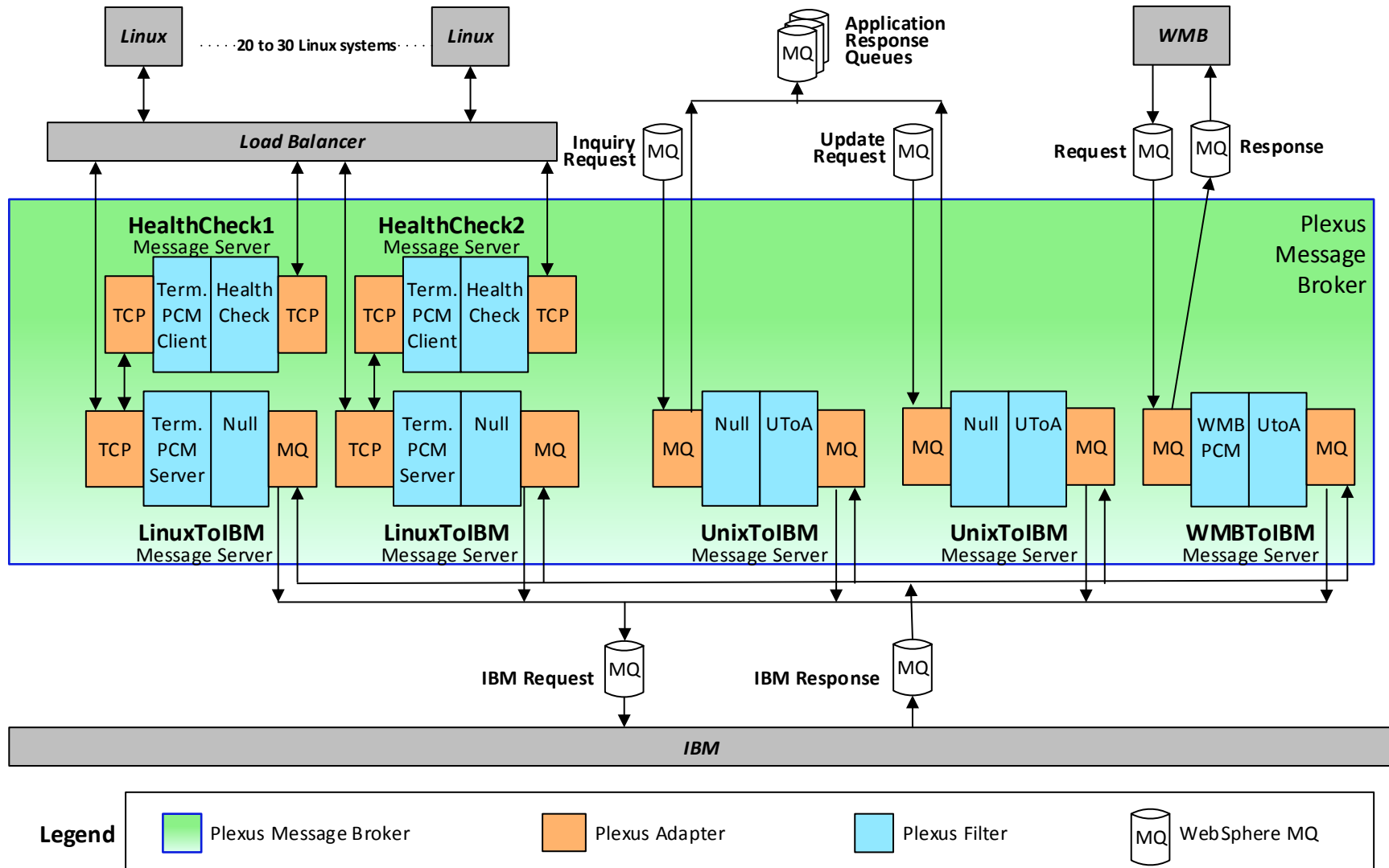


Plexus Message Server Functions

| Message Server | Function |
|----------------|--|
| LinuxToIBM | <p>Receives a TCP connect request, establishes a TCP session, extracts the message from the TCP session, converts the character set, creates an MQ message containing the TCP message and inserts the message into the appropriate MQ queue.</p> <p>Once the message is stored in the MQ queue, the LinuxToIBM Message Server waits on a message insert with the correct Message ID, picks up that response message, and sends the message back to the Linux server. The TCP session is then closed.</p> |
| HealthCheck | <p>There is one HealthCheck Message server for each UnixToIBM Message Server. Every 20 seconds, the Load Balancer send a HealthCheck request to the HealthCheck Message Server. The HealthCheck Message Server analyzes the performance metrics of the associated LinuxToIBM Message Server and responds back to the Load Balancer with either an OK or a Not OK, or does not respond. If the Load Balancer does not receive an OK response, the data path to the associated LinuxToIBM Message Server is disabled.</p> <p>The HealthCheck is also used by a separate automated monitoring facility which will alert an Operations Center any time the HealthCheck does not return OK or fails to respond.</p> |
| UnixToIBM | <p>Removes a MQ message from the input queue, converts the message into the IBM format retaining the message origination information, inserts the message into the IBM MQ queue, and waits on the IBM MQ queue for a message with that correlation ID. Once that message is received, the UnixToIBM Message Server converts the message into Unix format, creates an MQ message containing the output message, and inserts the message into the appropriate application queue.</p> |
| WMBToIBM | <p>Converts a WMB message format to a propriety internal message format</p> |

Plexus Message Server Details

The following figure drills down into the configuration of the Plexus Message Broker; in particular it provides insight into the Adapters and Filters used by each Plexus Message Server in this solution.



Adapters

| Adapter | Description |
|---------|---|
| TCP | Provides TCP connection services both inbound and outbound. For this particular Plexus Message Broker, each TCP adapter is associated with a Filter that provides Web Services, thus providing Web Services over TCP. |
| MQ | Provides send/receive services for WebSphere® MQ |

Filters

| Filter | Description |
|---------------------|---|
| Terminal PCM Client | Provides terminal simulation services. Terminal simulation services are used by the HealthCheck Message Servers to send/receive messages to the LinuxToIBM Message Server. |
| Health Check | Generates data path health check messages that are sent via the Terminal PCM Client to the rest of the system. If a health check message fails for any reason, a response is sent to the Load Balancer to shut down the associated data path. |
| Terminal PCM Server | Provides the server side of terminal services for both the Linux network and the Terminal PCM client filter |
| Null | A placeholder for a Filter |
| WMB PCM | Provides interface message services to/from IBM's WebSphere® Message Broker (WMB) |
| UToA | Provides message conversion services between WMB message formats and IBM message formats |