



NASTEL

Driving Business Transaction Performance ®



AutoPilot®

*Middleware-Centric
Application Performance
Management*

WebSphere User Group UK

30th September, 2014

Royal Society of Edinburgh

Nastel Technologies, Europe
Surrey Research Park
Guildford, Surrey
GU2 7YG, UK
+44 1483 685 015



Introduction



www.nastel.com

Session Abstract & Agenda

"Transaction Tracking on IBM DataPower SOA Appliances"

- Monitor the health and performance of IBM DataPower
- How to use analytics for proactive diagnostics
- Track messages flows that come through IBM DataPower

Agenda

- Introduction to IBM DataPower SOA appliances
- Collecting metrics from IBM DataPower appliances
- Tracking message flows on IBM DataPower appliances
- Applying Situational Analytics to IBM DataPower Environments
- Conclusion

Nastel Technologies, Inc.

VENDOR PROFILE

- Middleware management and "Middleware-centric" application management & monitoring
- Messaging Middleware, Java & .Net Application Servers, ESB's, SOA technologies
- Key value proposition : Identify performance and quality of service issues before business is impacted

CUSTOMERS AND USE CASES

- Large companies, leaders in their markets
- Mission Critical Applications, powered by Middleware
- Trading, Order & Claims Processing, Payments, Funds transfers

KEY DIFFERENTIATORS

- Single point of control for applications running on multiple middleware
- Real-time predictive analytics, policy-driven monitoring, transaction tracking
- Best of breed solution for messaging middleware management





DataPower Concepts

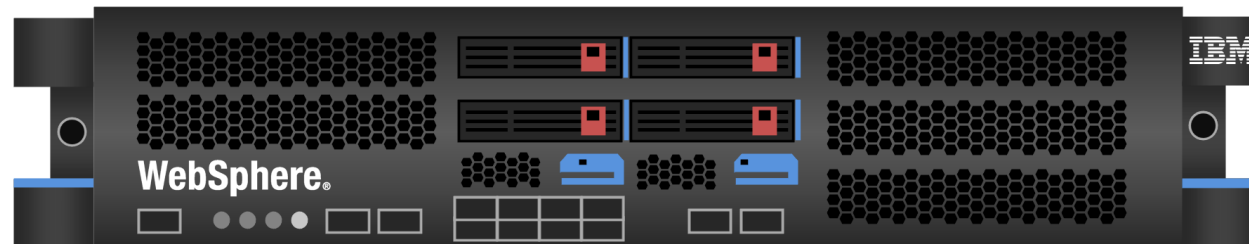


www.nastel.com

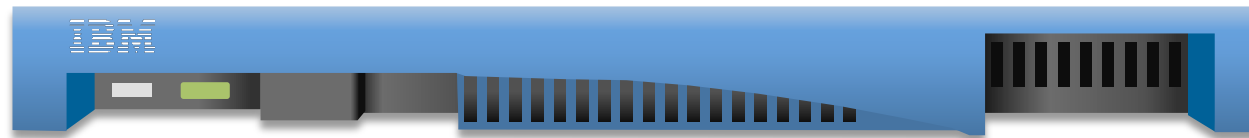
IBM DataPower SOA Appliances

- Addresses 3 challenges of SOA: Ease-of-Use, Security, and Performance
- High performance, firmware-based Enterprise Service Bus
- "Any-to-any" message brokering, transformation and processing
- Integrates any two applications by considering them as services
- Services can be exposed by using different formats and protocols than the ones in which they are implemented
- Protects web services and the architecture behind them from attacks

**DataPower
Xi52**

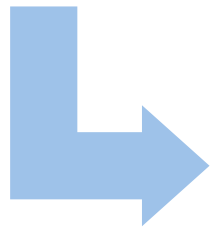


**DataPower
Xi50**



IBM DataPower SOA Appliances

- **XML Firewall** - Security for XML messages
- **Web Service Proxy** - Web service interface used to extend internally hosted services: security, abstraction
- **Multi-Protocol Gateway** - Interface to extend internally hosted services: protocol conversion, transformation, validation, security, abstraction



- **Gateway Policy** - Set of rules for processing messages
- **Policy Rules** - Set of actions to be performed for a specific condition: message arrival, message departure, error conditions
- **Rule Actions** - Process to be performed

Multi-Protocol Gateway Policy

The screenshot shows a web-based configuration interface for a Multi-Protocol Gateway Policy. It is divided into three main sections: Policy, Rule, and Rule Actions.

Policy: This section contains a text field for "Policy Name" with the value "CSC513P1_Policy". Below it are "Apply Policy" and "Cancel" buttons.

Rule: This section contains a text field for "Rule Name" with the value "CSC513P1_Policy_rule_0" and a "Rule Direction" dropdown set to "Client to Server". Below these are "New Rule" and "Delete Rule" buttons.

Rule Actions: This section displays a horizontal flow diagram. On the left is a cloud icon labeled "CLIENT". An arrow points from the client to a diamond-shaped connector. From the connector, an arrow points to a square icon labeled "ORIGIN SERVER". Above the flow diagram is a toolbar with icons for various actions: Filter, Sign, Verify, Validate, Encrypt, Decrypt, Transform, Route, and AAA.

Three yellow callout boxes with black text point to specific elements:

- Gateway Policy** points to the "Policy Name" field.
- Policy Rule** points to the "Rule Name" field.
- Rule Actions** points to the "Rule Actions" section.

On the right side of the interface, there is a yellow box containing a list of available actions:

- Match Actions (ex: test HTTP)
- Processing Actions (ex: convert XML using style sheet)

Below this list, it says "Many available actions" followed by a bulleted list:

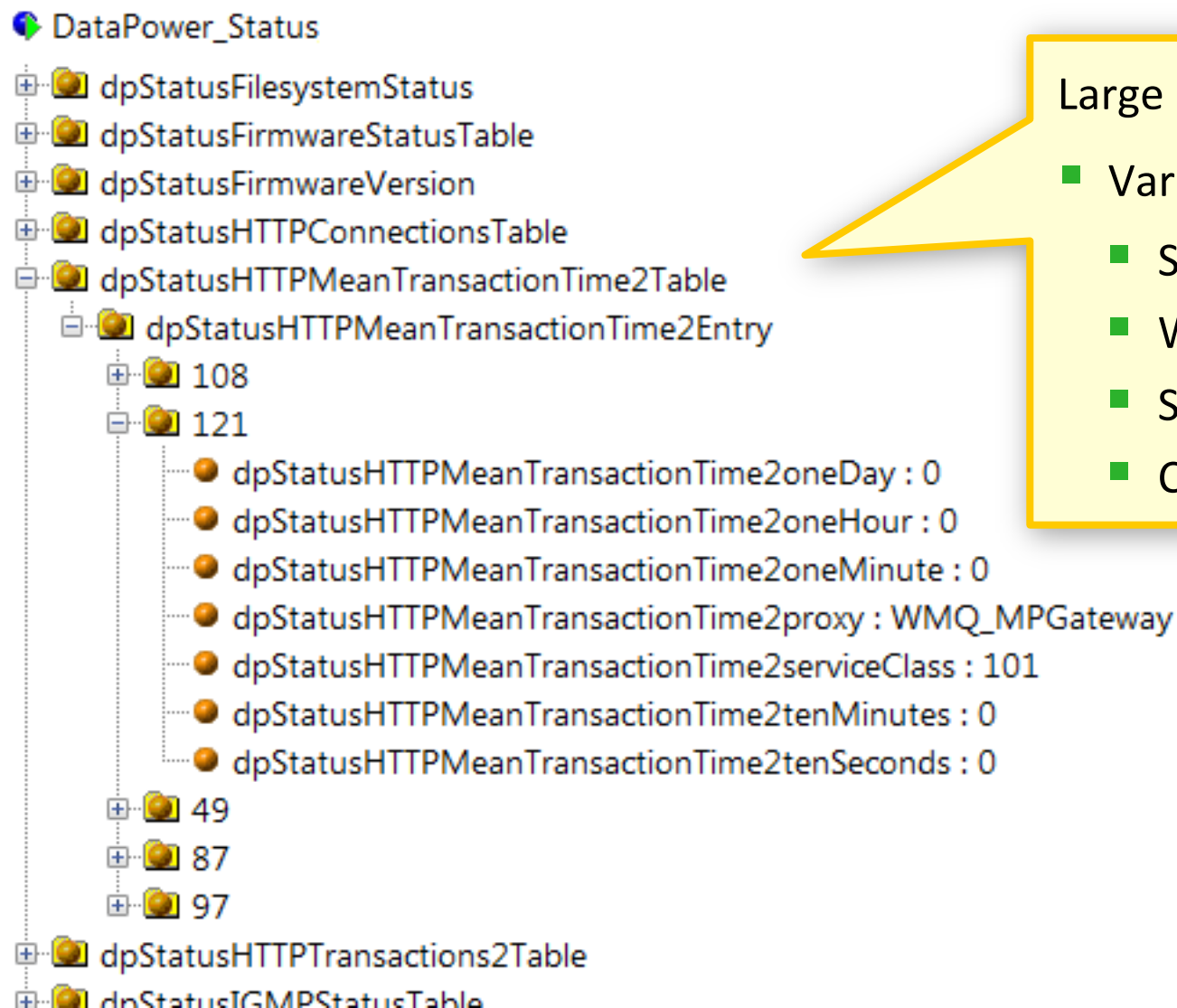
- Filter
- Transform
- Encrypt & Decrypt
- Conditional
- Results
- Results asynchronous ...

DataPower Metrics and Events



www.nastel.com

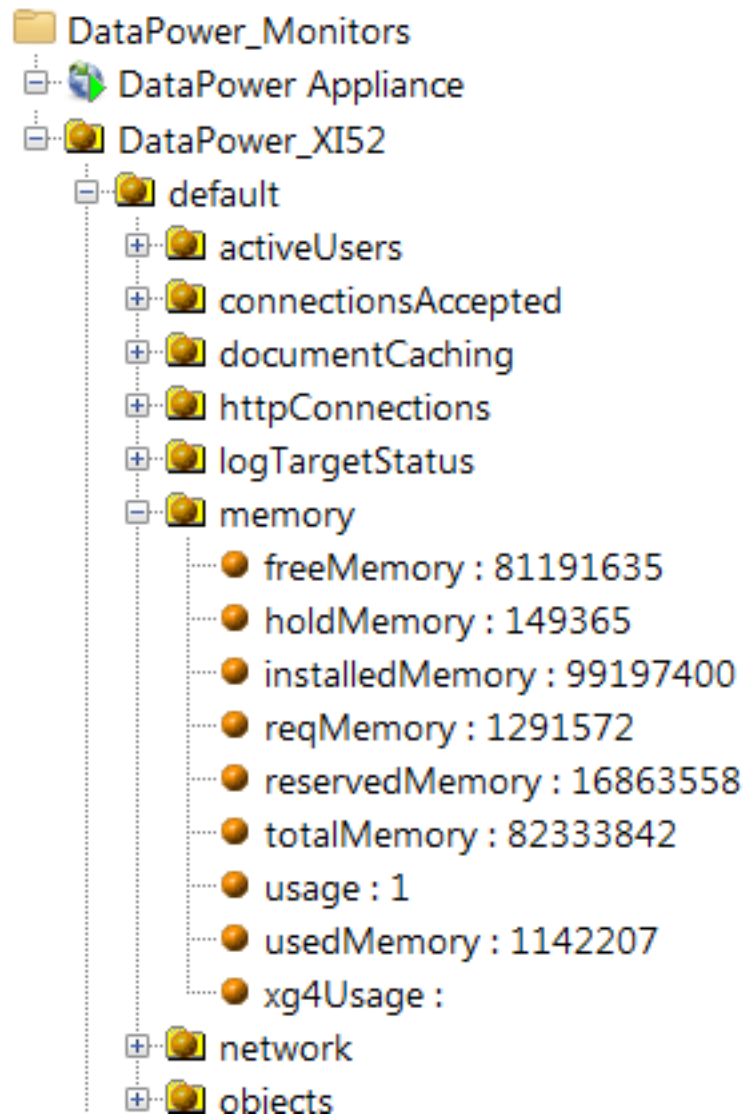
DataPower Metrics



Large range of metrics*

- Various interfaces:
 - SNMP
 - Web Services
 - Syslog
 - Command Line

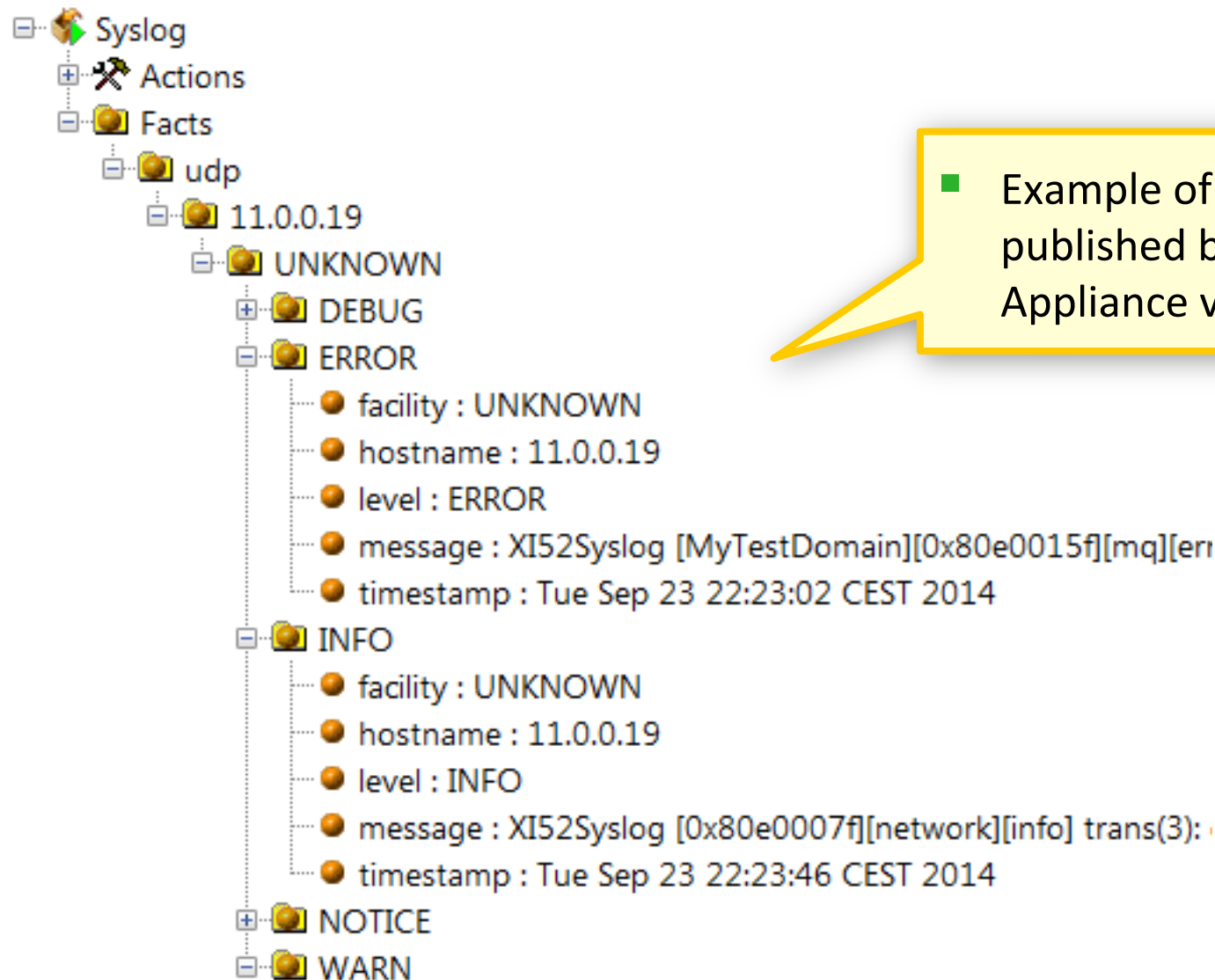
DataPower Metrics : Web Services Interface



Large range of metrics*

- Various interfaces:
 - SNMP
 - Web Services
 - Syslog
 - Command Line

DataPower Notifications (Syslog, SNMP)

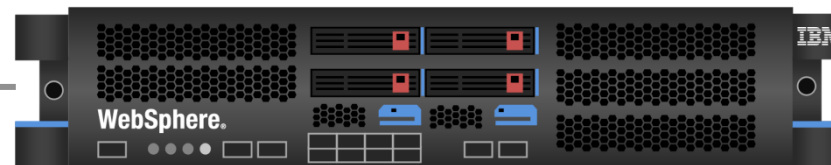
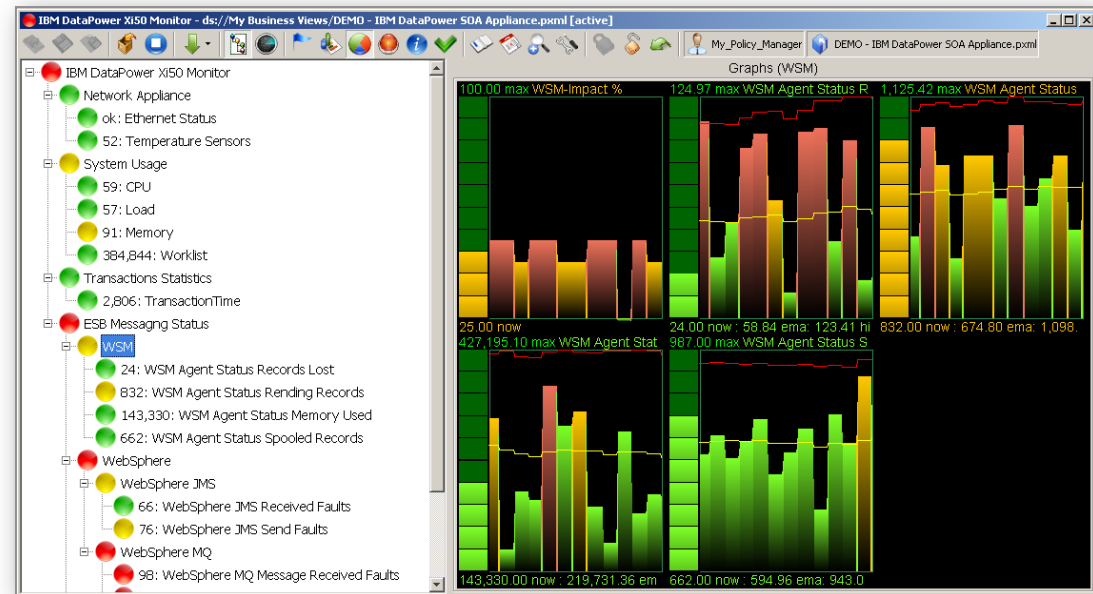


■ Example of Log Events published by DataPower Appliance via Syslog

How to monitor DataPower SOA Appliances

Several management API's and interfaces available on DataPower SOA Appliances that provide detailed information about system health, operations and performance ...

- Web Services
 - WSDM
 - WS-Management
- SNMP
 - Configuration
 - Statistics
- Syslog
 - Logs
- Command Line
 - Secure Shell



Configuring Web Services (XML) Interfaces

The screenshot displays the 'Configure XML Management Interface' web page. On the left is a 'Control Panel' sidebar with a search bar and a tree view containing folders like Status, Services, Network, Interface, Management, Other, Administration, and Objects. The 'XML Management Interface' is selected under the 'Management' folder. The main content area has tabs for 'main', 'Advanced', and 'SLM'. Below the tabs are 'Apply', 'Cancel', and 'Undo' buttons. The configuration fields include: 'Administrative State' with radio buttons for 'enabled' (selected) and 'disabled'; 'Local address' with a text box containing 'mgmtinterface' and a 'Select Alias' button; 'Port Number' with a text box containing '5550'; 'Access Control List' with a dropdown menu showing 'xml-mgmt' and buttons for adding or removing items; and 'Comments' with a text area. At the bottom, the 'Enabled Services' section lists several services with checkboxes: SOAP Management URI, SOAP Configuration Management, SOAP Configuration Management (v2004), AMP Endpoint, SLM Endpoint, WS-Management Endpoint, WSDM Endpoint, UDDI Subscription, and WSRR Subscription. Five yellow callout boxes provide additional context: one points to the 'main' tab, another to the 'mgmtinterface' text box, a third to the '5550' port number, a fourth to the 'xml-mgmt' dropdown, and a fifth to the 'Enabled Services' list.

Control Panel
Pattern Console

Search

- + Status
- + Services
- Network
 - + Interface
 - Management
 - Telnet Service
 - SSH Service
 - Web Management Service
 - XML Management Interface
- + Other
- + Administration
- + Objects

Firmware: XI52.6.0.0.0
Build: 231528
IBM WebSphere DataPower
Copyright IBM Corporation 1999-2013
[View License Agreement](#)

Configure XML Management Interface

main Advanced SLM

XML Management Interface [up]

Apply Cancel Undo

Export | View Log | View Status | Help

Administrative State ☒ enabled ☐ disabled

Local address

Port Number *

Access Control List

Comments

Enabled Services

- ☒ SOAP Management URI
- ☒ SOAP Configuration Management
- ☒ SOAP Configuration Management (v2004)
- ☒ AMP Endpoint
- ☒ SLM Endpoint
- ☒ WS-Management Endpoint
- ☒ WSDM Endpoint
- ☐ UDDI Subscription
- ☒ WSRR Subscription

Menu Option for configuring XML Management API's

Local (host) IP address alias

Port Number

Access Control list (IP alias)

List of enabled Management API's

Configuring SNMP Interface

Control Panel
Pattern Console

Search

- Status
- Services
- Network
- Administration
 - Main
 - Configuration
 - Access
 - New User Account
 - Manage User Accounts
 - Manage User Groups
 - RBM Settings
 - RADIUS Settings
 - SNMP Settings
 - Device
 - Storage Devices
 - Debug
 - Miscellaneous
 - Objects

Firmware: XI52.6.0.0.0
Build: 231528
IBM WebSphere DataPower
Copyright IBM Corporation 1999-2013
[View License Agreement](#)

Configure SNMP Settings

← Main Enterprise MIBs Trap Event Subscriptions

SNMP Settings [up]

Apply Cancel Undo

Export View Log View Status Help

Administrative State ☒ enabled ☐ disabled

Comments

Local IP Address [Select Alias](#)

Local Port

SNMPv3 Users

SNMPv3 Security Level

SNMPv3 Access Level

Local (host) IP address alias

Port Number

List of authorized users

Security Levels and Access levels

NASTEL

Configuring SNMP Interface - MIB Access

Control Panel
Pattern Console

Search

- +
- +
- +
-
- +
- +
- +
-
- +
- +
- +
- +
- +
- +

Firmware: XI52.6.0.0.0
Build: 231528
IBM WebSphere DataPower
Copyright IBM Corporation 1999-2013
[View License Agreement](#)

Configure SNMP Settings

← Main Enterprise MIBs Trap Event Subscriptions

SNMP Settings [up]

Apply Cancel Undo

Export | [View Log](#) | [View Status](#) | [Help](#)

Configuration	Click here to view /drConfigMIB.txt
Status	Click here to view /drStatusMIB.txt
Notifications	Click here to view /drNotificationMIB.txt

Menu Option for configuring SNMP interface

Access to DataPower MIBs

Configuration

Status

Notifications

MIB files can be viewed/downloaded directly from the DataPower Appliance

Can be used by monitoring tools to poll metrics ...

Configuring SNMP Interface - SNMP Traps

The screenshot shows the 'Configure SNMP Settings' page in a web interface. The left sidebar contains a 'Control Panel' and 'Pattern Console' with a search bar and a tree view of system components. The main area is titled 'Configure SNMP Settings' and has tabs for 'Main', 'Enterprise MIBs', and 'Trap Event Subscriptions'. The 'Trap Event Subscriptions' tab is active, showing 'SNMP Settings [up]' with 'Apply', 'Cancel', and 'Undo' buttons. Below this, there are radio buttons for 'Enable Default Event Subscriptions' (set to 'on') and a 'Minimum Priority' dropdown menu. The 'Event Subscriptions' table lists various traps with their codes and descriptions. A callout points to the 'Trap Event Subscriptions' tab, another to the 'Trap Event Subscriptions' text, and a third to the 'information' option in the priority dropdown. A fourth callout points to the 'Select Code' button at the bottom of the table.

Control Panel
Pattern Console

Search

- + Status
- + Services
- + Network
- Administration
 - + Main
 - + Configuration
 - Access
 - New User Account
 - Manage User Accounts
 - Manage User Groups
 - RBM Settings
 - RADIUS Settings
 - SNMP Settings
- + Device
- + Storage Devices
- + Debug
- + Miscellaneous
- + Objects

Firmware: XI52.6.0.0.0
Build: 231528
IBM WebSphere DataPower
Copyright IBM Corporation 1999-2013
[View License Agreement](#)

Configure SNMP Settings

Main Enterprise MIBs **Trap Event Subscriptions**

SNMP Settings [up]

Apply Cancel Undo

Enable Default Event Subscriptions ☒ on ☐ off

Minimum Priority **information**

Event Subscriptions	Priority	Action
0x00030002 (Out of memory)	emergency	X
0x00230003 (Unable to allocate execution res	alert	X
0x00330002 (Memory full)	critical	X
0x00330019 (Operation state transition to up	error	X
0x00b30014 (Duplicate IP address)	warning	X
0x00e30001 (NTP - Cannot Resolve Server Name)	notice	X
	information	X
	debug	X

add Help Select Code

Configuring Syslog Interfaces

Control Panel
Pattern Console

Search

- Status
- Services
- Network
- Administration
- Objects
 - Network Settings
 - Protocol Handlers
 - Service Configuration
 - XML Processing
 - JSON Processing
 - Web Services
 - Policy Configuration
 - Web Applications
 - Monitoring
 - Crypto Configuration
 - Device Management
 - Access Settings
 - Configuration Management
 - Logging Configuration
 - Log Category
 - Log Target
 - System Settings
 - z/OS Configurations
 - Secure Cloud Connector

Configure Log Target

Main | Event Filters | Object Filters | IP Address Filters

Log Target: APLogTarger [up]

Apply Cancel Delete Undo

General Configuration

Administrative State: ☒ enabled ☐ disabled

Comments: AutoPilot Log

Target Type: syslog *

syslog Facility: user *

Rate Limit: 100 events/second

Feedback Detection: ☐ on ☒ off

Identical Event Detection: ☐ on ☒ off

Event Category: (none) (none) aaa all audit auth cert-monitor cli cluster-service crypto evtlog fibre-channel file file-capture file-poller ftp http http-convert ilmtagent ip-multicast

Minimum Event Priority: notice emergency alert critical error warning notice information debug

Menu Option for configuring Log Targets

Specify different Log Targets for different types of Events ...

Publish/Subscribe Paradigm : Enables distribution of selected Log Events to various Log Targets

Command Line Interface to DataPower

```
xi52# show statistics
```

```
    system uptime: 69 days 14:36:58
  open connections: 38
    memory usage: 1089096 kB / 82333842 kB (1%)
```

	10 sec	1 min	10 min	1 hour	1 day
connections accepted:	0	2	20	2397	
cpu usage (%):	0	0	1	1	
stylesheet executions:					
store:///dp/policyDomainStatus.xsl:	9	1	0	2	18
local:///simple.xsl:	12	1	0	0	116
local:///tworks_wp.xsl:	13	1	0	0	170
stylesheet mean execution times:					
store:///dp/policyDomainStatus.xsl:	9	1	0	23	32
local:///simple.xsl:	12	1	0	0	89
local:///tworks_wp.xsl:	13	1	0	0	81

Running Command
Line requests

Get information;
Take actions ...

... Run a scripted
dialogue



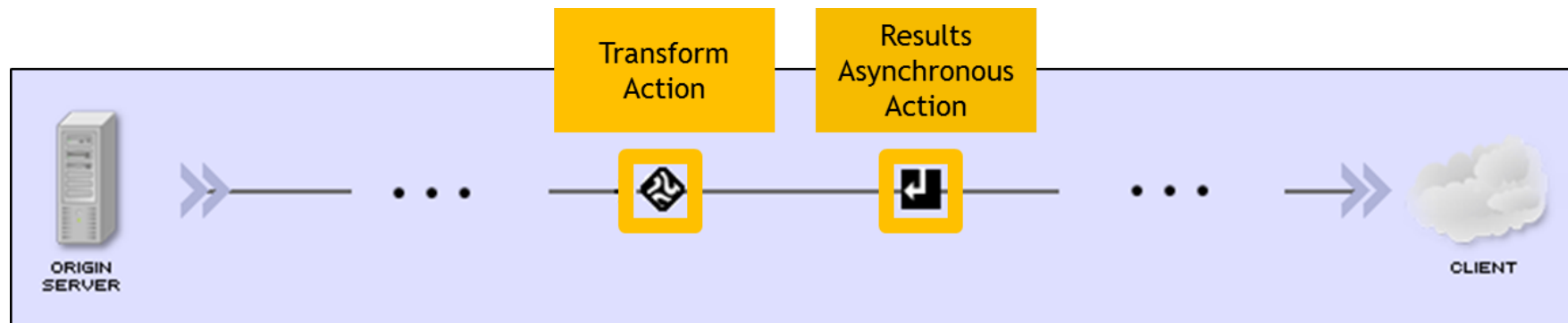
Message Flow Tracking



www.nastel.com

Instrumenting DataPower Transactions

- **Transform Action** : transforms input messages into a normalized form - a "tracking event" with pertinent information about the transaction flow using DataPower variables and functions. The tracking event also includes the message data.
- **Results Asynchronous Action** : sends the tracking event as a message to a WebSphere MQ queue - asynchronously - where it is subsequently read by a Processing Point.



- **Advantage:** DataPower transaction processing continues without performance impact while AutoPilot® M6 takes care of transaction monitoring.

Example: Transaction Trace Details

Transaction Group > Summary > Trace Details

Show: From: 2014-04-21 1 : 40 : 00 PM To: 2014-04-21 1 : 50 : 00 PM

Trace

Selected Transaction

Start Date	Applications	Transaction Status	SLA Status	SLA Status Text	Workload (HH:MM:SS.mm)	Transaction Duration	Operations	Messages
2014-04-21 13:40:24	Demo_Gateway	Complete		Within SLA	0:00:00.000	0:00:05.454	2	2

Transaction Details


Transaction ID 14997

☐ Show Hierarchy

Time	Application	Operation Name	Resource	Elapsed Time (usec)	Server	Message Id	Completion Code
2014-04-21 13:40:24.392	Demo_Gateway	0:ProcessingPolicy_rule_0	ProcessingPolicy	0	IX52	1	Succeeded
2014-04-21 13:40:30.846	Demo_Gateway	2:ProcessingPolicy_rule_0	ProcessingPolicy	0	IX52	2	Succeeded

Actions **Timings** **Message Content**

Configuring Message Flow Events

 **Configure Multi-Protocol Gateway Style Policy**

Policy:

Policy Name: *

[Export](#) | [View Log](#) | [View Status](#) | [Close Window](#)

Rule:

Rule Name: Rule Direction:

Create rule: Click New, drag action icons onto line. Edit rule: Click on rule, double-click on action.

Processing Actions

Filter Sign Verify Validate Encrypt Decrypt Transform Route AAA Results Advanced


ORIGIN SERVER

CLIENT

Transform **Results**


Configured Rules														
Order	Rule Name	Direction	Actions											
↑ ↓	ProcessingPolicy_rule_0	Both Direction												delete rule

Creating the Tracking Event


 Configure Transform with XSLT style sheet Action

Basic Advanced

Input

Input 

Options

 Transform with XSLT style sheet

Use Document Processing Instructions

☐ Transform binary
☐ Transform with a processing control file, if specified
☐ Transform with embedded processing instructions, if available
☒ Transform with XSLT style sheet

Transform File

URL Rewrite Policy

Asynchronous

☐ on ☒ off

Output

Output


- Transform Action creates a Tracking Event
- Analogous to the barcode sticker on a shipped package
- Transform action uses an XSLT style sheet
- Can include all or part of the input message data
- Tracking event is input to Results Async. Action

Constructing the Tracking Event

```
<?xml version="1.0" encoding="UTF-8"?>
<xsl:stylesheet version="1.0"
  xmlns:xsl="http://www.w3.org/1999/XSL/Transform"
  xmlns:dp="http://www.datapower.com/extensions"
  xmlns:dpconfig="http://www.datapower.com/param"
  extension-element-prefixes="dp"
  exclude-result-prefixes="dp dpconfig">
  <xsl:output method="xml"/>
  <xsl:template match="/">
    <tracking_event xmlns:xsi="http://www.w3.org/2001/XMLSchema"
      xsi:noNamespaceSchemaLocation="wp.xsd">
      <HostName>ix52</HostName>
      <HostInfo>
        <xsl:value-of select="dp:variable('var://service/system')" />
      </HostInfo>
      <Service>
        <xsl:value-of select="dp:variable('var://service/process')" />
      </Service>
      <Domain>
        <xsl:value-of select="dp:variable('var://service/domain')" />
      </Domain>
      <Correlator>
        <xsl:value-of select="." />
      </Correlator>
      <Policy>
        <xsl:value-of select="dp:variable('var://service/transaction-policy-name')" />
      </Policy>
      <Rule>
        <xsl:value-of select="dp:variable('var://service/transaction-rule-name')" />
      </Rule>
    </tracking_event>
  </template>
</xsl:stylesheet>
```

- XSLT stylesheet
- Provided as a template
- All available information can be included:
 - Processing rules
 - Correlators
 - Message text
 - DataPower variables
 - Other variables
- Can be reused in other MPG Policies

Sending the Tracking Event

 **Configure Results Asynchronous Action**

Basic Advanced

Input

Input | twmsg | twmsg ▼ *

Options

Results Asynchronous

Destination | dpmq:// | MB8QMGR/?RequestQueue=DataPc | Var Builder

Number of Retries | 0

Retry Interval | 1000 | msec

Method | PUT ▼ *

Delete Done Cancel

- Results Asynchronous Action
 - Sends results and does not wait for a response
- Uses Tracking Event message as input
- Output message is PUT to a WebSphere MQ Queue
- External Processing Point extracts transaction data from the MQ message

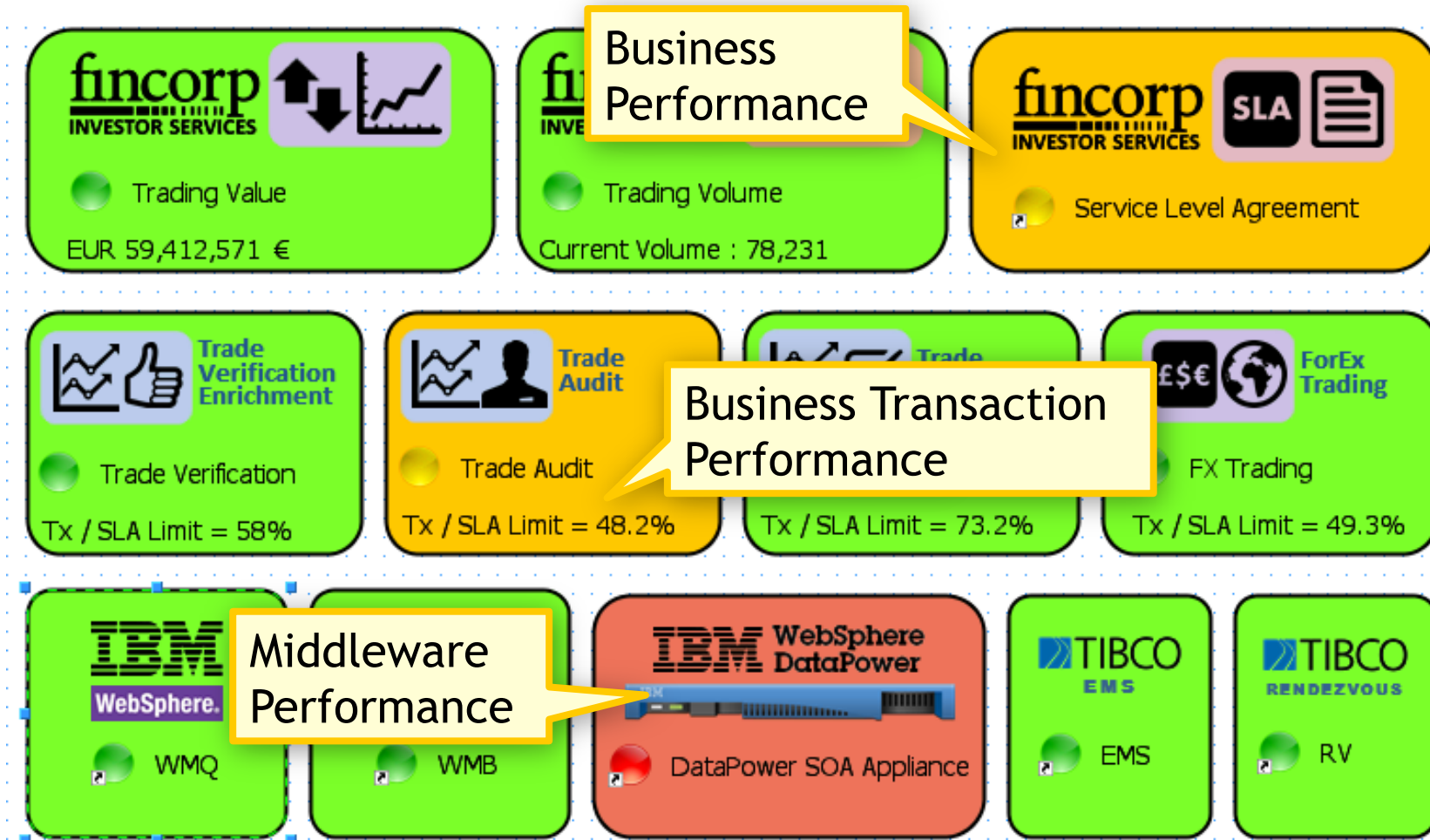


Leveraging the Information

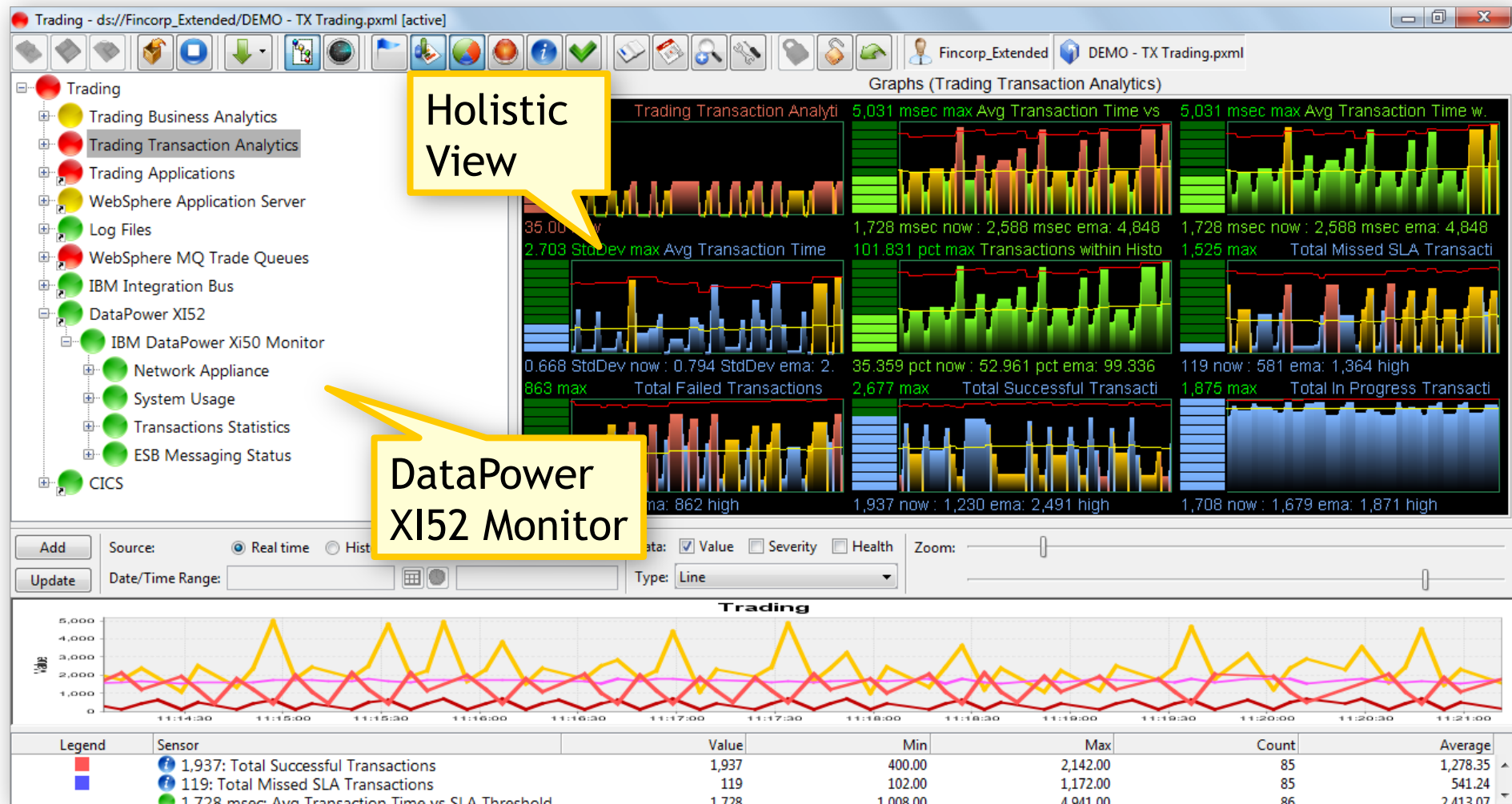


www.nastel.com

DataPower Status (Situational Awareness)

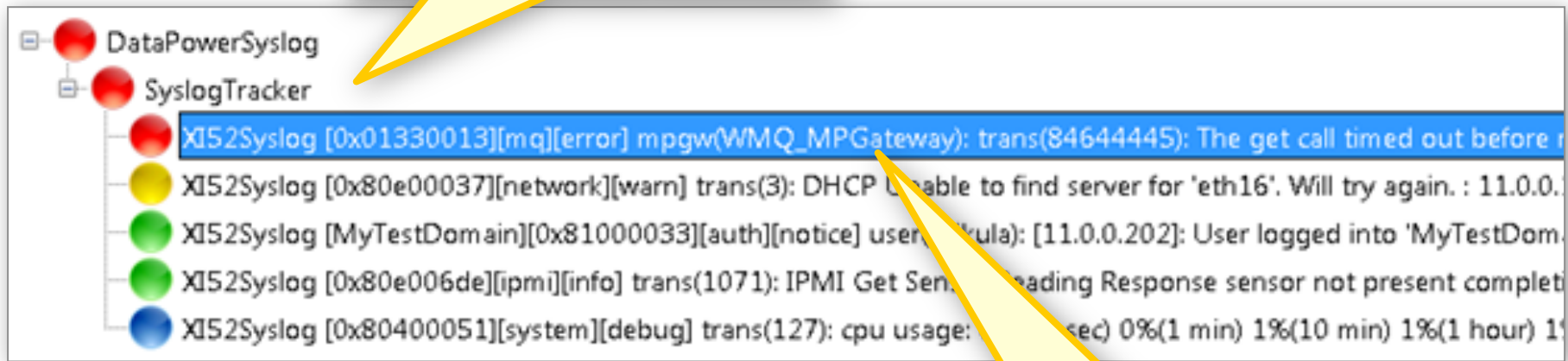


DataPower System Health



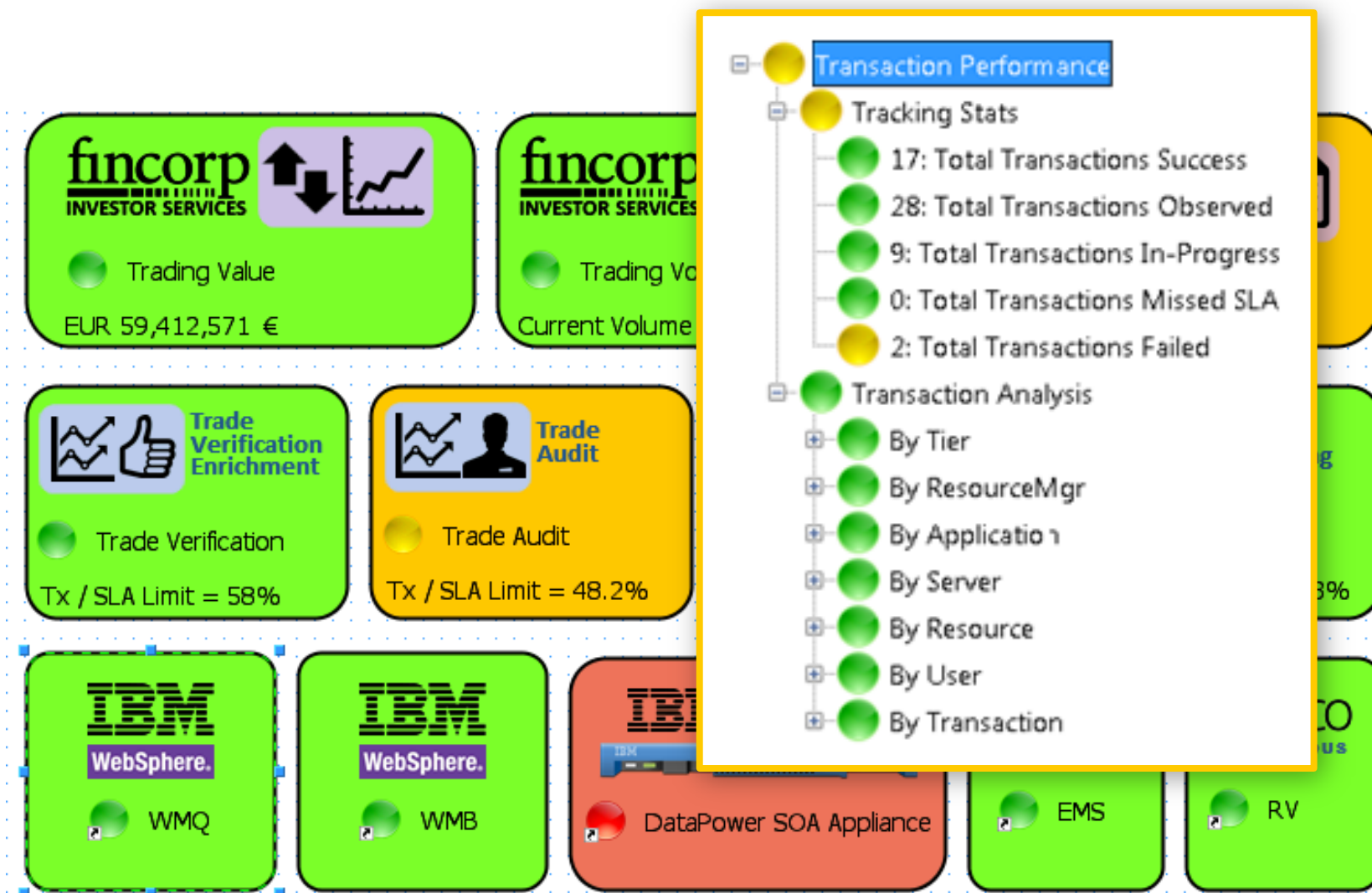
Message Failures are Occurring

Syslog Events Monitor

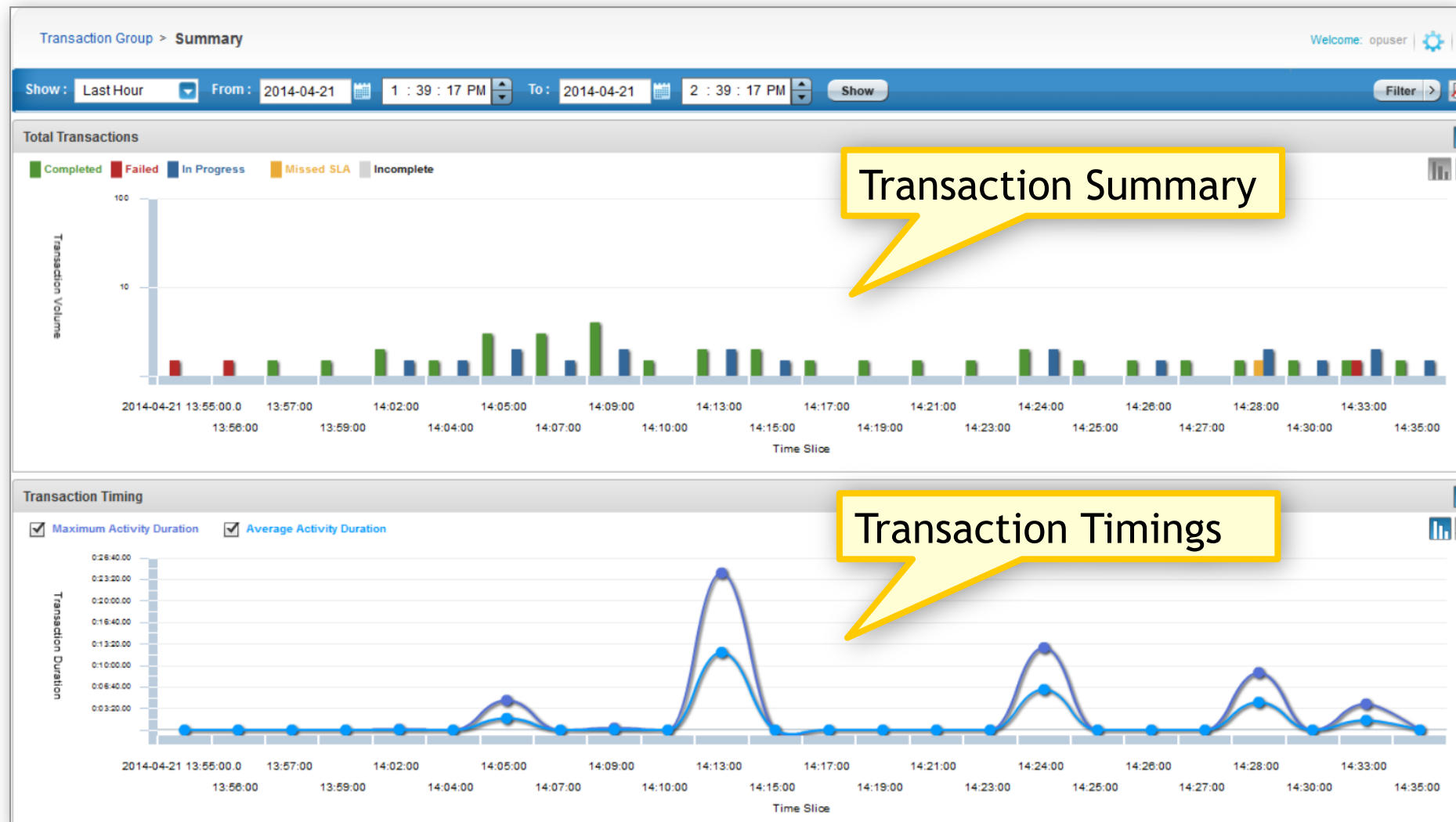


Syslog Event:
Multi-Protocol Gateway
Operation time-out

DataPower Status in Context (Situational Awareness)



Transaction Summary



Failure Code

Transaction Group > Summary > Trace Details

Show: Select From: 2014-04-21 5 : 10 : 00 PM To: 2014-04-21 5 : 20 : 00 PM Show

Trace

Start Date	Applications	Transaction Status	SLA Status	SLA Status Text	Workload (HH:MM:SS.mm)	Transaction Duration	Operations	Messages	Transaction
2014-04-21 15:33:12	DataPowerEngi...	Failed ✖	2400.00%	Missed SLA ⚠	0:00:00.083	0:02:00.080	4	2	15059

Transaction ID 15059

Transaction Flow Diagram Transaction Timeline Transaction Trace(4) Transaction Milestones

☐ Show Hierarchy

Time	Application	Operation Name	Resource	Elapsed Time (usec)	Message Id	Completion Code	Reason Code	Me
2014-04-21 15:33:12.573	injector	MQPUT	FRONT.GET	49	1	Succeeded	0	
2014-04-21 15:33:12.580	DataPowerEngine	MQGET	FRONT.GET	20257516	1	Succeeded	0	
2014-04-21 15:33:12.584	injector	MQCMIT	MB8QMGR	0		Succeeded	0	
2014-04-21 15:35:12.584	DataPowerEngine	MQPUT	FRONT.GET.REPLY	69338	4	Failed ✖	2053	

List of Transactions

Detail of selected Transaction

Queue Full

Correcting the Queue Definition

Web GUI
MQ Explorer

MQ Object
Properties

Queue: \\MQM\DESKTOP99\MB8QMGR\FRONT.GET.REPLY (3 / 3)

Browse criteria string: Page size: 10 Set and browse

	#	Message Cursor	Message Size
<input type="checkbox"/>	1	1	95
<input type="checkbox"/>	2	2	95
<input type="checkbox"/>	3	3	95

Local Queue FRONT.GET.REPLY Properties

General
Extended
Cluster
Triggering
Events
Storage
Monitoring
Statistics

Maximum Queue Depth: 5000

Maximum Message Length: 4,194,304

Shareability: Shareable

Default Input Open Option: Shared

Message Delivery sequence: Priority

Retention Interval: (Hours) 999,999,999

Distribution List: Not Supported

Definition Type: Predefined

Non-persistent Message Class: NORMAL

Property Control: Compatibility

Default Read Ahead: No

Default Put Response Type: Synchronous

OK Cancel Help

Ability to See the Combined Flow

Transaction Group > Summary > Trace Details

Show: Select From: 2014-04-21 5 : 10 : 00 PM To: 2014-04-21 5 : 20 : 00 PM Show

Trace

Start Date	Applications	Transaction Status	SLA Status	SLA Status Text	Workload (HH:MM:SS.mm)	Transaction Duration	Operations	Messages	Transaction ID	Transaction Groups
2014-04-21 17:11:34	DataPowerEngi...	Complete	300.00%	Missed SLA	0:00:15.610	0:00:15.603	15	8	15139	TradeApp

Transaction ID 15139

Transaction Flow Diagram Transaction Timeline Transaction Trace(15) Transaction Milestones

☐ Show Hierarchy

Time	Application	Operation Name	Resource	Resource Manager	Message Id	Comp Code	Correlator	User	Reason
2014-04-21 17:11:34.349	injector	MQPUT	FRONT.GET	MB8QMGR	1		Succeeded	TWD655556	rnikula
2014-04-21 17:11:34.355	DataPowerEngine	MQGET						GR_MQADMIN	
2014-04-21 17:11:34.359	DataPowerEngine	MQPUT						GR_MQADMIN	
2014-04-21 17:11:34.360	DataPowerEngine	MQPUT						GR_MQADMIN	
2014-04-21 17:11:34.361	injector	MQCMIT						rnikula	
2014-04-21 17:11:37.914	Demo_Gateway	0:ProcessingPolicy_rule							
2014-04-21 17:11:43.363	verifyapp	MQGET						rnikula	
2014-04-21 17:11:43.363	verifyapp	MQPUT						rnikula	
2014-04-21 17:11:43.367	DataPowerEngine	MQGET						GR_MQADMIN	
2014-04-21 17:11:43.370	DataPowerEngine	MQPUT						GR_MQADMIN	
2014-04-21 17:11:43.373	DataPowerEngine	MQPUT						GR_MQADMIN	
2014-04-21 17:11:43.373	verifyapp	MQCMIT						rnikula	
2014-04-21 17:11:46.925	Demo_Gateway	2:ProcessingPolicy_rule							
2014-04-21 17:11:50.943	finalizer	MQGET						rnikula	
2014-04-21 17:11:50.953	finalizer	MQCMIT						rnikula	

Message Content

Display Type: Character Character Set: ASCII

```
<?xml version='1.0' encoding='utf-8'?>
<ORDER_INFO>
  <CUSTOMER_DATA>
    <CUSTOMER_ORDER_NUMBER>TWD655556</CUSTOMER_ORDER_NUMBER>
    <CUSTOMER_NAME>SMITH</CUSTOMER_NAME>
  </CUSTOMER_DATA>
  <ORDER_DATA>
    <ORDER_ITEM>SKU0123</ORDER_ITEM>
    <ORDER_AMOUNT>3</ORDER_AMOUNT>
  </ORDER_DATA>
</ORDER_INFO>
```



Closing



www.nastel.com