IBM WebSphere Application Server V8.5
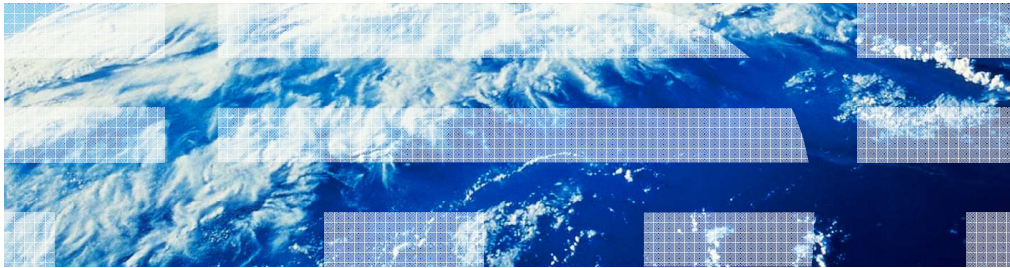
SNMP capability

This presentation describes support for SNMP included in IBM WebSphere Application Server V8.5

Section

Overview

SNMP capability

This section contains the overview of the SNMP capabilities in WebSphere Application Server V8.5.0.1.

WASV8501_SnmpAgent.ppt

WebSphere SNMP agent

- Simple Network Management Protocol (SNMP) based monitoring support for WebSphere Application Servers
- Core functionality of the WebSphere SNMP agent is to
  – Poll application servers for its Performance Monitoring Infrastructure (PMI) data and publish them as SNMP events
  – Listen to WebSphere notifications and generate them as SNMP traps
- Based on SNMP v3 specifications
- WebSphere SNMP monitors communicate with the WebSpere SNMP Agent for SNMP events and traps

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SNMP (Simple Network Management Protocol) is a commonly used protocol to monitor network devices like routers, switches, servers, printers and so on. WebSphere Application Server V8.5.0.1 provides SNMP based monitoring support for application servers. The WebSphere SNMP agent will poll application servers for the Performance Monitoring Infrastructure (PMI) data and publish them as SNMP events. It also listens for notifications emitted by application servers and communicates them as SNMP traps, if configured to do so. The WebSphere SNMP Agent and WebSphere SNMP monitors are based on SNMP v3 specifications. SNMP monitors communicate with the SNMP agent for PMI metrics information, and they listen for traps generated by the SNMP agent.

Section

Usage scenarios

SNMP capability

Next is a discussion of the usage scenarios of the WebSphere SNMP capabilities in WebSphere Application Server 8.5.0.1.
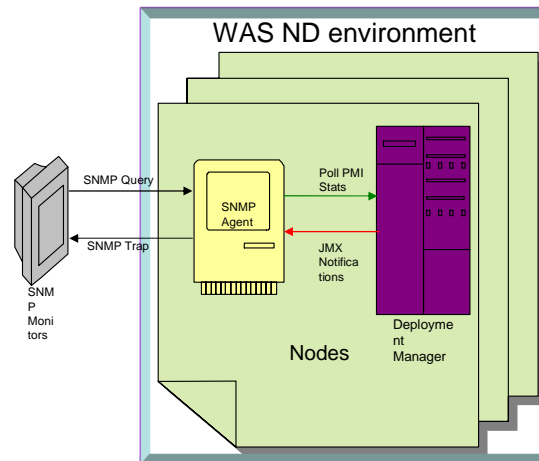
WebSphere SNMP Agent

- WebSphere SNMP Agent should be defined as Generic Server
- Can be configured to connect to management server or application server
- Multiple instances of an SNMP Agent can be defined
- WebSphere SNMP Agent configurations are defined in
  - agentConfig.xml
  - jmxConfig.xml
  - trapConfig.xml

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The WebSphere SNMP Agent is an independent process and it should be defined as a generic server in a Network Deployment environment. It can be configured to connect to a management server like the Deployment Manager or a Node Agent. Or, it can be configured to connect to application servers. Multiple instances of SNMP Agent can be defined as generic servers in the Network Deployment environment. Each must connect to a different Node Agent or application servers.
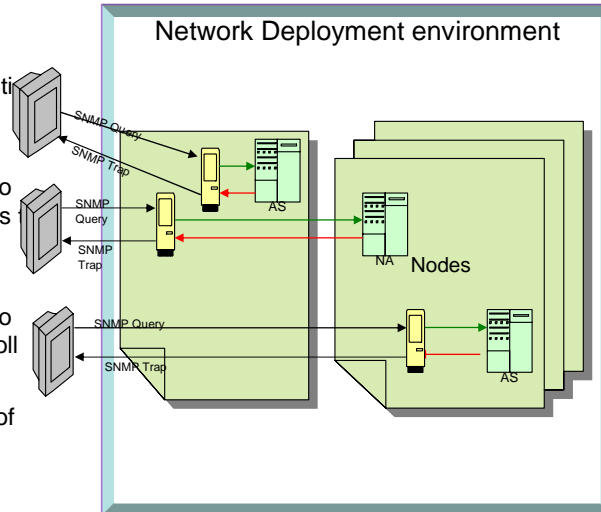
Configuration model – Single agent

- In a WebSphere Application Server Network Deployment environment, an SNMP Agent can be configured to connect to the Deployment Manager
- SNMP Agent is capable of polling PMI metrics on all servers defined in the environment
- Filters provide a sub set of PMI metrics

WAS ND environment

SNMP Query
SNMP Trap
SNMP Monitors
SNMP Agent
Poll PMI Stats
JMX Notifications
Deployment Manager
Nodes

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The WebSphere SNMP Agent can be configured to connect to a Deployment Manager server. In this case it is capable of collecting PMI metrics on all application servers and node agents defined in the environment. Although it can retrieve all PMI metrics, filters can be defined to retrieve and publish a subset of PMI metrics.

Configuration model – Multiple agents

Network Deployment environment

- In a WebSphere Application Server Network Deployment environment, multiple instances of an SNMP Agent can be defined
- Each SNMP Agent can be configured to connect to individual application servers to poll for PMI metrics of that application server.
- Each SNMP Agent can be configured to connect to individual Node agents to poll for PMI metrics of that node
- Filters can be defined to get a sub set of PMI metrics

SNMP Query
SNMP Trap
SNMP Query
SNMP Trap
SNMP Query
SNMP Trap

AS
NA   Nodes
AS

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Multiple instances of an SNMP agent can be defined as generic servers. Each agent should be configured to connect to individual application servers. In scenario, the agent will collect PMI metrics for the application server it is configured to. Similarly, agents can be configured to node agents. In this case, the SNMP agent can collect the PMI metrics of all application servers in the node. In both scenarios, filters can be used retrieve and publish a subset of PMI metrics.

Configuring WebSphere SNMP agent

- WebSphere SNMP agent configurations are defined in the agentConfig.xml
  – IP address, SNMP port, user, authentication mode, password
- jmxConfig.xml contains the connection configuration for SNMP agent to WebSphere servers
  – host name, port number, connection type, and security credentials
- jmxConfig.xml also contains the PMI filters for SNMP agent
- trapConfig.xml will contain the host name and port number of the trap listeners
- All security credentials defined in the configurations is encrypted

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WebSphere SNMP agent configurations are defined in the agentConfig.xml. This file contains the IP address and SNMP port the SNMP agent listens to, and the credentials of the user who is authorized to access the WebSphere SNMP agent from any SNMP viewer. The connection attributes required for the SNMP agent to connect with WebSphere servers are defined in the jmxConfig.xml. Additionally, filters that generate subsets of PMI metrics in the SNMP Agent are defined in the jmxConfig.xml. The host names and port numbers of listeners are defined in trapConfig.xml. The data of trap listeners can be configured manually. Some SNMP viewers have an option to send the data as SNMP events and SNMP Agent register the viewers as listeners. All the security credentials defined in the configuration files are encrypted by the SNMP Agent after the first time it is read.

Accessing WebSphere SNMP agent

- WebSphere SNMP Agent started and stopped using Administrative console
  - Since the SNMP agent is configured as a generic server click "Terminate" to stop the agent
- PMI metrics published by the SNMP agent can be accessed using any SNMP viewers or monitors that are SNMP v3 compliant
- PMI metrics are published as tables
  - Scalar table
  - Collection table
  - Control table
  - Counter table
  - Data table
- Each table entry is associated with an index called OID. SNMP viewers use OIDs to access the data

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The Administrative console can be used to start and stop the SNMP agent. The PMI metrics published by SNMP agents can be accessed using SNMP viewers or monitors that are compliant with SNMP V3 Specifications. The SNMP agent filters on PMI. The metrics are published in four tables. The server connection details are published in one table. Each entry in the table are associated with an index called OID. The SNMP viewers and monitors query the SNMP agent by way of the OID and, as a result, retrieves the PMI data associated with it.

Viewing the metrics (1 of 4)

- The collection table provides the list of PMI modules active in the servers

Index	Name
24	rharish1Node01,server1,hamanagerModule
25	rharish1Node01,server1,hamanagerModule>HAManagerMBean
26	rharish1Node01,server1,jvmRuntimeModule
27	rharish1Node01,server1,objectPoolModule
28	rharish1Node01,server1,objectPoolModule>ObjectPool_ibm.system.objectpool_com.ibm.ws.webcontainer.srt.SRTConnectionContextImpl
29	rharish1Node01,server1,objectPoolModule>ObjectPool_ibm.system.objectpool_com.ibm.ws.webcontainer.srt.SRTConnectionContextImpl.class@11801180
30	rharish1Node01,server1,orbPerfModule

- An index is assigned to each PMI module entry in the table and is referenced in further tables
- The collection table can be retrieved using SNMP GETNEXT operation with the OID 1.3.6.1.4.1.1977.22.10.10.1.2

SNMP capability

The collection table provides the list of PMI modules that are active in the servers accessed through the SNMP agent. The OID 1.3.6.1.4.1.1977.22.10.10.1.2 is associated to the collection table and the collection table can be retrieved using the OID and the SNMP GETNEXT operation. Each entry in the collection table is assigned an index one to n, and is prefixed with the collection table OID. SNMP monitors can use the entry specific OID with SNMP GET operation to get its data.

Viewing the metrics (2 of 4)

- control table reflects the list of filters defined in the jmxConfig.xml

Index	Status	Owner	Collection	CounterMode
1	active	WsT SNMP AGENT	objectPoolModule.*	automatic

- The collection column in the control table is the filter, a regular expression, applied on the collection table entries to generate the sub set of PMI metrics

- The counter mode can be configured as automatic or manual
  - automatic – SNMP agent will identify the counters for the PMI modules
  - manual – counters need to be defined manually with the filters in jmxConfig.xml

- The control table can be retrieved using SNMP GETNEXT operation with the OID 1.3.6.1.4.1.1977.22.10.11.1.2

SNMP capability

The control table reflects the configuration of filters defined in the jmxConfig.xml. A filter is a regular expression that is applied on the collection table entries to generate the subset of PMI modules that are monitored by the SNMP agent. The filters provide an option to define the counter mode as automatic or manual. In the case of automatic mode, the SNMP agent will resolve the list of PMI counters for the PMI modules monitored by the SNMP agent. In the case of manual mode, the list of PMI counters need to be defined in the filter definition. The OID 1.3.6.1.4.1.1977.22.10.11.1.2 is associated to the control table and the control table can be retrieved using the OID and SNMP GETNEXT operation.

Viewing the metrics (3 of 4)

- The counter table provides the list of PMI counters active in the servers and monitored by the SNMP Agent

- Manually defined counters are listed in the table, when the counter mode is set to manual

WsControlIndex	Index	Name
1	1	ObjectsCreatedCount
1	2	ObjectsAllocatedCount
1	3	ObjectsReturnedCount
1	4	IdleObjectsSize

- Each PMI counter name in the table is associated with an index

- PMI counter names are grouped by filter definition, counter indexes are prefixed with the control index

- The counter table can be retrieved using SNMP GETNEXT operation with the OID 1.3.6.1.4.1.1977.22.10.12.1.2

The counter table will list the PMI counters that are resolved or defined manually and monitored by the SNMP Agent. SNMP Agent will group the PMI counters by its filter definition. Each PMI counter is associated with an index and prefixed with the corresponding control index that reflects the filter definition. The OID 1.3.6.1.4.1.1977.22.10.12.1.2 is associated to the counter table and the counter table can be retrieved using the OID and SNMP GETNEXT operation.

Viewing the metrics (4 of 4)

- The data table provides the actual metrics of PMI counters and its data type

WsControlIndex	WsCounterIndex	WsCollectionIndex	Type	Value
1	1	27	long	10
1	1	28	long	5
1	1	29	long	5
1	2	27	load	0
1	2	28	load	0
1	2	29	load	0
1	3	27	load	0
1	3	28	load	0
1	3	29	load	0
1	4	27	load	12
1	4	28	load	6
1	4	29	load	6

- The data table entries are referenced using the indexes of the control, counter and collection tables
- The data table can be retrieved using SNMP GETNEXT operation with OID 1.3.6.1.4.1.1977.22.10.13.1.1

The data table will publish the actual PMI metrics of the monitored PMI counters and its data types. The PMI data in the data table are referenced using the combination of control, counter and collection indexes to uniquely identify the PMI data in a specific server. The OID 1.3.6.1.4.1.1977.22.10.13.1.1 is associated to the data table and the data table can be retrieved using the OID and SNMP GETNEXT operation.

Summary

SNMP capability

In summary,

Summary

- The SNMP agent offers the generic way for administrators and monitors to monitor the WebSphere Application Server performance metrics and its notifications as traps

- The SNMP agent provides a simplified way to filter and monitor a sub set of performance metrics

- The SNMP agent is compliant with SNMP v3 specifications and offers a secured user based access to the WebSphere Application Server performance metrics

In summary, the SNMP agent allows administrators and monitors to monitor the WebSphere Application Server performance metrics and listen to it's notifications as SNMP traps. SNMP agents provide a simplified way to filter the performance metrics and allows the monitoring of a sub set of performance metrics. To provide user based access and secure communications, the SNMP agent is compliant to SNMP v3 specifications and expects SNMP monitors to be compliant to SNMP v3 specifications

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