

Nagios Open-Source Monitoring for HP NonStop

Wolfgang Breidbach
NonStop System Manager
Bank-Verlag GmbH
March 2013

Bank-Verlag's two data centers in Germany utilize a broad range of systems from multiple vendors. Included in these systems are several HP NonStop servers. Bank-Verlag wanted to have a common monitoring facility to manage all of its systems and settled on the open-source Nagios monitoring application. Though Nagios supports the company's wide range of Windows, Unix, and Linux systems, it did not support NonStop.

In order to integrate its NonStop servers into the Nagios monitoring facility, Bank-Verlag created its own monitoring subsystem for NonStop and calls it "BVmonitoring." BVmonitoring provides the functionality of a Nagios agent along with significant infrastructure to gather the events and statistics that Nagios needs in order to perform its monitoring functions. Bank-Verlag data center-administrators now can monitor and manage their NonStop servers in the same manner as their other IT systems and with no requirement for special in-depth knowledge of NonStop systems.

Bank-Verlag

Bank-Verlag (www.bank-verlag.de) is a subsidiary of an association of over 300 German banks, including Deutsche Bank and all other large banks in Germany. It was established in 1961 to be the publishing arm for the association and published a banking magazine, "Die Bank," which was distributed to the association's member banks.¹ Bank-Verlag is now the IT-service provider for all the private banks in Germany.

In 1985, the banking association requested that Bank-Verlag build a central authorization system for the banks' debit cards. Bank-Verlag did so using an IBM System 370 that was available in its data center. However, as the need for continuous availability of its card services became apparent, Bank-Verlag moved this function to a Tandem (now HP NonStop) system.

To make the move without having to take down its card-authorization services, Bank-Verlag ran the services using the IBM 370 and the NonStop server as an active/active pair. Card transactions could be routed to either system for authorization. Ultimately, the IBM 370 was replaced with a NonStop server as the active/active companion. Under the guidance of Wolfgang Breidbach of Bank-Verlag, this is the first known active/active system so far as the *Availability Digest* is aware.²

¹ "Verlag" is "publishing house" in English.

² [Bank-Verlag – the Active/Active Pioneer](#), *Availability Digest*, December 2006.

Nagios

Nagios³ (www.nagios.com) is an open-source facility that provides monitoring and alerting for servers, storage devices, network components, services, and applications. Nagios was originally designed to run under Linux but now runs under other Unix variants. Bank-Verlag has extended the Nagios monitoring functionality to embrace HP NonStop servers.

The NonStop Nagios Agent

Overview

A NonStop server has many subsystems, each with its own monitoring facility. Examples of NonStop subsystems include CPUs, storage systems, Pathway (the application monitor), TMF (Transaction Management Facility), Lines (communication lines), and NetBatch (batch scheduling). Typically, NonStop operators are alerted to significant events via EMS messages sent to the NonStop Event Management Service (EMS). In order to integrate NonStop servers into Nagios, these messages are monitored by BVmonitoring, which drives Nagios alerts to the system operators. In addition, the subsystems gather statistics that are available for analysis. Typical statistics include CPU usage, file sizes, communication-line loads, and transaction rates. The NonStop Nagios agent makes these statistics available to system operators. Also, the system configuration is automatically detected and stored in SQL tables.

Via a central message collector, the Nagios monitoring tool filters EMS messages to select those that are appropriate. Descriptions of selected events are sent to Nagios for data center-wide monitoring. Selected statistical information is also made available. Data can be pushed to Nagios via a secure TCP/IP connection, or it can be pulled from a NonStop-resident file by Nagios via FTP or some other file-transfer utility. BVmonitoring itself is able to automatically correct many problems.

The BVmonitoring modules are all configurable, and most parameters have defaults. In most cases, BVmonitoring can run on NonStop with just the default parameter values. Each module can be “refreshed” to return its parameters to their default tables and to update its configuration tables.

BVmonitoring is not dependent upon any other NonStop module. The one exception is that if disk loading is to be monitored, Measure must be used to find the process that is causing the loading.

Alerts

BVmonitoring alerts users when something goes wrong and alerts them again when the situation is corrected. Some events causing alerts include:

High CPU usage by a process	Communication-line problems
Long CPU queues	Too many or too few Pathway processes
High memory usage by a process	TMF problems
Missing processes	Predefined EMS messages
Files or tables running fragmented or full	

Many of these alerts are time-sensitive. For instance, a long CPU queue for a brief instant is not a serious problem. But a long CPU queue for an extended period of time must be alerted.

A parameter for EMS messages defines how many occurrences of an EMS message within a specified timeframe must occur in order for an alert to be resent.

³ “Nagios” is a recursive acronym standing for “Nagios Ain’t Gonna Insist on Sainthood,” a reference to its original name, “NetSaint,” which it had to drop due to a legal challenge.

If an event happens, it is logged with its timestamp. When the problem has been resolved, the log entry is marked as deleted with the new timestamp. In addition, the time when the solution has been acknowledged by a system operator is also logged. Therefore, a history exists of all alerted events.

Alerts can be delivered via SMS, email, pager, or any other method for which the user has provided a plugin. A browser interface is provided for viewing current network status, notifications, problem histories, and log files.

Data Tables

Statistical and configuration data is kept in SQL tables. The configuration data is refreshed whenever a refresh command is issued to a module. The average and maximum values for statistical data such as CPU usage and transaction rates are recorded hourly and daily. These tables can be used for reporting via SQL queries, Excel spreadsheets, or other reporting facilities.

Examples of information stored in tables include:

- CPU information
- Operating system information
- Communication-line configuration
- TCP/IP configuration
- Pathway configuration

Supported Subsystems

The NonStop subsystems that are supported by BVmonitoring include:

CPU's	TMF	Spooler
Processes	RDF	EMS Messages
Lines	NetBatch	Message Collector
Pathway	Devices	Backups
Files	TCP/IP	

System Requirements

BVmonitoring running on NonStop requires SQL/MP. SQL/MX is an option. Measure is optional and is required only if it is desired to identify a process that is creating a heavy load on a disk.

Benefits of NonStop Nagios

One of the intents of the Nagios NonStop port is to minimize the specific NonStop knowledge that a system administrator requires. For instance, a TCP/IP connection would be reported as:

“The TCP/IP connection with address 192.168.77.77 is configured on the controller in slot 2.4 on ‘D’ and the port has the MAC address 08.00.12.34.56.”

BVmonitoring supports multiple languages. Currently, messages are available in English and German.

A major goal of BVmonitoring is to eliminate manual tasks wherever possible. Examples of corrective actions that might be taken automatically by BVmonitoring include:

- Perform a reload of a file that has become fragmented, or increase the extents available to a file that is becoming full. Specified files can be reloaded periodically.
- Issue a START command to a Pathway server that has aborted.

- Reduce the priority of a process that is consuming too many CPU cycles.
- Start the entire system including all applications, using the capability to automatically start a process.

Some BVmonitoring Saves

Bank-Verlag summarizes several instances in which BVmonitoring saved the day for a NonStop system:

- A NonStop server addressing another server through a firewall needed two connections. A rule within the firewall was erroneously changed, and the NonStop server could no longer establish another connection to the external server. Existing connections were not affected. BVmonitoring found the missing connection immediately when a new connection was attempted.
- An X.25 line was leased to connect to another server. Bank-Verlag began to have problems using the line during peak periods. Using the statistical data collected by BVmonitoring, it was determined that the capacity of the line was exceeded. Increasing the line speed immediately solved the problem.
- Safeguard began to report excessive logon attempts. However, it did not report the external origin of the logons. By using the BVmonitoring tables, the originating IP address of the logons was determined; and action was taken to disable that address as an originating address.

Monitored Parameters

The following parameters are monitored by NonStop Nagios:

CPU and Processes

CPU utilization
 Memory utilization
 CPU queues
 Number of PCBs (Process Control Blocks)
 Very active processes
 Very active disks
 Missing processes

CPU/Process Tables

Tables are maintained that contain statistics about CPU and process utilization, including:

- all CPU-related data.
- critical processes.
- missing processes.
- top CPU users.

Communication Lines

Finds all lines and subdevices (X.25, SNA, Async, Expand).
 Finds openers of subdevices.
 Monitors lines and subdevices.
 Monitors opens.
 Collects line and subdevice statistics.

Pathway

Collects information about all Pathway monitors and their servers.
Monitors all Pathway monitors and their servers.
Checks number of running servers.
Generates an alert if the number of static or dynamic servers is greater than a warning or error limit.
Auto-start of servers not running.

Files and Tables

Monitors configured file sets and partitions.
Generates alerts for files or tables that are filling or that are fragmented.
Daily statistics of file sizes.
Automatic reload of fragmented files.
Generates alerts if index levels are too high.

TMF

Monitors all TMF components.
Creates backup of TMF catalog whenever an Audit Trail is dumped.
Monitors transaction rates and stores them in a table.

RDF

Finds all RDF configurations.
Monitors RDF components in each configuration.
Generates an alert if replication latency exceeds a configured parameter.

Orphaned Processes

Stops orphaned processes (such as a paused TACL without a hometerm).

NetBatch

Stores detail of all existing batch jobs and calendars in SQL tables.
Checks status of batch jobs – generates alert if state is “special” or “suspended.”
Checks validity of calendars.

Disk Devices

Finds disk-device configurations.
Collects information about OSS filesets.
Checks:
 Is disk running?
 Is primary disk running?
 Is backup disk running?
 Are all paths accessible?
 Are the correct paths active?
 Is the disk running in the correct CPU?
 Does a disk or subvolume contain too many ZZAA files?

TCP/IP

Finds TCP/IP configuration and stores it in a SQL table.
Checks IP processes, subnets, routes, and PIF/LIF.

Spooler

Writes spooler configuration to a SQL table.
Monitors collectors, print processes, and devices.

Missing Processes

Finds missing processes via the configured startup file.
Starts missing processes.

Backup Control

Builds catalog of backed-up files.
Checks for errors.

EMS Messages

Checks the EMS log for configured events.
Can use one or more collectors and a filter.
Converts EMS messages into Nagios messages readable by an operator without NonStop-specific knowledge.

Message Collector

Collects all messages created by other modules.
Writes all messages and statistical data into a SQL table.
Produces flat files for statistics and configuration that are used by Nagios.

IP Information Delivery

Delivers information that the Message Collector has stored in its flat file to Nagios via TCP/IP.

User Exit

User-defined procedures for implementing specialized functionality.

Summary

By creating BVmonitoring for NonStop servers, Bank-Verlag is now able to monitor and manage its NonStop systems with the same open-source management facility that it uses to manage the other data-center systems. NonStop servers now are fully integrated into Bank-Verlag's IT infrastructure.

BVmonitoring is more than a Nagios client. It is a general-purpose monitoring tool and can act as a client to any system-monitoring facility. Bank-Verlag is currently in the process of modifying BVmonitoring so that it uses an Enscribe database, eliminating the need for SQL/MP.

Bank-Verlag is not interested in selling BVmonitoring as a product. However, it is willing to license the software to other users, with maintenance and support provided for a monthly or yearly fee. If anyone would like further details concerning BVmonitoring, he or she may contact me, Wolfgang Breidbach, of Bank-Verlag at wolfgang.breidbach@bank-verlag.de.