Note

Before using this information and the product it supports, read the information in "Notices" on page 21.

This edition applies to version 1.2.3.0 of IBM Network Performance Insight and to all subsequent releases and modifications until otherwise indicated in new editions.

© Copyright IBM Corporation 2015, 2018.
US Government Users Restricted Rights – Use, duplication or disclosure restricted by GSA ADP Schedule Contract with IBM Corp.
Contents

Introduction .............................................. v
Intended audience ........................................ v
Organization ........................................... v
Network Performance Insight architecture .......... v
developerWorks community .......................... ix
Network Performance Insight technical training ...... ix
Support information .................................... ix
Conventions used in this publication .................. ix
Typeface conventions .................................. ix

Chapter 1. Troubleshooting a problem. .......... 1

Chapter 2. Log files in Network Performance Insight .... 3
System log files ........................................ 4
Log message format ..................................... 4

Chapter 3. Known problems and solutions ........ 5
Troubleshooting Installation, upgrade, and Network Performance Insight services .......... 5
Ignore the warning messages in ui_update.log file during installation ......................... 5
Regenerating the security certificate files ........ 6
Some services do not start automatically on Ambari server restart ............................. 6
Descriptions for the newly installed Performance Metric OOTB Device Support agents are not visible during discovery ............................ 7
The basecamp-connect Service does not update to V1.2.3.0 during upgrade .................... 7
Ignore the error in some Network Performance Insight services log files ....................... 7
Snappy java.lang.UnsatisfiedLinkError error in the Storage Service log file ............... 7
Ignore the unfinished transactions message during upgrade .................................... 8
Kafka Connect Service startup failure .......... 8
Kafka Connect is unable to recover from a closed connection .................................. 8
Ignore the Kafka topic warning messages during database restore operation ................ 8
Timeout messages in SNMP Collector log .......... 8
Determine the absolute time for the Flows in a NetFlow IPFIX data packet ................. 9
Troubleshooting Dashboard Application Services Hub with Tivoli Common Reporting and Network Performance Insight integration ............... 9
Manually, remove httpd.x86_64 file during cleanup ............................................ 10
Cannot access Ambari server over a VPN connection ........................................... 10
Troubleshooting Ambari server ........................ 10
Problem in decommissioning DataNodes ........ 10

Ambari HDFS Metric showing huge value for under-replicated blocks in a single node environment ........................................ 11
Ambari Metrics configurations warning keeps appearing ...................................... 11
Ambari Metrics shows negative value for the Flow Collector available interfaces ........ 12
Timezone changes are not reflected for monitoring Network Performance Insight metrics on Ambari by using Firefox ESR ..................... 13
Troubleshooting system configurations .......... 13
Do not create subdirectories inside the Reflector Output Path .................................... 14
Inconsistency between NBAR and NBAR2 data on the configuration page ................ 14
You can open only one page at a time for system configurations on Dashboard Application Services Hub .................................. 14
Missing console integration icon .................... 14
You might notice an oversized payload when you query with parent ID ....................... 15
Always set your device cache-timeout setting to 60 seconds .................................... 15
Troubleshooting visualizations ..................... 16
Troubleshooting visualizations from Traffic Details dashboard ................................. 16
Traffic Details page is unresponsive when you refresh the browser ........................... 16
Troubleshooting the Network Health Dashboard ................................................. 16
Troubleshooting Network Performance Insight Dashboards ................................. 17
Horizontal scroll bar does not work in Firefox browser ....................................... 17
Can drill down only once at a time for a resource ............................................. 17
Clear the browser cache before you switch between users ..................................... 17
Issues in the exported formats of the dashboards ................................................. 18
Expand and collapse functions are not working correctly ....................................... 18
Data display is incorrect on the widgets that show data for more than 7 days .......... 18
Inconsistent legends in maximized and restored widgets ..................................... 18
Vertical scrollbar does not function correctly in maximized widgets ....................... 18
Troubleshooting integration with Tivoli
Netcool/OMNIbus ......................................... 18
Cannot view the Event List from AEL if the list of events is large ................................ 18
Do not use Google Chrome to view Tivoli
Netcool/OMNIbus Web GUI events ................ 19
Timezone settings on Event Viewer and Network Performance Insight dashboards on Dashboard Application Services Hub are not the same. 19
Troubleshooting integration with Tivoli Network Manager. 19
Performance Metric OOTB Device Support metrics are not displayed in the Device Dashboard. 19
Unable to set a new threshold definition if metric is not enabled. 19
IPv6 addresses is not stored correctly in NCIM database. 19
Interface name change for an entity might create a new entity ID for it. 20
Potential data loss from Tivoli Network Manager discovery. 20

Notices. 21
Trademarks. 23
Terms and conditions for product documentation. 24
Introduction

How to troubleshoot IBM® Network Performance Insight®.

Intended audience

The audience who are network administrators or operations specialist responsible for installing the Network Performance Insight product suite on an enterprise network.

To install Network Performance Insight successfully, you must have a thorough understanding of the following subjects:

• Network Performance Insight 1.2.3 system
• Basic principles of network protocols and network management
• NetFlow concepts
• Administration of the Linux
• Jazz™ for Service Management

Organization

Read this summary to help you find the information that you need.

• Chapter 1, “Troubleshooting a problem,” on page 1
• Chapter 1, “Troubleshooting a problem,” on page 1
• Chapter 2, “Log files in Network Performance Insight,” on page 3
• Chapter 3, “Known problems and solutions,” on page 5

Network Performance Insight architecture

IBM Network Performance Insight is a network performance monitoring system. It offers both real-time and historical trends in network performance and interactive view on the network data that helps in reduced network downtime and optimized network performance.

Network Performance Insight provides IBM Netcool® Operations Insight with comprehensive IP network device performance monitoring and session traffic analysis.

The following diagram shows how data is flowing through the various components in Network Performance Insight:
Network Performance Insight services

Network Performance Insight services are running on microservice architecture that has the software application as a suite of independently deployable, small, modular services in which each service runs a unique process and communicates through a well-defined, lightweight mechanism. Currently, Network Performance Insight 1.2.3 consists of the following microservices:

**Foundation services**
- DNS
- Event
- Manager
- Storage
- UI

**Entity Metric services**
- Cacti Collector
- Formula Service
- Entity Analytics
- SNMP Collector
- SNMP Discovery
- Tivoli® Network Manager Collector
- Threshold

**Flow Metric services**
- Flow Analytics
- Flow Collector
For more information about these services, see their respective sections in IBM Network Performance Insight: Product Overview.

**Network Performance Insight additional components**

Some of the additional components that are introduced in Network Performance Insight V1.2.3 for enhanced functions are described here:

**Network Performance Insight Dashboards**

These interactive dashboards are the built-in JSON-based dashboards suite that can display aggregated network data from Network Performance Insight database with the help of REST API calls. It supports a combination of data from multiple data sources.

This feature provides a wide variety of dashboards for Network Operators, Network Engineers, and Network Capacity Planners. These dashboards help in pinpointing the troubled resources and general resource performance. A number of web-based configuration options are available to control the data that is displayed on the dashboards.

For more information, see Network Performance Insight Dashboards section in IBM Network Performance Insight: Product Overview.

**Note:** Networks for Operations Insight is a solution extension of Netcool Operations Insight that includes the following components and products:

- Tivoli Network Manager
- Tivoli Netcool Configuration Manager
- Network Performance Insight
- Network Health Dashboard
- Device Dashboard
- Topology Search

**IBM Open Platform with Apache Spark and Apache Hadoop components**

IBM Open Platform with Apache Spark and Apache Hadoop (IOP) can be used to help process and analyze the volume, variety, and velocity of data that continually enters your organization every day. Network Performance Insight is installed as a service extension to the installed IBM Open Platform with Apache Spark and Apache Hadoop stack.

The features of IOP that are used in Network Performance Insight:

- IBM Open Platform with Apache Spark and Apache Hadoop
- Default support for rolling upgrades for Hadoop services
- Support for long-running applications within YARN for enhanced reliability
- Spark in-memory distributed compute engine for dramatic performance increase
- Apache Ambari operational framework. Apache Ambari is an open framework for provisioning, managing, and monitoring Apache Hadoop clusters. Ambari provides an intuitive and easy-to-use Hadoop management web UI backed by its collection of tools and APIs that simplify the operation of Hadoop clusters.
- Essentially includes the following open source technologies for working with Network Performance Insight:
  - HDFS
Note: Because Zookeeper requires a majority, it is best to use an odd number of machines. For example, with four machines ZooKeeper can handle the failure of a single machine; if two machines fail, the remaining two machines do not constitute a majority. However, with five machines ZooKeeper can handle the failure of two machines.

Integrated products

Products that are integrated with Network Performance Insight 1.2.3:

Jazz for Service Management
Dashboard Application Services Hub provides visualization and dashboard services in Jazz for Service Management. It has a single console for administering IBM products and related applications. Visualization for Network Performance Insight is federated into Dashboard Application Services Hub.

IBM Tivoli Network Manager IP Edition
Tivoli Network Manager provides network discovery, device polling, including storage of polled SNMP data for reporting and analysis, and topology visualization. In addition, Network Manager can display network events, perform root-cause analysis of network events, and enrich network events with topology and other network data.

Tivoli Netcool/OMNIbus component of IBM Netcool Operations Insight
Netcool Operations Insight is powered by the fault management capabilities of IBM Tivoli Netcool/OMNIbus. In Network Performance Insight V1.2.3, Tivoli Netcool/OMNIbus is an important part of the solution for monitoring the network threshold violations.

Related information:
- IBM Network Performance Insight on IBM Knowledge Center
- IBM BigInsights 4.2 documentation
- HDFS Architecture
- Apache Hadoop YARN
- Apache Kafka
- Apache Zookeeper
- IBM Networks for Operations Insight
**developerWorks community**

Connect, learn, and share with Service Management professionals and product support technical experts who provide their perspectives and expertise.

Access the IBM Network Performance Insight community. Use developerWorks community in the following ways:

- Become involved with transparent development, an ongoing, open engagement between other users and IBM developers of Tivoli products. You can access early designs, sprint demonstrations, product roadmaps, and prerelease code.
- Connect one-on-one with the experts to collaborate and network about Tivoli and the Network and Service Assurance community.
- Read blogs to benefit from the expertise and experience of others.
- Use wikis and forums to collaborate with the broader user community.

**Network Performance Insight technical training**

For Tivoli technical training information, see the following Network Performance Insight Training website at [https://tnpmsupport.persistentsys.com/updated_trainings](https://tnpmsupport.persistentsys.com/updated_trainings).

**Support information**

If you have a problem with your IBM Software, you want to resolve it quickly. IBM provides the following ways for you to obtain the support you need:

**Online**


**IBM Support Assistant**

The IBM Support Assistant is a free local software serviceability workbench that helps you resolve questions and problems with IBM Software products. The Support Assistant provides quick access to support-related information and serviceability tools for problem determination. To install the Support Assistant software, go to [https://www.ibm.com/software/support/isa](https://www.ibm.com/software/support/isa).

**Troubleshooting Guide**

For more information about resolving problems, see the problem determination information for this product.

**Conventions used in this publication**

Several conventions are used in this publication for special terms, actions, commands, and paths that are dependent on your operating system.

**Typeface conventions**

This publication uses the following typeface conventions:

**Bold**

- Lowercase commands and mixed case commands that are otherwise difficult to distinguish from surrounding text
- Interface controls (check boxes, push buttons, radio buttons, spin buttons, fields, folders, icons, list boxes, items inside list boxes,
multicolumn lists, containers, menu choices, menu names, tabs, property sheets), labels (such as Tip, and Operating system considerations)

- Keywords and parameters in text

**Italic**

- Citations (examples: titles of publications, diskettes, and CDs)
- Words defined in text (example: a nonswitched line is called a point-to-point line)
- Emphasis of words and letters (words as words example: "Use the word *that* to introduce a restrictive clause."; letters as letters example: "The LUN address must start with the letter *L*."
- New terms in text (except in a definition list): a **view** is a frame in a workspace that contains data.
- Variables and values you must provide: ... where myname represents....

**Monospace**

- Examples and code examples
- File names, programming keywords, and other elements that are difficult to distinguish from surrounding text
- Message text and prompts addressed to the user
- Text that the user must type
- Values for arguments or command options

**Bold monospace**

- Command names, and names of macros and utilities that you can type as commands
- Environment variable names in text
- Keywords
- Parameter names in text: API structure parameters, command parameters and arguments, and configuration parameters
- Process names
- Registry variable names in text
- Script names
Chapter 1. Troubleshooting a problem

Troubleshooting is a systematic approach to solving a problem. The goal of troubleshooting is to determine why something does not work as expected and how to resolve the problem.

The first step in the troubleshooting process is to describe the problem completely. Problem descriptions help you and the IBM technical-support representative know where to identify the cause of the problem. This step includes asking yourself basic questions:

- What are the symptoms of the problem?
- Where does the problem occur?
- When does the problem occur?
- Under which conditions does the problem occur?
- Can the problem be reproduced?

The answers to these questions typically lead to a good description of the problem, which can then lead you a problem resolution.

What are the symptoms of the problem?

When starting to describe a problem, the most obvious question is “What is the problem?” This question might seem straightforward; however, you can break it down into several more-focused questions that create a more descriptive picture of the problem. These questions can include:

- Who, or what, is reporting the problem?
- What are the error codes and messages?
- How does the system fail? For example, is it a loop, hang, crash, performance degradation, or incorrect result?

Where does the problem occur?

Determining where the problem originates is not always easy, but it is one of the most important steps in resolving a problem. Many layers of technology can exist between the reporting and failing components. Networks, disks, and drivers are only a few of the components to consider when you are investigating problems.

The following questions help you to focus on where the problem occurs to isolate the problem layer:

- Is the problem specific to one platform or operating system, or is it common across multiple platforms or operating systems?
- Is the current environment and configuration supported?

If one layer reports the problem, the problem does not necessarily originate in that layer. Part of identifying where a problem originates is understanding the environment in which it exists. Take some time to completely describe the problem environment, including the operating system and version, all corresponding software and versions, and hardware information. Confirm that you are running within an environment that is a supported configuration; many problems can be
traced back to incompatible levels of software that are not intended to run together or have not been fully tested together.

**When does the problem occur?**

Develop a detailed timeline of events leading up to a failure, especially for those cases that are one-time occurrences. You can most easily develop a timeline by working backward: Start at the time an error was reported (as precisely as possible, even down to the millisecond), and work backward through the available logs and information. Typically, you need to look only as far as the first suspicious event that you find in a diagnostic log.

To develop a detailed timeline of events, answer these questions:

- Does the problem happen only at a certain time of day or night?
- How often does the problem happen?
- What sequence of events leads up to the time that the problem is reported?
- Does the problem happen after an environment change, such as upgrading or installing software or hardware?

Responding to these types of questions can give you a frame of reference in which to investigate the problem.

**Under which conditions does the problem occur?**

Knowing which systems and applications are running at the time that a problem occurs is an important part of troubleshooting. These questions about your environment can help you to identify the root cause of the problem:

- Does the problem always occur when the same task is being performed?
- Does a certain sequence of events need to occur for the problem to surface?
- Do any other applications fail at the same time?

Answering these types of questions can help you explain the environment in which the problem occurs and correlate any dependencies. Remember that just because multiple problems might have occurred around the same time, the problems are not necessarily related.

**Can the problem be reproduced?**

From a troubleshooting standpoint, the ideal problem is one that can be reproduced. Typically, when a problem can be reproduced you have a larger set of tools or procedures at your disposal to help you investigate. Consequently, problems that you can reproduce are often easier to debug and solve. However, problems that you can reproduce can have a disadvantage: If the problem is of significant business impact, you do not want it to recur. If possible, re-create the problem in a test or development environment, which typically offers you more flexibility and control during your investigation.

- Can the problem be re-created on a test system?
- Are multiple users or applications encountering the same type of problem?
- Can the problem be re-created by running a single command, a set of commands, or a particular application?
Chapter 2. Log files in Network Performance Insight

Log files that are associated with different services and components in Network Performance Insight and their location.

Log files for different services:

<table>
<thead>
<tr>
<th>Service</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambari server</td>
<td>/var/log/ambari-server</td>
</tr>
<tr>
<td>Ambari agent</td>
<td>/var/log/ambari-agent</td>
</tr>
<tr>
<td>Ambari Metric Collector</td>
<td>/var/log/ambari-metrics-collector</td>
</tr>
<tr>
<td>Ambari Metric Monitor</td>
<td>/var/log/ambari-metrics-monitor</td>
</tr>
<tr>
<td>Cacti Collector</td>
<td>/opt/IBM/npi/npi-cacti-collector/logs</td>
</tr>
<tr>
<td>DNS</td>
<td>/opt/IBM/npi/npi-dns/logs</td>
</tr>
<tr>
<td>Entity Analytics</td>
<td>/opt/IBM/basecamp/basecamp-entity-analytics/logs</td>
</tr>
<tr>
<td>Event</td>
<td>/opt/IBM/npi/npi-event/logs</td>
</tr>
<tr>
<td>Flow Analytics</td>
<td>/opt/IBM/npi/npi-flow-analytics/logs</td>
</tr>
<tr>
<td>Flow Collector</td>
<td>/opt/IBM/npi/npi-flow-collector/logs</td>
</tr>
<tr>
<td>Formula Service</td>
<td>/opt/IBM/npi/npi-formula/logs</td>
</tr>
<tr>
<td>Hadoop</td>
<td>/var/log/hadoop/hdfs</td>
</tr>
<tr>
<td>Kafka</td>
<td>/var/log/kafka</td>
</tr>
<tr>
<td>Kafka Schema Registry</td>
<td>/var/log/kafka/schema-registry.log</td>
</tr>
<tr>
<td>Manager</td>
<td>/opt/IBM/basecamp/basecamp-manager/logs</td>
</tr>
<tr>
<td>MapReduce</td>
<td>/var/log/hadoop-mapreduce/mapred</td>
</tr>
<tr>
<td>Network Manager Collector</td>
<td>/opt/IBM/npi/npi-itnm-collector/logs</td>
</tr>
<tr>
<td>SNMP Collector</td>
<td>/opt/IBM/npi/npi-snmp-collector/logs</td>
</tr>
<tr>
<td>SNMP Discovery</td>
<td>/opt/IBM/npi/npi-snmp-discovery/logs</td>
</tr>
<tr>
<td>Storage</td>
<td>/opt/IBM/basecamp/basecamp-storage/logs</td>
</tr>
<tr>
<td>Threshold</td>
<td>/opt/IBM/npi/npi-threshold/logs</td>
</tr>
<tr>
<td>UI</td>
<td>/opt/IBM/basecamp/basecamp-ui/logs</td>
</tr>
<tr>
<td>YARN components</td>
<td></td>
</tr>
<tr>
<td>• Node Manager</td>
<td>/var/log/hadoop-yarn</td>
</tr>
<tr>
<td>• Timeline server</td>
<td></td>
</tr>
<tr>
<td>• YARN</td>
<td></td>
</tr>
<tr>
<td>ZooKeeper</td>
<td>/var/log/zookeeper</td>
</tr>
</tbody>
</table>
System log files

Network Performance Insight uses Linux systemctl utility, which causes outputs to system logs as well. The systemctl is a systemd utility that is responsible for controlling the systemd system and service manager. The systemd is implemented on most of the standard Linux Distribution with a few exceptions.

The kernel or core system logs are generally stored in a common directory on a Linux system, for example `/var/log/messages`, which is handled by the syslog. These log messages might contain some of the Network Performance Insight services log.

Note: The syslog is a utility for tracking and logging system messages from informational to the critical level.

Configuring and fine-tuning your system-logging facilities is important for system security and general diagnostics.

It is recommended to manage the system log files to avoid any memory or space issues in your system. To ensure that your logs do not grow too large and fill up their file-system, you can configure the system log retention period by using any appropriate Linux system tools.

For example, you can use logrotate utility. The logrotate utility can be used to automate the log file rotation.

Log message format

Typically, each log message indicates the log level, time stamp, component, thread, error code, and event description.

An example log message:

```
[INFO] [2016-08-27 23:58:29.497]
akka.tcp://npi@127.0.0.0:2553/user/storage singleton/collagen/storeopt/
localhost.NPI.FLOW_METRIC.AGG_001MIN_TOP_PROT_OCTET.MV001
[npi-storage.optimizer.dispatcher-9123]

GYMSC3003I: Optimization complete on localhost.NPI.FLOW_METRIC.AGG_001MIN_TOP_PROT_OCTET.MV001
```

Log message elements:
Chapter 3. Known problems and solutions

A list of known problems and their solutions are described here. Before you install and use Network Performance Insight, read these known issues.

These known issues are categorized as follows:

- Installation and configuration issues
- Troubleshooting Ambari server
- Integration with Tivoli Netcool/OMNibus issues
- Troubleshooting system configurations
- Traffic data visualization issues

Troubleshooting installation, upgrade, and Network Performance Insight services

Problems that might occur during installation, uninstallation, and upgrade. Information is provided to resolve the issues wherever applicable. You can also see issues that are related to some Network Performance Insight services.

About this task

Monitor the log files to examine the processing results and problems that are associated with installation, configuration, and functioning of Network Performance Insight microservices.

Related concepts:


Log files that are associated with different services and components in Network Performance Insight and their location.

Ignore the warning messages in ui_update.log file during installation

Symptoms

Ignore the following warning messages in ui_update.log during the installation of the basecamp_ui Service:

```
warning: file /opt/IBM/basecamp/basecamp-ui/resources/dashboards/json/<file_name.json>: remove failed: No such file or directory
```

Causes

For a typical upgrade scenario, this warning message appears due to the removal of existing basecamp_ui Service before the script installs the new basecamp_ui. All the existing JSON files that are available in /basecamp-ui/resources/dashboards/json are moved to the good directory and the new JSON files are installed.
Regenerating the security certificate files

When your existing security certificate expires or is corrupted for some reason, run the updateNPICrt.sh script to regenerate and import the ca.crt file.

Before you begin

Before you run the updateNPICrt.sh script, make sure that you have done the following tasks:

- Ensure that SSH passwordless login is set up from Ambari server to all cluster hosts. See Setting SSH passwordless login section in Installing and Configuring IBM Network Performance Insight

Procedure

1. Manually, remove the following files from /opt/IBM/npi/npi-installer-tools/dash-integration directory:
   - npi.csr
   - priv_key.key
   - ca.crt
   - ca.srl
   - npi.cer
   - security.keystore

2. Edit the configuration files.
   For more information, see Editing the configuration files section in Installing and Configuring IBM Network Performance Insight.

3. Generate the certificate and keystore files.
   For more information, see Generating the certificate and keystore files section in Installing and Configuring IBM Network Performance Insight.

4. Run the updateNPICrt.sh script from Ambari server as follows:
   ```
   cd /opt/IBM/npi/npi-installer-tools/dash-integration
   ./updateNPICrt.sh
   ```

   The following tasks are done after the script is run:
   - The certificate is regenerated in Ambari Server host.
   - It copies the ca.crt from Ambari Server host to all the Ambari agent hosts.
   - It deletes the existing certificate in basecamp-jre directory and adds the new certificate there.

5. Copy and run the script on all the Ambari agent hosts in your cluster.

Some services do not start automatically on Ambari server restart

Symptoms

You might see the following message, when Ambari Server is restarted:
```
[root@c7201 ~]# systemctl status ambari-server
ambari-server.service Loaded: not-found (Reason: No such file or directory) Active: inactive (dead)
```

Causes

This issue occurs because the systemd does not work on ambari-server on RHEL 7.2.

Resolving the problem
To resolve this issue, run the following command in a single line on the Ambari Server host:

```bash
unlink /etc/rc.d/init.d/ambari-server
cp -a /usr/sbin/ambari-server /etc/rc.d/init.d/ambari-server && systemctl daemon-reload
```

**Descriptions for the newly installed Performance Metric OOTB Device Support agents are not visible during discovery**

**Symptoms**
After the Performance Metric OOTB Device Support pack is installed and you try to run the discovery from Tivoli Network Manager GUI, you might not see the descriptions of all the newly installed agents.

**Resolving the problem**
To resolve this issue, restart your Tivoli Network Manager system.

The new agent descriptions are displayed on the Network Discovery Configuration page.

**Related information**

[Starting and stopping Network Manager](#)

**The basecamp-connect Service does not update to V1.2.3.0 during upgrade**

**Symptoms**
You might notice that the basecamp-connect Service is not updated to the current version during the upgrade process. You can ignore this issue as it has no functional impact to the Network Performance Insight system.

**Ignore the error in some Network Performance Insight services log files**

**Symptoms**
When you see the following error in some Network Performance Insight services log files:

```
[ERROR] [2016-11-14 00:38:13.569] [akka://npi/user/StreamSupervisor-0/flow-14774-0-unknown-operation] [npi-akka.actor.default-dispatcher-72] Error in stage [One2OneBidi]: Inner stream finished before inputs completed. Outputs might have been truncated.
```

Ignore the error as it does not have a functional impact.

**Snappy java.lang.UnsatisfiedLinkError error in the Storage Service log file**

**Symptoms**
You might encounter the following error in the Storage Service log file after the installation of Network Performance Insight:

```
java.lang.UnsatisfiedLinkError: /tmp/snappy-1.0.4.1-libsnappyjava.so
```

**Resolving the problem**
To resolve this issue, enable execution permission for /tmp folder by using the following command:

```
sudo mount -o remount,exec /tmp
```
Ignore the unfinished transactions message during upgrade

Symptoms
When you run the `yum` commands during upgrade, you might encounter the following message:
There are unfinished transactions remaining.
You might consider running `yum-complete-transaction` first to finish them.
The program `yum-complete-transaction` is found in the `yum-utils` package.

Kafka Connect Service startup failure

Symptoms
If you experience a startup failure with Kafka Connect Service any time you restart all the services from Ambari user interface, apply the resolution.

Resolving the problem
To resolve this issue, you must make sure that the Tivoli Network Manager database is up and running since Kafka Connect Service tries to connect to Tivoli Network Manager database at the time of startup.

Kafka Connect is unable to recover from a closed connection

Symptoms
Kafka Connect is unable to recover after the connection is closed and restarted.
You might see the following error is logged repeatedly in `/usr/iop/current/kafka-broker/logs/connect.log` file.

```
[2016-12-22 14:59:27,054] ERROR Failed to run query for table TimestampIncrementingTableQuerier{name='null', query='select * from ...... }:
java.sql.SQLRecoverableException: Closed Connection (io.confluent.connect.jdbc.JdbcSourceTask:232)
```

Resolving the problem
To resolve this issue, restart the Kafka Connect Service from Ambari.

Important: If you restart the Network Performance Insight database for any reason, monitor the logs and make sure to restart the Kafka Connect as well.

Ignore the Kafka topic warning messages during database restore operation

Symptoms
Ignore the following warning message during the database restore operation:

```
[WARN] Error while fetching metadata with correlation id 0 :
{<kafka_topic_name>=1.2.2,<timestamp>=LEADER_NOT_AVAILABLE}
```

Timeout messages in SNMP Collector log

Symptoms
You might see the following error messages in SNMP Collector Service log files:

```
[ERROR] [2017-06-01 11:59:01.616] [akka.actor.ActorSystemImpl[npi]] [npi-akka.actor.default-dispatcher-23]
Failed to poll from snmpTarget: SnmpTarget(SnmpRemoteAgent(2,10.55.239.201,161,4000,2),
SnmpCommunityCredentials(uVzzQ0IeVpAGwmLTwT7vwa=,vcekcd6VyKU=)) persistent.npm.snmp.SnmpTimeoutException timeout
```

Causes
You might notice this issue if any of the following conditions are met:
- If the connection or device is not available.
- Wrong `conf.key` file is copied into your Network Performance Insight systems. Therefore, wrong credentials are used.
- Non unique engine ID is used in for some snmpv3 devices.
• If the port number is changed on the SNMP device, while Network Performance Insight system is retrieving the credentials and at the same time Formula Service is restarting for some reason. You might notice two polling definitions with new and old credentials.

Determine the absolute time for the Flows in a NetFlow IPFIX data packet

Symptoms
For NetFlow v5 and v9, it is possible to calculate the absolute time via the UNIX Seconds in SysUptime fields in the packet header:

\[ \text{UnixSeconds} - \text{SysUptime} + \text{FlowStartSysUptime} \]

In IPFIX (v10), the header contains only the system time when the packet is created and not the system uptime.

Resolving the problem
In this scenario, include \text{systemInitTimeMilliseconds} field with element ID 160 in your template payload. The field, \text{systemInitTimeMilliseconds} gives the absolute timestamp of the last initialization or reinitialization of the IPFIX device.

Troubleshooting Dashboard Application Services Hub with Tivoli Common Reporting and Network Performance Insight integration

Symptoms
If the Dashboard Application Services Hub that you are integrating with Network Performance Insight has Tivoli Common Reporting for your existing Cognos-based reports, the integration might fail.

Causes
When Tivoli Common Reporting is installed along with Dashboard Application Services Hub, the installer overwrites the \text{JAVA_HOME} in setTCREnv.sh file and Java 1.6 is called instead of the original Java 1.7.

Resolving the problem
To resolve this issue, follow these steps:

1. Make sure that Java 1.7 is existing in your WebSphere Application Server environment by using the following steps:
   a. Navigate to bin directory in the AppServer directory on the server. The default location is /opt/IBM/WebSphere/AppServer/bin.
   b. View the available SDKs with the following command:
      
      \[
      . /managesdk.sh -listAvailable -verbose
      \]

2. Ascertain whether Java 7 SDK is present, and perform one of the following steps:
   If Java 7 SDK is not present
   a. Install Java 7 SDK by using the IBM Installation Manager.
   b. Run the following command to set Java 7 as the default SDK:
      
      \[
      . /managesdk.sh -setNewProfileDefault -sdkName 1.7_64
      \]

   If Java 7 SDK is present
   a. Run the following command to set Java 7 as the default SDK:
      
      \[
      . /managesdk.sh -setNewProfileDefault -sdkName 1.7_64
      \]
3. Manually, update the setTCRenv.sh file to point to Java 1.7 with the following command:

```
JAVA_HOME=$WAS_HOME/java_1.7_64/jre
```

**Note:** This step is required to be done only once.

### Related information

- [Why is global.lock file generated in /profile/config/cells/JazzSMNode01Cell/applications/isc.ear/deployments/isc/isclite.war/WEB-INF directory?](#)
- [SSO failed to configure ObjectServer repository](#)

### Manually, remove httpd.x86_64 file during cleanup

#### Symptoms
If you find the `httpd.x86_64` file in your environment after the uninstallation of Network Performance Insight, you must manually remove it.

#### Resolving the problem
Use the following command to remove the file:

```
# yum --setopt=tsflags=noscripts remove httpd.x86_64
```

For more information, see Uninstalling Network Performance Insight, in Installing and Configuring IBM Network Performance Insight.

### Cannot access Ambari server over a VPN connection

#### Symptoms
You might not be able access Ambari server over a VPN connection.

#### Resolving the problem
To resolve this issue, use the IP address of the host instead of the fully qualified domain name (FQDN). For example:

```
http://<IP_Address>:8080
```

### Troubleshooting Ambari server

Use this information to troubleshoot problems when you use Ambari server.

### Problem in decommissioning DataNodes
When you decommission some nodes from the cluster, HDFS replicates the blocks that belong to decommissioning DataNodes to other live DataNodes to reach the replication factor that you specified in the `dfs.replication` setting. You have the same setting in Ambari HDFS configuration as `Block replication`.

#### Before you begin
If you encounter the following error:

Identify the files that are under-replicated by using these steps:

1. Log in to the host where the HDFS NameNode is installed as `hdfs` user.
   Or, set the `HADOOP_USER_NAME` environment variable as follows:

```
export HADOOP_USER_NAME=hdfs
```
About this task

The dfs.replication is an HDFS global setting in hdfs-site.xml.

If you do not have enough live DataNodes to reach the replication factor, decommission process might hang until more DataNodes become available. For example, if you have 3 DataNodes in your cluster with dfs.replication is set to 3 and you are trying to decommission 1 DataNode out of 3, decommission process hangs until you add another DataNode to the cluster.

Procedure

1. Log in to the host where the HDFS NameNode is installed as hdfs user. Or, set the HADOOP_USER_NAME environment variable as follows:
   ```
   export HADOOP_USER_NAME=hdfs
   ```
2. Run the hadoop fs -setrep command as follows:
   ```
   hadoop fs -setrep [-R] [-w] <numReplicas> <path>
   ```
   Where:
   - `-w` flag requests that the command wait for the replication to complete. This step can potentially take a long time.
   - `-R` flag is accepted for compatibility with an earlier version. It has no effect.
   - `<numReplicas>`
   - `<path>`
   For example, `hadoop fs -setrep -w 2 /`
   This command changes the replication factor of a file. If path is a directory, then the command recursively changes the replication factor of all files under the directory tree rooted at path.

   **Important:** By default, the HDFS number of replication (numReplicas) is 3. If you have less than 3 live HDFS DataNodes, set numReplicas to total remaining number of live HDFS DataNodes in your cluster.

Related information:

[https://hadoop.apache.org/docs/r2.7.2/hadoop-project-dist/hadoop-common/FileSystemShell.html#setrep](https://hadoop.apache.org/docs/r2.7.2/hadoop-project-dist/hadoop-common/FileSystemShell.html#setrep)

Ambari HDFS Metric showing huge value for under-replicated blocks in a single node environment

Symptoms

Ambari Network Performance Insight HDFS metrics value is highlighted as red and showing a huge value for under-replicated blocks in the Ambari server web interface in a single node environment.

Causes

The HDFS status summary in Ambari server web interface shows the missing and under-replicated blocks.

Some files in your HDFS file system are corrupted either by losing its last block replica or just being under-replicated.

When a new DataNode is added, HDFS replicates these blocks. Even if the replication factor is set to 1, the HDFS still reports these blocks as under-replicated, as it is not fault tolerant.
This behavior is expected.

**Resolving the problem**
To work around this behavior, you can opt to follow the suggestions that are provided:

1. Use the following steps to clear the threshold values from the Ambari server UI:
   a. Select **Edit** from the HDFS metrics **Under Replicated Block** widget.
   b. Select **Edit Shared** from the Warning screen.
   c. Clear the thresholds values. For example, empty the **Thresholds** fields, **WARNING** and **CRITICAL**.
   d. Click **Next > Save**

2. The following are some suggestions to avoid this problem that depends on your data blocks.
   a. To get the full details of the files, which are causing the problem, run the following command by using root user.
      ```bash
      $ hdfs fsck / -files -blocks -locations
      ```
      The output identifies the replication factor set on your corrupted files.
   b. The following list some methods to fix the missing and under-replicated blocks.
      - This condition might be temporal; if you have a data under-replicated it must automatically replicate the blocks to other data nodes to match the replication factor.
      - If it is not replicating on its own, run a balancer manually.

      **Important:** Do not run the HDFS balancer if you are using HBase.
      - If it is not replicating on its own, you can manually set replication on a specific file that is under-replicated to a value higher than it currently set to. This setting makes the cluster to create more replicas.
        - The recommended default replication factor is to set at 3. If you then add a DataNode, the block is replicated.
      - If it is just a temporary file, which is created when the job is run and your speculative execution tasks are high, set the speculative execution tasks to match the replication factor.
   c. **CAUTION:**
      Run the following command only when you are sure about the corrupted files.
      If you are sure that these files are not needed and would like to eliminate the error, you can run the following command to automatically delete the corrupted files:
      ```bash
      hdfs fsck / -delete
      ```

**Ambari Metrics configurations warning keeps appearing**

**Symptoms**
The Ambari Metrics service configurations warning at times keeps appearing despite having the correct recommended value.

**Resolving the problem**
Ensure that your configurations value is according to the requirements or the recommended value. From the Ambari Metrics Warning UI, click **Proceed Anyway** to proceed.
Ambari Metrics shows negative value for the Flow Collector available interfaces

**Symptoms**

Ambari Network Performance Insight Flow Collector metrics at times show negative value from the Ambari web interface.

**Causes**

The Network Performance Insight Flow Collector is designed to run in multiple nodes. This issue is seen when many new interfaces are being discovered at a fast rate.

The negative value that is shown in Ambari metrics is indicating that the interfaces exceeded the maximum number of flow interfaces configured.

**Resolving the problem**

When the interfaces are disabled or when the maximum number of flow interfaces configuration value is increased, the Ambari Flow Collector metrics value is adjusted.

You can disable the interfaces, which are not needed to be collected.

To disable the interfaces, see Configuring flow thresholds in Installing and Configuring IBM Network Performance Insight.

**Timezone changes are not reflected for monitoring Network Performance Insight metrics on Ambari by using Firefox ESR**

**Symptoms**

When you use Firefox ESR to monitor Network Performance Insight metrics on Ambari, the time zone changes are not reflected correctly.

**Resolving the problem**

It is a known limitation.

**Troubleshooting system configurations**

Problems that might occur during Network Performance Insight system configuration and how to resolve them.

**About this task**

For more information about system configurations, see Configuring Network Performance Insight system environment section in Installing and Configuring IBM Network Performance Insight.
Do not create subdirectories inside the Reflector Output Path

Symptoms
If you have any subdirectories in the user-defined Reflector Output Path parameter where the log file path that you configured for Cacti is specified, you might find that /var/log/npi-cacti-collector/npi-cacti-collector-<timestamp>.log file displays all the logs recursively from the subdirectories as well, which might be irrelevant. By default, Reflector Output Path is /usr/share/cacti/log/.

Resolving the problem
To resolve this issue, do not create subdirectories in the Reflector Output Path.

For more information, see Configuring Cacti servers in Installing and Configuring IBM Network Performance Insight.

Inconsistency between NBAR and NBAR2 data on the configuration page

Symptoms
If a particular device is set up only for sending NBAR2 data without NBAR setup, you might not see the device details in NBAR configuration page.

For more information, see Configuring NBAR section in Installing and Configuring IBM Network Performance Insight.

Resolving the problem
To resolve this issue, make sure that you set up both NBAR and NBAR2 on all your devices.

Related information

You can open only one page at a time for system configurations on Dashboard Application Services Hub

Symptoms
When you try to configure Network Performance Insight system from Console Integrations ( ) on Dashboard Application Services Hub, you cannot open multiple pages at time. If you try to open another page, the current page is replaced by the new page.

Missing console integration icon

Symptoms
The console integration was successful but the table that lists the available tasks is empty, hence the Console Integration icon ( ) is missing in Dashboard Application Services Hub.

Note: For a successful connection:
• A table lists the tasks available from stand-alone console and attributes for each task.
• The specified stand-alone console content is available in the navigation bar of the Dashboard Application Services Hub console through the Console Integration icon.

**Resolving the problem**

• Verify that your login user has all the required groups set from **WebSphere Administrative Console** and user roles set from **Console Settings** in Dashboard Application Services Hub.

• Click **Save** from the **Console Integration** page in Dashboard Application Services Hub for NPI.

• Restart the Network Performance Insight UI service from Ambari server.

**You might notice an oversized payload when you query with parent ID**

**Symptoms**

When a static threshold is configured with a huge upper limit value and you try to query the database by using the anomalies API by parent ID, you might see the following error message:

```plaintext
[ERROR] [2016-09-06 22:38:46.039] [akka.tcp://npi@<IP_address>/system/endpointManager/reliableEndpointWriter-akka.tcp%3A%2F%2Fnpi%4010.212.6.20%3A2552-27/endpointWriter]
[npi-akka.remote.default-remote-dispatcher-5] Transient association error (association remains live)
 akka.remote.OversizedPayloadException: Discarding oversized payload sent to Actor [akka.tcp://npi@10.212.6.20:2552/temp/$e]: max allowed size 128000 bytes, actual size of encoded class persistent.npm.storage.spark.SparkQueryMessages$TableScanResults was 133408 bytes.
```

**Resolving the problem**

To resolve this issue, follow these steps:

1. Open a browser and access the Ambari server dashboard.
   
   Use the following default URL: `http://<myserver.ibm.com>:8080`
   
   The default user name is admin, and the default password is admin.

2. Click **Services > NPI > Configs > Advanced**.

3. Expand **Advanced npi-env** pane and add the following lines in **npi-env template** text area:
   ```plaintext
   ui.entity.anomalies.batchsize = <value>
   ```
   
   The default value is 900. If you want to reduce the payload size, enter a lower value.

For more information, see **anomalies** in **IBM Network Performance Insight: References**.

**Always set your device cache-timeout setting to 60 seconds**

The cache-timeout setting on your device specifies the length of time for which the list of NetFlow top talkers (unaggregated top flows) is retained. It specifies the active flow timeout in seconds that is in range 1 - 604800 (7 days). By default, it is 30 minutes.

Set the device configuration for NetFlow active timeout as follows:

```plaintext
Router(config)# ip flow-cache timeout active 1
```

With this cache-timeout setting, you specify the device to export flow records every minute to get the real-time traffic reports. Network Performance Insight calculates utilization based on the Flow records it receives at 1-minute intervals. If it is not set to 60 seconds, utilization might go over 100%.
For more information, see Configuring Flow Exporters in IBM Network Performance Insight: References.

**Troubleshooting visualizations**

You can see the issues related to various dashboards that are available for Network Performance Insight users here.

**Troubleshooting visualizations from Traffic Details dashboard**

Use this troubleshooting information when you view the Traffic Details dashboard and its views.

**Traffic Details page is unresponsive when you refresh the browser**

Do not refresh the Traffic Details page from the browser.

**Symptoms**

Traffic Details page becomes unresponsive after you click the Refresh button on the browser.

**Resolving the problem**

To work around this issue, click the Refresh button on the dashboard instead of refreshing from the browser.

**Troubleshooting the Network Health Dashboard**

Troubleshooting issues with Network Health Dashboard.

**Procedure**

- Monitor the log files.
  
  The Network Health Dashboard log files are available in the following locations:

<table>
<thead>
<tr>
<th>File</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log file</td>
<td>$NMGUI_HOME/profile/logs/tnm/ncp_nethealth.0.log</td>
</tr>
<tr>
<td>Trace file</td>
<td>$NMGUI_HOME/profile/logs/tnm/ncp_nethealth.0.trace</td>
</tr>
</tbody>
</table>

- See this information for other troubleshooting issues with Network Health Dashboard.

- Check the data sources for Network Health Dashboard widgets.
  
  Understand from where the Network Health Dashboard widgets retrieve data. This information might be useful for troubleshooting data presentation issues in the Network Health Dashboard. The Traffic Details dashboard that displays the data that is collected and processed from Network Performance Insight is retrieved from NCIM database schema that contains views from Network Manager NCIM topology data and Network Performance Insight data.
Troubleshooting Network Performance Insight Dashboards

Use this troubleshooting information when you view Network Performance Insight Dashboards.

**Horizontal scroll bar does not work in Firefox browser**

**Symptoms**
The horizontal scroll bar is not working when you view any maximized chart in Network Performance Insight Dashboards.

This issue is only seen in Firefox browser version 51.

**Can drill down only once at a time for a resource**

**Symptoms**
On Demand Filtering Device Health or IPSLA History dashboard loads only once at a time when you drill down for a particular resource from the Network Performance Overview or Network Performance Overview by Deviation dashboard.

If you click any other resource to drill down, the report does not update with the data from selected resource. You see the same dashboard content as previous.

For example:
1. From Quality of Service pane in Network Performance Overview dashboard, click any bar, say xx.yy.zz - VoIP range1 that represents the VoIP Inbound Jitter between a source and destination device IP addresses.
   The IPSLA History dashboard loads in a new tab for selected resource, xx.yy.zz - VoIP Range1.
2. From Quality of Service pane in Network Performance Overview dashboard, click any other bar, say xx.yy.zz - VoIP Range2.
   It toggles to the IPSLA History dashboard page view, but with the previous selected resource content, xx.yy.zz - VoIP range2.

**Resolving the problem**
It's a known limitation. You need to close the opened dashboard first before you initiate another drill-down for a different resource.

**Clear the browser cache before you switch between users**

**Symptoms**
You might see the same dashboard content as the previous user on Dashboard Application Services Hub if you are using the same browser.

**Resolving the problem**
Always, clear the browser cache when you are switching between users on same Dashboard Application Services Hub environment and if you are using the same browser.
**Issues in the exported formats of the dashboards**

When you export the dashboards to PDF, CSV, or Excel formats, you might see the following issues:

- If a number has a comma delimiter in it, the exported CSV file displays the number in two different columns instead of one column.
- The user preferences configuration settings are not functioning correctly. For example, if you specify the same alignment and position for **UserId**, **PageNo**, and **ReportTime** options, the exported PDF shows insufficient information. If you select different alignments for the options, all the information is shown correctly.
  
  For more information, see Optional: Setting User Preferences section in Administering IBM Network Performance Insight.

**Expand and collapse functions are not working correctly**

After you collapse any widget on the Flow aggregation dashboards, for example, Top Applications dashboard, you cannot expand later. This issue is seen in Firefox ESR 45 only.

**Data display is incorrect on the widgets that show data for more than 7 days**

If the time period is more than 7 days, 1-day aggregation is used for the data display. You might see that the start time of the data in the display is not 00:00. Instead, it shows the data based on your browser timezone. This issue is seen if you are viewing the dashboards from a different timezone from GMT.

**Inconsistent legends in maximized and restored widgets**

You can see all the legends in a maximized widget and all of them are not visible in a restored widget.

**Vertical scrollbar does not function correctly in maximized widgets**

This issue is seen in Chrome only.

---

**Troubleshooting integration with Tivoli Netcool/OMNibus**

Use this troubleshooting information to troubleshoot problems with the integration.

**Cannot view the Event List from AEL if the list of events is large**

**Symptoms**

Sometimes the Event list is not visible on AEL and you might encounter the following error:

W0025  HEMCDW0025

**Causes**

Typically, you encounter this issue if the Event list is large.

**Resolving the problem**

To work around this issue, see the Technical Note:

[WebGUI AEL displays W0025 error when viewing a very large list of events](#)
Do not use Google Chrome to view Tivoli Netcool/OMNibus Web GUI events

Do not use Google Chrome to view the AEL or Event Viewer on Dashboard Application Services Hub.

**Note:** Tivoli Netcool/OMNibus Web GUI v8.1.x versions on Dashboard Application Services Hub do not fully support the Chrome browser. For more information, see: [http://www-01.ibm.com/support/docview.wss?uid=swg21652158](http://www-01.ibm.com/support/docview.wss?uid=swg21652158)

Timezone settings on Event Viewer and Network Performance Insight dashboards on Dashboard Application Services Hub are not the same

The time that is displayed in the *Last Occurrence* column in Event Viewer is different from Network Performance Insight dashboards. AEL and Network Performance Insight dashboards use the same timezone setting as the local web browser. Event Viewer always displays the time based on the timezone settings on the OMNibus ObjectServer. Currently, this setting on Event Viewer cannot be changed.

---

**Troubleshooting integration with Tivoli Network Manager**

Use this information to troubleshoot problems with Tivoli Network Manager integration.

**Performance Metric OOTB Device Support metrics are not displayed in the Device Dashboard**

The ready-to-use vendor-specific device health metrics from Performance Metric OOTB Device Support component are not displayed in the Device Health.

**Unable to set a new threshold definition if metric is not enabled**

**Symptoms**
You cannot set a new threshold definition if a metric is not enabled on Tivoli Network Manager network polling. The NPI Anomaly Threshold page might not load completely.

**Related information**

- [Defining performance thresholds for anomaly detection](#)

**IPv6 addresses is not stored correctly in NCIM database**

**Symptoms**
You can’t use the address property for filtering on REST API because the NCIM probe target and source columns in the Tivoli Network Manager database is not reflecting the IPv6 addresses correctly.

**Resolving the problem**
Provide the IPv6 address as a string.
Interface name change for an entity might create a new entity ID for it

**Symptoms**
When you change the interface name for an entity, you might notice that a new entity ID is created for that entity.

**Resolving the problem**
This behavior is by design.

Potential data loss from Tivoli Network Manager discovery

**Symptoms**
By default, the probe discovery polling interval is set to 60 minutes. During the polling time, Network Performance Insight detects if there are any changes in the discovery on the Tivoli Network Manager system.

If there are any configuration changes, Tivoli Network Manager might remove an entity and create it again. If Network Performance Insight retrieves the inventory list after the removal and before the creation, it results in the probe deactivation until the next polling time.

It results in loss of IP SLA metric collection from the time the probe is removed from Network Performance Insight until the next discovery.

**Resolving the problem**
To work around this issue, reduce the probe polling time in the collector.itnm.probe.import-interval setting on Ambari web UI.

For more information, see *Setting up communication with Tivoli Network Manager in Installing and Configuring IBM Network Performance Insight.*

**Note:** Do not set a narrow polling interval to avoid load on Tivoli Network Manager database.
 Notices

This information was developed for products and services offered in the US. This material might be available from IBM in other languages. However, you may be required to own a copy of the product or product version in that language in order to access it.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user’s responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not grant you any license to these patents. You can send license inquiries, in writing, to:

IBM Director of Licensing
IBM Corporation
North Castle Drive, MD-NC119
Armonk, NY 10504-1785
US

For license inquiries regarding double-byte character set (DBCS) information, contact the IBM Intellectual Property Department in your country or send inquiries, in writing, to:

Intellectual Property Licensing
Legal and Intellectual Property Law
IBM Japan Ltd.
19-21, Nihonbashi-Hakozakicho, Chuo-ku
Tokyo 103-8510, Japan

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some jurisdictions do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM websites are provided for convenience only and do not in any manner serve as an endorsement of those
websites. The materials at those websites are not part of the materials for this IBM product and use of those websites is at your own risk.

IBM may use or distribute any of the information you provide in any way it believes appropriate without incurring any obligation to you.

Licensees of this program who wish to have information about it for the purpose of enabling: (i) the exchange of information between independently created programs and other programs (including this one) and (ii) the mutual use of the information which has been exchanged, should contact:

IBM  Director of Licensing  
IBM Corporation  
North Castle Drive, MD-NC119  
Armonk, NY 10504-1785  
US

Such information may be available, subject to appropriate terms and conditions, including in some cases, payment of a fee.

The licensed program described in this document and all licensed material available for it are provided by IBM under terms of the IBM Customer Agreement, IBM International Program License Agreement or any equivalent agreement between us.

The performance data discussed herein is presented as derived under specific operating conditions. Actual results may vary.

The client examples cited are presented for illustrative purposes only. Actual performance results may vary depending on specific configurations and operating conditions.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

Statements regarding IBM's future direction or intent are subject to change or withdrawal without notice, and represent goals and objectives only.

All IBM prices shown are IBM's suggested retail prices, are current and are subject to change without notice. Dealer prices may vary.

This information is for planning purposes only. The information herein is subject to change before the products described become available.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to actual people or business enterprises is entirely coincidental.

COPYRIGHT LICENSE:
This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs. The sample programs are provided "AS IS", without warranty of any kind. IBM shall not be liable for any damages arising out of your use of the sample programs.

Each copy or any portion of these sample programs or any derivative work must include a copyright notice as follows:

© (your company name) (year).
Portions of this code are derived from IBM Corp. Sample Programs.
© Copyright IBM Corp. _enter the year or years_.

### Trademarks

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of IBM trademarks is available on the web at "Copyright and trademark information" at [www.ibm.com/legal/copytrade.shtml](http://www.ibm.com/legal/copytrade.shtml).

Adobe, Acrobat, PostScript and all Adobe-based trademarks are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, other countries, or both.

IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency which is now part of the Office of Government Commerce.

Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Microsoft and Windows are trademarks of Microsoft Corporation in the United States, other countries, or both.

ITIL is a registered trademark, and a registered community trademark of The Minister for the Cabinet Office, and is registered in the U.S. Patent and Trademark Office.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Java and all Java-based trademarks and logos are trademarks or registered trademarks of Oracle and/or its affiliates.
Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license therefrom.

Linear Tape-Open, LTO, the LTO Logo, Ultrium, and the Ultrium logo are trademarks of HP, IBM Corp. and Quantum in the U.S. and other countries.

Terms and conditions for product documentation

Permissions for the use of these publications are granted subject to the following terms and conditions.

Applicability

These terms and conditions are in addition to any terms of use for the IBM website.

Personal use

You may reproduce these publications for your personal, noncommercial use provided that all proprietary notices are preserved. You may not distribute, display or make derivative work of these publications, or any portion thereof, without the express consent of IBM.

Commercial use

You may reproduce, distribute and display these publications solely within your enterprise provided that all proprietary notices are preserved. You may not make derivative works of these publications, or reproduce, distribute or display these publications or any portion thereof outside your enterprise, without the express consent of IBM.

Rights

Except as expressly granted in this permission, no other permissions, licenses or rights are granted, either express or implied, to the publications or any information, data, software or other intellectual property contained therein.

IBM reserves the right to withdraw the permissions granted herein whenever, in its discretion, the use of the publications is detrimental to its interest or, as determined by IBM, the above instructions are not being properly followed.

You may not download, export or re-export this information except in full compliance with all applicable laws and regulations, including all United States export laws and regulations.

IBM MAKES NO GUARANTEE ABOUT THE CONTENT OF THESE PUBLICATIONS. THE PUBLICATIONS ARE PROVIDED "AS-IS" AND WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE.