Before using this information and the product it supports, read the information in "Notices" on page 23.

This edition applies to version 1.2.1.0 of IBM Network Performance Insight and to all subsequent releases and modifications until otherwise indicated in new editions.

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Administering Network Performance Insight

Use this information to administer IBM® Network Performance Insight, Version 1.2.1 and its integration services.

Intended audience

The audience who are network administrator or operations specialist responsible for configuring 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 1.2.1 system
- Basic principles of network protocols and network management
- Flow concepts
- RHEL Administration
- Jazz for Service Management

Organization

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

- Chapter 2, “Administering Network Performance Insight services through Ambari,” on page 3
- “Starting and stopping services” on page 9
- Chapter 3, “Database administration,” on page 15

Network Performance Insight architecture

IBM Network Performance Insight is a network performance monitoring system.

Network Performance Insight provides comprehensive, flexible, and scalable traffic data management with visualization and reporting to support complex, multi-vendor, multi-technology networks. It offers a range of dashboard views with robust security features that are designed to meet the needs of executive management and converging network and IT operations teams.

Network Performance Insight offers near real-time and interactive view on the traffic 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:
IBM Open Platform with Apache Spark and Apache Hadoop

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 installing 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 increases
- 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
  - Kafka
  - Ambari
  - Spark
ZooKeeper

Note: Because Zookeeper requires a majority, it is best to use an odd number of machines. For example, with four machines ZooKeeper can only 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

The products that are needed to work with Network Performance Insight, V1.2.1 are as follows:

**Jazz™ for Service Management 1.1.3.0**
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.

Products that are integrated with Network Performance Insight 1.2.1:

**IBM Tivoli® Network Manager IP Edition 4.2.0.3**
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 1.4.1**
Netcool Operations Insight is powered by the fault management capabilities of IBM Tivoli Netcool/OMNIbus. In Network Performance Insight v1.2.1, Tivoli Netcool/OMNIbus 8.1.0.11 is an important part of the solution for monitoring the network threshold violations.

Network Performance Insight services

Network Performance Insight components 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.

For more information about these services, see *IBM Network Performance Insight: Product Overview*.

Related information:

- IBM Network Performance Insight on IBM Knowledge Center
- IBM BigInsights 4.2 documentation
- HDFS Architecture
- Apache Hadoop YARN
- Apache Kafka
- Apache Zookeeper
Service Management Connect

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


- 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.

Related information:

- IBM Network Performance Insight community on developerWorks

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 [http://www.ibm.com/software/support/isa](http://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. Creating a new user

Security relies on users and user groups. You define the groups to which the users belong in the application server. Use these steps to create new users for accessing Jazz® for Service Management server.

Procedure
1. Log in to Jazz™ for Service Management server.
2. Expand Console Settings > WebSphere Administrative Console.
3. Click Launch WebSphere Administrative Console.
4. On the side pane, Users and Groups > Manage Users.
5. Click Create.
6. Specify the required details.
7. Assign this new user to the required groups.
   a. Click Group Membership.
   b. On the Group Membership page, click Search.
   c. In the Available column, select the following groups and click Add:
      - npiuser
      - npiadministrator
      - ConsoleUser
      - ConsoleAdmin
      - WriteAdmin
      - ReadAdmin
      - manager-gui
      - manager-script
      - manager-jmx
      - manager-status
   d. Click Create.

Granting roles to the new user

New console users must be granted access to resources based on the role to which they have been assigned.

Procedure
1. Log in to Dashboard Application Services Hub portal as admin user.
2. In the navigation pane, select Console Settings > User Roles.
3. To assign a role to a user, click Search. A list of available users is displayed.
4. Select the new user from the User ID column.
   A list of available roles for the selected user is displayed on a new page.
5. Select all the roles and assign to new user.

Note: Make sure to select the noi_npi and noi_npi_admin roles to work with Device Dashboard. noi_npi and noi_npi_admin roles are created when the Device Dashboard is installed.
6. Click Save.
**What to do next**

Log off from Dashboard Application Services Hub and log in again to ensure all the privileges that include admin privileges are available to the new user.

*Related information:*

- [Configuring the Device Dashboard](#)
Chapter 2. Administering Network Performance Insight services through Ambari

The installation of Ambari server host and agents are now complete. Use this basic information to help you administer your environment.

Adding nodes and components to existing hosts in a cluster

Apache Hadoop clusters grow and change with use. You can add more services after you build your initial cluster with a base set of Hadoop services.

Related information:

Adding new hosts to the cluster

You can add more hosts to an existing cluster and assign these hosts to run as DataNodes and NodeManagers to expand both HDFS storage capacity and YARN processing power.

Before you begin

Set up SSH passwordless login on the new host.

For more information, see Setting SSH passwordless login in Installing and Configuring IBM Network Performance Insight

Procedure

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. In the Ambari web interface, browse to the Hosts page and click the Actions button.
3. Select Add New Hosts.
   The ADD HOST WIZARD provides a sequence of prompts similar to the ones in the Ambari installation wizard. Follow the prompts, and provide information similar to that provided to define the first set of hosts in your cluster.
   For more information, see Setting up Network Performance Insight cluster in Installing and Configuring IBM Network Performance Insight
4. Select the slave components to include on the host.
   For example, DataNode and NodeManager.
   Ambari deploys the software packages on the hosts, push the configuration to the hosts, and start the components so they join their respective Services.
5. Perform the postinstallation tasks on the new host.
   For more information, see Postinstallation tasks in Installing and Configuring IBM Network Performance Insight

Related information:

Adding Hosts to a Cluster
Adding components to new hosts in a cluster

After a new node is added to the cluster, expand your cluster by adding all the master host components to the slave hosts in your cluster.

About this task

Add the following components:
- Manager Service
- Kafka Broker

Procedure

1. Open a browser and access the Ambari server dashboard.
   Use the following default URL: \texttt{http://<myserver.ibm.com>:8080}
   The default user name is \texttt{admin}, and the default password is \texttt{admin}.
2. Click \texttt{Hosts} and browse to the specific host page and click the \textbf{Add} button.
3. Start all the added services.

What to do next

If you add a Kafka Broker to your new host, make sure to reassign the topic partition Leaders. Follow these steps:

1. Run the following commands to list all the available topics on your new host as follows:
   \texttt{cd /usr/iop/current/kafka-broker/bin}
   \texttt{./kafka-topics.sh --zookeeper <myserver.ibm.com>:<port> --list}

   Typically, the port number is 2182. You might see an output as follows:
Note: Select an existing Zookeeper.

2. Use the output to create your topics-to-move.json file.

3. Follow the steps as in [Reassigning Kafka topic partitions](#).
Adding ZooKeeper service to new hosts in a cluster

Expand your cluster further by adding the ZooKeeper service to the hosts in your cluster.

About this task

Because Zookeeper requires a majority, it is best to use an odd number of machines. For example, with four machines ZooKeeper can only 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.

Procedure

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 > ZooKeeper > Service Actions.
3. Select Add ZooKeeper Server and add it to the specific Ambari agent host.
4. Restart the service.

Deleting masters and slaves hosts in a cluster

Decommissioning is a process that supports removing a component from the cluster. You must decommission a master or slave before you remove the component or host from service. Decommissioning helps prevent potential loss of data or service disruption.

Related information:

Managing Hosts

Decommissioning NodeManager and DataNode components

Use this information to decommission NodeManager and or DataNode components on Ambari.

About this task

HDFS replication rule states that the number of live DataNodes must be equal or less than the replication factor. The dfs.replication is an HDFS global setting to set the replication factor that is available in hdfs-site.xml file. You can set this value on Ambari as follows:

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 > HDFS > Advanced.
3. Expand the General pane and enter a value for the Block replication.

   Note: This value must be equal or less than the number of live DataNodes in your cluster.

Procedure

1. In the Ambari web interface, click Hosts to find the host FQDN on which the component is available.
2. Select the specific host to decommission the components.
3. Click **Actions > Selected Hosts > <component_type>**.
   You can decommission NodeManagers and DataNodes.

   **Note:** Make sure that decommissioning of NodeManagers and DataNodes is completed successfully with status that is changed to “Decommissioned”. The decommissioning of DataNodes can take a long time based on the size of your DataNode.

4. Click **Decommission**.
5. Delete the decommissioned component as follows:
   a. Select the host name that is decommissioned in **Components**.
   b. Optional: Stop the component.
      A decommissioned slave component might restart in the decommissioned state.
   c. Select **Delete** from the component list.
6. Restart all services from Ambari.

**Related tasks:**

**Decommissioning the Kafka Broker component**
To remove a Kafka Broker component, first reassign the Kafka topic partition Leaders from the Kafka Broker by using the `kafka-reassign-partitions.sh` script, and then shutdown and delete the Kafka Broker component in Ambari.

**Related information:**

- How to Delete a Component
- Decommissioning Masters and Slaves

**Decommissioning the Kafka Broker component**
To remove a Kafka Broker component, first reassign the Kafka topic partition Leaders from the Kafka Broker by using the `kafka-reassign-partitions.sh` script, and then shutdown and delete the Kafka Broker component in Ambari.

**Before you begin**
Ensure that Kafka and ZooKeeper services are up and running.

**Procedure**
1. Connect to ZooKeeper Service by using the following commands:
   ```
   cd /usr/iop/current/kafka-broker/bin
   ./zookeeper-shell.sh <zookeeper_server>:<port>
   ```
   Where
   - `<zookeeper_server>` is the host name where ZooKeeper is running.
   - `<port>` is the port number where the ZooKeeper Service is running. By default, 2182.
2. In the ZooKeeper shell, list the brokers and their IDs by using the following command:
   ```
   ls /brokers/ids
   ```
3. In the ZooKeeper shell, get the specific Kafka Broker information with the help of the broker IDs by using the following commands:
   ```
   get /brokers/ids/<brokerId>
   ```
   The output looks as follows:
4. Exit the zookeeper shell, with the following command:
   ```
   quit
   ```

5. Identify the list of topics and partitions that require leadership and replicas reassignment by using the following commands:
   ```
   kafka-topics.sh --list
   ```
   The output looks as follows:

   ```
   Topic:__consumer_offsets PartitionCount:50 ReplicationFactor:1
   Configs:cleanup.policy=compact,compression.type=uncompressed
   Topic:__consumer_offsets Partition:0 Leader:1001 Replicas:1001 Isr:1001
   Topic:__consumer_offsets Partition:1 Leader:1001 Replicas:1001 Isr:1001
   Topic:ambari_kafka_service_check PartitionCount:1 ReplicationFactor:1 Configs:
   Topic:events Partition:0 Leader:1001 Replicas:1001,1002 Isr:1001,1002
   ```

   **Note:** Topic partitions that require reassignment are identified with Leader and Replicas values that are equal to the broker ID of the node that is to be decommissioned.

6. Isolate the topics for a specific broker ID that you want to delete by running the following commands:
   ```
   kafka-topics.sh --list | egrep "Leader:1004|Replicas:1004"
   ```
   You can see the following output:

   ```
   Topic:__consumer_offsets Partition:0 Leader:1004 Replicas:1004 Isr:1004
   Topic:__consumer_offsets Partition:2 Leader:1004 Replicas:1004 Isr:1004
   Topic:__consumer_offsets Partition:4 Leader:1004 Replicas:1004 Isr:1004
   Topic:events Partition:0 Leader:1001 Replicas:1001,1002 Isr:1001,1002
   ```

7. **Reassign partitions to a different Kafka Broker**

8. Stop the Kafka Broker Service and delete the component in Ambari.

9. Restart all the Network Performance Insight services and HDFS and YARN that might be consuming from the decommissioned Kafka node in the cluster.

Related tasks:
- "Decommissioning NodeManager and DataNode components" on page 6

Use this information to decommission NodeManager and or DataNode components on Ambari.

Related information:
- How to Delete a Component
Deleting hosts from a cluster

Deleting a host removes the host from the cluster.

Before you begin

Before you delete a host, complete the following tasks:

- Decommission any DataNodes, NodeManager, and Kafka Broker that are running on the host.
- Stop all components that are running on the host.
- Stop Ambari Metrics on each DataNode.
- Stop the Ambari Agent on the host.
- Move from the host any master components, such as NameNode or ResourceManager, running on the host.
- Turn Off Maintenance Mode, if necessary, for the host.

Procedure

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. In the Ambari web interface, browse to the Hosts page and select the specific host that you want to remove.
3. Click Host Actions > Delete Host.
4. Restart all services from Ambari.

Related information:

Starting and stopping services

Use this information to start and stop Network Performance Insight and its related components.

About this task

Note: If you must restart your server, stop all the services on that server. After the restart, start all the Network Performance Insight services manually.

Controlling the services from Ambari administration interface

Stop all IBM Open Platform with Apache Spark and Apache Hadoop services, by either using the Ambari administration interface or command line to start Ambari REST APIs.

Procedure

Stopping the services

- Click Actions > Stop All from the Ambari web interface.
  Then, wait for all of the services to stop.
- Optional: Follow this sequence to stop the services on Ambari web interface:
  The order in which to stop the services:
  1. Network Performance Insight
  2. MapReduce2
3. YARN
4. HDFS
5. KAFKA
6. Ambari Metrics
7. ZooKeeper

Starting the services

- Click **Actions > Start All** from the Ambari web interface.
- Optional: Follow this sequence to start the services on Ambari web interface:
  - The order in which to start the services:
    1. ZooKeeper
    2. Ambari Metrics
    3. KAFKA
    4. HDFS
    5. YARN
    6. MapReduce2
    7. Network Performance Insight

**Controlling the Ambari server and Ambari agent services**

Commands to control the Ambari server and Ambari agent services.

**Procedure**

- To start the Ambari server:
  
  service ambari-server start

- To stop the Ambari server:
  
  service ambari-server stop

- To restart the Ambari server:
  
  service ambari-server restart

- To check the Ambari server processes:
  
  ps -ef | grep Ambari

- To stop the Ambari agent by using the following command:
  
  Run this step on the specific Ambari agent server.
  
  service ambari-agent stop

- To start the Ambari agent by using the following command:
  
  Run this step on the specific Ambari agent server.
  
  service ambari-agent start

**Restarting Tivoli Network Manager Storm Spout**

The Storm Spout that is available with Tivoli Network Manager provides polling data and related metadata through Kafka.

**Procedure**

1. Go to the following directory:

   cd $NCCOREHOME/precision/bin

2. Source the environment.

   source $NCCOREHOME/env.sh

3. Restart Storm by using the following commands
Starting and stopping Apache Storm

Controlling Remote Flow Collector Service

Start and stop the Remote Flow Collector Service and its associated services by command line.

Starting the Remote Flow Collector associated services

Use these steps to start the Remote Flow Collector and its associated services.

Procedure

1. Start Zookeeper Service by using the following command:
   `sudo /usr/iop/current/zookeeper-server/bin/zkServer.sh start`
2. Start Kafka Service by using the following command:
   `sudo /usr/iop/current/kafka-broker/bin/kafka start`
3. Start the Remote Flow Collector Service by using the following command:
   `sudo systemctl start npi-remote-flow-collector`

Stopping the Remote Flow Collector associated services

Use these steps to stop the Remote Flow Collector and its associated services.

Procedure

1. Stop the Remote Flow Collector Service by using the following command:
   `sudo systemctl stop npi-remote-flow-collector`
2. Stop Kafka Service by using the following command:
   `sudo /usr/iop/current/kafka-broker/bin/kafka stop`
3. Stop Zookeeper Service by using the following command:
   `sudo /usr/iop/current/zookeeper-server/bin/zkServer.sh stop`

Checking the status of the Remote Flow Collector associated services

Use these steps to check the status of the Remote Flow Collector and its associated services.

Procedure

1. Check the status of Remote Flow Collector Service by using the following command:
   `sudo systemctl status npi-remote-flow-collector`
2. Check the status of Kafka Service by using the following command:
   `sudo /usr/iop/current/kafka-broker/bin/kafka status`
3. Stop Zookeeper Service by using the following command:
   `sudo /usr/iop/current/zookeeper-server/bin/zkServer.sh status`
Ambari Metrics System

Ambari Metrics System (AMS) is a built-in system for collecting, aggregating, and serving metrics for various services in Ambari managed clusters.

It contains two components:

**Metrics Collector**
It is the stand-alone server that collects metrics, aggregates metrics, serves metrics from the Hadoop service sinks and the **Metrics Monitor**.

**Metrics Monitor**
It is installed on each host in the cluster to collect system-level metrics and forward to the **Metrics Collector**.

**Metrics Hadoop Sinks**
Plug into the various Hadoop components sinks to send Hadoop metrics to the Metrics Collector.

**Ambari metrics for monitoring Network Performance Insight services**

The Ambari web interface home page is a dashboard of the operating status of your cluster. The dashboard contains metrics widgets that provide status information for each service in your cluster, and the status of your cluster. You can use some of these Ambari metrics to monitor Network Performance Insight services.

By default, you can see metrics for HDFS, YARN, MapReduce, and ZooKeeper in addition to cluster-wide metrics in the Ambari dashboard. You can add and remove individual widgets, and rearrange the dashboard by dragging and dropping each widget to a new location in the dashboard.

Status information appears as pie and bar charts. You can see the following metrics for Network Performance Insight services:

<table>
<thead>
<tr>
<th>Widget</th>
<th>Description</th>
<th>Metrics</th>
<th>Network Performance Insight service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cluster membership</td>
<td>Number of microservices that are in the cluster. This metric is a division of MemberCount by StartedInstance.</td>
<td>MemberCount</td>
<td>Manager</td>
</tr>
<tr>
<td></td>
<td></td>
<td>StartedInstance</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>TotalInstance</td>
<td>Manager</td>
</tr>
<tr>
<td>Total deployed instances</td>
<td>Number of Network Performance Insight microservices that are deployed in the cluster.</td>
<td>TotalInstance</td>
<td></td>
</tr>
<tr>
<td>Flow Agg-IF records read</td>
<td>Total records that are read for Flow Aggregation Interface grouper.</td>
<td>FlowAggIFRecordsRead.sum</td>
<td>Flow Analytics</td>
</tr>
<tr>
<td>Flow Analytics IP Address Count</td>
<td>Number of IP addresses that are resolved by Flow Analytics Inventory.</td>
<td>FlowInventoryIPAdressCount.sum</td>
<td>Flow Analytics</td>
</tr>
<tr>
<td>Widget</td>
<td>Description</td>
<td>Metrics</td>
<td>Network Performance Insight service</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
<td>---------------------------------------</td>
</tr>
<tr>
<td>Flow Collector disabled interface</td>
<td>Number of Interfaces that are disabled.</td>
<td>FlowCollectorDisabledInterfaceCount.max</td>
<td>Flow Collector</td>
</tr>
<tr>
<td>Flow Collector available interface</td>
<td>Number of Interfaces that are available to be added.</td>
<td>FlowCollectorAvailableInterfaceCount.min</td>
<td>Flow Collector</td>
</tr>
<tr>
<td>Flow Collector discarded raw records count</td>
<td>Total Number of RAW records that are discarded for all Flow collectors.</td>
<td>FlowCollectorFilteredRecords.sum</td>
<td>Flow Collector</td>
</tr>
<tr>
<td>Flow Collector total records written</td>
<td>Total number of RAW records that are written to Storage.</td>
<td>FlowCollectorWrittenRecords.sum</td>
<td>Flow Collector</td>
</tr>
<tr>
<td>Flow Collector total records receive</td>
<td>Sum of RAW records that are received from all Flow Collectors.</td>
<td>FlowCollectorRecordReceived.sum</td>
<td>Flow Collector</td>
</tr>
<tr>
<td>ITNM Collector NCIM Interface records received</td>
<td>Number of NCIM Network Interface records that are received from Kafka connect through Tivoli Network Manager database.</td>
<td>ITNMCollectorNCIMRecordReceived</td>
<td>Tivoli Network Manager Collector</td>
</tr>
<tr>
<td>ITNM monitored instance</td>
<td>Number of monitored instances that are received from Kafka topic and processed by Tivoli Network Manager Collector.</td>
<td>ITNMCollectorMonitoredInstances.</td>
<td>Tivoli Network Manager Collector</td>
</tr>
<tr>
<td>ITNM monitored objects</td>
<td>Number of monitored objects that are received from Kafka topic and processed by Tivoli Network Manager Collector.</td>
<td>ITNMCollectorMonitoredObjects</td>
<td>Tivoli Network Manager Collector</td>
</tr>
<tr>
<td>ITNM entity metrics records</td>
<td>Tivoli Network Manager Entity Metrics RAW records that are processed by Tivoli Network Manager Collector.</td>
<td>ITNMCollectorPollData</td>
<td>Tivoli Network Manager Collector</td>
</tr>
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<td>Tivoli Network Manager poll data Kafka topic lag offset by Collector.</td>
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</tr>
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<td>Tivoli Network Manager NCIM Interfaces that are processed by Tivoli Network Manager Collector.</td>
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<td>Tivoli Network Manager Collector</td>
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<td>Threshold events that are processed and stored by Event service.</td>
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<td>Event</td>
</tr>
<tr>
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<tr>
<td>Widget</td>
<td>Description</td>
<td>Metrics</td>
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</tr>
<tr>
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<td>DNS</td>
</tr>
<tr>
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<td>DNS</td>
</tr>
<tr>
<td>DNS Service Available Message Buffer</td>
<td>DNS Service free buffer queue to DNS server. Difference between DNSBufferMessageCapacity and DNSMessageBufferSize.</td>
<td>• DNSMessageBufferCapacity&lt;br&gt;• DNSMessageBufferSize</td>
<td>DNS</td>
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</tbody>
</table>

**Related information:**

[Ambari metrics](#)
Chapter 3. Database administration

Provides information about essential administration tasks such as backing up and restoring your performance data that is stored in a specialized, indigenously developed database in IBM Network Performance Insight.

A backup is a safeguard against unexpected data loss and application errors. If you lose the original data, then you can reconstruct it by using a backup.

**Important:** As a part of database best practices, it is recommended that you run backup operation regularly. Backup and recovery procedures protect your database against data loss and reconstruct the data, if there is a data loss.

You can use Network Performance Insight backup and restore scripts.

Network Performance Insight backup and restore

There are two modes of backup in Network Performance Insight 1.2.1.

The following are some typical scenarios of a backup activity.
- Perform an ad hoc backup before an application or services upgrade
- A periodic backup to recover from a disaster or failure scenarios
- Single node cluster backup in local directory

It is a best practice to schedule a backup process regularly. You can set up a cron job to run the backup command.

The following are the Network Performance Insight Backup Contents.
- Network Performance Insight Storage data
- Domain Objects

The following are the two types of backup modes:
- Backup - Store the Network Performance Insight Backup Contents in HDFS.
- Backup and Archive - Store the Network Performance Insight Backup Contents in HDFS and creates a tar file to a specified local directory.

**Network Performance Insight Storage data**

Network Performance Insight Storage data is located in HDFS and can be viewed by browsing HDFS [NameNode UI](/npi/work/storage) at the following HDFS directory: /npi/work/storage

**Domain Objects**

Domain object snapshots, which are maintained in Kafka are critical for managing Network Performance Insight Domain processes. Hence important to have a backup setup regularly.

The following list the Network Performance Insight Kafka topics that are backup during the procedure:
- snapshot.npi.cfg.domain_names-mgr
Backup

Create a backup of your Network Performance Insight Backup Contents to prevent data loss if there is a service outage.

Before you begin

1. Ensure that the following services are up and running:
   - ZOOKEEPER
   - KAFKA
   - HDFS
   - Network Performance Insight
   You can start the services through the Ambari Server UI.
   For more information about backup command reference see IBM Network Performance Insight: References.

   Note: Resiliency might be better achieved with a combination of a periodic backup and a multi-node setup, for example, backup on a multi-node cluster environment.

Procedure

1. Log in as root or netcool user.
2. Change to /<NPI_Home>/npi-storage directory:
   
   ```
   # cd /<NPI_Home>/npi-storage
   
   <NPI_Home> is the location where Network Performance Insight is installed.
   For example, /opt/IBM/npi.
   ```
3. Run the following command to display the usage for backup command.
   
   ```
   # ./bin/backup -help
   ```
4. Run the following command to start the Network Performance Insight backup procedure.
   
   ```
   # ./bin/backup
   ```
   The backup script runs the following tasks in the background:
   - Creates and stores Network Performance Insight backup contents in the following HDFS file system directories:
     - Network Performance Insight Storage data at /npi/work/storage/.snapshot/<BACKUP_VERSION>/*
       For example:
       /npi/work/storage/.snapshot/npi-1.2.1.0-20170518130417/
     - Domain Objects at /npi/work/dmbackup/<BACKUP_VERSION>/*.json
       For example:
       /npi/work/dmbackup/npi-1.2.1.0-20170518130417/snapshot.npi.cfg.domain_names-mgr.json

   Note: <BACKUP_VERSION> is the backup directory with the following naming format: npi-1.2.1.0-yyyyMMddHHmmss

   Note: Only the latest backup version is retained in the HDFS file system. All the older backup versions are deleted.
5. Verify the `/<NPI_Home>/npi-storage/logs/backup.log` file for any issues during the backup procedure.
   All messages during backup procedure are logged in `backup.log` file.

**Browsing HDFS file system directories**
You can access HDFS NameNode UI to view the HDFS directories by using Quick Links in the Ambari Server user interface.

**Procedure**
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. To access HDFS NameNode UI from Ambari Server UI, select Services > HDFS.
3. Click Quick Links > NameNode UI.
   The Overview page of the selected host is displayed.
4. To browse the HDFS file system in the HDFS NameNode UI, select Utilities > Browse the file system.
   The Browse Directory page is displayed.
5. Enter the directory path and click Go!

**Backup and Archive**
Create a backup of your Network Performance Insight Backup Contents to your local directory in your system to prevent data loss if there is a service outage.

**Before you begin**
1. Ensure that the following services are up and running:
   - ZOOKEEPER
   - KAFKA
   - HDFS
   - Network Performance Insight

   **Note:** Depending on the size of your Backup Contents, Backup and Archive mode might be more reasonable for a single node set up, for example a stand-alone mode of deployment.

   **Important:** Backing up content to `LOCAL_BACKUP_DIRECTORY` might take a long time to complete and large amount of disk space depending on the size of the backup contents.

**Procedure**
1. Log in as root or netcool user.
2. Change to `/<NPI_Home>/npi-storage` directory:
   `<NPI_Home>` is the location where Network Performance Insight is installed.
   For example:
   ```
   # cd /opt/IBM/npi/npi-storage
   ```
3. Run the following command to display the usage for backup command.
   ```
   # ./bin/backup -help
   ```
4. Run the backup script with `-path` option to create tar file of the backup contents to local directory by using the following command:
# ./bin/backup -path <LOCAL_BACKUP_DIRECTORY>

Note: Make sure that the netcool user has sufficient privilege to read and write the <LOCAL_BACKUP_DIRECTORY>. The directory should have sufficient disk space to contain the backup contents as well. For example:

# ./bin/backup -path /opt/IBM/npi/npi-storage/work/backup

You can specify any file path (-path) to store the backup tar file. In this example, tar file is created at /opt/IBM/npi/npi-storage/work/backup. By default, the backup script takes the following parameter.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default value</th>
</tr>
</thead>
<tbody>
<tr>
<td>-tool</td>
<td>&lt;NPI_Home&gt;/npi-storage/bin/backup-tool</td>
</tr>
</tbody>
</table>

Note: The backup script uses the default backup-tool script that is available in the Network Performance Insight package.

The backup script runs the following tasks in the background:

- Creates and stores Network Performance Insight backup contents in the following HDFS file system directories:
  - Network Performance Insight Storage data at /npi/work/storage/.snapshot/<BACKUP_VERSION>/*
    For example:
    /npi/work/storage/.snapshot/npi-1.2.1.0-20170518130417/
  - Domain Objects at /npi/work/dmbackup/<BACKUP_VERSION>/*.json
    For example:
    /npi/work/dmbackup/npi-1.2.1.0-20170518130417/snapshot.npi.cfg.thresholds-mgr.json

Note: <BACKUP_VERSION> is the backup directory with the following naming format: npi-1.2.1.0-yyyyMMddHHmmss

Creates a copy of Network Performance Insight Backup Contents in a tar file within the specified backup path directory (<LOCAL_BACKUP_DIRECTORY>). For example, the backup contents that are created in /opt/IBM/npi/npi-storage/work/backup:

```
# cd /opt/IBM/npi/npi-storage/work/backup
# ls -lrt
total 228236
-rw-r--r-- 1 netcool hadoop 75581440 Jul 28 17:21 npi-1.2.1.0-20170518130417.tar
```

5. Optional: Run the backup script with -tool option, to override the default backup-tool script, by using the following command:

```
# cd <NPI_Home>/npi-storage
# ./bin/backup -path <LOCAL_BACKUP_DIRECTORY> -tool <Customised_script>
```

Where, the Customised_script is the full path of the script.
The Customised_script takes the following parameter from the backup script:

a. <LOCAL_BACKUP_DIRECTORY> specified with -path.
b. The backup version name (<BACKUP_VERSION>), for example npi-1.2.1.0-20170518130417.
Note: It depends entirely on the user on how they want to customize their backup-tool script.

6. Verify the /<NPI_Home>/npi-storage/logs/backup.log file for any issues during the backup procedure.
   All messages during backup procedure are logged in backup.log file.

**Restoring Backup data**

You can restore the Network Performance Insight Backup Contents to a previous state by using the restore option. A backup image of the Backup Contents, which is generated with the Backup procedure, must exist before you can use this script. The Network Performance Insight service state is restored to the same state as the backup copy.

**Before you begin**

1. Ensure that the Network Performance Insight service is down.
2. Ensure that the HDFS, Kafka, and ZooKeeper services are running.

You can stop Network Performance Insight services through Ambari Server UI.

**About this task**

Explains how to restore Network Performance Insight service to a previous state.

For more information about restore command reference see IBM Network Performance Insight: References.

**Procedure**

1. Log in as root or netcool user.
2. Change to the <NPI_Home>/npi-storage directory:
   
   ```
   # cd <NPI_Home>/npi-storage
   ```
3. Run the following command to display the usage for restore command.
   
   ```
   # ./bin/restore -help
   ```
4. Run the following command to restore:
   
   ```
   # ./bin/restore
   ```
   After the restore procedure successfully completes, the Network Performance Insight Backup Contents is copied into the respective HDFS directories.
5. Start the Network Performance Insight process by using the Ambari Server UI. Ensure that process starts without any errors and your Network Performance Insight system works as expected.
6. Verify the /<NPI_Home>/npi-storage/logs/restore.log file for any issues during the restore procedure.
   All messages during restore procedure are logged in restore.log file.
   a. If the restore procedure fails, the script tries to revert the restore procedure.
      The following message is seen in the log when restore procedure fails and the revert restore is triggered.
      GYMSB10210E: Begin revert Restore
   b. You should seek technical support help for the following cases:
      1) You are unable to resolve issues that are highlighted in the log where you cannot proceed with a restore rerun.
      2) If there are issues with starting the Network Performance Insight processes.
3) You see the following message, which indicates the revert restore failed:
   GYSB1021E: Failed to revert restore. error: <error stack trace>

4) You see the following message, which indicates that the cleanup of Domain Object Kafka topics failed:
   GYSB1026E: Failed to clean Domain Object Kafka Topics, cause: Topics: <Failure Details>

The <Failure Details> message differs according to the issue.
   For example:
   GYSB1026E: failed to clean Domain Object Kafka Topics, cause: Topics: ${topic} exists after delete

**Restoring Backup and Archive data**

Explains how to restore the Network Performance Insight service to a previous state by using the Backup Contents tar file, which is created with the Backup and Archive procedure.

**Before you begin**

1. Ensure that the Network Performance Insight service is down.
2. Ensure that the HDFS, Kafka, and ZooKeeper services are running.

**Restriction:**

You cannot perform a Restoring Backup procedure immediately after performing a Restoring Backup and Archive procedure.

It can only be done after a Backup procedure is run after the restore Backup and Archive procedure.

To summarize, you need to follow the following sequence:

1. Run the **Restoring Backup and Archive** data procedure.
2. Run the **Backup** procedure.
3. Run the **Restoring Backup** data procedure.

**Procedure**

1. Log in as root or netcool user.
2. Change to the `<NPI_Home>/npi-storage` directory:

   ```
   # cd <NPI_Home>/npi-storage
   ```

3. Run the following command to display the usage for restore command.

   ```
   # ./bin/restore -help
   ```

4. To restore from a local backup file, run the following command:

   ```
   # ./bin/restore -localBackup <LOCAL_BACKUP_TAR_FILE>
   ```

   **Note:** You need to specify the full path of the backup tar file `<LOCAL_BACKUP_TAR_FILE>`.
   For example:

   ```
   # ./bin/restore -localBackup /opt/IBM/npi/npi-storage/workbackup/npi-1.2.1.0-20170518130417.tar
   ```

   After the restore procedure successfully completes, the Network Performance Insight storage backup tar file is extracted and copied into the respective HDFS directories.

5. Start the Network Performance Insight process by using the Ambari Server UI.
   Ensure that process starts without any errors and your Network Performance Insight system works as expected.
6. Verify the `/<NPI_Home>/npi-storage/logs/restore.log` file for any issues during the restore procedure.
   All messages during restore procedure are logged in `restore.log` file.
   a. If the restore procedure fails, the script tries to revert the restore procedure. The following message is seen in the log when restore procedure fails and the revert restore is triggered.
      **GYMSB1020E**: Begin revert Restore
   b. You should seek technical support help for the following cases:
      1) You are unable to resolve issues that are highlighted in the log where you cannot proceed with a restore rerun.
      2) If there are issues with starting the Network Performance Insight processes.
      3) You see the following message, which indicates the revert restore failed:
         **GYMSB1021E**: Failed to revert restore. error: `<error stack trace>`
      4) You see the following message, which indicates that the cleanup of Domain Object Kafka topics failed:
         **GYMSB1026E**: Failed to clean Domain Object Kafka Topics, cause: Topics: `<Failure Details>`

   The `<Failure Details>` message differs according to the issue.
   For example:
   **GYMSB1026E**: Failed to clean Domain Object Kafka Topics, cause: Topics: `${topic} exists after delete`
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