Nimsoft Service Level Manager

Nimsoft Documentation

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Content

Updating this documentation

The documentation system is a set of HTML-files compiled into a single *.chm* file. You can easily update this documentation by downloading a copy from the support Web here.

1. Make sure **no** On-line help is active, including this one.
2. Copy the downloaded file to the ...\Nimsoft\docs directory.

NOTE:

With security update 896358 or Microsoft Windows Server 2003 Service Pack 1 (SP1) installed, you may experience one or both of the following symptoms after you click a link to an HTML Help .chm file in Internet Explorer:

- Topics in the .chm file cannot be viewed when you click **Open** instead of **Save** in the **File Download** dialog box.
- Topics in the .chm file cannot be viewed when you click **Save** in the **File Download** dialog box, and you then try to open the file.

See http://support.microsoft.com/kb/902225/#kb2 for a description of how to solve this problem.

Document History

Date/version	What's new?
Version 3.60	• Added support for Hub with LDAP authentication. • The possibility to create monitoring profiles that are based on QoS data, provided that the qos_engine probe is installed.
Version 4.0	Updated for NimBUS Server 4.0 Release
Version 4.1	Updated for NimBUS Server 4.1 Release
Version 4.2	Changed "NimBUS" to "Nimsoft"
	Updated for Nimsoft Server 4.2 Release
Version 4.3	Corrected faulty links and text errors in the document
Version 5.0	Updated for logical expressions

SLM Overview

This chapter describes the different components and elements involved in Service Level Management.

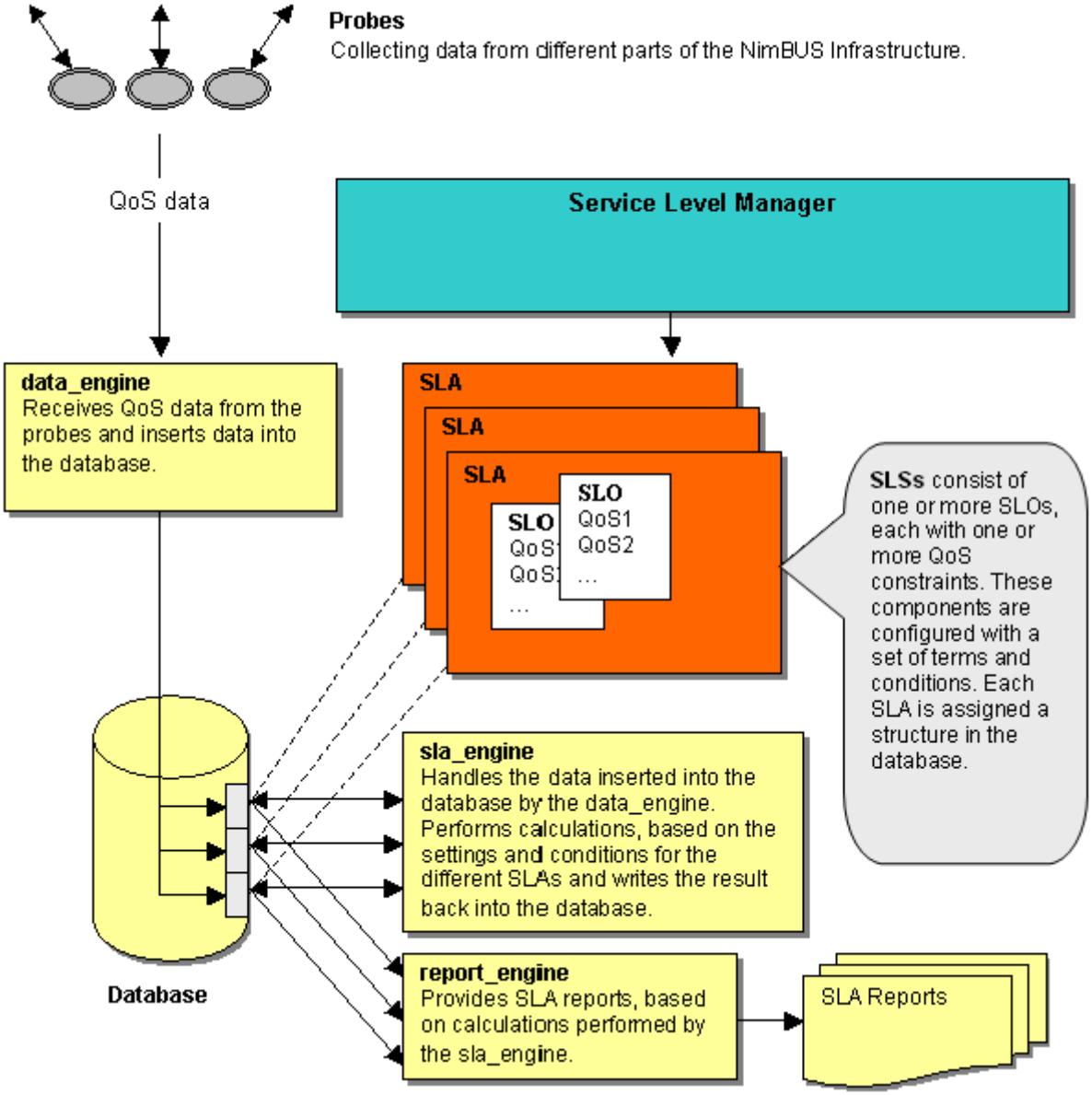
What is Service Level Management?

Service-level management is the set of people and systems that allows the organization to ensure that SLAs are being met and that the necessary resources are being provided efficiently.

A service level agreement (SLA) is an agreement between a client and a provider of the service. It is vital to the contract and the relationship between the client and the service provider that both parties *identify* and document their service *needs*.

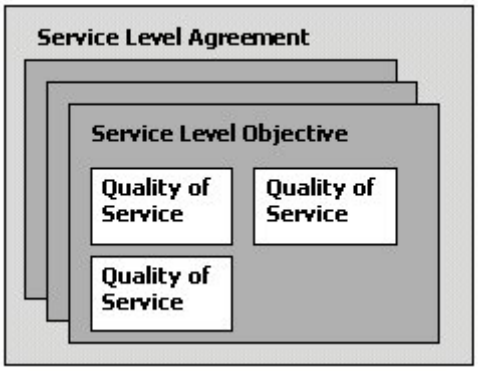
In short, Service Level Management embraces a set of tools to monitor and ensure the validity of a set of SLAs for internal customers (e.g. an IT-department providing services for a user-department) and external customers. We like to visualize the Service Level Management task as the following hierarchy:

- Service Level Management (SLM)
    - Service Level Agreement (SLA)
        - Service Level Objective (SLO)
            - Quality of Service (QoS)


Probes
Collecting data from different parts of the NimBUS Infrastructure.
QoS data
Service Level Manager
data_engine
Receives QoS data from the probes and inserts data into the database.
SLA
SLA
SLA
SLO
QoS1
QoS2
...
SLO
QoS
QoS
...
SLSs consist of one or more SLOs, each with one or more QoS constraints. These components are configured with a set of terms and conditions. Each SLA is assigned a structure in the database.
sla_engine
Handles the data inserted into the database by the data_engine. Performs calculations, based on the settings and conditions for the different SLAs and writes the result back into the database.
Database
report_engine
Provides SLA reports, based on calculations performed by the sla_engine.
SLA Reports

SLM Concept

This overview explains the various components of Service Level Management (SLM). Our design principle is to break down the Service Level Agreement (SLA) into smaller components, making it simple to build powerful, extendable and measurable agreements between you and your clients.

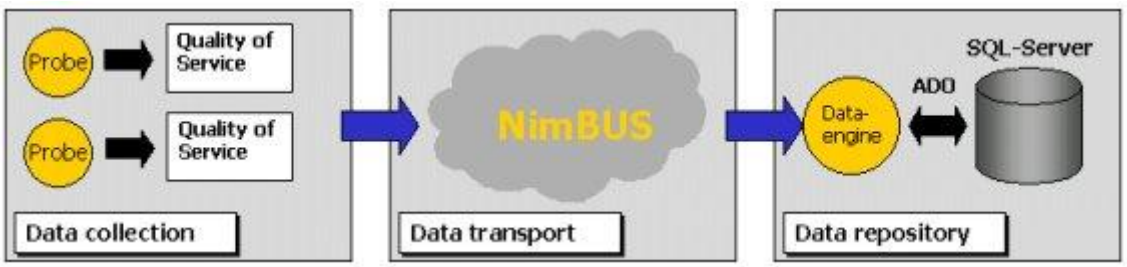


The illustration shows the various components that may be contained within a Service Level Agreement. This SLA contains 3 service level objectives (SLO) that contain one or more constrained Quality of Service (QoS) objects. The QoS is the smallest measurable entity within the SLM, typically a checkpoint value (e.g. CPU usage, Network usage) provided by a Probe capable of sending QoS.

The SLM product is, as stated above, built on the concept of modules. This eliminates the needs to install one big lump of program on your system. The Nimsoft architecture is highly modularised, thus spreading the workload across multiple nodes in your network. Some probes may monitor and report network traffic on one system, while another reports URL response etc.

To build a successful SLM environment we need to understand the areas of:

- Data collection
- Data transport
- Data repository



Data Collection

Data collection is normally performed by task-oriented software (*probes*) dedicated to monitor and report changes and threshold breaches. A QoS enabled probe, such as the *cdm* (the CPU, Disk and Memory monitoring probe) will generate a Quality of Service message each time it checks its objective, hence giving us the opportunity to gather the collected data and perform various processing techniques on the data.

You may browse the QoS data-series in the Service Level Manager and utilize the same data in your Service Level Objectives.

NOTE:
When computers hosting QoS enabled probes are renamed or when moving the monitoring from one machine to another or renaming a machine, the QoS objects will be stored in new tables in the QoS database. To keep your existing data you can merge the existing data with the new data, giving you one table with the full data series (see description of merging QoS objects in the section *The Active Objects Tab*).

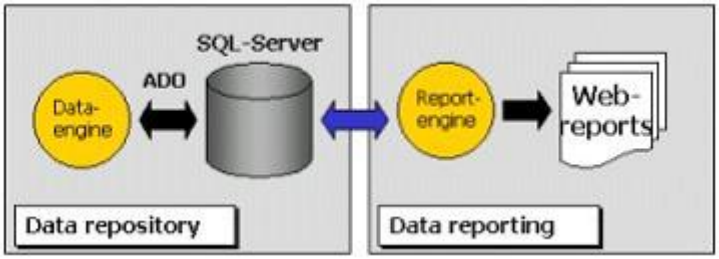
Data Transport

The underlying infrastructure of the transport mechanism is the message-bus. This message-bus is based on a high-availability architecture in a multi-platform environment.

Data Repository

One of the key elements of the SLM is the Data Engine; this "engine" subscribes to QoS messages and processes the messages into the database. Currently we support Microsoft SQL Server, over the ActiveX Data Objects (ADO) layer. The Data Engine will timely process the recorded QoS data into the Service Level Objectives and Service Level Agreements according to its configurations.

The optional *Report Engine* works on the same database tables as the *Data Engine* and produces HTML reports.

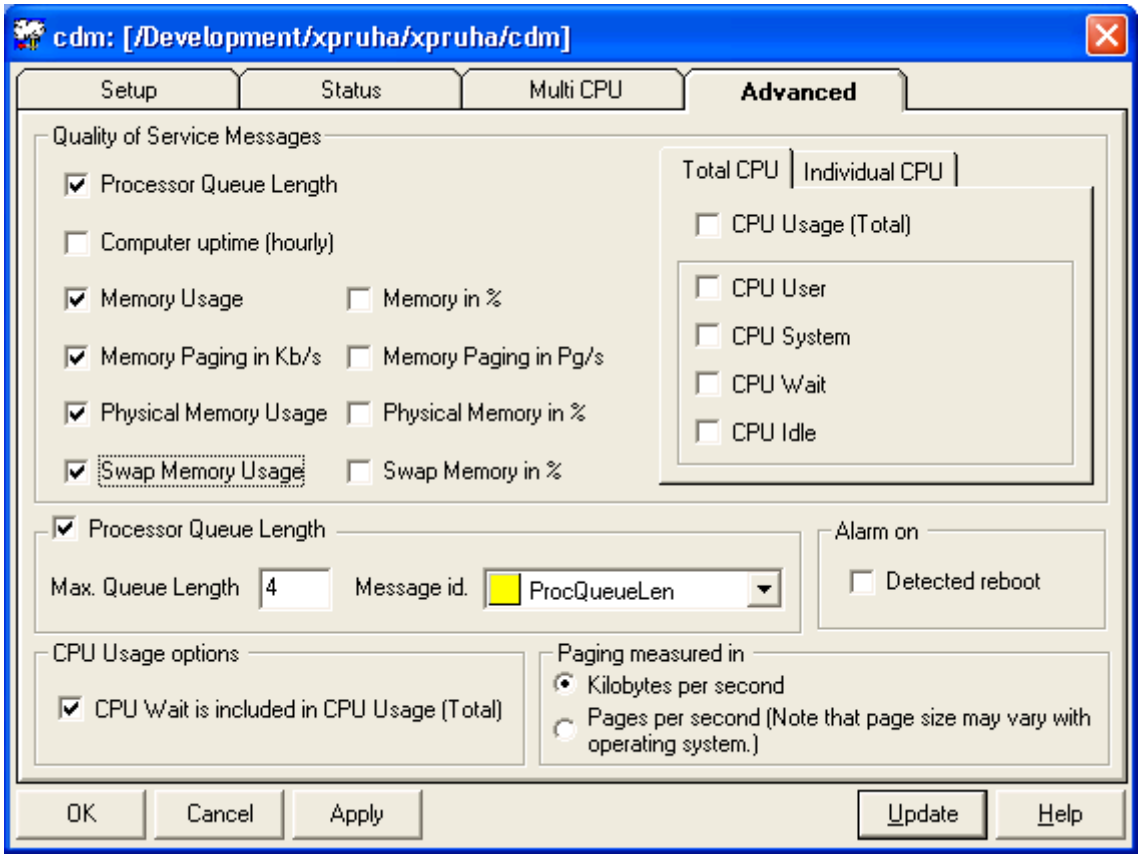


Setting up a Probe to Deliver Quality of Service Data

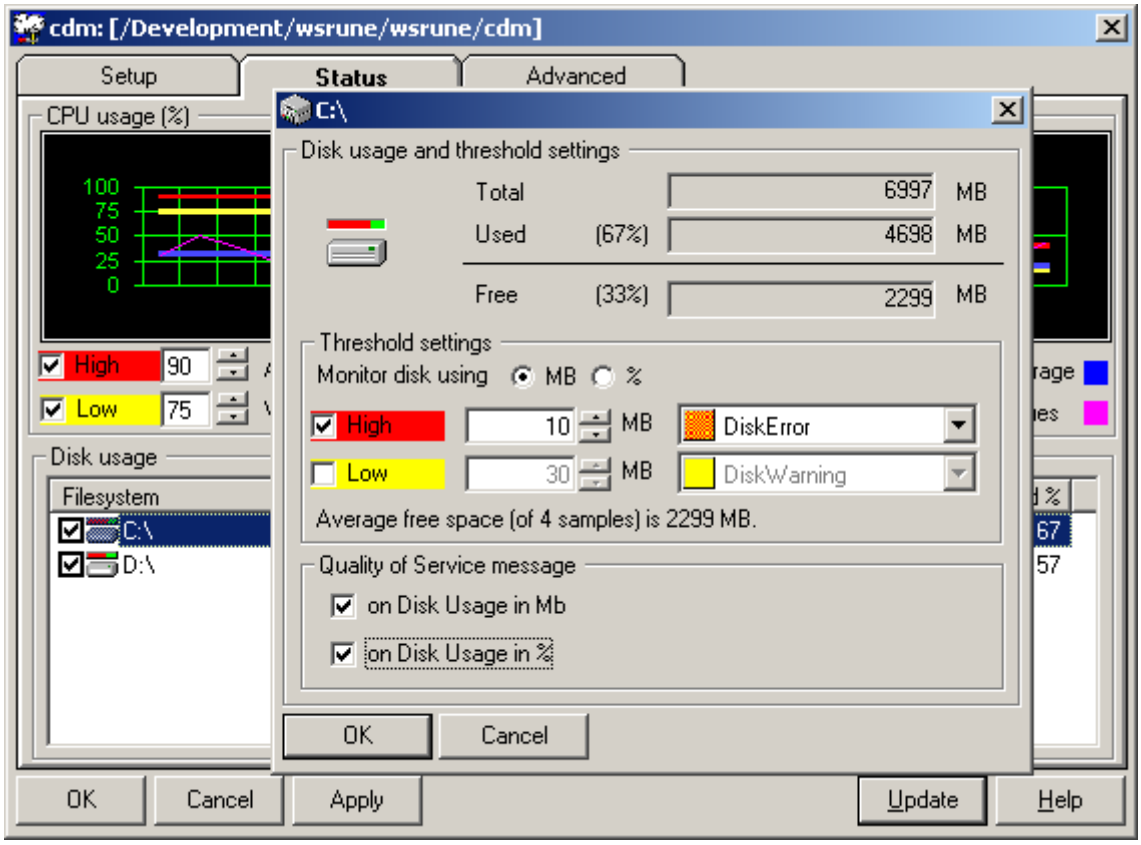
Let's configure a probe to generate QoS data while monitoring your system. In this example, we use the *cdm* probe.

Launch the property window of the *cdm* probe of your choice (assuming that you have Nimsoft administrative rights) from the Infrastructure Manager.

The *cdm* probe supports QoS for each **disk**, **CPU, Memory, Paging activity** and **Processor Queue length**. All QoS definitions, except for the disk properties, are located under the *advanced* tab. Check the ones you are interested in.



The QoS definitions for the disk properties are located under the *Status* tab. Double-click the disk you are interested in and check the Disk Usage QoS Message (in Mb and/or %) option in the dialog popping up.



Reply *Yes* when prompted for a restart.

The probe will initially send a QOS_DEFINITION message to the data_engine causing the SLM system to recognize the new QoS Object.

Please note that this procedure differs from probe to probe.

Troubleshooting

1. The probe has been configured, but no QoS object is recorded in SLM.

   This situation could easily occur if you configured the probe to deliver QoS prior to installing the data_engine. The QOS_DEFINITION message was then ignored, hence not defining the QoS object.

   Solution
   Restart the probe (deactivate/activate) or restart the robot (this is probably the best idea if you have modified the configuration for more than one probe).

2. I've restarted the probe/robot but still no QoS object is present under the QoS nodes.

   Solution
   There is probably only some delay in the system, wait a few

seconds/minutes and select *update* from the action (popup) menu.

SLM Database structure

The tables in the SLM database all have prefixes indicating the type of data it contains.

The name convention for the tables is on the form:

- **S_** for tables used to store system data.
- **D_** for data tables.
- **H_** for tables containing historic data.
- **HN_** for data tables containing historic/compressed data.
- **RN_** for data tables containing unprocessed (raw) data directly from the probes.

Tips:

If you want to take a look at the SLA database schema, you can do that by opening the SQL Server Enterprise Manager and select the SLA database node.

This node has a child called *Diagrams*. Select that child and right-click on it.

Select *New Database Diagram*. The *Create Database Diagram Wizard* is started. Follow the instructions in the wizard and select all the tables starting with S_ and D_.

Finishing the wizard will give you the complete database schema for SLA

QoS data tables

The QoS data structure is dynamically created by the ***data_engine*** on the first start-up, and on the first unique *QOS_DEFINITION* or *QOS_MESSAGE* message received from a probe.

The **S_QOS_DEFINITION** table contains the definitions of known QoS types (e.g. QOS_CPU_USAGE), and is updated when a probe sends a *QOS_DEFINITION* describing a new QoS type.

The **S_QOS_DATA** table contains an index of all data tables for the QoS objects. When a probe sends a *QOS_MESSAGE* containing a QoS object that is not already defined in the S_QOS_TABLE, a new entry is added to the table and the data is inserted into the table referenced in column **r_table** (typically RN_QOS_DATA_nnnn) with the table_id that

the new row is given when inserted into the S_QOS_DATA table.

Note!
Do not drop the data tables manually; instead delete the entry from the **S_QOS_DATA** table, and the tables will be dropped by a trigger. You must restart the ***data_engine*** afterwards.

SLA configuration tables

The Service Level Manager is used to describe the SLAs and the descriptions are stored in the following key tables:

- S_SLA_DEFINITION
- S_SLO_DEFINITION
- S_QOS_CONSTRAINTS

There are also other tables, containing data about *exclude periods*, *operating periods*, *FTP profiles* and so on. Here is a list of some of these tables.

- S_SLA_EXCLUDE_PERIOD, S_SLO_EXCLUDE_PERIODS
- S_SLA_NOTES, S_SLO_NOTES
- S_SLA_CALCULATION S_SLO_CALCULATION S_QOS_CALCULATION
- S_OPERATING_PERIOD S_TIME_SPECIFICATION

SLA calculation tables

The first step for a SLA to be calculated is that a job is added to the **D_SLA_JOBS** table manually by a user or automatically by the ***sla_engine***. The ***sla_engine*** detects that there is a new calculation job and performs the calculations. The results are stored in these tables:

- D_SLA_COMPLIANCE
- D_SLO_COMPLIANCE
- D_QOS_COMPLIANCE

When the last job for a SLA in the compliance period is calculated, the result will be added to the historic tables:

- H_SLA_COMPLIANCE
- H_SLO_COMPLIANCE
- H_QOS_COMPLIANCE

Account tables

The following tables were added to the database in Nimsoft Release 3.30 to support the Account views and data ownership functionality.

- Accounts Table (CM_ACCOUNT)
- Contacts Table (CM_CONTACT)
- Account-SLA reference Table (CM_ACCOUNT_SLA)
- Account Web Profile Table (CM_ACCOUNT_WEB_PROFILES)
- Origins Table (CM_ACCOUNT_OWNERSHIP)
- Roles Table (CM_ROLE)

SLA Engine

An Overview

The primary task of the SLA Engine is to compute Service Level Agreement compliance for the SLAs, based on the settings for the different SLAs done in the Service Level Manager.

Calculation jobs are automatically started and run on a schedule specified in the sla_engine user interface.

For more details, please refer to **SLM Probes → sla_engine → sla_engine Configuration** section in the Probes online help.

However, calculation jobs may also be started manually (see *Watching SLA Calculations*).

The result of these calculation jobs is sent to the report_engine, which generates SLA reports.

These reports are available under the WEB Reports node in the Navigation Pane of the Service Level Manager.

The reports generated by the *report_engine* may be also be published to other systems by the use of the File Transfer Protocol (see the sections *FTP Profiles* and *Creating a FTP Profile).*

Data Engine

The Data Engine has two primary focus areas:

- Subscribes to Quality of Service messages.
- Inserts QoS data into the database.

The *Data Engine* should ideally be installed as close to the database server as possible, preferably on the same server to reduce the network traffic. A subscriber channel is opened to the primary *Hub*, and this hub will be referred to as the SLM Hub. QoS messages are fed to the *Data Engine* using this channel. The incoming messages will be reacted upon, and database operations will be performed accordingly.

Quality of Service Messages

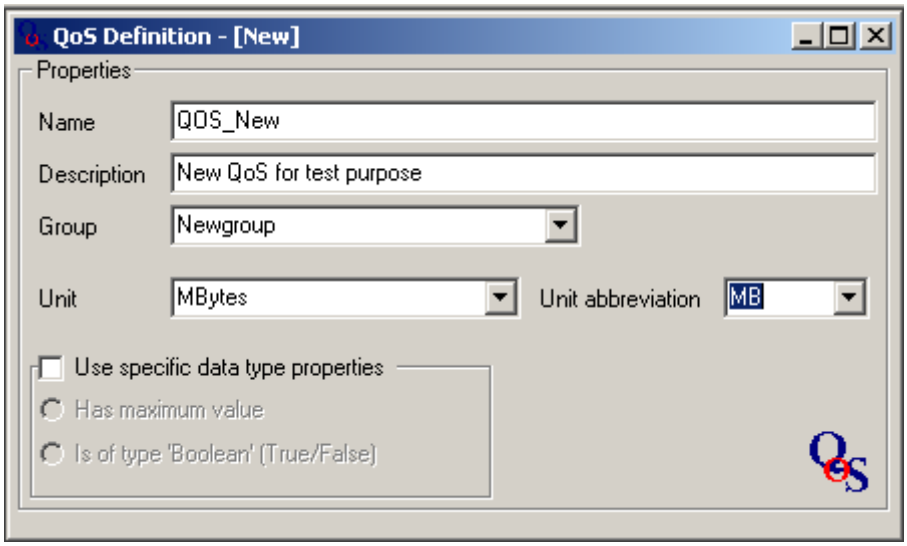
Please note that the Quality of Service requires a valid license (SLM-QOS) in the *Data Engine.*

For more details, please refer to **SLM Probes → data_engine → data_engine Configuration** section in the Probes online help.

Defining the Quality of Service Object

Any QoS enabled probe will initiate itself (during startup) by sending a *QOS_DEFINITION* message. This is picked up by the *Data Engine* and decoded for information. The content of this message refers to a Quality of Service object in the database. The object will **automatically** be created in the database with the provided information. You may, however, also create the QOS object **manually**, by adding the definition using the Service Level Manager.

This is done by selecting *File* > *New* > *Quality of Service* in the menu bar.



The following table describes the various fields in the dialog form:

Field	Description
Name	The actual object name.
Description	A short description of the QoS object.
Group	The group the object belongs to (drop-down list).
Unit	A string stating the unit (e.g. Milliseconds, Centimeter, etc.).
Unit abbreviation	Used by reports and views (e.g. ms, cm, % etc).
Has maximum value	Defines the object with a maximum value.
Is of type Boolean	Sets the type of the object to be Boolean (True/False).

Populating the Quality of Service Tables

The QoS enabled probe will issue a *QOS_MESSAGE* on each run. This message refers to an object that should be defined in the database and contains sample data (such as time, value, source, target, etc.)

You can display the database usage (which objects that occupies most space) by selecting **Tools/Database status** on the Service Level Manager menu-bar.

Report Engine

The Report Engine has the following primary focus areas:

- Generating SLA reports based on the computations done by the *data_engine*.
- Generating Quality of Service related graphs and reports.
- Optionally Generating Dynamic reports, grouped as defined in the Nimsoft Group Server probe.
- Running a lightweight web server for QoS and SLA reports.
- Performing file transfer (FTP) services to publish the reports to e.g. inter/intranet web servers.
- Possibilities to customize the reports by modifying templates.

For more details, please refer to **SLM Probes → report_engine → report_engine Configuration** section in the Probes online help.

Generating SLA Reports Based on the Computations done by the data_engine.

SLA reports are automatically generated on a schedule defined in the *sla_engine* user interface. Different templates define fonts, colors, etc. These templates can be selected from the *report_engine* configuration tool.

The *data_engine* will regularly compute the fulfillment of the compliance percentage. The reports contain a status view and a historic view for each SLA definition. The structure of the data representation is similar to how things are presented from the *Service Level Manager*. See also the section *SLA Reports*.

Generating QoS Related Graphs and Reports.

Opposite to the SLA reports, QoS reports are not automatically generated. You can create and administer the QoS reports by configuring the *report_engine* probe. Double-click the *Quality of Service Reports* node in the

Navigation Pane to launch the *report_engine* configuration tool.

Under the QoS Reports node in the Navigation Pane, you will also find the Dynamic Reports child-node, containing Dynamic Reports if the *Dynamic Reports* option is ticked.

See also the section *QoS Reports*.

Running a Light-weight Web Server

The *report_engine* runs a small web service (httpd) to serve the report browser in the *Service Level Manager* and other browsers. Please note that this web server is designed to handle up to 20 concurrent users. Use the web-publishing features of *SLM* if you want to make the reports available to larger communities. The web-server defaults to port tcp/8080.

Performing File Transfer Services to Publish the QoS/SLA Reports

All reports generated by the *report_engine* may be published to other systems by the use of the File Transfer Protocol (FTP). Profiles defined in the *Service Level Manager* contain enough information to move the reports and images across the network to a remote location.

How to Customize your SLA Reports

SLA reports are generated using a template architecture. If you want to incorporate the QoS and SLA reports in your own look-and-feel, company colors, etc. then simply modify the template and regenerate.

All reports are based on a report template found in the *report_engine* directory *Templates*. The templates use Cascading Style Sheets (CSS) to implement the style. More information about CSS is found at http://www.w3.org/Style/CSS/.

You may modify the template, or create a new one, using any HTML editor (such as Microsoft FrontPage) to fit your specific needs (layout, logo, language, etc.)

Follow these steps to create your own custom report:

1. Copy one of the existing template directories (located in the Templates directory, e.g. the *Default* directory) to a new directory (e.g. called *Classic*).

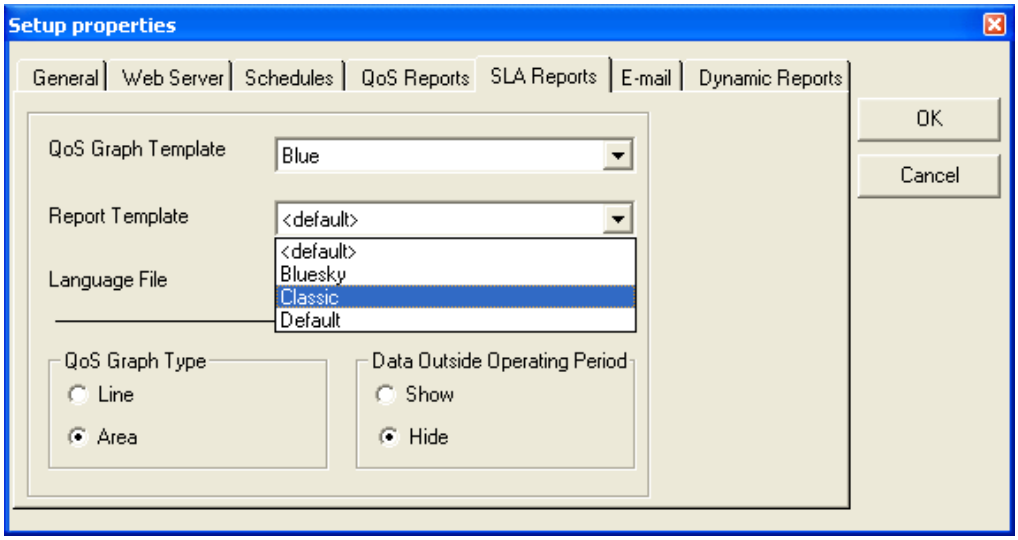
2. Open and modify the **slm.css** file in the new directory to your style by modifying background color, fonts, etc.
3. Change the colors of the images:

   - nav_left_edge.gif

   - nav_right_edge.gif

   - nav_top_history.gif

   - nav_top_status.gif
4. Save the file and launch the report_engine configuration tool.
5. The template *Classic* will now be available in the report_engine.



6. Select the template and click the Apply button in the report_engine configuration tool.

If you want to do some smaller changes to one of the reports, you could create a file called **custom.css** and put it into your report directory. The style changes found in this file will override the values set in **slm.css**.

Adding the Report to Existing Web Frames

There is another way to "customize" the looks of the reports, besides from using CSS. Simply replace the **default.html** file in the template directory.

The following three HTML pages represents the report:

- default.html - is part of the template.
- slm_header.html - is part of the template.
- index.html - is generated by the *report_engine.*

The **default.html** page has two frames that refer the two other pages (**slm_header.html** and i**ndex.html**). You can change the look of your report by replacing the **default.html** page in the template with your own **default.html** file, but you must remember to include the **index.html** file in one of the frames.

The Service Level Manager Application

Service level monitoring is mostly an automated task. When the SLA is defined and activated, data is recorded and computed in the background. Alarms will be generated and the *Data Engine* and the *Report Engine* will write reports automatically.

The Service Level Manager enables the administrator to quickly define and deploy SLAs based on objectives present in the agreements between the client and the service-provider. It interfaces the database using ADO, to display and modify the configuration, to display historic data, current data etc.

You will find this application in the **Start/Nimsoft Software** folder.

Compliance Calculation

Introduction

The primary task of the Nimsoft SLA Engine is to compute Service Level Agreement compliance for the SLAs, based on the settings for the different SLAs done in the Service Level Manager.

Calculation jobs are automatically started and run on a schedule specified in the *sla_engine* user interface.

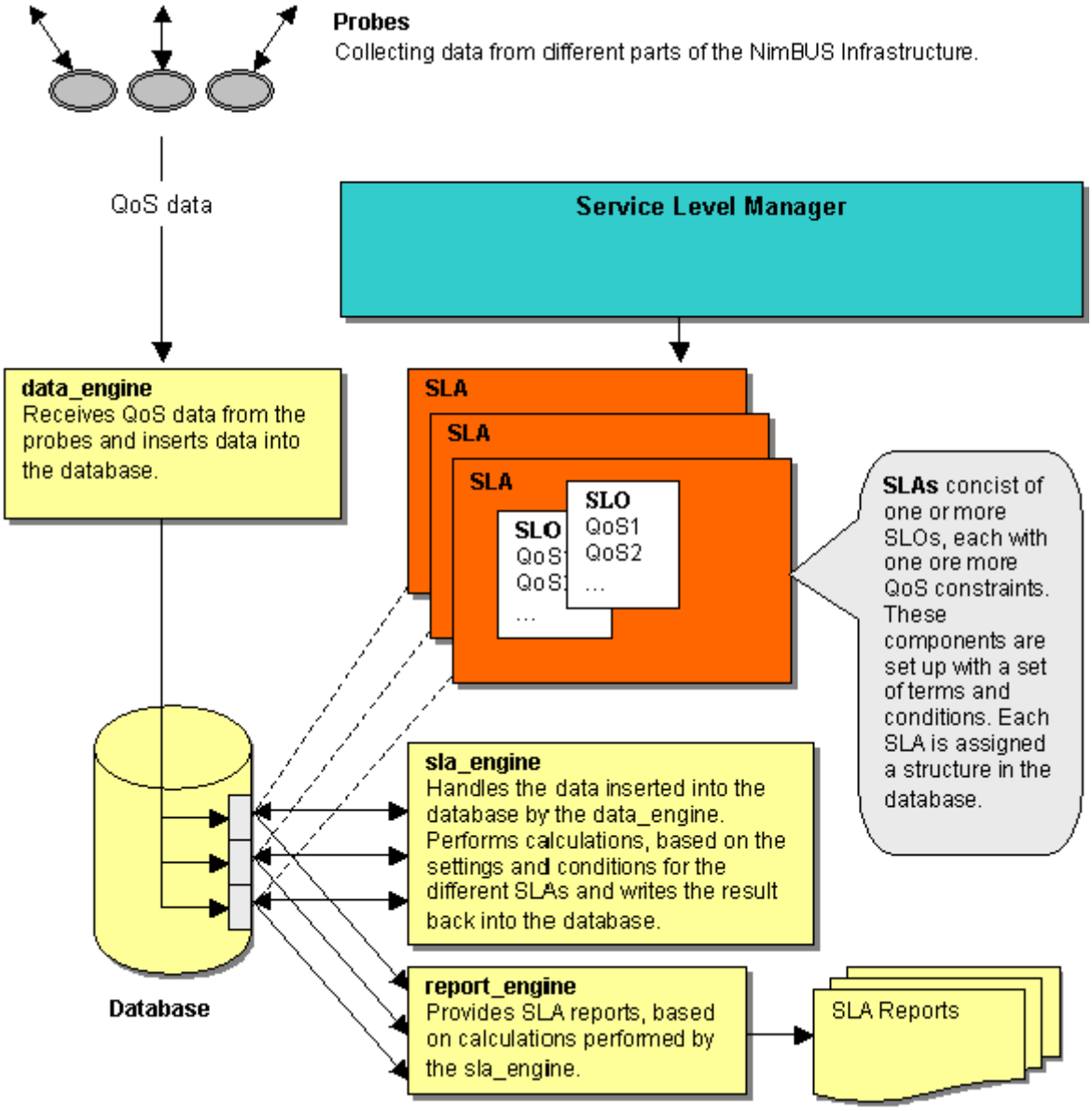
For more details, please refer to **SLM Probes → sla_engine → sla_engine Configuration** section in the Probes online help.

However, calculation jobs may also be started manually (see *Watching SLA Calculations*).

The result of these calculation jobs is sent to the report_engine, which generates SLA reports.

These reports are available under the WEB Reports node in the Navigation Pane of the Service Level Manager.

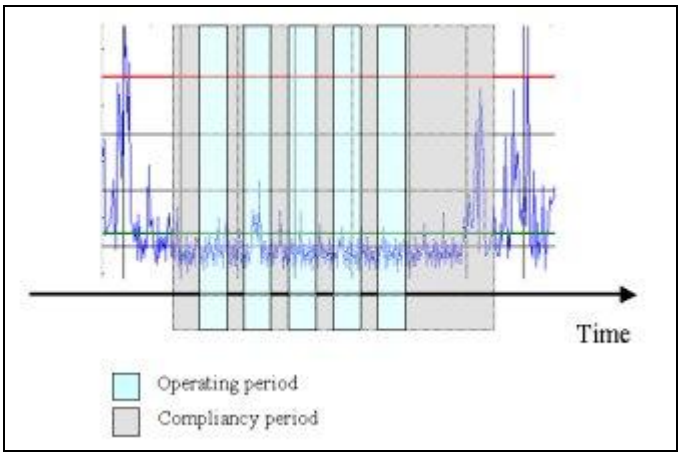
The reports generated by the *report_engine* may be also be published to other systems by the use of the File Transfer Protocol (see the sections *FTP Profiles* and *Creating a FTP Profile).*



Definition of Compliance Percentage

The compliance percentage is defined to be the percentage of time that the QoS, constrained by e.g. operating period and thresholds, should be considered compliant within the compliance period.

Each sample is checked within the compliance period by the *data_engine* and summarized as **failed** or **successful**. The result is compared against the expected compliance percentage (defined by the user).



Consider the data represented by the illustration. The **red** line represents the threshold value, the **green** line represents the average value and the **blue** line represents the actual sample values.

How many samples within the operating period are above the threshold settings?

Zero samples breach the threshold line within the operating periods, thus fulfilling 100% of our compliance requirements. The 5 samples that breach the threshold are outside the compliance period, which was e.g. Monday to Monday, with operating periods, every weekday from 08:00 to 17:00.

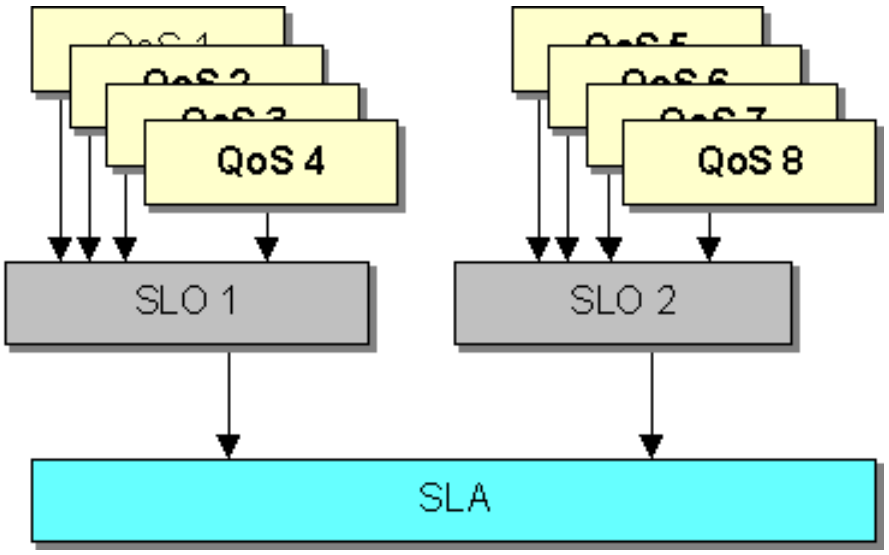
Let's assume that the total number of samples within the operating period is 129, with 9 samples breaching the threshold. This implies that 6.98% of the samples are accounted for as **out of compliance** (9 * 100/129).

If our Service Level Agreement requires a compliance of 98.50% (or better) and the only data defined in this SLA is the above data, then our requirements to the SLA is **breached** due to a current compliance percentage of 100% - 6.98% = 93.02%.

Defining the Calculation Terms and Conditions

A SLA consists of one or more SLOs, each with one or more QoS constraints.

- The compliance is calculated on each QoS and forwarded to the SLO.
- The SLO handles the received compliance data from the underlying QoS's, makes its calculations and forwards the result to the SLA.
- The SLA handles the received compliance data from the underlying SLOs and calculates the total compliance percentage.



QoS Constraints
Each of the QoS constraints compares the collected data values from the probes with the defined threshold value and calculates the compliance percentage.

⇒

SLOs
The SLO collects the compliance values from the QoS constraints and computes the compliance percentage based on a selected calculation method (selects the best value, the worst value, the average value etc.). The result is made available for the SLA.

⇒

SLA
The SLA collects the compliance value from the two SLOs and calculates the total compliance value, also based on a selected calculation method.

Calculation Terms and Conditions for the QoS

The QoS reflects the data series measured by the probes. The compliance percentage is calculated for each QoS, and the results are presented to the SLO.
The compliance percentage for a QoS is calculated, based on the following parameter settings:

- **Threshold value**
  You define a threshold value for each QoS, against which each sample in the data series received from the probe is compared.
  972 sample values of 1000 equal to, or better than the specified threshold value, means 97.2 % compliance for that QoS.
- **Operating period**
  Defines in which time period the compliance percentage should be measured (e.g. Monday to Friday from 08:00 – 17:00). Data series outside this period does not influence the compliance percentage.
- **Calculation method**
  Here you can select between different *calculation methods*, determining the way the compliance percentage is calculated for the QoS:

  Default
  Calculation based on all received samples in the operating period. Missing samples are excluded.

  or

  A set of configurable custom defined formulas The following formulas are currently available:

  - Average of all samples.
  - Number of samples that meets the constraints.
  - The median value of all samples.

Calculation Terms and Conditions for the SLO

The SLO receives the compliance calculations from the associated QoS's. The compliance percentage is calculated on each SLO, and the result is presented to the SLA.
The compliance percentage on the SLO is calculated, based on three different parameters:

- **Excluded period**
  You can specify time periods, which will not count when the compliance is calculated for the SLO. This may e.g. be periods when the monitored system is planned to be shut down due to maintenance etc.
  Note that the compliance data received from the QoS's within this excluded period will not count when the compliance is calculated.
- **Calculation method**
  Here you can select between different

calculation methods determining the way the compliance percentage is calculated for the SLO.

You may select between two different types of calculation methods, *Formula* or *Profile*:

- **Formula**

  Here you can select a mathematical formula to calculate the compliance percentage, based on the input from the QoS's:

  Average
  Calculates the average value of the input from the QoS's.

  Best
  Looks for the QoS with the best result and selects this result.

  Sequential
  The difference between 100 % and the achieved compliance for each QoS is summarized and then extracted from 100%.
  Example: The SLO receives the compliance calculations from two QoS's with compliance of 70% and 90 %.
  Calculated compliance:
  100 % - ((100 % -70 %) + (100 % -90 %)): **60 %**.

  Weight

  The possibility to weigh the importance of the different QoSs

  Worst
  Looks for the QoS with the worst result and selects this result.

- **Profile**

  A set of configurable custom defined formulas, currently available are:

  AND. The values of all samples in all QoS's are AND-ed, resulting in one compliance value. AND means that all sample values from all QoS's simultaneously must equal or be better than the threshold value to be compliant.
  See also the section *Definition of Multi-series Calculation*.

  OR. The values of all samples in all QoS's are OR-ed, resulting in one compliance value. OR means that at least one of the sample values must equal or be better

than the threshold value to be compliant.

See also the section *Definition of Multi-series Calculation*.

Calculation Terms and Conditions for the SLA

The SLA receives the compliance calculations from the associated SLOs and calculates the total compliance percentage, based on three different parameters:

- **Operating period**
  Defines in which time period the compliance percentage should be measured (e.g. Monday to Friday from 08:00 – 17:00). Data series outside this period does not influence the compliance percentage.
- **Weight**
  Possibility to weigh the importance of the different SLOs.
- **Calculation method**
  Here you can select a mathematical formula to calculate the compliance percentage, based on the input from the SLOs:

  Average
  Calculates the average value of the input from the SLOs.

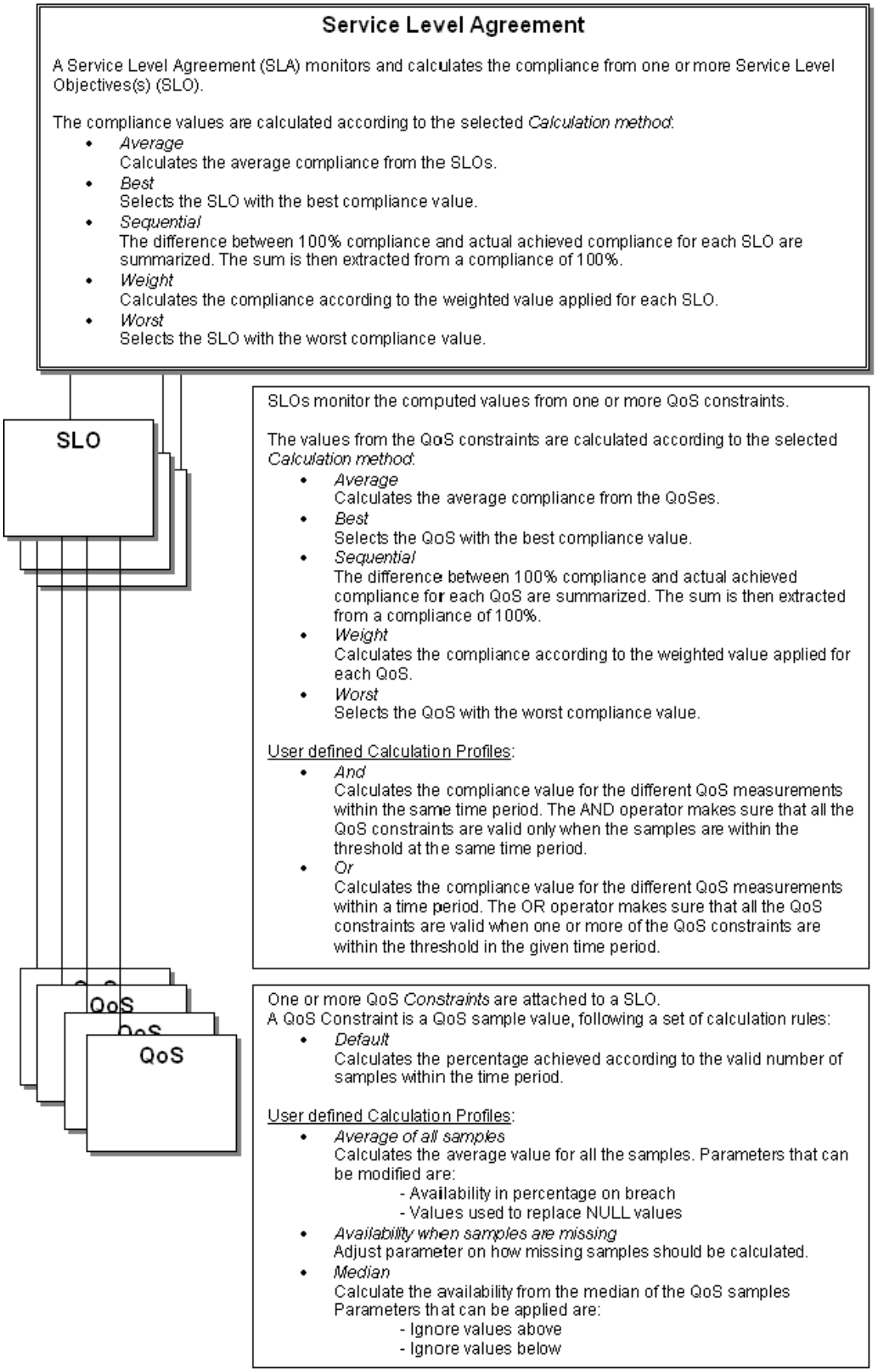
  Best
  Looks for the SLO with the best result and selects this result.

  Sequential
  The difference between 100 % and achieved compliance for each SLO is summarized and extracted from 100%.
  Example: The SLA receives the compliance calculations from two SLOs with compliance of 70% and 80 %.
  Calculated compliance:
  100 % - ((100 % -70 %) + (100 % -80 %)): **50 %**.

  Weight
  Enables the possibility to weigh the importance of the different SLOs.

  Worst
  Looks for the QoS with the worst result and selects this result.

Summary


Service Level Agreement
A Service Level Agreement (SLA) monitors and calculates the compliance from one or more Service Level Objectives(s) (SLO).
The compliance values are calculated according to the selected Calculation method:
• Average
Calculates the average compliance from the SLOs.
• Best
Selects the SLO with the best compliance value.
• Sequential
The difference between 100% compliance and actual achieved compliance for each SLO are summarized. The sum is then extracted from a compliance of 100%.
• Weight
Calculates the compliance according to the weighted value applied for each SLO.
• Worst
Selects the SLO with the worst compliance value.
SLO
SLOs monitor the computed values from one or more QoS constraints.
The values from the QoS constraints are calculated according to the selected Calculation method:
• Average
Calculates the average compliance from the QoSes.
• Best
Selects the QoS with the best compliance value.
• Sequential
The difference between 100% compliance and actual achieved compliance for each QoS are summarized. The sum is then extracted from a compliance of 100%.
• Weight
Calculates the compliance according to the weighted value applied for each QoS.
• Worst
Selects the QoS with the worst compliance value.
User defined Calculation Profiles:
• And
Calculates the compliance value for the different QoS measurements within the same time period. The AND operator makes sure that all the QoS constraints are valid only when the samples are within the threshold at the same time period.
• Or
Calculates the compliance value for the different QoS measurements within a time period. The OR operator makes sure that all the QoS constraints are valid when one or more of the QoS constraints are within the threshold in the given time period.
QoS
QoS
One or more QoS Constraints are attached to a SLO.
A QoS Constraint is a QoS sample value, following a set of calculation rules:
• Default
Calculates the percentage achieved according to the valid number of samples within the time period.
User defined Calculation Profiles:
• Average of all samples
Calculates the average value for all the samples. Parameters that can be modified are:
- Availability in percentage on breach
- Values used to replace NULL values
• Availability when samples are missing
Adjust parameter on how missing samples should be calculated.
• Median
Calculate the availability from the median of the QoS samples
Parameters that can be applied are:
- Ignore values above
- Ignore values below

Definition of Multi-series Calculation

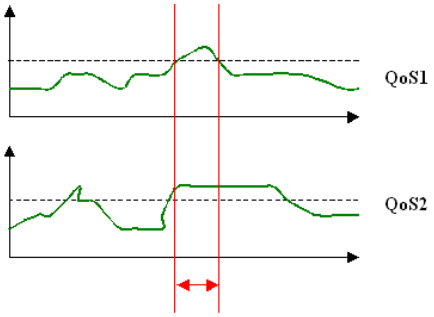
When defining the calculation settings for a SLO, you have the option to select a multi-series calculation profile.

(These profiles are custom-defined - see the section *Creating a Calculation Profile*).

Currently supported profiles are:

- **OR**
  Compliant if one of the QoS constraints equals or are better than the threshold value.
- **AND**
  Compliant when all of the QoS constraints equals or are better than the threshold value.

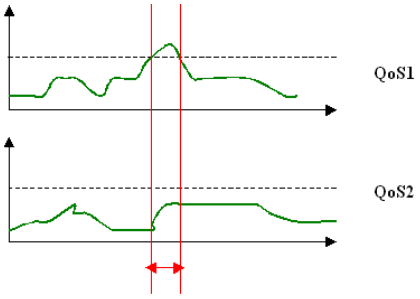
Example OR:



OR - At least one of the data series must equal to or be better (in this example lower) than the expected value:

In the graph above, this is achieved, except for the period marked red.

Example AND:



AND – Both data series must be equal to or better (in this example lower) than the expected value:

In the graph above, this is achieved, except for the period marked red.

Calculation Examples

QoS Constraints
Each of the QoS constraints compares the collected data values from the probes with the defined threshold value and calculates the compliance percentage.

⇒

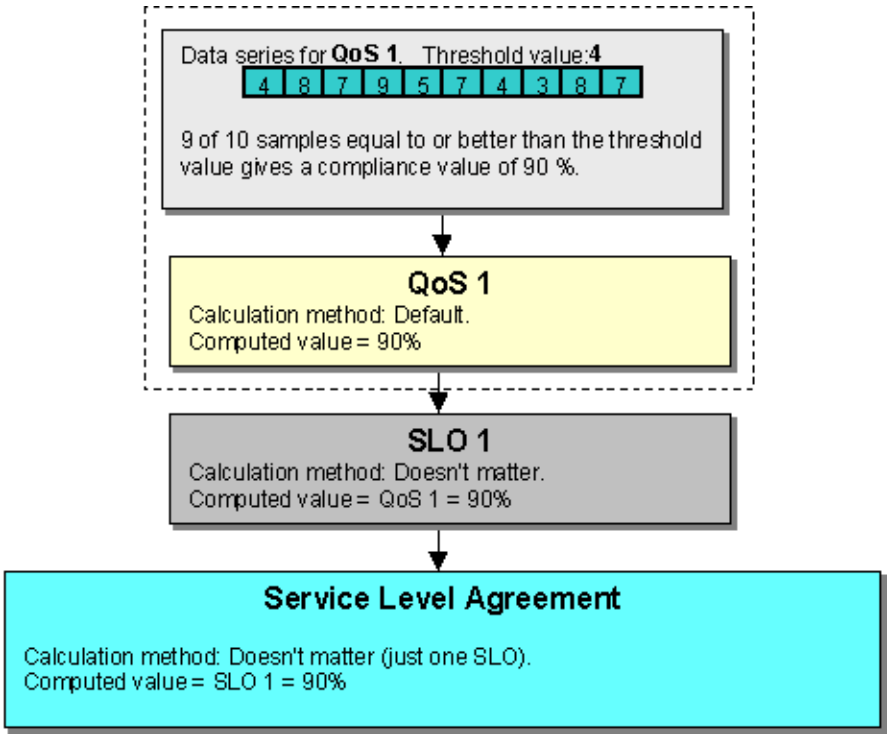
SLOs
The SLO collects the compliance values from the QoS constraints and computes the compliance percentage based on a selected calculation method (selects the best value, the worst value, the average value etc.). The result is made available for the SLA.

⇒

SLA
The SLA collects the compliance value from the two SLOs and calculates the total compliance value, also based on a selected calculation method.

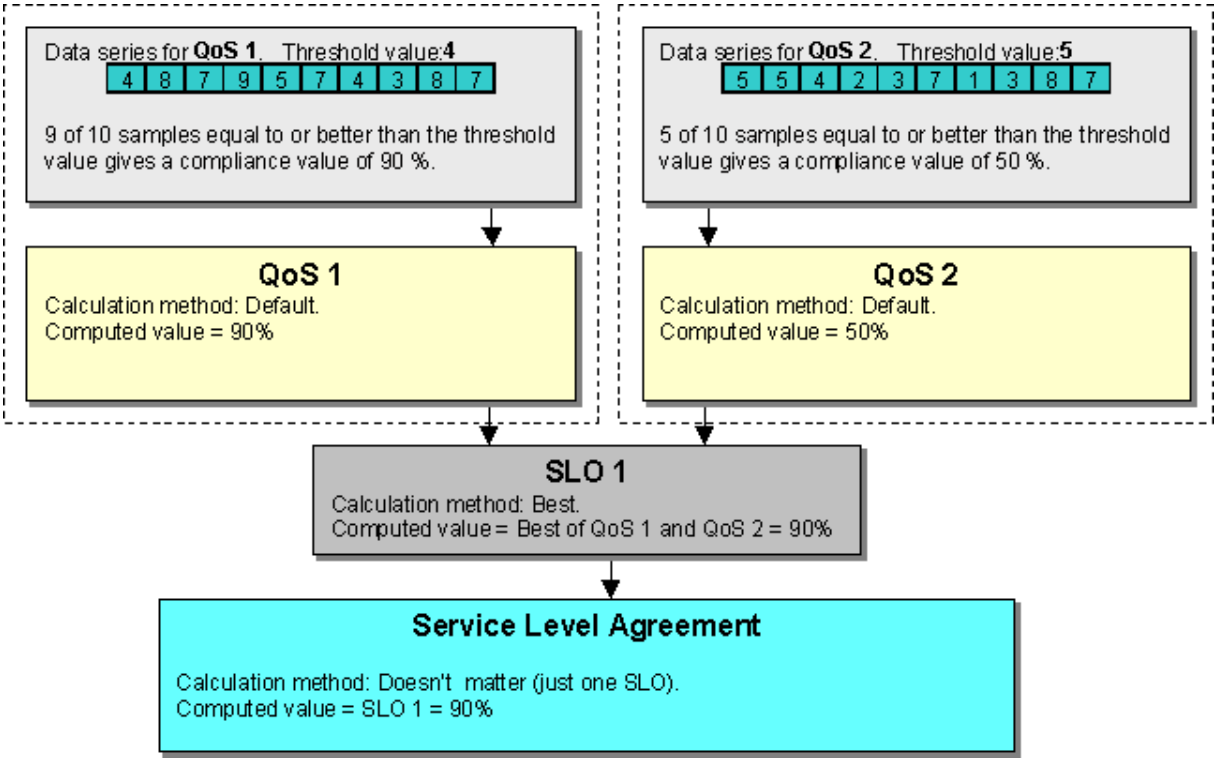
Example 1, one QoS and one SLO

If using calculation method other than *Default* for the QoS, see the section *Creating a Calculation Profile*.



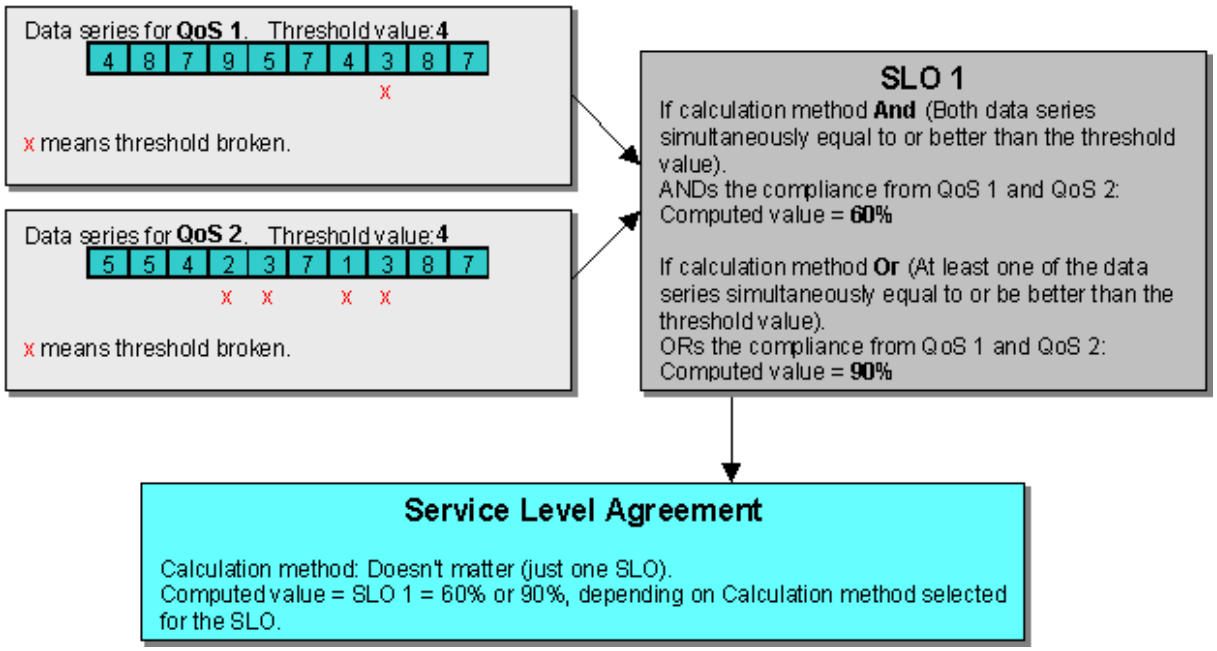
Example 2, two QoS's and one SLO

If using calculation method other than *Default* for the QoS, see the section *Creating a Calculation Profile*.



Example 3, two QoS's and one SLO, using Calculation method *AND* or *OR*

If using calculation method other than *Default* for the QoS, see the section *Creating a Calculation Profile*.



Example 4, two SLOs, each with 3 QoSs

If using calculation method other than *Default* for the QoS, see the section *Creating a Calculation Profile*.

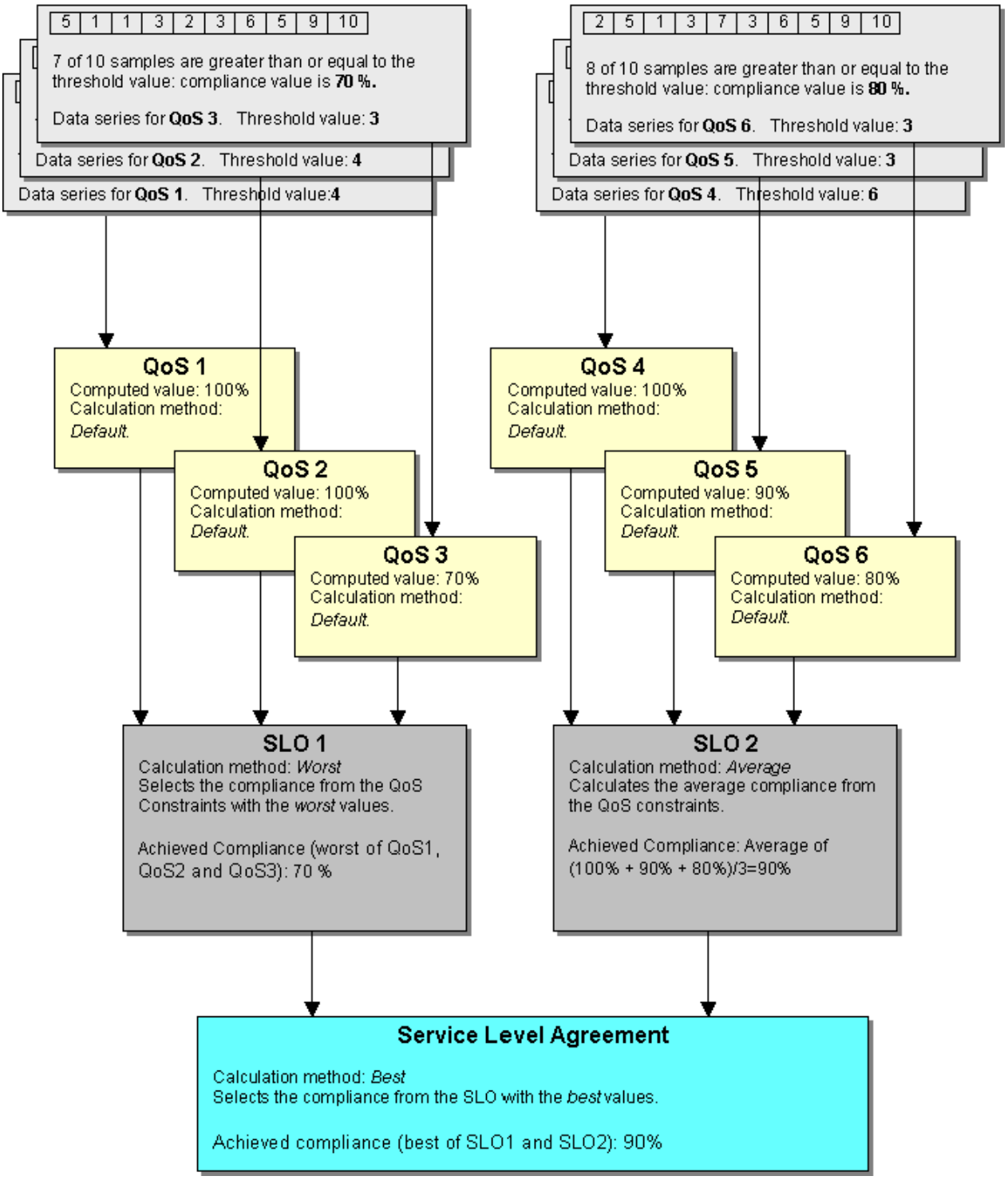
The figure at the bottom of this page shows a **SLA** with two **SLOs**, each with three **QoS constraints**.

Example assumptions:

On the figure below:

- **SLO 1**:
  Calculating the compliance percentage from QoS 1, 2 and 3, using calculation method *Worst* makes a compliance percentage of 70 %.
- **SLO 2**:
  Calculating the compliance percentage from QoS 4, 5 and 6, using calculation method *Average* makes a compliance percentage of 90 %.

The table below the figure shows the total SLA compliance percentage, using different calculation methods for the SLA.



The table shows the SLA compliance percentage for the example above, selecting different calculation methods for the SLA:

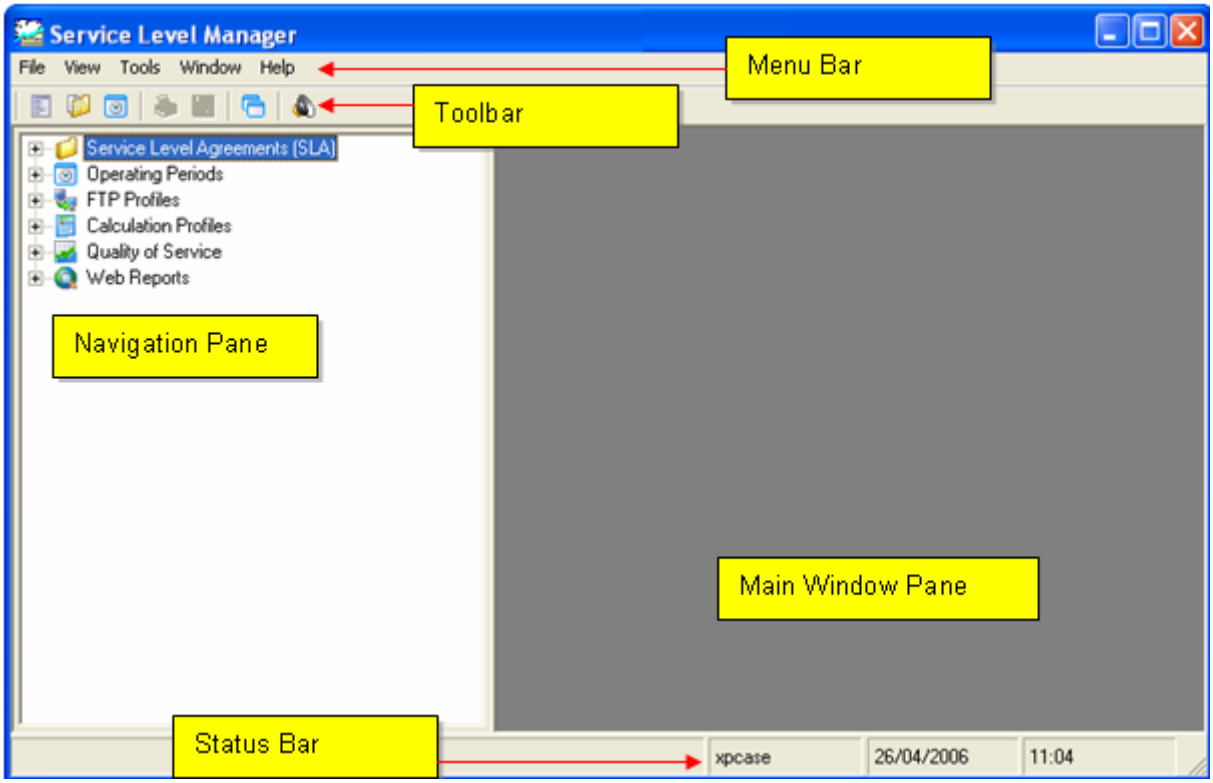
Calculation method	Achieved compliance	Explanation
Average	**80 %**	The average value of the two SLOs (70% + 90%)/2: **80 %**
Best	**90 %**	The best value of the two SLOs (70% and 90%): **90 %**

Worst	**70 %**	The worst value of the two SLOs (70% and 90%): **70 %**
Sequential	**60 %**	The difference between 100 % and achieved compliance for each SLO is summarized and extracted from 100%: 100 % - ((100 % -70 %) + (100 % -90 %)): **60 %**.
Weight	**82 %**	Assuming that the weight distribution between SLO 1 and SLO 2 is set to 40 / 60 for the SLA: (70 % * 40/100) + (90 % * 60/100) = **82 %.**

Service Level Manager Reference Guide

The Service Level Management application window consists of the following main parts:

- The Menu Bar
- The Toolbar
- The Navigation Pane
- The Main Window Pane
- The Status Bar

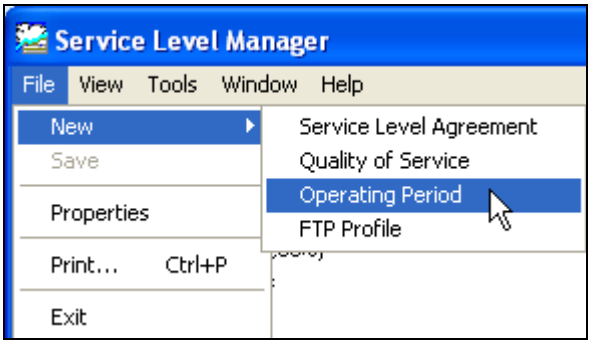


The Menu Bar

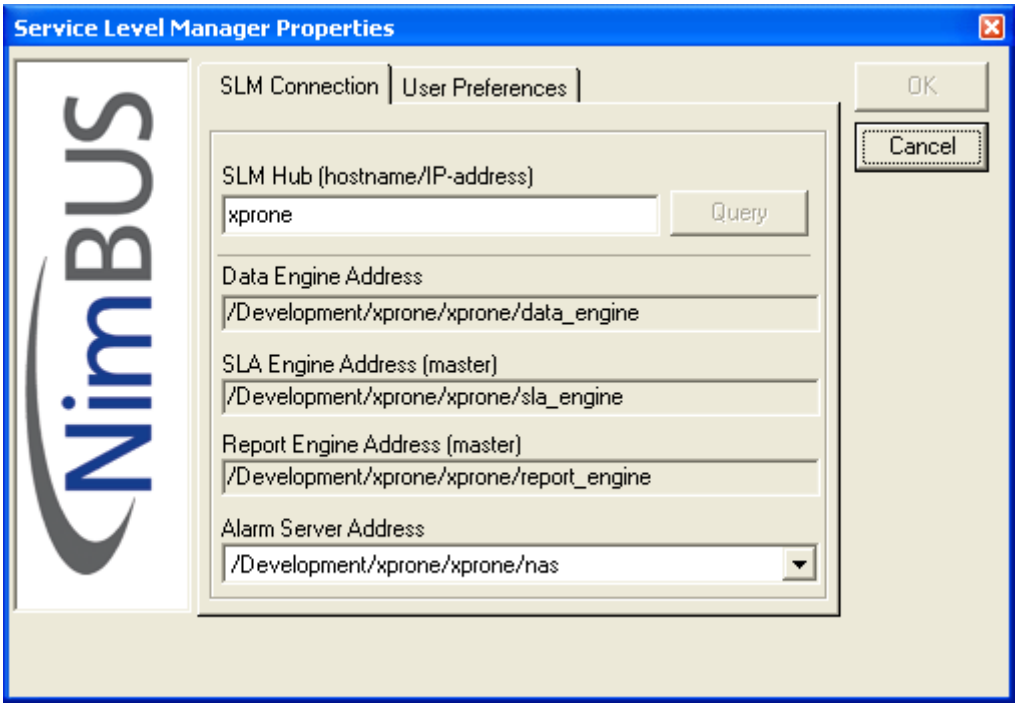
This section gives a short description of the different functions and tools found in the menu line. Note that some of the menus are partly

restricted, depending if your user is classified as operator or superuser.

File

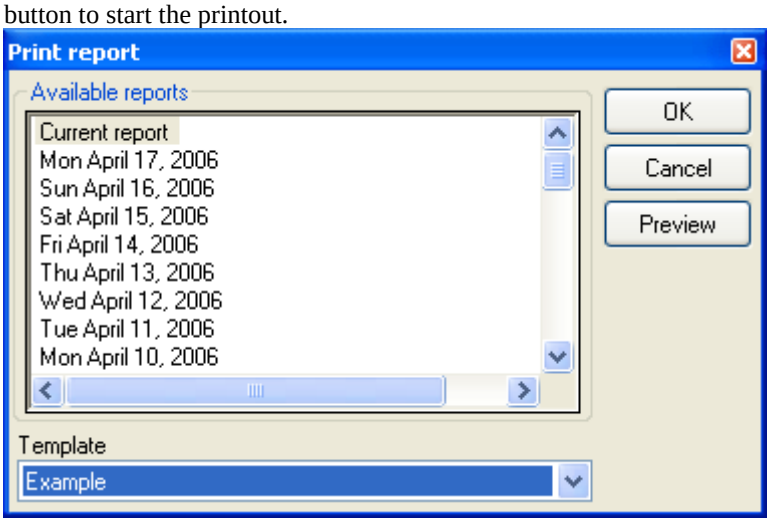


- **New**
  This option can be used when defining a new:
  - *Service Level Agreement*
    Opens the Service Level Agreement dialog, where you can create new SLAs. See description in the section *Creating Service Level Agreement*.
  - *Quality of Service*
    Opens the QoS Definition dialog; see description in the section *Defining a Quality of Service object*.
  - *Operating Period*
    Opens the Operating Period dialog; see description in the section *Creating an Operating Period*.
  - *FTP Profile*
    Opens the FTP Profiles dialog; see description in the section *Creating a FTP Profile*.
- **Save**
  Lets you save new definitions (as described under *New* (above), or any modifications in existing definitions.
- **Properties**
  Opens the Properties dialog which has two tabs.
  Also note that the Properties dialog pops up if the SLM Hub you are connected to gets unavailable.



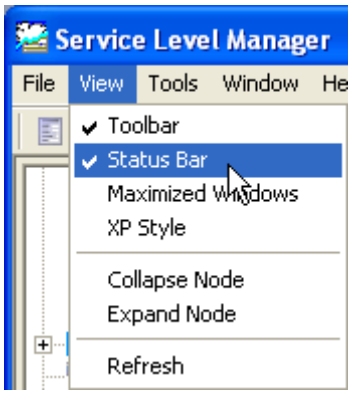
See the section *Setting the Connection Properties* for a detailed description of the properties dialog.

- **Print**
  This option lets you print the report for the opened and selected SLA. You can select the current report or an older one.
  Note that you can select a template, determining the layout of the report printout, and clicking the Preview button lets you see the result before clicking the OK button to start the printout.



- **Exit**
  Exits the Service Level Manager.

View



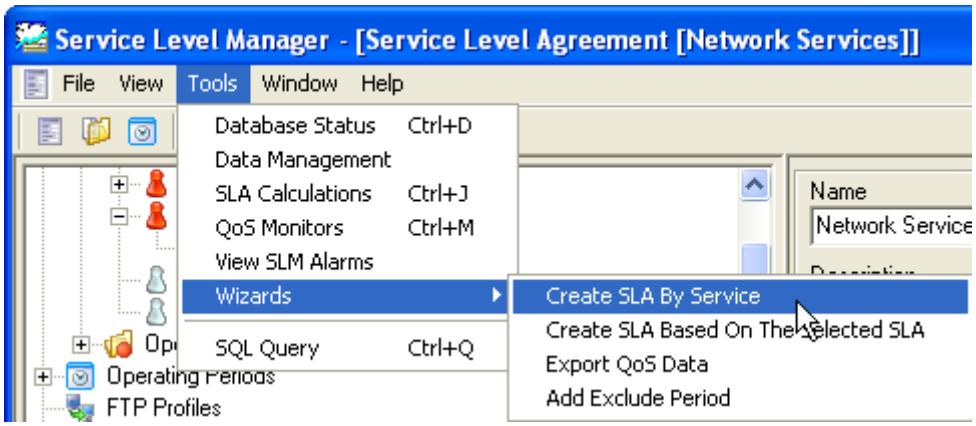
- **Toolbar**
  When selected, the Toolbar appears in the upper part of the window, otherwise not.
- **Status Bar**
  When selected, the Status Bar appears at the bottom of the window, otherwise not.
- **Maximized Windows**
  When selected, all windows opened in the Main Window Pane will appear in maximized state.
  When this option is selected, an icon will appear in the left part of the Menu Bar. The icon represents the currently active window (in this case an Operating Period dialog).

- **XP Style**
  If running another OS than XP, you may convert the SLM window to appear with XP style, rather than the normal *classic* style. This requires a restart of the SLM.
- **Collapse Node**
  Collapses the selected node in the Navigation Pane, hiding the sub-nodes.
  Note that you may also collapse the selected node by pressing the – key on the numeric keypad on your keyboard.
- **Expand Node**
  Expands the node selected in the Navigation Pane, showing the sub-nodes.
  Note that you may also expand the selected node by pressing the + key on the numeric keypad on your keyboard.

- **Refresh**
  Refreshes the Navigation Window to display current information.

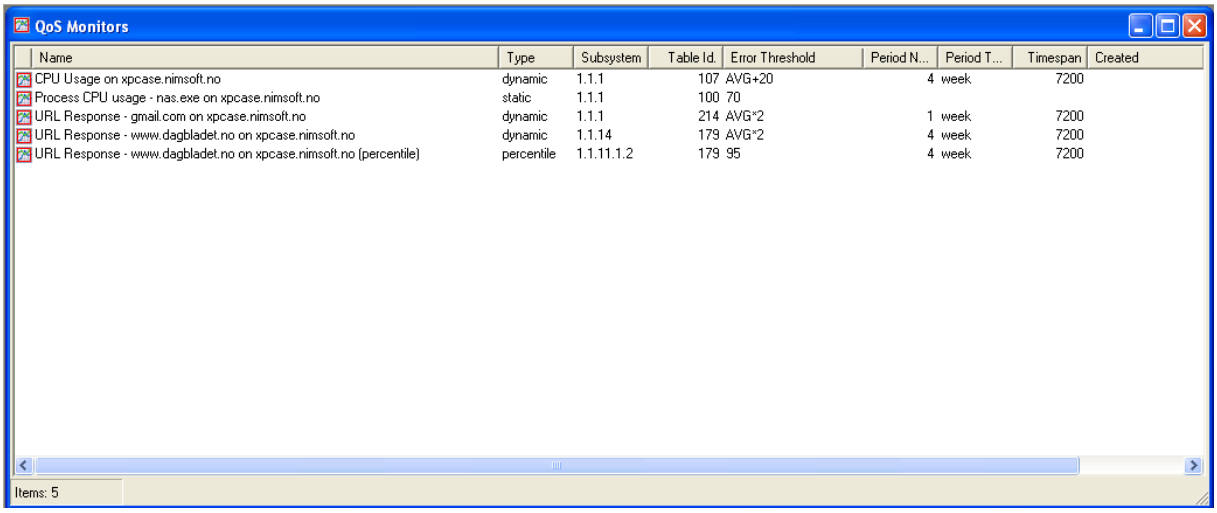
Tools



- **Database Status**
  Opens the Database Status window. The window contains relevant database information, such as:
  - Database information, such as server name and database name, size and location.
  - Listing QoS objects and probes enabled for sending QoS messages to the database.

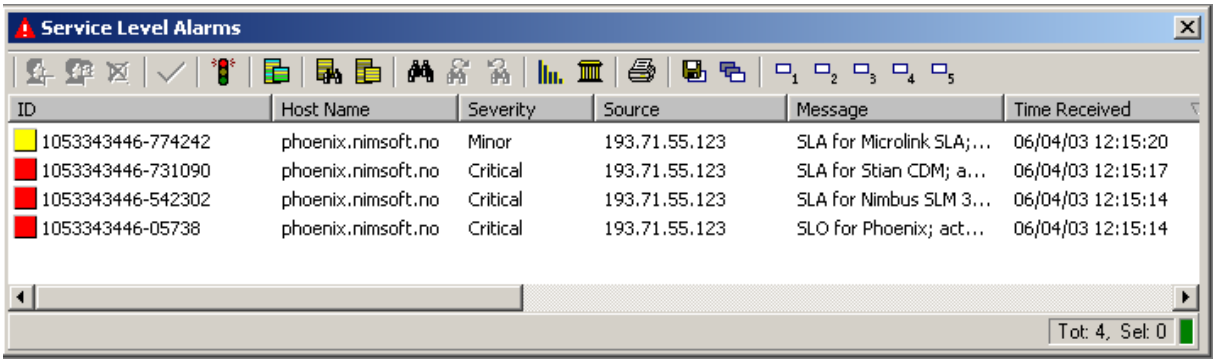
  See description in the section *Viewing the Actual Database Usage*.
- **Data Management**
  Opens the Data Management dialog. The *data_engine* may be configured to perform automatic clean-up procedures, but using the Data Management dialog, you may perform manual data-management. For details, see the section *Data Management*.
- **SLA Calculations**
  Opens the Service Level Calculations window, listing the last calculations for currently running SLAs. Double-clicking the entries in the list, you can observe the calculated SLA Compliance for each of the SLAs in separate windows. See the section *Watching SLA Calculations*.
- **QoS Monitors**
  NOTE:
  This feature introduced in SLM version 4.30 will be activated and visible, provided that the **qos_engine** probe is installed.
  Selecting this option, the QoS Monitors window will be launched,

listing the QoS Monitors defined (if any).



QoS Monitors can be defined by right-clicking a QoS object in the Navigation pane, selecting *Create Monitor* (see *Quality of Service*). See also the section *Creating QoS Monitor Profiles* for details.

- **View SLM Alarms**
  When defining SLAs, we can tell the product to send us an alarm when the "actual" compliance drops below expected levels. Selecting this option opens the Alarm Windows, displaying current alarms.



See description in the section *Nimsoft Alarm SubConsole* for a description of the Alarm Window.

- **Wizards**
  Lets you start a wizard for creating a one or more SLAs, based on your selections through the wizard. A group will be created with one ore more SLAs in the group. There are tree different types of wizards:
  - Creating SLAs from scratch, based on a selected service, see

Example – Creating a SLA based on a service.

- Creating SLAs based on an existing SLA. Selecting a SLA in the Navigation Pane, the wizard will create a new SLA, based on the properties for the selected SLA.
- Exporting QoS data, see *Exporting QoS data, using Export QoS Data wizard*.
- Adding an Excluded period. Normally this is done individually for SLAs/SLOs in the respective dialogs. Using this wizard, you can add an Excluded period and attach the period to some or all of your existing SLAs/SLOs.

- **SQL Query**
  Opens the SQL query dialog, enabling you to send SQL queries to the database. This is useful if you want to test and view the database contents. Also see the section *Sending SQL Queries to the database*.

Window

In addition to the menu options described below, you have the following possibilities to handle child-windows opened in the Main Window Pane:

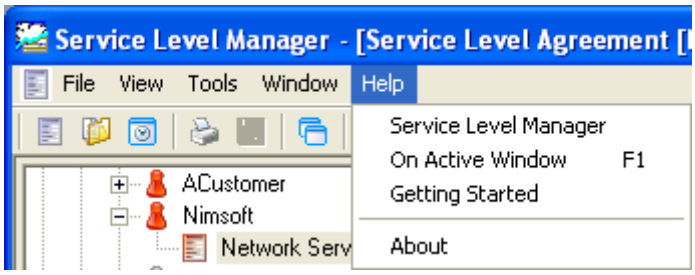
- **The ESC-key**
  Closes opened child-windows, one by one.
- **CTRL + TAB-key**
  Toggles between the opened windows

- **Cascade**
  Useful function when you have a lot of opened child-windows and dialogs

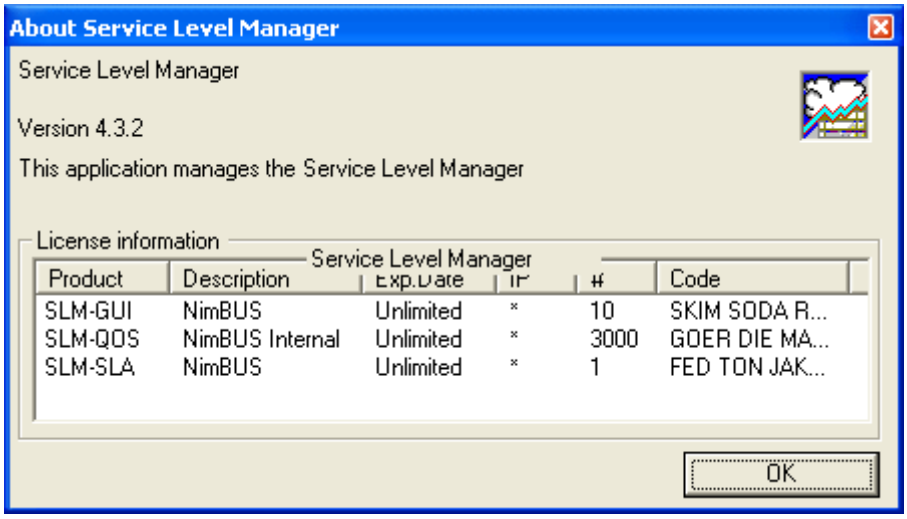
spread around. The *Cascade* function will then place the child-windows in a nice row in the Main Window Pane.

- **Save Preferences**
  Use this option to save new definitions, or any modifications in existing definitions.
- **Tile Horizontal**
  Tiles the opened child-windows horizontally with the selected child-windows on top.
- **Tile Vertical**
  Tiles the opened child-windows vertically with the selected child-windows on top.
- **Arrange Icons**
  Opened child-windows that are minimized will be arranged in a row in the lower part of the Main Window Pane.

Help



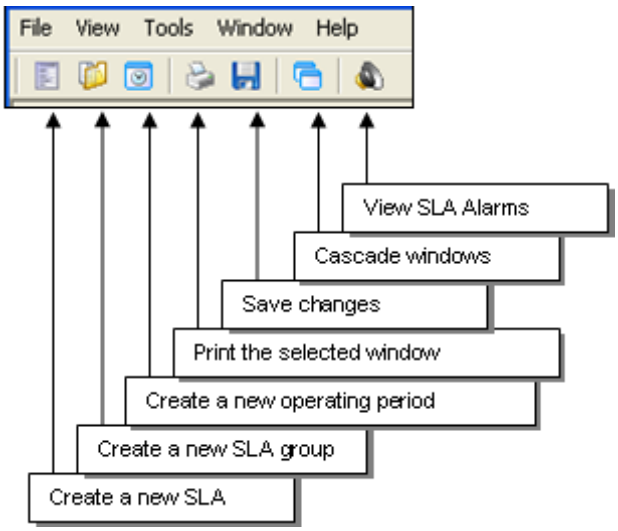
- **Service Level Manager**
  Starts the Nimsoft on-line documentation, describing the Service Level Manager.
- **On Active Window**
  Starts the Nimsoft on-line documentation, pointing directly to the section describing the currently active window. Alternatively press the F1 key.
- **Getting Started**
  Opens the Nimsoft on-line documentation, pointing directly to the *Getting Started* section.
- **About**
  Displays product SLM version and license information etc.



The Toolbar

The toolbar contains shortcuts to different tasks and operations:

- Printing and saving operations
- Creating new *Service Level Agreements*, *Service Level Agreement groups*, *Operating Periods* and *Quality of Services*.
- Cascade windows, a useful function when you have a lot of opened windows and dialogs spread around. The *Cascade* function will place the windows in a nice row in the main window.
- Launching the *Service Level Alarms* window.



The Navigation Pane

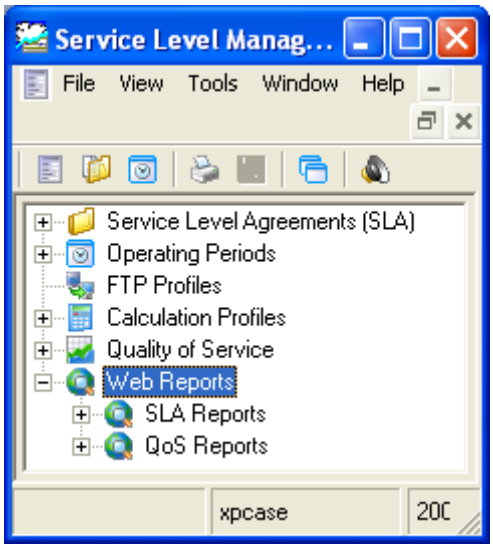
The Navigation Pane is "fixed" to the left-hand side of the application. It contains a tree-like structure, showing the various elements/nodes in the Nimsoft Service Level Management product suite.

Selecting *View>Refresh* refreshes the contents of Navigation Pane. You may also increase/decrease the width of the Navigation Pane by pressing the right edge of the window and simultaneously dragging it to your left/right.

The nodes shown in the pane are organized in a tree-structure with a top-level node and one ore more levels of sub-nodes and groups.

You may expand/collapse nodes and sub-nodes by double-clicking on them.

Note that you may also collapse the selected node by pressing the – key on the numeric keypad on your keyboard, and that you may expand the selected node by pressing the + key on the numeric keypad on your keyboard. You may also use the options *View* > *Collapse Node* and *View* > *Expand Node*.

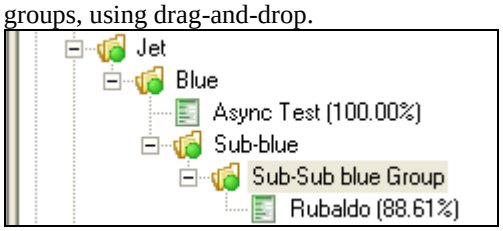


Service Level Agreements

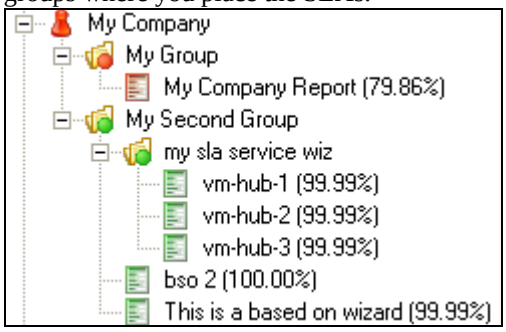
This node lists all defined SLAs. The SLAs may appear as:

- Single SLAs
- Grouped SLAs. The SLAs may be placed in one group, or in sub-groups on multiple levels under the main group. SLAs can be moved between

groups, using drag-and-drop.



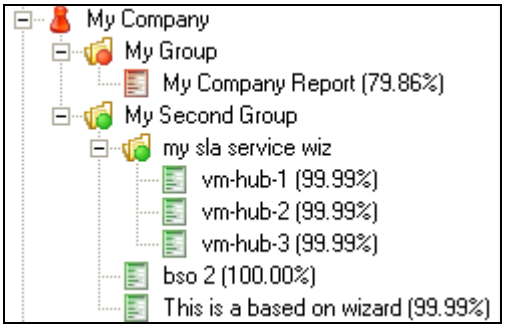
- SLAs attached to Accounts.
  Under the Accounts node, you will find all Accounts available. When creating SLAs, these can be attached to one of these Accounts. Under these Accounts, you may again create groups where you place the SLAs.



SLAs can be moved between groups, using drag-and-drop.

Right-clicking a node enables you to define new SLAs or SLA groups, launch the Service Level Alarms window and update the contents of the tree structure to reflect the current status.

The colour of the indicator for the SLAs (or SLA group or Account) indicates the current status:

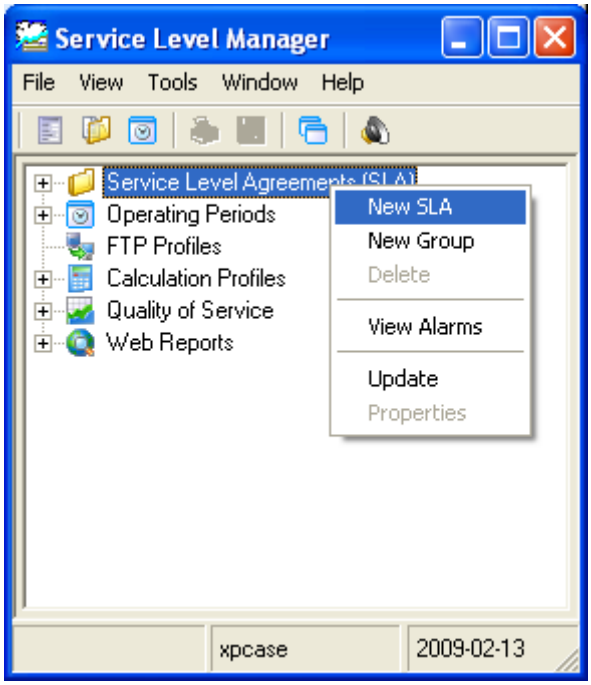


-  **Red** means that the compliance level for the SLA is breached.
  If a SLA in a SLA group or an Account is breached (red), the state will be propagated to the group/Account top node.
-  **Green** that the SLA (and all SLAs in the SLA group or Account) are compliant.

- **Yellow** indicator means that the current compliance (the last computed value) of the SLA (or one of the SLAs in a group or Account) breaches the alarm warning level.
- **White** means unknown status of the SLA (or one of the SLAs in a group or Account)

Right-clicking in the Navigation Pane opens a small menu with different options, depending what is selected.

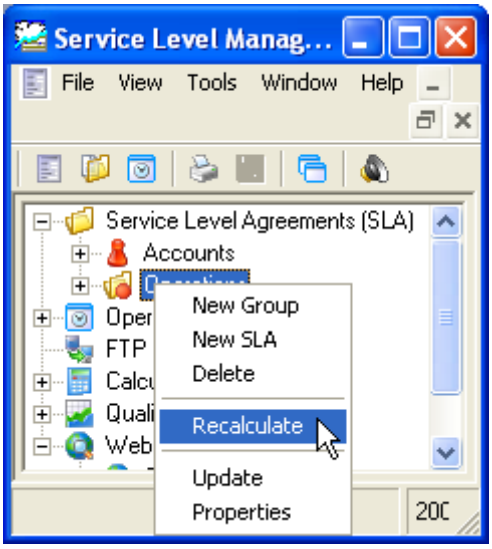
- The SLA Node is selected:



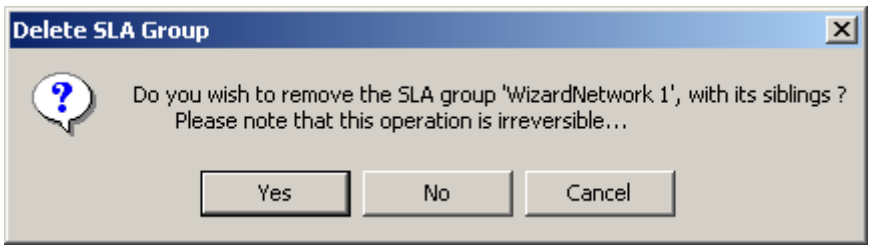
  - *New SLA*
    Opens an empty SLA dialog, where can define a new SLA (see the section *Creating Service Level Agreement*).
  - *New Group*
    Opens a *New Group* dialog, where can define a new SLA group. Give the new group a name and optionally a description. Note that you may also attach the group to one of the ftp profiles available, listed under the FTP Profiles node (see below).
  - *View Alarms*
    Opens the Service Level Alarms window (see Service Level Alarms).
  - *Update*
    Updates the Service Level

Manager to reflect the latest modifications.

- A SLA group or an Account is selected:



  - *New Group*
    Opens a *New Group* dialog, where can define a new SLA group. Give the new group a name and optionally a description. Note that you may also attach the group to one of the ftp profiles available, listed under the FTP Profiles node (see below).
    The report engine will use the FTP Profile to transfer the HTML reports for the SLAs in the group using FTP (File Transfer Protocol). The reports may be published to a web server for browsing.
  - *New SLA*
    Opens an empty SLA dialog, where can define a new SLA (see the section *Creating Service Level Agreement*).
  - *Delete*
    Deletes the selected SLA group, including all SLAs in that group.

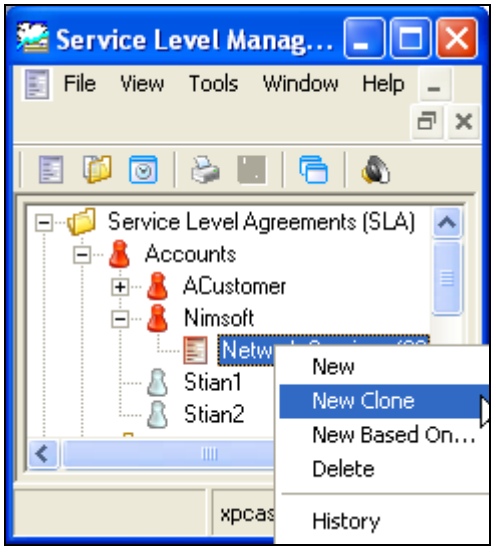


  - *Recalculate*
    Starts a new calculation job for

all SLAs in the selected group. The *Job Properties* dialog is opened, allowing you to edit the job parameters.

- *Regenerate*
  This option is available only when a wizard-created group is selected.
  Starts the wizard, enabling you to make modifications.
- *Update*
  Updates the Service Level Manager to reflect the latest modifications.
- *Properties*
  Opens the SLA group dialog for the selected SLA group, where you can edit the conditions and properties for the group.

- A SLA is selected:



- *New*
  Opens an empty SLA dialog, where can define a new SLA (see the section Creating Service Level Agreement).
- *New Clone*
  Makes a copy of the selected SLA.
- *New Based on*
  Starts the SLA wizard, enabling you to create a new SLA, based on the selected one. Note that you are not allowed to edit all parameter input fields (some of them are locked).
- *Delete*
  Deletes the selected SLA.
- *History*
  Enables you to view the historic

compliance of the current SLA. You can select the period you are interested in, and you can toggle between general and graphical view.

- *Regenerate*
  Starts a new calculation job for the selected SLA. The Job Properties dialog is opened, allowing you to edit the job parameters.
- *Update*
  Updates the Service Level Manager to reflect the latest modifications.
- *Properties*
  Opens the SLA dialog for the selected SLA, where you can edit the conditions and properties for the SLA (see the section Creating Service Level Agreement).

Operating Periods

This node lists the defined operating periods. Operating Periods are used to constrain the measured QoS values to specific hours of any day (the period the QoS constraint is valid.)

The operating period is defined to be a collection of time periods, and is used when we define new SLAs. We use the Operating Periods when defining the QoS constraints (see the section *Defining QoS Constraints*)

This means that samples falling outside these time specifications will not influence the SLO/SLA compliance requirements.

Right-clicking the node opens an empty dialog, enabling you to define a new Operating Period (see the section *Creating an Operating Period*).

Right-clicking one of the defined Operating Periods listed under the node opens a small menu containing 4 options:

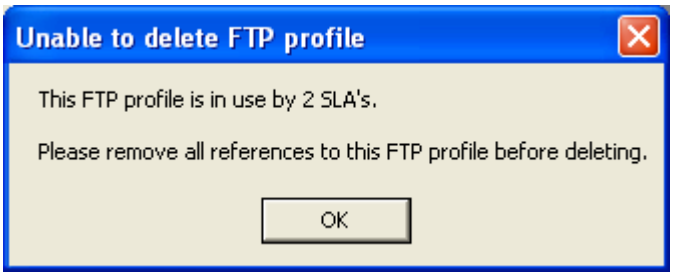
- **New**
  Opens an empty dialog, enabling you to define a new Operating Period.
- **Delete**
  Deletes the selected Operating Period.
- **Update**
  Updates the Service Level Manager to reflect the latest modifications.
- **Properties**
  Opens the dialog for the selected Operation Period, where you can edit parameters like *name*, *description* and *time* specifications.

FTP Profiles

All reports generated by the *report_engine* may be published to other systems by the use of the File Transfer Protocol (FTP). Under this node you find a list of all FTP-Profiles defined in the Service Level Manager. These FTP profiles are useful when defining new SLAs.

Right-clicking one of the defined FTP profiles listed under the node opens a small menu containing 4 options:

- **New**
  Opens an empty dialog, enabling you to define a new FTP profile.
- **Delete**
  Deletes the selected FTP profile.
  If the profile is used by any of the SLAs, you will receive a warning, telling you that you have to remove all references from SLAs using this FTP profile before you are allowed to delete the profile.

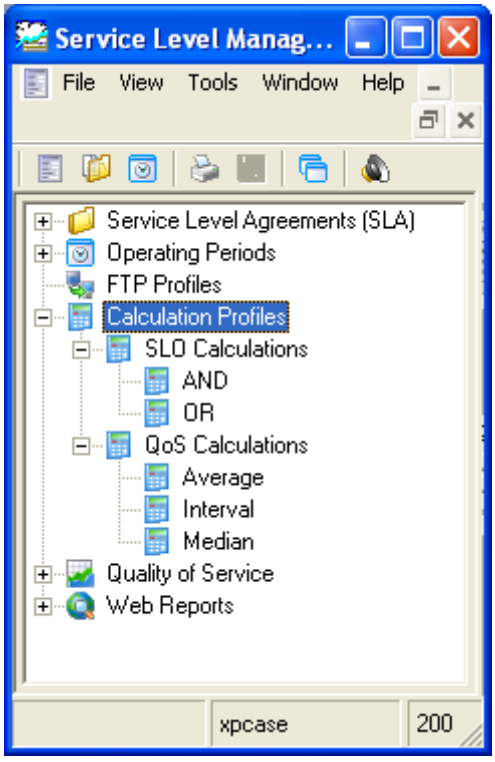


- **Update**
  Updates the Service Level Manager to reflect the latest modifications.
- **Properties**
  Opens the dialog for the selected FTP profile, where you can edit options and parameters. Also see the section *Creating a FTP Profile*.

Calculation Profiles

This option allows users to define their own calculation profiles.

These calculation profiles are used when defining the calculation properties for Service Level Objects and Quality of Service Constraints.



When defining calculation profiles, the profiles will be grouped either as SLO calculations or as QoS calculations, depending on if the selected plug-in supports single-data or multi-data series. See the section *Creating a Calculation Profile* and

Compliance Calculation.

- Right-clicking the SLO Calculation sub-node (or one of the defined SLO calculation profiles), selecting *New*, opens an empty dialog enabling you to define a new SLO Calculation profile.
- Right-clicking the QoS Calculation sub-node (or one of the defined QoS calculation profiles), selecting *New*, opens an empty dialog enabling you to define a new QoS Calculation profile.

The right-click menu offers three other options, common for both sub-nodes.

- **Delete**
  Deletes the selected Calculation profile.
- **Update**
  Updates the Service Level Manager to reflect the latest modifications.
- **Properties**
  Opens the dialog for the selected Calculation profile, where you can edit options and parameters.

Quality of Service

Under this node you will find the available registered QoS objects, grouped into logical groups based on the *description* field in the QoS object. This view enables the user to quickly browse the database for particular data-series.

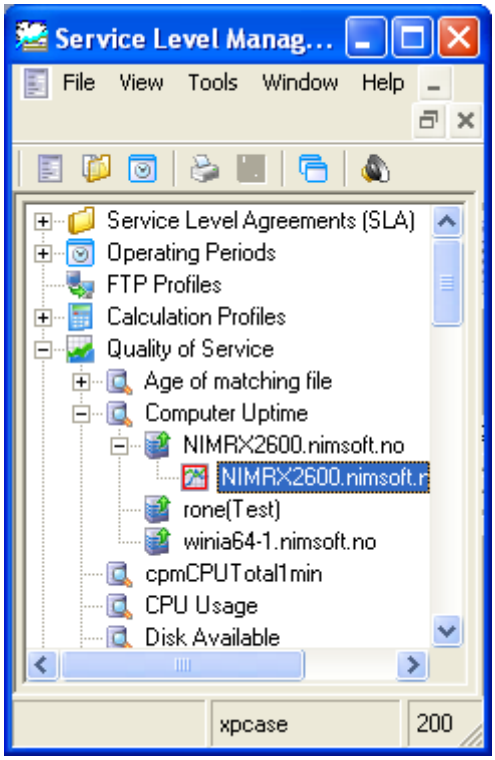
By default, it is possible to sort the QoS objects in two different ways:

- Order by QoS
- Order by QoS group

In addition, you have the possibility to define your own sorting criteria (views) by using the *Browse Menu Editor* (see further down on the page).

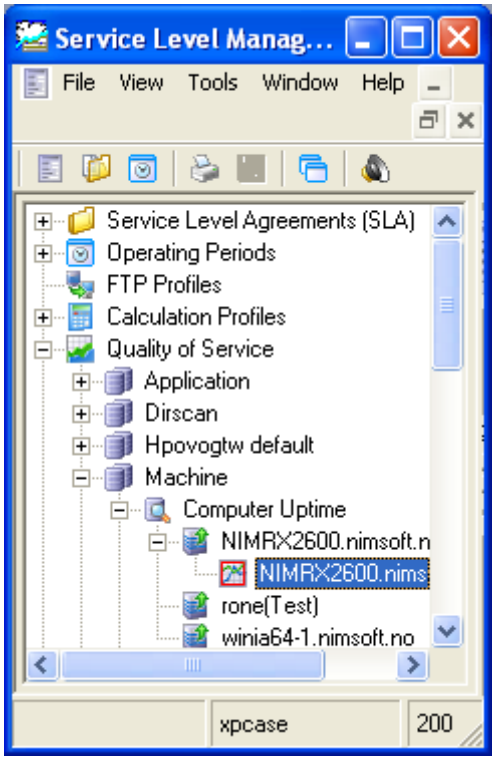
When **ordered by QoS**, the structure is organized like shown below.

- QoS node
  - QoS object name
    - Source
      - Target



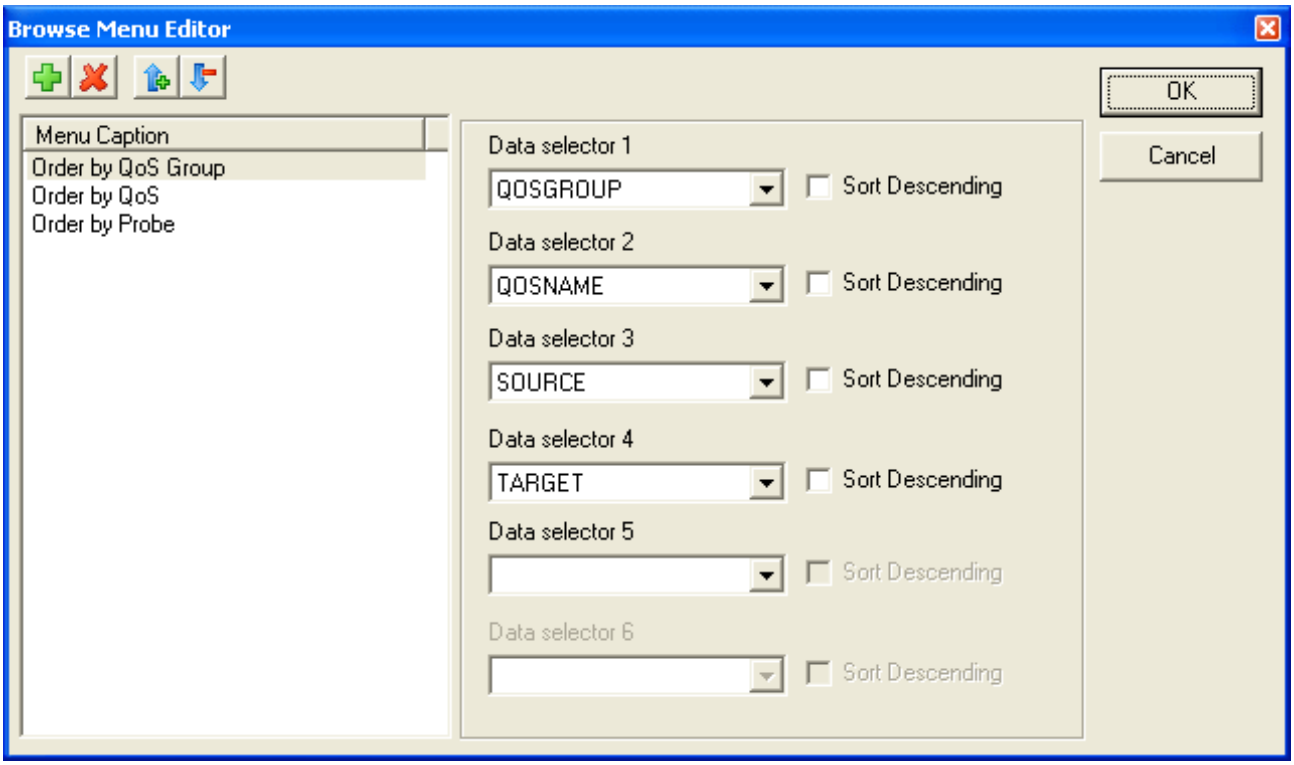
When **ordered by QoS group**, the structure is organized with one additional level (QoS Group) like shown below.

- QoS node
    - QoS group
        - QoS object name
            - Source
                - Target



Right-clicking the QoS node opens a small menu containing 4 options:

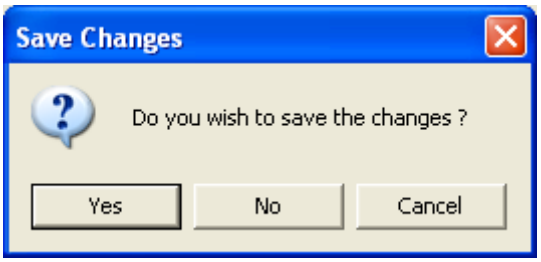
- **Browse Menu Editor**
  Launches the Browse Menu Editor, enabling you to define your own ways to group and sort the QoS objects listed under the QoS Node.



Clicking the Add button , a new sorting view will be added to the list. The new entry will by default be given the name *New Menu Item*. Rename it, giving it a descriptive name.

Select your sorting criteria, one or more, from the Data Selector drop-down menus and select descending or ascending sorting order.

Click the OK button, and you will be asked if you want to save the view.



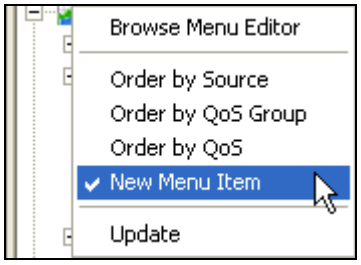
Clicking the Delete button , the selected view will be deleted.

When saved, the entries in the list will appear as menu items in the menu available when right-clicking the QoS node in the Navigation Pane.

They will be presented in the order they appear ain the list in the Browse Menu Editor.

Use the positioning buttons to move items up and down until the entries are listed in your preferred order.

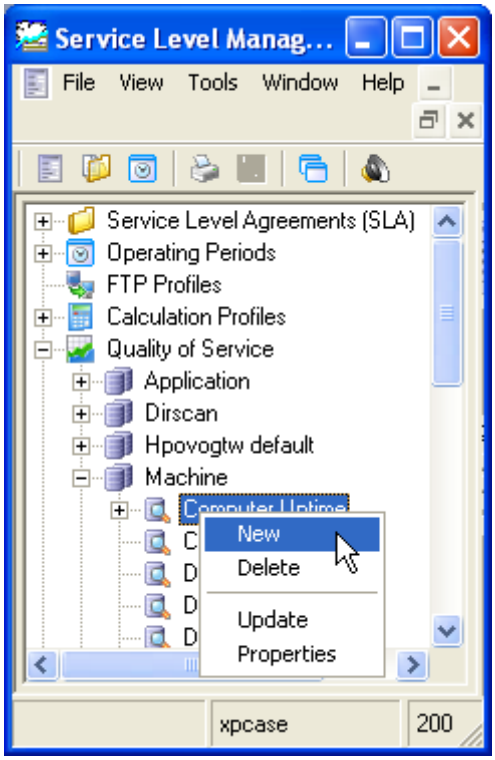
When saved, the new views will appear as menu items when right-clicking the QoS node in the Navigation Pane.



- **Order by QoS group**
  All QoS objects will be presented in their logical groups.
  In addition, see the section **Properties** for information on sorting and organizing QoS objects in folders.

- **Order by QoS**
  All QoS objects will be listed alphabetically (and not grouped). In addition, see the section **Properties** for information on sorting and organizing QoS objects in folders.
- **Update**
  Refreshes the Service Level Manager application window to reflect the latest modifications or changes.

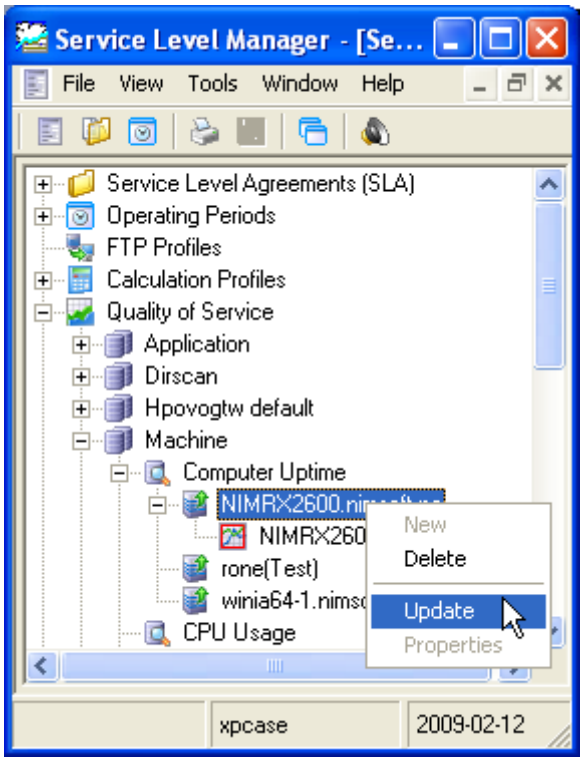
Right-clicking one of the QoS names under a group opens a small menu containing 4 options:



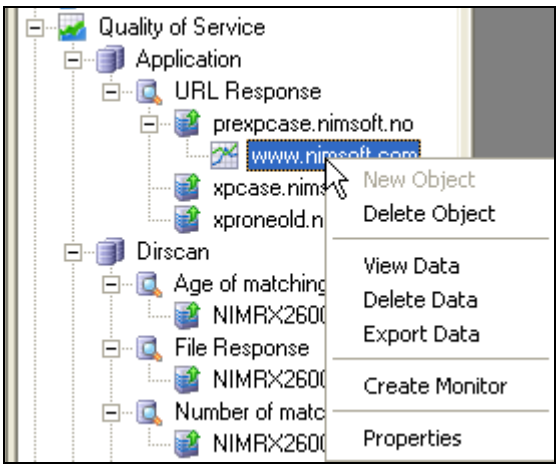
- **New**
  Opens an empty dialog, enabling you to define a new QoS definition.
- **Delete**
  Deletes the selected QoS and all associated data. You must also remove all references to this QoS from SLAs before you are allowed to remove the object. The QoS will be recreated after a while if the probe still sends QoS data.
- **Update**
  Refreshes the Service Level Manager application window to reflect the latest modifications or changes.
- **Properties**
  Opens the dialog for the selected QoS

object, where you can edit options and parameters.

Right-clicking one of the QoS sources under a QoS definition lets you delete the source or update/refresh the contents of the window.:



Right-clicking one of the QoS targets under the QoS node opens a small menu containing 4 options:



- **Delete Object**
  Deletes the selected QoS object and all associated data. Note that object will be recreated after a while if the probe still sends QoS data.
- **View Data**
  Opens the graph/table displaying the

data series for the selected QoS target. Also see the section *Viewing the Quality of Service (QoS) Data*.

- **Delete Data**
  Opens the Data Management dialog for the selected QoS object, allowing you to delete the complete QoS data series, or just for a selected period. The QoS object is not deleted selecting this option, and data will continue to be stored in the database table.
- **Create Monitor**
  NOTE:
  This feature introduced in SLM version 4.30 will be activated and visible, provided that the **qos_engine** probe is installed.
  Opens the QoS Monitor dialog, letting you create monitoring profile(s) for the selected QoS object. This way you can monitor the QoS data for an object. Thresholds can be set, and alarms will be issued if these thresholds are breached.
  This feature was introduced in SLM version 4.30.

  If one or more monitoring profiles have been created for the QoS object, the icon will get a red frame.

  Clicking *Tools* > *Options* in the menu bar (see *Tools*), a separate window will be launched, listing all QoS monitors created. Selecting one of the QoS monitors in the list, you can view the graph/table for the QoS object and also modify the monitoring properties.

  See the section *Creating QoS Monitor Profiles* to learn more about creating QoS Monitors.

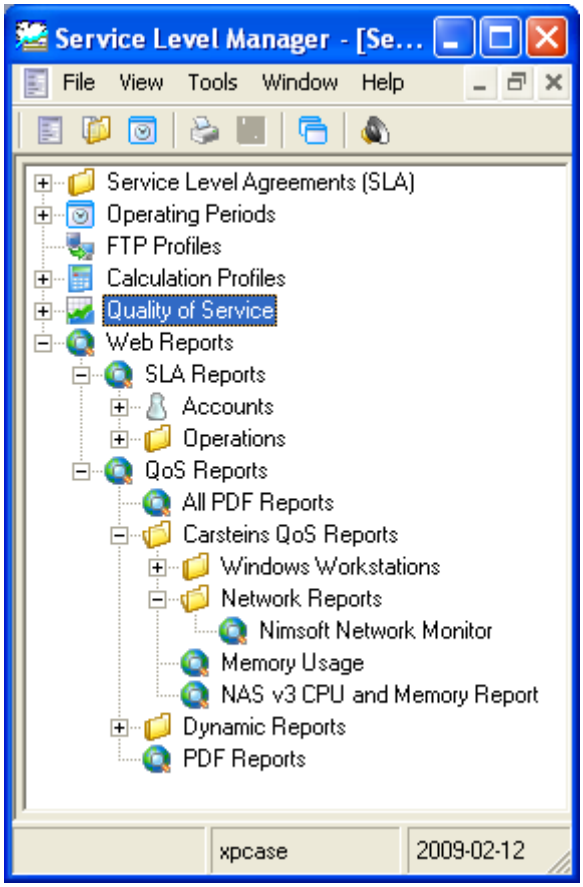
- **Properties**
  Opens the dialog for the selected QoS target, where you can edit options and parameters.
- **Properties**
  Opens the dialog for the selected QoS target, where you can edit options and parameters.

Web reports

Here you will find the SLA- and QoS-reports.

SLA reports

Under this node you will find SLA reports for all defined SLAs. The reports will be grouped and have a tree-structure identical to the tree-structure of the SLAs. You can navigate to SLAs that are placed in groups by expanding the group child node.



Double-clicking one of the reports (or right-clicking the report and selecting *View Report*) opens the report in a separate window.

Right-clicking the SLA Reports node or a group of SLA reports and selecting *View Summary* opens a summary report for all reports in that group, where you can drill down to the individual reports.

QoS reports

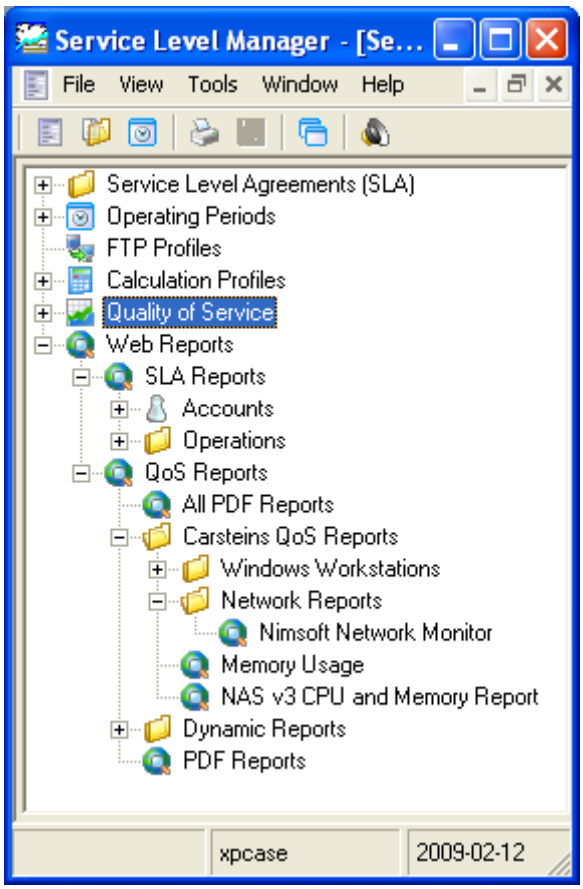
Lists all defined Quality of Service reports defined in the Nimsoft Report Engine. Double-clicking one of the reports (or right-clicking the report and selecting *View Report*) opens the report in a separate window.

Right-clicking the QoS Reports node (or one of the QoS reports under the node) and selecting *Configure*, opens the **report_engine** configuration tool, where you can define QoS-reports. Reports defined in the report_engine will be listed as QoS reports under the QoS Reports node, located in a three-structure

identical to the report-structure in the Navigation Pane of the report-engine.

Dynamic Reports

Under the QoS Reports child-node, you will also find the *Dynamic Reports*, generated by the Report Engine probe, provided that the *Dynamic Reports* option in the Report Engine probe is activated.



These Dynamic reports are sorted in groups as defined in the Nimsoft Group Server probe.

The end-node will represent a Dynamic Report representing a device or host in your Nimsoft Infrastructure. Clicking the end node will launch the report in the main window. Note that the Report Engine probe lets you choose between different report-layouts, using templates. You may also edit these templates to match your needs.

For additional information on reports, see the section *Web Reports*.

Main Window Pane

This is the application frame. All child-windows will be contained within the frame of the main-window, thus following the minimize/maximize schemes.

Handling Child-windows

In addition to the menu options described below, you have the following possibilities to handle child-windows opened in the Main Window Pane:

- **The ESC-key**

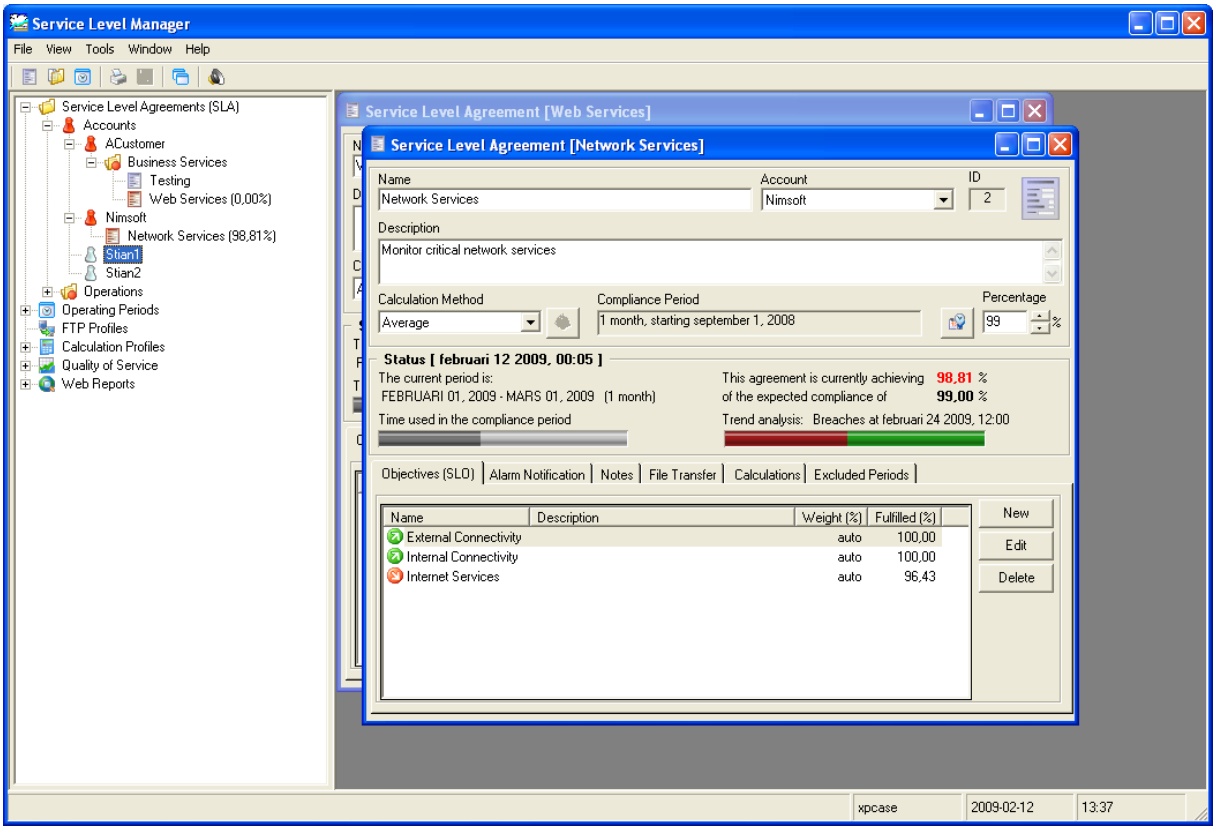
  Closes opened child-windows, one by one.

- **CTRL + TAB-key**

  Toggles between the opened windows

Using the Windows option in the Menu bar:

- **Cascade**
  Useful function when you have a lot of opened child-windows and dialogs spread around. The *Cascade* function will then place the child-windows in a nice row in the Main Window Pane.
- **Save Preferences**
  Use this option to save new definitions, or any modifications in existing definitions.
- **Tile Horizontal**
  Tiles the opened child-windows horizontally with the selected child-windows on top.
- **Tile Vertical**
  Tiles the opened child-windows vertically with the selected child-windows on top.
- **Arrange Icons**
  Opened child-windows that are minimized will be arranged in a row in the lower part of the Main Window Pane.



The Status Bar

The status bar, located at the bottom of the window, contains four fields, from left to right:

1. Status messages.
2. Current SLM Hub (your login hub).
3. The current date.
4. The current time.

Service Level Manager User Guide

The Service Level Manager application is your tool to create and modify Service Level Agreements (SLAs) and to view and print reports and graphs.

The main components involved in Service Level Management are:

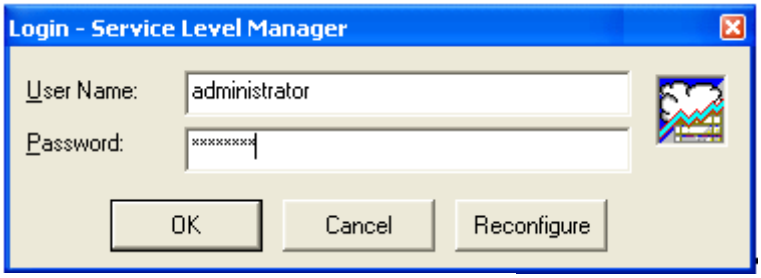
- **Probes** that must be prepared to deliver Quality of Service Data (see the section *Setting up a Probe to Deliver Quality of Service Data*).
- The SLM **database**, the *Nimsoft Data Engine*, the *Nimsoft SLA Engine* and the *Nimsoft Report Engine*, all installed during the SLM installation.
- The **SLM application,** with which we can perform a lot of management tasks, such as:
  - Define SLAs (see *Example - Defining a simple Service Level Agreement* or *Creating Service Level Agreement*).
  - Watch the reports (see also the section *Web Reports*).
  - Print the reports (see *Printing Reports*).
  - Customize the reports (see *Dynamic Reports*).
  - Handle alarms (see the section Handling Alarms).

Service level monitoring is mostly an automated task. When the SLA and the underlying structure is defined and activated, data is recorded and computed in the background. Alarms will be generated and the *Data Engine* and the *Report Engine* will generate reports automatically.

Login

The Login dialog is simpler than that of the Infrastructure Manager and Enterprise Console. You must specify a valid Nimsoft user name and password.

Note:
If already logged on (if e.g. running the Infrastructure Manager, Enterprise Console etc.), the login dialog will not appear at all when launching the SLM application.



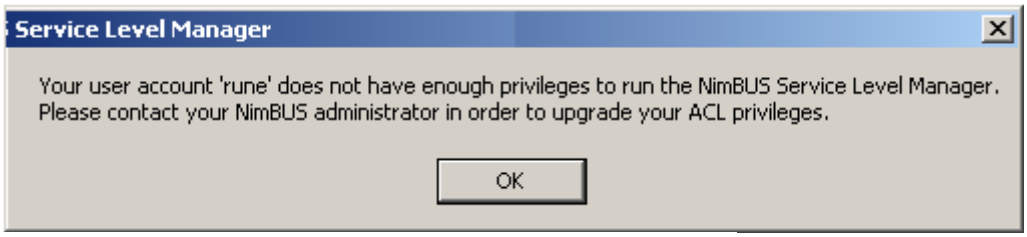
Note the Reconfigure button. Clicking this button launches the SLM Properties dialog, enabling you to change the SLM connection properties. You are allowed to change SLM Hub and Nimsoft Alarm Server.
For further information, see the **Properties** description and the section *Setting the Connection Properties*.

Note that all defined Nimsoft user names are associated with an ACL (**A**ccess **C**ontrol **L**ist), defining the privileges for the user.

There are ACLs for different types of users needing different privileges, such as *operator*, *guest*, *superuser*, *administrator* etc.

These ACLs can be modified by users with administrator privileges.

If attempting to log on as a Nimsoft user without valid privileges, the following message will appear:



Ask your Nimsoft administrator to upgrade your privileges.

See the section `<A HREF="ms-its:\Manager.chm::/managingtheaccesscontrollistacl.htm">` Managing the Access Control List`</a>` in the Infrastructure Manager on-line documentation for further information.

If logging on as a Nimsoft user with limited privileges (e.g. Operator), some of the options and tool in the application are grayed out and not active.

Note:
With Service Level Manager 4.20 or newer, it is also possible to log on the Nimsoft consoles as a LDAP user. See the Infrastructure Manager documentation for further information.

Creating Service Level Agreements

The process of creating Service Level Agreements consists of the following steps:

- Create a new SLA and define your
  - Compliance requirement.
  - Compliance period.
  - Calculation method.
  - Excluded periods.
  - Optionally attach the SLA to an account.
- Create your SLO(s) and define your
  - Calculation method.
  - Excluded periods.
  - Optional advanced Options: adding notes, FTP details and alarms.
- Defining QoS constraints with
  - QoS Object and source.
  - Defined expected QoS value.
  - Operating period.
  - Calculation method.

Creating a SLA

There are several ways to invoke the Service Level Agreement dialog:

- If you first want to create a new group for the SLA, you right-click the Service Level Agreement Node in the Navigation Pane and select *New Group*.
- If you want to place the SLA in a specific SLA group, you right-click that group in the Navigation Pane and select *NewSLA.*
- *Create a new SLA by:*
  - Selecting File > New > Service Level Agreement.
  - Right-click the Service Level Agreement Node in the Navigation Pane and select New SLA.
  - Choose one of the SLA wizards available by selecting *Tools > Wizards* from the Menu bar.

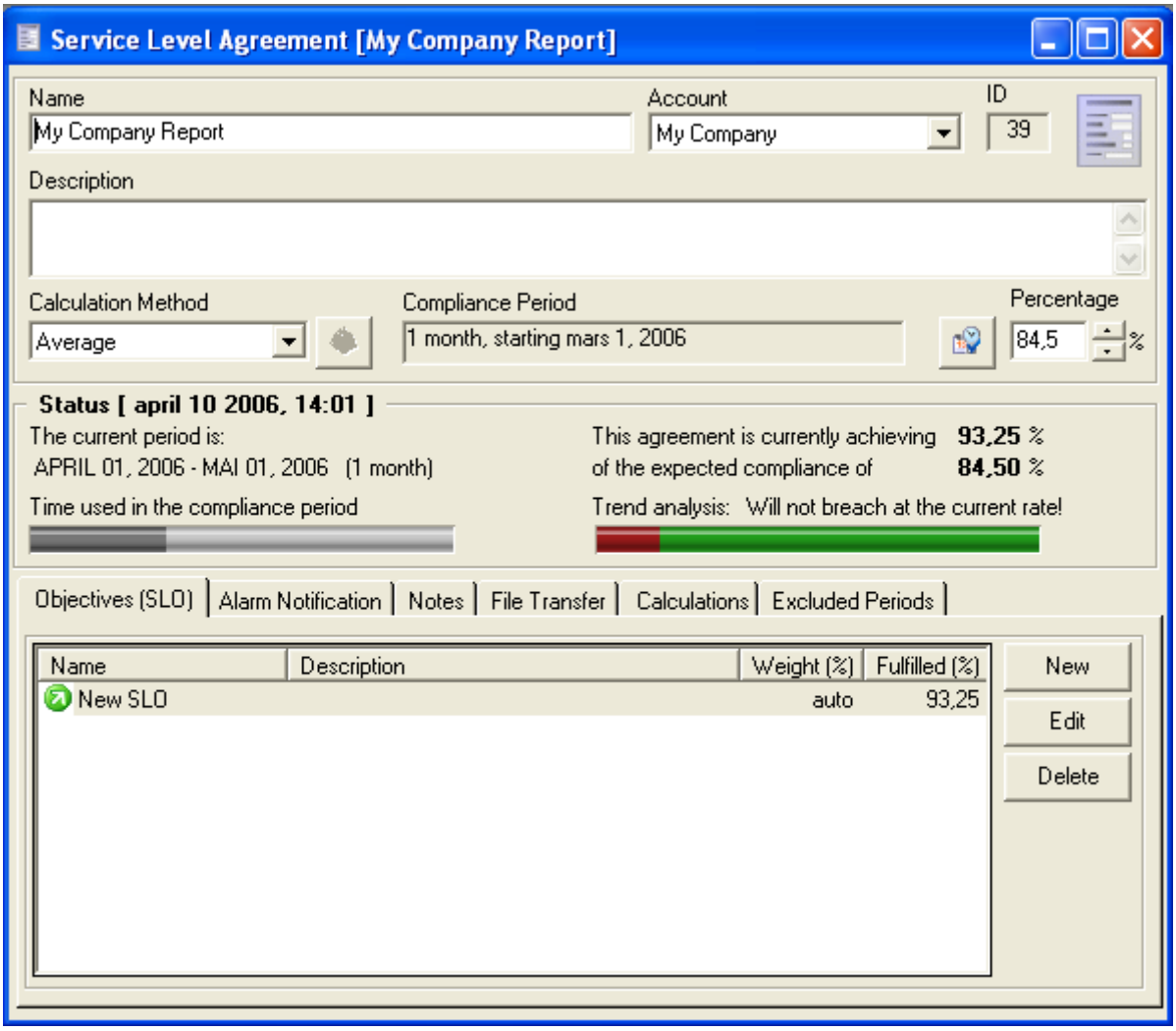
Note that you may move a SLA from one group to another in the Navigation Pane, using drag-and drop.

Introduction

Enter a descriptive name and a complete description of the SLA.

Then add your requirements to the SLA according to your needs and specification.

- General Settings.
- Service Level Objectives.
- Alarm Notification.
- Notes for the SLA.
- Using FTP profiles with the SLA.
- Recalculating your SLA compliance.
- Excluding data for specific periods.



General Settings

The following table describes the various fields in the SLA form:

- **Name**
  The short name of the SLA.
- **Account**
  If you want the SLA to belong to an account, you simply select the account you want the SLA to belong to from the drop/down list.

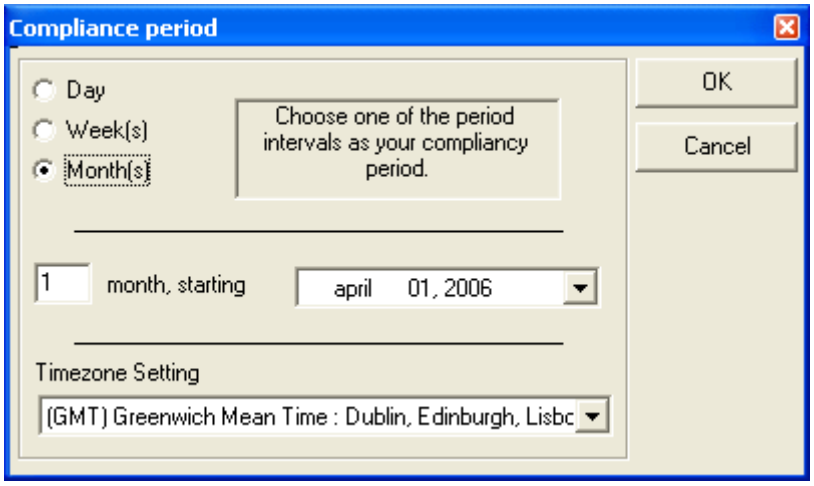
  An account typically defines a customer/company and the associated privileges. The administrator can create and manage accounts through the *Security* menu in the Infrastructure Manager Menu bar.
  See the on-line documentation for the Infrastructure Manager for further information.
- **Description**
  A longer descriptive text, stating the e.g. purpose of the SLA.
- **ID**
  Each created SLA is automatically assigned an ID number.
- **Percentage**
  Sets the compliance percentage of the current SLA.
- **Compliance period**
   Clicking the *Set Compliance Period* button opens the Compliance Period dialog, enabling you to set the SLA compliance period (the period where the compliance percentage is computed), and start date.

  The compliance period will constrain the SLA (with its underlying SLO and QoS constraints) to a user-defined timeframe, complying with an agreement between two parties. A typical period for SLA monitoring is on a monthly basis. You may, however, create daily and weekly periods as you wish.

The compliance period will, depending on its type (weekly and monthly) have fixed starting dates. For weekly reports the starting day is Mondays, and for the monthly reports the starting day is the first day of the month. However, it is possible to modify the starting day according to your specific needs. E.g. let's say you need monthly reports running from the 15th; then you adjust the starting date accordingly.

The difference in the interpretation of the *starting date* for the compliance period types is listed below:

- *Daily*
  The starting date is irrelevant.
- *Weekly*
  The starting date defines the starting day in every week.
- *Monthly*
  The starting date defines starting day of every month.



Example:
1 month, starting April 01, 2006, means that the compliance is measured and recorded into the database as soon as the next period starts.

- *Timezone Setting*
  This option enables you to set the time zone for your location. By default, the time zone of the location where the data engine is located is selected. As long as the SLM and the data engine are located in the same time zone, this setting should normally be used.

If you collect data from another time zone, and you want the SLA report to reflect the time in that zone, you can select this time zone here.

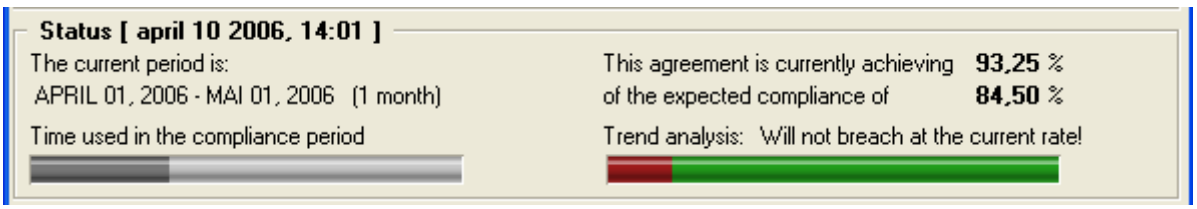
- **Calculation method**
  The SLA Monitors the compliance from the SLO(s). Calculation method is the way the SLA calculates the compliance input from the SLOs (see the section

Compliance Calculation). It is possible to define excluded periods, where the measured compliance will not influence the SLA (e.g. planned maintenance, company holiday etc.) The sample values are calculated according to the selected Calculation method:

- *Average*
  Calculates the average compliance from the SLOs.
- *Best*
  Selects the compliance from the SLO, if more than one, with the best values.
- *Sequential*
  Summarizes the periods when the expected value is not met for all SLOs and calculates the compliance.
  The difference between 100 % and achieved compliance for each SLO is summarized and extracted from 100%.
- *Weight*
  Weights the compliance from the different SLOs, according to importance (either auto- or manually defined).

  Selecting this option opens the Weight Properties dialog, where you can weigh the importance of the different SLOs, either manually or automatically (see the section *Distributing Importance (weight)*).
- *Worst*
  Selects the compliance from the SLO with the worst values.

Status



The status field gives you the following information:

The current period
Shows the current period defined by the compliance period settings (see above).

Time used in the compliance period
Shows the current placement in the compliance period. The dark part indicates how much time is spent of the period.

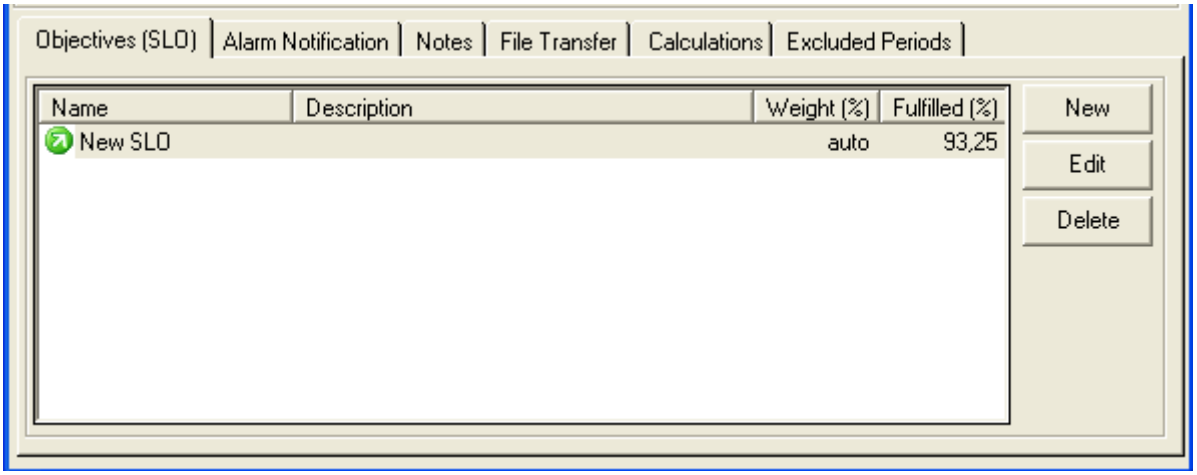
Achieved compliance
Shows the current compliance percentage values.

Expected compliance
Shows the expected compliance percentage values.

Trend analysis
Indicates **if** and **when** the SLA breaches the defined compliance percentage.
If a part of the bar is red, it indicates how much is used of the "allowed" unavailability. A bar that is almost completely red indicates that it is close to a breach.

The Service Level Objective (SLO) List

The service level objective list shows the status of the objectives within the current SLA. The table below describes the fields and the action buttons related to SLOs. You may copy an existing SLO from another SLA by drag and drop operations.



Name
The short name of the SLO(s).

Description
A longer descriptive text, describing the purpose of the objective

Weight
Shows the settings for the importance of the objective (see *Distributing Importance (weight)*) in relation to the other objectives within the current SLA. The possible values are **auto** or a percentage value.

Fulfilled
Shows the level of fulfillment (percent) of the objective. 100% means completely fulfilled.

New [Button]
Create a new objective within the current SLA.

Edit [Button]
Edit the selected objective.

Delete [Button]
Removes the selected objective from the current SLA.

Legend

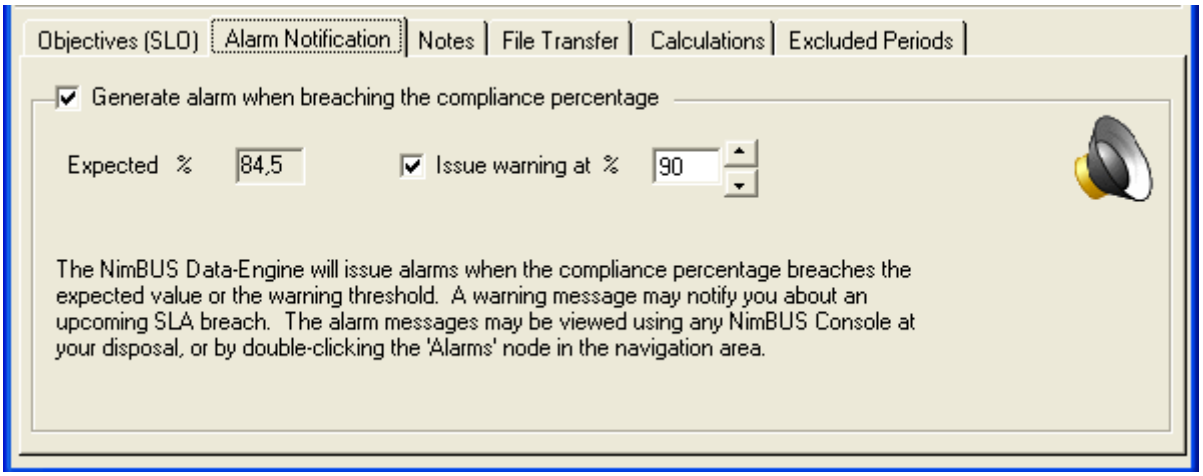
-The SLO is compliant with the requirements stated by the SLA and the QoS constraints defined within the SLO.

-The SLO is **not** compliant.

-No compliance values are currently available.

Alarm Notification

SLM is capable of generating alerts whenever a SLA has breached the defined compliance settings. The alert is treated as any alarm, and may be forwarded to e.g. email, paging etc.



Generate alarm when breaching the compliance percentage
Check this option if you want to be notified upon SLA breach. A standard Alarm is issued when the compliance breaches the value you specify in the Expected field (see below).

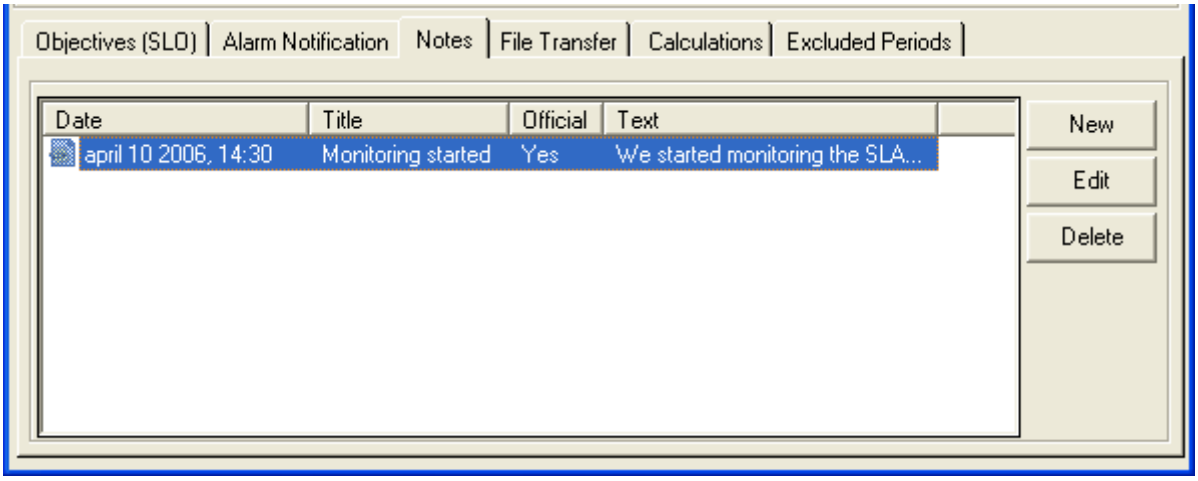
Expected %
Specify the threshold value for the alarm.

Issue warning message at
Check this if you want to be notified prior to the SLA breach, and also the threshold for generating the warning.

Notes

Any system administrator will comply with the fact that "unscheduled things may happen". This information is included in the reporting feature of SLM. E.g. you may want to notify about an event that occurred in the operating

period and therefore affected the outcome of the SLA compliance.



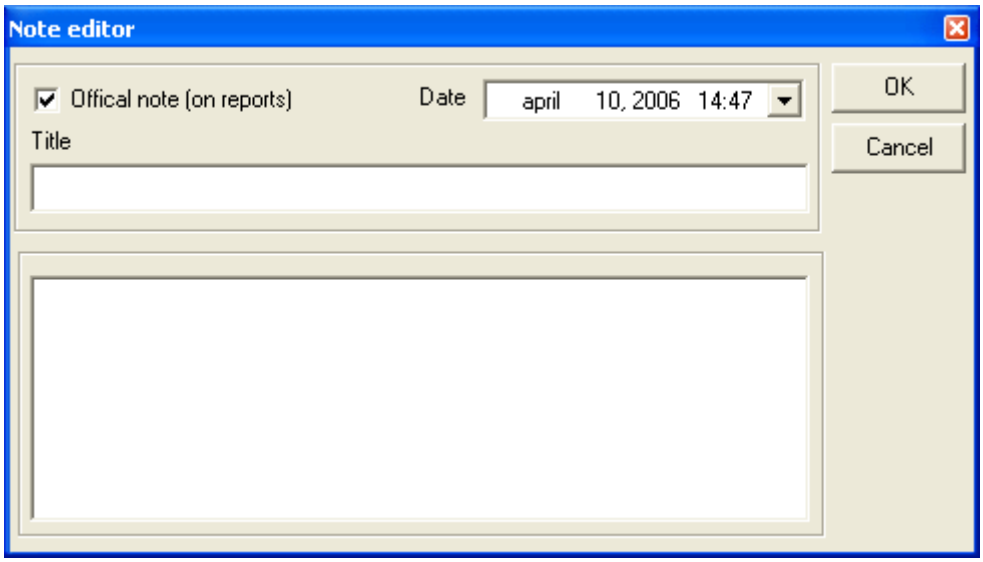
Date
Ties the note to a specific date/time.

Title
A descriptive text, describing the reason for the note.

Official
Defines the note to be official (included in the reports).

Text
The actual text body of the note

New [Button]
Create a note within the current SLA. The Note editor appears, enabling you to type your note.



Edit [Button]
Edit the selected note.

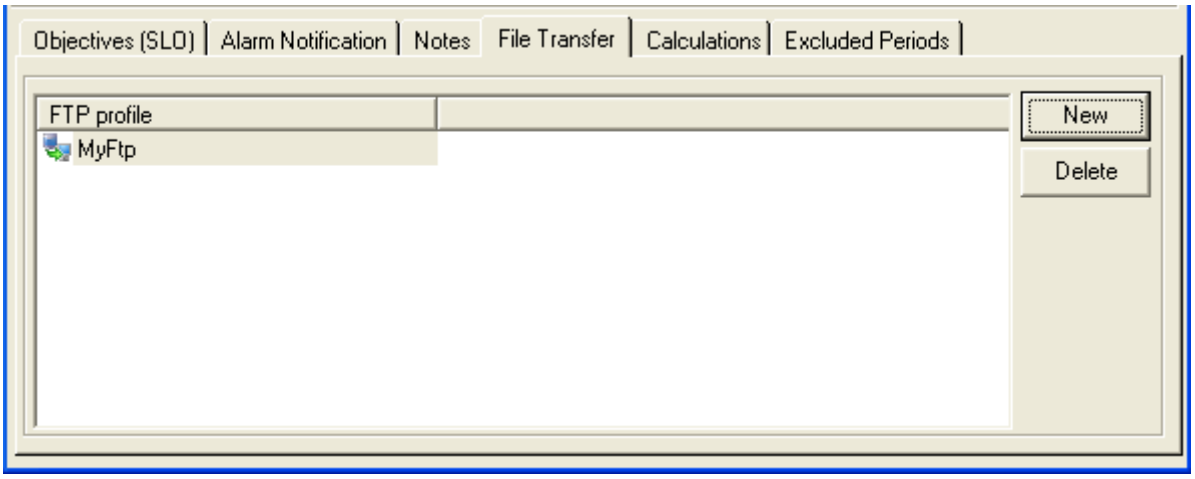
Delete [Button]
Removes the selected note from the current SLA.

File Transfer

The report engine will use the profiles defined in this list to transfer the HTML reports using FTP (File Transfer Protocol). The reports may be published to a web server for browsing. Simply drag the FTP profile(s) from the navigation-tree into the list to activate the FTP mechanism.

New [Button]
Assign a FTP Profile to the current SLA. Also see the section *Creating a FTP Profile*.

Delete [Button]
Removes the selected FTP profile from the current SLA.



Calculations

A compliance calculation is automatically performed on schedules as specified in the sla_engine. You may, however, require a recalculation due to various reasons by creating a new calculation.

The list shows all available compliance jobs related to the current SLA.

Job Id.
The job identification number assigned to a new job.

Period Begin
Defines the starting date/time of the compliance calculation period.

Period End
Defines the end date/time of the compliance calculation period.

Owner
The name of the operator that requested the calculation job

Job Start
Defines the date/time for when the compliance calculation job should start.

Job Expire
Defines the date/time for when the job is automatically removed from the SLM system.

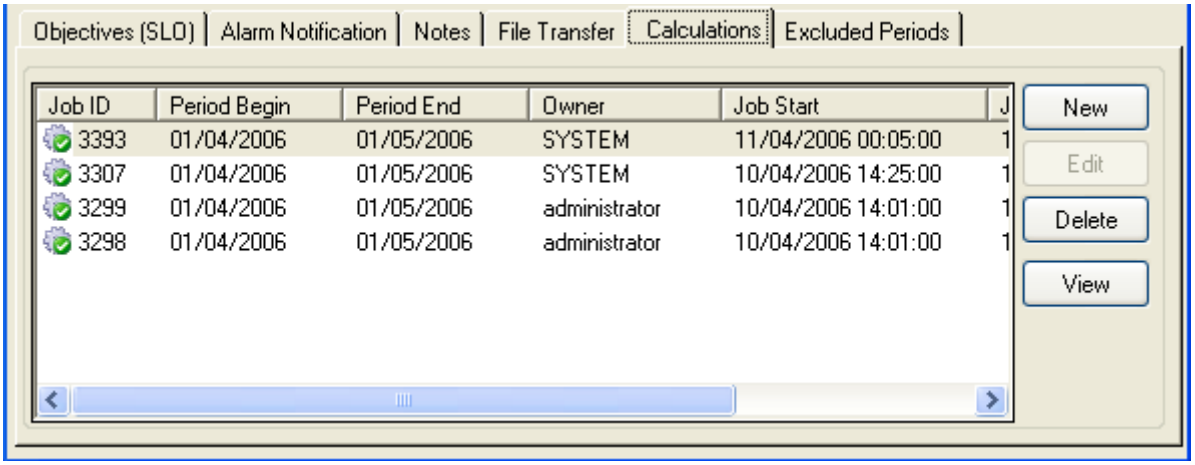
History
Indicates that compliance data should recorded/saved for historic reports.

New [Button]
Initiates a new compliance calculation using the current SLA.

Edit [Button]
Edit the selected job (only available when the job is queued).

Delete [Button]
Deletes the job from the system.

View [Button]
View the result of the compliance calculation.

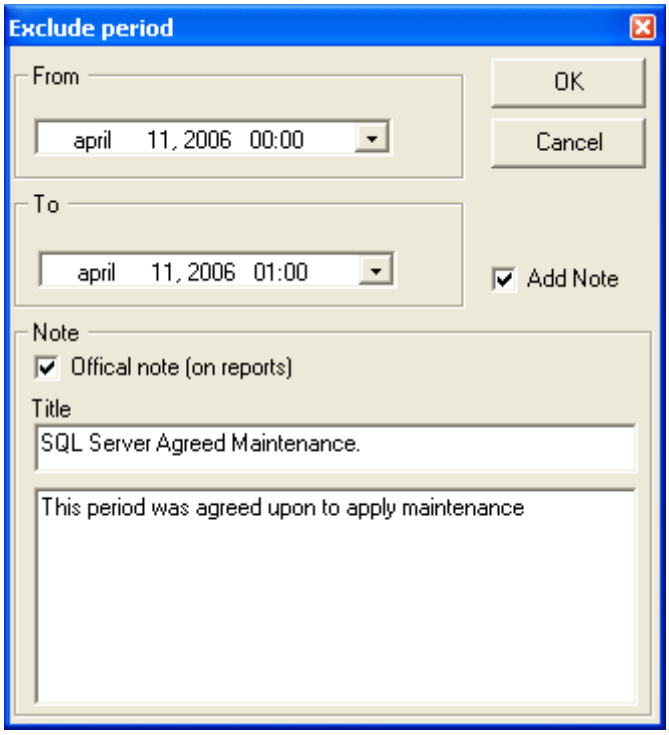


Also see the section *Watching SLA Calculations*.

Excluded Periods

In normal system management scenarios, services are subject to maintenance. Some maintenance is scheduled and some is not. Depending on the service level agreement between the parties involved, data may (or may not) be excluded due to unavailability of the service. The unavailability will most certainly affect the SLA compliance.

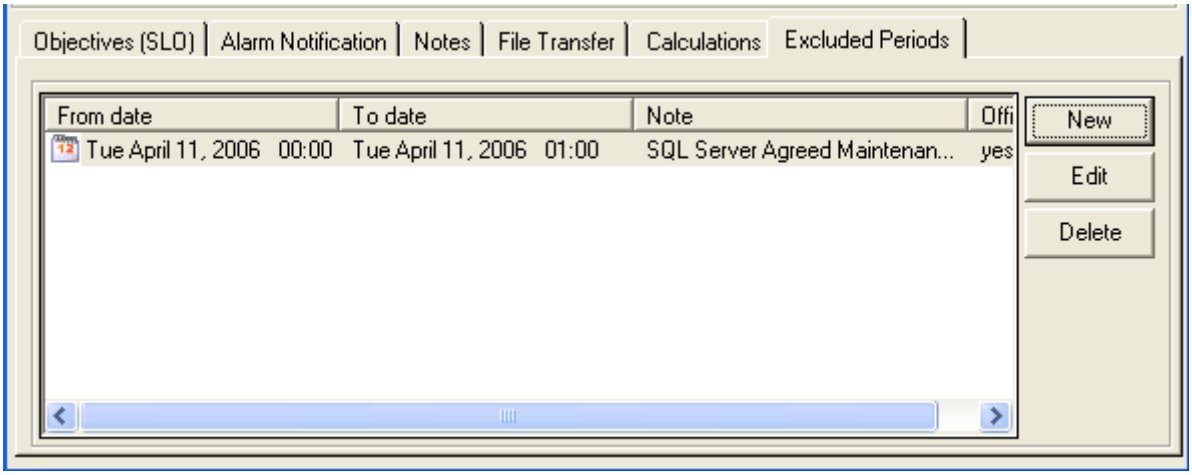
- *New [Button]*
  Opens the Exclude period dialog, enabling you to define an exclude period for the current SLA.



- *From Date*
  Defines the starting date/time for when to exclude data.
- *To Date*
  Defines the starting date/time for when to exclude data.
- *Note*
  The textual note (title and a description) related to this exclude period.
- *Official*
  Should the exclude period appear on the reports.

- *Edit [Button]*
  Edit the exclude period and note.
- *Delete [Button]*
  Deletes the exclude period from the current SLA.

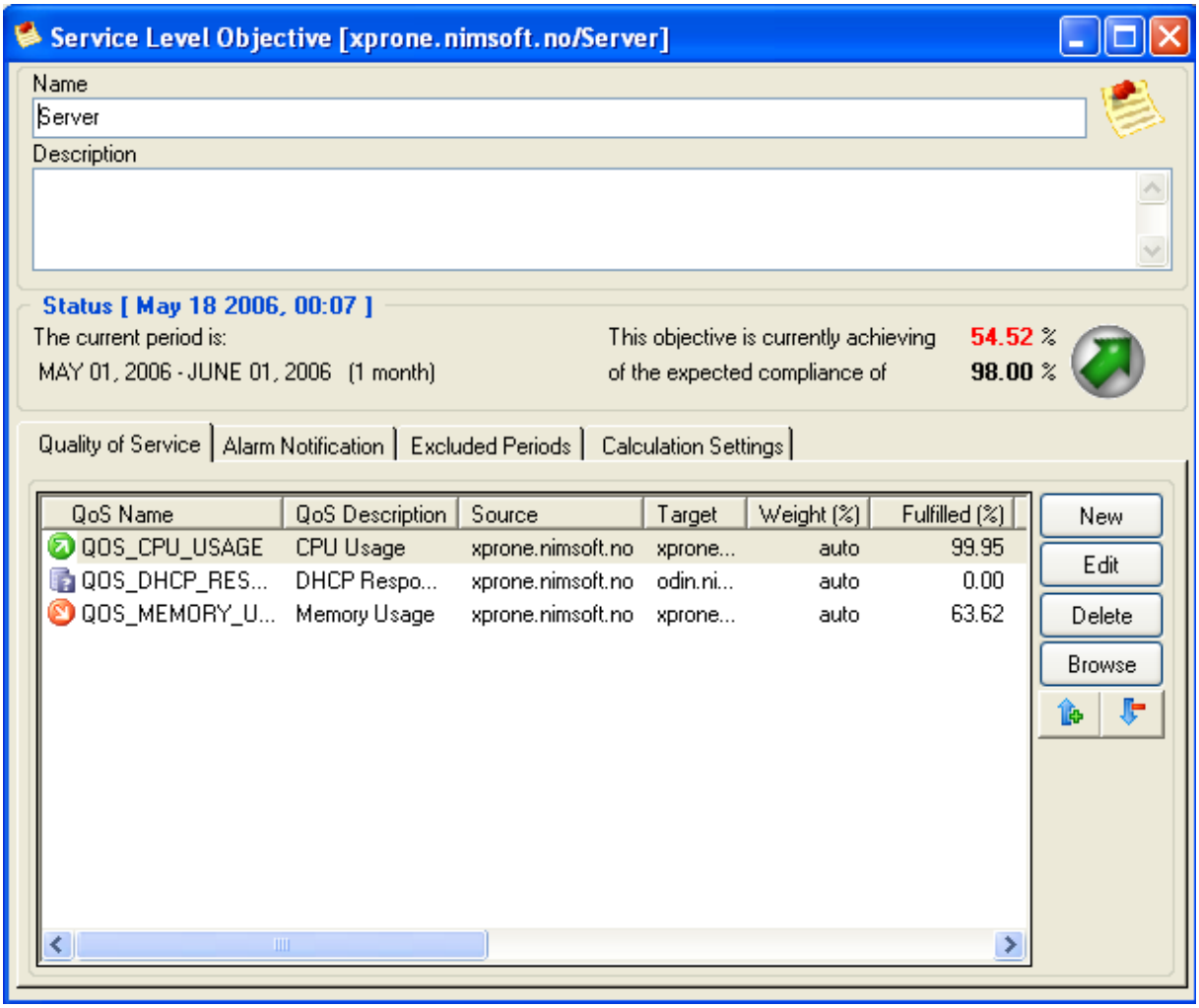
When clicking the *OK* button, the excluded period newly created will appear in the list



See also the section *Excluding Quality of Service Data*.

Creating a Service Level Objective (SLO)

Pressing the *New* button creates a new SLO form for you to complete. Enter a descriptive name and a complete description of the objective.



A SLO is built around one or more constrained Quality of Service (QoS) objects. The constraint is a combination of **source, target, threshold** and operating period settings for the QoS object.

You may invalidate the objective for certain periods, either known scheduled "down-time" due to maintenance etc. or unforeseen situations.

Breaches of the objective may also be reported as alarms, as you could with SLAs.

These are the various fields in the main SLO form:

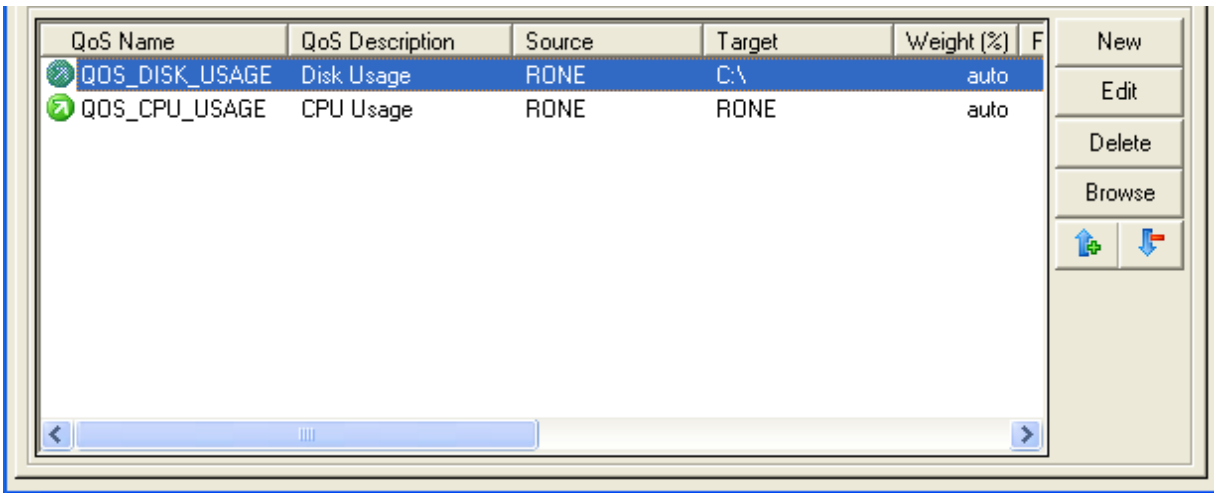
Name
The short name of the SLO.

Description
A longer descriptive text, stating the e.g. purpose of the SLO.

Achieved (status)
Shows the compliance percentage of the current SLO.

Expected (status)
Shows the expected compliance percentage.

The Quality of Service Tab



QoS Name
The official name of the Quality of Service object.

QoS Description
The description of the Quality of Service object

Source
States the source of the QoS data. E.g. computer, device etc

Target
States the target of the QoS data. E.g. the disk, network service, CPU, etc

Weight
Shows the importance of the QoS constraint in relation to the other QoS objects within the

current SLO. The possible values are **auto** or a percentage value.

Fulfilled
Shows the level of fulfillment (percent) of the QoS constraint. 100% means completely fulfilled.

Operator
The operator code for the value comparison

Threshold
The value set as expected QoS value for the QoS constraint.

Op.period
The defined operating period for the QoS constraint

OK
The number of samples that are validated against the threshold + operator and found to be **ok**.

Total
The number of sampled data used in the *calculations.*

Accuracy
The accuracy of the sampled data

Calc.method
The selected calculation method for the QoS constraint

Order
The order of the QoS constraint in the list.

New [Button]
Create a new QoS constraint within the current SLO.

Edit [Button]
Edit the selected QoS constraint.

Delete [Button]
Removes the selected QoS constraint from the current SLO.

Browse [Button]
Browses the QoS samples related to the current compliance period.

The Quality of Service constraints for the current SLO shows a current state based on the last computations by the *SLA Engine*. A **green** indicator illustrates a positive direction, i.e. the QoS is above the SLA compliance percentage. A **red** indicator means that the QoS is not conformant with the expected SLA fulfillment, this may however, not mean that the objective is breached. This depends on the weight of the QoS constraint in relation to the other constraints. The legend is as follows:

 -The QoS is compliant within the defined constraints (source, target, threshold and period).

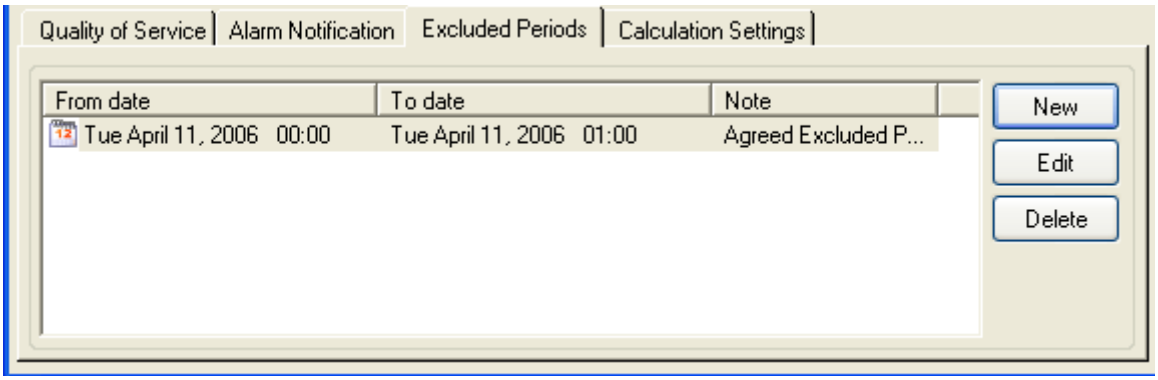
-The QoS is **not** compliant.

-No compliance values are currently available.

These buttons let you move QoS constraints up or down in the list. Note that the buttons will not appear if using a pre Nimsoft 3.30 SLM database.

The Excluded Periods Tab

The service level objective list shows the status of the objectives within the current SLA. The table below describes the fields and the action buttons related to SLOs.



From date
Start of the exclusion period.

To date
End of the exclusion period

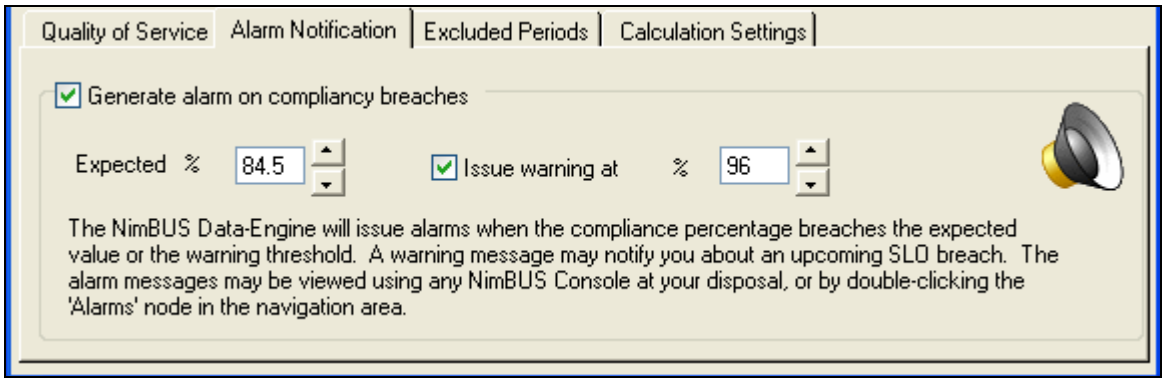
New [Button]
Create a new period within the current SLO.

Edit [Button]
Edit the selected period.

Delete [Button]
Removes the selected period from the current SLO.

The Alarm Notification Tab

Breaches of the SLO may be reported as alarms.



Generate alarm on compliancy breaches
Check this option if you want an alarm to be generated when the SLO breaches the value specified in the *Expected* field (see below). A standard Alarm is issued.

Expected
Set the compliance level threshold value for the alarm.

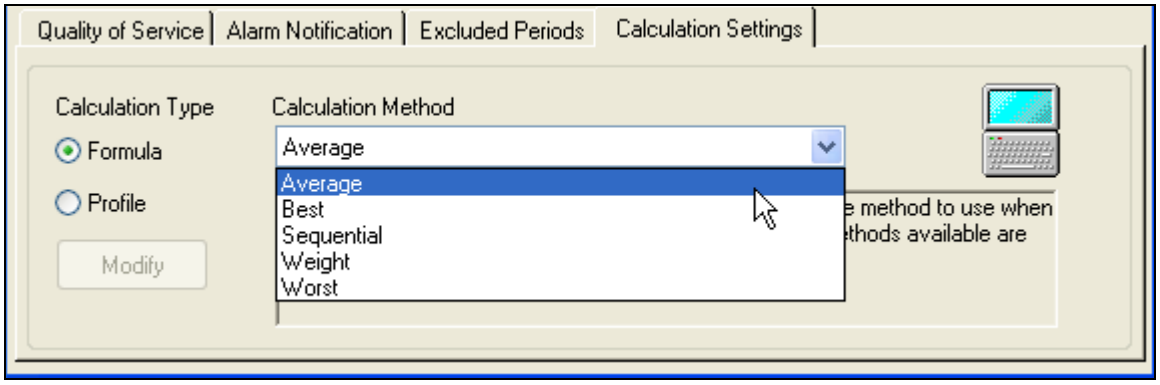
Issue warning at
Check this option if you want a warning to be issued at a specified compliance level prior to the SLO breach

The Calculation Settings Tab

Here you can select the way the compliance for the SLO is computed (see the section

Compliance Calculation).

Calculation *methods* available depend on the selected Calculation *type*.



- Calculation type
  If Formula is selected, you are allowed to select one of the Calculation methods from the drop-down menu.

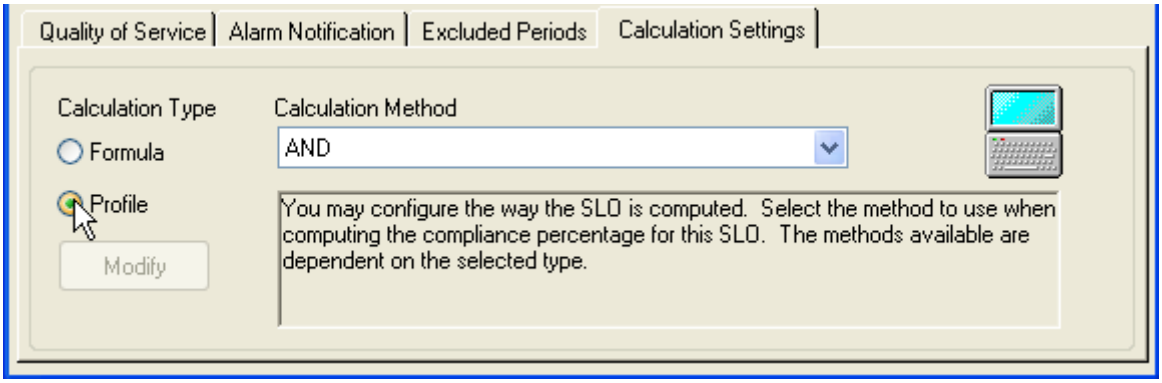
  The calculation methods determine how to use the calculated compliance percentage from the QoS constraints.

  The compliance percentage is defined to be the percentage of time that the QoS, constrained by e.g. operating period and thresholds, should be considered compliant within the compliance period.

  - *Average*
    Calculates the average compliance percentage from the QoS constraints.
  - *Best*
    Selects and uses the compliance percentage from the QoS constraint with the best compliance.
  - *Sequential*
    Summarizes the periods when the expected value is not met for all QoS constraints and calculates the compliance.
    The difference between 100 % and achieved compliance for each QoS is summarized and extracted from 100%.
  - *Weight*
    Weights the compliance from the different QoS constraints, according to importance. When weight is selected, the Weight Properties dialog is opened, enabling you to set the importance of the different QoS constraints.

- *Worst*
  Selects and uses the compliance percentage from the QoS constraint with the worst compliance.

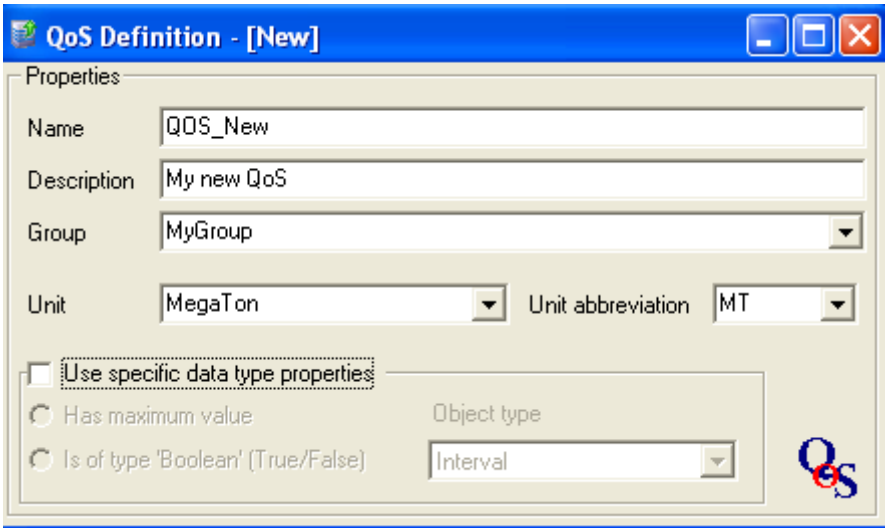
- If *Profile* is selected, you are allowed to select one of the defined *Calculation profiles* (if any) from the drop-down list. Note that these are listed under the *Calculation Profiles* node in the *Navigation Pane*.
  You will then get the compliance percentage for the SLO.



Defining a Quality of Service object

Any QoS enabled probe will initiate itself (during startup) by sending a *QOS_DEFINITION* message. This is picked up by the *Data Engine* and decoded for information. The content of this message refers to a Quality of Service object in the database. The object will **automatically** be created in the database with the provided information. You may, however, also create the QOS object **manually**, by adding the definition using the Service Level Manager. Select *File* > *New* < *Quality of Service* from the menu bar.

The following table describes the various fields in the dialog form:

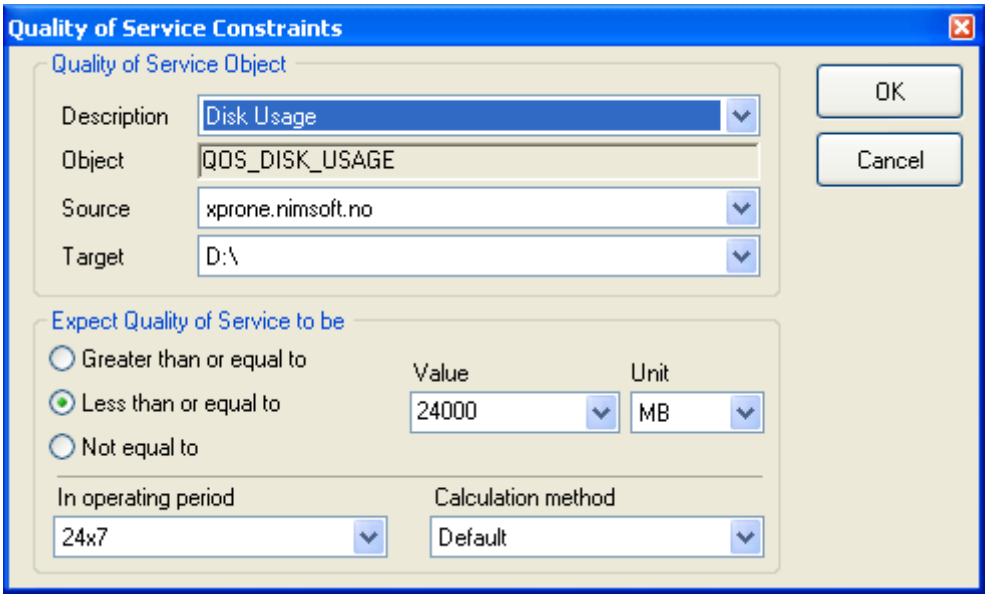


Field	Description
Name	The actual object name on the form QoS_xxx.
Description	A short descriptive text.
Group	The group the object belongs to.
Unit	A string stating the unit (e.g. Milliseconds, Centimeter, etc.)
Unit abbreviation	Used by reports and views (e.g. ms, cm)
Has maximum value	Defines the object with a maximum value.
Is of type Boolean	Sets the type of the object to be Boolean (True/False).

Defining QoS Constraints

The Quality of Service data itself has no value to the service objective unless it is constrained to a specific time-period, specific source/target information and rules to check the actual sample values.

Pressing the *New* button in the SLO form triggers the QoS constraint dialog-box.



The following table describes the various fields in the dialog-box:

Field	Description
Object	The Quality of Service object.
Description	A short descriptive text.
Source	From where the sample-value originates.
Target	The target name of the sample, e.g. a disk, URL etc.
Value (Expect Quality of Service to be)	The threshold value, used in conjunction with the rules (greater than, less than etc.
Unit	A QoS definition describes a unit for the QoS value (e.g. kilo, % mS etc). This will be the default unit. For some QoS objects you can select other units. This drop-down list lets you select another unit, if available. Note that the value will automatically be converted to match the new value. Example: If the value initially is 1 second, and you change the unit to milliseconds, the value will automatically change to 1000.
Operating period	The period the constraint is valid. You can select one of the defined operating periods or select *Always* (means 24 hours a day, 7 days a week).
Calculation method	Here you can select *Default* or one of the custom-made Calculation Profiles (if any) for QoS calculations. See the sections *Compliance* Calculation, *Calculation Profiles* and *Creating a Calculation Profile*. These settings describe the way the SLO will calculate the compliance input from the QoS constraints. **NOTE:** If selecting calculation method AND or OR, this will have

	the following effect on the SLA reports: The *Weight*, *Achieved* and *Expected* columns will display N/A instead of a value. The reason is that there is no individual calculation of the QoS series (all data series are calculated equally).

The *value* dropdown list will (if available) reveal the following values:

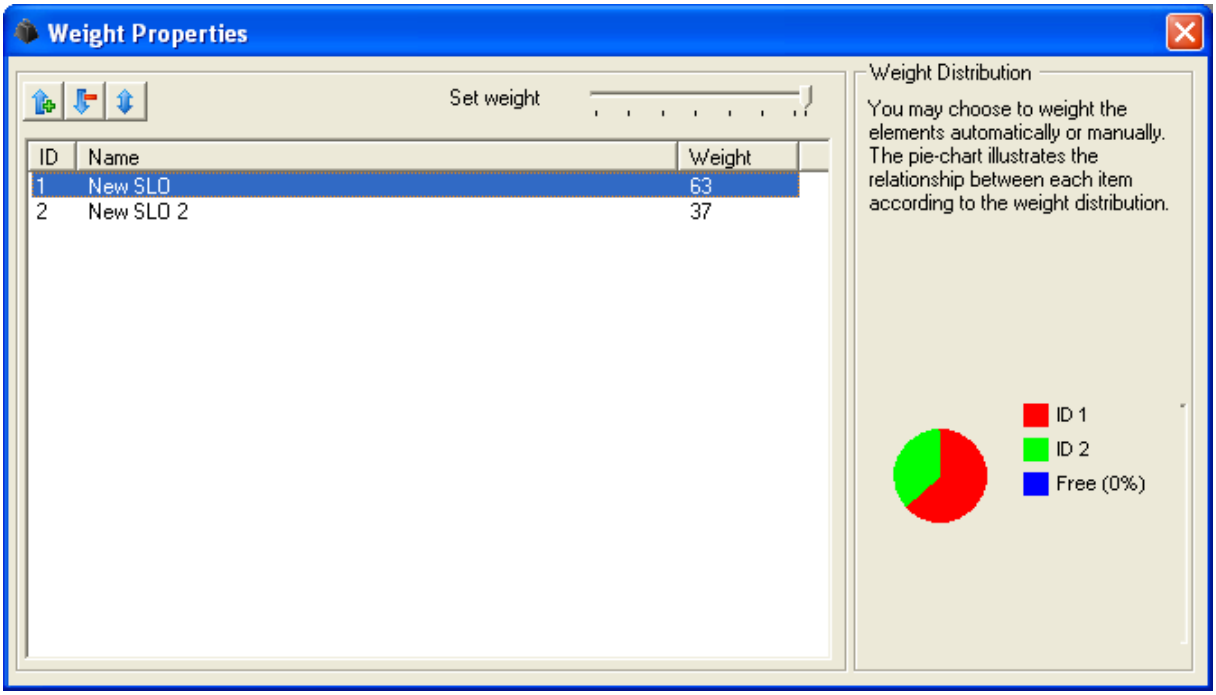
Minimum sample	Smallest value in sample range (last 24 hours)
Average sample	Average value the last 24 hours.
Maximum sample	Highest value in the sample range.
Defined maximum value	The QoS definition states that a maximum value exists for this QoS object, such as a disk sample.

Viewing the current sample-values

Use the QoS sample browser (see *Viewing the Quality of Service (QoS) Data*) to determine the best possible values for your QoS threshold settings.

Distributing Importance (weight)

When setting up service level agreements and objectives, we recognize the fact that some objectives are more important than others. The same fact applies to QoS constraints. The *weight distribution* feature will help the user to either automatically or manually set up importance (measured in percent) for SLO or QoS constraints. Clicking the *Weight* button in the SLA dialog opens the weight dialog, showing a pie chart representing the importance (%).



Automatic Weight Distribution

The weight will automatically be computed based on the number of objects available (objectives or constraints). This is the default method.

Manual Weight Distribution

This mode enables the user to manually distribute weight using the selected object (from the list) and the slider. Please note that all of the 100% needs to be distributed.

Creating a Compliance period

The compliance period will constrain the SLA (with its underlying SLO and QoS constraints) to a user-defined timeframe, complying with an agreement between two parties. A typical period for SLA monitoring is on a monthly basis. You may, however, create daily and weekly periods as you wish.

The compliance period will, depending on its type (weekly and monthly) have fixed starting dates. For weekly reports the starting day is Mondays, and for the monthly reports the starting day is the first day of the month. However, it is possible to modify the starting day according to your specific needs. E.g. let's say you need monthly reports running from the 15th; then you adjust the starting date accordingly.

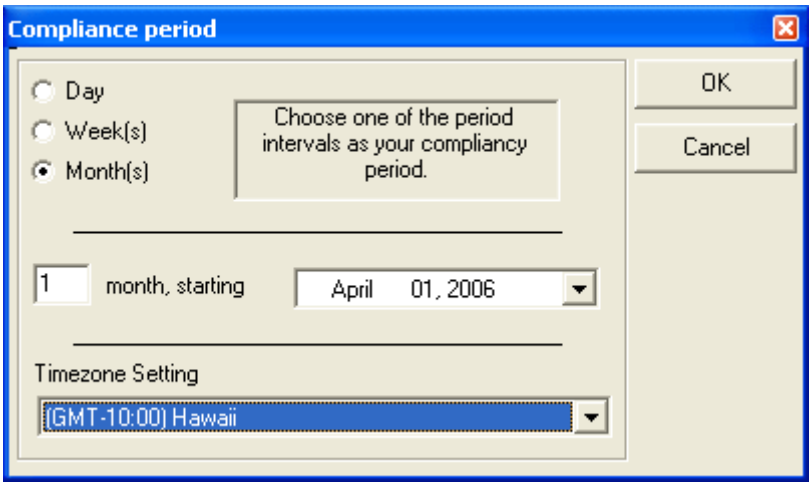
 Click the Compliance Period button on the SLA dialog to open the Compliance Period dialog.

See below for a description of the difference in the interpretation of the *starting date* (at the bottom of the dialog) for the compliance period types.

Daily
The starting date is irrelevant.

Weekly
The starting date defines the starting day in every week.

Monthly
The starting date defines starting day of every month.



Timezone Setting
This option enables you to set the time zone for your location. By default, the time zone of the location where the data engine is located is selected. As long as the SLM and the data engine are located in the same time zone, this setting should normally be used.

If you collect data from another time zone, and you want the SLA report to reflect the time in that zone, you can select this time zone here.

Creating an Operating Period

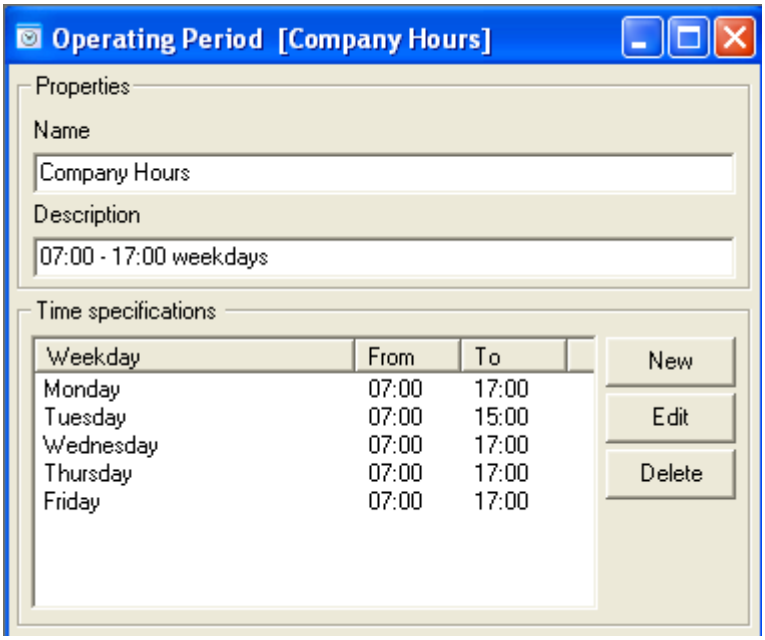
Operating periods are used to constrain the measured values (Quality of Service) to specific hours of any day.

The operating period is defined to be a collection of time periods, and is used when we define new SLAs. We use the Operating Periods when defining the QoS constraints.

Samples falling outside these time specifications will not influence the SLO/SLA compliance requirements.

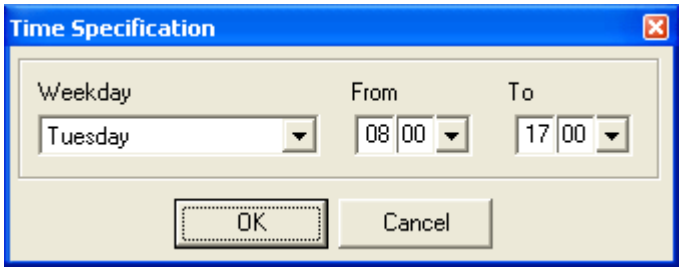
The *Operating Period* dialog is opened by right-clicking the *Operating Period* Node in

the Navigation Pane and selecting the *New* option.



Give the operating period a name and an optional description. Click the *New* button in the dialog to add days and time specifications.

To edit an entry in the list, simply double-click the entry to open the time specification dialog for the selected entry.



For example, let's create an operating period we can call *Company Hours*. First let's define our work-hours. Normally, they are Monday-Friday, from 0700 to 1700. The scheduled downtime is every Tuesday at 1500-2000 (*****).

The "Company Hours" profile will contain a list of time-specifications (days and time) like the one below:

Day	From	To
Monday	07:00	17:00
Tuesday	07:00	15:00 *
Wednesday	07:00	17:00
Thursday	07:00	17:00
Friday	07:00	17:00

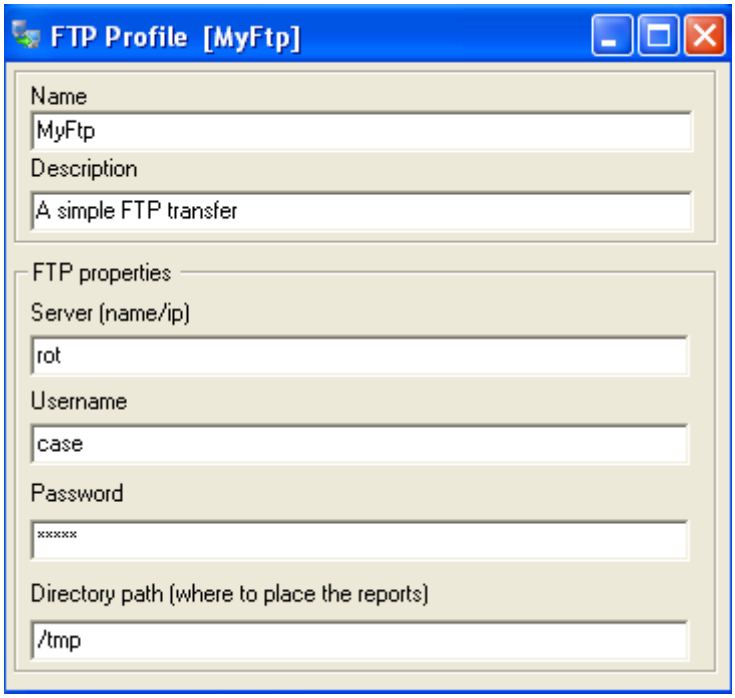
***** We simply ignore the scheduled downtime because it is outside our "work hours".

The format of the operating period and the time-specifications is so flexible that we can create complex operating periods.

Creating a FTP Profile

The report_engine is able to upload reports to one or more FTP servers in the network. This is useful whenever you wish to publish reports to high-end HTTP servers. You may share FTP profiles among multiple SLA definitions. Simply drag the FTP definition from the navigation-tree into the FTP tab of the targeted SLA.

Create a FTP Profile by right-clicking the FTP Profile node in the Navigation Pane and select *New*, and the FTP Profile dialog will be launched.



The fields in the dialog:

Name
The short name of the profile.

Description
A longer description of the profile

Server
The name of the server to which you want to upload reports.

Username
The username used to log in when accessing the FTP server.

Password
The Password used to log in when accessing the FTP server.

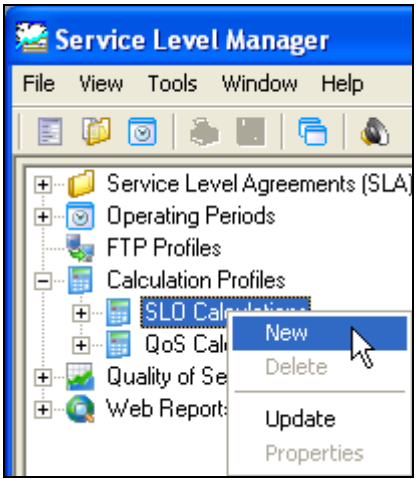
Directory path
In which directory to place the files
Note that the directory path must exist on the

target computer and that the user specified must have sufficient privileges.

Creating a Calculation Profile

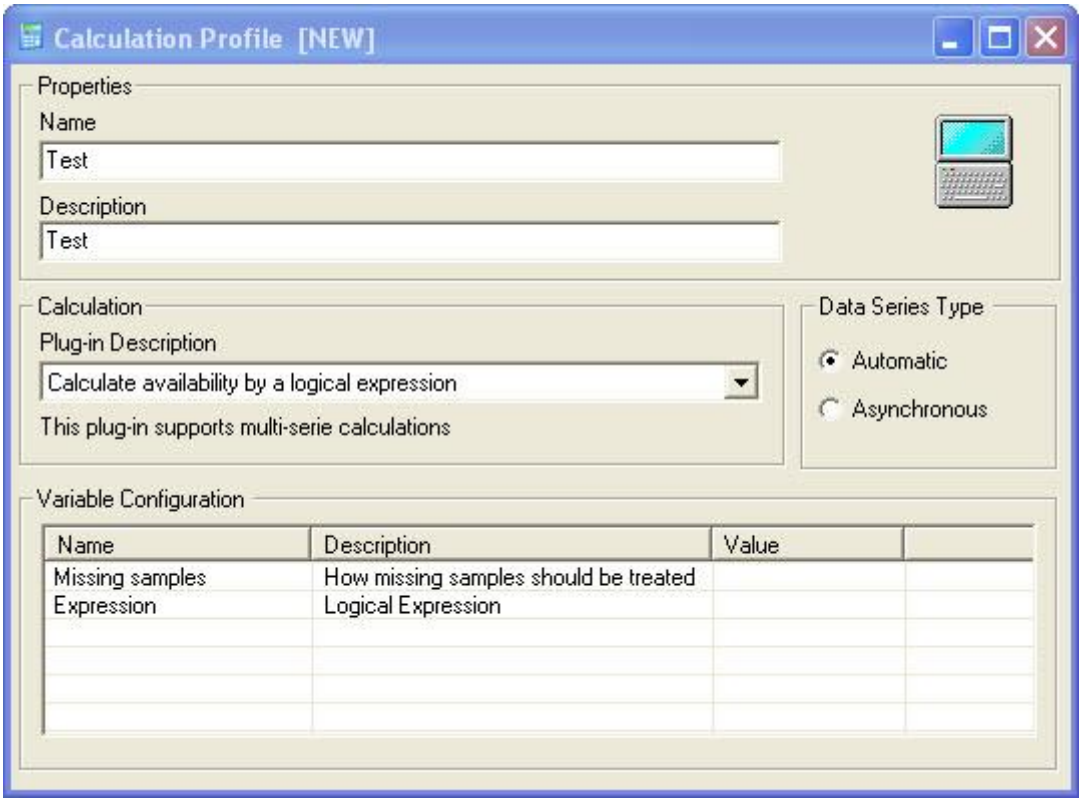
Users are allowed to define their own calculation profiles. This is done by right-clicking one of the Calculation Profiles sub-nodes in the Navigation Pane and selecting *New*.

- Right-clicking the SLO Calculation sub-node (or one of the defined SLO calculation profiles), selecting *New*, opens an empty dialog enabling you to define a new SLO Calculation profile.
- Right-clicking the QoS Calculation sub-node (or one of the defined QoS calculation profiles), selecting *New*, opens an empty dialog enabling you to define a new QoS Calculation profile.



These Calculation Profiles can be selected when defining the calculation properties for Service Level Objects (SLOs) and Quality of Service Constraints.

The profiles are based on built-in plug-ins distributed with the Service Level Manager application.



- **Name**
  Give the new Calculation profile a name in this field.
- **Description**
  Give a short description of the Calculation profile in this field.
- **Calculation**
  You can select one of the available calculation plug-ins from the drop-down list.
  Available plug-ins in the list depends on if you have opened the dialog for a SLO calculation profile (multi-series calculations) or the list for a QoS calculation (single-series calculations).

  The figure above shows the dialog for the QoS calculation profiles.

  We currently have four plug-ins:

  For QoS calculations:

  Calculate availability from the average of all samples.
  Finds the average value of all samples and compares this value against the defined threshold value.

  - If the average value of all samples meets the constraints, the availability for that QoS is 100%.
  - If the average value of all samples does not meet the constraints, the availability for

that QoS is by default set to 0%.
Note: Setting the *Breach value* to another value, using *Variable configuration* (see below), and the percentage (on breach) can be set to another value than 0%.
Also note that you can define the way NULL values are handled. (NULL value, typically if a probe does not measure a value from the target due to a timeout, e.g. no answer to a ping).

Example:
Threshold: 5
Samples: 5,4,8,6,2 and one NULL sample.
Define NULL sample as ignored and Breach Value as 35%, using the *Variables Configuration*.

Availability: The NULL sample is ignored, giving an average value of (5+4+8+6+2)/5= 4.6.
This is below the threshold (5), and therefore a breach condition (which we have set to 35%).

- *Calculate availability from number of samples that meets the constraints*.

  This profile calculates the availability by finding the percentage of samples that meets the constraints.

  Note that you may, using the *Variables Configuration*, define how missing samples should be treated: either ignored (and not influencing the availability) or treated as samples not meeting the constraints.

  Example:
  Threshold: 5
  Samples: 5,4,8,6,2 and one sample missing.
  Define missing samples as ignored, using the Variables Configuration).

  Availability: One sample missing (ignored), 3 of four samples meets the constraints, giving an availability of 75%.

- *Calculate availability from the median.*

  The median of a number of values is found by sorting the values in a row in descending

order. The value found in the middle of the row is the median value.

Example:
Threshold: 5
Samples: 5,4,8,6,2.
Sorted in descending order: 2,4,5,6,8 The value in the middle of the row is 5, which means that the median value is 5.

Availability: The median value 5 means that the threshold value is not breached. This mans 100% availability.

Note: Using the *Variables Configuration*, you are allowed to define a *floor* level and a *ceiling* level. Values below the floor level and above the ceiling level will be ignored and not count when calculating the median value.

For SLO calculations:

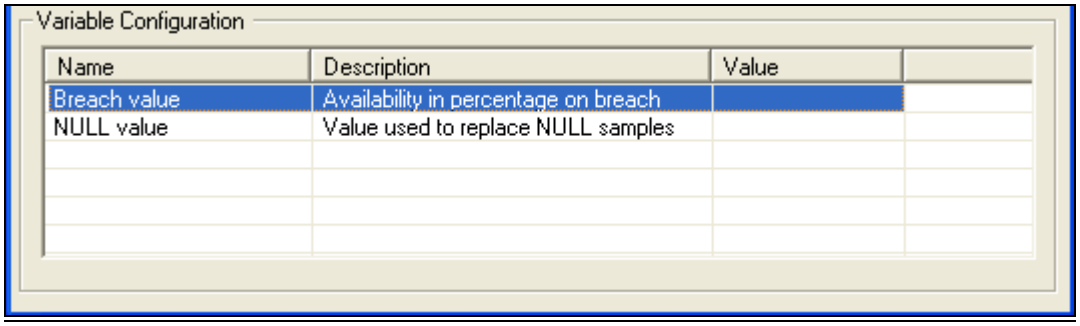
- *Calculate availability by AND-ing or OR-ing the data series.*
- *Calculate availability by logical expression*

  For creating a new Multi Expression in SLM, create a new *Calculation Profile* under SLO Calculations. For setting the logical expression in the profile, set the value in the *Expression* field.

- **Data Series**
  - *Automatic*
    QoS Data is recorded at intervals as specified in the probe configuration.
  - *Asynchronous*
    QoS Data is recorded only each time the measured value changes.
- **Variable Configuration**
  This field enables you to modify the selected plug-in.

  Example 1:
  If using the plug-in "*Calculate availability from the average of all samples*", you double-click the lines in this field to define how to handle

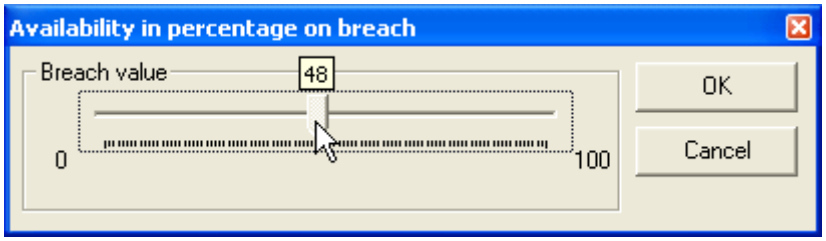
Null values samples and *Breach values.*



Breach value

When the average value breaches the defined threshold for the QoS, the average value is by default set to 0 % availability for that QoS.

This can be overridden by clicking the *Breach value* entry and set the Breach value to another percentage, e.g. 54 % as in this example.

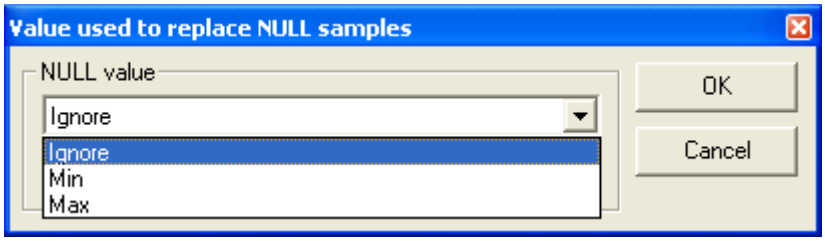


Null value

In the case of *Null value* samples in the data series, you have the following options on how these samples should be treated:

If none of the options described below are selected, a NULL sample will be treated as a not compliant value.

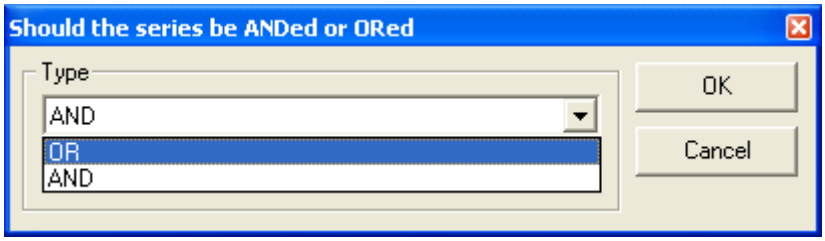
- *Ignore*
  The samples will be ignored and will not influence on the compliance percentage. The value "0" will be entered in the Value column.
- *Min*
  The samples will be set to the same value as the minimum sample value found in the dataseries. The value "1" will be entered in the Value column.
- *Max*
  The samples will be set to the same value as the maximum sample value found in the dataseries. The value "2" will be entered in the Value column.



Note:

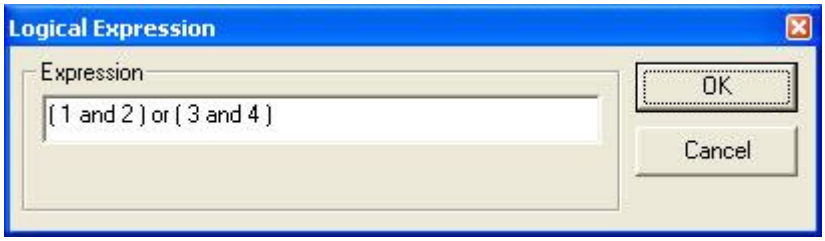
Right-click the NULL value entry and select Clear Parameter to reset the current parameter value

Example 2:
If using the plug-in with AND or OR calculation, you double-click the line in this field to select if the series should be *AND-ed* or *OR-ed*.



Expression

If using the plug-in with logical expression, you double-click the line in this field to define the logical expression.



For setting the expression use following guideline otherwise the expression parser error will occur.

- Use AND, OR and NOT operators either in upper and lower case.
- The QOS are represented by integer number.
- Each expression must be enclosed in bracket.
- Each token in the expression must be separated by a space.

Some valid samples of the logical expression are

- (1 or 2)
- (1 AND 2)
- (1 and (NOT 2))
- (1 AND 2) OR (3 AND (not 4))

Excluding Quality of Service Data

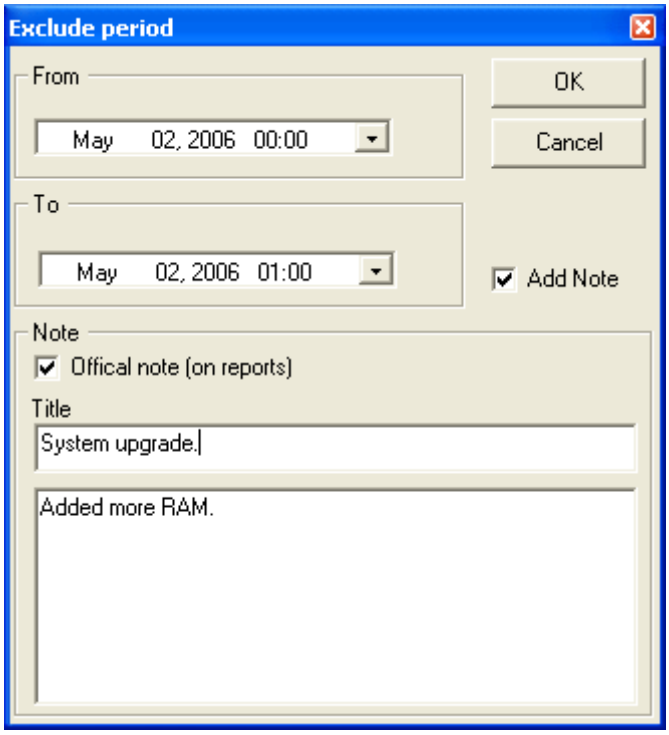
Backup, hardware/software upgrades etc. are normal system administrative tasks that make the systems unavailable for shorter or longer periods of time. Normally these procedures are placed to off-hours, such as evenings and weekends. Scheduled maintenance is covered by the agreement between the service provider and the customer. SLM allows you to exclude data for the period in question prior to the event, or after the event (this requires a recalculation of the SLA compliance).

Excluded periods may be created in two different ways:

- You may create an excluded period for a specific SLA by or SLO.
- You may create an excluded period for multiple SLAs by running the Add Exclude Period wizard (see the section *Creating an Exclude Period, using the Add Exclude Period Wizard*).

Creating an Exclude Period

You may create an excluded period for a specific SLA by or SLO by selecting the Excluded Periods tab in the SLA/SLO dialog and clicking the *New* button. This opens the *Exclude Period* dialog. Note that Ticking the Add Note option expands the dialog to display the Note section, which otherwise is hidden.



From
Defines the start date/time for the exclude period.

To
Defines the end date/time for the exclude period.

Add Note
Checking this option expands the dialog to display the Note section, which otherwise is hidden.
The textual note related to this exclude period.

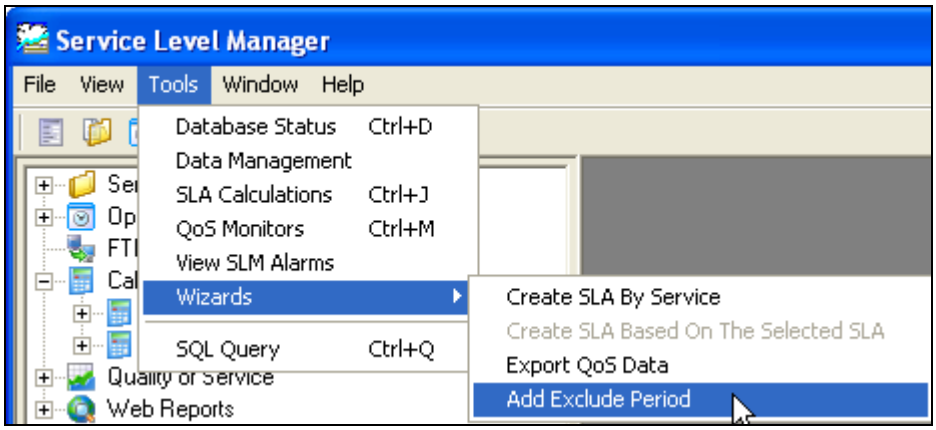
Official note (on reports)
If this option is checked, the excluded period and the note will appear on the reports

Title and text
A title and a short text, describing the reason for the excluded period

You may exclude data for the entire SLA or per SLO. The excluded data will not influence the SLA compliance calculations, and should therefore also be present in the report as a note.

Creating an Exclude Period, using the Add Exclude Period Wizard

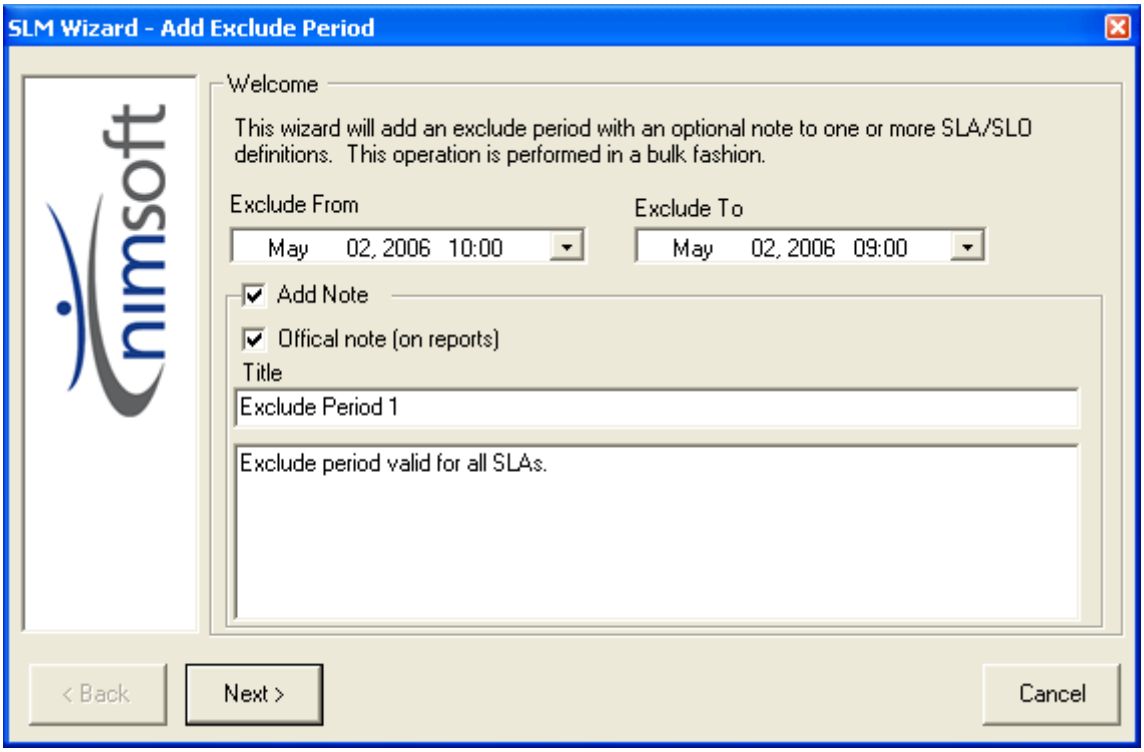
You may create an exclude period for multiple SLAs by running the *Add Exclude Period* wizard. Launch this wizard by selecting *Tools > Wizards > Add Exclude Period* from the menu bar.



This wizard will add an exclude period with an optional note to one or more SLA/SLO definitions.

The first dialog lets you define when the period starts and stops.

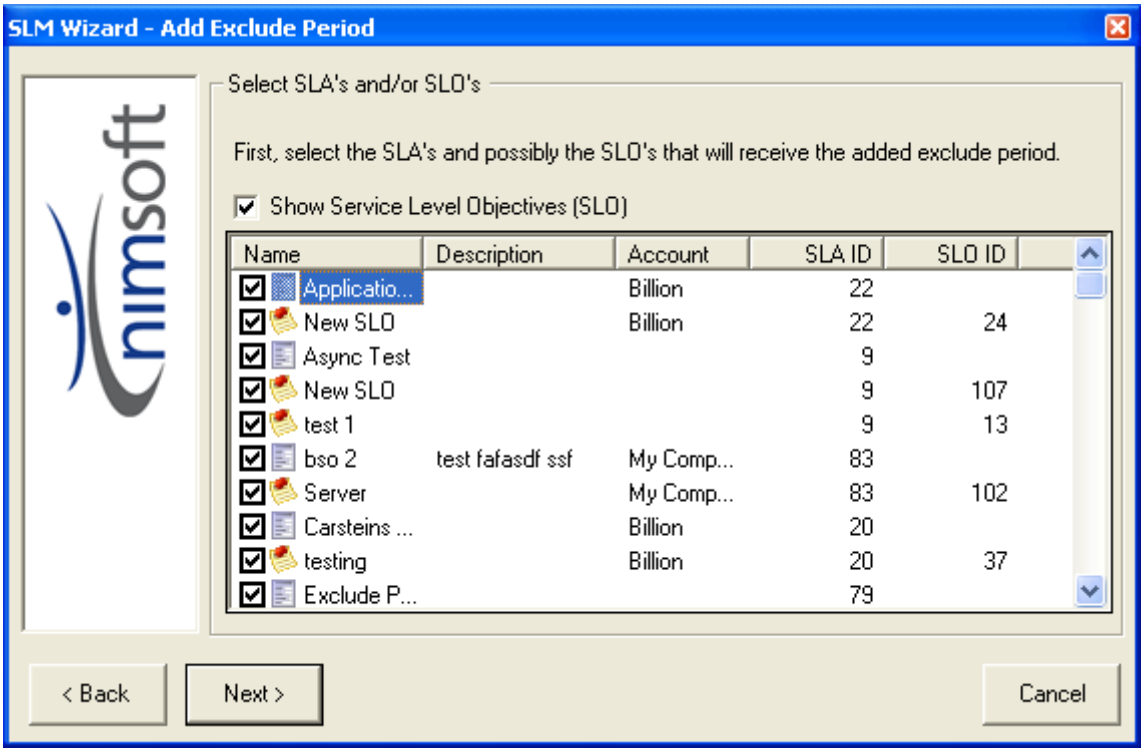
Ticking the *Add Note* option lets you add an optional title and description of the period. Ticking the *Official Note* option, the excluded period and the note will appear on the reports.



Click the *Next* button to continue.

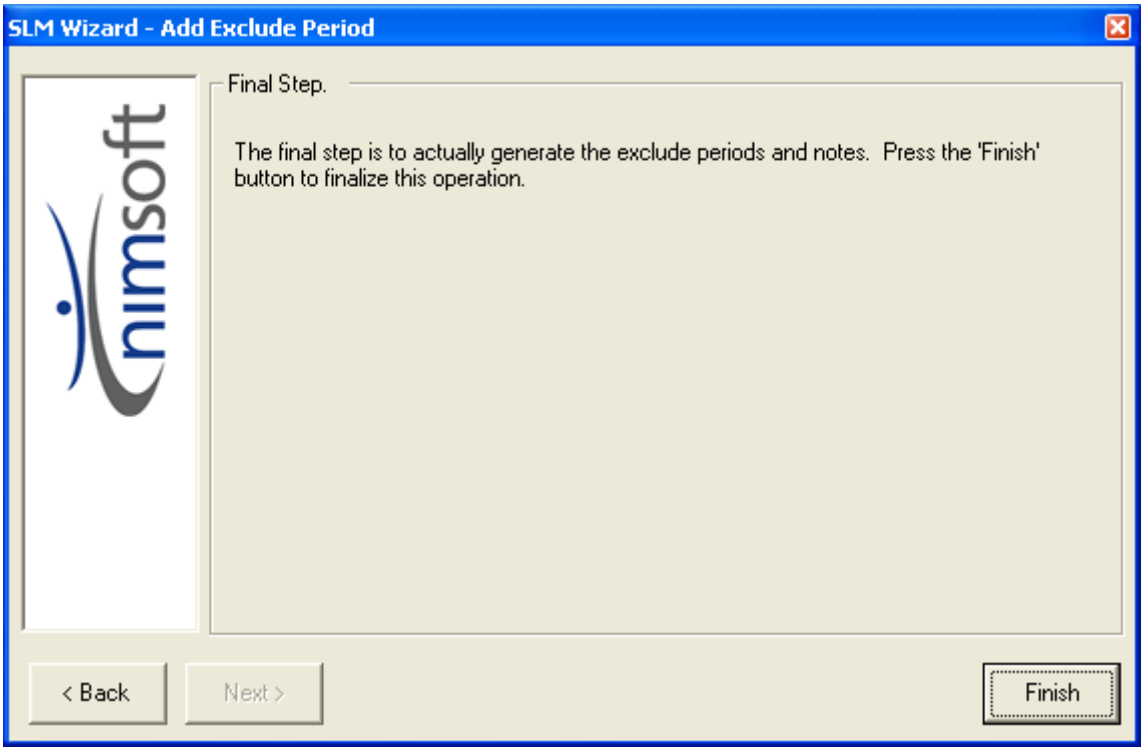
In the next dialog appearing, all SLAs are listed.

If ticking the *Show Service Level Objectives (SLO)* option, also SLOs will be listed below the SLA they are associated with. Select the components to which you want to add the exclude period.



Click the *Next* button to continue.

The final dialog appears. Click the Finish button to finish and exit the wizard.



Example - Defining a simple Service Level Agreement

Important prerequisite:
To be able to measure the service level, you must ensure that the probes monitoring your system are configured to generate QoS (see description in the section *Setting up a Probe to Deliver Quality of Service Data*).

The steps involved when defining a simple SLA are as follows:

- Define your operating periods.
- Create a new SLA and define your compliance requirement and measure period.
- Define the Service Level Objectives that make up your agreement.
- Advanced Options: adding notes, FTP details and alarms.
- Excluded periods.

Step 1 – Define an Operating Period

The first step is to define an operating period. You will need it in step 3.

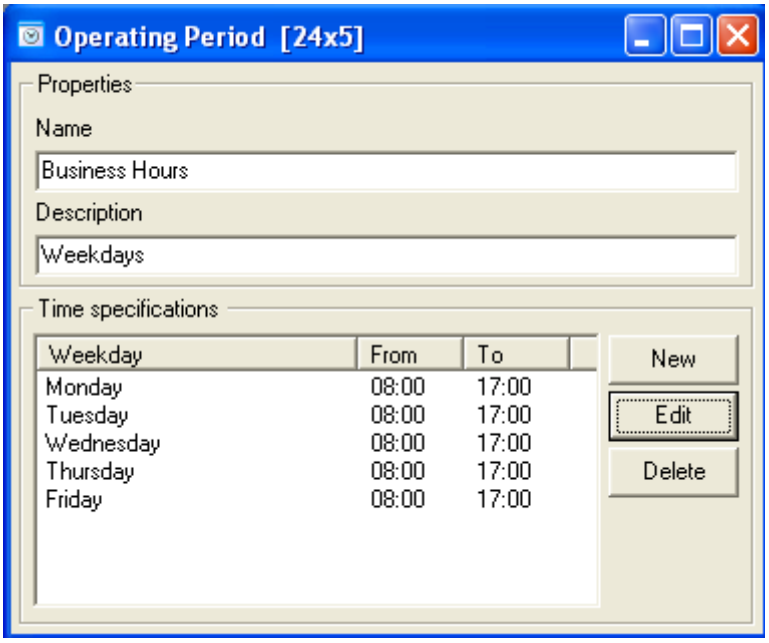
Select *File > New > Operating Period*.

Defining no period will default to a *24 hours x 7 days per week* service availability, but most organizations have a little more complexity than that. E.g. there may be a regularly scheduled maintenance window when services do not have to be available, or some services may only need to be available during business hours. In the example below we have chosen to define a "business hours" period.

You can define multiple periods for multiple different services as appropriate.

See also the section *Creating an Operating Period* for more information.

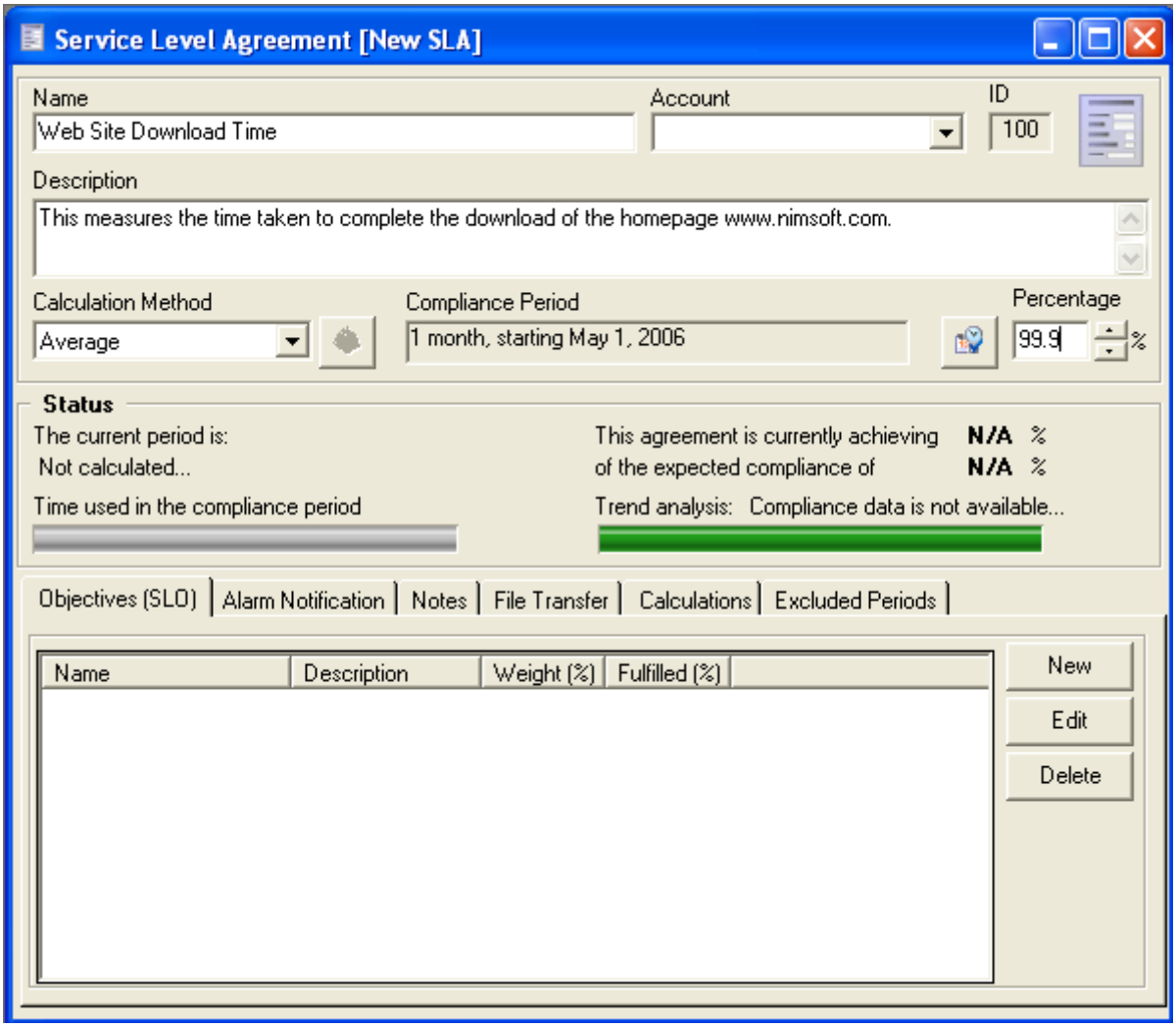
Defined operating periods will appear in the *Operating Periods node* in the Navigation Pane, available when defining new SLAs.



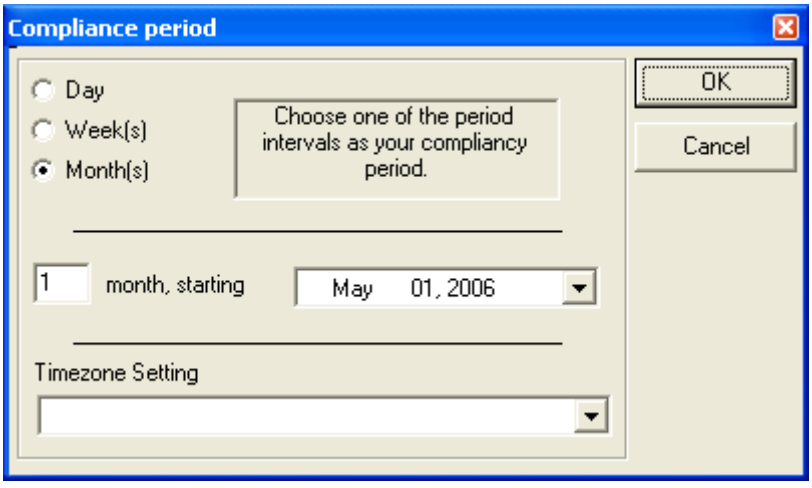
Step 2 – Create a new SLA and Define the Service Level Compliance Requirement

Select *File* > *New* > *SLA*.

Give the new SLA a name and a description, and set the compliance percentage to 99,9 %.



Click the *Set period* button. 



This is the period over which the service level will be measured and your committed compliance amount (measured as a percentage) i.e. if you are going to define a service level of say 99.9% availability; over which period will this be measured? You could define this as a daily service level, in which case your SLA

compliance will be measured on a day-to-day basis, or it could be measured weekly or monthly. You also define when you want the measurement period to start.

In this case we have selected a weekly service level that starts on a Monday and ends on Sunday and we are committed to 99.9% compliance.

Leave the Timezone field empty if your SLM is located in the same time zone as the data engine.

Also see the section

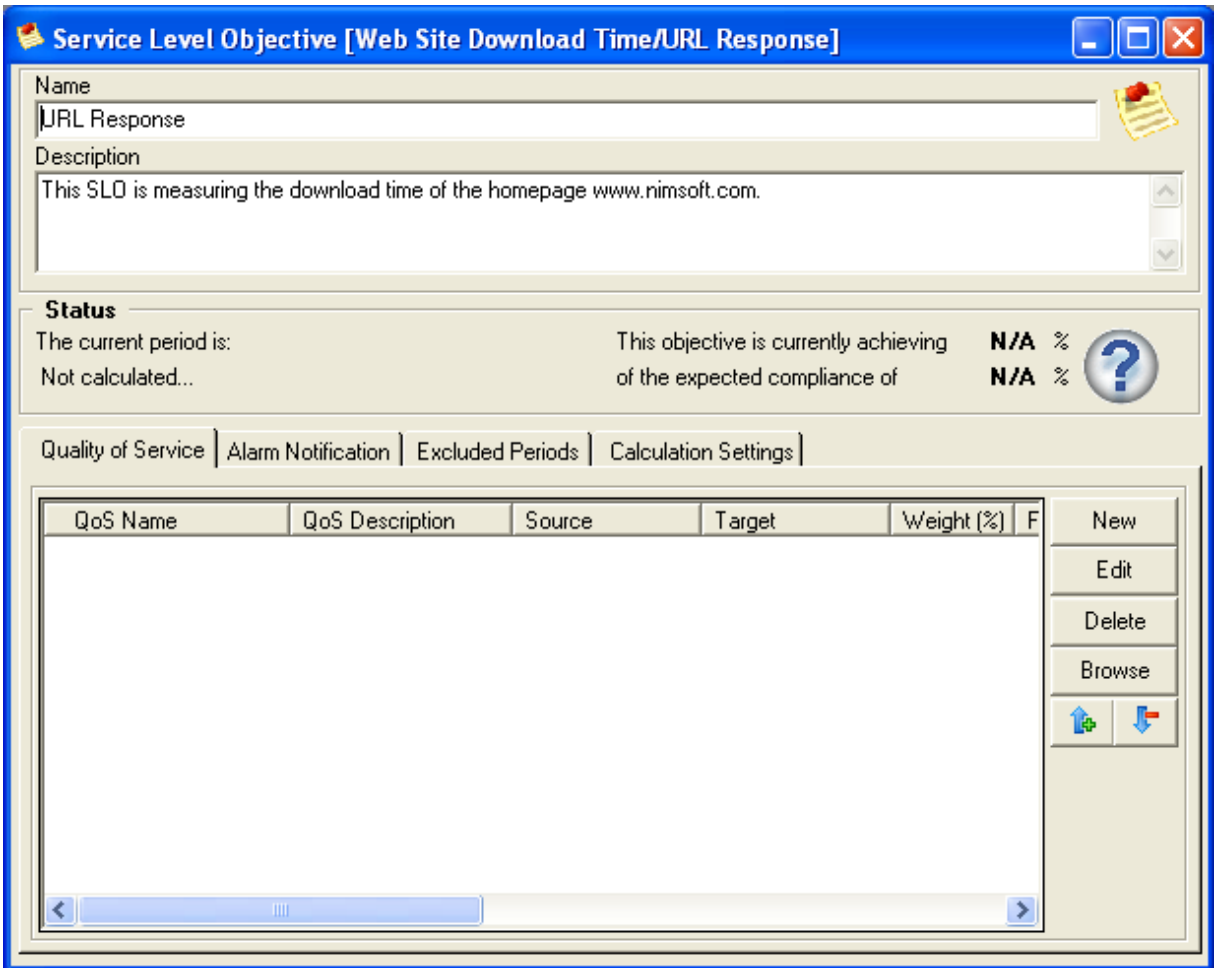
Compliance Calculation for selecting a Calculation method different from *Average*, which is default.

Step 3 – Define the Individual Service Level Objectives

Each Service Level Agreement is comprised of one or more *Service Level Objectives*. Each objective is a data point that we can measure and calculate into the report – the available data points are automatically prompted to the user by using the pull-down tabs.

Make sure the *Objectives (SLO)* folder is selected and click the *New* button.

The Service Level Objective window appears. (Note that the section *Creating a Service Level Objective (SLO)* contains additional information).



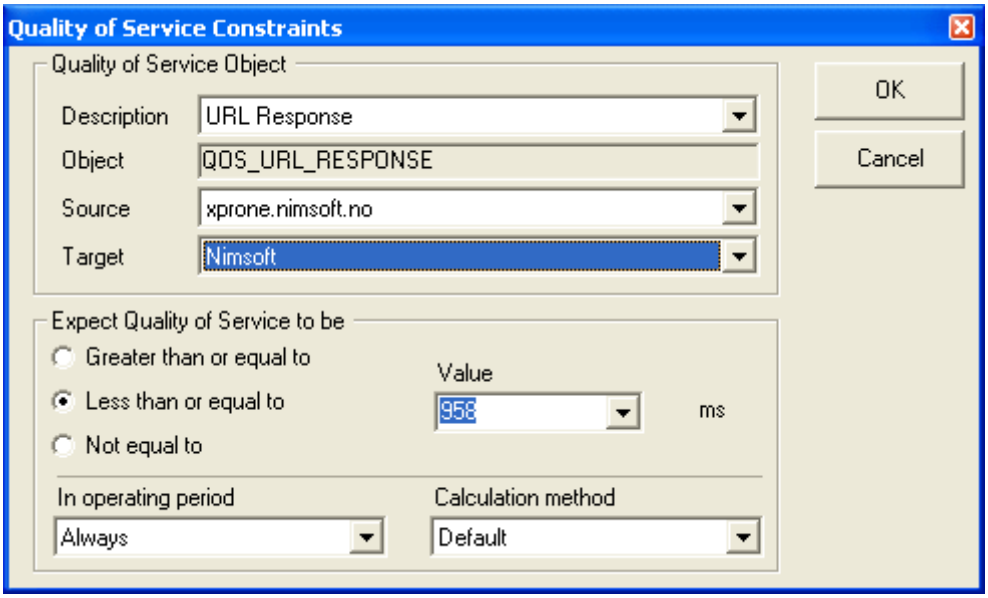
Give the new Service Level Objective a name and a description. Select the *Quality of Service* folder and click the *New* button.

Now the Quality of Service Constrains dialog appears.

In this case we have selected the download time for our home page (URL Response) to be

less than or equal to 6 seconds and we have selected that this objective should be measured in the "business hours" period that we defined in step 1. We also have the ability to manually "weight" each objective – so that if there are several objectives for us to meet, we can tell the product to apply either equal weightings (automatically selected) or to weight one objective more heavily than others. In this case we will just select a single objective. See also the section *Manual Weight Distribution* for more information.

If you don't want to use the default calculation method, you also have the possibility to select one of the customer-made Calculation Profiles (if any). See the section *Calculation Profiles*. These profiles describe the way the SLO will calculate the compliance input from the QoS constraints.



The definition of the Service Level Agreement is now complete. Step 4 describes several more advanced functions that may be interesting. Otherwise proceed with

Step 5 – Excluding Periods

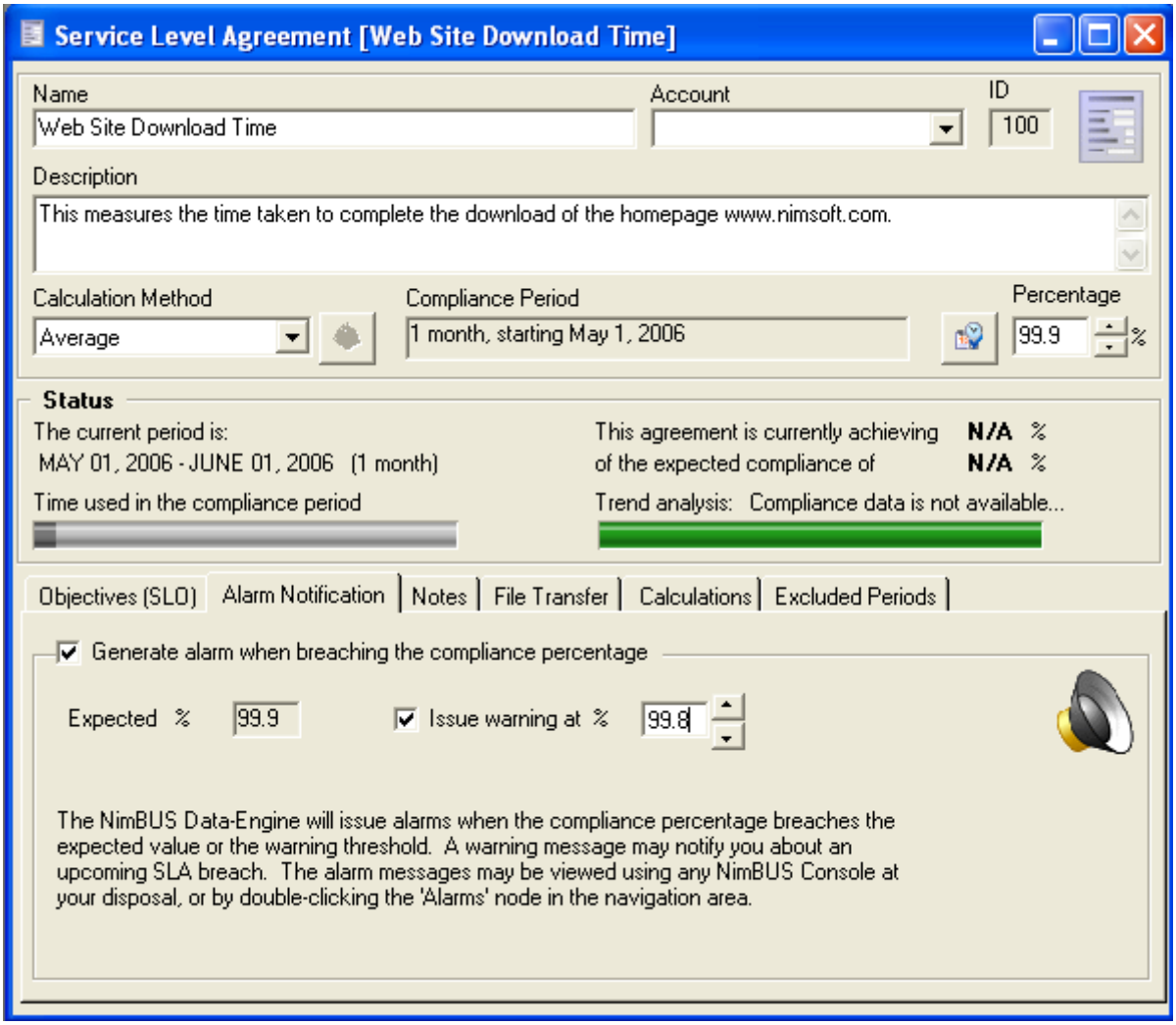
Step 4 – Advanced Functions

Actually, we have now completed the setup of the service level agreement but there are several advanced functions that we will now introduce as follows:

- Alarming
- Notes
- File Transfer

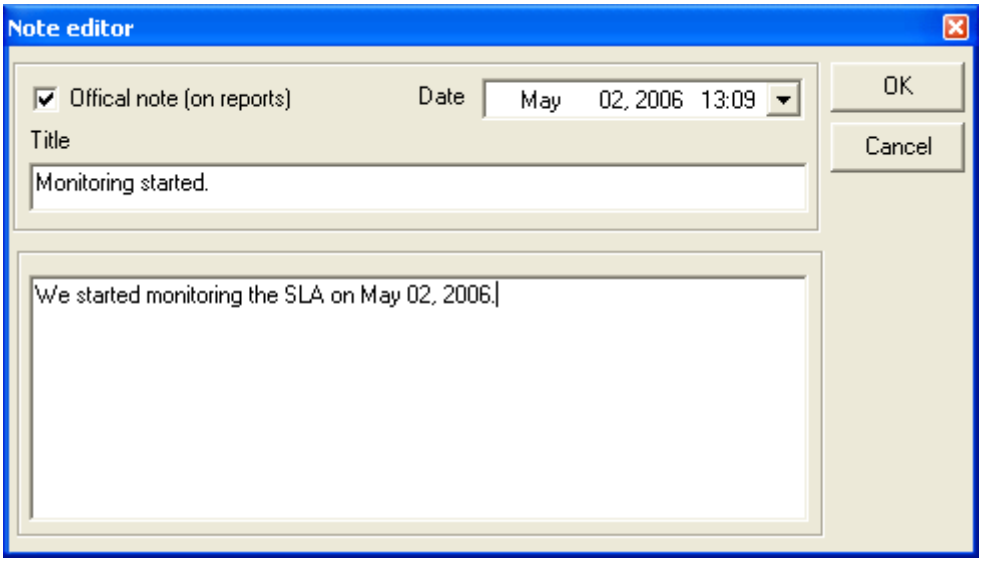
Step 4a – Alarming

We can tell the product to send us an alarm when the "actual" compliance drops below expected levels. In this case we have asked for an alarm to be generated if the actual compliance is 99.8% or lower. Alarms can be issued to the Enterprise Console, can be forwarded to other commonly used alarm consoles such as OpenView, Unicenter, Tivoli etc, or can be forwarded to email, pagers or cell phones.



Step 4b – Notes

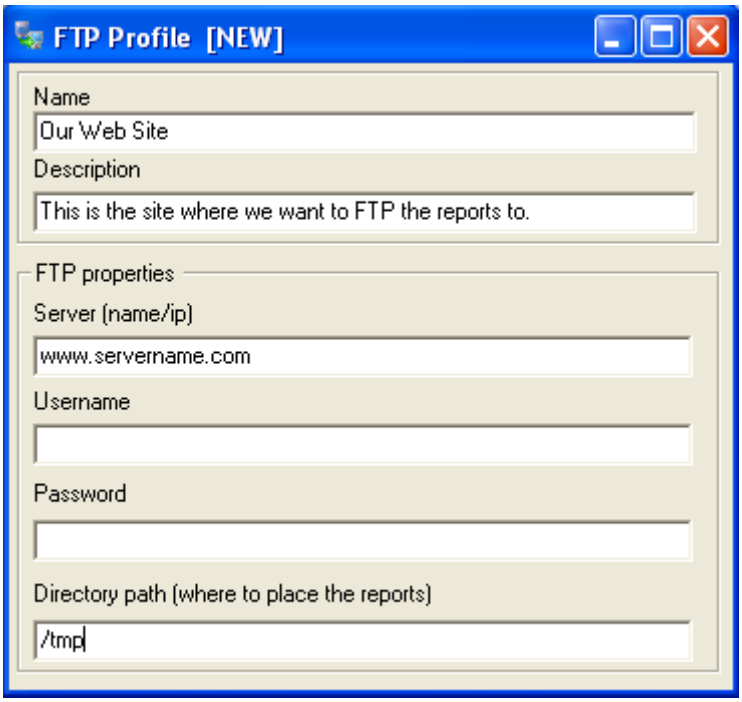
We can enter a note here as a reminder of some information if we wish. If we check the "offical note" box then this note will appear on our reports. In this example we are informing our users of when the SLA monitoring started.



Step 4c – File Transfer

The generated reports can automatically be put into a web directory for the pages to be served up by your web server. All reports are generated in HTML. Alternatively, we can select an FTP site to send the reports to.

For more information, see the section *Creating a FTP Profile.*



Step 5 – Excluding Periods

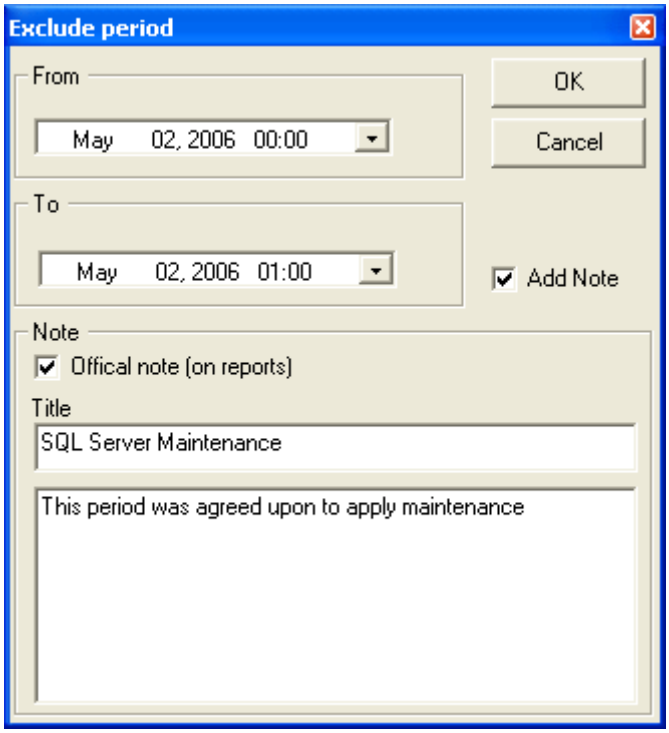
Now the SLA setup is complete. But what happens if there is an event outside our control that we want to "exclude" from the SLA calculation? Some examples of this could be that you have agreed with your customers that there will be a one-off maintenance window

required for applying some much needed Service Packs. Or, maybe there was a complete power outage to your building that you agree should not count towards the SLA calculation or perhaps a company holiday.

We simply enter the period that we wish to exclude, and add a "note" to that exclusion. Again, by selecting the "official note" box, this note will appear on the reports that everyone gets to see. This feature is extremely useful, because it means that we no longer have to go back and manually recalculate data.

In this case, we have agreed with our web-hosting provider that there was critical maintenance to be performed on our SQL Server database to protect it from the latest Internet worm. We have agreed to take a 2-hour outage that will not count towards the SLA Measurement.

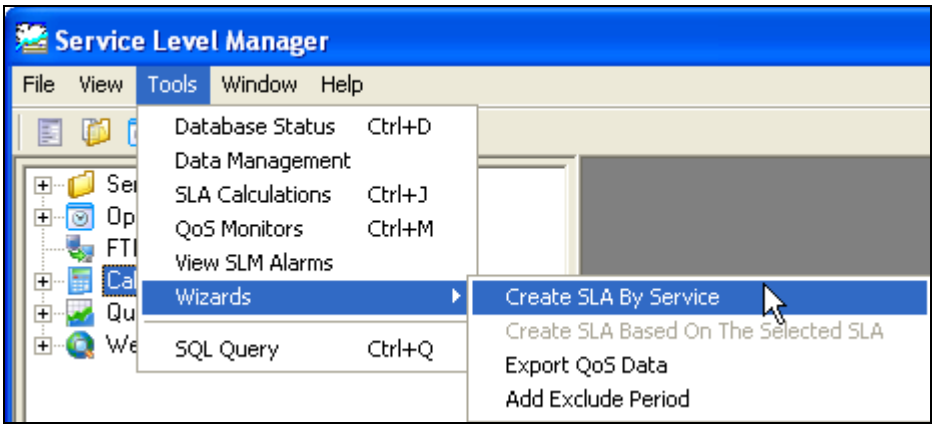
For more information, see the section *Creating Service Level Agreement*.



Once we save our work, the product then goes into action to generate the reports. It will by default generate a new SLM report every hour, although you can change that period to your own specifications. Once the report is generated, we can go back into our SLM definition where we can observe trending information (i.e. are we trending towards a breach in the future). We can also see the historical information for this service level. The reports can be viewed either through your internal web server, from the FTP site you sent them to or within the product itself.

Creating a SLA, using the SLA Wizard

The SLA Wizard can be launched by selecting the *Tools* > *Wizards* Option in the Service Level Manager Toolbar.



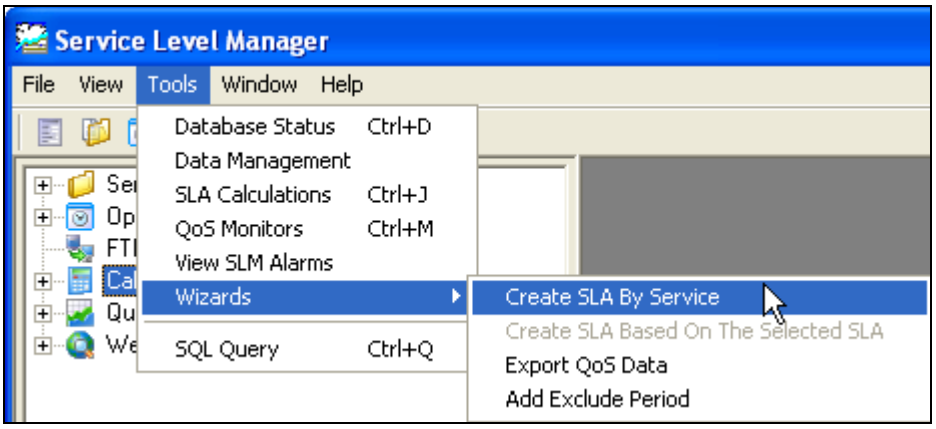
Two different SLA wizards are available:

- Creating a SLA based on a service
- Creating a SLA based on an existing SLA

Example – Creating a SLA based on a service

This wizard will create a SLA group containing one or more SLAs, based on your selections through this wizard (one SLA for each selected source computer). Each SLA will consist of one SLO with one or more QoS constraints, according to your selections.

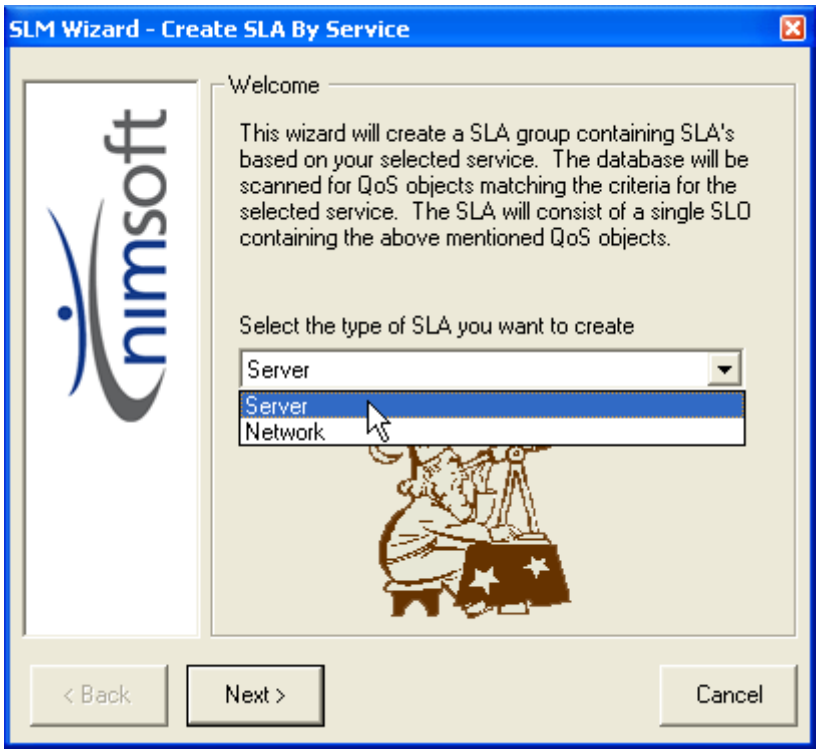
- Launch the wizard by selecting Tools > Wizards > Create SLA by Service.



- First you have to select the type of SLA you want to create. You have two options:
  - *Server SLA*
    Creating SLAs computing data from server related probes.

- *Network SLA*
  Creating SLAs computing data from network related probes.

Make your selection and click the *Next* button to continue.



Note the following if creating a *Network* SLA:

Currently the following two network probes are supported:

- *interface_traffic*
- *net_connect*

When selecting *source* in the wizard, it means:

- The robot hosting the probe for the net_connect probe.
- The device (e.g. a router) for the interface_traffic probe.

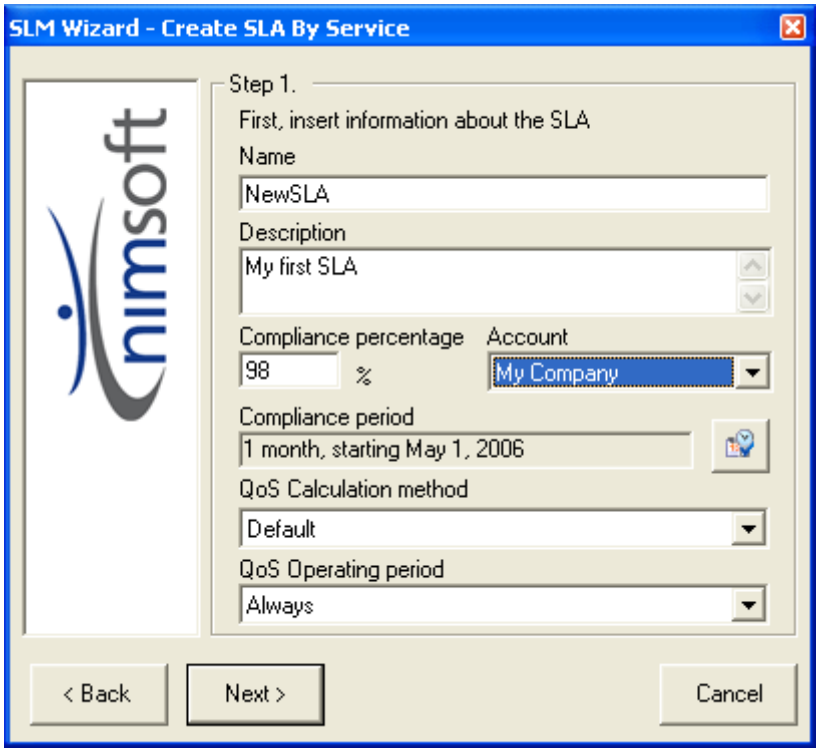
In this example we describe a *Server* SLA.
Click the *Next* button to continue.

- Step 1 prompts you for the following information:
  - *Name*
    This will be the name of the created SLA group.
  - *Description*
    This is a short informative

description of the SLA. This information will be displayed in the *Description* field of each of the SLAs created through this wizard.

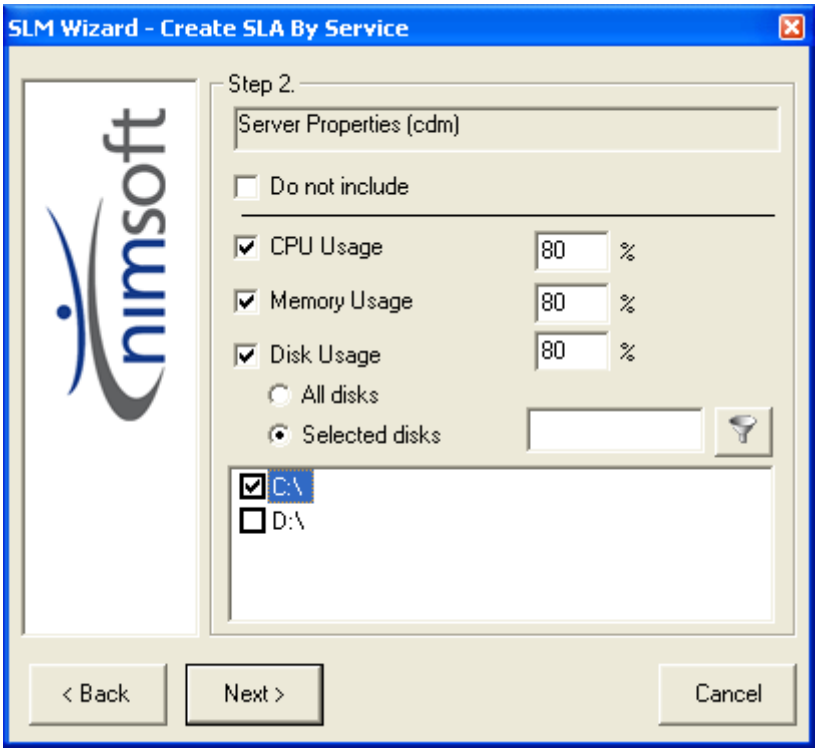
- Select *Compliance percentage*, *Compliance period*, *QoS calculation method* and *QoS calculation method* as described in the chapter *Creating Service Level Agreements.*
  Optionally attach the SLA to an *account*.

Click the *Next* button to continue.



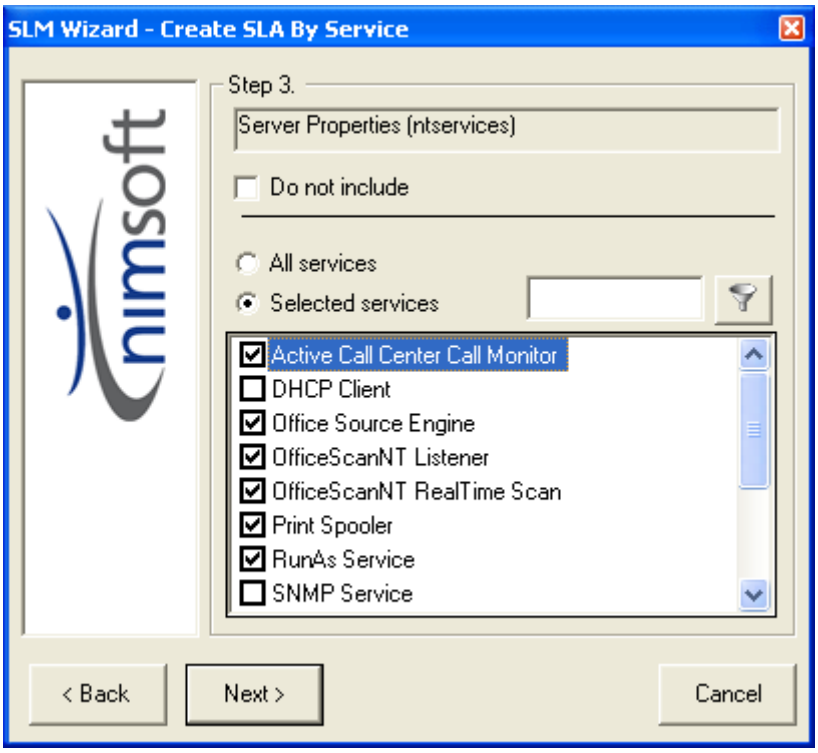
- Step 2 enables you select the *cdm* properties for the SLAs. You can select:
  - If you want to include CPU usage, Memory usage and Disk usage.
  - Which disks to include?
  - If you want to completely skip the *cdm* part (selecting *Do not include*).

Click the *Next* button to continue.



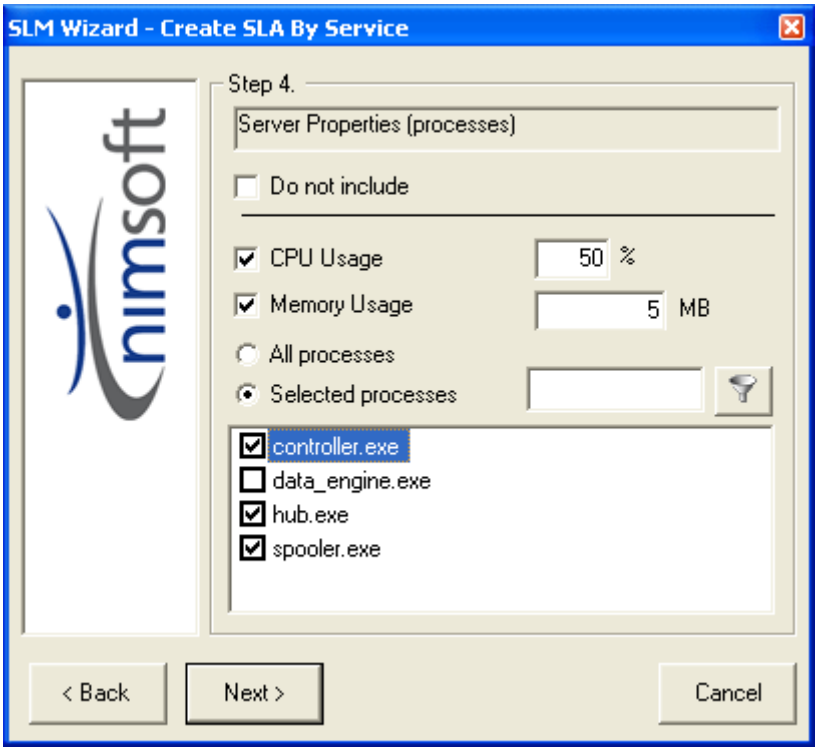
- Step 3 enables you select the *ntservices* properties for the SLAs. You can select:
  - One or more of the services listed.
  - If you want to completely skip the *services* part.

  Click the *Next* button to continue.

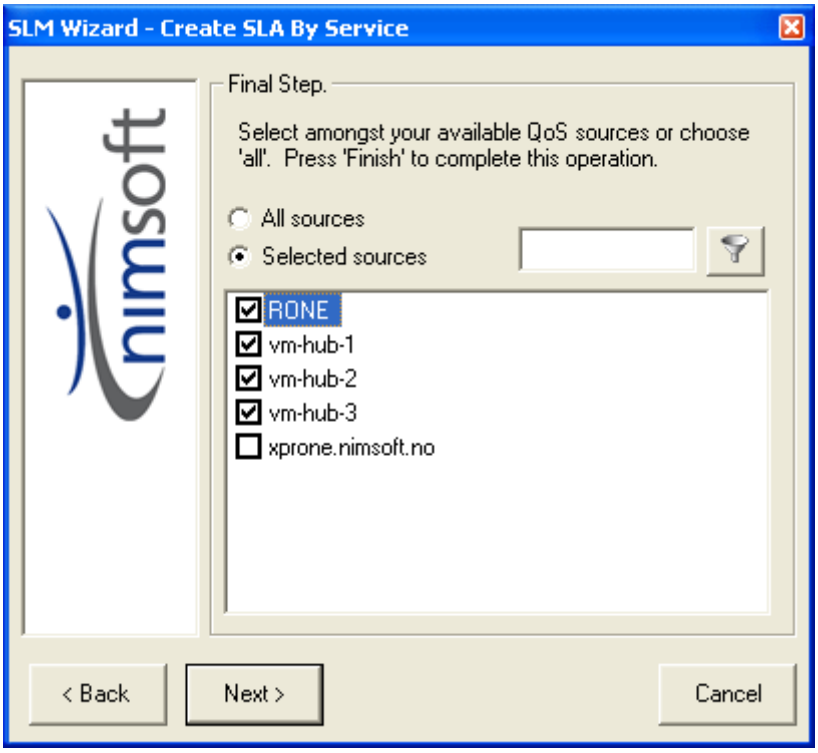


- Step 4 enables you select the *processes* properties for the SLAs. You can select:
  - One or more of the processes listed.
  - If you want to completely skip the *processes* part.

  Click the *Next* button to continue.

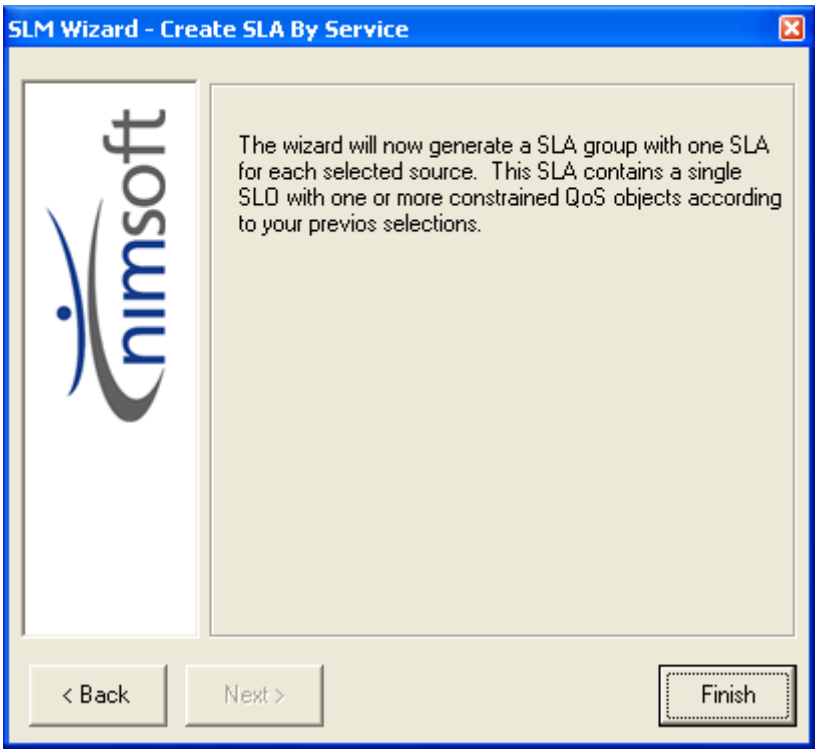


- Finally you can select one or more QoS Source. One SLA will be created for each of the selected QoS sources, and the SLAs will be placed in the SLA group created with the name specified in step 1.
  Click the *Next* button to continue.



- The wizard is now finished. When you click the *Finish* button, the SLA group will be created with one or more SLAs, depending on your selections.

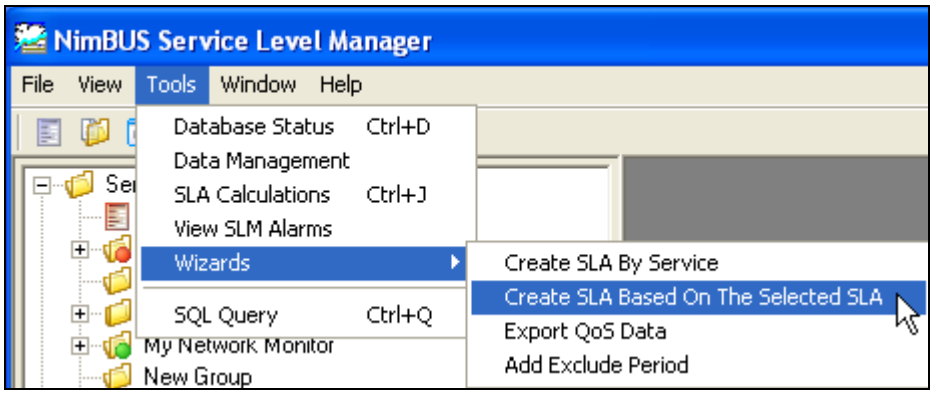
  Each of the SLAs contains one SLO with one or more QoS objects according to your selections.



Example – Creating a SLA based on the selected SLA

This wizard will create a SLA, based on a SLA selected in the Navigation Pane. The underlying SLO(s) and QoS definitions for the selected SLA will be used as a template.

- Launch the wizard by selecting *Tools* > *Wizards* > *Create SLA Based On The Selected SLA*.

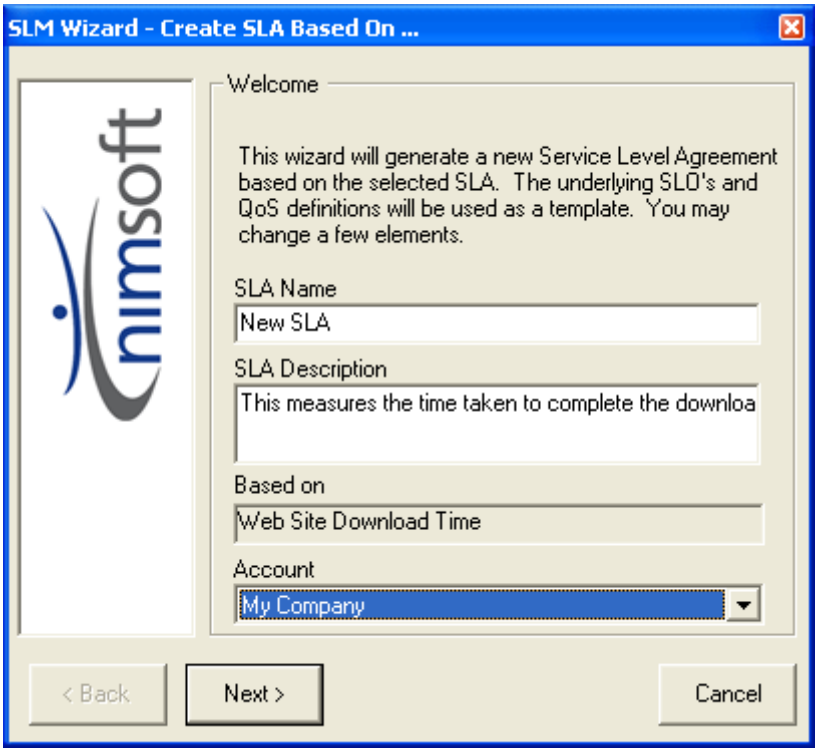


- Give the new SLA a name and an optionally short description.
  The *SLA Description* field will initially contain the description of the SLA that we use as basis for the new SLA.

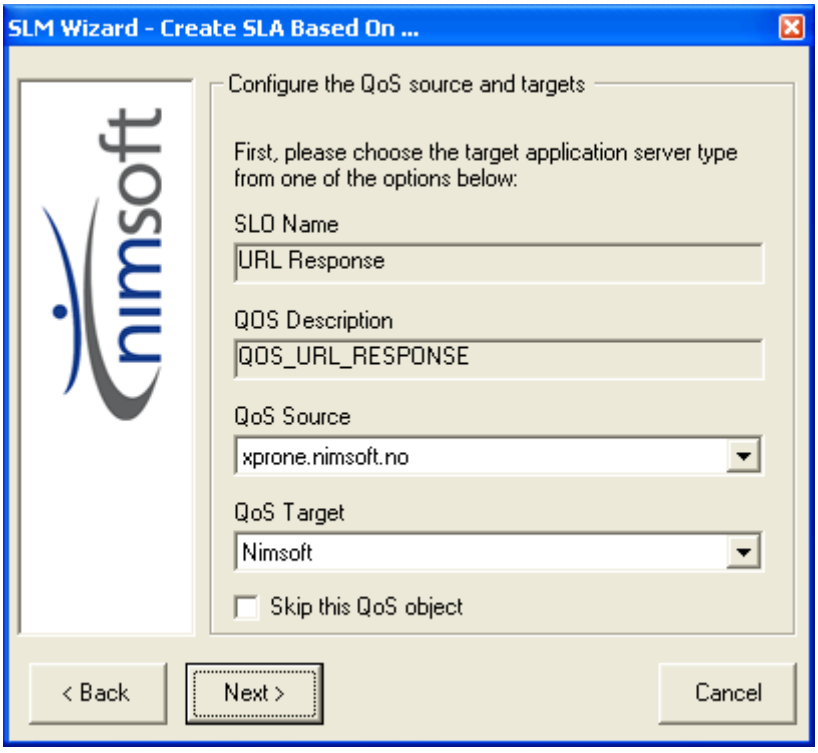
  The *Based on* field will contain the name of the SLA you have selected to use as a template.

  Select an account from the drop-down list at the bottom of the dialog if you want to attach the new SLA to an account, otherwise leave the field empty.

  Click the *Next* button to continue.

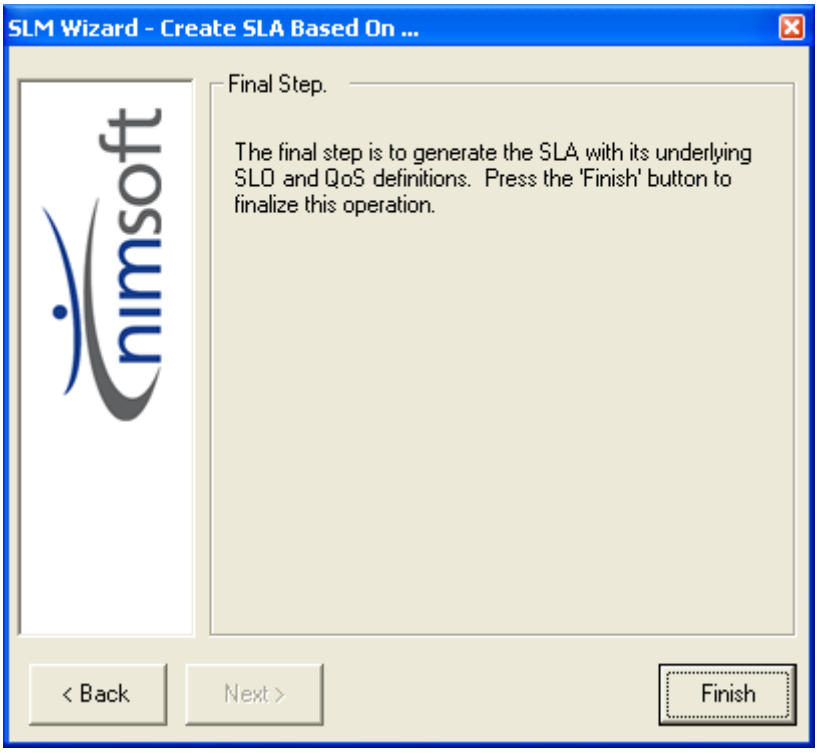


- The next dialogs ask you to choose a source and a target for all of the QoS definitions defined for the template SLA. Select your definitions (note that you may skip one or more QoS objects for the new SLA by checking the *Skip this QoS object* option).



Click the *Next* button to continue.

- When all QoS objects are defined, the following dialog appears:



Click the *Finish* button, and the newly defined SLA will appear in the Navigation Pane.

If the new SLA is based on a SLA in a SLA group, the new SLA will be placed in the same group.

Creating QoS Monitor Profiles

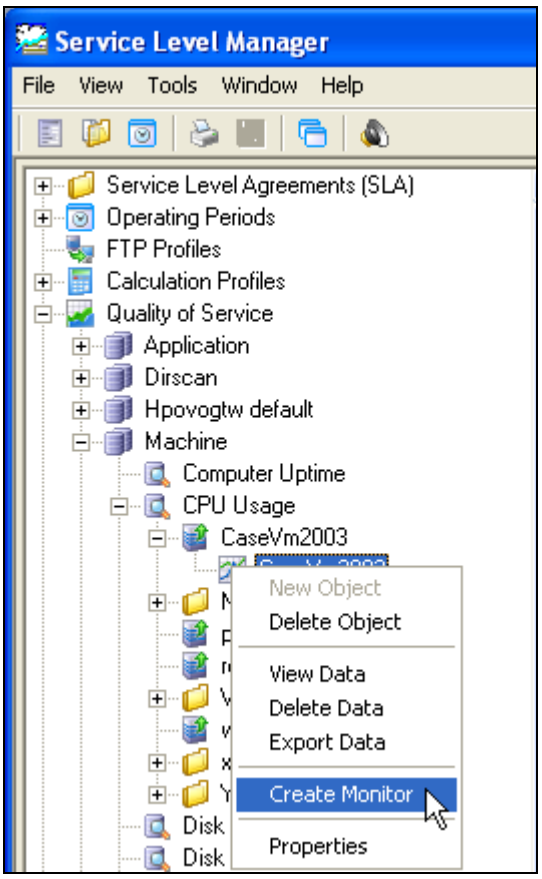
The possibility to create monitoring profiles that are based on QoS data instead of live information from a system the way a normal probe works was introduced in SLM version 4.30.

The feature will be activated and visible, provided that the **qos_engine** probe is installed.

For each QoS Object you will be allowed to create one or more monitoring profiles of same or different types.

A dedicated probe (the qos_engine) will subscribe to QoS messages, each QoS message will be checked to see if it fits a monitoring profile (a QoS can match to more than one profile). If one or more profiles match the incoming QoS message, the values are evaluated and alarms issued if a threshold violation is detected.

Creating and configuring monitoring profiles can be done by right-clicking a QoS object under the QoS node in the Navigation pane.

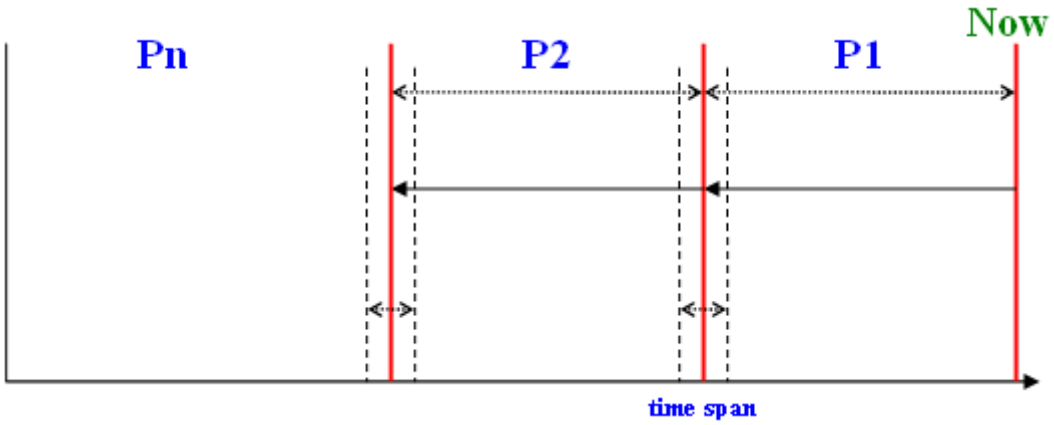


The QoS Monitor dialog pops up, enabling you to set the monitoring properties.

Baseline Value Definition

The baseline value is a central element for the threshold when creating monitors of type *Dynamic*.

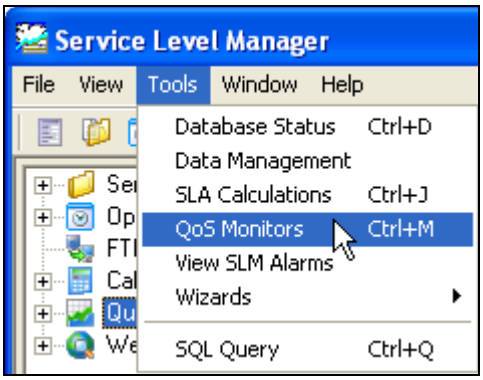
The baseline is calculated from measurements collected at a specific time each day for the last N days or a specific time for the same weekday the last N weeks.



All the samples within all the time spans are used to calculate the average and standard deviation of those values. This gives some fundamental values that can be used for further calculations.

An example would be: a weekly baseline definition that is set to 4 weeks and with time span 1 hour. The QoS arrives at a Friday 13:00:00; this will with a sample rate at 5 min give us 12 samples for each of the previous 4 Fridays between 12:30 and 13:30. Those 48 samples will be the basis for the baseline calculation.

QoS Monitors List



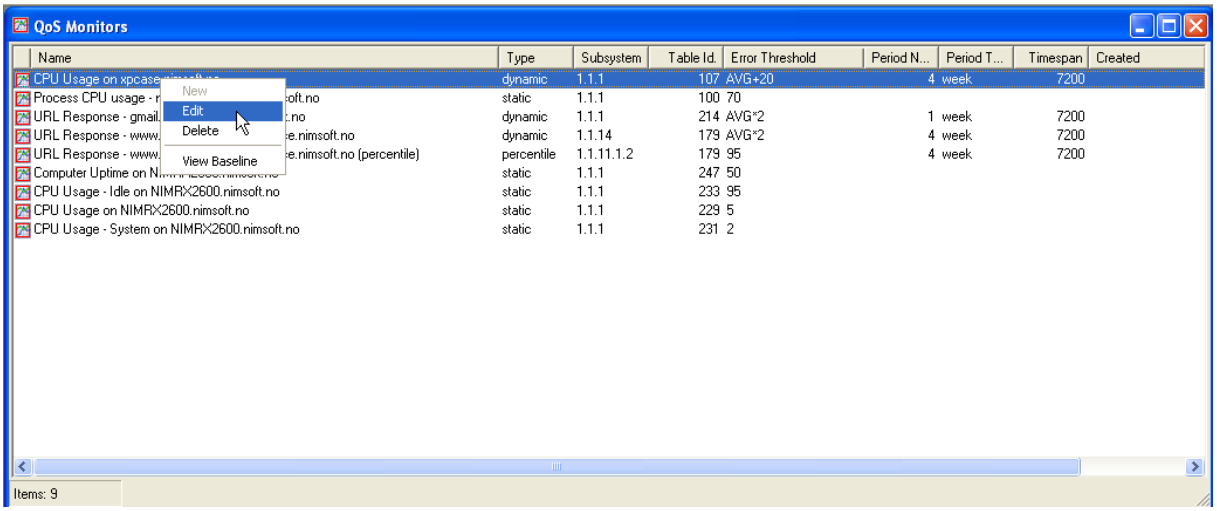
Selecting *Tools* > *QoS Monitors* in the SLM Menu bar, the QoS Monitors window will be launched. This window lists the QoS Monitors defined (if any).

QoS monitors are created as described in the section *Creating QoS Monitor Profiles* or by right-clicking in the list, selecting *New*.

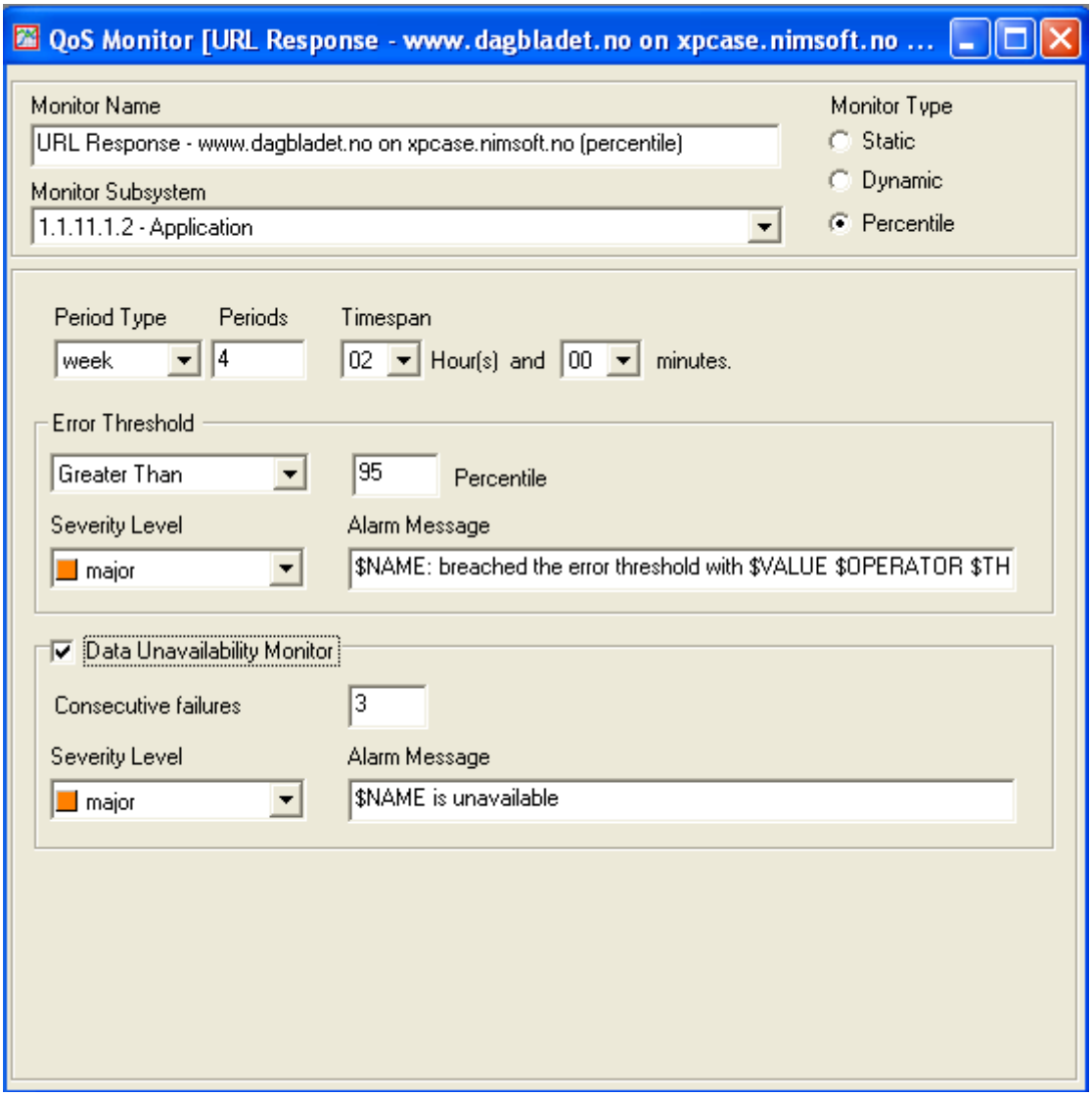
See also the section *QoS Monitor Properties* for details.

Right-clicking in the list, gives you the possibility to:

- Create new QoS monitors.
- Edit the properties for the selected QoS monitor (see *QoS Monitor Properties*).
- Delete QoS monitors.
- View the baseline values for the selected monitor (see *Baseline Value Definition*).



QoS Monitor Properties



Monitor Name

The monitor name is automatically filled in, based on the QoS name, source and target. This name may be overruled by a name of your own choice

Monitor Subsystem

This field is automatically filled in with the sub-system ID for the device, identifying from which part which part of the system the QoS and alarms come. The sub-system IDs are maintained by the Nimsoft Alarm Server (nas).

Monitor Types

Select a *monitor type* to be used as a basis for the threshold calculation. Your choice here depends on what you want to achieve:

Static
Use *Static* if you want alarms to be issued if the QoS value exceeds the threshold specified.

You may specify the threshold as an absolute value or as a percentage of the maximum value

(maximum value is only available for QoS types with maximum size, otherwise grayed out). You may also select that at least **n** consecutive breaches must occur before an alarm will be issued.

Dynamic

Use *Dynamic* if you for example want to consider that the QoS values have a regular fluctuation, such as high during the work hours and low at night.

Alarms will be issued if the QoS value exceeds the threshold, calculated from the *baseline* value.

You must specify *Period Type*, *Periods* and *Timespan* to find the *baseline* value, which will be used to calculate the error threshold.

- *Period Type* is day or week.
- *Periods* are numbers, defining how many days or weeks to be used to calculate the Baseline.
- *Timespan* is the time window within each period, from which samples should be used to calculate the Baseline value.

The baseline is calculated from measurements collected ***at a specific time each day for the last N days or a specific time for the same weekday the last N weeks***.

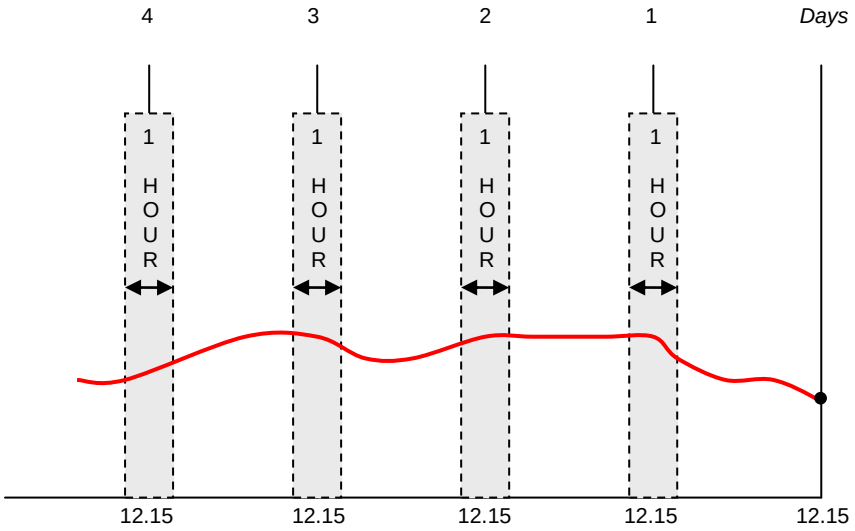
The threshold is defined as an expression that is calculated in a Lua script. The expression can contain the following variables that are calculated based on the baseline settings:

- AVG
- STDEV
- MIN
- MAX
- COUNT

Example:

Period Type: Day
Periods: 4
Timespan 1 hour

A sample collected at for example 12.15 o'clock, will be compared with the threshold, which is calculated from the *Baseline* value. The Baseline value will be calculated based on the average value of the samples collected within the timespan (1 hour) for the four past days.



The threshold can be by either selecting one of the formulas in the drop-down list, such as 20% Above Baseline.
Selecting *Custom*, you may specify a threshold manually.

Percentile
As for Dynamic (see above), you may use *Percentile* if you for example want to consider that the QoS values have regular fluctuations.

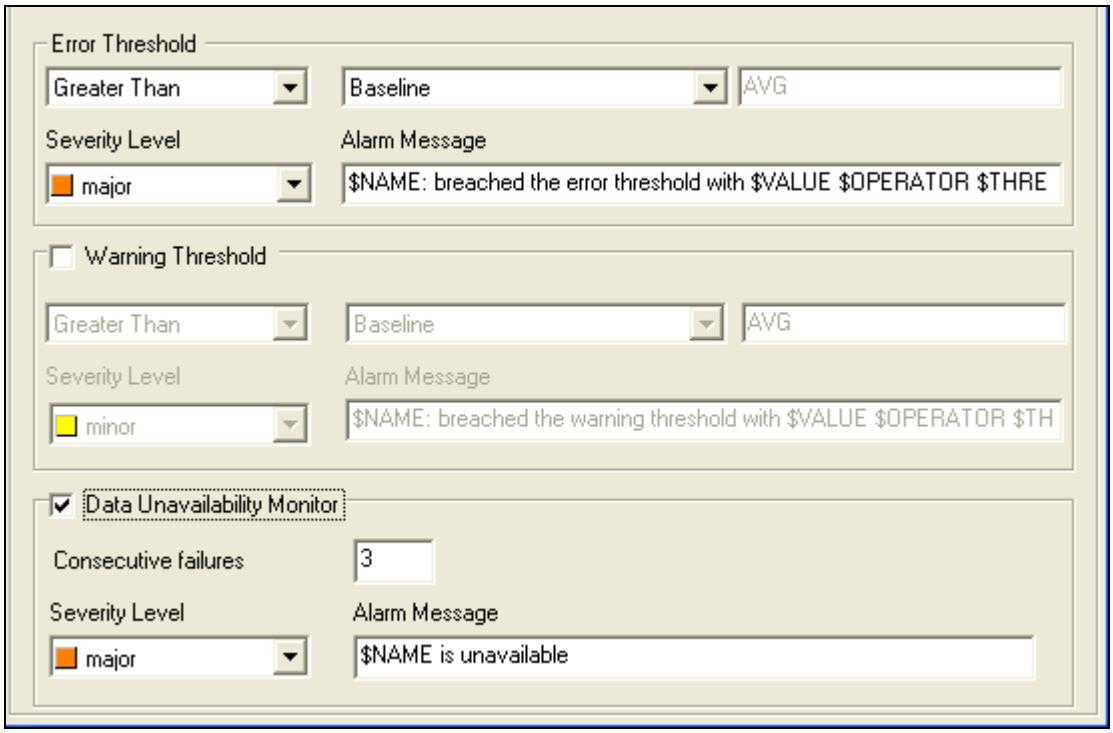
Alarms will be issued if the QoS value exceeds the threshold, which is a percentile of the values of the samples collected within the time spans for the periods specified.

The threshold can be specified as for example greater than the 95 percentile of the calculated value.

Alarm thresholds:

Error thresholds must be defined for the QoS monitors in order to have alarm messages issued on threshold breaches.

For monitors configured to use monitor type Static and Dynamic, it is also possible to define a warning threshold, and you may also select to monitor for unavailable data.



The operands available to be used to set the error- and warning thresholds are:

- Less Than
- Less Than Or Equals To
- Equals to
- Greater Than
- Greater Than Or Equals To

Threshold values

- Custom
  Selecting Custom, you can compose your own threshold value. If first selecting one of the predefined threshold values, and then selecting Custom
- Baseline
  The baseline is calculated from measurements collected at a specific time each day for the last N days or a specific time for the same weekday the last N weeks.
- 10 % Above Baseline
- 20 % Above Baseline
- Baseline + Standard Deviation
- Baseline + 20 % of Stdev
- Baseline Period Minimum
- Baseline Period Maximum

The alarm message text can contain some variables that will be expanded before the alarm is sent. The following variables are supported:

- NAME
- MONID
- VALUE
- OPERATOR
- THRESHOLD
- AVG (dynamic)
- STDEV (dynamic)
- MIN (dynamic)
- MAX (dynamic)
- COUNT (dynamic)

A typical alarm message example would be:
$NAME has breached the threshold value ($THRESHOLD)

Web Reports

Web reports can be opened and watched by double-clicking the report icon under the WEB Reports Node in the Navigation Pane.

The reports are divided into two groups:

- SLA Reports.
  These are automatically generated for each of the SLAs on a schedule defined in the **sla_engine** configuration tool.
  Note that the reports are grouped with the same structure as under the SLA node in the Navigation Pane.
- QoS Reports.
  These reports have to be created. Right-clicking the QoS Reports sub-node and selecting *Configure*, opens the **report_engine** configuration tool, where you can define QoS-reports.

Report templates
Note that the layout of the reports is determined by the selected *report template.* These templates are selected using the report_ engine configuration tool.

For more details, please refer to **SLM Probes → report_engine → report_engine Configuration** section in the Probes online help.

The templates can easily be modified as described here:

Customizing SLA reports
See the section *How to Customize your SLA Reports*.

Customizing QoS reports
See **SLM Probes → report_engine → report_engine Configuration** section in the Probes online help.

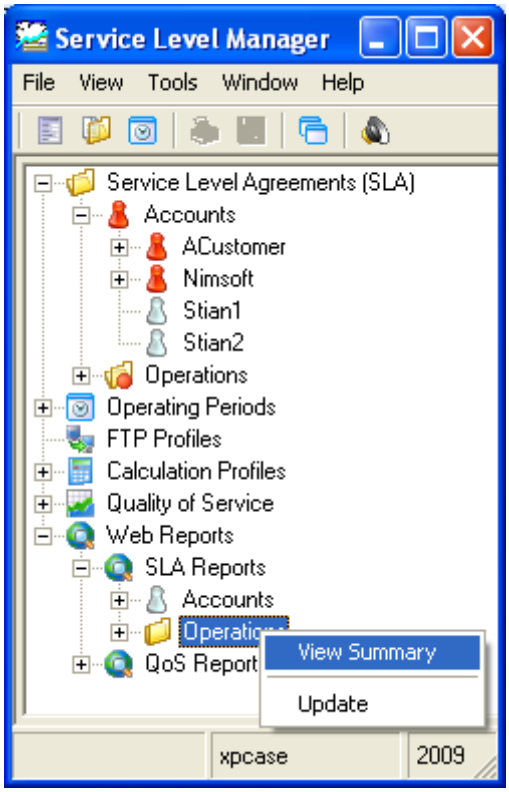
SLA Reports

The following reports are generated:

- *Service Level Agreement (SLA) reports*
  It is not necessary to define these reports, as they are automatically generated (one report for each SLA) as scheduled in the sla_engine.
  The report_engine configuration tool (see) lets you select templates determining the layout of the reports.

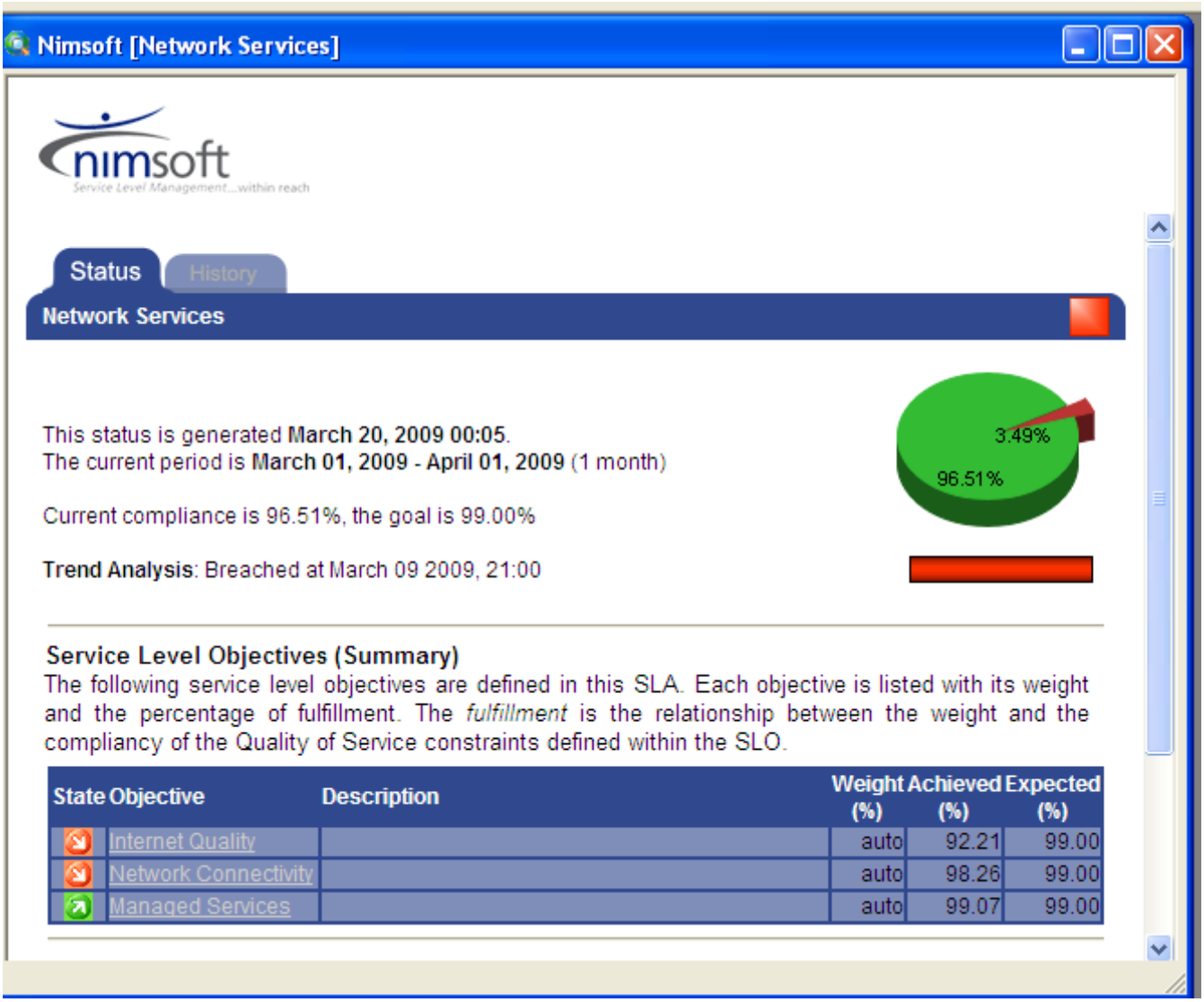
  The generated SLA reports are composed of the following pages:
  - SLA overview page, reflecting the status for the SLA and for each of the SLOs.
  - SLO reports (one for each SLO), reflecting the status for the SLO and for each of the QoS constraints.
  - QoS graphs for each of the QoS constraints.
  - SLA history page, where you can watch the historical SLA trend and also see previous reports.

Note that right-clicking a group and selecting *View Summary* opens a summary report for all reports in that group, where you can drill down to the individual reports.



This is a quick and easy report to get a glance view of how we're doing for the current period. Notice the notes and titles on the report, and also notice the excluded period defined in the SLA located at the bottom of the report.

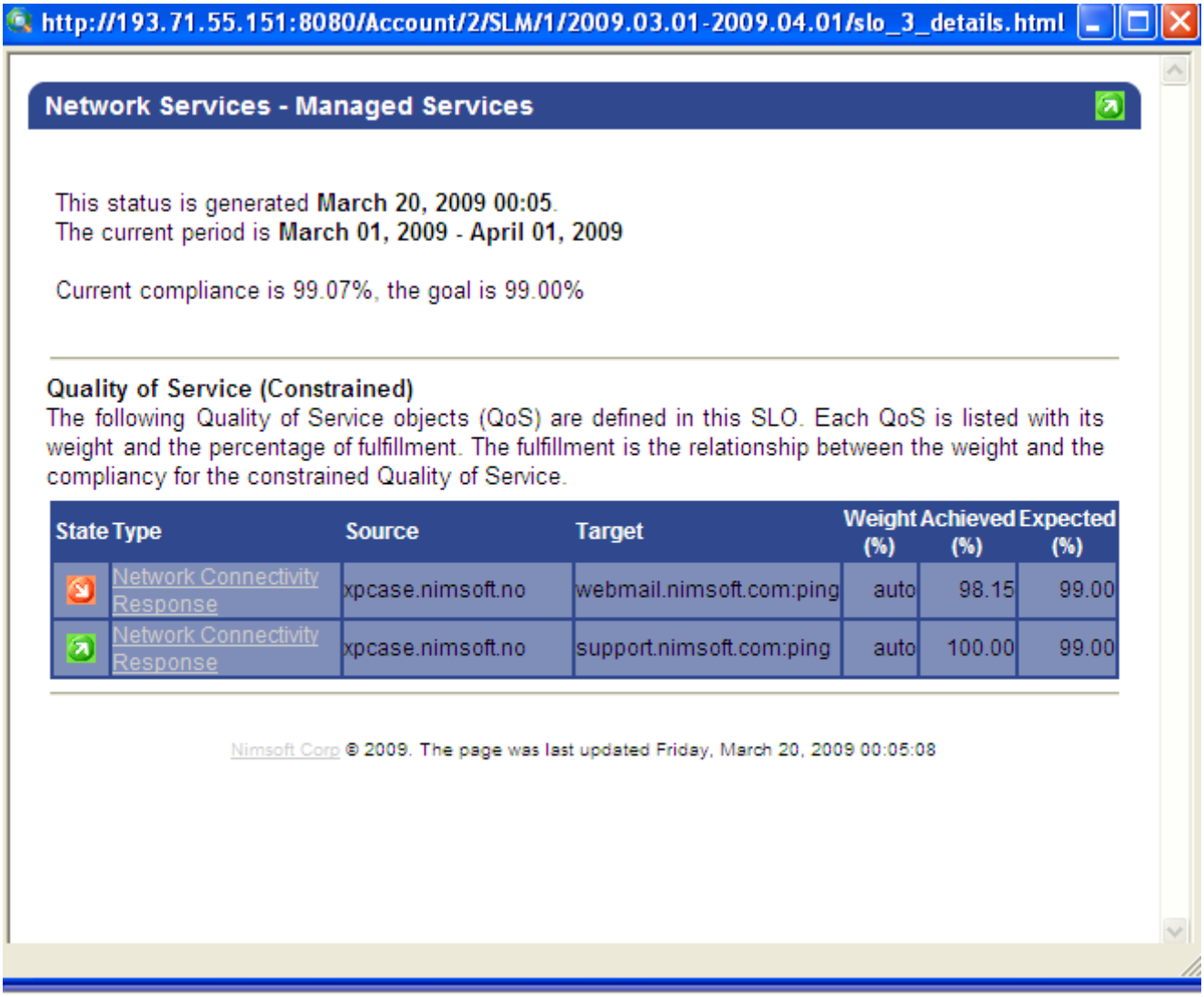
Double-clicking one of the SLA reports opens the report in a separate window.



The SLOs defined in the SLA are listed in the in the table with status info, weight information and expected / achieved compliance percentage.

Clicking one of the SLOs opens the report for that SLO.

The QoS constraints defined in the SLO (in this case four QoS's) are listed in the in the table with status info, source/target, weight information and expected / achieved compliance percentage.



Clicking one of the listed QoS constraints lets you see the graph for the current compliance period for the selected QoS constraint.

NOTE:

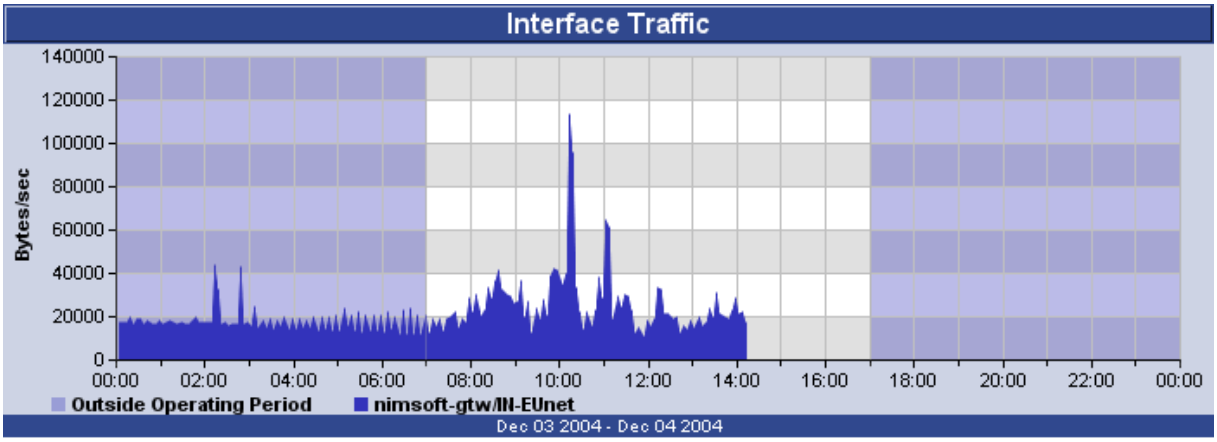
If selecting calculation method AND or OR, this will have the following effect on the SLA reports: The *Weight*, *Achieved* and *Expected* columns will display N/A instead of a value.

The reason is that there is no individual calculation of the QoS series (all data series are calculated equally).

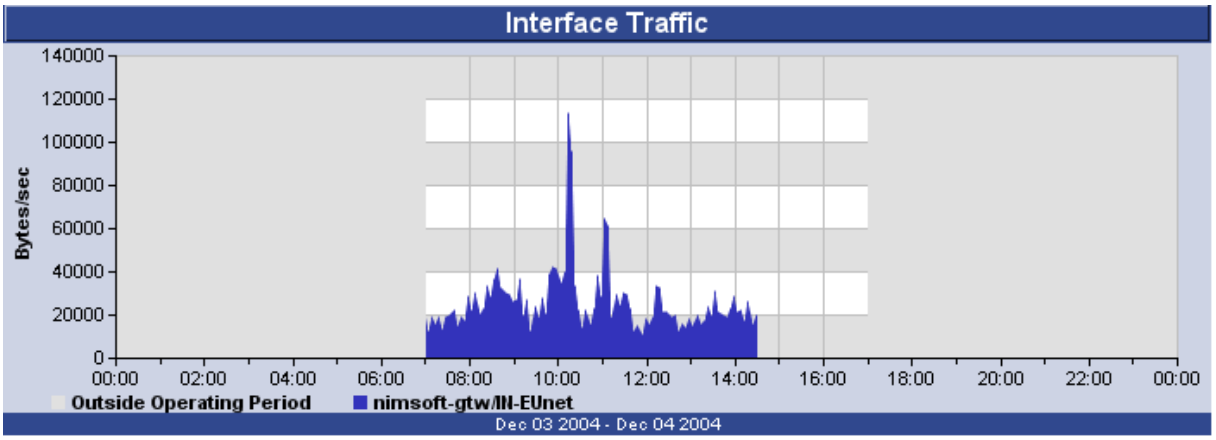
See the graphs below for an explanation of the different elements used:

1. *Outside Operating period*
   In addition to the data series, the graph shows periods that are outside the defined operating period, and the option *Data Outside Operating Period* is set to *Show* in the report_engine configuration tool.

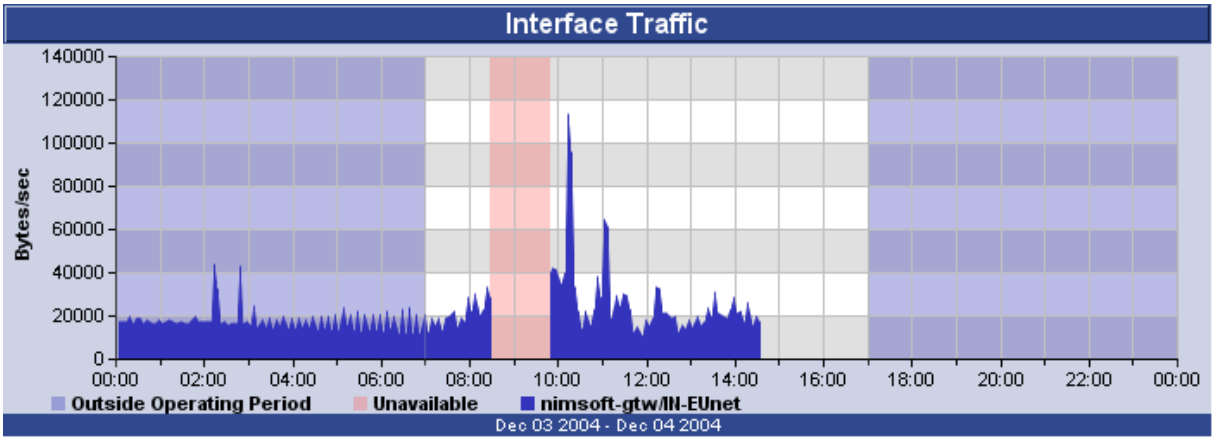
These periods therefore are marked in the graph, but you can still see that period.



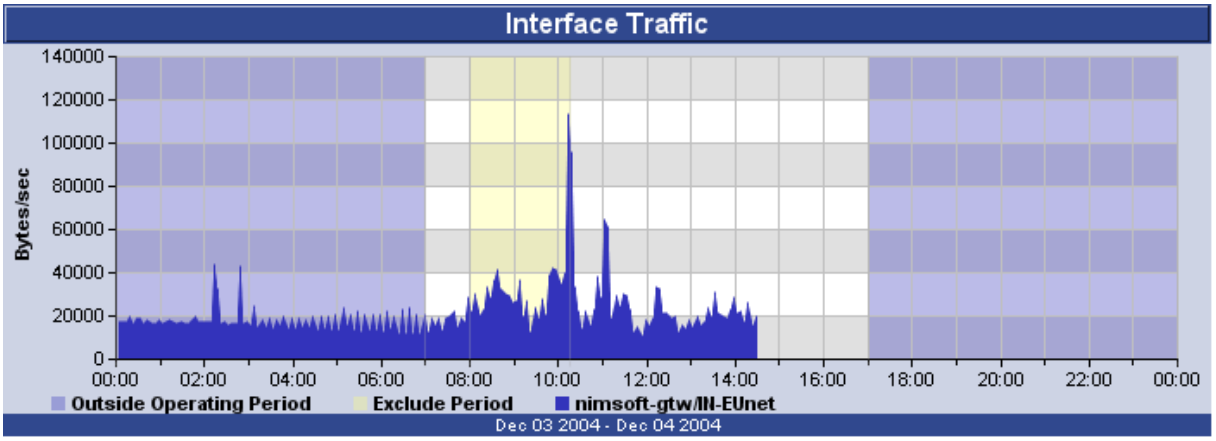
2. *Data series outside Operating period is hidden*
   In addition to the data series, the graph shows periods that are outside the defined operating period, and the option *Data Outside Operating Period* is set to *Hide* in the report_engine configuration tool. These periods therefore appear as grey fields in the graph.



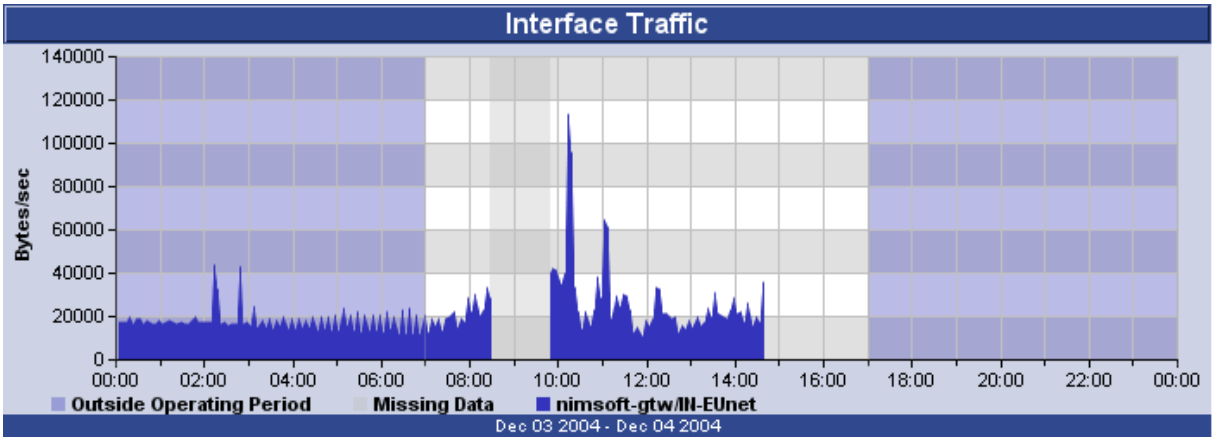
3. *Unavailable*
   In addition to the data series, the graph shows periods that are outside the defined operating period and a period when data was *unavailable* (e.g. the monitored computer did not respond).



4. *Excluded periods*
   In addition to the data series, the graph shows periods that are outside the defined operating period and an *excluded period* (a period defined in the SLA to be excluded from the compliance percentage calculation).



5. *Missing data*
   In addition to the data series, the graph shows periods that are outside the defined operating period and a period where data was *missing* (e.g. the Probe or the Robot hosting the Probe has stopped).



The Unavailability Report
Below the graph, you will find a report, summarizing the periods with threshold breaches and where the service is unavailable.

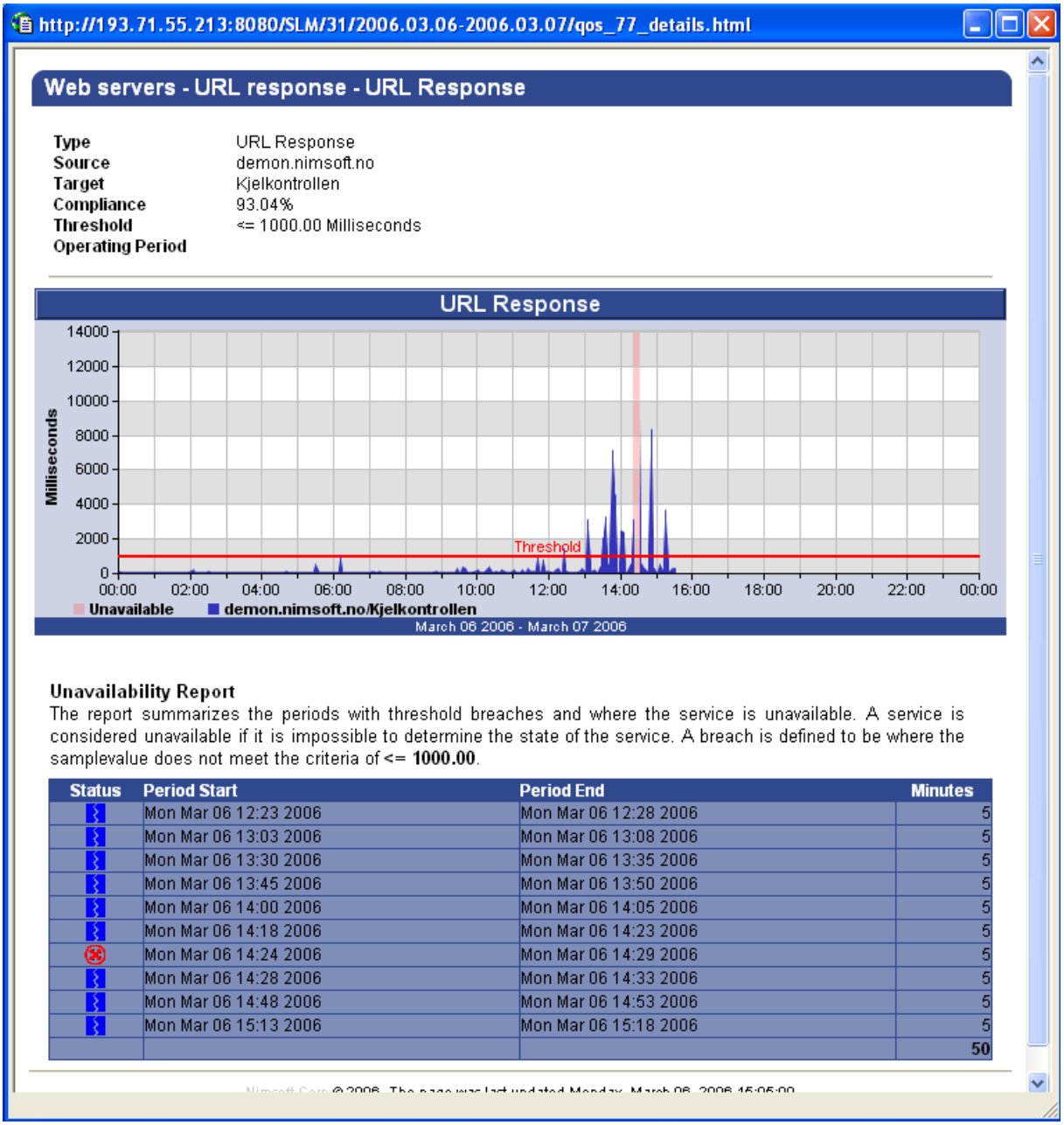
The table contains the following information:

- Status (why the data was unavailable).
- Period start
- Period end
- Duration, how long the data was unavailable.

Two following two icons indicates the status:


Data is unavailable (NULL values) in the period.


Data has breached the threshold value in the period.

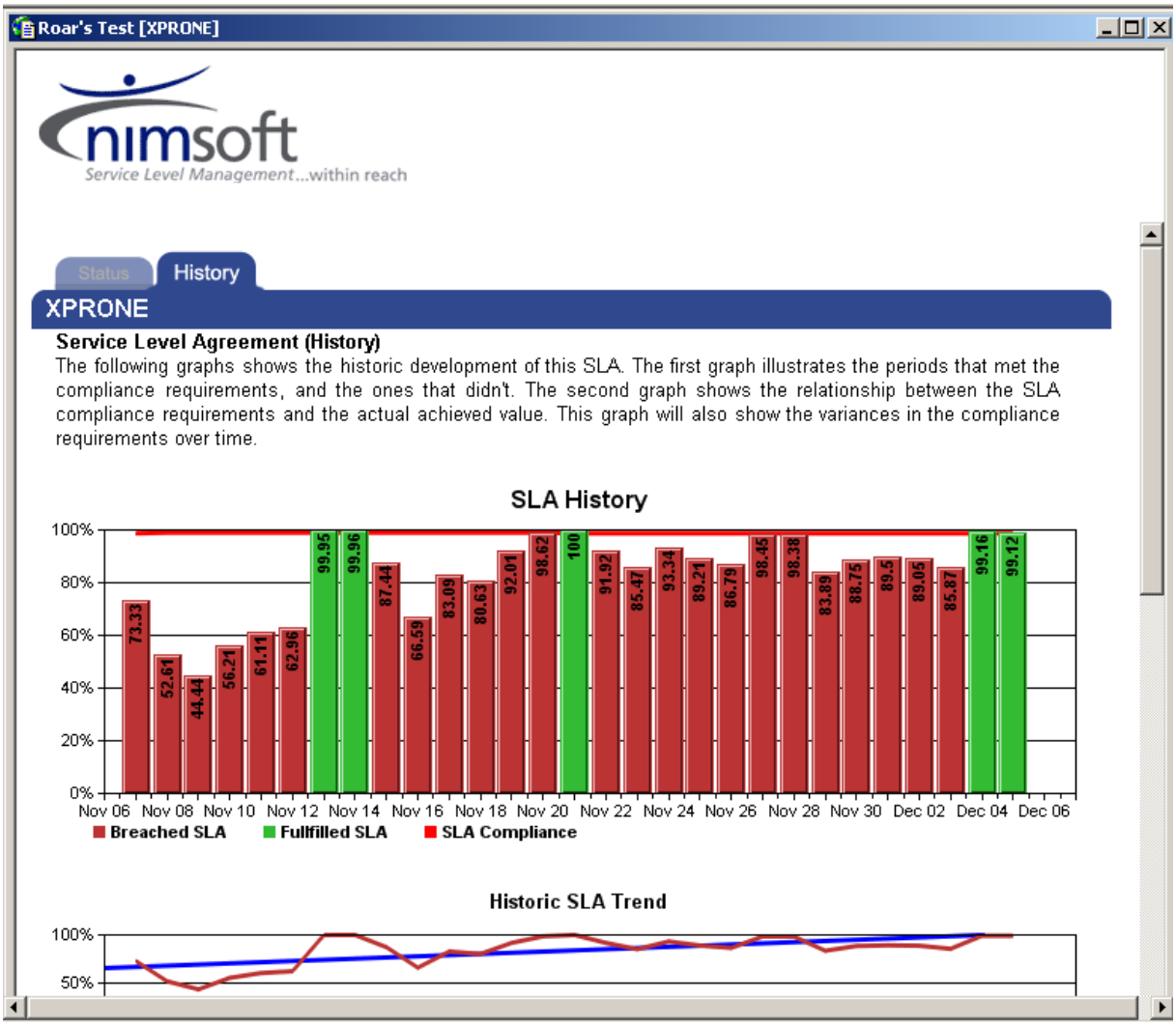


Historical SLA Report

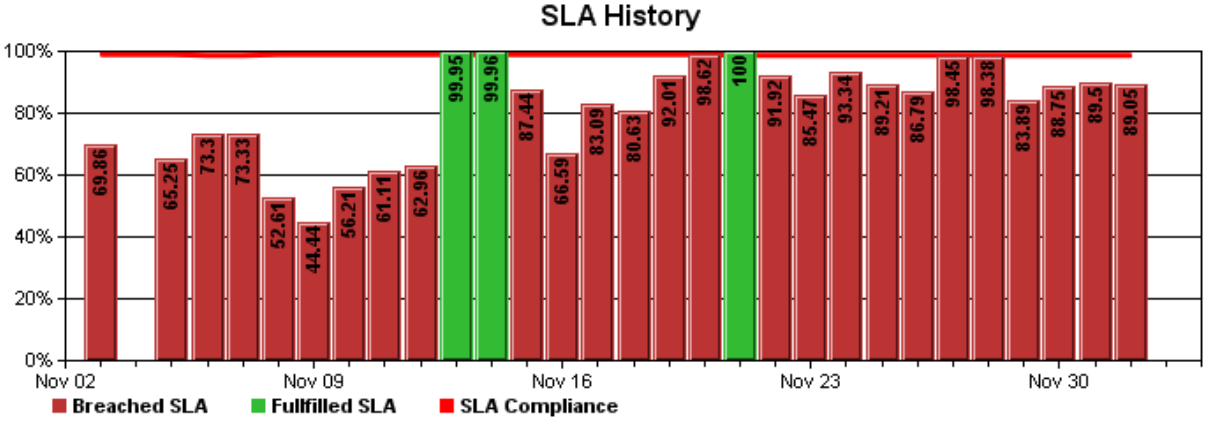
If we select the history tab from this report then you will see the historical periods (see *Historical SLA Report*).

Historical SLA Report

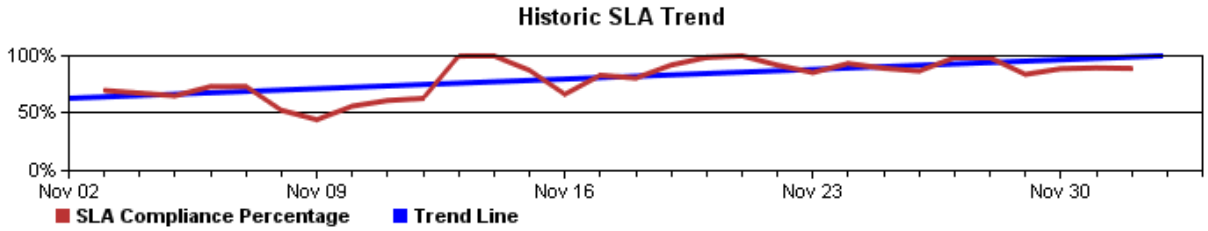
By selecting the history tab from a report, you can see each SLA period and the actual compliance for that period.



The upper part of the report contains a *graphic view* of the SLA history.



Below you will find another graph showing the *historic SLA trend*.

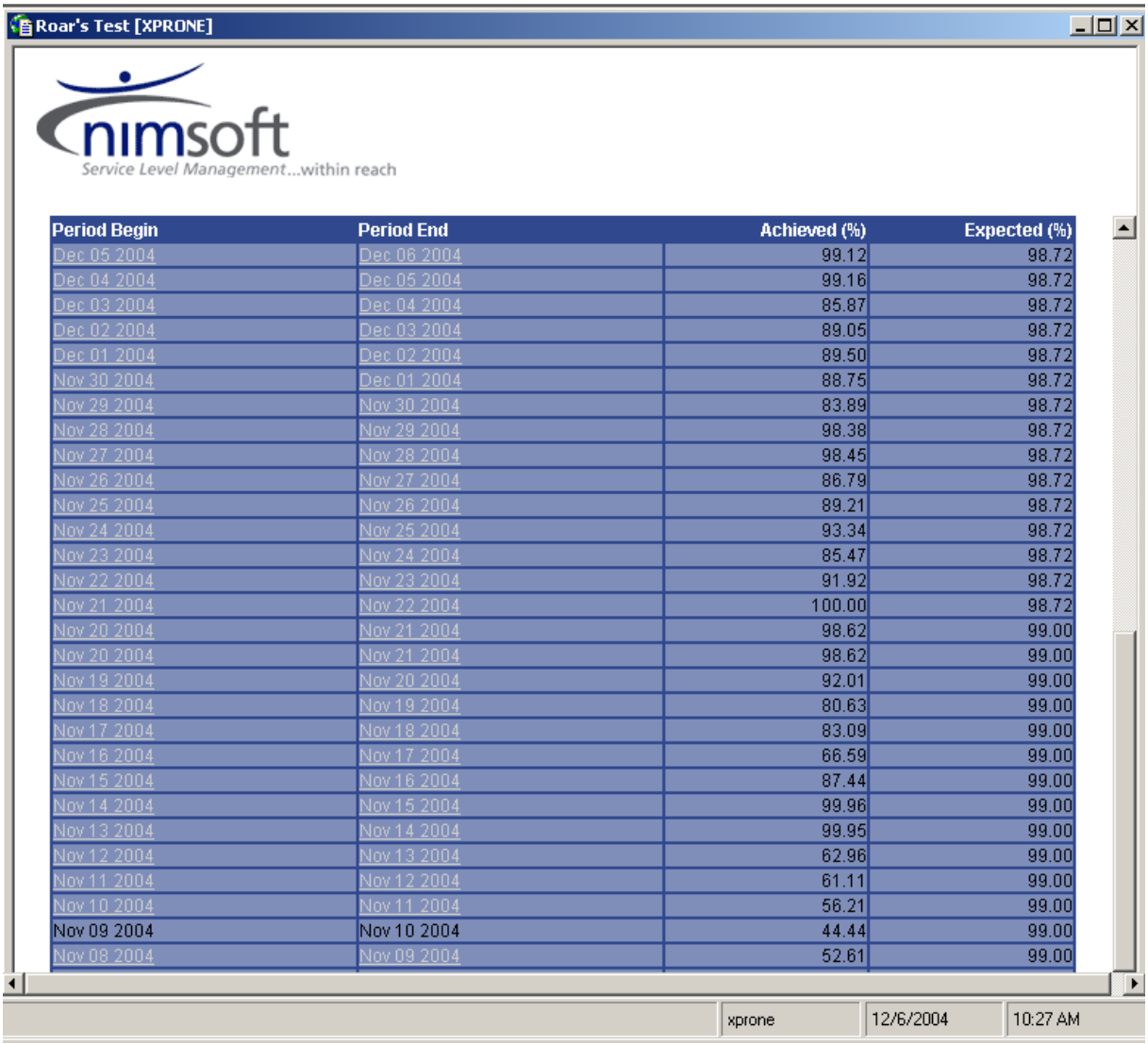


At the bottom of the page you will find a table, showing the achieved compliance percentage for all periods available. You can study the report for each of these periods as described in the section

Drill Down into a Period.

Drill Down into a Period

At the bottom of the History report, the periods found in the graph are listed. If you want to study a report from a specific period, you click that period in the list. The report from the period will appear, enabling you to see the report and the actual graph of the data points that were measured in that period.



Period Begin	Period End	Achieved (%)	Expected (%)
Dec 05 2004	Dec 06 2004	99.12	98.72
Dec 04 2004	Dec 05 2004	99.16	98.72
Dec 03 2004	Dec 04 2004	85.87	98.72
Dec 02 2004	Dec 03 2004	89.05	98.72
Dec 01 2004	Dec 02 2004	89.50	98.72
Nov 30 2004	Dec 01 2004	88.75	98.72
Nov 29 2004	Nov 30 2004	83.89	98.72
Nov 28 2004	Nov 29 2004	98.38	98.72
Nov 27 2004	Nov 28 2004	98.45	98.72
Nov 26 2004	Nov 27 2004	86.79	98.72
Nov 25 2004	Nov 26 2004	89.21	98.72
Nov 24 2004	Nov 25 2004	93.34	98.72
Nov 23 2004	Nov 24 2004	85.47	98.72
Nov 22 2004	Nov 23 2004	91.92	98.72
Nov 21 2004	Nov 22 2004	100.00	98.72
Nov 20 2004	Nov 21 2004	98.62	99.00
Nov 20 2004	Nov 21 2004	98.62	99.00
Nov 19 2004	Nov 20 2004	92.01	99.00
Nov 18 2004	Nov 19 2004	80.63	99.00
Nov 17 2004	Nov 18 2004	83.09	99.00
Nov 16 2004	Nov 17 2004	66.59	99.00
Nov 15 2004	Nov 16 2004	87.44	99.00
Nov 14 2004	Nov 15 2004	99.96	99.00
Nov 13 2004	Nov 14 2004	99.95	99.00
Nov 12 2004	Nov 13 2004	62.96	99.00
Nov 11 2004	Nov 12 2004	61.11	99.00
Nov 10 2004	Nov 11 2004	56.21	99.00
Nov 09 2004	Nov 10 2004	44.44	99.00
Nov 08 2004	Nov 09 2004	52.61	99.00

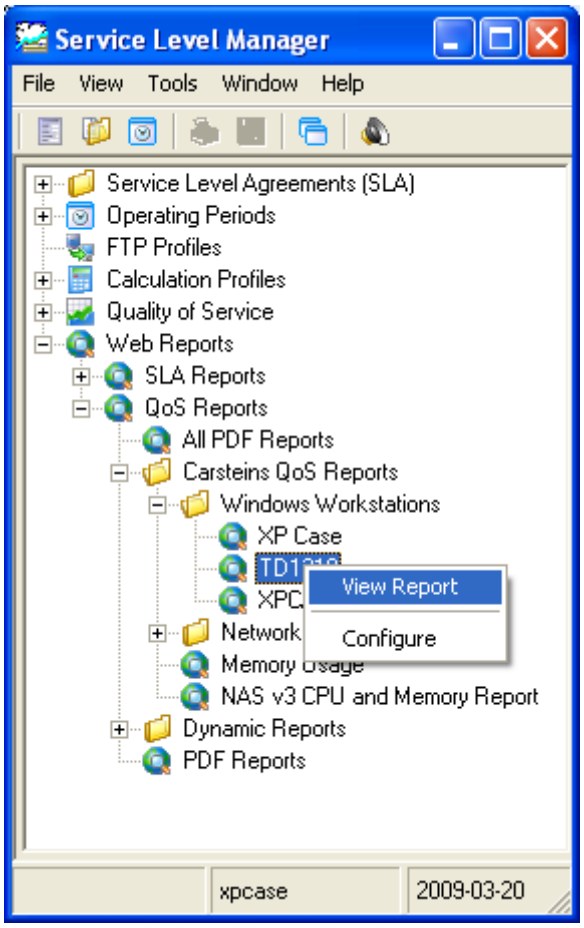
QoS Reports

The *Quality of Service (QoS) reports* must be defined using the report_engine configuration tool.
The generated QoS reports are composed of the following pages:

- *Current reports:*
  Last day (last 24 hours),
  Last week report (last 7 days) and
  Last month reports (last 30 days).
- *Daily*, *Weekly*, *Monthly* and *Quarterly* reports.
  Note that the report_engine configuration tool lets you hide or show all or just some of these reports.

Create your own QoS Report

You may create and administer the QoS reports by configuring the *report_engine* probe. Right-click the *Quality of Service Reports* node in the navigation pane and select *Configure*



The report_engine user configuration tool appears.

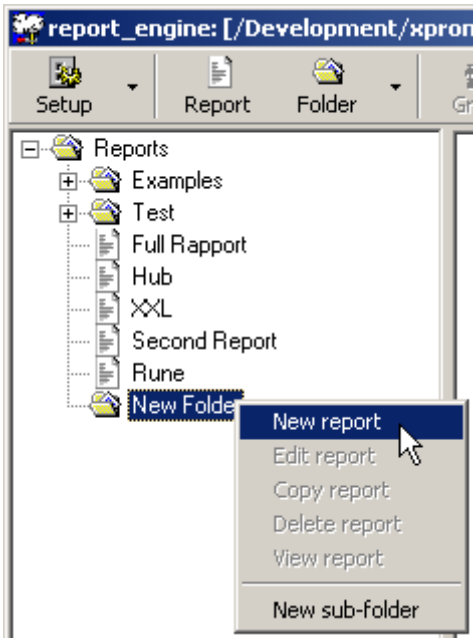
Add a new report by clicking the Report button.

Build a new QoS report by performing the steps described below:

1. Click the *Report* button in the Toolbar,
   or (if you want to create a folder and place the new report in that folder)

   Click the *Folder* button, select the folder, right-click and select New Report.

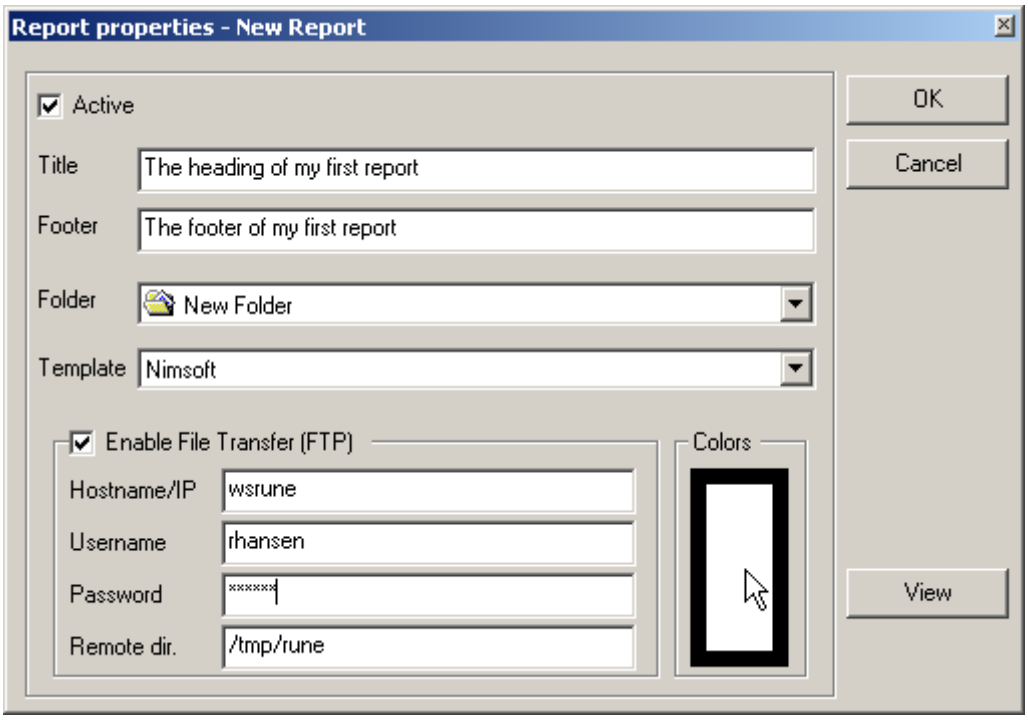
   If you don't care to rename, the folder will be named *New Folder* and the report *New report*. These names will appear in the report_engine only and not be visible in the report or anywhere else.



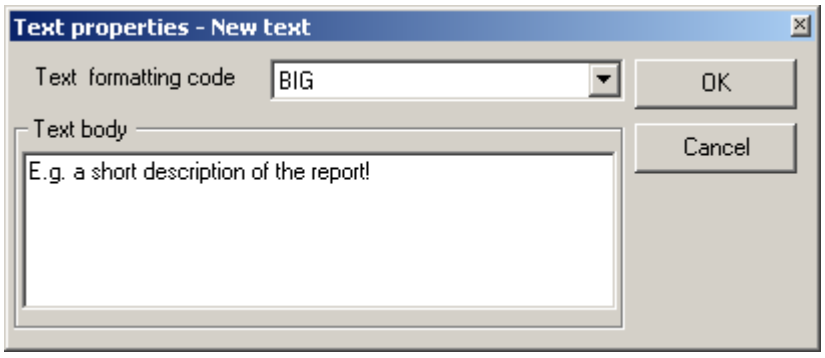
2. Double-click the new report to open its properties dialog.
   - Make sure the *Active* option is checked.
   - Give the report a title. This name will appear as the heading of the report and also appear as the report name under the QoS Reports sub-node in the Navigation Pane of the Service Level Manager when you have saved your configuration.
   - You may also give footer to the report, overriding the default footer specified under the Setup tab.
   - The folder in which you created the new folder is now selected in the *Folder* field. Selecting another folder here will move the report to that folder.
   - Select the Template you want to determine the layout of your report. Note that you may modify the templates or make new ones, using the *Graph Templates* editor.
   - Clicking the *Colors* field, you may select a background color for the report.
   - You may also enable for File Transfer. Specifying a host (or IP addr.), a valid username / password and a directory, your report will, when generated, be

transferred to the Host and stored in the directory you specify.

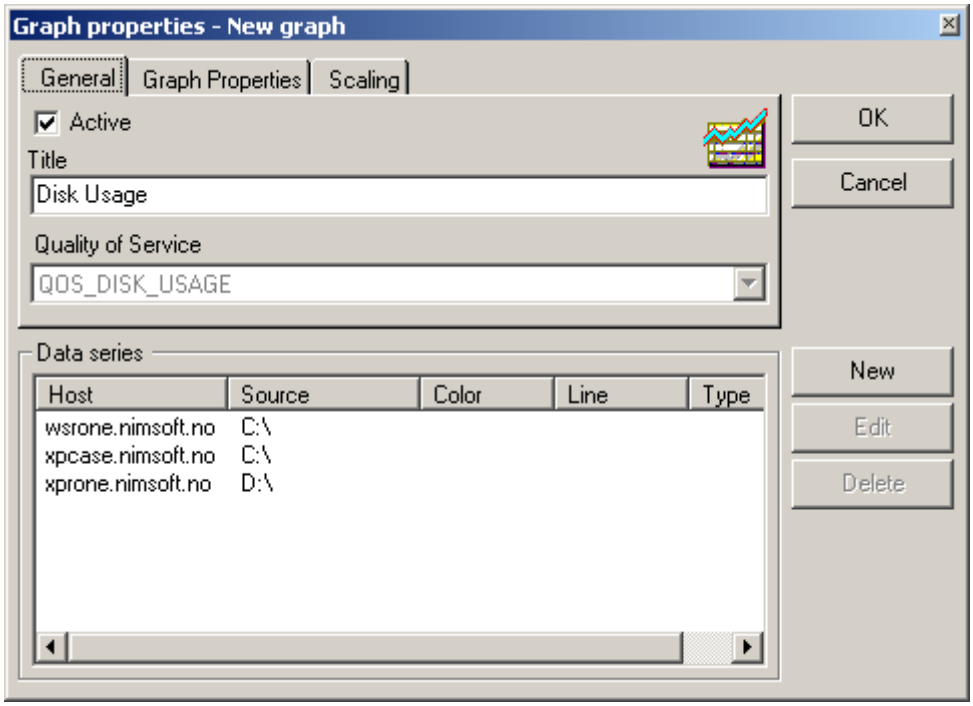
- When finished, click the OK button.



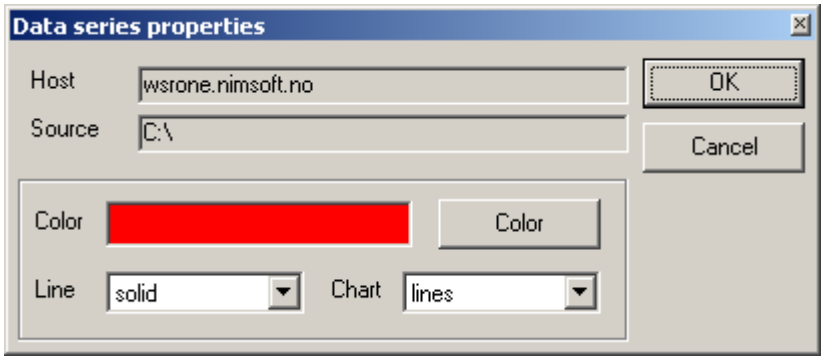
3. Now you are ready to start inserting elements into the report, such as headings, graphs etc.
4. If you want your report to have a heading, click the *Text* button in the Toolbar. A text object will appear in the Right window pane. Double-click the object to open the *Text property* dialog and type your heading title in the *Text body* field. You may also select another text style from the *Text formatting combo* box in the dialog.



5. Click the *Graph* button in the Toolbar to insert a graph object into the report.
   - Double-click the new graph to open the *Graph properties* dialog.



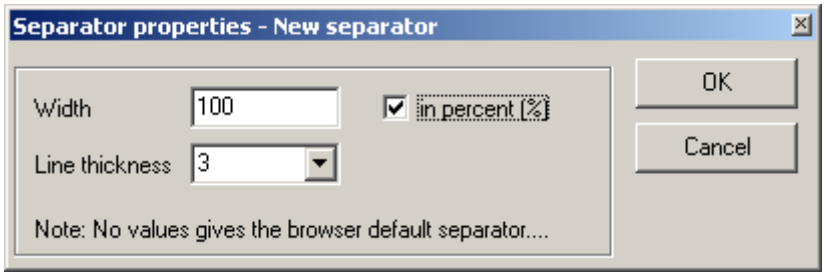
- Make sure the General tab is selected and that the *Active* option is checked.
- Give the Graph a name in the Title field. This name will appear as the title of the graph inside the report.
- Select the QoS object you want to measure from the Quality of Service combo box.
- Click the *New* button to select the Data series (which source and target to measure).
- Optionally add more Data series to appear in the graph.
- Double-click each of the Data series you have defined to set their layout properties, i.e. how they will appear in the graph:
  Color
  Line (solid, dotted etc.)
  Chart (line, bar, area etc.)



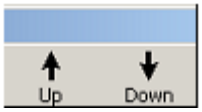
- Also note the optional properties under the two other tabs: *Graph properties* (if you want to set a min./max. value of the graph etc.) and *Scaling* (if you want to overrule the unit name, unit abbreviation etc.)

NOTE:
If you want to see how the definitions made so far will appear in the report, you click the *Apply* button in the report_engine configuration tool. You will be notified that the report_engine has to be restarted to activate your changes. Click Yes and open the report_engine configuration tool again, right-click your new report in the left pane and select *View report*. Your report will be opened. If graphs etc. appear as expected, you may continue inserting more objects into your report.
Otherwise you make modifications and view the report again until you are satisfied.

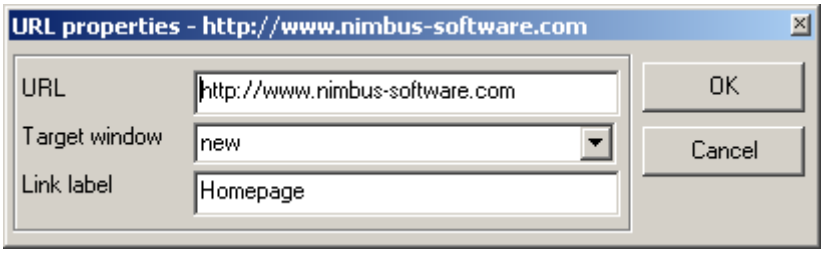
6. You may also insert separators (horizontal rulers) into the report by clicking the Separators icon in the Toolbar. It could be convenient to insert separators to separate the graphs from each other (if you insert more than one graph).
Double-clicking the Separator in the Main Window Pane opens the properties dialog, allowing you to specify the width and thickness of the separator line.



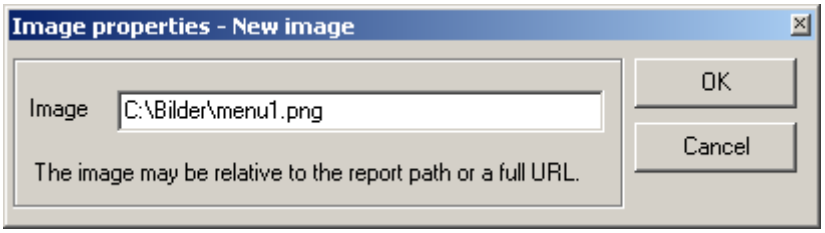
Note that all separators and all other inserted elements can be moved upwards or downwards, using the Up and Down buttons in the Toolbar.



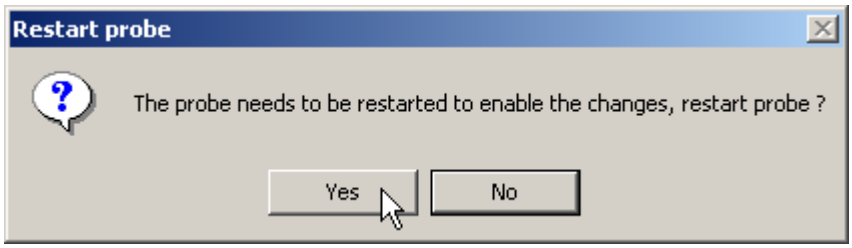
7. Clicking the *URL* button lets you insert a hypertext link into the report. You may specify the link as a relative path, or a full URL. You may refer to other reports, or e.g. your own homepage.



8. Clicking the *image* object inserts an image into the report. You may specify the image as a relative path, or a full URL. Hint: If you have access to web images/pages, simply refer them into your report using their URL.



9. Finish the report by clicking the *Apply* button in the report_engine dialog. You must answer Yes to the following question to enable the new report.

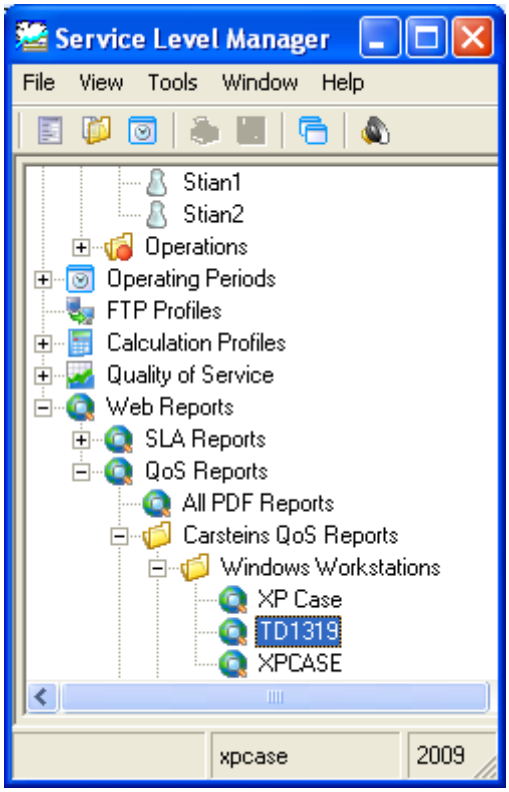


10. Finally click the OK button in the report_engine dialog.

The new report will now appear as a new QoS report (with the name specified as *Title* in the *Report properties* dialog) under the QoS Reports sub-node in the Navigation Pane. Double-click it to see how your new report appears.

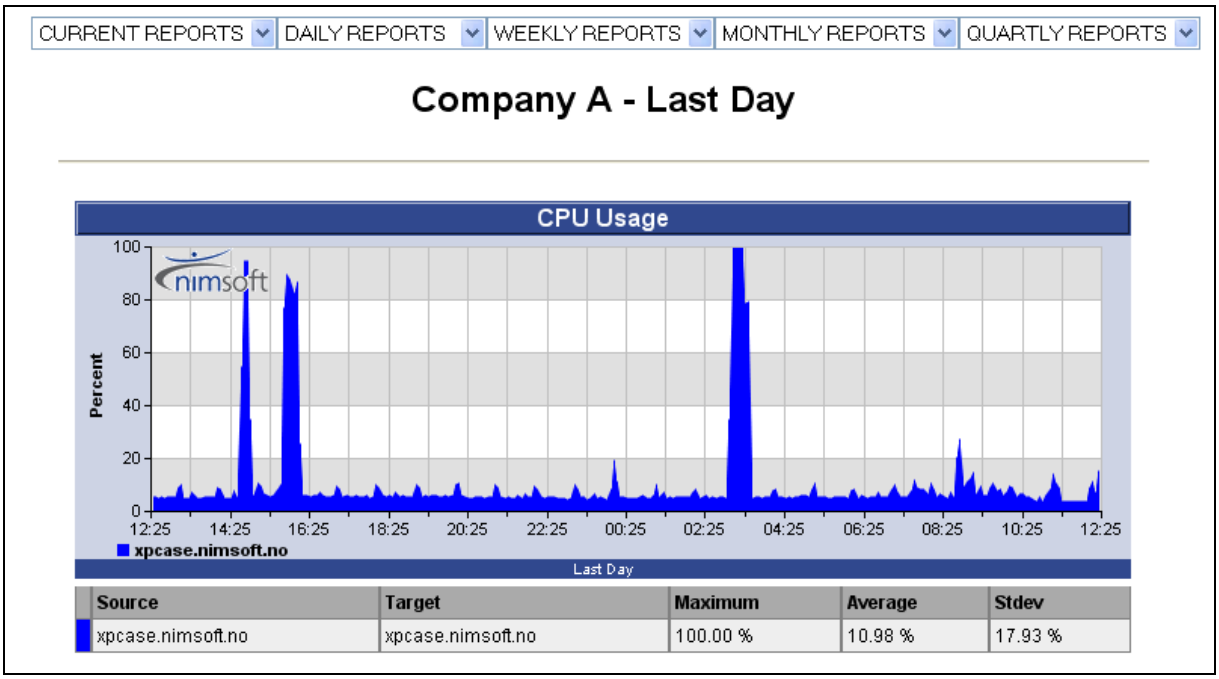
Viewing a QoS Report

Double-clicking one of the QoS reports in the Navigation Pane opens the report in a separate window.



Note the drop-down menus located in the upper part of the report. These enable you to select which report to view.

- *Current reports:*
  Last day (last 24 hours),
  Last week report (last 7 days) and
  Last month reports (last 30 days).
- *Daily*, *Weekly*, *Monthly* and *Quarterly* reports.
  Note that the report_engine configuration tool lets you hide or show all or just some of these reports.



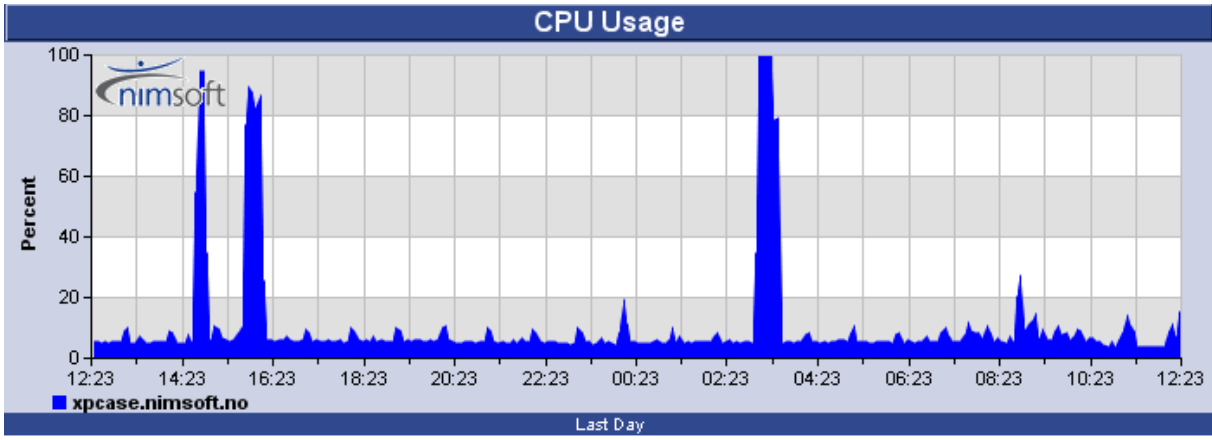
The report shows the QoS graph(s) specified when creating the QoS report (see the section *Create your own QoS Report*).

The tables below the graphs contain the following information for the period shown in the graph (all fields will display **N/A** if no data was available in the period):

- *Source*
  The computer hosting the probe sending the QoS data.
- *Target*
  The device/target being monitored, supplying the probe with QoS data.
- *Maximum*
  Shows the maximum value for the QoS, if available. Some QoS's have an absolute maximum value, such as Disk usage, CPU usage etc.
  For other QoS's, not having a maximum value (such as URL Response etc.) this field will display **N/A**.
- *Average*
  Average of all the samples within the report period (using the AVG() function in SQL Server).
- *Stdev*
  Standard deviation of all the samples within the report period (using the STDEV() function in SQL Server).

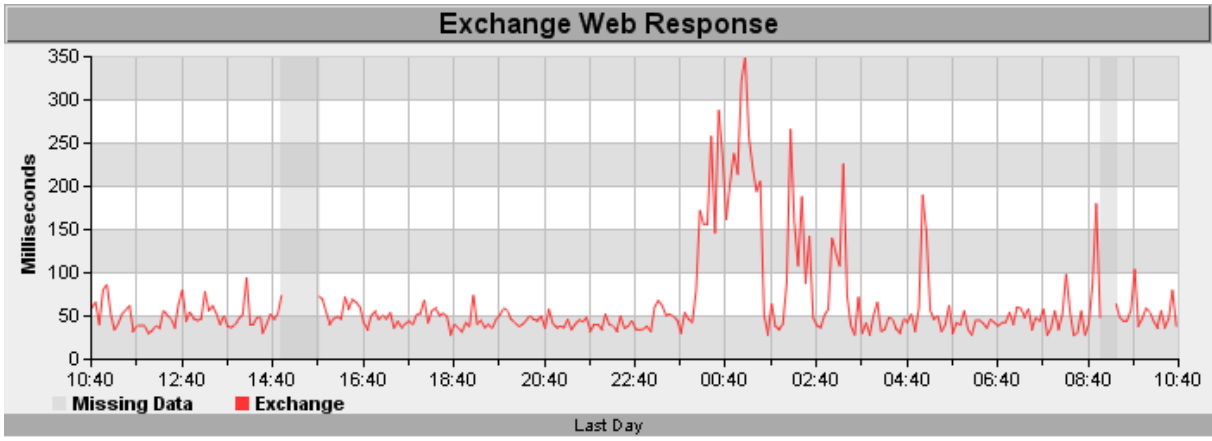
See the graphs below for an explanation of the different elements used:

1. The graph below shows QoS data for CPU USAGE (in percent) for the computer xpcase.nimsoft.no, and the graph is presented as a filled area (can be configured in the report_engine configuration tool).
   Note, as explained above, that this QoS has a maximum value 100.00%).



Source	Target	Maximum	Average	Stdev
xpcase.nimsoft.no	xpcase.nimsoft.no	100.00 %	10.98 %	17.93 %

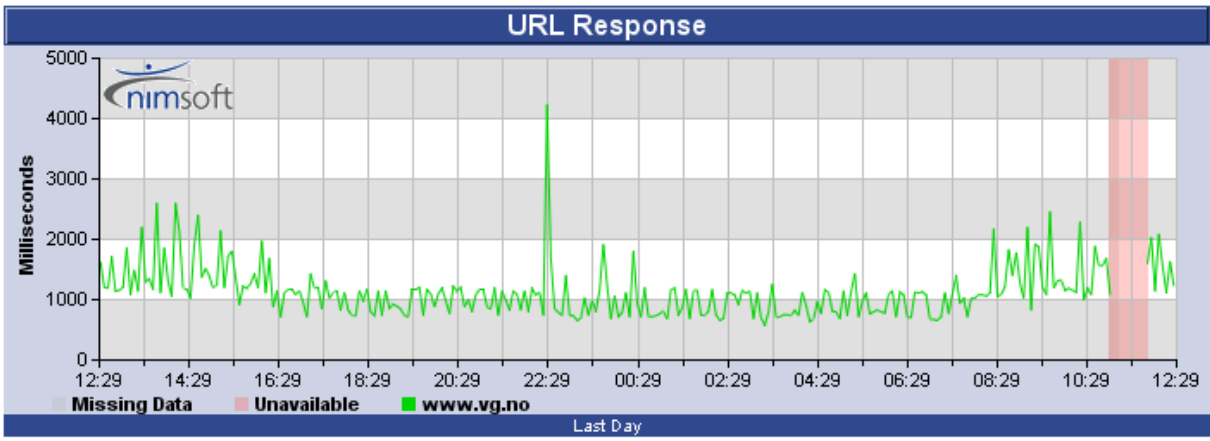
2. *Missing data*
   The graph below shows QoS data for EXCHANGE WEB RESPONSE (URL Response) in milliseconds, and the graph is presented as a line area (can be configured in the report_engine configuration tool).
   Note, as explained above, that this QoS has no maximum value. Note, however, that the graph has two periods where data is missing.



Source	Target	Maximum	Average	Stdev
wsrone.nimsoft.no	Exchange	n/a	63.78 ms	51.81 ms

3. *Data unavailable*
   The graph below shows QoS data for URL RESPONSE in milliseconds. The probe is hosted by the xpcase.nimsoft.no computer, monitoring the download time of the

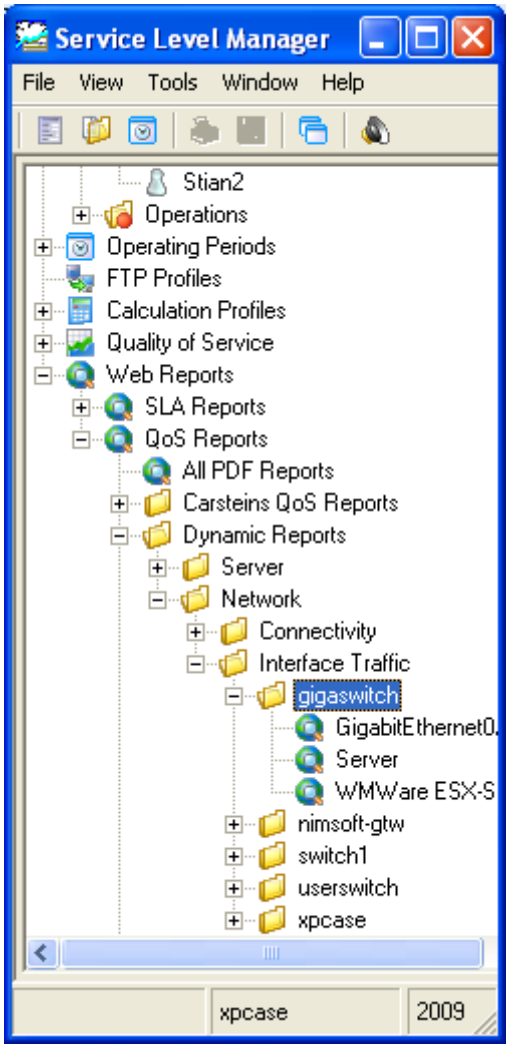
URL www.vg.no. Note that the graph has a period when the target was unavailable.



Source	Target	Maximum	Average	Stdev
xpcase.nimsoft.no	www.vg.no	n/a	1130.66 ms	426.75 ms

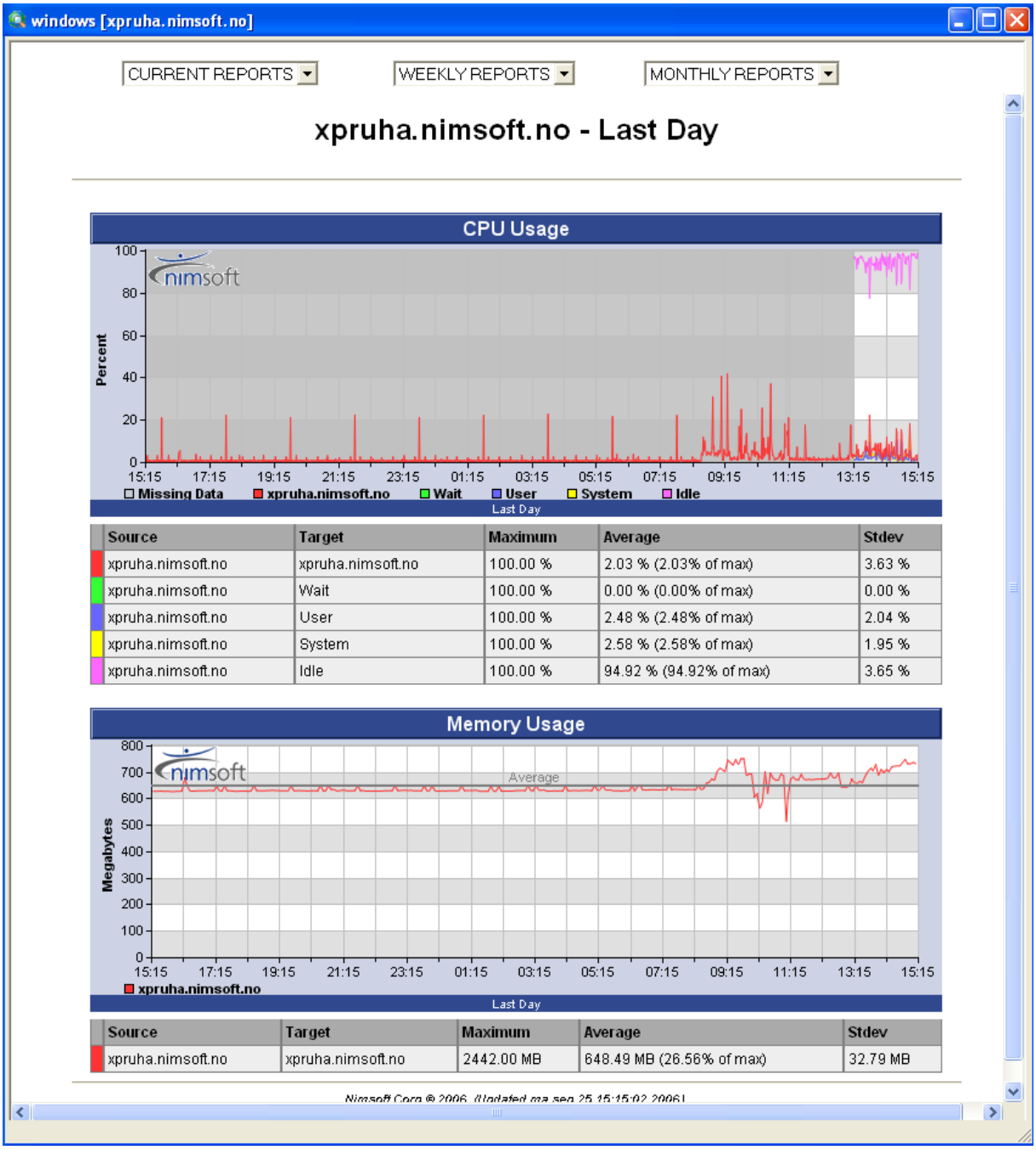
Dynamic Reports

Under the QoS Reports child-node, you will also find the *Dynamic Reports*, generated by the Report Engine probe, provided that the *Dynamic Reports* option in the Report Engine probe is activated.



These Dynamic reports are sorted in groups as defined in the Nimsoft Group Server probe.

The end-node will represent a Dynamic Report representing a device or host in your Nimsoft Infrastructure. Clicking the end node will launch the report in the main window. Note that the Report Engine probe lets you choose between different report-layouts, using templates. You may also edit these templates to match your needs.



Drop-down menus in the reports let you choose between the following views:

- *Current reports:*
  Last day (last 24 hours),
  Last week report (last 7 days) and
  Last month reports (last 30 days).
- *Daily*, *Weekly*, *Monthly* and *Quarterly* reports.
  Note that the report_engine configuration tool lets you hide or show all or just some of these reports.

Customizing Reports

The *report_engine* generates its reports using a template-based architecture. This means that you can with simple means change the looks of the QoS and SLA reports.

Templates for QoS reports and QoS graphs in SLA reports can be modified using the **Graph Templates Editor**.

For more details about the Graph Templates Editor, please refer to **SLM Probes → report_engine → The Graph Template Editor** section in the Probes online help.

Templates for SLA reports can be modified as described in the section *How to Customize your SLA Reports.*

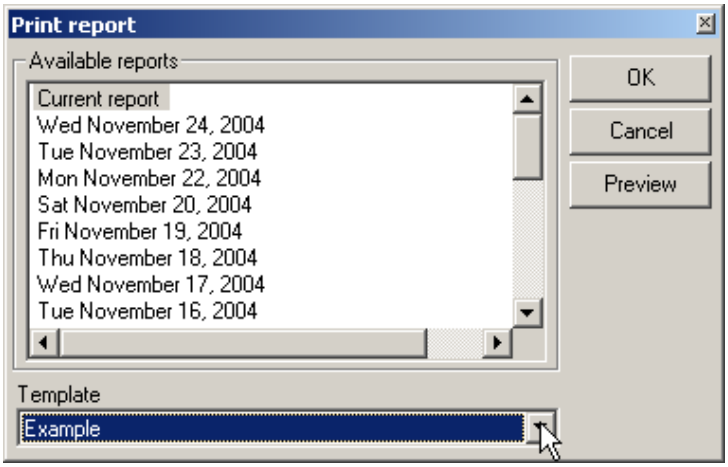
Printing Reports

There are two different methods of printing reports.

Printing reports opened from the Navigation Pane
The first method is to open a report, SLA report or QoS report, from the Web Reports sub-node in the Navigation Pane. This activates the Printer icon in the Toolbar, and you may print the selected report. These reports will, when printed, appear as defined by the report templates selected in the report_engine configuration tool.

Printing reports directly from an opened SLA/SLO

The other method is to open a SLA or a SLO. This activates the Printer icon in the Toolbar. Clicking the Printer icon opens the *Print report* dialog. The dialog lets you select which of the available reports for the selected SLA/SLO to print, and also select one of the available *printout templates*. The presentation and layout of these reports depends on the selected printout template and are quite different from the ones opened from the Web Reports sub-node.



You may print or preview the report for the selected SLO or SLA using a template found in the templates pull-down list. If you choose to preview the report, a window containing the report will be presented. Print the previewed report by pressing the *printer* icon on the toolbar.

You may modify (or copy and modify) the printout templates to fit your corporate standards, such as logo, fonts, backgrounds etc. Read more about it in the section *Reports. The* printout templates are located in the *Program Files/* Nimsoft */SLM/Templates/SLA* or *Program Files/* Nimsoft */SLM/Templates/SLO* folders locally on the computer you are running.

It is also possible to save the report to a file, for later retrieval or web publishing.

Using Tokens in your Custom Reports

A report is quite often subject to corporate standards such as fonts, logos, backgrounds etc. The SLM supports a set of tokens that you may use in your report-templates that will be replaced prior to printing (and previewing).

You may modify the template, or create a new one, in any HTML editor (such as Microsoft FrontPage) to fit your specific needs (layout, logo, language, etc.).

The template is a standard HTML file including a set of variables (or tokens) that are expanded by the Service Level Manager before previewing or printing.

General Tokens

$DATE
Today's date e.g.

$SYSDATE
Today's date, using the default date format.

$BLOCK_BEGIN_SLO
Initiates a repetitive SLO block. References each SLO within a SLA.

$BLOCK_END_SLO
Terminates a repetitive SLO block.

$BLOCK_BEGIN_QOS
Initiates a repetitive QoS block. Often used within a SLO block.

$BLOCK_END_QOS
Terminates a repetitive QoS block.

Tokens Related to the Current SLA

$SLA_sla_id
The identification number of the SLA.

$SLA_name
The name of the SLA.

$SLA_description
A longer descriptive text, stating the e.g. purpose of the SLA.

$SLA_period_begin
The starting date of compliance period.

$SLA_period_end
The ending date of compliance period.

$SLA_period_code
The period type (**d**ay, **w**eek and **m**onth)

$SLA_percentage
The achieved compliance percentage.

$SLA_compliance_percentage
The expected compliance percentage.

$SLA_compliance_warning_level
The warning threshold value for the SLA.

Tokens Related to the Current SLO

$SLO_slo_id
The identification number of the SLO

$SLO_name
The name of the objective

$SLO_description
A longer descriptive text, stating the e.g. purpose of the current objective.

$SLO_weight
The weight distribution

$SLO_percentage
The achieved compliance percentage

$SLO_compliance_percentage
The expected compliance percentage

$SLO_compliance_warning_level
The warning threshold value for the SLO

Tokens Related to Quality of Service (QoS)

$QOS_const_id
The identification number of the constrained QoS.

$QOS_name
The name of the current QoS

$QOS_description
The QoS description

$QOS_target
The QoS target specification

$QOS_source
The QoS source specification

$QOS_weight
The QoS weight percentage settings

$QOS_operator
The operator code for the value comparison

$QOS_threshold
The threshold value used with the QOS_operator to validate the data

$QOS_percentage
The achieved percentage within the defined period

$QOS_accuracy
The accuracy of the sampled data

$QOS_excpected_accuracy
The expected accuracy of the data

$QOS_total
The number of sampled data used in the *calculations*

$QOS_ok
The number of samples that are validated against the threshold + operator and found to be **ok**

Formatting Codes

The formatting codes are placed directly after the primitive on the form ='formatting code', e.g. $SLA_period_begin='d mmmm yyyy', where the actual HTML code is not split in the source.

Date
Format using the date formatting codes below. e.g. $SLA_period_begin='d mmmm yyyy'

Example:

Name	**$SLA_name ($SLA_sla_id)**
Description	**$SLA_description**
Period	**$SLA_period_begin - $SLA_period_end**
Service level	**$SLA_percentage%**, expected **$SLA_compliance_percentage%**

$BLOCK_BEGIN_SLO

$SLO_name

Description:	$SLO_description
Compliance:	$SLO_percentage % (expected: $SLA_compliance_percentage%)

Quality of Service	Description	Weight	Achieved
$BLOCK_BEGIN_QOS			
$QOS_description	$QOS_source/$QOS_target	$QOS_weight	**$QOS_percentage%**
$BLOCK_END_QOS			

$BLOCK_END_SLO

Date formatting codes:

The following table identifies characters you can use to create user-defined date/time formats:

(:)
Time separator. In some locales, other characters may be used to represent the time separator. The time separator separates hours, minutes, and seconds when time values are formatted. The actual character used as the time separator in formatted output is determined by your system settings.

(/)
Date separator. In some locales, other characters may be used to represent the date separator. The date separator separates the day, month, and year when date values are formatted. The actual character used as the date separator in formatted output is determined by your system settings.

c
Display the date as `ddddd` and display the time as `ttttt`, in that order. Display only date information if there is no fractional part to the date serial number; display only time information if there is no integer portion.

d
Display the day as a number without a leading zero (1 – 31).

dd
Display the day as a number with a leading zero (01 – 31).

ddd
Display the day as an abbreviation (Sun – Sat).

dddd
Display the day as a full name (Sunday – Saturday).

ddddd
Display the date as a complete date (including day, month, and year), formatted according to your system's short date format setting. The default short date format is `m/d/yy`.

dddddd
Display a date serial number as a complete date (including day, month, and year) formatted according to the long date setting recognized by your system. The default long date format is `mmmm dd, yyyy`.

aaaa
The same as dddd, only it's the localized version of the string.

w
Display the day of the week as a number (1 for Sunday through 7 for Saturday).

ww
Display the week of the year as a number (1 – 54).

m
Display the month as a number without a leading zero (1 – 12). If `m` immediately follows `h` or `hh`, the minute rather than the month is displayed.

mm
Display the month as a number with a leading zero (01 – 12). If `m` immediately follows `h` or `hh`, the minute rather than the month is displayed.

mmm
Display the month as an abbreviation (Jan – Dec).

mmmm
Display the month as a full month name (January – December).

oooo
The same as mmmm, only it's the localized version of the string.

q
Display the quarter of the year as a number (1 – 4).

y
Display the day of the year as a number (1 – 366).

yy
Display the year as a 2-digit number (00 – 99).

yyyy
Display the year as a 4-digit number (100 – 9999).

h
Display the hour as a number without leading zeros (0 – 23).

hh
Display the hour as a number with leading zeros (00 – 23).

N
Display the minute as a number without leading zeros (0 – 59).

Nn
Display the minute as a number with leading zeros (00 – 59).

S
Display the second as a number without leading zeros (0 – 59).

Ss
Display the second as a number with leading zeros (00 – 59).

t t t t t
Display a time as a complete time (including hour, minute, and second), formatted using the time separator defined by the time format recognized by your system. A leading zero is displayed if the leading zero option is selected and the time is before 10:00 A.M. or P.M. The default time format is `h:mm:ss`.

AM/PM
Use the 12-hour clock and display an uppercase AM with any hour before noon; display an uppercase PM with any hour between noon and 11:59 P.M.

am/pm
Use the 12-hour clock and display a lowercase AM with any hour before noon; display a lowercase PM with any hour between noon and 11:59 P.M.

A/P
Use the 12-hour clock and display an uppercase A with any hour before noon; display an uppercase P with any hour between noon and 11:59 P.M.

a/p
Use the 12-hour clock and display a lowercase A with any hour before noon; display a lowercase P with any hour between noon and 11:59 P.M.

AMPM
Use the 12-hour clock and display the AM string literal as defined by your system with any hour before noon; display the PM string literal as defined by your system with any hour between noon and 11:59 P.M. AMPM can be either uppercase or lowercase, but the case of the string displayed matches the string as defined by your system settings. The default format is AM/PM.

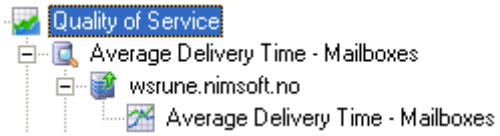
Viewing the Quality of Service (QoS) Data

The navigation window contains the **Quality of Service** node. All registered QoS objects are listed under this node using the *description* field in the QoS object. This view enables the user to quickly browse the database for particular data-series.

The structure is organized like illustrated below:

- Quality of Service
    - Quality of Service object name
        - Source
            - Target

Note:
This is the structure if the QoS objects are ordered on the QoS name. Right-clicking on the QoS node in the Navigation Pane lets you select another sorting key, such as *order by QoS group*, where the QoS objects will be grouped into logical groups.

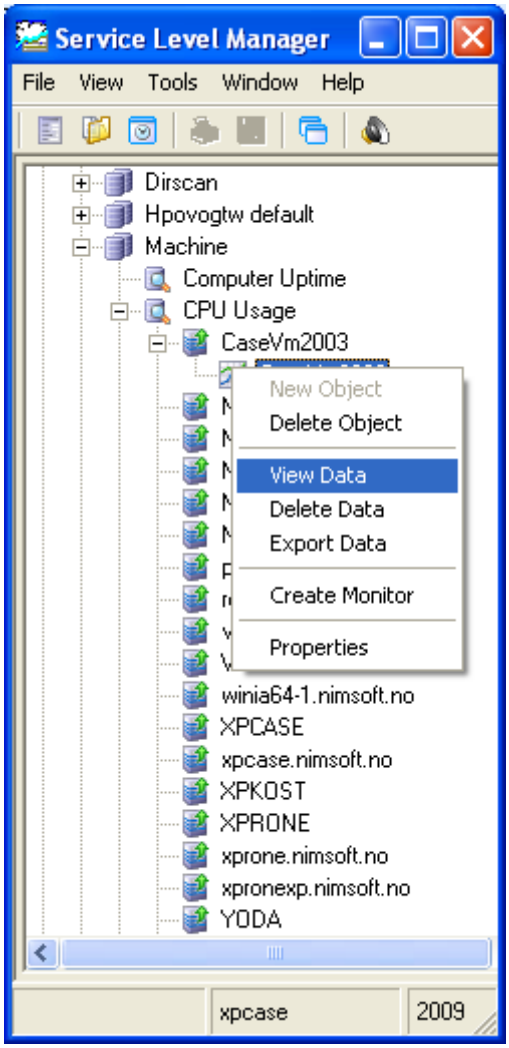


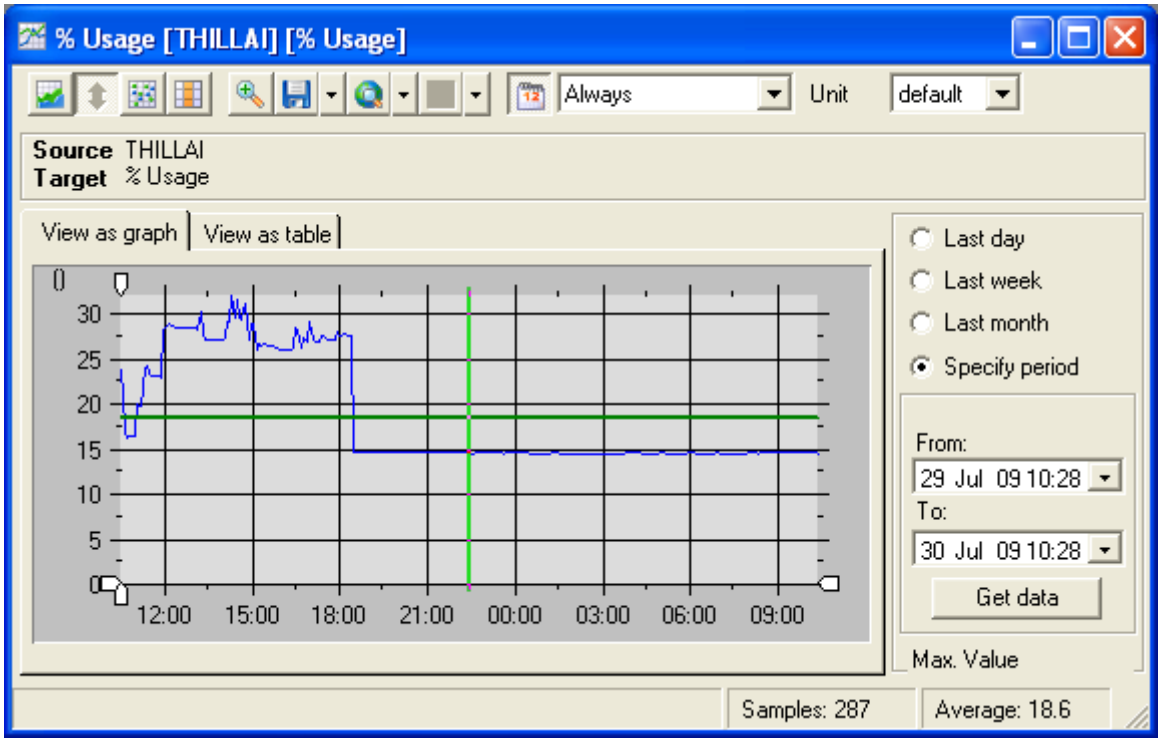
Let's explain the structure using "real" data. The *cdm* probe provides the QoS data registers the QoS objects it will use during the startup sequence. These messages are collected by the *Data Engine* and transformed into database tables and definitions. The *cdm* probe will, on a timed interval, send its QoS data, based on its findings and calculations to the *Data Engine* as messages (subject: QOS_MESSAGE).

This will populate the database tables matching the *cdm* QoS configuration. Let's say we configured the *cdm* to send QoS on CPU usage and Disk usage (C:) data. You are now able to browse the data using the Service Level Manager. Find the *Quality of Service* node and double-click to expand it. This brings up the QoS descriptions registered by the *Data Engine*. Find the **Disk Usage** node and double-click to expand it. The children nodes will reflect the *sources* (Robots) that are generating the QoS data. The *target* node holds the last piece of information needed to pinpoint the recorded data in the database, in this case e.g. **C:**\. We can address each QoS using the *QoS-Name, Source and Target.*

Generating a Graph

The Service Level Manager generates a graph when right-clicking and selecting *View* on a QoS objects *target* node in the Navigation Pane.

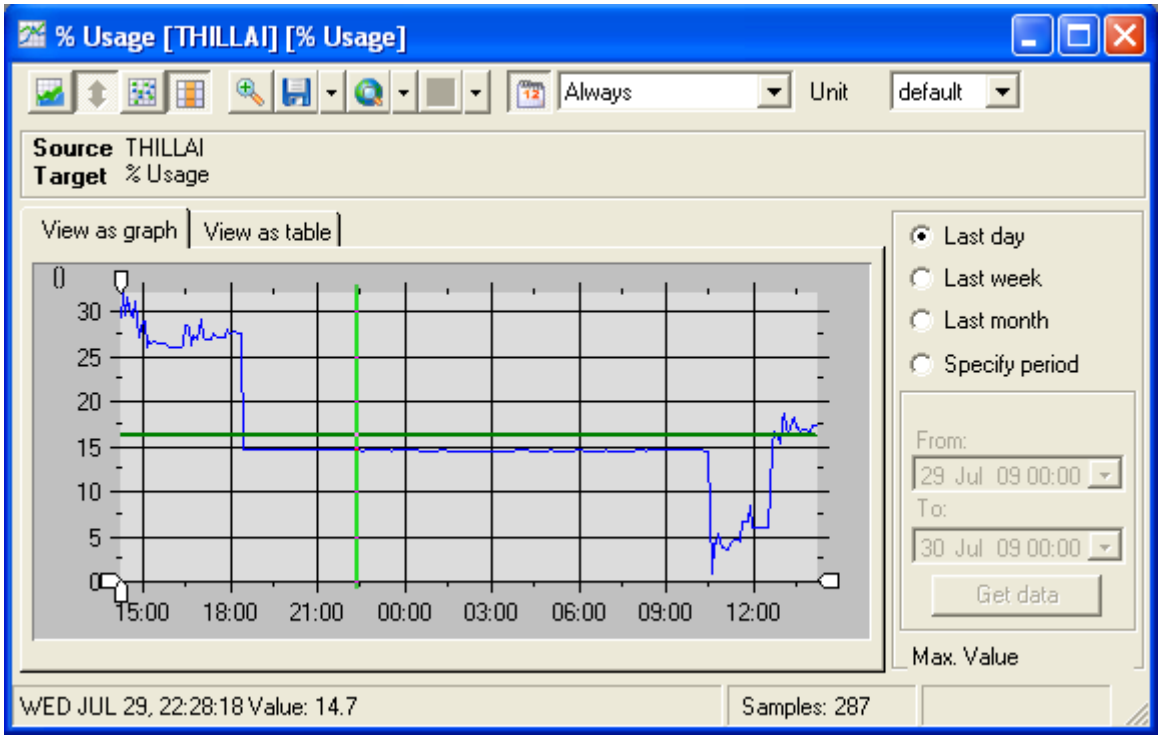




You can select the data view to be presented as a graph or as a table. Also note the status line at the bottom of the window supplying the following information:

- The number of Samples.
- Average sample value.

If you click at a point in the graph, the exact value of that point is displayed in the status bar.

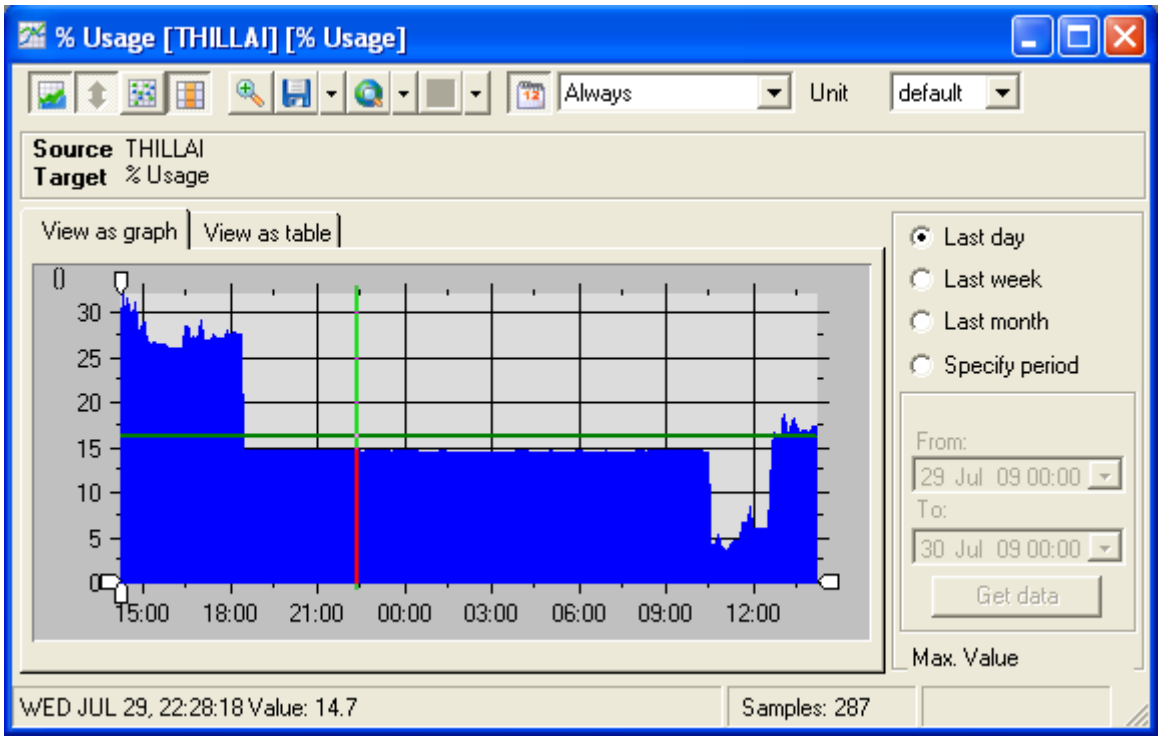


The graph has the following color code:

- **Blue**
  Represents the data value.
- **Green**
  Represents the average value.
- **Red**
  If the graph displays a QoS *constraint* (opened from a SLO) with a specified threshold value, a red line represents the threshold value.

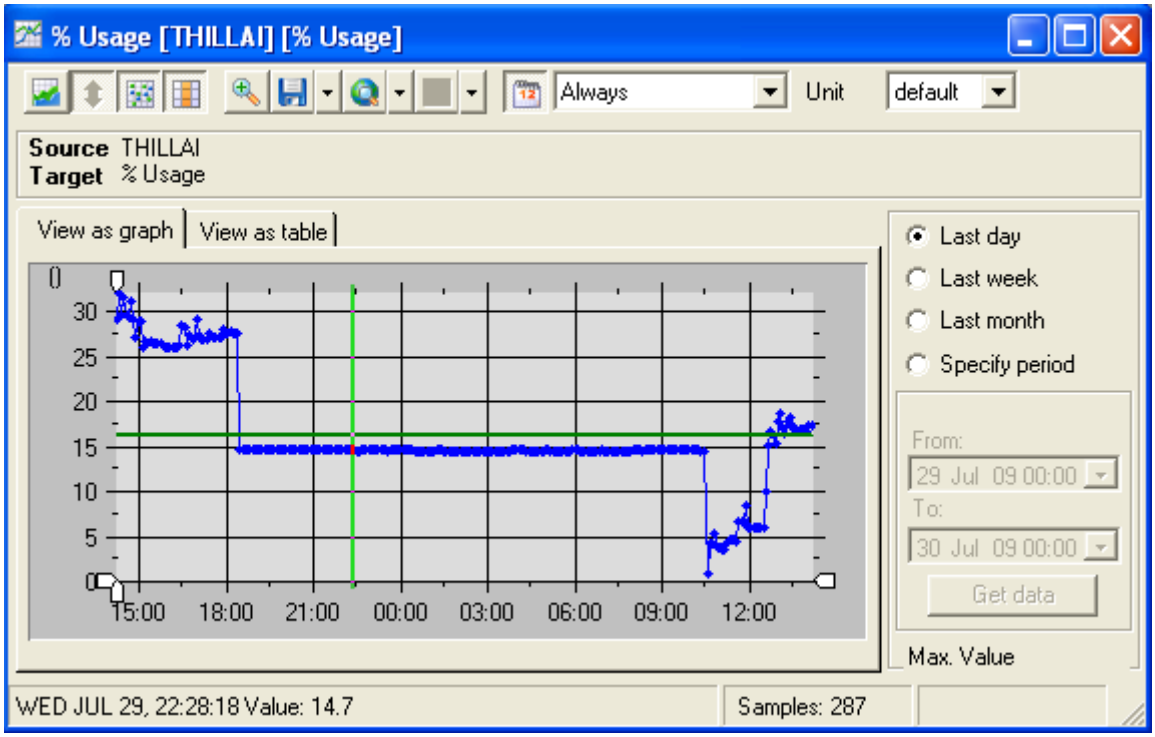
The window contains icons and controls for modifying the view:

Toggles the fill-mode of the graph, as shown in the following image.



Automatic scaling-function. Automatically scales the graph based on the maximum input value.

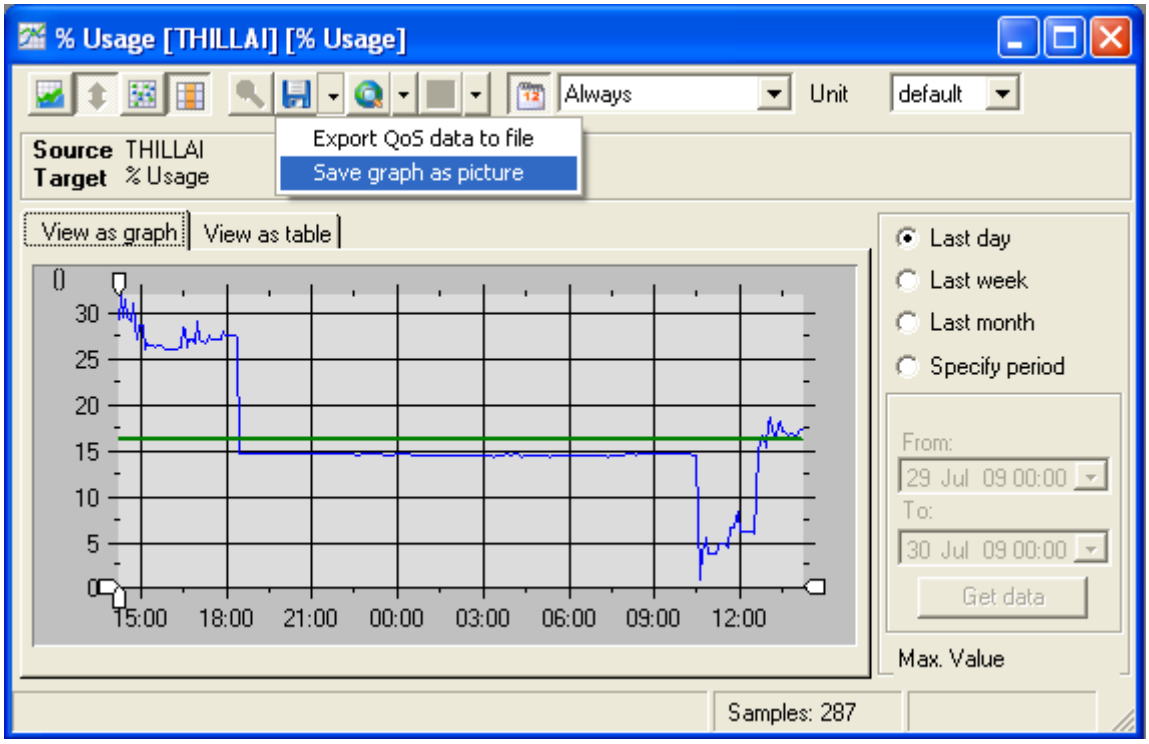
Adds value points to the graph (toggle function).



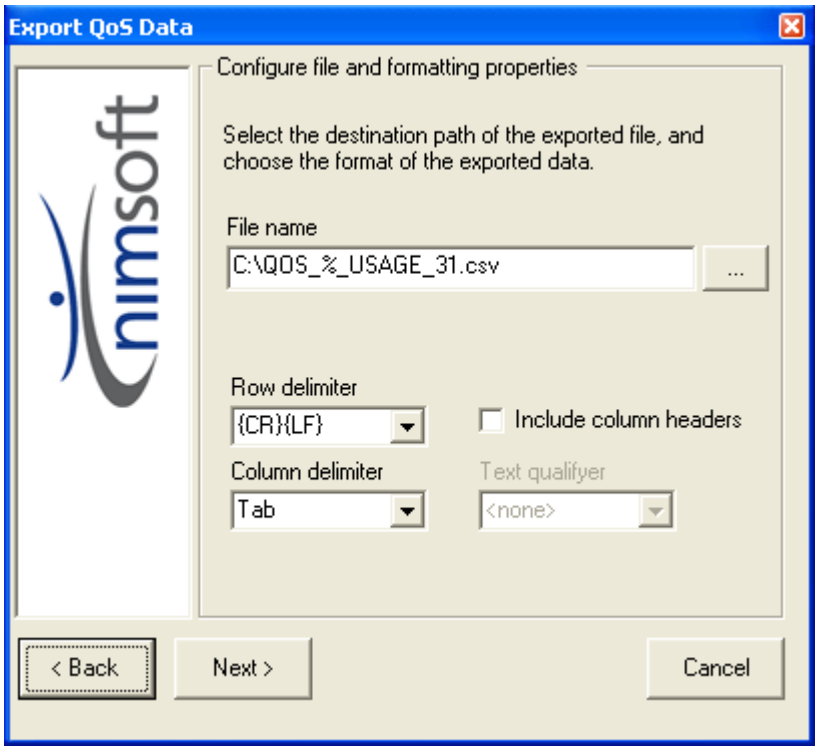
Shows periods when data is missing in the graph (toggle function).

Zooms in on the data samples (1 day period). Left-click the point in the graph where you want detailed view and then click this button. Return to normal view by selecting period (week, month etc.) by using the radio-buttons on the right.

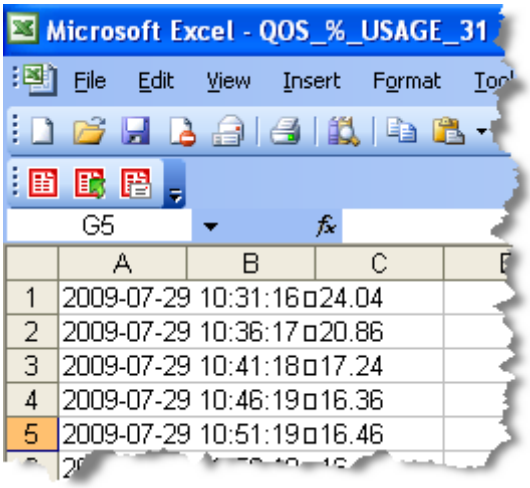
The Export QoS data to file icon lets you export the QoS data as a CSV file or as a picture file. As shown in the following image, click the down arrow key next to the save icon.



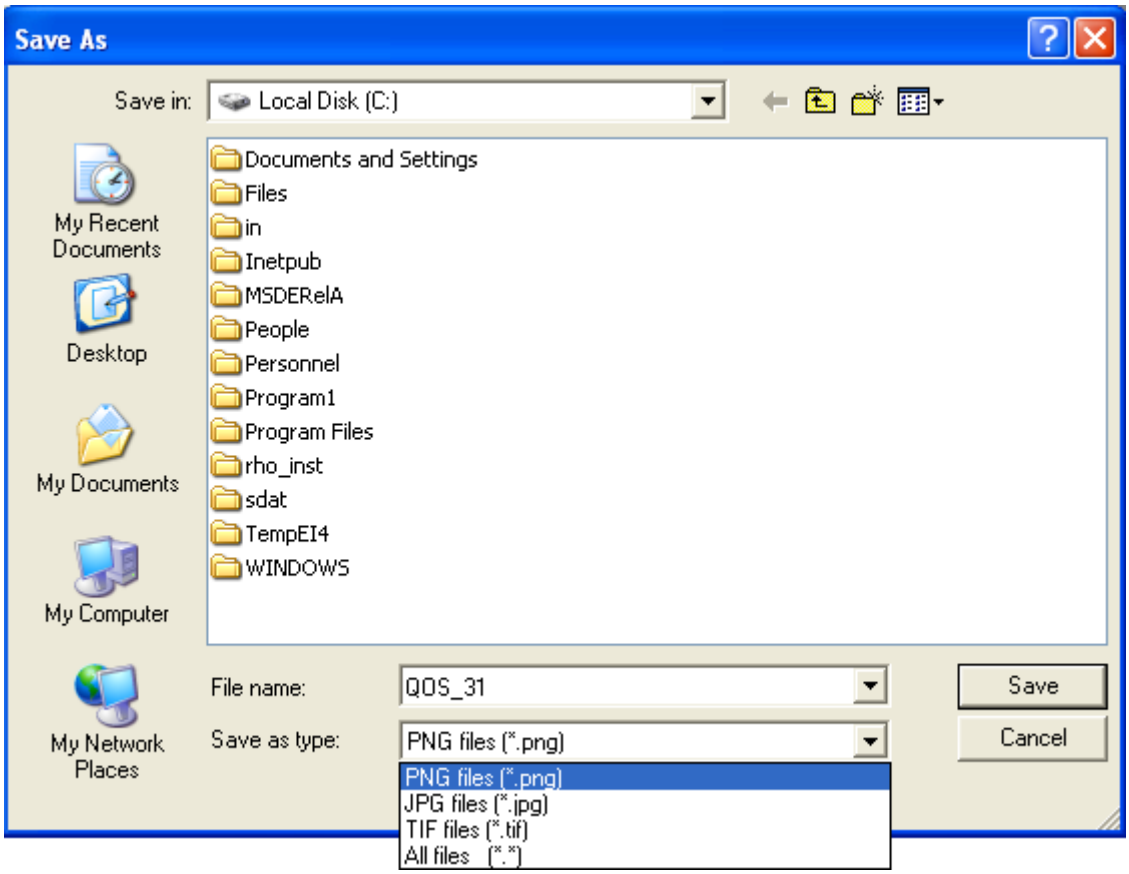
- Click Export **QoS Data to File Option** to save the QoS data to file. The **Export QoS Data** dialog opens.



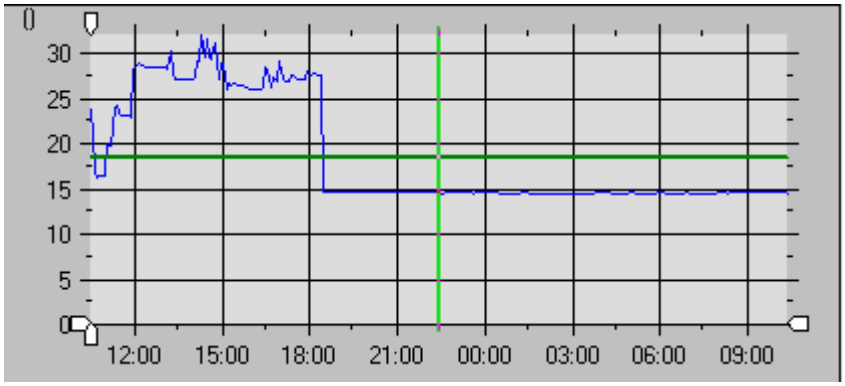
Enter file name in the **File name** box. Click **Next**. In the next step, CSV file is generated at the given path, as shown in the following figure.



- Select **save graph as a picture** option to save the graph as an image.



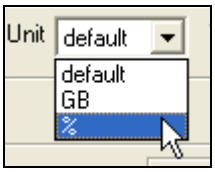
The supported graphic file formats are PNG, JPEG and TIF.



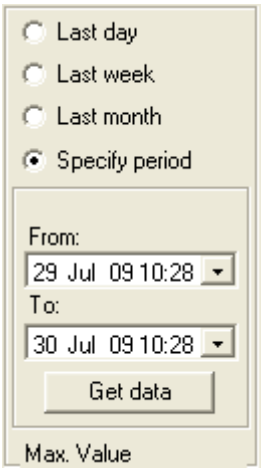
The Time zone icon of the graph lets you generate the graph based on different time zones. Click on the down arrow key next to the icon to open a list of time zone. Select the appropriate time zone from it.

Restricts the data to the selected operating period. When selected, this function disables the possibility to select other operating periods (see below).

This field lets you select operating period (from those defined and located under the Operating Periods Node in the Navigation Pane.



This field allows you to specify the Unit for the graph. The number of units available will be different for the various QoS types.

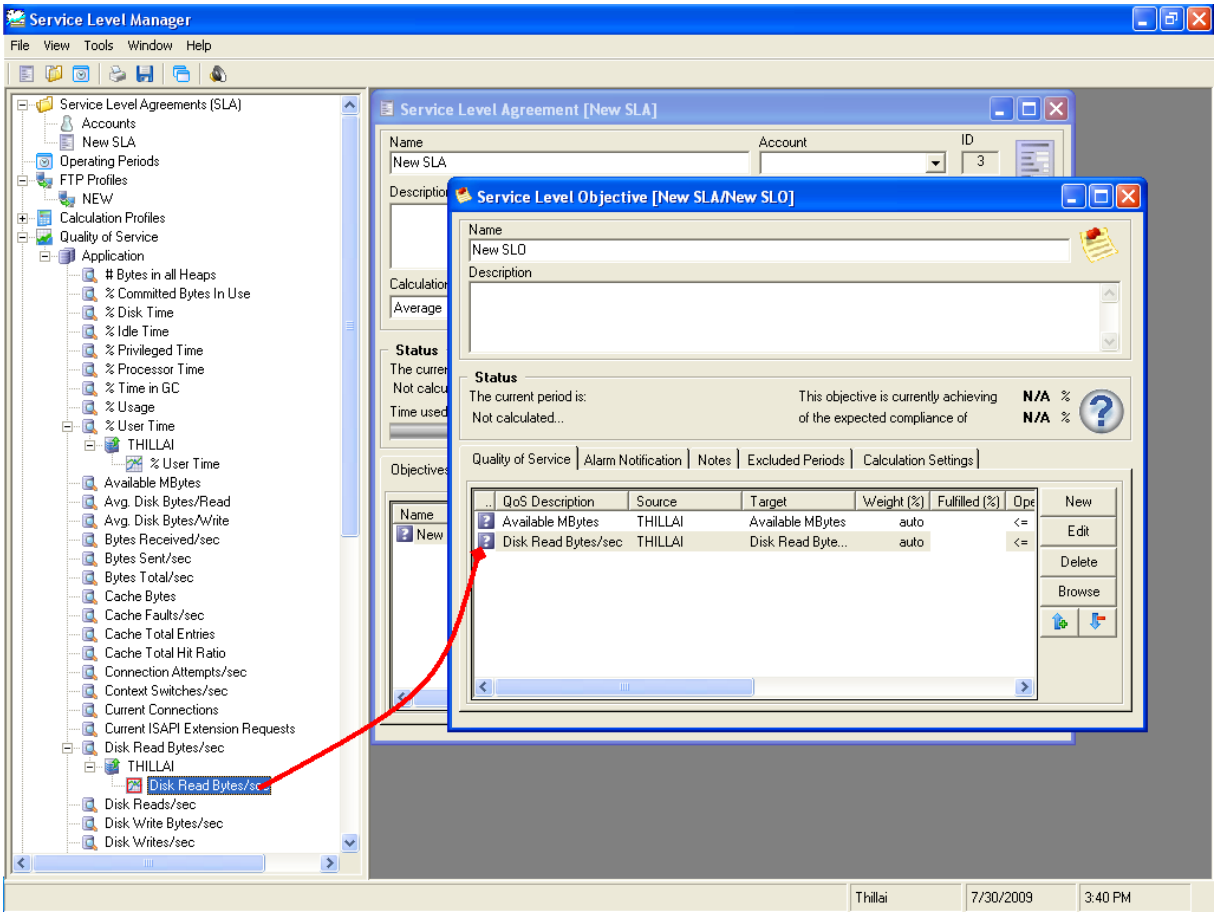


You may select the period by using the radio-buttons (last day, last week etc.).

Using the field in the lower right corner, you may also set the maximum value of the vertical axis in the graph to a proper value to compress the graph in cases where you have "peaks".

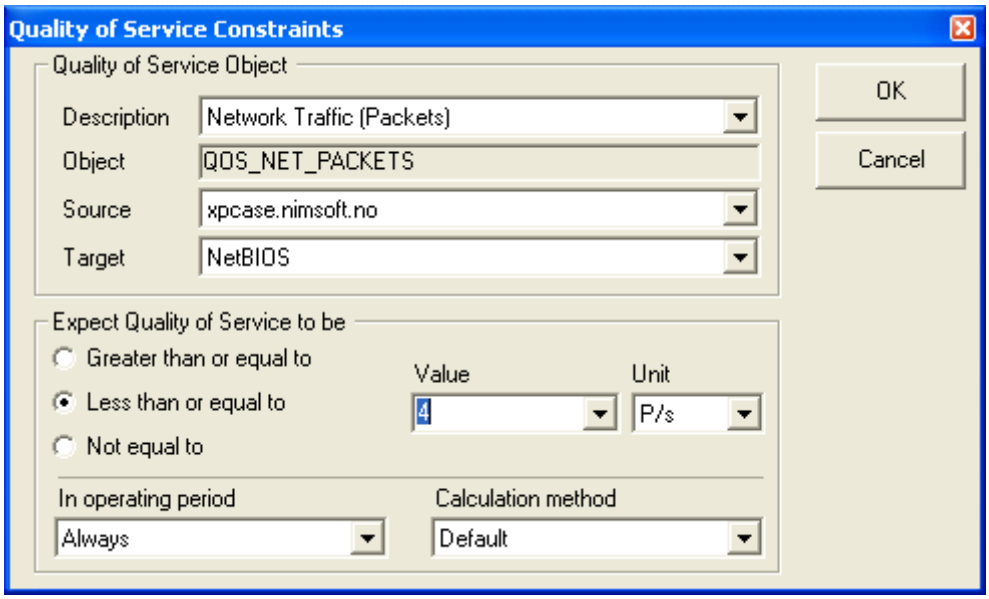
Including the Target in your Service Objective (SLO)

The quickest and simplest way of including QoS in your SLO is to drag the *target* into the *QoS* list in the SLO form.



This opens the standard QoS constraints dialog preset with the QoS name, source and target

information. Just set the threshold value, the operating period and the calculation method before clicking the *OK* button to save and close the dialog.



Exporting the QoS data series

You may export QoS data to a file, using the one of the following methods

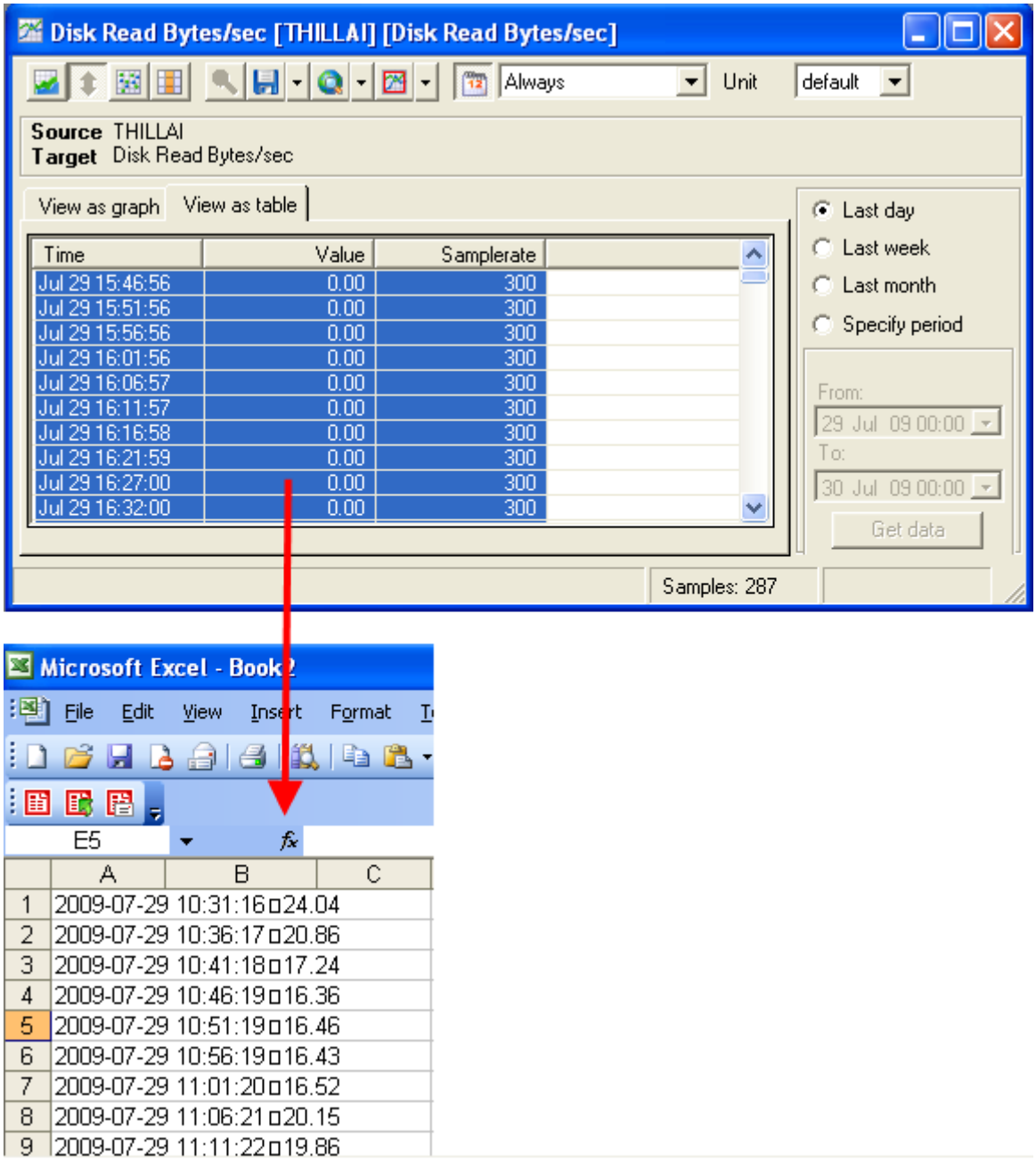
- Copy the data table from the QoS dialog and paste into e.g. a worksheet in Excel.
- Using the *Export QoS Data* wizard, accessible from the right-click menu in the Database Status dialog (see *Viewing the Actual Database Usage*). Note that this wizard may also be started, right-clicking the QoS constraint under the QoS node in the Navigation pane and selecting Export data.

Exporting QoS data, using copy and paste

You can export the QoS data series for the selected period by:

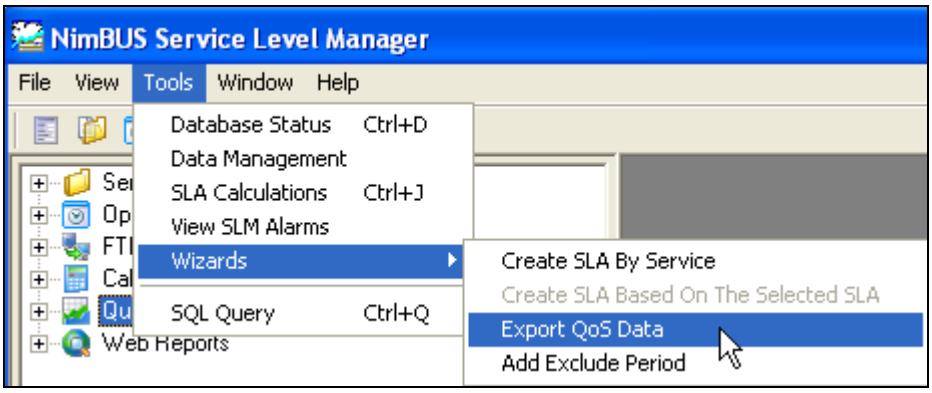
- Opening the QoS dialog by double-clicking it (either under the Quality of Service node in the Navigation Pane or in a SLO).
- Clicking the *View as table* tab.
- Marking the columns (left-click the first column and *shift + left-click* the last).

- Pressing *ctrl + c*.
- Opening the export target (e.g. a worksheet in Excel), placing the cursor in a cell and pressing *ctrl + v*.



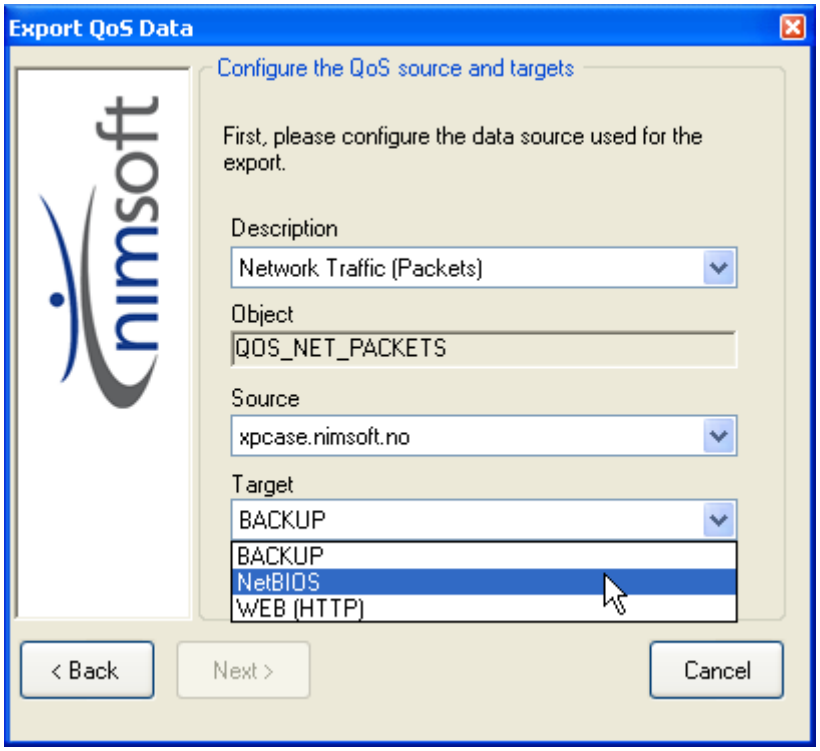
Exporting QoS data, using *Export QoS Data* wizard

- Select *Tools* > *Wizards* > *Export QoS Data* from the menu-bar to launch the wizard.

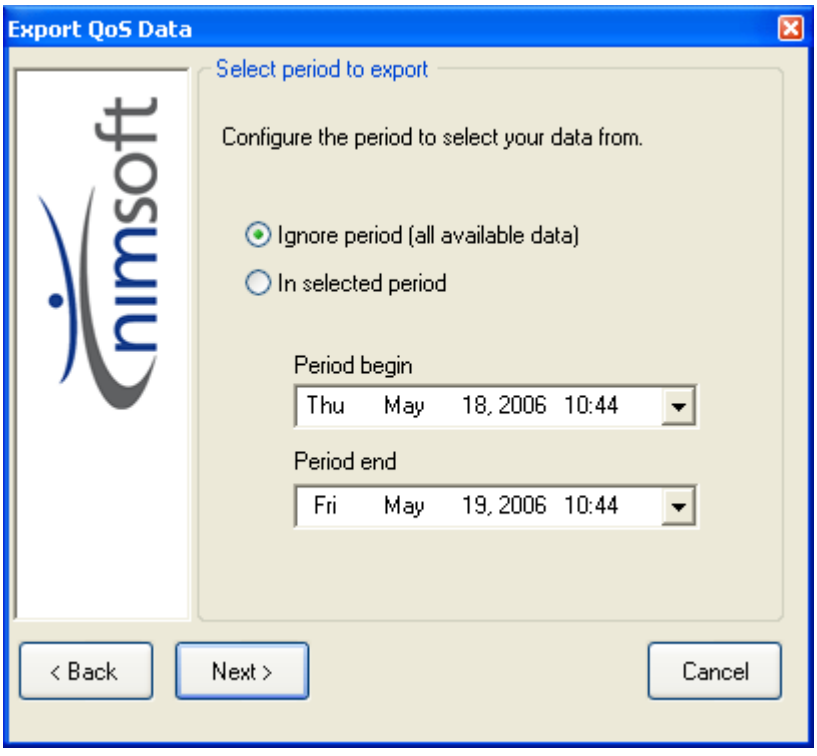


Click the *Next* button to continue.

- The next dialog lets you configure the QoS source and targets.
  (Note that the fields in this dialog are already filled in if the wizard was started from the Database Status window).
  Click the *Next* button to continue.



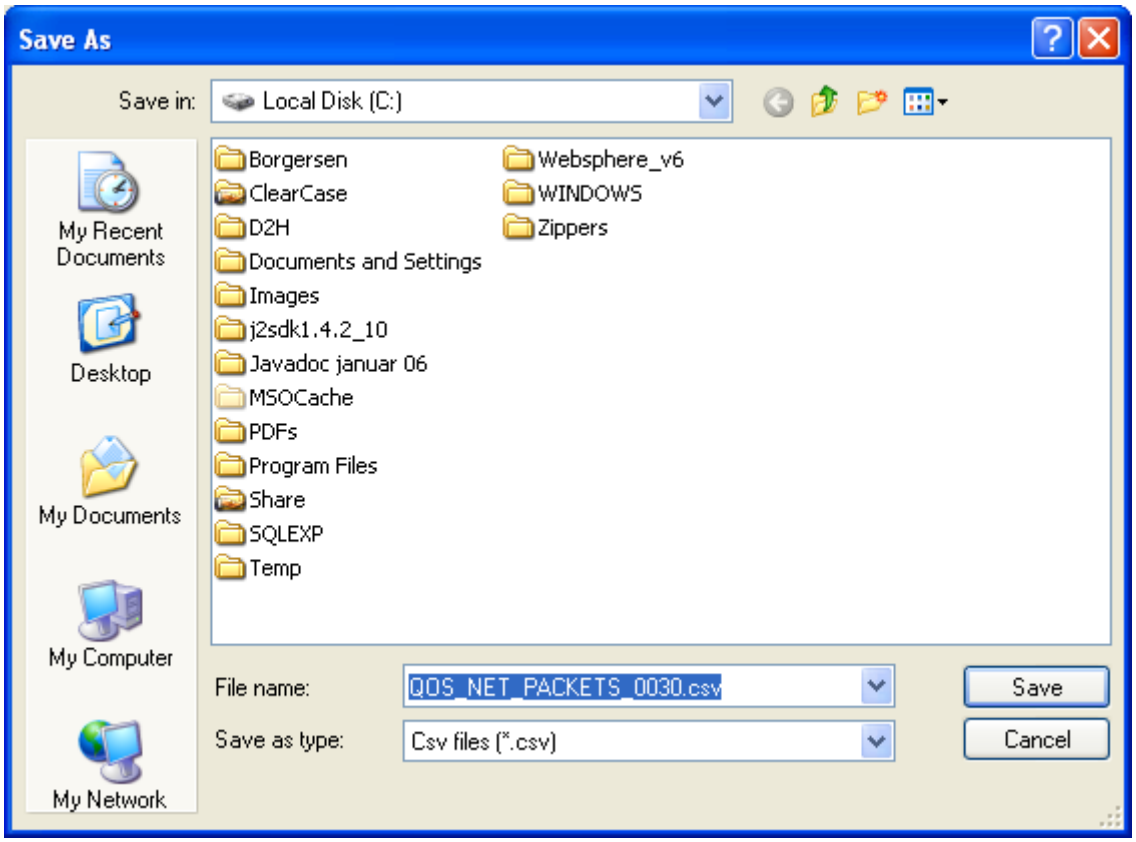
- The next dialog lets you select which period to export. Configure the period to select data from and click the *Next* button to continue.



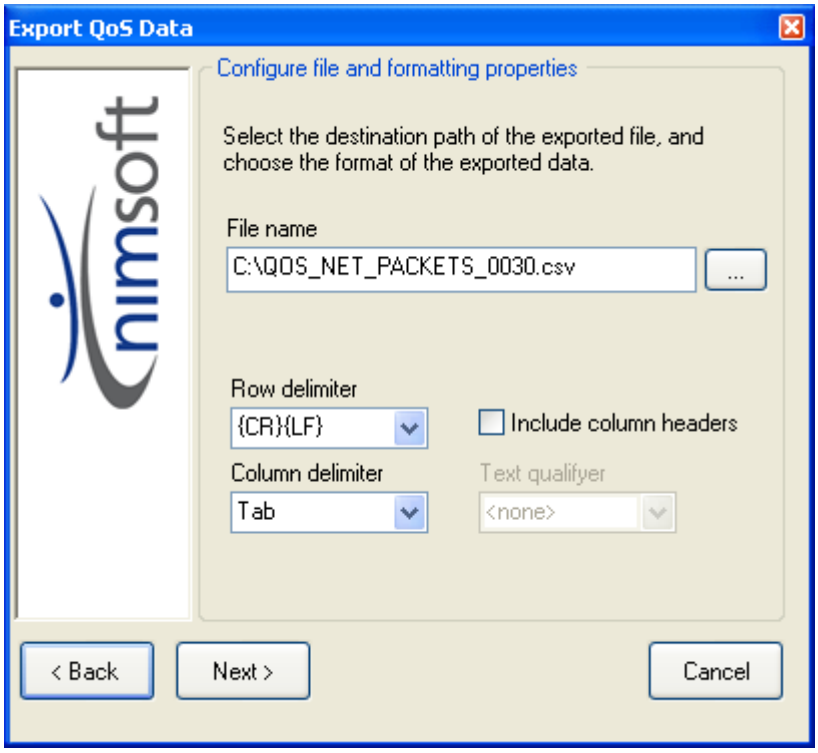
- The next dialog lets you specify a name and a destination path of the

exported file, and the format of the file.

If typing a file name, the file will by default be stored on your C: drive. If using the *Browse* function, a name and format as shown will be suggested.



You can modify the column and or row separators, and you can include or exclude column headers in the formatted file.

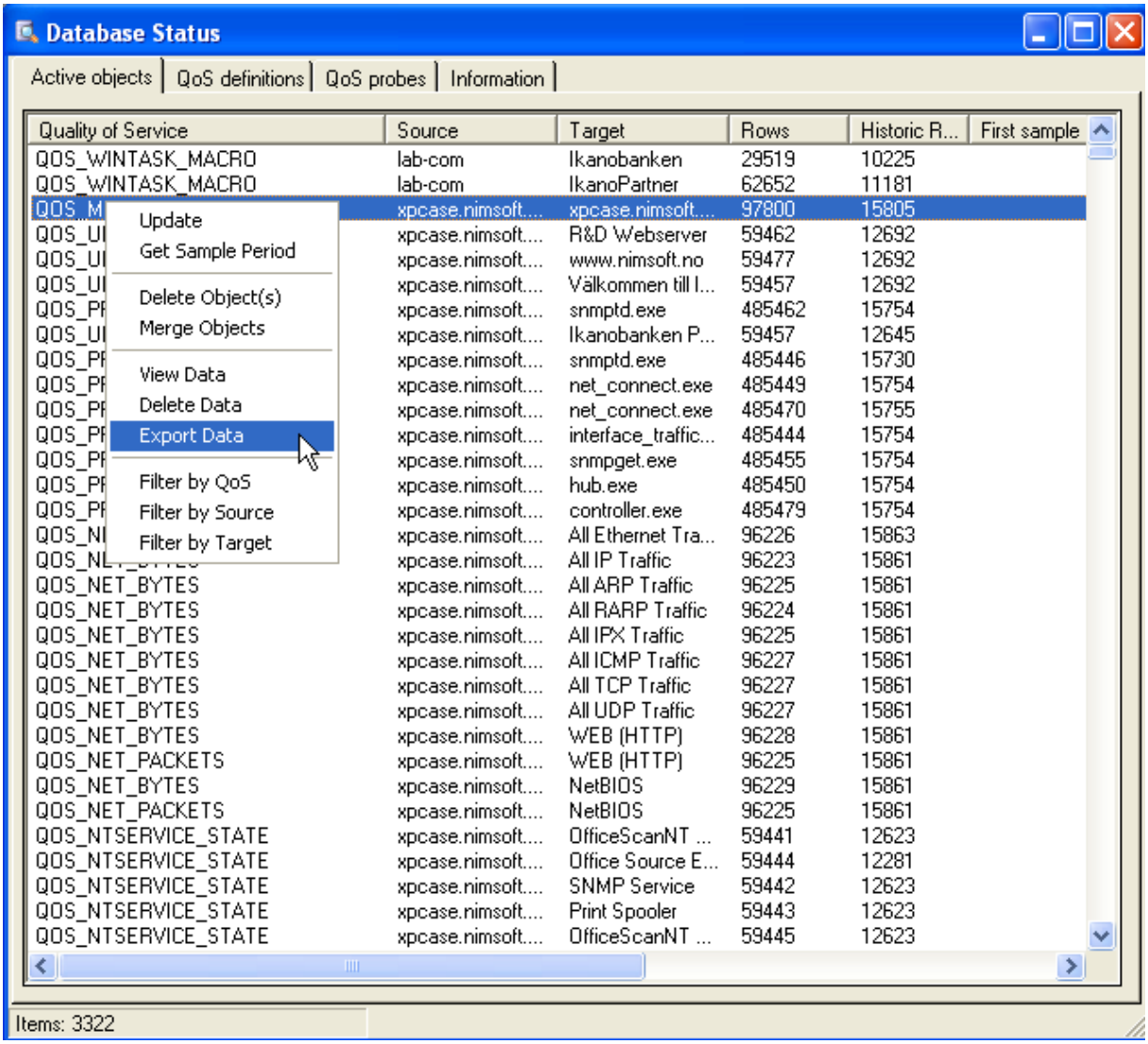


Click the *Next* button to continue to the last dialog, where you click the *Finish* button to finish and exit the wizard.

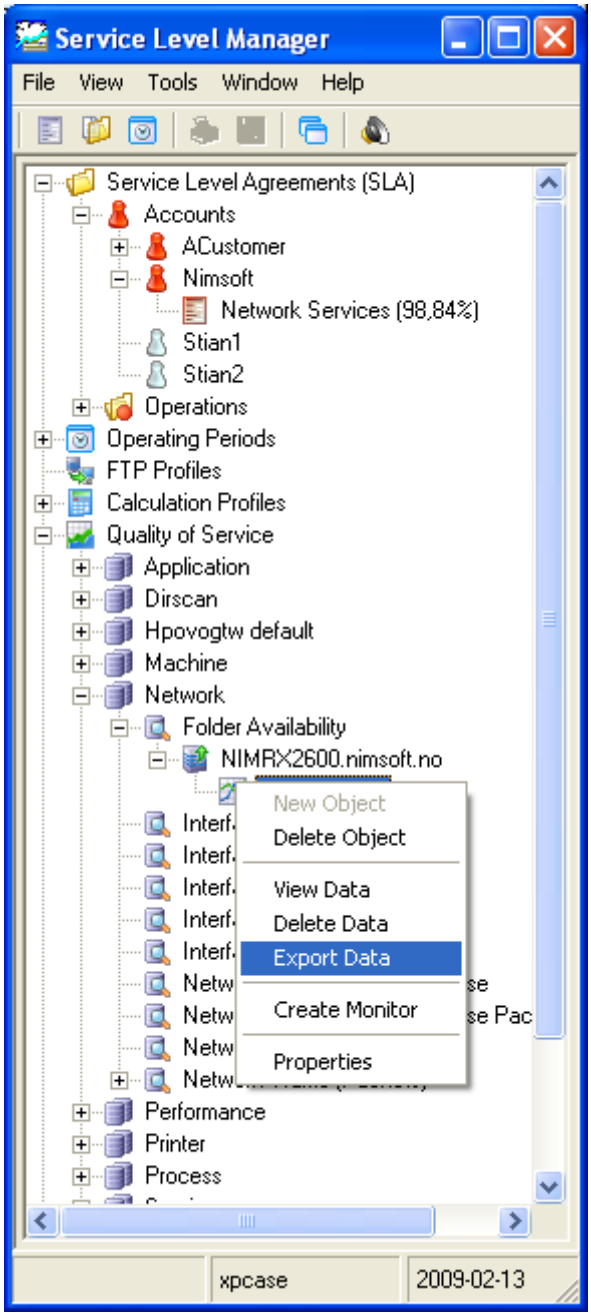
Two other ways to launch the Export Data wizard:

You may also launch the wizard by selecting *Tools* > *Database Status* from the menu-bar.

This will open the Database Status window, showing you various information related to the QoS data stored in your database.
Right-clicking in the list opens a small menu. Selecting the Export Data option will launch the wizard.



Also right-clicking a QoS object under the QoS node in the Navigation pane and selecting Export Data will launch the Export wizard.



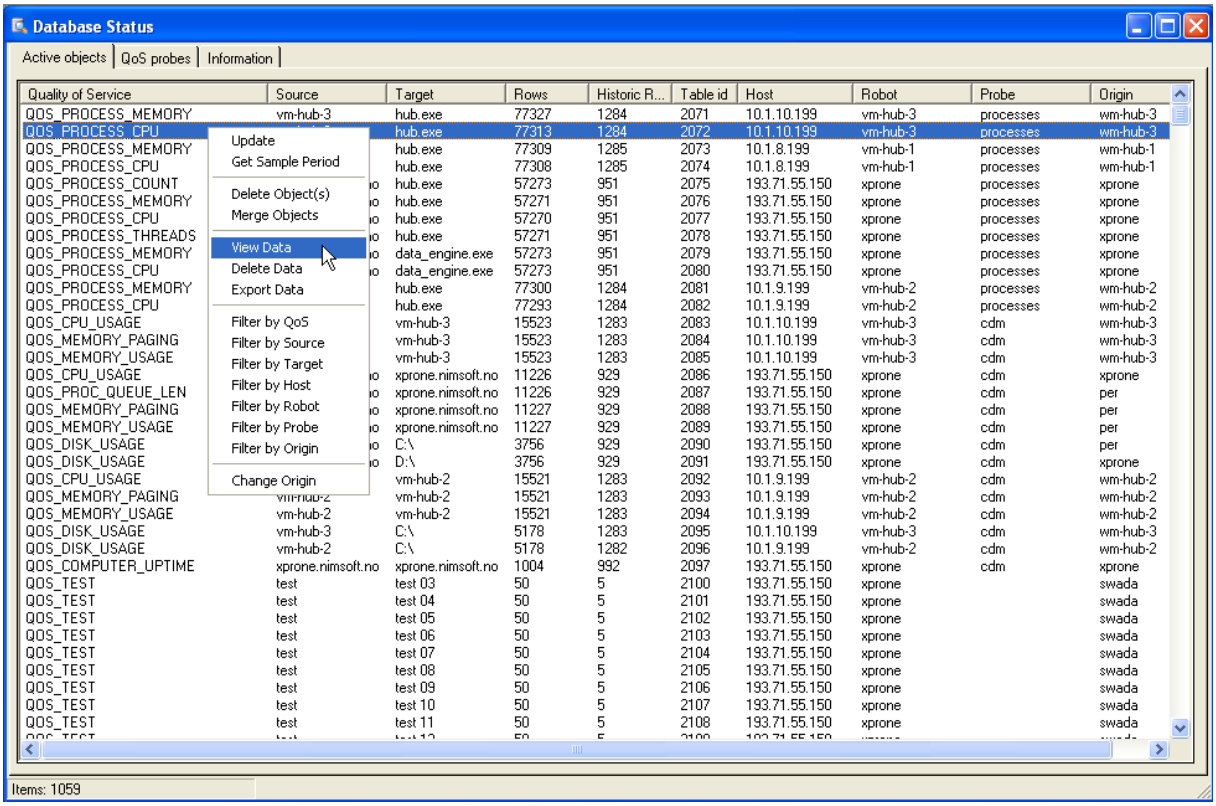
Data Management

All Quality of Service data is received by the data_engine and inserted into the database. The *data_engine* may be configured to perform automatic clean-up procedures by defining configuring the data management section of the *data_engine*.

You may, however, perform manual data-management by using the Service Level Manager.

Viewing the Actual Database Usage

Select *Tools* > *Database Status* from the menu-bar to bring up the Database Status window. This will show you various information related to the QoS data stored in your database. The tabs represent various ways of getting information regarding the database usage.



The Active Objects Tab

Shows all available QoS objects registered within the database structure. Bring up the action menu by issuing a right-mouse button-click. View the QoS data by double-clicking the list element, or perform a selective data-management by selecting *delete*.

- F5 - Refresh list
- F6 - Update/view sample period for the selected QoS objects.

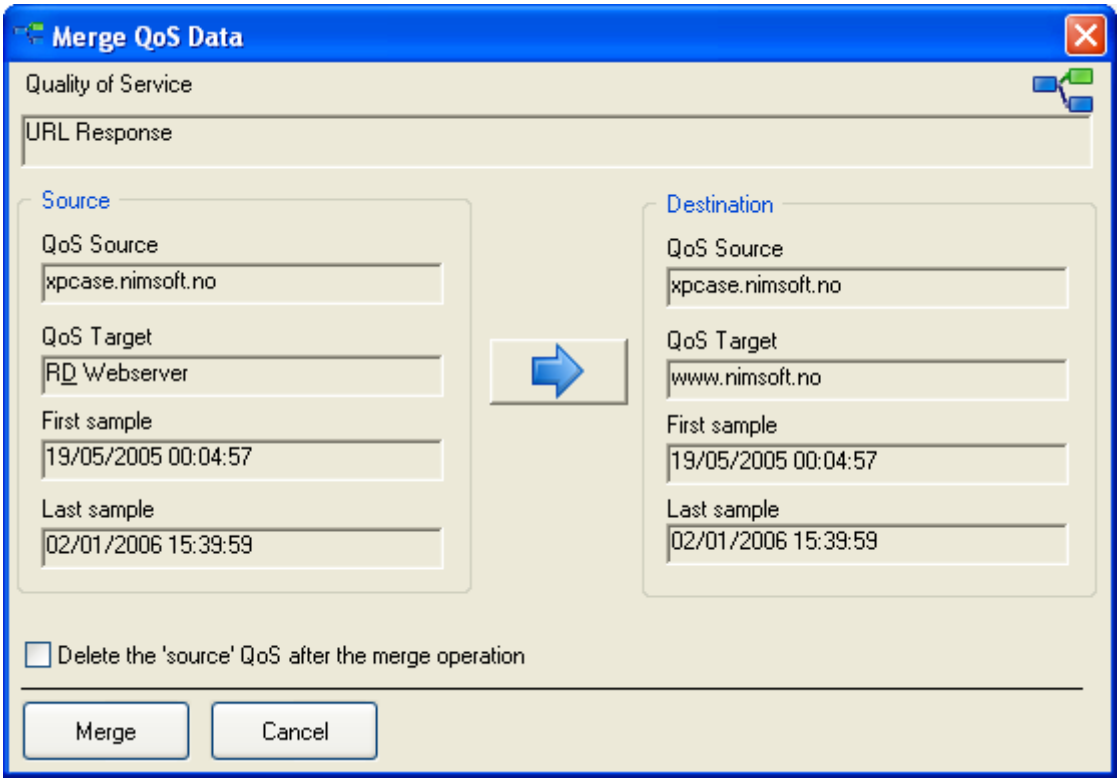
The Right-click menu

Right-clicking one of the QoS objects in the list opens a small menu with the following options:

- **Update**
  Updates the selected row with data from the current compliance period.
- **Get Sample Period**
  Finds the time and date of the first sample and the last sample within the

current compliance period.
This information will then be found in the respective columns (*First sample* and *Last sample*) in the window.

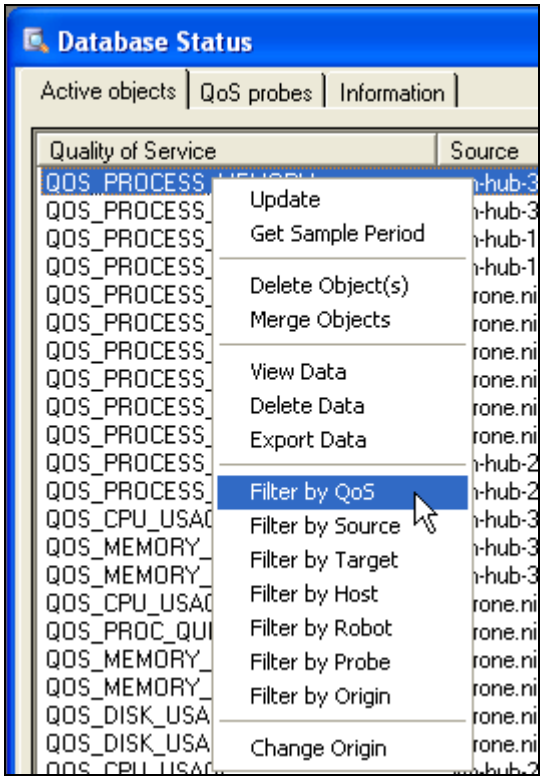
- **Delete Object(s)**
  Deletes the selected QoS object(s) (not only the data series) from the database. The deleted QoS object will disappear from the database and will not be re-created before the probe is restarted.
- **Merge Objects**
  Allows you to merge two QoS objects of the same type. Left-click the first object and <ctrl>+left-click the next object. Right-click and select the merge object option.



Note that you can toggle the direction of the merge operation by clicking the arrow in the middle of the dialog.
The newly merged QoS objects will take the “destination” QoS object’s name.

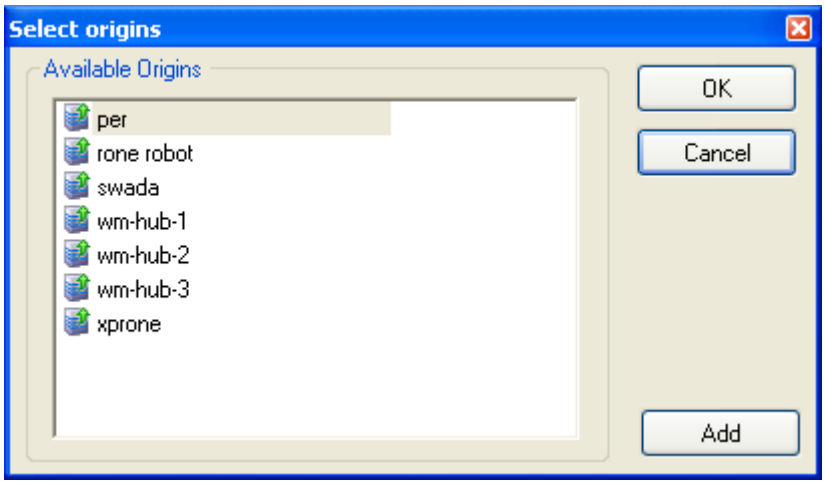
You also have the option to delete the “source” QoS after the merge operation.
The deleted QoS object will disappear from the database and will not be re-created before the probe is restarted.

- **View Data**
  Opens the graph, displaying the data for the current compliance period.
- **Delete Data**
  Opens the Data Management dialog for the selected QoS constraint, allowing you to delete the complete QoS data series, or just for a selected period. The QoS object is not deleted selecting this option, and data for the selected QoS constraint will continue to be stored in the database table.
- **Export Data**
  Opens the Export QoS Data wizard, enabling you to export the data series for the selected QoS constraint dialog to a file. See the section *Exporting the QoS data series*.
- **Filter by QoS**
  Selecting one entry in the list and selecting *Filter by QoS*, all entries with the same QoS as the selected one will be listed, all others will be removed from the list.
  In the example below, all entries with QOS_CPU_USAGE will be collected in a list; all others will be removed from the list.



Right-click and select *Update* to return to the original list.

- **Filter by Source**
  Same as *Filter by QoS*, but in this case entries with identical source will be collected in the list.
- **Filter by Target**
  Same as *Filter by QoS*, but in this case entries with identical target will be collected in the list.
- **Filter by Host**
  Same as *Filter by QoS*, but in this case entries with identical host will be collected in the list.
- **Filter by Robot**
  Same as *Filter by QoS*, but in this case entries with identical robot will be collected in the list.
- **Filter by Probe**
  Same as *Filter by QoS*, but in this case entries with identical probe will be collected in the list.
- **Filter by Origin**
  Same as *Filter by QoS*, but in this case entries with identical origin will be collected in the list.
  All messages received by a given hub are stamped with an *origin* element. The default *origin* name will be the HUB name.
- **Change origin**
  Selecting one or more entries in the list, right-clicking and selecting Change origin lets you change origin for the selected entries (all messages received by a given hub is stamped with an *origin* element. The default *origin* name will be the HUB name). Available origins will be listed in the dialog popping up. You can also create a new origin by clicking the *Add* button.



The columns in the window

The followings columns appear in the window when the *Active Objects* tab is selected:

- **Quality of Service**
  The name of the QoS object.
- **Source**
  From where the sample originates.
- **Target**
  The target of the sample.
- **Rows**
  The number of rows in the database table containing data for the QoS Object.
- **Historic rows**
  The number of rows in the *historic* database table containing data for the QoS Object.
- **First sample**
  The time and date of the first sample within the current compliance period. Note that this information is made available when right-clicking the entry and selecting *Get sample period*.
- **Last sample**
  The time and date of the last sample within the current compliance period. Note that this information is made available when right-clicking the entry and selecting *Get sample period*.
- **Table id**
  An id number assigned to each of the QoS objects registered within the database structure.
- **S.min.**
  The number of samples per minute. Note that this information is made available when right-clicking the entry and selecting *Get sample period*.
- **Originator**
  The address of the computer running the probe.
- **Host**
  The IP-address of the host hosting the probe from which the sample originates.
- **Robot**
  The name of the robot from which the sample originates.
- **Probe**
  The name of the probe from which the sample originates.
- **Origin**
  This is the origin of the QoS sample. All messages received by a given hub

are stamped with an *origin* element. The default *origin* name will be the HUB name.

The QoS Probes Tab

Shows the QoS objects registered per probe. Delete the selected data-series by right-clicking and selecting *Delete Data*. This operation deletes all objects matching the "host" field and the "QoS" field.

The followings columns appear in the window when the *QoS Probes* tab is selected:

- **Registered**
  The time the QoS object was registered in the database,
- **Host**
  The IP address of the host where the probe sending the QoS data is installed.
- **Probe**
  The name of the probe sending the QoS data.
- **Quality of Service**
  The name of the QoS object.

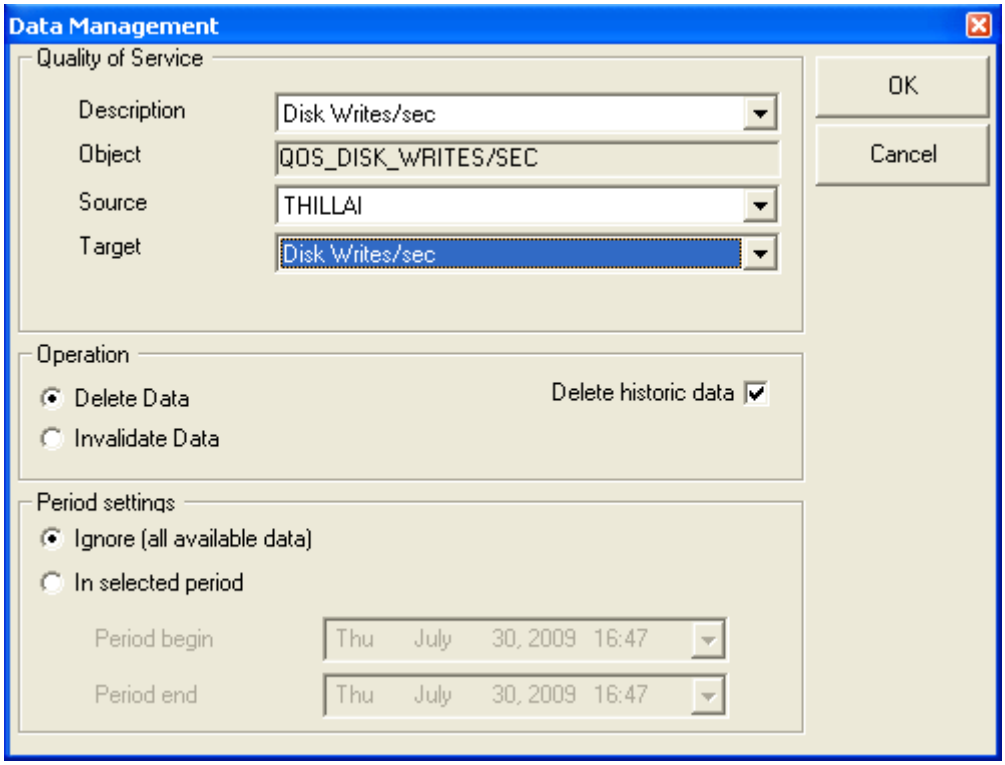
The Database Status Tab

Shows information related to the database, such as:

- Database server name
- Database name
- Database version
- Database owner
- When the database was created
- Database usage
- Database location

Managing your QoS Data

Select *Tools > Data Management* from the menu-bar to bring up the Data Management Dialog, where you can change the period settings and delete historic data for the selected QoS constraint. The various fields in the dialog are described below:

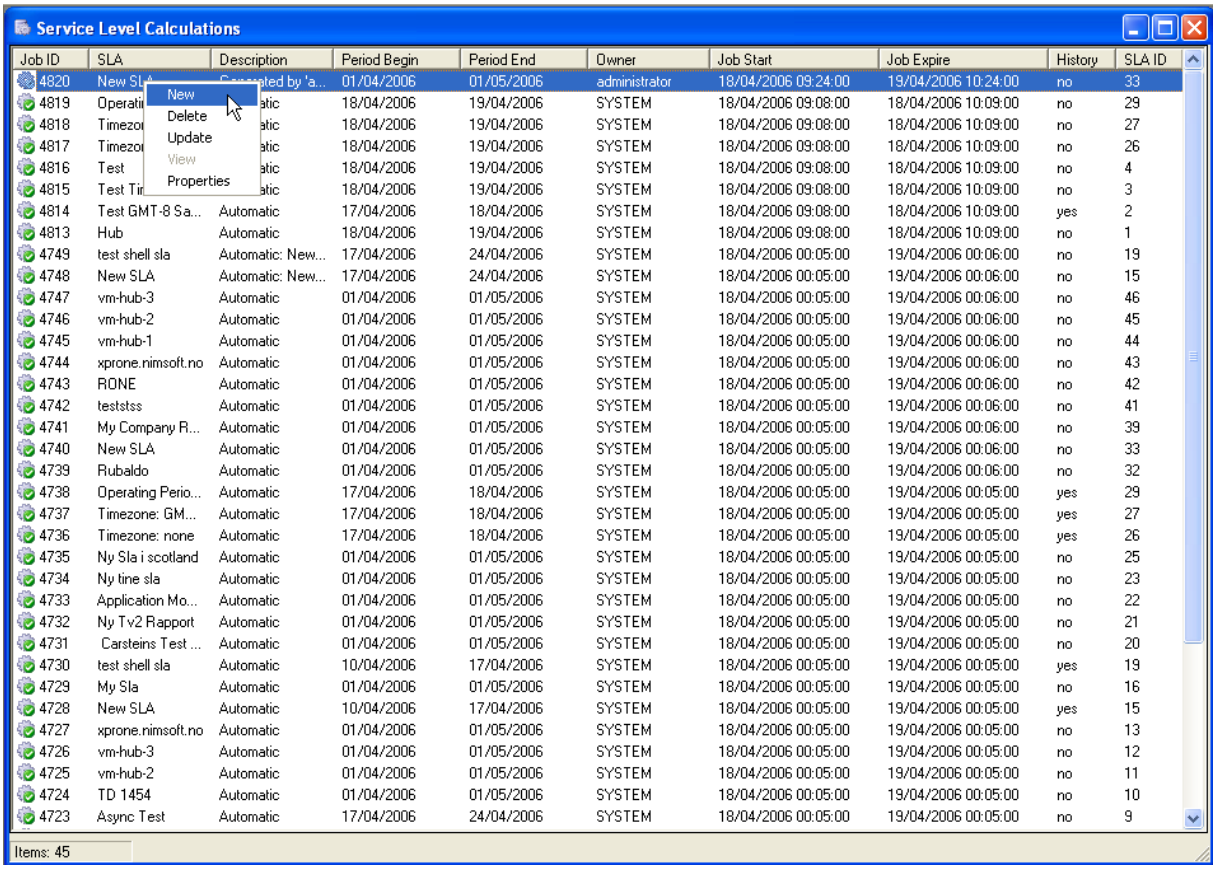


- **Quality of Service**
  - *Description*
    The QoS description string.
  - *Object*
    The QoS object name.
  - *Source*
    The source of the QoS data. E.g. computer, device etc.
  - *Target*
    The target of the QoS data. E.g. the disk, network service, CPU, etc.
- **Operation**
  - Delete Data: Select this option to delete the QoS data related to the source and target settings.
  - Invalidate Data: Select this option to invalidate the QoS data related to the source and target settings.
  - Delete Historic data: Select this check box to delete the historic data for this QoS constraint
- **Period settings**
  You can select a period, or you can select *Ignore*, which means that the measurement is not restricted to specific periods.

Watching SLA Calculations

Selecting *Tools > SLA Calculations* in the Menu bar opens the Service Level Calculations window, listing the current calculations for the SLAs.

A service level agreement (SLA) will automatically get recalculated for the current period by the sla_engine (on a schedule as specified in the sla_engine user interface), but you can manually recalculate a SLA by selecting *New* in the right-click-menu (see below), or by right-clicking the SLA in the Navigation Pane and selecting *Regenerate*.



Job ID	SLA	Description	Period Begin	Period End	Owner	Job Start	Job Expire	History	SLA ID
4820	New SLA	Generated by 'a...	01/04/2006	01/05/2006	administrator	18/04/2006 09:24:00	19/04/2006 10:24:00	no	33
4819	Operati	atic	18/04/2006	19/04/2006	SYSTEM	18/04/2006 09:08:00	18/04/2006 10:09:00	no	29
4818	Timezo	atic	18/04/2006	19/04/2006	SYSTEM	18/04/2006 09:08:00	18/04/2006 10:09:00	no	27
4817	Timezo	atic	18/04/2006	19/04/2006	SYSTEM	18/04/2006 09:08:00	18/04/2006 10:09:00	no	26
4816	Test	atic	18/04/2006	19/04/2006	SYSTEM	18/04/2006 09:08:00	18/04/2006 10:09:00	no	4
4815	Test Tir	atic	18/04/2006	19/04/2006	SYSTEM	18/04/2006 09:08:00	18/04/2006 10:09:00	no	3
4814	Test GMT-8 Sa...	Automatic	17/04/2006	18/04/2006	SYSTEM	18/04/2006 09:08:00	18/04/2006 10:09:00	yes	2
4813	Hub	Automatic	18/04/2006	19/04/2006	SYSTEM	18/04/2006 09:08:00	18/04/2006 10:09:00	no	1
4749	test shell sla	Automatic: New...	17/04/2006	24/04/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:06:00	no	19
4748	New SLA	Automatic: New...	17/04/2006	24/04/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:06:00	no	15
4747	vm-hub-3	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:06:00	no	46
4746	vm-hub-2	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:06:00	no	45
4745	vm-hub-1	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:06:00	no	44
4744	xprone.nimsoft.no	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:06:00	no	43
4743	RONE	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:06:00	no	42
4742	teststss	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:06:00	no	41
4741	My Company R...	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:06:00	no	39
4740	New SLA	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:06:00	no	33
4739	Rubaldo	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:06:00	no	32
4738	Operating Perio...	Automatic	17/04/2006	18/04/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	yes	29
4737	Timezone: GM...	Automatic	17/04/2006	18/04/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	yes	27
4736	Timezone: none	Automatic	17/04/2006	18/04/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	yes	26
4735	Ny Sla i scotland	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	no	25
4734	Ny tine sla	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	no	23
4733	Application Mo...	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	no	22
4732	Ny Tv2 Rapport	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	no	21
4731	Carsteins Test ...	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	no	20
4730	test shell sla	Automatic	10/04/2006	17/04/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	yes	19
4729	My Sla	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	no	16
4728	New SLA	Automatic	10/04/2006	17/04/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	yes	15
4727	xprone.nimsoft.no	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	no	13
4726	vm-hub-3	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	no	12
4725	vm-hub-2	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	no	11
4724	TD 1454	Automatic	01/04/2006	01/05/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	no	10
4723	Async Test	Automatic	17/04/2006	24/04/2006	SYSTEM	18/04/2006 00:05:00	19/04/2006 00:05:00	no	9

The Right-click menu

Right-clicking one of the QoS objects in the list opens a small menu with the following options:

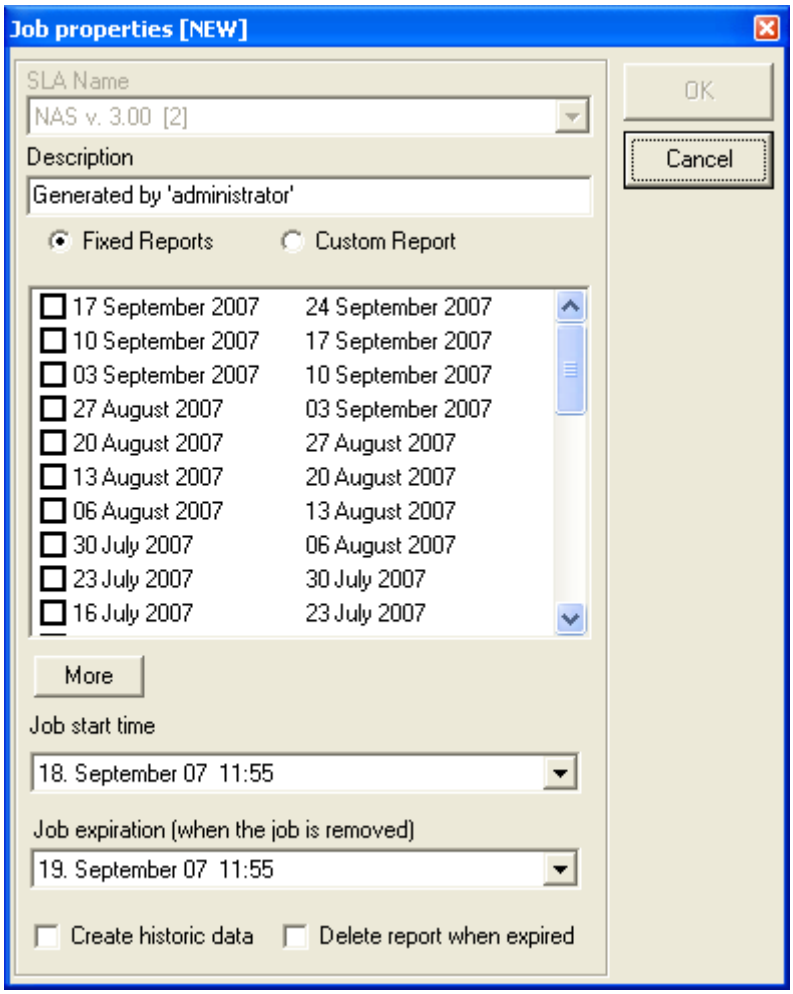
- **New**
  Using this option, you may manually recalculate the SLAs.

  The Job properties dialog is opened, allowing you to select a SLA to be recalculated.

  The time period for the report can be specified, either as a *Fixed report*, where you can select one or more fixed periods, or as a *Custom report*, where you can select a time range.

The *Job start time* specifies when the job calculation job should be started; the *Job expiration* time specifies when the job is removed from the database.

The *Create historic data* option lets you select the compliance data to be recorded/saved for historic reports, and the *Delete report when expired* will delete the report from the database when the report has expired.



Note the meaning of the following icons in the window, indicating different levels of the calculation jobs.

The calculation job is queued, waiting to be executed.

The calculation job is finished.

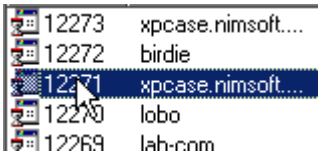
The calculation job is finished and the SLA report is generated.

SLAs are also automatically recalculated on a schedule as specified in the sla_engine user interface.

- **Delete**
  Deletes the calculations for the

selected SLA from the list in the window.

- **Update**
  Updates the selected row with data from the current compliance period.
- **View**
  This option opens the compliance job description window for the selected SLA.
- **Properties**
  Opens the *Job Properties* window for the selected SLA. This option is only available for currently running recalculation jobs, manually started by the *New* option (see description above). A wait cursor indicates that a recalculation job currently is running.



The columns in the window

The Service Level Calculations window contains the following columns:

Job Id
The job identification number assigned to a new job.

SLA
Shows the name of the SLA being calculated.

Description
Indicates if the calculation job runs *automatically* as scheduled, or if it was *manually started* by the administrator.

Period Begin
Displays the starting date/time of the compliance calculation period.

Period End
Displays the end date/time of the compliance calculation period.

Owner
The name of the operator that requested the calculation job

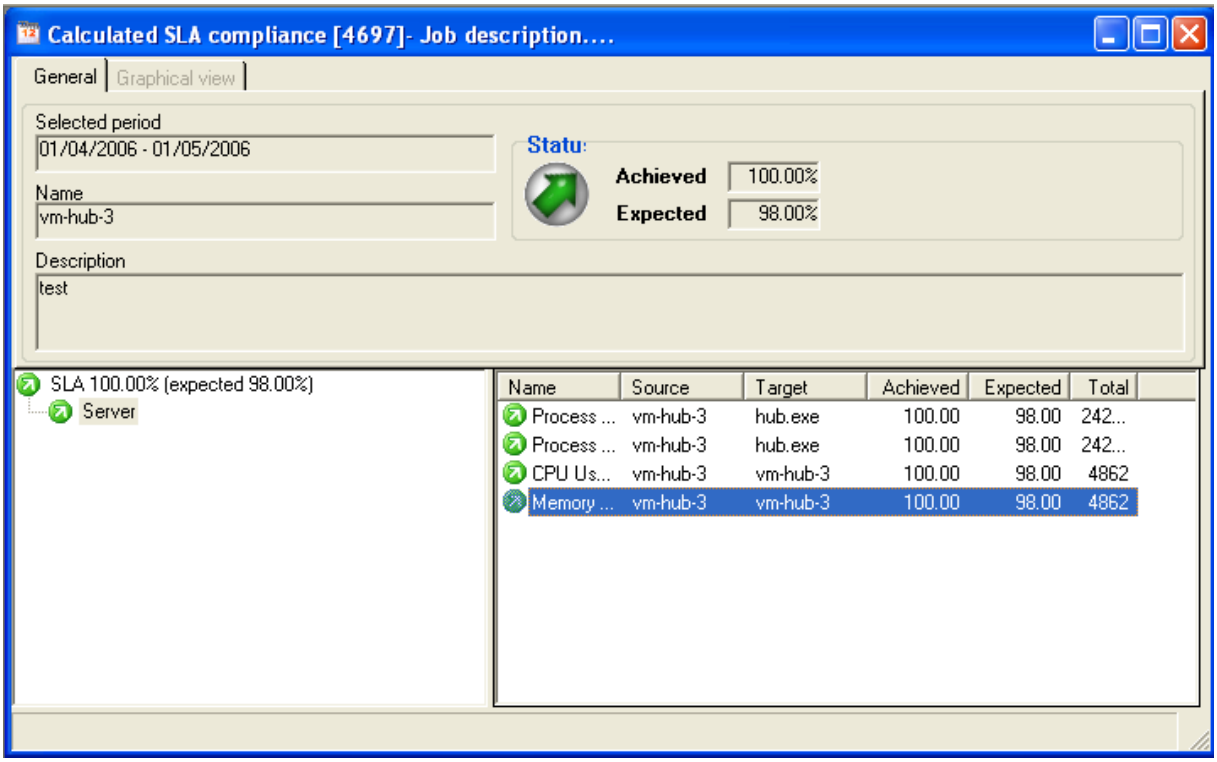
Job Start
Defines the date/time for when the compliance calculation job should start.

Job Expire
Defines the date/time for when the job is automatically removed from the SLM system.

History
Indicates that compliance data should be recorded/saved for historic reports.

Double-clicking (or right-clicking and selecting *View*) one of the SLAs in the window

opens the *Calculated SLA Compliance job* window for that SLA.



The window displays:

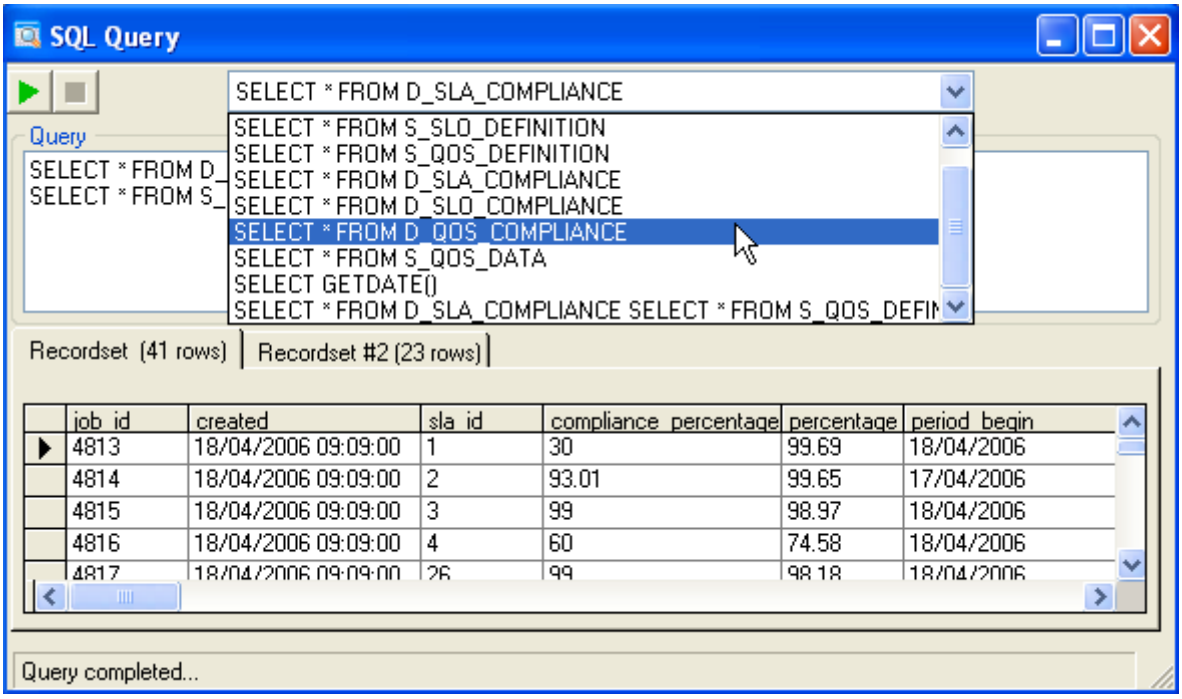
- The selected Compliance period
- The name and description of the SLA
- The Status, with the expected and the achieved value.
- The SLOs, listed in the lower left corner.
- The QoS constraints, listed in the lower right corner, supplying the following information:
  - The name of the QoS object.
  - The name of the source computer.
  - The name of the target computer.
  - The achieved compliance.
  - The expected compliance.
  - The number of samples returning an OK result.
  - The total number of samples.

  Double-clicking one of the QoS constraints brings up the QoS graph (also see the section *Generating a Graph*).

Sending SQL Queries to the database

Selecting the *Tool > SQL Query* option from the Menu Bar opens the SQL Query dialog. This function can be used to query the database directly, and is useful for testing- and verification purposes.

Warning:
This function should be used by experienced users only.

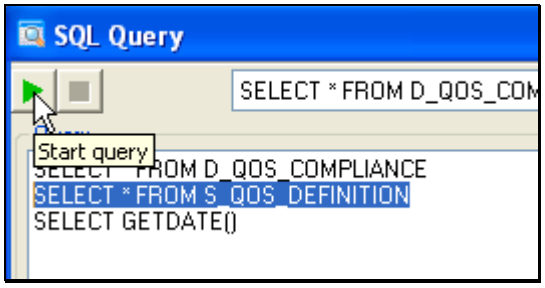


Here you can select a query from the combo box, and the query is sent to the database by clicking the *Start query* button.

The result of the query will be presented in a table under the *Recordset* tab. The number of rows found is also displayed on the tab header.

Note that you may run multiple queries simultaneously by typing queries in the list in addition to the one selected from the combo box. Clicking the *Start query* button will run all queries in the list.

If selecting (highlighting) one of the queries in the list, just that query will be run when clicking the *Start query* button.



Note that a started and running query can be stopped, using the *Stop query* button.

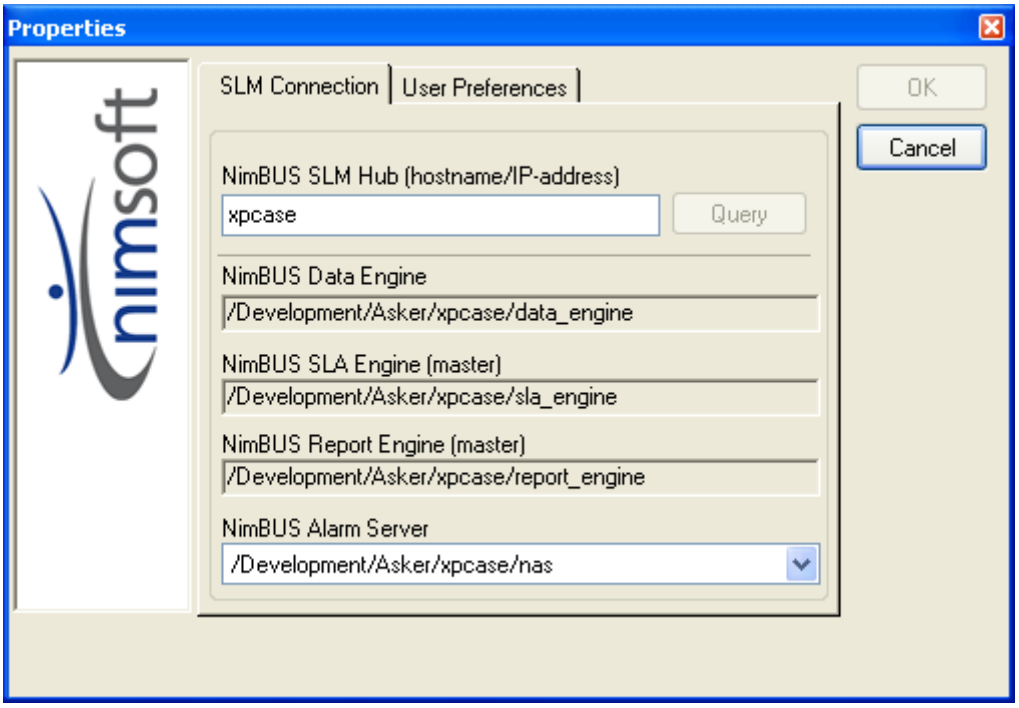
Setting the Connection Properties

The Service Level Manager requires a successful login to a Hub managing a Data Engine. This probe provides the SLM products with the necessary database information. The information is entered during the initial setup of the SLM products through the Installation Wizard.

The wizard is located in the **Start/ Nimsoft Software/Tools** folder, and should be used when database parameters change (e.g. username, password etc.).

Selecting *File* > *Properties* from the Menu Bar activates the connection properties dialog.

The *SLM Connection* tab



- *SLM Hub*

The **hostname** or **IP-address** of the computer running a Hub with SLM responsibilities

- *Query [button]*

  This button must be pressed to confirm the change in the *SLM Hub* field.

- *Data Engine*

  Displays the Nimsoft address of the Data Engine

- *SLA Engine*

  Displays the Nimsoft address of the SLA Engine

- *Report Engine*

  Displays a list of available Report Engines Select the preferred from the list

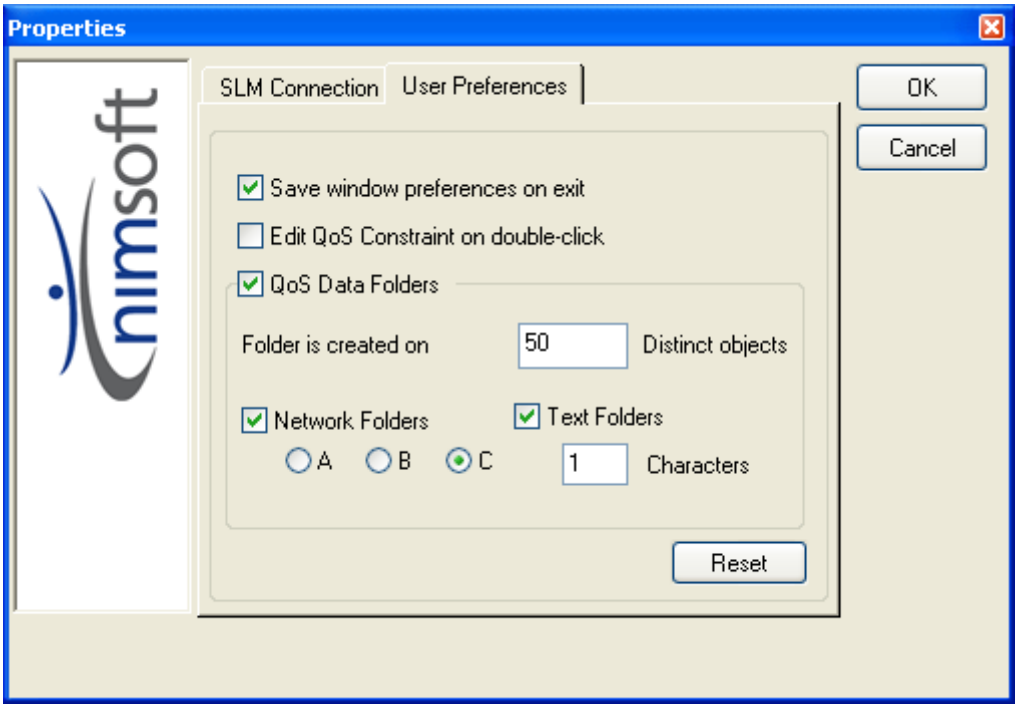
- *Alarm Server*

  Displays a list of available Alarm Servers Select the preferred one from the list

- *Save window preferences on exit*

  Window size (and position) will be stored and used the next time you launch a form.

The User Preferences tab



The following options and properties are available:

- *Save window preferences on exit*

Any window preferences you select will be saved on application exit, and these preferences will be active the next time you launch the SLM application.

- *Edit QoS Constraint on double-click*

  - When this option is checked, double-clicking a QoS constraint in a SLO dialog opens the properties dialog for the QoS constraint.
  - When this option is NOT checked, double-clicking a QoS constraint in a SLO dialog opens the QoS constraint graph.

  Note that pressing the *Shift* key when double-clicking a QoS constraint in a SLO dialog will toggle this functionality.

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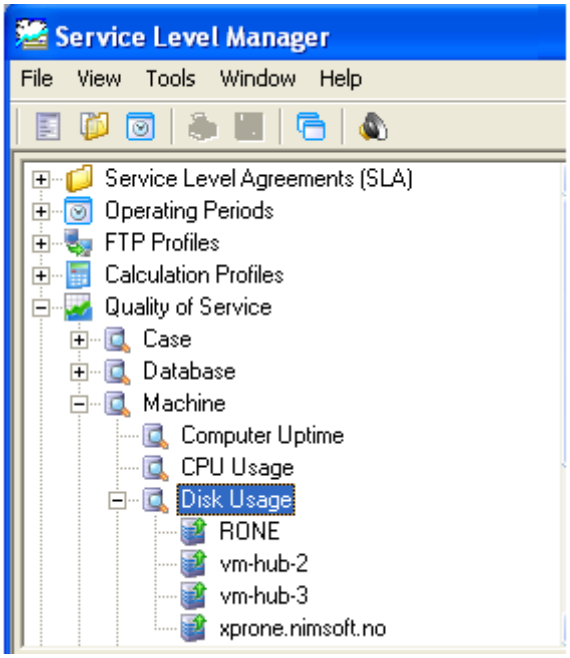
  - When this option is checked, double-clicking a QoS constraint in a SLO dialog opens the properties dialog for the QoS constraint.
  - When this option is NOT checked, double-clicking a QoS constraint in a SLO dialog opens the QoS constraint graph.

  Note that pressing the *Shift* key when simultaneously double-clicking a QoS constraint in a SLO dialog will toggle this functionality.

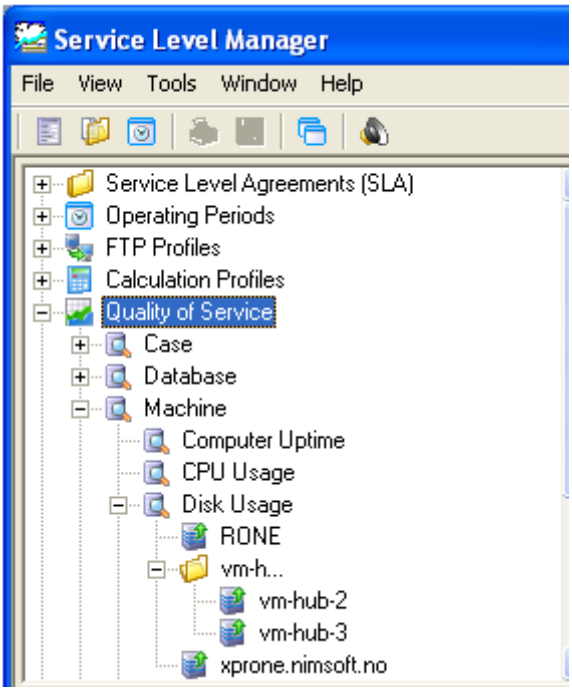
- *QoS Data Folders*
  This option lets you organize the QoS objects located under the QoS node in the Navigation Pane into folders.

  Folder is created on:
  Lets you define the minimum number of objects that must be present to enable for automatically organizing the objects into folders.

  If set to e.g. **5**, the Disk Usage group of objects shown below will not be grouped (only 4 objects present in the group)



If set to e.g. **4**, the group of objects will be grouped like this:



Note that the way the objects are grouped depend on the other settings (described below).

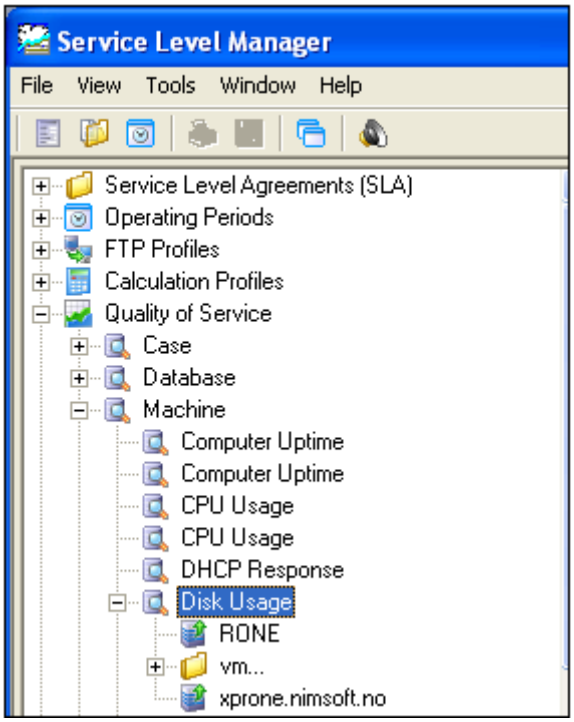
- *Network Folders*

  Organizes objects where an IP-address is used as the name of the object into folders.
  You may also select the number of octets of the IP-address to be used when organizing the objects.
  Example: Object name is

193.71.55.xxx
Selecting **A** will create a folder called 193, and all objects with a name starting with 193 will be placed in that folder.
Selecting **B** will create a folder called 193.71, and all objects with a name starting with 193.71 will be placed in that folder.
Selecting **C** will create a folder called 193.71.55, and all objects with a name starting with 193.71.55 will be placed in that folder.

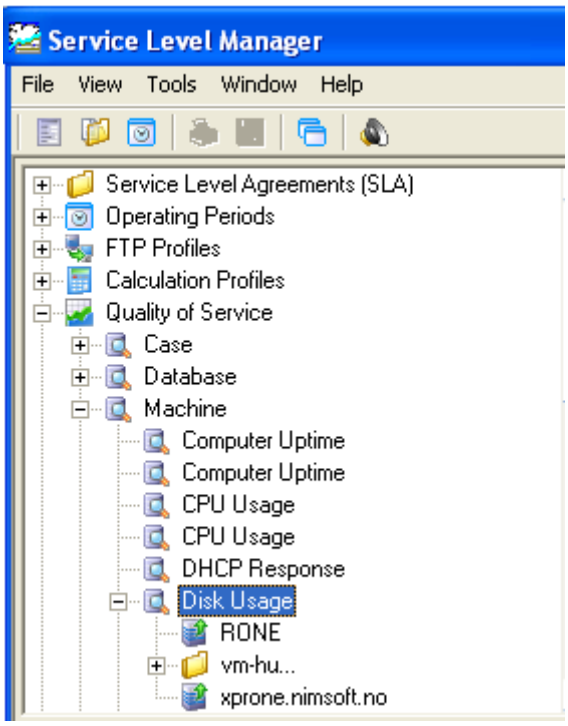
- *Text Folders*

  You may also enable objects to be grouped into folders, based on one or more characters in the object name.
  If e.g. selecting **2** (two) characters, all objects with a name starting with the same 2 characters will be placed in one folder. In the example below, there are three objects with names starting with **vm**. A folder called **wm…** will be created, and the three objects will be placed in that folder.



If e.g. selecting **5** (five) characters, all objects with a name starting with the same 5 characters will be placed in one

folder. In the example below, there are objects with names starting with **vm-hu**. A folder called **wm-hu…** will be created, and the objects will be placed in that folder.

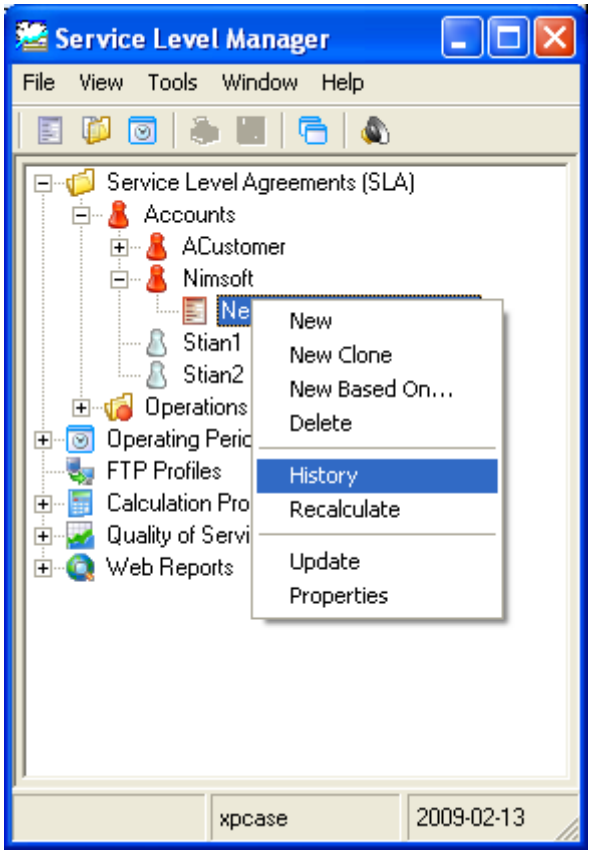


- Clicking the *Reset* button resets the preferences to the factory default values.

Press **OK** to save the changes. You may change between multiple SLA environments by setting the *SLM Hub* property.

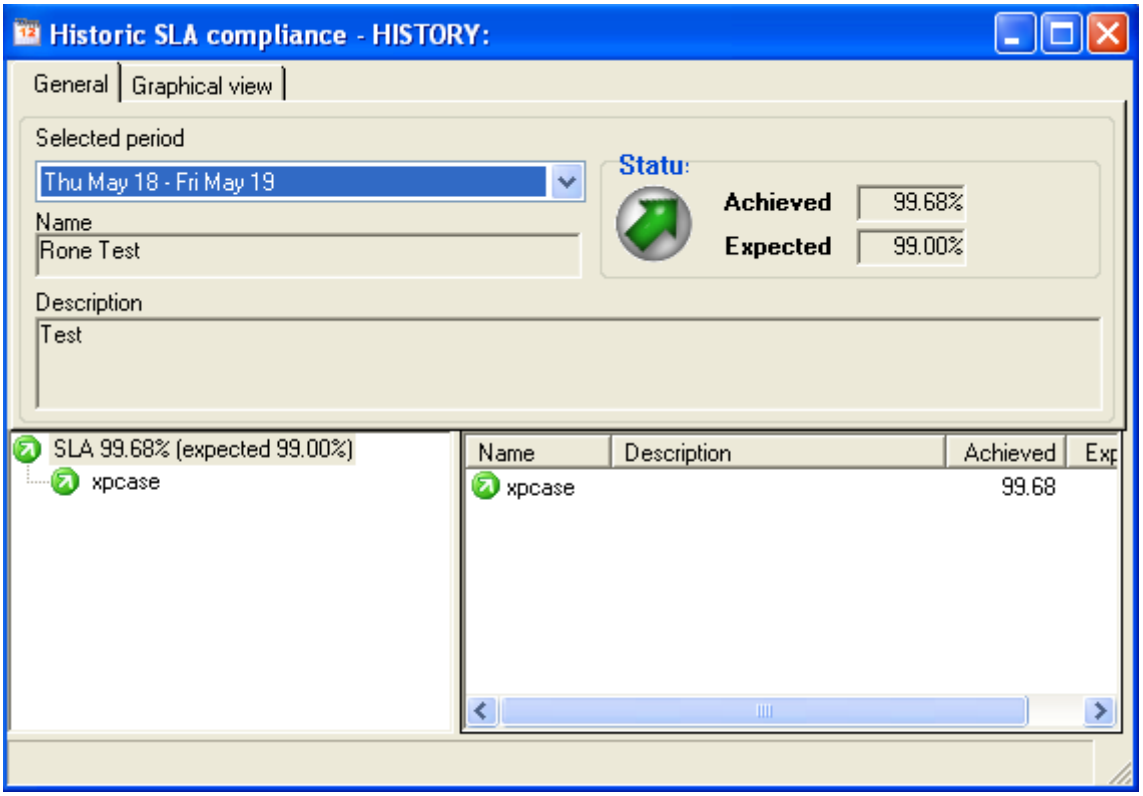
Viewing Historic Data

The Data Engine will store the current SLA and SLO compliance data before starting a new period. This data can be viewed and examined from the Service Level Manager Right-clicking a SLA in the Navigation Pane and selecting *History*.

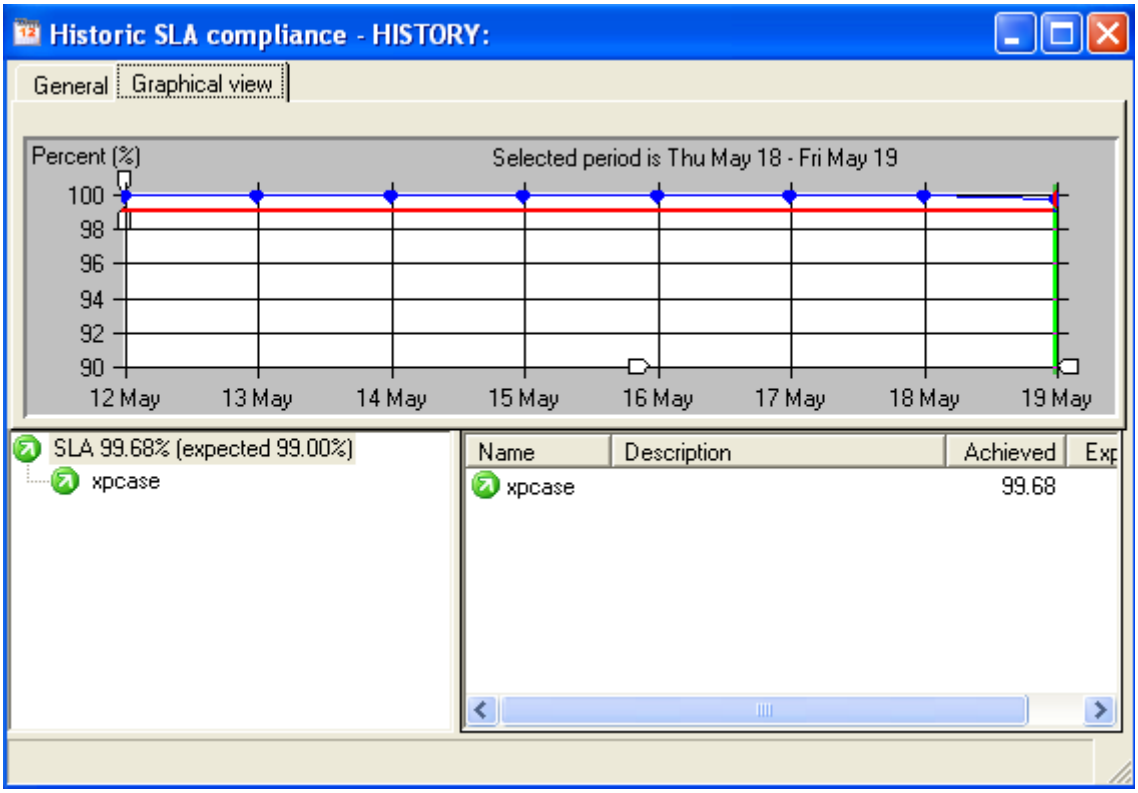


This brings up the Historic SLA compliance window.

You can select the period you are interested in, and you can toggle between general and graphical view.



The graphical view contains a combination graph showing the actual compliance percentage as a blue line with value plots and the expected compliance as a red line.

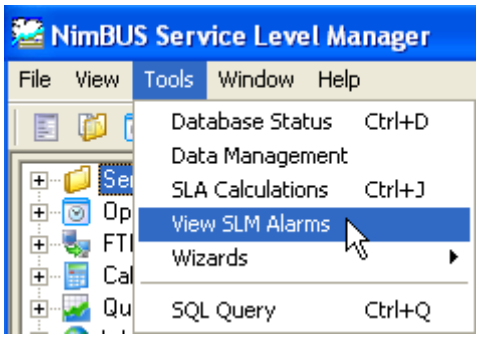


You may change / zoom in on a smaller period by using the zoom handles. Scroll the zoomed period by right-clicking and moving your mouse

Handling Service Level Alarms

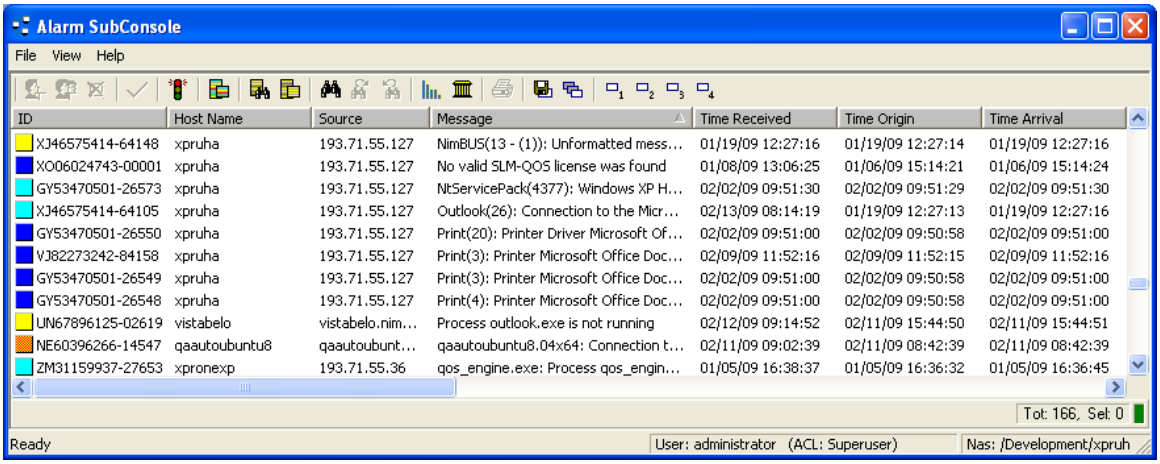
When defining SLAs, we can tell the product to send us an alarm when the "actual" compliance drops below expected levels. Alarms can be issued to the Enterprise Console, can be forwarded to other commonly used alarm consoles such as OpenView, Unicenter, Tivoli etc, or can be forwarded to email, pagers or cell phones.

Selecting Tools > View SLM Alarms launches the Alarm SubConsole application, displaying current alarms Service Level Alarms.



The Alarm SubConsole Window

The Alarm SubConsole window displays a list of alarms received, and the window is divided into a number of columns with information



The information about the alarms in the list is divided into the following columns:

- *ID*

  Each alarm is assigned a unique ID-number by the Alarm Server.

- *Message*

  This field contains the alarm text message, describing the error condition.

- *Time Received*

  The last time the alarm was received by the nas.

- *Time Origin*

  The time when the alarm was sent from the probe

- *Time Arrival*

  The time when the alarm was received by the nas

- *Severity*

  All alarms are stamped with a code indicating the severity level, indicating the seriousness of the alarm. Note that the severity level also appears as colored icons in the ID column, making the most important ones stand out. The severity levels are:

  - Clear (Green)
  - Informational (Cyan)
  - Warning (Blue)
  - Minor (Yellow)
  - Major (Orange)
  - Critical (Red)

- *Host Name*

  The name of the computer sending the alarm

  Note: Occasionally host computers are represented with their IP address in this column.
  You may try to convert these by setting the following string in Registry to **1**:

  HKEY_CURRENT_USER > Software > Nimsoft Software > Nimsoft Manager > Options > StripHostNameIp

  However, be aware of that this may result in timeouts!

- *Source*

  The IP-address of the computer sending the alarm

- *Subsystem*

  This identifies which part of the monitored computer the alarm was sent from (CPU, disk network etc.).

- *Subsystem ID*

  The subsystem ID is a field, containing one or more numbers

separated by dots. This ID identifies which part of the monitored computer the alarm was sent from (CPU, disk network etc.).

- *Count*

  This field shows how many times the alarm has been received from the probe.

- *Domain*

  The name of the Domain associated with the Probe sending the alarm.

- *Robot*

  The Robots hosting the Probe sending the alarm

- *Probe*

  This is the name of the probe that sent the alarm.

- *Assigned To*

  If the alarm is assigned to an operator, this field shows the name of this operator.

- *Assigned By*

  If the alarm is assigned to an operator, this field shows the name of user who assigned the alarm to the operator.

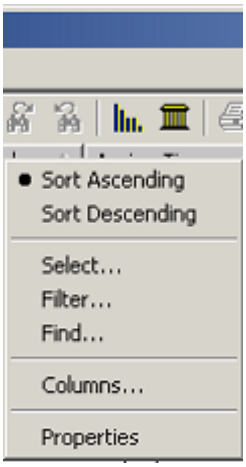
- *Assign Time*

  If the alarm is assigned to an operator, this field shows at which time the alarm was assigned to the operator.

Modifying the layout of the list in the window

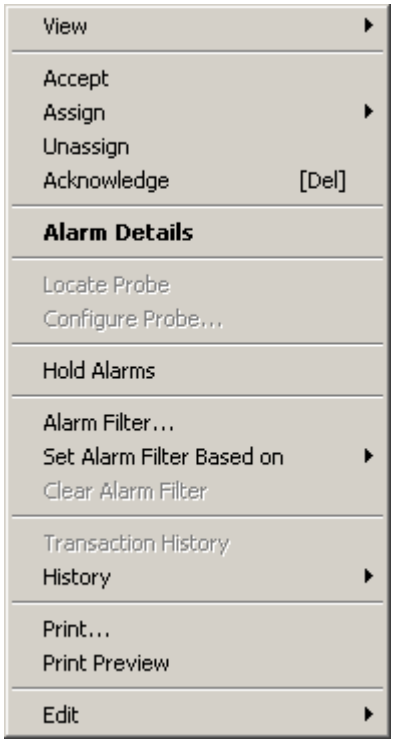
If you want to modify the layout of the list in the window, you have a set of options available:

- If you want to have the columns placed in another order, the columns can be moved, using drag and drop.
- Left-clicking the column border, dragging to the preferred width and releasing the mouse button can also modify the width of columns.
- Right-clicking in a column header or inside the list also gives many options.



For details, see the section Right-clicking a Column Header.

Right-clicking in the Alarm Window



- **View**
  Print
  Print Preview
  Edit

  See description in the section *Right-clicking in a list*.

- **Accept**
  Assign
  Unassign
  Acknowledge

Alarm Details
Hold Alarms

See the description in the section *Handling Alarms* for these options.

Locate Probe

Right-clicking an alarm message and selecting this option searches and finds the probe that sent the selected alarm message.

If the option is selected in the Alarm SubConsole integrated in the Infrastructure Manager, the probe will be selected in the Main Window Pane.

If the option is selected in the Alarm SubConsole integrated in the Enterprise Console, or when the Alarm SubConsole is running stand-alone, a message will appear on the screen, displaying the complete probe address (Domain/Hub/Robot/Probe).

Configure Probe…

Right-clicking an alarm message and selecting this option opens the Probe configurator for the probe that sent the selected alarm message.

This enables you to edit the options and configuration parameters for the Probe.

Alarm Filter…
Using the alarm filter, you can configure the alarm objects to display:

Alarms from selected source(s), subsystems, probes, etc.

Only alarms with severities as specified.

Alarms containing specific text

Time when the alarms were received

Alarms assigned to or by specific users, etc.

Also note the two options *Set Alarm Filter Based on* and *Clear Alarm Filter* (see below).

Set Alarm Filter Based on
Selecting (by left-clicking) one of the alarms in the window, you can use this option to filter on parameters like:

- Source
- Severity
- Host Name
- Probe
- Etc.

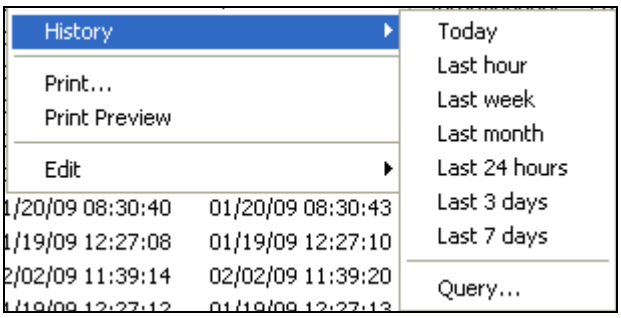
Then only alarms sent by the source, probe etc. that sent the selected alarm will be displayed in the window.
Another example: If selecting an alarm with severity Warning and filtering on Severity, only alarms with severity Warning will be displayed.

Clear Alarm Filter
Clears alarm filters (as described under *Set Alarm Filters based on*, see above), if any.

Transaction History
Marking an alarm in the list and selecting *Transaction History* opens a separate window, containing transaction information about the selected alarm.

History
Even if an alarm message is acknowledged, it can still be traced in the nas *history* database.

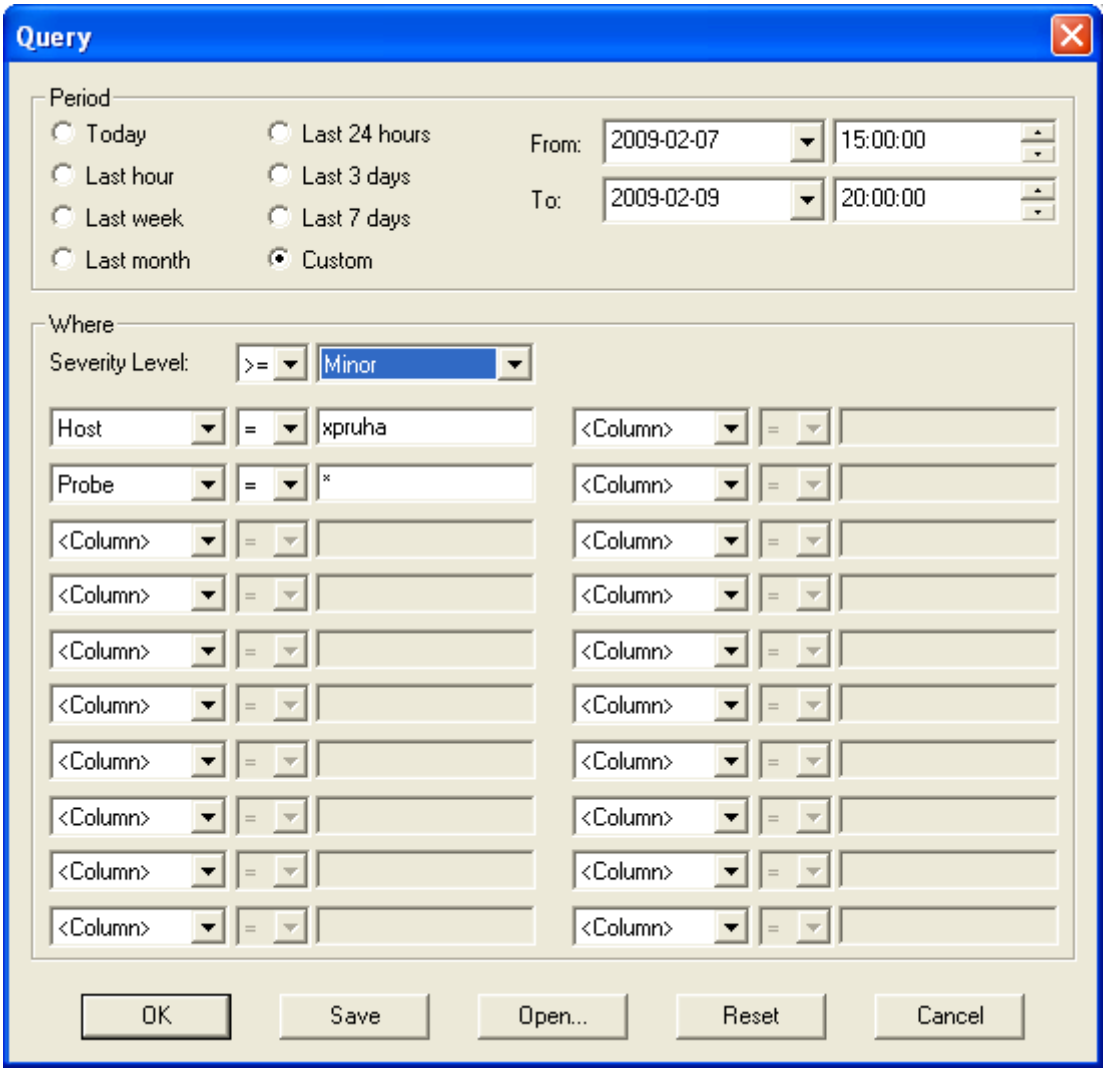
Using the *History* option, you can list and see alarms from the selected time frame (today, last hour, last week, last month, last 24 hours, last 3 days or last 7 days).



The alarms will be opened in a separate window.

Selecting the *Query* option, a filter dialog appears, enabling you to filter the historical alarms you want to see for the period specified.

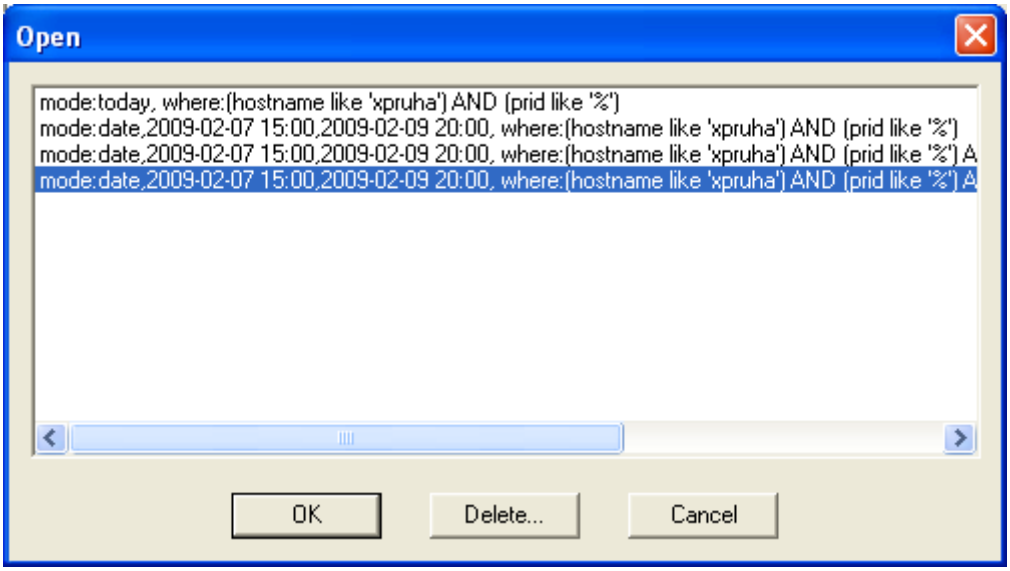
You can select one of the same predefined time periods as mentioned above, or you can select *Custom* and specify a custom period (*From* time and *To* time).



You can filter on one or more of the columns in the alarm window, and regexp (*regular expression*) is supported. The example above will pick alarms from **all probes** on the host **xpruha** with severity level **Minor** and above for the custom period specified.

Setting the filter and clicking the *Open* button, the alarms matching the filter will be opened in a separate window.

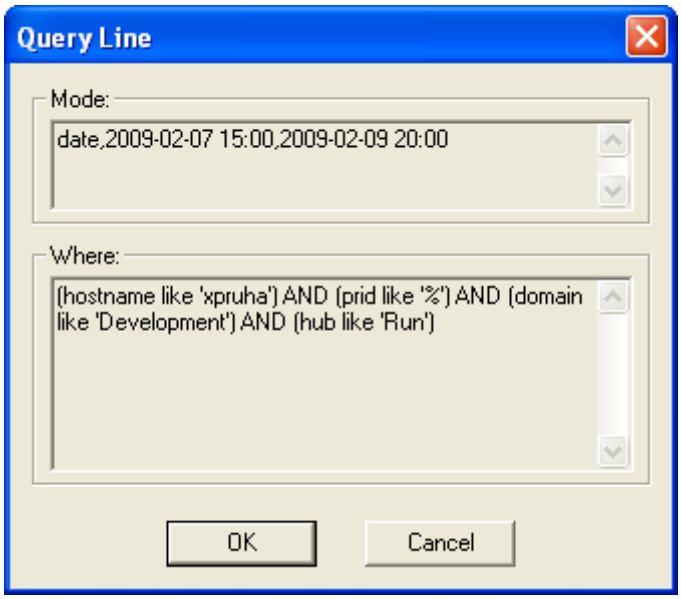
Clicking the *Save* button, the query will be saved to a local repository. Then clicking the Open button, this repository will be opened, enabling you to paste the query for other use.



Clicking the *OK* button, the filter dialog will be filled in according the selected query.

Clicking the *Delete* button will delete the query from the repository.

Note
Double-clicking a query will open the query in a new dialog, making long queries easier to read.



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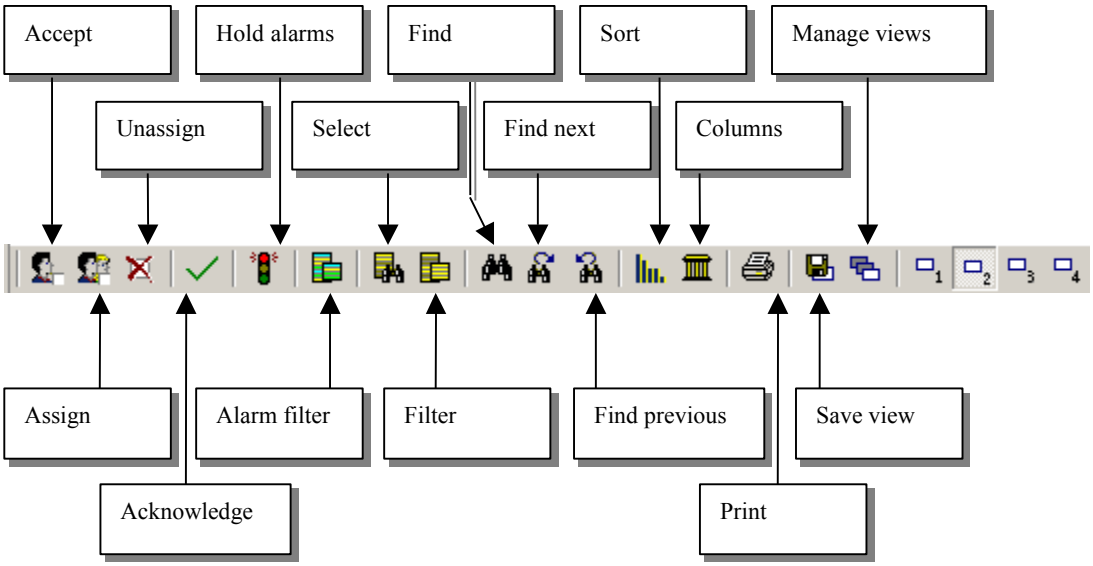
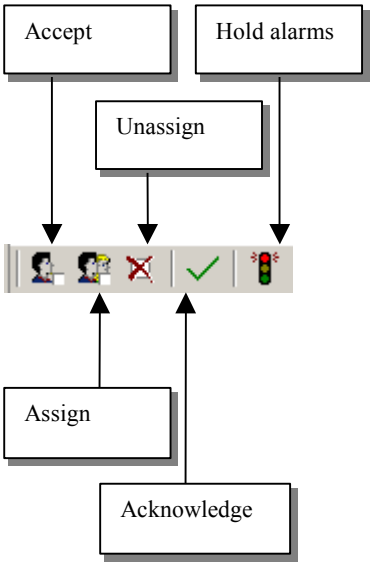
The Toolbar in the Alarm Window

The upper part of the Alarm Window contains a toolbar, enabling you to find, sort and handle alarms, manage views etc.



See the description in the section *Handling Alarms* for the following (leftmost) tool buttons.

- **Accept**
- **Assign**
- **Unassign**
- **Acknowledge**
- **Hold Alarms**

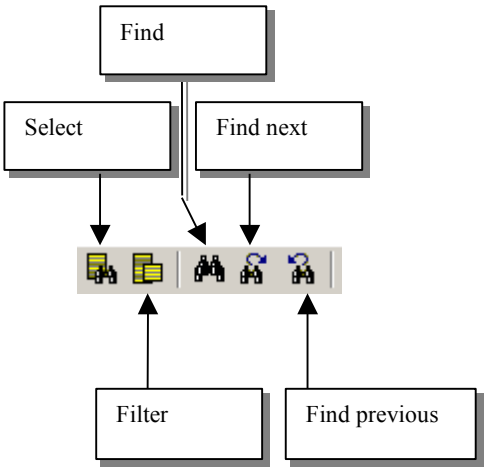


- **Alarm Filter…**
  Using the alarm filter, you can configure the alarm objects to display:
  - Alarms from selected source(s), subsystems, probes, etc.
  - Only alarms with severities as specified.
  - Alarms containing specific text.

- Time when the alarms were received.
- Alarms assigned to or by specific users, etc.

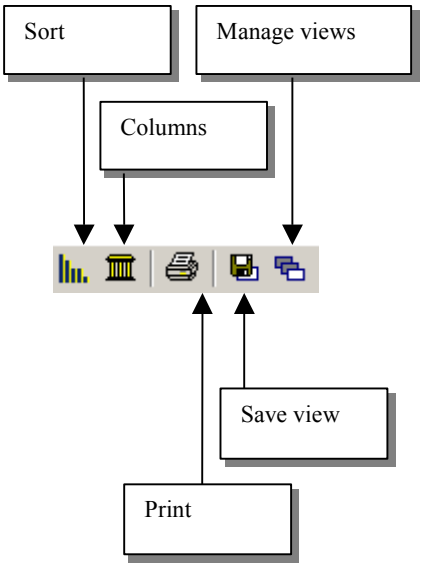
See the description in the section *Right-clicking a column header* for the following tool buttons:

- **Select**
- **Filter**
- **Find**
- **Find next**
- **Find Previous**



See description in the section *Right-clicking in a list* for a description of the right-most buttons:

- **Sort**
- **Columns**
- **Print**
- **Save views**
- **Manage views**



Working with Alarms

Once an alarm is generated, the Enterprise Console provides a powerful area where operators can view and manage the alarms. The basic alarm management architecture ensures that alarms are positively assigned and acknowledged (closed) before they disappear from the screen. Obviously some alarms can be set to timeout after a certain period and other alarms can be automatically closed based on the receipt of a clearing event.

The basic flow of alarm management is:

- Alarm generated by the probe.
- Alarm appears on the Enterprise Console.
- An operator takes ownership of the alarm.
- The operator gets more detail about the problem and fixes it.
- The operator closes the alarm, and the alarm is therefore removed from the console.

The basic alarm window allows the operator to decide which columns to display (see the section Working with views in lists), in which order to display them and how to sort the display. The operator can save preferred methods of viewing the alarms for future use.

Selecting any one of the icons at the top of the screen will filter the display to show only alarms associated with that source, or multiple servers can be grouped together to create a technology or business- view – e.g. see all alarms from File Servers.

Each alarm offers a menu of actions by right clicking on the alarm.

From this menu, the operator can assign the alarm, close the alarm or look at the history of an alarm (i.e. look at all previous occurrences and what state changes have occurred). Numerous other options are available to improve the operator's efficiency.

The Alarm Window

The Alarm window displays alarms received by the nas belonging to the Hub you are currently logged on to.

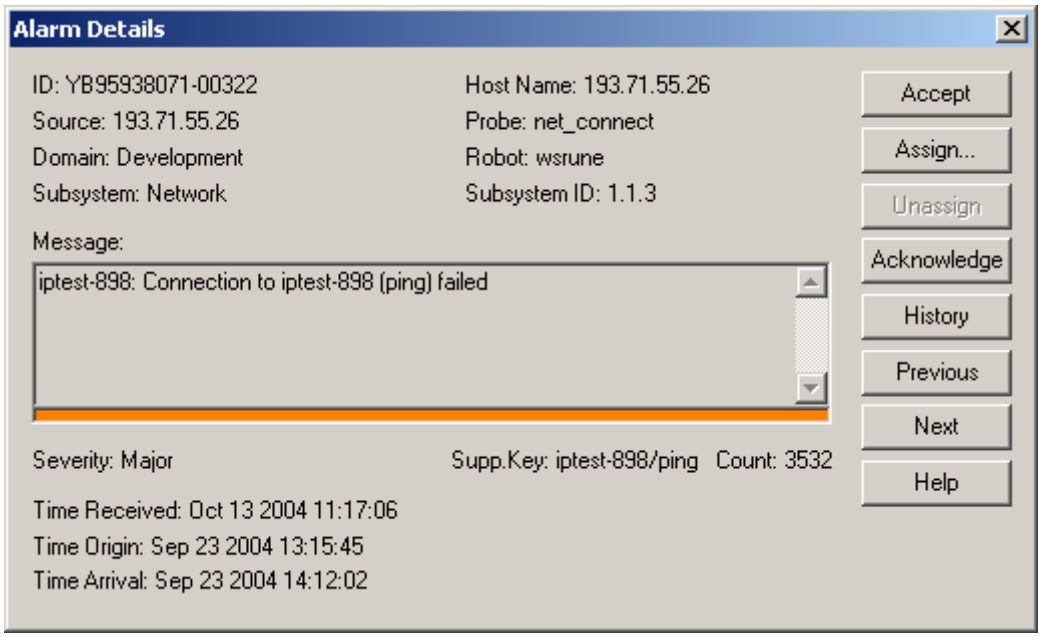
If no alarm filters are active, the window will display all alarms received.

Note that if you click an alarm object in a Dashboard, you implicitly set a filter. Click on an empty part of the Dashboard to clear the filter, or go through the Set Filter dialog to clear it manually.

Handling Alarms

Alarm details
Double-clicking an alarm in the Alarm Window opens the alarm and displays it in a separate window called *Alarm Details*.

The window provides detailed alarm information and some function buttons (going to the previous/next alarm in the Alarm Window, the alarms' history and some functions for handling the alarm).



Assign

The *Assign* function found in the alarm windows' toolbar could be used when assigning an alarm to a specific user. You can

also assign an alarm by right-clicking it and select *Assign*.

A white dot will appear in the lower right part of the colored alarm symbol when the alarm is assigned.

Assigned alarms can be unassigned again (see below).

Unassign

The *Unassign* function found in the alarm windows' toolbar could be used when unassigning an alarm that has been assigned.

You can also unassign an alarm by right-clicking it and select *Unassign*.

Acknowledge

Acknowledges an alarm. The alarm gets closed and disappears from the alarm window.

History

Opens the *Alarm History* window, showing the transaction log for the selected alarm.

Hold Alarms

The alarm window will not be updated when this function is active. May be useful when the alarm traffic is heavy.

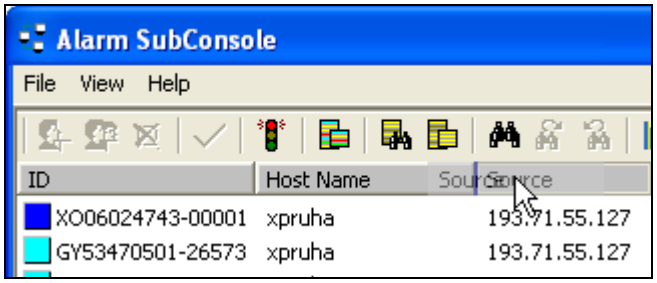
Accept

The user assigns selected alarms to himself

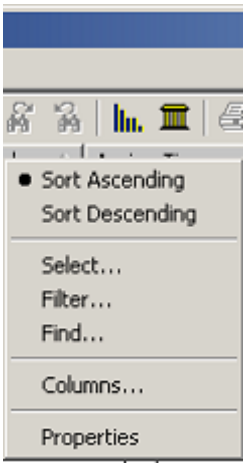
Working with Views in Lists

If you want to modify the layout of a list in a window (e.g. the alarm list in the Alarm SubConsole), you have a set of options available:

- Left-clicking the column border, dragging to the preferred width and releasing the mouse button can also modify the width of columns.
- If you want to have the columns placed in another order, the columns can be moved, using drag and drop. You left-click the column you want to move, drags it to the preferred position and drop it by releasing the mouse-button.



- Left-clicking the column border, dragging to the preferred width and releasing the mouse button can also modify the width of columns.
- Right-clicking a column header also gives many options.



See the section *Right-clicking a column header*.

- Right-clicking inside the list also gives many options. Some of the options are special for the different lists, and will be described in the sections describing the different lists.

  The other options, which are common for all lists are described in the section *Right-clicking in a list*.

- Further, the Toolbar in the upper part of the lists contains a set of functional buttons; see the section *The Toolbar in the list*.

The Toolbar in the list

The Toolbar integrated in the upper part of the list includes a set of functional tool buttons making it easier to navigate in the pane. Note that this toolbar can be selected / deselected by right-clicking in the list and selecting *View > Toolbar*.

The options in the toolbar are also available when either right-clicking in the list or when right-clicking a column-header.

See the section *Right-clicking in a list* for an explanation of the following options in the Toolbar:

- **Sort**
- **Columns**
- **Print**
- **Save view**
- **Manage views**

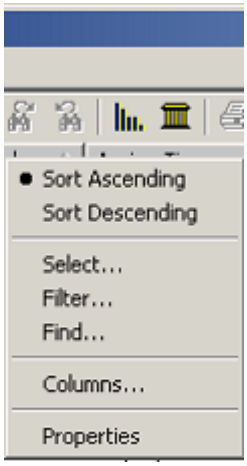
See the section *Right-clicking a Column header* for an explanation of the following options in the Toolbar:

- **Select**
- **Filter**
- **Find**
- **Find next**

- **Find previous**

Right-clicking a column header

Right-clicking a column header gives many options.



Sort Ascending / Descending

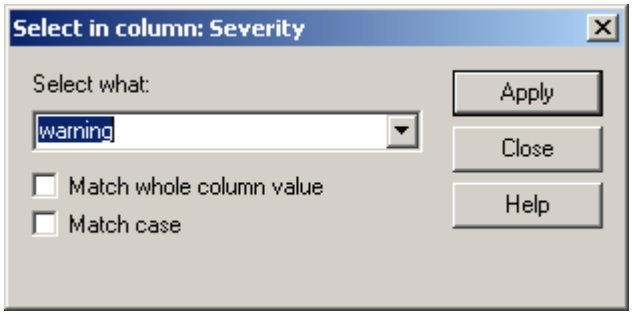
The entries in the list can be sorted, ascending or descending, based on the entries in the column under the header you right-click.

Select

This option can be used to select specific rows in the list. You can select all rows, or you can specify a select pattern in the *Select what* field. All rows matching the specified pattern will be selected.

Clicking the *Match whole column value* option, only rows containing exactly the pattern entered will be selected.

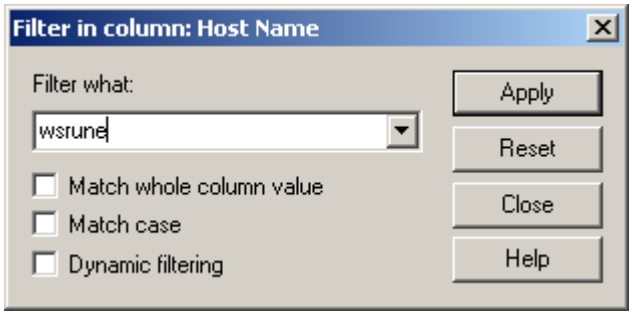
There is also an option for case sensitive selection. In this example, all list entries containing the word *warning* will be highlighted.



Filter

Entries in the list can be filtered by defining a select pattern (i.e. text). Only entries in the list containing this pattern will be displayed in the list, others will be hidden.
In this example, only alarms containing the word *wsrune* will be displayed.
Using the option *Dynamic filtering*, the

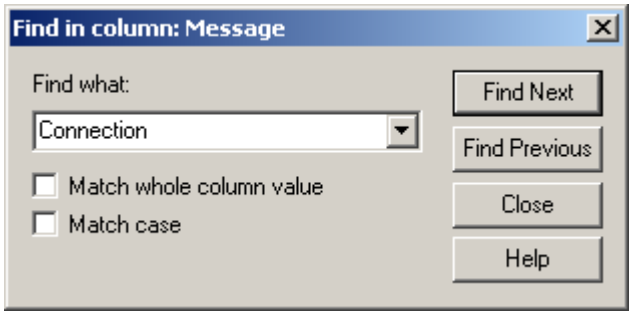
filtering starts immediately (while you are writing the select pattern).



To reset to normal view, with all list entries displayed, open the filter dialog again and click the *Reset* button.

Find

You can search for specific list entries by defining a select pattern (i.e. text), and the first list entry containing this pattern will be highlighted.



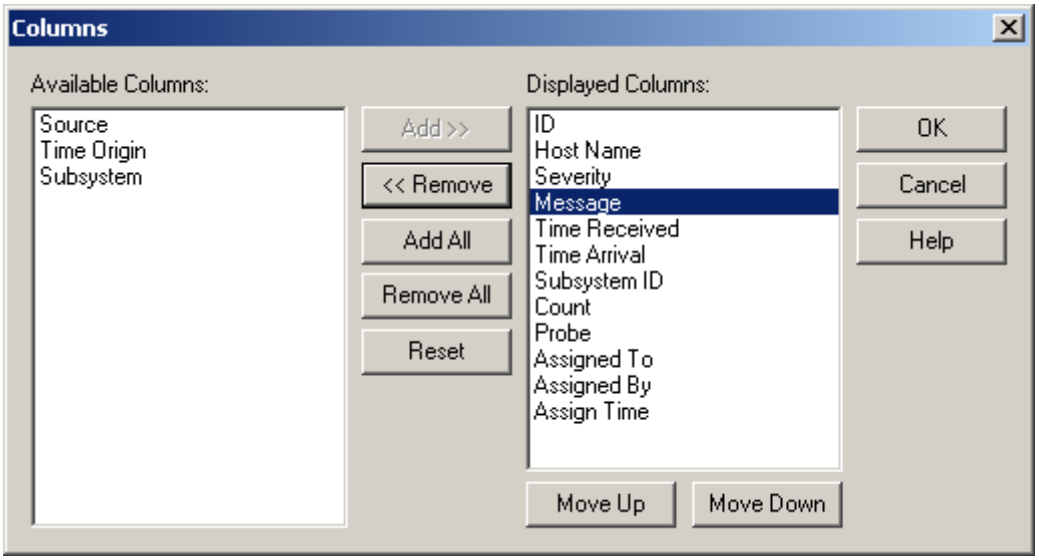
Clicking the *Match whole column value* option, the find function searches for a column with exactly the contents entered in the *Find what* field.

You may also select the find function to be case sensitive.

Clicking the *Find Next* button highlights the next entry containing the select pattern, while clicking the *Find Previous* button will find the previous entry containing the select pattern.

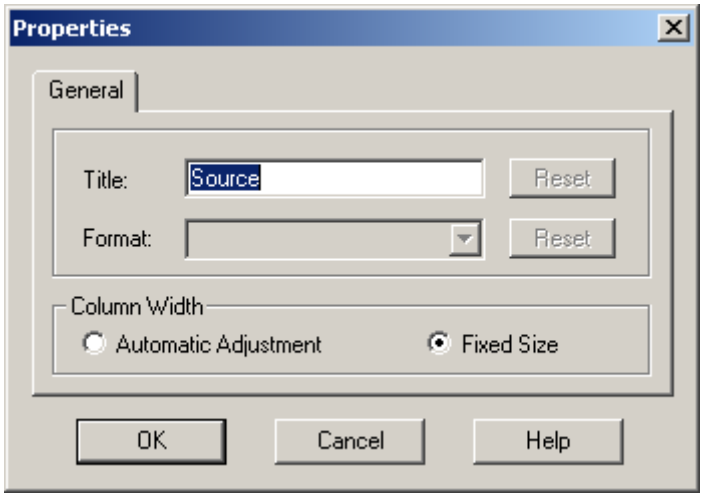
Columns

Columns can be removed from the list. You select the column you want to remove and click the <<*Remove* button. If you later want the removed columns back again, you simply select them and click the *add*>> button, or you click the *Reset* button.
You may also change the order of the columns. Selecting a column in the list and clicking the *Move Up* button, moves the column one step up, which means that the column will be moved one position leftwards in the list.



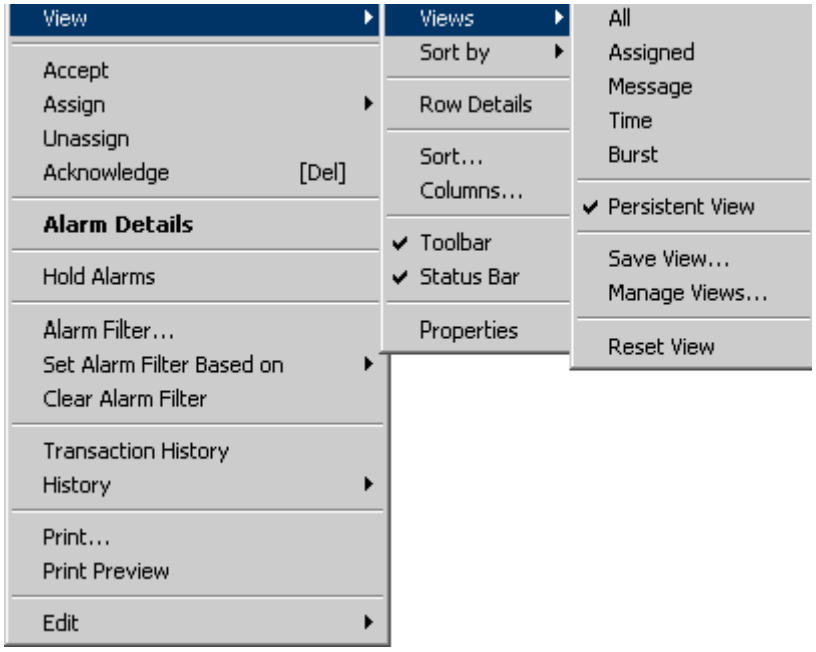
Properties

In the Properties dialog, you can modify the selected column's title. Note that for the *Assign Time* column, you may also specify the time format. You may also select between *Fixed column width* and Automatic Adjustment (the width is automatically adjusted to fit the length of the longest text string in the column.



Right-clicking in a list

Right-clicking inside the list offers a lot options. Some of the options are special for the different lists, and will be described in the sections describing the different lists.



The other options, which are common for all lists are described in this section.

Right-clicking in a list in a window (e.g. the alarm list in the Alarm SubConsole) gives you the possibility to modify the appearance of the list.

Views

The View function can be used to manipulate the view (the appearance of the list in the window). You may create your own views or make modifications of the layout of a list and save the views, giving them descriptive names (see *Save View*).

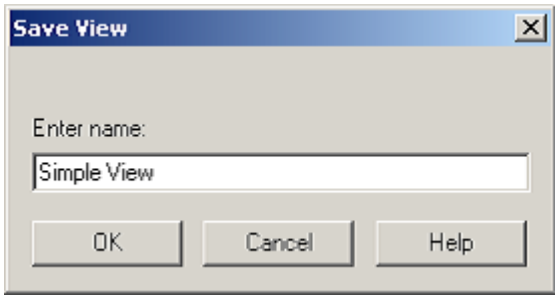
You can then toggle between different defined views.

Persistent view

If you have no default view specified, you can turn on or off a switch telling the system whether you want to save the changes you have made to a list during an ongoing session or not. If the switch 'Persistent View' is set, the sort levels and column ordering will appear in the same manner at start-up as when you exited the application.

Save View

This option can be used if you want to define specific views. If you change the layout of the list to match your specific needs, you can save the view and give it a specific name.



Manage views

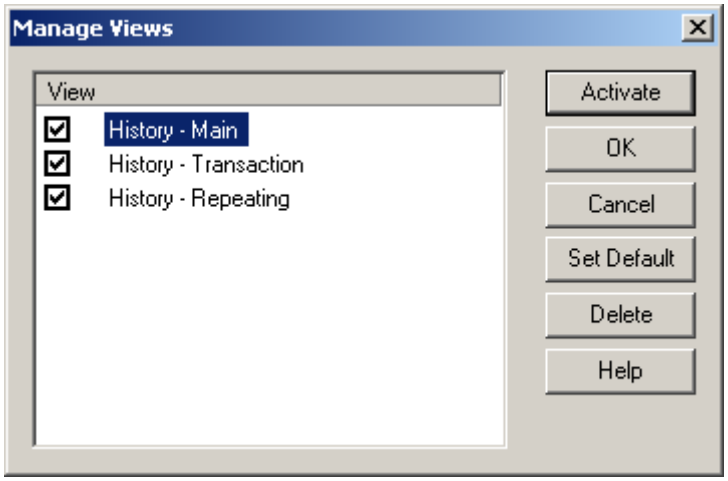
The *View* function can be used to manipulate the view (the appearance of the list in the window) and to create your own views.

The *Manage View* function can be used to manipulate these defined views.

You can:

- Activate a view
- Delete views that are no longer required
- Specify which view should be set initially when the application is started. A blue arrow will indicate this selection in the list containing your defined views.

If you have no default view specified, you can turn on or off a switch telling the system whether you want to persistently save the changes you have made to a list during an ongoing session or not. If the switch *Persistent view* is set, the sort levels and column ordering will appear in the same manner at start-up as when you exited the application.



Reset view

Resets to a basic view, with application default values.

Sort By

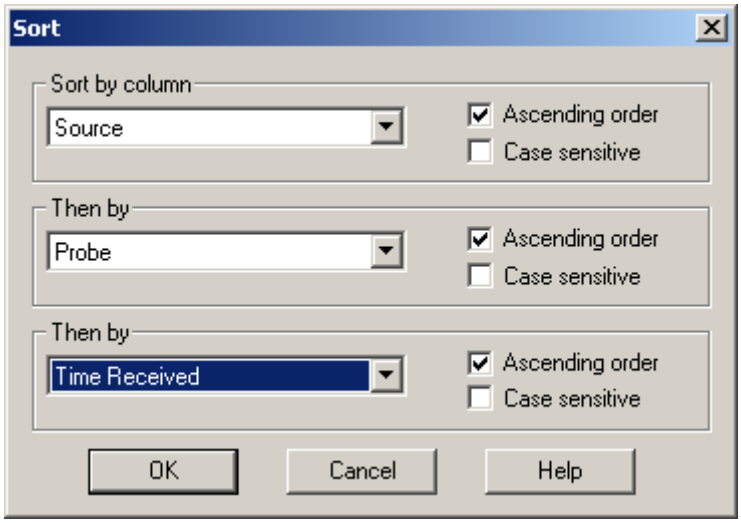
This function can be used to sort the list based on the different columns in the view.

Row Details

Marking an entry in the list and selecting *Row Details* opens a separate window containing detailed information about the selected list entry.

Sort

A more sophisticated sorting function, where you can specify multiple sorting keys.
You may sort by a *first column*, then by a *second* and finally by a *third* column.
You may select to sort in ascending or descending order and also choose case sensitive sorting.

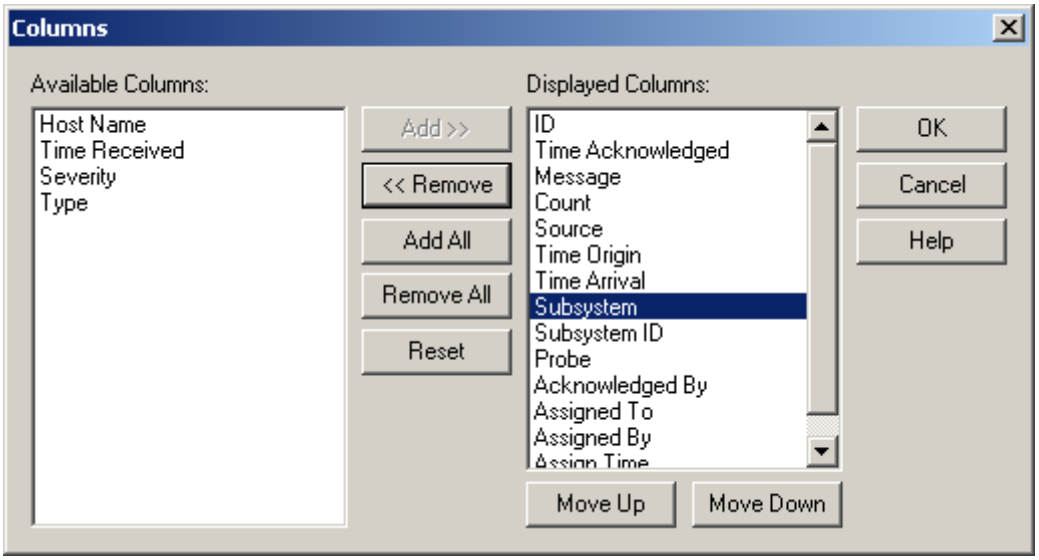


Columns

This function allows you to add or remove columns from the view.
Columns can be added by marking the column you want to add in the *Available Columns* field of the dialog and clicking the *Add>>* button. The column will move to the *Displayed Columns* field (note the *Add All* button, which moves all columns).

Columns can also be removed by marking the column you want to remove in the *Displayed Columns* field of the dialog and clicking the *<<Remove* button. The column will move to the *Available Columns* field (note the *Remove All* button, which removes all columns).

Further you may change the order of the columns by using the Move Up / Move Down button.



Toolbar

Lets you include or remove the Toolbar (see the section *The Toolbar in the list*) from the top of the list.

Status Bar

Lets you include or remove the Status Bar from the bottom of the list.

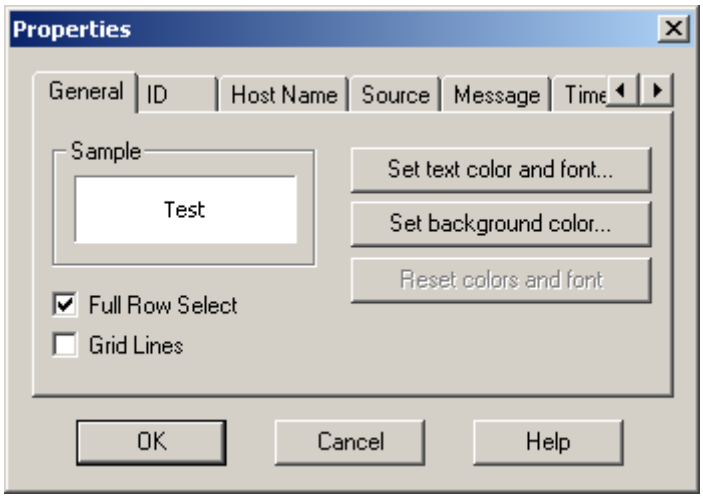
Properties

Opens the properties box for the list.
There is a General tab for selecting background color, text color and font etc. for the list.

Further you may select:

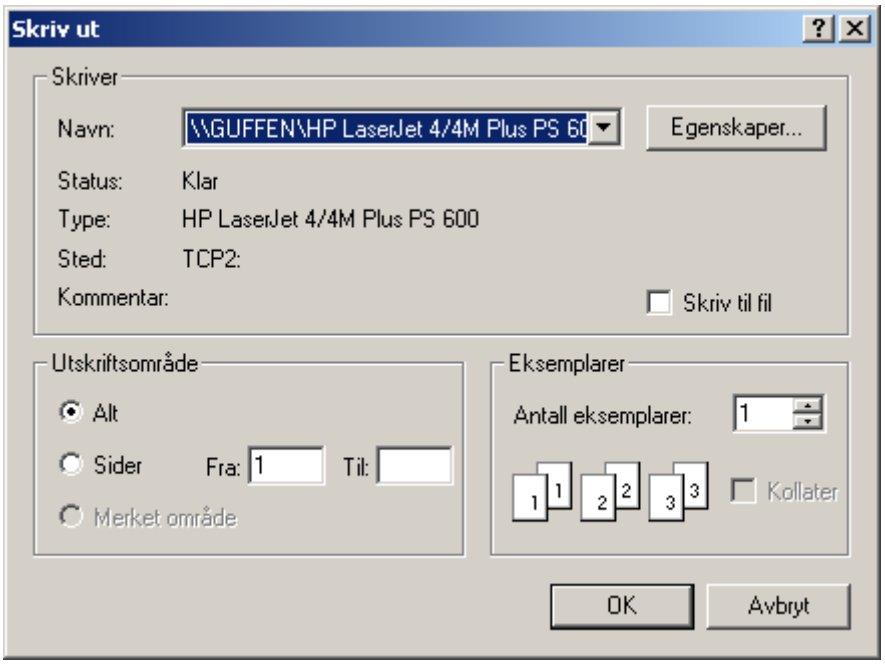
- The *Grid Lines* option, which will make the list appear with grid lines (as a table).
- The *Full Row* select, which makes it possible to select the full row in the list by left-clicking it.

In addition, there is a tab for each column, where you can modify the column title and column width.



Print

Prints the contents of the window. The printer dialog appears, allowing you to select a printer and to modify the printer properties, such as page orientation, number of copies etc.



Print Preview

Displays a preview of the contents of the list, as it will appear on a printout.

Edit

This option enables you to *select*, *filter* and *find* alarms in the list. These functions are also available in the Toolbar, and more information about these functions can be found in the section *The Toolbar in the list*.
You may also copy selected alarms to the clipboard.

SLM Terms and definitions

Automatic (Interval) data type

QoS Data is recorded at intervals, individually specified in the probe configuration for each of the probes.

Asynchronous data type

QoS Data is recorded only each time the measured value changes.

Calculation profile

Calculation profiles are user-created profiles that can be used when defining the calculation properties for Service Level Objects and Quality of Service Constraints. These profiles are based on built-in plug-ins distributed with the Service Level Manager application.

When defining calculation profiles, the profiles will be grouped either as SLO calculations as QoS calculations, depending on if the selected plug-in supports single-data or multi-data series.

Calculation method

Calculation method is the set of rules and conditions determining the way the SLA compliance is calculated.

Compliance period

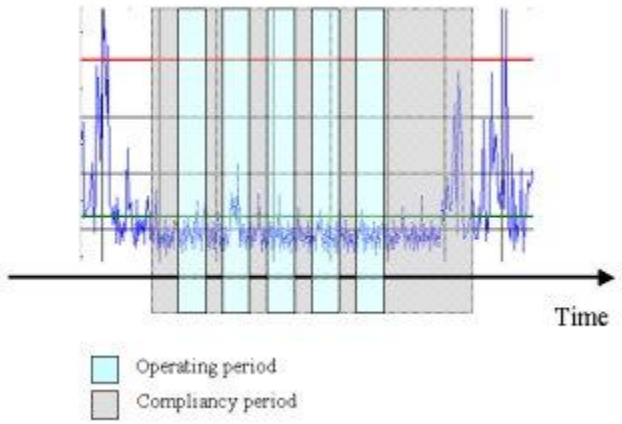
The compliance period defines the period of time that the SLA should meet the requirements stated by the compliance percentage, typically a day, a week or a month.

The illustration shows the relationship between the *operating period* and the *compliance period*.

The gray area illustrates the compliance period, and the blue area illustrates an operating period with 5 time-specifications.

Example:

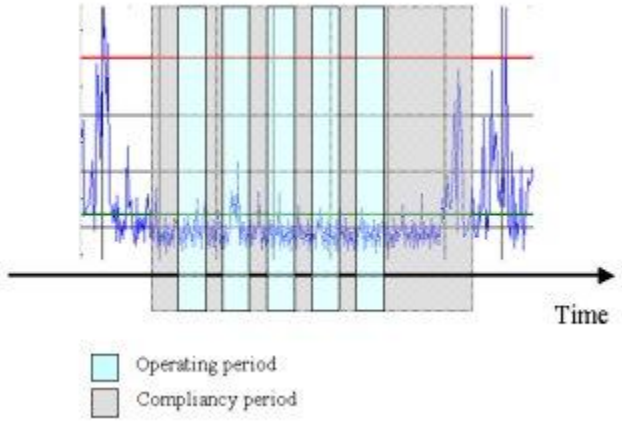
Let's say that the compliance period (gray area) is defined to be **one week** (Monday to Monday). Our requirements for the SLA is defined to be *between 08:00 and 17:00 every weekday* (operating period). Notice that the data (blue plot) within the operating periods (blue area) are included in the SLA computations.



Compliance percentage

The compliance percentage is defined to be the percentage of time that the QoS, constrained by e.g. operating period and thresholds, should be considered compliant within the compliance period..

Each sample is checked within the compliance period by the *data_engine* and summarized as **failed** or **successful**. The result is compared against the expected compliance percentage (defined by the user).



Consider the data represented by the illustration. The **red** line represents the threshold value, the **green** line represents the average value and the **blue** line represents the actual sample values.

How many samples within the operating period are above the threshold settings?

Zero samples breach the threshold line within the operating periods, thus fulfilling 100% of our compliance requirements. The 5 samples that breach the threshold are outside the compliance period which was e.g. Monday to Monday, with operating periods every weekday from 08:00 to 17:00.

Let's assume that the total number of samples within the operating period is 129, with 9 samples breaching the threshold. This implies

that 6.98% of the samples are accounted for as **out of compliance** (9 * 100/129).

If our Service Level Agreement requires a compliance of 98.50% (or better) and the only data defined in this SLA is the above data, then our requirements to the SLA is **breached** due to a current compliance percentage of 100% - 6.98% = 93.02%.

Data Types

We use the following different data types when calculating the compliance:

- *Automatic (Interval)*
  QoS Data is recorded at intervals, individually specified in the probe configuration for each of the probes.
- *Asynchronous*
  QoS Data is recorded only each time the measured value changes.

Domain

The Domain is the top-level node in the hierarchy, and a site is normally set up with one Domain. It is used to group one or more Hubs in a logical set such as a company or enterprise.

Hub

The Hub is a message concentrator and re-distributor. It is the collection point for all messages coming from the various installed Robots. Many other Nimsoft components can connect to the Hub to receive dedicated messages and perform other specific activities. One such component is the Alarm server.

NULL value

A NULL value will be recorded into the database typically if a probe does not measure a value from the target due to a timeout, e.g. no answer to a ping). In the QoS Calculation Profiles, available under the Calculation Profiles Node in the Navigation Pane of the SLM, you may define how these NULL values are handled in a compliance calculation.

Operating period

The operating period constrains the QoS samples to one or more time-specifications within the compliance period. This means that samples falling outside these time specifications will not influence the SLO/SLA compliance requirements. Each operating period is defined as a union of one or more time-specifications.

Probes

Probes are small dedicated pieces of software that monitor specific resources or events. Each probe can be easily configured for your own specific monitoring requirements.

Robot

The Robot is the first line of management for the Probes. The Robot starts and stops the probes at the required times, collects, queues and forwards messages from the probes onto the specified Hub.

Service Level Aagreement (SLA)

A Service Level Agreement (SLA) is an agreement to deliver a service within a specified/fixed time-period to an extent where both parties agree on a measurable service levels. The parties may be an IT department delivering services to another department within the company, or by a company and an external service provider.

The services included in the SLA may be a collection of monitored objectives we call Service Level Objectives (SLO). These objectives (or group of objectives) are monitored by dedicated programs (often standard probes) that monitor e.g. network connectivity, application (Oracle, Exchange, e-mail) availability and service (DNS, DHCP) availability.

SLA

A (SLA) is an agreement to deliver a service within a specified/fixed time-period to an extent where both parties agree on a measurable service levels. The parties may be an IT department delivering services to another department within the company, or by a company and an external service provider.

The services included in the SLA may be a collection of monitored objectives we call Service Level Objectives (SLO). These objectives (or group of objectives) are monitored by dedicated programs (often standard probes) that monitor e.g. network connectivity, application (Oracle, Exchange, e-mail) availability and service (DNS, DHCP) availability.

SLO

A Service Level Objective (SLO) is a combination of one or more *component measurements* (Quality of Service) to which constraints are applied. A SLO is said to be in compliance if the underlying measurement values are within the specified constraints.

SLO's may have operating periods during which the SLO has to be compliant.

SLM

The Service Level Manager (SLM) is the application where service level configuration and monitoring is performed. The application needs a valid license to operate.

QoS

The Quality of Service (QoS) is the atom of the Service Level Management. The QoS is the actual value (sample) collected and used centrally to determine the state of the service level objective. This value is normally collected by a probe like *cdm*, *net_connect*, *url_response* etc. The value is first used for alarm purposes, but if the probe is configured to deliver Quality of Service, then a QoS message is issued.

A QoS constrained by threshold, source, target and operating period settings is used as the building blocks for SLO's.

QoS object

The QoS object is defined by its **QoS name**, **source** and **target**. All sample-data with this unique combination form data-series that may be used as part of any Service Level Objective.

QoS constraint

A constrained QoS object is defined by its **QoS name**, **source**, **target**, **threshold** and **operating period**. This constrained object is the building block of the Service Level Objective.

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