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Software and Consulting GmbH

**ST-Perf**  
NetWorker®  
Measuring Device Performance

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# User manual

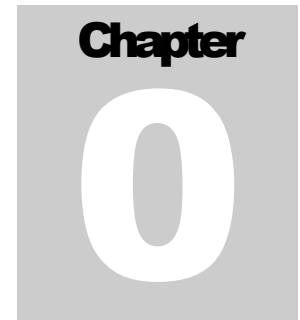
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## Foreword

“Just what we always needed,” was the remark of one NetWorker administrator the first time he set eyes on ST-Perf.

After seemingly endless weeks and months, we had finally reached our goal. The first release of ST-Perf was ready for launch. An preliminary minor release followed soon thereafter.

But something was still lacking: this user manual.

Now that it is finally finished, we hope it helps the reader better understand ST-Perf so that he can gain even more benefit from using it.

# Introduction

For years people in my workshops have asked me,

- *“How can I ascertain the nightly capacity utilization of my NetWorker tape drives?”*,

or

- *“We have several devices of the same type: one breaks down regularly, the other does not – why is this?”*

Recently another question has also arisen:

- *How can I find out when my SRS devices have free capacity?*

The NetWorker server provides only partial answers to these questions, if indeed any at all. Of course one can monitor the current throughput of the devices at any given time using the CLI command “nsrwatch” or the graphical interface programs, but who enjoys staying up all night to contemplate the capacity utilization of his devices? And that is to ignore the fact that with large NetWorker configurations the number of devices alone means there is little hope of this being a successful enterprise. It is impossible to note down the throughput of eight or more devices within 2 seconds, let alone all the other information that is needed for a detailed analysis. But this is precisely the key to solving the above questions after the failure of certain devices. For if the throughput of the devices is too low, the devices switch into so-called “start-stop” operation, which leads to an enormous wear on the devices and ultimately to their failure. Other devices that do not switch over to start-stop operation develop no faults in spite of longer running times. So if I want to find out the reason for the failure of my devices, the first step towards solving the problem is to record the throughput. Things are similar with the capacity utilization of SAN devices. Neither NetWorker nor the SRS server record when which device was reserved or run on which storage node.

These are precisely the problems that **ST-Perf** help solve. ST-Perf records the device data at the times scheduled by you, so that you can subsequently study and analyze them in a graphical environment.

ST-Perf is thus not limited merely to recording and reporting the plain data, but processes and displays it in the form of a graphical analysis.

# Configuration

*How do I define which devices of which NetWorker servers are recorded when?*

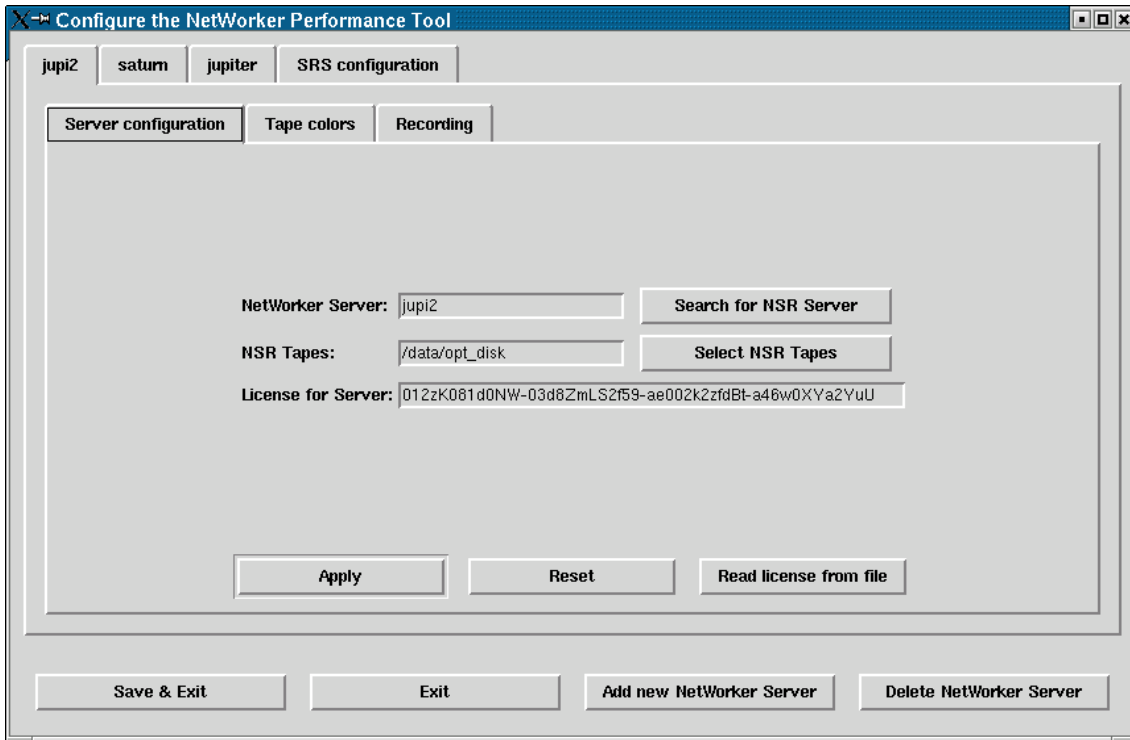
For the configuration of the recording parameters you have the choice of two programs: graphical or text-based. Generally speaking you should use the graphical program. The CLI interface is primarily intended for remote maintenance where display in an X-Window is not possible. This is why the following section initially looks only at the details of the graphical configuration program **xconfig**.

As with all the executable programs included in the product, you will find **xconfig** in the directory “/opt/nsr/st-perf/bin”. If you regularly use the ST-Perf commands, we recommend you specify this directory in your path statement. For example with the command:

```
PATH=$PATH:/opt/nsr/st-perf/bin; export PATH
```

or by making the necessary path changes in the /etc/profile or your local profile file.

After starting the program the following dialog is displayed:



## CONFIGURATION

Let us look first at the different tabs; the action buttons at the bottom edge of the window are described at the end of the chapter.

When configuring the program for the first time, you will see a tab for the configuration of your NetWorker server and a tab for the configuration of any SRS servers you may have. The NetWorker server configuration is subdivided into three further tabs.

### *NetWorker Server Configuration*

**Define NetWorker Server** In order to specify your NetWorker server, press the action button “**Search for NSR server**”. The tool now attempts to find all NetWorker servers present on your sub-network and lists these in a selection dialog. If only one NetWorker server is found, this is automatically entered in the associated textbox. If the tool does not find any NetWorker servers, that might be due to the network configuration. **xconfig** only searches in the sub-networks defined by the *netmask*. It is also possible to enter the name of your server directly in the appropriate textbox, if the server is accessed via a *gateway*.

**Define devices to be recorded** After defining the server you can now specify the devices you want to record. The default value for this attribute is “**ALL**”. If you do not change this value, during the recording phase ST-Perf will record performance data for all available devices on the selected NetWorker server, with the exception of logical SRS-managed devices. With some device types, however, this may be irrelevant (in general “file devices” do not need analyzing), or depending on which licensed version you have, it may not even be permitted (in the demo version only 2 devices can be defined). So now with the action button “**Select NSR tapes**” you can select the devices the data of which you wish to record. **xconfig** asks the specified NetWorker server which devices are present and lists these in a dialog window for you to make your selection.



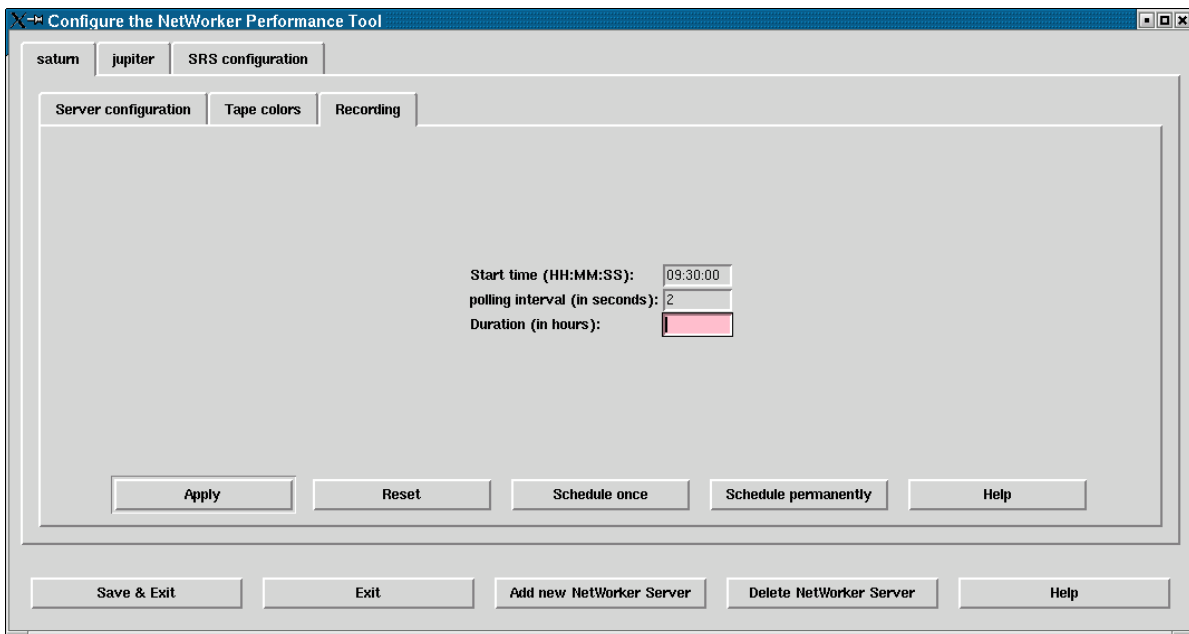
In the selection window, which now opens, you can select multiple devices by pressing SHIFT or CTRL at the same time as making your selection with the left mouse button. Multiple devices can be selected simultaneously by depressing the left mouse button and moving the cursor over several device names. After clicking the “**OK**” button the selected devices are listed on the server tab.

**Enter license code** The third input field on this tab is for you to enter the **ST-Perf license code**. This is a 54-character ASCII string. Normally, however, you do not have to enter this string by hand, but can read in the license from a license file. To do this, press the button action button “**Read license from file**”. This opens a file selection which shows you the current directory. Using the directory selection navigate to the directory in which the license file is located, and select the license file. If you prefer, you can also enter the absolute file path of the license file directly into the lower input field. When you press the “**Apply**” button on the tab, **xconfig** checks the validity of the license code.

## CONFIGURATION

If the license is a temporary one, both now and each time you launch the program **xconfig** will inform you how many days the license is still valid. If the license is no longer valid, this will be indicated by an error message to that effect. In order to check the validity of the license, **xconfig** needs to access the associated NetWorker server. So when typing in the license, make sure that this server can be accessed. If the license does not include SRS support, the tab “SRS configuration” will disappear. After entering a valid license and confirming this by pressing the “**Apply**” button, you can continue with the configuration of another NetWorker server.

**Have the recording start automatically** After entering all necessary data in the server tabs, you can turn your attention to the “Recording” tab.



Here you can schedule the recording of the device performance data on a one-off or daily basis. The input fields allow you to specify the start time of the desired recording, the recording frequency (in seconds) and the duration of the recording (in hours). The input values for each field are checked for validity as they are entered. If you hear a beep, or the input field is colored pink, then the input field contains a value that is invalid.



Please note: in the demo version the duration of the recording is limited to 2 hours.

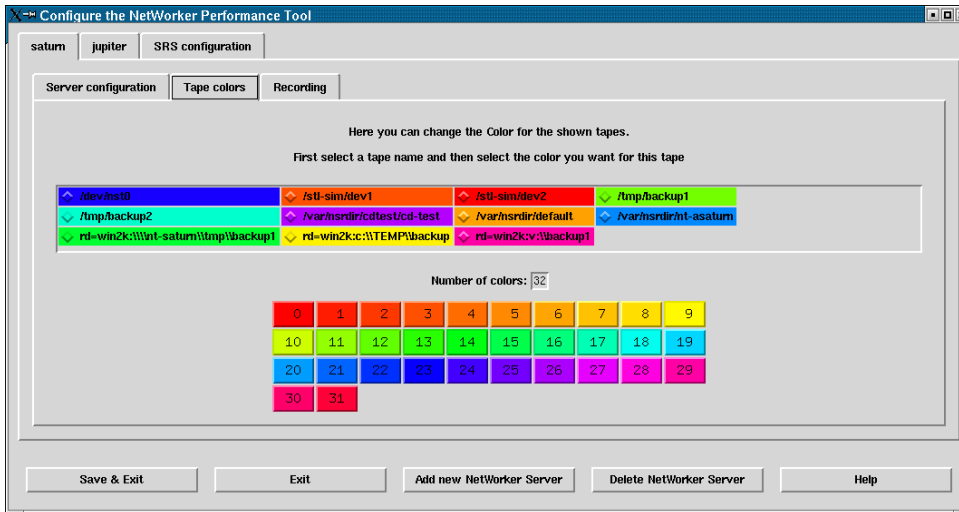
The two action buttons “**Schedule once**” and “**Schedule permanently**” allow you to launch the recording once only at a specified time, or to launch the recording daily at the given time. In the former case the task is scheduled using the “**at**” command. In the latter case **xconfig** enters the launch of the recording in your “**crontab**”. You can examine the “at task” at a terminal using the command “**atq**” and also remove it with the command “**atrm <job no.>**”. The crontab settings can be viewed with the command “**crontab -l**” and edited with the command “**crontab -e**”. For other options please refer to the two man pages “**at**” and “**crontab**”. Here too, changes are confirmed with “**Apply**”.

## CONFIGURATION

### **Specify device colors**

The final (optional) step is to change the predefined colors with which the devices are represented in the performance graphs (but you can also do that at a later stage in the evaluation program). This is done under the tab “**Device colors**”.

You will find a scrollable list of the selected server devices and any SRS devices connected to the server, plus a palette of colors. In order to change the color assigned to any device, first select the device name and then activate the desired color in the color palette below. If there are insufficient colors available in the color palette,



you can change the number of colors displayed by entering a number in the textbox “**Number of colors**”. The colors you have assigned will be saved by **xconfig** in the configuration after you press the “**Save & Exit**” button, and **ST-Perf** will use these colors to portray the device performance values.

## Configuring SRS servers

### **Configuring recording of SRS devices**



Please note: the graphical configuration is currently not able to deal with multiple SRS servers. If you have configured multiple SRS servers, please enter the desired servers by hand.

If your NetWorker configuration is based on an SRS server, you can have the performance data and the allocation of the SRS-managed physical devices recorded and specified by **ST-Perf**. For this **ST-Perf** must either be running in the demo version or with an **ST-Perf SRS license**. You can tell whether this option is available by whether or not a tab “SRS configuration” is displayed. During the configuration of the NetWorker server devices, **xconfig** recognizes that there are SRS managed devices present on your NetWorker. These are consequently **not** available for selection during the NSR device selection. To configure the SRS devices, activate the tab “SRS configuration”. When you press the action button “**Seek SRS server**”, **xconfig** searches for any SRS servers present on the sub-network. Should it not find the SRS server, you can also enter the name of the computer directly in the corresponding textbox. After the server has been found or entered, you can also select the devices for which you want to record the data. When you click the button “**Select SRS device**”, **xconfig** lists all devices defined in the SRS, and you can then make your selection (you will find instructions in the section “[Defining devices to be recorded](#)”).

## *The Action Buttons*

### **Apply and Reset**

have been applied.

At the lower edge of the window you will see the action buttons **Apply** and **Reset**. The reset button allows you to discard changes that have not yet been confirmed. The **Apply** button saves any changes that have been made. Resetting is not possible once changes

### **Add NetWorker server**

After you have entered the license code for a NetWorker server, the action button “**Add NetWorker server**” is activated. You are now able to specify the recording parameters for another NetWorker server.

### **Remove NetWorker Server**

As soon as you have finished the configuration of more than one NetWorker server, the action button “**Delete NetWorker server**” becomes active. By pressing this button you will delete the current server configuration. Initially, however, this deletion is merely registered in the program: it is only when you save the configuration with “**Save & Exit**” that the deletion becomes permanent. This means that if you delete the wrong server by mistake, you can always press the “**Exit**” button in order to save your previous configuration.

### **Save & Exit, Exit**

Once you have completed the configuration, you can save this to the hard drive by pressing the action button “**Save & Exit**”. This saves the configuration in the file `/nsr/st-perf/config/conf_perf`. This file is written in a structure specific to Python and may only be altered using the programs **xconfig** and **config**. Please do **not** attempt to alter the existing configuration by editing the file with a text editor. This can corrupt the file and the entire **ST-Perf** configuration would be destroyed.

Pressing the “**Exit**” button terminates the configuration process. In this case and likewise with all other methods of aborting the program (closing the program using the window decoration, program abort by sending a signal) the configuration is not saved. Please note: there is no warning along the lines of: “Are you sure?”!!!

## Recording

*What do I have to do in order for the performance of my devices to be recorded overnight, and so that I can easily evaluate the result of the recording the next day using ST-Perf?*

### ***Carry out a test recording!***

After defining the configuration parameters, you should test the recording of the performance values. This is possible using the **record** command (`/opt/nsr/st-perf/bin/st-perf`) without any parameters at all. If you have already defined the recording of multiple NetWorker servers, **record** will ask you interactively, for which NetWorker server the recording is to be started.

Please select the server whose data you wish to start recording:

```
0) uranus
1) jupiter
(Select number) -->
```

If you have only defined a single NetWorker server, the recording begins immediately. If you want to start a recording for a specific NetWorker server, you can provide the server name as an argument on the **record** command.



**Please note:** The program does not start as a daemon. That means that if you do not start it in the background, your terminal will be blocked after it starts. However you can release this blocking using the shortcut `<Ctrl>Z` followed by the command `"bg"`.

```
record jupiter
```

If you have scheduled the start of the recording via the **xconfig** program using the action buttons **“Schedule once”** or **“Schedule permanently”**, **xconfig** has stored this call in the **“at”** or in the **“cronab”**.

The recorded data is saved by **record** to the directory `“/nsr/st-perf/data”`. Here a new directory is created for each recording. The name of the directory is formed from the start time. For example, if the recording was started on 13 April 2004 at 20:00 hours, **record** creates a directory with the name **2004-04-13:20:00**.

If you have defined the recording for a single NetWorker server, this directory is created directly in the **“data”** directory. However if you want to record the data of several NetWorker servers, for each server **record** creates a separate sub-directory identified by the NetWorker server name. In this case the new recording directory would be named, for example, **“jupiter/2004-04-13:20:00”**. **record** can contain

## RECORDING

up to 31 sub-directories for each NetWorker server. If more than 31 recordings are made, the oldest is deleted.

For each device defined in the configuration, **record** creates a separate file in the recording directory in which the performance data for this device is logged. The names of the files are created using the device names and the ending ***.stp*** (which stands for ST-Perf), whereby the characters “/” and “\” are replaced by the underscore character “\_”. Thus for the device “*/dev/rmt/1cbn*” **record** would create a file with the name ***\_dev\_rmt\_1cbn***. In addition to the performance files, **record** creates a file with the name “*messages*”. This is where **record** saves the NetWorker messages sent during the recording. In the subsequent evaluation of the performance data you can start the analysis of a device directly via the selection of its device file from the corresponding recording directory (for more information see [Loading performance file](#)).

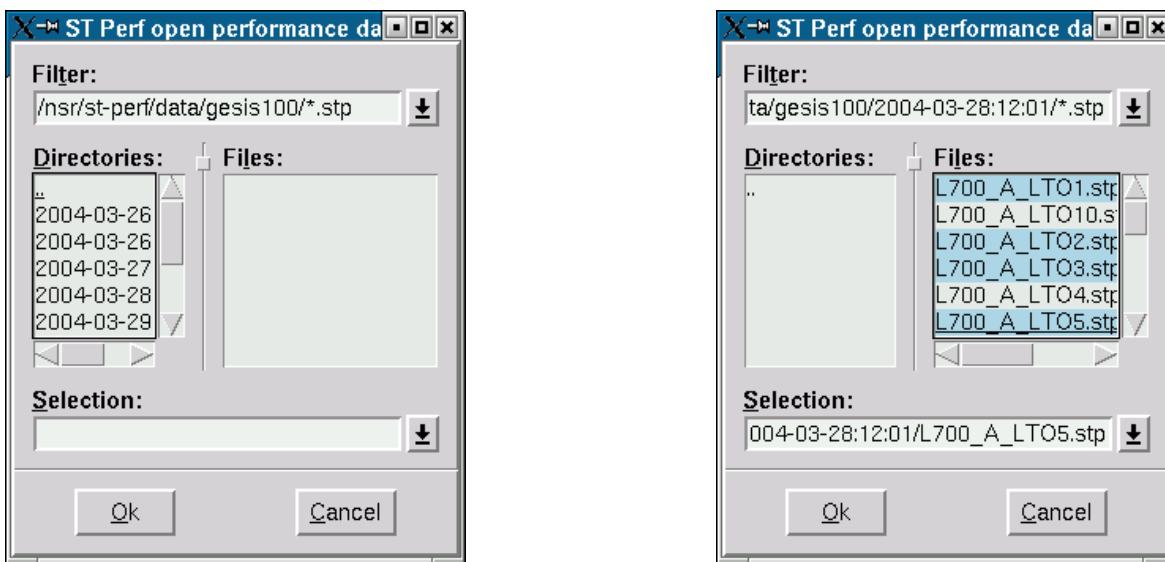
## Displaying performance data

*How can I graphically portray the recordings of the device speeds?*

To portray performance values, you need the program **st-perf**. You will find it and the other ST-Perf programs in the directory “`/opt/nsr/st-perf/bin`”. **st-perf** is a graphical interface program that needs an X-Windows server in order to display the information it has gathered. That means that you can display **st-perf** on the monitor of the computer on which **st-perf** is installed, or you can use the X-Windows remote display function to display the data on any X-Windows server on your network (further details in the [Appendix](#)).

**Select device files** You can specify the recordings that you wish to display either as arguments with **st-perf** when calling the program, or reload them at any time during runtime via the “**File**” menu.

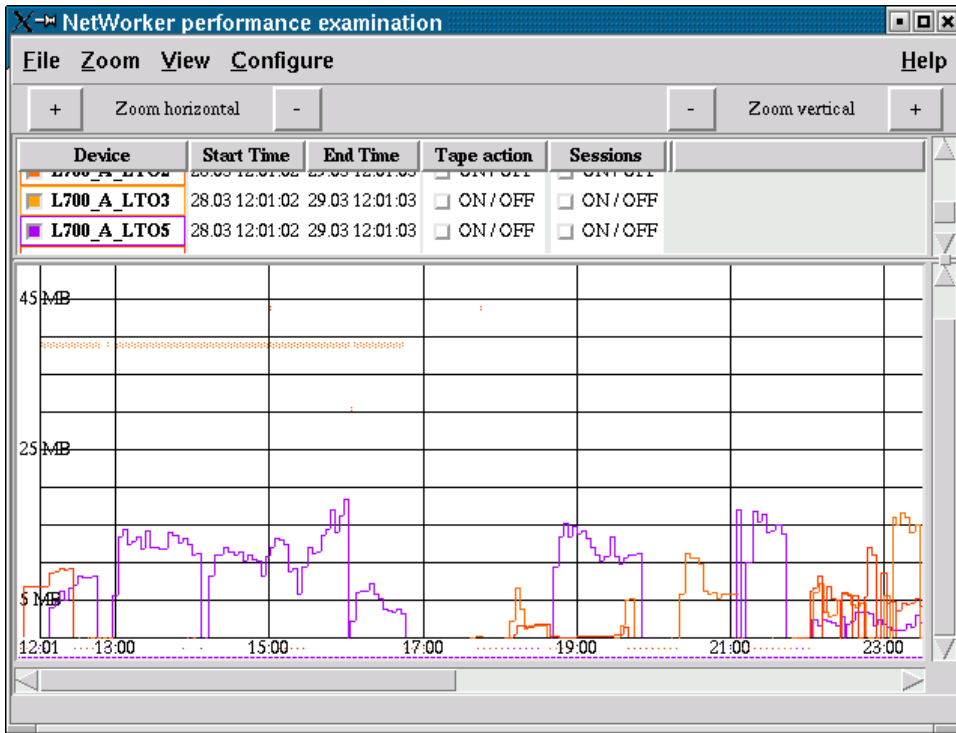
The menu item **File**→“**Load file**” allows you to add recording files from the same recording session to the device data already displayed. The file selection box that appears opens the subdirectory “`/nsr/st-perf/data`”.



Listed in the left-hand selection list are either the names of your configured NetWorker servers or the start times of your recordings. If you have configured multiple servers, select the server whose performance data you now wish to analyze, and then select the directory with the name of the recording start time. After you have selected a recording directory, in the right-hand selection list you will find the names of the devices of which data has been recorded (the names are slightly altered – see screenshots). You can now select one device or several at the same time for simultaneous display (instructions on how to proceed [here](#)). **st-perf** now

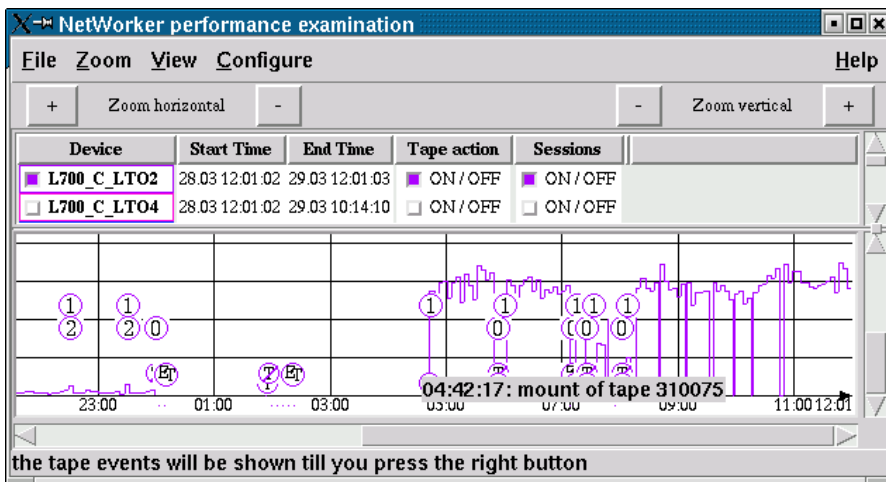
**EVALUATION**

loads the selected performance recordings, telling you which file is currently being loaded in the status line at the bottom edge of the window.



**Display elements “Sessions” and “Tape actions”** After loading the data, the selected devices with their names and the recording times are listed in the upper part of the program window. The device name and the associated performance graph are portrayed in the color that has been assigned to the device. This color can be customized for each device either in the configuration program ([xconfig](#)) or in the

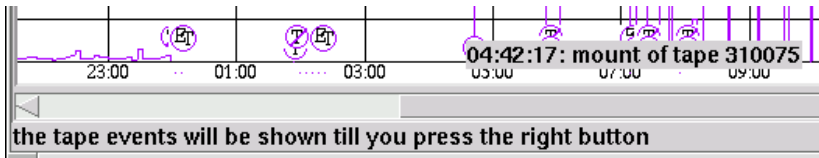
**Configure** menu. The device name is displayed in a “checkboxbutton” which you can use to toggle the display of the associated device in the performance window on and off. This is particularly useful when many devices are being displayed but you want to concentrate on the analysis of a single device. Behind each device are two further “checkboxbuttons” with which you can toggle the display of the numbers of currently active backups, and the associated tape actions, on and off. The symbols “**T**”, struck-through “**T**” and “**ET**” shown in the tape actions, stand for the actions “*Mount*”, “*Ready*” and “*Eject Tape*”.



**EVALUATION**

The numbers portrayed on the graph refer to the number of currently active backups (sessions). A “3” means therefore that at this point in time three backups were being carried out in parallel on the device in question. The symbols are staggered vertically only to make them easier to read. Nevertheless it can happen, as in the above example, that some symbols are not visible or decipherable owing to the condensed portrayal of the graph. This is easily remedied using the zoom function.

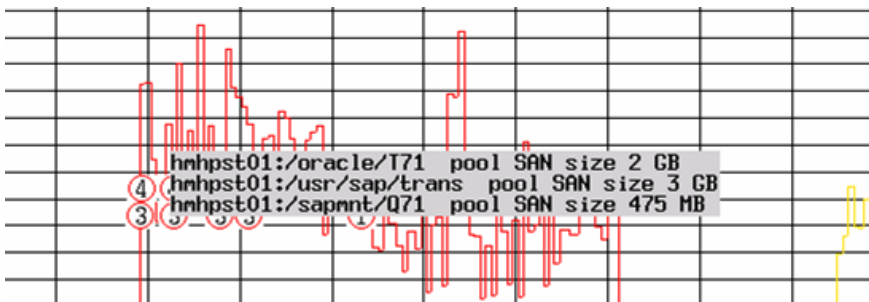
However the “Tape” and “Session” symbols not only show the changes in state of the device or the number of sessions running at one time, but can also be used to obtain more far-reaching information.



With the help of the “tape” symbols (T) (T) you can ascertain which medium was mounted or ejected with any individual action. To do this, simply click with the left mouse

button on a “tape” symbol. **st-perf** now shows you which tape was being processed at this point in time. Move the mouse to the next tape symbol, and this action displays a tape name. This property remains active until you click in the performance window with the right mouse button, or until the graphs are redrawn by another action.

The “Session” symbols (2) (0) can be used in a similar way and show a list of the save sets that have just been backed up. The list contains details of the backed-up NetWorker client, the save set name and the size of



the save set. Unlike with the “Tape” symbols, you have to click on every “Session” symbol for which you wish to see the information. In order to terminate the display of the save set information, click with the right mouse button in a free area of the display window. The display of

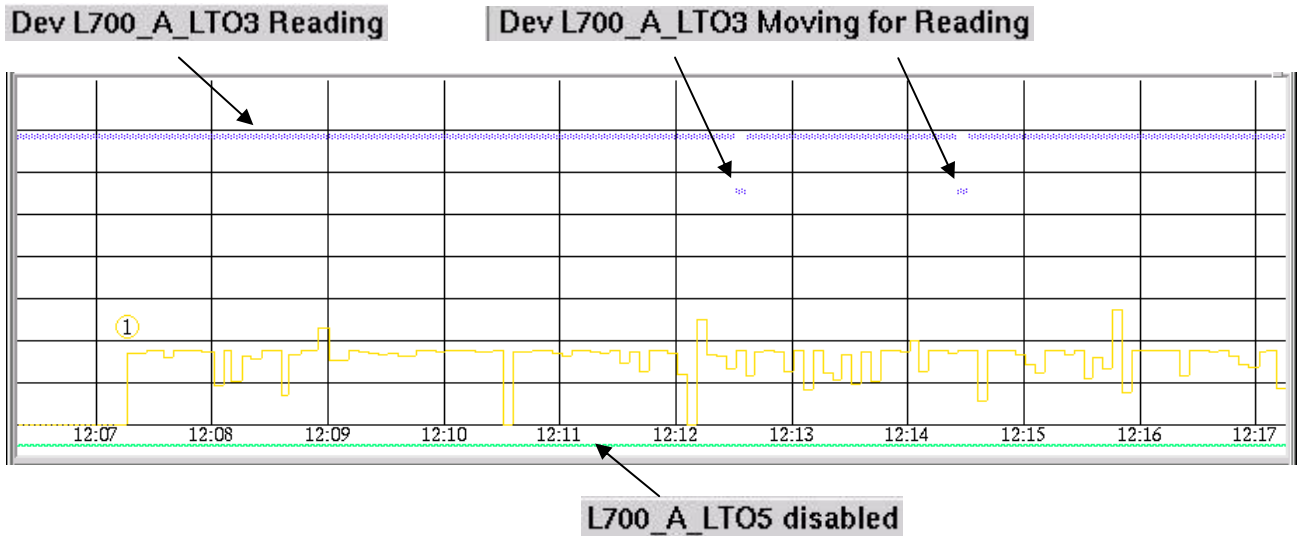
the save set list is also terminated when the graph is redrawn.

Occasionally you might find that no information is available for a medium on which a backup has been made. This may mean that the number of displayed save sets is different from the number of sessions, which can have a number of causes. Firstly, not all NetWorker messages are passed on to ST-Perf. The second cause is that a polling interval may be too long to record very small save sets. On the whole this slight ‘blemish’ does not detract from the functional efficiency and meaningful information offered by ST-Perf.

**EVALUATION**

**Other elements reading free disabled moving ...**

Other characters are displayed as necessary in the upper area of the performance window as well as below the time axis. If you touch these characters with the cursor, the associated message is displayed in the status line of the main window. The details comprise information on the device status which does not entail the flow of data onto the tape, meaning that it cannot be recorded in the performance graphs. Examples of this are: reading from the tape, or winding on to the next block. It also shows when a device is blocked for allocation by NetWorker (“disabled”). This information appears below the time axis. Further statuses are, for instance, “blocked” and “free”. The output in the status line disappears as soon as the cursor is moved elsewhere.



The picture above is an example of possible messages and the positions of the characters.

**Other functions: Zoom Configure View**

In the display module ST-Perf offers further options for settings and configuration. In the display window you can zoom in and out, so as to be able to examine the graph more closely at a specific point in the recording. You can change the colors of the device curves, if the colors used for the devices displayed are too close to each other. Under the “View” menu you also have the option of showing additional information.

**Zoom**

The Zoom function in the display window can be activated in two different ways.

<b>Horizontal Zoom</b>
Zoom + 10%
Zoom + 50%
Zoom + 100%
Zoom - 10%
Zoom - 50%
<b>Vertical Zoom</b>
Zoom + 50%
Zoom + 100%
Zoom - 50%

**The Zoom menu**

The Zoom menu offers a range of zoom factors, allowing you to select the desired enlargement or reduction factor quickly and directly. It is possible to stretch or compress the portrayal in the width (horizontally) or height (vertically). The “+100%” factor horizontally instructs the graph to double the width of the data in the display, meaning that there is only room to portray half as much time. In compressing the graph, “-50%” means that half the amount of information is displayed, effectively doubling the size of the portrayal of data. Initially the mid-point of the view remains the same.

## EVALUATION

That is: if the relevant section of the graph is portrayed approximately in the middle of the window, this area also remains in approximately the same place in the zoomed portrayal. It may therefore be a good idea to position the graph using the bottom scrollbar prior to widening the graph any further, in order not to lose sight of the desired area.

For the vertical zoom, “+100%” indicates that 100% *more information* is displayed vertically in the same area, which corresponds to a halving of the *scale* of the graphs. Likewise “-50%” means that 50% *less information* is displayed vertically, leading to a *doubling of the height* of the information displayed. Please note that the baseline (time axis) is always displayed in the window after the zooming process. So after zooming you may well have to scroll the area you are interested in back into view using the side scrollbar.

### The buttons

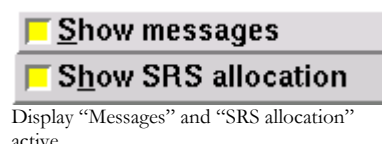
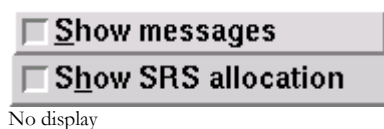


For quick access to the zoom function, above the device list there are four buttons. Both outer buttons magnify the portrayal by 100%. The two inner buttons compact the portrayal to 50% of its size. The right pair of buttons change the height, the left pair the width of the area portrayed by the graph. Please refer to the explanation of the zoom factors in the zoom menu section.

## View

The *View* menu

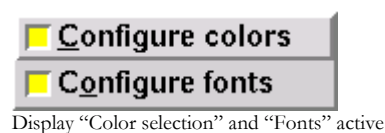
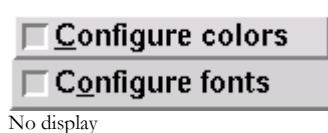
Using the View menu you can activate the display of the “SRS allocation” and the *Messages*. There follows a further explanation of “*Messages*” and “SRS allocation” in the next sections.



## Configure

The *Configure* menu

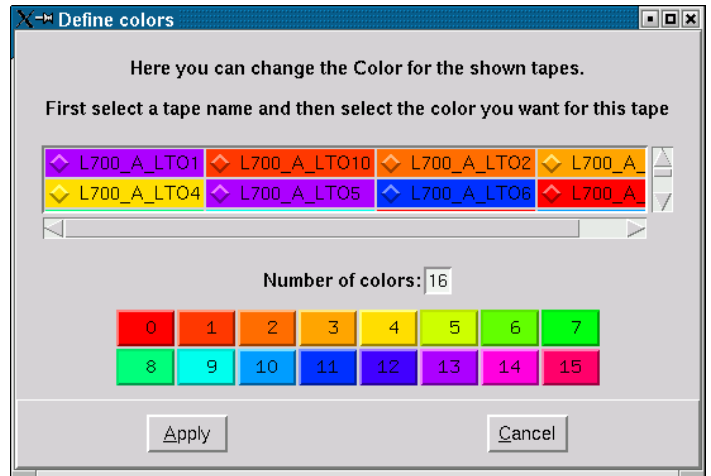
In the configure menu you have the option of changing font style, size, and the color in which the individual devices are portrayed.



By checking the checkboxes you activate the display of the following windows, in which you can then carry out the associated actions.

### Color selection

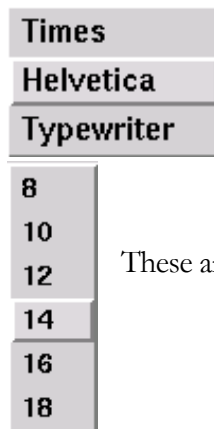
Select the device for which you want to change the color. Then select the desired color. The same applies here as in the basic configuration: if there are not enough colors available, you can increase the number of the colors displayed by entering any number in the number box. However, it is not very practical to have more than 64 colors. The default setting is 16 colors. Please note that the window size changes. You might have to reduce the number of colors so that the whole window becomes visible.



### Changing the font



In this window the font style and font size can be changed in line with the ergonomic requirements and one's personal taste. A sample of the font style and size that you have selected can be seen in the text field in the lower part of the window.



These are the available fonts.

Default is: Helvetica

These are the font sizes that can be used.

After confirming your selection with **Apply**, the following texts and captions will have changed:

Device details with times and button captions, all details of the graphs on the time and data axes.

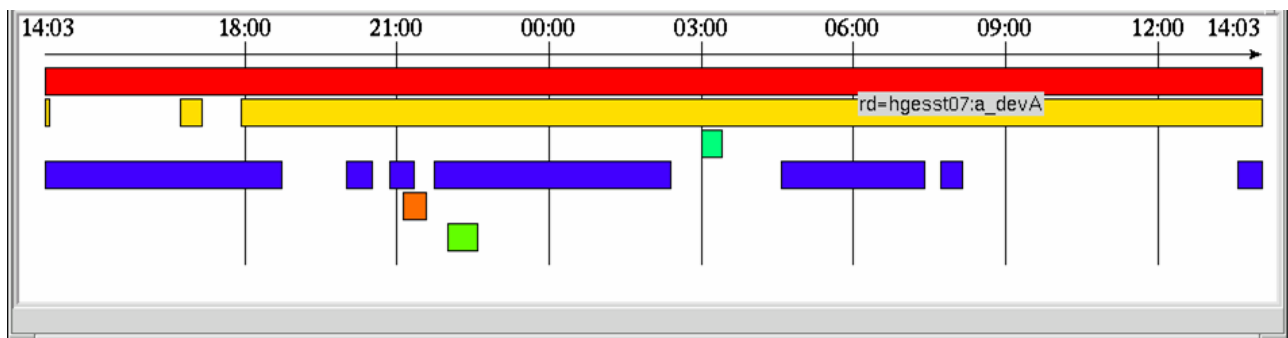
The font of the messages within the graphs giving tape action and session information are not changed immediately. These are only displayed in the new font after restarting ST-Perf.

## Display SRS allocation

*How can I graphically portray the usage of the physical SRS devices by the virtual storage node devices?*

**S**T-Perf offers the option of displaying the allocation of the devices managed by an SRS server. To do this, activate an additional window via the menu item “View/Display SRS allocation”.

Now a second display window appears below the performance graphs, with a colored bar for each physical device. The color of the bar corresponds to the color selected for the device. The bar is interrupted, or split by a vertical line. The interruption or vertical line indicate a release of the device by the SRS server or a change in allocation.



Please note: in some cases the display of logical NetWorker devices may take a long time to appear or in exceptional cases may not appear at all. If this occurs, it can help to refresh the display. The same applies when you move the performance data window.

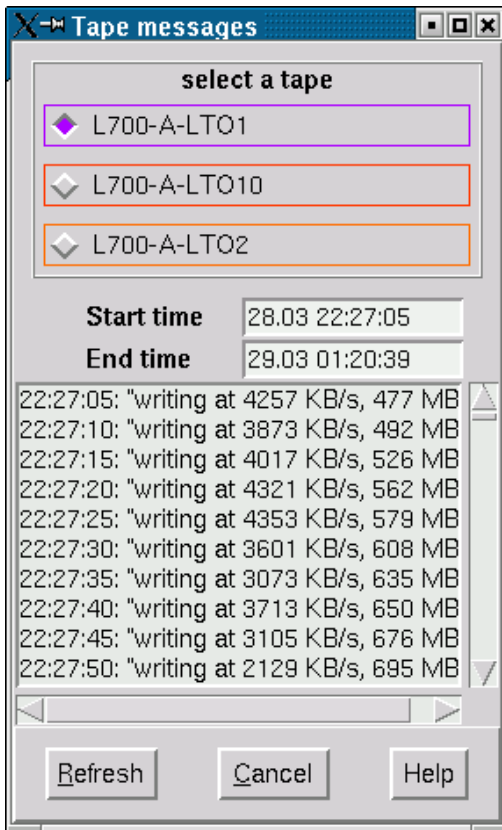
While the throughput on the physical device is shown in the performance graphs, the associated NetWorker device can be displayed in the SRS allocation. Simply move the cursor slowly over the area of the bar that you are interested in. The NetWorker name for the device (NetWorker device) is shown directly at the cursor.

If you have zoomed the graph and then move the area shown in the throughput window, you may find that you have to scroll the SRS display window manually. This should be done by scrolling the window very slowly, until the timelines are exactly above each other once again. Or following the steps outlined in: [“Tips und Tricks, Redraw part II”](#).

## Displaying messages

In addition to the graphical evaluation ST-Perf also allows the analysis of the recorded message output of the NetWorker server. Here all backup-relevant data can be viewed, but a particularly useful feature is that the actual throughput can be read precisely without having to comb through the associated log files.

The message window can be activated via the menu: “*View/Show Messages*”.



The messages can always only be displayed for a **single** device. The selection of the device is made in the upper part of the window “**Device messages**”. When opening the window, the output of the first **activated** device is shown automatically. Above the actual message are details of the start and end times of the recording currently displayed. These times correspond to those in the performance graph window. If the start and end times are not identical, press the refresh button at the bottom of the window, which will cause them to synchronize. If no device is activated for display or no performance file has been selected, an error message appears in the status line of the main window. The “Cancel” button closes the window.

The analysis of the messages is particularly useful when there is not enough information displayed on the graphs in the graphic window for you to understand why a certain problem occurred during the backup process.

In addition to this, in the message window you can read off the exact data throughput (max. 4 digits) and in an ideal situation (when the tape becomes full during recording) the complete amount of data written during the backup.

# Window elements

**Enlarge**  
**Reduce**

The windows can be made larger or smaller by clicking on one of the corners of the window with the left mouse button and, holding the mouse button down, moving the corner to set the desired size. This behavior can vary according to the window manager and which settings you have made.

**The menu bar**

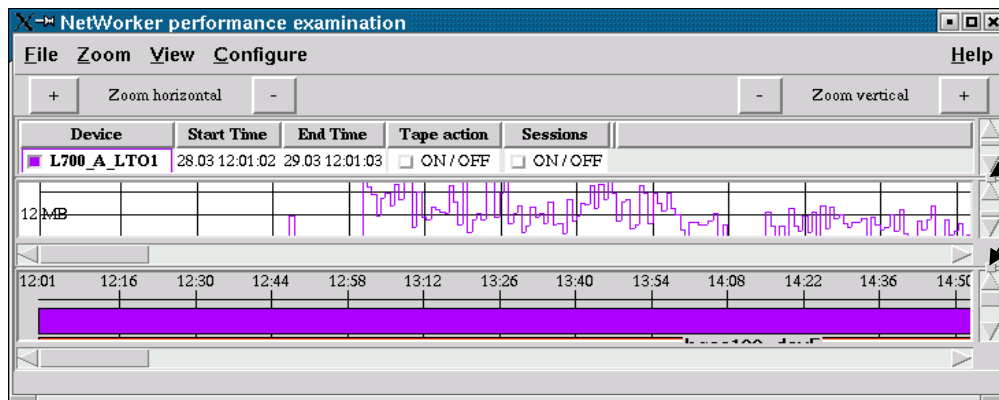
The menu bar holds the menu items. When you click on a menu, the individual menu items appear in a drop-down field. There you can either launch certain actions (“File/Load file”) or activate/deactivate options (“View/Show messages”).

**The scrollbars**

The scrollbars appear only as the need arises. That is, only when the size of the display window is not sufficient to display all elements or graphics in their entirety.

**Panners**

Panners are window elements that make it possible to divide a window into various areas. These elements can be repositioned, enabling the user to change the size of neighboring areas of the window.



**Panners:**

With these points it is possible to change the size of various areas of the window

## EVALUATION

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## Demands on resources

### *Volume of data produced*

The data produced during the recording is stored in various files. The size of the files is directly related to the activity of the configured devices and the interval that is specified during the configuration.

If a SAN environment with SRS is monitored, the size of the data files may be significantly less than with a conventional configuration with statically connected devices. The reason for this is that no data is produced for a non-reserved device and therefore nothing is recorded.

### *Data files and log files*

#### 1. Data files

Maximum size of a data file:

Assumed parameters:

- Duration of recording: 24h                      longest recording duration
- Interval: 2s                                        shortest interval
- Line length: 50 characters                    average line length

This results in:  $24 \times 60 \times 60 / 2 \times 50 \text{Byte} = 2.05 \text{ MB}$

The assumptions can be considered maximum values, since the line length on average remains below the assumed length of 50 characters. In the following calculations, to be on the safe side, we will nevertheless assume 50 bytes per interval.

#### 2. Log files

As a rule the size of the log files generated by ST-Perf is negligible. Each ST-Perf program creates its own log file in the directory `/nsr/st-perf/logs`. Prior to this the old log file is moved to the sub-directory `oldlogs`. Up to 30 log files can be generated in this sub-directory for each configured NetWorker server for each ST-Perf program. Older files are deleted automatically.

## *Calculation of storage space*

To calculate the required storage space one only has to know how many devices are to be monitored and how many data files are kept.

- The number of devices is defined in the configuration.
- The data files are saved in a directory which is named according to the start time of the recording. In this directory there is one data file per device.
- The number of maintained directories is fixed. A maximum of 31 directories is stored. Once this number is reached, the oldest directory is deleted.
- If multiple servers are configured, a directory is created for each server and within these data directories as described above. See Chapter 2 Recording.

When you know these details, you can calculate the required storage space.

Per device there is a maximum data volume of  $31 \times 2.05 \text{ MB} = 63.85 \text{ MB}$ .

If the interval is lengthened to 5 seconds, this results in the following values:

$24 \times 60 \times 60 / 5 \times 50 \text{ byte} = 1.09 \text{ MB}$ ;  $31 \times 1.09 \text{ MB} = 25.54 \text{ MB/device}$ .

### **Sample calculation:**

You have configured one server and four devices.

You set the recording duration to 24 hours and the interval to 3 seconds.

Thus the following calculation applies:

Number of intervals:  $24 \times 3,600 / 3 = 28,800$

Data volume per device per day =  $28,800 \times 50 \text{ bytes} = 1,440,000 \text{ bytes} = 1.3 \text{ MB}$

Based on four devices and 31 days this results a data volume of

$4 \times 31 \times 1.3 \text{ MB} = 161.2 \text{ MB}$

For three servers with 10 and 2 x 6 devices and an interval of 2 seconds the calculation would be:

Number of intervals:  $24 \times 3,600 / 2 = 43,200$

Data volume per device per day =  $2.05 \text{ MB}$

Total:  $22 \times 31 \times 2.05 \text{ MB} = 1.36 \text{ GB}$

## *Load on the NetWorker server and the computer carrying out the recording*

Generally speaking the load on the computer doing the recording is negligible. The overhead on the NetWorker server is also virtually insignificant, since ST-Perf only retrieves a fraction of the information that is periodically called up for instance by the NetWorker administration programs.

Neither is there any need to consider further the overhead on the network, since the volume of data is minimal.

## Examples of applications

### *How can I use ST-Perf efficiently?*

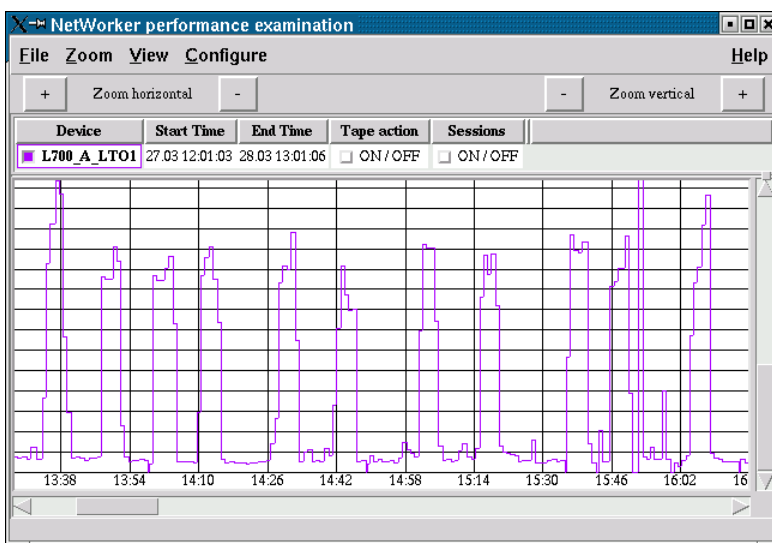
#### *The recording:*

The starting time and duration of the recording are of great significance for the evaluation. The start of a recording should be planned in such a way as to record the “critical” backups in their entirety. The duration can be adapted to suit the current situation. Allow the recording to start just before you launch the backup and run until some time after the backup is scheduled to end. In this way you will be able to see the whole backup process at a glance.

#### *Graphical evaluation:*

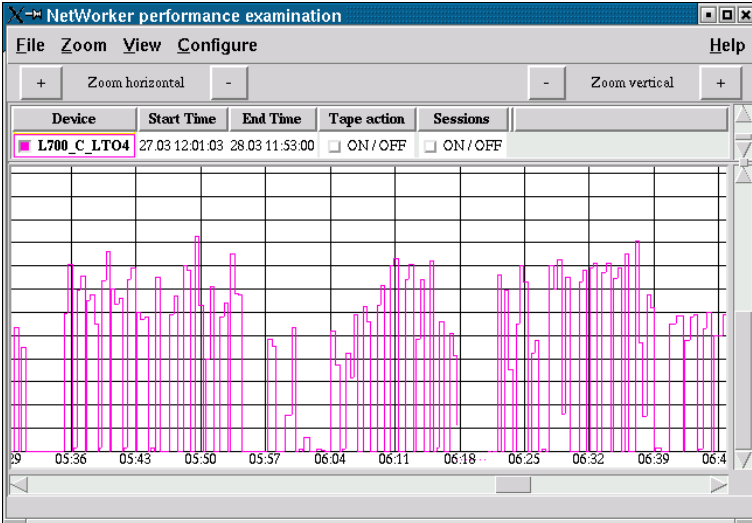
Load the devices that you want to investigate. It can be interesting to load devices that are connected logically one after the other. For up to 4 devices you can load all the devices at the same time without any problems. The graph only gets confusing if you try to display more than 4–5 devices at the same time.

Of course you can also load more than 4 devices and subsequently hide the irrelevant ones. The first step is to find the performance curves which indicate a problem.



**Example 1** is just such a case. The jagged curve of the graph indicates clearly that the save set is being delivered to the backup device with a strongly fluctuating throughput. This is quite obviously a less-than-ideal state of affairs. Of course we cannot tell from the graph which components are causing the phases of reduced throughput. But in such a situation, if there is a similar behavior on other days, and a problem with the associated LAN components can be ruled out, the best way to proceed is to backup the data on a “*file device*” with subsequent “*staging*”.

**SAMPLE ANALYSIS**

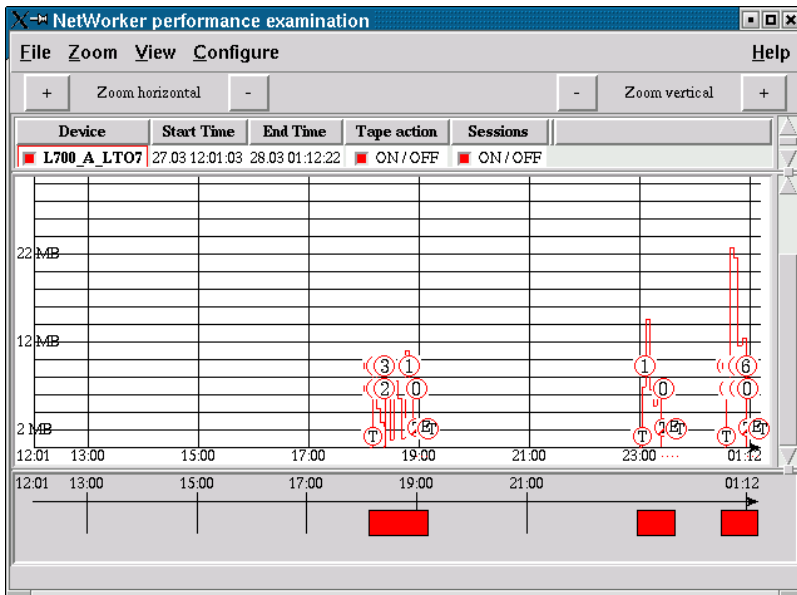


**Example 2:**

A similar picture emerges when cloning many relatively small save sets. In this example a typical kind of curve can be seen. Only one session is running, so only one Save is active on this device.

Comb-like curves during the backup are to be avoided as far as possible. They may damage the devices involved. In this specific case, however, no changes are possible.

A further category of “problematical performance curves” is portrayed in the following example.



**Example 3:**

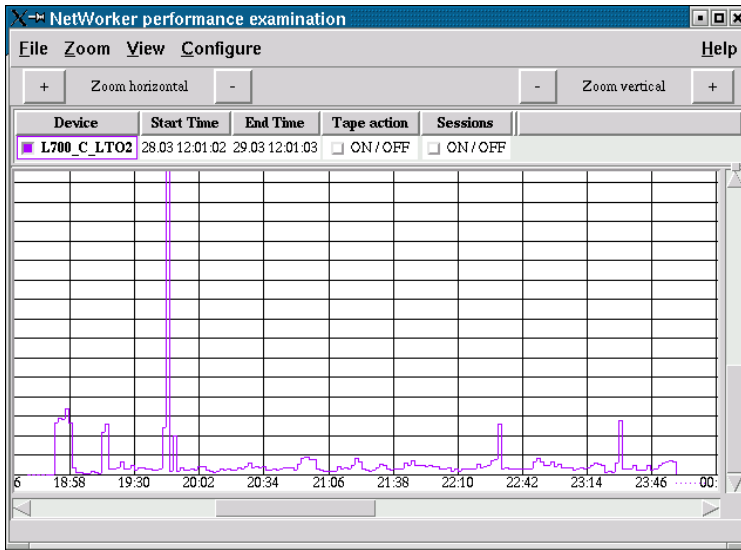
In this example the device under investigation is only being used sporadically.

The allocation by the SRS server (bar in the lower section of the ST-Perf window) only takes place occasionally. This means that an expensive device is only being used infrequently. In such a case you should check which server is allowed to register the affected device and, if any restrictions have been made, whether they can be relaxed somewhat.

With measures such as these it may be possible to significantly boost the utilization of the devices.

## SAMPLE ANALYSIS

A further problem is a data throughput that is too low. This is a major cause of device problems.

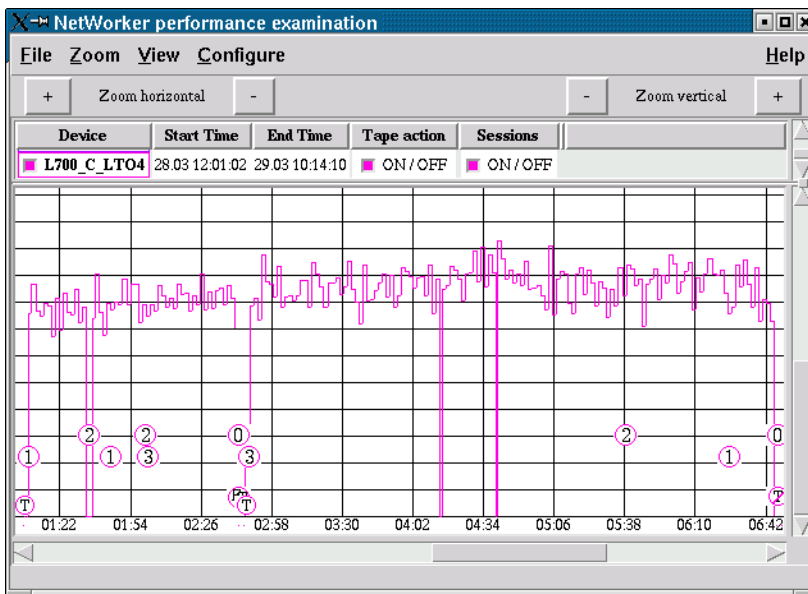


### Example 4:

In this example less than 1 MB/s is being backed up over a long period. That is far too little for most devices. The causes of this problem should be identified as quickly as possible, in order to reduce the risk of a damage to a device.

Possible causes could be a "congested" network, a weak or overloaded client computer or an overtaxed server. The latter diagnosis could be supported or disproved by displaying other devices. It might help to let the relevant backup run at a different time.

### Favorable performance curve

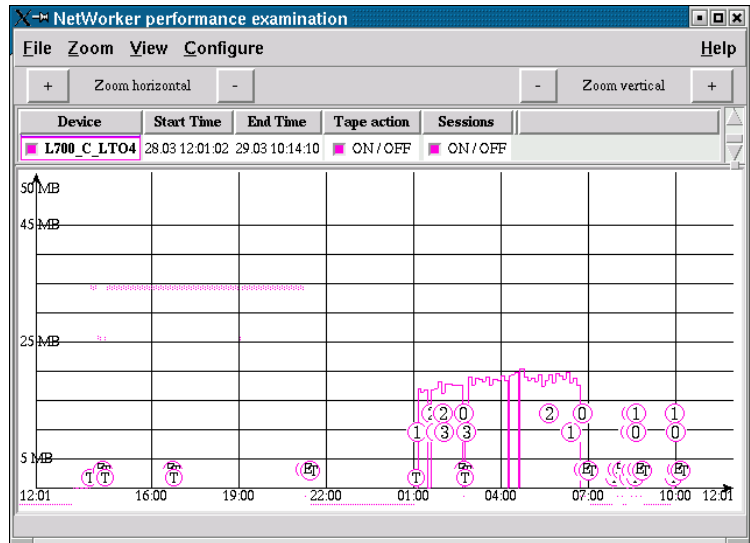


### Example 5:

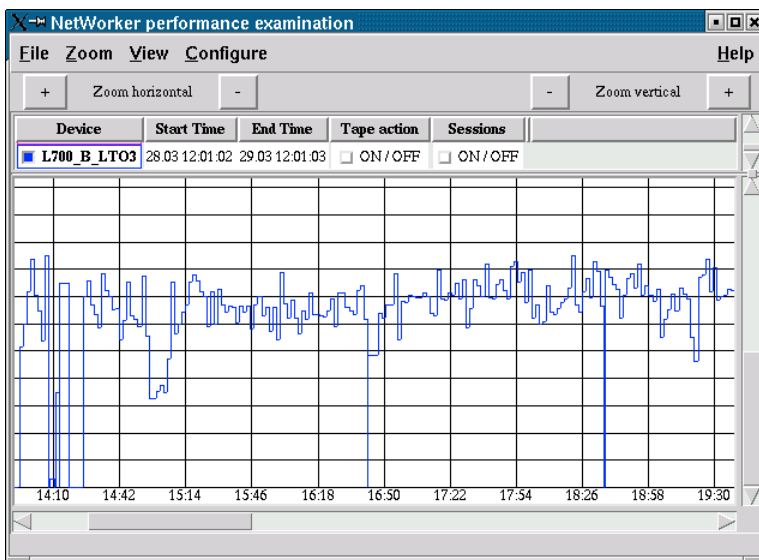
A favorable backup curve can be seen in this illustration. Here the writing is taking place continuously with a high throughput, backing up three save sets at the same time. Tape changes are rare and this occurs presumably only when the medium is full.

**SAMPLE ANALYSIS**

Looking at the entire recording period it becomes clear that the device is continuously in operation apart from a few hours during the backup. In the daytime the device is used for reading tapes in cloning operations, as can be seen in this example in the first half of the recording period.



A further example of a favorable performance curve:



In this example we assume that the device was an LTO 1. This device can write 15/30 MB (native / compressed). The graph shows us a performance of approx. 14–15 MB, in other words a good 50% of the maximum writing capacity. But here too, if we look at the whole recording period, we see that the device is being only used for some 12 hours.



## X-Window display

The graphical interface program used to display the performance data and the configuration of the recording are based on the Python script language and the Python module TKinter. They can only be displayed with an X-Window server. Consequently you can display **xconfig** or **st-perf** locally on the Linux computer carrying out the recording, but also on any other X-Window server in the network.

For this, all you have to do is permit the display in the X-Window server (xhost +<computer name>) and define the target of the display (export DISPLAY) on the Linux computer. One of the easiest ways to do this is to log on to the Linux computer from a terminal window of your X-Servers using the command "ssh -X". This way both the above criteria are fulfilled simultaneously.

Of course there are also other ways of carrying out a "remoteLogin" such as rlogin or rsh. For security reasons, however, it is advisable on principle to use ssh. For further information on these topics please refer to the relevant man pages (man ssh; man rsh; man X)

It is also possible to operate an X-Window server on a PC running Microsoft Windows. For this, however, you must install or have previously installed the appropriate software on the PC. There are various applications available on the market. We cannot make any recommendations here, since the requirements are simply too diverse. We tested the display on a PC running Windows XP Professional and X-Win32 from Starnet, as well as Windows 2000 with the free X-Windows "cygwin".

Thus you can also carry out the analysis of the backups on a Windows PC.

# Special features / Tips and tricks

## NetWorker Messages

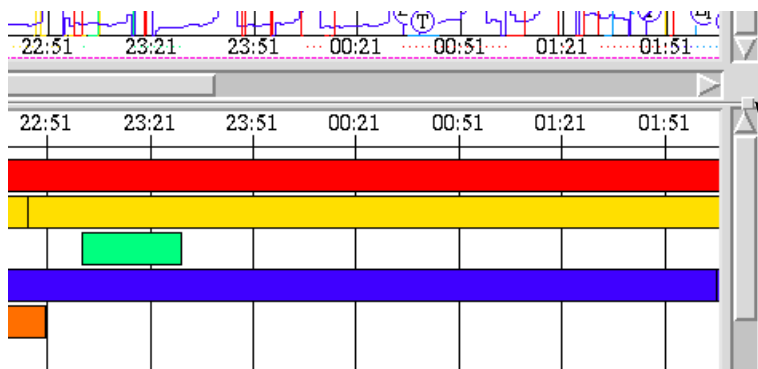
A high NetWorker server overhead may lead to some NetWorker messages not being recorded by ST-Perf. In these rare cases there may be a difference between the stated number of sessions and the number of save sets displayed.

## Redrawing the graphs:

Scaling the display and toggling the symbols always involves at least one Redraw command. The flickering of the display, possibly a number of times, is not a fault in your system but a peculiarity of the program. The same is true when you resize the window.

## Redrawing Part II:

When performing actions that trigger a Redraw in the performance window, the SRS window is frequently not redrawn. All you need to do then is to change the size of the SRS window by a minimal amount.



This is best done by slightly adjusting the lower panner. This small and inconspicuous point only has to be moved minimally for the SRS window to be redrawn.

## ST-Perf under Windows

Currently it is not possible to record performance data on a Windows PC, only to portray it, and then only with an additional X-Windows server. However a Windows version of ST-Perf is in development.

## Language settings

ST-Perf is a localized product. That means that the language of the messages and menus depends on the selected environment language. If no language has been selected, the texts are output in English. If you are not satisfied with the current setting, you can change the environment variable 'LANG' according to your preferences.

The selection of the language is made via the environment variable LANG. If you are getting English messages but would prefer the application language to be German, you can set a German language environment on your computer using the command 'export LANG=de\_DE'.

If the opposite is the case, with 'export LANG=C' you can set a neutral environment, i.e. the default language (in this case English) is used.

The same is true if the 'LANG' variable is not set and is therefore 'empty'. You can output the current setting using the command 'echo \$LANG'.

Please note: The language setting of the NetWorker server must be English. ST-Perf can only work with English NetWorker messages. Accordingly the NetWorker messages are always output in the original form, that is, only in English.

If you are working in a shell other than '*bash*', or '*ksh*', other commands may be required to set and read the environment variables.

## **NetWorker Updates**

If you are updating your NetWorker server to a new version, you might need a new Enabler, and if so you will also need to request a new ST-Perf license code. This is of course provided free of charge in the first year and sent to you by e-mail. After the expiry of this period we are obliged to make a charge for this, unless you have a service contract.

Please send your request to: [info@schaefer-tobies.de](mailto:info@schaefer-tobies.de) .