

The fsnmp program

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1 Overview

1.1 Purpose of the program

The fsnmp program is a print filter (the name “print filter” is misleading, fsnmp is more an output driver) for the LPRng print system.

It performs the following tasks:

- Read standard input, save contents to a temporary file.
- Read the printers page counter using SNMP.
The SNMP requests ask the printer to report device status, printer status and pagecounter value. The pagecounter value can be used if the following two conditions are fulfilled:
 - The device status is either “running” or “other” and
 - the printer status is either “idle” or “other”.

Fsnmp repeats the request until the printer is in a state allowing to use the pagecounter value.

The pagecounter value is send to LPRng’s accounting mechanism.

- Send print job (temporary file contents) to printer over a network socket.
- Read the printers page counter using SNMP. Again, fsnmp sends SNMP requests to the printer until the printer is in a state allowing to use the pagecounter value (see above) *and* one of the following two conditions is fulfilled:
 - The pagecounter value is larger than the value before submitting the print job or
 - the printer is in "ready" state for a specified time.

The pagecounter value is send to LPRng’s accounting mechanism.

- Remove the temporary file.

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2 Installation

2.1 Prerequisites

The following software packages are required to build fsnmp:

- Net-SNMP
The Net-SNMP libraries are used to send SNMP requests to the printer and to process the responses.
The software is available at
<http://sourceforge.net/projects/net-snmp>.
- dklibs library set
Several modules of the library set are used by fsnmp.
The software is available at
<http://sourceforge.net/projects/dklibs>.

To use fsnmp you need the LPRng print system.

2.2 Download

The sources are available at

<http://sourceforge.net/projects/fsnmp>.

2.3 Building fsnmp

After unpacking the sources change into the fsnmp directory and run

```
1 ./configure
2 make
3 make install
```

2.4 Configuring LPRng to use fsnmp

On the print server assign the “/dev/null” device to the print queue and use fsnmp as input filter for all input.

```
1 lp
2     :lp=/dev/null
3     :filter=/usr/local/libexec/filters/fsnmp
```

Note: Do *not* use the host/port combination in the “lp” entry here.

If you do so, the LPRng system opens a network connection, some printers change the printer status to “printing” immediately so we can not retrieve pagecounter values.

2.5 Configuring fsnmp

The fsnmp program must establish the network connection to the printer, so it needs configuration data.

This is read from the configuration file $\$(prefix)/etc/fsnmp/fsnmp.conf$. A section for a printer “lp” might look like this:

```
1 [ lp ]
2 lp = 192.168.1.99%9100
3 snmp version = 1
4 snmp community = public
5 ctrl-d at end = yes
6 shutdown data socket = no
7 minimum pagecount time = 30
8 shutdown accounting socket = yes
```

In line 1 we have the printer name in square brackets. The following lines contain configuration entries for that printer:

- lp
The output device in host/port combination. Host and port are separated by %. The host can be specified by host name or by IP address (preferred, doesn't need DNS lookups).
- snmp version
The SNMP version supported by the printer, may be “1”, “2c”, “2p” or 3.
- snmp community
The SNMP community name configured for the printer.
- ctrl-d at start
ctrl-d at end
These boolean entries can be set to “yes” or “no”. For some printers (i.e. PostScript printers) the control-D character is a special character to indicate the end of a print job. If the printer receives a control-D it finishes the last sheet of the current print job and resets itself to default settings.
If the entries are turned on, fsnmp ensures that the first and/or last character of the print job is a control-D, it sends a control-D before or after the job data if necessary.
For the majority of printers I recommend to have “ctrl-d at start = no” and “ctrl-d at end =yes”.

- shutdown data socket

Normally TCP/IP connections should have an “orderly release”:

- One of the processes (process *a*) shuts the network connection down for writing (it indicates that it will not write anymore to the socket).
- The peer process (process *b*) attempts to read from the socket and is informed that no more data will be available.
- This process (*b*) will optionally writes some final data to the socket and also shuts down the socket for writing.
- Process *a* attempts to read from socket, reads the optional final data from *b* and is notified that no more data will be available.
- Both processes can close the socket now.

This orderly release is not supported by all printers, most printers only support a simplified mechanism:

- The sending process *a* sends the print job data to the printer (process *b*). Optionally a control-D is the last byte indicating the end of the print job.
- The sending process *a* simply closes the connection.
- The printer reads from the network socket and prints the data received. If a read operation on the socket indicates that process *a* closed the connection the printer finishes printing and also closes the network connection.
- The printer completely ignores the shutdown-for-writing from process *a*.

If the sending software (process *a*) attempts an orderly shutdown on the printer network connection the print system will hang because the printer continues the attempts to read from the network socket and will not close it's connection endpoint (until a timeout occurs, but this can take several minutes).

For these printers the “shutdown data socket” entry should be set to “no”.

- minimum pagecount time

The fsnmp program retrieves a pagecount two times:

- before the print job data is transmitted and
- after the print job data is transmitted.

For normal print jobs, the pagecounter value after the print job is larger than the pagecounter value before the print job.

Only in special cases – i.e. if a control request is send to a printer, no page is printed – the pagecounter values are equal before and after the job.

So if the printer is in “ready” state after print job transmission and the pagecounter value did not change fsnmp continues to request status and pagecount information until either:

- the printer state changed to “printing” or
- the pagecounter value differs from the first value and the printer is ready or
- the amount of time specified in the “minimum pagecount time” option in seconds is gone.

- shutdown accounting socket

This option allows to configure an orderly release for the accounting network socket (if a network connection is configured for accounting). As the accounting software is a computer program on some server it is strongly recommended to do an orderly release.

- data transfer port range

If you configured the printer to accept connection requests only for a specified range of source port numbers you can set up fsnmp to bind to local ports in this range when opening a connection to the printer. Specify start port number and end port number separated by spaces, i.e.

```
1 data transfer port range = 9001 9010
```

I recommend to use privileged ports.

- accounting port range

If you configured the accounting software to accept connection requests only for a specified range of source port numbers you can set up fsnmp to bind to local ports in this range when opening a connection to the accounting software. Specify start port number and end port number separated by spaces.

I recommend to use privileged ports.

3 Output created by fsnmp

3.1 Status output

3.1.1 The status file

Fsnmp writes output to the status file. The file name is specified by LPRng using the “-s” command line argument.

By default the file is `/var/spool/lprng/queue/status`. The status file is overwritten each time fsnmp is started, so it contains only output from the fsnmp process currently running for a queue or the last fsnmp process run for the queue.

The messages are preceded by a line containing date and time. For multiple messages at the same time (messages occurred in the same second) only one date-and-time line is printed.

3.1.2 Inspecting the status file

The LPRng `lpq` command (or the Yanolc `klpq` command) prints the last line in the status file by default. The “-L” command line option requests to print the entire status file.

Status file contents is marked by a leading “Filter_status: ” at the beginning of the line.

3.2 Accounting output

The fsnmp filter produces “filestart” and “fileend” accounting lines and sends these lines to the accounting mechanism configured in the `printcap` file. Files, commands (pipes) and network connections can be used.

After the `filestart/fileend` keyword the “-p” (pagecounter value), “-H” (host name), “-n” (user name), “-P” (printer name), “-b” (file size in bytes), “-t” (submission time), “-C” (job class) and “-J” (job name) information is printed first, followed by all other command line options specified by LPRng to the fsnmp filter. Options are truncated only if the line length would exceed the output buffer length (16384 bytes).

All information given from LPRng to fsnmp are passed through to the accounting mechanism (if possible), this allows the accounting mechanism to select the information it needs.