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Line Printer Daemon Protocol

Status of this Memo

This RFC describes an existing print server protocol widely used on the Internet for communicating between line printer daemons (both clients and servers). This memo is for informational purposes only, and does not specify an Internet standard. Please refer to the current edition of the "IAB Official Protocol Standards" for the standardization state and status of this protocol. Distribution of this memo is unlimited.

1. Introduction

The Berkeley versions of the Unix(tm) operating system provide line printer spooling with a collection of programs: lpr (assign to queue), lpq (display the queue), lprm (remove from queue), and lpc (control the queue). These programs interact with an autonomous process called the line printer daemon. This RFC describes the protocols with which a line printer daemon client may control printing.

This memo is based almost entirely on the work of Robert Knight at Princeton University. I gratefully acknowledge his efforts in deciphering the UNIX lpr protocol and producing earlier versions of this document.

2. Model of Printing Environment

A group of hosts request services from a line printer daemon process running on a host. The services provided by the process are related to printing jobs. A printing job produces output from one file. Each job will have a unique job number which is between 0 and 999, inclusive. The jobs are requested by users which have names. These user names may not start with a digit.

3. Specification of the Protocol

The specification includes file formats for the control and data files as well as messages used by the protocol.

3.1 Message formats

LPR is a a TCP-based protocol. The port on which a line printer daemon listens is 515. The source port must be in the range 721 to 731, inclusive. A line printer daemon responds to commands send to its port. All commands begin with a single octet code, which is a binary number which represents the requested function. The code is immediately followed by the ASCII name of the printer queue name on which the function is to be performed. If there are other operands to the command, they are separated from the printer queue name with white space (ASCII space, horizontal tab, vertical tab, and form feed). The end of the command is indicated with an ASCII line feed character.

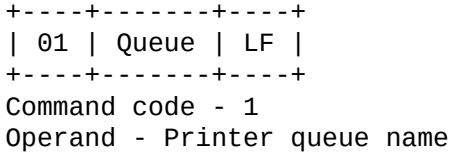
4. Diagram Conventions

The diagrams in the rest of this RFC use these conventions. These diagrams show the format of an octet stream sent to the server. The outermost box represents this stream. Each box within the outermost one shows one portion of the stream. If the contents of the box is two decimal digits, this indicates that the binary 8 bit value is to be used. If the contents is two uppercase letters, this indicates that the corresponding ASCII control character is to be used. An exception to this is that the character SP can be interpreted as white space. (See the preceding section for a definition.) If the contents is a single letter, the ASCII code for this letter must be sent. Otherwise, the contents are intended to be mnemonic of the contents of the field which is a sequence of octets.

5. Daemon commands

The verbs in the command names should be interpreted as statements made to the daemon. Thus, the command "Print any waiting jobs" is an imperative to the line printer daemon to which it is sent. A new connection must be made for each command to be given to the daemon.

5.1 01 - Print any waiting jobs



Command code - 1
Operand - Printer queue name

This command starts the printing process if it not already running.

5.2 02 - Receive a printer job

```
+----+-------+----+
| 02 | Queue | LF |
+----+-------+----+
Command code - 2
Operand - Printer queue name
```

Receiving a job is controlled by a second level of commands. The daemon is given commands by sending them over the same connection. The commands are described in the next section (6).

After this command is sent, the client must read an acknowledgement octet from the daemon. A positive acknowledgement is an octet of zero bits. A negative acknowledgement is an octet of any other pattern.

5.3 03 - Send queue state (short)

```
+----+-------+----+------+----+
| 03 | Queue | SP | List | LF |
+----+-------+----+------+----+
Command code - 3
Operand 1 - Printer queue name
Other operands - User names or job numbers
```

If the user names or job numbers or both are supplied then only those jobs for those users or with those numbers will be sent.

The response is an ASCII stream which describes the printer queue. The stream continues until the connection closes. Ends of lines are indicated with ASCII LF control characters. The lines may also contain ASCII HT control characters.

5.4 04 - Send queue state (long)

```
+----+-------+----+------+----+
| 04 | Queue | SP | List | LF |
+----+-------+----+------+----+
Command code - 4
Operand 1 - Printer queue name
Other operands - User names or job numbers
```

If the user names or job numbers or both are supplied then only those jobs for those users or with those numbers will be sent.

The response is an ASCII stream which describes the printer queue. The stream continues until the connection closes. Ends of lines are

indicated with ASCII LF control characters. The lines may also contain ASCII HT control characters.

5.5 05 - Remove jobs

```
+----+-------+----+-------+----+------+----+
| 05 | Queue | SP | Agent | SP | List | LF |
+----+-------+----+-------+----+------+----+
```

Command code - 5
Operand 1 - Printer queue name
Operand 2 - User name making request (the agent)
Other operands - User names or job numbers

This command deletes the print jobs from the specified queue which are listed as the other operands. If only the agent is given, the command is to delete the currently active job. Unless the agent is "root", it is not possible to delete a job which is not owned by the user. This is also the case for specifying user names instead of numbers. That is, agent "root" can delete jobs by user name but no other agents can.

6. Receive job subcommands

These commands are processed when the line printer daemon has been given the receive job command. The daemon will continue to process commands until the connection is closed.

After a subcommand is sent, the client must wait for an acknowledgement from the daemon. A positive acknowledgement is an octet of zero bits. A negative acknowledgement is an octet of any other pattern.

LPR clients SHOULD be able to sent the receive data file and receive control file subcommands in either order. LPR servers MUST be able to receive the control file subcommand first and SHOULD be able to receive the data file subcommand first.

6.1 01 - Abort job

Command code - 1

```
+----+----+
| 01 | LF |
+----+----+
```

No operands should be supplied. This subcommand will remove any files which have been created during this "Receive job" command.

6.2 02 - Receive control file

```
+----+-------+----+------+----+
| 02 | Count | SP | Name | LF |
+----+-------+----+------+----+
Command code - 2
Operand 1 - Number of bytes in control file
Operand 2 - Name of control file
```

The control file must be an ASCII stream with the ends of lines indicated by ASCII LF. The total number of bytes in the stream is sent as the first operand. The name of the control file is sent as the second. It should start with ASCII "cfA", followed by a three digit job number, followed by the host name which has constructed the control file. Acknowledgement processing must occur as usual after the command is sent.

The next "Operand 1" octets over the same TCP connection are the intended contents of the control file. Once all of the contents have been delivered, an octet of zero bits is sent as an indication that the file being sent is complete. A second level of acknowledgement processing must occur at this point.

6.3 03 - Receive data file

```
+----+-------+----+------+----+
| 03 | Count | SP | Name | LF |
+----+-------+----+------+----+
Command code - 3
Operand 1 - Number of bytes in data file
Operand 2 - Name of data file
```

The data file may contain any 8 bit values at all. The total number of bytes in the stream may be sent as the first operand, otherwise the field should be cleared to 0. The name of the data file should start with ASCII "dfA". This should be followed by a three digit job number. The job number should be followed by the host name which has constructed the data file. Interpretation of the contents of the data file is determined by the contents of the corresponding control file. If a data file length has been specified, the next "Operand 1" octets over the same TCP connection are the intended contents of the data file. In this case, once all of the contents have been delivered, an octet of zero bits is sent as an indication that the file being sent is complete. A second level of acknowledgement processing must occur at this point.

7. Control file lines

This section discusses the format of the lines in the control file which is sent to the line printer daemon.

Each line of the control file consists of a single, printable ASCII character which represents a function to be performed when the file is printed. Interpretation of these command characters are case-sensitive. The rest of the line after the command character is the command's operand. No leading white space is permitted after the command character. The line ends with an ASCII new line.

Those commands which have a lower case letter as a command code are used to specify an actual printing request. The commands which use upper case are used to describe parametric values or background conditions.

Some commands must be included in every control file. These are 'H' (responsible host) and 'P' (responsible user). Additionally, there must be at least one lower case command to produce any output.

7.1 C - Class for banner page

```
+---+-------+----+
| C | Class | LF |
+---+-------+----+
Command code - 'C'
Operand - Name of class for banner pages
```

This command sets the class name to be printed on the banner page. The name must be 31 or fewer octets. The name can be omitted. If it is, the name of the host on which the file is printed will be used. The class is conventionally used to display the host from which the printing job originated. It will be ignored unless the print banner command ('L') is also used.

7.2 H - Host name

```
+---+------+----+
| H | Host | LF |
+---+------+----+
Command code - 'H'
Operand - Name of host
```

This command specifies the name of the host which is to be treated as the source of the print job. The command must be included in the control file. The name of the host must be 31 or fewer octets.

7.3 I - Indent Printing

```
+---+-------+----+
| I | count | LF |
+---+-------+----+
Command code - 'I'
Operand - Indenting count
```

This command specifies that, for files which are printed with the 'f', of columns given. (It is ignored for other output generating commands.) The identing count operand must be all decimal digits.

7.4 J - Job name for banner page

```
+---+----------+----+
| J | Job name | LF |
+---+----------+----+
Command code - 'J'
Operand - Job name
```

This command sets the job name to be printed on the banner page. The name of the job must be 99 or fewer octets. It can be omitted. The job name is conventionally used to display the name of the file or files which were "printed". It will be ignored unless the print banner command ('L') is also used.

7.5 L - Print banner page

```
+---+------+----+
| L | User | LF |
+---+------+----+
Command code - 'L'
Operand - Name of user for burst pages
```

This command causes the banner page to be printed. The user name can be omitted. The class name for banner page and job name for banner page commands must precede this command in the control file to be effective.

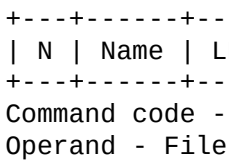
7.6 M - Mail When Printed

```
+---+------+----+
| M | user | LF |
+---+------+----+
Command code - 'M'
Operand - User name
```

This entry causes mail to be sent to the user given as the operand at

the host specified by the 'H' entry when the printing operation ends (successfully or unsuccessfully).

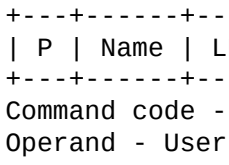
7.7 N - Name of source file



Command code - 'N'
Operand - File name

This command specifies the name of the file from which the data file was constructed. It is returned on a query and used in printing with the 'p' command when no title has been given. It must be 131 or fewer octets.

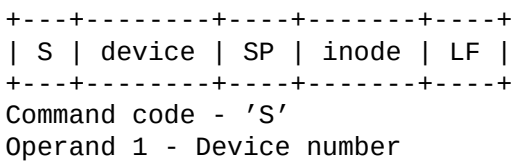
7.8 P - User identification



Command code - 'P'
Operand - User id

This command specifies the user identification of the entity requesting the printing job. This command must be included in the control file. The user identification must be 31 or fewer octets.

7.9 S - Symbolic link data



Command code - 'S'
Operand 1 - Device number
Operand 2 - Inode number

This command is used to record symbolic link data on a Unix system so that changing a file's directory entry after a file is printed will not print the new file. It is ignored if the data file is not symbolically linked.

7.10 T - Title for pr

```
+---+-------+----+
| T | title | LF |
+---+-------+----+
Command code - 'T'
Operand - Title text
```

This command provides a title for a file which is to be printed with either the 'p' command. (It is ignored by all of the other printing commands.) The title must be 79 or fewer octets.

7.11 U - Unlink data file

```
+---+------+----+
| U | file | LF |
+---+------+----+
Command code - 'U'
Operand - File to unlink
```

This command indicates that the specified file is no longer needed. This should only be used for data files.

7.12 W - Width of output

```
+---+-------+----+
| W | width | LF |
+---+-------+----+
Command code - 'W'
Operand - Width count
```

This command limits the output to the specified number of columns for the 'f', 'l', and 'p' commands. (It is ignored for other output generating commands.) The width count operand must be all decimal digits. It may be silently reduced to some lower value. The default value for the width is 132.

7.13 1 - troff R font

```
+---+------+----+
| 1 | file | LF |
+---+------+----+
Command code - '1'
Operand - File name
```

This command specifies the file name for the troff R font. [1] This is the font which is printed using Times Roman by default.

7.14 2 - troff I font

```
+---+------+----+
| 2 | file | LF |
+---+------+----+
Command code - '2'
Operand - File name
```

This command specifies the file name for the troff I font. [1] This is the font which is printed using Times Italic by default.

7.15 3 - troff B font

```
+---+------+----+
| 3 | file | LF |
+---+------+----+
Command code - '3'
Operand - File name
```

This command specifies the file name for the troff B font. [1] This is the font which is printed using Times Bold by default.

7.16 4 - troff S font

```
+---+------+----+
| 4 | file | LF |
+---+------+----+
Command code - '4'
Operand - File name
```

This command specifies the file name for the troff S font. [1] This is the font which is printed using Special Mathematical Font by default.

7.17 c - Plot CIF file

```
+---+------+----+
| c | file | LF |
+---+------+----+
Command code - 'c'
Operand - File to plot
```

This command causes the data file to be plotted, treating the data as CIF (CalTech Intermediate Form) graphics language. [2]

7.18 d - Print DVI file

```
+---+------+----+
| d | file | LF |
+---+------+----+
Command code - 'd'
Operand - File to print
```

This command causes the data file to be printed, treating the data as DVI (TeX output). [3]

7.19 f - Print formatted file

```
+---+------+----+
| f | file | LF |
+---+------+----+
Command code - 'f'
Operand - File to print
```

This command cause the data file to be printed as a plain text file, providing page breaks as necessary. Any ASCII control characters which are not in the following list are discarded: HT, CR, FF, LF, and BS.

7.20 g - Plot file

```
+---+------+----+
| g | file | LF |
+---+------+----+
Command code - 'g'
Operand - File to plot
```

This command causes the data file to be plotted, treating the data as output from the Berkeley Unix plot library. [1]

7.21 k - Reserved for use by Kerberized LPR clients and servers.

7.22 l - Print file leaving control characters

```
+---+------+----+
| l | file | LF |
+---+------+----+
Command code - 'l' (lower case L)
Operand - File to print
```

This command causes the specified data file to printed without filtering the control characters (as is done with the 'f' command).

7.23 n - Print ditroff output file

```
+---+------+----+
| n | file | LF |
+---+------+----+
Command code - 'n'
Operand - File to print
```

This command prints the data file to be printed, treating the data as ditroff output. [4]

7.24 o - Print Postscript output file

```
+---+------+----+
| o | file | LF |
+---+------+----+
Command code - 'o'
Operand - File to print
```

This command prints the data file to be printed, treating the data as standard Postscript input.

7.25 p - Print file with 'pr' format

```
+---+------+----+
| p | file | LF |
+---+------+----+
Command code - 'p'
Operand - File to print
```

This command causes the data file to be printed with a heading, page numbers, and pagination. The heading should include the date and time that printing was started, the title, and a page number identifier followed by the page number. The title is the name of file as specified by the 'N' command, unless the 'T' command (title) has been given. After a page of text has been printed, a new page is started with a new page number. (There is no way to specify the length of the page.)

7.26 r - File to print with FORTRAN carriage control

```
+---+------+----+
| r | file | LF |
+---+------+----+
Command code - 'r'
Operand - File to print
```

This command causes the data file to be printed, interpreting the

first column of each line as FORTRAN carriage control. The FORTRAN standard limits this to blank, "1", "0", and "+" carriage controls. Most FORTRAN programmers also expect "-" (triple space) to work as well.

7.27 t - Print troff output file

```
+---+------+----+
| t | file | LF |
+---+------+----+
Command code - 't'
Operand - File to print
```

This command prints the data file as Graphic Systems C/A/T phototypesetter input. [5] This is the standard output of the Unix "troff" command.

7.28 v - Print raster file

```
+---+------+----+
| v | file | LF |
+---+------+----+
Command code - 'v'
Operand - File to print
```

This command prints a Sun raster format file. [6]

7.29 z - Reserved for future use with the Palladium print system.

REFERENCES and BIBLIOGRAPHY

[1] Computer Science Research Group, "UNIX Programmer's Reference Manual", USENIX, 1986.

[2] Hon and Sequin, "A Guide to LSI Implementation", XEROX PARC, 1980.

[3] Knuth, D., "TeX The Program".

[4] Kernighan, B., "A Typesetter-independent TROFF".

[5] "Model C/A/T Phototypesetter", Graphic Systems, Inc. Hudson, N.H.

[6] Sun Microsystems, "Pixrect Reference Manual", Sun Microsystems, Mountain View, CA, 1988.

Security Considerations

Security issues are not discussed in this memo.

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