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Bell Laboratories

subject: UNIXLIST - An IBM/370 Utility Program to List a UNIX File Stored on a 9-track Magnetic Tape - FC 39394-21; CC 39394

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MEMORANDUM FOR RECORD

1.0 General Description of the UNIXLIST utility program.

One often wants to obtain a listing (print out) of a UNIX file using a high speed line printer attached to an IBM/370 computer system. This may be accomplished by first copying the UNIX file on to a standard 9-track magnetic tape and then invoking the UNIXLIST utility program described in this section. This utility program provides a default set of options and parameter values which are often adequate to produce the desired listing. However, in order to accomodate a greater range of possible applications, the UNIXLIST program also allows some nonstandard options and parameter values to be specified explicitely at execution time.

Printed output from the UNIXLIST program is meant to be printed on an IBM-1403 printer equipped with a TL text train identical to the one currently in use in the Holmdel computation center (TRAIN=TL). This printer is capable of producing an excellent quality listing quite suitable for reproduction purposes. The program requires that the printer be operated with the automatic page overflow feature disabled (OVFL=OFF, the default mode at Holmdel). The Holmdel TL text train is capable of printing 94 of the 95 ANSCII graphics; the tilde graphic "~", corresponding to ANSCII code 176 octal, is not available on this print chain. Program UNIXLIST will normally translate ANSCII code 176 octal to EBCDIC code 5F hexadecimal, which is the IBM logical NOT character "¬".

In addition to converting from the ANSCII to the EBCDIC character code, the UNIXLIST program also must perform several other functions requisite to producing a valid and useful listing. The input stream of ANSCII characters is monitored

for the format control codes, backspace (010), horizontal tab (011), new line (012), vertical tab (013), new page (014), and carriage return (015), and appropriate action is taken when any of these codes is encountered. The backspace and carriage return characters normally result in overstrikes of one or more print positions of the line (underlining, circumflex over a letter, etc.), and the UNIXLIST program has been compiled with appropriate parameter values so that up to two overstrikes of each print position are handled correctly. A default set of horizontal and vertical tab stop values have also been compiled into the program, but these values may be overridden if desired as will be described shortly. The UNIXLIST program must also carefully control the slewing of the paper in the printer so that the horizontal tear line always falls correctly between the printed pages of output. The source language in which the UNIXLIST program is coded is PL/I.

A typical deck setup at Holmdel to invoke the UNIXLIST utility program would consist of the following JCL statements:

```
//JOBNAME  JOB (job#,bin#),yourname
//*MAIN    T=3,L=2,G=S,F=RESTART
//*FORMAT  PR,DDNAME=,TRAIN=TL
//         EXEC PGM=UNIXLIST,REGION=64K,TIME=2
//STEPLIB  DD  DSN=H6891.CSRLIB.LOAD,DISP=SHR
//SYSPRINT DD  SYSOUT=A,DCB=(RECFM=VBA,LRECL=137,BLKSIZE=963)
//UNIXPRNT DD  SYSOUT=A,DCB=(BLKSIZE=990)
//UNIXFILE DD  UNIT=TAPE9,DISP=(OLD,KEEP),LABEL=(,NL),VOL=SER=XXXXX
//PARMIN   DD  *
   ....
   up to 7 cards containing an input text string which
   specifies nonstandard options and parameter values
   ....
/*
```

In the above deck setup, the statements defining the data set having ddname=PARMIN should be omitted if nonstandard options or parameter values are not to be specified or if a PARM='/options-text' keyword field is added to the EXEC statement. The data set with ddname=UNIXFILE is the 9-track input magnetic tape in UNIX standard format containing the file to be listed; the listing of this data set is written out for printing as the dataset having ddname=UNIXPRNT. Error messages from the program are written on the data set having ddname=SYSPRINT.

In the absence of either a data set with ddname=PARMIN or a PARM='/options-text' field on the EXEC statement, program UNIXLIST executes with its standard compiled-in options and parameter values. These are as follows:

1. Left margin set at printer column 10. Horizontal tab stops

set at columns 18, 26, 34, 42, 50, 58, 66, 74, 82, 90, 98, 106, 114, 122.

2. Vertical tab stops set at lines 10, 20, 30, 40 and 50.

3. Each printed page consists of 66 lines for text. Automatic jumping over the tear line in the printer paper is not provided.

4. Standard ANSCII graphics printed for character codes 040 through 175 octal in the UNIX input file; logical NOT "¬" graphic printed (instead of tilde "~") for code 176; character codes 000 through 007, 016 through 037 and 177 through 377 are ignored if encountered in the UNIX file input stream.

As examples, the following two UNIX commands produce magnetic tapes suitable for processing by program UNIXLIST with its standard options and parameter values in force:

```
pr afile >/dev/mt0
roff intext >/dev/mt0
```

In the above example using the roff command, it is assumed that file intext specifies .pl 66 (paper length is 66 lines) either explicitely or by default.

1.1 Specifying nonstandard options or parameter values to the UNIXLIST program.

When required, nonstandard options or parameter values may be specified to the UNIXLIST program via an input text string either contained in a data set assigned ddname=PARMIN or following a PARM= keyword field on the EXEC statement. (Placing this input text string in file PARMIN is probably less prone to errors since correct use of PARM= requires a bit more knowledge of the syntax of JCL.) In either case the input text string is made up of substrings of the following form:

```
OPTNAME(arg1,arg2, ... ,argN)
```

Only the first four characters of an OPTNAME keyword are significant, and alphabetics in the first four characters must be either all upper case or all lower case in order for the keyword to be recognized properly. The valid OPTNAME keywords are:

```
HTAB
VTAB
PAGE
TRAN
```

A pair of parenthesis must always be included following one of the above keywords, even when the corresponding argument list for

the keyword is empty. Multiple keywords may appear in the input text string in arbitrary order, and a comma must separate a keyword and its associated pair of parenthesis from any subsequent keyword. In file PARMIN blanks may be used freely in the input text string before or after keywords, parenthesis or commas. An example of a valid input text string contained in file PARMIN might be:

```
HTAB(1,21,41, 61),PAGE(), TRAN( 176O/AØH,47O/9ØH)
```

Alternately, instead of including the above text string in a data set with ddname=PARMIN, the identical options could be specified to program UNIXLIST by including on the EXEC statement the following field:

```
PARM='/HTAB(1,21,41,61),PAGE(),TRAN(176O/AØH,47O/9ØH)'
```

Note that IBM's rules for coding JCL impose certain restrictions on the text string that follows PARM= on an EXEC statement. For example, the text string may not contain embedded blanks. The JCL reference manual should be consulted for the full set of rules applicable to a text string specified after PARM= on an EXEC statement.

The HTAB keyword is used to specify the positions of the left margin for printing and the positions of any horizontal tab stops. For example,

```
HTAB(8,16,24,4Ø)
```

specifies left margin at printer column 8 and three horizontal tab stops at printer columns 16, 24, and 40 respectively. The setting of horizontal tab stops is relevant only if the UNIX input file contains one or more horizontal tab characters (ANSCII code 011 octal); for input files not containing any horizontal tab characters, this feature of the UNIXLIST program may be disregarded.

The HTAB keyword may have up to 16 arguments specified; each must be an unsigned decimal integer in the range 1 to 132, and the arguments must appear in monotone increasing order. The first argument determines the position of the left margin; subsequent arguments set horizontal tab stops at the column values specified. Used with an empty arguments list, i.e. HTAB(), the left margin is set at column 1 and all horizontal tab stops are cleared. A horizontal tab character is treated as a space character if the tab occurs at a position in the print line to the right of the rightmost horizontal tab stop.

The VTAB keyword is used to set any vertical tab stops desired. For example,

VTAB(13,30,45,52)

sets vertical tab stops at lines 13, 30, 45, and 52 of the logical page. The setting of vertical tab stops is only relevant if the UNIX input file contains one or more vertical tab characters (ANSCII code 013 octal); for input files not containing any vertical tab characters, this feature of the UNIXLIST program may be disregarded.

The VTAB keyword may have up to 8 arguments specified; each must be an unsigned decimal integer in the range 2 to lpage, where lpage equals the number of print lines on a page. The arguments for VTAB must appear in monotone increasing order. Used with an empty argument list, i.e. VTAB(), all vertical tab stops are cleared. It should be noted that one nonclearable vertical tab stop is always assumed present at line 1 of each page. Thus, a vertical tab character is equivalent to a new page character when no vertical tab stops are set or when the line position at the time that the vertical tab character is encountered equals or exceeds the largest vertical tab stop value.

The PAGE keyword is used to specify the number of print lines on each page of output. One argument may be specified with PAGE, and it must be an unsigned decimal integer in the range 1 to 66. For example,

PAGE(50)

will cause the UNIXLIST program to print 50 lines on each page of output. An empty argument list, i.e. PAGE(), causes 60 lines of output on each page; thus, PAGE() and PAGE(60) are synonomous. Whenever a PAGE keyword is not specified explicitely, a default of PAGE(66) is used by the UNIXLIST program.

The UNIXLIST program assumes that each sheet of IBM-1403 printer paper consists of 66 possible print line positions (11 inch long paper, 6 print lines per inch). Thus, the default specification of PAGE(66) allows printing to be done on all possible lines of each sheet of paper. When a PAGE keyword specifies fewer than 66 lines per page, the UNIXLIST program automatically produces an appropriate size margin at the top and bottom of each sheet (adjacent to the tear line in the paper).

The TRAN keyword is used to specify nonstandard translations into EBCDIC for a selected set of character codes in the UNIX input file. This feature allows any graphic available on the print chain to be printed for a specific 8-bit input code. As an example of the use of TRAN,

TRAN(176O/A0H)

causes a code of 176 octal in the input file to print as the

horizontal overline character of the TL text train (hexadecimal code AØ). This feature of the UNIXLIST program can be ignored if printing of only the standard ANSCII set of graphics is desired.

The TRAN keyword may have multiple arguments, all but the last being followed by a comma. Each argument consists of a pair of code values separated by a slash character "/". The code value on the left of the slash refers to a character code in the UNIX input file; the code value on the right of the slash refers to a character code for the IBM printer. Each code value may be specified either as an octal or a hexadecimal number; code values in octal terminate with the letter O (upper or lower case); code values in hexadecimal terminate with the letter H (upper or lower case). The following is another example of a valid TRAN specification:

TRAN(011O/5AH,202O/4AH,27H/9ØH,136O/1ØØO)

A TRAN specification provided for any of the ANSCII format control codes, Ø1Ø through Ø15 octal, will override the normal meaning of that control code. Hence, the example above will cause (among other things) the horizontal tab character (Ø11 octal) to print as the exclamation point graphic "!".

1.2 Miscellaneous notes on the implementation of UNIXLIST.

When PAGE(nlines) is specified where nlines<66, the UNIXLIST program automatically provides a margin at the top and possibly at the bottom of each sheet of printer paper. The size of these margins is given by

```
margin_top=min(4,66-nlines)
margin_bottom=66-(nlines+margin_top)
```

Hence, if nlines<63 the top margin size will be 4 print lines.

The UNIXLIST program uses ASA printer control characters to accomplish the required slewing (line spacing) on the output printer. When multiple blank lines, vertical tabs and new page characters appear consecutively in the UNIX input file, the UNIXLIST program analyzes the required slewing and accomplishes it using the minimum number of ASA control characters possible. The ASA control characters used are +, blank, Ø, -, A, 1, 2, 3 and 4. The printer control channels for the skip characters A, 1, 2, 3 and 4 must be set up as they are in the Holmdel computation center.

Vertical tab stops refer to logical line numbers on a page. For example, if the specification

PAGE(56),VTAB(12,26,44)

is used, the top margin on each sheet will be 4 lines wide. Hence, the vertical tab stops will be at physical line numbers 16, 30 and 48 of each sheet of paper. Similarly, a new page character always advances to the first line of a logical page, i.e. to physical line 5 in the current example.

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