NAME

    tapeboot – magnetic tape bootstrap programs

DESCRIPTION

    There are two magnetic tape bootstrap programs to handle the problem of booting a PDP-11/45 or PDP-11/70 from a TU10 or TU16 tape transport. In both programs, the tape density used is 800 bpi.

    The first bootstrap program, *mboot,* is designed to be used in conjunction with the *tp* command. The *tp* command first copies a bootstrap program /usr/mdec/mboot, if magnetic tape, or /usr/mdec/tboot, if DECtape, to the first record (block 0, 256 words) of the tape. Note, the bootstrap mboot or tboot, as appropriate, must exist whenever a tape is made using *tp*. When using DECtape, booting is relatively simple since the standard DEC® ROM bootstrap loader reads block 0. However, when using magnetic tape, a special ROM or some manual procedure must be used to read in block 0. The standard DEC loaders for magnetic tape read the second record (block 1) of the tape, since the first record (block 0) contains header information on DEC operating systems.

    To boot from magnetic tape using mboot, first create a tape using *tp*. For example, to make a boot tape containing the UNIX operating system, execute

        tp mr unix

Next, read the first record of the tape into memory starting at address 0 and then jump to address 0, using a special ROM or some manual procedure (toggle in the program). The bootstrap program, mboot, relocates itself to high core as specified when assembled (typically 24K words, maximum of 28K). It then determines whether to use the TU10 code or the TU16 code. The TU10 is used if the TM11 command register (772 552) exists and the function (bits <3:1>) is non-zero, otherwise the TU16 is used. Next, the program rewinds the tape and prompts the user by typing '=' on the console. The user must then enter the name of the desired program exactly as contained in the table of contents on the tp tape. The '#' character will erase the last character typed, the '@' character will kill the entire line, and 'A' through 'Z' is translated to 'a' through 'z'. Also, carriage return (CR) is mapped into line feed (LF) on input, and LF is output as CR-LF. The upper-case to lower-case conversion is used to handle upper-case-only terminals such as the TELETYPE® Model 33 or the DEC LA30. Therefore, a file name with upper case characters can not be booted using this procedure.

    After the name has been completely entered by typing CR or LF, the program reads the table of contents into memory starting at address 0. This table of contents is 24 blocks long for DECtape and 62 blocks for magnetic tape. If the name matches an entry in the table, memory below the bootstrap program is cleared, the tape is positioned to the address found in the table entry, and read into memory starting at address 0. Note, the amount of data read is only the low order 16 bits of the 24 bit size field in the table of contents entry. Next, the bootstrap program rewinds the tape. If address 0 contains 000 407, a UNIX a.out program is assumed and the first 8 words are stripped off by relocating the loaded program toward address 0. Finally, a jump to address 0 is done by executing "jsr pc,*$0".

    If the name entered does not match or if the loaded program returns, the bootstrap starts over and prompts '='. Also, if there is an error while reading the tape, the program will backspace one record and attempt to read the record again. This may lead to a looping condition if there is a hard tape error.

    The other bootstrap program, *tapeboot,* does not involve the *tp* command. The complete program fits in one 256 word block, but is duplicated so that one copy resides in block 0 and another in block 1. Thus, both the standard DEC ROM bootstrap loaders and the special ROM loaders will work. For example, to create a boot tape, execute

        cat /usr/mdec/tapeboot program-to-boot > /dev/mt0

    After the program is loaded and started, it relocates itself to high core and determines whether to use the TU10 code or the TU16 code as described above. It then types on the console "PWB tape boot loader", rewinds the tape, reads two blocks to skip past itself on the tape, clears memory, and reads the rest of the tape, to the tape mark, into memory starting at address 0. The loaded program is adjusted if address 0 contains 000 407 as above. Finally, a jump to address 0 is done by executing "jsr pc, *$0".

- 2 -

If there is an error while reading the tape, the bootstrap program will type "tape error" and attempt to read the record again.

FILES

/usr/mdec/mboot - *tp* magtape bootstrap
/usr/mdec/tboot - *tp* DECtape bootstrap
/usr/mdec/tapeboot - TU10/TU16 magtape bootstrap
/sys/source/util - source directory

SEE ALSO

tp(I), unixboot(VIII)