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Chapter 1

Source Code Transfer

One of the major problems inhibiting the porting of applications between UNIX system derivatives is that of incompatible media standards and the physical problems of transferring source code in machine readable form.

This part includes X/OPEN definitions for the transfer of source code, including portable media formats and guidelines in the use of transfer utilities. The physical characteristics and necessary formatting information are described, as are the special file names by which these devices are known in X/OPEN systems.

Standards are defined for transfer of 5 ¼″ floppy discs and ½″ magnetic tapes between machines. Because of the different nature of X/OPEN systems, ranging from single-user work stations to large mainframes, it is not possible to define a single portable medium which is supported across the whole range. Defining standards for both floppy discs and ½″ magnetic tape gives the highest practical coverage of systems.

Current differences in the physical recording formats between cartridge tape devices prevents the definition of a standard for this popular medium.

Chapter 2

Floppy Disc

2.1 INTRODUCTION

As exchange media, the X/OPEN Group defines formats for 40 and 80 track floppy discs. It is intended that the prime format should be 80 track, with 40 track retained for compatibility with personal computers. X/OPEN systems equipped only with 80 track disc drives will offer the facility to read 40 track discs by skipping alternate tracks

2.2 PHYSICAL RECORDING

The standard floppy disc recording formats are shown below:

Floppy Disk Recording Formats
80 tracks (96 tracks per inch) 2 tracks per cylinder 9 sectors per track 512 bytes per sector Modified Frequency Modulation (MFM) recording
40 tracks (48 tracks per inch) 2 tracks per cylinder 8 sectors per track 512 bytes per sector Modified Frequency Modulation (MFM) recording read only

Note that the 80 track format is preferred; systems equipped only with 80 track disc drives will be able to read but not write 40 track discs.

2.3 SPECIAL FILE NAMES

The special file names associated with these formats are:

Number of Tracks	Name
40	/dev/sctfdl<number>
80	/dev/sctfdm<number>

The device number is constructed from the physical drive number. To this is added 0 or 128 (decimal) to define whether cylinder 0 is accessible. 0 means that cylinder 0 is accessible, so the first sector accessed is sector 1 track 0 cylinder 0. 128 means that cylinder 0 is *not* accessible, so the first sector accessed is sector 1 track 0 cylinder 1.

2.4 MEDIA

There is no standard method of handling media flaws (alternative track recording for example). The X/OPEN definition therefore requires that the transfer medium must be error free.

Chapter 3

Magnetic Tape

3.1 INTRODUCTION

The X/OPEN standard for magnetic tape covers ½" magnetic tape with a number of different recording formats and densities. The "preferred" format is 9 track phase encoded (PE) at 1600 bits per inch.

3.2 PHYSICAL RECORDING

The preferred physical tape recording format is

- 9 track Phase Encoded (PE), 1600 bits per inch (bpi).

Optional formats that may also be supported by particular systems in addition to this are

- 9 track Group Code Recording (GCR), 6250 bpi.
- 9 track Non Return to Zero Inverted (NRZI), 800 bpi.

3.3 SPECIAL FILE NAMES AND BLOCKING

The device names associated with these formats are:

name	format	blocksize(bytes)	remarks
/dev/sctmtl<number>	NRZI	512	optional
/dev/sctmtm<number>	PE	512	
/dev/sctmth<number>	GCR	512	optional
/dev/rsctmtl<number>	NRZI	see below	optional
/dev/rsctmtm<number>	PE	see below	
/dev/rsctmth<number>	GCR	see below	optional

On the "raw" devices (rsct...), data is both read and written in blocks corresponding to the length requested in the read or write system call, see *read*(2) and *write*(2) in Part II of the Guide.

The device names are usually links to system-specific device names.

3.4 DEVICE NUMBERS

The part of the special file name described in the table above as <number> is constructed from the physical tape unit number with the addition of 0 or 128 (decimal) to indicate whether the tape is to be rewound on closure. Any tape that is opened for writing has a tape mark written on closure. Addition of 0 to the unit number causes the tape to be rewound to the beginning of tape mark (BOT); addition of 128 inhibits this.

Hosted implementations may need extra information to be specified in the device names, for example volume names.

Chapter 4

Utilities

4.1 INTRODUCTION

X/OPEN systems support two standard utilities for use with any of the devices mentioned in this part of the Guide. *Cpio* is the preferred utility; *tar* is included primarily because certain versions of the UNIX operating system are issued in that form. If an exchange medium is to be read on a target machine that is architecturally different from the source machine, problems may arise concerning the ordering of bytes within a word and words within a long word (see the portability guidelines in Part III). These can easily be handled when using *cpio* as the exchange utility, while with *tar* it may be a little more difficult.

4.2 CPIO

This is the preferred utility for source code transfer. The *-c* option is mandatory to prevent problems with byte ordering from occurring. The *-B* option, which enables 5,120 byte blocking, is only sensible if it is used on a "raw" tape device (/dev/rsctmt...), where it helps to reduce the amount of tape wasted on inter-record gaps. It has no effect on other devices. The *-s*,*-S*, and *-b* options must not be used when writing onto a medium that is to be read elsewhere.

4.3 TAR

This utility may be used, but it is not recommended unless it is necessary to read, for example, media written elsewhere using *tar*. It should only be used to write 512 byte records or 10,240 byte records (with the *-b*20 option). Other record sizes may cause problems when other systems try to read the archive produced.

The standard byte order is that a character sequence of "abcd" when written to tape will be written in the order "a", "b", "c", "d". Suppliers of systems whose natural byte ordering is different will need to modify either their tape driver software, or their version of *tar*, to support this ordering.

Chapter 5

Other Techniques

Among other methods of moving data between X/OPEN systems, direct machine to machine connection using *uucp* and its utilities is the most relevant, since it is supplied with most X/OPEN systems. However, *uucp* is far from easy to use and the following points should be noted:

- The systems to be connected must have a compatible serial interface, preferably V.24/RS232C. Not all suppliers support a reasonable subset of the V.24 specification and in particular, many of its signalling lines are not supported. However, these lines are not essential as long as the configuration file, *L.sys*, is set up appropriately. Baud rate, character size and parity have to be configurable.
- The TTY drivers should support XON/XOFF (ASCII DC1/DC3) handshaking and an 8-bit transparent mode.
- The interface should provide enough internal buffering to avoid over-runs at higher baud rates. Otherwise, retransmissions will make data transfer time excessive.
- The versions of *uucp* must be compatible.

Besides this most common form of networking between X/OPEN systems, other networks may be available. Care must be taken in their use, since the higher level protocols often differ from system to system.