TEN-SYS-2

To: PDP-1∅ System Design File

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Subj: Ten-Sys File Structures; Addendum to 2/14/69

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File Names

Each file will have one primary name string, probably of indefinite length. Suffixes may be used which will serve to identify the file type or the program with which it is used, such as:

FOO.MAC, FOO.REL, etc.

The concatenator and suffix will be part of the string, and will receive no special attention by the directory lookup routine.

A file name may be preceeded by a file directory or user name (enclosed in angle brackets--<>) to designate a directory other than the one to which the user is currently attached.

A class of additional information may be specified by appending an exclamation point to the name. The exclamation point designates that the characters following are codes for various options. Some of the possibilities are:

T - Temporary file. A file created with this mode will be deleted when the user logs out (unless the type is subsequently changed). Additionally, the system will cause the job number (monitor internal job number) to be considered to be appended to the name string as part of the file identifier. A file name given without specification will match a temporary file name only if the user's job number also matches the file's job number. Programs often create scratch files, the names for which are fixed within the program. Appending the job number as described will prevent conflicts of such temporary names when several users are attached to the same directory. Whenever a user detaches from a directory, all temp files having that user's job number will be deleted. File directory listings will include only those temporary files for which the job number is equal to the users job number, and will include a designation that the file is temporary. This designation will probably be |T as was used to specify the file originally.

A - Account number (never called job number). The user may specify that the file is to be charged to an account number different from the one on which he is currently entered.

P - Protection specification. When a file is created or rewritten, the user may designate the protection which is to apply to the file. This relieves the user of having to remember to re-specify protection for a file when he returns to the EXEC (as is now the case on the 94Ø), as well as eliminating the period of time over which the protection may be inappropriate to the file.

V - Version number. See discussion of version numbers below. The user may specify a particular version or, in the case of write, a new version. Default case is most recent (current) version.

Version Numbers

By version number, we mean a numeric identifier associated with a file name, principally for the purpose of maintaining the integrity of other files which may be sharing pages. The feature may also be employed by users to distinguish several copies of a file undergoing change, but this is incidental and could be done as well by making the specification part of the name string.

The version number will be one of the pieces of information in the file directory entry for a file. It will be a binary field of at least 12 bits. A file directory search on the name of a file with multiple versions will yield only the most recent (current) version entry. A chain of pointers will link the entries, beginning with the current one. This will make the search for the current version (the usual case) take no longer and require no more information that the search for a one-version file.

Recognition and Name Delimiting

An alt-mode will normally be used to terminate a typed-in file name. It will call for recognition of what has been typed. The recognition will be done in two logical steps. First, an exact match will be sought. Failing that, if exactly one entry string exists of which the typed string is an initial subset, the typed string will be taken to be an abbreviation for the full string. If no such entry exists, the typed string will identify a new file (where appropriate). If more than one such entry string exists, the typed name is ambiguous. Thus it will normally be impossible to create a name which is an initial subset of an existing name. Also, the system will consider illegal any new name which is a superset of an existing name. A name string supplied by a program will undergo exactly the same lookup procedure.

Some name examples:

```
FOO   FIE.MAC   FIE.REL
```

If these three names exist in a file directory, the following are the minimum abbreviations:

```
FO   FIE.M   FIE.R
```

To either the whole name or any legal abbreviation may be appended additional specifications, e.g.

```
FOO¦V1   FIE.M¦A11335,P1Ø   FIE.R¦T
```

The first example specifies version 1. The second specifies account number 11335 and protection key 1Ø. The third specifies a temporary file.

User Information

The exact strategy for storing user information has not been determined, but the following pieces of data must be available.

1. User name string. A user name string will be a complete identifier of the entry and will be unique. There are no system-recognized subfields of user names. Names may be selected to include the company name or user initials as desired, e.g. BBNTRS, D.BOBROW, R.BOBROW.
2. Password
3. User number--a second complete identifier of the entry used internally by the system.
4. Access data, including
   1. Legal account numbers
   2. Share group data
   3. Privilege group data (wheels, general, Telcomp only etc.)
5. Resource allocations and use accounting
   1. Disc allocated/used
   2. Time and/or money allocated/used.

    3. Demand factors (percent CPU guaranteed or allowed, etc)

6. Last entered time and date. (Login message is sent on login if it was written after user's last previous login)
7. Message control.
8. Attach only. (Specifies a file directory name which may be used only for attaching, not entering. Some of above data will be irrelevant in such entries.)

File Directory Entries

1. Name (plus indefinite extension)
2. Owning user number
3. Version number or job number (mutually exclusive)
4. Account number
5. Dates: created, read, written, backed-up
6. Backup codes (delete, backup and delete, etc.)
7. Share info (protection key)
8. Share count
9. Length (sequential compacted files only)
1Ø. Read/write count
11. Permanent/regular/temporary; long/regular/short
12. Where file is (e.g. index block address)

Long Files

A file longer than 256k (or a random access file of address space greater than 256k) will have an index block of index blocks and thus will look like a regular file in which each "data word" is the address of a data block.

Short Files

A "short file" is one where it is more economical to keep the data block pointers in the file directory rather than in an index block. When such a file is opened, a regular index block will be created and if necessary, written on the disc. The file will remain in this standard format, and subsequent references to open it will be handled in the regular way. The file may be re-formatted to small file format by the backup system. That is, the backup system will reformat any file which is appropriately small, regardless of any previous state. Thus short files which are opened and lengthened sufficiently will remain in standard format.

2/2Ø/69 DLM