

PDP-1 COMPUTER
ELECTRICAL ENGINEERING DEPARTMENT
M.I.T.
CAMBRIDGE, MASSACHUSETTS 02139

PDP-28-1
TIME-SHARING SYSTEM CHANGES

July 18, 1966

TIME-SHARING SYSTEM CHANGES

A new time-sharing supervisor has been written, correcting many of the shortcomings of the previous (Jan. 1966) system. The new system will go into effect as of 9:00 A.M. Monday, July 18.

I. Features:

1. 8k for any user that requests it, if sufficient drum fields are available.
2. No MYSTIC - ID for all users.
3. Expanded arq's - ability to share drum fields.
4. Higher performance - more rapid IO service.
5. More drum fields in most cases.
6. More efficient swapping of users.
7. More equitable queuing algorithm.
8. Faster searches and swaps in ID, in most cases.
9. Continuous paper tape reading when switching users, in many cases.
10. Saved "dia word" may be examined and modified in ID.
11. Multiple proceed for last breakpoint that broke.

II. Details:

1. Any user may assign core 1. Assignment and dismissal are as before. (+c1 to assign, -c1 to dismiss.) One drum field is used for each user with core 1 assigned. An unsuccessful assignment means that all fields are busy. Users are urged not to assign core 1 unnecessarily.

2. MYSTIC no longer exists. The "extended executive routine" has been removed also. Arq's are now processed in the executive routine. Every user has an ID, which is started immediately when a console is turned on. Each console requires two drum fields. (One for ID, the other for the user's "core 0".) If two fields are not available when a console is turned on, no action is taken. Turn off and on again to try again.

3. Arq's are now processed in the executive routine directly, and do not require two drum swaps. Hence, they take .5 to 1.25 m.s., compared with 84 m.s. in the old system. An arq instruction with the indirect bit skips when and only when the corresponding arq does not. Drum fields may be shared among several users, enabling each to read or write. The arq +sf works the same as +af except that the field is assigned for sharing. If the field is already assigned absolutely, the mode is changed, permitting other users to share it. If a field is assigned in shared mode, +af changes it to absolute. This will be successful only if no other consoles are using it. +1f and +f assign in absolute mode. -sf is exactly the same as -af.
Example:

console 5	console 6
120003<sfF	120002<sfF

Console 5's field 3 and console 6's field 2 both refer to the same real field, 12. Each may read or write. Other consoles may read it by referring to field 52, and may read or write by assigning it in shared mode. +xf exchanges the drum field translation table entries of the pseudo fields specified in the high and low 6 bits of the IO. For example, 040002<xfF may be used to move pseudo field 4 to pseudo field 2 without dismissing field 4 and reassigning it as field 2, which would involve the risk of losing it to another user. If pseudo field 2 was assigned, that field becomes

field 4. This arg never skips. +f assigns n additional fields, where n is in IO_{0-5} . It is equivalent to +f n times. It previously assigned or dismissed fields as necessary to leave a total of n fields assigned.

4. In addition to vastly improved arg service, IO, call button, and console on/off service is faster. An rpa now takes about .9 m.s. It previously took 1.4 m.s. It now takes 1 drum swap to turn on a console and start ID, where it previously required 8.
5. Since MYSTIC and the extended executive routine do not exist, and since core 1 is used for storage even when no user has it assigned, more drum fields are available. However, since every user has ID, there may, in some extremely unusual cases, actually be fewer fields than in the old system.
6. Both core modules are used equally, and users are swapped into whichever is less busy or will require fewer drum swaps. Drum swaps are, in general, held to an absolute minimum.
7. Previously, if one user was typing very rapidly and two or more users were continuously active, one of them received much more frequent quanta. This bug has been fixed.
8. The ID commands W, N, E, U, S, and Z are executed in core whenever possible. (by bringing the appropriate field into one core and running ID in the other). These commands particularly E, run much faster.
9. When two 4k user are running, one of them reading tape, no drum swaps are required to switch users, so the tape moves continuously.

10. A new internal register W (dia word) has been added to ID. It lies between G (program counter) and F (flags). This contains the word which is stored from the IO when a dia is executed, and supplies the write field and drum address for the following dec. Hence, if a breakpoint is placed between a dia and a dec, the result of the dia may be examined and modified. Also, if an illegal instruction trap occurs on a dec, the write field may be determined.

11. Multiple proceeds previously applied to the first breakpoint only, (the one in register B), whether that was the one which broke or not. Multiple proceeds now apply the last breakpoint that broke. Also, a bug in ID's replacement of instructions under breakpoints has been fixed.

- III. This system is incompatible with the old in the following ways:
1. +f arq is different - see 3 above.
 2. +af arq with 0 in the IO now does nothing. It previously assigned 1 field.
 3. If it is impossible to log in, no message is typed.
 4. Mystic and the commands to it have been removed. ID is started instead.