INTERDEPARTMENTAL

MASSACHUSETTS INSTITUTE OF TECHNOLOGY *CAMBRIDGE, MASS. 02139*

from the office of

TO: F. J. Corbató
FROM: Robert R. Fenichel and J. H. Saltzer
SUBJECT: 24-hour MULTICS Staff
DATE: October 6, 1966

A utility's human work force need not be of constant capacity through the utility's 24-hour day. Some of the services provided by utility employees may be only available intermittently.

Maintenance, for example, might be restricted to certain hours in a system with highly redundant hardware. Billing -- as opposed to charging -- is a maintenance-like activity which is commonly restricted to business hours.

1. Security

   A. The Physical Security Officer

      (1) The central hardware of a MULTICS installation is part of the hard-core supervisor. No part of the system is more sensitive to espionage, sabotage, or natural disasters.

      (2) The system provides vaults for back-up tapes and for tapes generated by the multilevel storage manager. In addition, vaults may be provided for tapes, decks, etc. belonging to users. The file system is no more secure than these vaults.

      (3) The Physical Security Officer is a door-holder, a badge-checker, and a good man with a fire extinguisher.

   B. The Logical Security Officer

      (1) Certain sensitive procedures may refuse to run without certain

settings of lockable central switches. A user who wishes these switches to be set must convince a key-wielder of his (the user's) identity and motives.

(2) The Logical Security Officer is -- at any given time -- sole member of the key club.

C. The Locksmith

(1) Deep in the Forbidden City of the system, users will find themselves buried alive. Some Passwords will be forgotten, and others will have been magically transmuted. The locksmith will be able to penetrate ordinary security barriers on behalf of deserving users.

(2) Bad people will find judo-like ways in which to misdirect the tremendous power of MULTICS. The locksmith will be able to spy on these people, to trace their communication lines, and to restrict them to the point of harmlessness or even helplessness.

2. I/ϕ Operation

A. The Backup Man

(1) As the backup system produces tapes, it will ask that they be dismounted and taken to the vaults.

(2) For retrieves, the process is reversed.

(3) The backup man essentially owns the backup vaults.

B. The Multilevel Man

(1) - (3) The multilevel man performs the same functions as the backup man, except that quite possibly he deals with different values. For example, backup tapes might be created in duplicate, with two separate vaults used to insure against diasters.

The multilevel vault procedures could presumably be less elaborate.

In the present implementation, backup and multilevel are so intermingled as to merge the backup and multilevel responsibilities.

C. The Bulk I/ϕ Man

(1) Cards will be presented by users for input to the file system. The decks will be returned to the users.

(2) Cards and bulk listing will be produced by the system for distribution to users.

(3) The Bulk I/ϕ man will be the channel between the unit record equipment and the bins.

D. The Media Man

The media man keeps blank cards and paper in the punches and printers. He fills other operators' requests for special card and printer forms.

E. The User Tapes Man

(1) - (3) Same as for the Multilevel Man

(4) The User Tapes Man logs the receipt of tapes submitted to system storage by users.

(5) Conversely, he logs delivery of user-owned tapes to users requesting possession.

F. - Z. Encapsulated Subsystems

Installations may run one or more encapsulated subsystems -- GECOS, media conversion, etc. These subsystems may or may not have units dedicated to them, etc. Each is a specific responsibility.

3. Trouble spotting

A. Patternfinders

(1) Malfunctions may make themselves evident by the (absence, presence) of (usual, unusual) patterns of system behavior. In traditional computer installations, operators frequently detect malfunctions by observing console lights, mechanical I/ϕ devices, meters, and audio taps.

(2) Patternfinding is a responsibility distributed among all operators -- and users -- of MULTICS.

B. Servicemen

(1) Similarly, patterns may appear while the system is attempting to solve its own problems. The system may, for example, react to certain drum troubles by removing tracks from service. By scanning a log of these removals, an engineer may detect patterns of progressive drum decay or other global phenomena.

(2) The system may include one or more hardware-testing demons, reporting to the product-service engineers. Whether or not these routines execute as demons, they may exist as procedures for the use of worried engineers or other users.

C. Dial-a-prayer

(1) The system must expect to receive continual telephone calls of inquiry and complaint. Answerers must be trained to extract maximal information from each call.

(2) In particular, the answerers must be prepared to distinguish signs of real trouble from signs of ignorance, stupidity, and malice. The answerers must be informed, for example, of planned alterations

in popular commands. No matter how advertised these changes may be, some users will be surprised by them.

(3) The answerers must also be able to supply up-to-date information about the prognosis for a sick MULTICS. By having this information, the answerers keep the users from annoying other staff members.

4. Trouble shooting

In general, reconfiguration is the only possible response to trouble in MULTICS. A single reconfiguration operator is assumed.

A. Reconfiguration will always be more graceful when the system is still talking. If the reconfiguration operator cannot talk to the system, everyone else will suffer. The communication lines of the reconfiguration operator must be guaranteed.

B. On the basis of advice from the hardware programs and from the answerers, the reconfiguration operator may be able to decide what damage has been done to the lasting memory of the system.

(1) The reconfiguration operator may choose to run some or all of a series of salvager programs. A salvager is a program which detects and corrects impossible (inconsistent) configurations in essential data-bases. The actual series of MULTICS salvagers can not be listed at this time.

(2) Certain data-base problems (e.g.,random reassignments of passwords) are inherently beyond detection -- much less correction -- by any plausible salvager. If there is reason to believe that a problem of this sort has arisen, the reconfiguration operator may choose to run some or all of a series of reloader programs.

A reloader is a program which loses certain work in order to restore a data-base to an old condition which was satisfactory at one time and which, by default, is more desirable than the present condition.

C. Finally, of course, the reconfiguration operator will arrange software or hardware reconfiguration. All reconfiguration will be logged by the reconfiguration operator.

To: F. J. Corbató and J. H. Saltzer
From: Robert R. Fenichel
Subject: Errata to "24-hour Multics Staff" memo dated October 6
Date: October 7

After 2nd ¶ on p 1, insert

"Other human services are demanded by and through the utility at all hours. This memorandum lists the roles which Multics personnel may be asked to play at any time.

In second line from bottom of p 2, read "vaults" for "values"