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Automated Validation of a Computer Operating System

Automated validation programs are designed to apply selected input/output loads to a complex computer operating system and to measure the performance of that system under such loads. While such programs have been developed to load computers with simulation of the loading that would be experienced during the actual launch of a complex space vehicle, the technique would also lend itself to checkout of computer software designed to monitor automated complex industrial systems (petrochemical installations, for example). In this employment, the automated validation program would prove out the computer system's ability to monitor plant operation under actual production conditions.

Many different problem areas may be investigated by judicious use of the loading capabilities of the automated validation programs. In attempting to duplicate problems due to input/output loading, the operator may choose from loads presently included in the repertoire of the internal monitor. If such loads are not suitable, other loads may be added with a minimum of programming effort.

For maximum effectiveness in testing, a standard set of loads is selected and runs are made with a sampling of as many possible combinations of these loads as time permits. This will provide a performance baseline for the computer system tested and each new version can be compared with this performance baseline and any significant performance changes noted.

Inasmuch as the automated validation programs operate as test programs or function executors and do not violate any of the computer system restraints, they should operate with any new system not involving a major revision. Failure of the automated validation program and/or function executor to operate with a

new version of the system requires careful review to determine if similar failure might also occur with established test programs and function executors.

The display load generator and the discrete load generator portions of the automated validation program can be used independently of the internal monitor test program. Therefore, they can be used to test the system while it is running an actual launch test program in the systems development facility (SDF). The environment of the SDF can be made to closely simulate that encountered in operational use if the discrete generator is used in the cycling discrete mode (at a rate of about 1 discrete change each 80 msec, and the display load generator active on 5 consoles with function monitoring entries being added at a rate of 1 every 10 sec). The function executor version of the basic monitor, modified to execute for a maximum of 1 sec, can also be used to monitor the computer operating system (to obtain approximate system overhead relative to level zero and one-half). It also determines the function executor executive's scheduling performance on all function executor routines that are active. To use the function executive basic monitor routine, it must be read in from cards at computer load time, and all other function executors to be used must be defined on control cards preceding the function executor basic monitor binary deck.

Note:

Requests for further information may be directed to:
Technology Utilization Officer
Code A&TS-TU
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(continued overleaf)

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No patent action is contemplated by NASA.

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