

Saltzer

To: MTR Distribution

From: Multics Systems Assurance Subgroup,
Gary Dixon, Recorder

Date: April 27, 1976

Subject: Subgroup Status for April

I. SUBGROUP MEETING OF APRIL 13, 1976

A meeting of the Multics Systems Assurance Group was held on April 13, 1976. Attendees were: Grace Ackerman-Lewis, Gary Dixon, Peter Kelley, and Roger Roach. The following information was presented at the meeting.

A. Significant Events

Gary has finished his full-time work on the Janus System, and is now spending half time in the SMAG group. First order of business is to get the library tools installed. They should be submitted by the end of April, barring unforeseen demands on his time.

Grace and Peter have shifted installation roles: Grace is now handling Online Library installations, while Peter is installing Hardcore Library changes and performing crash analysis functions.

B. The Crashes of Monday, April 12, 1976

We were down a total of 19 hours on Monday due to two problems. From 19:50 Sunday throughout unattended service to 7:10 on Monday, and again from 20:47 Monday until 23:30 a tty_write column setting bug (Fixed in 28.3) was triggered by a single user's program. The bug occurred during a fatal process error in the user's process; it prevented the Initializer from printing "A fatal error has occurred". The Initializer attempted to terminate itself because the I/O was unsuccessful.

The second problem was a bad electronics board in DISK B, Module 1, which transmitted bad data to the MPC. The MPC channel couldn't handle the data and signalled an error itself, thus obscuring the source of the error. We were down from 9:06 until 17:58 Monday diagnosing and correcting this problem.

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During this period of 6 crashes, only a few directory entries were lost, although several segments being rewritten at the time of the crash (by editors, the archive command, indent, etc) were truncated to 0 records. This truncation phenomenon occurs because segment truncation by a command prior to rewriting the segment is updated immediately into the segment's VTOCe, but the rewriting process is only updated when the AST entry is examined as a candidate for deactivation. This examination process (called AST trickle updating) occurs at a rate which is inversely proportional to the ASTe grace time for the segment's AST pool. Thus, the larger pools in which most Multics segments are activated have longer grace periods and are therefore more susceptible to the truncation phenomenon. This may be the most frequent cause for lost data under NSS.

C. Installation Backlog

In spite of the change in installation roles for Peter and Grace, the installation backlog is low. About 12 online installations are queued, and no hardcore installations are queued (28.3 has been generated, 28.4 is on deck but not all 28.4 submissions have been received).

During May, Gary will learn the Hardcore Installation process so that he can take over during the first two weeks in June while Peter and Grace are attending 6.08S, a Summer Session course on mini-computers.

D. Library Reorganization

With the installation of the new library tools, we can again consider minor reorganization of the contents of the System Libraries. Several MCRs have been approved for restructuring the info libraries. In addition, the include segment library is rapidly filling up and will have to be split into several directories.

The subject of restructuring the Hardcore Library like the Online Libraries was once again raised by John Gintell. It was decided that, because of the reprogramming of tools needed to support hardcore installations in a library of such organization, the decision to restructure would have to wait until July, when all three group members were available full time for Systems Assurance work.

E. Operational Procedures

With the advent of NSS and its various flavors of updates, documentation of the various system operating procedures has fallen well below par. CISL has promised to include better operational documentation with 28.4, the temporary mount/demount system. Roger has requested that this documentation describe at least the following procedures:

- how to recover from a crash
- how to recover from disk problems
(hardware/software problems)
- how to remove a physical volume from a logical volume
- how to add a physical volume to a logical volume
- how to restart a SAVE after errors occur
- how to do a restore
- how to do a cold boot/reload

II. SUBGROUP MEETING OF APRIL 27, 1976

A meeting of the Multics Systems Assurance Group was held on April 27, 1976. Attendees were: Grace Ackerman-Lewis, Gary Dixon, Peter Kelley, and Roger Roach. The following topics were discussed at this meeting.

A. State of the System Libraries

Gary mentioned that, while investigating system problems, he has been unable to find listings for several Online and Hardcore Library segments. We suspect one cause for this problem is the careless filing of listings for commands which have subroutines supporting their operation. When the subroutine is given the command name followed by underscore, then very often either the command listing or the subroutine listing gets lost when the other procedure is updated. This and other types of human errors prevent us from having a complete set of listings.

The group decided that whenever any of us find or are told of a missing listing, that person will:

1. Generate a new listing.
2. Compare the installed object with the newly-generated object to insure that compiler or include segment changes do not introduce mismatches between the object and the listing.
3. If the new object matches the old, file the regenerated listing, noting on the listing the proper date of compilation as stored in the old object segment.
4. More likely, if the new object differs from the old, test the operation of the new object, and install the object (and file the listing) within a reasonable period of time (hopefully within one week).

In this way, we can keep the libraries up-to-date and avoid having a large backlog of listings to be replaced all at once.

A second, more serious problem is the mismatch between source and object segments stored in the libraries. Few checks have been made in the recent past to detect such errors, but now several people have reported lack of source for a given object, or vice versa.

Feeling that this problem is too large to solve for all the libraries at once, the group decided to look for and correct inconsistencies in the Hardcore Libraries as a first step. Gary will check the Hardcore Library map for mismatches between source and object. Grace will investigate inconsistencies between listings and Hardcore object segments, when the listings either do not exist or have different date/time compiled than the object. Peter will investigate how two sources segments that we know of were lost from the Hardcore Library, in an attempt to correct the error that caused the loss. By Friday, May 7, 1976 we hope to have these investigations complete and will decide how to correct any problems that are found.

Roger voiced concern that our maintenance of the System Libraries is one of the prime services which Honeywell is buying from PDO. We therefore feel that correction of any problems which are found should have a high priority.

B. Problems with Multics System 28.4

With the installation of 28.4a, there is still one outstanding problem known to exist in NSS version supporting interim mount/demount. One is looping in tty_free on both processors because the tty_buf wasn't unlocked. A fix for the suspected cause for the problem is known, and will be installed soon.

The generation of System 28.4 gave Peter many problems. Pathnames of the segments to be installed were often omitted from the installation forms, or the pathnames of old or debugging versions of the programs were given. Also, an Online Library command to register master directories is required for use with 28.4, but this command has not yet been written. We were told verbally of this requirement, but it was not indicated on any of the installation forms for 28.4 and was overlooked while we were beset with the other 28.4 installation problems. Without the command, we cannot register any new master directories.

Poor communication between the people at CISL who were installing the interim mount/demount version of NSS, coupled with poor understanding on our part of the implications of the changes being made, are attributed as the cause of these problems. Roger Roach will discuss the problems with John Gintell, Tom VanVleck and other involved CISL people.

The operational documentation for 28.4 did not include many of the procedures which we asked for during our last meeting (see section I.E above). We are delaying the generation of System 28.5 until the lack of these procedures can be discussed with Bernie Greenberg next week. Hopefully, they will be forthcoming in the very near future.

C. Delay in Publishing Installation MIBs

Roger noted that installation MIBs for Hardcore Systems from 28.0 on had not yet been published, due to the backlog of work in our group. The group hopes to publish these MIBs as soon as possible. If they have not been published by Friday, May 7 (the time of our meeting on the Hardcore Libraries, described in II.A above), we will give publication of these MIBs priority over other work.

D. Tasks for Next Year

A tentative list of tasks to be performed by the group next year is shown in the task list attached to this report.

E. New Meeting Time

The Multics Assurance Group will meet in the future on May 10, 1976 and every other Tuesday thereafter, at 2:00 PM in Roger Roach's office. Peter Kelley will be the recorder at the next meeting.

III. ASSURANCE SUMMARY FOR APRIL

The following section briefly summarizes the group's work over the past month.

A. Online Installations

There were 24 changes to the Online Libraries during April. Most significant of these are the changes to the Answering Service to support the Autocall facility.

Things are still not up to speed yet, but Grace is becoming more familiar with the patterns and workflow of the Online installation process. She expects installations to be made more frequently in the next two weeks, and at full speed by the end of May. It is a pleasant surprise that the installation backlog is small (only 12 or so installations on deck) when you consider Peter and Grace's changing installation responsibilities and Dave's leaving the group. [Since our meeting, the backlog has increased to about 25 modules, as new changes have been submitted and some of those on deck have failed their submission tests.]

B. Hardcore Installations

The end of April was a busy period as 6 Hardcore systems were installed in 6 days. In all 9 systems were installed during April, including MSS 28-2 (mentioned in the last report), 28-2a, 28-3, 28-4, 28-4a, -4b, -4c, -4d, and -4e. Significant changes include: implementation of new tty_ input canonicalization rules, replay and polite I/O modes, and dump_fnp and patch_fnp control operations; installation of Hardcore support for the Autocall facility; and installation of a new volume registration facility, support for virtual mounting, and a new master directory control. In addition, many bugs were fixed (including at least 7 which caused system crashes) and 35 Hardcore modules were modified and recompiled to take advantage of the EIS instruction set.

C. Crash Analysis

The crash rate increased this month as we began to shake the bugs out of the new TTY software, new BOS systems, and the various new features of NSS. In addition, our hardware has developed its usual Spring fever as temperature and humidity vary. The table below shows our crash rate in the various crash categories.

	04/03 04/09	04/09 04/16	04/17 04/23	04/24 04/30	Total
Hardware	1	7	5	6	19
Hardware ?	0	2	0	0	2
Software	0	8	3	7	18
Software ?	1	0	0	1	2
Hard/Soft	0	1	0	0	1
Operator ?	0	0	0	1	1
Unanalyzed	0	0	1	0	1
Total	2	18	9	15	44

Thirteen of the 18 software bugs were caused by repeated occurrences of 3 bugs in the TTY software (both tty_input and output). They caused the system to crash depending upon what lines users typed in or out. In most cases we were unable to find the users in question until the system had crashed several times. Thankfully, Mike Grady and Robert Coren were able to find and fix these bugs rapidly.

The table below summarizes our down time and mean time down for failures for the various categories of crashes.

	Time Lost	#	Mean Down
Hardware	23:54	19	1:15
Hardware ?	6:56	2	3:28
Software	7:16	18	1:24
Software ?	1:10	2	1:05
Hard/Soft	1:15	1	1:15
Operator ?	1:09	1	1:09
Unanalyzed	1:08	1	1:08
Total	38:48	44	1:53

PROJECT Systems Assurance Subgroup AREA Continuing Tasks

TASK DESCRIPTION	PERSONNEL	START	FINISH	P-W	CHANGES-SIAIUS
Online Library Installations	Ackerman-Lewis	Continuing Task	Continuing Task	150%	~10 changes per week is our performance goal
Hardcore and BOS Library Installations	Kelley	Continuing Task	Continuing Task	140%	1 system per week is our performance goal
Audit Hardcore Installations	Dixon	Continuing Task	Continuing Task	3%	New Task to Insure Hardcore Library consistency
System Performance Monitoring	Ackerman-Lewis	Continuing Task	Continuing Task	5%	1 or 2 tests per week
Provide Input to System Design Process	ALL	Continuing Task	Continuing Task	5%	continue reading MTBs, attending Design Reviews
Monitor Documentation Status	ALL	Continuing Task	Continuing Task	1%	auditing/installing ~240 new info segments
Maintain System Libraries	ALL	Continuing Task	Continuing Task	1%	Rush effort underway to Insure consistency of Hardcore Libraries
Maintain System Listings	Pitts	Continuing Task	Continuing Task	25%	100 listings per week Is our performance goal
Do Monthly, Weekly Maintenance - xrefs, maps, etc	Ackerman-Lewis	Continuing Task	Continuing Task	1%	
Consulting	ALL	Continuing Task	Continuing Task	1%	Serving as online_consultant

PROJECT Systems Assurance Subgroup AREA Interrupt-Driven Tasks

TASK DESCRIPTION	PERSONNEL	START	FINISH	P-M	CHANGES-SIAIUS
Crash Analysis	Kelley	As Needed	Needed	20%	~10 crashes per week is maximum we can handle
Problem Investigation and Correction	ALL	As Needed	Needed	5%	10 to 20 problems occur per week
Provide Support for Operations	ALL	As Needed	Needed	2%	
Monitor Configuration Requirements	ALL	As Needed	Needed	1%	monitoring phone line and disk usage
Supervise Test Sessions on MIT Multics	ALL	As Needed	Needed	<1%	protect MIT hierarchy during test session
Maintain I/O Daemon	Kelley	As Needed	Needed	<1%	Little maintenance required now
Maintain Ring 1, Accounting Data Bases	ALL	As Needed	Needed	1%	Little maintenance required now
Enforce and Publicize Submission Standards	ALL	As Needed	Needed	<1%	Check with submitters about errors on installation forms

PROJECT _____ Systems Assurance Subgroup _____ AREA _____ Improvements _____

TASK DESCRIPTION	PERSONNEL	START	FINISH	P-W	CHANGES-STATUS
Improve facilities and Strategies for Testing Software					no work underway due to lack of personpower
Install library_map and friends	Dixon		05/31/76 05/31/76	2 2	About 1/3 complete
Maintain, Improve Library Submission Tests					Nothing underway ue to lack of personpower
Change format of news.info to support new help features	Kelley			.2 .2	deferred until time available
Upgrade Installation exec_coms, install and document					deferred
Honeywell PLM - AN80: Library Maintenance Manual	ALL				deferred
Investigate compare_source_statement program to replace compare_ascii					Compare PL/I source statements, ignoring differences in comments, formatting