TO: Distribution
FROM: M. S. Hodges
DATE: May 23, 1974
SUBJECT: Multics Change Requests

Attached are copies of Multics Change Requests which were approved from May 1 - 15, 1974
TITLE: mstrds command

AUTHOR: Bill Silver

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System
X Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency | This is an interim command for use during change in size of standard record length.
Performance Improvement | Simplification | 
Reliability Improvement | Generalization |

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS:

A new command, mstrds, has been written. It allows a user to specify the record size when writing a Multics standard tape.

IMPLICATIONS:

This command will work only with the new version of tape. It should be used with care since other Multics sites may not have the version of tape which can read long (1024 words of data) records.

Detailed Proposal:

If mstrds is called with no arguments it displays the current record data size for the user's process. The following arguments can be used to change the record data size.

"-lg" or "-long" will set the record data size to 1024 words.
"-st" or "-short" will set the record data size to 256 words.
MULTICS CHANGE REQUEST

TITLE: Addition of -unique option to sort_seg command

AUTHOR: Ross F. Klinger

SOURCE: (if external) e.g., "User", "Marketing"

MIT - PNO

CLASSIFICATION

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IMPROVED BY PROPOSAL MCR 488

PRESENTED TO: PNO

REASONS: It has been suggested (by Jerry Stern, PNO) that the object of many sorts is the elimination of duplicate lines from a file. sort_seg currently does not have this capability; however, the implementation of such a function is trivial, and can be done in a manner such that no additional overhead is forced on the user not requiring the feature.

SUMMARY: Add a new control option, -unique (-un), to the sort_seg command. (MCR 107) Add a new bit to the control bit string of the sort_seg subroutine.

IMPLICATIONS: None - the documentation for sort_seg and sort_seg_ has not yet been submitted for publication.
TITLE: Bug fixes to Debug

AUTHOR: Susan Barr

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | REPLACED BY PROPOSAL
----------------|--------------|---------------------
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency | 1. Don't do l-c; change documentation.
Performance Improvement | x Simplification |   
Reliability Improvement | Generalization |   
| x Reported Fix |   

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS:

1. Printing Instructions:
   a) The line number is printed at the wrong place if there are multiword instructions.
   b) 'eis' instructions are not disassembled.
   c) Instead of printing the number of instructions requested, debug prints that many words.
   d) There are some instructions missing from the op code table.

2. Breaks:
   a) All the global break commands cause a reference through a null pointer if there are no breaks set.
   b) The break skip command (.bsl n) does not work if there is a condition line with the break.
   c) If the caller tries to set a regular break at the same location as the last temporary break an invalid break results.
   d) Breaks can not be set at the start of eis instructions.

3. Assigning values to variables:
   a) Precision is lost on assigning floating point data with a large fraction part. Each digit of the fraction was converted to a floating point number and then divided by the appropriate power of ten.
   b) When reading several floating point number to fill an array, the minus sign is ignored if the previous number had no fraction. (i.e., -10. -10 would be read -10. +10.)
c) Debug overwrites its storage if the user tries to read a character string of more than 80 characters.

4. Printing Variables:
   a) Debug is not compatible with the new ioa, which requires that the control argument matched the descriptors. Debug uses a fixed binary variable based on a pointer to print floating point data.
   b) Varying character strings used as arguments are not printed correctly.

5. Debug searches the directory in which a program was compiled for the source segment. It should search the working directory as well.

6. Debug has no error handlers and the user returns to command level when an error occurs in the debugger itself.

SUMMARY:

1. The disassembler routine was rewritten using portions of the disassembler from the pl compiler. The op_mnemonic table of the compiler was used instead of the debug table.

3. The assignment of arithmetic values is done using assign_ which uses a better algorithm.

6. An "anyother" handler was set up which uses the default error handler to print an error message and then reads a debug input line. The "anyother" condition must be reverted or disabled when leaving the debugger. (e.g., when issuing ".." and ":=").
TITLE: Modify initialization to ease the "high water mark" problem.

AUTHOR: Steve Webber

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION: Incompatible Change

JUSTIFICATION: Marketing Requirement

IMPLEMENTED IN SYSTEM: Replaced by proposal MCR

REASONS: Due to the method that the system is initialized it is possible to run out of core memory early in initialization. This MCR proposes a method of minimizing this difficulty. The problem only occurs if there is 128k of memory.

SUMMARY: The technique proposed is to move several procedures and data bases from collection 1 to collection 2.

IMPLICATIONS: If the change is done in a clever way there can be a breakage of about \( \frac{1}{2} \)k to 1k of core that will be lost. In the ideal case breakage can be reduced to near zero, but it should never exceed 1k.

DETAIL DESCRIPTION:
1. The following modules and data bases will be moved to collection 2.
   - emergency_shutdown
   - d 355_data
   - bound_355_wired
   - bound_iom_wired
   - bound_tc_wired
   - pxss
   - tc_data
   - tty_ctl
   - tty_buf
   - disk_traffic_data
   These total to about 30k.
2. Changes will have to be made to the software to change the initialization of the 355 software and certain other I/O modules.

3. The initialization "waiting" mechanism used by page control will have to be slightly changed.

4. The initialization of disk_traffic_data will have to be slightly changed.

5. The programs and read only data bases above should be bound together to minimize breakage.

6. The fabrication of the length of tc_data will be removed from bootstrapl.

7. The I/O buffer tty_buf should be forced in abs_usable core.
## Title: Emergency Installation of pl1_operators

### Author: Richard A. Barnes

### Source: (if external) e.g., "User", "Marketing"

### Classification

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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

### Reasons:

An obsolete version of pl1_operators was installed at MIT leaving several bugs unfixed and creating a minor inconsistency with the p11 compiler in regards to bug 1044.

### Summary:

Fixes basic bug: 026
PL/I bugs: 1044, 1065, 1078, 1082, 1083

Any_to_any, pl1_operators and power must be replaced.

Bugs 1065 (conversion to short unpacked string target) and 1082 (assignment of null string to varying string) are especially important.
TITLE: Repair Problems Introduced by Change to Tape Controller Specifications

AUTHOR: Noel I. Morris

SOURCE: Internal

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
---|---|---
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency
Performance Improvement | Simplification
Reliability Improvement | Generalization
Unreported | Bug Fix

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS:
A change was made to the MTS500 Magnetic Tape Controller specifications. This change causes end of tape status to be returned on all tape writes which follow the detection of the end of tape reflector. Formerly, only the first such write caused end of tape status to be returned.

Since the ntape package treats the end of tape status as an error, BOS SAVE runs off the end of SAVE tapes.

Summary:
The BOS ntape package will be modified to treat end of tape status differently. Other tape writing programs in BOS and Multics will have to be audited to see if the end of tape condition is handled properly.

Implications:
MTS500 controllers running level H1 firmware will be incapable of performing BOS SAVEs until the repaired software is installed. If SAVEs must be performed on the MTS500, the controller must be running level G firmware until the repairs are made.
MULTICS CHANGE REQUEST

TITL̂E: Emergency Fixes to I/O Coordinator

AUTHOR: Robert S. Coren

SOURCE: (if external) e.g., "User", "Marketing"

TITLE: Emergency Fixes to I/O Coordinator

AUTHOR: Robert S. Coren

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
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Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency |
Performance Improvement | Simplification |
Reliability Improvement | Generalization |

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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS:

1. I/O daemon was sometimes repeating same request over and over because of failure to delete a request (Bug 264).

2. I/O coordinator sometimes takes mysterious recursive linkage errors (Bug 277).

SUMMARY:

1. If an unsuccessful attempt is made to delete a message from a queue, drop the queue.

2. Correct handling of faults so spurious recursion will not occur; cause SCU data to be written onto "log_output" stream if actual recursion occurs.

IMPLICATIONS:

Already installed as an emergency installation.
MULTICS CHANGE REQUEST

TITLE: Version 1 Message Segment Primitive
Bug fix

AUTHOR: Peter Haber

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency
Performance Improvement | Simplification
Reliability Improvement | Generalization

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS:

Primitive copies 13 bits of extended access from caller, should only copy first 5.

SUMMARY:

Change primitive to copy only 5 bits.

IMPLICATIONS:

Commands which use this interface will work whether they pass 5 or 13 bits of extended access.

Bug not reported.
TITLE: Fix bug in del_dir_tree

AUTHOR: E. Stone

SOURCE: (if external) e.g., "User", "Marketing"

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| Reliability Improvement |
| Generalization          |

| Bug Fix 280 |

REASONS:
The procedure del_dir_tree should have been changed in system 22-0 when the rules for deletion changed.

Currently if a request is made to remove a sub_tree containing a directory to which the user lacks SM access, the procedure returns rather than forcing access.

IMPLICATIONS:
Prevent looping in the user ring by the delete_dir command.
MULTICS CHANGE REQUEST

TITLE: Loss of form feeds on input

AUTHOR: R.B. Synder

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency |
Performance Improvement | Simplification |
Reliability Improvement | Generalization |
x | Bug Fix - 279 |

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS:

With the installation of 23.9, a bug was inserted wherein /014s (form feeds) typed as the last characters on a line are being thrown away.

SUMMARY:

This bug will be fixed.

IMPLICATIONS:

None
**MULTICS CHANGE REQUEST**

**TITLE:** DC_Pack Cleanup Handler bug

**AUTHOR:** Andrew Kobziar

**SOURCE:** (if external) e.g., "User", "Marketing"

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**REASONS:**
The cleanup handler for dc_pack is established in a begin block but references variables that are set only in the parent. When invoked, these values are obtained from the begin block stack frame and are undefined. If the magnitude is larger than the bound on system_free_seg, the system will crash.

**SUMMARY:**
Change references to a variable that is set in the begin block.
TITLE: Improper ACL setting in Delete

AUTHOR: Andrew Kobziar

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
---|---|---
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency | 
Performance Improvement | Simplification | 
Reliability Improvement | Generalization | 
Unreported | Bug Fix | 

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS:
Delete adds an ACL for "USER RE" if unable to initiate a segment in order to terminate reference names. It later asks the user if it should force deletion of the segment. If the answer is "no" then the "USER RE" ACL is not removed.

SUMMARY:
Remove the "USER RE" ACL in this case.
## MULTICS CHANGE REQUEST

**TITLE:** Fix bugs in meter_gate  

**AUTHOR:** Steve Webber  

**SOURCE:** (if external) e.g., "User", "Marketing"  

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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

### REASONS:

There are 2 separate bugs in meter_gate as follows:

1) The percentage of cpu time reported is incorrect if the configuration has or has had 2 CPU's

2) The program did not work for "fast gates".

### SUMMARY:

Fix these bugs

### IMPLICATIONS:

All old output with percentages is wrong and comparisons should be made with this in mind.
### MULTICS CHANGE REQUEST

**TITLE:** Bug in `process_input_string`

**AUTHOR:** Steve Herbst

**SOURCE:** (if external) e.g., "User", "Marketing"

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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**REASONS:**

`process_input_string` discards an error code returned by `eval_ec_if_test` when there is a syntax error in an evaluated "&if" expression. It may print an erroneous error message.

**SUMMARY:**

Save the code and pass it to `com_err`.
TITLE: Fix Bug in Tape DCM

AUTHOR: Noel I. Morris

SOURCE: (if external) e.g., "User", "Marketing"

REASONS:
The tape DCM can cause a system crash if no handler 1 is in the configuration. Code in the force detach handler section of the TDCM erroneously assumes the information in the handler table for drive 1 to be correct.

Summary:
Change TDCM not to examine the handler table entry for drive 1.
MULTICS CHANGE REQUEST

TITLE: Automatic System ID Generation by MST Generator

AUTHOR: B. Greenberg

SOURCE: (if external) e.g., "User", "Marketing"

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency | 
Performance Improvement | Simplification | 
Reliability Improvement | Generalization | 

Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

REASONS: Every hardcore installation is currently accompanied by the re-installation and re-assembly of active_all_rings_data, for the sole purpose of changing the system ID. In addition to being useless work, the complete updating procedure invoked on this module is devoid of semantic significance.

SUMMARY: Provide keyword and command option for generate_mst to insert the system ID in the copy of active_all_rings_data being written at system generation time.

IMPLICATIONS: Change the documentation for gm.

DETAILED PROPOSAL: The optional keyword "sysid" or "sys_id" followed by a colon and the name of an internal symbol in the segment under which this keyword appears is put in (any number) of header entries in the hardcore header. When encountered by the generator, a copy of the segment will be made, and the system ID will replace the two words at that symbol in the copied segment. The system ID used is defaulted the same as the name which, suffixed by ".header", is sought as the name of the header. If the "-sysid" (or "-sys_id") option is used in the generate_mst command, the following argument is used as the system ID.

Although it might be argued that the current proposal is something of a kludge, I contend, in the absence of some "sophisticated" mechanism such as writing the ID into bootstrap1, making a new type of SLT entry or MST header word, etc., that the proposed mechanism is viable, simple, and compatible.
**MULTICS CHANGE REQUEST**

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<tr>
<td>AUTHOR:</td>
<td>Peter Haber</td>
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**REASONS:**
Message segment facility repeatedly initiates the same message segment, filling KST and causing i/o daemon to the linkage errors.

**SUMMARY:**
Change initiate call to return internal static ptr from first initiate.

**IMPLICATIONS:**
None
MULTICS CHANGE REQUEST

TITLE: New versions of sort_items_ and sort_items_indirect_

AUTHOR: Ross E. Klinger

SOURCE: (if external, e.g., "User", "Marketing") MIT - POO

CLASSIFICATION: Rejected by proposal MCR

JUSTIFICATION: Replaced by proposal MCR

1: Incompatible
2: Marketing
3: Change
4: Requirement
5: Functional
6: Extension
7: Conformance
8: Performance
9: Distribution
10: Consistency
11: To Standard
12: Objections/Comments
13: Increased
14: Simplification
15: Reliability
16: Generalization
17: Bug Fix
18: Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally DETAILED PROPOSAL

1. Changing the sort algorithm used by sort_seg_ (MCR 107) from combination of Shell and radix exchange sorts, performed by an intern procedure, to the QUICKERSORT algorithm, performed by sort_items_indirect results in a marked decrease in execution time. This decrease ranges from 15% for a 1 record segment to 50% for a 30 record segment.

2. sort_seg_ requires that sort_items_indirect_ accept adjustable-length character strings.

3. The current sort_items_indirect_ (and sort_items_) entry sequenc necessitate an inordinate amount of argument manipulation due to alignment considerations. Their current data comparison methods execute superfluous cmpc instruction (80 microsec. for a 100 character string) 50% of the comparisons. The sort is currently accomplished using recursive inner procedure which can be made non-recursive.

4. Eliminating these inefficiencies reduces the execution time sort_items_ and sort_items_indirect_ by a factor of 4.

SUMMARY:

1. Change sort_seg_ to use sort_items_indirect_.
2. Change the internals of sort_items_ and sort_items_indirect_ produce more efficient code.
3. Add an entry point (adj_char) which accepts adjustable-length character strings to sort_items_indirect_.

Page 1
New versions of `sort_items_` and `sort_items_indirect_`

4) Change the calling sequences of `sort_items_` and `sort_items_indirect_` to accept pointers to structures containing aligned arrays.

5) Remove `sort_items_` and `sort_items_indirect_` from `bound_utility_tools_` in `system_library_tools`, and create a new bound segment, `bound_sort_routines_` in `system_library_standard`, which will contain `sort_items_`, `sort_items_indirect_`, `sort_seg`, and `sort_seg_`.

**IMPLICATIONS:**

1) User Interface - minimal, as no system routines currently reference `sort_items_` or `sort_items_indirect_`.

2) Performance
   
   a) `sort_seg` and `sort_seg_` will operate as much as 4 times faster than `sort_file`. The initial versions operated, at best, only twice as fast.

   b) `sort_items_` and `sort_items_indirect_` will operate 4 times faster than the currently installed versions.

**DETAILED PROPOSAL:** see MTB-068 for changes made to the user interfaces of `sort_items_` and `sort_items_indirect_`.

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