DATE: May 6, 1974
TO: Distribution
FROM: M. S. Hodges
SUBJECT: Multics Change Requests

Attached are copies of Multics Change Requests which were approved from April 16 - April 30, 1974.
Title: Cache Multics, single-cpu version.

Author: Bernard S. Greenberg

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

Classification: Incompatible Change

Justification: Marketing Requirement

Status: Written 2/21

Date: Rejected 8/23/74

Withdrawn 2/26/74

Expires 10/23/74

Objections/Comments:

Awaiting MTB and design review.

Classification: Extension

Justification: Conformance to Standard

Classification: Restriction

Justification: Increased Consistency

Classification: Performance Improvement

Justification: Simplification

Classification: Reliability Improvement

Justification: Generalization

Classification: Bug Fix

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

Reasons: A processor cache is now available for the 6000 line, which has several features specifically included for Multics. Multics should use this hardware.

The software which is necessary to run the cache under Multics is not incompatible with the current software, and should be installed before the arrival in Cambridge of the cache, in order to simplify the process of debugging the cache and its supporting software here and in Phoenix.

This software will be implemented in two phases, a one-cpu version and a multiple-cpu version.

Summary: Code is added to page control to selectively clear cache when paging i/o will change contents of core. A new SLT attribute is defined to determine whether hardcore segments can go in the cache (see MCR 374), and code to incorporate this information in SDW's is added. Code to disable and enable the cache at various points is added. In this first version, all SDW's created by segfaults allow their segments in the cache. Some code which will be used by the second version is added, including a redefinition of the meaning of a connect fault. Bos "PROC" package must be modified to not interpret the "bos dump bit" of SDW's, which is now the "cache" bit, and the bos "dump" program must be modified to print out the "cache" bit (see MCR 375). A separate bos program is being written to dump the cache.
MULTICS CHANGE REQUEST

TITLE: MST Generator and Checker changes for Cache

AUTHOR: Bernard S. Greenberg

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

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
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Incompatible Change | Marketing Requirement | Implemented in System
X Extension | Conformance to Standard | Objections/Comments: Awaiting MTB and Design Review
Restriction | Increased Consistency | 
Performance Improvement | Simplification | 
Reliability Improvement | Generalization | 
Bug Fix | 
X Needed for MCR 373 | 

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

REASONS: The use of the 6180 Cache on Multics requires a new SLT attribute which tells whether or not the words of a given hardcore segment are to be allowed in the cache. The MST generator and checker must be modified to process this attribute.

These tools should be installed before the arrival in Cambridge of the cache, in order to reduce the number of non-installed tools which will be necessary to debug the cache and its support software in Phoenix.

SUMMARY: Change 'SLTE include file for new bit (slte.cache), modify generate_mst and gm_util_ to process "cache" attribute (default is "on"), and modify loading_summary_ subroutine of checker to print an "A" in the "SWITCHES" field if a segment is allowed in the cache.

IMPLICATIONS: None. New slt bit is not used elsewhere or ever assumed to be zero.
MULTICS CHANGE REQUEST

TITLE: Bos Compatibility changes for 6180 Cache

AUTHOR: Bernard Greenberg

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

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REASONS: The new cache software (see MCR 373) redefines the meaning of SDW bit 57. In a previous version of Multics, this bit had been used to force BOS dumping of directories. As this is no longer necessary, this bit being on would force dumping of all segments which would be allowed in the cache. This feature should thus be removed from BOS.

The BOS dumping package should be modified to print out this new bit.

SUMMARY: Modify "proc.incl.alm" to ignore "sdw.dump". Modify "dump.alm" to print out a flag indicating the status of the cache bit.

IMPLICATIONS: The version of "sdw.incl.alm" which defines the cache bit must be installed. No Multics programs would be affected.
TITLE: install BOS ABS command

AUTHOR: Bernard S. Greenberg

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

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

REASONS: There are currently no tools to analyze the contents of core after a crash.

SUMMARY: Install a BOS program which analyzes the contents of core after a crash.

IMPLICATIONS: Greater ease in analyzing various natures of page control failures.

DETAILED PROPOSAL: The ABS command prints a dump of core by absolute core address, describing the contents of each page of core. It also answers inquiries about the contents of any specific location in core, directed from the Operator's console. It also analyzes the contents of the 6180 cache, if one is present. This program uses information not available in FDUMP images, and thus must run at crash time. Perhaps the information currently printed by this program will be added to the FDUMP image at some later date.

An MOSN will be written describing the use of this program.
TITLE: New abs_usable-abs_wired mechanism

AUTHOR: Bernard S. Greenberg

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 | 
Restriction | Increased Consistency | 
Performance Improvement | % Simplification | Objections/Comments:
Reliability Improvement | % Generalization |
Bug Fix |

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

REASONS: The new I/O interfacer (MCR 056) requires the ability to restrict pages of any arbitrary segment to abs_usable (non-reconfigurable) memory.

SUMMARY: A new bit in the AST entry of a segment (aste.abs_wireable) is defined. A page fault (or forced read) taken on a segment with this bit turned on is always resolved in abs_usable core. Entries to abs-wire-pages will be removed, and programs calling them modified to use the new mechanism.

IMPLICATIONS: All programs requiring segments in abs_usable memory will have to use this new mechanism.
### MULTICS CHANGE REQUEST

**Title:** Fix 2 CPU bug in operator's console software  

**Author:** Noel I. Morris  

**Source:** Internal

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**Reasons:**

A "deadly embrace" condition could result where one processor was trying to pickup IOM status while the other processor was trying to deliver the status.

**Summary:**

The method of status delivery will be changed to resemble that of the disk DIM (which once suffered from the same problem). The processor waiting for status will be able to pick up the status which the other processor is trying to deliver.
TITLE: Fix bug in BOS command LD355

AUTHOR: Noel L. Morris

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

CLASSIFICATION
Incompatible Change
Extension
Restriction
Performance Improvement
Reliability Improvement

JUSTIFICATION
Marketing Requirement
Conformance to Standard
Increased Consistency
Simplification
Generalization
Unreported Bug Fix

Replaced by proposal MCR
Implemented in System
Objections/Comments:

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

REASONS:

LD355 fails to call the operator's console initialization subroutine. This causes a problem when an operator's console channel number other than 20 is used.

Summary:

Fix LD355 to call 'ttyinit' in BOS.
### Title
Fix bug in operator's console software when not using log.

### Author
Neal I. Morris

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

### Classification
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### Reasons
If the "PART LOG" card is omitted from the configuration deck, logging by the operator's console software should be turned off. Instead, the system will crash during initialization.

### Summary
Repair the software so that an uninitialized data base is not referenced when logging is not in use.
**MULTICS CHANGE REQUEST**

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**TITLE:** Implement I/O Interfacer

**AUTHOR:** Noel L. Morris

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

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**CLASSIFICATION JUSTIFICATION:**
- Replaced by proposal MCR
- Implemented in System

**REASONS:**

See MTB-028 and MTB-056.
TITLE: Fix bugs in BASIC

AUTHOR: Barry L. Wolman

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 |
| x Bug Fix |

REASONS: BASIC currently installed in Phoenix (release 1.0) has a number of bugs that should be fixed.

PROPOSAL: Install new BASIC that fixes following bugs:
#18 Bug in string operation
#20 No message for runtime error 97
#21 abs (cos(x)) can return negative result
#22 let a$ = a$ sets a$ = ""
#23 x^ -k is parsed incorrectly
#24 mat a = b + c fails (caused by bug in Pl/l)
#25 usr$ function returns string with trailing blank

SUMMARY: These bugs are fixed in experimental version of BASIC

IMPLICATIONS: None
## MULTICS CHANGE REQUEST

**TITLE:** The Phonetic Underscore  
**AUTHOR:** M.D. MacLaren  
**SOURCE:** (if external) e.g., "User", "Marketing"

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

**REASONS:** There is an annoying inconsistency in the spelling of command names: a few of them do not have underscores between distinct words e.g. "addname". This is a pointless annoyance for the casual user. Even the experienced user may have trouble when he wants to look the commands up in the MPM.

**SUMMARY:** Add the name shown below in the left column to the command in the right column. Make the new name the official one as far as MPM documentation is concerned, demoting the old name to the status of an abbreviation.

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<td>create_dir</td>
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**MULTICS CHANGE REQUEST**

**TITLE:** Install compiler tools tmg and compile_messages

**AUTHOR:** R.A. Barnes

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

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

**REASONS:** Our contract with the U.S.A.F. requires that they be able to reproduce the entire system from the source level.

**SUMMARY:** tmg (table) is a macro expander that is used to preprocess the compiler macro tables before assembling them. Compile_messages compiles an ASCII file of error messages into an error message table.
TITLE: Fix bug in illegal_procedure's attempted simulation of the MVT instruction to zero length target strings.

AUTHOR: Steve Webber

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 |
| unreported |
| Bug Fix |

REASONS: The MVT instruction is not handled correctly by the procedure illegal_procedure when it attempts to ignore the illegal procedure fault that results from a zero length target string.

SUMMARY: Fix the program to change the ILC by 4 rather than 3 for the MVT instruction.
**MULTICS CHANGE REQUEST**

**TITLE:** Add "report_reset" control argument to tty_meters

**AUTHOR:** R.B. Snyder

**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 | 
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Extension | Bug Fix |

**REASONS:** To conform to the metering command standards, tty_meters will be modified to accept the "report_reset" control argument. It will also be modified to use the ring_zero_peek_subroutine.

**IMPLICATIONS:** None
TITLE: Fix to meter_gate_subroutine

AUTHOR: R.B. Snyder

SOURCE: local

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 | 
X | Unreported Bug Fix | 

REASONS: The meter_gate_subroutine returns the total cpu time used by gate entry as fixed bin (35). This should be fixed bin (52).

SUMMARY: meter_gate_ and tty_meters (the only program that calls meter_gate_) will be modified.

IMPLICATIONS: None
Title: TTYDIM change for online T&D

Author: R.B. Snyder

Source: Local

Reasons: The online T&D folks want to know when a message has actually been written at a terminal.

Summary: A new mode will be added to (if the mode is on) cause the ttydim to send a wakeup to a user's process after a message has been written to a terminal.

Implications: None except document change (MPM, PLM)
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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**REASONS:** Determination by device drivers at initialization of whether an I/O Coordinator is running is not completely reliable.

**SUMMARY:** Device driver when logging in will check for existence of Coordinator and wait 60 seconds if there is none.

**IMPLICATIONS:**
1. Error message about missing coordinator will only occur after one-minute wait.
2. System exec which log in coordinator and then driver immediately should work better.

**DETAILED PROPOSAL:** Supplement existing lock (used by coordinator to ensure that another coordinator is not already running) with a secondary lock indicating that coordinator lock is being tested. For a driver to lock coordinator lock, attempts to lock coordinator lock. If it succeeds, unlocks both, waits 60 seconds, and tries again; if it again succeeds in locking coordinator lock, assumes coordinator wasn't logged in, prints error message and logs out.
**TITLE:** Improve access checking in dprint

**AUTHOR:** Robert S. Coren

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

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**REASONS:**
1. First invocation of dprint in a process currently requires call to iodc_parse_parms in order to get daemon's access id for specified device class.
2. Access checking assumes daemon's person_name to be IO, which makes life difficult for users of private remote devices.

**SUMMARY:**
- a. Change get_ioc_defaults to use device class table set up by I/O coordinator, instead of getting its own version from iodc_parse_parms
- b. Add "Person" keyword to io_daemon_parms and corresponding item in device class table entry, which is person id of device driver for the class. If not supplied, defaults to "IO".

**IMPLICATIONS:**
A. 1. Use of dprint will no longer involve invocation of the iodc_parse_parms. This will save considerable time in initial invocation, and will enable iodc_parse_parms to be taken out of bound_io_commands and put in bound_ioc where it belongs.
2. If dprint is invoked when I/O coordinator is not up, or has not yet initialized device class table, values left over from previous coordinator session will be used. On rare occasions, dprint user may pick up inconsistent device class table if first dprint is issued while coordinator is parsing io_daemon_parms.
B. 1. User may request dprints by device classes whose drivers have a person id other than "IO", and the check for the driver's access to the segment will be correct.
2. Format of device class table must change, which will involve recompilation of many I/O daemon modules.
# MULTICS Change Request

**Title:** Gcos Daemon and Gcos User changes

**Author:** Peter Haber

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

**Status:**
- Written
- Approved
- Rejected
- Postponed
- Withdrawn
- Expires

**Classification:**
- Incompatible Change
- Extension
- Restriction
- Performance Improvement
- Reliability Improvement

**Justification:**
- Marketing Requirement
- Conformance to Standard
- Increased Consistency
- Simplification
- Generalization

**Replacement by Proposal:** MCR 468

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

**Reasons:** Implements changes to gcos daemon outlined in MTB-057, bug fixes to gcos_user code.

**Summary:** This update represents the following changes to the gcos daemon:
1. The use of the obsolete command "set_homedir" has been replaced with use of the "set default wdir" command.
2. The daemon will obtain the Multics person and project combination by verifying the EPA number on the IDENT card rather than the project password combination from a possible USERID card.
3. The instance tag of all gcos absentee jobs queued by the gcos daemon will have the instance tag "g" instead of ".*".
4. The default name of an absentee job will be "Anonymous.GCOS.g" instead of "Anonymous.Gcos.*"
5. The gcos user table procedures have been modified to use an EPA number instead of a gcos userid-password combination. (The documentation of "gcos_user" and "gcos_user" must be changed to reflect this.)
6. These changes also fix a number of bugs in the gcos user table code which prevented the gcos daemon from processing USERID cards correctly.
7. The gcos user table procedures have been modified to use a gcos user table in the gcos daemon's home directory.

**Implications:** gcos_user code will work.
TITLE: Version 2 Message Segment Bug Fixes

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 | 
unreported | Bug Fix | 

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

REASONS: Bug in message_segment_addname primitive causes error to be returned when called.

Bug in message_segment_conversion primitive causes oob error on version 1 message segments which are empty but have non-null headers.

SUMMARY: Fix bugs

IMPLICATIONS: None: submitted in MIT System. Bugs are unreported.
TITLE: New GCOS Simulator

AUTHOR: T. Casey

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

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

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

REASONS: The currently installed GCOS simulator contains many bugs, and simulates many GCOS features incorrectly.

SUMMARY: Install new bound_gcos_ and bound_gcos_utilities, containing a large number of bug fixes and improvements, including the following:

1. Complete rewrite of the simulation of I/O, supporting many more functions than before.
2. Implement cards: $BREAK, $DAC, $GOTO, $IF, $Label, $TAPE7, $TAPE9, $WHEN, and MMEs: GELOOP, GEROUT, GESNAP.
3. Handle activity aborts correctly.
4. Set PSW bits and slave prefix locations correctly, including the storing of correct information when a fault occurs.
5. Make execution report format and content, and the sorting of sysout, more like real GCOS.
6. Accept job limits and negative loader space on $LIMITS card.
7. Accept GCOS file string on $PRMFL and $SELECT cards.
8. Use pool directories for temporary and output files, if user so specifies.
9. Improved several simulator debugging facilities.
10. Cleaned up code, made more efficient, fixed many unreported bugs.

IMPLICATIONS: The incompatible change to the handling of $SELECT and $SELECTD cards, warned of in MCR 184, takes effect with this installation.

DETAILED PROPOSAL: The detailed list of changes made since the last installation is 15 pages long. Copies may be obtained from the author.

GCOS BUG NOS.: 1, 2, 4, 6, 10, 12, 14, 18, 22, 28, 31, 32, 37, 42, 44, 46 (partially), 48, 49, 51, 52, 53, 54.
**MULTICS CHANGE REQUEST**

<table>
<thead>
<tr>
<th>TITLE: Fix bug in cv_dir_acl.</th>
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<tbody>
<tr>
<td>AUTHOR: P. Kelley</td>
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<tr>
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<tr>
<td>Bug Fix</td>
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Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally DETAILED PROPOSAL

**Subject:**

Modify cv_dir_acl (entry point in cv_acl) to fix bug which incorrectly formats directory ACL entries for printing.

**Implications:**

Modification necessary for correct performance of program.
# Multics Change Request

**Title:** Fix Bug in bootstrap1

**Author:** Noel I. Morris

**Source:** Internal

<table>
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<td>Unreported Bug Fix</td>
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**Reasons:**

When bootstrap1 reads the rest of itself into core from tape, it expects to find MST records with no flag bits set. The new tape DIM causes the last record of bootstrap1 to be written onto the tape with padding bits in the tape record (during MST generation). bootstrap1 is unable to read this record.

**Summary:**

bootstrap1 will be changed to ignore the flag bits which indicate that a record was padded. It is already capable of handling records which contain fewer than the maximum possible number of data bits.

**Implications:**

This change must be installed before any system tapes are generated using the new tape DIM.
TITLE: Modify BOS CORE command

AUTHOR: Noel I. Morris

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

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 |
Bug Fix |

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

REASONS:
The BOS CORE command, when used to restore the contents of core, does an automatic GO unless the WAIT argument is supplied. Most of the time, the CORE command is used by programming staff, and in most of the instances of use, the programmer does not want to restart the core image after restoring it. Thus, the CORE command should be modified to just restore the contents of core, unless the GO argument is supplied.

Implications:
The Operator's Guide to BOS must be changed. This change will prevent programmers and operations from accidently restarting a core image.
**TITLE:** Fix handling of special interrupts in BOS

**AUTHOR:** Noel I. Morris

**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 | 
Unreported | Bug Fix | 

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

**REASONS:**

The special status channel (channel #6) in the IOM looks at its DCW in an unexpected way. A list service to fetch a new DCW is initiated when the DCW tally goes from 2 to 1, not from 1 to 0 as in all other channels. Programs in BOS which set up control words for the special status channel have thus been incorrectly designed.

**Summary:**

The DCW tally will always be set to a number greater than 1.

**Implications:**

The BOS iom manager (include file bos_iom_manager.incl.alm) and the BOS 5-card loader must be modified.
TITLE: Fix bug in procedure "get_device_status"

AUTHOR: D. Wells

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

CLASSIFICATION

- Incompatible Change
- Extension
- Restriction
- Performance Improvement
- Reliability Improvement

Justification

- Marketing Requirement
- Conformance to Standard
- Increased Consistency
- Simplification
- Generalization
- Unreported

Classification Justification

- Replaced by proposal MCR

REASONS: The "list_assigned_devices" entry point in the procedure "get_device_status" will attempt to free a structure which was never allocated if the calling process had no assigned devices. This bug primarily affects users logged in from the ARPA Network because locally dialed users have at least one assigned device (the "tty" login device).

SUMMARY: Fix bug in "get_device_status". Also, convert module to Version II PL/I.
MULTICS CHANGE REQUEST

TITLE: Changes to User Ring Link Unsnapping

AUTHOR: D. Wells

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

CLASSIFICATION

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

REASONS: There are currently several problems/bugs associated with the unsnapping of intersegment links in the user ring:

1) The term_$single_refname entry point discards the linkage section of the segment having the designated reference name. This has the undesirable side effect of reinitializing the segment's internal static storage.

2) The entry points in the module "term_" declare all character strings arguments to be char (*) aligned, rather than char (*). This causes all calling programs to have to copy their character strings which have been used with hcs_ entries into aligned strings. (It should be noted that term_ is an illegal PL/I program in that it misdeclares hcs_ entries as requiring char (*) aligned arguments.

3) There is currently a bug in the Hardcore Linker such that a pointer in a linkage section is invalid if the linkage template was a ".link" segment rather than a section of the original object segment. This causes the procedure "link_unsnap_" to incorrectly unsnap links from segments which have ".link" linkage template segments.

SUMMARY:

1) Alter the term_$single_refname entry point to not discard the linkage section of the referenced segment. (This is done by moving the procedure "unsnap_service" to the user ring from hardcore.

2) Change the declarations of all character strings in "term_" to be unaligned. (Note that because these character strings are never examined in term_, this should cause no performance degradation.

3) Place a check into link_unsnap_ to check (and correct) any linkage template pointers from segments with separate linkage template segments. This check may be removed if/when the linker bug is fixed.
IMPLICATIONS:

2) The documentation for `term` should be corrected to declare all character string arguments as unaligned. Because of the structure of the Multics PL/I compiler, all user programs will continue to function correctly. (In fact, it is only due to this implementation of the compiler that the current `term` functions correctly.)

3) There will be a slight performance degradation each time that a link is unsnapped (on the order of 4 instructions). There will be a slight performance degradation for each link from which a link is unsnapped which had a ".link" segment (approx. one call to hcs_$initiate). There will be no performance degradation for any links which are left unchanged.

It is assumed that no user could be relying on this bug as a feature.

1) The alteration of the function of the `term_$single_refname` entry point could affect some users (though none are known to exist). These users could use this entry point and rely on the current action of reinitializing the segment's internal static.

In moving the procedure "unsnap_service" to the user ring, the method of finding the proper LOT has been changed. When this procedure was in Hardcore, the lot array was used to find it. The new unsnap_service uses the LOT pointer at the base of the appropriate stack. While no user is known to patch the LOT pointer at the base of the stack, this is still a different mechanism. (This is the same mechanism used by the User Ring Linker being developed at MACW.)

Because of the above changes, this installation will be preceded by an info file describing these changes.
## MULTICS CHANGE REQUEST

**TITLE:** Fix bug in Interprocess Communication Interface

**AUTHOR:** D. Wells

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

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**STATUS**

| Written         | 74.04.16       |
| Approved        | 4/23/77        |
| Rejected        |                |
| Postponed       |                |
| Withdrawn       |                |
| Expires         | 10/23/77       |

**REASONS:** The entry point "ipc$_read_ev_chn" neglects to fill in the message portion of the event message structure. Instead, any old data which occupied that portion of the structure will be returned to the caller as the message. This action is inconsistent with the desired action of being analogous to the "ipc$_block" entry point with regard to returned information.

**SUMMARY:** Fix bug in procedure "full_ipc_" -- assign message bits into users structure.
TITLE: Change LOADDM to accept command name arguments

AUTHOR: Bernard 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

REASONS: It would be quite useful to selectively load programs from a full or partial BOS tape into the BOS environment. Currently, we can only load an entire tape. I have felt this need many times.

SUMMARY: LOADDM, the BOS loader, when invoked from BOS command level, currently takes an optional argument which is a tape drive number. Add further optional arguments, specifying which segments are to be loaded from this tape. If none are specified, the entire tape will be loaded as now. Operation of LOADDM as invoked by the IOM loader deck is not affected.

IMPLICATIONS: n/a
### MULTICS CHANGE REQUEST

**TITLE:** Shutdown/Startup reused address bug

**AUTHOR:** Bernard Greenberg

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

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

**REASONS:** Bringing the system up and down and up and down several times causes the message "page: unprotected or reused address" to appear and crash the system. Phoenix reports that this frequently causes crashes after shutdowns.

**SUMMARY:** At least one bug leading to this symptom has been isolated from an analysis of two Phoenix crashes. The depositing of disk storage for pages discovered to be zero after their branches are updated by shutdown causes these addresses to be unprotected in the FSDCT. Subsequent deletion of that branch (e.g., the deletion of pdd by init branches at boot time) causes an unprotected address to be discovered. Hence, we will inhibit all zero-page depositing during shutdown.

**IMPLICATIONS:** Some pages of zero contents may exist on disk as a result of this policy. As long as such pages are not modified, they will stay this way.
TITLE: Delete pll_operators_ from lang library

AUTHOR: Barry L. Wolman

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: Now that pll_operators_ is installed in ring 0, there is no reason to have a duplicate copy in the languages library. Indeed, as long as the pll_operators_ in the languages library remains in the standard search path, the pll_operators_ in hardcore will not get used by ring 4 programs.

SUMMARY: Delete pll_operators_ from lang library. Ring 4 programs will start using the wired-down version of the operators in hardcore.

IMPLICATIONS: None
TITLE: Study new scheduler and paging algorithms

AUTHOR: Steve Webber

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 |
Bug Fix |

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

REASONS: As part of the performance improvement task a new scheduler and page removal algorithm are very important. This MCR requests the study of these functions be approved. Note there is only one MCR because it is believed that the result of the study will show a need for a close cooperation between the scheduler and page control.

SUMMARY: Two MTB's have already been prepared in anticipation of the study.
TITLE: Change error_table_messages

AUTHOR: T. Casey

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: Two error_table codes, formerly used only by the obsolete procedure fm, and no longer documented in the MFM, are now being used by the GCOS environment simulator. Their use is necessary since subroutine interfaces for reading and writing GCOS files must be available to users, as promised in marketing specifications.

These existing error_table entries were chosen (rather than adding new ones), first, so that they could be used immediately, and second, because their names, and the messages they contain, are most appropriate to describe the conditions for which they are returned.

SUMMARY: This MCR is to request:
1. that the descriptions of these two entries be put back into the MFM;
2. a change to the wording of the messages, making them consistent in form with each other, and removing the error_table_entry name from the messages.

IMPLICATIONS: The change in wording will not affect users in any significant way.

DETAILED PROPOSAL: Change the messages to the following:

error_table $file already opened:
- A file is already open under this reference name.

error_table $file not opened:
- No file is open under this reference name.
### MULTICS CHANGE REQUEST

**TITLE:** Fix to message segment pointer validator

**AUTHOR:** Peter Haber

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

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

**REASONS:** Bug fix to pointer validating procedures which caused this procedure to reject valid pointers.
**TITLE:** Fix error handling in GCOS Daemon and I/O Subroutines  

**AUTHOR:** T. Casey & P. Haber  

**SOURCE:** Internal  

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

**REASONS:** The subroutines gcos_gsr_read and gcos_gsr_write are to be made available to users, as promised in marketing specifications. They presently call com_err and then return nonstandard error codes (1 & 2), which the daemon looks for, when any error occurs.  

**SUMMARY:** Change the subroutines to return error_table codes, and change the daemon to call com_err whenever appropriate.  

**IMPLICATIONS:** The changed subroutines and the daemon must be installed at the same time (they are in different bound segments).  

**DETAILED PROPOSAL:** Changes will be made to gcos_gsr_read, gcos_gsr_write, and to the following daemon procedures:  

gcos_convert_sst, gcos_print_file.
MULTICS CHANGE REQUEST

TITLE: Allow B, D, E, F, and I in numeric input fields

AUTHOR: Barry L. Wolman

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

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

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

REASONS: The BASIC compiler and runtime use the any_to_any conversion program for all conversions from string to numeric. The characters b, d, e, f, and i are recognized by any_to_any as having special meaning in strings representing numeric values. BASIC uses the format 1.23 E+23 when printing numeric values in exponential format. In order to read such values from ASCII files previously written by BASIC programs, we propose to change any_to_any so that E is treated as equivalent to e. For the sake of uniformity, we propose treating the uppercase of all special characters (b, d, e, f, and i) as equivalent to the lowercase version.

IMPLICATIONS: Some PL/I and FORTRAN programs may start accepting strings that they currently would reject.