To: Distribution

From: M. S. Hodges

Date: July 10, 1974

Subject: Multics Change Requests

Attached are copies of Multics Change Requests which were approved from June 16 - 30, 1974.

Multics Project internal working documentation. Not to be reproduced or distributed outside the Multics Project.
Prevent "deadly embrace" in get_aste

E. Stone

CLASSIFICATION
Incompatible Changes
Extension
Restriction
Performance Improvement
Reliability Improvement

JUSTIFICATION
Marketing Requirement
Conformance to Standard
Increased Consistency
Simplification
Generalization

Note: Reduces occurrences of, but does not eliminate the problem.

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

REASONS:
The procedure get_aste violates a ring_0 locking rule regarding locking order. The global ast lock is set prior to a directory lock attempt. This action was done for some time with impunity for the following reasons:

1) An attempt is made to lock the parent of any active segments suitable for deactivation; the choice of segment is anonymous.

2) If the parent cannot be locked and the next ast in the list is scrutinized.

3) Usually the size of each ast list is large enough to contain an entry whose parent could be locked.

4) If no parent can be locked, another loop through the entire list is done. The third condition was not met when 256k segments first were made available and few astes of this size were allocated.

Several times a deadly embrace resulted with one process waiting to lock the aste having locked a directory containing several 256k active segments and a second process looping through the ast list unable to lock the parent containing the 256k segments.

PROPOSAL:
If no parent can be locked, unlock the ast and wait for the first such parent to be unlocked. Then try the whole process again.
**MULTICS CHANGE REQUEST**

<table>
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<th>Protect accounting job from blowup if files destroyed</th>
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<tr>
<td>STATUS</td>
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<td>Rejected</td>
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<td>Withdrawn</td>
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| AUTHOR | VanVleck |
| SOURCE | (if external e.g., "User", "Marketing") |

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
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<tbody>
<tr>
<td>Incompatible</td>
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<td>(Unreported)</td>
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<td>Bug Fix</td>
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Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally DETAILED PROPOSAL

**REASONS:**

The segments reqfile and projfile seem to be especially vulnerable to destruction by the salvager. On many occasions, the salvager has truncated these segments, leaving the branch intact. (This may be due to the use of the copy switch option of initiate in some of the administrative tools.) When the crank runs and encounters a zero-length reqfile, the program compute_bill assumes that the reqfile entry for each project was inadvertently lost, and creates a dummy entry, with all fields set to "(unknown)" or zero. Similar action is taken if projfile is truncated. This causes all projects to be added to the reqfile and projfile with an open requisition balance, and an already-expired requisition cutoff date. This, in turn, causes all users to be unable to log in.

**SUMMARY:**

Modify compute_bill to check for the case of an empty reqfile and projfile, and abort by signalling "crank_cant_run." Also change the editors for the projfile and reqfile to check for this condition and exit with an error message, to prevent user accounts office personnel from attempting to add data to a damaged file; and change these editors to eliminate use of the copy switch in an attempt to prevent the problems. Rename erf to edit_reqfile and epro to edit_projfile in the interest of clarity.
IMPLICATIONS:

If the cause of the truncations has been diagnosed correctly, this change should make the problem happen much less often. When reqfile is truncated, the crank will abort with a sensible error message rather than making it impossible for all users to log in.

The crank already keeps backup copies, a day old, of reqfile and profjfile. Causing the crank to stop short before over-writing the backup copies will enable a system administrator, investigating why the crank cannot run, to restore the backup copies with minimum loss of data. The renaming of the modules will have no effect, since the old names will be kept as alternate names for a suitable period.
MULTICS CHANGE REQUEST

TITLE: New Programs for System Administration: new_proj, edit_proj

AUTHOR: VanVleck

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

CLASSIFICATION | JUSTIFICATION
-----------------|-----------------------
Incompatible     | Replaced by proposal
Change           | MGR
Extension        | Implemented in System
Restriction       | Objections/Comments:
Performance      | Increased
Improvement      | Simplification
Reliability      | Generalization
Improvement      | Bug Fix

Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally DETAILED PROPOSAL

REASONS:

The current method used by the system administration subsystem to add a new project or to modify an existing project's attributes consists of running several programs under control of the master exec_com. If the system crashes while a project is being added, the restricted system administrator cannot, in general, recover without the assistance of a programmer. Furthermore, the interfaces presented by the system administration subsystem for the editing of project data are difficult to learn, which has often led to errors and problems.

SUMMARY:

Install new programs "new_proj," "edit_proj," "rename_proj," "edit_proj_," "delete_proj," and "parse_attributes_," These programs present a uniform and relatively foolproof interface for adding, deleting, and changing project registration data. Compilation of an SMF into an SAT is eliminated, except during initial setup of the system, since these programs work directly on the binary SAT. The use of "epro" and "erif" will be replaced by use of "edit_proj" (although the pro)file and reqfile editors will still work for unrestricted system administrators). System administrators will also be able to specify several project attributes which previously could only be set by unrestricted system administrators, including project attributes, load control group, additional project administrators, and maximum grace.
New Programs for System Administration
new_proj, edit_proj

06/08/74

IMPLICATIONS:

Project management should become easier, require less intervention by system-programmer class administrators, and consume less machine time.
## MULTICS CHANGE REQUEST

<table>
<thead>
<tr>
<th>TITLE</th>
<th>Remove Obsolete Code from daemon_user_manager_</th>
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<tbody>
<tr>
<td>AUTHOR</td>
<td>VanVleck</td>
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<tr>
<td>SOURCE</td>
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### CLASSIFICATION

<table>
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### REASONS

The initial version of the "console-less daemon" facility allowed for use of actual TTY channels for daemon process I/O instead of message coordinator attachments. This enabled us to check out the daemon log in facility before the message coordinator was ready.

This feature is not currently used. It provides no particular advantage over use of the message coordinator and adds complication to the code and documentation for the answering service. Furthermore, it is a likely source of operational errors unless its operation is understood.

### SUMMARY

Remove this code from daemon_user_manager_ and admin before some installation finds it and starts depending on it.

### IMPLICATIONS

The answering service code will be slightly smaller and cleaner. One source of confusion about the state of and control responsibility for a terminal will be eliminated. No functional incompatibility exists, because the message coordinator routing tables can be set up to dedicate a particular terminal to a single process -- and use of the message coordinator allows the installation to recover if the terminal goes down.
Daemon users can still be logged in from the terminal with a "login" command instead of by the operator, although this practice is considered unwise because there is no recovery from terminals going down and because it requires the operator to know a password.
**MULTICS CHANGE REQUEST**

**TITLE:** BOS DELREC Command to Protect Disk Record

**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 |
Unreported Bug Fix |

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

**REASONS:**

If a bad record exists on a disk pack (or if a record becomes bad), Multics may attempt to mark the record as used and continue operation when that record is encountered. In some cases, however, Multics can not recover from such a disk error. Also, any disk records marked as used, but not actually part of a segment, will be freed up when a salvager is run. A scheme is needed to prevent Multics from using bad disk records.

**Summary:**

The following is proposed as a temporary measure.

A BOS command called DELREC will be provided which, when entered, will read input lines from the operator's console, the card reader, or a runcom file. Each input line will specify a device address in a format accepted by the 'argbos' device address scanner. Such a device address may be of the form

```
DEVNAM RECORD#
```

or

```
DEVNAM BOS AREA# SECTOR#
```

If the fsdct bit corresponding to that record indicates that the record is free, the bit will be set to indicate that the record is in use. Multics will then never assign a page of a segment to that record.

**Implications:**

The new DELREC command should be invoked after every salvager run. If disk packs are swapped, the device addresses are subject to change. Therefore physical addresses should be used when possible.
MULTICS CHANGE REQUEST

TITILE: Implement 1/0 Buffer Manager

AUTHOR: B. Greenberg

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

CLASSIFICATION

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<td>Bug Fix</td>
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REASONS:
Proposal: Implement the 1/0 Buffer Manager as described in MTB 74.

IMPLICATIONS: SWG and PLM documentation required.
Move cam/connect generator to page_fault

AUTHOR: B. Greenberg

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

CLASSIFICATION

| Incompatible Change | Marketing Requirement |
| Extension           | Conformance to Standard |
| Restriction         | Increased Consistency  |
| Performance Improvement | Simplification |
| Reliability Improvement | Generalization |

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

REASONS: There is duplicate code in privileged_mode_ut and page_fault to generate CAMs and connects. Each change to these routines requires changing both. This code should be localized in page_fault, eliminating wired code in pmut.


IMPLICATIONS: Change four programs to call page instead of pmut.

COMMENTS: Memory deletion strategy is under modification to use new interfaces made available to I/O Buffer Manager. ALM code within bound_page_control will need to call connect-and-hold function - this is a logical time to move the entire connect/cam code into page_fault.
TITLE: Unify PL/I Coded Page wait strategy

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 | X | Simplification
Reliability Improvement | Generalization |

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

REASONS: There is duplicate code in pc, pc_abs, pc_wired, and delete_pd_records to await the completion of page control events. This code involves the decoding of the event ID to obtain a device ID, calls to addevent, unlock_ptl, wait (in device_control), and lock_ptl. Page_fault communicates with the traffic controller primitives via a much cleaner strategy which involves unlocking the page table lock once the traffic controller lock has been locked.

The proposal is to introduce a primitive, page$pwait, callable with an event ID, and the page table lock locked, which decodes the event, calls the traffic controller if necessary (via a new entry which merges with page_fault's entry), and relocks the page table. The interface is simple, clean, and efficient.

SUMMARY: Change the above programs to call this new primitive.

IMPLICATIONS: PLM documentation.

COMMENTS: The I/O Buffer manager (MTB 074) would implement a further program which would have to engage in the current addevent protocol. This is a logical time to save code and time all around and simplify the interface.

Code already written.
### MULTICS CHANGE REQUEST

**TITLE:** Implement 2 CPU Cache software.

**AUTHOR:** B. Greenberg

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

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**REASONS:**

Implement 2-cpu cache software as described in MTB-54.

**IMPLICATIONS:** PLM documentation.
TITLE: change translator_ec.ec

AUTHOR: Steve Herbst

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

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Performance to Standard | Objections/Comments:
Restriction | Increased Consistency | Delete from alm_abs also.
X Performance Improvement | X Simplification |
Reliability Improvement | Generalization |
Bur Fix |

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

REASONS: pl1_abs, alm_abs and fortran_abs run this exec_com. If a listing segment is produced by the compiler or assembler, it appends to it the output from a print_link_info. pl1 listings and fortran listings already contain all the print_link_info information so this is redundant.

SUMMARY: Append print_link_info only to alm listings.

IMPLICATIONS: References to print_link_info in the mpm documentation of pl1_abs and fortran_abs have to be removed.
TITLE: add "-bftb" option to pl1_abs

AUTHOR: Steve Herbst

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

TULICS CHANGE REQUEST

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
Incompatible | Marketing | Implemented in System
Curative

Extension | Performance to Standard | Objections/Comments:

Restriction | Increased Consistency

Performance Improvement | Simplification

Reliability Improvement | Generalization

Fix

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

REASONS: pl1_abs does not recognize the "brief_table" option which was recently added to pl1. This option causes a partial symbol table to be produced containing only statement labels.

SUMMARY: Implement the new option in pl1_abs.
TITLE: fix bug in delete

AUTHOR: Steve Herbst

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

CLASSIFICATION
Incompatible
Current
Extension
Restriction
Performance
Improvement
Reliability
Improvement

JUSTIFICATION
Marketing
Requirement
Conformance to
Standard
Increased
Consistency
Simplification
Generalization

Replaced by proposal MCR
Implement in System
Objections/Comments:

CLASSIFICATION
X

JUSTIFICATION
Bug Fix 296

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

REASONS: 1) "delete_dir x" where x is a link produces the misleading error message:
"x is not a directory. Use delete."

2) "unlink x" where x is not a link produces "x is not a link" which is not as informative as it could be.

SUMMARY: Fix all 3 commands to print messages of the form:
"x is a {directory. file link} Use {delete_dir. delete unlink}
**Title:** Special version of GCOS Library for MIT  

**Author:** T. Casey

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

**User**

<table>
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**Customer Request**

**Reasons & Summary:**

MIT does not use the GCOS simulator for anything other than preparing software for Multics. Thus, they use GMAP, 355 MAP, 355sim, and GELOAD, but none of the other compilers, etc., supported by the simulator. The library containing this software is in two multisegment files, whose total size is 617 records at MIT, and 1027 records in the latest version at PCO. MIT has requested that we create a version of the library for them, containing only the software necessary for preparing Multics software, in order to save storage.

**Implications:**

1) Development, testing, and demonstrations of the capabilities of the simulator will no longer be able to be done at MIT.
TITLE: Change directory hashing algorithm to use entire hash table

AUTHOR: Eleanor Stone

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
Performance Improvement | Simplification
Reliability Improvement | Generalization

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

REASONS: The on-line installation procedures push the current hashing algorithm to its limits by the practice of saving all of the old names of a modified segment with a suffix. Several installations have aborted in the middle due to an overflow of the directory hash table.

In general the behavior of the hashing algorithm with regard to the number of entries is anomalous. A directory has a full hash table if the number of probes of the table exceeds half its size. The actual number of names any one directory may contain depends on the order in which names are added, the order in which names are deleted and the characteristics of the names themselves. There may be situations in which two directories contain the same names, but one is judged to have a full hash table and one does not. In the worst case with the present scheme, a directory may be able to use only half the size of the hash table, if all names hash to the same value.

Further problems ensue in trying to repair directories whose hash table is full. Often deletion of names does not permit new names to be added nor the directory to be searched. This is because the same criterion for judging the fullness of the hash table is applied for removing, locating and adding a name.

To a limited extent, users have encountered similar problems.
PROPOSAL:

1. Make the following changes to the module hash to alleviate these problems.

   A. Search the entire hash table whether adding, deleting or locating a name. Currently the number of searches may not exceed half the size of the hash table.

   B. Indicate that the hash table is full only when adding a name.

   C. Provide better cleanup of the hash table if all entry names of a directory have been deleted. The hash table should be cleared completely in this case. (Bug hrd0017p)

2. Make the following unrelated changes to the module hash while it is being worked on.

   A. Fix an unreported bug which prevented the first location of the hash table from being used if it was marked as a deleted bucket. A variable containing the first available location is initialized to zero; zero is a valid available location since the hash table is indexed starting at zero.

   B. Use EIS-style coding to check an entry name being added.

   C. Remove a trap for a bug which has been found. The detection of the bug involved checking for an entry pointer with a zero offset.

IMPLICATIONS:

Possible performance degradation if many directories increase number of names. It will take longer to search directories very full of names. If a measurable performance effect occurs, variable size hash tables will probably have to be implemented.

Performance improvement in that pathname processing will be inherently faster.

A new salvager must be made and installed at the same time this change is made.
There currently exists a directory hash table problem in the online system libraries where hash tables are fairly "full". This results in increased time searching a directory for a name, and, occasionally, both at MIT and Phoenix, the hash table overflows resulting in an inconsistent directory. The online updating tool contribute in part to this problem by retaining all entry names of a segment being "replaced" by simply renaming them to "name.i" where "i" is an integer.

The proposal is to temporarily modify the updating tool to retain only two names on "replaced" segments; a unique name given to all "replaced" segments, plus the renamed primary name of the segment for easy identification. When an installation has to be backed up (i.e. de-installed) the complete name list of the old "replaced" segment is derived from a data base maintained by the updating tool so that no names are lost because of this modification.

This proposal is meant to temporarily alleviate the hash table problem in the online system libraries. The chances of a hash table overflow will only be reduced, not eliminated.
### TITLE:
Remove outdated compatibility features in real_sdh

### AUTHOR:
M. Weaver

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

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

### REASONS:
real_sdh currently contains code to handle PL/I conditions in two different ways, depending on how the conditions are signalled. Now that these conditions are signalled only in the new way, the old compatibility code can be removed. This will also remove a bug whereby the handling of the area condition, when signalled by a user area package, transfers default_handler_for_pll_ which does not work and officially no longer exists.

### SUMMARY:
Change real_sdh_ to send all conditions except alrm, cput and quit to default_error_handler_.
MULTICS CHANGE REQUEST

TITLE: Install cumulative_page_trace, cpt

AUTHOR: John Gintell

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 |
Performance Improvement | Simplification |
Reliability Improvement | X Generalization |

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

REASONS: We must substantially improve Multics system performance. This tool will assist us in finding performance (and reliability) problems.

This tool is a complement to page_trace and can also be used by users in analyzing their own programs.

SUMMARY: A) Install cpt. The attached info segment describes what it does and how it does it.

B) Add entrypoint print_trace_entry to the page_trace command to facilitate the implementation of the -trace feature of cpt.

IMPLICATIONS: None
The cumulative_page_trace command (cpt) accumulates page trace data so that the total set of pages used during the invocation of a command or subsystem can be determined. The command can accumulate data from one invocation to the next. Output from the command is in tabular format showing all pages that have been touched. A trace in the format of that produced by the page_trace command can also be prepared.

It operates by sampling and reading the system trace array after invocation of a command and at repeated intervals. Control arguments are given to specify the detailed operation of cpt.

The command line used to invoke cpt includes the command or subsystem to be traced as well as an optional number of control arguments.

The usage is as follows:

```
cumulative_page_trace (cpt) "command line" -control arguments-
```

At least one of three generic operations must be requested, they may all be combined and will be performed in the following order:

- reset the table of accumulated data
- call the command to be metered applying the various options specified
- print the results applying the various options specified

The following control arguments are accepted:

- `-reset`, `-rs` reset the table of accumulated data
- `-flush` flush core before each invocation of the command line
- `-loop n` call the command to be metered n times
- `-sleep n` sleep for n seconds after each call to the command to be metered
- `-interrupt n` interrupt execution every n VCPU milli-seconds for pagefault sampling
- `-int n` write dump of array on cpt.dump if special markers can't be found, the user must attach and detach this switch himself
- `-debug` include all faults between signal and restart
- `-trace path` write trace on file named path using io_switch named cpt.out, cpt will attach and detach this switch
- `-print`, `-pr` print the accumulated results
- `-count`, `-ct` print the accumulated results giving the number of faults for each page
- `-shortline` format output for a linelength of 80

Some examples follow:

```
cpt "list -p >udd>Multi cats" -loop 2 -sleep 10
```

will call the list command twice, and sleep for ten seconds between each call.

```
cpt "pl1 test" -interrupt 500 -trace trace.out
```

will call pl1 to compile test, requesting an interrupt every
500 ms to obtain page trace information. Write file of trace onto file named trace_out.

`cpt -print`

will print the accumulated results.
TITLE: New version of create_lines_file

AUTHOR: D. R. Vinograd

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 lib 0021p |

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

REASONS: The create_lines_file command is presently inoperative due to a change from tty cards to lsia cards in the config deck.

SUMMARY: The code will be changed to correctly handle the present configuration deck as well as add an option that is required for use in starting up a system.

IMPLICATIONS: It will work again.

DETAILED PROPOSAL: See attached draft documentation
Name: create_lines_file

This program is used to generate an initial copy of the "lines" segment for a new site. It creates this segment by examining the configuration deck.

Usage

create_lines_file-control_arg1.....arg1....argn
-contr...-arg2 argn....argm.....

1) control_arg1 may be one of the following items.
-pathname, -pn the next argument will be taken to be the pathname of the output file.
-skip, -sk the next 'n' arguments until either the end of the argument list or the next control argument will be "commented out" in the output segment. The arguments must be in the form "ttyxxx" where xxx is same three character string.

2) If no control arguments are specified the first argument will be assumed to be the pathname of the output file.
TITLE: Fix to map355 and build355

AUTHOR: R. Snyder

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

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

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

REASONS: A number of improvements are being made to map355 and build355 to provide new features and insure compatibility with future gcos simulators.

SUMMARY: 1) The option "-ag" (as in enter_absentee_request) has been added to allow arguments to be passed to the gcos simulator when it is called by map355 or build355.

2) The program cv_printfile_to_ascii_ will no longer be used by map355 or build355 to convert the bcd output file to lower case ascii. Instead the gcos_sysprint command will be called with the -lower_case option.

3) All file cards will be put after the $355map or $355sim cards since a future gcos simulator installation will require this.

4) The output files that aren't needed will be deleted.

5) In map355, gcos will be called with the -truncate option so that source lines > 80 chars will be truncated rather than having the simulator abort.

6) Both map355 and build355 will call gcos with the -brief option to disable the printing of some useless information by gcos.

IMPLICATIONS: Can get rid of cv_printfile_to_ascii_ and have a smoother running job.
**TITLE:** Recompile user-ring I/O in EIS.

**AUTHOR:** M. Smith

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

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

**REASONS:** The improved code generated by the EIS compiler should make user-ring I/O consume less system resources.

**SUMMARY:** Recompile the following modules:

- "attach_iocname.pl1",
- "find_iocb.pl1",
- "get_at_entry_.pl1",
- "io.pl1",
- "ios_.pl1",
- "pat.pl1",
- "propagate.pl1",
- "syn_attach.pl1",
- and "tty_attach.pl1".

**IMPLICATIONS:** All user processes should experience a performance improvement.

* "pl1" = \( p - 1 - \text{one} \)
 TITLE: Fix "tty_attach.pl1" error code returns

AUTHOR: M. Smith

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 Improvement | ltb 0025p
X Bug Fix

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

REASONS: In module "tty_attach.pl1", which implements the I/O module "tty_" as well as the write-arounds which map IOX calls into IOS calls, the operations "get_line", "get_chars", and "put_chars" do not always pass back to their caller error codes they receive.

SUMMARY: Fix the three operations so that they do pass back encountered error codes.

IMPLICATIONS: Some situations in which users were deceived into believing that I/O had successfully taken place when it had not will be correctly diagnosed. For example, a file-output to a segment lacking the "w" attribute.
**TITLE:** Fix "ioa_sioa_stream" error code return

**AUTHOR:** M. G. Smith

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

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

**REASONS:** In module "rest_of_ioa_pll", when "ioa_sioa_stream" is called to perform I/O on a non-existent stream, an incorrect error code of zero is passed to "ios_signal_".

**SUMMARY:** Fix "rest_of_ioa_pll" to pass the IOX error code returned by the "put_chars" I/O operation.

**IMPLICATIONS:** The resulting error message to the user will be correct and more informative.
TITLE: Fix title parse in "attach_ioname".

AUTHOR: M. G. Smith

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

CLASSIFICATION | JUSTIFICATION |
-----------------|--------------|
Incompatible Change | Marketing Requirement |
Extension | Conformance to Standard |
Restriction | Increased Consistency |
Performance Improvement | Simplification |
Reliability | Generalization |
X Improvement | Unreported |

REASONS: In the extraction of the I/O module name from the supplied title in module "attach_ioname.pll" an incorrect test sometimes rejects legal names (the test incorrectly limits the pathname to 26 characters).

SUMMARY: Correct the test to allow full pathnames.

IMPLICATIONS: Long pathnames will no longer be erroneously rejected.
REASONS: Now that the new IOX I/O system is installed, the old IOS version of the "print_attach_table" command is no longer required. The IOX command of the same name replaces it.

SUMMARY: Delete the module "print_attach_table.pl1" from "bound_io_commands..archive". Remove the lines in "pat.pl1" (the IOX replacement) which call the IOS version when IOX is not running.

IMPLICATIONS: The I/O library will become smaller due to deletion of unnecessary code.
TITLE: Recompile APL in EIS.

AUTHOR: M. G. Smith

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

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR
---|---|---
Incompatible Change | Marketing Requirement | Implemented in System

EXTENSION

| Improvement | Standard |
---|---|
Restriction | Increased Consistency
Performance | Simplification
Reliability | Generalization
Improvement | Bug Fix

REASONS: The improved code generated by the EIS compiler should speed up APL and reduce its cost.

SUMMARY: Recompile all modules of APL. APL is already in Version Two, so few changes to the source code, if any, will be needed.

IMPLICATIONS: APL will run faster and cheaper.
**TITLE:** Fix APL transpose bug.

**AUTHOR:** M. G. Smith

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

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**REASONS:** The APL transpose operation fails when coordinate numbers are repeated on the left hand side, due to an incorrectly declared constant.

**SUMMARY:** In module "transpose.pl1", make the constant 1.0e20 into double-precision so it compares correctly.

**IMPLICATIONS:** Transpose will work as documented.
TITLE: Fix APL take/drop bug

AUTHOR: M. G. Smith

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

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

REASONS: The APL operators take and drop do not work correctly on a scalar. They should ravel it first, but instead they produce nonsensical answers.

SUMMARY: Fix "take.pll" and "drop.pll" to ravel their right argument if it is a scalar.

IMPLICATIONS: Takes and drops of a scalar will work correctly.
**Title:** no_s_permission with status command

**Author:** Steve Herbst

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

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**Summary:** Test for error_table_$no_s_permission and print the above minimal information.

---

**Reasons:** If the user has no status permission on the parent directory but has non-null access on the segment, hcs_status_long will still return:

- type
- effective access
- bit count
- records used
- current length

The status command should print this information.

**Summary:** Test for error_table_$no_s_permission and print the above minimal information.
NEW GCOS SIMULATOR

TITLE: New GCOS Simulator

AUTHOR: T. Casey

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

CLASSIFICATION

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REASONS: Parts of the currently installed GCOS simulator have an internal structure completely different from that of the real GCOS. As a result, many GCOS features that are not explicitly described in user documentation operate differently in the simulator. The differences are great enough to make the current simulator unacceptable for release to customers.

SUMMARY: Install new bound_gcos_ and bound_gcos_utilities_. The major change is a complete rewrite of the simulator's handling of files, making its internal operation more like the real GCOS. In addition, many bugs, both reported and unreported, have been fixed, including bug numbers 19, 21, 29, 33, 46, 47, 50, 57, 59, and 66, in the gcs bugfile on System M.

IMPLICATIONS: Certain illegal GCOS jobs will no longer be accepted by the simulator. Since the 355 installation tools used to generate these illegal jobs, the new tools (MCR 600) must be installed first (the new tools are compatible with both simulators).

DETAILED PROPOSAL: The detailed list of changes made to each procedure in the simulator is 10 pages long. Copies may be obtained from the author.
**MULTICS CHANGE REQUEST**

**TITLE:** Make fixes to get_library_segment and its control files

**AUTHOR:** A. J. Scherer

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

**CLASSIFICATION** | **JUSTIFICATION**
--- | ---
Incompatible | Marketing
Change | Requirement
Extension | to Standard
Restriction | Conformance
Improvement | Consistency
Performance | Increased
Reliability | Simplification
Improvement | Generalization
| (Unreported)
Bug Fix | Objections/Comments:

Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally DETAILED PROPOSAL

**REASON:**
Add network library to get_library_segment and to control files os.control, object.control
Add network.control file and network.object.control file for same purpose.
Fix bug which prevents extracting an archive component with the -rename option when the original-named entry already resides in that directory.
Remove obsolete entry get_library_source.
Add the IIS directory path to the info_files.control segment so it can pick contents of IIS.

**MMARY:**
the rename option is used, extract the archive component into the user's process directory, and from there, copy it by its new name into the user's working directory to avoid name-dups which now occur when another version of the component exists in the working directory (a primary reason for wanting to use a -rename option).
**MCR 613**

**TITLE:** Fix bug in ipc_message_facility

**AUTHOR:** Steve Herbst

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

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

**REASONS:** send_message causes a stack overflow trying to put too long a message from the command line into its 132-char. buffer.

**SUMMARY:** Test message length when concatenating args to form the message. Report if the message has to be truncated.
**MULTICS CHANGE REQUEST**

**TITLE:** Add entry msf_acl to copy_acl

**AUTHOR:** Steve Herbst

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

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**CLASSIFICATION** | **JUSTIFICATION** | **Replaced by proposal MCR**
---|---|---
Incompatible Change | Marketing Requirement | Implemented in System

**Extension** | Performance to Standard | Objections/Comments:

**Restriction** | Increased Consistency |

**Performance Improvement** | Simplification |

**Reliability Improvement** | Generalization |

**x** | **x** | Bug Fix

---

**REASONS:**

copy_acl currently uses hcs_$acl_list, hcs_$acl_delete and hcs_$acl_replace on multi-segment files, treating them like segments. msf_manager has entries to read and set acl's on MSF's; copy_acl should use these. Since copy_acl is called almost exclusively by the copy command which knows whether a file is a segment or an MSF, save copy_acl the trouble of deciding and add a new entry, copy_acl$_msf_acl.

**SUMMARY:**

add new entry which calls msf_manager$_list_acl and msf_manager$_replace_acl.
**Title:** Implement the "-long" option with abc

**Author:** Steve Herbst

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

---

**Reasons:**

adjust_bit_count should implement the "-long" option.

**Summary:** "abc -long" prints a message:

1) when the bit count of a segment is changed. "bit count changed from xxxx to xxxx."

2) when the bit count of the last component of an MSF is changed, if and when adjust_bit_count is allowed to work on MSF's. "bit count of last component changed from xxxx to xxxx."

3) when the msf indicator (number of components) of an MSF is changed, if and when etc. "number of components changed from xxxx to xxxx."
TITLE: Implement Security Attributes in Storage System, Part 1

AUTHOR: A. Kobziar

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 | Performance to Standard | Objections/Comments:
Restriction | Increased Consistency
Performance Improvement | Simplification
Reliability Improvement | Generalization

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

REASONS: Install all changes required to create a test environment for security. These changes are part of the MTB-081 proposal.

SUMMARY: 1) Change PDS and dir_entry.incl to contain security information.

2) Change access_mode to return 3 types of mode: raw, security factored, and both security and ring bracket factored.

3) Change all callers of access_mode to use the appropriate entry. (This implies removal of local ring bracket factoring).

4) Create a special temporary procedure, accessible through a temporary privilege gate, to set any value of security information in the PDS and in any normally modifiable branch.

IMPLICATIONS: The above installation will allow a timing test to be performed on the security design. The gate will allow on-line testing of user interactions in a security system, as well as testing of non-hardcore modifications.
DETAILED PROPOSAL:

The following callers of access_mode will use the "security and ring bracket factored" entry as well as having internal ring bracket factoring removed:

del_dir_tree, dir_control_error, fs_get, initiate, makeunknown, move_device, set and truncate.

The following will use the "raw" entry:

dc_pack, quota (to the lower depth directory), status_ (this includes get_user_eff mode) and star_.

In cases where the user does not have status permission on the parent, status_ will use the "ring bracket" entry for the mode to the branch.

The remaining callers are seg_fault, which will use the "security" entry and sum_$get_ring which will be eliminated as no procedures call this entry.
Titl: Implement Security Attributes in Storage System, Part 2

AUTHOR: A. Kobzier

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

Classification | Justification | Replaced by proposal: 
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Incompatible Change | | 
X | | 
X | Marketing Demand | Implemented in System

| Classification | Justification | 
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| Extension | Performance to Standard | 
| Restriction | Increased Consistency | 
| Performance Improvement | Simplification | 
| Reliability Improvement | Generalization | 
| User Fix | | 

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

REASONS: Complete the hardcore changes to implement on-line security. (Salvager and Retriever remain for Parts 3 & 4).

SUMMARY: 1) Write a create_upgrade_directory primitive which does the following: Appends a new directory, moves quota to it, and upgrades the security information.

2) Change quota to be able to increase quota on an upgraded directory.

3) Add user accessible entries which return security information (in status_ & get_group_id).

DETAILED PROPOSAL FOR 1): The PDS will have the user's current security level as well as his maximum possible level. Requests to upgrade larger than the maximum will not be performed.
TITLE: Improve add_copyright command

AUTHOR: John Gintell

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

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Incompatible Change | Marketing Equipment | Implemented in System

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

REASONS: The add_copyright command which is used to implement and enforce the Multics copyright convention should be upgraded to allow the specification of other than the "joint" copyright and to place the current year in the copyright notice.

SUMMARY: The Multics copyright notice is a comment or set of comments embedded in the source program at "the beginning". It commences with a line of *'s and after several blank lines contains the string:

Copyright (c) yearlist by owner

where yearlist is the set of years (separated by commas) during which changes were made and installed, and owner is the appropriate member of the set
- Massachusetts Institute of Technology
- Honeywell Information Systems, Inc.
- or both joined with "and".

The add_copyright command will be modified to place the current year in an old copyright notice and to place the correct owner as specified by control argument.

A subroutine interface will be added that will return the copyright information so that it can be used as part of a report preparing program to summarize the status of a library of programs.
IMPLICATIONS:

This change is an extension to that implemented by the current version of the add_copyright command which management people have agreed is adequate.

This command does not implement the policy of choosing which owner to place in the copyright notice but leaves that decision to the user of the command.

DETAILED PROPOSAL:

Name: add_copyright

Usage

add_copyright pathname -control arguments-

pathname is the pathname of the segment whose copyright notice is to be checked or modified.

Control arguments

-check print a message stating what the notice would contain and what was changed.
-his make the owner be HIS.
-mit make the owner be MIT.
-joint make the owner be MIT and HIS.

The default action for the owner is to not change the owner if it is already there and to make the owner be MIT and HIS for new copyright notices.

Name: return_copyright_

Usage

call return_copyright_ (segptr, length, owner, year, code);

segptr is a pointer to the segment to be checked (Input)
length is the length (in characters) of the segment (Input)
owner is a varying character string giving the control argument used to specify the owner (Output)
year is a varying character string giving the year(s) (Output)
code is a fixed binary field
   = 0 if a copyright is present
   = 1 if there is no copyright  (Output)
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<td>TITLE: Fix bug in enter command.</td>
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</tr>
<tr>
<td>AUTHOR: VanVleck</td>
<td></td>
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<td>STATUS</td>
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<tr>
<td>Written</td>
<td>06/13/7</td>
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<td>Expires</td>
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<tr>
<td>SOURCE: (if external: e.g., &quot;User&quot;, &quot;Marketing&quot;)</td>
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<tr>
<td>CLASSIFICATION</td>
<td>JUSTIFICATION</td>
</tr>
<tr>
<td>Incompatible</td>
<td>Marketing</td>
</tr>
<tr>
<td>Change</td>
<td>Requirement</td>
</tr>
<tr>
<td>Extension</td>
<td>to Standard</td>
</tr>
<tr>
<td>Restriction</td>
<td>Consistency</td>
</tr>
<tr>
<td>Performance</td>
<td>Increased</td>
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<tr>
<td>Improvement</td>
<td>Simplification</td>
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<tr>
<td>Reliability</td>
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<tr>
<td>Improvement</td>
<td>Generalization</td>
</tr>
<tr>
<td>(Unreported)</td>
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<tr>
<td>Bug Fix</td>
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</tbody>
</table>

Use these headings: REASONS, SUMMARY, IMPLICATIONS, and optionally DETAILED PROPOSAL

**REASONS:**

The "enter" ("e") command stopped working in answering service 7.5. I tried to look up the user in the password table.

**SUMMARY:**

Add missing line of code to dialup_.

**IMPLICATIONS:**

Anonymous users which do not require password checking will work again.
**TITLE:** Recompile vfile

**AUTHOR:** M.D. MacLaren

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

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>JUSTIFICATION</th>
<th>Replaced by proposal MCR</th>
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<tr>
<td>Incompatabl</td>
<td>Marketing</td>
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<td>Objections/Comments:</td>
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<td></td>
</tr>
</tbody>
</table>

**REASONS:** Performance improvement, avoid future problem if a new version of indexed files is introduced.

**SUMMARY:** Recompile all of vfile with EIS compiler. Add check that indexed files have version number 1.