To: Distribution
From: M. S. Hodges
Date: September 16, 1974
Subject: Multics Change Requests

Attached are copies of Multics Change Requests which were approved from September 1 through September 15, 1974.
A new symbolic debugger - probe

Jeffrey M. Broughton

Title: A new symbolic debugger - probe

Author: Jeffrey M. Broughton

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

Increased ease of use: support procedures from the stack.

Support procedures

REASONS:

The current system debugger, debug, is not well suited for use by the unsophisticated user. It is very much machine language oriented and has a confusing and error prone syntax. In addition, it is deficient in its handling of include files, quick blocks, and certain data types. Probe is intended to be more simple to use and to deal with the constructs of the user program in a more straightforward way. Notable differences between it and debug are:

1) Probe cannot modify or examine code.

2) Breakpoints are implemented in such a manner that an active invocation of probe need not be on the stack for a break to occur.

3) The syntax for breaks is potentially far more flexible.

4) Quick procedures and blocks, as well as normal begin blocks are recognized in a stack trace. Support procedures are excluded (at the user's discretion) from the stack trace.
5) Type checking and conversion is performed in assignments.

6) Arguments are converted to expected type in a call, if entry argument descriptors are present.

7) A wider range of constants, including decimal and complex, is supported.

SUMMARY:

Install probe as a standard service system command.

IMPLICATIONS:

The use of debug and probe are compatible except that the break map is in a different format. Probe will give an error if an attempt is made to use a segment containing a break map it does not know about.

DETAILED PROPOSAL:

See attached documentation.
**TITLE:** Fix bug in copy_names

**AUTHOR:** Steve Herbst

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

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**CLASSIFICATION** | **JUSTIFICATION** | **Remarks**
--- | --- | ---
Incompatible Change | Marketing Requirement | Replaced by proposal MCR 731
Extension | Conformance to Standard | Objections/Comments:
Restriction | Increased Consistency |  
Performance Improvement | Simplification |  
Reliability Improvement | Generalization | 
| | | 
| | | X Bug Fix Unreported

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**REASONS:** If the user has no access to add a name onto the target, the error is ignored and processing continues (with the next name).

**SUMMARY:** Have `copy_names` return when adding a name to `dir2>en2` produces a non-zero error code other than `namedup` or `segnamedup`. If moving names, add the name back on `dir1>en1` before returning.
**TITLE:** Modify stu to interpret ITP pointers

**AUTHOR:** Jeff Broughton

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

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<tbody>
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<td>Marketing Requirement</td>
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<td>Extension</td>
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<tr>
<td>Restriction</td>
<td>Increased Consistency</td>
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<tr>
<td>Performance Improvement</td>
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<td>Reliability Improvement</td>
<td>Generalization</td>
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**Use these headings:** REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**REASONS:** Under certain circumstances, the latest version of the PL/I compiler will generate argument lists containing ITP pointers when calling quick procedures. Use of these pointers requires that certain values be in specific pointer registers (e.g., the stack pointer for the procedure in pr6). When stu tries to get an argument or descriptor to a quick procedure called with an ITP argument list, incorrect results are obtained as the expected values are not in the registers.

**SUMMARY:** Modify the procedures, find runtime address and decode runtime value, to detect and interpret ITP pointers in argument lists.

**IMPLICATIONS:** None
**SUPPLEMENT CHARGE PROPOSAL**

**TITLE:** Probe

**AUTHOR:** Jeff Broughton

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

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<td>Intention</td>
<td>Conformance to Standard</td>
<td>Objections/Comments:</td>
</tr>
<tr>
<td>Restriction</td>
<td>Increased Consistency</td>
<td>Investigate possibility of break mechanism common with debug.</td>
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<tr>
<td>Performance</td>
<td>Simplification</td>
<td></td>
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<tr>
<td>Improvement</td>
<td>Generalization</td>
<td>Do not install until debug is fixed to detect a probe break map.</td>
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<tr>
<td>Reliability</td>
<td></td>
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<tr>
<td>X New feature</td>
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</table>

**REASONS:**
- Provide an additional tool to Multics users. See MCR-665.

**SUMMARY:** Install probe as a standard command.

**IMPLICATIONS:** See MCR-665. Appropriate documentation.

**DETAILED PROPOSAL:** See MTB-106. Since that document was issued, the following changes have been made as the result of suggestions received:

1. A quit command which causes a return to the previous command level was implemented.
2. A "." request which prints "probe" was implemented.
3. The default action for the status command was changed from listing the last break which occurred to listing all breaks in the current program.
4. The stack command was changed to give level numbers in a top down order as opposed to the bottom up order in which the trace is given.
5. Several other changes were made to improve the aesthetics of the output of certain commands.
6. A substr builtin and pseudo-variable was added to access portions of long strings.
**TITLE:** Install tools print translator_search_rules and set translator_search_rules  

**AUTHOR:** Steve Webber  

**CLASSIFICATION** | **JUSTIFICATION** | **Replaced by proposal NCR**  
--- | --- | ---  
Irreproducible Change | Marketing Change | Implemented in System  
X Addition | Performance to Standard | Objections/Comments:  
Restriction X | Increased Consistency |  
Performance Improvement | Simplification |  
Reliability Improvement X | Generalization |  
 | | Bug Fix  

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

**REASONS:** Two useful commands which manipulate translator search rules should be installed as tools.
MULTICS CHANGE REQUEST

TITLE: Documentation for the new unbundled library.

AUTHOR: P. Kelley

SOURCE: (If external; e.g., "User", "Marketing")
Local

CLASSIFICATION: JUSTIFICATION

Incompatible
Marketing
Change
Requirement
Implemented in System
Extension
To Standard
Conformance
Increased
Restriction
Consistency
Performance
Improvement
Simplification
Improvement
Reliability
Improvement
Generalization
Improvement
Dbug Fix

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

Subject:
Provide for automatic documentation of online library changes made to the new "unbundled" library.

Detailed Proposal:
Modify the procedure upc_coc_task to recognize the "unbundled" library as standard online execution library.

Implications: None.
MULTICS CHANGE REQUEST

TITLE: Cleanup ACL on phcs_

AUTHOR: Roger A. Roach

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

STATUS | DATE
Written | 09/26/71
Approved | 9-7-73
Rejected | 
Postponed | 
Withdrawn |
Expires | 3-3-73

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

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

REASONS: To complete the conversion of the metering tools as described in MCR 303. (This MCR is an elaboration of step 5 of that MCR.) The object is to provide access to metering data without having access on phcs_. Now that the tools have been installed, the extra ACL's on phcs_ can be removed.

SUMMARY: Remove all ACL's on phcs_ except for the "Sys" projects (SysAdmin, SysDaemon, SysMaint and SysLib) which require phcs_ access for normal functions. All other access will be granted by means of a call to setacl$hpsetacl in the system_start_up.ec. The ACL on phcs_.link will be set to "rw 0,0,0 *.::*" to reduce the number of calls needed to be added to system_start_up.ec to add a person to the ACL of phcs_.

IMPLICATIONS: Certain programmers not on the list to be added to the ACL of phcs_ (see attach memo) will not be able to use entries in phcs_ (such as ring_0_message).
TO: Multics Administrative Distribution  
FROM: Roger A. Roach  
DATE: September 3, 1974  
SUBJECT: List of programmers having access on phcs_

The following is a list of programmers who are now granted access to phcs_ thru commands issued in the system startup exec_com. Also, members of the "Sys" projects (SysAdmin, SysDaemon, SysLib and SysMaint) are given access from the ACL existing on the system tape.

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<thead>
<tr>
<th>programmer</th>
<th>reason</th>
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<tr>
<td>Grady.Multics</td>
<td>ring_0 Peek: TTY DIM development &amp; debugging</td>
</tr>
<tr>
<td>Greenberg.Multics</td>
<td>ring_0 Peek: page control debugging &amp; development</td>
</tr>
<tr>
<td>Kobziar.Multics</td>
<td>ring_0 Peek: salvager debugging (dumping dirs)</td>
</tr>
<tr>
<td>Morris.Multics</td>
<td>ioi and tape entries: T&amp;D's, tapes, ioi</td>
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<tr>
<td>Mullen.Multics</td>
<td>ring_0 Peek: backup/dir control changes</td>
</tr>
<tr>
<td>Meer.Multics</td>
<td>ring_0 Message, grab_tape_drive: listings</td>
</tr>
<tr>
<td>Silver.Multics</td>
<td>ring_0 Message: tape DIM/DCM development</td>
</tr>
<tr>
<td>Stone.Multics</td>
<td>ring_0 Peek: syserr logging debugging</td>
</tr>
<tr>
<td>VanVleck.Multics</td>
<td>ring_0 Peek: dir control debugging</td>
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<tr>
<td>Vinograd.Multics</td>
<td>ring_0 Peek: new storage system development</td>
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<tr>
<td>Webber.Multics</td>
<td>ring_0 Peek: hardcore debugging</td>
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<td></td>
<td>ring_0 Peek: hardcore debugging/development</td>
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</tbody>
</table>
MULTICS CHANGE REQUEST

TITLE: Fix bug in printer initialization.

AUTHOR: VanVleck

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

CLASSIFICATION | JUSTIFICATION | Replaced by proposal MCR

| Incompatible | Marketing |
| Change | Requirement |
| Extension | to Standard |
| Restriction | Consistency |
| Improvement | Simplification |
| Reliability |
| Improvement | Generalization |
| (Unreported) |
| Bug Fix |

ReasOns:

If an installation sets up its configuration deck so that it has a printer named PRTB but no PRTA, the system will refuse to allow any printers to be attached.

Summary:

Fix the bug.

Implications:

None.
MULTICS CHANGE REQUEST

TITLE: Aux hardcore support for PRT303 printer.

AUTHOR: VarVleck

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

CLASSIFICATION | JUSTIFICATION
-----------------|---------------------
Incompatible | Marketing
Change | Requirement
Extension | to Standard
Restriction | Consistency
Performance | Improvement
Reliability | Simplification
Improvement | Generalization
-------- | -------
Bus Fix |--------

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

REASONS:

The PRT303 printer looks very much like a PRT301, but is run by an MPC. The current hardcore printer DCM does not support the PRT303, and at least one site (CISL) has such a printer.

SUMMARY:

Modify the hardcore printer DCM to support PRT303. This requires the use of different operation codes in the instruction DCM's to the printer, and some minor changes to status handling in the hardcore and ring-4 printer support.

IMPLICATIONS:

The error messages printed by the ring-4 printer DCM will be changed to be somewhat more informative.

The mode number on the PPRH card will no longer be ignored; it must be one of the following:

202.
300.
301.
303.
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<tr>
<td>X</td>
<td>Bus Fix</td>
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</tbody>
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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (Optional)

**REASONS:** Several months ago a version of tcm.incl.pl1 was not submitted-installed when it should have been. This causes spg_util_to work incorrectly.

**SUMMARY:** Submit the include file and a recompiled version of spg_util.
MULTICS CHANGE REQUEST

TITLE: Fix bug in abs bump operator command.

AUTHOR: VanVleck

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

CLASSIFICATION | JUSTIFICATION
--- | ---
Incompatible | Marketing
Change | Requirement
| Implemented in System
Extension | to Standard
| Objections/Comments:
| Increased
Restriction | Consistency
| Performance
| Improvement
| Simplification
| Reliability
| Improvement
| Generalization
| (Bug No. ans069)
| Bug Fix

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

REASONS:

When the operator issues an "abs bump" or "abs cancel" command and specifies the project ID of the user to be bumped, the system treats matches on project ID as mismatches, and vice versa.

SUMMARY:

In line 1172 of admin.pl1, change the equal to a not-equal.

IMPLICATIONS:

None.
**REASONS:** A bug exists in the g115 dim which causes character compression to fail in certain cases.

**SUMMARY:** Fix the bug.

**IMPLICATIONS:** None

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**CLASSIFICATION** | **JUSTIFICATION** | **Replaced by proposal MCP**
--- | --- | ---
Incompatible Change | Marketing Requirement | Implemented in System
Extension | Conference to Standard | Objections/Comments:
Restriction | Increased Consistency | 
Performance Improvement | Simplification | 
Reliability Improvement | Generalization | 
X Bug Fix Unreported |
Add a storage system primitive to set the entry point bound of a segment

E. Stone

Title: Add a storage system primitive to set the entry point bound of a segment

Author: E. Stone

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

Classification: Incompatible Change

Justification: Marketing Requirement

Replaced by proposal MOC:

Implementation in System

Extension: X

Justification: Conformance to Standard

Objections/Comments:

Restriction: X

Justification: Increased Consistency

Performance Improvement

Reliability Improvement

X Improvement

J ustification: Generalization

Bus Fix

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

REASONS:

The immediate reason is to allow the setting of call limiters on gates into ring 1. The lack of such a mechanism has been characterized as a vulnerability.

DETAILED PROPOSAL:

Three other tasks are necessary to solve the problem:

1) Backup and reload this attribute.

2) Install a command and subroutine which calculates the correct entry point bound and calls the proposed primitive.

3) Change the installation procedures to set the call limiter on gates.

These tasks have been set in motion.

The storage system should be changed as follows:

Two entries will be added to the module sct. One will change the entry point bound given the pathname of a segment and the other will change this attribute given the pointer.

The value of 0 as an entry point bound will mean that the call limiter mechanism will be disabled for this segment; the entry point bound switch will be reset.

A value > 0 and < 16384 will mean that the call limiter mechanism will be enabled for this segment.

Two entries will be added to hcs to call the new entries in sct.
name: hcs_$set_entry_bound

This subroutine sets the entry point bound of a segment, given a directory name and an entryname.

The entry point bound attribute provides a way of limiting which locations of a segment may be targets of a call. This subroutine allows the caller to enable or disable a hardware check of calls to a given segment from other segments. If the mechanism is enabled, all calls to the segment must be made to an entry point whose offset is less than the entry point bound.

In practice, this attribute is most effective when all of the entry points are located at the base of the segment. In this case the entry point bound is the number of callable words.

usage

declare hcs_$set_entry_bound entry (char(*), char(*),
fixed bin(14), fixed bin(35));

call hcs_$set_entry_bound (dirname, ename, entry_bound, code);

1. dirname is the directory name of the segment whose entry point bound is to be changed. (Input)

2. ename is the entryname of the segment whose entry point bound is to be changed. (Input)

3. entry_bound is the new value in words for the entry point bound of the segment. If entry_bound = 0, then the mechanism is disabled. (Input)

4. code is a standard storage system status code. (See Notes below.) (Output)

Notes

A directory can not have its entry point bound changed.
Modify permission with respect to the directory containing the segment is required.

If an attempt is made to set the entry point bound of a segment greater than 16383, the maximum value allowed, code will be set to error_table_$argerr.

The subroutine hcs_$set_entry_bound_seg can be used when a pointer to the segment is given, rather than a pathname.
Name: hcs_$set_entry_bound_seg

This subroutine sets the entry point bound of a segment, given a pointer to the segment.

The entry point bound attribute provides a way of limiting which locations of a segment may be targets of a call. This subroutine allows the caller to enable or disable a hardware check of calls to a given segment from other segments. If the mechanism is enabled, all calls to the segment must be made to an entry point whose offset is less than the entry point bound.

In practice, this attribute is most effective when all of the entry points are located at the base of the segment. In this case the entry point bound is the number of callable words.

Usage

declare hcs_$set_entry_bound_seg entry (ptr, fixed bin(14), fixed bin(35));

call hcs_$set_entry_bound_seg (segptr, entry_bound, code);

1. segptr is a pointer to the segment whose entry point bound is to be changed. (Input)

2. entry_bound is the new value in words for the entry point bound of the segment. If entry_bound = 0, then the mechanism is disabled. (Input)

3. code is a standard storage system status code. (See Notes below.) (Output)

Notes

A directory can not have its entry point bound changed.

Modify permission with respect to the directory containing the segment is required.
If an attempt is made to set the entry point bound of a segment to greater than the system maximum, 16383, code will be set to error_table$_argerr.

The subroutine hcs$_set_entry_bound can be used when a pathname of the segment is given, rather than a pointer.
Remove multiple references to parameters in status

E. Stone

Title: Remove multiple references to parameters in status

Author: E. Stone

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

Classifications and Justifications:

- Incompatible Change: Marketing Requirement
- Extension: Conformance to Standard
- Restriction: Increased Consistency
- Performance Improvement: Simplification
- Reliability Improvement: Generalization
- Improvement: Bus Fix Unreported

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

Reasons:

The status primitive does not copy its arguments before referencing them in all cases. This has been characterized as a vulnerability. In one instance, this deficiency could cause a segment fault while a directory is locked.
When one is attempting to debug a process it is sometimes necessary to examine the process's combined linkage section(s) to see the values of internal static variables and to examine linkage pointers. There is currently no tool which produces a formatted dump of a linkage section.

SUMMARY:
Write a new program, "dump_linkage_section" ("dlls"), which will print a dump of the linkage section(s) in a process using information from the LOT to head each linkage block with the name of the owning segment. For bound segments, examine also the bindmap for the segment and title each separate component's internal static with the component name. For linkage pointers, show both the octal form and also the interpreted information describing what the link points to whether or not it has been snapped.

The program should have a subroutine interface which accepts an output stream-reme as an argument, so that as_dump_ and similar programs can call this subroutine as well as calling trace_stack_.

The command program should accept optional arguments which specify a segment name, reference name, or segment number whose linkage is to be dumped, or a location in the combined linkage section, to specify dumping of the element which contains that location.

IMPLICATIONS:
The command may prove useful occasionally.
MULTICS CHANGE REQUEST

TITLE: Add hardcore support for PRU1200 printer.

AUTHOR: VanVleck

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

CLASSIFICATION | JUSTIFICATION
-----------------|------------------
Incompatible | Marketing
Change | Requirement | Implemented In System
Extension | to Standard | Objections/Comments:
Restriction | Consistency | Increased
Improvement | Performance | |
Reliability | Simplification | |
Improvement | Generalization | |
| | Bug Fix | |

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

REASONS:

The PRU1200 printer works much like the PRT303 printer. Both are run by an MPC; but the PRU1200 has a software VFU format instead of a paper tape loop. The current hardcore printer DCM does not support the PRU1200, but this printer is expected to become a product offering.

SUMMARY:

Modify the hardcore printer DCM to support PRU1200. This requires special code in printer_attach to load the software VFU tape. A new mode will be added so that the printer can be run at 6 or 8 lines per inch.

IMPLICATIONS:

PRU1200 and PRU1600 will be usable. At some later date, a new dprint argument may be provided to allow users to select 8 LPI, or to choose one of several different VFU formats.
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<td>X Extension</td>
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<td>X</td>
<td>Bug Fix gco067p</td>
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Use these headings: REASONS, SUMMARY, IMPLICATIONS, DETAILED PROPOSAL (optional)

**REASONS:**

The tools used in reading the software and subroutine libraries from a GCOS total system tape and putting them into a format readable by the GCOS simulator should be installed.

**SUMMARY:**

Install `bound_gcos_tools`, containing the commands:

- `dump_gcos`
- `gcos_pull_tapefile`
- `gcos_extract_module`
- `gcos_build_library`
- `gcos_library_summary`
- `gcos_reformat_syslib`

This "fixes" bug gco067p, which is a complaint that these tools are not installed.
**TITLE:** Remove obsolete hardcore modules

**AUTHOR:** E. Stone

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

**REASONS:**

In the course of converting ring-O modules to version 2, it became apparent that several modules were unnecessary. None of the proposed deletions will affect the user interface.

A. dsu270_reconfig and 2 entries in hphcs_ which call it.

B. usercode and 3 entries in hphcs_ which call it.

C. absentee_test - this gate has never been used for its original purpose of testing the absentee facility. Further its presence has been declared a vulnerability. The module init_hardcore_gates must be changed in order to delete this gate.

D. force_access - this module is not called by any hardcore gate. In addition, the highly privileged acl primitives provide the same function.
MULTICS CHANGE REQUEST

| TITLE: | Addition of error file processing to the backup system. |
| STATUS | APPROVED |
| DATE | 9/5/7 |

| AUTHOR: | Grace Ackerman-Lewis |

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

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<td>Increased Consistency</td>
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<tr>
<td>Performance Improvement</td>
<td>Simplification</td>
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<tr>
<td>Reliability Improvement</td>
<td>Generalization</td>
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<td>Bug Fix</td>
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</tbody>
</table>

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

REASONS: To tell a user whose entries have not been backed up by the system, which entries were not backed up and why.

SUMMARY: a) Change backup cleanup and start dump to make a copy of the error file before printing and deleting it.

b) Add programs to scan the copy of error file and notify all users whose entries were unaccessible for backup.

IMPLICATIONS: This will require the addition of a new directory

> /user_dir_dir/SysDaemon/error_files.

If an installation does not wish to use this feature the directory /user_dir_dir/SysDaemon/error_file should not be created. If the directory is not present, the backup system will operate as it does now.