

TO: MSPM Distribution
FROM: Judy Spall
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The attached write-up is a major revision of BE.5.02. It is more of a reference and less a tutorial than the previous write-up, but it is hoped that the examples should be sufficiently informative.

Effective 11/20/67, the following changes should be noted

- (1) The command line requires additional arguments
- (2) The following new lines are recognized in the GECOS file
 - (a) ERROR
 - (b) the (LIST) option
 - (c) MAKETL or MK
 - (d) PURE
 - (e) NOTAPE
 - (f) DECK
 - (g) LIBRARY

MCB-6 and MCB-20 are obsoleted as a result of the new write-up.

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Identification

Merge-editor
B. Kernighan, N. Morris, and J. Spall

General Information

The merge-editor is used to prepare a tape of GECOS input which drives the assembly and simulation system. Taking directions from a specified file (the control file), the merge-editor builds a card-image disc file which it finally copies onto the tape.

As stated in section BE.5.00, the GECOS tape carries images of several types of user-specified cards:

- (1) EPL Assembler source programs
- (2) EPL source programs
- (3) Previously-produced text and linkage files
- (4) Directions for the loader
- (5) Directions for the dumper

These cards appear on the GECOS tape separated by many other cards which the user need not specify. The merge-editor proceeds in three phases:

- (1) The control file is scanned, and tables of specifications for the control cards are produced.
- (2) The tables are scanned, and the remainder of the tape-image disc file is written.
- (3) The disc file is copied onto tape.

Although it is possible for CTSS users to manipulate tape files via the CTSS file system, these tape files must be in a specialized format. Because this format is incompatible with that of GECOS tapes, the merge-editor is not able to utilize the file system for its tape-writing. Three special privileged supervisor entries have been provided for the privileged use of the merge-editor.

CTSS users are not generally permitted to perform their own I/O operations of any kind, and the primary purpose of these entries is alleviation of this restriction.

Because the merge-editor's supervisor entries are so volatile, their use has been restricted to authorized 6.36 users as determined by restriction bit (100)8 in the CTSS accounting files. The tape-writing portion of the merge-editor simply will not work for non-authorized users; their attempts will only result in protection violations. ~~Lee Selwyn~~ Martha Nelson (MIT) will accept requests for 6.36-use authorization.

The secondary purpose of these supervisor entries is to prevent conflicts between two 6.36 users who might want simultaneous access to the one 6.36 tape.

- (1) When the system is first brought up, the 6.36 tape is free.
- (2) By using the MRGEDT command, a user causes the 6.36 tape to appear busy to all other users, until his tape-writing is completed.
- (3) When a quit is given during tape-writing, any command except rstart will release the 6.36 tape. An automatic logout will also release the 6.36 tape.

Finally, the tertiary purpose of these supervisor entries is to shorten the real-time bottleneck which may develop around the unique 6.36 tape. As long as he has control of the 6.36 tape, the 6.36 user has a guaranteed share of the 7094. It is hoped that this preferential service rate to the merge-editor will allow the 6.36 tape-writing to be expedited without noticeable degradation in general CTSS service.

Usage

The user issues the command

`mrgedt name1 runnam username -instal- -option- -arg6-`

where the command line is interpreted as follows:

name1 is the primary name of a 6-bit-line marked file with secondary name GECOS, the control file, from which the merge editor takes its instructions

name1 may be (TAPE), in which case the merge-editor will make a tape copy of the previously prepared disc file "runnam 6.36in"

- runnam is the name which identifies the disc-file copy, and the error and dump files returned after the 6.36 run.
- username is a programmer identification used by operations. This must be less than or equal to 6 characters.
- instal- if present, is the installation where the job is to be run and must be one of the following
- MAC whereby the job will be run on the GE 645 in Cambridge
 - MH whereby the job will be run on the GE 645 at Murray Hill
- If instal is not specified the job will be run on the GE 645 which is operationally advantageous. The only output the user will receive will be via the files returned to CTSS.
- option- if present represents options for running the job. The following options are currently interpreted by operations
- IT whereby the job will not be run until the user is present as the job is an interactive one
 - SP whereby the job will be run according to a specific set of special operative instructions given to operations by the programmer.
- arg6- if present and equal to (NOTP)^{or NOTP}, will cause the merge-editor to prepare the disc-file copy but no tape will be made. The file 'runnam 6.36in' can be copied at a later time using (TAPE).
- if present and equal to (SAVE)^{or SAVE}, will prevent the merge-editor from deleting the file 'RUNNAM 6.36IN' after 6.36 tape copy is completed.

Input Files for Merge-editor

The following types of files may be used as input to the merge-editor:

- (1) Source files to the EPL Assembler (EPLBSA) are given to the merge-editor in the form produced by the EPL compiler, EDA or QED.
- (2) Source files to the EPL compiler are given to the merge-editor in the form in which they are produced by the EDA command or QED command.
- (3) Text and Linkage files from previous assemblies are given to the merge-editor in the form in which they first appeared in the user's files.
- (4) Any file to be made into a text segment on the 645.
- (5) All other files given to the merge-editor are line-marked or card-image files of the sort produced by the EDL, ED, and QED commands. The EDA command, it should be noted, may not be used to produce these files.

As is well known, it is customary for each CTSS file name (two 6-character words) to consist of a primary, arbitrary name (like "ALPHA") and a secondary, class name (like "FAP" or "BCD"). Also, CTSS users have always been discouraged from using special characters in their file names.

These conventions have been used extensively within the 6.36 system, where segment names are frequently used as primary name of files. File names for EPLBSA segments must not exceed six characters in length. These characters must be chosen from among the lower case letters, the numerals, and the period.

A user who concerns himself with a CTSS File named ALPHA during a 6.36 run named BETA may see, at one time or another, any of the following files in his directory.

<u>name</u>	<u>description</u>	<u>format</u>
ALPHA EPLBSA	Source file of ALPHA	Produced by EPL, EDA, or QED.
ALPHA EPL	Source file of ALPHA	Produced by EDA or QED.
ALPHA LIST	Assembler-produced listing of ALPHA	Printable, see subsection BE.5.05
ALPHA TEXT	Assembler-produced text segment of ALPHA	Absolute binary
ALPHA LINK	Assembler-produced link segment of ALPHA	Absolute binary

BETA ERROR	6.36-produced output included with every return tape	Printable, see subsection BE.5.05
BETA DUMP	6.36 core dump	See subsection BE.5.06

In addition, the user will find a number of links in his file directory after any use of the merge-editor. Although these links may be deleted, retaining them will allow subsequent use of the merge-editor to be considerably faster.

Special Inclusion Policy

Several segments are given special treatment by the merge-editor, as follows:

Whenever the control file calls for a 645 execution as part of the 6.36 job, the merge-editor creates library calls for certain essential segments which comprise the pseudo-supervisor.

Normally this need not concern the user, unless he wishes to provide his own versions of some of these segments by supplying appropriate TEXT+LINK or EPLBSA and LOAD cards. If a user wishes to provide a personal version, his request will override the special inclusion mechanism.

The following special inclusion segments are called off the library automatically, and LIBE cards for them are not to be included:

<u>SEGMENT NAME</u>	<u>DESCRIPTOR</u>
LINKER	SLVPRC,SLVACC
SEGMAN	SLVPRC,SLVACC
F2CATC	MASPRC, SLVACC
INIT	MASPRC
ESCAPE	SLVPRC, SLVACC
MESSAG	SLVPRC, SLVACC
TRACERDATABASE	SLVPRC, SLVACC, WPERMT
NEWSEG	SLVPRC, SLVACC
GROW	SLVPRC, SLVACC
INIT-ESC	SLVPRC, SLVACC
INIT-DISP	SLVPRC, SLVACC

<u>SEGMENT NAME</u>	<u>DESCRIPTOR</u>
TRUNCT	SLVPRC, SLVACC
LENGTH	SLVPRC, SLVACC
RELPAG	SLVPRC, SLVACC
SEGPR_	SLVPRC, SLVACC
NEWPAG	SLVPRC, SLVACC
FREE_PAGE_POOL	DATA, SLVACC, WPERMT
GET_PUT	MASPRC, SLVACC
SEARCH	SLVPRC, SLVACC
LIBRARY_DICTIONARY	DATA, SLVACC

Delayed Tape Writing and Other Interruptions

After the tape-image disc file has been written, the merge-editor may discover that the 6.36 tape is busy. In this event, the program will go into a loop of

Sleep for 15 seconds (uses no machine time)

Wakeup

Try the Tape

If it is free, capture it and proceed
Otherwise, print message and loop

If this procedure is unsatisfactory to the user, he may quit at any time. Later, the command

mrgetd (TAPE) run

where run identifies the aborted disc-to-tape copy, will cause the program to continue.

At other times during tape-writing by the merge-editor, the user may be struck by a sudden change of heart. Because the user should not retain any guaranteed share of the 7094, the usual quit is not adequate. The procedure which must be followed after a quit is immediate issuance of any command, followed - at the user's convenience - by restart from scratch (mrgetd name1 run username -instal-option-). The command, which will automatically release the 6.36 tape, is necessary for proper re-initialization of the 6.36 supervisor entries.

If the merge-editor program finds the 6.36 tape free but not ready, it goes into a loop of

Sleep for 15 seconds (uses no machine time)

Wake up

Try Tape

If ready, go on

If not ready, print message to the operator and loop.

The user may react to the successive "tape not ready" messages by telephoning the 7094 operator.

Interpretation of the Control File

Lines in the control file are interpreted one at a time. Blanks - equivalently, tabs - on these cards are given the PL/I interpretation: A non-zero number of consecutive blanks is interpreted as a single delimiter. Initial blanks on these cards are ignored.

One should observe the following notation which is used in the chart for the control file

- λ refers to the primary name of a CTSS file. To avoid confusion, the minus sign, '-', may not be used.
- B refers to the secondary name of a CTSS file. To avoid confusion, the minus sign, '-', may not be used. Note that B may be TEXT+LINK or TL to refer to the 2 files λ TEXT and λ LINK.
- γ refers to a segment name. Since only BCD characters may be used to represent ASCII characters, upper case characters are mapped into lower case and '-' (minus) is mapped into '_' (underscore).
- δ refers to an entry name. The same mapping as for γ applies.
- n refers to a numeric value
- g represents a character string

-variable- any variable enclosed in '-' is optional

The following chart summarizes the information which is recognized in the GECOS control file for the MRGEDT command

<u>Word</u>	<u>Abbrev.</u>	<u>Default</u>	<u>Description</u>
⁶ \$ COMMENT q	none	none	q may be any Hollerith characters which the user wishes to be printed on the 645 console. To avoid tying up the 645 typewriter, no more than 3 comments should be used per run.
CORE	none	no on-line dump is produced	If the command argument instal is specified, a 645 on-line segment dump is produced for all segments whose attributes are DATA and/or WPERMT
DECK <i>h</i>	none	none	Text and link for file <i>h</i> is punched. <i>a</i> may be '*' in which case decks of all object code resulting from MAKETL, EPL, or EPLBSA activities are punched. <i>if no instal, no deck</i>
DSGBND <i>n</i>	none	n = 1	Descriptor segment bound set at n
DSPGSZ <i>n</i>	none	n = 64	Descriptor segment page size set at n.
ENTRY <i>γ - δ -</i>	none	1. <i>γ</i> = <MAIN> <i>δ</i> = START 2. <i>δ</i> = <i>γ</i> if <i>δ</i> omitted	Begin execution at <i>γδ</i> .
EPL <i>h</i> -(LIST)- <i>None</i>	<i>None</i>	none	Use the 645 EPL compiler on the CTSS file <i>h</i> EPL. If % is the first character in the EPL file, EPLMAC will be used to interpret macros (see BN.3.02).

<u>Word</u>	<u>Abbrev.</u>	<u>Default</u>	<u>Description</u>
"	"	"	If (LIST) is present and instal is specified, a source and assembly listing will be produced on-line on the 645.
EPLBSA α -(LIST)-	EB	none	Use the EPLBSA Assembler on the CTSS file α EPLBSA. If (LIST) is present and instal is specified, an assembly listing will be produced on-line.
ERRØR	none	Error file is not printed on-line.	The error file is printed on-line on the 645, if instal is specified.
FETCH $\alpha\beta$...	none	none	Return to the 7094 as a CTSS file $\alpha\beta$. Note that α and/or β may be '*' where the normal CTSS '*' conventions apply. A line such as FETCH * TL will return all TEXT+LINK files generated as object code by all EPL and/or EPLBSA activities in the run. Note that it is inconsistent to have β text or link
FLTBAS n	none	$n = 256$	Set the base of the fault vector at n in slave memory.
INSERT $\alpha - \beta$	none	$\beta = \text{GECØS}$ if β omitted	Insert the CTSS file $\alpha\beta$ as a control file. After an end-of-file in β , control cards are again taken from the present control file. Nesting is permitted to a depth of 5.

<u>Word</u>	<u>Abbrev.</u>	<u>Default</u>	<u>Description</u>
LIBE δ -opt-	LI	Standard option procedures apply	Load the segment δ from the segment library.
LIBRARY PERM q	none	Standard segment library used	Use the segment library q (where $1 \leq q \leq 12$ characters) which resides on a permanent GEOS file (drum or disk).
LIBRARY TAPE q	none	Standard segment library used	Use the segment library q (where $1 \leq q \leq 12$ characters) which resides on tape.
LIMITS n	none	$n = 71000$	Set the core need for execution at n , where $30000 \leq n \leq \text{MAXCORE} - 25000, 40000$. MAXCORE is the number of words of core available. Note that n may be XK where K is 1000, like 71K for 71000.
LOAD α -opt-	LD	Standard option procedures apply	Load the segment α assuming that α text and link were produced during this job. α may be '*' in which case all object decks resulting from EPL or EPLBSA activities will be loaded.
LOADORG n	none	$\alpha = \text{FLTBAS} + 384$	Set the loading origin at n
LSPGSZ n	none	$n = 64$	Set the linkage segment page size at n for all linkage segments to be loaded

<u>Word</u>	<u>Abbrev.</u>	<u>Default</u>	<u>Description</u>
MAKETL λ β γ -opt-	MK	Standard option procedures apply	Make a text and link file from the CTSS file λ . Load the text and link as segment name γ . If $\beta = '*'$, a dummy segment γ is created and text and link files may be returned as file name λ .
NØTAPE	none	At least CTSS files runnam ERROR and runnam DUMP are returned to the user via the return tape	No return tape created
NMTBND n	none	$n = 1$	Name table segment bound set at n
NTPGSZ n	none	$n = 64$	Set page size of the name table at n
PBLKSZ n	none	$n = 64$	Set the block size of page table at n .
PGSIZE n	none	$n = 64$	Set the size of subsequent page table segments at n . If $n \neq 0$ segments are unpagged.
PURE	none	only impure segments will be dumped after execution	Produce a dump of <u>all</u> segments after execution if instal is specified.
SIMULATE	none	Execute like 645	Execute process by use of the 645 simulator
STPGSZ n	none	$n = 1024$	Set stack segment page size at n . If $n = 0$ the stack segment is unpagged.

<u>Word</u>	<u>Abbrev.</u>	<u>Default</u>	<u>Description</u>
TEXT+LINK α -opt-	TL	Standard option procedures apply	Move text, and link and symbol (if present) files α to 645 and load for execution.
TIME n	none	$n = 1000$	Set maximum simulation time at n (thousands of 645 memory cycles)
UNDUMP	none	CTSS dump file runnam DUMP produced	No 645 dump file produced on return tape

* q

A line with '*' in column 1 indicates a comment card which is ignored by the merge-editor. The character string q may be used to document the control file's functions. Any number of comments may be used.

standard options procedures

The following options are allowed on LOAD, LIBE, MAKETL, and TEXT-LINK control lines.

<u>MNEMONIC</u>	<u>MEANING</u>	<u>DESCRIPTOR BITS</u>
F0	Directed fault 0	00
F1	Directed fault 1	10
.	.	.
F7	Directed fault 7	70
DATA	Data Segment	01
SLVPRC	Slave Procedure	02
MASPRC	Master Procedure	04
EXONLY	Execute Only	03

<u>MNEMONIC</u>	<u>MEANING</u>	<u>DESCRIPTOR BITS</u>
SLVACC	Slave Access	20
WPERMT	Write Permit	40

If the options are missing on the first LOAD, LIBE, MAKETL, or TEXT+LINK card, it is assumed to be

SLVPRC, SLVACC

If the 'options' field is omitted, the descriptor bits will be taken to be the same as those specified on the previous LOAD, LIBE, MAKETL or TEXT+LINK card.

The descriptor bits of a segment are taken to be the inclusive OR of the bits associated with each option. Note that if a segment is declared to be 'SLVACC', a descriptor containing a Directed Fault 2 will be created. The segment should be declared to be 'SLVACC, SLVPRC', 'SLVACC, MASPRC', etc.

Example 1

It is desired to

- (1) Assemble the procedure TEST at Murray Hill, and call the library segment ZORCH_
- (2) Execute the process, using as the entry point the symbol START in TEST. TEST is assumed to be a slave procedure with slave access. ZORCH_ is to be a master procedure with slave access.
- (3) Return all files to CTSS.

The control file EX1 GECOS, produced with EDL or QED, is as follows:

```

EPLBSA  TEST
LOAD    TEST
ENTRY   TEST    START
LIBE    ZORCH-  MASPRC    SLVACC
FETCH   * *

```

The command is

```

MRGEDT  EX1    RUN001  USER    MH

```

Example 2

It is desired to

- (1) Assemble (using EPLBSA) the procedures FILEA and FILEB, include the already assembled procedure FILEC, and call the segments SEG1 and SEG2 from the library tape.
- (2) Execute the process by using as an entry the symbol START in segment FILEA. FILEC is to be a master-mode procedure, with slave access permitted. FILEB is a data segment, paged 1024 words to a page. SEG1 is unpagged.
- (3) Return all text and link files produced by the process, as well as the error file. Suppress return of the 6.36 core dump and request an on-line 64.5 dump.

The control file EX2 GECOS is produced by the USER, using EDL or QED.

EPLBSA	FILEA	
LOAD	FILEA	
ENTRY	FILEA	START
LIBE	SEG2	
TEXT+LINK	FILEC	MASPRC,SLVACC
PGSIZE	1024	
EPLBSA	FILEB	
LOAD	FILEB	
PGSIZE	0	
LIBE	SEG1	SLVPRC,SLVACC,WPERMT
FETCH	* TEXT+LINK	
UNDUMP		
CORE		

The command is

```
MRGEDT EX2 645RUN USER MAC
```

Example 3

The user has the following CTSS files

TEST	EPL
SQRT	EPL
DATA	TABLE
EX3	GECØS
LIBE	GECØS
ØUTPUT	TEXT
ØUTPUT	LINK

where EX3 GECØS is as follows

```

*           Test of SQRT routine
EPL        SQRT      (LIST)
EPL        TEST
TL         ØUTPUT
MK         DATA      TABLE  TEST-DATA  SLVACC  DATA
LIMITS    92K
INSERT    LIBE
ENTRY     TEST
LD *      SLVACC, SLVPRC
ERRØR
UNDUMP
CØRE
FETCH *   TL
DECK      SQRT

```

and LIBE GECØS is as follows.

```

LI      TYPER      SLVACC,SLVPRC
LI      STGØP-
LI      WRITE-ØUT
LI      PSEUDØ-SUPERVISØR
LI      CATSTR-
LI      SUBSTR-
LI      FREE-      DATA,SLVACC,WPERMT

```

If the user issues the following command line

```
MRGEDT  EX3  REMØTE  USERNM  SP
```

the following action is taken.

The file EX3 GECØS is scanned such that an IMCV tape is created to be executed on the 645 which is operationally advantageous, and according to a special set of instructions given to operations at both installations.

The EPL files SQRT and TEST are compiled. The TL files ØUTPUT are loaded with attributes SLVACC, SLVPRC (by default); the TL files DATA, segment name TEST_DATA, are loaded with attribute SLVACC, DATA; the library segments TYPER, STGØP, WRITE_ØUT, PSEUDØ_SUPERVISØR, CATSTR_ and SUBSTR_ are loaded with attributes SLVACC, SLVPRC; the library segment FREE_ is loaded with attribute SLVACC, DATA, WPERMT; the user TL files SQRT and TEST are loaded with attributes SLVACC, SLVPRC; execution begins at symbol START (by default) in segment TEST where 92000 words of core has been set aside.

Upon completion of the job the user will discover the following additional files in his directory.

```

TEST      TEXT
TEST      LINK
SQRT      TEXT
SQRT      LINK
REMØTE    ERRØR

```

Note that DATA TEXT and DATA LINK were not returned.

Since the instal designation was not specified the lines

CØRE

SØRT (LIST)

ERRØR

DECK SØRT

in EX3 GECØS were ignored as no hardcopy output was to be produced for this run.