SOFTWARE ENGINEERING LABORATORY (SEL) COMPRENDIUM OF TOOLS (REVISION 1)

FEBRUARY 1982
FOREWORD

The Software Engineering Laboratory (SEL) is an organization sponsored by the National Aeronautics and Space Administration Goddard Space Flight Center (NASA/GSFC) and created for the purpose of investigating the effectiveness of software engineering technologies when applied to the development of applications software. The SEL was created in 1977 and has three primary organizational members:

NASA/GSFC (Systems Development and Analysis Branch)
The University of Maryland (Computer Sciences Department)
Computer Sciences Corporation (Flight Systems Operation)

The goals of the SEL are (1) to understand the software development process in the GSFC environment; (2) to measure the effect of various methodologies, tools, and models on this process; and (3) to identify and then to apply successful development practices. The activities, findings, and recommendations of the SEL are recorded in the Software Engineering Laboratory Series, a continuing series of reports that includes this document. A version of this document was also issued as Computer Sciences Corporation document CSC/TM-81/6038.

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Single copies of this document can be obtained by writing to

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Greenbelt, Maryland 20771
This document presents a brief description of each of a selected set of software tools in use at the Software Engineering Laboratory (SEL) of the Goddard Space Flight Center (GSFC) Mission Support Computing and Analysis Division (Code 580). These brief descriptions allow the reader to judge quickly the suitability of a particular software tool for a particular application.
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SECTION 1 - INTRODUCTION

This compendium of software tools provides a synopsis of a selected set of programs available to users of the Goddard Space Flight Center (GSFC) Mission Support Computing and Analysis Division (Code 530) Software Engineering Laboratory (SEL). The programs described are all software tools; that is, each program can be used as an aid to software developers in generating a given software product.

Although there is hardly a consistent definition as to what a software tool is or is not, the SEL definition generally includes all support programs that are used to aid the developer or manager in generating the software product. The SEL definition excludes such vendor-supplied programs as compilers. Examples of software tools include requirements analyzers, design languages, precompilers, code auditors, code analyzers, and software librarians.

Section 2 of this document describes each software tool available to SEL users; each description is presented in the format explained at the beginning of Section 2. The presentation is intentionally brief to allow the reader to make a quick judgment as to the suitability of a particular program for specific needs. A reader interested in a particular software tool may then find more detailed information in the documentation cited for that entry.

Users of the GSFC Code 580 SEL may use or obtain all of the described software tools, either as executable programs on the indicated computer or as system generation tapes containing the source code. Appendix A specifies the locations of all files and data sets required to execute each software tool. Documentation for each tool is available from the SEL library.
Each tool description includes an AVAILABLE ITEMS section. Where indicated, the software may be obtained in the form of system generation tapes (and accompanying documentation) from the GSFC Computer Program Library or the NASA Computer Software Management and Information Center (COSMIC).

The GSFC Computer Program Library will release the indicated programs to GSFC employees, GSFC contractor employees, and employees of other government agencies. The requestor should submit a Request for Program Retrieval form (Figure 1-1) and a blank magnetic tape to the Computer Program Library. GSFC contractor employees must obtain sponsor approval before submission of the request. Employees of other government agencies should include a letter detailing the need for the program. All requests should be directed to

Goddard Space Flight Center
Computer Program Library
Building 23, Room C-238
Greenbelt, Maryland 20771

Telephone: (301) 344-6796

COSMIC will release the indicated programs to NASA employees, the general United States public, and foreign organizations and individuals. If a tool is available from COSMIC, either two or three pieces of information are listed under System Tape Availability: the COSMIC identification number, the date COSMIC received the software, and the date COSMIC evaluated the software. All requests for programs or information about the programs should include the COSMIC identification number. No requests for software will be honored by COSMIC until after the evaluation date. When this document was issued, some of the programs had not yet been evaluated by COSMIC; this is indicated by the notation "in evaluation."

1-2
### GSFC Computer Program Library Request for Program Retrieval

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<thead>
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<th><strong>SUMMARY</strong></th>
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<td>CANCELLED</td>
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Figure 1-1. GSFC Computer Program Library Request for Program Retrieval Form

1-3
NASA employees should direct their requests for software or documentation from COSMIC through the Technology Utilization Office at their installation.

Requests from the general public for a program must be accompanied by a fee, which is determined separately for each program, to defray reproduction and mailing costs. Inquiries about fees, software, or documentation should be directed to

COSMIC
112 Barrow Hall
University of Georgia
Athens, Georgia 30602

Telephone: (404) 542-3265

Requests from organizations and individuals outside the United States should also be directed to the address specified above. In general, requests from outside the United States can only be honored for software that is certified for foreign distribution. A determination on foreign distribution is made approximately 1 year after the program is received by COSMIC.
SECTION 2 - SOFTWARE TOOL DESCRIPTIONS

Each software tool described in this section is presented in a format that includes an abstract and several of the following optional sections: resource requirements, available items, and a processing summary.

The abstract provides information about the function of the tool. The abstract also describes the uses of the tool in the software development process.

The description of resource requirements lists the specific hardware and software used for operation and installation of the software tool in the SEL. The list indicates the minimum configuration required to support operation of the tool. The specific operating system version is not a strict requirement, but other versions may require some software modifications to the tool to attain correct operation.

For each tool, lists may be given of available items. These lists include all pertinent documentation and software. Some of the SEL software tools are available from COSMIC, the GSFC Computer Program Library, and the SEL Software Tools Library.

Finally, a processing summary is given for most tools. This processing summary illustrates the relationships among the tool, the user, the data files, and other software tools and utilities. Notes are given in the summary diagram to point out the significant features of each tool. In addition, file names are shown, where appropriate, and indicate the mandatory (upper case) and user-choice (lower case) naming conventions.

Table 2-1 provides an alphabetical list of the software tools described in the remainder of this section.
<table>
<thead>
<tr>
<th>Tool Acronym</th>
<th>Computer</th>
<th>Tool Title</th>
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<tbody>
<tr>
<td>CAREM</td>
<td>PDP-11/70</td>
<td>Cost and Reliability Estimation Models</td>
</tr>
<tr>
<td>CAT</td>
<td>PDP-11/70</td>
<td>Configuration Analysis Tool</td>
</tr>
<tr>
<td>CAT</td>
<td>VAX-11/780</td>
<td>Configuration Analysis Tool</td>
</tr>
<tr>
<td>CSMR</td>
<td>PDP-11/70</td>
<td>Common Software Module Repository</td>
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<tr>
<td>DBAM</td>
<td>PDP-11/70</td>
<td>Data Base Maintenance System</td>
</tr>
<tr>
<td>DOCLIB</td>
<td>PDP-11/70</td>
<td>Document Library Support Software</td>
</tr>
<tr>
<td>FINREP</td>
<td>PDP-11/70</td>
<td>Financial Report Generator Program</td>
</tr>
<tr>
<td>MARS</td>
<td>PDP-11/70</td>
<td>Manpower Allocation and Reporting System</td>
</tr>
<tr>
<td>MEDL-R</td>
<td>PDP-11/70</td>
<td>Multi-Level Expression Design Language - Requirements Level</td>
</tr>
<tr>
<td>NPP</td>
<td>PDP-11/70</td>
<td>NAMELIST Preprocessor Program</td>
</tr>
<tr>
<td>NPP</td>
<td>VAX-11/780</td>
<td>NAMELIST Preprocessor Program</td>
</tr>
<tr>
<td>SAP</td>
<td>PDP-11/70</td>
<td>FORTRAN Static Source Code Analyzer Program</td>
</tr>
<tr>
<td>SAP</td>
<td>VAX-11/780</td>
<td>FORTRAN Static Source Code Analyzer Program</td>
</tr>
<tr>
<td>SFORT</td>
<td>IBM-S/360</td>
<td>Structured FORTRAN Preprocessor</td>
</tr>
<tr>
<td>SFORT</td>
<td>PDP-11/70</td>
<td>Structured FORTRAN Preprocessor</td>
</tr>
<tr>
<td>SFORT</td>
<td>VAX-11/780</td>
<td>Structured FORTRAN Preprocessor</td>
</tr>
</tbody>
</table>
TOOL: COST AND RELIABILITY ESTIMATION MODELS (CAREM)

ABSTRACT

The Cost and Reliability Estimation Models (CAREM) Program is a collection of models designed to compute estimates of resources/productivity, costs, and, in the future, reliability/error analysis of computer software development. The models currently included were applied to the historical data of the SEL data base to appraise their applicability to the flight dynamics area.

Input to CAREM is a set of estimated parameters describing the software development project and the environment.

Output from CAREM is estimated costs and required resources.

RESOURCE REQUIREMENTS

PDP-11/70 Operating Resource Requirements

The resource requirements for operating CAREM on the PDP-11/70 are as follows:

Operating System: RSX-11M (Version 3.2)
User Interface: Terminal (CRT/Decwriter)
Output Device(s): Terminal, lineprinter
Disk Storage: Task image:
CAREM.TSK = 215 blocks

PDP-11/70 Installation Resource Requirements

CAREM can be obtained in the form of a system tape. To install CAREM, the following are required:

Operating System: RSX-11M (Version 3.2)
Utilities: FLX
Language Processor(s): SFORT, FORTRAN-IV+
Peripherals: Tape drive (9 track, 1600 bpi)
CAREM(PDP-11/70)
December 1981

AVAILABLE ITEMS

Documentation

Availability:
GSFC Computer Program Library (ID = G0768)
GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for CAREM that contains the following:
1. Tape description and installation guide
2. Command file to load the files on the CAREM tape to disk
3. Structured FORTRAN source code
4. FORTRAN source code
5. Command files to preprocess, compile, and task build CAREM
6. Overlay description file
7. All files required to build the structured FORTRAN Preprocessor (SFORT) (see description under SFORT(PDP-11/70), System Tape)

Availability:
GSFC Computer Program Library (ID = G00768)
GSFC Code 580 SEL Software Tools Library
PROCESSING SUMMARY

1. All program control is through interactive prompts.
2. Four estimation models are currently available.
3. The SEL data base is used as the source for project phase dates and programmer/management/(other services) hours.
TOOL: CONFIGURATION ANALYSIS TOOL (CAT)

ABSTRACT

The Configuration Analysis Tool (CAT) is an information storage and report generation tool for support of configuration management activities. Configuration management is the process of tracking and directing the evolution of a system. CAT aids in tracking systems by providing a central storage location for information in the following seven categories: milestones, documentation, changes, tests, discrepancies, data set status, and resources.

CAT provides editing facilities through which data can be added or modified. It also provides reports for each of the seven categories. The reports can be formatted for presentation on a CRT or a lineprinter, and the information can optionally be presented in sorted order by subsystem name or entry date.

Input to CAT consists of information about the current status of a system.

Output from CAT is a set of reports displaying the current status of a system.

RESOURCE REQUIREMENTS

PDP-11/70 Operating Resource Requirements

The resource requirements for operating CAT on the PDP-11/70 are as follows:

Operating System: RSM-11M (Version 3.2)
User Interface: Terminal (CRT/Decwriter)
Output Device(s): Terminal, lineprinter
Disk Storage: Task image:
  CAT.TSK = 146 blocks
  Data base = 100 blocks
PDP-11/70 Installation Resource Requirements

CAT can be obtained in the form of a system tape. To install CAT, the following are required:

Operating System: RSX-11M (Version 3.2)
Utilities: FLX
Language Processor(s): FORTRAN-IV+, MACAO
Peripherals: Tape drive (9 track, 1600 bpi)

AVAILABLE ITEMS

Documentation

2. Configuration Analysis Tool (CAT) Design (Computer Sciences Corporation handwritten draft)

Availability:

COSMIC (ID = GSC-12710)
GSFC Computer Program Library (ID = G00754)
GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for CAT that contains the following:

1. Tape description and installation guide
2. Command file to load the files on the CAT tape to disk
3. FORTRAN source code
4. FORTRAN include files
5. Assembler source code
6. Command files to compile, assemble, and task build CAT

7. Overlay description file

Availability:

COSMIC (ID = GSC-12710)
  Received: February 12, 1981
  Evaluated: October 18, 1981

GSFC Computer Program Library (ID = G00754)

GSFC Code 580 SEL Software Tools Library
The CAT Program operates in two independent modes.

2 All input to the CAT Program is performed interactively.

3 Reports can be directed to the printer or the terminal.
TOOL: CONFIGURATION ANALYSIS TOOL (CAT)

ABSTRACT

The Configuration Analysis Tool (CAT) is an information storage and report generation tool for support of configuration management activities. Configuration management is the process of tracking and directing the evolution of a system. CAT aids in tracking systems by providing a central storage location for information in the following seven categories: milestones, documentation, changes, tests, discrepancies, data set status, and resources.

CAT provides editing facilities through which data can be added or modified. It also provides reports for each of the seven categories. The reports can be formatted for presentation on a CRT or the lineprinter, and the information can optionally be presented in sorted order by subsystem name or entry date.

Input to CAT consists of information about the current status of a system.

Output from CAT is a set of reports displaying the current status of a system.

RESOURCE REQUIREMENTS

VAX-11/780 Operating Resource Requirements

The resource requirements for operating CAT on the VAX-11/780 are as follows:

Operating System: VAX/VMS (Version 2.3)
User Interface: Terminal (CRT/Decwriter)
Output Device(s): Terminal, lineprinter
Disk Storage:
- Task image: CAT.EXE = 107 blocks
- Data base = 100 blocks
CAT (VAX-11/780)  
December 1981

VAX-11/780 Installation Resource Requirements

CAT can be obtained in the form of a system tape. To install CAT, the following are required:

Operating System: VAX/VMS (Version 2.3)  
Utilities: FLX, LIBRARY  
Language Processor(s): FORTRAN-IV+, MACRO  
Peripherals: Tape drive (9 track, 1600 bpi)

AVAILABLE ITEMS

Documentation

The following documents were written for the PDP-11/70 version of CAT. However, the user's guide information is also correct for the VAX version of CAT.

2. Configuration Analysis Tool (CAT) Design (Computer Sciences Corporation handwritten draft)

Availability:

GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for CAT that contains the following:

1. Tape description and installation guide
2. Command file to load the files on the CAT tape to disk
3. FORTRAN source code
4. FORTRAN include files
5. Assembler source code
6. Command files to compile, assemble, and link CAT

Availability:

GSFC Code 580 SEL Software Tools Library
The CAT program operates in two independent modes.

2. All input to the CAT program is performed interactively.

3. Reports can be directed to the printer or the terminal.
TOOL: COMMON SOFTWARE MODULE REPOSITORY (CSMR)

ABSTRACT

The Common Software Module Repository (CSMR) is a software tool designed to support the creation, maintenance, and access of a data base describing software products. The data base contains most information related to the software product, i.e., the source code, abstract, prolog, author, documentation, and status. A user can do the following on line:

- Locate software products meeting specified criteria
- Examine or retrieve material
- Leave a request with the library for desired material
- Display the news file to obtain information about recent additions

Input to CSMR consists of the source code and the description of software products selected for inclusion in the repository.

Output from CSMR is information and source code for software products meeting a user's stated needs.

RESOURCE REQUIREMENTS

PDP-11/70 Operating Resource Requirements

The resource requirements for operating CSMR on the PDP-11/70 are as follows:

Operating System: RSX-11M (Version 3.2)
User Interface: Terminal (CRT/Decwriter)
Output Devices(s): Terminal (library entry displays), lineprinter (system catalog), tape drive (system catalog)
Disk Storage:

Task images:
  CSMR.TSK = 225 blocks
  CSMRIN.TSK = 51 blocks
Data base = 150 blocks
PDP-11/70 Installation Resource Requirements

CSMR can be obtained in the form of a system tape. To install CSMR, the following are required:

Operating System: RSX-11M (Version 3.2)
Utilities: FLX
Language Processor(s): FORTRAN-IV+, MACRO
Peripherals: Tape drive (9 track, 1600 bpi)

AVAILABLE ITEMS

Documentation

Availability:
COSMIC (ID = GSC-12735)
GSFC Computer Program Library (ID = G00767)
GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for CSMR that contains the following:
1. Tape description and installation guide
2. Command file to load the files on the CSMR tape to disk
3. FORTRAN source code
4. Assembler source code
5. FORTRAN include files
6. Command files to compile, assemble, and task build CSMR
7. Overlay description file
8. Command procedure to build and install the TAP utility

CSMR(PDP-11/70)
December 1980
Availability:

COSMIC (ID = GSC-12735)
Received: April 6, 1981
Evaluated: November 17, 1981
GSFC Program Library (ID = G00767)
GSFC Code 580 SEL Software Tools Library
All program control is through user response to menus.
The CSMR data base must be initialized with the CSLMRIN Program.
The user performs some operations through the control of the text editor (EDI) and file listing utility (LST) while the execution of CSMR is suspended. When the user terminates EDI or LST, CSMR resumes execution.
A system catalog containing a directory listing, all abstracts, and sorted entries can be created by the librarian. The CSMR Program can create a tape copy of the system catalog at the librarian's request.
ABSTRACT

The Data Base Maintenance System (DBAM) is an interactive package used to manage collected SEL data. The SEL data are collected from various ongoing projects for evaluation of software development methodologies by managers and researchers.

DBAM provides the following five basic functions for the user: create, archive, restore, compress, and update. Update provides 12 separate functions, each of which allows the user to interactively add to or modify a specific file type. The following seven types of data are maintained on the data base: project, form, SAP, code, status, comments, and computer.

Input to DBAM consists of information from SEL forms, project managers, the SAP Program, and the computer accounting system.

Output from DBAM is an up-to-date SEL data base.

RESOURCE REQUIREMENTS

PDP-11/70 Operating Resource Requirements

The resource requirements for Operating DBAM on the PDP-11/70 are as follows:

- Operating System: RSX-11M (Version 3.2)
- User Interface: Terminal (CRT/Decwriter)
- Output Device(s): Lineprinter, tape drive
- Disk Storage: Task images:
  - ARCFIL.TSK = 204 blocks
  - CREFIL.TSK = 203 blocks
  - RESFIL.TSK = 212 blocks
  - UPDCIF.TSK = 263 blocks
  - UPDCRF.TSK = 263 blocks
  - UPDCSF.TSK = 265 blocks
  - UPDCSR.TSK = 244 blocks
  - UDPENC.TSK = 209 blocks
  - UPDEST.TSK = 226 blocks
  - UPDHDR.TSK = 231 blocks
  - UPDHIS.TSK = 230 blocks
  - UPDRAF.TSK = 252 blocks

DBAM(PDP-11/70)  
December 1981

TOOL: DATA BASE MAINTENANCE SYSTEM (DBAM)
Disk Storage (Continued):  
UPDSTS.TSK = 211 blocks

PDP-11/70 Installation Resource Requirements

DBAM can be obtained in the form of a system tape. To install DBAM, the following are required:

- Operating System: RSX-11M (Version 3.2)
- Utilities: FLX
- Language Processor(s): SFORT, FORTRAN-IV+
- Peripherals: Tape drive (9 track, 1600 bpi)

Available Items

Documentation


Availability

GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for DBAM that contains the following:

1. Tape description and installation guide
2. Command file to load the files on the DBAM tape to disk
3. Structured FORTRAN source code
4. Command files to preprocess, compile, and task build DBAM

DBAM(PDP-11/70)
December 1981
5. Overlay description files
6. All files required to build the Structured FORTRAN Preprocessor (SFORT) (see description under SFORT(PDP-11/70), System Tape)

Availability

GSFC Code 580 SEL Software Tools Library
The Static Source Code Analyzer Program (SAP) is used to create some input to the SEL data base.

Two examples of analysis programs that use SEL data are the Cost and Resource Estimation Models (CAREM) and Profile Reporting System (PRS).

The CREATE, RESTOR, AND ARCHIV programs perform SEL data base maintenance.
TOOL: DOCUMENT LIBRARY SUPPORT SOFTWARE SYSTEM

ABSTRACT

The Software Engineering Laboratory (SEL) Document Library Support Software System (DOCLIB) provides a mechanism for the storage and display of information about the documents contained within the SEL library. Each document has nine informational items associated with it: reference number, title, author(s), publication date, sponsoring organization, number of pages, subject(s), and organization document number.

DOCLIB provides an editing capability through which data can be added, modified, displayed, or deleted. Formatted reports are provided to document the use of the editing capabilities.

Input to DOCLIB is either data for inclusion in the data base or queries about the contents of the data base.

Output from DOCLIB consists of terminal displays describing the documents in the data base. The displays may optionally be directed to the lineprinter.

RESOURCE REQUIREMENTS

PDP-11/70 Operating Resource Requirements

The resource requirements for operating DOCLIB on the PDP-11/70 are as follows:

Operating System: RSX-11M (Version 3.2)
User Interface: Terminal (CRT/Decwriter)
Output Device(s): Terminal, lineprinter
Disk Storage:

- Task images:
  - DBINIT.TSK = 50 blocks
  - DOCLIB.TSK = 92 blocks
  - LIBMGR.TSK = 104 blocks
- Data base = 1 document per block
PDP-11/70 Operating Resource Requirements

DOCLIB can be obtained in the form of a system tape. To install DOCLIB, the following are required:

Operating System: RSX-11M (Version 3.2)
Utilities: FLX
Language Processor(s): FORTRAN-IV+, MACRO
Peripherals: Tape drive (9 track, 1600 bpi)

AVAILABLE ITEMS

Documentation


Availability:
GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for DOCLIB that contains the following:

1. Tape description and installation guide
2. Command file to load the files on the DOCLIB tape to disk
3. FORTRAN source code for DOCLIB
4. FORTRAN include file
5. Assembler source code
6. DOCLIB help file
7. Command files to compile, assemble, and task build DOCLIB

Availability:
GSFC Code 580 SEL Software Tools Library

DOCLIB(PDP-11/70)
December 1981
The DBINIT Program initializes the document data base.
2. The Librarian Program (LIBMGR) interacts with the document data base and generates sorted data files.
3. Reports can be directed to the lineprinter or the terminal.
4. The DOCLIB Help File instructs the user in running the document display program (DOCLIB).
TOOL: FINANCIAL REPORT GENERATOR PROGRAM (FINREP)

ABSTRACT

The Financial Report Generator Program (FINREP) is a software tool that produces three financial analysis reports: (1) monthly task data reports, (2) month-by-month hourly data summaries, and (3) month-by-month monetary data summaries. These reports are based on a master financial report tape supplied in a specific format. FINREP reports are primarily used as planning tools for the Mission Support Computing and Analysis Division (Code 580) of GSFC.

Input to FINREP consists of a master financial tape and user report generation instructions.

Output from FINREP is a set of financial summary reports.

RESOURCE REQUIREMENTS

PDP-11/70 Operating Resource Requirements

The resource requirements for operating FINREP on the PDP-11/70 are as follows:

Operating System: RSX-11M (Version 3.2)
User Interfaces: Terminal (CRT/Decwriter) and control input file
Input Device: Tape drive (9 track, 1600 bpi)
Output Device: Lineprinter
Disk Storage:
Task images:
FINREP.TSK = 122 blocks
FININIT.TSK = 46 blocks
FINAME.TSK = 64 blocks
Data base = 216 blocks

PDP-11/70 Installation Resource Requirements

FINREP can be obtained in the form of a system tape. To install FINREP, the following are required:

Operating System: RSX-11M (Version 3.2)
Utilities: FLX
Language Processor(s): FORTRAN-IV+, MACRO
Peripherals: Tape drive (9 track, 1600 bpi)

AVAILABLE ITEMS

Documentation


Availability:

GSFC Computer Program Library (ID = G00750)
GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for FINREP that contains the following:

1. Tape description and installation guide
2. Command file to load the files on the FINREP tape to disk
3. FORTRAN source code
4. Assembler source code
5. Command files to compile, assemble, and task build FINREP

Availability:

GSFC Computer Program Library (ID = G00750)
GSFC Code 580 SEL Software Tools Library
FINREP control functions are read from a file created by the user with the PDP text editor.

2. The user need only verify the date associated with the data on the tape.

3. The FININIT Program is used to create the fiscal year data base at the beginning of each year.

4. The fiscal year data base is updated whenever a new tape is processed.

5. Each FINREP report is routed to the printer.

6. The FINAME Program may be used to list the names of each task present on a tape.
 TOOL: MANPOWER ALLOCATION AND REPORTING SYSTEM (MARS)

ABSTRACT

The Manpower Allocation and Reporting System (MARS) is a software tool that automates a majority of the resource scheduling process used by the GSFC Mission Support Computing and Analysis Division (Code 580). MARS is used to enter, update, and report allocation decisions that are maintained in a data base.

The organization of the data base permits entry, update, and report functions to be performed upon projects, persons, and manpower allocations and constraints. An interactive scheduling feature allows trial-and-error methods to be used on a temporary data base to investigate the results of resource reallocation.

Input to MARS consists of personnel assignments and project schedules and constraints.

Output from MARS is a set of reports analyzing the current staffing and workloads.

RESOURCE REQUIREMENTS

PDP-11/70 Operating Resource Requirements

The resource requirements for operating MARS on the PDP-11/70 are as follows:

Operating System: RSX-11M (Version 3.2)
User Interface: Terminal (CRT/Decwriter)
Output Device(s): Terminal, lineprinter
Disk Storage: Task images:
- MARS.TSK = 243 blocks
- MARSIN.TSK = 49 blocks
- MARSBD.TSK = 71 blocks
- MARSUP.TSK = 87 blocks
Data base = 780 blocks
PDP-11/70 Operating Resource Requirements

MARS can be obtained in the form of a system tape. To install MARS, the following are required:

Operating System: RSX-11M (Version 3.2)
Utilities: FLX
Language Processor(s): SFORT, FORTRAN-IV+, MACRO
Peripherals: Tape drive (9 track, 1600 bpi)

AVAILABLE ITEMS

Documentation


Availability:

COSMIC (ID = GSC-12708)
GSFC Computer Program Library (ID = G00753)
GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for MARS that contains the following:

1. Tape description and installation guide
2. Command file to load the files on the MARS tape to disk
3. FORTRAN source code for MARS
4. Structured FORTRAN source code for the MARSUP and MARSRD routines
5. FORTRAN include files
6. Assembler source code
7. Command files to precompile, compile, assemble, and task build MARS
8. All files required to build the Structured FORTRAN Preprocessor (SFORT) (see description under SFORT(PDP-11/70), System Tape)

Availability:
COSMIC (ID = GSC-12708)
  Received: February 5, 1981
  Evaluated: October 12, 1981
GSFC Computer Program Library (ID = G00753)
GSFC Cole 580 SEL Software Tools Library
The MARS Program performs three independent functions.

1. During Interactive Scheduling, the MARS Program manipulates a temporary data base. When scheduling is completed, the user may elect to replace the MARS data base with the temporary data base.

2. Reports may be directed to the lineprinter or to the terminal.

3. The MARSIN Program creates an empty data base for use by the MARS Program.

4. The MARSUP Program "advances" the MARS data base by 1 year. The earliest year of the 5-year period is deleted and a new year is added at the end of the 5-year period.

5. The MARSRD Program is used for debugging. A formatted dump of the entire MARS data base is produced on the lineprinter.
ABSTRACT

The Multi-Level Expression Design Language - Requirements Level (MEDL-R) Program is a software tool used in the requirements analysis phase of system development. MEDL-R is an interactive program that permits the user to create or modify a data base containing descriptions of system requirements. The structure of MEDL-R requirements descriptions allows individual requirements to be categorized or related to other requirements through "derived from" and "derives" links.

Analysis of the data base can be performed in a "query" mode in which MEDL-R reports which requirements meet a specified set of criteria or in various report modes that summarize certain qualities of the data base.

Input to MEDL-R consists of system requirements expressed in the MEDL-R language.

Output from MEDL-R is a set of reports describing the requirements for a system.

RESOURCE REQUIREMENTS

PDP-11/70 Operating Resource Requirements

The resource requirements for operating MEDL-R on the PDP-11/70 computer are as follows:

Operating System: RSX-11M (Version 3.2)
User Interface: Terminal (CRT/Decwriter)
Output Device(s): Terminal
Disk Storage: Task images:
- MEDLR.TSK = 424 blocks
- SUMREL.TSK = 83 blocks
Data base = 400 blocks
PDP-11/70 Installation Resource Requirements

MEDL-R can be obtained in the form of a system tape. To install MEDL-R, the following are required:

- Operating System: RSX-11M (Version 3.2)
- Utility: FLX
- Language Processor(s): FORTRAN-IV+
- Peripherals: Tape drive (9 track, 1600 bpi)

AVAILABLE ITEMS

Documentation

1. Multi-Level Expression Design System Requirements Level Description Manual (Martin-Marietta document, February 1979)

Availability:

GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for MEDL-R that contains the following:

1. Tape description and installation guide for MEDL-R
2. Command file to load the files on the MEDL-R tape to disk
3. FORTRAN source code
4. Lexicon skeleton file
5. Command files to compile and task build MEDL-R
6. Overlay description file
Availability:

GSFC Code 580 SEL Software Tools Library
PROCESSING SUMMARY

1. All program control is by user commands at a terminal.
2. An input data file may be constructed using the system editor or the MEDL-R "create" facility.
3. The MEDL-R data base is composed of six direct-access files. MEDL-R uses a relational data base organization.
4. MEDL-R uses a variety of temporary files for communication between various MEDL-R functions.
5. MEDL-R creates all reports as disk files. The user may list selected reports on the lineprinter after MEDL-R termination.
ABSTRACT

The NAMELIST Preprocessor Program (NPP) is a software tool that brings the FORTRAN NAMELIST input/output (I/O) feature to the PDP-11/70. FORTRAN NAMELIST I/O is a language extension available (with only minor variations) in IBM, CDC, and UNIVAC FORTRAN dialects.

NPP accepts as input programs containing NAMELIST I/O statements and produces as output equivalent code with references to a set of NAMELIST library routines. The library routines perform the actual NAMELIST read and write operations.

NPP can be used to take advantage of the NAMELIST extension in developing programs for the PDP-11/70 or can be used when installing programs on the PDP-11/70 that have been developed on other computers.

RESOURCE REQUIREMENTS

PDP-11/70 Operating Resource Requirements

The resource requirements for operating NPP on the PDP-11/70 computer are as follows:

- Operating System: RSX-11M (Version 3.2)
- User Interfaces: Terminal (CRT/Decwriter)
- Output Device(s): Terminal (error log), disk (FORTRAN source code)
- Disk Storage: Task image: NPP.TASK = 143 blocks
- Reference file: KEYWORDS.DAT = 1 block
- Object library: NAMLIB.OLB = 56 blocks

PDP-11/70 Installation Resource Requirements

NPP can be obtained in the form of a system tape. To install NPP, the following are required:

- Operating System: RSX-11M (Version 3.2)
- Utilities: FLX, LBR

NPP(PDP-1)
Language Processor(s): SFORT, FORTRAN-IV+, MACRO
Peripherals: Tape drive (9 track, 1600 bpi)

AVAILABLE ITEMS

Documentation

1. NAMBLIST Preprocessor Program (NPP) System Description and User's Guide (Computer Sciences Corporation document CSC/SD-78/6090)

Availability:

COSMIC (ID = GSC-12704)
GSFC Computer Program Library (ID = G00752)
GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for NPP that contains the following:

1. Tape description and installation guide
2. Command file to load the files of the NPP tape to disk
3. FORTRAN source code
4. FORTRAN include files
5. Assembler source code
6. Test case
7. Command files to precompile, compile, assemble, and task build NPP
8. Overlay description file
9. All files required to build the Structured FORTRAN Preprocessor (SFORT) (see description under SFORT(PDP-11/70), System Tape)

Availability:

COSMIC (ID = GSC-12704)
Received: January 19, 1981
Evaluated: November 19, 1981
GSFC Computer Program Library (ID = G00752)
GSFC Code 580 SEL Software Tools Library

NPP(PDP-11/70)
December 1980
The NAMELIST dictionary contains information about the variable names and types contained in NAMELIST statements in a particular FORTRAN module (PROGRAM, FUNCTION or SUBROUTINE). Thus, a NAMELIST dictionary is produced for each module.

The NAMELIST library must be referenced in the program task build command file to resolve external references generated during NAMELIST preprocessing.

The NAMELIST dictionary is referenced by the NAMELIST library routines when NAMELIST I/O is performed during program execution.
TOOL: NAMELIST PREPROCESSOR PROGRAM (NPP)

ABSTRACT

The NAMELIST Preprocessor Program (NPP) is a software tool that brings the FORTRAN NAMELIST input/output (I/O) feature to the VAX-11/780. FORTRAN NAMELIST I/O is a language extension available (with only minor variations) in IBM, CDC, and UNIVAC FORTRAN dialects.

NPP accepts as input programs containing NAMELIST I/O statements and produces as output equivalent code with references to a set of NAMELIST library routines. The library routines perform the actual NAMELIST read and write operations.

NPP can be used to take advantage of the NAMELIST extension in developing programs for the VAX-11/780 or can be used when installing programs on the VAX 11/780 that have been developed on other computers.

RESOURCE REQUIREMENTS

VAX-11/780 Operating Resource Requirements

The resource requirements for operating NPP on the VAX-11/780 computer are as follows:

Operating System: VAX/VMS (Version 2.3)
User Interface: Terminal (CRT/Decwriter)
Output Device(s): Terminal (error log), disk (FORTRAN source code)
Disk Storage:
  Task image: NPP.EXE = 77 blocks
  Reference file: KEYWORDS.DAT = 3 blocks
  Object library: NAMLIB.OLB = 45 blocks

VAX-11/780 Installation Resource Requirements

NPP can be obtained in the form of a system tape. To install NPP, the following are required:

Operating System: VAX/VMS (Version 2.3)
Utilities: FLX, LIBRARY

NPP(VAX) -1
Language Processor(s): SFORT, FORTRAN-IV+, MACRO

Peripherals: Tape drive (9 track, 1600 bpi)

AVAILABLE ITEMS

Documentation

The following document was written for the PDP-11/70 version of NPP. However, the user's guide information is also correct for the VAX version of NPP.

1. NAMELIST Preprocessor Program (NPP) System Description and User's Guide (Computer Sciences Corporation document CSC/SD-78/6090)

Availability:

COSMIC (ID = GSC-12711)
GSFC Computer Program Library (ID = G00755)
GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for NPP that contains the following:

1. Tape description and installation guide
2. Command file to load the files of the NPP tape to disk
3. FORTRAN source code
4. FORTRAN include files
5. Assembler source code
6. Test case
7. Command files to precompile, compile, assemble, and link NPP
8. All files required to build the Structured FORTRAN Preprocessor (SFORT) (see description under SFORT(VAX-11/780), System Tape)
Availability:

COSMIC (ID = GSC-12711)
Received: February 12, 1981
Evaluated: In evaluation

GSFC Computer Program Library (ID = G00755)
GSFC Code 580 SEL Software Tools Library
The NAMELIST dictionary contains information about the variable names and types contained in NAMELIST statements in a particular FORTRAN module (PROGRAM, FUNCTION, or SUBROUTINE). Thus, a NAMELIST dictionary is produced for each module.

The NAMELIST library must be referenced in the program link command file to resolve external references generated during NAMELIST preprocessing.

The NAMELIST dictionary is referenced by the NAMELIST library routines when NAMELIST I/O is performed during program execution.
TOOL: FORTRAN STATIC SOURCE CODE ANALYZER PROGRAM (SAP)

ABSTRACT

The FORTRAN Static Source Code Analyzer Program (SAP) is a software tool that automatically produces statistics on the occurrences of statement types and structures within a FORTRAN program. In addition, SAP produces information describing the complexity of the source code in the form of Halstead measures.

SAP output reports are available in several levels of completeness: (1) detailed listings of SAP statistics for each source module, (2) detailed summary listings of SAP statistics for a group of modules, or (3) short summary listings of a selected subset of SAP statistics on a module or group of modules.

RESOURCE REQUIREMENTS

PDP-11/70 Operating Resource Requirements

The resource requirements for operating SAP on the PDP-11/70 are as follows:

Operating System: RSX-11M (Version 3.2)
User Interface: Terminal (CRT/Decwriter)
Output Device: Lineprinter, terminal
Disk Storage: Task images:
  SAP.TSK = 208 blocks
  INCLUD.TSK = 49 blocks
  DEF.TSK = 49 blocks
  REP2.TSK = 67 blocks
  SAP user data base = 25 blocks per user
Reference files:
  KEYWORDS.DAT = 3 blocks
  WEIGHTS.DAT = 1 block

SAP(PDP)-1
SAP(PDP-11/70)  
November 1980

PDP-11/70 Installation Resource Requirements

SAP may be obtained in the form of a system tape. To install SAP, the following are required:

- Operating System: RSX-11M (Version 3.2)
- PDP Utilities: FLX
- Language Processor(s): SFORT, FORTRAN-IV+
- Peripherals: Tape drive (9 track, 1600 bpi)

AVAILABLE ITEMS

Documentation


2. FORTRAN Static Source Code Analyzer Design and Module Descriptions (Computer Sciences Corporation document CSC/TM-78/6012 and NASA/GSFC SEL document SEL-78-001)

Availability:

- COSMIC (ID = GSC-12693)
- GSFC Computer Program Library (ID = G00749)
- GSFC Code 580 SET Software Tools Library

System Tape

A system tape exists for SAP that contains the following:

1. Tape description and installation guide
2. Command file to load the SAP files from the tape to disk
3. FORTRAN source code
4. FORTRAN include files
5. Required data sets (two)
6. Command files to precompile, compile, and task build the various elements of SAP
7. SAP overlay description file
8. All files required to build the Structured FORTRAN Preprocessor (SFORT) (see description under SFORT(PDP-11/70), System Tape)

Availability:

COSMIC (ID = GSC-12693)
Received: March 5, 1981
Evaluated: August 17, 1981
GSFC Computer Program Library (ID = G00749)
GSFC Code 580 SEL Software Tools Library
PROCESSING SUMMARY

1. The SAP FORTRAN source code may be direct input to SAP or, if the source code contains INCLUDE statements, the code may be preprocessed by the INCLUD Program to insure that the statistics are complete.

2. A required preliminary step to the execution of the SAP Program is the creation of the SAP data base file using the DEF Program.

3. The REP2 Program may be used to produce summary reports after SAP execution if the user does not wish to examine voluminous detailed reports.

4. KEYWORDS.DAT and WEIGHTS.DAT are permanent files required for SAP execution.

The SAP FORTRAN source code may be direct input to SAP or, if the source code contains INCLUDE statements, the code may be preprocessed by the INCLUD Program to insure that the statistics are complete.

A required preliminary step to the execution of the SAP Program is the creation of the SAP data base file using the DEF Program.

The REP2 Program may be used to produce summary reports after SAP execution if the user does not wish to examine voluminous detailed reports.

KEYWORDS.DAT and WEIGHTS.DAT are permanent files required for SAP execution.
TOOL: FORTRAN STATIC SOURCE CODE ANALYZER PROGRAM (SAP)

ABSTRACT

The FORTRAN Static Source Code Analyzer Program (SAP) is a software tool that automatically produces statistics on the occurrences of statement types and structures within a FORTRAN program. In addition, SAP produces information describing the complexity of the source code in the form of Halstead measures.

SAP output reports are available in several levels of completeness: (1) detailed listings of SAP statistics for each source module, (2) detailed summary listings of SAP statistics for a group of modules, or (3) short summary listings of a selected subset of SAP statistics on a module or group of modules.

RESOURCE REQUIREMENTS

VAX-11/780 Operating Resource Requirements

The resource requirements for operating SAP on the VAX-11/780 are as follows:

Operating System: VAX/VMS (Version 2.3)
User Interface: Terminal (CRT/Decwriter)
Output Device(s): Lineprinter, terminal
Disk Storage:

<table>
<thead>
<tr>
<th>Task images:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SAP.EXE = 122 blocks</td>
<td></td>
</tr>
<tr>
<td>INCLUD.EXE = 7 blocks</td>
<td></td>
</tr>
<tr>
<td>REP2.EXE = 13 blocks</td>
<td></td>
</tr>
<tr>
<td>DEF.EXE = 6 blocks</td>
<td></td>
</tr>
<tr>
<td>Data base = 25 blocks</td>
<td></td>
</tr>
</tbody>
</table>

Reference files:

| KEYWORDS.DAT = 3 blocks |
| WEIGHTS.DAT = 1 block |

VAX-11/780 Installation Resource Requirements

SAP can be obtained in the form of a system tape. To install SAP, the following are required:

Operating System: VAX/VMS (Version 2.3)
VAX Utilities: FLX

SAP(VAX)-1
Language Processor(s): SFORT, FORTRAN-IV+
Peripherals: Tape drive (9 track, 1600 bpi)

AVAILABLE ITEMS

Documentation

The following documents were written for the PDP-11/70 version of SAP. However, the user's guide information is also correct for the VAX version of SAP.


2. FORTRAN Static Source Code Analyzer Design and Module Descriptions (Computer Sciences Corporation document CSC/TM-78/6012 and NASA/GSFC SEL document SEL-78-001)

Availability:

COSMIC (ID = GSC-12724)
GSFC Computer Program Library (ID = G00758)
GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for SAP that contains the following:

1. Tape description and installation guide
2. Command file to load the SAP files from the tape to disk
3. FORTRAN source code
4. FORTRAN include files
5. Required data sets (two)
6. Command files to precompile, compile, and link the various elements of SAP
7. All files required to build the Structured FORTRAN Preprocessor (SFORT) (see description under SFORT(VAX-11/780), System Tape)
Availability:

COSMIC (ID = GSC-12724)
Received: March 16, 1981
Evaluated: In evaluation

GSFC Computer Program Library (ID = G00758)
GSFC Code 580 SEL Software Tools Library
PROCESSING SUMMARY

1. The SAP FORTRAN source code may be direct input to SAP or, if the source code contains INCLUDE statements, the code may be preprocessed by the INCLUD Program to insure that the statistics are complete.

2. A required preliminary step to the execution of the SAP Program is the creation of the SAP data base file using the DEF Program.

3. The REP2 Program may be used to produce summary reports after SAP execution if the user does not wish to examine voluminous detailed reports.

4. KEYWORDS.DAT and WEIGHTS.DAT are permanent files required for SAP execution.

SAP(VAX)-4
TOOL: STRUCTURED FORTRAN PREPROCESSOR (SFORT)

ABSTRACT

The Structured FORTRAN Preprocessor (SFORT) is a software tool used to extend the capabilities of the FORTRAN language. Computer programs written in the SFORT language can contain the structured programming constructs IF...ELSE...ENDIF and DOWHILE...ENDDO, in addition to any valid FORTRAN statement.

The SFORT preprocessor accepts as input programs written in the SFORT language and produces as output valid, equivalent FORTRAN source code.

AVAILABLE ITEMS

Documentation

1. Structured FORTRAN Preprocessor (SFORT) (Computer Sciences Corporation document CSC/TM-77/6256 and NASA/GSFC SEL document SEL-77-003)

2. Structured FORTRAN Preprocessor (SFORT) 360 System Maintenance Guide (Computer Sciences Corporation document CSC/SB-78/6068)

Availability:

GSFC Code 580 SEL Software Tools Library
PROCESSING SUMMARY

SFORT CODED PROGRAM

SY SIN DD

SFORT

DSN=SFORTIN

SFORT LISTING AND ERROR LOG

SYS PRINT DD

FORTRAN SOURCE CODE

FORTRAN COMPILER
TOOL: STRUCTURED FORTRAN PREPROCESSOR (SFORT)

ABSTRACT

The Structured FORTRAN Preprocessor (SFORT) is a software tool used to extend the capabilities of the FORTRAN language. Computer programs written in the SFORT language can contain the structured programming constructs IF...ELSE...ENDIF and DOWHILE...ENDDO, in addition to any valid FORTRAN statement.

The SFORT preprocessor accepts as input programs written in the SFORT language and produces as output valid, equivalent FORTRAN source code.

RESOURCE REQUIREMENTS

PDP-11/70 Operating Resource Requirements

The resource requirements for operating SFORT on the PDP-11/70 are as follows:

Operating System: RSX-11M (Version 3.2)
User Interface: Terminal (CRT/Decwriter)
Output Devices: Lineprinter (SFORT listing/error log), disk (FORTRAN source code)
Disk Storage: Task image: FPP.TSK = 70 blocks

PDP-11/70 Installation Resource Requirements

SFORT can be obtained in the form of a system tape. To install SFORT on the PDP-11/70, the following are required:

Operating System: RSX-11M (Version 3.2)
Utilities: FLX
Language Processor(s): FORTRAN-IV+, MACRO
Peripherals: Tape drive (9 track, 1600 bpi)
AVAILABLE ITEMS

Documentation


Availability:

COSMIC (ID = GSC-12688)
GSFC Computer Program library (ID = G00747)
GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for SFORT that contains the following:

1. Tape description and installation guide
2. Command file to load the files on the SFORT tape to disk
3. FORTRAN source code
4. Assembler source code
5. Command files to compile, assemble, and task build SFORT

Availability:

COSMIC (ID = GSC-12688)
Received: October 30, 1980
Evaluated: September 10, 1981
GSFC Computer Program Library (ID = G00747)
GSFC Code 580 SEL Software Tools Library
PROCESSING SUMMARY

SFORT Coded Program
filename.FPP

SFORT

FORTRAN Source Code
filename.FTN

SFORT Listing and Error Log
filename.FLS

FORTRAN-IV+
Compiler

SFORT (PDP-11, 70)
November 1980
TOOL: STRUCTURED FORTRAN PREPROCESSOR (SFORT)

ABSTRACT

The Structured FORTRAN Preprocessor (SFORT) is a software tool used to extend the capabilities of the FORTRAN language. Computer programs written in the SFORT language can contain the structured programming constructs IF...ELSE...ENDIF and DO WHILE...ENDDO, in addition to any valid FORTRAN statement.

The SFORT preprocessor accepts as input programs written in the SFORT language and produces as output valid, equivalent FORTRAN source code.

RESOURCE REQUIREMENTS

VAX-11/780 Operating Resource Requirements

The resource requirements for operating SFORT on the VAX-11/780 are the following:

Operating System: VAX/VMS (Version 2.3)
User Interface: Terminal (CRT/Decwriter)
Output Device(s): Lineprinter (SFORT listing/error log), disk (FORTRAN source code)
Disk Storage: Task image: FPP.EXE = 29 blocks

VAX-11/780 Installation Resource Requirements

SFORT may be obtained in the form of a system tape. To install SFORT on the VAX-11/780, the following are required:

Operating System: VAX/VMS (Version 2.3)
Utilities: FLX
Language Processor(s): FORTRAN-IV+, MACRO
Peripherals: Tape drive (9 track, 1600 bpi)
AVAILABLE ITEMS

Documentation

The following document was written for the PDP-11/70 version of SFORT. However, the user's guide information is also correct for the VAX version of SFORT.


Availability:

- COSMIC (ID = GSC-12712)
- GSFC Computer Program Library (ID = G00756)
- GSFC Code 580 SEL Software Tools Library

System Tape

A system tape exists for SFORT that contains the following:

1. Tape description and installation guide
2. Command file to load the files from the SFORT tape to disk
3. FORTRAN source code
4. Assembler source code
5. Command files to compile, assemble, and link SFORT

Availability:

- COSMIC (ID = GSC-12712)
  - Received: February 12, 1981
  - Evaluated: In evaluation
- GSFC Computer Program Library (ID = G00756)
- GSFC Code 580 SEL Software Tools Library
PROCESSING SUMMARY

SFORT CODED PROGRAM → SFORT → FORTRAN SOURCE CODE → FORTRAN-IV+ COMPILER

filename.FPP → filename.FTN → filename.FLS
The software tools described in this document are maintained on line to support users of the SEL. Table A-1 lists the file locations of these tools. These files are the files upon which maintenance is performed. Files in other locations may possibly be superseded versions or test versions. The information specified in Table A-1 represents the SEL software tool status as of January 4, 1982.
### Table A-1. SEL Software Tools and Their Locations (1 of 2)

<table>
<thead>
<tr>
<th>Tool</th>
<th>Executable Image, Object Library, and Reference File Locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAREM (PDP)</td>
<td>DB1: [213, 2]CAREM.TSK</td>
</tr>
<tr>
<td>CAT (PDP)</td>
<td>DB1: [213, 2]CAT.TSK</td>
</tr>
<tr>
<td>CAT (VAX)</td>
<td>DBB1: [TOOLS]CAT.EXE</td>
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A-2
Table A-1. SEL Software Tools and Their Locations (2 of 2)

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