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GEORGE C. MARSHALL SPACE FLIGHT CENTER

INTRODUCTION TO THE

MARSHALL
INFORMATION RETRIEVAL AND DISPLAY SYSTEM

MIRADS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
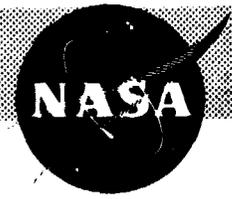
AN INTRODUCTION TO THE

MARSHALL
INFORMATION RETRIEVAL
AND
DISPLAY SYSTEM
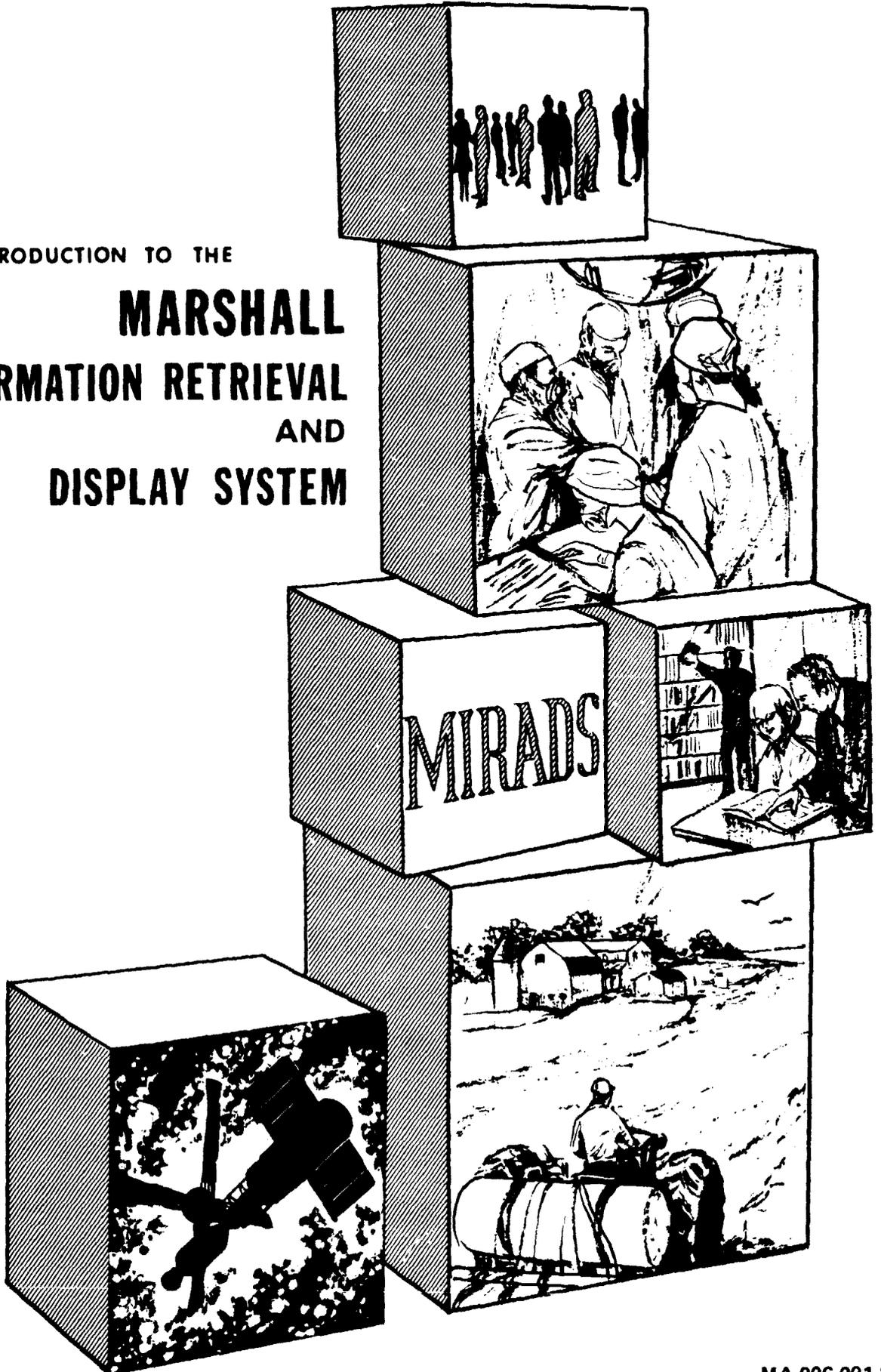
Prepared By

COMPUTER SCIENCES CORPORATION
INDUSTRIAL MANAGEMENT SYSTEMS DEPARTMENT

For

MSFC COMPUTATION LABORATORY
DATA CENTER DIVISION

Under

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SECTION 1 - INTRODUCTION

1.1 DATA MANAGEMENT SYSTEMS

Space research has not only put man on the moon, but has provided many
tools which benefit man in his everyday life. The Marshall Information
Retrieval and Display System is a Data Management System developed
by NASA to support the space program. After the development of
MIRADS, the system was found to be of great value to nonspace related
tasks as well as future space explorations. The success of the initial
release of MIRADS necessitated a continuous development effort to
maintain MIRADS as the state-of-the-art Data Management System.
The original MIRADS has now evolved into MIRADS-1.

In presenting a Data Management System, a definition of such a system
should first be given.

A Data Management System (DMS) is a software package which involves
the use of a computer to generate reports describing past or present
activities. The user generates a data base which is accessed by the
Data Management System to retrieve requested data and arrange it in
a desired format.

Data Management Systems consist primarily of a set of processing
programs and control tables required to access a data base and gen-
erate the requested output report. The processing programs are

designed to provide an interface between the input/output requests gen-
erated by the users and the storage media used for the data bases.   The
control tables describe the data base and locate specific requested
information within it.   The primary functions of a Data Management
System can be grouped into three major categories:

1.   Data Base Definition and Generation

2.   Functional Processing

3.   Data Retrieval and Processing

These functions are illustrated in Figure 1-1.
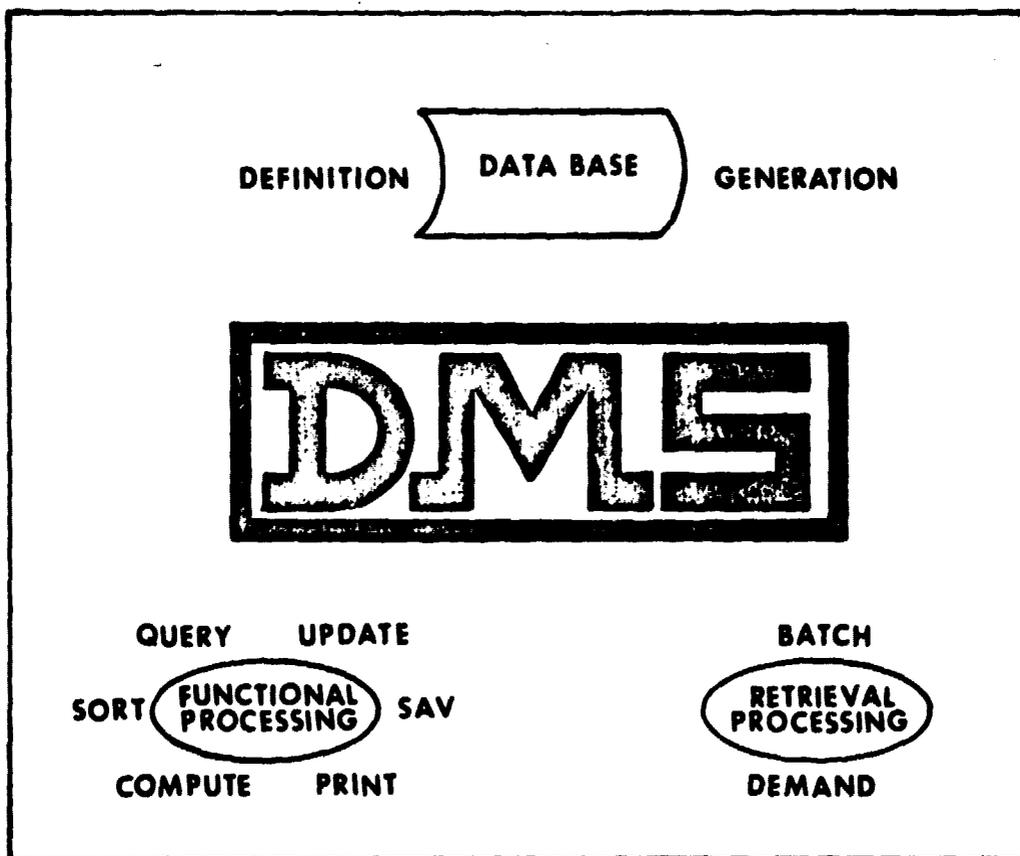
Figure 1-1.   Primary Functions of a Data Management System

The Data Base Definition is accomplished with a Data Description Language. This technique will vary from one Data Management System to another but in all cases the language is primarily used to associate the data elements to user reference names or tags, to describe the contents of the data base, and to provide a relative location of the data elements within the data base structure. The Data Description Language is used to create the file which is commonly referred to as a Dictionary. Figure 1-2 shows the functions of the Data Description Language.
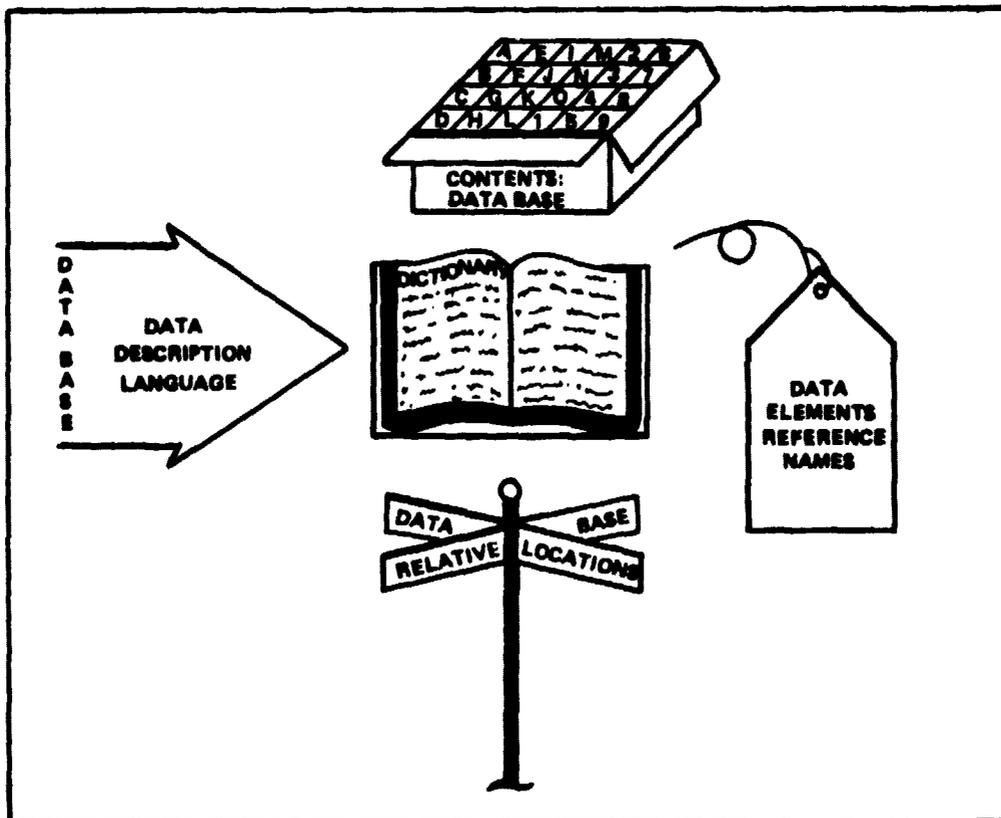
Figure 1-2. Data Base Definition and Generation

At Data Base Generation time, mass storage is allocated and the Dictionary is created. The file Dictionary functions as an interfacing part of the system which permits the user to easily access any data contained within the file structure.

Functional Processing encompasses those features found in most Data Management Systems. With simplified commands, the user is able to select, sort, edit, and update requested data. The commands associated with Functional Processing are illustrated in Figure 1-3. A successful and efficient Data Management System must possess a command language which can be easily understood and used by non-programming type people.

On-line Data Retrieval and Processing includes Batch Mode reporting as well as Demand reporting. In a situation where a high volume report is requested, but not immediately needed, the Batch Mode of operation should be used. In the Batch Mode, the request is submitted to the computer with the same level of priority as programs which are introduced on-site. Response time will be dependent upon the number of programs being processed at the time the request is submitted. Whenever an immediate response is required, the Demand Mode of operation should be used. The Demand Mode has a higher priority level than Batch and therefore results in a rapid response. The terminal
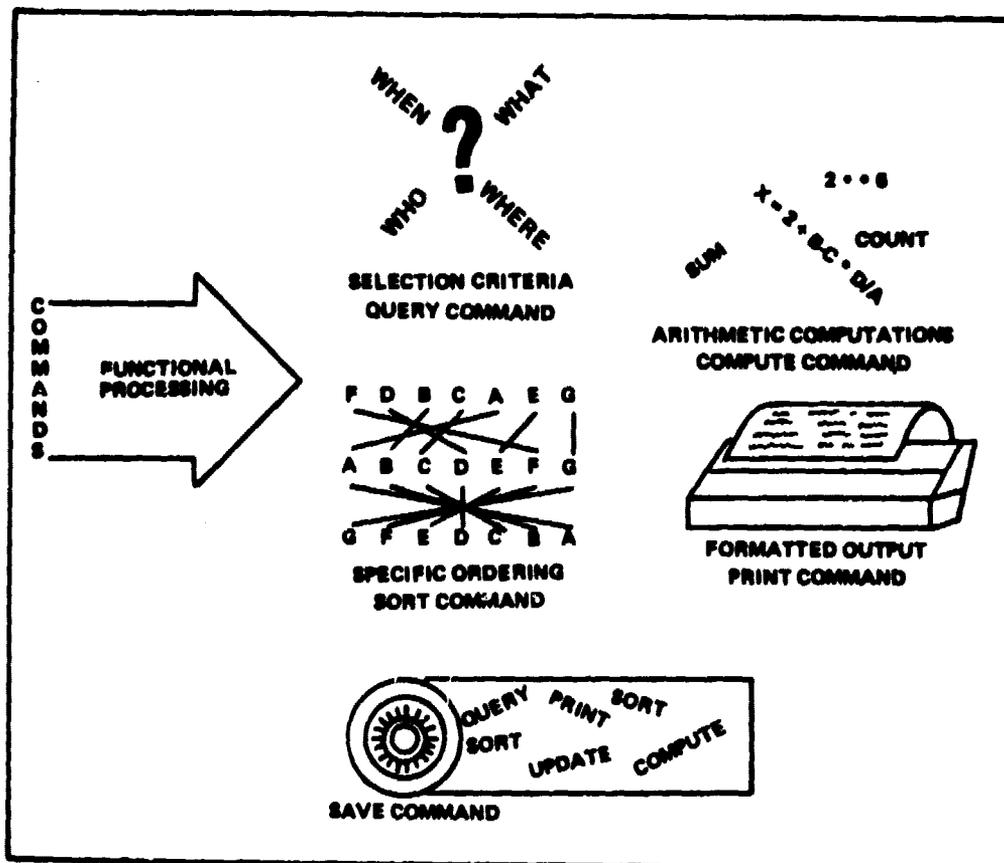
Figure 1-3. Functional Processing Data Base

devices which are used for Batch Mode and Demand Mode Retrieval Processing are illustrated in Figure 1-4.

In any case, whether the user requires simple or complex inquiries and requires a high or low volume output, the system must be easily adaptable so that he may utilize all of its features as soon as his data base is generated.
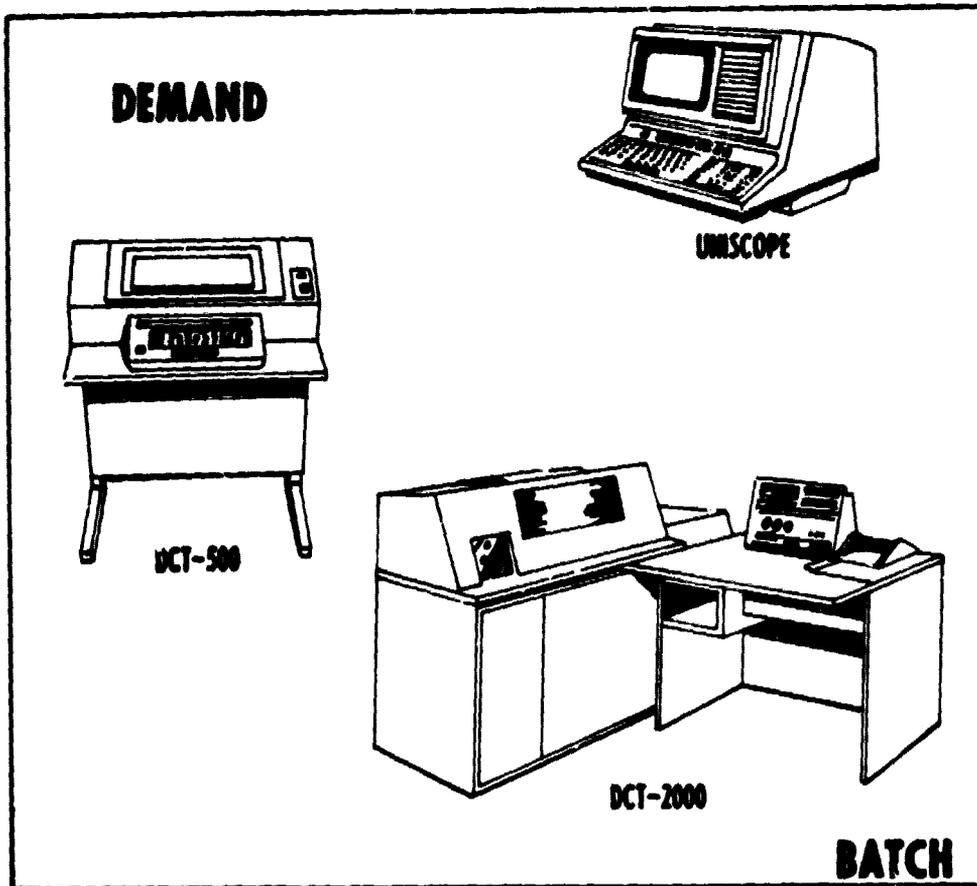
Figure 1-4. Data Base Retrieval Processing

1.2 MIRADS AS A DATA MANAGEMENT SYSTEM

The Marshall Information Retrieval and Display System (MIRADS) is an on-line terminal oriented data storage and retrieval system which allows a user to extract and process information from stored data bases. The use of on-line terminals for extracting and displaying data from the data bases provides a fast and responsive method of obtaining needed information. The system consists of general purpose computer programs that provide the overall capabilities of the total system.

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MIRADS is an operational Data Management System that allows new applications to utilize it without requiring any reprogramming. Some of the outstanding features offered in MIRADS are:

- Simplicity of command language

- Allows multiple users of multiple files

- Requires no modifications to the standard Computer Executive Operating System

- Direct Access of fields used as retrieval/update arguments

- On-line/remote capabilities for retrieval and update

- Efficient use of random access devices for data base storage

- Standard system formatted outputs and user defined flexible report formats

- Update data validation

- Data base integrity and access rights to field level during simultaneous on-line/batch processing

- In-line edit of user commands

The features listed are only a few of the advantages afforded by MIRADS. In the sections which follow, the components which enable the user to effectively manage data under the Marshall Information Retrieval and Display System are presented.

1.3 SYSTEM DESCRIPTION

MIRADS is a command driven system with on-line editing of user commands which provides error diagnostic messages and recovery procedures that assist in the utilization of the system. The system

can process any number of data files via a Dictionary (one for each file) which describes the data format to the system. New files may be added to the system at any time without reprogramming of the MIRADS programs. Normally, the only requirement would be that of creating a file Dictionary for the new file.

MIRADS is currently operational on the UNIVAC 1108 computer, under the standard EXEC 8 system. A user enters his commands or requests through a DCT-500 or Uniscope (CRT) terminal which transmits the commands via communication lines to the computer. The computer, utilizing the MIRADS programs and the user's data files, performs the necessary functions relative to the query commands and returns the reply to the user.

MIRADS provides a highly diversified choice of data processing functions depending on the requirements. MIRADS contains several programs that perform its various tasks. Within the system, there are functions which are referred to as commands. Figure 1-5 illustrates the basic configuration of MIRADS.

MIRADS provides the user with an inquiry language which may be used in connection with stored data files to respond to on-line inquiries. In response to a Query the system can search specified data files,
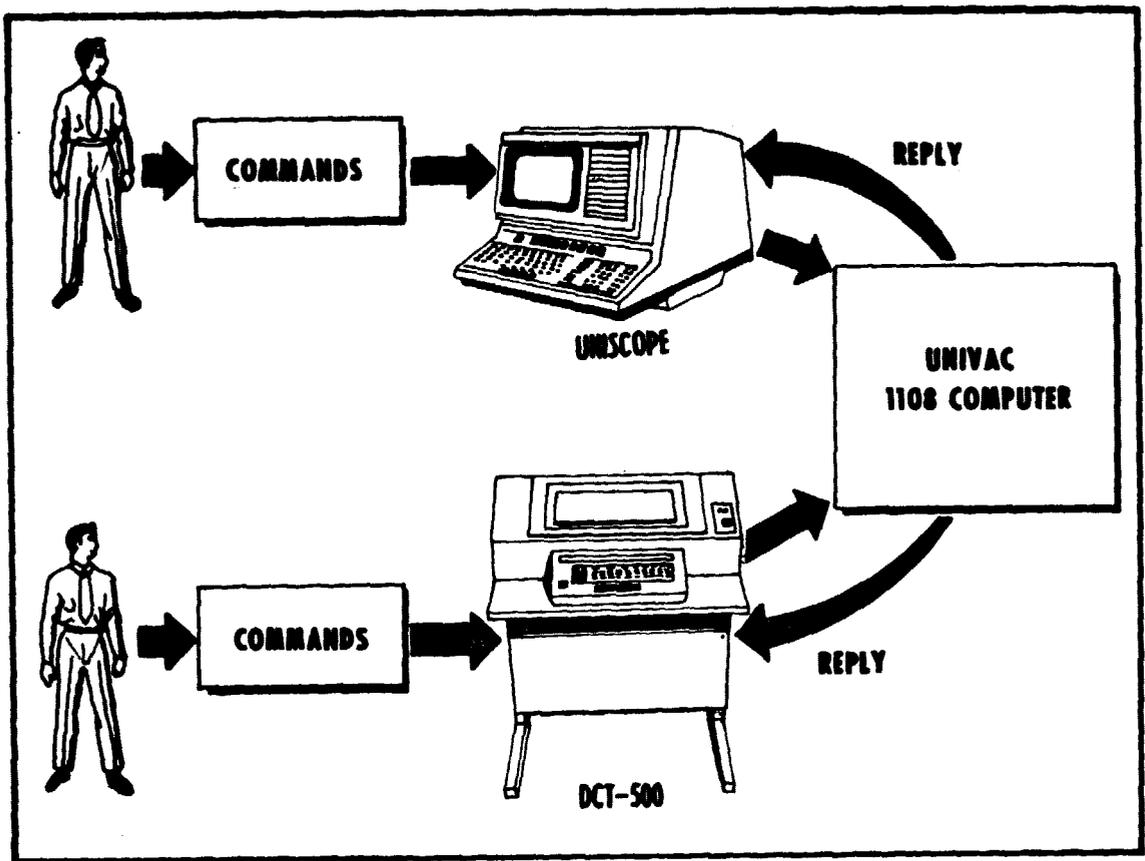
Figure 1-5. MIRADS System

sort the extractions into a specified order, perform simple or com-

plex computations, and print or display the results.

MIRADS provides the user with an inquiry language which may be used

in connection with stored data files to respond to on-line inquiries. In

response to a Query, the system can search specified data files, sort

the extractions into a specified order, perform simple or complex

computations, and print or display the results.

SECTION 2 - MIRADS COMMANDS

2.1 INTRODUCTION

The commands which are contained within MIRADS provide the necessary functional capabilities to retrieve, manipulate, format and display data. A basic means of questioning is provided in the Query Set which consists of eight major commands, each of which performs a specific function that contributes to the answering of a user's inquiry.

2.2 QUERY

Information is extracted from a data base by executing a Query Set. The focal point of the Query Set is the QUERY command. It is used to specify the selection criteria which may be integers, literals, field names, or fixed decimals. Records from the data base can be selected which meet the relational test for one criterion, or a combination of relational tests for multiple criteria through the use of the logical operators of AND, OR or NOT. For data bases which are structured with narrative information, records can be selected which satisfy the relational for a keyword or keyphrase contained anywhere within a given field.

Once the desired records have been selected by the QUERY command, a decision must be made of what to do with this available information.

2.3 SORT

SORT is an optional command which allows the records to be rearranged in a specified order. The records can be sorted in either an ascending or descending mode using the standard commercial collating sequence. A single level or a multi level sort can be specified using up to ten fields or a combined total of 78 characters as sort keys.

After selecting records by the QUERY command and possibly sorting them, some type of arithmetic calculation may be required.

2.4 COMPUTE

COMPUTE is an optional command which allows arithmetic functions using the operators for add, subtract, multiply, divide, and exponentiation. In addition to performing algebraic expressions, summarizations of specified fields or counting the occurrences of a specified field may be performed. It is not necessary to predefine a field within the data base to receive the value computed by this command. At the time the command is entered, a receiving field called a new-variable is specified. A New-Variable is indicated in the COMPUTE command by prefixing the new-variable name with a dollar sign.

Now that information has been extracted, sorted, and new-variables computed, the output report must be formatted.

2.5 PRINT

The PRINT command allows the specification of up to five lines of titles or heading information and the positioning of up to 25 fields for the output report. In addition to specifying the format of the report, the printing of the report can be controlled. In some cases, data is stored as a coded value. By utilizing the table lookup feature, the option of printing either the coded value or the actual descriptive data is provided. A group suppression option restricts the printing of repetitive data. Other options allow for the control of line spacing and output volume.

2.6 FORMAT

The FORMAT command allows the specification of up to three different output displays. The print for each display can be controlled by the value contained within a Data Base field. Some print control options available on the PRINT command are also available with FORMAT.

Formatted print is used generally in lieu of the standard PRINT command when an output report is required that resembles reports produced by dedicated batch processing programs.

2.7 SAVE

The commands which have been presented thus far represent a Query Set. The Query Set can be simple or complex depending on specific requirements. If a user requires the execution of the same Query Set

on a regular basis, he need not input the commands each time. The
SAVE functions allow the user to retain a Query Set for later execu-
tion by assigning a unique one-to-six character name for identification.

When multiple Query Sets have been saved, a table-of-content listing
can be generated for all saved Query Sets by the LIST command. The
DISPLAY command will list the individual commands contained within
a specified saved Query Set. By entering a DC command, the Query
Set can be executed or by entering a DELETE command it will be
deleted from the system.

2.8 UPDATE

One of the basic requirements of a good data management system is
the ability to perform either batch or on-line updates to the data base.
The UPDATE command allows batch or on-line replacements, inser-
tions, or deletions to be made to the data base. Updates can be made
to a single field or record or they can be performed on multiple fields
or records. After specifying the new data, an option is given to
accept or reject the new information.

2.9 RUN

When all the commands which are required to accomplish a unique
request have been specified, execution of those commands must be
initiated.

The RUN command is used to designate the end of a Query Set and that processing is to begin. Following execution, an output device must be specified for the generated report. This device can be the initiating terminal, a high speed printer, magnetic tape, or whatever type of output peripheral is in the computer configuration.

2.10 MIRADS USAGE EXAMPLE

To illustrate the ease with which MIRADS can be used, Figure 2-1 shows the command which would be required to calculate and print the monthly salary for all employees earning over $8,000 annually. The Query Set will reference the data base shown in Figure 2-2 and produce the output shown in Figure 2-3.

```
QUERY, SALARY GREATER 8000.
SORT, SALARY DESCENDING.
COMPUTE, $MONTHLY-SALARY = SALARY /12.
PRINT, NAME, DATE-HIRED, $MONTHLY-SALARY.
```

Figure 2-1. Sample Query Set

RECORD NUMBER	NAME	DATE-HIRED	SALARY
1	JONES P J	01-28-60	10000
2	SMITH R A	04-26-66	11000
3	WALLACE I N	03-17-63	9000
4	JOHNSON P J	07-09-69	8500
5	DAVIS D D	11-11-61	12500
6	BROWN A B	11-06-68	7500

Figure 2-2. Sample Data Base

NAME	DATE HIRED	MONTHLY-SALARY
DAVIS D D	11-11-61	1042.67
SMITH R A	04-26-66	916.67
JONES P J	01-28-60	833.33
WALLACE I N	03-17-63	750.00
JOHNSON P J	07-09-69	708.33

Figure 2-3. Sample Output

SECTION 3 - SUMMARY

3.1 GENERAL ADVANTAGES OF MIRADS

The Marshall Information Retrieval and Display System is an operational Data Management System that offers a wide choice of features which under many Data Management Systems are still in the proposal stage. Among these features are:

- File Security

- Low Core Requirements

- Multilevel Files

- Modular System

- Update Data Validation

- Full Set of Relational Operators (Equal, Less Than, Greater Than, etc.)

- All Standard Arithmetic Operators (Add, Subtract, Multiply, Divide, Exponentiation)

- Boolean Operators (AND, OR, NOT)

- Saved Query Sets

- User Control of Output Volume

- Flexibility of Accessing and Modifying Data Files

- Simplicity of Query Commands

- In-Line Edit of Query Commands

- Minimization of Response Time

- User Selection of Output Device

3.2 SUPPORT SERVICES AND IMPLEMENTATION

Users of MiRADS are given thorough training consisting of both lecture and on-hand experience with the system. The estimated training time required to become a proficient user is eight to forty hours.

Users of MIRADS are supplied with a manual which illustrates the commands and their options. Through the study of this user's manual and a minimum of instruction time, the user can begin utilizing the system.

For a new application, a MIRADS representative will provide consultant services for formatting the data base. From this consultation, the MIRADS representative will then code, verify, and load the Dictionary. The total process to implement a new application requires from three to ten days depending on the availability, volume, and structure of the user's data.

3.3 APPLICATIONS

The versatility of MIRADS makes it applicable to most phases of computer reporting. The sample applications which follow were selected because of their diversification.

In the INQUIRY section of each example, those commands which were made by the user are preceded by a delta (Δ) symbol. In the RESPONSE section of those examples with a large HIT number, the total output has not been shown.

- **SELECTED APPLICATIONS OF MARSHALL INFORMATION RETRIEVAL AND DISPLAY SYSTEM**

  LAND USE INFORMATION

  PROVIDES ON-LINE INFORMATION RETRIEVAL AND UPDATE FOR LAND UTILIZATION AND ENVIRONMENTAL CONTROL.

  SKYLAB

  PROVIDES ON-LINE CAPABILITIES FOR INSTANTANEOUS RETRIEVAL AND UPDATE OF DATA REQUIREMENTS INVOLVING CONTROL REQUISITIONS, PROCESSING, AND DISSEMINATION OF REQUESTS ASSOCIATED WITH SKYLAB.

  EQUIPMENT VISIBILITY

  PROVIDES ON-LINE INFORMATION RETRIEVAL AND UPDATE FOR CENTER PROPERTIES CONCERNING INVENTORY CONTROL AND COST ACCOUNTING.

  TECHNICAL DOCUMENTATION

  PROVIDES ON-LINE INFORMATION RETRIEVAL AND UPDATE FOR TECHNICAL DOCUMENTATION AND CATALOGING DOCUMENTATION BY SUBJECT MATTER.

  PERSONNEL MANAGEMENT

  PROVIDES ON-LINE INFORMATION RETRIEVAL AND UPDATE FOR PERSONNEL DATA AND PLACEMENT RECORDS.

- ## LAND USE INFORMATION APPLICATION

    A major concern in today's society is man's environment.
    With the threat of pollution endangering our lives, we realize
    that something must be done to clean up the air we breathe
    and the land on which we walk. But, before we can clean up
    our earth, we must know something about it. How is this
    land used?

    Rapid answers can now be given to these questions through
    MIRADS. Upon request, NASA at the Marshall Space Flight
    Center developed a prototype land use information data base
    composed of environmental data extracted from aerial
    photographs.

    If the question is asked, "How many acres of hardwood forest
    are in a given area? ", the answer can be rapidly retrieved.
    The area selected to illustrate this is Limestone County,
    Alabama.

    A QUERY command is entered selecting Limestone County
    which has a coded value of two.

    Since the data is in metric measurements, a summation of
    square kilometers of hardwood forest will have to be con-
    verted to acres.

    To display the result, a PRINT command is entered. The
    response for executing this inquiry required less than 1.4
    seconds at a cost of about 16 cents.

    Limestone County, Alabama, has 504.08 acres of hardwood
    forest according to this phototype data base.

QUESTION:

WHAT IS THE TOTAL ACREAGE OF HARDWOOD FOREST IN
LIMESTONE COUNTY, ALABAMA.

<u>INQUIRY:</u>

```
Δ Q, CT = '2'.
  READY
Δ C, NONE, 0, $TOTAL-HARD-FOREST = SUM FH.
  READY
Δ C, NONE, 2, $TOTAL-HARD-ACRES = $TOTAL-HARD-FOREST
Δ    * 2471 / 1000.
  READY
Δ P, SM, CT TLU, $TOTAL-HARD-ACRES.
  READY
Δ RUN
  QUERY NOW PROCESSING
```

<u>RESPONSE:</u>

```
  FILE CONTAINS    10 RECORDS
  QUERY SELECTED  10 RECORDS
  COUNTY      TOTAL-HARD-ACRES
  LIMESTONE   504.08
```

- ## SKYLAB APPLICATION

  Now that NASA is directly involved in man's environment on earth as well as in space, the technology of space research and exploration must be used to improve life on earth.

  Skylab is the first United States manned space flight program developed specifically to carry activities and equipment aimed at improving man's environment. MIRADS is used to provide the capability for monitoring, tracking, status reporting, and disseminating data requirements associated with in-flight experiments and systems.

  A common question asked of the Skylab data base is to locate all contract requests with an implementing agency code for Huntsville, Houston, Cape Kennedy, or a contractor. For the records extracted by this inquiry, the data request form, mission, and period of interest will be printed. At the time this inquiry was made, the data base contained approximately 5000 records and over 700 were selected. This inquiry required approximately 30 seconds at a cost of $3.58.

LOCATE ALL CONTRACT REQUESTS WITH AN IMPLEMENTING
AGENCY CODE OF 'H', 'T', 'K', OR 'C'.

INQUIRY:

Δ Q, IMPL = 'H' OR 'T' OR 'K' OR 'C'.
READY
Δ P, FULL, DRF, MISSION, POI.
READY
Δ RUN
DO YOU WISH TO CONTINUE WITH THIS FORCED SEQUENTIAL
SEARCH (YES OR NO)
YES

RESPONSE:

```
FILE  CONTAINS    4963 RECORDS
QUERY SELECTED  740 RECORDS
DATA REQUEST FORM       MISSION       PERIOD OF INTEREST
H-00001-T               SL-1/2, 3, 4  FLT/MAN, UNMAN.
H-00055-H               SL-1/2        FLT/LAUNCH
H-00077-T               SL-1, 3       POST-FLT
```

o   EQUIPMENT VISIBILITY SYSTEM

Projects such as Skylab and Land Utilization require the
acquisition of many forms of general purpose and related plant
equipment. To properly utilize this equipment and to prevent
the overhead of duplication, an equipment visibility data base
was generated. MIRADS provides on-line information con-
cerning management visibility in the reutilization of some
two million dollars worth of equipment. In relation to the
environmental studies for land utilization, airplanes are
required for obtaining the necessary data. A question is
then put to MIRADS asking--what airplanes are available
at the Marshall Space Flight Center? A full description of
each airplane is listed. The data base contains more than
53,000 records and four were selected which pertain to air-
planes. This inquiry required approximately two seconds at
a cost of 25 cents.

QUESTION:

LOCATE AND DISPLAY FULL DESCRIPTION, ACQUISITION COST, YEAR OF MANUFACTURE, AND CURRENT AGE OF ALL CENTER PROPERTY ITEMS WHICH ARE DESCRIBED AS AIRPLANE OR AIRCRAFT.

INQUIRY:

Δ Q, DESG = 'G-159' OR '65-80 QUEEN AIR' OR 'C45'.
   READY
Δ P, FULL, PCODE TLU, NOUN, YRMFG;COND TI U, LINE1 S 2.
   READY
Δ RUN
   QUERY NOW PROCESSING

RESPONSE:

FILE CONTAINS 54375 RECORDS
QUERY SELECTED 4 RECORDS

POSSESSOR CODE	NOUN	YEAR MANUFACTURED
CONDITION	DESCRIPTION LINE 1	
MARSHALL SPACE FLIGHT CENTER	AIRPLANE	63
USED-GOOD AIRPLANE, GULFSTREAM, G-159, SN-92		
MARSHALL SPACE FLIGHT CENTER	AIRCRAFT	64
USED-GOOD AIRCRAFT, BEECH AIRCRAFT CORP, 65-80 QUEEN AIR, SN-LD49		
MARSHALL SPACE FLIGHT CENTER	AIRPLANE	64
USED-GOOD AIRPLANE, ATLANTIC AVIATION, G-159, SN-125		
MARSHALL SPACE FLIGHT CENTER	AIRCRAFT	43
USED-GOOD AIRCRAFT, BEECHCRAFT, C45, SN-5210604		

● TECHNICAL DOCUMENTATION APPLICATION

There is a need to locate technical documents concerning subjects pertinent to present or future projects. To rapidly retrieve any technical information, a data base was generated containing approximately 38,000 records. Each

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document within the system is cataloged by subject matter. For a scientist who requires all locally available information on laser research, a query command is entered with a keyword or keyphrase search. To actually locate the document, a report is printed giving a full descriptive title and file sequence number. The file sequence number is used for direct location in the same manner as the cataloging system of our public libraries. This information was retrieved in less than 15 seconds at a cost of $1.72.

QUESTION:

LOCATE ALL DOCUMENTS WHICH PERTAIN TO ANY AREA OF LASER RESEARCH.

INQUIRY:

Δ Q, SUB1 = 'LASER' KW OR SUB2 = 'LASER' KW.
READY
Δ P, FULL, SUB1, SUB2, FSNO.
READY
Δ RUN
QUERY NOW PROCESSING

RESPONSE:

FILE CONTAINS   37892 RECORDS
QUERY SELECTED   45 RECORDS

SUBJECT1	SUBJECT2	FILE SEQUENCE
LASERS		000199
LASERS		001606
LASERS		002140
LASERS		013008
LASERS		014014
LASERS		014036
LASERS		016294
LASERS		020188
LASERS-DIFFRACT I ON-LIMITED-GAS		020539
LASER -ABSOLUTE -GRAVIMETER		021028
LASER -ABSOLUTE -GRAVIMETER		021225
LASER -ALTIMETER		013691

● <u>PERSONNEL MANAGEMENT APPLICATION</u>

NASA is a diversified organization involved in research and
space exploration not only to learn about other worlds but so
man can have a better understanding of the one on which we
live. No matter what type of project is involved, competent
people are required to coordinate and execute the many tasks
which are necessary to successfully complete a mission. An
on-line Data Base has been established for civil service em-
ployees, and through the use of MIRADS, pertinent information
about personnel placement and utilization can be rapidly
obtained. Many projects require specialized personnel to
accomplish the desired goals. If a particular project re-
quired personnel with an advanced college degree in a given
subject, pertinent information can rapidly be retrieved
through the use of MIRADS.

<u>QUESTION</u>:

LOCATE ALL PERSONNEL WITH AN ADVANCED COLLEGE DEGREE
IN PHYSICS AND LIST EMPLOYEE NUMBER, MAIL STATION,
ORGANIZATION CODE, AND LOCATION CODE.

<u>INQUIRY</u>:

Δ Q, COLSW = '2' AND LEV2 GT '1' AND FLD2 = 'A02' CH.
READY
Δ P, FULL, PAY, MAIL, ORG, LOC; LEV2 TLU, FLD2 TLU.
READY
Δ RUN
QUERY NOW PROCESSING

<u>RESPONSE:</u>

FILE CONTAINS   5761 RECORDS
QUERY SELECTED   55 RECORDS

EMPNO MAIL SYMBOL DEG LEVEL	ORG CD DEGREE FIELD	LOCATION
801 S+E-SSL-P DOCTORATE PHYSICS	801110	11730089
821 S+E-SSL-T MASTER PHYSICS	803410	11730089
822 S+E-SSL-T DOCTORATE PHYSICS	803410	11730089
823 AD-S DOCTORATE PHYSICS	10300	11730089
850 S+E-COMP-C DOCTORATE PHYSICS	744210	11730089
866 S+E-COMP-C DOCTORATE PHYSICS	744010	11730089
940 MO-MGR MASTER PHYSICS	870010	11730089
1012 S+E-AERO-DIR MASTER PHYSICS	750010	11730089
1019 S+E-AERO-A MASTER PHYSICS	794410	11730089

QUESTIONS/ANSWERS

This Section is a composite of questions and answers which are most
frequently asked by individuals who are exploring the possibility of
implementing a new application on MIRADS. It is hoped that this
information will furnish most of the answers for questions which may
arise after studying the MIRADS User's Manual and Data Base Handling
Procedures Manual.

1. Is there a manual containing systems and program specifica-
   tions written for data automation type personnel?

Documentation on MIRADS presently consists of three manuals.

a. <u>MIRADS User's Manual</u> - Released September 1974.

This manual has been prepared to provide users of the
Marshall Information Retrieval and Display System
(MIRADS) an insight into the mechanics, capabilities,
and use of the system. The contents and structure of
the manual are designed to provide instructions and
explanatory information needed by users of the system.

The manual contains an introduction and two major
sections: Terminal Operations and MIRADS. The
Terminal Operation Section presents information which
will orient the user to the MIRADS terminal. Instruc-
tions are given which describe the various terminal
keyboard arrangements and the procedure to be used
for each type of terminal. The section explains how to
initiate and terminate the terminal functions and describes
error recovery steps.

The sections covering MIRADS describes the initialization
procedures, general capabilities and the language neces-
sary to communicate with MIRADS. Detailed instructions
are furnished regarding information about control functions,

inquiries, file and record criteria, diagnostic messages, and output displays.

b. **MIRADS - Data Base Handling Procedures** - Released September 1974. This manual has been prepared to provide users of the Marshall Information Retrieval and Display System (MIRADS) procedures for initially creating a Data Base, Data Base update, and Data Base protection for MIRADS.

The manual contains an introduction and five major sections: Initial Data Base File Generation, Data Base File Update, Data Proctection, MRANDH, and MIRADS Support Programs and Subroutines. The Initial Data Base File Generation section illustrates a sample RUN stream for creating a new application for MIRADS. Each program required in this RUN is illustrated with its input and output documented. The Data Base File Update section illustrates a RUN stream for performing modification to an existing MIRADS application. The section on Data Protection illustrates the use of MIRADS for producing magnetic tape backups of application files. MRANDH is an I/O package that is used by MIRADS. All application files must be created with MRANDH I/O commands. The

section on MIRADS Support Programs and Subroutines

provides documentation on the execution of utility pro-

grams and subroutines which are contained in the MIRADS

Library (1000-MIRADS*MA).

c.   An Introduction to MIRADS - Released September 1974.

2.   Could we have a list of other users of the system and what kind

of computer hardware on which they use MIRADS?

MARSHALL SPACE FLIGHT CENTER - Huntsville, Alabama
    UNIVAC 1108 3X2 Multiprocessing Multiprogramming System
    DCT-500, DCT-2000, UNISCOPE-100, 9300

SKYLAB
    Provides on-line capability for instantaneous requirements
    involving control requisitions, processing, and dissemina-
    tion of requests associated with Skylab.

TECHNOLOGY UTILIZATION
    Provides on-line information retrieval and update for
    technical documentation and cataloging documentation by
    subject matter.

PERSONNEL MANAGEMENT
    Provides on-line information retrieval and update for
    personnel data and placement records.

EQUIPMENT VISIBILITY SYSTEM
    Provides on-line information concerning management
    visibility in the reutilization of general purpose and
    related plant equipment.

COMMUNICATIONS OFFICE MANAGEMENT SYSTEM
    On-line retrieval of cost figures for installation of new
    communication modems, lines, and circuits and point to
    point line utilization.

PROGRAM DEVELOPMENT OFFICE
    On-line retrieval for the payload management system to
    schedule Space Shuttle payloads and payload functions.

FEDERAL COMMUNICATIONS COMMISSION - Washington, D. C.
UNIVAC 1108
Implementation of MIRADS for application areas of personnel,
assets and communication frequencies control.

UNIVERSITY OF ALABAMA - Huntsville, Alabama
UNIVAC 1108
DCT-500
Implementation of MIRADS for application areas of
population control, air pollution control, and student
records.

Implementation of MIRADS for Model Cities application
areas of census data and housing utilization.

JET PROPULSION LABORATORY - Pasadena, California
UNIVAC 1108
Implementation of MIRADS for general purpose data
management.

3. Can MIRADS process in a batch mode, or is it strictly for on-line application?

The Marshall Information Retrieval and Display System (MIRADS) is an on-line data storage and retrieval system which allows the user to extract and process information from stored Data Bases. The use of remote terminals to extract and display data from the Data Bases provides a fast and responsive method of obtaining needed information. This on-line processing eliminates the extensive data processing cycle normally required when using an off-line or batch processing mode.

In the event that a user does not have access to an on-line or demand type terminal, inquiries can be made through any batch device executing the request in a batch mode of operation. All capabilities which are available to on-line applications are also available in batch mode.

4. Can mainline peripherals be used for high-volume I/O, or is it only remote terminal I/O?

Input requests can be made via on-line demand terminal devices or via batch procedures. Once the inquiry has formatted an output report, the user has the capability of directing the output to any type of output device which is contained in the computer configuration. This output device can be a slow, medium, or high speed printer, a cataloged drum file, or magnetic tape.

5. We get the impression that only a limited number of characters are printed per line, i.e., less than 132. Is this wrong?

Output reports generated by the PRINT command have a maximum print capability of 127 characters per print line. This print limitation was required due to hardware restrictions of the UNIVAC DCT-2000 terminal. This particular device has the smallest print line (127 character/line) of any hardware devices presently being used by MIRADS.

Formatted print commands (DEFINE and FORMAT) allow a user to format a tabular report with a maximum print of 128 characters per line.

6. How many different files can be accessed per query? Per update?

MIRADS allows a user to access only one Data Base for each Query-Set whether it be an inquiry or on-line update. However, any number of users can access the same Data Base simultaneously.

A user may specify the access of a different Data Base from the one which was previously queried through the use of the NEW command.

7. What is the capability to edit input/update transactions? Are decision logic tables used for this?

Each application Data Base has an associated Dictionary file which describes the size, location, data type, and reference name for each element within a given record. As input/update transactions are made to the Data Base, each data value specified for a given element is compared against the data type specified in the Dictionary file for validity of type. For example, if a user specifies an alphabetic value to be

inserted into a field designated to contain signed decimal numeric, the transaction will not be honored.

8. Can transaction edit procedures be modified without recompiling programs?

The UNIVAC 1108 COBOL compiler provides file handling for at least fourteen different type files, some of which are IBM compatible (reference UNIVAC 1108 COBOL under EXEC 8 Supplementary Reference, UP-7626 Current Version, Chapter 11). The UNIVAC 1108 FORTRAN compiler provides for file creation with binary and formatted write statements which are not compatible with each other or any file handling capabilities in UNIVAC 1108 COBOL. This total number of file handling capabilities provided on the UNIVAC 1108 inhibits the feasibility of having one or even several programs which can be used as general purpose edit/update for transactions on any given Data Base. The problem is compounded when you consider the varying record and block sizes with which Data Bases can be created. Consequently, MIRADS provides a common I/O package (MRANDH) which can be used from either COBOL or FORTRAN edit/update programs. (See Data Base Handling Procedures Manual, Section 5.)

Many users have designed new or modified existing edit/update programs which read/write Data Bases in MIRADS format (MRANDH). These programs are used for handling large volume edit/updates of Data Bases, and the MIRADS on-line update capability is used for handling small volume updates.

9. What recovery procedures are provided?

Data protection is of great importance to a user of any Data Management System. Utilizing MIRADS under Level 27 and Level 31 of EXEC 8, users have the advantage of the UNIVAC 1108 SECURE Processor which maintains an automatic file backup procedure. MIRADS maintains its own file protection for those users who do not have the advantages offered in Level 27 and Level 31.

10. Can I/O images be saved; i.e., is an audit trail possible?

An audit trail capability requires the use of a dedicated tape drive for logging access information. MIRADS does not provide this feature due to operation regulations at the Marshall Space Flight Center Computation Laboratory and the Slidell Computer Facility. Operating Procedures at both computer facilities inhibit the dedication of any device to one system.

11. Is there an ENTER COBOL capability? FORTRAN? Assembly?

Users that require capabilities which surpass those offered in MIRADS can easily interface dedicated application programs. Records are extracted from the Data Base which meet the selection criteria specified on a QUERY command. The address of each selected record is written onto a drum file which can be used as input to an application program whether it be COBOL, FORTRAN, or Assembler.

12. What type of file organizations can be processed? (Index Sequential, Sequential, Tree, Ring, List, Inverted List, etc.)

MIRADS allows records to be extracted by either a sequential search or direct access through an inverted list.

13. Is there a capability to generate Geographical Location tables?

MIRADS provides a Table Lookup feature in connection with the PRINT command which greatly enhances the flexibility of the total system. Each application Data Base can contain up to 99 tables with each table having no practical limit to the number of entries. Coded or compressed data can be used to identify and select information which may be an alphanumeric narrative or numeric string. The Table Lookup feature could easily be used to specify Geographical Location Tables.

14. We note the change/delete/insert/replace functions--is there

    a capability to create a file; i. e. , start from scratch?

    MIRADS is a versatile Data Management System which has

    been designed to handle a wide variety of applications. Due

    to the flexibility in Data Base file structuring, a set of com-

    mands were generated to allow a user to construct his Data

    Base with either COBOL or FORTRAN program depending

    on which type is his preference. The procedure for generating

    a new application for MIRADS is documented in the Data Base

    Handling Procedures Manual (Section 2 and Appendix A).

15. What is the core requirements on the 1108? Is MIRADS always

    core resident? Are portions of it always core resident?

    MIRADS, which is modular in design, currently utilizes 32K

    words of core storage using the UNIVAC 1108 and standard

    EXEC 8 operating system features. The additional programming

    and core requirements normally associated with other data

    management systems for communications and message handling

    have been eliminated because the EXEC 8 operating system

    symbionts accomplish all functions necessary for terminal

    monitoring and message handling.

MIRADS is a drum resident system which resides on FASTRAND.

Upon user access, the MIRADS 'driver' module is loaded into

core and from user commands the required modules are over-

layed to accomplish the user specifications.

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