

The Report Management System (RMS) Meeting Agencies' Reporting and Querying Needs

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What is RMS?

The Report Management System (RMS) is a mainframe-based (IBM or VAX), menu-driven application that allows users to access and retrieve data from one or more legacy systems and produce pre-defined or custom reports from that data. Utilizing a powerful and user-friendly user interface, RMS provides users the ability to perform queries and create reports without technical hardware or software expertise. RMS was developed in SAS AF, using SCL and Base SAS.

RMS was developed in 1992 by American Management Systems, Inc. for the Internal Revenue Service and the United States Customs Service. Over the past two years, several other federal agencies, including the Department of Veterans Affairs, the Bureau of Alcohol, Tobacco, and Firearms, the Library of Congress, and the State Department, have implemented RMS, often enhancing existing features or developing new components to meet the specific requirements of the agency. The various components and features of RMS have become known as the *RMS Tool Kit* - a standardized set of reusable components that can be introduced quickly and easily into a new organization. The sections below describe the data storage and user interface aspects of RMS.

RMS Provides Flexibility in Database Configuration

Although RMS can access information in ORACLE, DB2, and many other databases, all of the current users of RMS store the information in SAS data sets. RMS has shown that SAS is a viable database management tool, providing efficient retrieval of data from extremely large data sets.

The RMS data sets use SAS indexing and compression to increase efficiency and decrease memory requirements. By indexing the data sets on the most important data fields, the retrieval of information from RMS data sets is very efficient. Of course, the actual time that it takes to retrieve a subset of information from the data sets is dependent upon the speed of the machine and the amount of data being requested.

RMS can access one or more databases, comprised of data from one or more legacy systems. Although it is not necessary to create databases for RMS that are separate from the legacy systems, most of the agencies using RMS have chosen this option to protect the on-line response time of their large legacy systems. The most widely used database is the Budget and Spending Database. By accessing this database, an agency can perform queries and create reports to determine spending levels, both on an actual basis and in relation to budgeted amounts.

RMS Offers a Powerful User Interface

The RMS user interface is an easy-to-use series of windows that enable users to generate their own reports and queries. Developed in SAS AF, the user interface provides the point-and-click feature that has become a graphical user interface (GUI) standard. RMS also allows function key use, as well as mouse capability. To select an option in RMS, the user simply moves the cursor to the desired option and presses ENTER. Through this series of windows, users can generate standardized reports, perform interactive queries, or develop custom reports.

Standardized Reports - In every legacy system certain reports are produced on a periodic basis, usually daily or monthly. RMS provides this same functionality with *standardized reports*. However, not every user has the same interest in these reports: some users don't need or want these reports; some users are content receiving the reports on a predefined basis; and others would like to see these reports on a more frequent basis. With RMS, standardized reports can be utilized according to each users' needs. RMS allows users to determine the frequency of the report and to view and print the report on demand.

RMS also allows users to specify parameters for each report. Using the RMS Standardized Report Parameter Screen, as shown in Figure 1 below, users can specify the information that the report should contain. For example, a standard report may provide information for every project within a particular office. RMS allows users to select on a single project or group of projects, rather than being subjected to information on every project. This feature not only facilitates the decision making process, it also saves processing time by retrieving less data from the database.

REPORT5 Report Parameters
The previously used values are:
Enter the parameters and execution options for the report and select Submit.

Organization-Object Class Report by Allotment

Accounting Period (FM/PY)	05 / 94	REQUIRED
Report Element	From To	
Beginning BFY	93 -	REQUIRED
Ending BFY	94 -	(Multi-Yr Only)
Admin/Office Code	H -	REQUIRED
Fund Code	016081 -	
Project	-	
Object Class Code	-	

Execution Options

Submit Immediately or Overnight (I/O)?	I	REQUIRED
Produce Data on a Report (D/R)?	R	REQUIRED

SUBMIT HELP
RESULTS MAIN
GO BACK PF3 QUIT

Figure 1

When an RMS user selects a report for the first time, the report's parameter screen is empty. The user then enters the desired parameters and selects the SUBMIT button in the upper right corner of the screen. The submission of a report in RMS is a multi-step process. First, RMS validates

the parameters against RMS data sets. Second, a unique parameter file is created which stores the parameters entered by the user. Third, RMS creates user-specific job control language (JCL or DCL) and submits it to the internal reader. Fourth, the parameters are saved so that the next time this report is selected, the parameters will already be filled.

Once the report has finished, the user can view it online or print it to a recognized printer. The details of how RMS handles the report and parameter files created by users is discussed in the File Management section.

Interactive Queries - Although RMS provides users added flexibility with regard to standardized reports, some users may want even more flexibility, such as the ability to view specific data contained in a report. With *Interactive Queries*, users can access a database to produce both summary and detailed queries. First, users select the desired information from a parameter screen, similar to that used by Standardized Reports. A summary of that information is then presented to the users, as shown in Figure 2 below.

Quarterly Budget and Spending Query				
To begin a detailed inquiry, select DETAILS.				
			DETAILS	HELP
			PARAMS	
			RESULTS	SAVE
Quarterly Budget and Spending Query - Totals			GO BACK PF3	QUIT
	Budgetary Resources	Unliquidated Obligations	Expended Amount	Remaining Balance
Pr Yr	560,352.00	505,360.76	54,759.81	231.43
Qtr 1	0.00	-262,871.64	262,417.93	435.71
Qtr 2	0.00	-2,107.17	2,313.54	-206.37
Qtr 3				
Qtr 4				
	560,352.00	240,381.95	319,491.28	478.77

Figure 2

The power of *Interactive Queries* lies in its ability to let users select specific, detailed information associated with the summary information displayed on the screen. Users can consolidate data across organizational breakdowns and skip certain levels. To perform these queries, users simply select the DETAILS button in the upper right corner of the screen. The Interface Queries screen is shown in Figure 3 on the following page.

Quarterly Budget and Spending Query
The previously used fields are ...

Place 1-4 in up to 4 fields from the Accounting Codes and Budget/Spending Values. Place an 'S' from 1 to 4 quarters.

SUBMIT HELP

GO BACK PF3 QUIT

Accounting Codes	Budget and Spending Values
1 _ Accounting Period	a 2 Budgetary Resources
2 _ Budget Fiscal Year	b _ Unliquidated Obligations
3 _ Fund	c _ Expended Amount
4 _ Admin./Staff Office	d 3 Total Obligations (b+c)
5 _ Station	e 4 Balance Remaining (a-d)
6 1 Project	
7 _ Object Class	Quarter
8 _ Cost Center	
9 _ Sub-Cost Center	1 _ Prior Year
10 _ BOC	2 S Quarter 1
11 _ Sub-BOC	3 S Quarter 2
	4 _ Quarter 3
	5 _ Quarter 4

Figure 3

Users then choose specific accounting codes, values, and quarters on which to base the query, as shown above. RMS then displays the intermediate totals requested by the user. By placing an 'S' by the desired intermediate total line and pressing ENTER, users are able to view the detailed transactions that were used to generate the intermediate total line.

Report Builder - In certain instances where the Standardized Reports and Interactive Queries do not provide the information or the format that the user wants, an experienced RMS user can create a new report in a matter of minutes without having to know SAS, COBOL, JCL, or any of the technical aspects of programming that are normally required to develop a new mainframe-based report.

Using a combination of windows and pull-down menus, the *RMS Report Builder* allows users to:

- Determine the databases (data sets)
- Create new fields from elements in the databases
- Select a small subset of information from a large database
- Choose the fields that are going to become columns in the report
- Determine the sort order, page breaks, and subtotals that will be used
- Enter a one or many line title for the report.

Once the user has constructed the report framework, they may:

- Submit the report for execution
- Save the report for execution at a later time
- Transfer the report framework to another user or group of users
- Save the report framework to a Report Builder Bulletin Board so that other users can take advantage of work that has already been completed.

A completed Report Builder report resides in the user's RMS directory just like the standardized reports. There it may be printed or viewed using the steps described above.

Additional Features

RMS's help screens, file management capabilities, security, and usage monitoring features combine to facilitate ease of use while allowing database managers to maintain control over the environment.

Help Screens - RMS uses SAS computer based training (CBT) entries to provide extensive online help to its users. Every report, inquiry, and screen provides text that describes how to perform a particular action or what to do next as shown in Figure 4 below. The *RMS Help Screens* also provide users with the capability to obtain more information on a topic, if desired. For example, if the user selects the HELP button for the RMS Report Builder, they have the option of seeing more information on how to construct a report by selecting the CONSTRUCT button on the first line.

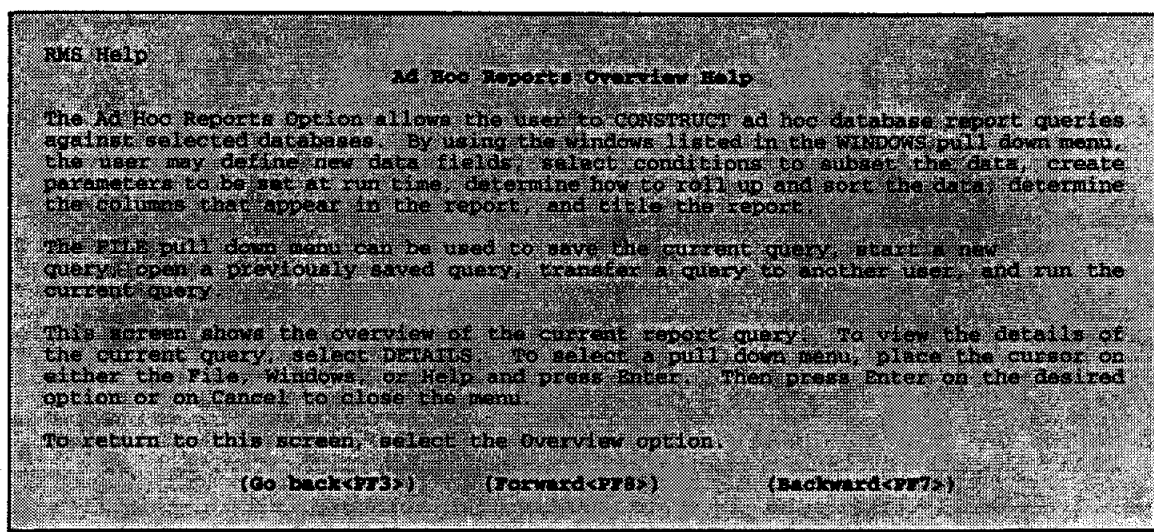


Figure 4

File Management - Every time a user submits a report in RMS, a series of processes occur in the background that go unnoticed by the user. After the validation of the report parameters and the creation of the report's parameter file, the individual user's RMS directory is updated. The user's RMS directory contains every report that has been created by the user and not yet deleted. Each user may have multiple versions of a report in their directory until they are deleted. RMS can be configured to automatically delete or archive files that are older than a specified number of days. This is discussed further in the Resource Management section.

After the submission of a report, the user's RMS directory will contain the report's current status, as shown in Figure 5. The status will show that the report is:

- **NOT FINISHED** - indicating that the report is either processing or in the job queue;
- **ARCHIVED** or **DELETED** - indicating that the report is not available;
- **OVERNIGHT** - indicating that the report was submitted for overnight processing; or
- **PAGES** and **BYTES** - indicating that the report has finished executing and consists of a certain number of pages and bytes.

Report File Management					
Please choose an option and press Enter.					
Options Codes:			REFRESH	HELP	
V - View Report			DOWN PF8	UP PF7	
S - Show Report Parameters			GO BACK PF3	QUIT	
D - Delete Report					
P - Print Report					
H - Report Description					
F - Report Filename					
Directory Listing for USERIDX					
(5 REPORTS)					
Option #	Report	Comments and Information	Submit Date	Time	
1	REPORT1	1 PGS. - 1839 BYTES	MARCH 23, 1994	13:51	
2	REPORT5	NOT FINISHED	MARCH 28, 1994	11:21	
3	REPORT6	6 PGS. - 43566 BYTES	MARCH 24, 1994	10:43	
4	REPORT6	1 PGS. - 1769 BYTES	MARCH 25, 1994	10:44	
5	REPORT8	1 PGS. - 1846 BYTES	MARCH 27, 1994	11:05	

Figure 5

Besides viewing and printing the report, the user also has the option to delete the report, show the parameters used to generate the report, show the actual filename of the report, or read some detail information about the report.

Security - RMS also has means to prevent sensitive information from being accessed by an unauthorized user. By interfacing with products such as TOP SECRET and RACF, RMS can protect the database and application files. The system may also construct organization-specific security files to restrict the RMS information that a particular user is allowed to access. This can be accomplished by creating stand-alone RMS security tables, or by using a legacy systems security tables to determine RMS security. For example, RMS may use an organization's payroll system security table as input to the RMS security table. This eliminates the need to maintain security tables in both systems.

Usage Monitoring - RMS provides a self-monitoring capability that allows an organization to answer the following questions:

- How many different users are there?
- How many people use RMS frequently?
- What are the most popular reports and queries?
- What reports were submitted on any given day?
- What is the peak time of the day that users log on to RMS?

The above questions, and many more, can be answered by running one of the utilization reports. These utilization reports, like the standardized reports, are submitted from easy-to-use parameter screens. The results of these reports also appear in the user's RMS directory.

Resource Management

No matter how powerful the system, it is not valuable if it does not manage the computer's resources efficiently. RMS provides the capability to automatically delete or archive the users' files. The amount of time that a report is kept on disk may be decided on a report by report basis. Besides the users' files, RMS application database files must also be managed to ensure that they are not wasting space. This is accomplished by using SAS data set compression. The compression of the RMS databases saves as much as forty percent of the allocated disk space.

How Does RMS Work?

RMS was developed in SAS AF, using Screen Control Language and Base SAS. In order to better understand how RMS works as a whole, it is important to understand how each of the different aspects or modules of RMS functions.

User Interface - The RMS user interface brings together all of the features of RMS in a user-friendly manner. The user interface is a complex series of SAS AF entries that either call other AF entries, submit jobs to the internal reader, or display data sets using SAS Full Screen Processing (FSP). The RMS application contains program, SCL, CBT, KEYS, PMENU, and HELP entries in order to provide a seamless window to access information.

Report Submission - The following steps demonstrate the processes that take place during a typical report submission:

- The report's parameter screen is displayed using an AF program entry.
- The user enters the desired parameters in the program entry.
- The program entry validates the parameters against an RMS data set, creates a user-specific parameter file, generates the report's JCL, and submits the JCL to the internal reader.
- The report file, statistics file, and report termination file are created by the report's JCL.
- The user then accesses the report file management program entry to view the report file through the SAS FSLIST window.

Database Configuration - The RMS data base configuration varies greatly from site to site. The actual configuration of the data is not critical to RMS; however, it usually contains summary and detail levels. The RMS database is updated incrementally on a nightly basis by the RMS Nightly Cycle. The cycle performs the following:

- backs up the databases;
- reads the daily input file;
- updates the databases with the daily input;
- runs system assurance to insure that the information was loaded properly.

Report Builder - The RMS Report Builder is by far the most complicated module in RMS. It combines the power and flexibility of both SAS AF and Base SAS. The user constructs a report framework using the numerous program entries and PMENUs in the Report Builder interface. Once the framework is completed, the user can submit the report through the user interface. The typical Report Builder report submission contains the following processes:

- The user constructs the report framework.
- The report framework is passed to the Report Builder code generator where the actual Base SAS report code is created.
- The newly created JCL and Base SAS code is submitted to the internal reader for batch processing.
- The user views the report through the FSLIST window in the file management program entry.

The Base SAS code generated from the report framework performs the following actions:

- merges the selected databases by a list of predefined variables;
- creates new fields from existing database fields;
- sorts, summarizes, and subtotals variables by the desired key fields.

Additional Information

For additional information on RMS, please contact:

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