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USING MICROSOFT EXCEL APPLICATIONS

IN

THE GRADUATE INTERN PROGRAM
AT
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BY

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During the ten-week program at Goddard Space Flight Center I worked in code 513, the Project Operations Branch, which is a branch in the Mission Operations Division, code 510. The Mission Operations Division is a division of code 500, Mission Operations and Data Systems. Code 500, Mission Operations and Data Systems, is directed by Dale L. Fahnestock. Code 500 is responsible for the planning, designing, development, and operation of spaceflight tracking and communications networks and data systems support for near-flight spaceflight missions. Also, code 500 ensures that space and ground communications network and end-to-end data systems meet mission support requirements and are maintained at the state-of-the-art.

Carroll G. Dudley is the Chief of the Mission Operations Division, code 510. The functions of the Mission Operations Division include designing, developing, operating and maintaining the Goddard Space Flight Operations and Payload Operations Control Centers (POCC), operating computer facilities on which related software systems reside, designing, developing, and maintaining operational flight software executed on-board spacecraft as an integral part of the total data systems, and providing simulator system resident on portable computers and large-scale computer systems.

Vicki L. Oxenham is the head of the Project Operations Branch, code 513, which is responsible for requirements, design, development, and conduct of full data system simulations and tests, develops, plans, and directs activities of all system elements and end users, serves as an interface for operations planning and management, performs mission analysis of present and future project POCC requirements and equates these to resource needs.

My contributions to the mission of the Project Operations Branch, code 513, included the development of the Xtractor and Bargraf macros for the Remote User Scheduling Terminal (RUST) using Microsoft Excel. Because of little to no experience with the MacIntosh, I took three training courses to become familiar with MacIntosh, which is a complex combination of computer hardware and software working together. Hypereasy is a software designed to help computer owners accomplish business or personal tasks. Hypereasy programming involves creating scripts, which are attached to objects which are placed on cards.

Microsoft Excel is a software that allows the user to create labels and formulas, format worksheets, paste formulas and arguments, link worksheets, use built-in formulas, create charts, print worksheets and charts, and plan, record, and run macros.

The Deep Space Network (DSN) Remote User Scheduling Terminal is a personal computer-based system designed to assist Goddard projects in the planning and scheduling of DSN resources for Goddard missions unable to use the Tracking and Data Relay Satellite System. The DSN RUST is the Goddard interface to the Jet Propulsion Laboratory Network Scheduling System. The RUST replaces the Jet Propulsion Laboratory (JPL) Mission Planning Terminal System effort.

JPL determines the time of day that a satellite will be in close vicinity of a particular antenna. Thereafter, a one-week strawman's schedule, which is a composite schedule for the 26-meter network for a 7-day period, may be obtained from the RUST. Data can be transmitted from satellite to control centers through an antenna.

Currently, the minimum DSN RUST system hardware consists of an IBM PC AT clone with 5.25 inch floppy disk drives, an internal hard disk drive, and internal 2400 Baud Modem, a high resolution video interface and monitor and a parallel printer interface and printer. Currently, the DSN RUST software consists of five subsystems. These subsystems are:

a. Menu-Executive controls the display of the user-selectable menus.
b. Enter controls the forms for data input.
c. Editing Menu Executive provides the editing function.
d. Token to page performs the formatting function for the display, print, and transmit information.
e. Pick allows the user to delete an unwanted request.

In the near future the RUST will be implemented on the MacIntosh. Upon implementation of the MacIntosh RUST macros, which are programs that Microsoft Excel follows to carry out tasks or calculations, may be used to further automate the process of data retrieval keeping with the latest innovations. The Xtractor macro is designed to perform query extracts from the RUST database to the report section depending on the selection criteria. To utilize the Xtractor macro, which is shown in figure 1, the operator should follow these twelve steps:

1. Open Microsoft Excel
2. Open the RUST file
3. Set the criteria by entering the day, start, beginning of track, end

of track, and, and the user

4. Paint the criteria
5. Select the Data Set Criteria Command
6. Paint the RUST database
7. Select Data Set Database
8. Paint the Extract Range, which is P8 to U36
9. Select Formula Define Name
10. Choose QU_OUT
11. Open the Xtractor file
12. Select the Macro Run Command

The requested data is extracted from the RUST database and placed in the report section.

The Bargraf Macro, which is shown in figure 2, activates the RUST worksheet data range to automatically generate a bar graph with the data legend. To utilize the Bargraf macro the operator should follow these five steps:

1. Open the Bargraf file
2. On the RUST file, paint the extracted data to be graphed
3. Select the Define Name Command and type graph_rng
4. Click on the Bargraf Macro
5. Select Macro Run

A bar graph of the extracted data is generated with the data legend.

	A
1	RUST XTRACTOR
2	PERFORMS EXTRACT FROM THE RUST DATABASE
3	DEPENDING ON THE SELECTION CRITERIA
4	=ACTIVATE("RUST")
5	=ALERT("WELCOME TO THE REMOTE USER SCHEDULING TEMINAL",2)
6	=ALERT("MICROSOFT EXCEL ALLOWS THE OPERATOR TO RETRIEVE DATA ",2)
7	=ECHO(FALSE)
8	=FORMULA.GOTO("QU_OUT")
9	=VLINE(1)
10	=MESSAGE(TRUE,"DATA EXTRACT IN PROGRESS . . . ")
11	=EXTRACT?()
12	=RETURN()

	A
1	Graphics Macros
2	
3	COLUMN1
4	COLUMN GRAPH WITH LEGEND
5	=ACTIVATE("RUST")
6	=ECHO(FALSE)
7	=SELECT("graph_rng")
8	=NEW(2)
9	=MOVE(22,63)
10	=SIZE(478,288)
11	=LEGEND(TRUE)
12	=ECHO(TRUE)
13	=GALLERY.COLUMN(4)
14	=RETURN()

FIGURE 2

RECOMMENDATIONS AND CONCLUSIONS

For future improvements on the XTRACTOR and BARGRAF macro I recommend the following:

1. Implement the autoexec mode for the XTRACTOR AND BARGRAF macro so that when the RUST database is opened the XTRACTOR and BARGRAF macros are activated simultaneously.
2. Implement a dialog box that would allow the user to select the criteria from a menu.
3. Update the macros to give the user the option to exit the database.
4. Update the Bargraf macro to create a horizontal bar graph.

The following books, which my be obtained through the interlibrary loan system at the Goddard Library, may be useful in updating the XTRACTOR and BARGRAF macros:

1. Excel Macro Library by Mary V. Campbell
2. The Complete Book of Excel Macros by Louis Benjamin
3. Microsoft Excel with Macros by Douglas Hergert

In conclusion, my summer at Goddard Space Flight Center was an interesting, enlightening, and significant experience. My training courses at the ITC building enhanced my MacIntosh skills. A project, that was challenging and meaningful, was provided for me during the summer. The Goddard Library was efficient in providing me with the necessary books to complete my project. The people in Code 513 were extremely helpful and friendly for the duration of this program. It was a good summer!