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PC-BASED MULTIPLE INFORMATION SYSTEM INTERFACE (PC/MISI) DESIGN PLAN

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ABSTRACT

The general design plan for the implementation of a common user interface to multiple remote information systems on a microcomputer is presented. The intent is to provide a framework for the development of detailed specifications which will be used as guidelines for the actual implementation of this system.

KEYWORDS

Information Storage and Retrieval Systems, User/System Interaction, Man/Machine Interface, Personal Computer, Microcomputer, Casual User, Interface Design, Specifications.

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I. BASIC SYSTEM DESIGN

The major technical problems which must be solved in order to implement the PC-Based Multiple Information System Interface (PC/MISI) have been organized into five basic components as follows:

1. Provide Necessary Communication Capabilties
2. Provide Capabilities for Incorporating New Systems and Making Changes to Existing Systems.
3. Provide Mechanisms for Translating User Commands into Host System Commands and Interpreting Responses
4. Provide a Three-Level User Interface into the System
5. Provide Tools for Collection and Interpretation of Evaluation Information

The remainder of this section will describe the capabilities which will be required of each of these components. A chart describing the data flow within the system is included as Appendix A.

1.1. Communications

The functionality which must be provided by the

communication interface involves the transmission of commands generated by the translator to either the communication intermediary or the host system and the retrieval and subsequent storage of responses in a file which will be read by the interpreter and used to determine the appropriate next action to be taken. Data flow between the communications subsystem and the other components will be handled by the creation of standard input and output files. The communications interface system must be capable of detecting error conditions which have occurred in establishing the proper communications protocol parameters with a host system and taking steps to rectify these problems to establish proper data communications. If the interface is unable to accomplish this for some reason, it must have the capability of notifying the user of these problems and accepting user-initiated parameters to make the corrections. The system must also have capability of automatic re-dialing when a line into the host system is not available.

1.2. Administrative Subsystem

The addition of new systems, the modification of existing systems, and the manipulation of access rights will be handled by an administrative subsystem. Access to this subsystem in systems which will be available to multiple users must be restricted to a single user and this user will be referred to, in the remainder

of this document, as the primary user. This subsystem will provide a step-by-step prompt driven procedure for the addition of new systems. The use of this procedure will result in the creation of three files as follows:

1. Access Sequence - contains the sequence of commands which will bring the user to a state where the host system is ready to accept search commands.
2. Command Table - this file will contain a table which will map the commands issued by the user into the appropriate host system syntax.
3. System Response File - this file will be used by the interpreter to identify the response from the host system and perform the appropriate function based on this response.

The access sequence file will be created directly by the user based on his knowledge of these access procedures. The command table will be generated by prompting the user with the required system function and allowing the user to enter the appropriate system command with a standard convention indicating where variable values are to be placed. After creation of these first two files, the user will be prompted to begin access to the system and the administrative subsystem must be capable of interacting with the communications subsystem through the

translator. This will allow testing of the access sequence and correction of any errors which have occurred and the system will then generate the required entries into the system response file by invoking the command which should cause the appropriate response and then asking the user to identify if the response is the one required and to identify labels or standard indications which identify the response. This procedure will also be used to identify labels of accessions to be downloaded and this information will also be placed into the response file. A unique set of three files will be generated for each host system which is to be incorporated into PC/MISI.

The administrative subsystem must also be able to access and modify the system security file. This file will be initialized with a personal identifier and password which will be given to the primary user of the system. This individual will have primary responsibility for the addition and maintenance of host system files and will be responsible for entering new users into the security file if so desired and setting access to these users for any subset of host systems which are available.

The administrative subsystem must also have the capability of activating the mechanisms which collect and store evaluation data.

1.3. Translator/Interpreter Subsystem

The mapping of user commands to host system commands and the interpretation of the host system responses involve somewhat dissimilar problems, but, in order to solve these problems most efficiently, there is a requirement for the sharing of certain data objects (i.e., the type of request submitted is valuable when attempting to interpret the response). The two functions should, therefore, be implemented as one program with subprocedures to perform the different functions and global variables containing the information to be shared. The translator will accept input from the user interface subsystem and use this information to extract the correct host system command format from the command table, plug in the variable value(s), and send the string thus constructed to the input file to be read by the communications subsystem. The communications interface will then transmit extract the string from the input file, transmit it to the host system and await a response.

Each line of the response will be stored in the output file as it is received. When the host transmission is complete, the communication subsystem will return control to the main program which will then call the interpreter. The interpreter will read lines from the output file and utilize information in the system response file to determine any processing required on the response, perform this processing, and then store the transformed lines in the user interface file. If the interpreter is unable to

determine the type of the host system transmission, the line(s) of response are simply stored in the user interface file as received.

1.4. User Interface

The user interface accepts input from the user and returns information to the user concerning system activity. There are three levels of interaction which the user may choose:

1. Menu-Driven Interaction
2. Command-Driven Interaction
   (utilizing PC/MISI commands)
3. Direct Interaction with the Host System.

The menu system will list choices which are available to the user at any given point in his interaction with the system and take appropriate action dependent upon the user's response. The user will also be required to enter such items as search variables directly upon prompting from the system. The choices available to the user at level 1 to formulate commands to the host system will basically consist of the full text of the abbreviated commands available to the user at level 2. The abbreviations will be highlighted in order to make the level 1 interaction a tool for learning to deal with the system at level 2. A possible menu might be as follows:

1) FInd Subject term
2) FInd Author
3) COmbine sets
4) DIsplay reference

The user at level 1 who wished to extract all references to microcomputers would enter a 1 and would then be prompted for the subject term and would enter "microcomputers". At level 2, the user would accomplish the same action by entering "FIS microcomputers" when prompted by the system. At either level, the user will have the option of having each instruction sent to the host system as it is entered or formulating a series of queries offline and connecting to the host system to perform the entire sequence when query formulation is finished. The processing of user input will be organized in such a way that the search string sent to the translator will be the same for either level 1 or 2. The level 3 interface is intended for the advanced user of a particular system and allows direct transmission of a command as entered by the user and direct display of the information returned by the system. A user at this level will also have the option of downloading accessions into the standard file format used at the other two levels or saving information into a sequential file exactly as it is transmitted from the host system. The user at level 1 or 2 will also have the capability of sending a single command line directly to the host system if so desired. This capability is necessary in order to maintain flexibility, recover from unusual error conditions, and to allow users at any level to access unique system functions which are outside the scope of PC/MISI.

The screen display which the user at any level sees will be divided into three sections. The upper section of the screen will be used by the system to display prompts or menus and receive input from the user. The bottom section will be used to display information being returned from the system. The last line of the screen will be used to display user orientation information such as time, date, system being accessed, etc.

1.5. Evaluation

The evaluation subsystem will consist of collection mechanisms imbedded in the system code and activated by the primary user through the administration subsystem and the data files generated by these mechanisms. There is a necessity for two separate types of evaluation: System Management Evaluation and System Functionality Evaluation. These will be implemented as two separate components.

The System Management files will contain a collection of information concerning the activity of different individuals and the utilization of different host systems. This information will be used to track individual utilization for possible cost determination when a number of users utilize a system and to determine the cost-effectiveness of individual host systems.

The System Functionality files will be used to determine the learnability and usability of the system and the relative merits

of the different interface levels. The information contained in these files will be such things as error rates, volume of retrievals and online versus offline time. This type of information will be used in controlled and quasi-controlled experimental conditions to determine the relative merits of different interface configurations.

II. Resource Requirements

The user interface implementation will require the use of a standard window generation library. The evaluation subsystem will require an interface with a statistical package. Hardware requirements will include a system with a minimum 256K memory and a hard disk system for efficient file handling as well as floppy disk capability. The communications system will also require a modem and this implementation will be based on compatibility with a Hayes-1200 Smartmodem. Capabilities will also be provided for the user to change communications configurations to utilize other types of modems. The administration subsystem will be designed so as to include the optional use of a light pen. A color monitor will be required to fully utilize the windowing capabilities to be incorporated into the system.

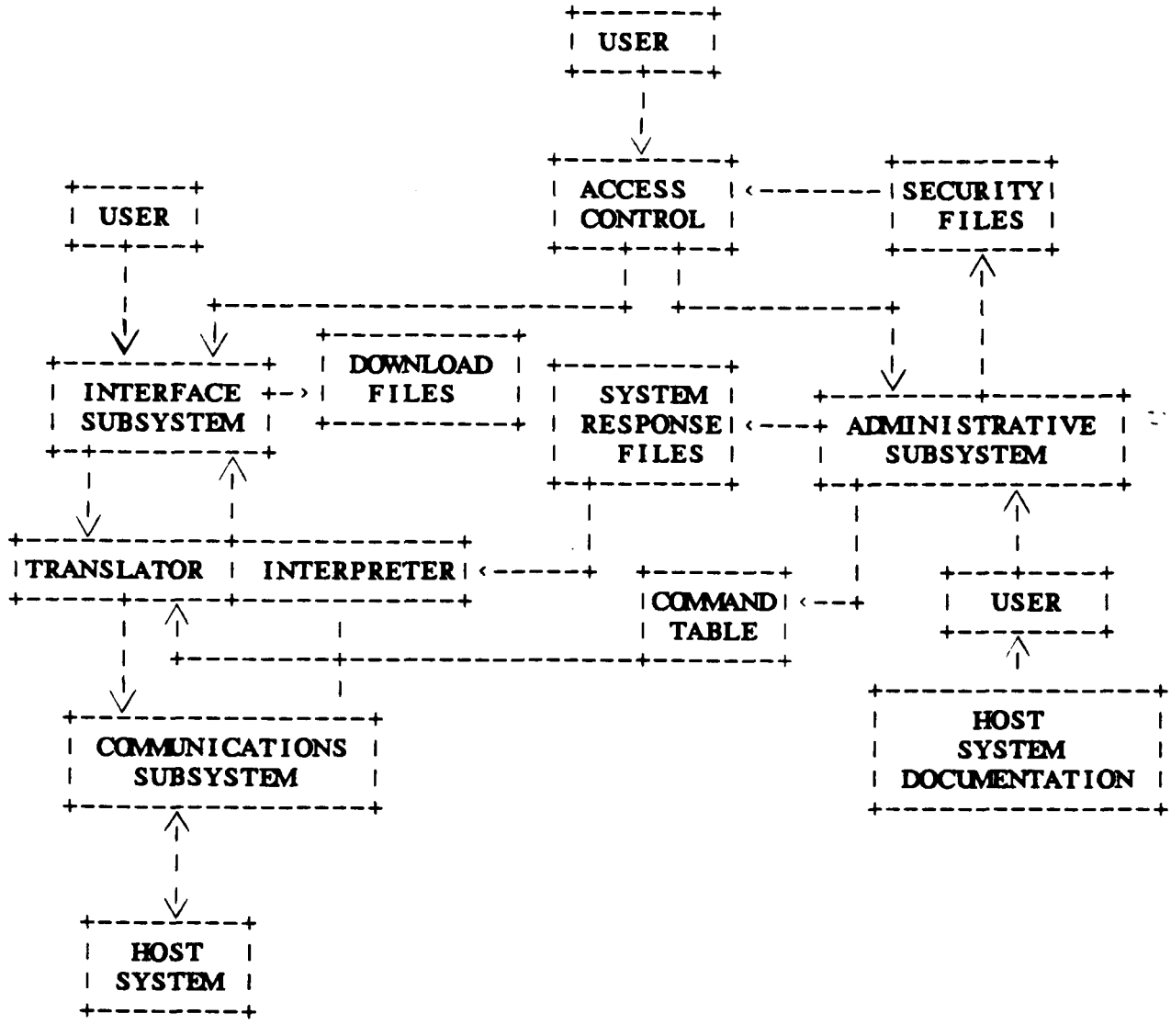
The programming time required for implementation is difficult to estimate since it is, to a great extent, dependent on the skill of the programmer who will perform the

implementation. Rough estimates of implementation time and program size are as follows:

	TIME	SIZE
1. Communication	30-40 Hrs.	40,000 Bytes
2. Administrative Subsystem	60-80 Hrs.	30,000 Bytes
3. Interpreter/Translator	40-60 Hrs.	40,000 Bytes
4. User Interface	40-60 Hrs.	30,000 Bytes

The time to implement the evaluation system is included in the user interface time.

APPENDIX A
SYSTEM DATA FLOW



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16. Abstract

This Working Paper Series entry presents the general design plan for the implementation of a common user interface to multiple remote information systems within a microcomputer-based environment. The intent is to provide a framework for the development of detailed specifications which will be used as guidelines for the actual implementation of this system.

This report represents one of the 72 attachment reports to the University of Southwestern Louisiana's Final Report on NASA Grant NGT-19-010-900. Accordingly, appropriate care should be taken in using this report out of the context of the full Final Report.

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