

VOLUME 3 - TECHNICAL PROPOSAL

A Proposal To:
UNITED STATES NUCLEAR REGULATORY COMMISSION
In Response To:
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3. VOLUME 3: TECHNICAL PROPOSAL

3.1. DATABASE MANAGEMENT SYSTEM REQUIRED FEATURES

3.1.1. PRODUCTIVITY

3.1.1.1. FOURTH GENERATION LANGUAGE

The vehicle for using IDMS/R relational capabilities to establish applications is the Automatic System Facility (ASF) the user signs on to ASF to define, store, modify and delete relational record when the user creates a relational record the ASF invokes the appropriate system facility to generate automatically all necessary applications components data definitions screens formats application logic and documentation. Relationships among the generated components are also established automatically, producing a comprehensive applications available for immediate use, further, because ASF stores all the components definitions in the Data Dictionary documentation is readily provided from a central source.

3.1.1.2. PROTOTYPING CAPABILITIES

In relational facilities of IDMS/R are ideal for prototyping database applications. The frequent modifications involved in production application is easily done through IDMS/R. Our underlining structures are generated automatically at each revision of the prototype. Further, the IDMS/R prototype can be thoroughly tested with actual data before being implemented permanently. The design for the large high volume inventory system for instance, could be extensively tested and tuned before production processing is initiated. Efficient use of system resources is thus insured from the start.

3.1.1.3. SCREEN PAINTING

The IDMS/R DC/UCF online mapping facility is used to create, modify, and delete the maps used in application development. Online mapping prompts the application developer for information through a series of screens. This information includes the map's name, names of records used by the map, and characteristics of the terminal on which the map will be displayed, such as its screen size.

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The application developer designs map screens by using a blank screen displayed automatically by online mapping. Screen formats include values that appear as prompts to the terminal operator, the location of fields that will be filled with data at run time (either by the terminal operator or by ADS/OnLine), and optional titles. The application developer can select attributes for each data field or use default attributes supplied automatically by ADS/OnLine. For example: Can a field contain any value or only numeric values? Will a field's characters appear to be bright, normal, or dark (not visible)? Special attributes include underscores, blinking and colors.

Online mapping offers the following benefits to the application developer:

- o Responsiveness to change - all screen formats can be reviewed quickly and easily. If the initial format is not suitable, alternatives can be designed.
- o Enhanced use of participation - working the end user, the application developer can tailor maps to fit exact user requirements; designs can be modified and improved on the spot.
- o Fast creation of maps and menus for use with any IDMS/R DC/UCF, or ADS/OnLine application.
- o Automatic documentation and control, because all map definitions are stored in the data dictionary.
- o Rapid modification of existing maps in ADS/OnLine system supplied menus.

Automatic editing and error-handling facilities are available for the application as part of the IDMS/R DC/UCF mapping facility. Automatic editing permits the application developer to define how data input by and displayed to terminal operator is to be edited. With automatic error handling, terminal operator is notified of errors encountered during automatic editing. By using automatic editing and error handling, the application developer eliminates the need to write process code to handle these tasks.

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Automatic editing is performed by using internal representations and descriptions of data. Internal representations describes how data fields are to be stored. Data descriptions specify how data is to appear to the terminal operator; for example: Is the data to be displayed with a leading dollar sign? To request more extensive editing, the application developer can define a list of values that is valid for a data field; for example, the application developer can specify the value entered in a field must be A, B, or C. The application developer can also define a table that contains information about how a value displayed at a terminal is to be stored in the database; for example, a department code that can be stored as 01 is displayed at the terminal as ACCOUNTING.

The automatic editing and error-handling facilities can be activated globally for a map or on a field-by-field basis. The application developer can specify one or more of certain criteria to handle errors encountered in map fields for which automatic editing has been requested.

3.1.1.4. DESIGN AIDS

Simulation. To simulate the IDMS/R-DC run-time environment in a control manner, without the use of terminals, IDMS/R-DC provides a batch simulator. The batch simulator is useful for debugging new application programs in an environment that closely resembles the online processing environment without incurring the expense of real-time testing.

The batch simulator runs in batch mode and executes IDMS/R-DC tasks as if executed by terminal operators in a multiterminal, online environment. It uses a simulated telecommunications network, defined in the IDMS/R-DC system generation, and a user-supplied input file that supplies the terminal input for this simulated network. Terminal input operations can be timed according to user-specification in order to simulate online data entry. The output from the batch simulator consists of a series of printed pages that show each screen as it would appear at a terminal in an online session.

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3.1.1.5. DATA DICTIONARY

The Cullinet Integrated Data Dictionary (IDD) is a system that stores and maintains information about data, whether the data is part of a database, conventional file, teleprocessing network, or manual system. IDD stores information in an organized, central repository called the data dictionary.

The data dictionary provided with the IDD organizes information about data by providing major categories called entity types that corresponds to major data processing components (e.g., element, record, file, program, user). For example, USER is an entity type within the data dictionary; and occurrence of the USER entity type exists in the data dictionary for each user within an organization and contains information specific to that user (e.g., user name, user authority, user description).

Information about occurrences of these entity types as described above, is stored and maintained in the data dictionary. Using IDD entity types, the user can document the following kinds of information about an entity organizations:

- o Source of data
- o Relationship of data
- o Physical characteristics of data
- o Frequency of data access/update
- o Names of persons who use the data
- o Places where the data is kept

Once the information is stored in the data dictionary, it is immediately available to users in the form of online reports or batch reports provided by the Data Dictionary Reporter (DDR). These reports enable the user to view and monitor the contents of the data dictionary.

By organizing data into a central repository, providing extensive reporting on that repository, and allowing the user to expand and/or modify the repository to meet specific needs, IDD permits the user to achieve greater control over the organization's data.

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Further flexibility is offered in the form of synonym processing. Synonym can be used in the naming of the entity to permit the user to reference a single entity occurrence by multiple names thereby eliminating data redundancy.

Occurrences of IDD entity types define data resource components within an organization. Entity types fall into three general categories:

- o Basic Entities - IDD basic entity types correspond to components of automated or manual systems and have names that are easily recognizable by anyone familiar with basic data processing terminology: user, system, file, etc.

The second of entities are teleprocessing entities. The teleprocessing entities type, together with the basic entity types, document online applications. These entity types correspond to the components of online systems and are named accordingly: message, map, task, physical terminal, logical terminal, etc.

The third type of entity is called special entities. The special entity types consist of classes, attributes, load modules, and user-defined entities. Classes and attributes allow the user to define specific documentation options applicable to individual sites. The load module entity provides IDMS DB/DC compilers a place to store executable modules in the data dictionary. User-defined entities allow the user to create, relate, and report on nonstandard, site-specific entity types.

The data dictionary provided in the IDD is the tool that makes integration with other Cullinet database management products possible. All Cullinet data management products make extensive use of the data dictionary information. IDD provides each product with the information it needs to perform its services. By utilizing this central resource, products have access to the same information and can communicate with each other.

Integration with the IDD provides features and benefits to Cullinet data management products, as follows:

- o IDMS - Information placed into the data dictionary is actively used to control and direct the processing of data by IDMS and its related software components. The IDD

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automatically captures program activity and monitors program use of database records and elements. Additionally, the IDMS central version uses information stored in the data dictionary to create the run-time environment.

- o IDMS-DC - IDD maintains system definitions, messages, system load modules, and all map definitions used by IDMS-DC. IDMS-DC uses information stored in the data dictionary to create the run-time environment. Map-field editing and validation criteria are also stored in the data dictionary; IDMS-DC uses this information to perform automatic editing and error handling.
- o ONLINE QUERY (OLQ) - OnLine Query uses data dictionary information to automatically format online database reports. Report formats are based on current data definitions stored in the data dictionary. If database information changes, OLQ has immediate access to the information and automatically formats reports accordingly. Additionally, all queries automatically have access to any change in database information.
- o ADS/ONLINE - IDD maintains map-field editing and validation criteria that allow ADS/OnLine to automatically edit run-time input data. Source modules and executable modules required by ADS/OnLine are stored in the data dictionary.

3.1.2. PERFORMANCE

3.1.2.1 MULTI-THREAD AND RE-ENTRANT

The CV feature of the IDMS/R system allows any number of tasks to concurrently use a single copy of the DBMS for update as well as retrieval. It provides for locking at the record occurrence level and includes sophisticated algorithms to detect and resolve deadlocks. The CV, which provides multitasking, threads all calls from application programs in other partitions or regions out to the DBMS. The CV also includes a fully automatic recovery feature which will back out to the last checkpoint, the effect of a program that abends in the CV environment. IDMS/R logs before and after images of all transactions and by using the Journal Reporter. All changes to the database can be tracked through in date and time sequence and by the program or user that made the change.

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3.1.2.2 AVERAGE RESPONSE TIME

The response time in an IDMS/R environment is a function of your job mix and the number of concurrent database tasks. Performance in a high volume, online environment is one of the major design criteria which went into the development of IDMS/R. Experience has shown that performance is one of the major strengths of our software and is in a large way responsible for its success.

Many factors contribute to response time including: job mix, paging, OS tuning, DASD management, channels, application requirements, CPU instruction rates, number of terminals, efficiency of application code and proper database design. Therefore, it would be very difficult to project response times. At a later date, Cullinet would be glad to provide volumes and response times from references operating in environments similar to the one which you expect.

3.1.2.3 ONLINE UPDATE RESPONSE TIME

IDMS was designed specifically for performance in high-volume transaction-oriented environments. The single-region architecture, multi-threaded update capabilities and space management techniques of IDMS result in efficient and rapid update processing.

Single-region architecture eliminates on-line inter-region communication. The results are reduced CPU resources and quicker terminal response since database requests are not made across regions.

The multi-threading capabilities of IDMS allow any number of batch and on-line applications to run concurrently, resulting in lower I/O overhead and increased system throughput.

Finally, IDMS space management minimizes I/O involved in the update process. The update of a record and related records can be accomplished in as few as 2 I/O's. A record can be stored on a page (the equivalent of a block) calculated by IDMS based on a key value in the record and its related records can be stored physically as close as possible to the owner record.

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3.1.2.4 BATCH UPDATE RESPONSE TIME

IDMS was designed specifically for performance in high-volume transaction-oriented environments. The single-region architecture, multi-threaded update capabilities and space management techniques of IDMS result in efficient and rapid update processing.

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3.1.2.5 PERFORMANCE MONITORS

The IDMS/R Central Version Journal Facility and Journal Reporter assist in monitoring and reporting on the use and accesses of the database. For each run unit and in aggregate for all run units, the Journal Reporter will provide the following information:

- Number of records updated
- Number of pages read
- Number of pages written
- Number of times CALC record stored on target page
- Number of times via record stored on target page
- Number of records requested from IDMS/R
- Number of calls to IDMS/R
- Number of shared DB-key locks held
- Number of exclusive DB-key locks held

Using this information, the user can analyze the activity by run unit, by area within the database and across the entire database.

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In addition, online commands are available to display system utilization information such as active run units, buffers and areas and to vary such elements on or off line.

IDMS/R provides a comprehensive set of performance statistics and database utilization reports to monitor database performance. All statistics are automatically recorded in the Central Version Log within the Integrated Data Dictionary. Log utilities provide page analysis by which each page (the equivalent of a block) is analyzed to provide information on the percent utilized, data randomized to that page but located on another page because no space was available, and the number of variable length record fragments stored within the page.

3.1.2.6 CONCURRENT USERS

Yes. IDMS/R is fully re-entrant, multi-threaded and multi-tasking, allowing any number of users to be active at one time. It allows and controls multiple application programs accessing and updating the database concurrently thus providing database integrity and efficient system through-put.

There is no limit to the number of terminals that IDMS/R can support. There is an IBM limit based on TP access method.

3.3.1. OPERATING COSTS

3.1.3.1 APPLICATION DEVELOPMENT FACILITY

The Cullinet Application Development System (ADS) is a fourth generation facility that allows users of IDMS/R to develop and execute online transactions against the database. ADS/O applications are developed online directly into the Integrated Data Dictionary using the Online Mapping Facility (OLM) of the Data Communications/Universal Facility (DC/UCF) and the standard source module feature of the IDD.

The ADS/O programming language, is a fourth generation programming language designed to be used in a structured coding manner. It has full logic capabilities for "perform varying" processing, data manipulation, subrouting processing, data access, backup and recovery, and screen control. In addition, it features automatic editing and data conversion, i.e. range checks, table conversions, sequential or binary edit table searching, etc.

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Full Boolean logic is incorporated in ADS/D. This includes AND, OR, NOT, IT, as well as, relational testing (greater than, less than, equal, not equal, etc.). ADS/D will also support multiple level subscription, and multiple field occurrence.

ADS/D provides for the addition, subtraction, multiplication and division mathematical functions in both simple and complex structures. In complex structures, the same operation sequence incorporated in COBOL is used.

ADS/D incorporates the extensive features available in IDMS for data access and control, and the advanced features available in IDMS-DC/UDF for teleprocessing network access and transaction security.

IDMS/R security can be invoked at multiple levels:

- o View Access - Each view of the data can be controlled to prevent unauthorized access. In addition, the usage of each view (update or retrieval) can be secured.
- o Record Level - Within each view that is authorized for modification, each record type can be identified as to whether it is available for retrieval or modification.
- o Value Dependent Security - For each record type authorized within a view, additional security can be established depending on the contents of one or more fields contained within the record. This data content security level can be further separated by retrieval or update authority.

IDMS-DC/UDF security is also invoked at multiple levels:

- o Network - Only authorized users are permitted to sign onto the network.
- o Transaction - A user can only execute those transactions they are authorized to use.

In addition to the above security levels, ADS has a unique security feature that significantly adds control to an online application and reduces development time. This feature is terminal operator response security. Within a transaction, each terminal operator response can be secured. ADS/D can invoke

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security based on the terminal operators response. Also security can be implemented via the IDD, to control access to all screens, report, and procedures.

ADS/O utilizes the OnLine Mapping (OLM) facility of IDMS/DC or UCF for the creation of maps. The OnLine Mapping Facility enables most screens to be fully developed within fifteen minutes. The developer simply "paints" on the terminal exactly how he wants the screen to appear. OLM then prompts them for special characteristics that should be applied to each field. During this process ADS/O automatically documents into the IDD the map name and the record elements that appear on the map.

The online transaction development is begun by developing a screen format or map using OLM, as described above. The second step in developing a transaction is the generation of application logic. Application logic is built and stored directly in the IDD using the ADS high level fourth generation application development language. The building of the logic modules in this manner is the foundation for the highly structured programming concept employed in ADS transaction generation. Logic modules, once built, can be used by any member of ADS/O transaction without having to be re-written, copied or merged. After a period of time developing a transaction is simply a process of

selecting already coded logic modules out of the dictionary and combining them with a particular screen. The IDD automatically documents which logic modules are used by each transaction. The last step in creating a transaction is the development of a "Dialog". The dialog in essence links the correct map with the appropriate logic module.

ADS/O transaction generation and testing is all done online without the need to make any modifications to any system tables.

User exits for ADS transaction can be written in either COBOL, Fortran, PL/I or Assembler.

ADS/O allows complete forms creation as described above. Extensive exiting of each field is automatic which includes: tables of valid or invalid values, ranges, numeric check, and mandatory input checks. Conversion from internal format to display format with editing is also automatic. OLM is comprehensive such that it gives you all the flexibility to

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develop custom forms. The application development language of ADS/Online provides standard verbs for add, modify, delete, and retrieval functions.

The transactions/application developed using ADS/O allows direct access to all data types and elements in the IDMS/R system.

The Automatic System Facility (ASF) can be used to create full-function applications (i.e. populate, modify, delete, retrieve) very quickly and easily online through menu driven programs. Since ASF builds applications without the user having to learn coding, programming, or syntax, non-data processing people can acquire the knowledge to use it very quickly. Access to the Automatic System Facility and to the applications created by ASF can be completely controlled through the Integrated Data Dictionary.

The Automatic System Facility can also be used to create private databases and applications by end-users. Again, access to ASF and to the applications, generated by ASF and to the data in the private database can be limited to the originating user through the Integrated Data Dictionary.

3.1.3.2 ONLINE HELP FACILITY

Online Query is extremely easy to use. It is menu driven, so there are no commands or syntax to learn. Extensive help facilities are available, which means no formal user training is required.

Online English is the ultimate in ease-of-use for a query facility. A user queries the database with actual English sentences. No user training is required.

3.1.4.1 NCR TERMINAL COMPATIBILITY

Cullinet Software supports all standard IBM protocols or communication access methods. If a terminal has the capability to communicate with any standard IBM mainframe, through its communication link, it will be compatible with Cullinet products. If you are talking to a Honeywell terminal which cannot emulate an IBM protocol, then the Cullinet product will not communicate. However, if the terminal can provide communications to any standard IBM mainframe environment, then the Cullinet Software can communicate with that terminal.

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3.1.4.2 EASE OF LEARNING/USE

The training period required to learn the use of IDMS/R depends on the type of implementation that is required by the organization. If you wish to implement the strictly relational capabilities of the database and not utilize any of the other capabilities, then the training period is very minimal. However, if you wish to take advantage of all the other capabilities within our architecture to meet your requirements (such as implementing network capabilities) then the training requirement is greater. It is totally dependent upon the type of implementation that is desired by the user. Please refer to the Cullinet Training Bulletin for more details about training available and how the courses are related to the specific functions of the different database products.

3.1.5. IN-HOUSE CUSTOMIZATION

3.1.5.1 COBOL 74 INTERFACE

The IDMS/R Data Manipulation Language (DML) processors copy file, record, element, database, and data communication definitions from the data dictionary into requesting programs. Language supported are COBOL, PL/I, FORTRAN, and Assembler. Sort program activity, (e.g., date compiled, number of source lines, files opened) are captured automatically and stored in the data dictionary.

3.1.5.2 WRITING AND STORING MACRO COMMANDS

IDMS provides, through the Integrated Data Dictionary (IDD), the capability to write and store macros. The macros can be either standard third generation language macros, macros defined with CULPRIT report writer, or those defined using the On-line Query system of IDMS/R. In addition, other procedures may be stored in the IDD.

3.1.5.3 PASSWORD PROTECTING CUSTOMIZED ROUTINES

IDMS/R provides security and access control down to the element occurrence level. This is accomplished through the use of value dependent security locks. Using this system would give you the ability to, for example, allow an employee access to all payroll records where the salary is under \$20,000 but not the others.

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IDMS also includes element level, record level, relationship level and logical area security. This security may be enforced by user ID and password, terminal ID, or transaction code or any combination thereof.

Security is defined in the IDD for all programs and applications. Program security for particular requests is enforced at compile time as well as execution time. Operational security can be enforced for any combination of read, write, update, and is enforced at compile and execution time as well. IDMS allows the selective control of output of data to non-secure devices.

It is not possible for IDMS users to access, update or control internal information, pointers or index tables. This guarantees complete physical integrity at all times. All security is defined and modified in the Integrated Data Dictionary. Security information is encrypted in the data dictionary.

3.1.5.4. DATABASE AND FILE ACCESS

The IDMS/R Distributed Database System (DDS) supports IDMS/R databases at multiple locations in a network and makes data available on a demand basis to any network node. The system requires the use of the IDMS/R Central Version at each distributed location. DDS dynamically configures itself as various nodes sign on and off the network and automatically routes requests to their target nodes. DDS nodes may be connected by means of an SVC (if both nodes are within the same CPU), channel-to-channel adapter or telecommunication line. The BTAM and VTAM access methods are supported for teleprocessing interconnection. DDS operates on IBM 360/370, 30XX and 43XX or equivalent hardware under any OS operating system, DOS/VS or DSS/VSE. This application programmer under DDS is not required to know on which node the data he is accessing resides. DDS provides the full data integrity and data recovery features of IDMS/R-CV.

Integrity and security controls are enforced by the Integrated Data Dictionary (IDD). Database access is either global or local. Whereas global access implies accessible to all users within the network, local implies access limited to the node owning the database. In both cases, database access is authorized by the IDD at the node which owns the database.

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3.1.6. DATABASE INVESTMENT

3.1.6.1. DATA INDEPENDENCE

With IDMS and the Integrated Data Dictionary, data is completely independent. Changes to program logic may be made without any effect to the Data Management System other than the dictionary capturing information regarding the program's latest compilation. Screens may be changed without influencing any other areas, as may data descriptions and the definition of relationships between the data records. With IDMS/R, elements and relationships may be added to or deleted from logical records without causing program recompilation. In any case where these various types of changes would cause an inconsistency, a message is issued and the situation is immediately resolved.

3.1.6.2. DATA CONSISTENCY

The Integrated Data Dictionary is the only truly integrated and fully active data dictionary available today. It automatically updates dictionary contents, assuring accuracy, consistency, and security of all data resources. This unique facility of IDD reflects program changes as they occur. With IDMS/DC and Universal Communications Facility (UCF), the run-time statistics are also automatically captured.

3.1.7. DISTRIBUTED DATA PROCESSING AND DATABASES

3.1.7.1. MICRO-MAINFRAME LINK

GOLDENGATE is an integrated set of management decision-support tool that run on the IBM Personal Computer. These tools can be used to dynamically analyze and manipulate data with a flexibility and ease unattainable with conventional spreadsheet and graphics products. In addition, GOLDENGATE is fully integrated with the Cullinet Information Database and/or IDMS/R to allow easy, but controllable access to corporate production data from the Personal Computer (PC).

The spreadsheet, graphics, financial modelling, document processing, personal database capabilities and electronic mail, which comprise the GOLDENGATE, function as a single software tool. Because they have all been built on a common architecture, these capabilities interactively work together in the same

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environment - and all are able to access and utilize the same set of data in the Information Database. When combined with the intelligent connection to the mainframe, an automated process of providing access to mainframe data make the Cullinet solution unique.

The Cullinet Information Database system provides the link necessary to access data from the production database and/or external sources, summarize it, and make it accessible to end users from their personal computers. In addition to serving as a central information resource with a relational database capability, the Information Database also connects all of an organization's personnel computers into a single network. Once documents, messages or graphs have been stored in the Information Database, they can be broadcast directly to selected users. This greatly facilitates the implementation for electronic mail.

This relational facility may be populated from a number of sources: the production database (IDMS/R, IMS, other DBMS's), external/public databases (Chase Econometrics, Data Resources, Dow Jones, Bureau of the Census, etc.) and other corporate data. Managers and other end users can then use their personal computers to access, retrieve, locally store and manipulate this database information. The files created as a result of local processing and analysis can be stored back in the Information Database for distribution to other users. These files can also be used to update the production database, given the proper security clearances and procedures.

3.1.7.2. OFFICE AUTOMATION LINK

Cullinet Database System is fully compatible with the standard IBM operating system, its teleprocessing environment, and its standard teleprocessing access methods. Therefore, the access to the database via 3270 emulation, if it were 100% compatible component, is allowed. If the IBM 5520 generates 3270-like character strings then it can access the database.

3.1.8. VENDOR SUPPORT

3.1.8.1. TECHNICAL

It is Cullinet's contractual responsibility to completely install and demonstrate the software. From a single tape, the products

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are installed using the Integrated Installation Procedure. Installation is completed within two days. All products will be thoroughly demonstrated and recommended procedures discussed in detail with your systems and operations staff. We will provide a comprehensive installation guide for future reference with complete implementation and procedural rules.

Cullinet's standard for customer support is the highest in the computer software industry. The Cullinet Service Plan is designed to assist us in understanding your needs and requirements. The information that we collect permits us to provide you with an individually tailored program of education, consultation, and technical assistance. The Service Plan is made on the basis of three studies: Project Profile, Resource Analysis, and Training schedules.

A Project Profile is constructed during a roundtable meeting. From our discussion, we will capture critical information regarding your plans for the coming year. The profile is documented by quarter and identifies the applications, activities, systems software, and principal staff associated with each project. From this study, we will identify and forecast important activities in your shop, and we will recommend the service you will need from Cullinet to achieve your goals.

A Resource Analysis is created to document the materials and personnel availability in your environment for the first three months. In this analysis, we will examine by month your hardware, software, and staff configuration during this study, we will be able to recognize and point out any significant changes which may occur in the utilization of these resources.

The development of a training schedule allows us to identify a primary software team which will lead your shop through the period of education so necessary to the successful use of new software. During the initial meetings with your team, we will review Cullinet's educational offerings and develop a program of classes which best suit your needs.

The Customer Support Manager assigned to the Agency will work jointly with you and your staff to assure the successful implementation of the Service Plan. The development of and adherence to this service plan will provide a strong working relationship between the Agency and Cullinet.

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There is no charge for troubleshooting support. Our hot lines are toll-free numbers which are staffed 24 hours a day, seven days a week by technicians. Should it become necessary to dispatch a local technical representative, this would be done at any time. Our technical development staff is located in the Corporate Office. A full complement of highly qualified technical representatives are in all district and field offices. The local technical representatives have responsibility for installation and on going on-site support including database design reviews.

Response time on our toll-free hot lines is immediate. The typical response time, therefore, would range from immediate (telephone) to the time required to place the local representative on-site. Considering the fact that most questions are not software bugs but problems in attempted usage, these problems will be recognized and corrected immediately by the use of our hot lines. A typical problem resolution time would, therefore, be approximately one-half hour. Cullinet is unmatched in the support category of industry surveys for database management systems.

3.1.8.2 TRAINING

Please reference the Cullinet Education Bulletin Fall/Winter of 1984 for information on the educational requirements as outlined in this section. In addition you will find the course description material for all of the other software products offered by Cullinet.

3.1.8.3 DOCUMENTATION

Please refer to the enclosed Cullinet Product Bibliography for all documentation provided for those areas listed in this section.

3.1.9. SYSTEM CONTROLS - RELIABILITY

3.1.9.1. CUMULATIVE DOWN TIME

IDMS offers the strongest recovery features of any database management system operating on IBM mainframe hardware. Our error recovery is fully automatic and functions concurrently with all other processing in the system. IDMS is completely isolated from application program failures.

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For all records which are updated in the database, "before" and "after" images are written to the IDMS journal file. Records which are retrieved but not updated may be journalled also, at your option. The information in the journal is available to you and may be reported in various ways using the Journal Reporter. IDMS provides a checkpoint-restart capability with checkpoint records being recorded on the journal file together with the "before" and "after" images.

IDMS does allow for the restoration of one area of the database without having to restore the entire database. This process may occur while other processing is carried out against the database.

3.1.5.2. DAILY DOWN TIME

When a program, batch or online, fails, records which have been updated in the database by that program are automatically set back to their original appearance. There are no restrictions whatsoever on the use of the database by other programs during this error recovery processing.

3.1.5.3. ROLL FORWARD CAPABILITY

In the event of an intermittent failure, IDMS would do an automatic warm-restart when the system is brought back up. Any programs which were previously active are rolled out and the "before" images of records which have been updated by these programs would be returned to the database. This brings the database back to a synchronous starting point from which processing may be restarted.

In the event of a catastrophic failure, a security backup of the database or portions thereof would be restored to another disk(s). The roll forward utility would then be used to place into the database the "after" images of all records which had been updated since the security backup of the database was taken. This would bring the database back to the point in time where the failure occurred.

3.1.5.4. DATABASE REORGANIZATION

Although any standard disk backup utility may be used, backup and restore utilities are supplied with IDMS. Although the database never needs to be reorganized through unloading and reloading, a

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security backup should be taken at regular intervals. This backup may have to be restored in the event of a head crash or other disk failure. IDMS does allow the backing up of selected areas of the database on an as-required basis. When backing up or restoring multiple areas of the database, these functions may be performed concurrently. Note that the batch and online IDMS system use an integrated journal for recovery purposes regardless of host TP monitor for complete recovery synchronization. Some combination of TP monitors and DBMS use separate journals allowing small "windows" where recovery could be out of sync. IDMS eliminates this loophole.

3.9.1.5. DATA ENTRY EDITING

IDC table occurrences document edit and code tables that enable automatic editing, encoding, and decoding of map fields used by the IDMS/R-DC/UCF mapping facility. Table occurrences can also be used to document tables that are not used by the IDMS/R-DC/UCF mapping facility. EDIT tables are lists of single values or ranges of values that can be compared with data fields in a map to make sure the data fields in the map are correct. For example, an edit table could be used to check for the numbers 1 through 12, the only valid values for a field called MONTH.

Code tables translate internal codes in a record to an external, more meaningful format. For example, a code table could be used to translate state codes such as CA or NY to their corresponding state names CALIFORNIA and NEW YORK.

3.1.10. SYSTEM CONTROLS - SECURITY

3.1.10.1. DATA ACCESS

IDMS/R provides security and access control down to the element occurrence level. This is accomplished through the use of value dependent security locks. Using this system would give you the ability to, for example, allow an employee access to all payroll records where the salary is under \$20,000 but not the others. IDMS also includes element level, record level, relationship level and logical area security. This security may be enforced by user ID and password, terminal ID, or transaction code or any combination thereof.

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3.1.10.2. UNAUTHORIZED ACCESS/DESTRUCTION

Security is defined in the IDD for all programs and applications. Program security for particular requests is enforced at compile time as well as execution time. Operational security can be enforced for any combination of read, write, update, and is enforced at compile and execution time as well. IDMS allows the selective control of output of data to non-secure devices.

It is not possible for IDMS users to access, update or control internal information, pointers or index tables. This guarantees complete physical integrity at all times. All security is defined and modified in the Integrated Data Dictionary. Security information is encrypted in the data dictionary.

3.1.10.3. FIRST LEVEL PASSWORD PROTECTION

IDMS/R provides security and access control down to the element occurrence level. This is accomplished through the use of value dependent security locks. Using this system would give you the ability to, for example, allow an employee access to all payroll records where the salary is under \$20,000 but not the others. IDMS also includes element level, record level, relationship level and logical area security. This security may be enforced by user ID and password, terminal ID, or transaction code or any combination thereof.

3.1.10.4. TRANSACTION JOURNALLING

IDMS/R interfaces with all major accounting packages through its extensive user exits capability.

In addition, IDMS/R automatically captures statistics in the areas of logical I/O counts, physical I/O counts, update counts, space utilization, and timing. This information is available through batch reports. Executing programs may also access some of this data. The dictionary, journals, and log files provide additional statistics for tuning the software. These statistics can be captured by task, program, and user ID.

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3.1.11. DATA MANAGEMENT

3.1.11.1. SHARED DATABASES

An IDMS schema is the complete description of the content and the structure of the database. It includes all records and set types necessary to define data elements and data relationships.

The subschema provides access to all or a subset of the data elements, record types, set types and areas defined in the schema. Any number of subschemas can exist for a given database. Typically, one subschema exists for each group of related applications.

Database accessing during execution of Host Language programs is restricted by the subschema load module, which resides in the load area of the IDD.

A single schema is accessible to a host language program at any given time. Multiple schemas should be consolidated to accommodate the requirements of the application or schemas should be intermittently bound and released within the logic of the program. System-wide, any number of schemas can be accessed concurrently by different batch and on-line host programs.

3.1.11.2 ACTIVE DATA DICTIONARY

The Integrated Data Dictionary is the only truly integrated and fully active data dictionary available today. It automatically updates dictionary contents, assuring accuracy, consistency, and security of all data resources. This unique facility of IDD reflects program changes as they occur. With IDMS/DC and Universal Communications Facility (UCF), the run-time statistics are also automatically captured.

The IDMS/R Data Manipulation Language (DML) processors copy file, record, element, database, and data communications definitions from the data dictionary into requesting programs. Languages supported are COBOL, PL/I, FORTRAN, and Assembler. Source program activity (e.g., date compiled, number of source lines, files opened) is captured automatically and stored in the data dictionary.

The Integrated Data Dictionary (IDD) serves as a central repository for all the data describing the DP environment and is actively integrated with all Cullinet products.

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3.1.11.3. HIERARCHICAL AND NETWORK SUPPORT

The structures of IDMS/R allow a user to easily represent any logical record requirements. For example, the basic building blocks of one-to-one, one-to-many and many-to-many relations allows one to represent a reflexive data structure like a bill-of-materials design as well as a simple hierarchical data structure. The IDMS/R indexing facility also allows easy representation of indexed or sequential data relations. In addition to a high performance network data structure, IDMS/R supports full relational capabilities including storage and maintenance of relational files and the ability to apply relational operands against them. IDMS/R supports fully interactive file design and data manipulation. All data in both network and relational databases is available for program access. Relational data can be incorporated in a production CODASYL compliant network model and network data may be accessed from a relational point of view.

3.1.11.4. ACCESS METHOD SUPPORT

IDMS can access records stored on BDAM files, IDMS VSAM files, or native VSAM files, as follows:

- o BDAM -- A BDAM file is divided physically into units known as blocks, each of which corresponds to a database page. When an application program issues a call to IDMS for a database record, the DBMS maps the page number for that record to a relative block number (RBN) and requests that relative block from BDAM. The database page size must equal the BDAM block size.
- o IDMS VSAM -- An IDMS VSAM file is structured as an IDMS database file (i.e., it is formatted into pages and areas). VSAM provides the access method used to perform the actual file access. The IDMS VSAM file is divided into units known as control intervals. For VSAM files accessed by IDMS, each control interval contains eight bytes of control information and one VSAM record. The VSAM record corresponds to a database page. When an application program issues a call to IDMS for a database record, the DBMS maps the page number for that record to a VSAM control interval and requests that control interval from VSAM. The control-interval size must equal the VSAM record size.

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- c. Native VSAM -- A native VSAM file, unlike BDAM or IDMS VSAM files, is not actually structured as an IDMS database but can be accessed as if it were. To access data in native VSAM data sets, IDMS converts DML statements issued by an application program into record-level (not control-interval) VSAM macro variations (e.g., ACE, RPL) and passes control to VSAM. An IDMS local run-unit or IDMS central version appears to VSAM as a single application that opens VSAM data clusters and activates VSAM paths using local-shared resources (LSR) or non-shared resources (NSR), accesses data records, and closes the clusters and paths.

3.1.11.5. DATABASE SIZE

An IDMS database is comprised of pages or blocks of data. The maximum number of characters in a database is based on the maximum number of pages per database, which is 16,777,214, and the disk device type. An optimal block size on a 3380 is 32764, therefore, the maximum number of characters possible in a database is over 549 billion bytes.

There can be 9900 record types per database. The number of record types is based on a 4-character unique record-id which is assigned to each record type, with valid values in the range of 100 through 9999. The first 99 are reserved for IDMS internal purposes.

IDMS puts no limit on the size of a data record, data element or the number of data elements per record.

3.1.12. EASE OF USE

3.1.12.1. QUERY AND REPORT WRITER

Cullinet provides two query language facilities. OnLine Query is a powerful menu driven system for retrieving information from the IDMS/R database or VSAM to satisfy online requests for immediate information.

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The system is designed for use by non-programmers by making full use of the information available in the dictionary. OnLine Query is an excellent tool for testing as well as production reporting and will meet your needs for timely and complete information. Frequently used queries may be created and stored in queue files or developed ad hoc. Editing and header information is provided automatically by IDD, thus the user need only ask for the data. OnLine Query has a help function, and expensive queries can be prevented.

Unlike parameter-driven query languages and report generators, OnLine English is a technological breakthrough designed for top management and end users with no data processing experience. It uses actual English and requires no knowledge of file content nor organization. OnLine English is fully integrated with IDMS.

3.1.12.2. SCREEN AND REPORT FORMATTING

Automatic screen generation is one of the unique features of the Automatic System Facility (ASF). OnLine Mapping (OLM) can be used to tailor the resulting screens. OLM provides a paint-the-screen tool for application development. It is just as easy to go back and un-paint the screen without need for recompilation. Modifications to the IDD will be automatic.

3.1.13. EASE OF CHANGE

3.1.13.1. DATA AND DEVICE INDEPENDENCE

Cullinet's IDMS/R functions on the agency's current hardware and software operating environment.

IDMS/R operates with all of IBM's mainframe disk drives, including 3330's, 3350's, 3375's, 3380's, and 3370's, FBA devices. IDMS/R operates with all of IBM's mainframe controllers, tape drives, and all 327x (or compatible) type terminals.

DASD upgrades for an IDMS/R database would never impact the application program or any Cullinet system software. We provide IDMS/R utilities to dump the database from one disk and restore to another disk of a different type. The file organization change would be reflected in the database definition supplied to the dictionary. Cullinet provides full support for all currently available disk devices. Cullinet is contractually obligated to support any new disk device for your mainframe hardware.

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IDMS/R runs under all existing IBM operating systems, including DOS/VSE, VS1, MVS, VM, and VM/CMS and all configurations thereof with identical functionality. There are no significant operating or configuration restrictions or performance factors in DOS/VSE with or without VM. IDMS/R enables CMS users to access the database directly. IDMS/R software runs as a conventional software program and, as such, does not interfere with any other areas of the operating environment. Installing our software requires no change to the operating system software. The use of IDMS/R causes no database or program conversions when migrating from one operating system to another.

3.1.13.2 HARDWARE INDEPENDENCE

See Answer 3.1.13.1.

3.1.13.3. FUTURE TECHNOLOGY

IDMS/R accommodates growth using state-of-the-art techniques.

Whole blocks or percentages of blocks may be left "free" for future growth. Blocks are packed, moving empty space to the bottom of a block whenever records are physically deleted. This alleviates the need for fragmentation and garbage collection routines assuring that there will be no performance degradation nor any need to reorganize the database.

When records are deleted from an IDMS/R database, the space which they occupied is dynamically reclaimed and immediately available for reuse.

- o In the event that the database should require that the blocks be increased in size, this can be done with a utility which expands the size of a block without an offload/reload. New groups of blocks can also be added without a reorganization with no performance degradation. This is achieved through logical block to physical block mapping which is a feature of the DMCL (Device Media Control Language).

3.1.13.4. DATABASE EXPANSION

Flexibility is an extremely powerful aspect of IDMS/R. With IDMS/R and the Integrated Data Dictionary, data is completely independent. Changes to program logic may be made without any effect to the Data Management System other than the dictionary capturing information regarding the program's latest compilation.

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Screens may be changed without influencing any other areas, as may data descriptions and record-types be added or deleted through dictionary definition and utility functions.

Elements may be deleted from existing record-types or new elements may be added anywhere in the records by simply defining the change in the data dictionary and then running the Restructure utility which will make the necessary changes "in place" in the database.

Relationships among the data may be changed in exactly the same manner while changes to relational views of the data require only a change in the dictionary (no restructure nor recompilation of programs). Any inconsistency caused by such a change is immediately recognized and resolved. In any event, programs which use these records but which are not affected by the change need not be recompiled.

3.1.14. RISK

3.1.14.1. REPUTATION

Vendor Record - Cullinet Software, Inc. is unmatched in the industry for support. Based on our financial record and commitment to providing our users with the best software in the industry, you can be assured that Cullinet is well-positioned for the future of the Data Processing Industry.

Cullinet has a long history of database experience and continuous database success since 1973. Today, there are more than 1,500 IDMS users and over 8,500 installations of Cullinet products worldwide. This includes more than 100 users in the metropolitan area. Today, Cullinet provides a fully integrated, comprehensive family of database tools, application software and decision support systems.

3.1.14.2. LOCAL USER'S GROUP

Our independent National User Association, Annual Cullinet User Week, International User Week and Quarterly Local Washington User Group Meetings have been in place for years and have contributed significantly to our Users' success. This association includes a Technical Advisory committee which expresses the needs of Cullinet users on a regular basis to our Development Management

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Staff. Attendance at the last National User Meeting included more than 2,000 database users. Local User Group meetings average 180 people in attendance.

3.2 DATABASE MANAGEMENT SYSTEM DESIRABLE FEATURES

3.2.1 PRODUCTIVITY

3.2.1.1 SELF DOCUMENTING

For each relational record created using ASF, these structures are generated:

- o Screen formats (maps) for displaying the record during load, retrieval and update functions.
- o Programming logic modules (dialogs) for accessing the record.
- o Application views of the database (subschemas) defining the logical context of the record as far as run-time operations are concerned.
- o Database definitions (schema records) incorporation stored relational records in the database as a whole.

The names assigned these modules follow a pattern when they are defined to the data dictionary; each module associated with a specific relational record has that relational record's Record Definition Number as a portion of its name.

Because all of these components are stored centrally in the data dictionary, documentation for the application is instantly available.

3.2.2 PERFORMANCE

3.2.2.1 FAST LOGGING

Database activity is recorded on a journal file. There can be one journal file or several identical journal files; a duplicate journal file is maintained to facilitate recovery if an I/O error occurs when writing to one of the journal files. The name of each journal file is specified by the user in the journal buffer

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portion of the Device-Media Control Language. Entries in the journal file are Maintained at the record level and consist of:

- o The database key of a record occurrence.
- o The prefix portion of a record occurrence.
- o The data portion of a record occurrence if the database record is added, deleted or modified.

Before a database record is modified or deleted, a journal record entry containing an image of the original record is written to the journal file buffer of the journal. After a database record is modified or added, a journal record entry containing an image of the modified or new record is written to the journal file buffer.

In addition IDMS/R places journal record entries into a journal file buffer for MODIFY, ERASE, STORE, CONNECT and DISCONNECT DML statements.

Since IDMS/R performs its journalling function in main storage buffers, (before writing the journal record to auxiliary storage) it occurs at core speed and has very little impact on the active task. This means the IDMS/R journalling function is as fast as any other internal database activity.

3.2.2.2 FAST INDEXING

In IDMS/R indexing is fully integrated; the DBMS manages all aspects of indexing. A database record type can be defined in a subschema as a member of an indexed set (versus a chained set). All set orders (FIRST, LAST, NEXT, PRIOR and SORTED) are supported for indexed sets.

Unlike chained sets, set order in indexed sets is not implemented by chaining the actual member record occurrences to each other and their owner by pointers. Instead, IDMS/R creates an index that contains the member record occurrences' database keys in the specified set order.

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The member record occurrence contains a pointer to the index and, optionally, a pointer to the owner record occurrence. The index, in turn, contains next, prior and owner pointers that chain it to the owner record. The owner record contains next and prior pointers that chain it to the index.

As a result, IDMS/R locates member record occurrences in an indexed set by searching the index; it does not have to access each member record occurrence by navigating the database using set linkages.

Because IDMS/R searches the index rather than actual record occurrences, indexed sets provide a quick and efficient means of database access.

3.2.2.3 DATA STRUCTURE ACCESS METHOD

IDMS/R can access records stored on BDAM files, VSAM files created by IDMS/R, and native VSAM files.

BDAM files are divided physically into units called blocks, and each block is equal to one database page. When an application program issues a call to IDMS/R for a database record, it maps the page number for that record to a relative block number and requests the relative block from BDAM.

An IDMS/R VSAM file is structured the same as an IDMS/R database file. VSAM provides the access method used to perform the actual file access. The IDMS/R VSAM file is divided into units called control intervals. Each control interval contains eight bytes of control information and one VSAM record. The VSAM record corresponds to a database page. When an application program issues a call to IDMS/R for a database record, it maps the page number for that record to a VSAM control interval and requests that control interval from VSAM.

A native VSAM file is not structured like an IDMS/R database but it can be accessed as if it were. To access data in native VSAM data sets, IDMS/R converts DML statements issued by an application program into record-level VSAM macro variations and passes control to VSAM. An IDMS/R local run-unit or IDMS/R central version appears to VSAM as a single application that opens VSAM data clusters and activates VSAM paths using local shared resources or non-shared resources. After it accesses the data records it closes the clusters and paths.

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3.2.2.4 DATA PLACEMENT CAPABILITY

IDMS/R record placement is flexible and efficient. Records are stored through one of four record placement modes:

CALCKEY - IDMS/R applies an algorithm to specified data element within a record to determine a position within a specific page.

DIRECT - IDMS/R allows the programmer to specify a position within a specific page.

VIA - members of a set are placed in proximity to the set owner to minimize I/O when accessed one after another.

In addition, records can also be stored in flat sequential files.

For example, if a new owner record is being stored using CALC, and its new member records stored using VIA, an "add" transaction can involve as few as 2 I/O's.

IDMS/R maintains standard set relationships by using pointers to link owner and member records. The technique is simple and reliable, and permits records to be added and deleted with little or no system degradation.

These pointer links are the most efficient in the industry since they require no searching and matching indexes.

3.2.3 OPERATING COSTS

3.2.3.1 RUNTIME CODE INCLUSION

Our Integrated Data Dictionary (IDD) is a dynamic, active dictionary and the central repository of information about the IDMS/R environment. IDD is implemented as an IDMS/R database, and allows taking advantage of all unique features of IDMS/R. IDMS/R automatic backup/recovery feature guarantees the integrity of the data stored in IDD, as it does all other data under its control.

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The record, element, set relationships, edit criteria, logical records, programs, online transactions, physical and logical terminals and lines used by IDMS/R are all defined, stored and maintained directly in the IDD. This provides one point of control and allows for a single definition used by multiple components.

At runtime, our DML Processor Interface allows an application program to automatically copy record and file descriptions of any data definition in IDD.

3.2.4 IN-HOUSE CUSTOMIZATION

3.2.4.1 FORTRAN AND PL/I INTERFACE

IDMS/R programming facilities for use in the traditional programming environment include the following:

- o Data Manipulation Languages (DML) offer powerful capabilities for retrieving and updating the contents of the database. DML compilers translate functional requests issued in FORTRAN IV (68), FORTRAN VS (77) and PL/I programs into expanded database access instructions.
- o The Logical Record Facility (LRF) enables the user to predefine access paths through the database and present application programs with a simplified view of the database.
- o Full support of native VSAM files allows users database access techniques against data stored in existing VSAM data sets. Native VSAM support makes IDMS/R processing features available without requiring immediate conversion of existing VSAM file structures to IDMS/R file structures.

3.2.5 SYSTEM CONTROLS

3.2.5.1 TRANSACTION ARCHIVE

IDMS/R provides a user exit and utility program called IDMSAINX to review journal records to collect statistics and audit trail information. The journal record types written to the journal control block contain the information necessary to determine the run unit, the program name, and the time and date and journal

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record was created. In addition the user is provided a reserved space in the journal control block to include any other information necessary to maintain audit controls.

3.2.6 DATA MANAGEMENT

3.2.6.1 RELATIONAL SUPPORT

Although IDMS/R supports hierarchical (one-to-one) and high-performance network (one-to-many) structures, it is specifically designed to support a fully relational (many-to-many) database including:

- o Storage and maintenance of relational files.
- o The ability to select, project and join those files.

The vehicle for using IDMS/R relational capabilities is the Automatic System Facility (ASF). Users sign on to ASF to define, store modify and delete relational records. When the user creates a relational record, ASF invokes the appropriate system facilities to automatically generate all necessary application components.

Relationships between the components are also established automatically producing a comprehensive application available for immediate use. And because ASF stores all the definitions in Integrated Data Dictionary (IDD), documentation is readily available from a central source.

3.3 SOFTWARE INTEGRATION

Today Cullinet is in position to respond to NRC's broadest needs for information management. Building on the power and flexibility of our proven database management software we offer an integrated three-layered solution to NRC's resource management problems. We can provide NRC with these fully integrated software products, now or in the future:

- o Database Management System Products

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IDMS/R - The high-performance relational database management system that centralizes and controls the NRC data resource. IDMS/R supports applications for diverse data processing environments and provides easy-to-use tools to make data accessible to end users.

Integrated Data Dictionary (IDD) - The fully integrated data dictionary that documents the source and use of all data for all Cullinet database management and application software.

IDMS-DC - The teleprocessing monitor fully integrated with IDMS/R and designed for efficient processing of online, transaction-oriented applications.

Universal Communications Facility (UCF) - The facility that permits operation of IDMS/R online applications under any teleprocessing monitor, providing the advantages of a fully integrated database data communications system.

Application Development System/OnLine (ADS/OnLine) - The system that enables rapid online development and execution of both retrieval and update applications for IDMS/R.

Application Development System/Batch (ADS/Batch) - The facility that centralizes and simplifies the tasks of validating transaction files and updating an IDMS/R database.

OnLine Query (OLQ) - The conversational system designed for application developers and end users to retrieve information from an IDMS/R database.

CULPRIT - The information retrieval tool that generates user-designed reports from IDMS/R databases and other, external files.

EDF-Auditor - The comprehensive library of CULPRIT routines that perform auditing tasks, such as confirmations, file footing, exception and summary analysis, and sampling.

OnLine English (OLE) - The query system that allows users with no data processing background to access information in an IDMS/R database, by entering simple, English-language requests.

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Distributed Database System (DDS) - The networking system that allows distribution of data and applications among multiple mainframe computers.

ESCAPE - The software tool designed to facilitate conversion from a non-IDMS/R database processing environment to an IDMS/R environment.

INTERACT - The interactive system designed for program development; text entry, editing and formatting; and remote job entry.

o Application Products

Cullinet's database application software, built on the integrated database management software, is designed to perform specific business activities. The application software is modular in design, permitting NRC to install applications tailored to its particular needs.

All Cullinet application software uses a common IDMS/R database, to provide a high level of integration among applications. Cullinet currently offers complete application software in the areas of manufacturing, financial planning, banking and human resource management.

o Decision Support Products

Cullinet's decision support software places vital agency information at decision maker's fingertips. They provide desktop access to the data resource managed by the database management and application software. The decision support products have the power and flexibility to present the most current information directly to the decision maker in easily understood formats.

Our decision support software includes a stand alone graphics system, a collection of fully integrated microcomputer software tools, and a micro-to-mainframe link that allows microcomputer users to access current information stored at the mainframe computer.

TREND-SPOTTER - An executive information system that presents data in high-quality graphic for fast, direct and easy analysis.

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GOLDENGATE - A set of integrated decision support tools for use on an IBM Personal Computer. GOLDENGATE tools include relational database, electronic spreadsheet, graphics, document processing and electronic mail capabilities.

Information Database (IDB) - A mainframe software product that links GOLDENGATE to the mainframe, providing decision makers with direct access to the corporate data resource for use with GOLDENGATE tools.

3.4 DELIVERY SCHEDULE

Cullinet will deliver ordered software including ten copies each of the applicable user and operator documentation, to a location specified by NRC, within 30 calendar days after receiving the contract. We are prepared to deliver all furnished software, including transportation charges to:

United State Nuclear Regulatory Commission
Attention: Asa R. Frost, Jr.
Office of Resource Management
Division of Automated Information Services
Mail Stop MNBB
Washington, D. C. 20555

We understand the installation of the furnished software may be deferred by NRC for a period of up to one year following delivery. We will install the system within 30 calendar days after receiving a written notice from the contracting officer identifying the installation site.

3.5 REFERENCE INSTALLATIONS

3.6 WARRANTIES

During the license term our software will operate as specified in our technical documentation delivered to NRC and relating to the then current release of our software. It is understood, however, that errors may exist or occur in a licensed product and we will respond to any reported error condition as specified in the provisions of Licensing Terms and Conditions which describe support and maintenance. This warranty shall not apply to the portions of any of our products which the user has modified.

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During the license term of a video course, we will repair or replace any video course tape cassette in unusable or damaged condition. We may require the user to return any damaged materials to be replaced or to provide satisfactory proof that such materials have been damaged.

We certify that we have title to or a proprietary right to license our products. We shall indemnify, hold harmless and at our expense defend the user against any claim that one of our products infringes a U. S. patent or copyright, provided that:

- o the user promptly notifies us in writing of the claim;
- o we shall have sole control of the settlement or defense of any action against the user which this indemnity relates; and
- o the user cooperates with us in every reasonable way to facilitate such a defense.

Other than the warranties expressly stated above, there are no express or implied warranties relating to any of the products or services covered by our agreement with NRC. This includes, but is not limited to, warranties of merchantability or fitness for a particular purpose.

Any written commitments by us within the scope of this proposal binds us, whether or not incorporated into a purchase order. If we fail to fulfill our written commitments it will make us liable for liquidated or other damages due NRC under this proposal.

For the purpose of this proposal our written commitment includes:

- o Prices and options committed to remain enforce over a specified period of time.
- o Any warranty or representation made by us in this proposal relating to hardware or software performance, total systems performance, any other physical, design or functional characteristics of a machine, software package or system.
- o Any warranty or representation made by us concerning the characteristics or items described in the previous paragraph made in any literature, descriptions, drawings or proposal.

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- o Any modifications of or affirmation or representation relating to the above which is made by us in or during the course of negotiations whether or not incorporated into a formal amendment to this proposal.
- o Any representation by us in this proposal, supporting documents or subsequent negotiations relating to training to be provided, services to be performed, prices and options committed to remain in force over a fixed period of time or any other similar matter regardless of the fact that the duration of such commitment may exceed the duration of this proposal.

when orders are accepted which include commitments relating to prices, options, etc., to endure beyond the period specified in this proposal, we agree to either amend the proposal accordingly or to provide the Contracting Officer with a copy of the order, within 10 calendar days of our acceptance.

3.7 POST-CONTRACT SUPPORT

After this contract has terminated we will provide maintenance for the entire life of the product equal to the services described in section 3.8 of this proposal. The fee for these services will be either:

- o ten per cent of the then list price of the same product, or;
- o a sum equal to the previous year's maintenance fee plus eight per cent; whichever is less.

3.8 SOFTWARE MAINTENANCE PROGRAM

For the first year of the contract we will provide NRC installation service for our products at a mutually convenient time within thirty days of notification by the Contracting Officer. Installation requires two of our Customer Support Representatives to be at you site for two days. Before our representatives leave all our products will be thoroughly demonstrated, and operators will be taught system procedures. We will also leave you a comprehensive installation guide with complete implementation and procedural rules.

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Each system comes with ten sets of user and operator manuals, and each Video Course comes with one copy of the Video Course tape and Course Documentation. While your license remains in effect, we will provide one copy of each new release, or update; or 10 copies of each user manual for that product. NRC can get additional copies of user manuals at the fees which are then in effect.

We will provide maintenance services to attempt to correct any error or defect reported by NRC, which is in an unmodified portion of our product or in our operational procedures. We provide these services as quickly as possible and at no additional cost to NRC.

Maintenance is normally accomplished by sending a tape or disk pack with the corrections, updates or enhancements, along with a set of instructions for their installation. If the their installation requires us to be in attendance, we will comply.

In addition, we have toll-free hot-lines staffed 24 hours/day, seven days/week by technical representatives knowledgeable in our products. Each technician has available an information resource with profiles on each of our customers. This means responses are tailored to the needs of your site and situation. If it becomes necessary to send a technical representative to your site, we are prepared to do so with staffs in Falls Church, Virginia and Columbia, Maryland.

We also have support offices in over 30 cities in the U. S. and 24 hour telephone support is provided at our 13 regional offices and our development division at corporate headquarters in Westwood, Massachusetts.

After the twelfth month and throughout the remainder of the system's life, we will provide the same services at rates specified in Table B.2.2 of our Cost Proposal.

3.9 SOFTWARE TRAINING PROGRAM

Cullinet offers a multi-tiered education process that is individually tailored for each user.

- o Video Education - We offer a full set of video-based education courses including course materials, sample problems and instructor manuals.

Cullinet

- o Cullinet University - We have a National Education Center where students from multiple organizations participate in the same class. There is a cadre of experienced, full-time education personnel who teach the courses. To provide a comprehensive learning experience, a dedicated mainframe is available for actual hands-on training.
- o District Education Centers offer an expanded curriculum of courses that integrate computer workshops with classroom lectures.
- o Regional Education Centers - Regional Education Centers offer a more comprehensive schedule of classes.

We will present an introductory class and tailor it to meet your specific needs. We recommend all your technical personnel attend this first course.

We will also provide training in the use and application of each of our products. We will provide training credits equalling 250 person/days of training for your installation. The courses will be conducted at our Regional Training Center in Falls Church, Virginia.

At your request, and open to negotiation, we can provide special on-site training for up to twenty-five students a course at a cost of \$1800.00/day including training materials.

After contract award and before product installation, our Customer Support Service Staff will visit you to prepare a training plan and schedule to compliment your resource planning.

We've included our most recent Education Bulletin for you to review in the Technical Literature Volume.

3.10 OPERATIONAL CAPABILITY DEMONSTRATION

We are prepared to provide, at your discretion, an operational capability demonstration. But we need information about your requirements for our products, and what you want demonstrated to commit to a particular facility.

Cullinet

There are over one hundred government and commercial entities using Cullinet products in the Washington metropolitan area. Each is structured differently, each has installed different products and each uses our products for varied reasons and purposes.

We would appreciate the opportunity to discuss your OGD requirements to determine the site that would best satisfy them. If this is unacceptable we can perform a complete and comprehensive demonstration at our Regional Facility at:

5113 Leesburg Pike, 5th Floor
Falls Church, Virginia 22041

3.11 NEGOTIABLE RESTRICTIONS

Our software was developed at private expense and there are a number of limitations on its use by your agency. None of these limitations have any effect on the commitments we've made relating to the way the software functions or performs. These restrictions are:

- ✓ NRC agrees to limit use of our software to a specific computer room at one physical location named on the purchase order. NRC may transfer our software to a different single computing facility at one physical location if it belongs to your agency.
- ✓ NRC shall notify us in writing of all such transfers and NRC will erase, destroy or otherwise render unusable our software programs at the facility from which the software programs are being transferred within thirty days from the date of such transfer.
- ✓ The software we provide may be used only for, by or on behalf of NRC at the facility named on the purchase order.

NRC shall take all reasonable steps necessary to ensure the software programs on magnetic tape or disk are not made available to any other person, firm, organization, corporation or other government agency.

NRC's rights in and to the software programs may not be assigned, licensed or transferred voluntarily without our written consent.

NRC agrees to refrain from changing or removing any insignia or lettering from software program literature or output which indicates our ownership of the software program.

Cullinet

NRC agrees to refrain from using the software programs for others on a service basis. This does not preclude the use or distribution of the output produced by the software programs.

NRC is authorized to use the software on an unlimited number of CPU's located within a specific computer room at one physical location at the base, center, complex or station named on the purchase order.

A second agency may acquire the right to use software on NRC's computer system via a "sharing agency license" basis. The cost to the sharing agency is fifty per cent of the applicable license costs per year, each year. A purchase credit towards a full license will be credited on fifty per cent of any money paid in the prior twelve months for the software.

VOLUME 4 - TECHNICAL LITERATURE

A Proposal To:
UNITED STATES NUCLEAR REGULATORY COMMISSION
In Response To:
SOLICITATION NUMBER RS-DRM-85-312 (CDN-DBMS)

Prepared By:
CULLINET SOFTWARE, INC.
5113 LEESBURG PIKE, 5th FLOOR
FALLS CHURCH, VIRGINIA 22041

~~This proposal or quotation includes data that shall not be disclosed outside the Government and shall not be duplicated, used or disclosed - in whole or in part - for any purpose other than to evaluate this proposal or quotation. If, however, a contract is awarded to this offeror or quoter as a result of - or in connection with - the submission of this data, the Government shall have the right to duplicate, use, or disclose the data to the extent provided in the resulting contract. This restriction does not limit the Government's right to use information contained in this data if it is obtained from another source without restriction. The data subject to this restriction are contained in all sheets.~~

Amendment 1
Cullinet Software, Inc. Proposal
In Response To RFP RS-ORM-85-312

Section 3.4 Delivery Schedule

Paragraph 1, Sentence 1, Change to:

Cullinet Software, Inc. shall deliver ordered software, including ten (10) copies each of the applicable user's and/or operator's manuals, at the location specified on the order, within 30 calendar days after order receipt. The ordering activity may reproduce additional copies of the user's and/or operator's manuals, including all copyright and logos, if they should be needed, but only for use by the agency and agency personnel. No copies may be distributed to any other outside organization.

Cullinet requires an audit confirmation of delivery of the products to initiate billing. Execution of Amendment 1, Attachment 3 is required upon delivery of products, per this contract.

Section 3.5 Reference Installations

Art Chantker
Chief of Info Tech Div
Dept. of Transportation
M-92
400 7th Street, SW
Washington, DC 20590
202-382-0500

Jack Fulmer
Deputy Director for Tech.
Information Sys & Tech Div
Comptroller of the Currency
490 L'Enfant Plaza, SW
Washington, DC 20219
202-447-9838

Section 3.8 Software maintenance Program.

Change the last paragraph to read:

"Beginning the thirteenth month after installation of the software and for each month throughout the remainder of the system's life, Cullinet will provide support services as defined and priced in the then current GSA schedule or commercial price schedule."

Section 3.11 Negotiable Restrictions

Paragraph 2 - Change " . . . location named on the purchase order." to read " . . . location to be determined.

Paragraph 2 - change sentence two to read: "NRC may transfer the software programs to a different single computing facility at a different physical location provided NRC maintains possession and the only usage of the software."

Paragraph 4 - change " . . . facility named on the purchase order." to read " . . . facility that is selected."

Paragraph 9 - change " . . . station named on the purchase order." to read " . . . station that is selected."

Add:

Section 3.12 Deposit of Documentation

Prior to the delivery of the initial copy of any software that is acquired by the Government under this contract, Cullinet Software, Inc. shall deposit with a custodian one (1) copy of a full source language statement for the software and complete maintenance documentation for same. The material shall be held by the custodian for delivery to the Government if Cullinet becomes unable to, or otherwise fails to, maintain the software adequately, and in that event only for the proper maintenance of the software which is in use by the Government.

Cullinet Software, Inc. further agrees to deposit all updates and changes to the material described in sub-paragraph 10(a) above in the same manner and on the same basis. Such further deposits shall be made whenever updates and changes are generally released or implemented.

The Government agrees that the custodian may return or destroy the material described in sub-paragraph 10(a) and 10(b) after the Government has discontinued all use of the software covered by the material.

The custodian is the First National Bank of Boston, 100 Federal Street, Boston, MA 02110.

Replace:

Table B.2.1. Software Unit Price Schedule

Replace with the selected plan, Page 2 and
Price Table Attachments 1 and 2

Inclusively - See Amendment 1 Attachment 1
(Price Proposal - Plan I)

And Amendment 1 Attachment 2
(Alternate Price Proposal - Plan II)

Add:

Section K - Representations, Certifications and other statements of Offerors or Quoters.

Include: Amendment 1, Attachment 4 - inclusively