SYSTEM 2000 DBMS is a user-oriented data base management system. It provides data management capabilities that serve the entire range of system users: the end user, the application developer, and the data base administrator. SYSTEM 2000 DBMS is controlled via an integrated data dictionary; uses multiple-indexed hierarchical data structures for fast retrieval and updates; allows the definition of complex network structures; features a programming language extension (LEX) that allows data base access from COBOL, PL/I, FORTRAN, and Assembler programs; provides a powerful, easy-to-use query/update (QUEST) language; and includes an interactive report writer to accommodate tabular reports. SYSTEM 2000 DBMS currently runs on IBM 370 and compatible machines under OS, VM/CMS, and VSE; the Sperry 1100 series under OS 1100; and the CDC 6000 and CYBER series under NOS and NOS/BE. SYSTEM 2000 DBMS includes a basic (single-user) product; a Multi-User™ product; and several optional products - a CICS interface and the QueX™, Screen Writer™, and CREATE™ software products. Features in the basic product include the Data Base Manager, an integrated data dictionary, Quest, Flex, and the Report Writer. The Multi-User product for IBM and Sperry includes Multi-User/multi-thread (multi-thread is IBM only), an accounting log, coordinated recovery, and user exits. QueX software is a function-driven, screen-oriented query/update product. Screen Writer is an extension to the QueX software product for Sperry environments that allows users to define and process transactions interactively against the data base without programming. CREATE is an interactive prompting tool for the CDC environment that allows users to define and load SYSTEM 2000 data bases more easily. In addition, several SAS® procedures are available to provide interfaces between SYSTEM 2000 DBMS and the SAS System.

SYSTEM 2000 DBMS

One of the challenges of data processing in the 1980s is to provide mechanisms for distributing the data workload directly to the end user. Central data processing capabilities are moving closer to the end user through user-friendly tools and information and decision assist facilities that enable managers and other end users to take advantage of computing power to solve business needs. Information Centers serve as the interfaces between end user professionals and production data. In many cases, the production data is in a central data base maintained by data processing, or a Development Center. At present, the Development Center is faced with an 18 to 36-month application backlog, with minimal ability to handle unplanned end-user requests. Typically, multiple end users want concurrent access to subsets of the production data. These users do not want to be restricted by the logical and physical design of the production data base. To make the best possible business decisions, end users need access to the most current data with minimal data security and need to be prepared for backup and recovery in the event of system failures.

SYSTEM 2000 DBMS represents a solution for reducing demands on the Development Center. As a comprehensive data base management system, SYSTEM 2000 DBMS provides integrated facilities, interactive data base definition, access to data via logical views, high-level programming interfaces, nonprogramming alternatives for both end users and data processing, as well as application concurrency.

SYSTEM 2000 DBMS includes a basic (single-user) product; a Multi-User product; and several optional products, a CICS interface, the QueX, Screen Writer, and CREATE software products. In addition, the SAS System interfaces give SYSTEM 2000 users access to the capabilities of the SAS System. The basic SYSTEM 2000 product features an integrated data dictionary, an on-line query/update language (QUEST), a report writer, programming language interfaces (PLEX), and archival data base recovery.

The IDD (Integrated Data Dictionary) handles data base interaction and processes that are integral to the functioning of the data base. The dictionary is at the core of SYSTEM 2000 DBMS and handles definition, logical subschema specifications and modification, and control functions for SYSTEM 2000 data bases. As shown in these examples, a data base can be quickly defined, using the data definition language, as well as easily modified.

Using the control language, secondary passwords can be defined with alternate logical views. Also, an archival data base is saved and restored for backup. The benefits from the data dictionary allow an integration of facilities used by end users and development center personnel. Users can process requests independently, data processing can shorten application development time. Finally, the IDD produces a mechanism for controlled data sharing with the facilities to enforce security.

The English-like SYSTEM 2000 query/update (QUEST) language is useful for those who need ad hoc access to the data base as well as data base testing and prototyping tools. This easy-to-use, free form language includes powerful search, display, and update capabilities. SYSTEM 2000 DBMS allows user-defined commands and arithmetic calculations to be stored like macros in the data dictionary. All retrieval and update commands can specify selection criteria by means of a where-clause with a variety of formats. Character and text data can be searched for specific character strings.
The Report Writer feature combines a powerful report specification language with an optional conversation mode, to meet both simple and complex reporting requirements. Using the Report Writer, multiple reports can be generated by passing relevant portions of the data base once. Other capabilities include break point logic and comprehensive data editing and report formatting options.

The FLEX (Programming Language Extension) supports an accelerated application development cycle. FLEX provides the interface between SYSTEM 2000 data bases and programs written in COBOL, FORTRAN, PL/I and Assembler. The programmer needs to deal only with the pertinent parts of the data base by defining subschemas through the data dictionary. SYSTEM 2000 DBMS addresses the physical data base environment so programmers can focus on specific application solutions using the powerful search commands. Network relationships can be established dynamically between one or more data bases.

Comprehensive return codes and diagnostics enhance the program development process, with special features for batch, sequential and on-line production.

The SYSTEM 2000 Multi-User product supports concurrent processing, including concurrent updating. Features include: Multi-User/multi-thread, accounting log, coordinated recovery and user exits. Users, data bases, and resources are coordinated via the Multi-User feature to ensure data integrity and efficient use of resources. Multi-thread supports installations with on-line and batch demands that are higher than a single-thread system's throughput capabilities. Multi-thread queues transactions and user output and controls the concurrent processing of multiple SYSTEM 2000 updates and retrievals.

The accounting log provides information about jobs run in the Multi-User environment. The log records statistics such as job, step, program name, terminal ID, CPU time, I/O counts, start/stop time, and data by individual users of the features.

Coordinated recovery provides data base protection when batch and on-line systems must update concurrently and a high degree of data availability is required. If any component of the environment fails, rollback provides rapid automatic recovery of data bases from software and hardware failures. Recovery occurs as soon as the failure is detected by SYSTEM 2000 DBMS. If failure is caused by a user's data, only the failing user's updates are removed without affecting other users. SYSTEM 2000 user exits allow data base administrators to extend or custom-tailor SYSTEM 2000 features.

User exits can be implemented to support: custom-developed security checks for on-line systems; specialized edit checks; and data encryption/decryption.

Optional products available for SYSTEM 2000 DBMS are QueX software, Screen Writer, CREATE and a CICS interface. The QueX software product extends the power of SYSTEM 2000 DBMS with function-driven, screen-oriented data query and update. QueX (Query by Example) software is based on a sequence of screen displays. It extracts the logical record the user is authorized to retrieve or update (via logical views) and asks the user to select the record type to be accessed. After displaying the record format, the user can supply partial data and direct the facility to locate and display the record. Once positioned on a record, the user can retrieve related records in any data base. Data entry and modification can be performed as allowed by user views defined to the data dictionary.

For the Sperry series of SYSTEM 2000 DBMS, Screen Writer is a menu and form driven extension to the QueX software product. Screen Writer lets users define and process transactions interactively without programming. The security and data validation features offer central control. Users interactively define transactions that read and update items and records in data bases. Data base activities can take place before or after screen display, and screen parsing can be ordered conditionally.

CREATE is a conversational add-on feature to the CDC series of SYSTEM 2000 DBMS that simplifies the data base building process. Based upon the user's response to a series of prompts, CREATE defines data bases, ensures that the data are compatible with the data base definition, converts existing data to a loading format, and enters the data. Once a data base is defined, CREATE also estimates the size of the data base files for the analyst.

SYSTEM 2000 DBMS supports on-line transaction processing through an interface with IBM's CICS product. Operating in a separate address space, the SYSTEM 2000 Multi-User product coordinates on-line transactions and batch processing while optimizing resource use. Data base recovery is invoked automatically at the transaction level when an on-line session terminates abnormally.

SAS System Interface to SYSTEM 2000 DBMS

The SAS System interface gives SYSTEM 2000 users access to the extended capabilities of the SAS System. In turn, SAS software users can benefit from a full function DBMS within the Information Center. The current interface contains three facilities: PROC S2K, PROC QUEST, and PROC SKLOAD for the OS and CMS environments.

PROC QUEST is a SAS procedure that allows the user to interactively query a SYSTEM 2000 data base from within the SAS Display Manager System. Query commands can be used for ad hoc reporting and retrieval. A user can use the display manager editor to enter, retrieve, and edit commands before they are submitted. All output is returned to the output screen for review, scrolling, and optional printing. After PROC QUEST is used to determine the data base items needed, PROC SKZ can be used to subset that data for further analysis.

PROC SKZ is a SAS procedure that lets the user extract data from a SYSTEM 2000 data base in an interactive, full-screen environment and store the data in a permanent or temporary SAS data set.
Data can then be accessed directly from a SAS program, making it very efficient if a user has large volumes of data.

PROC S2KLOAD is a SAS procedure that allows the user to load a SAS data set into a SYSTEM 2000 database in an interactive, full-screen environment. In addition, front-ends can be developed for applications that access these and other procedures by using SAS/AF™ software.

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