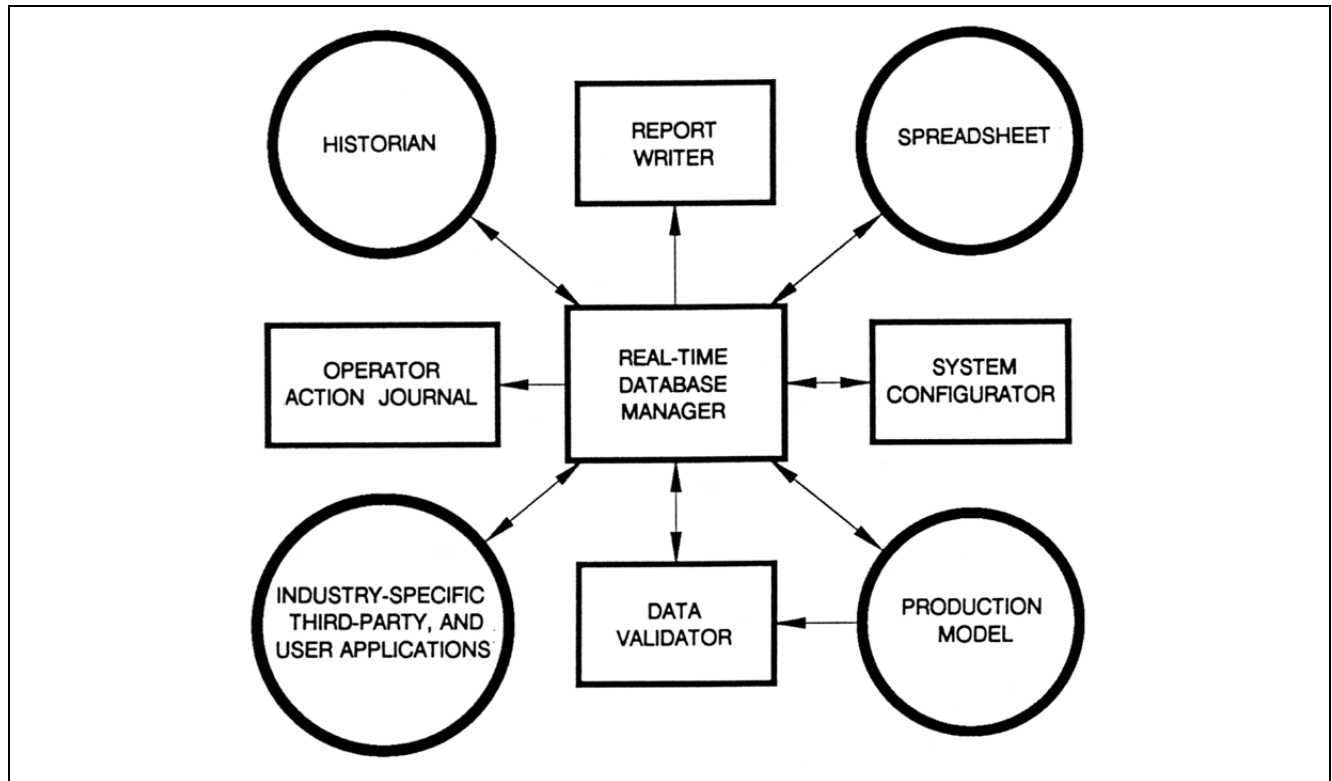


I/A Series® Software Real-Time Database Manager



The Real-Time Database Manager enables you to organize, access, and manipulate data. It provides standard interfaces between the user or application programs and the file system (databases).

The Real-Time Database Manager organizes plant information and supports updates, queries, and reports. The database manager is a relational database management system (RDBMS) with special application interfaces which allow you to read and write data in real-time. You can access information and process this information directly through the manager's interfaces, or through the following I/A Series Industrial Software:

- Historian - uses the DBMS to configure sample (raw data) collection, i.e., analog and digital value storage, and to store the results of statistical operations performed on it. You can generate reports of historical data through the I/A Series or Ace Report Writer.
- 50 Series Report Writer - allows you to generate reports using the data from any application database maintained by the database manager.
- Spreadsheet - allows you to read from and write to any application database maintained by the database manager.
- Production Model - describes both the production control and the process activities within a plant. The Production Model uses the database manager to maintain its relations, such as views (plant models), units (material processing entities), and process connections (material movement between units). All data retrieval, updates, and storage operations are made through the database manager on the AP20.

- Data Validator - uses the services of the database manager on the AP20 to store its results and to print reports.
- Operator Action Journal - also accesses (read only) the data base manager as an ACE application.
- System Configurator - uses the services of the database manager to read from and write to a database.

You can also use the database manager to integrate industry-specific, third-party, and user applications with process and production data stored by the database manager.

The Real-Time Database Manager runs on a 50 Series Application Processor or Application Workstation as well as on an AP20 and a Personal Workstation. Because these are different types of processors, they use different versions of the database manager, but the user interfaces are similar and applications are "portable" between them.

The INFORMIX OnLine Version of the database manager is:

- Version 5.01 for AP51s and Aw51s
- Version 4.10 for AP50s and AW50s

Version 1.10 for AP20s and PWs is not Online, but Standard Engine.

DATABASE MANAGER INTERFACES

Interfaces to the database manager are based on IBM's Structured Query Language (SQL), which offers you a powerful and flexible database management language. You have the ability to store, retrieve, and update data. Data is organized based on relations (tables), which can be changed dynamically. The key component of the database manager is SQL, which is called relational database SQL (RDSQL) on the AP20. On 50 Series APs and AWs, SQL meets ANSI level II standards.

Structured Query Language (SQL) is a query language which allows you to query the database and create new relationships through English-like query statements. You can choose specific tables to query, join columns from multiple tables, perform mathematical and logical operations, and sort query results--all at the time you enter an SQL query. The three major components of SQL are:

- Data Manipulation Language (DML) - allows you to add new data or modify existing data. You have the ability to insert new rows, delete existing rows, and update column values.
- Data Definition Language (DDL) - includes statements that allow you to create and drop a

database with its tables and indexes, and add, modify, delete, or rename tables and columns.

- Data Dictionary/Directory (DD/D) - is a repository for information about location (for Informix 1.0), structure, content and (for Online 5.01), constraints on contents, and relationships between, user tables. It can also be queried through the DBMS interfaces described in the following section.

User-Accessible Programs

The database manager (see Figure 1 and Figure 2) is composed of the following user-accessible programs:

- INFORMIX-SQL (ISQL)
- INFORMIX DB-Access (dbaccess)
- INFORMIX-ESQL/C (ESQL/C)
- Ace Report Writer (Ace)
- Indexed Sequential Access Method (C-ISAM)
- Perform

ISQL

ISQL is an interactive SQL interface to the RDBMS. ISQL supports the menu-based selection of all database manager functions. SQL statements can also be accessed at the operating system level.

dbaccess

DB-Access supports menu-based queries, similar to the menu-based query support in ISQL. It is available with OnLine 5.01 on the AP51 and AW51.

ESQL/C

ESQL/C is used as an embedded SQL for programming in C language. ESQL/C enables you to use SQL query statements to access databases from your C program. You can create new databases and tables, and add indexes. ESQL/C helps you build applications that accept dynamic queries. You can prepare the specific queries needed to manage data in the most flexible and efficient manner.

ACE

Ace is a general-purpose, relational, report writer that produces reports based on the tables of a database. Ace has advanced formatting capabilities which allow you to create simple or complex reports to your exact specifications.

You can retrieve and link data from multiple tables, sort and group your data, display it on a terminal, send it to a printer, or send it to an operating system file.

The custom formatting capabilities, including automatic page headers and trailers and adjustable page length and margins, make it easy to produce standard columnar reports.

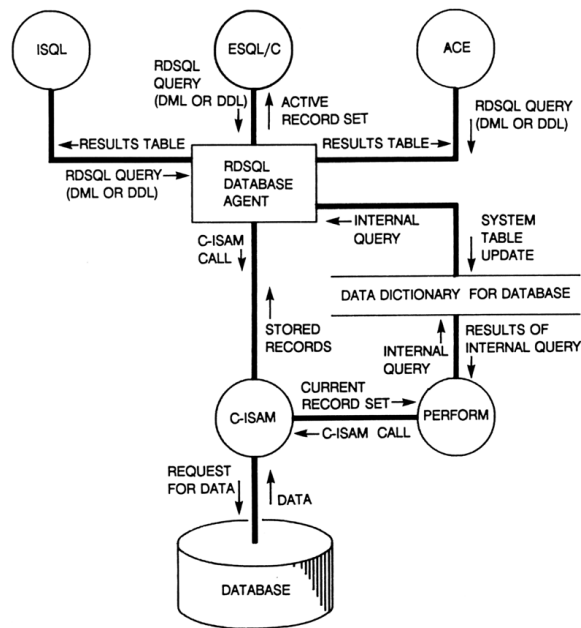


Figure 1. Real-Time Database Manager Architecture for AP20 and PWs

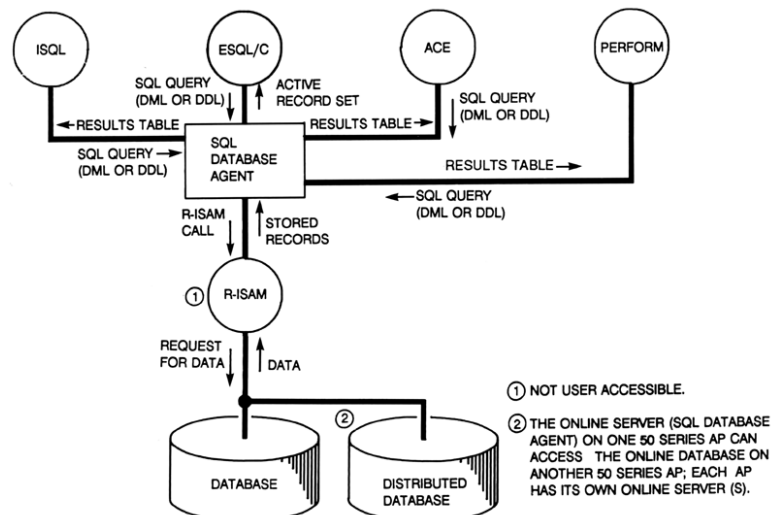


Figure 2. Real-Time Database Manager Architecture for 50 Series APs and AWs

C-ISAM

C-ISAM is a library of C-language functions for creating and manipulating indexed file systems on the AP20 and PW. C-ISAM performs all the required index file maintenance and manipulation tasks. It provides fast data access and retrieval plus efficient storage capabilities.

C-ISAM's locking and audit trail processing capabilities ensure data integrity by protecting against unauthorized access and corruption.

PERFORM

Perform is a special-purpose program that supports three important tasks:

Custom Screen Design - offers you the option of a simple default data entry screen or a custom designed screen form. If you custom design your own screen form, you can place fields anywhere on the screen.

You can link and display data from several tables at once, controlling the cursor movement from field to field. If there is more data than will fit on one form, you can create multi-screen forms.

Data Entry and Validation - provides validation of data that you enter and retrieve, and is integral to Perform. These checks ensure that your data is in the right range, of the right type, and consistent with data in existing tables.

Query-by-forms - allows you to query your database and retrieve data quickly by simply filling in one or more fields on your screen. Search criteria include relational and range operators, wildcard characters, and highest-lowest value operators.

The standard or "runtime" environment allows you to run previously compiled embedded applications, reports, forms and menus as well as recompile report applications; the development environment allows you to build new embedded applications, reports, forms, and menus.

On the AP20 or PW, all of the above user-accessible programs (except dbaccess) are standard. On 50 Series APs, the following user-accessible programs are standard:

- ISQL - menus only support previously built entities, that is, reports, forms, user menus. You can build or run queries from the command line but not from the menu interface.
- DB-Access - menus support building and execution of queries, but not of other entities (reports, forms, user menus). Available with OnLine5.01 on the AP51 and AW51.
- Ace - you can build reports from the command line, and then, you can run them from either the ISQL menu or the command line.

On 50 Series APs, the optional program development package includes the following user-accessible program extras:

- ISQL - with menus that support all database manager functions, including customer application RDBMS development.
- ESQL/C
- Perform

OTHER FEATURES

On 50 Series APs and AWs, the database manager:

- Allows you to use raw UNIX partitions instead of the UNIX file system to increase performance.

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- Uses shared memory for common database structures to increase performance.
- Supports the distribution of INFORMIX processing as well as data. Applications can run on one processor, while the OnLine servers (SQL database agents) run on other processors.
- Offers the possibility of tuning the OnLine server to the application and load.
- Supports the ability to access multiple, distributed databases in a single query.
- Supports the handling of large objects as separate data types.
- Allows you to use optional information network communications to integrate Real-Time RDBMS process information with transactional processing in connected RDBMS.

On AP51 and AW51 stations, the database manager supports:

- Faster index creation
- Faster joins
- Adjustable query optimization level
- Referential integrity and constraints to better ensure a consistent database
- Stored procedures:
 - reduce communications overhead between application and database server
 - offer runtime performance advantage of fully compiled, compared to interpreted or partially compiled, program
 - allow applications to share common SQL code which executes solely in the engine
- Triggers to execute further SQL statements or stored procedures when insert, update or delete operations performed on database tables
- Ability to update multiple distributed databases in a single query
- Optional X/Open standards compliance
- More efficient client-server communication with I-Net: client does not have to run a database server process