

Gone are the days when DBMSs looked alike. Today, they come in a variety of shapes and sizes. They serve different purposes within the company, and they aren't just for programmers anymore

THE MARKET FOR DBMS SOFTWARE

Dr. George Schussel

During the last 10 years, the marketplace for productivity tools has changed significantly. In the early 1970s, when data base management systems (DBMSs) were just starting to become popular, few productivity tools were available for Cobol programming. The "lucky" programmer might have had a timesharing workbench, and perhaps an early teleprocessing monitor such as Intercomm or CICS, if an online application was being developed. In the late '70s to mid '80s, many additional productivity tools were developed and brought to market.

Today the market for such software products is large and complex. Instead of pitting DBMS against DBMS, the typical software vendor is selling a broadly functional, integrated set of software. Some buyers want tools for the information center, while others have eschewed the mainframe entirely and are building applications on standalone or networked micros.

This article looks at the current market for DBMS-related programmer productivity software and comments on the different categories of software available. Locations of the vendors mentioned appear on page 35.

Integrated Development Software

This is "major league" software — the guts of the data processing (DP) department of the 80's. It usually consists of a data base management system (DBMS), an integrated, active data dictionary, query language, transaction processing monitor (often CICS), report writer, micro/mainframe link and interfaces to various other packages, including applications. A key portion of the integrated software package is the data dictionary/directory which controls data definitions and therefore is primarily important in coupling the different software pieces.

Integrated Development Software for Mainframes

Examples of products that compete in the IBM mainframe segment of this market are Cincom's TIS/XA-Supra, Cullinet's integrated software line based on IDMS/R, Applied Data Research's Datacom/Ideal, Software AG's Adabas/Natural and Computer Corporation of America's Model 204/User Language. All of these products run in the IBM 370 architecture; some also run under the DEC VAX/VMS operating environment.

Other mainframe companies also offer comparable software product lines. Examples include Burroughs' DMS II/Link II, NCR's Tranpro/Total/Mantis, Sperry's innovatively different Mapper, and ICL's IDMS/Quickbuild.

Integrated development software is normally effective only on a machine that is at least the size of a large mini-computer (IBM 4381 or larger). Such a software set is certainly recommended if your shop is developing transaction processing systems as applications. Alternatively, if you have large data bases and you want to support multiuser applications in a mainframe environment, this is also the type of software that is required. Most companies that are developing corporate-wide applications or what they consider "strategic systems" will use integrated development software.

Building applications with these product sets is not cheap. The initial license fee for software alone typically runs \$300,000 plus for a paid-up purchase license from independent software vendors. Regardless of your hardware/operating system architecture, the installation and use of an integrated development software set of tools requires a technical staff that includes, but is not limited to, data base administration. In addition, the training time needed to use the products and to develop data base administration and support can easily take a year or more.

DBMS Software

One important advantage is that all of these software tools contain powerful fourth-generation languages (4GLs) that are useful for replacing most Cobol code with much higher-level programming. These programmer-oriented 4GLs are designed to implement systems even with complex business logic and large-scale transaction processing (TP) volumes. While the computer performance of a system developed with a 4GL may suffer compared with that of a comparable application developed in a Cobol/CICS environment, the performance decrease is normally no more than 100 percent. Although this might not sound positive, it is important to remember that the performance enhancement of the programmers writing the code was probably 500 percent or more. Programmer-oriented 4GLs should not, however, be confused with higher-level, non-procedural languages such as Focus and Nomad2. These latter products are geared to information center and end-user use, and typically generate systems that perform three to eight times slower than a comparable Cobol system.

It is interesting to observe how IBM, the largest software vendor of all, participates in this market. In the past, IBM has offered various software components that compete in this marketplace. Examples include a data base management system (IMS), a data dictionary (IMS DB/DC Dictionary) and a fourth-generation language (ADF II). In general, these IBM products have been viewed as technically inferior compared to the programmer productivity tools available from independent software vendors. The principal reasons for this have been: 1) lack of user-friendliness (the well-known IMS user-hostile nature); and 2) a lack of integration among the various products, including the lack of active or integrated data dictionaries.

The recent emergence of new IBM products, including the relational DBMSs, SQL/DS and DB2 and the fourth-generation language, CSP, indicates that IBM wants to be competitive in this marketplace. Although these new software tools, especially DB2, are an important improvement over earlier products in terms of programmer productivity, they still suffer in the area of integration. IBM's new products lack integrated, active data dictionaries and do not provide common user interfaces and approaches.

Integrated Development Software for Superminicomputers

Minicomputer operating systems offer simpler-to-use, friendlier environments than IBM's batch-based, mainframe-oriented MVS and DOS/VSE. As a result, many supermini systems are showing up as departmental computers or corporate data processing systems in mid-sized companies. Application systems built in these environments will play an important role by providing needed connectivity between widely-installed personal computers (PCs) and mainframe-oriented data bases.

The supermini marketplace is served by both hardware vendors and independent software vendors which market integrated development software that usually includes a DBMS, and a 4GL. Products from the hardware vendors include DEC's VAX Information Architecture, Concurrent's Reliance Plus and Hewlett-Packard's Allbase. Examples of products from independent software vendors are Software AG's Adabas/Natural, Cincom's Ultra/Mantis, Relational Technology's

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Ingres, Seed Software's Seed, Software House's 1032 and Oracle's Oracle.

In contrast to comparable software products marketed for IBM mainframes, many of these minicomputer DBMS/4GLs are: 1) based on more modern technology; and 2) less mature (smaller total function). The most common data base model used in mini implementations is relational. This contrasts with the 370 world where most of the DBMSs were installed before the relational model was widely adopted.

A couple of the important products in the mini market (Adabas/Natural, and Ultra/Mantis) have been ported from the 370 architecture. For these products, it is possible to use identical source code in both mini and main-

frame environments. The vendors also provide communications software to connect minis and mainframes.

Because the various minicomputer architectures are similar, it is common to find independent vendor software products that run on several different minicomputer hardware/operating systems. One of the principal advantages of procuring software from an independent supplier is that it can run on different hardware/operating system combinations. Customers who choose a hardware vendor's software will sacrifice portability to other environments. The emergence of Structured Query Language (SQL) as a standard DBMS data language will eventually make DBMS applications more portable, but the realization of this portability is a few years off.

Data Base Machines

Data base machines are typically implemented as back-ends, the converse of front-end dedicated hardware/software computers. Data base machines have the goal of offloading the data base and disk file management from the mainframe. Implementation requires software that runs in the mainframe to interpret data base machine language (DML) commands. These commands are then shipped down a channel to the dedicated data base machine which manages the disk file environment. The two dominant vendors in the data base machine marketplace are Teradata and Britton Lee.

Data base machines offer unique advantages in situations such as those described below.

a) Dissimilar Hosts — when access from dissimilar hosts is required, the data base machine can provide a software interface to each host and serve as a single integrated data base for multiple mainframe or minicomputer hosts. Because this capability can be easily extended, in the future we may see data base machines as local area network file servers.

b) Multiple Computers — when multiple computer access is required against a single, integrated data base, a data base machine can offer the same important functional advantages as it does when access is required from dissimilar hosts.

c) Large Data Bases — when a very large data base needs to be updated and searched, a dedicated data base machine can provide a more cost-effective solution than a software-only implementation on a mainframe.

d) Relational Transaction Processing — when a relational DBMS and high transaction processing are desired, data base machines provide the most cost-effective solutions. In looking at today's software implementations of the relational model, it is clear that relational DBMSs provide much less transaction processing capability than some other types of DBMS implementations. The highest TP rates achievable today with a relational DBMS are reached by the use of a data base machine rather than a software-only solution. Recently, Teradata announced transaction processing speeds for its DBC 1012 that match IBM's IMS Fastpath.

A new trend of some importance in the data base machine market is cooperative marketing and technical agreements between data base machine vendors and mainframe DBMS vendors. For example, Britton Lee and Cincom have announced cooperative products where Britton Lee's machines can be used under Cincom's software. A similar linkage between ADR and Teradata has been announced. Such agreements have the advantage of providing the best of both worlds: performance and wide software availability to customers.

Integrated Development Software for Multiuser Micros

These products are most easily explained as minicomputer software which has been implemented on multiuser micros, now that micros have the memory and operating systems to support these features. Good examples are Unify and Informix. These products are true DBMSs with security, Commit updating, data base administration utilities and concurrency controls. In addition to the DBMS (usually relational), these products often deliver a simple 4GL, report writer, inquiry language and sometimes a data dictionary.

End-User Software

The integrated development tools described above are principally designed for management information systems (MIS) shops and professional programmers. They enable existing programming staff to become more productive. Information center (IC) software and decision support tools, on the other hand, are products designed to support the non-professional in the use of DBMSs and 4GLs.

Vendors Mentioned in This Article

Applied Data Research, Inc. (ADR)

Princeton, NJ
R.S. No. 250

Battelle (Software Products Center)

Columbus, OH
R.S. No. 251

Britton Lee, Inc.

Los Gatos, CA
R.S. No. 252

Cincom Systems, Inc.

Cincinnati, OH
R.S. No. 253

Computer Corporation of America

Cambridge, MA
R.S. No. 254

Comshare, Inc.

Ann Arbor, MI
R.S. No. 255

Concurrent Computer Corp.

Oceanport, NJ
R.S. No. 256

Cullinet Software, Inc.

Westwood, MA
R.S. No. 257

D&B Computing Services, Inc.

Wilton, CT
R.S. No. 258

Digital Equipment Corporation (DEC)

Maynard, MA
R.S. No. 259

Hewlett Packard Company

Cupertino, CA
R.S. No. 260

IBM Corporation

Armonk, NY
R.S. No. 261

ICL, Inc. (International Computer, Inc.)

Stamford, CT
R.S. No. 262

Infodata Systems, Inc.

Falls Church, VA
R.S. No. 263

Information Builders, Inc.

New York, NY
R.S. No. 264

Information Resources, Inc.

Chicago, IL
R.S. No. 265

Informix Software, Inc. (Informix)

Menlo Park, CA
R.S. No. 266

Isogon Corporation (Intercomm)

New York, NY
R.S. No. 267

Lotus Development Corporation (1-2-3)

Cambridge, MA
R.S. No. 268

NCR Corporation

Dayton, OH
R.S. No. 269

On-Line Software International, Inc.

Fort Lee, NJ
R.S. No. 270

Oracle Corporation

Menlo Park, CA
R.S. No. 271

Relational Technology, Inc.

Alameda, CA
R.S. No. 272

Seed Software Corp.

Alexandria, VA
R.S. No. 273

Software AG of North America, Inc.

Reston, VA
R.S. No. 274

Software House

Cambridge, MA
R.S. No. 275

Teradata Corporation

Los Angeles, CA
R.S. No. 276

Unify Corporation (Unify)

Sacramento, CA
R.S. No. 277

Unisys Corp. (Burroughs)

Detroit, MI
R.S. No. 278

Unisys Corp. (Sperry)

Blue Bell, PA
R.S. No. 279

Information Center Software

Information center software allows non-data processing professionals to build systems. Popular software in this category includes Information Builders' Focus, D&B Computing's Nomad2, On-Line Software's (formerly Martin Marietta) Ramis II, Infodata's Inquire and Battelle's Basis.

Information center software is used not only by end users but also by MIS departments. In general, however, the slow performance of this software (compared with Cobol) makes it more suitable for departmental computing than for corporate-wide or strategic systems.

Information center software works best with relatively static data bases. These products are not designed for production transaction processing. They are typically single threaded and best suited for query and reports.

The programming languages in this category tend to be more non-procedural than the 4GLs delivered in integrated development software. Frequently, menu-driven user interfaces are provided. Information center software also makes extensive use of default options so that little specification is required for queries and reports.

Passive data dictionaries seem to be characteristic of information center software. Beyond the dictionary, a

DBMS Software

broad array of interfaces to many different software packages such as DBMSs, statistical packages and graphics is usually supported. Information center packages such as Nomad2 and Focus have been the first products from independent vendors to support both read and write access to IBM's relational DBMSs, DB2 and SQL/DS.

Information center software is easy to use compared to integrated development software. Easy to use, however, needs to be defined in relative terms: It can still take as long as a year between initial installation of the product and getting the information center ready to operate. But the time can be used to create the information support organization, develop a small number of prototype applications, design the necessary training and establish data bases for querying and reporting purposes.

Information center software also has a reputation for high central processing unit (CPU) and memory usage. Experience shows that the combination

of high computer utilization rates and the products' popularity for end-user applications often results in a rapid escalation of computer resources in this environment.

Decision Support Systems

Decision support systems (DSSs) are software systems that include a combination of data modeling, DBMS, query facility and simulation language. These combinations are well-suited for decision analysis and correlation analysis at field level. DSS products are normally used for modeling future scenarios rather than reporting against existing historical data bases.

Simple, two-dimensional spreadsheets like Lotus 1-2-3 can be thought of as decision support systems. Mainframe-oriented DSSs, however, can be significantly more powerful. Comshare's System W provides an interesting example of a multi-dimensional analytical tool that provides more sophistication than a spreadsheet. Information Resource's Express combines multi-dimensional analytical fa-

cilities with a true DBMS environment. Many DSS vendors are now providing micro implementations of their mainframe software.

DSS tools are frequently sold to end users in production, marketing and finance departments. Their user interfaces are friendly and typically do not require programming.

While DSS tools seem functionally similar to information center tools, important differences do exist. On the one hand, DSS tools can be more easily used to model difficult, complex situations. On the other hand, IC tools can be used to build some production (transaction-oriented) systems, while the DSS tools are designed for data bases that are essentially static.

Most organizations need DBMS software from both the integrated development software and the end-user software categories to improve program development productivity. The technology that underlies the creation of effective end-user software is still very different from what is needed for high-performance transaction processing. Integration between these two worlds, however, is very possible — and essential. Wise software purchasers will understand their companys' requirements in all areas and develop an integrated software strategy that includes tools for application development across the diverse types of hardware and operating systems that are likely in the 1990s. ■

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View to the Future

The corporation of the future will have an integrated data processing environment built on a combination of micro, mini and mainframe computers with appropriate software that allows each hardware type to be used where it's most advantageous. The following diagram illustrates the individual roles of the different hardware classes. The network will truly be "The System" in this environment.

For most people, whether end users or professional programmers, the interface to The System will be through a workstation, the successor to today's personal computer (PC). For both the programmer and the end user, the tools available on micros will resemble what is available on minis or mainframes. The data base administrator will manage a distributed data base environment that stores data where economics and response times indicate need, while at the same time making that data available to all who need access to it.

NETWORK SYSTEM

MAINFRAME

- corporate data bases
- information distribution
- transaction processing
- network server

MINICOMPUTERS

- manage local data
- departmental computing
- local network server

WORKSTATIONS

- user interfaces
 - application development
 - word processing
 - E-mail
 - modeling
 - query