

# DBA SHOPTALK

*Keeping the shop updated, healthy, and competitive in the '90s*

**M**ELLON BANK, A large Eastern financial institution, employs more than 500 MIS professionals in its data-processing shop. With DP sites in Pittsburgh and Philadelphia, Mellon Bank ranks in the top 100 DP shops in the United States. The Philadelphia site runs an IBM 3090 400E; the Pittsburgh site has two IBM 3090 600Es running as four virtual machines. The operating system is MVS/ESA, with each site running TSO, CICS, IMS DB/DC, DB2, and Inquiry, our own teleprocessing system.

We use a combination of centralized and decentralized application development. Most individual departments manage the MIS personnel responsible for their applications, while corporate-utility functions (such as check processing and electronic funds transfer) are located in a centralized MIS department. All system-support functions (including database administration) are also centralized.

The bank's Information Management and Research Dept. contains the centralized portion of the MIS department. Within MIS, the Database and Capacity Management section defines, implements, and administers the practical use of data technology. The DB&CM unit coined the term *data technology* to describe the combined disciplines of data and database administration.

DB&CM is made up of six technicians whose skills are used for data administration, IMS and DB2 database administration, and large system-tuning efforts. Each person specializes in one area but can provide backup in at least one other area.

Corporate data administration, a relatively new priority at Mellon Bank, is intended to pro-

BY CRAIG S. MULLINS

## Dusting Off The Database

mote the concepts of data-driven design and sharability of corporate data, direct plans for the data dictionary and IBM repository, and make sure data is treated as a valuable corporate asset.

Data administration may be more affected than other areas by the decentralization of application-development efforts. With the responsibility for system design under the control of several organizations, promoting a unified data concept is a challenge.

However, we've made great strides during the past year. The design for all new DB2 development has been driven by data models. Even though a corporate data model does not yet exist, entities within the corporation have begun to acknowledge the benefits of such models.

We've also managed to promote the data-dictionary concept. One of our largest DB2 development projects has successfully used a DB2-based data dictionary developed by our data administration staff, promoting its use throughout the corporation. This data dictionary is planned as a stepping-stone to the IBM repository, which we'll install once we've determined its economic and practical value.

The recent acquisition of Bachman Information Systems' Re-engineering Product Set has greatly helped data administration at Mellon Bank. The Bachman tools

consist of two components: Bachman DA, used to develop entity-relationship diagrams and logical data models, and Bachman DBA, used to assist in physical database design. The products allow development and maintenance to be driven by logical data models created using the Bachman DA component. When the logical design process is complete, the logical data model is forward-engineered into a physical data model. We use the Bachman DB2/DBA component to modify the physical design and generate DB2 data-definition language (DDL).

In the future, all DB2 objects will be maintained by the Bachman tool set before being migrated to DB2. All maintenance will be through the DA component to the DBA component, with changes forward-engineered and propagated to the appropriate system. The validity of the data models will therefore be preserved and each system's data adequately documented.

Database administration at the bank supports two DBMSs: IMS and DB2. IMS has been around for more than two decades now and is still going strong. We plan to support it indefinitely—IMS-based systems won't be converted to DB2 without a solid business reason. The only acceptable reason would be complete redesign of an application to support expanded business requirements.

Two IMS regions (test and production) at the Pittsburgh site and one production region in Philadelphia are active for a total of 15 batch and on-line IMS applications. Three teleprocessing monitors are used to access IMS data: IMS/DC, CICS, and Inquiry. With well over 400 databases, this IMS/DC on-line system makes up the bulk of DB&CM's workload for IMS.



Version 1.3 of IMS is still in production at Mellon Bank due to changes that permitted modification of IMS log tapes. We're analyzing the effects of these changes on IMS/ESA v. 3.1.

The focal point for the development and support of IMS databases is DB&CM, which handles all control-block generation, including program specification blocks for programs, database descriptions for databases, and application control blocks for online transactions. Physical database design supports logical database design, which is based on data models provided by application areas and data administration. Future directions include the mandatory use of database recovery control and exploitation of IMS/ESA. The use of DBRC is now determined on an application-by-application basis.

Relational technology and DB2 are two of data technology's fastest-growing and most widely accepted areas. Mellon Bank management decided that all future database development will be

done with DB2 unless a strong argument can be made against it. Currently, the only acceptable argument is our need to maintain compatibility with IMS-based application systems.

Five DB2 subsystems are active across three CPUs within the bank: two production and two test in Pittsburgh and one production in Philadelphia. Seven production DB2 applications are spread across the sites, with four more applications in development.

The on-line environment for DB2 is limited to CICS and TSO. We're trying to establish a link to IMS/DC this year that will communicate with the Trust System,

our primary IMS application. A link to Mellon's Inquiry teleprocessing system is also planned. Transaction response time and throughput are at an acceptable level for both CICS and TSO; the average response time for CICS transactions ranges from subsecond to just under two seconds and for TSO ranges from two to five seconds (Table 1).

The most advanced business analysts use IBM's Query Management Facility for ad hoc querying. Each QMF user is assigned a segmented table space for issuing SAVE DATA commands, and the governor is set to 15 CPU seconds for prompting and two CPU minutes

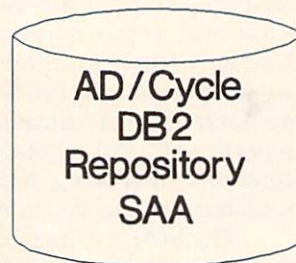
	IMS	DB2
IMS/DC	240,000	—
CICS	10,000	5,000
Inquiry	5,000	—
TSO	—	250*
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\*Taken from on-line TSO applications; doesn't include SPUFI executions.

TABLE 1. Mellon Bank weekly transaction-throughput averages.

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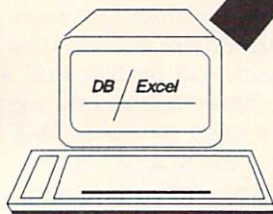
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for cancelling. We believe our lack of performance problems are the result of educated users and frugal use of the QMF governor capabilities.

All production DDL is created and executed by the DB&CM team. DDL isn't stored but can be recreated as needed from the DB2 catalog via IBM's DBMAUI program. DBMAUI helps users migrate DB2 objects from test to production. Test DDL is handled by application experts with database administration authority to execute operations on their specific application databases. The development teams receive guidance from the DB&CM unit to ensure that the proper DDL options are chosen.

DB2 v. 2.2 has been installed in both of our test DB2 subsystems and will be installed in all of the production subsystems by the end of the second quarter. Migration from one DB2 release to another isn't taken lightly at Mellon Bank; experience has taught us that DB2 performance enhancements may

actually cause problems in some applications.

Installing DB2 v. 2.1 caused us so many headaches that we created an exhaustive test plan to be executed before any new DB2 release is promoted to production. The problems we encountered with this version were serious enough to warrant IBM's changing the code for the DB2 optimizer. Two queries (both involving joins) that ran under v. 1.3 wouldn't complete under v. 2.1. Investigation showed that the optimizer chose different access paths in each version, so queries didn't execute. Luckily, we were still in a test environment when we discovered these problems.

We learned a simple lesson: Test all queries (in production volumes) under each new release of DB2 before promoting the release to production. But as the number of DB2-based applications grows, we'll have to question the viability of this approach.

DB2 v. 2.2 will be installed for both the performance enhance-

ments and the distributed-database capabilities. Two application systems may use the distributed remote query capability of DB2 v. 2.2 to communicate across CPUs at one site, and one of those applications may also need to communicate across sites. One application is cloned on each of the three CPUs; the other is awaiting v. 2.2 for resolution.

Tools used for DB2 administration and development include DB2-PM for performance monitoring, DB/Optimize for query optimization, DBMAUI for migration, Compile/QMF for QMF query optimization, and the Bachman set of tools for DDL generation from an application data model. These tools meet most of our current needs. As development continues, however, we may purchase an alter product and an on-line performance monitor to help administer DB2.

DB2's future at Mellon Bank looks bright. The four applications we're developing are strategic; the bank will rely on them for imme-

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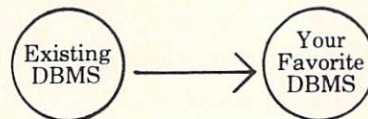
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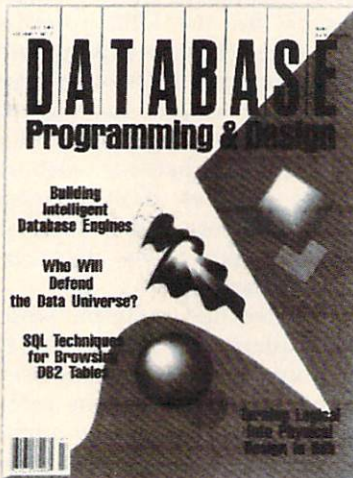
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diated financial gains in the form of increased efficiency (due to better data access) and greater customer use of fee-based systems. While our largest production table is now only about four million rows, we expect DB2 application tables of up to 100 million rows.

**O**NE OF OUR MOST immediate priorities is to turn over DB2 security administration to the Corporate Data Security unit. All production security is now administered by the DB&CM unit because it must be written into the database-access language, and in-depth education is required before it can be administered effectively. Computer Associates recently announced an extension to our ACF2 product. If ACF2 can be used for DB2 security administration, the Corporate Data Security unit will be able to handle most DB2 security requests.

In addition to data and database administration, data technology at Mellon Bank consists of large system-tuning efforts. The primary target of these efforts is the Trust System. However, we periodically monitor and tune each system that uses IMS or DB2.

DB&CM monitors job statistics to target application subsystems that may need tuning. This unit only performs the analysis; work orders are issued to application-development areas to implement program tuning. The DB&CM unit also provides guidance on batch job scheduling. IMS/DC transactions are monitored daily to target potential performance and response problems before they become debilitating.

Data technology is thriving at Mellon Bank now that the importance of data as a corporate asset is finally being realized. Systems based upon data technology have increased in reliability and usefulness. With this sound investment in corporate data, Mellon Bank expects to remain competitive through the 1990s. ■■■

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