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Distributed & Client/Server DBMS: Underpinning for Downsizing Part IV of IV

Almost all of the advanced functions listed in the previous section on distributed DBMS (such as BLOB data types, RPCs, and event alerters) are also available from leading DBMS server vendors. To repeat our previous definition, the primary difference between a server DBMS and a distributed DBMS is whether or not each node on the network has a full copy of the DBMS. Added functionalities aren't a good way to tell the difference between these two cousin technologies.

Many companies are delivering client/server DBMS and

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Windows-Based Tools for SAs and DBAs

by Karen Watterson

We don't hear glass house types referring to PC gurus as "propeller heads" nearly as much as we used to, but the fact remains that MIS remains largely suspicious of PC or Unix-based DBMSs. MIS staffers can sometimes be overheard muttering politically incorrect statements about sending boys to do men's work. They're far more likely to complain aloud, however, about the lack of proper utilities.

In last month's ***Schussel's Downsizing Journal***, for example, Howard Fosdick warns potential DB2 downsizers

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Distributed & Client/Server...

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associated tools at this time. The very large and active market of the 1970s and 1980s for mainframe DBMS and 4GLs that featured companies like Cullinet, IBM, Software AG, Cincom, and Applied Data Research, has been replaced by a new market. This new environment is built around the client/server model with open availability (connectivity) between tools and DBMS. The domination of this new marketplace is being fought for among companies including Microsoft, Revelation Technologies, Borland, Sybase, Oracle, and Powersoft. The reasons behind the current and impending growth of this market are many:

- The architecture is simpler (from a software developer's point of view) than is distributed DBMS, and, therefore, more important (matter of opinion here) as the capabilities can be brought to market sooner and at a lower price.
- Developers can use PCs instead of time-sharing terminals as primary development platforms.
- Even though the PC is used as the principle platform, the security, integrity, and recovery capabilities that result are comparable to mini-computers.
- The efficiency of SQL queries and transmissions greatly reduces the network communication load (from that of a PC LAN/file-server-based approach).
- Gateway technologies, which are an important component of client-server computing, will allow PC users to gain access to data located in mainframe and mini-computer DBMS products such as DB2, IMS, and Rdb.
- The client/server model isolates the data from the applications program in the design stage. This allows for a greater amount of flexibility in managing and expanding the database and in adding new programs at the application level.
- The client/server model is very scalable because as requirements for more processing arise, more servers can be added to the network, or can be traded up for the latest generation of micro-processors.
- Computing environments based upon SQL allow for greater flexibility since the language is a standard. Commitment to an SQL server engine will mean that most front-end, 4GL, spreadsheet, word-processing, and graphics tools will be able to interface to the SQL engine.
- Client/server computing provides the industrial strength security, integrity, and database capabilities of mini-computer or mainframe architectures, while allowing companies to build and run their applications on relatively inexpensive PC and mini-computer networks. The use of this hardware and software combination can cut 90% of hardware and software costs when building "industrial strength" applications.

The client/server model offers users choices between many different hardware and software platforms. The hardware choices are too expansive to be listed here, but the principal choices for operating systems are multi-user, multi-tasking, protected products such as UNIX, OS/2, Windows NT, and NetWare. The micro-processor engine driving the hardware is typically a single or dual processor Intel x86, or RISC chips such as SPARC or the MIPS R4000.

The client environment is typically a smaller, but powerful, PC that has enough power to run applications on top of multi-tasking, single-user operating systems such as Windows 3.1 or OS/2.

The concept of using a large mainframe such as a VAX 9000 or ES/9000 as a database server to networks is

often discussed by mainframe vendors. For these machines to play a role in future networks, however, it is clear that they will have to adopt server functionality by acquiring and supporting emerging downsizing standards such as UNIX, NetWare, LAN Manager for Window's, Window's NT, and LAN Server for OS/2.

Performance from a client/server environment

The reader might be skeptical of the claim that PCs running server software can perform as well as mainframes, but there is documented evidence to this effect. The most efficient PC server operating system at this time is probably NetWare. Tests run in abidance of the Transaction Processing Council's standards have shown that products like ORACLE and Gupta's SQLBase are capable of running about 50 transactions per second (TPS) on 486-based PCs. This number would not be an unreasonable result for a mainframe running IBM's DB2.

The transaction capabilities of client/server software working with low-end PC servers or super-servers (mini-computer style cabinets built with merchant micro-processors such as the 80486 or R4000) is quite astounding. For example, at the low-end of the hardware scale, both Gupta's SQLBase and Microsoft's SQL Server can run on Intel 80486-based PCs processing approximately 18 TPC-B TPS (Transaction Processing Council, database Benchmark B). PC hardware can support disks with 12-millisecond access time and 4 to 6 MB transfer rates. Such a machine can be configured with 600 MB of disk for under $10,000. In case you're not familiar with the TPC-B benchmark, it should be pointed out that a rate of 18 TPS would be adequate to support 400 automated teller machines on a single server.

If you have had a chance to build PC-based database applications in the last few years, you may be suspicious of any claim that a PC hardware environment could be capable of performing on a level comparable with mini-computer technology. However, it is important to remember that the processing capability of a typical PC has increased by a factor of twenty between 1984 and 1992. A PC built around the Intel 80486 micro-processor chip running at 33 MHz has forty times the computing power of a PC/XT. This high level of service can provide on-line transaction on-line transaction processing capabilities at a cost of $2,000 per TPS.

This cost is much less per TPS than existing mini-computer and mainframe systems can provide. Using proprietary mini-computers, you can expect to spend between $25,000 and $40,000 per TPS. IMS-based MVS

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DATABASE SERVER PERFORMANCE

LOW END

* 486 PCs, LOW END RISC, 12 ms ACCESS/4MB TRANSER RATE
* 10 - 20 MIPS @ $6,000 TO $18,000
* 8 - 15 TPC-B/SEC
* 90 WORKSTATIONS SIMULTANEOUSLY ON A SINGLE SERVER
* 250 ATM's ON A SINGLE SERVER
* ETHERNET - 100 TPS ACROSS NETWORK

HIGH END

* PARALLEL CISC OR RISC GIVES 100's OF MIPS
* SCSI AND IPI CHANNELS - COMPARABLE TO 3090 CHANNELS

RESULT:

* OLTP AT $1K - $4K/TPS

Distributed & Client/Server...

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mainframe environments typically yield a cost of $50,000-$75,000 per TPS. Alternatively, using the combination of MVS and DB2 as a transaction processing engine will typically cost over $100,000 per TPS. What all of this means is that, based upon full development, maintenance, hardware, software, and staff costs, SQL client-server computing is likely to result in finished systems that cost only a small fraction of what building transaction systems has cost in the past. Actual case studies confirm this type of important savings in finished, delivered systems.

Of course, there are many applications which are simply too large to contemplate running on (even a fast) PC. Client/server architectures allow you to design the application once and then, without change, port that application to whichever server has the database processing power you need to manage your database. This allows application development on PC-style servers, with the porting to the new generation of "super servers," mini-computers built to run open operating systems powered by multi-processing versions of merchant CPU chips. The approach is to take micro-processor-based technologies and combine them with high speed buses, channels, and parallel computing architectures to create platforms that can run with the fastest mini-computers. Vendors such as Compaq, Pyramid, and Sequent are building parallel processing machines using CICS or RISC micro-processor units capable of reaching a sustained processing capability of 100s of MIPS. Do not be surprised, then, to see a combination of these new hardware systems with software from companies like Sybase, Gupta, Novell, Microsoft, and Oracle delivering computing technologies comparable to IBM's largest machines, but at a tiny fraction of the price.

As a first project, it is clearly better to use client/server computing for mostly-read or decision support environments. The very large, tough performance-based applications, such as retail credit card verification or airline reservations, require reliable processing of hundreds of transactions/second and are still relegated to mainframes only.

In the future I expect multi-processor-based client/server architectures to take on mainframe types of applications. It is very reasonable to envision products like Oracle and Sybase in combination with high-end super servers from companies such as Solbourne, Pyramid, Concurrent, Compaq, IBM, or DEC. This high-end super server hardware is typically built with parallel Intel 386, 486, and/or RISC chips from MIPS or Sun. By configuring a server with a multi-processor design and an open operating system that

PLAYERS IN THE SERVER MARKET

GUPTA TECHNOLOGIES, INC.	SQLBase
IBM	OS/2EE
INFORMIX SOFTWARE INC.	INFORMIX ONLINE
ASK/INGRES DIVISION	INTELLIGENT DATABASE
MICROSOFT/SYBASE	SQL SERVER
NOVELL	NETWARE SQL
ORACLE	ORACLE SERVER
SYBASE	SQL SERVER
XDB SYSTEMS INC.	XDB-SERVER
BORLAND/INTERBASE	INTERBASE
PROGRESS SOFTWARE	PROGRESS
COMPUTER ASSOCIATES	IDMS/R, DATACOM
DEC	Rdb, ACMS

supports it (e.g. UNIX, VINES, NT, OS/2, or LAN Manager), a vendor can build a machine with hundreds of MIPS processing power and 250 GB of disk data storage for well under $500,000. Combining this technology with high speed channels and a client/server DBMS, allows a configuration of new technology hardware and database server to be considered as a replacement for a $14 million IBM System 390 running DB2. With a potential savings of almost 95%, this would appear to be an offer well worth considering for many situations.

Conclusion - A Reality Check

The various advantages of distributed processing and distributed DBMS are both well documented and considerable, especially for companies that wish to take advantage of new computing styles featuring graphical interfaces and distributed implementation. Migrating to these new technologies, however, requires serious investments in the training and building of expertise for the new systems. There do exist potential problems associated with taking advantage of the advanced capabilities of distributed databases. Below is a quick summary of some of the problems associated with this technology.

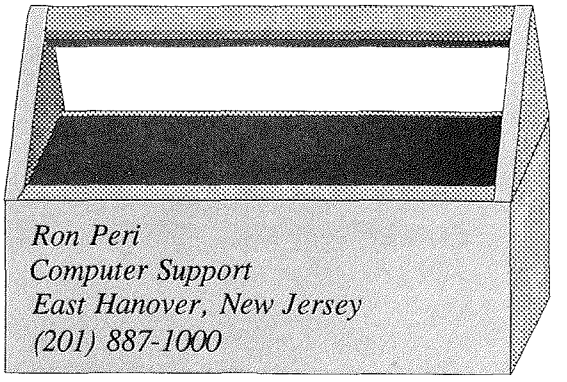
1. Communication costs can be quite high, and using a two-phase commit protocol tends to generate a considerable amount of communications traffic.
2. There is the need for gateway technology to handle the SQL differences among different DBMS vendors.
3. The predictability of total costs for distributed queries is variable. In other words, it is difficult to predict how much it will cost to get a job done.
4. Supporting concurrency, in addition to deadlock protection, is very difficult.
5. Supporting full recovery with fail over reconstruction is very expensive.
6. Performing a JOIN across different physical nodes is very expensive using today's technology and networks.
7. Some advanced relational functions, reasonable for single computers, are difficult and expensive across distributed networks (e.g. the enforcing of semantic integrity restraints).
8. The job of the database administrator is more difficult because, above and beyond their current functions, they need to understand the integrity, optimizer, communication, and data owner issues of the distributed world.
9. Data security issues are neither well understood nor proven. It would appear that a distributed environment is more susceptible to security breaks than is a database which is contained in one box.

Please recognize this as a list of potential pitfalls that await (in most cases) the advanced user of this new technology. As in the case of most new technologies, the well-advised user would take small steps while the approach is mastered before moving onto the more complex conversions/implementations. Many companies will find the client/server approach to be simpler to implement initially. Investments made in such an approach will likely migrate towards a distributed database if later desired.

At a rate of 50 TPC-B transactions/second, a (currently) large PC is capable of running a SQL DBMS and delivering services comparable to most of the IMS applications in existence today. The ability to create those applications with the ease associated with SQL databases and GUI screen painters is something that we could have only dreamed about in the mid-1980s. Prototyping approaches in building those applications means that significant time-savings will be realized in better looking and more flexible 1990s approaches. The era of PC LAN-based systems has arrived, and will dominate the systems building paradigm for the foreseeable future. *GS*

NUTS & BOLTS

Answers for your downsizing questions.



Ron Peri
Computer Support
East Hanover, New Jersey
(201) 887-1000

Q **I am the Database Administrator at a moderately-sized company of 100 employees. We have plans to install Sybase NLM** [NetWare Loadable Module] **as a database server for a medium-size network with on-line database queries and updates. At this point, we don't believe that the up-time or processing requirements necessitate us to look at installing a superserver. Instead, we'd like to use a 486 PC as the server. Can you give me some hints on what I can do in the NetWare environment to speed the processing time if a single PC can't handle the job?**

A One trick is to use multiple Ethernet cards. This is especially helpful if you have a high volume of network traffic. If you have not yet purchased a 486 PC, consider buying an EISA bus machine with an EISA disk controller and network adapter. This will help to maximize input/output throughput. You should also be certain to select the fastest disk that you can afford. In addition, since the NLM tends to be very sensitive to CPU speed, opt for a 50 MHz 486 as a minimum.

A different approach involves using fully-duplexed disk drives and controllers for the database. Such a setup will allow for overlapped reads and writes in an input/output intensive environment, and will almost double the throughput. Both Sybase and NetWare benefit substantially from additional memory.

Finally, the most obvious way of increasing performance in a Novell environment is to have the largest amount of real memory installed as possible. NetWare is able to recognize free memory in the server and then allocate that memory to cache the disk drives. You should determine if you have a sufficient memory disk/cache hit rate on the server. Your goal should be approximately to have 95% cache hits. *Hint:* To squeeze out that last little bit of extra performance, disable all of the printer and serial ports on the server. In addition, try to avoid running print server NLMs on the database server. Also, spend some time after installation adjusting the various parameters for both Sybase and NetWare to achieve maximum performance. *RP*

Nuts and Bolts is a question and answer column to which readers may send either technical or managerial questions they have about downsizing or related topics. Contributing Editor Ron Peri will reply to your questions here each month. Please mail all questions to: Stacey Griffin, ***Schussel's Downsizing Journal***, 204 Andover Street, Andover, MA 01810. Questions may also be FAXed to Stacey Griffin at (508) 470-1992. ***SDJ*** reserves the right to edit questions for both space and clarity.

Evaluating MIPS – Revisited

One of the most popular arguments in favor of downsizing usually relies on the difference in instruction cycle cost on a PC in contrast to that of a mainframe. Over the last few years at conferences, I too, have been guilty of using this approach to grab people's attention. The pitch is typically some variant of "your cost is $100,000/MIPS on the mainframe and $1,000/MIPS on the PC."

I recently had a chance to research these MIPS numbers, and the result is some updated information for my downsizing presentations. The purpose of this article is to share some of this new information with ***SDJ*** readers.

Intel engineers are now willing to forecast the power of their upcoming architectures for PC's and servers through the end of the decade. The resulting numbers are eye popping. See *Chart One, The History of x86.*

As can be seen in Chart One, it's clear that although we've come a long way in the power of the chip driving PCs, we have a much longer road to travel in the 1990s than the one we crossed in the 1980s. By employing parallel engineering teams armed with advanced design and manufacturing capabilities, Intel is going to keep the heat on its competition for CPU architectures. And, of course, the heat on the mainframe will be intense!

It is interesting to understand the ratio of PC to

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The History of x86

CHIP	SHIP DATE	TRANSISTORS	MIPS
286	1983	130K	1
386	1986	500K	5
486	1990	1.2M	20
586 (P5)	1993	3M	100
686	1994	7M	175
786	1996	20M	250
886	1999	100M	2B

Chart One

Evaluating MIPS...

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mainframe costs over a decade. To do just that, I've gone back and computed the ratio of costs and performance for both PCs and mainframes over the last five years. Using information published by Xephon, a London-based computer research firm, I was able to estimate and extrapolate mainframe prices and performance into the year 1996. Combining Xephon's and Intel's forecasts with historical measurements yielded the interesting results found in *Chart Two*.

Note that the information contained here is based on actual street selling prices, not fictional published prices. While we know that microprocessor-based systems offer important cost/performance benefits over mainframes, the sharp diverging trend predicted for the future in *Chart Two* is shocking. In 1990, a PC instruction cycle cost only 1/160 of a mainframe instruction cycle– that is less than 1%. Yet by 1996, this ratio will balloon to 1/6000, an improvement of almost 50 fold in six years! ***As we approach the middle of this decade, the difference in these cost ratios will be so striking that information system designers will be well advised to consider the costs of PC MIPS as free when planning new systems.***

Certainly, when compared to staff, software, and other large budget items, the PC MIPS cost will become just about invisible. We are actually seeing this kind of analysis come into vogue at aggressive downsizing sites.

...While we know that microprocessor-based systems offer important cost/performance benefits over mainframes, the sharp diverging trend predicted for the future in Chart Two is shocking....

The astounding power of the numbers in Chart Two recalls a comment by Steve Gibson in the July 13, 1992 issue of *InfoWorld,* "I believe that the radical advances in the PC's power/cost ratio will have another far ranging impact: all competing hardware platforms are dead. Inertia may carry them forward for a while, but their justifications for existing have completely evaporated."

It's no wonder that the actual number of mainframes in existence (as counted by MVS licenses) is now decreasing. I can not foresee anything of the mainframe's technology that will change this trend. *GS*

$/MIPS

YEAR	PC $/MIPS	MAINFRAME $/MIPS	RATIO	YEAR	PC $/MIPS	MAINFRAME $/MIPS	RATIO
87	2,000	130,000	65/1	92	75	58,000	775/1
88	1,600	111,000	70/1	93	37	49,000	1,325/1
89	1,000	94,000	94/1	94	18	41,000	2,280/1
90	500	80,000	160/1	95	9	35,000	3,900/1
91	150	68,000	450/1	96	5	30,000	6,000/1

Chart Two

Windows-Based...

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that "not one vendor can currently offer a package that will also downsize and port those DB2 [backup and recovery] utilities onto the PC. This is a big concern." Sam Shuler, communications strategy manager at Texas Instruments in Plano, Texas, comments that "There's a radical difference from mainframe environments, where you can get detailed information on a process, application, or the system itself, and the client/server environments. There are tools and parts available today to manage client/server, but a product that integrates and simplistically glues those tools together is not yet here."

My goal for this article was to examine four leading Windows Systems Administrator (SA) and Database Administrator (DBA) tools, understand in which environments they run, and compare functionalities using DB2 as a ruler.

DB2 utilities as a baseline

If DB2 is to serve as a sort of benchmark, let's review what utilities it brings to the table:

- LOAD: Loads data into tables with options like LOAD REPLACE and for enforcing referential integrity.
- COPY: Workhorse of DB2 utilities for making image or incremental copies of tablespaces or tablespace data sets.
- MERGECOPY: Combines incremental and image copies.
- DPROP: Data propagation, mapping, and consistency checker.
- DSN1COPY: Operating system level copy command.
- QUIESCE: Establishes a point of consistency for all tablespaces specified.
- MODIFY: Removes unwanted image files.
- RECOVER: Restores a database, tablespaces, and or index files from backups.
- CHECK: Determines whether table and index data are consistent.
- DSN1CHKR: Checks integrity of DB2 directory and catalog tablespaces.
- REPAIR: Attempts to repair damaged index and data files.
- REORG: Another workhorse that reorganizes physical files to recover space from deleted records. Has options like SORTDATA.
- ALTER STORAGE: Alters attributes for tablespace, index space, or partitions.
- DIAGNOSE: Provides diagnostic data from running other utilities.
- DISPLAY: System monitor for tracking indexes, locks, users, and so on.
- RUNSTATS: Generates statistics on DASD utilization, index efficiency. Optionally updates system statistics table.
- STOSPACE: Reports on space allocation for storage groups, tablespaces, indexes.
- REPORT: Reports on tablespaces related through referential constraints, on results of recovery, etc.
- EXPLAIN: Shows access plan used by query optimizer.

As you can see, there are two basic classes of tools: one for managing data and backups, the other for monitoring performance.

Oracle and SQL Server as platforms

Before looking at what the new Windows-based tools offer SAs and DBAs, let's quickly review the utilities that ship with Oracle and SQL Server. This pertinent to the article since the tools to be discussed, Datura's Desktop DBA, PACE Systems' SQL-Watch, SQL Monitor, and SQL-Programmer, all run against either one or both of these servers.

The Oracle 6.0 *Database Administrator's Guide* is about

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an inch and a half thick. It explains how to use Oracle 6.0's main utility, SQL*DBA, and, because Oracle 6.0 lacks an optimizing compiler, devotes as significant number of pages to both configuration and performance tuning issues. The *Database Administrator's Guide* for Oracle Version 7.0 consists of three volumes that take up three inches of shelf space. The additional pages include a good architectural overview as well as sections on supporting Oracle 7.0's enhanced distributed computing. Both versions have an SQL*LOADER program, as well as import and export routines. SQL*DBA does some performance monitoring, but lacks the flexibility of the DB2 utilities.

Sybase SQL Server ships with isql (interactive SQL) and a host of special system-stored procedures that DBAs and SAs can execute from isql, e.g. sp_addalias or sp_extendsegment. These are detailed in a two-inch binder, *Sybase System Administration Guide* and the three-inch *Commands Reference Manual*. Most Sybase customers supplement these by buying *SA Companion*, a utility with components for basic server installation and physical configuration, for managing databases and users and for generating reports on space utilization, users, server logins, user objects, and so on. This provides a fill-in-the-blank alternative to typing in syntactically correct stored procedure commands. Interestingly, because SQL*DBA is not known for its ease of use, Oracle SAs often buy an Oracle version of SA Companion called DBA companion–from Sybase!

Microsoft bundles a bit more functionality with the OS/2-based SQL Server. In addition to isql, you get SAF (System Administrator Facility), and an enhanced SAF for Windows. The latter provides a graphical environment for managing devices, segments, users, remote servers, and backup and recovery, including scheduling backups. Both SAFs provide a simple editor for creating, executing, and editing SQL commands. The two manuals describing SA tasks, including how to use SAF for Windows, take up less than an inch of shelf space.

Tool #1: Datura's Desktop DBA

Datura shipped the first Windows tool for SQL Server, but *SQL Commander* lacked focus. It tried to be an all-purpose aide for SAs, developers, and end users. Datura's second product, *Desktop DBA*, targets SAs and DBAs specifically and can be used with either SQL Server (Microsoft or Sybase) or Oracle DBMSs.

Desktop DBA's opening screen will probably have about a dozen icons representing tasks like Logins, Tuning, Add Database, Drop Database (or any

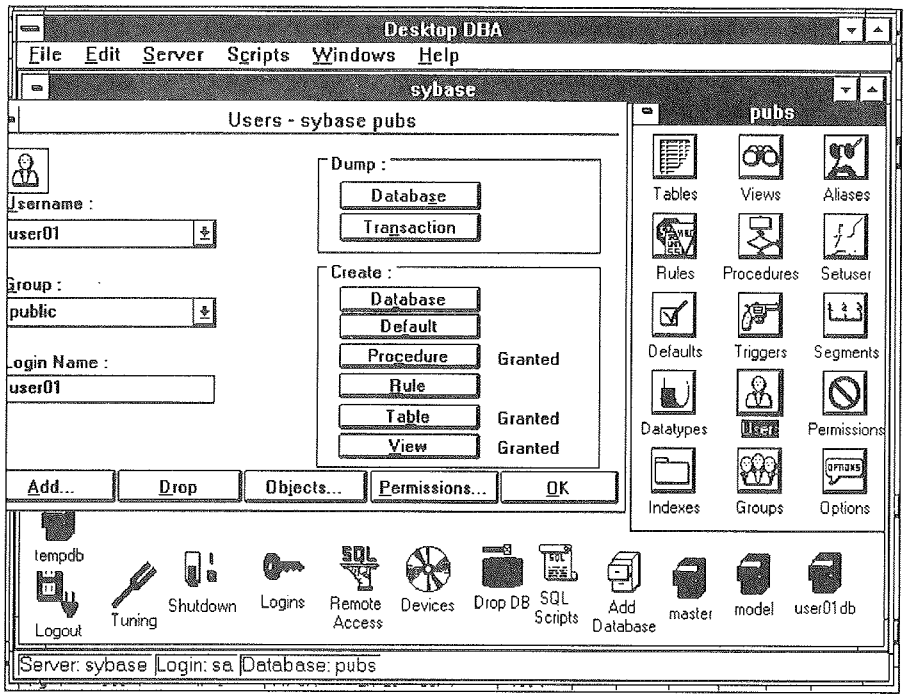

Figure 1

of its components), Remote Access, Devices, SQL Scripts, user database(s), and Shutdown. The exact number of icons will vary depending on whether you're using SQL Server or Oracle, whether you sign in as the SA/DBA, how you have configured Desktop DBA, and the number of attached servers and databases.

The beauty of Desktop DBA is that instead of having to type in SQL statements or call SQL Server stored procedures, you simply click on the appropriate icon and fill in the blanks (Fig. 1). If you click on an individual database's Tables icon, you're presented with a database window that has a host of options including a useful bar chart including how "full" your data, index, and log files are.

Desktop DBA also eases the burden of database backup and provides an edit window for creating and submitting SQL commands or scripts directly to the server. It will also generate a script file with commands to recreate anything from an entire database to any combination of components like indexes or stored procedures.

Because or architectural differences between Oracle and SQL Server, the Oracle version of Desktop DBA provides additional support for tablespaces, sequences, clusters, and synonyms. Otherwise, the functionality, style, and interface are basically the same.

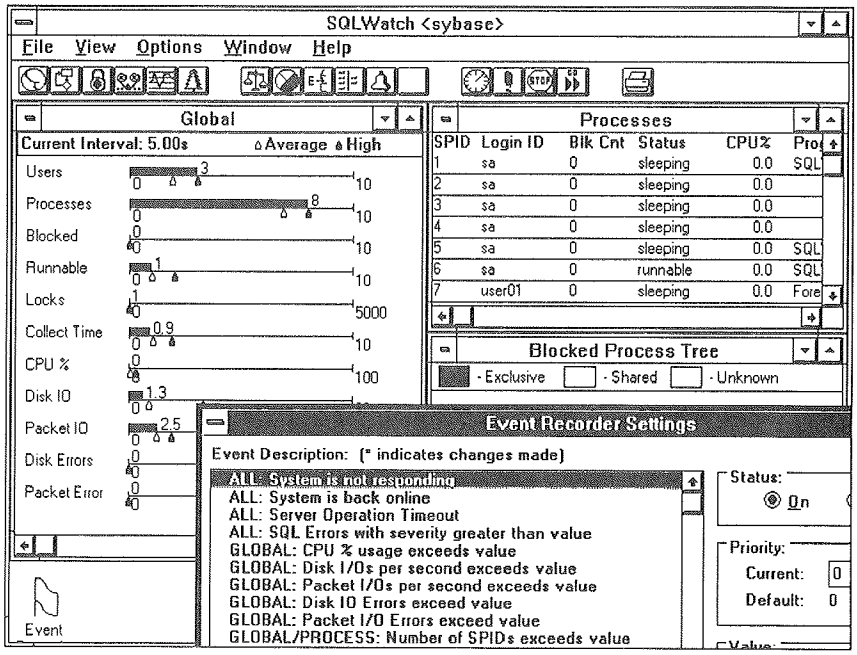

Figure 2

For the SQL Server version, Desktop DBA creates 15 stored procedures in the master database. The Oracle Desktop DBA creates a pair of views on the Oracle database. Installing either version consumes about 1.5 MB disk space on the client PC. Datura also offers a "Combo Pack" that includes both the Oracle and SQL Server versions and supports drag and drop interconnectivity. Desktop DBA prices range from $695-$6995 depending on the number of users and whether you need the Combo Pack or not. You can contact Datura at (804) 264-1225 or (804) 264-1297 FAX.

Tool #2: PACE Systems' SQLWatch

Desktop DBA doesn't offer many tools for performance monitoring like tracking CPU usage, I/Os, or activity by table or user. However, server-specific Windows tools that provide this functionality are beginning to appear. Consider what PACE Systems' SQLWatch offers: the ability to view multiple windows with overall and detailed information about users, processes, locks, and CPU utilization. In addition to supporting the Windows Multiple Document Interface (MDI), SQLWatch will display many performance parameters in animated chart form (Fig. 2). SQLWatch is SQL Server specific (it works with both the Sybase and Microsoft versions).

One powerful feature is SQLWatch's Event Recorder. This means SQLWatch can monitor events sent to it from user applications. It works by optionally creating a "pacedb"

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database from a SQL script file along with a special stored procedure that allows an application to send messages to SQLWatch. The messages are stored in pacedb until SQLWatch retrieves them; retrieved messages are automatically deleted. A user event is generated from a user application by calling the stored procedure and passing parameters for alarm_id, priority, and message. Events will be color coded depending on their priority.

SQLWatch, like Desktop DBA, creates its own stored procedures on the Master database, but the five are easily identifiable as sp_pace_xxxx. You'll need about 2 MB free disk space on your client PC. SQLWatch is available from Pace Systems (800) FONPACE or 713-373-5430. Single and multi-server versions cost $395 or $695 respectively, and a demo version is available.

Tool #3: SQLMonitor

You might think of SQLMonitor, from The Client Server Factory Inc., as a cross between Desktop DBA and SQLWatch–but for Gupta's SQLBase. SQLMonitor, like Desktop DBA and SQLWatch, also runs under Windows and lets DBAs, developers, or SAs perform routine administrative chores like creating, installing, deleting, or backing up either databases or log files. Backups can also be scheduled, followed by automatic update statistics and check database utilities. Snapshot and incremental backups are supported, as are a special "backup to sets."

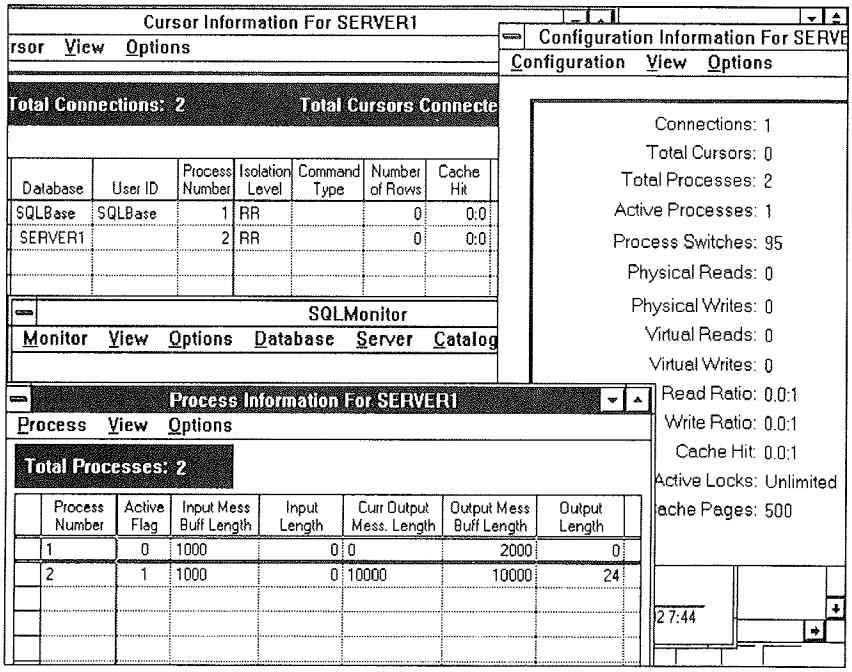

Figure 3

SQLMonitor also provides database, cursor, process, and configuration statistics for all SQLBase servers the PC can connect to (Fig. 3) in MDI windows. The database window displays the names and sizes of the databases with active connections, the number of active transactions, and so on. The cursor window lets SAs or DBAs monitor all cursors for a given server and for a given database, associates cursors with processes and identifies isolation levels, and shows which SQL command is currently being processes in the cursor. It also displays the cache hit ratio.

The process window lists a series of statistics for each process or open session, including process number, an active flag that shows if the process is doing any work, the length of the output and input message buffers, and the actual input and output lengths. The configuration window displays the accumulated active configuration information for a server, including number of current connections, total number of physical and virtual reads and writes, the read/write to cache hit ratio, and the total number of process switches since the server was last started. Information from any or all of these windows can be logged. SQLMonitor costs $395. The Ontario-based Client Server Factory can be reached at (416) 477-3278 or (416) 694-5469 (FAX).

Tool #4: SQL-Programmer

Another SQL Server-specific Windows tool targets application developers. Sylvain Faust, Inc. offers a superset of Desktop DBA called SQL-Programmer for $749. SQL-Programmer uses MDI windows and supports up to ten simultaneous, distinct SQL Server connections and ten separate SQL script windows. It is multi-programmer ready, via an optional "Check In/Check Out" facility.

SQL-Programmer's greatest functionality is in its support for developer work with stored procedures (Fig. 4) and triggers, as well as its ability to generate DDL (Data Definition Language scripts for any (or all) database objects. The procedures window offers predictable support for editing, copying, recompiling, and executing, but also features like dependencies, execution plan, and CPU and I/O statistics.

SQL-Programmer also includes a well-chosen series of built-in reports including basic and detailed reports for both stored procedures and tables, table and trigger chain reports, and a report on indexes. SQL-Programmer is non-intrusive (it doesn't create any stored procedures on Master) and uses about 1.5 MB disk space. For more information about SQL-Programmer, call (800) 561-9127 or (819) 778-5045, or FAX (819) 778-7943.

Summary

Are the Windows tools designed for PC LAN and Unix-based client/server systems up to snuff? They may not provide the robust environment found at some DB2 sites, but they're quickly getting there. The four products I have mentioned in this article are at least worth some current consideration.

Each of the four products discussed here are unique in features and functionalities offered, and so when possible, the most desirable choice may be a combination of packages. If you are running SQL Server, you can support Datura's Desktop DBA, PACE Systems' SQLWatch, and SQL-Programmer. For people running either Oracle 6.0 or 7.0, or Gupta's SQLBase, you have less of a choice as your opinions, at this time, are limited to Datura's Desktop DBA and SQLMonitor, respectively. As far as purchasing more than one package to run on SQL Server is concerned–when possible, for such low prices, a DBA can't afford *not* to purchase two or more of these DBMS tools.

After using some of these products, you'll discover how intuitive they are–so easy you don't even need a manual. And, they're available at what is spare change relative to mainframe utilities. *KW*

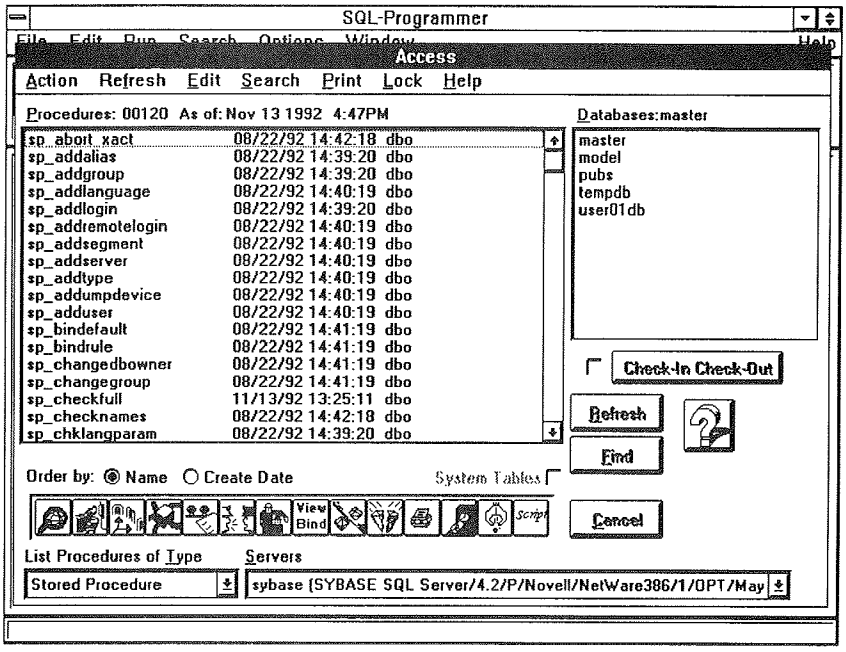

Figure 4

Karen Watterson is an independent San Diego-based writer and consultant specializing in advanced database, connectivity, and application design issues. She is a columnist for Windows Sources and is currently completing a book on Paradox for Windows for Addison-Wesley. Email 76064.51@compuserve.com or MCI KWatterson.

Notebooks, The Next Chapter

It's been exactly one year since I acquired my current notebook computer, a Toshiba T2200. Over this past year, the combination of new technology and evolving personal computing requirements has forced me to look for a different companion. At DOWNSIZING EXPO in San Francisco this August, I had the opportunity to use Compaq's new LTE/Lite 25C. This is a superb machine–it sports an embedded trackball and active matrix color screen. I thought that this notebook surely was to be my new love–at least for six months or so! When I returned to the office, a few telephone calls to local dealers and mail order suppliers made it clear that the Lite 25C/120 was backordered to the tune of four weeks. Its street price (for the 120 MB hard disk model) was also a little high at $5,399. I decided to wait.

By October, the Compaq 25C/120's list price had been reduced to $3,799. In addition, the notebooks were back-ordered by only one week. While still waiting to order one, I noticed in the November 9 issue of ***InfoWorld*** that, as part of Compaq's announcement of a new 486-based notebook series, Compaq had dropped the price on the 25C/120 to $2,699. All of these reductions amount to a price decrease of 50% over three months!

...Since the technology and price on [notebooks] are changing almost on a weekly basis, dealers aren't carrying any in stock for fear of being stuck with obsolete models....

This past year, my Toshiba T2200 has served its purpose very well. Its light weight (5½ lb.), small size, good screen, excellent auto resume functionality, fast floppy (much quicker than those on desktops–why, I don't know) and 386 processing power travels with me everywhere, and usually can accomplish the jobs I need done. It has survived numerous trips throughout the U.S., Europe, and Africa. The NiHD battery's fast recharge capability and long life have absolutely converted me–I am now a faithful advocate for NiHDs over NiCads batteries.

But, let me tell you, it hasn't been all sunshine, there have been problems, most of which have been solvable. The most serious problem was a fuzziness in the display quality when the T2200 was used to generate a projection screen show. That required the replacement of the motherboard which was done quickly by Toshiba and at no charge. A more plaguing problem is an incompatibility between certain Lotus software screens with external monitors. The Lotus screens display well on the internal screen, but become invisible when the computer is connected to an external

VGA display. Unfortunately, odd ball problems such as this don't interest the vendors. Neither Toshiba nor Lotus had any interest in trying to remedy the problem. Overall, I give the T2200 a "9" out of a perfect "10" for its performance.

Some of the new capabilities the T2200 pioneered a year ago have yet to be adopted by the rest of the industry. Some of its excellent features that are still exclusive include: a high quality carbon fiber case, a metal hydride battery type, a power supply not much larger than a deck of cards, an under 6 lb. (with battery) weight. I'm especially surprised by the fact that most new, full-function notebooks are staying in the 6½ - 7 lb. weight range.

The reason why I have chosen to move on is that new applications are changing my requirements for a traveling companion. I am currently generating screen show presentations directly on my notebook rather than using overheads or projection slides. The benefit, for me, is that a computer screen show can be modified right up until minutes before the presentation, and therefore is assured of being up-to-date. And the fact that it's in color allows for more interest in the presentation visuals. And, most importantly, it allows me to demonstratively illustrate some of the points I'm making about Windows 4GLs, OOPS, or other modern subjects. I am now starting to use DataEase Express, the new Windows 4GL for SQL databases, and the ability to concurrently run Windows, DataEase, Excel, and Freelance Graphics during my presentation is important. Pedagodically speaking, it's much better to illustrate interactive software, rather than just talking about it. Such a demo is fun and educational–fun for me and educational for those poor souls stuck in the era of mainframe character-oriented computing!

...Laptop prices [are] dropping at the rate of about $50/week...and, fortunately for consumers, it's unlikely that these rapid price decreases will stop....

As I have been doing these shows, it has become more difficult to create a color presentation on a computer with a monochrome screen. At home, I can plug my notebook into a VGA monitor, but for working in hotel rooms or planes, the monochrome view is becoming boring, especially now that I've seen the superb color available on notebooks including the new Compaq 25C/120.

Another problem with my Toshiba T2200 is the hard disk. My notebook is an initial production unit, and therefore only has a 60 MB hard drive. And any Windows user can tell you, each Windows application or clip art library requires 10 MB, more or less, of drive space. After one year, the machine's hard drive is, of course, full. So what's new? How about disk compression? Yes, I bit the bullet and installed Stacker on the notebook. No question, it works by doubling the available space on the hard drive. Though it is a good product, it is a TSR(Terminate and Stay Resident), and uses approximately 40K of real RAM which makes a difference in the performance of my DOS applications. An even worse problem is that Stacker noticeably slows hard drive bound applications. For example, running a disk compression on the hard drive now runs about twice as long as it did. Some items like loading or printing from Windows are noticeably (20–30%) slower.

Laptop and notebook retailers

In my quest, I have been spending much time at local

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Notebooks...

(continued from previous page)

stores and computer expositions trying out new laptops. One thing I've noticed is that local stores are not keeping up with new product cycles. If there exists a hot machine (such as the new Compaq Color Contura), the local store won't have it in stock. So, my best luck in trying out new machines has been stalking the floor at shows such as DOWNSIZING EXPO or MOBILE WORLD (March 3-5, 1993 in Boston) to try out the machines that vendors such as AST and Compaq display.

Some interesting conclusions about laptop and notebook computers that I've discovered include:

- The prices of these machines continually drop (for constant capability) at a dizzying rate. The Toshiba T2200, which is in the process of being discontinued, is now sold for $1,599 for the 60 MB machine and $1,895 for the 80 MB machine. Exactly one year ago, the best street prices for these PCs were, respectively, $3,899 and $4,299. When I first wrote about the laptop market in the November 1991 issue of ***Schussel's Downsizing Journal***, the article included my impression that laptop prices were dropping at the rate of about $50/week. That number has proven remarkably accurate over the last year. And, fortunately for consumers, it's unlikely that these rapid price decreases will stop. I'm glad I'm not in the business of manufacturing these machines: can you imagine selling a product that drops 60% in price over a year, every year?

...For an upgrade, it seems that waiting for the next generation to arrive in quantity may be the prudent course. The high-end of the notebook market is undergoing a transition to the 486SL processor....

- Price seems to be an overriding design issue for vendors at this time. There are many new notebook computers with 386 processors and monochrome screens priced at or under $2,000. After looking at several of these machines, including the new monochrome Compaq Conturas, I am mildly disappointed. The ones I've tested have all been serviceable, but the screens are not setting any technological standards. Some of the other features, such as the case and keyboard quality, are only mediocre.
- The most exciting new notebook capability is color screens. The big issue here is the difference between the active (a transistor for every screen pixel/color) and the passive (colors generated as for a CRT) technologies. No one disputes that an active matrix is the better technologically, but it's far more expensive. In mid-October, fully-configured, active color notebooks from Toshiba and Compaq were list-priced in the $5,000 range. Street prices on the passive machines at the same time were running closer to $3,000. At those price points, it seems that most of the improvement in visibility and usability is delivered by moving from a monochrome monitor to a passive color screen, while most of the price increase is in the move from passive to active.

Towards the end of October, a number of announcements from IBM, Toshiba, and Compaq seemed to indicate that a 386-based color notebook would be priced in the mid-$3,000 range for the

active monitor, and in the low $2,000s for passive. From what I've seen, at those price levels, the value/price difference between the two technologies seems logical. However, the key phrase here is *"from what I've seen."* I have yet to find a live sample of either the Color Compaq Contura or the Toshiba T1850C. Since the technology and price on machines such as these are changing almost on a weekly basis, dealers aren't carrying any in stock for fear of being stuck with obsolete models.

Further News:

- Beginning in October, ads began running for a new IBM Thinkpad notebook. It features a 25 MHz 486SL chip with speed doubling internally to 50 MHz, an active matrix color screen, and an embedded mouse control feature, all at a list price of $4,300! Let's see, what will be the street price? In the two weeks since it has been announced, I haven't been able to find any dealer that has a demonstration model. This Thinkpad is important because it sets a new price/value point in this market. This is a product positioning that we haven't seen from IBM for the last few years. Even though you can't find or buy one just yet, the Thinkpad has already forced Compaq to lower the price on its 386 LTE color laptop.
- By the first week of November, stories about new Compaq and Toshiba machines featuring the 486SL (low power) processor were surfacing. In other words, by the time you're reading this, you will be able to purchase a 486-based machine at the same price point that 386s were available a month ago.

...At under $2,000 each, this [the Toshiba T2200] represents a good value for a machine of high quality....

What to do?

Currently, the quality standard for laptops is the active matrix Compaq Color LTE Lite mentioned here. It has a superb screen that really eliminates the need for an external VGA monitor, uses a NiHD battery, offers an optional in-board fax/modem capability, can be expanded to 20 MB of DRAM, has a 120 MB hard drive, and has a track ball built right into the machine. The imbedded track ball concept, first seen in Apple Powerbooks, has been copied by very few 386 notebook vendors.

The Compaq's track ball is built into the screen panel with buttons on the back side of the panel. Though I love this design, it might not please some left-handers (sorry southpaws). Another advantage of the Compaq LTE is that it has been produced in adequate numbers so that I've actually seen and used some.

Temporarily, at DCI, we've made the decision to acquire several more of Toshiba T2200s for staff members who want portable computing. At under $2,000 each, this represents a good value for a machine of high quality. One of these machines with 80 MB of hard disk will be adequate for the upcoming computer screen show I'll be running at DATABASE WORLD in Chicago this December.

For an upgrade, it seems that waiting for the next generation to arrive in quantity may be the prudent course. The high-end of the notebook market is undergoing a transition to the 486SL processor. This chip runs at twice the speed of high-end 386s, and is available in 3.3 volt form.

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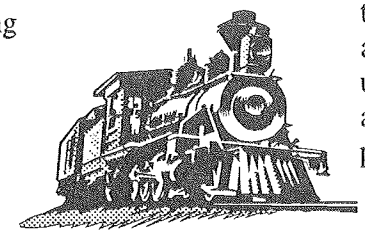
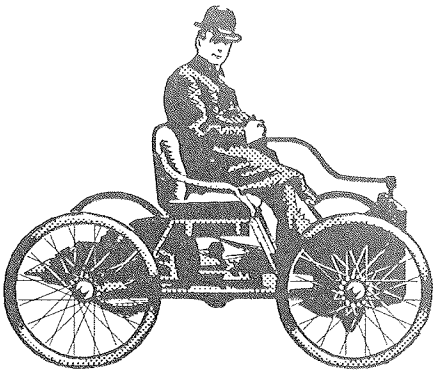
The Last Paradigm

I recently received an invitation from an old friend, Orland Larsen of Hewlett Packard, to prepare a keynote presentation for the 1993 Hewlett Packard User Conference. As we discussed possible subjects, the title "The Last Paradigm" came to mind. Orly asked what I meant by the title. My reply was that the industry's current transition to downsized, distributed, network-based computing was the final step in the evolution of computing architectures.

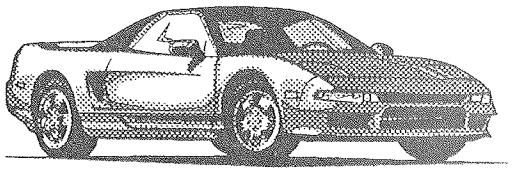
If that last statement sounds presumptuous, consider that there exists much history which indicates that the IS industry is in the final stages of an evolution. Certainly, we can look at power generation and manufacturing for analogous support of this assertion: one hundred years ago, our ancestors built mills on rivers to tap into the potential power of rushing water. That power was harnessed by paddle wheels and brought indoors through large crankshafts. At necessary points, power was taken off the main crankshaft by mechanical means. This example certainly seems analogous to time-shared computer systems; ultimately, electricity has become the means for effective, potential power distribution. The large shared engines and motors of the mill days have given way to millions of small electric motors applying power precisely to where it's needed is comparable to the concept of placing personal computers where tasks need to be accomplished using electricity and networks to provide the distribution and connection means.





...As the migration to this new (and final) paradigm proceeds, the focus of the computer industry's attention will shift from the computer high priests and technical specialists towards the end-business users who can turn the computer into a competitive business advantage...

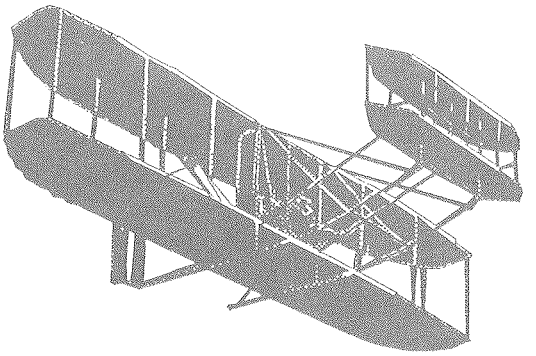
Another analogy can be made by looking at our transportation system. Just over a century ago, the primary form of personal transportation was stagecoach over dirt roads. This style of transportation was slow and employed low technology, bringing to mind the first computers used in the early 1960s, such as the Bendix G-15 and IBM 7090. Those machines could only run one job at a time and certainly employed low levels of technology by today's standards.



Early stagecoach travel was eventually supplanted by a powerful new technology–the railroad. By making massive investments in

centralized group approaches, railroads allowed much faster and more comfortable travel. But travel wasn't flexible and, of course, the railroad needed specialized technicians (engineers, conductors, etc.) for support. I can see here a strong similarity to time-shared mainframes with their expensive systems and support programming staff.

The railroad was, in turn, supplanted by personal autos. At first the car wasn't much of a challenger because no infrastructure existed to support automobile travel. Abandoned roads had to be rebuilt and designed for car travel. However, once the infrastructure was in place, automobile travel quickly became king, even though it was significantly more expensive than riding the rails! The expense didn't matter as much as the added convenience of personal travel. It doesn't take too much imagination to see the parallel of PCs to automobiles and networks to the roads that allow the car to dominate personal travel.



It is noteworthy that I am writing this article while flying in a plane. Where does the plane fit into this story? No one is saying that all future computing will be on PCs. This is because, in the future as in the past, there will still be the need for small, medium, and large computers. In this scenario, the plane can be analogized as the supercomputer of transportation. There will always exist high-requirement jobs whose completion will require large, multi-tasking machines that can support many users concurrently.

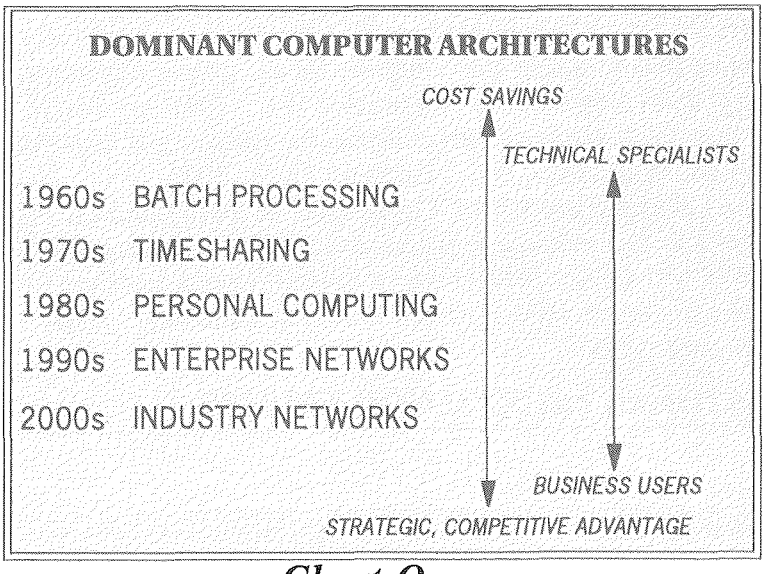


Chart One

Chart one visually depicts the evolution of computing over this half-century. We've come from the era of batch processing, through time sharing, into personal computing. We are now entering the era of network-based enterprise-wide client/server computing. I believe that this is only a stepping stone on the road to expansion of networks from company-wide status to industry-wide status. By the turn of the century, it will be common for leading-edge firms to be electronically connected to their suppliers and customers in huge network fabrics. As the migration to this new (and final) paradigm proceeds, the focus of the computer industry's attention will shift from the computer high priests and technical specialists towards the end-business users who can turn the computer into a competitive business advantage.

I, for one, can't wait. This new era is more fun and more valuable than anything computing has done for end-users in the past. *GS*

Notebooks, The Next Chapter

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This lower power requirement will give batteries longer life (while it keeps your lap cooler!). AST, Compaq, and Toshiba have already announced machines for delivery this year that feature a 486 processor with 120 to 209 MB hard drive capacity. This upcoming transition is probably the major reason why I can't find any of the high-end 386 machines at dealers. The dealers don't want to get stuck with inventory as the market moves to new higher end capabilities.

As soon as I can get my hands on some of the new passive and active screen color machines, I will choose one for my home office. Of course, that 25C/LTE is a mighty compelling machine at its new low price! I wonder if anyone is discounting it? I even wonder if anyone will sell it at the new list price–several calls made to resellers on November 11 didn't turn up one who even knew of the price reduction. Stay tuned. *GS*

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UPCOMING downsizing Events...

DOWNSIZING EXPO, being held in Chicago, February 16-18, 1992, will be co-chaired by ***Schussel's Downsizing Journal*** Editor George Schussel, and Larry DeBoever of Tucker/DeBoever Technologies. The conference portion has been expanded to include: The Downsizing Conference, The Interoperability Conference, The Business Re-Engineering Conference. There will be over 100 exhibitors on the exposition floor, as well as several dozen renown conference keynote speakers including: William Zachmann, John Soyring, Esther Dyson, and Robert McDowell.

Being offered in both January and February are two of DCI's most popular downsizing seminars: **Cheryl Currid: Managing Downsizing** and Herbert Edelstein's **Implementing Client/Server Applications and Distributing Data**. Currid will be showing how to assess your company for the proper implementation of downsized systems in Boston, January 14-15, 1993, and in Washington D.C., February 24-15, 1993. Edelstein's course on the pragmatic "how-to's" involved with client/server systems and distributed data will be in Boston, January 12-13, 1993, and Washington D.C., February 22-23, 1993.

Richard **Finkelstein's Practical Guide to Client/Server DBMS Computing**, in San Francisco, February 23-24 1993, is an in-depth study of the tools and techniques that are necessary in implementing a successful client/server application. Finkelstein will discuss the features of several popular database servers including: Microsoft/Sybase SQL Server, Oracle, IBM Database Manager, SQLBase, Ingres, Informix, Interbase, Informix, NetWare SQL, and XDB.