

The Magazine Formerly Known as OTJ

# Oracle

The Independent Voice of the Oracle™ Community

New Name, New Look  
Now Monthly!

## Avoiding System Bottlenecks

### New Columns:

- Dear Sysop
- Inside Larry's Brain

Case Study:  
The EPA  
Chooses Oracle

**EXPANDED**  
Product News Section



# Review

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## FEATURES

### 10 Application Tuning, Part 1

By Roger Snowden

Part 1 of this three-part series steps you through the application tuning process, showing you exactly what you should be tuning and why.

### 18 The EPA Implements Oracle

By Lawrence James

How the EPA used Oracle's Procedural Gateway to move legacy mainframe applications to emerging client/server systems.

### 28 PL/SQL Coding Guidelines

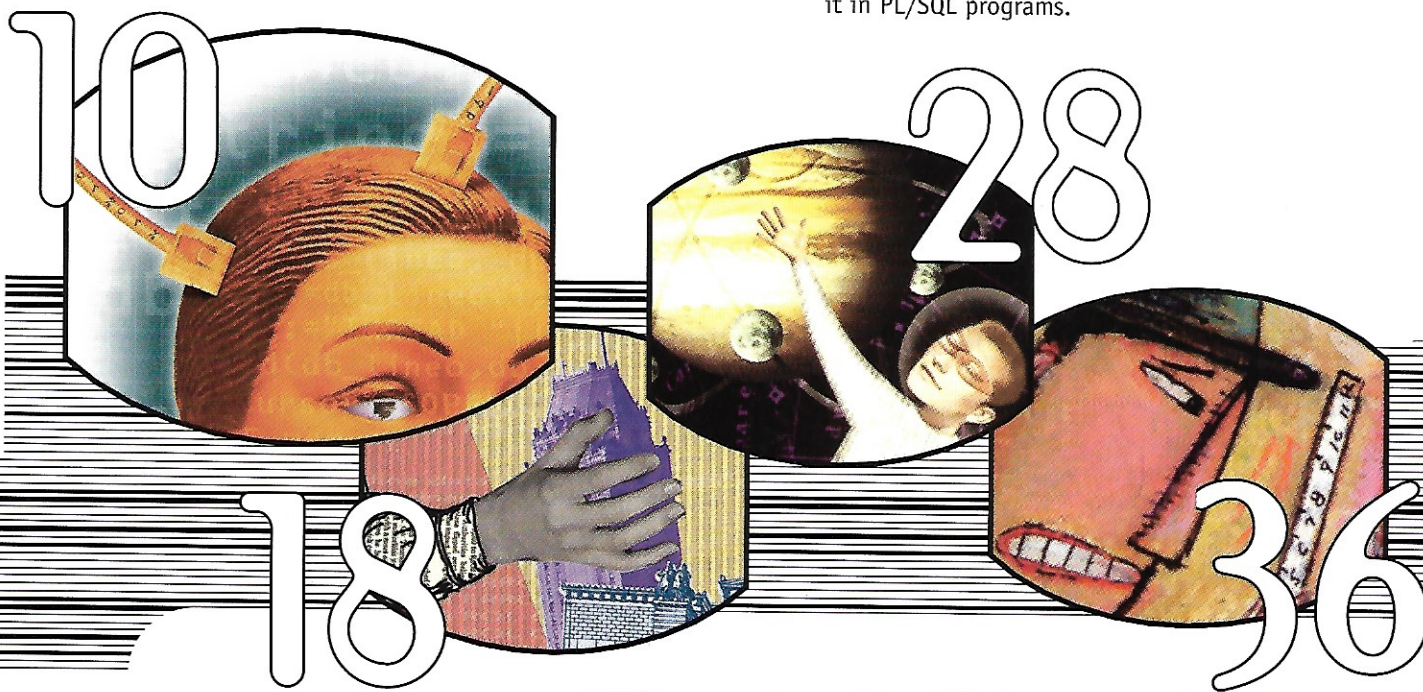
By Michael R. Ault

Standards for PL/SQL coding that can help you write code that is easier to understand and maintain.

### 36 Implementing DECODE for PL/SQL

By Steven Feuerstein

Steve reminds us all just how useful DECODE is and just how nice it would be to be able to use it in PL/SQL programs.



## COLUMNS

7 Dear Sysop  
By Michael R. Ault

48 Inside Larry's Brain  
By J. Hughlings Jackson

## DEPARTMENTS

- 4 Editor's Page
- 5 Letters/Events
- 6 Business News
- 43 Overheard at the Show
- 44 Product News

Cover Illustration by: John Ueland



# EDITOR'S note

By Kathleen O'Connor

Did you notice when it happened? When was the precise moment that computer conference keynote speeches and product launches became less like technical newsworthy events and more like rock 'n' roll happenings? It may be hard to track, but Bob Cringley — former gossip columnist for *InfoWorld*, veteran of 19 years in the personal computer industry (having been employee #12 at Apple), former Stanford University professor, and author and TV star — offers insight into the evolution of the computer industry in his PBS miniseries "Triumph of the Nerds," based on his best-selling book *Accidental Empires: How the Boys of Silicon Valley Make Their Millions, Battle Foreign Competition and Still Can't Get a Date*. Mr. Cringley uses his acerbic wit to chronicle the people who created, thwarted, copied, back-stabbed, re-created, and bullied their pet projects to prominence (including Bill Gates, Steven Jobs, Paul Allen, and Larry Ellison). To find out when this program will be rebroadcast in your area, check out [www.pbs.org/nerds](http://www.pbs.org/nerds). This site also includes:

- *History of the Computer* — a brief timeline outlining the history of the personal computer and the people who shaped it
- *Who Are These Nerds?* — stats and facts about some of your favorite nerds from the television program
- *Can You Guess the Computer?* — an interactive "pick the computer" game that lets you test your nerd quotient
- *The TV Transcript* — a three-part transcript from the television program

Oh, by the way, welcome to *OReview*, the redesigned and renamed *OTJ*. The new name and design herald a more frequent publication (11 times in 1997) and an expanded editorial vision. Our original editorial charter is still firmly in place. As did *OTJ*, *OReview* supplies you with the information you need to tune, maintain, and manage your Oracle environment. *OReview* continues to offer unbiased technical solutions for Oracle product users, but now we also provide a more strategic (and sometimes more tongue-in-cheek) view of your Oracle environment. New columns in this issue include:

- *PL/SQL Guru* — Written by Steven Feuerstein, the leading PL/SQL authority, this column offers real-life examples and technical tips on how to write optimal PL/SQL code.
- *Dear Sysop* — Written by the Mike Ault, the Sysop of the ORAUSER (the Oracle Users Support forum from IOUG) and a frequent contributor to the ORASUPP forum (the Oracle Users Support forum from Oracle Corp.), this column offers timely, practical tips on implementing, developing, and managing your Oracle systems.
- *Inside Larry's Brain* — Written by a source close to the Wizard of Oracle, this column offers a peek at what's really going on in Mr. Eloquent's head.

Within the next few months, be on the lookout for the following upcoming columns:

- *The Strategist* — a look ahead to where you need to be and what you need to do to keep your Oracle system and your company competitive
- *The Tool Box* — sage advice on best practices for developing applications for your Oracle environment, or for your heterogeneous environment, focusing on a different development tool each month; it will also look at how to develop Web-based applications
- *The Developer* — a look at a new Oracle or third-party tool, including Developer/2000, Forms, and Reports; practical advice on tools you can use to maximize your Oracle environment

Your comments about the redesign, the new name, and the expanded editorial focus are welcome. You can contact me anytime at 415.655.4243 or via email at [koconnor@mfi.com](mailto:koconnor@mfi.com).



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PRINTED IN THE USA

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# The EPA Implements Oracle

How the EPA used Oracle's Procedural Gateway to move from legacy mainframe applications to emerging client/server systems.

By Lawrence James

Like many large organizations, the U.S. Environmental Protection Agency (EPA) has numerous information systems spanning decades of system development methodologies. Unable to afford the luxury of reengineering everything, interfaces between old and new systems are often a challenge. When the agency's newest national client/server application, the Integrated Contracts Management System (ICMS), needed to interface with the mainframe financial system, the EPA decided to look at some new options. The EPA chose Oracle's Procedural Gateway to integrate its legacy mainframe applications with emerging client/server

systems. My intention here is to go through the experience of actually using the gateway for readers who are considering it or are unaware of what the gateway could be doing for them in terms of integrating mainframe applications with client/server.

## The EPA's Architecture

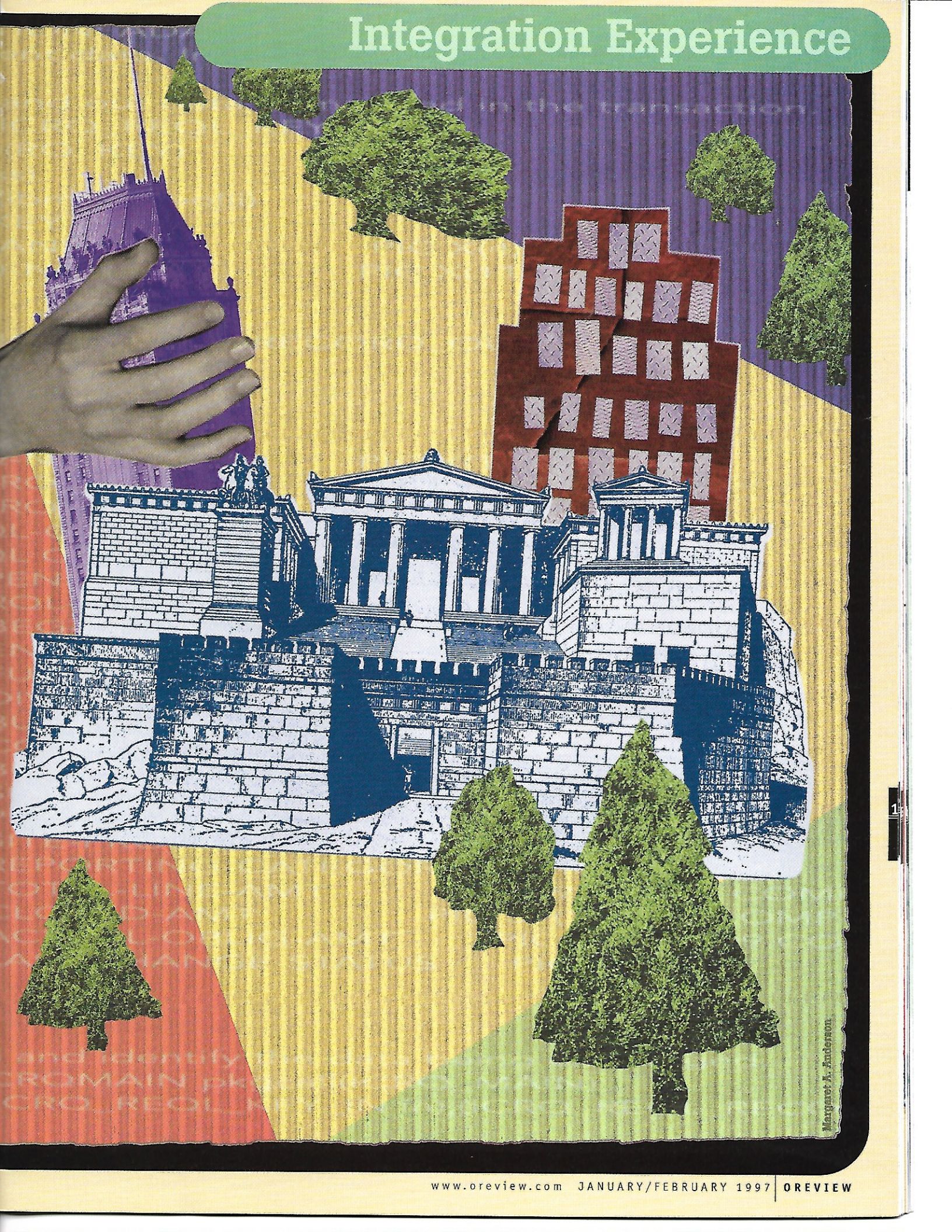
The EPA's financial system – the Integrated Financial Management System (IFMS) – is a customized version of American Management Systems' government financial package, Federal Financial Systems. Originally developed for VSAM files, the IFMS was ported to Software AG's Adabas database.





# Integration Experience

...in the transaction



1

Margaret A. Anderson



# The EPA Implements Oracle

The application runs using CICS and Cobol on an IBM MVS mainframe. The design is what you would expect in a typical VSAM application: a classic legacy application, heavily based on data flow modeling and hierarchical data structures.

At the other extreme, the ICMS is completely client/server-based. It is developed with a variety of software development tools, including Oracle's Developer/2000, Sybase's PowerBuilder, and C, with some application components tightly integrated with Word Perfect word processing and PC Docs document management. Back-ending the system is a distributed Oracle database environment on both NetWare and Unix servers. Data is managed across regional sites both directly within the applications and via Oracle replication options.

## Implementing Oracle's Procedural Gateway

Because the EPA already has a number of batch interfaces moving copies of data between applications, the project managers decided to explore some new options for OLTP-style interfaces. After some mediocre experiences with "screen scraper" solutions, they chose Oracle's Procedural Gateway for APPC (Advanced Program to Program Communications).

Oracle's Procedural Gateway for APPC lets developers create Oracle stored procedures in Oracle's proprietary SQL extension PL/SQL, which on the other end ultimately execute CICS transactions on the MVS mainframe using IBM's SNA APPC. This process is transparent to the developer's location and code. Translation of

character sets is automatically provided for string data. Numeric data is also translated between Oracle number data types and various Cobol II data definitions, including the ever-popular packed binary coded decimal, also known as "comp-3."

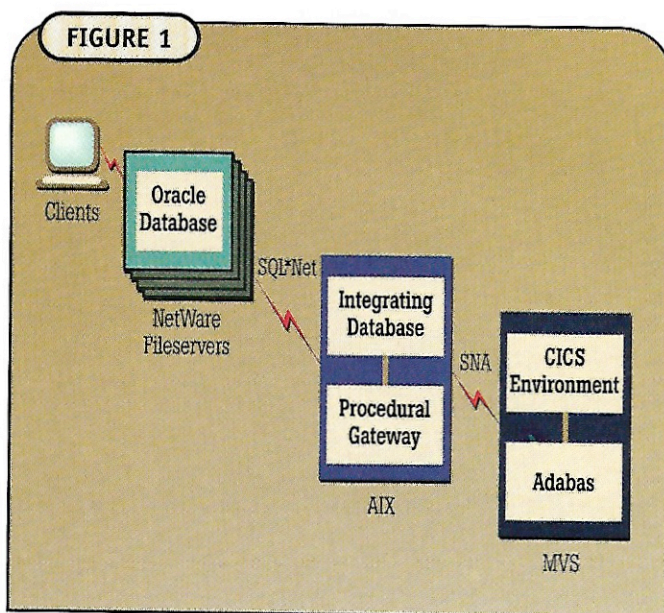
In addition to the existing platforms, the gateway requires an integrating platform that must support TCP/IP (the protocol the EPA uses on its wide area network) and the SNA protocol with the MVS mainframe. At the time the EPA began working with the gateway, the only machine supporting both was IBM's RS6000 line. Since then other Unix vendors began offering this support. Figure 1 illustrates the procedural gateway components at the EPA and their interconnectivity. Local applications use the gateway by calling remote stored procedures on the integrating database through database links. This can either be directly from the application or from within local stored procedures. The stored procedures on the integrating database are then passed to the gateway and emerge on the SNA side of the network as APPC calls to the IBM mainframe.

The Procedural Gateway installs entirely on the integrating platform. There is no gateway-specific code on the MVS mainframe or on the local Oracle databases. Communication between the integrating platform and the mainframe uses only SNA, not SQL\*Net. Thus the transactions developed in the CICS environment are standard CICS transactions. No special code needs to be linked or called in the transactions. On the opposite end, standard Oracle PL/SQL code is used on the local Oracle database servers to communicate to the gateway platform.

Because of this configuration, many options are available on either side of the gateway. Any Oracle database or development tool that can use Oracle stored procedures on any platform can communicate with the gateway. On the back end, any other platform supporting CICS transactions, such as AS400 and VSE, can be called. Additionally, IMS and Computer Associate's IDMS can be called directly via APPC without the CICS component. At the EPA, the mainframe environment is MVS and the bulk of the administrative systems on the mainframe use Adabas to manage their data. Therefore, for the EPA, transactions had to be developed in Cobol.

Knowing that ultimately this gateway had to be managed like any other system environment, the EPA installed three complete gateway environments: development, quality, and production. Like Oracle databases, the gateway also supports multiple instances on a single machine. This configuration required three instances of the integrating database plus three instances of the gateway. Individual SNA sideprofiles were used to connect each environment to its CICS counterpart on the mainframe. This configuration also allowed the gateway tracing options to be turned on by default in the development and quality environments.

Like many of Oracle's gateway products, an integrating database is required. The integrating database is a standard Oracle database install. The database is provided as part of the procedural gateway software package but is restricted to using the database for gateway stored procedures only. This restriction means that user data cannot be stored on the integrating database. (This issue applies only



**The procedural gateway components at the EPA and their interconnectivity.**



**LISTING 1. An example PGAU script generated at the EPA. To create a specific gateway transaction, you begin by providing definitions for the mainframe OLTP, the data to be exchanged, and the communications to be used. You do this by writing a script for the PGAU. The PGAU then uses that script as input and generates a PL/SQL package script. This PL/SQL script is executed on the integrating database and the package is created. You then execute the procedures within this package to setup your specific transaction on the gateway.**

```

# NAME: ifmsrq.ctl
# DESCRIPTION: ADABAS query returning financial
# commitment data. Input is a commitment key.

# Define in and out data items used in the transaction.
define data ICRQ_REQL_KEY_IN
  plsdbname(RQ_KEY)
  usage(pass)
  language(ibmvscobolii)
  (01 RQ-KEY
    05 TRANS-ID          PIC X(4).
    05 RQ-NO             PIC X(11).
  );

define data ICRQ_REQL_RECORD_OUT
  plsdbname(RQ_REC)
  usage(pass)
  language(ibmvscobolii)
  (01 RQ-OUT.
    05 RQ-NO             PIC X(11).
    05 ERROR-NO         PIC 9(3).
    05 ERROR-MSG        PIC X(20).
    05 RQL-CNT          PIC 9(3).
    05 RQL OCCURS 1 TO 50 TIMES
      DEPENDING ON RQL-CNT.
    10 RQL-LINE-NO      PIC X(3).
    10 BEG-BUDGET-FY    PIC X(2).
    10 END-BUDGET-FY    PIC X(2).
    10 FUND              PIC X(6).
    10 DIVISION-RPIO    PIC X(4).
    10 BUDGET-ORGANIZATION PIC X(7).
    10 COST-ORGANIZATION PIC X(7).
    10 BUDGET-OBJECT-CODE PIC X(4).
    10 SUB-OBJECT       PIC X(2).
    10 PROGRAM-ELEMENT  PIC X(9).
    10 SITE-PROJECT     PIC X(8).
    10 REPORTING-CATEGORY PIC X(4).
    10 TOTAL-LINE-AMT   PIC S9(13)V99 COMP-3.
    10 CLOSED-AMT       PIC S9(13)V99 COMP-3.
    10 ACTUAL-OBLIG-AMT PIC S9(13)V99 COMP-3.
    10 LAST-CHANGE-STATUS PIC X(1).
  );

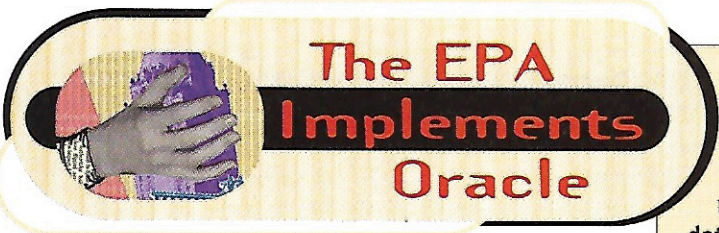
# Define call and identify the data being exchanged.
define call ICRQMAIN pkgcall(ICRQ_MAIN)
  parms((ICRQ_REQL_KEY_IN in),(ICRQ_REQL_RECORD_OUT out));

# The transaction defines the SNA side profile and the CICS
# transaction to be called.
define transaction ICRQ call(ICRQMAIN)
  sideprofile(LU62SIDE) tpname(ICRQ) synclevel(0)
  nls_language("american_america.we8ebcdic37c");

# Generate tip procedures. This names the package and writes
# the scripts that will generate the package. The database
# link to the gateway is also specified here.
generate ICRQ pkgname(ICRQ) pganode(pgalink) outfile("icrq_pkg");

```





# The EPA Implements Oracle

to licensing; a full-use license for AIX can be used for the integrating database instead.) The actual database installed is fully functional. Oracle's procedural gateway component, like many of the company's gateways, resembles a database without the database functionality. It has the typical "init" file for parameters and communications between the integrating database, and the gateway is via database links. This functionality is also used to communicate between distributed Oracle databases.

The details of communicating with the mainframe OLTP, initializing, exchanging data, translating data, and terminating are complex and similar in nature for each call. Because of this similarity, one component of the procedural gateway is a code generator. This feature is the core element of what is called the Procedural Gateway Administration Utility, or PGAU. To create a specific gateway transaction, you begin by providing definitions for the mainframe OLTP, the data to be exchanged, and the communications to be used. You do this by writing a script for the PGAU; the PGAU then uses that script as input and generates a PL/SQL package script. This PL/SQL script is executed on the integrating database and the package is created. You then execute the procedures within this package to setup your specific transaction on the gateway. Listing 1 (page 21) shows an example of a PGAU script written at the EPA.

The results of the last step in Listing 1 will be two PL/SQL scripts, `icrq_pkg.pkh` for the PL/SQL package header and `icrq_pkg.pkb` for the PL/SQL package body, and a documentation file called `icrq_pkg.doc`. The package header and package body scripts are then run using any SQL execution tool, such as SQLPlus on the integrating database, to create the actual stored procedures. The documentation file contains the Oracle data definitions used as arguments to the procedures.

As seen in Listing 2, the Cobol data structure has been translated into Oracle data types. The elements of the repeating group are first defined as individual Oracle table data types. Then all of these data types are grouped together in a record definition. Finally, another record definition is used to contain the non-repeating data elements plus the record with the repeating data.

The resulting PL/SQL package `icrq`, defined by the package header and package body scripts, contains public declarations of these variable data types used in the transaction. These types can be referenced in the local applica-

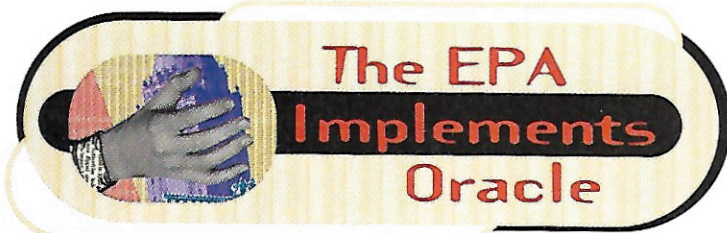
**Listing 2. Oracle data types generated. The elements of the repeating group are first defined as individual Oracle table data types. Then all of these data types are grouped together in a record definition. Finally, another record definition is used to contain the non-repeating data elements plus the record with the repeating data.**

```

TYPE RQL_LINE_NO_Tbl IS TABLE OF CHAR(3)
INDEX BY BINARY_INTEGER;
TYPE BEG_BUDGET_FY_Tbl IS TABLE OF CHAR(2)
INDEX BY BINARY_INTEGER;
TYPE END_BUDGET_FY_Tbl IS TABLE OF CHAR(2)
INDEX BY BINARY_INTEGER;
TYPE FUND_Tbl IS TABLE OF CHAR(6)
INDEX BY BINARY_INTEGER;
TYPE DIVISION_RPIO_Tbl IS TABLE OF CHAR(4)
INDEX BY BINARY_INTEGER;
TYPE BUDGET_ORGANIZATION_Tbl IS TABLE OF CHAR(7)
INDEX BY BINARY_INTEGER;
TYPE COST_ORGANIZATION_Tbl IS TABLE OF CHAR(7)
INDEX BY BINARY_INTEGER;
TYPE BUDGET_OBJECT_CODE_Tbl IS TABLE OF CHAR(4)
INDEX BY BINARY_INTEGER;
TYPE SUB_OBJECT_Tbl IS TABLE OF CHAR(2)
INDEX BY BINARY_INTEGER;
TYPE PROGRAM_ELEMENT_Tbl IS TABLE OF CHAR(9)
INDEX BY BINARY_INTEGER;
TYPE SITE_PROJECT_Tbl IS TABLE OF CHAR(8)
INDEX BY BINARY_INTEGER;
TYPE REPORTING_CATEGORY_Tbl IS TABLE OF CHAR(4)
INDEX BY BINARY_INTEGER;
TYPE TOTAL_LINE_AMT_Tbl IS TABLE OF NUMBER(15,2)
INDEX BY BINARY_INTEGER;
TYPE CLOSED_AMT_Tbl IS TABLE OF NUMBER(15,2)
INDEX BY BINARY_INTEGER;
TYPE ACTUAL_OBLIG_AMT_Tbl IS TABLE OF NUMBER(15,2)
INDEX BY BINARY_INTEGER;
TYPE LAST_CHANGE_STATUS_Tbl IS TABLE OF CHAR(1)
INDEX BY BINARY_INTEGER;
TYPE RQL_Typ IS RECORD (
RQL_LINE_NO          RQL_LINE_NO_Tbl,
BEG_BUDGET_FY        BEG_BUDGET_FY_Tbl,
END_BUDGET_FY        END_BUDGET_FY_Tbl,
FUND                 FUND_Tbl,
DIVISION_RPIO        DIVISION_RPIO_Tbl,
BUDGET_ORGANIZATION BUDGET_ORGANIZATION_Tbl,
COST_ORGANIZATION   COST_ORGANIZATION_Tbl,
BUDGET_OBJECT_CODE  BUDGET_OBJECT_CODE_Tbl,
SUB_OBJECT           SUB_OBJECT_Tbl,
PROGRAM_ELEMENT      PROGRAM_ELEMENT_Tbl,
SITE_PROJECT         SITE_PROJECT_Tbl,
REPORTING_CATEGORY  REPORTING_CATEGORY_Tbl,
TOTAL_LINE_AMT      TOTAL_LINE_AMT_Tbl,
CLOSED_AMT          CLOSED_AMT_Tbl,
ACTUAL_OBLIG_AMT    ACTUAL_OBLIG_AMT_Tbl,
LAST_CHANGE_STATUS  LAST_CHANGE_STATUS_Tbl);
TYPE RQ_REC_Typ IS RECORD (
RQ_NO                CHAR(11),
ERROR_NO             NUMBER(3,0),
ERROR_MSG            CHAR(20),
RQL_CNT              NUMBER(3,0),
RQL                  RQL_Typ);

```





# The EPA Implements Oracle

tion code to avoid redefining the structure of these complex records. Referring to remote definitions looks like:

```
rq_record icrq.rq_rec_type@<database link>
```

The data is referred to using dot notation to identify the levels. For example:

```
rq_record.rq1.total_line_amt(subscript)
```

The gateway supports the use of repeating groups in both the input and output record definitions. Placing the repeating group at the end of the record and using the Cobol `DEPENDING ON` clause lets you transfer only the actual number of populated occurrences rather than the maximum. (For those of you not versed in Cobol, this is how variable dimension arrays are defined in Cobol.) This setup results in data transfers that contain only real data and are not padded out to a fixed length.

The Cobol program is coded using standard CICS calls. Although too long to include here, Listing 3 shows its general outline. For read transactions, these programs will be simple. The CICS send and receive the in-and-out record structures that were defined earlier in the PGAU script. It is up to the developers to ensure that these structures match up properly. The example contains an error code and error message in the return record indicating if a matching record is found. It is also used to pass along other errors — for example, when the Adabas database is not available. For transactions that update mainframe data, you may wish to have more exhaustive edit checks on the incoming data.

Calling the transaction from the application side is quite simple. You make three basic calls: initialize, exchange data, and terminate. Initializing the transaction establishes a conversation with the CICS environment; it also returns a unique conversation number back to the caller. The number serves to identify the specific conversation initiated with CICS and is subsequently used when exchanging data and terminating the conversation. This

### Listing 3. Cobol transaction pseudocode.

```
Standard Cobol stuff at the top.
Initialize any variables needed.
EXEC CICS receive into local variables defined
  for the input key.
Look up header and detail records in ADABAS.
EXEC CICS send local variables back to the
  caller.
Terminate.
```

reuse permits multiple simultaneous users of the transaction, each with their own data areas.

The next step is to exchange data with the transaction. Typically data will be exchanged in both directions, but this is not required. For read-style transactions, data going to the CICS transaction will most likely be primary-key components, with record structures returned. Write transactions are the opposite, with a record of data going to the CICS transaction and only error data elements returned.



## Calling the transaction from the application side is simple.

**You make three basic calls:**

**initialize, exchange data,  
and terminate.**



Finally, the conversation is terminated from the application side. The termination procedure accepts a second argument to indicate if the termination is normal or abnormal. When error exceptions occur, the abnormal termination is used. Listing 4 shows an example calling the transaction defined in the earlier listings. This example is designed to be executed on a local database calling the integrating database using the `pga_prod` database link. It uses the remote data definition to define the returning record. The transaction name in CICS is also passed as the first four characters of the input key. This transaction is used at the EPA as part of its machine-usage cost tracking on the mainframe.

Because these three basic steps are consistent from transaction to transaction, the EPA's design simplified the task even further by creating a single stored procedure on the integrating database that makes all three calls. The application developer uses the gateway via a single procedure call that includes the data elements to be exchanged. The initialization and termination process is concealed from the application developer, who merely creates the local variables and makes the single procedure call.



To date, the EPA has developed transactions that return data from the mainframe and transactions that update data on the mainframe. All of these transactions are "one-shot" transactions: Conversation is established, data is exchanged, the conversation is over. The EPA's gateway also supports persistent transactions. Simply put, a persistent transaction is a transaction with multiple data exchanges. The number of exchanges and the data exchanged can be controlled dynamically in the programs at either end of the gateway.

The use of a persistent transaction can be crafted into a very powerful development tool. In a simple scenario, it can be used to pass back multiple records by calling the transaction repeatedly for data until an "end of file" flag is set. A more complex arrangement would be a type of command processor on the mainframe side that accepts all kinds of input structures from the application and performs a variety of tasks based on the data received — in essence, a custom mainframe server.

## Debugging and PL/SQL Headaches

It is easy for me to sit here and relate to you how wonderfully this gateway is working at the EPA today. Be assured, however, that de-

bugging in this environment is a major headache. The only tools available are tracing facilities at the three major stages of the process: the procedural gateway, VTAM, and CICS. It is doubtful that many shops will have a single person who can develop code for both ends. Even fewer shops will have a single person who can expertly trace the process from beginning to end. Be prepared for some frustration during development.

The extensive use of Oracle's PL/SQL version 2.x data types will also produce some difficulties. One common problem results from the table and the record types. These data types were not available in version 1.x of PL/SQL, and few development tools — including Oracle's own Developer/2000 — can use them. The EPA's solution was to use additional stored procedures in the database to move the data into simpler data types before returning them to the application. This task is not too difficult if there are no repeating groups. (Repeating groups require the application to call the stored procedure multiple times to get all of the occurrences.)

To make matters more difficult, the behavior of some of these new data types is not completely predictable. Even as late as Oracle7 version 7.2, some bugs are still associated with these new data types. The behavior includes corruption or loss of data without the triggering of an error condition. These problems seem to manifest themselves as a certain level of data complexity is reached. Presumably Oracle will try to fix some of these problems. Supposedly Oracle7.3 fixes some of the PL/SQL bugs, but if you investigate you will find that, in general, the PL/SQL group has a major backlog of problems. Fortunately, the EPA encountered all of these problems during testing and development, and when problems surfaced they were specific to a particular code arrangement. If a functional work-around was devised, it remained stable in production.

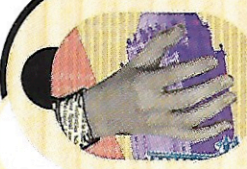
Because data is stored in both the LAN and mainframe environments, there are potential data consistency problems. In the gateway version running at the EPA, distributed transactions are not supported. This lack of support is further complicated by the fact that the gateway does not know whether the transaction changes mainframe data. An initialization parameter can be set for the entire gateway instance to make it read-only. When set in read-only mode, the gateway assumes that no transactions are update transactions. That is not to say that they cannot be updates. Oracle recommends operating two production instances of the gateway: one in read-only mode and the other in update mode. Then you can call the mainframe transactions from the appropriate gateway instance.

**Listing 4. An example calling the transaction defined in the earlier listings. This example is designed to be executed on a local database calling the integrating database using the pga\_prod database link. This is used at the EPA as part of its machine usage cost tracking on the mainframe.**

```
DECLARE
  rq_rec   icrq.rq_rec_typ@pga_prod
  rq_key   char(15);
  trannum  integer := 0;
  retcode  integer := 0;
  term     integer := 0;

BEGIN
  -- add cics trans id and a key
  rq_key := 'ICRQ' || '9655KA0002';
  -- init trans
  retcode := icrq.icrq_init@pga_prod(trannum);
  -- exchange data
  retcode := icrq.icrq_main@pga_prod(trannum, rq_key, rq_rec);
  -- close trans
  term := 1;
  retcode := icrq.icrq_term@pga_prod(trannum,0);
  -- At this point the rq_rec record variable contains the
  -- results of the lookup in Adabas on the mainframe.
  .
  .
EXCEPTION
  WHEN others THEN
    IF term = 0 then
      retcode := icrq.icrq_term@pga_prod(trannum,1);
    END IF;
  RAISE;
END;
```





# The EPA Implements Oracle

For now, the EPA chose not to operate two gateway instances. Because distributed transactions are not supported, when you are in the update mode the gateway requires that there be no uncommitted work at any Oracle database before calling the gateway. You must issue a commit before performing any other updates. This procedure still creates a potential data consistency problem and also places unneeded constraints on the developer. The EPA is currently fooling the gateway by telling it that all transactions are read-only; this trick creates the possibility of data inconsistencies. Our present solution is to time local database commits as close to gateway update transactions as possible. Once two-phase commit is functional, this problem will be readdressed.

## Performance and Security Issues

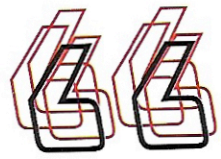
So far, performance has been outstanding. Transactions typically complete in less than two seconds, even when the client application and local database are at another site and the communication to the gateway is via a T1 wide area network. In the long run, we expect to reduce mainframe resource requirements because use of the gateway will lower interactive use of mainframe applications. We are currently watching the following areas for performance problems: the wide area communications, resource utilization on the RS6000 machine, and the SNA link between the RS6000 and the mainframe.

As with any other large organization with thousands of internal users and many public-access systems, the EPA must pay close attention to security risks. Also, the EPA's LAN environment grew up outside of the mainframe environment, and there is no coordination between mainframe user IDs and LAN user IDs. Many LAN users do not even have IDs on the mainframe. Compound this deficiency with the fact that Oracle does not provide any serious security management features that span multiple databases, and proper security planning becomes complex.

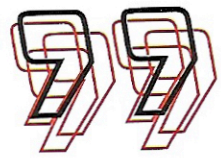
Careful planning of the gateway implementation is needed to prevent a security gap at any point along the chain. Because of the complexity of this environment, you may find that you need to spend extra time educating your security group so they can properly assess risks. It is possible to set up a secure environment, but you must keep the number of people who know the database link passwords to a minimum. Also, the database links should never be


set up as public. The EPA has achieved further security for the mainframe link by restricting the connection to the VTAM physical unit that is the integrating RS6000 platform and by housing that platform inside the controlled-access computer room with the mainframe.

The EPA's implementation of Oracle's Procedural Gateway is a success. We had many obstacles to overcome, but the final benefits far outweighed the initial costs. The gateway provides a robust tool to integrate legacy mainframe applications with emerging client/server systems. It enables the EPA to move data immediately among these disparate applications without waiting for



**Transactions typically complete in less than two seconds, even when the client application and local database are at another site and the communication to the gateway is via a T1 wide area network.**



cumbersome, prone-to-failure batch interfaces. Edit checks can be performed in realtime against data in mainframe systems. Edit failures on interfacing data can be shown to users immediately rather than setting up error-reporting business processes for batch interfaces. Developing and testing remain difficult, exacerbated by continued problems in PL/SQL, but this difficulty should lessen as Oracle improves PL/SQL 2.0 and its gateway products. 

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**Lawrence James** is currently a senior analyst with the U.S. Environmental Protection Agency in Research Triangle Park, North Carolina. He began working with Oracle products in 1985, and he continues to specialize in Oracle-based solutions. He has worked in a variety of government and commercial organizations as either an application developer or a database administrator.



# Dear SYSOP (continued from page 9)

the maximum value for the sequence that is used for the primary key, not the maximum date value:

```
SELECT col1,
       col2,
       col3
FROM sample_table
WHERE pk_seq = (
  SELECT MAX(pk_seq)
```

```
FROM sample_table b
WHERE a.col1 = b.col1)
ORDER BY col1;
```

One caveat on the above technique is that it may not be valid for parallel server configurations when each instance caches sequence numbers. Because most applications that use the parallel server option are generally failover or use one server for transaction processing and one for reporting, this sequence caching may not be a problem, but you need to consider it if you are using parallel server.

If you know that data is not deleted from the table (for instance, it grows forever), you can also use the maximum value of the pseudo-column ROWID as a way to pull the most recent value (if your table fits in one datafile). However, in an updatable table, the maximum ROWID may not always be the latest value inserted.

## Selected Download

My selected download for this column is "Interview Questions — Martin Ryan,

Mike Ault." From the ORAUSER forum library, search under my user ID as the contributor or search under the keyword "Interview." I make this suggestion for the perfectly selfish reason that I have been conducting interviews for TreCom (about 26 in the last three months). If you cannot answer a majority of the questions listed in this download, then you're not ready to apply for a middle or senior DBA or developer position. About four out of the 26 interviews I have performed so far were senior-level DBAs; the rest fell somewhere in the middle to lower level. If you plan on interviewing for an Oracle DBA or developer position, or if you need to interview candidates and sift the wheat from the chaff, then this download is an excellent choice. 🗨

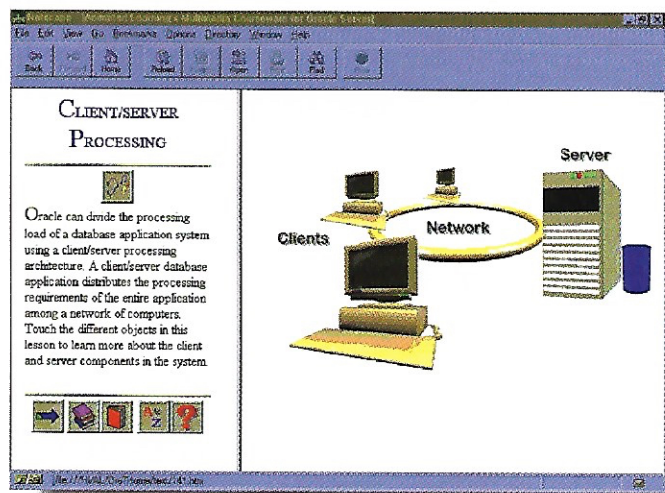
You can reach Mike in his incarnation as ORAUSER Sysop for the RDBMS and Administration sections by posting a message to SYSOP in either of these sections. You can also reach him via email at [73564.544@compuserve.com](mailto:73564.544@compuserve.com).

### LISTING 4. Sample query output.

PARAMETER	VALUE
NLS_LANGUAGE	AMERICAN
NLS_TERRITORY	AMERICA
NLS_CURRENCY	\$
NLS_ISO_CURRENCY	AMERICA
NLS_NUMERIC_CHARACTERS	.,
NLS_DATE_FORMAT	DD-MON-YY
NLS_DATE_LANGUAGE	AMERICAN
NLS_CHARACTERSET	US7ASCII
NLS_SORT	BINARY
NLS_CALENDAR	GREGORIAN
NLS_RDBMS_VERSION	7.2.3.0.0

11 rows selected.

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CIRCLE 5 ON READER SERVICE CARD



# Product News

By Kathleen O'Connor

## FREE TRAINING TEST DRIVE

**ANIMATED LEARNING INC.**, developer of multimedia courseware for client/server technology, announced a new release of its comprehensive training kit for the Oracle7 relational database server. This revolutionary courseware kit combines more than 50 hours of training material using text, audio, 3D graphics, and animation to deliver visually stimulating training material.

Animated Learning's courseware is a unique alternative or supplement to traditional classroom training. The multimedia courseware makes extensive use of graphics to present visually the complicated topics of administering and developing applications for database servers such as Oracle7. Consequently, users learn job skills fast and retain what they learn for long periods of time.

Animated Learning's **Multimedia Courseware Kit for Oracle Server** consists of 15 separate training modules. Half of the modules in the kit are for the database administrator, the other half are for the application developer. All content within the Multimedia Courseware Kit for Oracle

Server is Web-ready. Users can experience the courseware using Web browsers such as Netscape Navigator or Microsoft Internet Explorer. Complete audio narration is available for all courseware text through the use of the Progressive Network's Real-Audio player.

Two different licenses of Animated Learning's Multimedia Courseware Kit for Oracle Server will be available. A single-user CD-ROM sells for \$1999 (USA). An Intranet license, capable of training up to 25 concurrent users, sells for \$6999 (USA). Animated Learning also plans to offer low-cost subscription accessibility to the courseware directly from its Web site. A free test drive of the courseware is now available at [www.animatedlearning.com](http://www.animatedlearning.com). The current version of Animated Learning's Multimedia Courseware Kit for Oracle Server is now available as a Windows courseware kit. All modules in the new kit will be available late in the first quarter of 1997.

Contact *Animated Learning Inc.*, 408-688-7735 or [www.animatedlearning.com](http://www.animatedlearning.com).

## IN NOVEMBER AT ORACLE OPEN WORLD

**SAVANT CORP.** launched its beta release of **Q Diagnostic Center**, a database administration tool that enables rapid client/server problem diagnosis by system and database administrators. The Q Diagnostic Center provides an interesting, information-dense GUI summary of system resource usage that lets you quickly analyze system performance. Q is composed of the Q Viewer and the Q Diagnostic Engines for Oracle and Client PCs. The Diagnostic Engine for Oracle executes on any Oracle7.2 or 7.3 database. The Client Engine currently supports Windows 95 and NT platforms. The Q Viewer runs on Windows 95 or NT. Contact the company for pricing information.

*Savant Corp.*, 800-956-9541, 301-548-9610, fax 301-548-9619, or [www.savant-corp.com](http://www.savant-corp.com).

**PLATINUM TECHNOLOGY** announced **Enterprise DBA for Oracle**, a tool for enterprise database administration, alteration, and migration in het-

erogeneous client/server environments that allows DBAs to manage Oracle and other data types from a single workstation. It lets you automatically propagate changes to all related objects, propagate database changes across an enterprise, administer both Oracle and IBM DB2 for MVS simultaneously, and restart a function from the point at which a stop occurred, rather than having to repeat the entire process.

Enterprise DBA for Oracle currently supports Sybase SQL Server and DB2 for MVS (Microsoft SQL Server, Informix, DB2 Common Server, and DB2 PE support is planned for the second quarter of 1997). Client platform support includes Motif and Windows 95 and NT. Agent support is available for Unix, Windows NT, and MVS. Pricing is agent-based and starts at \$1200 for PC and Unix versions and \$16,000 for the MVS version.

Platinum also debuted its **Database Analyzer for Oracle**, a tool for structural analysis,

44



engine, letting users choose the

management, and dictionary reporting. It:

- has graphical displays of complex data such as table-spaces and database instances
- uses statistics collected from Oracle objects to measure and project trends, identify over-allocated tables, find the number of distinct keys in an index, and store all of this information in retrievable history tables
- reports only the data DBAs need by suppressing unwanted information; filters are user-definable
- automatically refreshes the statistics used by Oracle's cost-based optimizer

Database Analyzer for Oracle is compatible with Oracle7 and is available for the major Unix platforms. Prices start at \$2000 for a console and \$3300 for each agent.

These announcements bring the number of tools Platinum provides for Oracle7 environments to more than 30. *Platinum Technology Inc., 800-442-6861, 630-620-5000, or www.platinum.com.*

**COGNOS INC.** unveiled **HeadStarts Solutions for Oracle Financials version 3.0**, which gives Oracle Financials users immediate and easy access to the business intelligence data stored within their applications. The company also revealed that it has combined the **Oracle Express open API and PowerPlay version 5.0's PC-based multidimensional**

optimal platform for multidimensional processing, whether it be the PC for moderate amounts of data or the server for larger and more complex data sets. **HeadStarts for Oracle Financials** is free to current Cognos customers; a per-seat charge of \$150 is required for the link to Oracle Express. Contact the company for more pricing information.

*Cognos Inc., 613-738-1440, fax 613-738-0002, or www.cognos.com.*

**SYLVAIN FAUST INC.** released **SQL-Programmer 2.0**, the latest version of its programming development tool for back-end programming. This version provides full support for the Oracle7 relational database and offers server developers an intuitive user interface and extensive toolset for the development and maintenance of all programmable objects, such as stored procedures, triggers, functions, views, tables, indexes, and Oracle synonyms. **SQL-Programmer 2.0** now provides version-control support, as well as multiple simultaneous connections to Oracle and Sybase and Microsoft SQL Server.

**SQL-Programmer 2.0** is \$799 for a single-user license, which includes one DLL. An additional DLL is available for \$279. Licensed users of previous versions of **SQL-Programmer** can upgrade to version 2.0 for \$399. Multiple-user licenses are also available. Contact the company for more pricing information.

*Sylvain Faust Inc., 819-778-5045 ext. 152, fax 819-778-7943, or www.sfi-software.com.*

**THE DATABASE SOLUTIONS COMPANY** released **TPM 96 (32-Bit)**, an integrated suite of software tools with 32-bit functionality that proactively manages all performance aspects of the client/server database environment. It is fully compliant with Windows 95 and NT operating systems and uses realtime performance data to measure and analyze the client/server environment, forecast future needs, and tune database and application performance. You can use **TPM 96 (32-Bit)** with any Oracle or Sybase or Microsoft SQL Server database that uses **SQL\*Net, SNMP, or Open Client. TPM 96 (32-Bit)** includes **DBScope, Configuration Forecaster, DBTune, Control Center, DBMonitor, C/SMonitor, and CCAlarm.** Contact the company for pricing.

*The Database Solutions Company, 800-933-7688, 804-794-0354, fax 804-794-0813, or www.dbsol.com.*

**REVEALNET INC.** revealed its **PL/Vision Professional**, a comprehensive library of reusable prebuilt packages for accelerating PL/SQL application development. It includes a flexible code generator for creating PL/SQL packages, procedures, and functions, a DDL code generator, and a rollback and savepoint manager, commit manager, foreign-key manager, and compile error analyzer. **PL/Vision Professional** was developed by Steven Feuerstein, senior technology officer for **RevealNet** and

contributing columnist to this magazine. The product is licensed on a per-seat basis. The annual subscription fee of \$495 includes four quarterly upgrades plus full support.

*RevealNet Inc., 800-738-3254 or www.revealnet.com.*

**VERITAS SOFTWARE CORP.** announced its **Veritas ServerSuite Database Edition for Oracle**, which combines the performance of raw devices with the manageability of building Oracle databases on top of a file system. In addition, the product increases availability through RAID redundancy techniques, online administration, and failover capabilities.

**Veritas ServerSuite Database Edition for Oracle** incorporates **Veritas Quick I/O Database Accelerator**, which, in conjunction with **Veritas File System**, delivers up to 90 percent improvement over the Unix file system, closing the performance gap between Oracle implemented on a file system and on raw disk. The **Quick I/O** technology inside **Database Edition for Oracle** is particularly suited for write-intensive applications such as online transaction processing (OLTP), and it can be easily configured to handle data warehousing and other I/O-intensive applications that require high performance.

**Veritas ServerSuite Database Edition for Oracle** is available on the Solaris platform. Pricing starts at \$3575 for the single server version; the high-availability version starts at \$16,745.

*Veritas Software Corp., 415-335-8000, fax 415-335-8050, or www.veritas.com.*



## OPEN WORLD

**NETWORK COMPUTER INC.'s** (NCI) **hardware partners announced the availability of network computers**, based upon NCI's reference design. NCI, a wholly owned subsidiary of Oracle Corp., is working with the industry's leading hardware, consumer electronics, and software companies to deliver complete network computing solutions. NCI's partners demonstrated a range of existing and future NC devices and NC software applications.

NCI's partners will produce the network computer for both

the consumer and corporate market, in a number of different "form factors." RCA, America's leading seller of color televisions, intends to manufacture a \$300 set-top box network computer for the consumer market. Funai, the premier manufacturer of VCRs worldwide, will manufacture the JANESA, a network computer for both the corporate and consumer markets. Acorn Computer Group plc, Akai Digital, IDEA, Proton Industrial Electronic Co. Ltd., and Uniden also announced pricing and produc-

tion details of their network computers — all based on NCI's reference design.

Working with the hardware companies, NCI will supply the database, networking software, applications, consulting, and support services to implement the network computer into the corporate and consumer market.

Also demonstrated at Oracle Open World was a range of next-generation network computers and software. Future models shown include a network computer television, set-

top box, executive telephone, and a network computer streaming video. Because the network computer is based on open standards, several software companies — including Scopus, IntelliMatch, Com.Sortium, The Consumer's Choice Network, and NetChannel — demonstrated their applications and services on the network computer for both corporate and consumer markets.

*Network Computer Inc., 415-631-4600, fax 415-631-4696, or www.nc.com.*

## December@DB/Expo

It was standing room only at the **Informix Software Inc. Universal Server** launch. Among much round-robin backslapping, Informix executives delivered on the company's promise to ship its Universal Server object/relational database on time. The self-congratulations are well deserved: Informix acquired Illustra Information Technologies in December 1995, shipped beta copies of the Universal Server in September 1996, and only three months later are shipping the Universal Server.

Although Oracle's current Universal Server product appears to be a remarketing of an existing product, Informix's Universal Server is a true object-relational database. Oracle has

been promising to go object-relational for a while (three years or so) but has yet to deliver a product. Both Informix and Oracle are using the term "universal server" for systems that handle nontraditional data types. The difference lies in how the object technology is integrated with each existing relational database. The universal server fight will center on this issue: Should vendors re-architect their relational engines, putting new code next to the database, or add it from the outside?

Oracle opted for a more partitioned architecture, adding object-handling functions externally and utilizing Corba middleware to link the core relational data engine to data and

cartridges. What this means is that object extensions run as separate processes in a middle tier and talk to the database on the back end. Oracle has partners that are writing "cartridges" for the Oracle Universal Server. Cartridges, unlike DataBlades, run in a separate process space from the relational database engine. As a separate process, cartridges will run as separate servers. The Oracle Universal Server is, in fact, several servers: text, geospatial, video, image, and online analytical processing. Relying on middleware to extend the database may not be the best solution, according to analysts, and may cause performance problems.

Informix is building object intelligence into its relational engine. The product is result of merging the Informix relational database with the Illustra Ob-

ject Relational database. Informix has pushed query optimizers and the additional logic required to support new data types to a lower level, closer to the database engine. Informix is adding new types directly into the database engine via DataBlades modules, which are being developed by both Informix and several third parties. A Data-Blade is a reusable software component that extends the relational database to manage new types of data. Data-Blade modules plug directly into the database. With Informix's Universal Server, you can use a single DataBlade module or a number of Data-Blade modules simultaneously, choosing from 29 different DataBlades created by Informix or third parties, or you can define your own DataBlade. Fifty new DataBlade modules have been



announced and hundreds of companies are in varying degrees of development.

Informix claims that its approach, though labor-intensive, will yield substantial benefits in performance and manageability; Oracle claims that Informix's approach could compromise the integrity of the relational database model. Informix is implementing a DataBlade certification program to help alleviate some of these concerns, submitting each third-party DataBlade to a quality-assurance process to ensure the code is safe.

*Informix Software Corp., 415-926-6300, www.informix.com, or www.illustra.com.*

**PLATINUM TECHNOLOGY INC'S** been busy. Just after its announcement at Oracle Open World in November, it announced **Platinum SQL-Station**, its integrated application development solution for database server programming, at DB/Expo in December. SQL-Station is a set of Windows-based tools for creating, executing, debugging, testing, analyzing, optimizing, tuning, and managing SQL code and server-side database objects. This suite of products includes a PL/SQL debugger and a powerful tuning tool.

SQL-Station consists of new versions of three products, each tightly integrated, enabling developers to use the same base environment for all development functions. The three products are Platinum SQL-Station Code version 2.0, Platinum SQL-

Station Debugger version 2.0, and Platinum SQL-Station Analyzer version 2.3. SQL-Station is available now for Oracle 7.1, 7.2, and 7.3. SQL-Station Coder also supports Sybase and Microsoft SQL Server and ODBC-compliant databases. Prices for the product suite start at \$2995 per seat; the products are available separately.

*Platinum Technology Inc., 800-442-6861, 630-620-5000, or www.platinum.com.*

**MAPINFO CORP.** introduced **SpatialWare**, server technology for extending the power of Oracle databases through spatial analysis. SpatialWare lets users store, manage, and analyze complex spatial information in a single database source. The product is open standards-based server software that combines the power of MapInfo mapping technology and Oracle databases. SpatialWare uses new SQL spatial operators and verbs. SpatialWare is available in several forms.

SpatialWare is a complete middleware layer for storing and seamlessly integrating any type of complex data, including MapInfo mapping objects, within your Oracle environment. By adding two columns to a database table, it enables the storage and sharing of large databases (50+ gigabytes) of spatial data.

**MapServer DB** is tailored to organizations already using MapInfo desktop software that now need to manage and share data among multiple users. It

provides transparent online connectivity and data conflict resolution between the MapInfo desktop and a shared Oracle server.

SpatialWare is available for Sun Solaris and SCO UnixWare operating environments and supports Oracle 7.1.6 or 7.2.3. Prices range from \$25,000 for a workgroup configuration to \$200,000 for an enterprise server implementation.

*MapInfo Corp., 800-327-8627, 518-285-6000, fax 518-285-6070, or www.mapinfo.com.*

**NEXT SOFTWARE** released **WebObjects Enterprise 3.0**, featuring a suite of integrated development tools including the WebObjects Builder graphical development environment and support for browser-based components. WebObjects Builder provides drag-and-drop application development and is the first product to bind client-side components easily to server-based enterprise applications. Developers can now use either traditional HTML-based forms or browser-based applets to connect to applications running on the server.

WebObjects Enterprise application server lets developers rapidly create dynamic Web applications while enabling access to existing corporate data and applications. The development environment includes many prebuilt client and server components that can extend traditional client/server systems to the

Web. And the WebObjects 3.0 application server dynamically creates SQL for flexible access to enterprise corporate data. The WebObjects product line offers a cross-platform and language-independent development environment for delivering interactive, scalable, server-based Web applications. Standard features include:

- browser independence (Netscape Navigator, Microsoft Internet Explorer, and so on)
- client language independence with support for HTML, Java Applets, JavaScript, and ActiveX technologies
- heterogeneous database support including Oracle, Informix, Sybase, and ODBC
- enterprise application interoperability, with support for OLE, Corba 2.0, Perl, C, C++, and Objective-C applications
- standard Web server support via NSAPI, ISAPI, and CGI

WebObjects Enterprise is available on Windows NT, Solaris, and OpenStep/Mach platforms. WebObjects Builder is available for Windows NT and will ship as part of WebObjects Enterprise 3.0. WebObjects Enterprise 3.0 will be provided free to customers with existing software maintenance contracts. WebObjects Enterprise development seats start at \$4999. Contact the company for more pricing information.

*Next Software Inc., 800-879-6398, 415-366-0900, fax 415-780-3929, or www.next.com.*