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NOVEMBER/DECEMBER 2007

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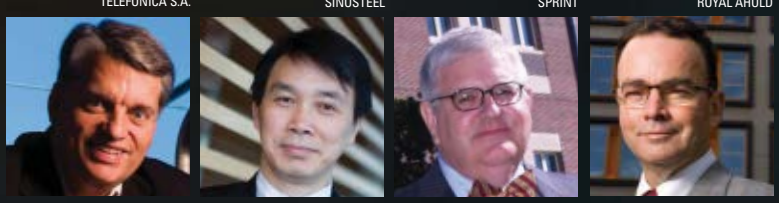
EDITORS' CHOICE AWARDS 2007

Honoring Technology Leadership and Innovation



OUR CIOs OF THE YEAR

IN THIS ISSUE: ORACLE SOA SUITE • CONTENT MANAGEMENT • ORACLE BPEL PROCESS MANAGER • ORACLE DATABASE 11*g*

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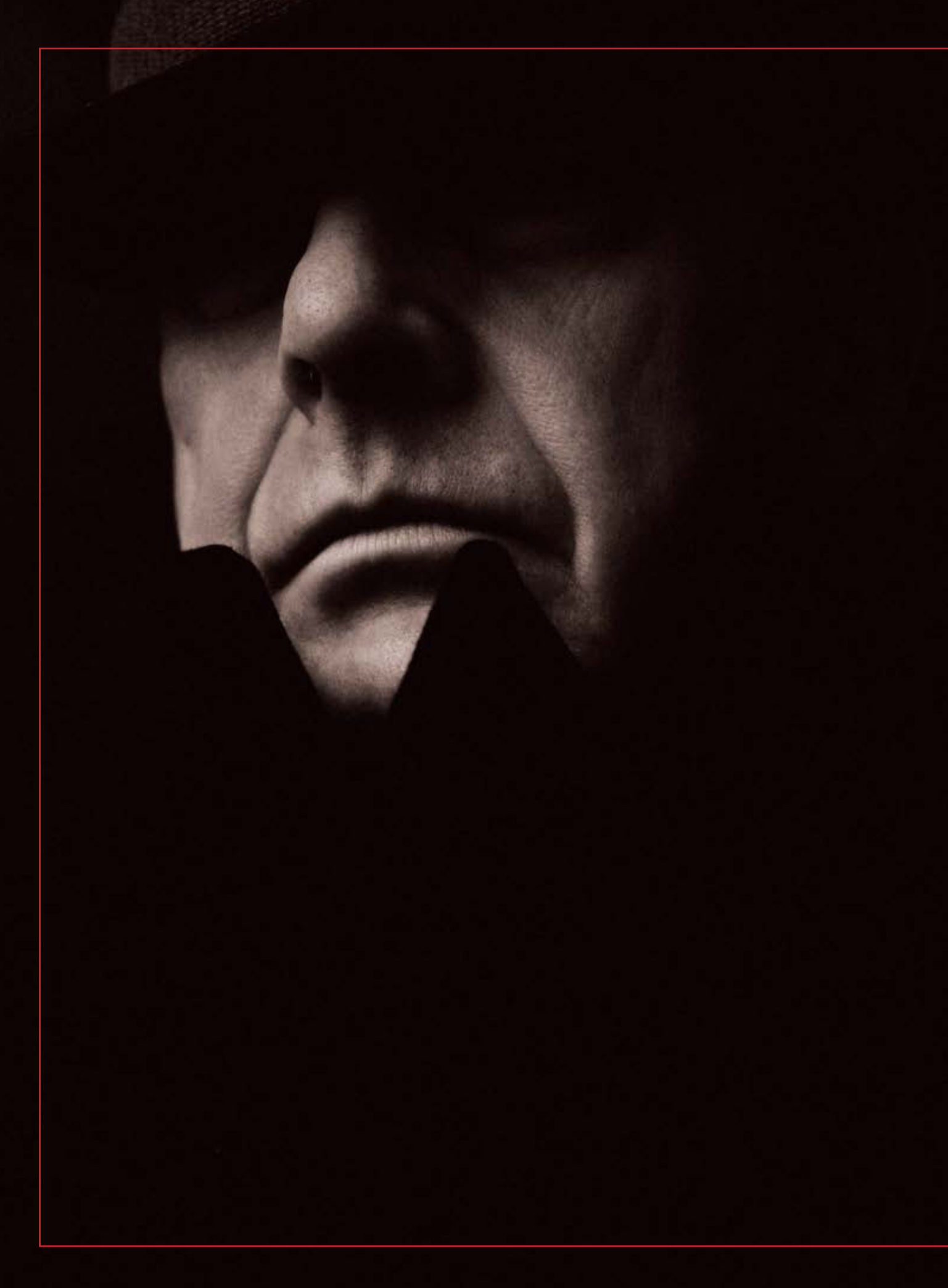

Confirmed

Two months ago, their new ideas and future plans were unveiled. Now, more and more new details about SQL*Detective* 4.0 have been exposed and can be confirmed.

- The public beta test is running and selected beta testers will receive a FREE full set of SQL*Detective* 4.0
- A sneak preview of initial details and screenshots of SQL*Detective* 4.0 are now available at www.sqldetective.com
- Buy SQL*Detective* now, and save money with a FREE (equivalent) upgrade to 4.0 (Terms & Conditions apply)
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- The release of SQL*Detective* 4.0 is scheduled for the end of October

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VOLUME XXI, ISSUE 6

FEATURES

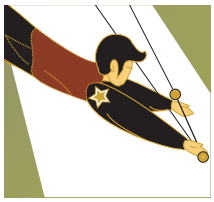
EDITORS' CHOICE AWARDS 2007

Honoring Technology Leadership and Innovation

From building and managing enterprise technologies to simplifying architectures and improving return on investment, IT professionals demonstrate tremendous vision and commitment. The editors of *Oracle Magazine* are pleased to announce the recipients of the sixth annual Editors' Choice Awards and recognize the achievement and innovation of these outstanding technologists. *—David A. Kelly* /37

Cover by I-Hua Chen

Perform with SOA



Flexibility, integration, and quality of service are critical for all organizations. See how Oracle service-oriented architecture solutions work with your legacy systems, partners, and next-generation applications to deliver unparalleled service.

—David Baum /54

EXPERIENCE OPENWORLD

Don't miss Oracle OpenWorld, November 11–15, 2007. Find out what's on the agenda. /17

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As the volume of digital content continues to grow, controlling that content requires going beyond storage and making it part of your business processes. Read how Oracle Universal Content Management helps companies put their content to work. *—Alan Joch* /65

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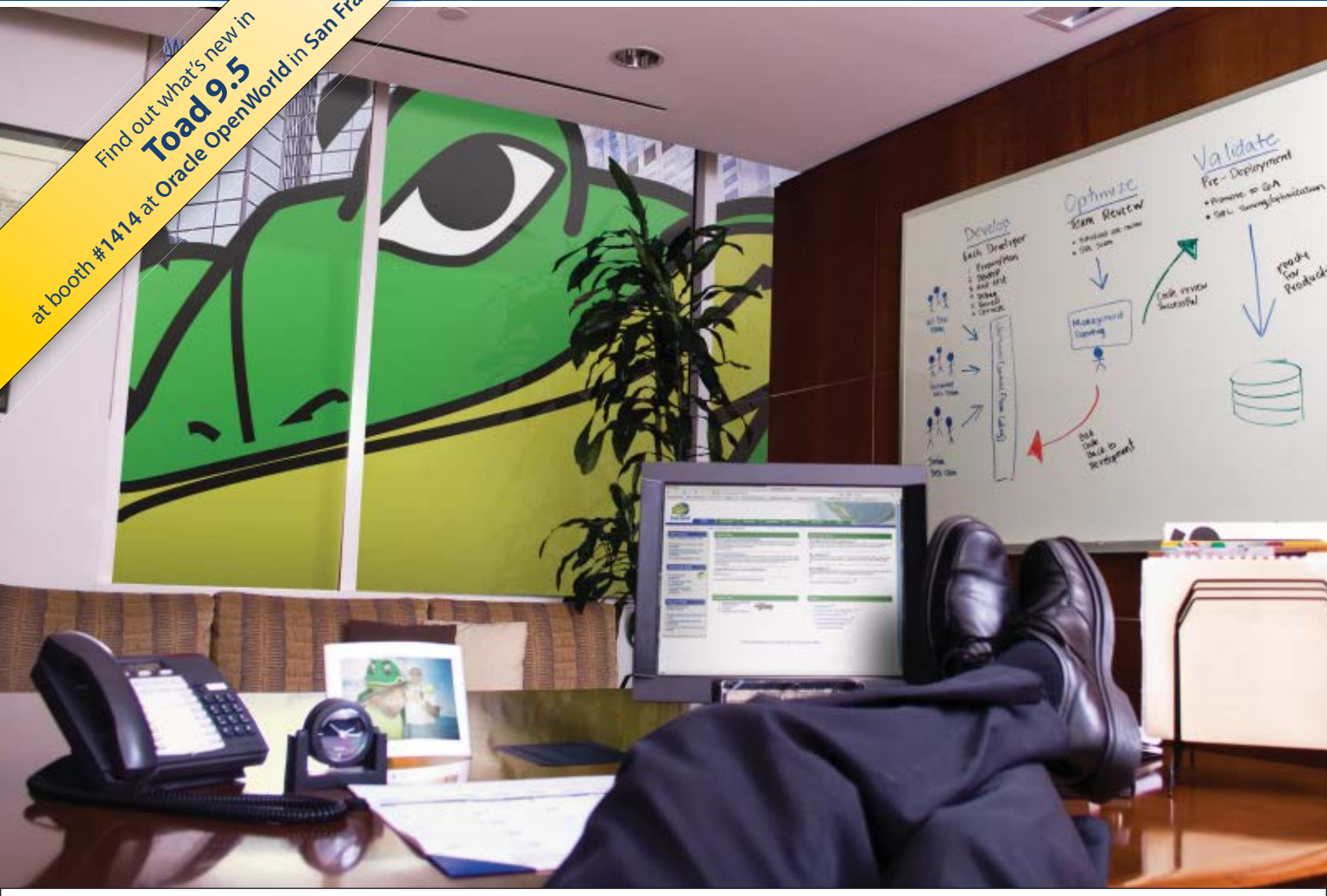
Find out what's new in **Toad 9.5** at booth **#1414** at **Oracle OpenWorld** in **San Francisco!**



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Your corrections, your opinions, and your requests: Here's your forum for telling us what's right and wrong in each issue of *Oracle Magazine,* and for letting us know what you want to read.

GET ADVANCED

First of all, I appreciate all your efforts in *Oracle Magazine*. Additionally it seems to me that presenting advanced database concepts, such as data mining, advanced replication, data warehousing, online analytical processing, and clustering in *Oracle Magazine* would be very useful.

Ahmad Pahlavan
taftia.pahlavan@comet.ae

I am a regular reader of *Oracle Magazine* and look forward to receiving the new issue when it comes out. I enjoy the articles, especially when it comes to new technology and advice on how to use it. I would love to see some articles on the administration of the Oracle Fusion Middleware products, more specifically the Oracle SOA Suite 10*g* Release 3 components Oracle BPEL Process Manager, Oracle Enterprise Service Bus, and Oracle Web Services Manager, in conjunction with Oracle Identity Management 10*g* Single Sign-On and Oracle Delegated Administration Service.

We are in the process of implementing this technology at our site, and in addition to the Oracle documentation, I think some real-world examples of configuration and administration would help with this. I have seen plenty of tutorials and guides for development but not much on the administration side.

Kyle Maggard
kyle.maggard@mpsgroup.com

MORE APPLICATIONS

I'm just a novice with Oracle products, but I would like to request more articles on Oracle E-Business Suite applications. I'm supporting the Oracle Enterprise Asset Management application, and it would be interesting to read about other Oracle E-Business Suite implementations.

Gina G. Laviste
gglaviste@pasar.net.ph

GET SEPARATE, GET FUNDAMENTAL

I congratulate Oracle for their 30th anniversary. Oracle has been wonderful, but I would like the organization to take time and explain the fundamentals of Oracle to new users. In fact, I think there should be a separate magazine for new Oracle enthusiasts.

Sunday Adeniyi
sundayime97@yahoo.com

BROKEN PAGE, NEW PAGE

The featured downloads section of the oracle.com/oramag page (right-hand column) has links that do not work.

Arnold van de Brug
arnold.vandebrug@south-ayrshire.gov.uk

Thanks for pointing out these broken links. We've addressed the problem, and the links have been fixed.

Note that this is the redesigned Oracle Magazine *home page, and it now features links to Oracle product downloads, featured columns, podcasts, blogs, and more. Check it out, and let us know what you think.*

MORE LINUX

I was happy to read the article "World-Class IT" in your July/August 2007 issue. This article provided insight on fast and cost-efficient Oracle products for the Linux platform. I believe readers would be happy to read more articles on new Oracle products for Linux (and other platforms).

Sahil Baharwal
vivscuteguy@yahoo.co.in

DIFFERENT COVERS, SAME MAGAZINE

Congratulations to Oracle for reaching 30 years and to everyone working in the background to make it possible. Also, keep up the good work on *Oracle Magazine*.

Did you have any reason for your two different covers of the July/August 2007 issue? I received the one with the "1977–2007" cover, whereas a friend of mine received the Linux cover.

Sunil Jacob
suniljacob@sultan-center.com

Most copies of the July/August 2007 issue had the "1977–2007" cover. Copies with the Linux cover were distributed at the LinuxWorld trade show, although some copies with the Linux cover were also mailed. The editorial content inside this issue was identical, regardless of the cover.

send mail to the EDITOR

Send your opinions about what you read in *Oracle Magazine,* and suggestions for possible technical articles, to **opubedit_us@oracle.com**.

Or click on the Write the Editors link on our Web site, **oracle.com/oraclemagazine**.

Letters may be edited for length and clarity and may be published in any medium. We consider any communications we receive publishable.

Getting the Right Questions

Both questions and answers are important sources of information.

Your search for information technology answers may lead you to attend a conference, call or meet with an expert, send an e-mail, post a question in a forum, look at a Web site, look at user documentation, or even run a SQL query against an Oracle Database. Your search for answers may also include follow-up questions and additional questions for other sources. Your questions are designed to get the answers you need, but questions themselves can be an important source of information, too.

ONE TIME, AT ORACLE OPENWORLD . . .

Several years ago I was responsible for setting up some small technology discussion groups at Oracle OpenWorld in San Francisco. The plan was to invite *Oracle Magazine* readers to ask questions of well-known Oracle technology experts.

I had expected rather formal question-and-answer sessions during which our readers asked the experts questions and the experts responded, and in several discussions—where the experts were Oracle employees—this was exactly the Q&A flow.

In some discussions that were led by well-known, independent Oracle consultants, however, our readers asked *and* answered the questions. The readers became an ad hoc Oracle user group and were completing each other's sentences, quoting database best practices, referring to undocumented parameters (not-so-good practices), and asking about and offering up every possible answer they could think of. Rarely did the consultants offer a response that no one else in the room had mentioned.

These discussions were also the best collection of Oracle customer feedback that I've ever heard. The readers provided opinions and suggestions for new and enhanced product features (answers) and specific requests for information (questions). From all of these discussions, I walked away with plans for several new article topics for upcoming issues of *Oracle Magazine*.

MORE RECENTLY

At a more recent Oracle OpenWorld, I listened in (eavesdropped, really) on a conversation between an Oracle product manager and an Oracle evangelist about what features and feature improvements the evangelist would like to see in the next release of an Oracle product. The product manager took notes on the questions and gave status information on current and upcoming features. These questions and answers definitely affected the next release(s) of that product, and I came away with questions, answers, and ideas for more new content for *Oracle Magazine*.

It's not just questions and answers from conference discussions that influence Oracle products and *Oracle Magazine* content. For example, we invite our readers to send us corrections (answers), opinions (answers), and requests for content (questions) to opubedit_us@oracle.com, and we use this reader input to help determine what goes into *Oracle Magazine*. (We publish select e-mail from *Oracle Magazine* readers in our From Our Readers column.)

NEW QUESTIONS, NEW ANSWERS

I'll be asking and answering questions, listening to discussions, and getting information for upcoming magazine content at Oracle OpenWorld in San Francisco, November 11–15, 2007. This year, Oracle OpenWorld features more than 1,600 sessions and 450 exhibitors—which means lots of formal questions and answers, and with thousands of attendees, there will be plenty of informal discussions, Q&A sessions, and networking opportunities for more information exchanges.

If you're able, bring your questions and answers to share at Oracle OpenWorld San Francisco. And of course all your questions and answers don't need to be about Oracle technology and innovation. "What's the best restaurant in San Francisco?" and "Is the performer at the Appreciation Event as good live as he was at the Superbowl [on TV]?" are both excellent questions.

And if you can't attend Oracle OpenWorld in person, tune into the keynotes and check out the presentations at oracle.com/openworld/2007. Online or in person, enjoy the show.

Tom Haunert, Editor in Chief
tom.haunert@oracle.com

nextSTEPS

GET ANSWERS

Oracle OpenWorld
oracle.com/openworld/2007

Oracle discussion forums
forums.oracle.com

Oracle documentation
otn.oracle.com/documentation

Oracle 30th Anniversary Timeline
oracle.com/timeline

Technology Events

Conferences and sessions to help you stay on the cutting edge

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November 11–15, San Francisco

Some 41,000 people from all over the world will converge in San Francisco and choose from more than 1,600 sessions and 500 exhibitions that explore the latest innovations in applications, technologies, and solutions from Oracle and its partners. Get the details and sign up today at **oracle.com/openworld**.

Gartner Identity & Access Management Summit

November 14–16, Los Angeles

See how leading organizations are using identity and access management (IAM) to protect data while boosting productivity. Through case studies, peer sessions, and roundtables, learn about the leading IAM architectures, technologies, and processes. Get more information at www.gartner.com/it/page.jsp?id=502298&tab=overview.

Oracle with 20:20 Foresight

November 20–21, Perth, Australia
November 27–28, Melbourne, Australia

Sponsored by the Australian Oracle User Group (AUSOUG) and the Oracle Applications Users Group (OAUG), these events feature independent and Oracle experts in comprehensive parallel sessions that address Oracle topics, as well as vendor exhibitions and networking opportunities. Sign up for either event at www.ausoug.org.au/2020.

Deutschen Oracle-Anwenderkonferenz

November 21–22, Nuremberg, Germany

Presented by Deutschen Oracle-Anwendergruppe (DOAG), the German Oracle Users Group, this conference includes more than 140 specialized lectures that provide information for DBAs, developers, users, and IT managers. Additional workshops will be offered the day before and the day after the conference. Learn more at www.doag.org/konferenz/doag/2007.

Gartner Data Center Summit

November 27–30, Las Vegas

This 26th annual conference for data center professionals will cover virtualization, consolidation, workload management, and procurement. Sign up at www.gartner.com/it/page.jsp?id=502390&tab=overview.

UK Oracle User Group (UKOUG) Conference 2007

December 3–6, Birmingham, England

UKOUG 2007 aims to be the largest independent Oracle user group conference in Europe, with more than 330 presentations covering 25 topic areas. Tracks include Oracle Technology, Oracle E-Business Suite, Oracle's JD Edwards, Oracle's PeopleSoft, Oracle's Siebel, Oracle's Stellent, and Oracle Fusion. Sign up at conference.ukoug.org.

XML 2007

December 3–5, Boston

XML 2007, themed "XML in Practice," is the world's largest and longest-running conference devoted to XML and other open data and document technologies. Learn more and register at 2007.xmlconference.org.

ORACLE USER GROUPS

PeopleSoft Mid-Atlantic Regional User Group
November 2, Annandale, Virginia
www.psmidatlanticrug.com

New York Oracle Users Group (NYOUG) Training Days
November 6, New York City
www.nyoug.org

UKOUG DBMS SIG Meeting
November 7, Midlands, England
www.ukoug.org

Georgia Oracle User Group Meeting
November 8 and December 13, Dunwoody, Georgia
www.gouser.org

Suncoast Oracle Users Group
November 8 and December 13, Tampa, Florida
soug.acomp.usf.edu

Dallas Oracle Users Group Oracle OpenWorld Review
November 15, Irving, Texas
www.doug.org/meeting_details.cfm?id=72

Ottawa Oracle Users Group IOUG Oracle Boot Camp
November 30, Ottawa, Canada
www.ioug.org/events/regional/113007ooug.cfm

Eastern Caribbean Oracle Users Group Breakfast Meeting
December 5, Port of Spain, Trinidad, West Indies
www.ecoug.org

PeopleSoft Northwest Regional User Group
December 5, Portland, Oregon
www.psnwrug.org

NYOUG Winter General Meeting
December 6, New York City
www.nyoug.org

East Tennessee Oracle Users Group
December 17, Oak Ridge, Tennessee
easttennessee.oracle.ioug.org

Nashville Oracle Users Group
December 19, Nashville, Tennessee
www.noug.net

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November 11–15, 2007 | **Moscone Center** | San Francisco

Oracle OpenWorld 2007, with more than 1,600 sessions and 450 exhibitors, promises to be even bigger and more information-packed than last year's record-breaking conference. Showcasing the customers and partners whose innovation with Oracle translates to better business results, Oracle OpenWorld 2007 provides technologists and business leaders with the information—and inspiration—they need to drive innovation throughout their own companies.

Oracle OpenWorld 2007 Highlights

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Innovation. Get inspired at Inside Innovation, a new Oracle OpenWorld extravaganza sponsored by Intel Corporation that showcases how the innovations of today and tomorrow are changing the way we live, work, and play.

Connection. Network with your colleagues before, during, and after the event with Oracle OpenWorld Connect sponsored by EMC. ■ Celebrate and mingle at the Welcome Reception, sponsored by AMD; OTN Night; and It's a Wrap, sponsored by Subaru of America, Inc. ■ Party to the music of Billy Joel, Prince, and Stevie Nicks with Mick Fleetwood at the Appreciation Event sponsored by Network Appliance, Inc.

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The latest Webcasts, courses, and online content

ORACLE'S 30TH ANNIVERSARY

Interactive timeline

oracle.com/timeline

Take a walk through Oracle's 30 years of innovation and hear commentary from Oracle executives about key milestones.

WEBCASTS AND PODCASTS

The Future of Enterprise Performance Management with Oracle

oracle.com/pls/ebn/live_viewer.main?p_shows_id=5782857

Thomas Kurian, senior vice president of development, Oracle Fusion Middleware, and John Kopcke, senior vice president of enterprise performance management, discuss how Oracle is integrating Hyperion applications with Oracle's business intelligence technology to deliver end-to-end enterprise performance management.

Dr. DBA, What's New in Oracle Database 11g?

oracle.com/techcasts

Oracle Vice President of Product Strategy Ken Jacobs ("Dr. DBA") describes his favorite new features in Oracle Database 11*g* and characterizes the release's place in database technology history.

Meet the Oracle Linux Kernel Team: Chris Mason on Btrfs

oracle.com/techcasts

Chris Mason, head of the Oracle Linux kernel team and creator of the Btrfs file system for Linux, explains the purpose behind his mission to provide an "upgrade" from the ext3 file system.

The New SOA Standards: Service Component Architecture (SCA)

oracle.com/techcasts

David Chappell, vice president and chief service-oriented architecture technologist at Oracle, takes listeners on a tour of the new SCA specification.

Focus on Data Warehousing: Partitioning and Information Lifecycle Management

oracle.com/techcasts

Hermann Baer, principal product manager for partitioning technology at Oracle, explains how partitioning improves data warehouse performance and why a more-strategic, expansive view can improve manageability across all environments.

RESOURCE KIT

Oracle Enterprise Manager DVD kit

oracle.com/start

(keyword: iwantmanagementpacks5)

This free DVD kit contains a virtual data center with typical data center components—database, middleware, and applications—as well as Oracle Enterprise Manager. Find out how to increase IT insight, reduce resolution times, and increase productivity in systems and applications management by up to 80 percent.

ORACLE UNIVERSITY

Oracle E-Business Suite Release 12 courses

oracle.com/education

(For both courses below, search keyword: R12)

R12 Oracle General Ledger Management Fundamentals

Learn how to implement Oracle General Ledger to maximize its benefits. This five-day class will address achieving a high level of efficiency and information security. Also covered: performing high-end tasks such as simultaneous accounting for multiple reporting requirements and allowing superusers to access and process data for multiple ledgers and legal entities.

R12 Oracle Inventory Management Fundamentals

Learn how to set up Oracle E-Business Suite Release 12 Inventory Management to carry out the entire cycle of inventory management and ensure a well-managed process. In this five-day course, participants will become familiar with the product's wide feature set and will execute tasks such as receiving, moving, and replenishing inventory items and generating count tags for physical inventories.

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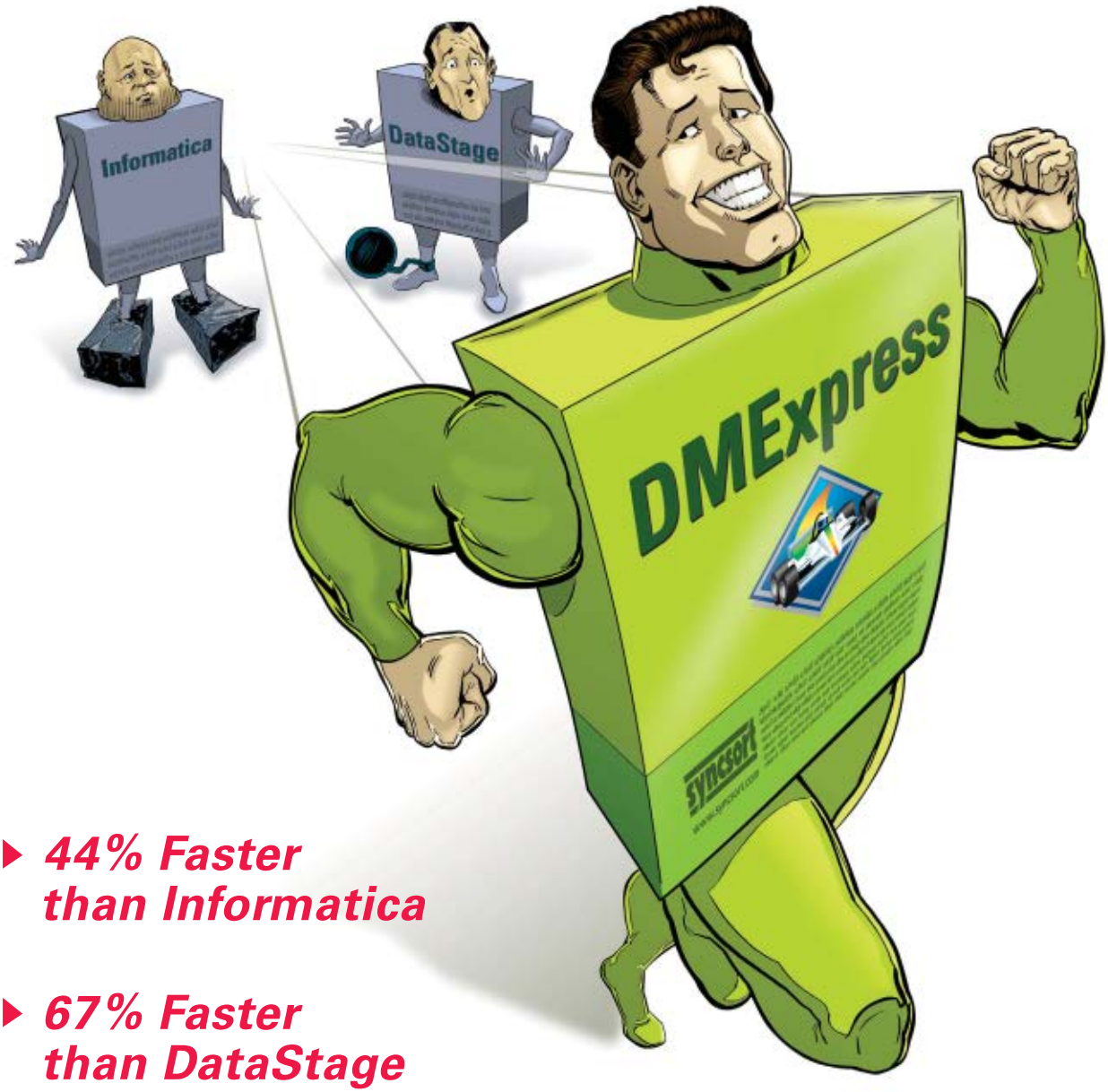

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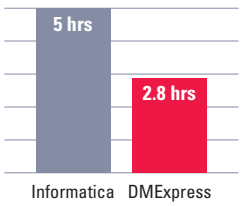

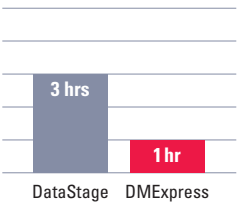

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BY JUSTIN KESTELYN

Oracle OpenWorld, Community Style

From lounges to giveaways, Oracle Technology Network membership has its benefits.

Oracle OpenWorld and the concurrent Oracle Develop Conference are the Oracle Technology Network (OTN) community's major "skill-set enhancement" calendar entries for the year, but there's far more to these events than packing your agenda with sessions and keynotes.

The OTN Lounge, located in San Francisco's Moscone Center West (second floor), will be your community nexus throughout the conference—a place not only to relax (perhaps via a friendly game of chess with Oracle ACE Laurent Schneider) but also to chat up other OTN members with similar interests, meet Oracle ACEs and Oracle ACE Directors in person, and get advice from legendary experts and community figures like Tom Kyte. It's also an opportunity to pick up exclusive OTN swag, including free Oracle software, T-shirts, coffee mugs, and the 2007 edition of OTN's *Greatest Hits* CD.

Last year's OTN Night was the most successful yet, but this year's event (Monday, November 12, at the Westin St. Francis) promises to be even better. Whether you're focused on "edutainment" (the Oracle-on-Linux Installfest or the DBA Hot Seat Competition) or strictly on recreation, OTN Night is the hottest ticket of the week.

For more information and to register for Oracle OpenWorld and the Oracle Develop Conference, visit oracle.com/openworld. For a complete picture of OTN activities at the show, visit the Developer and DBA's Guide to Oracle OpenWorld at otn.oracle.com/events/oracle-openworld-2007.

THE HANDS-ON USERS GROUP

The Puget Sound Oracle Users Group (PSOUG), in Seattle, Washington, gives its members more bang for their US$35 annual membership fee. The group now boasts its own well-stocked technology lab that's open to members 10 hours a day, five days a week.

"We've moved away from the model where a user group charges for a few training events or conferences a year," says Oracle ACE Director Dan Morgan, who was instrumental in putting the lab together. "Instead, we charge for hands-on classes one week a month and then open the doors so members can come in and practice in the lab."

The lab equipment includes a NetApp 1TB 270C NAS appliance as well as other equipment donated by NetApp and a 7TB Axiom 500 SAN donated by Pillar Data Systems. Brocade donated all the switches and fiber required for a first-class network. The configuration can simulate a cluster of up to eight nodes, using Oracle Real Application Clusters.

"The people who teach our classes and develop our curriculum also teach at the University of Washington," says Morgan. "We've had people fly in from New Jersey to take classes here. They pay to become members of PSOUG and then enroll in classes just to get access to this lab." The great thing about this setup, adds Morgan, is that a member can take a class and then get hands-on practice on the lab equipment.

PSOUG's lab approach is potentially a model for other user groups, and PSOUG has surplus equipment to pass on to any group that wants to set up a lab of its own (while supplies last). Visit www.psoug.org to learn more.

IT'S ALL ACADEMIC

Oracle ACE Steve Karam started using Oracle Database when most kids his age were learning long division. In high school, Karam landed a job building applications for an Oracle consulting company. Today, he is an Oracle ACE and Oracle Certified Master who wants to give children a similar opportunity, via Oracle Academy.

Oracle Academy provides software, training, and resources to prepare students for careers in information technology. The program trains educators and provides resources for high schools, vocational schools, colleges, and universities around the world.

Karam judges student projects at Virginia's Edison Academy and speaks with students through Oracle user group events. "I want to show the education community that Oracle Academy is out there and is very worthwhile," he says. "It will likely be the next great source of top-notch Oracle technologists." What better goal for an Oracle ACE?

Learn more about Oracle Academy at academy.oracle.com; read Karam's blog at www.oraclealchemist.com. ■

Justin Kestelyn *(justin.kestelyn@oracle.com) is the editor in chief of Oracle Technology Network.*

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BY JEFF ERICKSON

Extreme Transaction Processing

Oracle Coherence 3.3 provides fast access to frequently used data.

With the recent release of Oracle Coherence 3.3, Cameron Purdy, Oracle vice president of development and former CEO of Tangosol, sat down with *Oracle Magazine's* Jeff Erickson to talk about this leading in-memory data grid solution. The following is an excerpt from that interview. Download a podcast of the full interview at otn.oracle.com/syndication/magcasts.

Oracle Magazine: Tell us about the current imbalance between demand and supply in the data management industry.

Purdy: If you look at the combination of much higher demand in terms of number of end users actually using today's systems, combined with technologies like service-oriented architecture, XML, and Ajax that tend to require much more information, the result is that the demand for information and the demands placed on the data infrastructure have just exploded over the past decade. At the same time, the technology that supplies this information has not kept pace, so we have a tremendous increase in demand compared to the technology that actually supplies the information. Oracle has addressed this already in several ways, starting with Oracle Real Application Clusters (Oracle RAC) and Oracle TimesTen In-Memory Database.

Oracle Magazine: How does Oracle Coherence address this demand increase?

Purdy: Oracle Coherence provides predictable qualities of service for applications built with Oracle's middleware technology: scalable performance, availability, and reliability and consistency of the information.

Oracle Magazine: Oracle already has an in-memory technology, Oracle TimesTen. How is Oracle Coherence different?

Purdy: Oracle TimesTen provides an in-memory SQL database and has the ability to move information up into memory, so it provides much faster access to SQL data. What Oracle Coherence provides is similar, in that the information is in memory, but instead of doing it with SQL information it does it with information that is in the application's programming language.

Cameron Purdy, Oracle Vice President of Development

Oracle Magazine: How are companies using Oracle Coherence?

Purdy: What we see are four general use cases. The first is caching. Companies are using Oracle Coherence to provide very fast access to information—fast access both because it's in memory and because it's already in the form that the application needs—but additionally because it's typically already on the server that actually needs the information.

The second use case is analytics, where applications are processing very large amounts of information. Typically there are various trends or statistics that companies are looking for in a pile of information, and generally they're looking for real-time answers.

The third use case is transactions—actually having the transactions in the application being conducted in memory. The reason Oracle Coherence is so uniquely suited for this is that the information is synchronously backed up onto at least one other server to make sure that it can't be lost, and that allows the transactions to run at in-memory speed without sacrificing the information in case of a server failure. The more servers that are available, the higher the overall transaction rate, and that allows us to accomplish what's known as extreme transaction processing.

The fourth case is event-driven architectures. These are systems where events, such as information streaming into the system or information changing, drive the system.

Oracle Magazine: What does Oracle Coherence mean for the future of IT?

Purdy: We see this as a foundation for scalable and continuously available software applications that are being deployed today as well as basically all applications in the future. These are qualities of service that every application wants to achieve and that any CIO or architect is going to want. We're talking about being able to provide scalable performance, continuous availability, and reliability and consistency of information. But we don't achieve those in a vacuum—we actually provide a foundation for achieving all of them simultaneously, and as a result it becomes a no-brainer to build applications using this technology. ■

Jeff Erickson *is a senior editor with Oracle Publishing.*

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otn.oracle.com/syndication/magcasts

LEARN more about Oracle Coherence
oracle.com/technology/products/coherence

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ONLINE IT COMMUNITIES ARE WIDESPREAD AND HELPFUL

100 percent of IT professionals surveyed who participate in online communities say they benefit professionally from online interaction. But a large number—94 percent—say they have to visit more than one source of information for each problem they set out to solve. A similar number—93 percent—claim that they do their jobs more efficiently and save time by using IT communities to solve system administration problems.

Source: KACE and King Research
www.kace.com/pdf/KingResearch_The_Value_of_Online_Communities.pdf

"TOTAL GEEK" BOSSES HELP SMALL COMPANIES GROW

A survey of 152 CEOs and senior officers of midsize companies—100 to 5,000 employees—showed that having a tech-savvy top boss correlates with fast company growth. 73 percent of respondents who rated themselves "total geeks" reported double-digit average annual growth in their businesses over the past five years. Almost half—48 percent—of total geeks also reported that their businesses reached the 100-employee milestone within five years of launch, compared to just 33 percent of all survey respondents.

Source: CDW Business Rearview Mirror Survey
newsroom.cdw.com/news-releases/news-release-08-20-07.html

JAVA INCREASES, .NET DECLINES IN SOA PLATFORM DEPLOYMENTS

The number of companies planning or executing service-oriented architecture (SOA) deployments on a Java platform increased slightly during the first six months of 2007, while those planning to build SOA implementations on .NET decreased by almost 20 percent. .NET deployments for SOA were still ahead, with 31 percent targeting that platform, but 28 percent now expect to target Java technologies. Three-quarters of all companies that have built or are building Web services now plan to implement SOA, and more than 70 percent of those writing Web services have experienced cost savings, primarily from code reuse and automation of processes.

Source: Evans Data Corporation
www.evansdata.com

CENTRALIZED SECURITY AND USER AUTHENTICATION SERVICES FOR LINUX

A preview release of Oracle Authentication Services for Operating Systems, which is designed to make user management in Linux more efficient, secure, and centralized, is now available. A new offering within Oracle Identity Management, Oracle Authentication Services for Operating Systems is designed to enable Oracle Unbreakable Linux Support users to rapidly experience the benefits of streamlined secure user authentication.

The preview release of Oracle Authentication Services for Operating Systems features a secure and efficient means for user authentication with zero-touch administration of Linux directories. Additionally, it enables administrators running Linux to use existing graphical and command-line user management tools to manage users.

"The preview release of Oracle Authentication Services for Operating Systems supports the heterogeneous security capabilities that are reflective of our customers' data centers—and the growth of Linux—while helping them more rapidly centralize the authentication and management of their operating system accounts," says Hasan Rizvi, vice president, security and identity management products, Oracle.

ORACLE BERKELEY DB 4.6 AVAILABLE

The latest release of Oracle's open source, embeddable database, Oracle Berkeley DB 4.6, is now available. It features improved performance, ease of use for developers, and portability across new platforms.

Performance enhancements in the new release of Oracle Berkeley DB include a more efficient mutex implementation and a faster hash access method. Improvements for developers include a quick-start tool for generating schema and configuration; and new features, including cache size adjustment during runtime, cache operation prioritization, and replica-private temporary databases. Portability enhancements include additional support for Windows CE, S60, and Binary Runtime Environment for Wireless (BREW), as well as simple platform verification tools that ease porting.

"The latest release of Oracle Berkeley DB delivers even faster performance and concurrency, while giving developers greater flexibility and control for their applications," says Mike Olson, vice president of embedded technologies at Oracle.

PDF CONVERSION SIMPLIFIED

Oracle has released Oracle Outside In PDF Export, the first cross-platform, application-independent portable document format (PDF) conversion solution for the original equipment manufacturer and independent software vendor software market. Part of the Oracle Outside In Technology product line, this software development kit includes its own rendering engine so that native applications are not required to generate PDFs, which simplifies workflow and decreases costs.

Appropriate for content management, document management, Web publishing, or any application that can benefit from application-independent, server-based PDF conversion, the product supports popular PDF conversion features.

"Oracle Outside In PDF Export is unique in the market for its ability to provide a cross-platform PDF conversion solution for more than 400 different file formats," says Julie Garrett, director of product management, Oracle. "Because it doesn't require a document's native application, Oracle Outside In PDF Export simplifies PDF conversion workflow. This is especially beneficial for those customers on platforms other than Windows where the native application may not be available."

NEW ORACLE VALIDATED CONFIGURATIONS

Six new Oracle Validated Configurations are now available on Oracle Enterprise Linux. These configurations provide proven architectures that include software, hardware, storage, drivers, and networking components

along with documented best practices for deployment. Tested in real-world environments, the configurations enable Linux customers to achieve standardization, scalability, and reliability while lowering infrastructure costs. The latest Oracle Validated Configurations comprise components from Compellent, Dell, Egenera, EMC, HP, Pillar Data, and Unisys.

"With its focus on the Oracle Validated Configuration Program, Oracle continues to deliver on its commitment of providing the tools, resources, and expertise to help customers accelerate Linux deployments and lower implementation costs," says Wim Coekaerts, vice president of Linux engineering at Oracle. "We are extremely pleased with the adoption of Oracle Validated Configurations. We expect to see more end users deploying Linux for mission-critical applications as they enjoy faster deployment and better supportability with Oracle."

ORACLE COHERENCE 3.3 AVAILABLE

Oracle Coherence 3.3, an in-memory data grid and the latest hot-pluggable component of Oracle Fusion Middleware, is now shipping. To address growing extreme transaction processing (XTP) requirements, this release features enhanced performance, quality-of-service, and clustering capabilities; tighter integration with Oracle Fusion Middleware; and support for Microsoft's .NET Framework.

Designed to meet an organization's need to predictably scale mission-critical applications, Oracle Coherence 3.3 enables customers to push data closer to the application for faster access and greater resource utilization.

"As elements of a modern application infrastructure such as service-oriented architecture, Web 2.0, and event-driven architecture push the scalability, reliability, and performance envelope, organizations are increasingly relying on middleware to distribute application processing and more efficiently utilize resources," says Cameron Purdy, vice president of development, Oracle. "Combining the in-memory data grid infrastructure of Oracle Coherence with Oracle Fusion Middleware, we now offer customers a comprehensive solution to address their evolving XTP requirements."

Read more about Oracle Coherence in *Oracle Magazine*'s interview with Purdy on page 22.

ORACLE'S LATEST LINUX CONTRIBUTIONS

Oracle has announced several new projects and code contributions designed to augment the enterprise-class capabilities of Linux.

First, Oracle has developed the Btrfs file system, which is designed to address the expanding scalability requirements of large storage subsystems, common in today's data centers. Btrfs will allow enhanced scalability and simplified management for large storage configurations, while also adding flexible snapshotting and fast incremental backups.

Second, Oracle has ported the popular system management tool Yet another Setup Tool (YaST) to Oracle Enterprise Linux and Red Hat Enterprise Linux.

Third, the Oracle Linux Test Kit is now available as open source under General Public License and Artistic License. This kit is designed to verify Linux kernel functionality and stability essential for Oracle Database.

"One of the greatest assets of the Linux operating system is the Linux and open source communities—which are directly responsible for the success that Linux has had in the market," says Al Gillen, research vice president of system software, IDC. "With contributions from individuals and from the vendor community alike, Linux continues to grow and evolve as an enterprise-class platform for data center deployments."

ORACLE BUYS NETSURE TELECOM LIMITED

Oracle has agreed to acquire Netsure Telecom Limited, a leading provider of network intelligence, analytics, and network data integrity software. Netsure offers communications service providers critical network intelligence and analytics software, which is vital to ensuring efficient operation and utilization of existing and next-generation networks and services.

"The addition of Netsure's products to Oracle's comprehensive communications applications suite is expected to help Oracle's customers improve network utilization, optimize capacity planning and financial modeling, and streamline end-to-end network lifecycle management," says Bhaskar Gorti, senior vice president and general manager, Oracle.

ORACLE BUYS BRIDGESTREAM

Oracle has acquired Bridgestream, a provider of enterprise role management software. Bridgestream's role discovery, definition, and management capabilities will be added to Oracle's access management and user provisioning solutions, which expands Oracle's comprehensive identity management solution.

"With the acquisition of Bridgestream, Oracle can help organizations streamline compliance-related tasks and automate role management," says Hasan Rizvi, vice president, identity management and security products, Oracle. ■

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Oracle Authentication Services for Operating Systems
otn.oracle.com/products/oid/oracleauthenticationservices.html

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otn.oracle.com/products/content-management/oit/pdfexport.html

Oracle Validated Configurations
otn.oracle.com/tech/linux/validated-configurations

Oracle Coherence 3.3
oracle.com/products/middleware/coherence

Btrfs file system (alpha release)
oss.oracle.com/projects/btrfs

YaST
oss.oracle.com/projects/yast

Oracle Linux Test Kit
oss.oracle.com/projects/olt

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bookBEAT

Oracle PL/SQL Best Practices, 2nd edition

By Steven Feuerstein
O'Reilly Media
www.oreilly.com
ISBN: 0596514107

In this compact book, Steven Feuerstein distills his many years of programming, writing, and teaching about PL/SQL into a set of best practices. Covering Oracle Database 11*g*, the text is organized in a problem/solution format that chronicles the programming exploits of a team of developers at a mythical company called My Flimsy Excuse, Inc.

This book offers practical answers to some of the hardest questions faced by PL/SQL developers, including the best way to write the SQL logic in application code, how to write packages so they can be leveraged by an entire team of developers, and how to make sure that all of a team's programs handle and record errors consistently.

Feuerstein writes *Oracle Magazine*'s PL/SQL Practices column and answers questions in his PL/SQL Best Practices column on Oracle Technology Network. He has published 10 books on PL/SQL.

Oracle Database 11g DBA Handbook

By Bob Bryla and Kevin Loney
Oracle Press
www.oraclepress.com
ISBN: 0071496637

This essential resource for Oracle DBAs has been completely updated to cover the new features in Oracle Database 11*g*. This 800-page tome details each topic with an emphasis on the big picture, enabling users to achieve effective and efficient database management. Readers will learn to develop and implement applications, manage storage space, and create reliable system backups. New and revised sections cover high availability, performance optimization, information management, and security procedures. Real-world examples and case studies illustrate each concept along the way.

Bob Bryla and Kevin Loney, authors of the previous edition, have teamed up again on the Oracle Database 11*g* edition. Bryla has more than 20 years of experience as a database designer, systems analyst, and DBA. Loney is a veteran Oracle consultant, developer, and DBA.

Look for Oracle books at oracle.com/technology/bookstore

With Oracle Database 11*g* now generally available, dozens of Oracle PartnerNetwork members at all levels have announced products or services support for the new release.

ORACLE CERTIFIED ADVANTAGE PARTNERS

170 Systems' 170 MarkView Financial Suite is available on Oracle Database 11*g*. The 170 MarkView Financial Suite is used in the world's largest companies to optimize and manage financial processes. "Our customers collectively process well over US$100 billion in critical financial transactions annually with the 170 MarkView Financial Suite and need a secure and reliable database platform that can adapt and scale quickly to support their growing and changing organizations," says Karl Büttner, chairman and CTO of 170 Systems.

EMC will support Oracle Database 11*g* on all of its major storage platforms. Because of its participation in the Oracle Database 11*g* beta program, EMC is confident that its customers will successfully deploy Oracle Database 11*g* on EMC Symmetrix, EMC CLARiiON, and EMC Celerra networked storage systems. "EMC customers like what they see in Oracle Database 11*g*, and our investment in testing and qualification will enable them to deploy it seamlessly," says Chuck Hollis, vice president, Technology Alliances at EMC.

HP will offer its StorageWorks technology for Oracle Database 11*g* Real Application Clusters deployments. Oracle has integrated network file system (NFS) client functionality directly into Oracle Database 11*g*, resulting in improvements in database throughput as high as 40 percent. When used with the HP StorageWorks Enterprise File Services (EFS) Clustered Gateway, Oracle Database 11*g*'s direct NFS provides a unified connectivity model for storage and networking and enables use of existing storage area networks. Oracle used HP StorageWorks technology to validate the direct NFS feature with decision-support system and online transaction processing workloads.

TUSC will offer database upgrade solutions using the workload capture and database replay capabilities of Oracle Database 11*g*. These new capabilities will help TUSC customers compare performance on different hardware or systems by capturing and replaying an actual business workload for a representative period of time. TUSC provides integration services for Oracle Applications and Oracle Fusion Middleware, as well as other services and training.

Unisys will make Oracle Database 11*g* available for the Unisys ES7000/one Enterprise Servers for both Linux and Microsoft Windows environments. Running Oracle Database 11*g* on Unisys ES7000/one servers is an element of Unisys' participation in the Oracle Modernization Alliance, an initiative within the Oracle PartnerNetwork that brings together vendors with products, processes, solutions, and architectures to move existing IT environments to modern, open systems.

ORACLE CERTIFIED PARTNERS

DataMirror has extended its real-time data integration solutions to support Oracle Database 11*g*. The scalability enhancements in Oracle Database 11*g* and DataMirror's high-performance Changed Data Capture technology together help companies react to critical business events as they occur and gather business intelligence in real time. DataMirror products enable real-time data integration across Oracle and heterogeneous environments.

GIP will use Oracle Database 11*g* in Xyna Service Factory, GIP's integrated platform for the development, production, and lifecycle management of IP-based telecommunication services. Specifically, Oracle Database 11*g* is the basis for two elements of the Xyna Service Factory platform: Xyna Service Warehouse, a subscriber-centric active

warehouse, and Xyna Intelligence, a subscriber touchpoint management system. GIP serves leading German and international companies in the telecommunications, information, media, and entertainment sectors.

Tele Atlas, a global provider of digital maps and dynamic content for navigation and location-based solutions, has released Tele Atlas MultiNet for Oracle Database 11*g*. The full Western Europe version of MultiNet will include Oracle Database 11*g* geocoding and routing extensions and Oracle Database 11*g*–compliant 3-D city maps. "The support of 3-D features in Oracle Database 11*g* is important to the development of next-generation map-based applications, with textured models of buildings and landmarks that more closely match what users actually see in their surroundings," says Rob Van Essen, Tele Atlas vice president of research and development.

ORACLE PARTNERS

Application Security's DbProtect database security suite supports Oracle Database 11*g*. Built on an extensive knowledgebase of database-specific vulnerabilities, DbProtect combines database discovery, vulnerability scanning, real-time activity monitoring, auditing, and optional encryption. DbProtect complements the many security improvements in Oracle Database 11*g*, ensuring comprehensive, integrated database security.

Carrier Call has made its voice trading solution, XCarrier, available on Oracle Database 11*g*. XCarrier is an integrated enterprise voice trading platform for wholesale voice carriers—a high-volume, low-margin business that requires a scalable back end with very fast response times. The new release of XCarrier benefits from the features and capabilities of Oracle Database 11*g*, including partitioning capabilities to deploy multiple storage tiers based on activity; advanced compression, which helps businesses maximize storage usage while maintaining availability and performance; and Oracle SecureFiles compression and deduplication, which improve the performance and security of file-based data.

EqualLogic, a provider of enterprise iSCSI storage area network (SAN) solutions, supports Oracle Database 11*g*. The EqualLogic PS Series modular iSCSI storage arrays automatically balance workloads across all available system resources. EqualLogic's PS3000 Serial-Attached-SCSI (SAS) disk arrays can be used on Oracle application workloads within a multitier SAN that also includes Serial Advanced Technology Attachment (SATA) disk drives. The integration of SAS and SATA in a single SAN allows optimization of storage tiers to meet the performance and capacity needs of production and archive data.

GridApp Systems' Clarity database automation software supports Oracle Database 11*g*. Clarity simplifies database administration and management while enabling migration of database infrastructures to the new Oracle platform. GridApp Clarity automates error-prone operational tasks such as provisioning and patching, resulting in improved management, streamlined operations, reduced downtime, and cost savings. "Companies taking their databases to the next level with Oracle Database 11*g* should think about automating the management of this critical resource now," says Matthew Zito, chief scientist at GridApp Systems.

IT Convergence will offer managed services and strategic consulting solutions for customers upgrading to Oracle Database 11*g*. IT Convergence expects to help Oracle Database 11*g* customers to employ new features, such as database replay and automatic database diagnostic monitor. "We anticipate that some of the first experiences with Oracle Database 11*g* will be in conjunction with the Oracle E-Business Suite or similar enterprise applications," says Dan Norris, technology services practice manager at IT Convergence.

NAVTEQ, a global provider of digital map data for vehicle navigation and location-based solutions, will make NAVTEQ map data available in Oracle Spatial 11*g* geocoding, routing, and mapping format. As an Oracle Database 11*g* beta program participant, NAVTEQ collaborated with Oracle to ensure that NAVTEQ map data, NAVTEQ Transport, NAVTEQ Traffic Patterns, and NAVTEQ's real-time traffic products support the extended data schemas in Oracle Spatial 11*g*.

The Pythian Group is offering outsourced database administration and related services for Oracle Database 11*g*. Pythian DBAs will use the new change assurance features in Oracle Database 11*g* to validate existing client applications against Oracle Database 11*g* using real production data, allowing customers to upgrade to this new release with confidence. ■

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Telematics and Biometrics

Oracle powers tracking devices and ID systems.

Telematics on the Move

For companies that face the challenge of managing a large fleet of vehicles that are moving across a continent, telematics provides an efficient solution. Telematics is the science of sending, receiving, and storing information via telecommunications devices in vehicles. Today's telematics integrate global positioning system (GPS) technology with computers and mobile communications devices.

One telematics solution is the Vector 300 from Prolificx, a company that has worked with the Oracle Telematics solution center to deliver an end-to-end mobile resource management solution based on Oracle Database Lite and Oracle MicroEdge Server. In each vehicle, the Vector 300 embeds the Oracle MicroEdge Server to capture the data from onboard sensors such as GPS and a speed tracker and process the data via predefined rules and filters. This data is then stored locally in Oracle Database Lite and can be synchronized wirelessly across cellular data networks using the Oracle Database Lite Mobile Server with backend fleet management applications.

The Vector 300 telematics unit allows the location and speed of every vehicle to be tracked, even when the vehicle is temporarily out of cellular range. This enables large fleets to be efficiently managed in real time, saving time and cost, and providing better customer service. Other applications of the Vector 300 include tracking leased vehicles and managing vehicle health information and driver behavior data.

Identity in Action

In the near future, biometrics will likely be the way many people are granted access to their personal data and business applications, as well as physical access to homes, cars, and secure rooms and buildings.

Today biometric systems, including those from BIO-key International, are used in custom applications such as voting machines. Using proprietary search techniques, enhanced imaging, and mathematical modeling, BIO-key's True User Identification products accurately identify individuals by their fingerprints, out of a database of millions of fingerprints. BIO-key's fingerprint technology validates a user's identity by something that they *are* (fingerprint), versus something they have (token or key) or know (password). To store fingerprint data, BIO-key has embedded Oracle Database 10*g* in its True User Identification product line.

True User Identification complements many identity management solutions, such as Oracle Identity Management, through the creation of a unique ID based on a user's fingerprint. While the technology's most popular use is for strong user authentication, its ability to eliminate fraudulent and duplicate IDs has enabled implementations including child identification systems, healthcare systems, financial applications, identity verification for college entrance exams, and even entry to workout facilities.

BIO-key provides a completely secure environment for biometric identification systems: the storage format for the biometric data is impossible to reverse-engineer into a fingerprint, and the fingerprint data can be stored or destroyed if necessary.

webLOCATOR

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BY BLAIR CAMPBELL

Managing the Middle

Oracle ACEs stay current on the latest and greatest technologies.

Atul Kumar

How has Oracle University helped you move forward in your career? My first Oracle University training course was sponsored by my first employer, Triniti Corporation. Since then, I've taken additional classes to get a quick but thorough overview of new products. I prefer to take online classes and use self-study materials—then I can utilize my business travel time for reading Oracle University's self-study guides and have them on hand to reference later.

What new products or features have you been exploring lately? I'm using a shared application tier for multinode applications, because of reduced maintenance overhead. It's cost-effective, because the same shared drive is used to mount the file system—and software—across various servers, which reduces hardware costs.

If you were going to the International Space Station for six months and could take only one Oracle reference book, what would it be? The *Oracle Applications Concepts* documentation—because every time I read it I find something new.

peerSPECS

Company: Self-employed

Job title/description: Independent Oracle consultant, responsible for managing, designing, and deploying Oracle Applications

Location: London

Oracle credentials: Oracle Certified Associate (Oracle Application Server 10*g*), with 7 years of experience using Oracle

Oracle ACE
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Srinivas Polsani

What's your favorite tool or technique on the job? Service-oriented architecture [SOA] is my favorite concept, as this architecture isn't tied to a specific technology and can be implemented using a wide range of technologies. It can also support integration and consolidation activities within complex enterprise systems. SOA can help businesses respond more quickly and cost-effectively to changing market conditions.

What advice do you have for those just getting started with Web-based database development? The advice I've got for anybody working on Oracle Forms, Oracle Reports, Oracle Developer Tools, or related technologies is to start getting into object-oriented programming and Java. Take some introductory classes on both technologies, buy a good book, and start practicing. To be very successful at Web and database development, it's important to have a good foundational understanding of the technology you're going to be working with.

What's your favorite thing to do that doesn't involve work? Reading reviews on the latest electronic gadgets and keeping track of developments in technology that affect day-to-day life.

peerSPECS

Company: Satyam Computer Services, a global consulting and IT services company

Job title/description: Principal consultant and general manager in the Oracle Fusion Middleware Practice of Satyam's Enterprise Applications Group, responsible for technical competency and global presales

Location: Hyderabad, India

Length of time using Oracle products: 10 years

Oracle ACE
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Nathalie Roman

What technology has most changed your life? Web services, Oracle BPEL Process Manager, and Oracle's Enterprise Service Bus. I consider these technologies a fun playground that has given me lots of opportunities. The passion I feel for my job has everything to do with Oracle SOA Suite and the different technologies I like to work with. By giving seminars and blogging, I'm able to transfer that passion to customers and other developers.

What's your favorite tool or technique on the job? Oracle JDeveloper and Oracle SQL Developer are my favorite IDEs; Oracle Enterprise Manager in Oracle SOA Suite is my favorite environment, from a management point of view; and blogging is my favorite technique.

What would you like to see Oracle, as a company, do more of? I'd like to see more opportunities to engage in beta testing. Working more closely with Oracle would also help us know what the company is looking for and how we can help—for example, if Oracle needs articles, tutorials, or experience in a certain technology or wants to test a new approach. ■

peerSPECS

Company: iAdvise, an IT consulting firm

Job title/description: Competence leader of the iAdvise Oracle Fusion Middleware team, responsible for presales, learning tracks for new members and employees, workshops, seminars, and internal and external courses

Location: Antwerp, Belgium

Oracle credentials: Oracle Fusion Middleware Sales Champion, Oracle Implementation Champion, and Oracle Presales Champion, with 6 years of experience using Oracle

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pillar® DATA SYSTEMS

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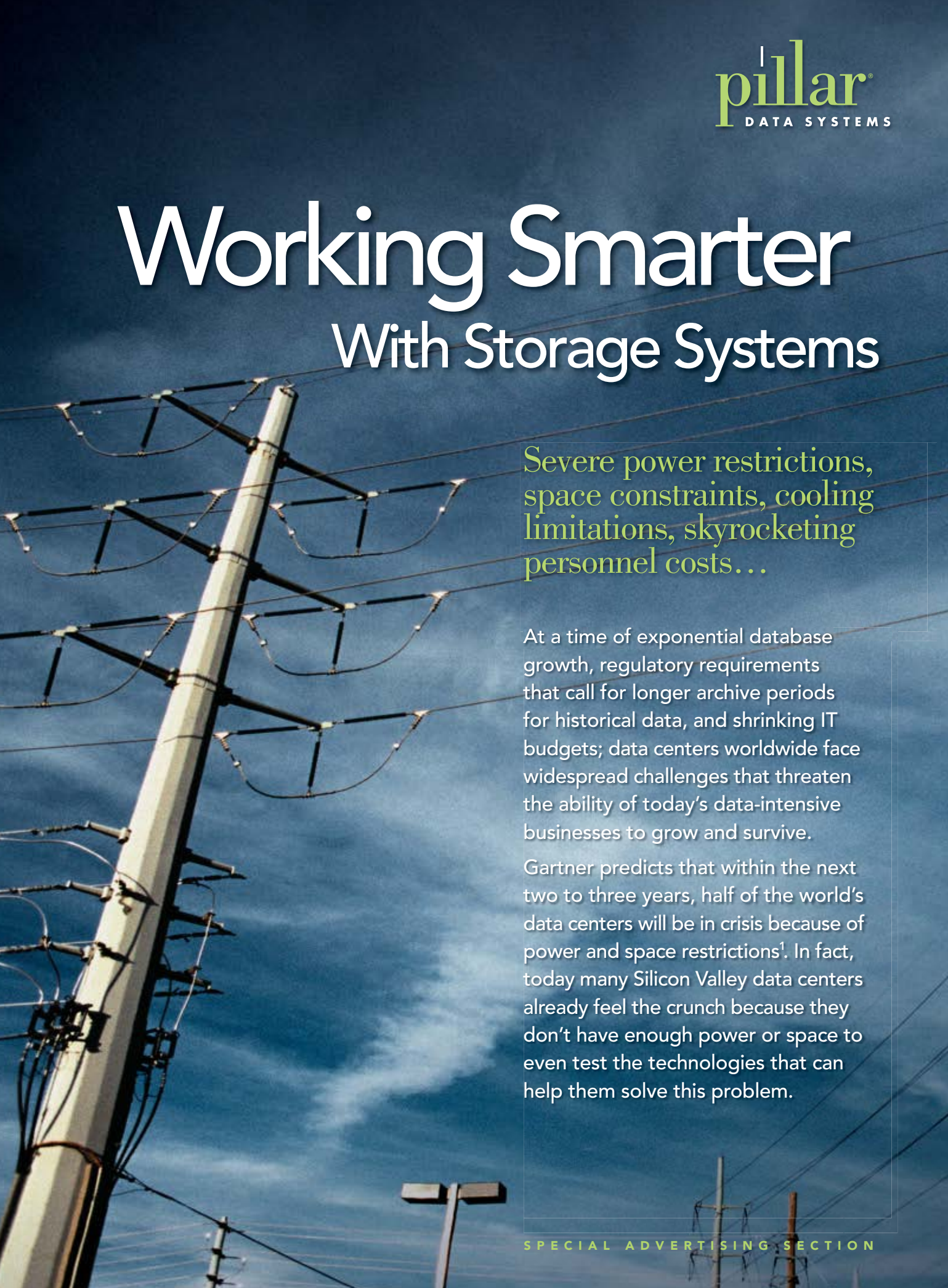
With Storage Systems



Severe power restrictions, space constraints, cooling limitations, skyrocketing personnel costs…

At a time of exponential database growth, regulatory requirements that call for longer archive periods for historical data, and shrinking IT budgets; data centers worldwide face widespread challenges that threaten the ability of today's data-intensive businesses to grow and survive.

Gartner predicts that within the next two to three years, half of the world's data centers will be in crisis because of power and space restrictions[1]. In fact, today many Silicon Valley data centers already feel the crunch because they don't have enough power or space to even test the technologies that can help them solve this problem.

To meet these challenges, data centers need to meet their growing storage needs not just with more storage systems, but with smarter storage systems. The new systems must conserve power, run cooler, and take up less space. At the same time, these systems must maximize efficiency and be easy to set up and manage.

Smarter Storage Solutions

Storage solutions from Pillar Data Systems are ideal for the Oracle-based data center. Not only are Pillar's unique SAN/NAS storage systems low-power, easy to use, and have a small-footprint – but they are also fully validated with Oracle's Unbreakable Linux Program and certified with Oracle Enterprise Linux. And with new compression features and expanded options for data partitioning with Oracle Database 11g, data centers will realize even greater storage efficiencies with Pillar. With tera- and even petabytes of storage needs, only the storage systems that are smart energy consumers will survive in the coming environment. These systems are the smart choice because they offer:

- Power efficiency
- Simplified corporate-wide storage
- Validation with Oracle applications

Power-efficiency: Meeting Growth With Green

The "Green" discussion historically has revolved around environmental issues such as greenhouse gasses and carbon neutral storage, and in IT the discussion largely has been limited to only half the problem: power and cooling consumption.

Consider that in less than two years, $6 billion was spent powering data centers in the United States alone. According to IDC, for every dollar spent on hardware, a quarter of that was spent on power and cooling for the same hardware[2]. Additionally, Gartner estimates that today large corporations spend between four and eight percent of their IT budget on energy. Looking into the future, Gartner predicts this will increase by up to four times during the next five years. As IT managers break down their budget and see that 32% of it could be spent on energy alone by 2011, they begin to consider implementing "green" policies on future data storage purchases[3].

For a true measure of overall storage efficiency, companies need to consider an additional critical component – physical space. Pillar is the only company not only to reduce energy consumption associated with powering and cooling storage systems, but also to reduce the overall physical space consumption of those same storage systems. Pillar has taken on a leadership role within the storage industry, defining the metrics to measure overall efficiency. Pillar recently introduced the Pillar Storage Efficiency Quotient (EQ™), a measurement that factors in the key elements of data storage efficiency, including capacity, performance, power, and space. Pillar's EQ is nearly double that of competing storage systems, revealing leading performance and capacity while consuming the lowest levels of space and energy. The result is the most efficient storage system on the market today.

$$(\mu)\ \frac{\text{Capacity x Performance}}{\text{Power x Space}}$$

Figure 1. Pillar Data Systems' EQ™ is a measurement of system efficiency as a function of Capacity times Performance, divided by the product of Power and Space.

"Resource limitations, such as energy and space, are becoming an increasing concern for companies of all sizes and geographic locations," said Mike Workman, Chairman and CEO, Pillar Data Systems. "These pressures impact the already precarious balance of performance, capacity, energy and space in the data center. With EQ, Pillar is leading the charge toward helping companies address the limitations of specialized, single-purpose legacy architectures. Pillar systems generate less heat, consume less power, and require much less physical space than the competition."

Pillar is a member of the Green Grid consortium, an interactive body of members who share and improve current best practices around data center efficiency. The consortium's scope includes collaboration with end users and government organizations worldwide to ensure that each organizational goal is aligned with both developers and users of data center technology.

"We are pleased to have vendors like Pillar Data get involved in addressing data center efficiency," said Mark Monroe, a director of The Green Grid. "The necessity for efficient storage solutions is ever increasing and The Green Grid is eager to have Pillar Data… bring their industry expertise to the consortium."

Storage Simplified

Part of working smarter boils down to reducing complexity. Customers can significantly simplify by eliminating multiple storage silos across their enterprise. Rather than selling different systems based on different IO needs, or point products, Pillar dynamically provisions Quality of Service (QoS) levels on a single system to meet the IO requirements of the customer's various applications. The result is getting Tier 1 through Tier 3 service on a single system instead of with three separate systems. Leveraging Pillar's QoS-based architecture eliminates the need to manage disparate point products and incompatible platforms; with the licensing, service agreements, power, space, and personnel costs that go with that.

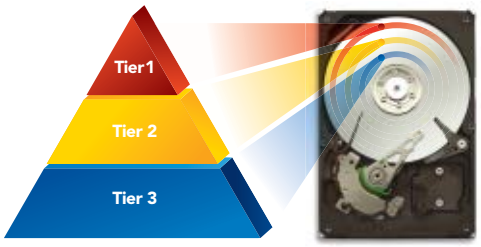


Figure 2. Pillar data System's dynamically provisioned Quality of Service (QoS) levels

"The new Quality of Service enhancements in Oracle Database 11g coupled with Pillar's QoS-based architecture for storage provides superior accountability for maintaining application Service Levels in the industry" says Mark Salser, senior vice president of Oracle's Technology Business Unit. "Customers can now leverage QoS across the entire pool of compute resources for both CPUs and storage, breaking the dependency on point products forever."

This enterprise-class benefit of Pillar's QoS-based architecture is available to companies of all sizes, allowing the storage system the small business uses today to grow with the company and be part of the overall storage system the medium business uses tomorrow.

The other part of the simplification factor is making the systems easier for DBAs to set up and manage. Pillar worked with Oracle to simplify the management of Pillar and Oracle environments with the Pillar Storage Manager plug-in for Oracle Enterprise Manager. This tool allows administrators to monitor their Pillar Axiom storage systems and manage their Oracle infrastructure through a single consolidated console, simplifying administration and lowering the cost of storage management. Pillar's plug-in for Oracle Enterprise Manager takes advantage of Oracle Enterprise Manager's lights-out monitoring and alerting framework to provide availability, performance, and configuration information for Pillar Axiom storage systems. Utilizing Oracle Enterprise Manager reports and alerts, DBAs can collaborate with storage administrators to perform root cause analysis of issues affecting their data center.

Figure 3. Pillar Data Systems Storage Manager plug-in for Oracle® Enterprise Manager.

CUSTOMER TESTIMONIALS

Data centers are realizing massive savings on energy costs to power and cool their Pillar and Oracle Grid infrastructures, as well as on real estate costs to physically house those systems and on licensing. In some cases, savings of up to 75 percent annually are being reported on energy costs alone. The real estate costs savings eclipse that figure in the more densely populated metropolitan areas such as San Francisco

ORACLE®

Oracle Corporation runs Pillar Data Systems in production servicing 45,000 users daily and some 38 million documents of unstructured data for its employees worldwide. "We chose Pillar because it provides us the greatest capacity at the lowest cost, while providing enterprise performance and availability," says Campbell Webb, vice president of Server Technologies IT at Oracle. "Pillar was the perfect match for Oracle grid computing and our Real Application Clusters, Automatic Storage Management, and Secure Backup product offerings."

redENVELOPE

"Due to the large volume of data we produce, our power capacity was reaching the limit and causing our power costs to soar. We needed an option that would not overload our circuits and would keep our costs low," said Dale Emel, Director, Technology Services, RedEnvelope. "Pillar afforded us both. We're getting far greater efficiency out of our storage resources with Oracle RAC on the [Pillar Data Systems] Axiom system, which drives our energy costs down and allows our data capacity to grow and scale."

University College FALMOUTH

University College Falmouth (UCF), one of the UK's leading university colleges of art, design and media, recently embarked on a project to greatly expand its storage capacity while keeping a close eye on the budget. "We have actually been able to reduce our software licensing costs alone by 20 percent," said Nathan Prisk, head of IT at Falmouth. "What we did not expect was to be able to reduce running costs in the data centre, and this is a significant bonus. In particular we have seen our cooling costs cut to 6 percent of those required previously, even though storage capacity is 16 times bigger."

"Oracle Enterprise Manger with its unique top-down approach to application management enables Oracle and its partners to deliver unprecedented depth and breadth for application management," said Richard Sarwal, senior vice president of Applications and Systems Management, Oracle. "We have demonstrated this very successfully with Pillar Data Systems' plug-in for Oracle Enterprise Manager. This collaboration has provided our joint customers a consolidated view of Oracle applications down to the storage using a single management console."

Validated Systems for High Availability

Lowering costs is crucial to any business; but at the end of the day, the system has to get the job done. Pillar worked with the Oracle Unbreakable Linux Program to validate an entire "end-to-end" solution and published several validated configurations for Oracle Database on Oracle Enterprise Linux with Real Application Cluster technology for both SAN and NAS. These Validated Configurations are pre-tested to ensure that the servers, operating system, and storage network connectivity components all work together seamlessly. "These Validated Configurations provide our customers with a pre-tested and integrated solution that delivers fault tolerance and high availability across the entire infrastructure" says Paul Veilleux, executive director of global alliances at Pillar Data Systems.

Pillar also worked with Oracle's Technology Business Unit to deliver 11g Accelerator Services that provide rapid installation of the Validated Configurations. In the end, customers get a production-ready system with their live data up and running, along with documented best practices for standardization and maintaining their Grid – saving time and expense while improving on the total customer experience.

"Pillar and Oracle continue to provide support to the Linux and the open source community. Both companies will continue their coordination to provide enhanced security, data protection and connectivity solutions to the Linux developer and user communities" says Wim Coekaerts, vice president of Oracle Enterprise Linux. Pillar's consolidated NAS/SAN architectures combined with Oracle's Unbreakable Linux program provides customers enterprise-class support for their Linux environments."

"Oracle's Unbreakable Linux support program is additional proof of Oracle's deep commitment to making the Linux experience better for users. As more and more customers deploy simplified and consolidated architecture, our close partnership with Pillar enables us to jointly provide the performance and reliability these customers demand for their mission-critical applications," said Monica Kumar, senior director of product marketing, Oracle.

RESOURCES

Visit the Pillar Data Systems website to learn more about the features described in this article:

Meeting Growth With Green
Maximizing Efficiency
pillardata.com/green

Storage Simplified
Pillar's QoS
pillardata.com/green/qos.shtm

Pillar Disk Utilization
pillardata.com/green/disk-utilization.shtm

Validated Systems for High Avaiability
Unbreakable Linux and Certified Configs
pillardata.com/solutions/oracle-databases
pillardata.com/partners/technology/oracle.shtm
oracle.com/technology/tech/linux/validated-configurations

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About Pillar Data Systems
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Simplify, Consolidate, and Save.

Pillar Data Systems takes a sensible, customer-centric approach to networked storage to create an entirely new class of storage. Pillar started with a simple, yet powerful idea: Build a successful storage company by creating value that others had promised, but never produced. We're on a mission to deliver the most cost-effective, highly available networked storage solutions on the market. We build reliable, flexible solutions that seamlessly unite SAN with NAS for the first time and enable multiple tiers of storage on a single platform. But don't take our word for it. Check out the resources listed in this article, or pick a pilot project and contact Pillar Data Systems to request a real-data demo today.
www.pillardata.com

[1] Michael A. Bell, Gartner, December 2006, "Meeting the Power and Cooling Challenge"

[2] Data Center Decisions 2006 Presentation

[3] "Why 'Going Green' Will Become Essential for Data Centers," Gartner, By Rakesh Kumar, October 2006

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EDITORS' CHOICE AWARDS 2007

Honoring Technology Leadership and Innovation

Selecting the recipients for *Oracle Magazine*'s Editors' Choice Awards is never easy, but it's always rewarding. Nominated from all corners of the globe, the extremely accomplished candidates for this year's awards have distinguished themselves in their leadership and innovation with Oracle technology, and all are worthy of recognition.

The editors of *Oracle Magazine* are proud to name the recipients of our sixth annual Editors' Choice Awards. The women and men on the following pages exemplify innovation, vision, and dedication in working with and managing Oracle technology today.

–THE EDITORS OF *ORACLE MAGAZINE*

BY DAVID A. KELLY

MANEL BENAZET

CIO OF THE YEAR, LATIN AMERICA

CIO works to cut costs and be more responsive to business through SOA.

For Manel Benazet, global Latin American CIO for Telefónica and *Oracle Magazine*'s CIO of the Year for Latin America, implementing service-oriented architecture (SOA) isn't about technology—it's about serving the business better.

"We made some very important architectural decisions in our technology road maps, such as deciding to build an SOA environment, so that we could be more responsive to the business," says Benazet. "We also decided to build all of our SOA architecture over an enterprise service bus [ESB] to reduce the number of interfaces. Interfaces are one of the most important costs when you look at the typical traditional legacy architecture."

Cutting costs and being more responsive to the business is critically important when you're serving millions of customers across 14 countries in Latin America. In fact, one of Benazet's big challenges has been the global integration of these systems, including the migration of multiple legacy systems, some of which were 20 years old. Three years ago, Telefónica created a road map to migrate these 14 unique regional systems to Oracle E-Business Suite and integrate them into a consistent, SOA-based global architecture. The objective was to reduce costs, increase efficiencies, and enable Telefónica to take advantage of new market opportunities.

Although Telefónica is still in the process of deploying its global SOA architecture, it has made significant progress. "For example, using Oracle E-Business Suite we have a work management system that manages more than 15,000 telephone technical services and installation employees," says Benazet. "We're using SOA interfaces and the ESB to connect our services personnel to the Oracle workforce management system that dynamically allocates jobs to them based on client requests and their proximity. The solution helps reduce the costs of the global operations of the field workforce."

The overall goal of Telefónica's SOA architecture is to have a very configurable infrastructure to dynamically support business systems—to be able to meet business needs more rapidly and at a lower cost. "Traditionally, you need a huge amount of time to develop interfaces to legacy systems and deliver new systems," says Benazet. "With our ESB and SOA infrastructure, you can change things much more easily and quickly."

Telefónica's projects pay off. For example, the consolidation of its database architecture in its Brazil location using Oracle will result in an estimated US$30 million cost reduction in maintenance and ongoing costs over three years of database operation.

While saving money and deploying new technology is satisfying to Benazet, one of the best things about his job is the people he works with. "I enjoy the challenge of my job and being able to work with different people and different cultures, helping to optimize all our skills and resources across all the countries we serve," he says.

PAULO FRIDMAN

winnerSPECS

Name: Manel Benazet

Job title/description: Global Latin American CIO

Company: Telefónica S.A.

Location: São Paulo, Brazil

Award: CIO of the Year, Latin America, 2007

HONG LI

CIO OF THE YEAR, ASIA PACIFIC

CIO leads first deployment of an ERP system—and plans for growth with Oracle E-Business Suite.

In 2004 Sinosteel—a state-owned company in China focused on the development, processing, logistics, and services related to metal production—realized that to continue growing, it needed a comprehensive and integrated enterprise resource planning (ERP) system that would help unify management, resource integration, and information sharing and provide centralized services.

At the time, there were no successful ERP implementation cases among similar domestic companies. Sinosteel, which had more than 32,000 employees and revenues of RMB61 billion in 2006, is already large. But the company has big ambitions, including the goal of becoming one of the top 500 global enterprises by 2010. To help get them there, Sinosteel selected Oracle as its partner.

"We selected Oracle E-Business Suite as the platform for supporting Sinosteel's management and business operation because Oracle E-Business Suite provides a comprehensive solution that meets our strategic goals of establishing an integrated and unified management information platform; enabling cross-region centralized management; and the integration of capital, information, and business," says Hong Li, Sinosteel's Information Management Department general manager and *Oracle Magazine*'s CIO of the Year for Asia Pacific.

Sinosteel's ERP system consists of Oracle E-Business Suite 11*i* Financials, Human Resources Management System, and Customer Relationship Management, as well as Oracle Discoverer and other modules. An important part of Sinosteel's successful implementation was the flexibility of Oracle E-Business Suite.

"With the flexible configuration and strong adaptability of the Oracle application system, we have solved the problem of integrating our logistics, capital flow, workflow, and information flow and highlighted how a large enterprise group in China's trading industry could successfully build an integrated ERP system," says Li. "In addition, the flexible and open architecture of Oracle application products allowed us to easily integrate them with Sinosteel's existing systems—improving the timeliness of our ERP implementation while reducing the implementation risks and total cost of ownership."

The architecture works for Sinosteel. Among other accomplishments, the company has implemented its business management system, including trading, cargo transportation, and engineering contract applications, in five subsidiaries and has enabled the real-time sharing of purchase, inventory, and project management data. Sinosteel has built a unified financial management system and implemented it across 28 subsidiaries. And its customer relationship management system includes customer information contract, credit, and business opportunity management, enabling the integration of customers and suppliers between the headquarters and the branches. "Oracle E-Business Suite integrates the management process of Sinosteel's critical sectors," says Li.

Being first isn't always easy, but it can pay big dividends.

winner**SPECS**

Name: Hong Li

Job title/description: General Manager, Information Management Department

Company: Sinosteel

Location: Beijing

Award: CIO of the Year, Asia Pacific, 2007

GETTY IMAGES/ADRIAN BRADSHAW

2007 DAVID McNALLY

CIO OF THE YEAR, EUROPE, MIDDLE EAST, AFRICA

For this CIO, integrated technology solutions are about serving the customer better and faster.

While most people think of milk, fruit, and cereal when they think of grocery stores, David McNally, the global CIO for Amsterdam's supermarket giant Royal Ahold, thinks of people and integrated IT systems.

"At the heart of everything we do is the customer," says McNally, *Oracle Magazine*'s CIO of the Year for Europe, Middle East, and Africa. "Having integrated retail systems allows us to provide the customer with better access to the best new products. It also allows us to develop a better understanding of customer behavior and how we can meet customer product, pricing, and availability expectations."

Like many large businesses, Ahold had found itself limited by older IT systems that were poorly integrated and unable to support new initiatives or provide timely and accurate information. In 2006 the company reviewed its retail business, restructured, and developed a strategy for long-term profitable growth. Over the past year, the company has been launching global IT projects—which McNally oversees—in support of these profitability initiatives.

For example, the goal of Ahold USA's most strategic initiative has been to create a new retail business model and the systems platform necessary to support it.

"In conjunction with our operating companies and our business leaders, we've selected Oracle Retail for our next-generation retail systems platform," says McNally. "We feel that this will be a key enabler for our business transformation."

winnerSPECS

Name: David McNally

Job title/description: Global CIO

Company: Royal Ahold

Location: Amsterdam

Award: CIO of the Year, Europe, Middle East, Africa, 2007

In Europe, Royal Ahold uses Oracle's PeopleSoft Enterprise Human Capital Management and Financial Management systems to increase its effectiveness and profitability. "We're now deploying Oracle's optimization capabilities to extend our European retail systems," says McNally.

For Ahold's Europe and America operations, the key to competitive success and serving their customers relies on integrated retail systems that can bridge business gaps and deliver the right information at the right time.

"The real value of the integration is around the speed and efficiency of new product adoption and delivery to market," McNally says. "We need to be able to procure, promote, and deliver to our supply chain in the most efficient manner possible. Being competitive is really about delivering the right assortment at the right price with speed and accuracy."

TON HENDRIKS

YAZU NAKAOKA

2007 RICHARD LEFAVE

CIO OF THE YEAR, NORTH AMERICA

Simplicity, IT synergies, and teamwork fuel this CIO's plans for growth.

Although Sprint serves 54 million customers with its communication products and services, its IT goals are much more concise.

"One of our primary IT initiatives is getting to one—one set of systems, one set of platforms, one set of standards," says Richard LeFave, CIO of Sprint and *Oracle Magazine*'s CIO of the Year for North America. "Oracle has been a major contributor toward that goal by helping us rationalize our applications into Oracle's PeopleSoft ERP [enterprise resource planning] suite, thereby eliminating older, more maintenance-heavy applications." Sprint implemented PeopleSoft's human resources component at the beginning of the year and completed rolling out the ERP functionality for the financials and supply chain in July.

Now into the second year of its three-year integration plan following the merger with Nextel, Sprint is gaining competitive advantage from the combination of PeopleSoft products and Oracle Database by scaling its operations effectively and being able to put out new products more efficiently.

winnerSPECS

Name: Richard LeFave

Job title/description: CIO

Company: Sprint

Location: Overland Park, Kansas

Award: CIO of the Year, North America, 2007

"IT plays a huge role in enabling Sprint to optimize the synergy that results from the merger," says LeFave, who notes that streamlining applications, databases, and business processes is especially important for the combined company's growth. "The combination of Oracle's professional services linked with the fundamental stability of their software has been a significant contributor to the effectiveness of our ability to hit our synergy targets."

A key part of LeFave's success is enabling IT to be viewed as a business unit instead of in its traditional role as a support function. LeFave credits his extensive background in IT, as well as serving five years in the U.S. Army, with forming his leadership skills, building customer-focused teams, and applying technology to drive growth. "Running IT as a business means that we talk in terms of the business and address the business problems."

But being successful also requires simplicity. "Driving simplicity through IT systems yields better scalability," says LeFave. "Greater simplicity enables us to innovate in new spaces, so that our product and marketing departments can drive new ideas and solutions for customers."

In the end, though, all the technology in the world is only as good as the people designing and deploying it. "We've assembled an outstanding team of operators and IT professionals who are focused on delivering high-quality IT solutions. And being part of a team that has clear technology objectives makes my job exceptional."

2007 DECIO TOMAZ AQUINO DE OLIVEIRA

CTO OF THE YEAR

CTO improves the environment, operational goals, and efficiencies at the same time.

CTOs obviously have to worry about databases and applications, but Decio Tomaz Aquino de Oliveira, CTO of Brazil's MRS Logistica and *Oracle Magazine*'s CTO of the Year, also has to think about plants and soil.

"As one of the largest railroads in Brazil, we believe environmental preservation is important," says Oliveira. "As a result, we have implemented a number of environmental programs, including the recuperation of degraded areas with plant coverage, a program to manage residues from the railroad, and the adoption of preventive measures for eliminating polluting processes."

The environmental impact from such efforts is important because MRS covers three states across southeast Brazil, the most industrialized and populated regions, responsible for 65 percent of Brazil's gross domestic product.

But helping the business grow is still Oliveira's first priority. "Using our existing track system, MRS has committed to doubling our production and revenue in three years," he says. "Our objective is to reach the top ranking in operational efficiency to make MRS the best railway logistics operator in the country."

To do that, MRS works with state-of-the-art rail technology, including GPS equipment to track the position of trains in real time, onboard signaling, and the detection of problems on the tracks with laser and ultrasound equipment. While MRS uses Oracle Database to monitor such information, Oliveira is overseeing the deployment of a new Oracle E-Business Suite platform that will help the company achieve its aggressive growth goals.

"MRS is implementing a new maintenance process for its assets to support its growth and improve critical processes like finance, materials, and planning," says Oliveira. "We chose Oracle as our partner for that project, and in January 2008 we'll deploy a new Oracle-based maintenance system as our first step."

For MRS, having an integrated platform that can both scale with its business growth as well as cover the breadth of back-office and front-office requirements is critical.

"Oracle's solutions are increasingly integrated and provide a wide range of functionality," says Oliveira. "We believe that Oracle systems are strong and will be able to support our business processes now and in the future."

The result is that Oliveira has confidence that MRS's new Oracle-based solutions, such as a new maintenance solution, will give the company a competitive edge and make his job easier. "A good CTO needs to make sure that IT is aligned with our business processes and supporting business growth. Oracle is helping me do that."

winner SPECS

Name:	Decio Tomaz Aquino de Oliveira
Job title/description:	CTO
Company:	MRS Logistica
Location:	Juiz de Fora, Brazil
Award:	CTO of the Year 2007

PAULO FRIDMAN

JOAN LAWSON

IT MANAGER OF THE YEAR

IT manager says that delivering consistent data in real time is critical to success.

For many companies, data integration can be a monster job. But for online employment leader Monster.com, data integration using Oracle technologies has been a monster success.

"Delivering consistent data in real time to our key end points, such as our Siebel [Customer Relationship Management] CRM application, our Oracle E-Business Suite, and our Monster.com Web site, is critical to our success," says Joan Lawson, senior director of information architecture at Monster Technologies and *Oracle Magazine*'s IT Manager of the Year. "Effective integration is key because it enables greater productivity and flexibility as well as cost savings within our business."

Lawson has worked to eliminate inefficiencies such as redundant data entry and silos of data. "We want to have that single, central view of our customers," says Lawson. "The business benefit of being able to automate the order-to-invoice cycle is that we can reduce costs and improve the cash realization cycle. The integrations between our Web site and marketing applications also allow for a reduction of the cycle time for upsell/cross-sell opportunities."

An important aspect of her job has been ensuring consistent data quality. "Data governance is critical to a consistent definition of information across applications and databases," says Lawson. "We need to ensure that we know who owns the data, where the system of record is, and what the source of the truth is, as well as ensuring that everyone buys into that data ownership and definition of metrics."

Monster's relationship with Oracle has been extremely helpful. "The Oracle Fusion Middleware suite has served us well—it handles integration, workflow, and more," says Lawson. "The Oracle product suite is fully cohesive; there's consistency in implementation and monitoring. Oracle is truly a business partner. They work closely with our technology and business folks to identify ways in which we can leverage the best products to provide strong solutions based on solid technology."

For Lawson, the real joy in her job comes from participating in the design and evolution of solutions based on new technologies. "I'm particularly interested in the convergence of middleware technologies, along with application integration, data warehousing, business activity monitoring, data governance, and master data management," she says. "Those tools, along with a business commitment to process improvement, enable companies to eliminate silos and open up enterprise information that has a value to all."

DAVE BRADLEY

winnerSPECS

Name: Joan Lawson

Job title/description: Senior Director, Information Architecture

Company: Monster Technologies

Location: Maynard, Massachusetts

Award: IT Manager of the Year 2007

JON WALDRON

DBA OF THE YEAR

DBA's increased role matches bank's growth.

"The role of a DBA has changed significantly in my time doing it," says Jon Waldron, enterprise architect of database systems at the Commonwealth Bank of Australia and *Oracle Magazine*'s DBA of the Year. "Instead of just low-level tuning skills, today's DBAs need to be aware of in-depth design principles and application and infrastructure architecture and be able to consult with both the business and the developers on how best to achieve their goals. It's a very interesting and all-encompassing role."

It's a role he has performed exceedingly well for the Commonwealth Bank of Australia. Commonwealth is Australia's largest bank and its second-largest employer, with more than 38,000 employees and 1,100 branches.

Six years ago, Jon Waldron was the only Oracle DBA in the company. At the time, the bank realized that to be competitive it would have to overhaul its information management and applications so it could take a customer-centric approach. So Waldron and team built a customer relationship management (CRM) system for a small segment of the bank—the Premium Financial Services area—using Oracle Database and Microsoft Visual Basic.

Then the bank's CEO decided that the organization needed a CRM system that could power growth and help deliver expanded customer service. After evaluating off-the-shelf products and outsourced solutions, the Commonwealth Bank settled on the homegrown CRM solution as the best choice. The application has won multiple awards in the Asia Pacific region, including 2007 Asian Banker Best CRM Application. Oracle 10*g* products provide the power for the solution on the back end, while Microsoft .NET provides the power on the front end, resulting in one of the largest .NET/Oracle CRM deployments in the world.

winnerSPECS

Name: Jon Waldron

Job title/description: Enterprise Architect, Database Systems

Company: Commonwealth Bank of Australia

Location: Sydney, Australia

Award: DBA of the Year 2007

"The integration of .NET and Oracle works very well for us. We've been happy with the performance and how they've worked together," says Waldron.

Over the past three years, Waldron has championed a team of up to 45 DBAs in concert with 200 developers to create an AU$250 million (US$200 million) CRM and product origination system based on Oracle Database, Oracle Enterprise Manager with Grid Control, and Microsoft .NET. "The solution is all-encompassing—most interactions you can have with the bank from the front-end perspective are run through this system," says Waldron. "And the back end runs on an Oracle 128 CPU RAC cluster."

The result is a massively scalable system that can handle 30,000 simultaneous users. Migration to Oracle Automatic Storage Management and Oracle Clusterware is bringing even greater stability and availability to the system.

ROBERT EDWARDS

SERGIO CORETTI

APPLICATIONS IMPLEMENTER OF THE YEAR

Applications implementer finds that one Oracle solution can support many services right out of the box.

Generating invoices effectively and efficiently is a critical function for businesses. That operation can be particularly difficult in fast-moving industries such as telecommunications, where the range of products and services that companies offer and have to invoice against has grown exponentially over the past few years.

That's why Telecom Argentina turned to Oracle. "We chose Oracle for its flexibility, which has enabled us to offer diverse billing plans and customized solution bundles to meet diverse customer needs and help to expand our market share," says Sergio Coretti, senior project director at Telecom Argentina and *Oracle Magazine*'s Applications Implementer of the Year, who has been in charge of the complex project to transform the company's billing applications and architecture.

winnerSPECS

Name: Sergio Coretti

Job title/description: Senior Project Director

Company: Telecom Argentina

Location: Buenos Aires, Argentina

Award: Applications Implementer of the Year 2007

Previously, bringing out new or different services could require custom or nonintegrated billing applications. "Now with our Oracle-based billing and revenue management solution, we have only one system that can support many services right out of the box," Coretti says. "It has really simplified our billing architecture."

Telecom Argentina finished its implementation of Oracle Communications Billing and Revenue Management on time and on budget in March 2007. One of the key success factors for the company was establishing the parameters of their project very well. "You need to convey to the users what the solution will cover and what it will not cover," says Coretti. "It's very important just to manage the expectation of the project and define the scope."

Another important success factor in the project was executive support. Although Telecom Argentina's IT director was very committed to their technology and the new implementation process, he also made sure to align himself with the business director and business needs. "Thanks to this support, I had the commitment to create the best team for delivering the billing solution," says Coretti.

GABRIEL PIKO

2007 DAN KIEWLICH

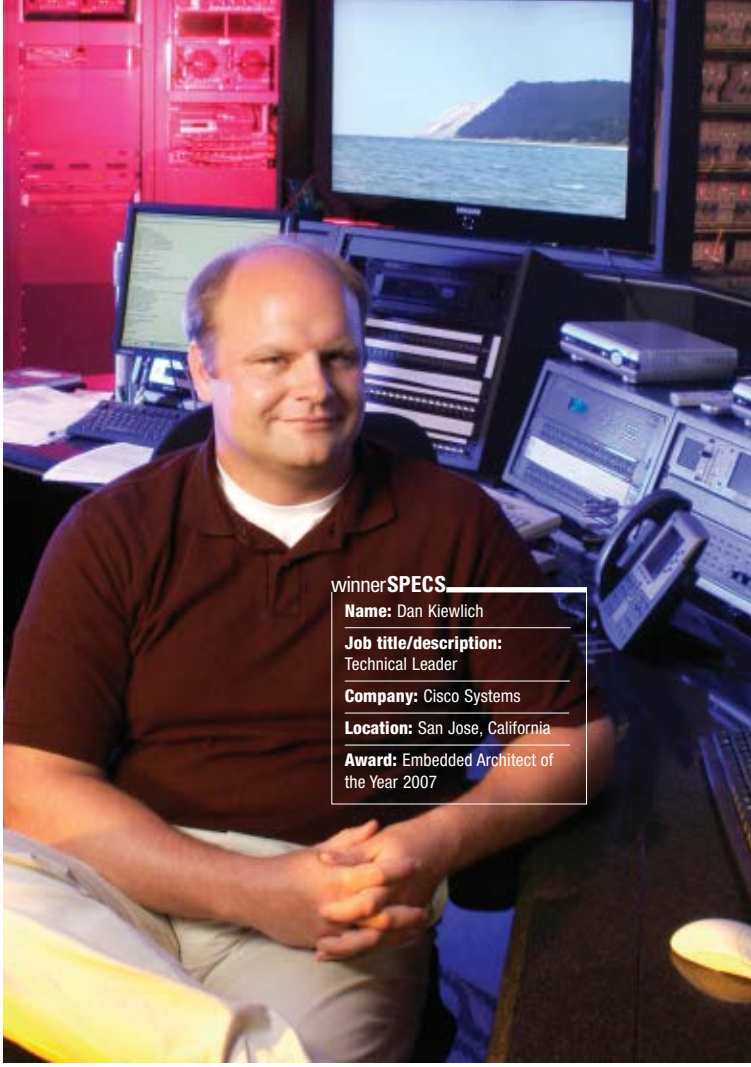
EMBEDDED ARCHITECT OF THE YEAR

Designing embedded systems is all about building a stable, high-performance solution, architect says.

For Dan Kiewlich, a technical leader at Cisco Systems and *Oracle Magazine*'s Embedded Architect of the Year, the most important part of designing embedded systems is creating a predictable, stable, and performance-oriented solution.

"We tailor the architecture for platforms with CPU and memory constraints and platforms where we're managing hundreds of millions of records," says Kiewlich, who designed a video-on-demand distribution system for cable and telco operators that is now sold by Cisco around the world. Cisco's Content Distribution System is based on a real-time networked video architecture that pools and load-balances servers based on off-the-shelf hardware to enable scalability, nonstop availability, and low total cost of ownership. Oracle Berkeley DB provides the database needs, including metadata and storage.

The Content Distribution System needs to operate flawlessly in a lights-out environment. "That's one reason why Oracle's Berkeley DB works so well for us—there are so many tuning options in the database that we can optimize our usage of system resources for the particular type of server we're running on," says Kiewlich. "It also provides near-zero maintenance requirements, which means we can embed it in our product and have a high level of comfort that things will work right."



winner**SPECS**

Name: Dan Kiewlich

Job title/description: Technical Leader

Company: Cisco Systems

Location: San Jose, California

Award: Embedded Architect of the Year 2007

ROBERT ADLER

winner**SPECS**

Name: Dasmeet Singh Ahluwalia

Job title/description: Senior Consultant

Company: BearingPoint

Location: McLean, Virginia

Award: Portal Developer of the Year 2007

2007 DASMEET SINGH AHLUWALIA

PORTAL DEVELOPER OF THE YEAR

Developer finds that Oracle Portal increases productivity and streamlines business processes.

Having the right applications and information is one thing. Enabling thousands of people to access and use them effectively is another.

That's the problem that Dasmeet Singh Ahluwalia, senior consultant at BearingPoint and *Oracle Magazine*'s Portal Developer of the Year, solved for a federal government agency. The organization's users spent too much time navigating environments, logging into multiple applications and browser sessions, and looking for the information they needed.

Ahluwalia used Oracle Portal to create a dashboard incorporating portlets for mail, calendar, tasks, RSS feeds, chat, live streaming video, and more. He also made extensive use of Oracle Portal's personalization capabilities. By developing a single-sign-on process, he eliminated the need for multiple logins and automatically provided authentication based on the user's profile stored in Oracle Identity Management.

The solution has increased productivity and streamlined the organization's business processes. Since the portal pulls data directly from source systems, it reduces potential data redundancy and lets users make decisions faster.

"The customers were very happy to be able to access all their applications and data from one dashboard," says Ahluwalia. "It's a significant improvement in productivity for them."

STEPHEN DIGGES

2007 LONNEKE DIKMANS

ORACLE FUSION MIDDLEWARE DEVELOPER OF THE YEAR

For this developer, success is balancing strategic vision with tactical benefits.

"If you're working with IT architecture, you have to look into the future as well as looking at what's practical and makes business sense to do right now," says Lonneke Dikmans, CEO and managing partner of Approach Alliance and *Oracle Magazine*'s Oracle Fusion Middleware Developer of the Year.

Oracle Fusion Middleware and SOA strategies are an important part of Dikmans' toolkit. "I like the fact that Oracle Fusion Middleware is so open. We work with a lot of companies that need to communicate with applications outside their own company and with different departments," says Dikmans. "Since Oracle Fusion Middleware is based on standards, you don't have to throw away all the previous investments."

However, open standards and SOA environments still need to be managed—since the increased flexibility they bring can also mean increased complexity.

"You don't need to define everything as a service just because you're in an SOA environment," says Dikmans. "It's important to look at your architecture from a business point of view so you can identify what should be reusable. Build your SOA up step-by-step, and don't go too fast."

PAUL HOWELL

winnerSPECS

Name: Lonneke Dikmans

Job title/description: CEO/ Managing Partner

Company: Approach Alliance

Location: Utrecht, The Netherlands

Award: Oracle Fusion Middleware Developer of the Year 2007

winnerSPECS

Name: Rasmus Lerdorf

Job title/description: Infrastructure Architect

Company: Yahoo!

Location: Sunnyvale, California

Award: Enterprise Developer of the Year 2007

ROBERT ADLER

2007 RASMUS LERDORF

ENTERPRISE DEVELOPER OF THE YEAR

Developer's home page programming adventure leads to tremendous results.

"I hate programming with a passion," says Rasmus Lerdorf, infrastructure architect at Yahoo! and *Oracle Magazine*'s Enterprise Developer of the Year. "But I love solving problems, and unfortunately a lot of the problems that interest me need to be solved through programming."

Back in 1994, Lerdorf developed the PHP dynamic Web page programming language for producing his personal home page. Today Lerdorf uses PHP to manage one of the largest Web sites in the world—Yahoo.com. "Just about everything at Yahoo! is PHP driven," says Lerdorf, who's responsible for Yahoo!'s PHP infrastructure components and common tools.

The fact that PHP has evolved from managing Lerdorf's home page to massively scalable enterprise Web sites is testimony to not only his original vision but also the support of a wide community of PHP contributors.

For Lerdorf, furthering PHP is all about community and contributions. "Over the past few years, Oracle has assigned engineers to work with the PHP team, and it's been really, really helpful," says Lerdorf. "I wish more companies would do what Oracle has done and make engineers available to open source projects."

THERESA HO

SECURITY ARCHITECT OF THE YEAR

Architect finds that security is a key business enabler, making better-informed decisions possible.

Verifying users and their appropriate access levels is no easy task when you're a US$6.3 billion enterprise such as the McGraw-Hill Companies. The information services provider encompasses brands such as Standard & Poor's, McGraw-Hill Education, *BusinessWeek,* and J.D. Power and Associates and has more than 20,000 employees in 40 countries. Authentication and access strategies for users are critical for growing the business.

"We view security as a key business enabler. Our security strategy enables our employees to perform their jobs and our customers to interact with the corporation with confidence," says Theresa Ho, McGraw-Hill's director of risk management and *Oracle Magazine*'s Security Architect of the Year. McGraw-Hill also uses its security architecture to tie together IT functions to ensure that consistent practice and coherent approaches are applied across the corporation to maximize security and control.

McGraw-Hill's risk management team is responsible for defining security policies, standards, application reviews, strategy, and architecture. Ho is leading an enterprisewide identity management and access control initiative to automate the process of creating, resetting, and removing employees' user IDs and passwords. "We use Oracle Identity Manager and Access Manager to help us manage user accounts and to perform password management," Ho says. The initiative is a key element of, and a foundation for, McGraw-Hill's security strategy and architecture.

"Our initiative focuses on enabling users to access business data in a secure way," says Ho. "The goal is to manage our employees' ID accounts effectively so that we can protect company assets and user privacy, maximize operational efficiency and user support, and meet regulatory requirements while reducing costs."

For Ho, a great security architect needs to understand a company's business and its challenges. "Without that basic understanding, you run the risk of having a mismatch between your knowledge of security strategy and the needs of the business," she says.

winnerSPECS

Name: Theresa Ho

Job title/description: Director, Risk Management

Company: The McGraw-Hill Companies

Location: New York City

Award: Security Architect of the Year 2007

CATHERINE GIBBONS

DENNIS AVONDET

ORACLE ENTERPRISE MANAGER ARCHITECT OF THE YEAR

High availability and fast response times are paramount for architect.

Few industries are growing and changing as fast as the healthcare industry, and healthcare leaders need to keep pace. That's why Cerner, a leading healthcare information technology provider, uses Oracle technologies to open up capacity and enable rapid growth for its hosted services.

With many clients, including very large ones like the U.K. healthcare system, Cerner faces the challenge of ensuring high availability and fast response times. To help, Cerner uses Oracle Enterprise Manager in conjunction with other Oracle technologies.

"Oracle Enterprise Manager fits into our infrastructure because of the depth and breadth of what it can manage," says Dennis Avondet, senior technology architect at Cerner and *Oracle Magazine*'s Oracle Enterprise Manager Architect of the Year. "Having a common management tool like this enables clients to break down silos and IT barriers and gives everyone across the health organization a common interface to manage databases, applications, and servers."

Avondet loves doing what Oracle Enterprise Manager does so well—getting to interact with and manage dozens (if not hundreds) of technologies. "The challenge of making them all work together is what's exciting to me," says Avondet.

CHRIS WILBORN

winnerSPECS

Name: Dennis Avondet

Job title/description: Senior Technology Architect

Company: Cerner

Location: Kansas City, Missouri

Award: Oracle Enterprise Manager Architect of the Year 2007

PATRICK WOLF

ORACLE APPLICATION EXPRESS DEVELOPER OF THE YEAR

For Patrick Wolf, fast and easy development isn't just for small projects.

"Oracle Application Express is a proven technology for any size of project—not just small ones," says Patrick Wolf, senior solution architect at Sphinx IT Consulting and *Oracle Magazine*'s Oracle Application Express Developer of the Year. "Its great performance and scalability allow us to use it for our customers' mission-critical, large-size applications." Using Oracle Application Express, Sphinx IT Consulting can develop state-of-the-art, Ajax-enabled Web 2.0 applications quickly and securely.

Last year Wolf started two open source Oracle Application Express projects, ApexLib (a development productivity framework) and the APEX Builder Plugin, which are already used worldwide. As an Oracle ACE, he contributes regularly to the OTN Application Express forum, and his Oracle Application Express–related blog (www.inside-apex.blogspot.com) gets about 500 unique visitors a day.

Wolf was a beta tester for Oracle Application Express 3.0. "The nice thing about Oracle Application Express is that you don't have to install software on your local PC to test it; you simply use Oracle's hosted environment," he says. "For the beta, we uploaded our existing applications, did tests with them, and corresponded with the developers. Doing the beta testing was a really nice experience for us."

TON HENDRIKS

winnerSPECS

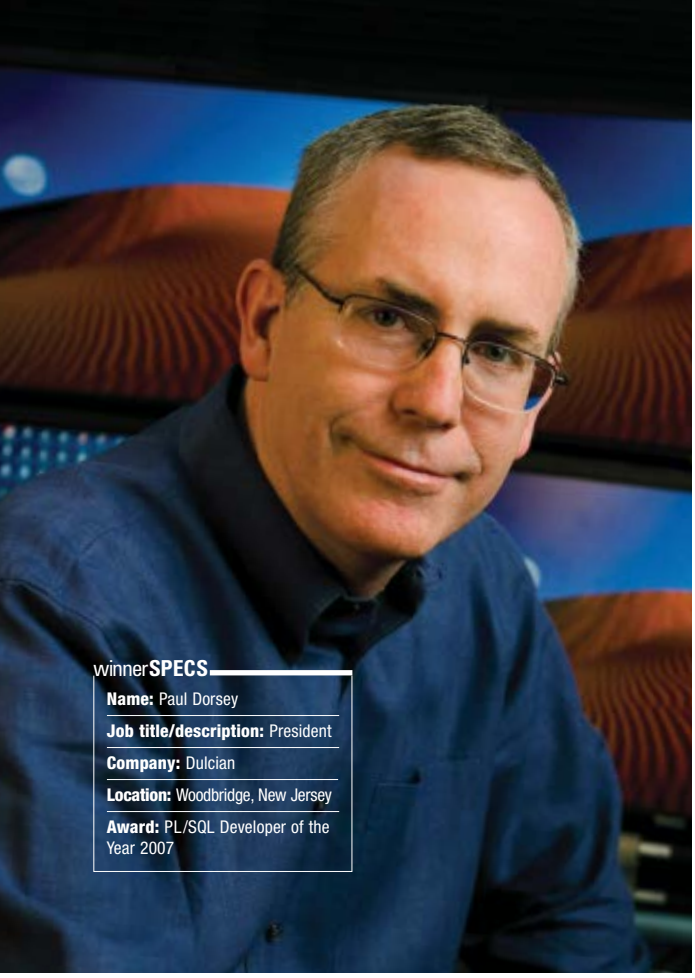
Name: Patrick Wolf

Job title/description: Senior Solution Architect

Company: Sphinx IT Consulting

Location: Vienna, Austria

Award: Oracle Application Express Developer of the Year 2007



winner**SPECS**

Name: Paul Dorsey

Job title/description: President

Company: Dulcian

Location: Woodbridge, New Jersey

Award: PL/SQL Developer of the Year 2007

2007 PAUL DORSEY

PL/SQL DEVELOPER OF THE YEAR

Developer uses PL/SQL for speed, efficiency, and ease of maintenance.

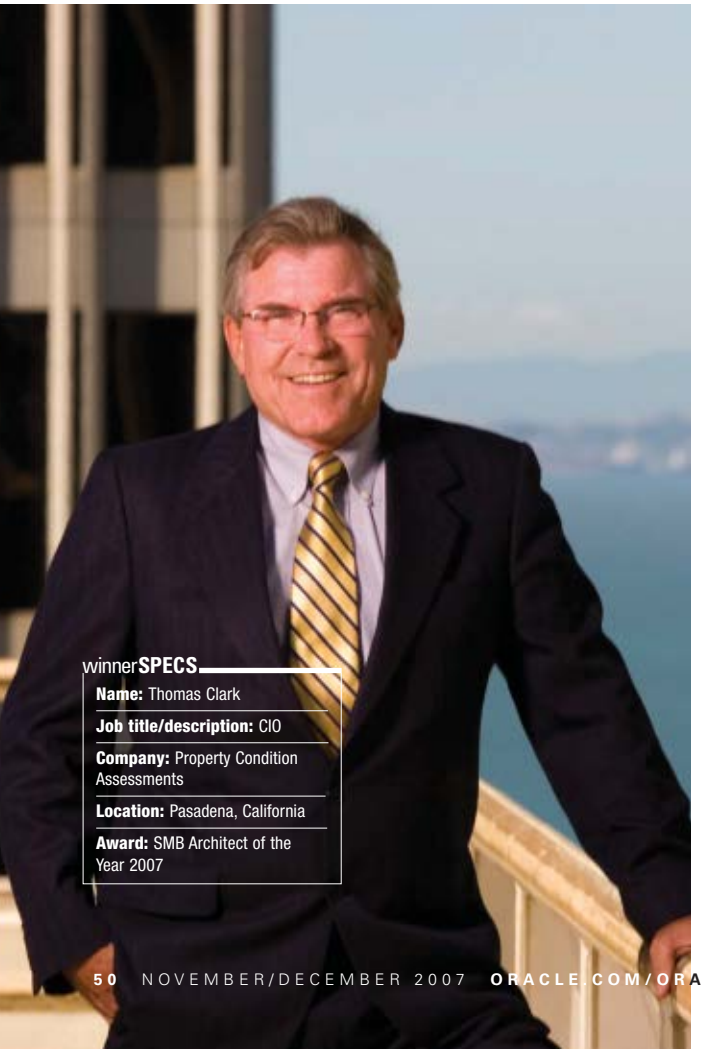
An Oracle ACE Director and winner of the Oracle Fusion Middleware Challenge, Paul Dorsey, *Oracle Magazine*'s PL/SQL Developer of the Year, has spoken at Oracle technology conferences, cowritten eight books—including *PL/SQL for Dummies* (John Wiley & Sons, 2006)—taught at multiple colleges, and consulted around the world. His company, Dulcian, provides Oracle consulting and Web application development services, among others.

For Dorsey, speed, efficiency, and ease of maintenance are the main reasons for using PL/SQL—even when others disagree.

"There's probably no more pernicious conventional wisdom than the trend to say, 'we need to be database independent,'" Dorsey says. "We've had routines that took 20 minutes to run in midtier logic that were reduced to two-tenths of a second by moving them down into the database in PL/SQL."

In the end it comes down to results. "I'm an engineer. If I haven't provided software that users derive benefits from, I don't feel as if I've accomplished anything," says Dorsey. "I like to make sure that a system works the way it's supposed to."

CATHERINE GIBBONS



winner**SPECS**

Name: Thomas Clark

Job title/description: CIO

Company: Property Condition Assessments

Location: Pasadena, California

Award: SMB Architect of the Year 2007

2007 THOMAS CLARK

SMB ARCHITECT OF THE YEAR

Integration allows users to have better and easier experience, architect says.

"Connectivity is bringing people together in a virtual world," says Thomas Clark, CIO of Property Condition Assessments (PCA) and *Oracle Magazine*'s SMB Architect of the Year. "Oracle understands this and is responding with new products, so we're redeveloping our programs to take advantage of the new technologies that Oracle has developed."

PCA is an architectural and engineering firm specializing in property condition due diligence. Its mission—to reduce client risk in acquisition and operation of real properties—requires the company to have an army of engineers and architectural assessors distributed nationwide.

"By using new [Oracle] technologies, we can integrate business functions, so now it feels like our employees are working next to each other, even when they're spread out across the country," Clark says.

In addition to Oracle Application Server, Oracle Database, and Oracle Collaboration Suite, PCA is aggressively leveraging new infrastructure technologies from Oracle. "We're going with Oracle WebCenter Suite, Oracle Portal, Oracle Single Sign-On, all of it. With these technologies, we can create an environment that will have more richness for our users, allowing them to process data faster, more effectively, with less of a learning curve. We're very excited about our future," Clark says.

ROBERT ADLER

HEIDI KUJAWA

CONTENT MANAGEMENT ARCHITECT OF THE YEAR

Architect uses content management to increase efficiencies and improve ROI.

Content management might be just another technology to some companies, but not at Sony Pictures Entertainment.

"As we deploy this capability throughout the company, it's become much more of a necessity—people realize the value of it, and the efficiencies have increased dramatically," say Heidi Kujawa, executive director of information technology at Sony Pictures Entertainment and *Oracle Magazine*'s Content Management Architect of the Year. "After five years of deploying Oracle Content Management–based applications, over 75 implementations, we continue to see a positive ROI every year."

Moreover, Oracle's content management is something Sony employees want. "We just can't keep up with the demand," Kujawa says. "People are lined up at my door to get it. To me, that speaks volumes about the success of the program and the necessity of the technology."

The project started with the goal of managing content for Sony Pictures' Web site and corporate division, but its success—and the need for greater content management—broadened the scope. Kujawa and her team now provide content management support for Sony Pictures Television and other business units' Web sites and content management needs. They also created a reusable framework to support rapid development and application integration.

Kujawa considers Oracle Content Management a key part of Sony's framework for building enterprise applications. Since each business unit is so different, Sony took the approach of abstracting the business logic to increase flexibility and reduce deployment time frames.

"We architected a business logic layer that sits on top of the [Oracle] Content Management suite of tools and enables us to build very distinct applications that leverage content in a consistent way," says Kujawa. "It has been very successful. It has enabled us to keep up with the demand for content management much more efficiently."

Because much of Sony's business is driven off the content being managed by Oracle products, issues such as access control and security are extremely important to Kujawa. In addition, the content management team works closely with Sony's records information management department to embed retention policies into its implementations, which "makes sure we're in compliance across many different levels within the company," says Kujawa.

The future looks bright. "Oracle is a great partner of Sony Pictures, and Oracle has always been great about investing in their product suites and making them better and more efficient," says Kujawa. "I'm really excited about the efficiencies that they're working on, as well as the expanded scalability they can bring."

winner SPECS

Name: Heidi Kujawa

Job title/description: Executive Director, Information Technology

Company: Sony Pictures Entertainment

Location: Culver City, California

Award: Content Management Architect of the Year 2007

PETER STEMBER

2007 JOB SIMON

SOA ARCHITECT OF THE YEAR

Architect uses SOA to achieve growth, performance, and flexibility.

Strategic growth requires a flexible IT infrastructure. Yet most organizations still have too many individual systems and unintegrated business processes hampering rapid growth.

That's why Network Appliance (NetApp), a multibillion dollar company specializing in unified storage solutions, has turned to service-oriented architecture (SOA). NetApp's wide collection of enterprise applications, including Oracle's Siebel, Oracle's PeopleSoft, SAP/Vantive, Agile, Webplan (now Kinaxis), and Oracle E-Business Suite, makes for a complex IT environment but also one that's ripe for the benefits of SOA.

"We are implementing SOA as the basic architectural framework to achieve our growth, so we can easily scale our IT systems to achieve the level of agility and performance that we need," says Job Simon, senior director of enterprise architecture at NetApp and *Oracle Magazine*'s SOA Architect of the Year.

A key achievement has been the transformation of NetApp's B2B process with distributors, using modules of Oracle SOA Suite, to rearchitect and automate, thus minimizing or eliminating unnecessary break points and human intervention points. NetApp used Oracle Business Activity Monitoring to help monitor the health of the system, with real-time dashboards for efficient process management and exception handling. The result was the transformation of a time-consuming, slow process into an automated and efficient process that the company could easily monitor.

winner**SPECS**

Name: Job Simon

Job title/description: Senior Director of Enterprise Architecture

Company: Network Appliance

Location: Sunnyvale, California

Award: SOA Architect of the Year 2007

"We've laid out a clear vision for implementing the SOA registry, Oracle Web Services Manager, and other foundation components," says Simon. "We're approaching SOA in a very practical way, with a clear approach to achieving specific results over a period of time."

NetApp is also doing extensive business process transformation studies of the company's key processes. "Understanding business processes is very critical," says Simon. "So we're starting to identify potential services that are reusable, and then we plan to utilize Oracle SOA Suite to develop and manage these services to meet our business needs."

Even though it takes lots of technology to make SOA work, the end goal for NetApp's SOA strategy isn't simply technology. "The business process is the driving force behind all this," Simon says. "We're approaching it purely as a business transformation exercise and then backing that into an SOA to realize value."

PHIL SALTONSTALL

2007 SIMON GRIFFITHS

BUSINESS INTELLIGENCE ARCHITECT OF THE YEAR

Architect delivers tactical and strategic results with agile approach to Oracle Business Intelligence.

Simon Griffiths, *Oracle Magazine*'s Business Intelligence Architect of the Year, faced a challenge. As chief designer for the Enterprise Information program at BT Group, and with hundreds of reporting systems often showing conflicting information, he had to build a world-class data warehouse that would support BT's aim to be a global information and communications technology company while improving the experience for customers.

Griffiths has led BT in establishing a scalable business intelligence (BI) architecture that has delivered tactical and strategic results. One example is increasing the customer save rate by more than 20 percent. Oracle Business Intelligence provided a single login and interface "glue" for the multiple application sets that customer service agents accessed during calls to understand customer complaints.

"It provides a holistic view and enables customer service agents to make better recommendations to the customer," Griffiths says. "It improves the customer experience and uplifts customer retentions for BT."

The data warehouse was a long-term goal with incremental requirements. "We needed to show business benefits every 90 days," says Griffiths. "We used an agile approach to grow our BI capabilities by taking discrete applications and subject matter areas and implementing specific business intelligence capabilities, so the business owners could see benefits quickly."

JOHN BLYTHE

winner**SPECS**

Name: Simon Griffiths

Job title/description: Business Intelligence Chief Designer

Company: BT Group

Location: Cardiff, Wales

Award: Business Intelligence Architect of the Year 2007

winner**SPECS**

Name: Ramiro Cormenzana

Job title/description: DBA/Information Corporate Director

Company: MercadoLibre.com

Location: Buenos Aires, Argentina

Award: Data Warehouse Architect of the Year 2007

GABRIEL PIKO

2007 RAMIRO CORMENZANA

DATA WAREHOUSE ARCHITECT OF THE YEAR

Architect sees phenomenal business growth with Oracle Database and Oracle Real Application Clusters.

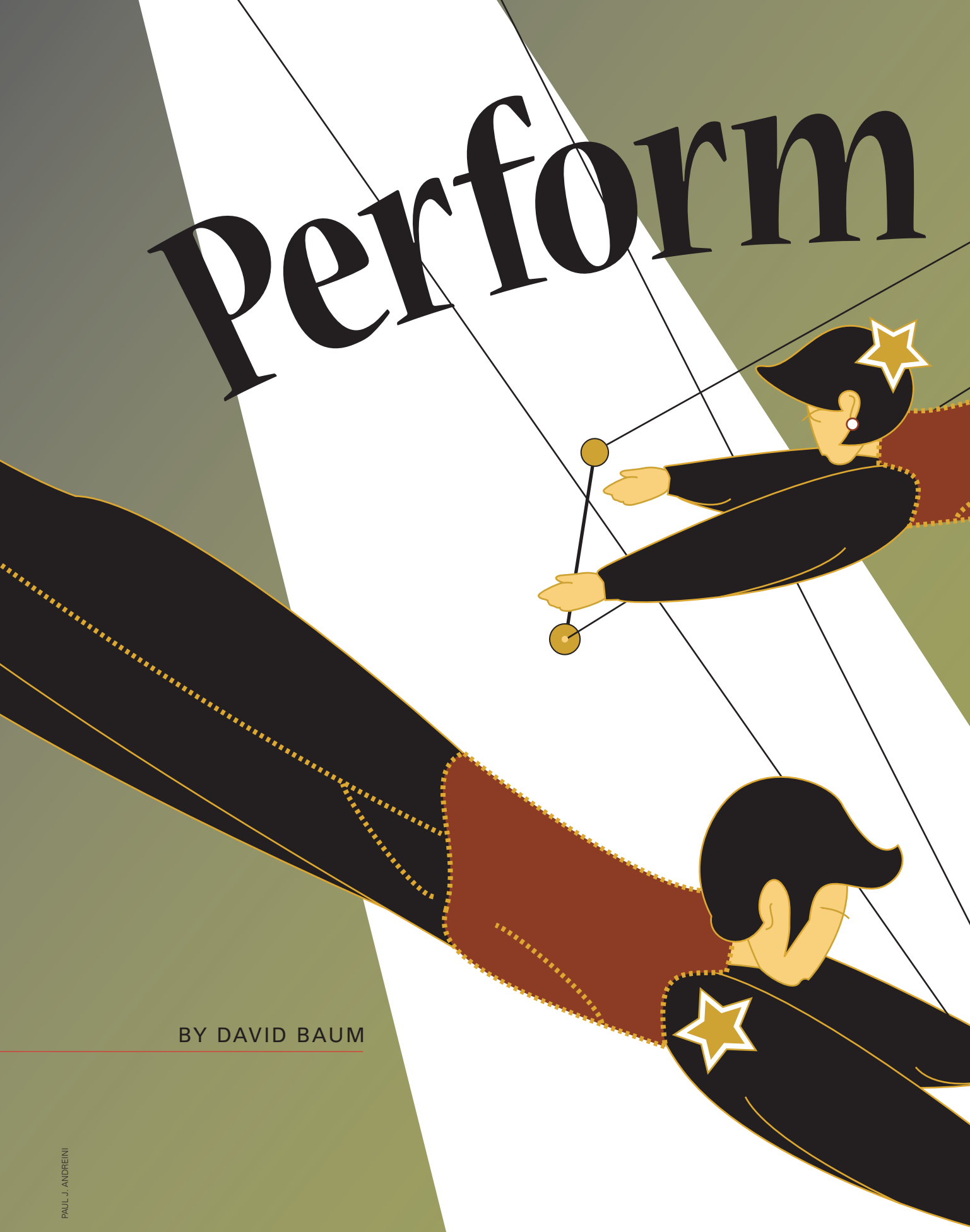
When a company's online volume requires that it manage thousands of transactions per second, it's important to have sophisticated data assurance systems to keep this buying and selling flowing smoothly. That's what Argentina's MercadoLibre.com has been doing for the past eight years.

Ramiro Cormenzana, DBA and information corporate director at MercadoLibre.com and *Oracle Magazine*'s Data Warehouse Architect of the Year, and Edgardo Sokolowicz, MercadoLibre.com's chief technology officer, have worked to create an IT infrastructure that can accommodate the company's dynamic growth rate with the highest availability. They've done it by using a combination of Oracle Database and Oracle Real Application Clusters, creating an online transaction system and data warehouse that powers Latin America's largest online trading platform.

The results are impressive, including an ROI of more than 450 percent over five years and net benefits of US$2.4 million. The high-availability architecture allows maintenance to be completed during commercial hours and allows the company to increase computing power as needed.

Oracle enabled this tremendous growth. "MercadoLibre.com is data coming and going, allowing transactions of all kinds," Cormenzana says. "Without the warehouse and technology platform, there is no business."

perform



BY DAVID BAUM

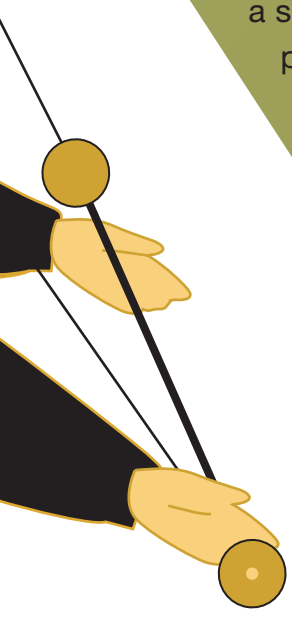
PAUL J. ANDREINI

with SOA

Oracle delivers flexibility to the enterprise.

Changing markets, competitive pressures, and evolving customer needs all demand that IT managers deliver greater flexibility and speed for their organizations. To achieve better partner application integration, modernize or integrate legacy elements into new systems, or use new or different Web interfaces, many companies turn to a service-oriented architecture (SOA). An SOA simplifies the development of enterprise applications as modular, reusable business services that are easily integrated, changed, and maintained.

While SOA may be considered too new or experimental by some development shops, John R. Rymer, vice president and senior analyst at Forrester Research, says today's service-oriented software systems are based on distributed computing principles that have been created and refined over the last 18



to 20 years. "We've learned a lot about creating modular software systems connected by well-defined interfaces, and today's SOA platforms incorporate all of those lessons," he says.

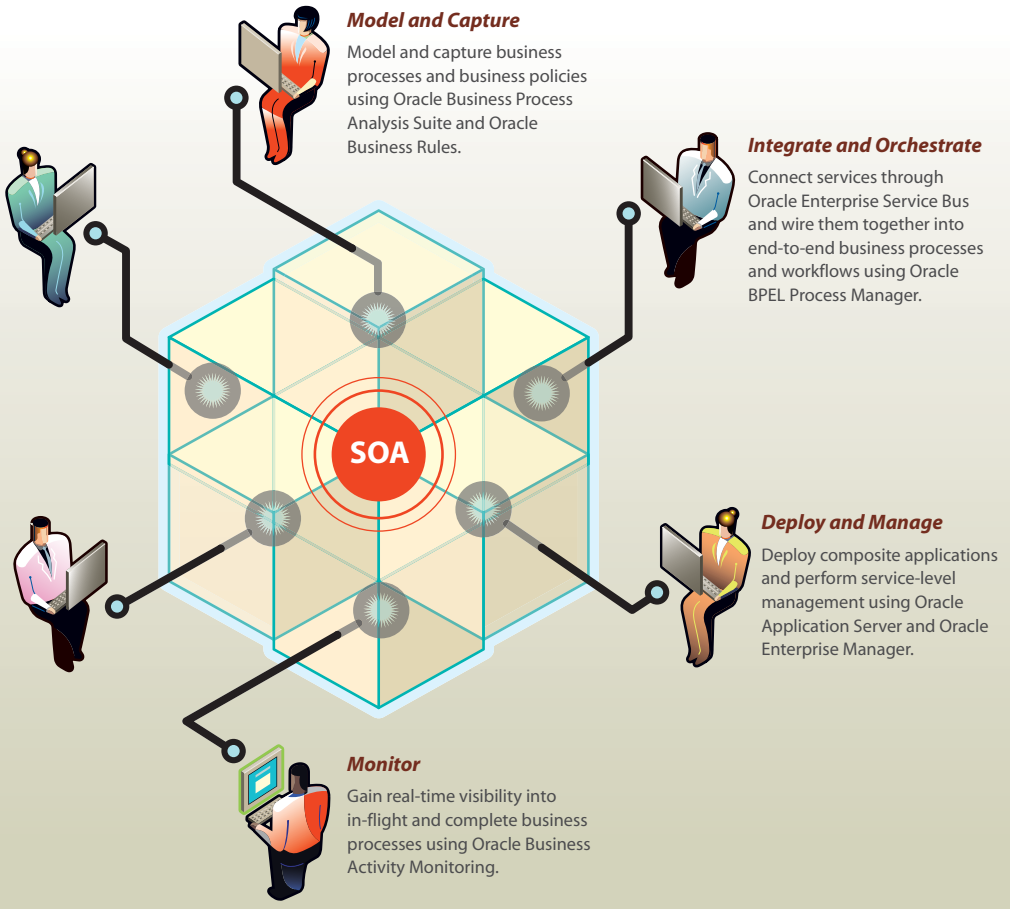
Even with refined distributed computing principles behind SOA, a common challenge for organizations facing change is how to adopt SOA technologies and techniques without destabilizing existing business services. Is there a way companies can gracefully modernize or evolve legacy applications into the new world of SOA?

Based on the successful Oracle Forms-to-SOA strategy underway at Eurotransplant International Foundation, the answer is yes. This not-for-profit organization helps coordinate the supply of organ donations and related information to institutions in the Netherlands, Germany, Luxembourg, Belgium, Austria, Croatia, and Slovenia, bringing together hospitals, transplant centers, and laboratories into a collaborative framework. Instantaneous communication is essential in the life-or-death situations that Eurotransplant confronts each day, and the foundation has a long history of using Oracle Forms to provide physicians with current information about available organs and patient waiting lists.

Murk Schaafsma, development manager at Eurotransplant, and his colleagues are now upgrading their core information systems while exploring the opportunities presented by Java and SOA. "BPEL [Business Process Execution Language] and SOA are helping us implement a system that supports our back office in the time-critical organ allocation process," says Schaafsma. "The system will give us a more patient-

Oracle SOA Suite Simplifies the Enterprise

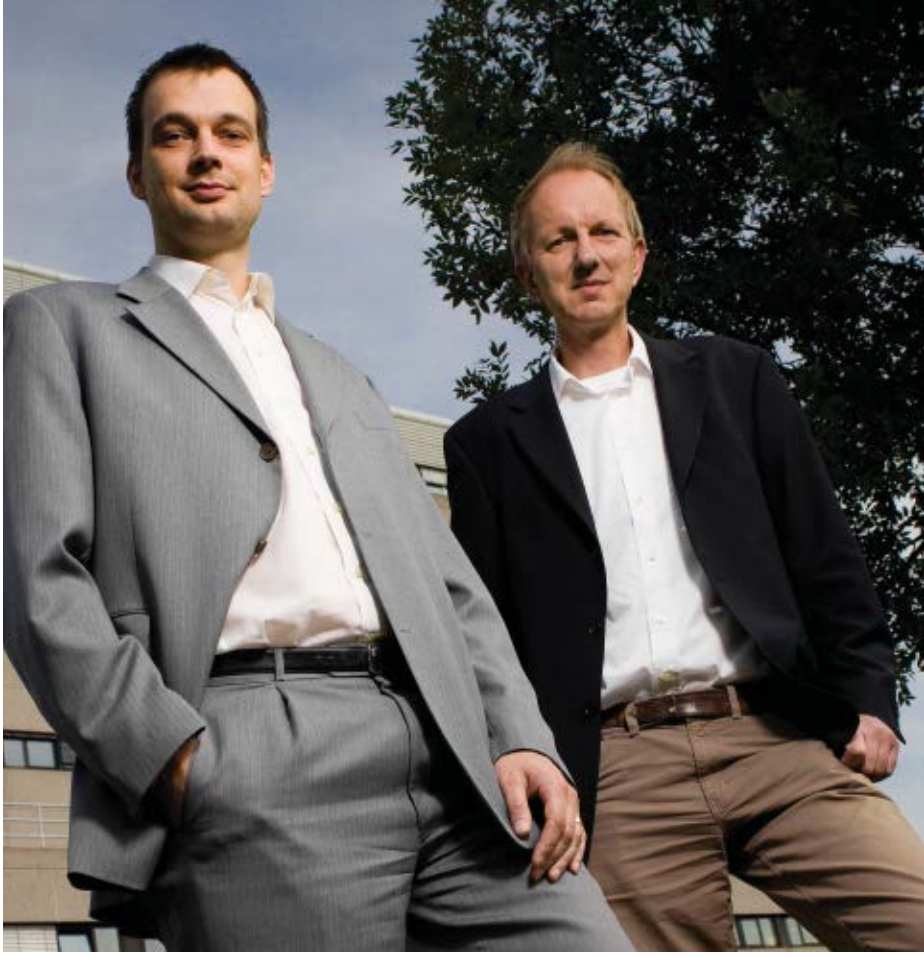
A service-oriented architecture (SOA) facilitates application integration by "modularizing" business services, which simplifies reuse and maintenance and improves business visibility. Oracle SOA Suite is a comprehensive package for the building, deployment, and management of an SOA.



STEVE LYONS

"With SOA and Oracle BPEL Process Manager, we are proving that we can service-enable our existing systems and reuse them."

—Wilfred van der Deijl,
System Architect, Eurotransplant



Eurotransplant's Wilfred van der Deijl, left, System Architect, and Murk Schaafsma, Development Manager, are exploring new opportunities presented by Java and SOA. "The system will give us a more patient-safe process," says Schaafsma. In addition, they will be able to fulfill the wishes for more transparency, he says.

TON HENDRIKS

safe process and, in addition, we can fulfill the wishes for more transparency, which is increasingly desired by patients and national authorities."

Wilfred van der Deijl, the system architect at Eurotransplant, says an SOA will allow the foundation to accommodate disparate business rules while retaining their investment in Oracle Forms. "We want to deploy an evolutionary model, not a revolutionary one," he says. "In the past, adopting a new technology frequently meant we had to abandon the old technology. With SOA and Oracle BPEL Process Manager, we are proving that we can service-enable our existing systems and reuse them in the new architecture."

Eurotransplant uses Oracle BPEL Process Manager to help developers translate business requirements into workable information systems that can be implemented by the IT department. "Allocating available organs to the appropriate patients is a complex process requiring a great deal of flexibility," van der Deijl says. "Oracle BPEL Process Manager allows us to develop process-driven applications that truly support the people who will be executing these business processes."

Eurotransplant developed a technique to reuse its existing Oracle Forms, which used to be at the core of many of Eurotransplant's data-entry applications, in new user interfaces that were being built. The technique uses Oracle JDeveloper and Oracle Application Development Framework (Oracle ADF) technology. "With Eurotransplant's background firmly rooted in Oracle Forms, Oracle JDeveloper and Oracle ADF have allowed the organization to use its existing skill set to realize the benefits of SOA technologies quickly," says

A Foundation for Web 2.0

New forms of communication and personalized services—collectively referred to as Web 2.0—are enabling browser-based applications to mimic the rich user experience of the client/server era. Referring to a second generation of the Web that entails hosted services and communities such as social-networking sites, wikis, and folksonomies, Web 2.0 points to changes in the ways developers and consumers use the Web as a platform.

"Web 2.0 represents a series of new ideas about how to make applications more interactive," says John R. Rymer, vice president and senior analyst at Forrester Research. "It includes new metaphors for communicating and collaborating that have become popular on the Web at large. There's absolutely no reason we shouldn't use these techniques in our business applications."

These new services are compelling, but they can't stand in isolation from the rest of the enterprise. "For an enterprise IT department, the issue is not only how to use Web 2.0 capabilities but how to integrate new development environments and scripting languages with traditional languages and databases," says Kenneth Bailey, principal product manager for Oracle Fusion Middleware.

SOA lays a foundation for Web 2.0 because Web services protocols allow us to more flexibly create interactions and conduct transactions over the internet, Forrester's Rymer says. "Services can be plugged into social networks, wikis, rich internet applications, and other metaphors and presentation formats," he says. "Without SOA, Web 2.0 isn't very interesting because the systems are too brittle, too static, and thus they can't evolve to use these new capabilities."

Oracle's Bailey sees a natural synergy between Web 2.0 and SOA-enabled applications. "Oracle WebCenter uses SOA principles to create productive work environments that include Web 2.0 services such as instant messaging, wikis, and discussion forums, as well as applications that create or use Web services," he says.

"Using Oracle BPEL Process Manager as part of an SOA strategy gives us a standards-based mapping and data transformation tool."

—Alan Wamser,
Systems Analyst, Hays Medical Center

When the Hays Medical Center wanted a cohesive way to integrate old and new technologies using open, standard protocols, it looked to SOA. "We want to bring all our applications under one umbrella," says Alan Wamser, a Systems Analyst who is driving the SOA implementation.

Grant Ronald, group product manager, application development tools, Oracle. Indeed, Eurotransplant's approach won the organization the 2007 Editor's Choice Award at the Oracle Development Tools User Group conference.

GRADUAL EVOLUTION

SOA is also valuable as an integration platform for connecting disparate information systems. Consider Hays Medical Center, a private, not-for-profit hospital in Hays, Kansas, that serves about 130,000 citizens and employs more than 1,200 people. Hays Medical Center has received numerous honors for its outstanding patient care and telemedicine programs.

Over the years, Hays Medical has created an extensive set of point-to-point interfaces to exchange vital healthcare information, both internally and with its business partners. These interfaces have been constructed using various technologies, protocols, and document standards—most recently using Health Care Language 7 (HL7), a standard protocol for exchanging electronic medical records.

Faced with the high cost of managing, maintaining, and enhancing this diverse environment, Hays Medical looked for a more cohesive way to integrate new and old technologies using open, standard protocols. "We want to bring all of our applications under one umbrella," says Alan Wamser, a systems analyst at Hays Medical Center who is driving the SOA implementation.

Wamser and his team worked with Oracle Consulting to complete a proof-of-concept that integrates their existing infrastructure, including a Meditech Patient Care System module and the GE Vitals 8000 hardware device. This versatile architecture—which uses Oracle B2B Engine, Oracle Healthcare Adapter, and Oracle BPEL Process Manager—is reducing development costs and supplying more-timely patient information to healthcare providers. For example, nurses can capture vital telemetry data at the bedside with mobile devices, then automatically upload the information to pertinent medical and business applications.

Hays Medical plans to expand the proof-of-concept to incorporate additional application-to-application interfaces and to simplify its B2B interactions with trading partners using the HL7 standard. "Using Oracle BPEL Process Manager as part of an SOA strategy gives us a standards-based mapping and data transformation tool," says Wamser. "Ultimately, we'll have a more-cohesive application environment, with an open framework to deploy multiple processes based on Web services. It will be easier to map existing processes and develop new integration flows into Hays

CHRIS WILBORN

SNAPSHOTS

Eurotransplant International Foundation www.eurotransplant.nl
Location: Leiden, The Netherlands **Industry:** Healthcare
Employees: 100 **Oracle products:** Oracle Application Server 10*g*, Oracle Forms, Oracle JDeveloper, Oracle BPEL Process Manager

Hays Medical Center www.haysmed.com
Location: Hays, Kansas **Industry:** Healthcare **Employees:** 1,200
Oracle products and services: Oracle Consulting, Oracle B2B Engine, Trading Partner Management, Oracle BPEL Process Manager, Oracle Healthcare Adapter, Oracle's XSLT transformation tool, Oracle Business Activity Monitoring, Oracle WebCenter

Korea Institute of Patent Information www.kipi.or.kr
Location: Seoul, South Korea **Industry:** Public sector
Employees: 500 **Oracle products:** Oracle Database, Oracle Real Application Clusters, Oracle SOA Suite, Oracle Content Database Suite, Oracle Application Server, Oracle JDeveloper

Medical applications." Additionally, Hays Medical plans to use Oracle WebCenter and Oracle Business Activity Monitoring tools to create real-time dashboards that can present medical information to authorized personnel in the chain of care.

LEARNING FROM THE PAST

For organizations faced with increasing customer demands for more information and better service, an SOA can be the answer. The Korea Institute of Patent Information (KIPI) in South Korea manages data related to intellectual property rights (IPR). As an organization established by the Korean Intellectual Property Office (KIPO), KIPI is responsible for disseminating information on local and international IPR. KIPI also provides patent analysis services to companies, research institutes, and investors.

Escalating demand for KIPI's services prompted the organization to review the way it manages and distributes information. In the past, organizations that wanted trademark data had to submit a request to KIPI, then wait up to 10 days for information to be compiled. This approach was inefficient and frustrated the organization's clients. KIPI decided to move to an SOA environment to make it easier to collect, share, and manage information.

Developers used applications from Oracle SOA Suite, including Oracle BPEL Process Manager, to link their trademark database to the KIPO database as well as to model a number of workflows. "We concentrated on building a system infrastructure that enables institutes or enterprises that require intellectual property information to utilize KIPI's SOA-based Web service," says Kang Chang-soo, team manager of the computing development operation team at KIPI.

The new self-service system uses SOA to connect users to that data directly, so they can log in to the trademark database and download the required information. And the 10 days it used to take to process user requests for patent data has been reduced to less than one hour.

The job was successful despite severe time constraints for completion. "Oracle SOA Suite established perfectly the basic framework of this project," concludes Kang. ■

David Baum *(david@dbaumcomm.com) is a freelance business writer based in Santa Barbara, California.*

nextSTEPS

LEARN about SOA
oracle.com/technologies/soa

READ about Web 2.0 in Oracle WebCenter
oracle.com/products/middleware/webcenter.html

DOWNLOAD Oracle SOA Suite
otn.oracle.com/software/tech/soa

AN OUNCE OF PREVENTION

A well-planned, strategic approach to disaster recovery has helped Dell strengthen its infrastructure—and provided some valuable lessons about keeping enterprise systems up and running.

Dell IT's comprehensive disaster recovery plan takes into account critical operations such as the Enterprise Command Center above, which provides vital customer support.

It has become a truism in business that IT is a strategic asset that is vital to the operation of companies. A few years ago, however, Dell decided to take a deeper look at just what that meant.

To start, executives asked a fairly straightforward question: What would it cost the business if the company's main data center were destroyed? The Dell IT group determined that it could take as long as 12 weeks to get things back up and running, and then worked with business people to determine what that would mean to areas such as sales, manufacturing, shipping, and service. "When you multiplied that impact out across that time frame, needless to say, the lost-revenue figure was huge," says Debi Higdon, Dell's Global Disaster Recovery test manager.

With that financial assessment in hand, it was clear that Dell could benefit from an enterprise approach to disaster recovery. But not many companies had implemented such an approach—disaster recovery was typically addressed in a fragmented, tactical manner. "There just wasn't a good handbook to go by—we had to write our own,"says Higdon. The group did just that, and worked out a comprehensive plan for using standards-based technology in a rigourous, robust approach to protecting its strategic IT assets.

PLANS AND PRIORITIES

After assessing the financial impact, the next step was to develop an understanding of where to focus disaster recovery initiatives. "We created a risk profile based on hard data, rather than guesswork," says Higdon. To get that hard data, the IT group gathered input from a range of sources, including meteorologists and the company's insurance carrier—an especially valuable source of risk information.

Next, the group conducted a careful analysis to identify the applications that would have the greatest impact on the business in the event of a disaster, creating three classifications. Class 1 applications are those that need to be up and running in the event of a disaster within four hours—generally, things that affect manufacturing, sales, and service. Class 2 applications need to be up within 48 hours. And Class

3 applications are to be backup based on "best effort". That classification helped the group prioritize efforts and allocate investments appropriately in order to be able to recover the most crucial systems first.

STRENGTHENING THE INFRASTRUCTURE

Armed with that understanding, Dell laid the cornerstone of its disaster recovery effort—a new 40,000 square-foot data center with some 5,000 servers to provide redundant backup to the company's main data center in Austin, Texas. In both centers, Dell IT professionals looked at business continuity across several levels, including the site as a whole, computing platforms, applications, and data.

For example, the centers make use of Oracle®Real Application Clusters (Oracle RAC) technology, running on Dell™PowerEdge™servers that have a number of high-availability features. With Oracle's clustering technology, if one system in a cluster fails or is taken down for maintenance, the others can pick up its workload instantly. "About 72 percent of the Oracle databases we have in production are Oracle Database 10g and Real Application Clusters," says Logan McLeod, IT strategist for Dell. "They provide high availability and scalability, and they enable us to dynamically respond to ever-changing workloads in our environment." The data centers also use Oracle Data Guard software to manage standby databases, and Oracle Enterprise Manager 10g Grid Control, which provides a single point of management for 100 percent of Dell's global production databases.

Mitchell McGovern, director of Dell's Global Operation Services, says that Dell paid close attention to rooting out single points of failure in the infrastructure. "We did a detailed analysis across the entire infrastructure, focusing on ensuring redundancy at all levels—power, cooling, network, software, hardware," says McGovern. "You may have duplicate networks and systems, but if the power fails, for example, and you just have one generator that doesn't come on, it's all for naught."

The group also found that it needed to pay close attention to processes as well as technologies. In particular, they established detailed change-management processes to make sure that over time, patches and upgrades are applied consistently across the data centers so that the two remain identical as the infrastructure evolves. Otherwise, seemingly minor differences in the two centers could delay and complicate failover efforts in an actual emergency.

Maintaining that consistency is especially important as Dell moves to an active-active configuration across the two data centers. With this configuration, systems operate in a fully distributed production environment, with each data center able to handle 75 percent of peak workloads and 100 percent of normal workloads. For example, Dell's Quote Management System runs in both data centers on two independent Oracle Database 10g RAC clusters, using Oracle Streams technology. If there were a disaster, failover would be automatic and instantaneous—the problem would constitute a loss of capacity, but not of data or functionality. Thus, if one system handling quotes becomes unavailable, the other simply carries on, and customers continue to get quotes without noticing any difference except possibly a minor degradation in response times. That active-

DISASTER RECOVERY: RULES OF THE ROAD

In creating and implementing its enterprise approach to disaster recovery, Dell's IT group developed 10 principles designed to help ensure a thorough, focused effort.

1. **Articulate the need in financial terms.** Doing so provides a clear business case, helps ensure organizational buy in, and provides a guidepost for investing in disaster recovery.
2. **Use hard data to create a risk profile.** Rather than simply taking a best guess, work with insurers and other data sources to determine the true nature of the risk—such as fire, storms, etc.—for a particular operation.
3. **Identify critical resources.** Conduct a rigorous analysis to identify key applications that warrant redundancy, backup, and recovery attention, and categorize applications to help prioritize efforts.
4. **Think beyond the data center.** Factor in essential and relevant business processes and infrastructure components across the organization.
5. **Eliminate or mitigate single points of failure.** Perform a detailed single-point-of-failure analysis across the entire infrastructure—including seemingly minor components—to find areas where redundancy is lacking.
6. **Assume that everything is going to fail.** Create business continuity plans based on the idea that every key piece of internal and external infrastructure may fail or become unavailable for extended periods.
7. **Consider an active-active data center strategy.** A distributed environment that runs across data centers enables high availability and the use of load balancing as a constant test of recoverability.
8. **Recognize potential vendor weaknesses.** Evaluate vendors' disaster recovery capabilities, and include vendors in disaster recovery testing to understand how their policies and technologies might affect the enterprise.
9. **Keep disaster recovery capabilities up to date.** Monitor documentation and establish strong procedures and processes to make disaster recovery part of everyday activity.
10. **Perform tests on a regular basis.** Validate failover and recovery capabilities to make sure things work as planned—perhaps on a quarterly basis.

"WE ASSUME THAT EVERYTHING IS GOING TO FAIL. IT MIGHT BE SYSTEMS, A NETWORK, PHONE LINES, ROADS LEADING TO ONE OF THE DATA CENTERS. AND THEN WE THINK ABOUT WHAT TO DO IF THOSE THINGS DO FAIL." Mitchell McGovern, director, Dell Global Operation Services

active configuration not only provides high levels of availability, it also allows Dell to balance loads across centers to maintain high performance levels. What's more, this load balancing is essentially testing the fail-over capabilities—all the time, as a part of day-to-day operations.

Dell IT recognized that although the data centers are critical, they don't operate in a vacuum. The group took a broad look at its infrastructure to identify where business continuity depended on applications in other Dell facilities around the world, and took steps to apply disaster recovery procedures in those areas. It also looked outside corporate boundaries. "We felt that it is important to look for potential vendor weaknesses," says Higdon. "We spend time testing with our vendors—for example, we might simulate a disaster here at Dell and include a couple of vendors to see how an event here might affect them. You don't want to get in a silo and forget about everything else that touches your operations."

McGovern says that the broad search for weaknesses—internally and externally—is the result of a guiding principle adopted by the IT group: "We assume that everything is going to fail. It might be systems, a network, phone lines, roads leading to one of the data centers. And then we think about what to do if those things do fail."

KEEPING DISASTER RECOVERY CURRENT

Dell has completed its transformation of its disaster recovery plans and processes—but the effort will never be entirely finished, says McGovern. Technologies, business needs, and security threats all continue to evolve, and Dell's disaster recovery policies and procedures are designed to do the same. For example, when a change is made to an application, database, or datacenter, disaster recovery capabilities are updated as well. New applications must be engineered for recoverability. Dell actively monitors and manages disaster recovery compliance, and disaster recovery documentation for each system has to be updated every 90 days.

The company also maintains a strict policy that calls for all of its more than 250 Class 1 applications to be tested at least once a year. "That's not negotiable—it's mandatory," says Higdon. Dell has created a disaster recovery scorecard that lets the company keep close track of testing and documentation status. The card is used by the IT group and the CIO, and is eventually shared with the corporate audit function and the audit committee of the board of directors. "You can see how serious we are about this," says Higdon.

The Dell disaster recovery initiative has put the company in good position to ensure business continuity—and keep supporting customers—in the event of a serious interruption at its data center. "The goal is to do a complete failover to the disaster recovery site within four hours, and we've been hitting that mark. In our last test, we actually failed over all the applications in scope in less than an hour," says Higdon. And as an unexpected benefit, the company has seen its insurance premiums go down because its carrier has recognized the value of Dell's disaster recovery efforts.

"This initiative shows how cost-effective, standards-based servers can be used to support a strategic, enterprise approach to disaster recovery," says McGovern. "Just as important, it has enabled us to build disaster recovery into our culture. That's key to keeping disaster recovery in sync with the business. In today's world, disaster recovery is not a 'nice to have'—it's a 'must have.' And we've been able to make it a part of everyday life at Dell."

FOR HIGH AVAILABILITY, DELL'S DATA CENTERS RELY ON DELL POWEREDGE SERVERS RUNNING ORACLE DATABASE 10G WITH REAL APPLICATION CLUSTERS.

THE DELL AND ORACLE RELATIONSHIP

Dell and Oracle have a long collaborative relationship based in large part on the similar long-term visions of both companies. Oracle's Grid Computing strategy focuses on delivering flexible, reliable database throughput; the dynamic provisioning of database workloads on grids of industry-standard servers; and the ability to easily add more capacity to grids. Dell's Scalable Enterprise vision complements that strategy with its focus on standardizing the core elements of IT infrastructure to deliver superior value, and ultimately enabling customers to simplify operations, improve utilization, and scale effectively. With those complementary visions in mind, Dell and Oracle work together on a number of fronts. For example, experts from both companies have collaborated to develop a number of pre-engineered, tested, and validated Intel-based Oracle database solutions on Red Hat Linux®and Microsoft®Windows Server®2003. Dell and Oracle test and support the entire solution stack—servers, storage, switches, operating systems, and Oracle Database software—giving companies a cost-effective solution to legacy data center technologies. In addition, Dell Services and Oracle Consulting Services work together to provide fixed-fee and custom services designed to accelerate implementation and help organizations make the best use of the technology. The two companies also have a firsthand view of the effectiveness of these technologies: Both use Dell and Oracle platforms in their own operations. Oracle develops and tests much of its software on Dell PowerEdge™ servers and relies on more than 20,000 Dell Linux servers to power key elements of its Global IT operations. Similarly, Dell entrusts several mission-critical business systems to PowerEdge servers running Oracle Database 10g—including not only its EMEA (Europe, Middle East, and Africa) order-management system, but also its North American supply chain database.

RESOURCES

DELL POWEREDGE SERVERS
www.dell.com/PowerEdge

DELL AND ORACLE DATABASE 10G
www.dell.com/oracle10g

ORACLE AND DELL
www.oracle.com/dell
www.dell.com/oracle

SIMPLIFY YOUR DATA CENTER AT DELL.COM/SimplifyIT

BY ALAN JOCH

CONTROLLING THE CONTENT EVOLUTION

Oracle Universal Content Management consolidates and controls unstructured data.

For Emerson Process Management, getting a handle on content isn't just about keeping multiple gigabytes' worth of important data organized and accessible. Thanks to workflow engines and other sophisticated tools, the company is using the power of information to create new processes and keep its business humming.

The US$5.5 billion division of Emerson Electric uses Oracle Universal Content Management to administer technical information about its process control products as well as business and marketing documents and multimedia presentations. In all, it adds up to about a terabyte of information just for the North American operations alone.

One of the applications Emerson created logs repair requests sent to an Emerson Web site, generates a repair ticket, and then routes the ticket to the PC support group. When technicians fix a problem, they enter their solutions into the application, which manages a searchable and ever-growing knowledgebase of fixes that's always available to the support group. "We don't just capture the content," says Mark Heindselman, Emerson's manager of knowledge network and information services. "We move that content through a business process to solve problems."

Enterprise content management (ECM) lets companies capture, store, secure, establish version control, retrieve, distribute, and destroy documents and content, thus enabling workflow and business process management systems. "The good thing about having an enterprise content management suite is that you reduce the amount of integration that's required among the different components," says Ken Chin, Gartner research vice president.

The drive for improved business efficiency propels companies to content management solutions. Emerson is a good example. In the past, report reviews were hard to manage. "We would write a report, put it in a folder, and then send it around to everyone," Heindselman recalls. "It might take days, weeks, or months. Sometimes the reviews never got done."

That's all changed. The company's content management system spans eight divisions across North America, Europe, and Asia. Architecturally, the system is split into three server layers: one for standard types of business documents and Web

IMAGES BY CORBIS; MONTAGE BY RICHARD MERCHÁN

“We don’t just capture the content. We move that content through a business process to solve problems.”

—Mark Heindselman
Manager, Knowledge Network and Information Services,
Emerson Process Management

content; one to handle large engineering reports created using mainframe and enterprise resource planning (ERP) applications; and one for a database of images, including serial cards, drawings, and multimedia content.

The workflow engine inside Oracle Universal Content Management is a key element in an Emerson content management application that ensures that the worldwide engineering staff reviews and approves lab reports before their general release throughout the company. Now, when an engineer completes a report, he or she submits the digital document to the content management system, which fires off an end-to-end workflow process that ensures that approvals happen as quickly as possible.

The workflow engine inside Oracle Universal Content Management is a key element in an Emerson content management application, says Mark Heindselman.

HIGH-PROFILE IMAGES

Land O’Lakes, the producer of dairy products and agricultural goods, has also realized new content-handling efficiencies. The company, based in Minneapolis, Minnesota, runs about 80 feed plants and about 20 dairy foods manufacturing locations across the country.

Over the past decade, Land O’Lakes has become increasingly dependent on its intranet to distribute business information and news to help employees perform their jobs more effectively. “We realized this isn’t just some nice-to-have information that’s sitting off to the side somewhere. It’s become critical, and we decided to build an industrial-strength platform for it,” says Curt Doble, corporate IS business liaison at Land O’Lakes. “We needed an integrated platform that allowed us to combine content, brochureware, and application functionality in one system.”

Land O’Lakes now has that capability with Oracle Universal Content Management. It gives staff members tools to create and publish information to the intranet, which relieved a burden for the IS department. The system also helps the Agricultural Services arm of the company speed the processing of transactions with vendors. The division handles about 200,000 payables receipts a month, a task that was becoming almost impossible as a paper-based process. “We were keeping a lot of paper documents around so that when we got inquiries from vendors we could pull out the documents and say, ‘OK, here’s the status, here’s the payment amount,’” Doble says.

Land O’Lakes now creates digital images of each payable transaction and uses Oracle Universal Content Management to index the images for easy retrieval. “People can respond to inquiries by searching using a variety of criteria to find the right image,” Doble says. “The images come up right at their desks, and we can provide answers quickly.”

Imaging capabilities are now expanding to other areas in the company, including departments that handle fixed assets, credit, and HR. “Pretty much anywhere you look in the company, there are opportunities to use the imaging technology,” Doble says. “It’s all content management—it’s just that images are a different kind of content. Bringing it all together onto one [Oracle] platform is a big advantage for us.”

INFORMATION SECURITY

For almost 60 years, the prestigious Formula One World Championship has showcased the world’s fastest cars, with 11 teams competing in the most recent event. Beginning in 2002, Renault invested £180 million to develop the ING Renault F1 team. The investment paid off:

JOHN HOLTORF

SNAPSHOTS

Emerson Process Management
www.emersonprocess.com/fisher
Location: Marshalltown, Iowa **Industry:** Process management products and engineering **Employees:** 4,000 **Oracle products:** Oracle Universal Content Management, Oracle E-Business Suite

Land O’Lakes
www.landolakesinc.com
Location: Minneapolis, Minnesota **Industry:** Dairy and agriculture **Employees:** 13,000 **Oracle products and services:** Oracle Universal Content Management, Oracle Database 10*g*, Oracle’s JD Edwards EnterpriseOne

Renault Group
www.renault.com/renault_com/en/main/10_groupe_renault
Location: Boulogne-Billancourt, France **Industry:** Vehicle design and manufacture **Employees:** 130,000 **Oracle products and services:** Oracle Universal Content Management, Oracle Database 10*g*

"The overall simplicity of the installation, customization, and configuration [of Oracle Universal Content Management] was very important to us."

—Alex Rigal, IT Project Manager, Renault

the group won back-to-back titles in 2005 and 2006.

Part of the success hinged on being able to connect racing teams, which travel to events throughout the world, to gigabytes worth of technical information, much of it held at the team's main factory in the U.K. Content ranges from weather reports and mechanical specifications to engine schematics and telemetric data collected from the vehicles during races.

At first, the Renault race teams didn't use a consolidated information management solution, opting instead to store and share data by e-mail or in databases on the internet, and use the local hard drives of laptops to synchronize data between the mobile teams and the factory. "It was a real headache to manage all this information and try to get it to teams in the field when they requested it," says Alex Rigal, IT project manager at Renault. "Some documents were getting lost; many were duplicates. With the level of competition we face, we need to make sure that all our documents are very accurate."

The company evaluated Oracle Universal Content Management, putting it into production in January 2007. Rigal gives the system high marks for how easy it is use. "The overall simplicity of the installation, customization, and configuration was very important to us," he says.

Comprehensive Content Management

Oracle provides content management applications to meet the needs of the enterprise. These include

Oracle Universal Content Management 10*g*, which provides a single, unified application for document collaboration, Web content, digital assets, and e-mail. Organizations can also use the application for converting documents from one format to another, such as Microsoft Word to Adobe PDF files.

Oracle Imaging and Process Management, which enables the annotation of images and automates their routing and approvals, so enterprises can integrate the controls within the accounts payable and time and expense processing capabilities of Oracle and third-party applications.

Oracle Universal Records Management, which lets organizations centrally administer and enforce records and retention policies for content held in repositories across the enterprise, such as file systems and e-mail archives.

Oracle Information Rights Management, which offers *document sealing*, the ability to control access to individual content. Sealing content enables it to be secured beyond the firewall and even beyond the enterprise.

Oracle also offers the ability to manage content in a secure, online enterprise archive with Oracle Content Database. Online archiving allows organizations to move old content off cluttered systems while still making it available for enterprise search, e-discovery, and compliance requirements.

Oracle's content management solutions are integrated components of Oracle Fusion Middleware, a standards-based family of middleware software.

JOHN BLYTHE

Renault team members were keen to adopt Oracle Universal Content Management because they gained many new features, says Alex Rigal, IT Project Manager.

Now, information accuracy is ensured through the platform's check-in/check-out tools and version-control features. Just as important are the security capabilities in the Oracle Information Rights Management module for protecting the team's engineering innovations. Oracle Information Rights Management offers document sealing, the ability to control user access to individual pieces of information. "Once you seal a document, each attempt to access it needs to be validated by our internal server," Rigal says. "Someone may have had access on Monday, but we can remove it on Tuesday. So if someone leaves to go to another team, they can't take important documents from our engineering department with them." Even if someone is authorized to view a file, the system can prevent edits, copying, printing, or creating screen shots.

Proof that the system is both protective and usable comes from how quickly team members have accepted the application. "I was dreading what the reaction might be; I feared users would not want to change the old way of dealing with documents," Rigal recalls. "But people were very keen on moving forward because they gained many new features." ■

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BY MIKE LEHMANN

Enhanced Calculation and Validation

Do even more in Oracle Application Development Framework 11*g*—without code.

In this column, I take another look at the upcoming Oracle JDeveloper and Oracle Application Development Framework (Oracle ADF) 11*g* release and experiment firsthand with several examples designed to improve developer productivity. This column shows how easy it now is to create calculated attributes, validate foreign key values, constrain mutually dependent attribute values, and define more-complex validation rules without writing any Java code.

To follow along with this article, make sure you're using the Oracle JDeveloper 11.1.1.0 (or later) Technology Preview release, which is available as a free download on Oracle Technology Network at otn.oracle.com/products/jdev/11. Furthermore, download the starter workspace at otn.oracle.com/oramag/oracle/07-nov/o67frame.zip.

After extracting the contents of the o67frame.zip file, start by opening the FrameworksNovDec2007.jws workspace in Oracle JDeveloper. Note that the starter workspace defines a familiar set of Emp and Dept entity objects, an EmpView view object, and an HRModule application module. Next, configure the scott connection in the starter workspace to point to the database you'll be using. To do this, expand the **Application Resources** zone of the Application Navigator, the **Connection** folder, and the **Database** node to reveal the scott connection. Right-click the **scott** connection, and select **Properties…** to view the database connection settings. Review these settings, and change them, if necessary, to point to the SCOTT database user you'll be working with. Click the **Test Connection** button to ensure that you can successfully connect to the SCOTT user, and then click **OK.**

Note that if you are using the free Oracle Database Express Edition, you may need to create a new SCOTT user account with CONNECT and RESOURCE privileges and run the CreateDeptEmpTables.sql script provided in the starter workspace to create the DEPT and EMP tables.

SIMPLIFYING CALCULATED ATTRIBUTES

Groovy is a standards-based dynamic language for the Java platform, defined as Java Specification Request 241 (JSR 241). It provides a simpler syntax than Java for many common programming tasks, it interoperates seamlessly with any Java class, and it can be both compiled and interpreted on the fly. Oracle ADF 11*g* provides extensive support for the Groovy language, and the first example in this column demonstrates how to use Groovy expressions to define calculated attributes.

In the starter workspace referenced above, the Emp entity object already has a defined transient attribute called TotalComp. Let's update this attribute definition to be the sum of the employee's salary and that person's commission (as defined by the Sal and Comm attributes, respectively). In the formula, let's accommodate for the fact that Comm and Sal might be null.

In Oracle JDeveloper, double-click the **Emp** entity in the Application Navigator to open the Entity Object Editor. Click **Attributes** to go to the Attributes page, and double-click the row in the table containing the TotalComp attribute. In the Attribute Editor dialog box, ensure that the **Expression** radio button in the **Value Type** radio group is selected. In the **Value** field, enter the following formula:

```
(Sal!=null?Sal:0)+(Comm!=null?Comm:0)
```

This formula uses a ternary operator that tests a Boolean condition (`Sal!=null`) to return the value of Sal if it is not null and zero otherwise. It then performs a similar calculation on the value of Comm, and returns the sum of both calculations.

To complete the attribute assignment, go to the Dependencies page of the Attribute Editor, select the **Sal** attribute in the **Available** list, and click the **Add** (right-arrow) button to shuttle it to the **Selected** list. Perform the same steps to also add the Comm attribute to the **Selected** list. Finally, click **OK** to save the changes. To test your changes, right-click the HRModule application module in the Application Navigator and select **Run** from the menu that appears. When the Business Components Browser – Connect dialog box appears, click **Connect.** Double-click the **Employees** view object instance, and change the commission and/or salary values in any row to observe that the total compensation is always kept up to date.

VALIDATING FOREIGN KEYS

The last Frameworks column (September/October 2007), looked at how to define declarative lists of values (LOVs) for a view object attribute to assist users choosing existing foreign key lookup values. Keep in mind that, although these LOVs are handy for end users, they are not a substitute for proper validation of the foreign key at the entity object level. For example, some UI components, such as text fields with a pop-up LOV, allow the user to type a foreign key value directly. Furthermore, in a service-oriented architecture, the foreign keys in entity objects can be set programmatically by another application by use of a Web service interface. Fortunately, the new Key Exists validation rule makes it

easy to validate foreign key attributes, making quick work of what is normally a programming chore.

The next example adds a Key Exists validation rule to the Emp entity in the Model project. On the General page of the Entity Object Editor, click the **Add Validation Rule** button, a green plus sign to the right of the Validation Rules heading on the page (on a smaller monitor, you may need to scroll down to see this section). In the Add Validation Rule dialog box, select **Key Exists Validator** from the **Rule Types** list. While on the **Rule Definition** tab, select **WorksInDeptAssoc** from the **Association Name** list. This selection denotes a one-to-many association between the Dept and Emp entity objects that represents the foreign key relationship to be validated. Next, on the **Failure Handling** tab, enter the error message `Department does not exist` in the **Message Text** box. Finally, click **OK** to define the new validation rule.

Run the HRModule again, and change the value of the department ID of an existing employee to any two-digit invalid number (such as 99). When you commit or navigate to a different row, an exception with your custom error message will be raised.

CONSTRAINING DEPENDENT VALUES

Another common kind of validation involves comparing two attributes in the same row. The next example enforces a rule that says that an employee's commission must be less than that person's salary. This rule will be applied only when both the commission and salary are non-null, and it will be re-evaluated when either the commission or the salary value changes. The enhanced Compare validation rule in Oracle JDeveloper 11*g* makes this check easy to implement.

On the General page of the Entity Object Editor for Emp, go to the Validation Rules section and click the **Add Validation Rule** button again. In the Add Validation Rule dialog box, select **Compare Validator** from the **Rule Types** list. On the **Rule Definition** tab, select **Comm** from the **Attribute** list and **LessThan** from the **Operator** list. From the **Compare With** list, select **Entity Attribute,** and select the **Sal** attribute in the **Select Entity Attribute** box below. These steps set up the basic comparison in the validation rule. Next, on the **Validation Execution** tab, enter the formula `Sal!=null && Comm!=null` in the **Conditional Execution Expression** field. This field causes the rule to be applied only when the specified condition is true. Note that the expression is case-sensitive, so be sure to type `Comm` and not `comm`. Next, go to the Triggering Attributes section, select **Sal** from the **Available Attributes** list, and click the **Add** (right-arrow) button to shuttle **Sal** into the **Selected Attribute** list, along with **Comm.** At runtime, when the value of any attribute in this list changes, the rule will be re-evaluated.

Finally, go to the **Failure Handling** tab and enter the following validation error message in the **Message Text** box:

```
The {attr1} of {val} must be less than
the {attr2}.
```

Be sure to include the three message expressions in curly braces. In the **Error Message Expressions** table below, click the row for the attr1 token and double-click the **Expression** cell in that row. Enter the expression `source.hints.Comm.label` to reference the value of the user-friendly display label for the Comm attribute of the source entity object being validated. Similarly, enter the expression `source.hints.Sal.label` for the attr2 message token, and enter the expression `Comm` for the val token to reference the value of the Comm attribute. These message expressions, like those in the calculated attribute example above, use Groovy syntax. Although these are very simple expressions, it's important to understand that developers can leverage the full power of Groovy when necessary. To finish, click **OK** to define the new rule.

Run the HRModule again to test the rule. Try to enter a value of `13000` for the commission of an existing employee. When you commit, the parameterized error message "The Commission of 13,000 must be less than the Salary" should appear. If you change the value of the salary of an employee with no commission, you can verify that no exception is raised, because the Comm value is null. Finally, you can verify that the triggering attributes work properly, by changing the salary of an employee to a value lower than that person's existing commission.

The online version of this column, at otn.oracle.com/oramag/oracle/07-nov/o67frame.html, demonstrates how to write Groovy validation rules for this sample Oracle JDeveloper workspace.

Hopefully, these simple examples will help you understand some of the new declarative development features that will be available in the next major release of Oracle JDeveloper and Oracle ADF. For more information on this new release, see the resources at otn.oracle.com/products/jdev/11. If you'd like to learn more about the Groovy language, visit http://groovy.codehaus.org. ■

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BY DAVID PEAKE

Application Integration Workshop

Consuming Web services with Oracle Application Express

Just about every leading Web site, from Amazon and eBay to Facebook and Google, has a Web services offering these days. Web services enable applications to interact with one another over the Web in a platform-neutral, language-independent environment. In a typical Web services scenario, a business application sends a request to a service at a given URL, using HyperText Transfer Protocol (HTTP). The service receives the request, processes it, and returns a response.

Oracle Application Express has supported Web services integration for several releases now, but with Oracle Application Express 3.0, that support has been enhanced—for example, document-style Web services are now supported. Oracle Application Express 3.0 also enables manual creation of Web service references. This column shows you how to create Web services references manually, using one of the YouTube Web services APIs.

Note that you must create this example on your own instance of Oracle Application Express—the apex.oracle.com site does not support external network callouts, so it cannot be used for this project.

codeLISTING 1: Web services properties

```
Name:   YouTube Music Videos
URL:    http://www.youtube.com/api2_xmlrpc
SOAP Envelope:

<?xml version='1.0'?>
 <methodCall>
 <methodName>youtube.videos.list_by_category_and_tag</methodName>
    <params>
       <param><value><struct>
          <member>
             <name>dev_id</name>
             <value><string>YOUR_DEV_ID</string></value>
          </member>
          <member>
             <name>category_id</name>
             <value><int>10</int></value>
          </member>
          <member>
             <name>tag</name>
             <value><string></string></value>
          </member>
          <member>
             <name>per_page</name>
             <value><int>5</int></value>
          </member>
       </struct></value></param>
    </params>
 </methodCall>

Store Response in Collection: YOUTUBE_MUSIC_VIDEOS
```

OVERVIEW

Oracle Application Express 3.0 provides two approaches to adding Web services to an application:

- Generate Web services references by using a wizard to automatically create valid Simple Object Access Protocol (SOAP) request messages with input parameters, output parameters, and operations specified, based on the Web Services Description Language (WSDL).
- Create Web services references manually. First, examine the WSDL, and then create the SOAP envelope for the request. Typically, you will need a SOAP tool to help you determine the SOAP envelope, but in this sample application, the details for the XML-RPC APIs are provided by the YouTube developer site.

EXAMPLE YOUTUBE XML-RPC–STYLE WEB SERVICE

YouTube (www.youtube.com) offers access to several areas of its video repository via an open API interface that lets you easily integrate YouTube content into an application. The YouTube APIs enable you to obtain information about videos and obtain videos by tag name or username. For this sample application project, you'll obtain just music videos and display them in a report-style format. YouTube's Web services APIs are in both representational state transfer (REST) and XML-RPC format. This example describes how to create an Oracle Application Express application that interacts with the YouTube XML-RPC Web service music video API.

To use the YouTube APIs, you must have a YouTube account (it's free) and you must obtain a developer ID (also free). Your developer ID is embedded in the XML-RPC request document and submitted with every request to the API. To get your account and developer ID, visit www.youtube.com/dev.

The sample application project consists of the following steps:

Step 1: Create an Oracle Application Express application

Step 2: Create a manual Web reference
Step 3: Test the Web reference
Step 4: Create a process to associate with the Web service
Step 5: Extract the embedded XML document
Step 6: Create a report on the manual Web reference
Step 7: Refine the report

Step 1: Create an application. Prior to creating the manual Web reference to the YouTube music video XML-RPC Web service, you must create an application in Oracle Application Express.

1. Log on to your Oracle Application Express workspace.
2. Select **Create Application** from the **Application Builder** menu to launch the Create Application wizard.
3. Enter a name for the application, such as `SimpleVideoService`.
4. Click **Next** to continue. The Add Page option appears.
5. Select **Blank** as the page style, and add one blank page to the application. Leave the defaults, and click **Next** to step through the wizard and finish creating the application.

If your Oracle Application Express instance requires a proxy server to reach pages on the internet, you must define the proxy server in Application Definition (**Shared Components -> Application -> Definition**).

Step 2: Create a manual Web reference. To create a manual Web reference, enter the URL to the Web service and define the document to send to it. The results will be stored in a collection, which you define in the steps below. To create a manual Web reference,

1. Click **Shared Components.**
2. Click **Web Service References.**
3. Click **Create.** The Create Web Service Reference wizard begins, displaying the message "Do you want to search a UDDI registry to find the WSDL?"
4. Select **No,** and click **Next.** Entry fields for WSDL location and authentication credentials appear. Disregard them.
5. In the Tasks region in the right-hand section of the page, click **Create Web Service Reference Manually** to open a Create/Edit Web Service properties page, with regions for Web service name, service description, SOAP envelope definition, and SOAP response. Enter the details shown in Listing 1.
6. Click **Create.** The **YouTube Music Videos** component appears on the Web Services References page.
7. Click the **YouTube Music Videos** component to select it for testing (in the next step).

Step 3: Test the Web reference. To test the manual Web reference you created for the YouTube music videos list, you must have the component selected on the Web Service References page:

1. Select **Details** from the **View** list, and then click **Go.** The component appears in a table just below the selection row.
2. Click the **Test** icon next to the YouTube Music Videos reference. A SOAP Envelope and Response page appears.
3. Click **Test.**
4. View the response in the Result Text area.

The response section displays the XML-RPC response, a string that contains an escaped, standalone XML document. The embedded XML document contains the information about the music videos. (In step 5, you'll see how to unescape the content so that it displays properly in a report.)

code LISTING 2: PL/SQL code that processes the embedded XML

```
declare
   l_clob clob;
   l_xml xmltype;
   l_val clob;
begin
   for c1 in (select clob001
              from apex_collections
              where collection_name = 'YOUTUBE_MUSIC_VIDEOS'
             ) loop
      l_clob := c1.clob001;
      exit;
   end loop;

   l_xml := xmltype.createxml(l_clob);

   l_val := dbms_xmlgen.convert(l_xml.extract('/methodResponse/params/param/value/
string/text()').getclobval(),1);

   apex_collection.update_member_attribute(
     p_collection_name  => 'YOUTUBE_MUSIC_VIDEOS',
     p_seq              => '1',
     p_clob_number      => '1',
     p_clob_value       => l_val );
end;
```

Step 4: Create a process to associate with the Web service. Now that you've created the Web service reference, you must invoke it from your application. To create the process that invokes the Web reference,

1. Navigate to the definition of page 1.
2. Click the plus (+) icon in the Processes section under Page Rendering.
3. Select **Web Services** for the process category, and click **Next.**
4. Enter `Call YouTube Music Video Service` in the **Name** field, and click **Next.**
5. Select **YouTube Music Videos** from the **Web Service Reference** list, and click **Next.**
6. Leave the message text areas blank, and click **Next**.
7. Click **Create Process.**

Step 5: Extract the embedded XML document. The YouTube Music Videos API returns a string (an XML-RPC response) that contains an escaped standalone XML document comprising the result of the API call: the list of music videos. (When the embedded XML is unescaped, the result is the same as the response to a REST call.) It's this result that you want the application to report on, so now create a process that extracts the document and unescapes the XML. The process also updates the collection used to

store the response with the value of the extracted document.

To create a process to extract the embedded XML document,

1. Click the plus (+) icon in the Processes region under Page Rendering.
2. Select **PL/SQL** from the **Process Category** list, and click **Next.**
3. Enter `Extract Embedded Document` in the **Name** field.
4. Enter `20` in the **Sequence** field, and click **Next.**
5. Enter the code from Listing 2 in the **Enter PL/SQL Page Process** text area.
6. Leave the message text areas blank, and click **Next.**
7. Select **PL/SQL** from the **Condition Type** list.
8. Click **Create Process.**

Step 6: Create a report on the manual Web reference. To display the output of the Web services reference, build a report by using the "Create Report on a Manual Web Service" wizard. For this step, you must provide information about the structure of the XML response document.

To create a report on a manual Web service,

1. Click the plus (+) icon in the Regions area under Page Rendering.
2. Select **Report** from the region type list, and click **Next.**
3. Select **Report on collection containing Web service result,** and click **Next.**
4. Enter `Music Videos` in the **Title** field, and click **Next.**
5. Select **Manually Created from the Web Reference** and click **Next.**

Several entry fields appear for defining the SOAP style and message format. Complete the fields as follows:

- From the **Web Service Reference** list, select **YouTube Music Videos.**
- For **SOAP style,** select **RPC.**
- For **Message Format,** select **Encoded.**
- Leave **Message Namespace** blank, and click **Next.**
- For **Result Node Path,** enter `/video_list/video`.
- For **Parameter Names,** enter the following names:

```
title
author
rating_avg
description
url
thumbnail_url
```

6. Click **Create SQL Report.** The Success message appears.

The basic application is now complete. Click the **Run Page** icon to view the application.

Step 7: Refine the report. You can fine-tune the report layout, displaying thumbnails of the video and adding hyperlinks from the thumbnail to the video on YouTube. To make refinements to the report,

1. Click the **Report** link next to the Music Videos region on the page definition of page 1.
2. Click the **Edit** icon next to the thumbnail_url column.
3. Enter the following in the **HTML Expression** text area:

```
<a href="#url#">
<img src="#thumbnail_url#" />
</a>
```

4. Click **Apply Changes.**
5. Uncheck the **Show** check box in the url column row.
6. Click the **Move-Up** icon in the thumbnail_url column row until it appears directly after the title column.
7. Click **Apply Changes.**

Run the page to view your refinements. Figure 1 shows a sample result.

Music Videos

thumbnail_url	title	author	rating_avg	description
	Incubus - AT&T acoustic series	Skromblin	4.91	An Incubus Acoustic concert
	Kingdom Hearts Piano Medley	GermanSeabass	4.89	SHEET MUSIC AND MP3: http://sebastianwolff.info/music.php (Oh, and the freaky eyes - sorry, it's this: http://tinyurl.com/eaeq7) ---- Hokay, so, in lieu of proper sheet music, I decided to arrange my favorite KH / KH2 songs for piano. In chronological order: Dearly Beloved, Hikari, Organization XIII, Roxas, Kairi, Waltz of the Damned, This is Halloween, Scherzo di Notte, Hallow...
	Pink Floyd-Live 8	NBgrl133	4.86	london
	Mario Piano	sasukekun22	4.87	Mario Piano Dear All YouTubers, Thank you for watching my "Mario Piano" performance. I have recently created a YouTube account at http://www.youtube.com/profile?user=MMLeung I look forward to making more videos for all of you and providing the best entertainment! Thanks sasukekun22 for posting this video! Sincerely, Video Game Pianist aka Martin Leung
	Paul Potts Semi Final winning performance High Quality	myredroom	4.90	Paul's official websites have been announced. http://sonybmg.co.uk/artists/paul_potts/ Official Website:- http://www.paulpottsuk.com/ Official myspace:- http://www.myspace.com/officialpaulpottsmusic Paul Potts has won the final of this competition and ins £100,000 and

Figure 1: Sample application result

CONCLUSION

Oracle Application Express lets you build applications that integrate with other applications on other platforms, by supporting the consumption of Web services. It makes it easy to build applications based on XML-RPC–style Web services such as the YouTube Music Video API. ■

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BY STEVEN FEUERSTEIN

On Continuing and Indexing

Best practices for PL/SQL in Oracle Database 11*g* and multilevel, string-indexed collections

I have been assigned one of those big blobs of spaghetti code to maintain, and in particular I have to make changes to a very complicated loop. I want to be able to make a "surgical strike"—put the new rules in place and then bypass the rest of the logic in the loop body with the minimum-possible fuss. What's the best way to do this?

Isn't it painful to make changes to an existing program that is packed full of contorted logic ("spaghetti code")? And isn't it positively terrifying to make those changes when you don't have a regression test for the program that you can run afterward to ensure that no bugs were inadvertently introduced?

Yet that is what we are often called upon to do.

When faced with this situation, the smart thing to do is to make the smallest, most isolated change possible, thereby minimizing the ripple effect.

It sounds to me like you have a situation along these lines:

```
PROCEDURE someone_elses_mess
/*
|| Author: Long-Gone Consultant
|| Maintained by: Terrified Employee
*/
IS
BEGIN
  ... lots and lots of convoluted code

  FOR index IN 1 .. my_collection.COUNT
  LOOP
    ... hard-to-understand logic here

    ... more of the same here

  END LOOP;
END;
```

and you need to add some code between "hard-to-understand logic here" and "more of the same here." If a certain condition is met, you want to execute some new code and then skip over the rest of the loop body and move on to the next iteration.

You can accomplish this in a few ways:

- Adding an IF statement
- Using a GOTO statement
- In Oracle Database 11*g*, taking advantage of the new CONTINUE statement

Here's what the loop body might look like with an IF statement:

```
BEGIN
  ... lots and lots of convoluted code

  FOR index IN 1 .. my_collection.COUNT
  LOOP
    ... hard-to-understand logic here

    IF new_condition
    THEN
      ... new code here
    ELSE
      ... more of the same here
    END IF;
  END LOOP;
END;
```

Here's the approach with GOTO:

```
BEGIN
  ... lots and lots of convoluted code

  FOR index IN 1 .. my_collection.COUNT
  LOOP
    ... hard-to-understand logic here

    IF new_condition
    THEN
      ... new code here

      GOTO end_of_loop;
    END IF;

    ... more of the same here

    <<end_of_loop>>
    NULL; -- Placeholder
  END LOOP;
END;
```

And, finally, here's the approach with CONTINUE (new to Oracle Database 11*g*):

```
BEGIN
  ... lots and lots of convoluted code

  FOR index IN 1 .. my_collection.COUNT
  LOOP
    ... hard-to-understand logic here

    IF new_condition
    THEN
      ... new code here

      CONTINUE;
    END IF;

    ... more of the same here

  END LOOP;
END;
```

Now, with code this simple, all three of these approaches look reasonable and get the job done. But if you are dealing with an extremely complex, convoluted program, the IF statement gets tricky. You have to make sure you set up the ELSE clause properly and enclose the correct logic. Which means that you have to find the END LOOP statement for this loop, which could be hundreds of lines later in the program, with many other END LOOPs in between.

The GOTO allows you to simply branch to the end of the loop, but, again, you must find the end of that loop and then add both the label and the placeholder "NULL;" statement so that the GOTO has someplace

executable to *go*.

No, the best solution to this problem—available when you upgrade to Oracle Database 11*g*—is to simply tell the PL/SQL runtime that you want to *continue* with the loop execution, skipping the rest of the body for this iteration. Clean, simple, and declarative.

And, by the way, just as with the EXIT statement, you can use CONTINUE in a WHEN clause and also specify an END label (helpful with nested loops).

Here is an example of CONTINUE WHEN:

```
BEGIN
  ... lots and lots of convoluted code

  FOR index IN 1 .. my_collection.COUNT
  LOOP
    ... hard-to-understand logic here

    /* I want to execute this new logic
       and then "escape." */
    ... new code here
    CONTINUE WHEN new_condition;

    ... more of the same here

  END LOOP;
END;
```

The following block shows how you can skip not only the rest of the inner loop but also the outer loop by specifying a label with CONTINUE:

```
BEGIN
  <<outer_loop >>
  FOR o_index IN 1 .. my_collection.
COUNT
  LOOP
    <<inner_loop>>
    FOR i_index
        IN your_collection.FIRST ..
           your_collection.LAST
    LOOP
      ... lots of code

      /* Skip the rest of this and the
         outer loop if condition is met. */
      CONTINUE outer_loop
      WHEN condition_is_met;
      ... more inner loop logic

    END LOOP inner_loop;

    ... more outer loop logic

  END LOOP outer_loop;
END;
```

codeLISTING 1: Package specification for wora_manager

```
SQL> PACKAGE wora_manager
 2   IS
 3     c_folk   CONSTANT CHAR (4) := 'FOLK';
 4     c_rock   CONSTANT CHAR (4) := 'ROCK';
 5
 6     PROCEDURE reset_counts;
 7
 8     PROCEDURE song_requested (title_in IN wora_songs.title%TYPE);
 9
10     PROCEDURE song_played (title_in IN wora_songs.title%TYPE);
11
12     FUNCTION song_requested_count (title_in
13     IN wora_songs.title%TYPE)
14        RETURN PLS_INTEGER;
15
16     FUNCTION folk_requested_count
17        RETURN PLS_INTEGER;
18   END wora_manager;
```

codeLISTING 2: Using the wora_manager package

```
SQL> BEGIN
 2     wora_manager.song_requested (
 3       'If I were a rich man');
 4
 5     wora_manager.song_requested ('Peace train');
 6
 7     DBMS_OUTPUT.PUT_LINE (
 8       wora_manager.song_requested_count (
 9         'If I were a rich man')
10     );
11     wora_manager.song_played ('Peace train');
12   END;
```

HOW DO I TRACK MY SONGS?

I work for a radio station (call it WORA—not the real name), and I need to write a program that keeps track of how many times a song is requested and played within a given period and also track the count of songs in one of our two categories: *folk* and *rock* (I am simplifying things for the question). Although the list of available songs is stored in a database table, this tracking information is not stored in the database; it is active only during the current session. I see how I could write the program by creating a few database tables and writing a bunch of SQL, but I wonder if there might not be an easier way.

There is definitely a *much* easier way: use multilevel, string-indexed collections!

As you will see, although the syntax for multilevel, string-indexed collections can be a little bit tricky at first, once you are up to speed and as long as you are careful about how you define these structures, they can make your life very, very easy.

Now, when building code as you describe in your question, you should start by describing the functionality you need in the package specification. Listing 1, for example, is the specification that I believe corresponds to your requirements (much simplified, I am sure, from the reality at the radio station and based on a table called wora_songs).

Summarizing the wora_manager package specification, in Listing 1:

- Lines 3 and 4: I declare constants to avoid multiple instances of hard-coded literals.
- Line 6: I provide a program to reset counts as needed.
- Lines 8–10: The song_requested and song_played procedures record the fact that a particular song (by title) was

requested or played.

■ Lines 12–17: I can retrieve the number of times a particular song was requested or songs in the folk category were requested.

Yes, I know—you need additional functions for rock songs and "number of times a song was played," but I have limited space in this column, so you will have to add those. I also will not include in this column code that is not germane to the demonstration of the use of the collections, such as the inserts into the wora_songs table and a function to look up the category for a song title. You can, however, view all of this code in the download file at otn.oracle.com/oramag/oracle/07-nov/o67plsql.zip.

Listing 2 shows an example that uses the wora_manager package.

Once the package specification is defined and compiled, you *should* set up the tests for these programs—before you start writing the package body. With my tests in place, I can move on to the implementation. Let's recap the data I need to keep track of:

■ How many songs were requested/played within a category

■ How many times a song was requested/played

There are many ways to implement data structures to store this data. Listing 3 shows the approach I took for the wora_manager package body.

The following are key lines in the wora_manager package body (Listing 3):

■ Lines 3–6: a record type to hold the two types of counts—requested and played.

■ Lines 8 and 9: a collection type (PL/SQL's version of an array) in which each element of the collection is one of those records, and the index into the collection is a string—the title of the song.

■ Lines 11–13: a collection type in which each element of the collection is *another* collection, of those song count records, and the index into the collection is a string—the category (either folk or rock).

■ Line 14: a variable based on the "collection of collections" type. This variable will hold all the count information.

code LISTING 3: Package body for wora_manager

```
SQL> CREATE OR REPLACE PACKAGE BODY wora_manager
 2   IS
 3     TYPE counts_rt IS RECORD (
 4       requested_count   PLS_INTEGER
 5      , played_count     PLS_INTEGER
 6     );
 7
 8     TYPE song_counts_tt IS TABLE OF counts_rt
 9       INDEX BY wora_songs.title%TYPE;
10
11     TYPE by_category_tt IS TABLE OF song_counts_tt
12       INDEX BY wora_songs.CATEGORY%TYPE;
13
14     g_song_data   by_category_tt;
```

code LISTING 4: Song_requested procedure

```
SQL> PROCEDURE song_requested (title_in IN VARCHAR2)
 2   IS
 3     l_category wora_songs.CATEGORY%TYPE :=
 4        category_for_title (title_in);
 5   BEGIN
 6     g_song_data (l_category) (title_in).requested_count :=
 7       g_song_data (l_category) (title_in).requested_count + 1;
 8   EXCEPTION
 9     WHEN NO_DATA_FOUND
10     THEN
11       g_song_data (l_category) (title_in).requested_count := 1;
12   END song_requested;
```

code LISTING 5: Anonymous block

```
SQL> DECLARE
 2     l_songs_in_category   song_counts_tt;
 3     l_song_counts           counts_rt;
 4   BEGIN
 5     l_songs_in_category := g_song_data ('FOLK');
 6     l_song_counts :=
 7        l_songs_in_category (If I had a rocket launcher');
 8     DBMS_OUTPUT.put_line (l_song_counts.requested_count);
 9   END;
```

code LISTING 6: song_requested_count function

```
SQL>  FUNCTION song_requested_count (title_in IN VARCHAR2)
 2    RETURN PLS_INTEGER
 3    IS
 4      l_category wora_songs.CATEGORY%TYPE :=
 5        category_for_title (title_in);
 6    BEGIN
 7      RETURN g_song_data
 8           (l_category) (title_in).requested_count;
 9    EXCEPTION
10       WHEN NO_DATA_FOUND
11       THEN
12           RETURN 0;
13    END song_requested_count;
```

Listing 4 shows the implementation of the song_requested procedure.

In the song_requested procedure, the user passes in a song title, so I call a function to retrieve the category for that title. These two pieces of information (category and title) are the two index values for my g_song_data collection of collections.

As you can see in line 6 of Listing 4, the syntax I use to identify the record that holds the count information for

this song is

```
g_song_data (l_category) (title_in)
```

In other words, g_song_data (l_category) takes me to the element in the collection of collections for that category (there are at most two elements in this "outer" collection, because I am working only with folk and rock songs). Then I go after the counts for a particular song by using its title as the index in the "inner" collection.

I then increment the requested_count by 1. If this is the first time the song is requested, Oracle Database will raise the NO_DATA_FOUND exception, because I tried to look at an element for an index that was not defined. So I trap that exception and set the count to 1.

To make these steps a bit clearer, consider the anonymous block in Listing 5.

I have broken out the intermediate data structures. I declare a collection of count records (l_songs_in_category) and a record of counts (l_song_counts). In Listing 5, line 5, I get all the song counts for folk songs. In lines 6 and 7, I get the counts (a record) for one song. In line 8, I display one field of the record.

I am sure that if you are new to collections and multilevel collections, this can take a little getting used to. Yet, consider how much I am able to do with such a small amount of code. I simply provide the string name (title or category) as the index value, and PL/SQL automatically sorts out all the information for me and keeps track of it all very neatly.

The logic for retrieving the count for a given song is also very simple, as shown in Listing 6. ■

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BY LONNEKE DIKMANS

Testing BPEL in the Real World

Use the Oracle BPEL Test Framework to improve the quality of your BPEL processes.

One of the big benefits of service-oriented architecture (SOA) development is that it approaches design from a business, as opposed to a technical, point of view. Unfortunately, SOA development projects can be more complicated than "regular" Java Platform, Enterprise Edition (Java EE) projects. With SOA projects, there are often more stakeholders, more disparate technologies to integrate, and more possible misunderstandings about overall project goals.

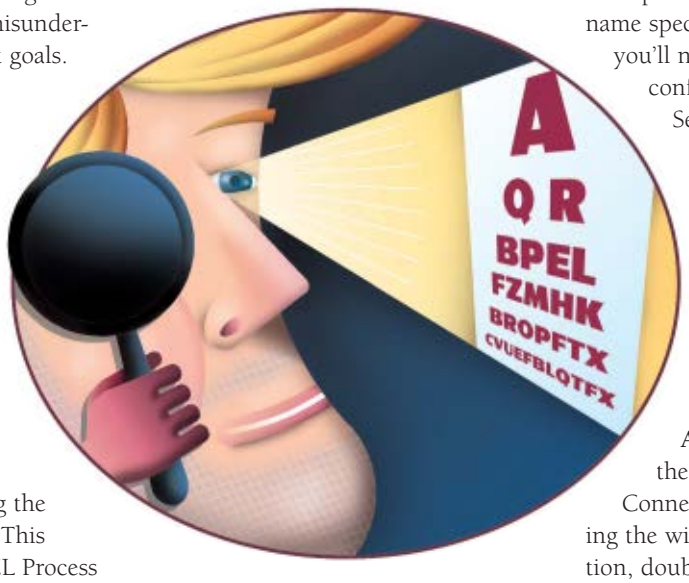
Testing in such an environment can be complicated—from both a technical and an organizational perspective. To properly test an SOA deployment, you need to test the set of Web services, the individual applications that implement the Web services, and the business processes that handle the orchestration of these services.

This article describes how to test a BPEL process by using the Oracle BPEL Test Framework. This framework, part of Oracle BPEL Process Manager, provides a way to create and execute a set of repeatable tests on a BPEL process. In addition, this article also offers some best practices borrowed from traditional integration and agile development projects to help developers, project managers, and testers working in an SOA environment.

The examples in this article are all based on a simplified BPEL process that manages automobile loan applications. As Figure 1 shows, the process contains the following steps:

1. A potential customer applies for a loan.
2. The system calculates a credit rating for this person.
3. The system provides a recommendation and an annual percentage rate (APR) for this person.
4. The customer receives a notification about the result.

A single BPEL process and two services are used to implement the business process described above. One service implements a credit rating, and the other provides loan advice.



DAN HUBIG

In our walk-through, we will build these components by modifying an AutoLoanFlow sample project, which is part of the AutoLoanDemo BPEL demo that is installed by default with Oracle BPEL Process Manager.

PRELIMINARY SETUP

Before getting started, make sure you have Oracle SOA Suite installed and configured and that you have the AutoLoanFlow project running in Oracle JDeveloper. Follow the steps below to complete this setup.

1. Install Oracle SOA Suite 10*g* Release 3 (10.1.3.1) or later, along with Oracle JDeveloper 10*g* Release 3 (10.1.3.1) or later. These products, with installation and configuration instructions, are available at the Oracle SOA Suite download page, at otn.oracle.com/software/tech/soa. When installing Oracle SOA Suite, be sure the BPEL and business rules components install (they should be installed by default). Also note the SOA application Oracle Application Server Containers for Java Platform, Enterprise Edition (OC4J) instance name specified by the installer, because you'll need it in the next step when configuring an Oracle Application Server connection.

2. In Oracle JDeveloper, set up Oracle Application Server and Oracle Integration Server connections to the newly installed Oracle SOA Suite components. Open the **Connections Navigator** tab, and double-click **Application Server** to launch the Create Application Server Connection wizard. After completing the wizard and testing the connection, double-click **Integration Server** in the **Connections Navigator** tab and complete the Create Integration Server Connection wizard.

3. In Oracle JDeveloper, open the AutoLoanFlow.jpr project file. It is located in **[SOASUITEHOME] -> bpel -> samples -> demos -> AutoLoanDemo -> AutoLoanFlow,** where **[SOASUITEHOME]** is the directory in which you installed Oracle SOA Suite. In the Create Application to Contain Project dialog box, which appears, enter `AutoLoanFlowTest` as the application name. Note that we'll be making changes to this project, so if you'd like to keep the original project for another use, make a copy of the

AutoLoanDemo folder and use the copy for this walk-through.
4. In the **Applications Navigator** tab, open **AutoLoanFlow.bpel** to bring up the Diagram view in the main edit pane. Expand the **GetLoanAdvise** icon, and change the name of the **Invoke** activity to `InvokeLoanAdvisor`. Next, expand the **GetCreditRating** icon and change the name of the **Facts_To_BPEL_Var** activity to `CreditRatingFacts_To_BPEL_Var`. These steps are necessary because the BPEL Test Framework requires unique names for each activity.
5. Remove the loan approval part of this process. To keep this example simple, delete the **SetupTaskPayload** activity, the **LoanApproval_1** scope, and **taskSwitch**.
6. Finally, deploy the modified **AutoLoanFlow** process to the SOA instance. In the **Applications Navigator** tab, right-click the **AutoLoanFlow** project and select **Deploy -> BPEL Process Deployer**. In the dialog box that appears, click **OK** to deploy the process by using the Oracle Integration Server connection created earlier in your setup.

TESTING THE PROCESS STEPS

Now it's time to create a suite of test cases that test the BPEL AutoLoanFlow process. As these test cases execute, they don't actually call the credit rating and loan advisor services specified in the process flow. Instead, they emulate these services and execute the entire process flow as if these services had actually been called. This approach makes it easier to test the integrity of the process prior to deployment in a production environment.

Create the test suite. Begin by creating a test suite in Oracle JDeveloper. Note that a BPEL test suite is simply a logical collection of test cases. In the **Applications Navigator** tab, right-click **AutoLoanFlow.bpel** and select **Test -> Create Test Suite**. In the dialog box that appears, name the test suite `logicSuite`.

Create a baseline test. A baseline test is a test that does not run on its own but exists to be included within other tests.

codeLISTING 1: XML source for test

```
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/">
 <soap:Header/>
  <soap:Body xmlns:ns1="http://www.autoloan.com/ns/autoloan">
    <ns1:loanApplication>
    <ns1:SSN>12345</ns1:SSN>
    <ns1:email>demo1@otn.com</ns1:email>
    <ns1:customerName>Irving Stone</ns1:customerName>
    <ns1:customerAge>41</ns1:customerAge>
    <ns1:customerAnnualIncome>45000.0</ns1:customerAnnualIncome>
    <ns1:city>Redwood</ns1:city>
    <ns1:state>CA</ns1:state>
    <ns1:country>United States</ns1:country>
    <ns1:loanAmount>60000.0</ns1:loanAmount>
    <ns1:carMake>Toyota</ns1:carMake>
    <ns1:carModel>Toyota 4Runner</ns1:carModel>
    <ns1:carYear>2005</ns1:carYear>
    <ns1:creditRating></ns1:creditRating>
    <ns1:creditRisk></ns1:creditRisk>
    <ns1:creditMaxAmount></ns1:creditMaxAmount>
   </ns1:loanApplication>
 </soap:Body>
</soap:Envelope>
```

Baseline tests make it possible to reuse parts of a test in multiple test cases. Although you could build a test case from scratch (without using a baseline test), it's often easier to use Oracle BPEL Process Manager to build a baseline test for you. The latter approach is recommended when you have existing BPEL processes or are new to the BPEL testing framework.

Perform the following steps to create a baseline test:
1. Open a browser window, and navigate to the Oracle BPEL Process Manager console, using this URL syntax: `http://[servername]:[port]/BPELConsole`.
2. Enter the username and password of the SOA administrator. By default, the administrator username is oc4jadmin.
3. On the console dashboard that appears, click the **AutoLoanFlow** process. (Note: if the process does not appear under **Deployed BPEL Processes**, check your preliminary setup to make sure you deployed the process to the SOA instance.)
4. In the "Initiating a test instance" form area, select **XML Source**. Then copy the code from Listing 1 into the message box that appears.
5. Click **Save Test**.
6. Click **Post XML Message** to create a new test instance. A message saying that a test instance is being processed asynchronously should appear.

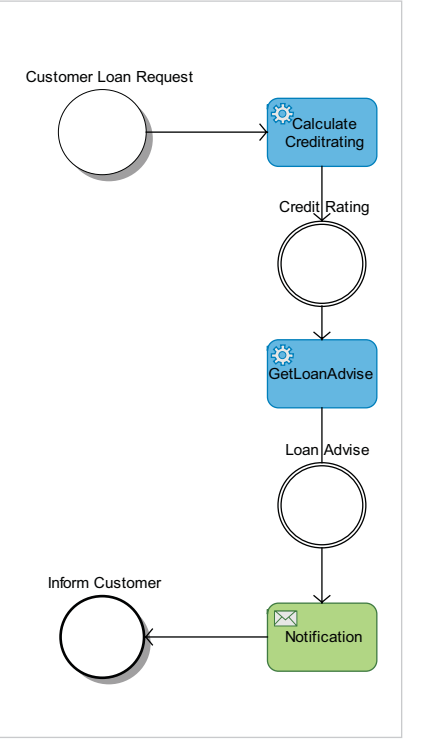


Figure 1: An auto loan BPEL process

7. In the upper right corner of the Web page, click the **Instances** tab. In the list of BPEL process instances that appears, click the **test** instance you just created. Then click the **Test** tab to get to the Test Case Information page.
8. Click **Save as unit test (.xml)** to save this instance as a unit test case. Save the generated XML, using the filename baseline.xml on your local

file system, into the **bpel/testsuites/logicSuite/includes** subdirectory of the **AutoLoanFlow** project directory. Note that this file must appear in the **includes** subdirectory to be used as a baseline case.

9. Import the baseline test into Oracle JDeveloper, by selecting the **logicSuite** test suite in the **Applications Navigator** tab and selecting **Refresh** from the **View** menu. The baseline.xml test case should now appear in the **Includes** directory in the tree.

Design the test cases. The next task is to design the test cases that will be used to test the BPEL process. Oracle BPEL Process Manager test cases contain several key components:

Initiate action. Every test case starts with an initiate action that calls the BPEL process and defines the initial payload. See Listing 2 for the initiate action we will use in all of our test cases.

Emulations. When executing a BPEL process, the test cases don't actually call the partner services included in the process definition. Instead, the test cases in our example emulate the services' activity. As part of the emulation, the test cases also specify the data to be returned by each service being emulated. Listing 3 shows the part of baseline.xml (which we created earlier) that emulates invoking the CreditRatingAgent.

Assertions. Assertions are used to validate a variable or an entire XML document at any point during a BPEL process execution. Three types of assertions are available. Simple Value Assert checks the value of a variable, XML Assert compares the elements of an entire XML document with their expected values, and Activity Executed Assert checks the number of times an activity is invoked.

When you are designing test cases, it is important to decide how many assertions to put into a single test case. Because one execution of a test case (or test run) corresponds to one BPEL process instance, only one execution path is possible per test case. You can, however, divide test cases based on the activities you want to assert. This approach might be useful if you have a large BPEL process and you want to check certain transformations or activities within single test cases.

Because our example is more straightforward, let's instead divide the test cases according to possible outcomes. One outcome is that the loan will be approved, and the other is that the loan will be rejected. So for this example, we'll create two test cases. For each test case, we will emulate invoking the CreditRatingAgent and assert the value of the credit rating.

First, let's create the test case in which the loan is approved:

1. In the **Applications Navigator** tab, right-click the **logicSuite** test suite and select **Create BPEL Test…**. In the dialog box that appears, name the test case `testApprove` and click **OK.**

2. Include the baseline test case baseline.xml. Make sure the Diagram view is open for testApprove.xml, and click the **Included BPEL Tests** button in the upper left corner of the edit pane. In the dialog box that appears, click **Add** and select **baseline.xml** to add it to the set of included BPEL tests.

Next, add the assert value to CreditRatingFacts_To_BPEL_Var.

1. In the Diagram view for testApprove .xml, expand the **GetCreditRating** icon and double-click the **CreditRatingFacts_To_BPEL_Var** icon. Make sure the **Asserts** tab is selected, click **Create,** and select **Value Assert…** from the menu that appears.

2. In the Create Value Assert dialog box, click the flashlight icon to the right of the **Variable** field to open the Variable XPath Builder dialog box. Navigate to

code LISTING 2: Initiate operation

```
<BPELTest processName="AutoLoanFlow" xmlns="http://xmlns.oracle.com/bpel/instancedriver">
  <initiate operation="initiate">
   <inboundMessage>
    <part name="payload">
     <content>
      <ns1:loanApplication xmlns:ns1="http://www.autoloan.com/ns/autoloan">
       <ns1:SSN>12345</ns1:SSN>
       <ns1:email>demo1@otn.com</ns1:email>
       <ns1:customerName>Irving Stone</ns1:customerName>
       <ns1:customerAge>41</ns1:customerAge>
       <ns1:customerAnnualIncome>45000.0</ns1:customerAnnualIncome>
       <ns1:city>Redwood</ns1:city>
       <ns1:state>CA</ns1:state>
       <ns1:country>United States</ns1:country>
       <ns1:loanAmount>60000.0</ns1:loanAmount>
       <ns1:carMake>Toyota</ns1:carMake>
       <ns1:carModel>Toyota 4Runner</ns1:carModel>
       <ns1:carYear>2005</ns1:carYear>
       <ns1:creditRating/>
       <ns1:creditRisk/>
       <ns1:creditMaxAmount/>
       </ns1:loanApplication>
     </content>
    </part>
   </inboundMessage>
  </initiate>
```

Figure 2: The Create Value Assert dialog box

/ns3:loanApplication/ns3:creditRating of **inputVariable**, and click **OK.**

3. Enter `500` as the expected value for the rating.

4. Enter an error message that will appear if the assertion fails. (Do not leave this field blank.)

5. Uncheck the **Fatal** check box so that the test will continue even if this assertion fails. At this point, the Create Value Assert dialog box should appear, as in Figure 2. Click **OK** twice to close the dialog boxes and complete the assertion definition.

Next, override InvokeLoanAdvisor.

1. In the Diagram view for testApprove .xml, expand the **GetLoanAdvise** icon and double-click the **InvokeLoanAdvisor** icon. Click the **Emulate** tab.

2. Check **Override Included Emulation**, and in the message field body, change `<approved>false</approved>` to `<approved>true</approved>`**.** Click **OK** to save your changes.

Next, assert that the loan is approved.

1. In the Diagram view for testApprove .xml, double-click the **callbackClient** icon.

2. As you did above with CreditRatingFacts_To_BPEL_Var, create a Value Assert to check that the loan is approved. In this case, navigate to **/ns3:loan/ns3:loanOffer/ns3:approved** of the taskPayload variable and enter `true` for the expected value. As before, enter an error message to appear in case the assertion fails and uncheck the **Fatal** check box.

3. Save the test.

The first test case is now finished. Now let's create the second one.

1. As before, create a new test case within the logicSuite test suite. Call this test case `testReject`.

2. Include the baseline test case baseline.xml.

Next, override the Invoke activity.

1. In the Diagram view for testReject .xml, expand the **GetCreditRating** icon and double-click the **Invoke** activity. Click the **Emulate** tab.

2. Check **Override Included Emulation**, and in the message body, change the value of the rating from 500 to `400`. Click **OK** to save changes.

Next, assert the creditRating.

code LISTING 3: Emulating the CreditRatingAgent

```
<activityDriver name="Invoke" firstIteration="1" lastIteration="1">
  <emulate>
    <inboundMessage>
      <part name="payload">
        <content>
          <ns0:assertExecuteWatchStatelessDecision
            xmlns:ns0="http://xmlns.oracle.com/AutoLoanFlow/CreditRatingAgent">
            <ns0:resultList>
              <rating xmlns="http://samples.otn.com/bpel/demo">
                <SSN>12345</SSN>
                <rating>500</rating>
                <risk>Medium</risk>
                <maxAmount>50000.0</maxAmount>
              </rating>
            </ns0:resultList>
          </ns0:assertExecuteWatchStatelessDecision>
        </content>
      </part>
    </inboundMessage>
  </emulate>
</activityDriver>
```

1. While the **GetCreditRating** icon is still expanded, double-click the **CreditRatingFacts_To_BPEL_Var** icon.

2. As you did before, create a new Value Assert. In this case, navigate to **/ns3:loanApplication/ns3:creditRating** of **inputVariable.** Set `400` as the expected value. As before, enter an error message to appear in case the assertion fails and uncheck the **Fatal** check box.

Next, assert that the loan is rejected.

1. In the Diagram view for testReject .xml, double-click **callbackClient.**

2. Create another Value Assert, this time to check that the loan is rejected. In this case, check that **/ns3:loan/ns3:loanOffer/ns3:approved** of **taskpayload** equals "false." Again, enter an error message to display in case the assertion fails and uncheck the **Fatal** check box.

3. Save the test.

Now that the two test cases are finished, the next step is to deploy the test cases.

1. In the **Applications Navigator** tab, right-click the **Test Suites** folder and select **BPEL Test Deployer….**

2. In **Test Suites to Deploy,** expand the **logicSuite** test suite and the **Tests** folder and select both the test suite and the two new test cases. In **Servers to Deploy Into,** select the Oracle Integration Server connection created during the preliminary setup.

3. Click **Deploy.** After a few seconds, the test suite should be deployed to the Oracle BPEL Server.

The online version of this article, at otn.oracle.com/oramag/oracle/07-nov/o67testing.html, describes how to run the test suite.

The BPEL Test Framework, which is part of Oracle BPEL Process Manager and is integrated into Oracle JDeveloper, provides features similar to those that developers would expect when practicing test-driven development in Java EE projects. Along with Ant tasks that deploy, execute, and provide reports on tests, this test framework can easily be combined with testing tools and an automated deployment process to meet the most-demanding SOA testing needs. ■

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BY SUE HARPER

Working with PL/SQL

Edit, compile, run, and debug PL/SQL code easily with Oracle SQL Developer.

Among its other features, Oracle SQL Developer provides database developers and DBAs with a comprehensive environment for creating, editing, compiling, running, and debugging PL/SQL program units. Its editing capabilities include customizable syntax highlighting, bookmarks, code completion, code folding, and search/replace. The debugging features are especially useful for working with more-complex packages, debugging while stepping through a series of procedures, and *remote debugging* (debugging initialized by an external client or program).

This column introduces Oracle SQL Developer's key features for working with PL/SQL in the database. The column's examples use the sample HR schema and the EMP_FETCHER package—both available in the default database installation—and the EMP_REC object type, which you'll create. By working through the examples, you'll

- Run PL/SQL procedures, functions, and packages
- Edit PL/SQL code
- Compile PL/SQL
- Debug compiled PL/SQL code, both locally and remotely

GETTING STARTED

Follow these steps to establish the basic setup for this column's examples:

1. With an Oracle database running, start Oracle SQL Developer.

2. Create a new connection for the HR schema, and name it `HR_ORCL`. (For detailed information on creating a connection, see the link in "nextSTEPS.")

3. Open the SQL worksheet (**Tools -> SQL Worksheet**) for `HR_ORCL`. (It opens automatically when you first invoke the new connection.)

4. Enter the code in Listing 1 into the **Enter SQL Statement** text box.

code LISTING 1: Script for creating the EMP_REC object type

```
CREATE OR REPLACE TYPE EMP_REC AS
OBJECT(EMPLOYEE_ID NUMBER(6),
 LAST_NAME VARCHAR2(25),
 JOB_ID VARCHAR2(10),
 MANAGER_ID NUMBER(6),
 HIRE_DATE DATE,
 SALARY NUMBER(8, 2),
 COMMISSION_PCT NUMBER(2,2),
 DEPARTMENT_ID NUMBER(4));
```

code LISTING 2: Script for creating the EMP_FETCHER package specification

```
CREATE OR REPLACE PACKAGE EMP_FETCHER AS
 FUNCTION GET_EMP(EMP_NO IN NUMBER) RETURN EMP_REC;
END;
```

code LISTING 3: Script for creating the EMP_FETCHER package body

```
CREATE OR REPLACE PACKAGE BODY EMP_FETCHER AS
 FUNCTION GET_EMP(EMP_NO IN NUMBER) RETURN EMP_REC IS EMP_FOUND EMPLOYEES % ROWTYPE;
 EMP_RTN EMP_REC;
 BEGIN
  SELECT *
  INTO EMP_FOUND
  FROM EMPLOYEES
  WHERE EMPLOYEES.EMPLOYEE_ID = EMP_NO;
  EMP_RTN := EMP_REC(EMP_FOUND.EMPLOYEE_ID,
             EMP_FOUND.LAST_NAME,
             EMP_FOUND.JOB_ID,
             EMP_FOUND.MANAGER_ID,
             EMP_FOUND.HIRE_DATE,
             EMP_FOUND.SALARY,
             EMP_FOUND.COMMISSION_PCT,
             EMP_FOUND.DEPARTMENT_ID);
  RETURN EMP_RTN;
 END;
END;
```

5. Press F5 (or click the **Run Script** button) to create the EMP_REC object type.

6. Click the **Clear** button or press Ctrl-D to clear the **Enter SQL Statement** text box.

7. Create the package specification and body, respectively, by entering the code in Listings 2 and 3 into the **Enter SQL Statement** text box and running the script for each. (Another way to create a new package is to expand the **HR_ORCL** node in the Connections Navigator, select **Packages**, and right-click to invoke the **New Package**… menu.)

To see the new package in the Connections Navigator, expand the **HR_ORCL** node and then expand the **Packages** node. Figure 1 shows the SQL worksheet and the Connections Navigator as they should look after you complete the preceding steps.

RUNNING PL/SQL PROCEDURES, FUNCTIONS, AND PACKAGES

To run any PL/SQL procedure, function, or package, you select the object in the Connections Navigator, right-click, and

select **Run**. Now run the EMP_FETCHER package. The Run PL/SQL dialog box, displaying an anonymous PL/SQL block and a return value, appears. You'll see this dialog box whenever you run any PL/SQL in Oracle SQL Developer. It shows details about the arguments—and, for functions, return values—for the selected object. If the selected object is a package, the dialog box will display a list of the procedures and functions defined in the package specification. You can select one of these procedures or functions as the target you want to run.

In the PL/SQL block, change `EMP_NO := NULL;` to `EMP_NO := 201;` and click **OK**. In your **EMPLOYEES** table, 201 is an existing employee, so the package executes and completes with minimal feedback. For comparison, run the package again for `EMP_NO := 2001;` (a nonexistent employee). On completion, you should see a "no data found" error message.

In this example, the function retrieves information that a procedure could use. You can use the anonymous block in the Run PL/SQL dialog box to see that detail. The block contains the lines

```
-- Modify the code to output the variable
-- DBMS_OUTPUT.PUT_LINE('v_Return
= ' || v_Return);
```

By uncommenting and modifying the second of these two lines, you can display the output. The function returns a record, or set of elements, so you must specify which value(s) you want to output. You can select from all the values in the record. This example uses the LAST_NAME, HIRE_DATE, and SALARY values. Expand the **Types** node in the Connections Navigator, and select **EMP_REC.** Review the code. Return to the EMP_FETCHER package, and run it again. Change `EMP_NO := 2001` back to `EMP_NO := 201.` Then replace the line

```
--DBMS_OUTPUT.PUT_LINE('v_Return
= ' || v_Return);
```

with

```
DBMS_OUTPUT.PUT_LINE('Employee '||
emp_no || ' is ' || v_return.LAST_NAME);
```

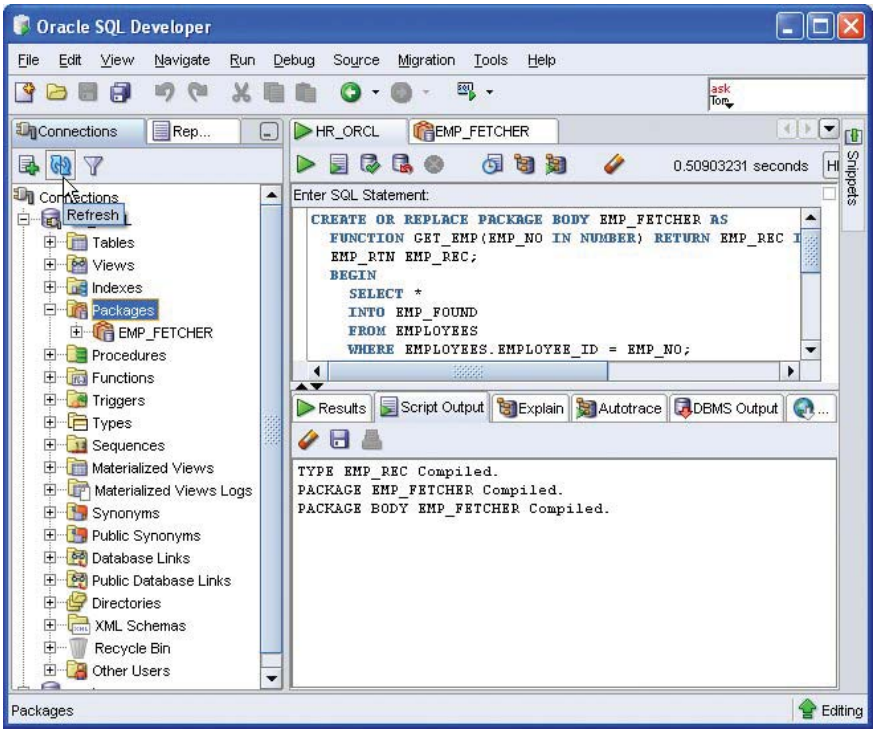

Figure 1: Connections Navigator and SQL worksheet

```
DBMS_OUTPUT.PUT_LINE('Hired on the
'|| v_return.HIRE_DATE || ' and earns '||
v_return.salary);
```

Click **OK,** and view the output in the Running – Log window.

EDITING AND COMPILING PL/SQL

To open Oracle PL/SQL Code Editor, expand the EMP_FETCHER package in the Connections Navigator and double-click the **EMP_FETCHER Body** node to open two new tabs. The first tab, which is read-only, is easily identifiable by a series of tabs along its top. The second tab is the code editor.

Oracle SQL Developer's Code Insight feature includes both Parameter Insight and Completion Insight. Parameter Insight displays a context-sensitive pop-up menu that provides you with a list of procedures or functions in a package. Completion Insight displays a context-sensitive pop-up menu that provides you with a list of possible completions at the insertion point, which you can use to autocomplete the code you are editing in either the code editor or the SQL worksheet. By default, if you type a period (.) and pause for more than one second, Completion Insight is invoked automatically. (You can change the delay time by setting a preference.) To invoke it manually, press Ctrl-space. To try Completion Insight, type `SELECT HR.` in Oracle PL/SQL Code Editor and then pause. Completion Insight provides a pop-up menu that displays all the objects HR owns. Click an object in the list to add it to your code at the insertion point.

Possibly more useful is a narrowed-down insight search, such as for the table alias. Type

```
SELECT  FROM EMPLOYEES e
```

in the code editor. Then type `e` in the space between `SELECT` and `FROM` and press Ctrl-space. After a pause, a list of the columns in the **EMPLOYEES** table pops up.

A full discussion of Oracle SQL Developer's editing features would be too extensive for this space. I encourage you to experiment with Code Insight and other Oracle PL/SQL Code Editor features, such as parenthesis matching

(click on a set of parentheses, and note the highlighting), before compiling your code.

When you're ready to compile, click the **Compile** button or press Ctrl-Shift-F9. Any compilation errors display in the Compiler-Log window. Double-click on errors to navigate to the error source.

DEBUGGING PL/SQL CODE

Even if your PL/SQL code compiles successfully and runs, it might not perform exactly as you want it to. This is when you need to start debugging.

To debug any code, you must set one or more breakpoints and then select **Compile for Debug.** This compiles the PL/SQL with PL/SQL library units for debugging. If you then run the code in debug mode, it runs to the first breakpoint. Breakpoints are customizable; for example, you can associate breakpoints with any unhandled exception or with specific Oracle Database exceptions. (If you are debugging PL/SQL in a database version prior to Oracle9*i* Database Release 2, you must set the **Migration -> PL/SQL Debugger** preference to **Use Probe Debugger to debug PL/SQL.**)

Oracle SQL Developer's main debugging features let you control your program's execution. For example, you can *step into* each line of code or *step over* a procedure or function. Oracle SQL Developer displays the values of variables and data as you step though the code. Stepping over code is useful when you're debugging a procedure that calls a function. You don't necessarily want to go through all the lines of code in the function, so you step over it and back into the troublesome procedure.

LOCAL AND REMOTE DEBUGGING WITH ORACLE SQL DEVELOPER

Using Oracle SQL Developer to debug PL/SQL *locally* means that you select and connect to the PL/SQL program unit by using the SQL Developer Connections Navigator. You set the breakpoint where you want the debugger to pause, and then you click the **Debug** button. Oracle SQL Developer starts the debugging session, connects to it, and pauses when the breakpoint is reached. With local debugging, Oracle SQL Developer is the client that initiates debugging.

Remotely debugging PL/SQL with Oracle SQL Developer means that you initiate the debug action from a client external to Oracle SQL Developer. External clients include PL/SQL Web applications, Oracle Application Express applications, and SQL*Plus sessions. Remote debugging requires some manual steps: starting the Oracle SQL Developer debugger listener and attaching to that listener via the database session you want to debug. (Remote debugging is not available for databases prior to Oracle9*i* Database Release 2.)

The following steps walk through an example of remote session debugging:

1. In Oracle SQL Developer, set up a connection to the database where the PL/SQL is resident. Use the same HR_ORCL connection and EMP_FETCHER package you used earlier.

2. Select the **HR_ORCL** connection in the Connections Navigator, and then right-click and select **Remote Debug**. This invokes the Listen for JPDA dialog box.

3. Enter a port and the IP address for the server. You should now see a new Run Manager window displaying the Debug Listener host information. (You can set **Tools -> Preferences -> Debugger -> Prompt for Debugger Host for Database Debugging** when connecting across firewalls or virtual private network [VPN] sessions.)

4. In the Connections Navigator, select the **EMP_FETCHER** package body, and then right-click and select **Edit…** to open Oracle PL/SQL Code Editor. Click in the left margin next to FUNCTION GET_EMP… to set a breakpoint.

5. Click **Compile for Debug.**

6. You are now ready to start the remote debugging process from Oracle SQL Developer's perspective. You need to get the external client—in this case SQL*Plus—ready. Start a SQL*Plus session for the same database user, and enter the following, substituting the IP address and port you used when you started the remote connection from Oracle SQL Developer:

```
exec DBMS_DEBUG_JDWP.CONNECT_TCP
('127.0.0.1', 4000)
```

7. In SQL*Plus, use an anonymous block to call the function:

```
DECLARE
 EMP_NO NUMBER;
 v_Return HR.EMP_REC;
BEGIN
 v_Return := EMP_FETCHER.GET_EMP(201);
END;
/
```

8. Control now passes to Oracle SQL Developer, and you can step through the code. The process at this point is the same for remote debugging as for local debugging.

The online version of this column, at otn.oracle.com/oramag/oracle/07-nov/o67sql.html, concludes with information about the different windows and editors used for debugging.

CONCLUSION

With Oracle SQL Developer, you can browse and edit database objects, query data, and run reports. One of the useful features in Oracle SQL Developer is its ability to edit, compile, run, and debug PL/SQL. Oracle SQL Developer supports both local and remote debugging; the remote-debugging capabilities let you kick off PL/SQL debugging sessions inside Oracle SQL Developer from external clients (such as SQL*Plus). ■

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BY TOM KYTE

More on Oracle Database 11*g*

Our technologist takes another look at Oracle Database 11*g*.

Last issue, I wrote about some new Oracle Database 11*g* features, and I continue that coverage in this issue, focusing on my favorite procedural language, PL/SQL. PL/SQL is a competent language. In my book *Effective Oracle by Design*, I wrote:

PL/SQL is Oracle's procedural extension to SQL, and it is a true 3GL programming language. It was first introduced way back in version 6 of the database, giving us the ability to code "anonymous blocks" in our client applications and submit them for processing on the database. In Oracle6, there were no stored procedures, no packages, and no triggers. The ability to store PL/SQL in the database came with version 7 in 1992.

Today, PL/SQL is competent, mature, and full-featured, offering everything you expect to find in a 3GL programming language. In general, I find that PL/SQL is underused in Oracle applications and rarely exploited to its full potential.

That was written when Oracle9*i* Database Release 2 was just going into production—three major releases ago—and it still rings true today. I can honestly say that Oracle Database 11*g* makes PL/SQL an even more compelling language, and in this issue, I take a look at some of the reasons why.

code LISTING 1: Query on USER_IDENTIFIERS view

```
SQL> select name, type, usage, line
  2    from user_identifiers
  3   where object_name= 'RUNSTATS_PKG'
  4     and object_type= 'PACKAGE BODY'
  5   order by name, type, line
  6   /

NAME                           TYPE            USAGE           LINE
------------------------------ --------------- ----------- ------
DBMS_OUTPUT                    SYNONYM         REFERENCE       35
DBMS_OUTPUT                    SYNONYM         REFERENCE       37
DBMS_OUTPUT                    SYNONYM         REFERENCE       41
DBMS_OUTPUT                    SYNONYM         REFERENCE       45
DBMS_OUTPUT                    SYNONYM         REFERENCE       50
 ⋮
G_START                        VARIABLE        DECLARATION      4
G_START                        VARIABLE        ASSIGNMENT      16
G_START                        VARIABLE        REFERENCE       22
G_START                        VARIABLE        ASSIGNMENT      26
G_START                        VARIABLE        REFERENCE       33
P_DIFFERENCE_THRESHOLD         FORMAL IN       ASSIGNMENT      30
P_DIFFERENCE_THRESHOLD         FORMAL IN       DECLARATION     30
P_DIFFERENCE_THRESHOLD         FORMAL IN       REFERENCE       67
RS_MIDDLE                      PROCEDURE       DEFINITION      19
RS_START                       PROCEDURE       DEFINITION       8
RS_STOP                        PROCEDURE       DEFINITION      30
RUNSTATS_PKG                   PACKAGE         DEFINITION       1
X                              ITERATOR        DECLARATION     54
X                              ITERATOR        REFERENCE       70
X                              ITERATOR        DECLARATION     80
X                              ITERATOR        REFERENCE       96

39 rows selected.
```

NOW, WHERE DID I LEAVE MY KEYS?

Have you ever inherited someone else's code? It is a lot like misplacing your keys: annoying. And it is always fully commented, well designed, modular, and easy to understand, right? No, in fact, the opposite is typically true. So you have a couple thousand lines of inherited code, and you need to understand, fix, and enhance it. That is a job easier said than done, but an important new compile option for PL/SQL makes the "understand" component of your task much easier. This new compile option is called PL/Scope, and the documentation describes it this way:

PL/Scope is a compiler-driven tool that collects data about user-defined identifiers from PL/SQL source code at program-unit compilation time and makes it available in static data dictionary views. The collected data includes information about identifier types, usages (declaration, definition, reference, call, and assignment), and the location of each usage in the source code.

That is a fancy way of saying that all of your variables, procedures, functions, and so on are extracted from the code and made visible in a database table for you (or some tool) to query. I believe that seeing an example is the easiest way to understand something, so a quick demonstration is called for. First, I need to enable this feature, and I do that via a session-settable PLSCOPE_SETTINGS parameter:

```
SQL> alter session set
  2   PLSCOPE_SETTINGS =
  3  'identifiers:all'
  4   /
Session altered.
```

That enables the compiler feature

that will extract and store this additional information. The other (default) setting for PLSCOPE_SETTINGS is `identifiers:none`, which disables this collection feature.

Now, once that setting is enabled, any code compiled in that session will have its identifiers extracted and stored in a set of data dictionary tables, exposed via views—including USER_IDENTIFIERS and USER_SOURCE—for my use. So the next thing I need to do is compile some code; for testing, I used my RUNSTATS package (asktom.oracle.com/tkyte/runstats.html). After compiling the package, I was able to run the query in Listing 1.

The listing shows me all referenced identifiers (the package DBMS_OUTPUT that I invoke many times, for example) as well as all local, global, and parameter variables in my code. It shows me not only the variables but also how they are used, where they are defined, where I reference them, and where I assign to them. Taking this one step further, I can run the query in Listing 2.

Note how I can focus right in on where and how the G_START variable is used.

By itself, this new feature is really cool, but it will be even more useful when the tools I use to access the database become aware of it. Fortunately, I don't have to wait long—not at all, really—because Oracle SQL Developer is already aware of this new capability. I had Kris Rice, the director of development for Oracle SQL Developer, do exactly what I just demonstrated, only by using Oracle SQL Developer, instead of SQL*Plus, as the front end. In 15 seconds, he did what took me a bit of time and SQL to accomplish. Figure 1 shows his results. So, with the PLScope Identifier Lookup, just by clicking a line in the right pane of Oracle SQL Developer, you can go right to the source code in the left pane, and the pop-up bubble help displays the relevant information as you hover over the line.

For more information on this feature and how to use PL/Scope in its entirety (I've just touched on the capabilities here!), see chapter 8 of *Oracle Database Advanced Application Developer's Guide 11g Release 1*.

codeLISTING 2: Query on USER_IDENTIFIERS and USER_SOURCE

```
SQL> select a.line, a.usage,
  2       b.text
  3     from user_identifiers a,
  4       user_source b
  5   where a.line = b.line
  6     and b.name = a.object_name
  7     and b.type = a.object_type
  8     and a.object_name= 'RUNSTATS_PKG'
  9     and a.object_type= 'PACKAGE BODY'
 10     and a.name  = 'G_START'
 11   /

    LINE  USAGE          TEXT
_______  _____________  ____________________________________

       4  DECLARATION    g_start number;
      16  ASSIGNMENT     g_start := dbms_utility.get_time;
      22  REFERENCE      g_run1 := (dbms_utility.get_time-g_start);
      26  ASSIGNMENT     g_start := dbms_utility.get_time;
      33  REFERENCE      g_run2 := (dbms_utility.get_time-g_start);
```

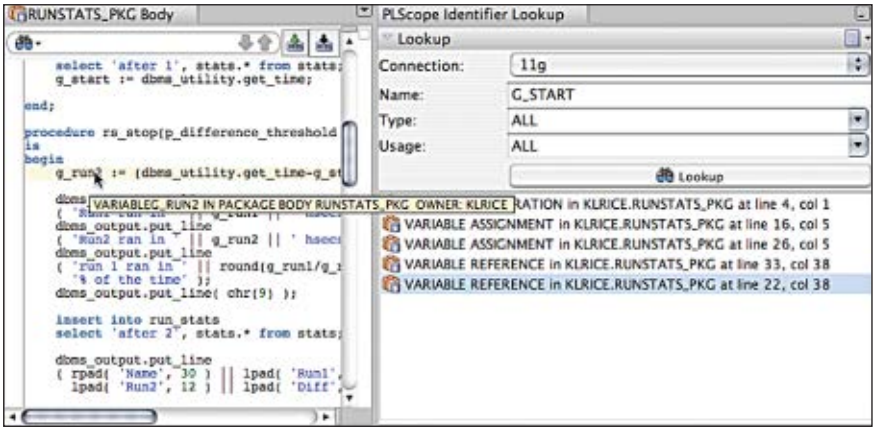

Figure 1: Oracle SQL Developer PLScope Identifier Lookup

IMPROVED DYNAMIC SQL

PL/SQL has supported dynamic SQL for a long time—since Oracle 7, in fact. Early releases provided support for dynamic SQL in PL/SQL via the DBMS_SQL built-in package. Later, with Oracle8*i* Database Release 1, PL/SQL added native dynamic SQL, which enabled us to dynamically open REF CURSORS and execute arbitrary SQL. At that time, many people said, "DBMS_SQL is dead; native dynamic SQL is so much easier that no one will ever use DBMS_SQL."

Well, that turned out not to be the case—for many reasons. First, to use native dynamic SQL, you needed to know at compile time the number of inputs (bind variables) to the SQL being executed as well as the number of types of the outputs. But that frequently defeated the purpose of dynamic SQL, because often you do not know the number of inputs and outputs (let alone their datatypes) at compile time—the SQL isn't known until runtime. When that is the case, REF CURSORS are not very useful but DBMS_SQL—with its procedural API approach—is.

So DBMS_SQL still lives. For example, a popular download from AskTom is my DUMP_CSV routine (asktom.oracle.com/tkyte/dump_csv.html). It takes a SQL statement (not a cursor, but a query in a string) as input and produces a comma-delimited

file as output. This is something that would be impossible to do in PL/SQL with a REF CURSOR in Oracle Database 10g and earlier releases, because PL/SQL would not and could not know the number of items in the select list.

But DBMS_SQL is somewhat limiting—it is designed purely for PL/SQL, not for client applications. In fact, if you use PL/SQL to open a cursor with DBMS_SQL and return it to a client application, there is nothing that client application can do with the cursor except send it back to PL/SQL for processing. Additionally, if you have an existing stored procedure that returns a REF CURSOR to a client application and you try to call that from a PL/SQL routine, you'll likely find that the PL/SQL routine is not able to make heads or tails of the REF CURSOR—because PL/SQL needs to know the number and types of outputs at compile time.

Well, in Oracle Database 11g Release 1, these limitations are removed. Two new functions have been added to the DBMS_SQL package:

- **DBMS_SQL.TO_NUMBER_CURSOR** takes a REF CURSOR as input and returns a DBMS_SQL-friendly cursor handle that can be used in any call to DBMS_SQL—as if DBMS_SQL had created the cursor itself.
- **DBMS_SQL.TO_REFCURSOR** takes a DBMS_SQL cursor handle as input and returns a REF CURSOR suitable for returning to a client application.

This greatly extends the use cases of DBMS_SQL for PL/SQL—especially in environments such as Oracle Application Express. One of the issues with Oracle Application Express in the past was that the environment demanded that you use DBMS_SQL cursors so that it could procedurally process the results. Because Oracle Application Express is written in PL/SQL, REF CURSORS would not work in the past. But that meant that if you had already written stored procedures that returned result sets, repurposing them in an Oracle Application Express environment was difficult, if not impossible, because these stored procedures would have been returning REF CURSORS to existing client applications. Vice versa, if you wrote an Oracle Application Express application, you would find having a Java client access the stored procedures you wrote for Oracle Application Express to be cumbersome at best, because the stored procedures you wrote would be returning DBMS_SQL cursors, not REF CURSORS.

In Oracle Database 11g, this is no longer a problem. We can convert easily and rapidly between the two cursor types now. By way of example, let's look at the DUMP_CSV routine referenced above. I won't reproduce all of the code here, but I will show the interface to it:

```
create or replace
function dump_csv(
   p_query      in varchar2,
   p_separator  in varchar2 default ',',
   p_dir        in varchar2 ,
   p_filename   in varchar2 )
return number
AUTHID CURRENT_USER
is
 ⋮
```

codeLISTING 3: Calling DUMP_CSV routine

```
SQL> create or replace directory TMP as '/tmp'
  2  /

Directory created.

SQL> declare
  2    l_rows  number;
  3  begin
  4    l_rows := dump_csv( 'select *
  5                           from all_users
  6                          where rownum < 5',
  7                         ',', 'TMP', 'test.dat' );
  8  end;
  9  /

PL/SQL procedure successfully completed.

SQL> !cat /tmp/test.dat
SYS,0,05-JUN-07
SYSTEM,5,05-JUN-07
OUTLN,9,05-JUN-07
DIP,13,05-JUN-07
```

codeLISTING 4: New UNLOAD package specification

```
SQL> create or replace package unload
  2  as
  3  function csv
  4  ( p_query      in out sys_refcursor,
  5    p_separator  in varchar2 default ',',
  6    p_dir        in varchar2 ,
  7    p_filename   in varchar2 )
  8  return number;
  9  function csv
 10  ( p_query      in out integer,
 11    p_separator  in varchar2 default ',',
 12    p_dir        in varchar2 ,
 13    p_filename   in varchar2 )
 14  return number;
 15  function csv
 16  ( p_query      in varchar2,
 17    p_separator  in varchar2 default ',',
 18    p_dir        in varchar2 ,
 19    p_filename   in varchar2 )
 20  return number;
 21  end;
 22  /
Package created.
```

And you might call the routine as shown in Listing 3.

Now, what if you wanted to call this by using a REF CURSOR as input? To use a REF CURSOR, DUMP_CSV needs to know how many columns the SELECT statement fetches *at compile time*, because the syntax for fetching from a REF CURSOR is

```
fetch ref_cursor into host_variable1,
host_variable2, ..., host_variableN;
```

But this generic utility cannot do that—it cannot fetch into a fixed number of columns, because the query might select 5 columns one time and 500 columns the next. That is why I used a string in the past—so I could open it with DBMS_SQL and process it. Now that we can convert a REF CURSOR into a DBMS_SQL cursor and back, we can utilize REF CURSORS (or DBMS_SQL cursors). Listing 4 shows the revised interface, and it uses a package (called UNLOAD) so we can overload the function to accept a query in a string; an opened REF CURSOR; or an opened, executed DBMS_SQL cursor type.

So now we have an API that supports three different invocations for the query—a string; an opened REF CURSOR; and an opened, executed DBMS_SQL cursor. The advantage of the REF CURSOR input is that it allows a PL/SQL routine to easily open a cursor by using bind variables (and that is a good thing) or reuse an existing routine that returns a result set and repurpose that result set (unloading it, instead of doing whatever the original client application used to do with it).

The modifications to the generic code referenced above (the DUMP_CSV routine) were minor. Basically, all I did was remove the DBMS_SQL.OPEN_CURSOR call and the DBMS_SQL.PARSE/EXECUTE calls. That was it—none of the remaining code was modified. The routine accepted the DBMS_SQL cursor (instead of a string) as input and instead of calling OPEN_CURSOR, PARSE, and EXECUTE, it

code LISTING 5: CSV function, SYS_REFCURSOR variant

```
SQL>
     ⋮
 4  function csv
 5  ( p_query in out sys_refcursor,
 6    p_separator  in varchar2 default ' , ' ,
 7    p_dir        in varchar2 ,
 8    p_filename   in varchar2 )
 9  return number
10  is
11     l_cursor integer :=  dbms_sql.to_cursor_number(p_query);
12  begin
13     return csv( l_cursor, p_separator, p_dir,p_filename);
14  end;
```

code LISTING 6: CSV function, DBMS_SQL cursor variant

```
SQL>
     ⋮
16  function csv
17  ( p_query       in varchar2,
18    p_separator   in varchar2 default ' , ' ,
19    p_dir         in varchar2 ,
20    p_filename    in varchar2 )
21  return number
22  as
23     l_theCursor    integer default dbms_sql.open_cursor;
24     l_status       number;
25  begin
26     dbms_sql.parse(  l_theCursor,  p_query, dbms_sql.native );
27     l_status := dbms_sql.execute(  l_theCursor );
28     return csv( l_theCursor, p_separator, p_dir, p_filename );
29  end;
```

code LISTING 7: Invoking UNLOAD.CSV

```
SQL> declare
  2     l_rows  number;
  3     l_cursor sys_refcursor;
  4   begin
  5      open l_cursor
  6      for
  7      select *
  8        from all_users
  9       where rownum < 5;
 10
 11     l_rows := unload.csv
 12               ( l_cursor, ' , ' ,
 13                 'TMP', 'test.dat' );
 14
 15     l_rows := unload.csv
 16               ( 'select rownum, sysdate
 17                    from dual',
 18                ' , ' , 'TMP', 'dual.dat' );
 19   end;
 20   /

PL/SQL procedure successfully completed.

SQL> !cat /tmp/test.dat
SYS,0,05-JUN-07
SYSTEM,5,05-JUN-07
OUTLN,9,05-JUN-07
DIP,13,05-JUN-07

SQL> !cat /tmp/dual.dat
1,26-JUL-07
```

will process whatever cursor was sent to it as before. So the last version of the CSV function above (defined in lines 10 through 13 in Listing 4) will be implemented in the package body by use of the existing code, minus the OPEN_CURSOR, PARSE, and EXECUTE calls.

The other two variants of the CSV function above were fairly simple to implement. Listing 5 shows the SYS_REFCURSOR variant.

As you can see, all I need to do here is convert the SYS_REFCURSOR into a DBMS_SQL cursor and invoke the original code (minus the OPEN_CURSOR, PARSE, and EXECUTE calls). The second variant of the CSV function was a little more involved but really was the result of the code I removed. I just cut and pasted it, as shown in Listing 6.

So, the OPEN_CURSOR, PARSE, and EXECUTE calls I removed from the original DUMP_CSV routine just got moved, not really removed. I open the query in the string, "execute" it (that really opens it and gets the result set ready for processing), and then pass it on.

Now I can invoke our routine by using three methods: string, using a DBMS_SQL cursor, or using a REF CURSOR. Listing 7 shows an example for invoking the routine.

In addition to this nice enhancement for dynamic SQL, we also have the following enhancements in Oracle Database 11*g*:

- DBMS_SQL.PARSE allows for a CLOB, and the 32K limit that applied before on the length of a SQL string has been removed.
- Native dynamic SQL permits statements of any length via a CLOB.
- DBMS_SQL now supports binding of object types in addition to the scalar types it always supported. ■

Tom Kyte *has worked for Oracle since 1993. He is a database evangelist in Oracle's Server Technology division and the author of* Expert Oracle Database Architecture: 9*i* and 10*g* Programming Techniques and Solutions *(Apress, 2005) and* Effective Oracle by Design *(Oracle Press, 2003), among others.*

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BY ARI KAPLAN

A Place for Everything

Oracle's free ILM Assistant helps enterprises implement cost savings.

Finding the storage necessary for corporate data is a continuous problem. An Independent Oracle Users Group (IOUG) survey indicates that 92 percent of respondents anticipate that their database storage needs will increase in 2007, and 64 percent say they'll increase spending on storage to meet those needs.

In part, storage needs have increased because companies need to retain data for long periods to satisfy compliance requirements such as Sarbanes-Oxley and HIPAA. In addition, many companies routinely preserve e-mail and other data as a defense against possible lawsuits. While hanging on to all that data could save the day in such a situation, storing it in the meantime is problematic and expensive.

ENTER A SOLUTION

Many companies are finding the solution to this dilemma in the practice of information lifecycle management (ILM). I applied ILM principles to a large insurance company client, which had more than 300 applications, about 200 Oracle databases, and nearly 100 data centers—and major compliance issues, as you might guess. Using ILM approaches, the insurance company retained the data it needed to satisfy legal requirements, while significantly reducing the overall cost of storage.

The basic idea of ILM is to manage data actively throughout its lifecycle. In particular, you want to choose the most appropriate storage solution for your data at each point in its lifecycle. For example, you might want to keep a recent e-mail (or transaction) readily accessible for, say, 30 days so that you can use it. After that, you might want it somewhat accessible for another 60 days, just in case. Beyond that, you probably don't want it clogging up your system, although you might be unwilling to throw it away.

The solution to this situation is to design several tiers of storage. Tier A might consist of fast and roomy hard drives, which are expensive. Tier B might be hard drives that are slower and smaller but inexpensive. Tier C might be bulk storage, such as a tape drive library or, increasingly, low-cost Serial Advanced Technology Attachment (SATA) disks.

Once you establish these tiers of storage options, you assign data to each one. Must-have data goes on tier A, nice-to-have data moves to tier B, and don't-care data gets dumped onto tier C. You set up a mechanism—automatic is the goal, but possibly manual—to maintain this arrangement, moving aging data from one tier to another and defining and enforcing compliance policies. For its lifetime, then, the data will migrate between the data tiers, and access to it will be controlled. Eventually the data may be archived, or it can remain inside the database forever.

The potential cost savings of this strategy is amazing. Typically, tier A hard drives cost 5 to 10 times more (per GB) than tier B hard drives and up to 50 to 100 times more than bulk tier C storage. In one study, a company moved nearly all of its data from US$72/GB hard drives to a US$4/GB online archive, reducing its storage costs by 94 percent.

This practice does not discard necessary data. If a file is needed to meet compliance requirements or to satisfy discovery in a lawsuit, you can still access it. So ILM saves money while also supporting your company's compliance strategies.

ILM becomes more complicated with databases. You must ensure that applications can find data, no matter where it is physically located. In addition, you don't want to degrade database performance. Several Oracle Database characteristics facilitate an ILM solution: it's fine-grained, has enforceable compliance policies, has application transparency, and is low-cost.

Oracle offers a tool to help with the complexity. Oracle ILM Assistant is GUI-based software that can create lifecycle definitions; advise you on when to move or delete data, based on those definitions; display the storage requirements—and cost savings—for a given ILM plan; suggest how to partition a table based on your lifecycle definitions; provide underlying technology such as triggers; and simulate events on a table as if it were partitioned. Oracle ILM Assistant itself does not make any physical changes to your database. But it does generate scripts so that you can perform the necessary tasks when you're ready. And it's free.

ILM is a practice that's gaining acceptance in the marketplace because of its proven cost savings. Using Oracle ILM Assistant can make it easier to finally have the right place for everything. ■

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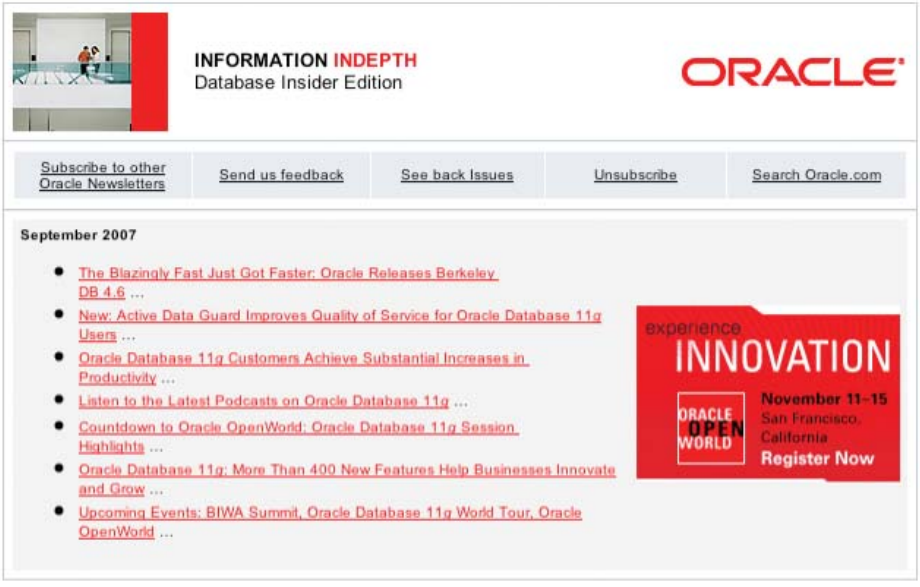

ORACLE

BY MARY ANN DAVIDSON

The Future Is Now

More security automation means less finger lifting.

I just watched a replay of the Oracle Database 11*g* launch, and it made me think of the old cartoon *The Jetsons* (hear me out, please). In the futuristic world of the Jetsons, there was a mechanical gadget to automate everything—you hardly had to lift a finger in your daily business (and if you did, there was probably an automatic finger-lifter). As described at the launch, Oracle Database 11*g*, across the board, enables automation of many tasks that have, to date, been manual and highly repetitive, and security is positively affected in a number of ways. For one thing, while security is hardly the tail that wags the IT dog, any organization that can do better work faster or with fewer people can use those savings on something else—such as better security. Automation also helps reduce risks introduced by human error.

For example, there has never been an easy way to upgrade mission-critical systems, because organizations always need to thoroughly test upgrades or patches in their own environments (on top of the tests Oracle does, that is). To date, customer testing has been both labor- and time-intensive. In Oracle Database 11*g*, however, Oracle Real Application Testing enables companies to capture transactions (for example, over an entire day) and then use that "typical day" for testing. One description of Oracle Real Application Testing is "a DVD recorder for your applications." I suspect that it will be particularly useful for security patching, since many organizations are pressed—by their own formal security policies or their auditors—to apply security patches quickly. Automated testing will save time and money and will help everyone maintain a strong security posture more effectively.

What also strikes me about the Oracle Database 11*g* launch: the option and product releases *before* the launch. Oracle has released a number of innovative database security options, products, and features over the last two years, including Oracle Database Vault and Oracle Audit Vault. These two offerings were so important that Oracle did not wait for the Oracle Database 11*g* release; instead, Oracle shipped them when they were ready for market.

MORPHING SECURITY

For the longest time, everyone accepted the security model that database administrators have unlimited privileges. Between the amount of information stored in databases and an increased regulatory environment, that security model no longer works. Oracle Database Vault enables organizations to separate managing the nuts and bolts of a database from accessing the data contained in them.

Organizations have also come to expect that the audit kahuna will be someone other than the database administrator. Oracle Audit Vault is the answer to the age-old question: *Quis custodiet ipsos custodes?* (Who watches the watchmen?) Even changes to Oracle Database Vault settings can be captured and managed in Oracle Audit Vault.

One of the things that I like about Oracle Database 11*g* is that I see Oracle trying to solve some of the hard security problems in a way that is easy to use. For example, encryption of stored data has always been difficult, because key management is just so darn hard. Who manages the keys? Where are they stored? If you store the key in a place that is too easily accessible, there goes your encryption. Oracle Database 11*g* supports hardware security modules (a good thing: hardware is generally a better secret key keeper than software). Also, if you are encrypting data to add that extra "virtual Kevlar" to personally identifiable information (PII), you can now encrypt the entire *megillah* if it lives together in one big, happy tablespace. Let's face it: encrypting address separately from credit card number separately from name is too much work, not to mention being computationally intensive.

I think that anytime you can morph security to reflect new realities—such as "multiple people have to manage security now" and "make it easy for us to do good security," you've helped your customers do more with less. Oracle Database 11*g*, Oracle Database Vault, and Oracle Audit Vault reflect new security realities, and the resulting better security and easier administration mean that some repetitive finger lifting previously required for security can be directed to other, more-strategic tasks. Because in security or anything else, nobody ever complains that they have too many people and not enough to do. ■

Mary Ann Davidson *is the chief security officer at Oracle, responsible for secure development practice, security evaluations, and assessments. She represents Oracle on the board of directors of the Information Technology Information Security Analysis Center (IT-ISAC) and the Defense Science Board and is on the editorial review board of* SC Magazine.

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BY DAVID BAUM

Design for People, Build for Change

SOA and Web 2.0 deliver greater enterprise flexibility.

Oracle Magazine spoke with John R. Rymer, vice president and senior analyst at Forrester Research, about how service-oriented architecture (SOA) and Web 2.0 are enhancing business applications.

Oracle Magazine: What is SOA, and why is it so important for today's businesses?

Rymer: SOA is a set of ideas or principles. In many ways it's nothing new, when you consider that we've been building distributed applications for nearly 20 years. We've learned a lot along the way, and SOA represents a lot of that knowledge. We've learned that modularity is important. We've learned the importance of having flexible software components that are accessible through well-defined interfaces. We've learned a lot about messaging and how to build applications that operate reliably across network links. SOA embodies the best of these ideas, and it relies on Web services to make distributed applications more accessible and affordable.

Oracle Magazine: How does SOA lay a foundation for Web 2.0?

Rymer: Initially what we had on the internet was pages of information. SOA and Web services protocols let us go beyond this simple paradigm of presenting static information. They enable us to create real applications and conduct transactions over the internet. SOA helps with two key aspects of these applications. First is combining data. A lot of the information that people use today comes from the internet. Other information comes from internal databases, and it often has to be combined with the online information in a meaningful way.

Delivering that information through a Web service insulates the applications that use that information from changes in the surrounding infrastructure. Once we can plug services into social networks, we can evolve them to serve user needs with social metaphors like blogs, wikis, and RSS feeds. Without SOA, Web 2.0 isn't very interesting because the systems are too brittle, too static, so they can't evolve to use these new capabilities. At Forrester, we call it "design for people, build for change." Without SOA, it just doesn't happen.

Oracle Magazine: What's the best way to approach SOA when you're confronted with a legacy environment?

Rymer: Start by identifying valuable information from that legacy and then build either a Web service or a REST [representational state transfer] service that accesses that information and makes it broadly available. Of course, once you start exposing key information through Web services, you'll find that the users want to do more with that information than you initially envisioned. Often they want to use it to drive their own business processes. Thus you need some way of ensuring that the interaction with that Web service proceeds with integrity, that you can handle exceptions, that you can complete secure transactions. You need more automation, and you often need to pull in more than one information source. That's when you look to a BPM [business process management] tool like Oracle BPEL Process Manager, which describes flows of information, sequences, and more-complex workflows.

Oracle Magazine: Application developers have created sequences and process flows before. What's new about BPEL?

Rymer: Earlier integration flows were proprietary and attached to an individual product. What BPEL does, like any other standard, is open up this programming domain to lots of people.

In the context of Web 2.0, we have to recognize some limitations. BPEL was designed to automate system-to-system flows. Human workflow is different. It calls for task lists and forms and versatile ways of interacting with users that don't apply when you are creating system-to-system interfaces.

BPEL is evolving, and within a couple of years it will have these human workflow commands. In the meantime, Oracle and others have created extensions to BPEL to allow people to add human workflow to their applications. [Oracle Business Process Analysis Suite includes these process components: Business Process Architect, Business Process Repository, Business Process Simulator, and Business Process Publisher.]

Oracle Magazine: Can you bring this to life with a Web 2.0 example?

Rymer: Imagine how a law firm or construction company could create a social network like LinkedIn to organize contacts and connections. This could be a great way to match resources and skills to the needs of each project, or to pull together a team quickly to respond to a Request for Proposal. We're beginning to understand how to apply these ideas to business. ■

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Forrester Research (www.forrester.com) is an independent technology and market research company specializing in business and consumer information.

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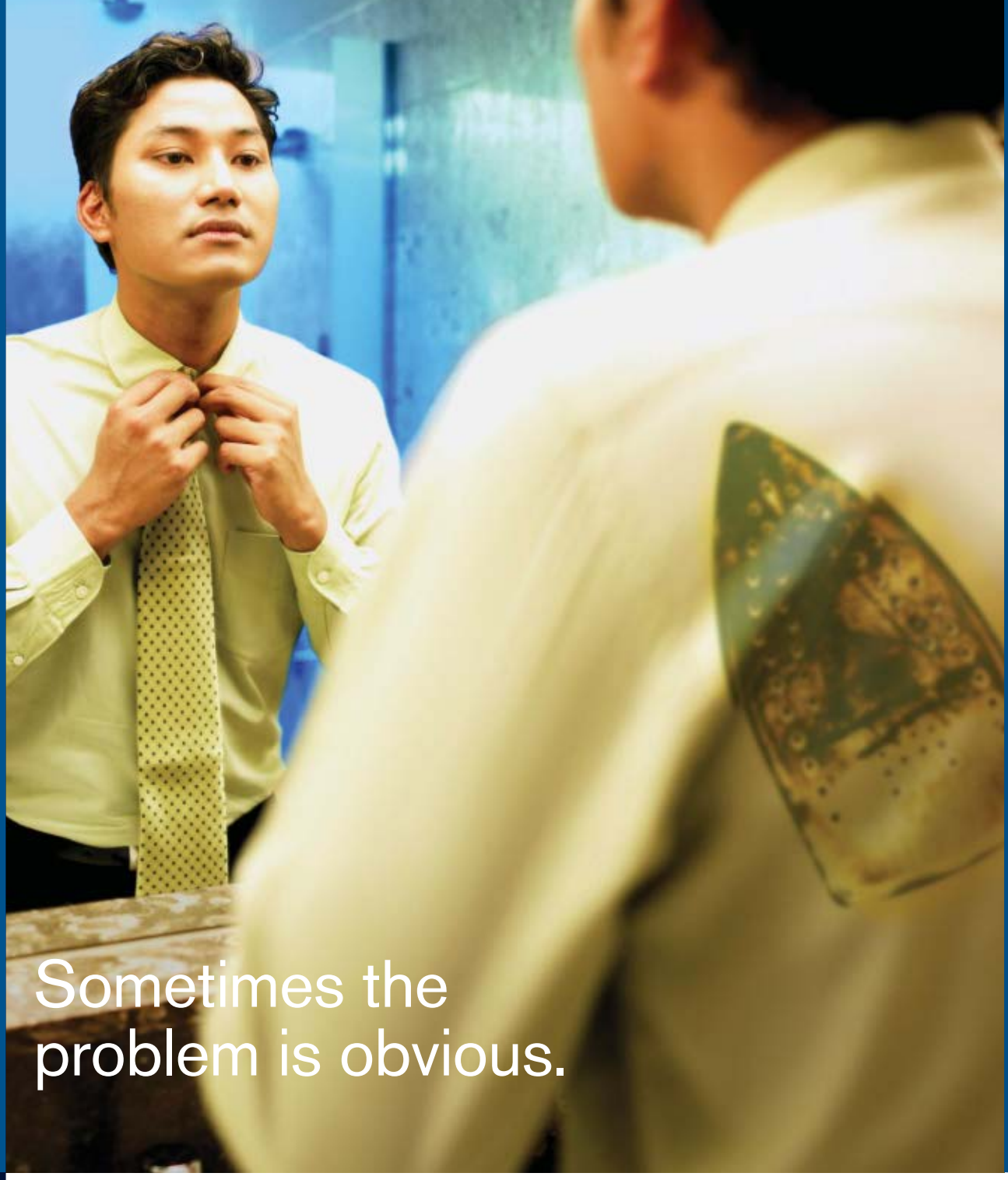

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