Brava, La Scala!

Music, scores, and scenes from Italy's leading opera house are immortalized in a multiterabyte multimedia online archive based on Oracle8.

BY SARA RECORD

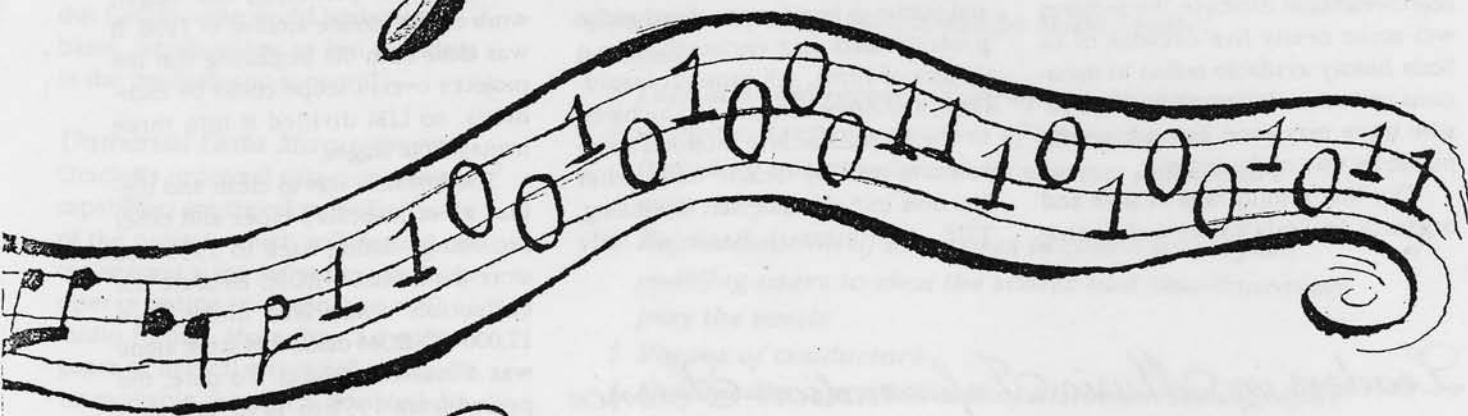**L**IKE PILGRIMS TO A HOLY SHRINE, OPERA LOVERS FROM ALL NATIONS FLOCK TO MILAN'S TEATRO ALLA SCALA. THEY COME FOR THE MUSIC—AND THE MYSTIQUE. FOR INSIDE LA SCALA'S VELVET DARKNESS, AUDIENCES CAN REVEL NOT ONLY IN THE RENOWNED VOICES AND PERFECT ACOUSTICS BUT ALSO IN THE SHEER GLAMOUR OF ONE OF THE WORLD'S OLDEST AND MOST FAMOUS OPERA houses. At La Scala, more than in any other theater, patrons feel themselves to be part of a grand historical tradition—one that began more than 200 years ago and continues unabated to the present day.

Built in 1776 at the behest of Empress Maria Theresa of Austria, La Scala has staged the openings of some of the world's most famous operas, including Bellini's *Norma,* in 1831; Donizetti's *Lucrezia Borgia,* in 1833; Verdi's *Otello,* in 1887, and *Falstaff,* in 1893; and Puccini's *Madama Butterfly,* in 1904, and *Turandot,* in 1926. Closed during World War I and destroyed by Allied bombs in World War II, the theater was reopened in 1920, and again in 1946, largely through the efforts of the great conductor and artistic director Arturo Toscanini.

Today, La Scala is known for the unusual variety of its repertory, which tends to include a large number of relatively unfamiliar works balanced by a limited number of popular favorites. With many leading opera houses focused mainly on filling seats and attracting new attendees through frequent productions of well-known titles, La Scala's insistence on innovation and breadth gives it a position of unique importance in its contributions to the genre.

Musical and Historical Preservation

Given La Scala's exalted place in the cultural pantheon, it's easy to see why the online archive project currently under way at the Laboratorio di Informatica Musicale (LIM) has taken on international importance. The project's goal is nothing less than recovering, restoring, and preserving the musical and historical wealth of La Scala through complete digitization and automation of the theater's recordings, scores, and scenography materials dating back to 1951. Based on an Oracle8 object-relational database, the archives will make nearly five decades of La Scala history available online to musicians and scholars. Someday, this treasure trove may even be open to the public by way of the Internet.

"Our first priority was to save and organize La Scala's enormous patri-mony by creating a systematic database of the entire musical and iconographical heritage of the theater," explains Dr. Fiorenzo Galli, of Fondazione Milano per La Scala, a private organization that supports all the artistic and management activities of the theater. "Eventually, we would like to provide people the world over with the opportunity to savor the quality of this cultural heritage, both electronically and in more-traditional ways."

Galli envisions a broad audience for this project, ranging from the general public to highly specialized music professionals and encompassing a variety of firms, educational institutions, and other theaters and archives.

The La Scala archive project is sponsored in part by Oracle Italy; other sponsors include Andersen Consulting, TDK, Commercial Bank of Italy (COMIT), Hewlett-Packard, and Italy's National Research Center. Oracle donated the software—which includes Oracle8, Oracle Application Server, Developer/2000, Designer/2000, and Personal Oracle—and worked in tandem with Andersen Consulting and LIM to design the databases for the project.

Digitizing Five Decades

With support from Fondazione Milano per la Scala, which lined up sponsors and handled other business and financial planning, LIM began work on the online archive in 1996. It was clear from the beginning that the project's overall scope could be enormous, so LIM divided it into three manageable stages.

The first task was to clean and digitize all of La Scala's tapes and other recordings dating back to 1951 and store them on CD-ROM. Because the collection comprises more than 12,000 CD-ROM discs, this stage alone was a massive project. To date, the period from 1951 to 1996 has been completely transferred and digitized.

The objective for LIM was to recover the operas in their historical integrity, as they were staged by the maestros who originally premiered them. On May 15, 1997, La Scala presented excerpts of its first fully recovered opera, Mozart's *Le Nozze di Figaro (The Marriage of Figaro)*. Arias from the early recordings were played first, followed by the same arias in their cleaned and digitized versions. The process included eliminating extraneous noises evident on the original magnetic recordings and reinstating missing parts; the contrast proved the value of LIM's preservation efforts beyond a shadow of a doubt.

The second stage began in May 1997, when LIM began converting the digitized recordings into an online database known as the Phonic Archive. This Oracle8-based system will potentially enable extensive use and distribution of the recordings via Internet browser and protocol technologies.

According to Professor Goffredo Haus, director of LIM, Oracle8 was the only platform that could enable the laboratory to develop this project.

Leaders in Music Information Science

ounded in 1975, the Laboratorio di Informatica Musicale (LIM) is the pride of the Information Science Department at the University of Milan. In the field of information science applied to music, LIM has attained international recognition for its achievements in the areas of digital sound techniques, multimedia authoring and composition, and hardware/software design and implementation for sounds and musical scores.

The organization's director, Professor Goffredo Haus, was responsible for conceiving the La Scala archive project and presenting a feasibility study to Fondazione Milano per la Scala, a private organization that supports the theater's artistic and management activities. Professor Haus has been involved in music information science for the past 22 years.

LIM is supported by the Italian National Research Council and Beni Culturali Italiani for the preservation of Italy's musical heritage.
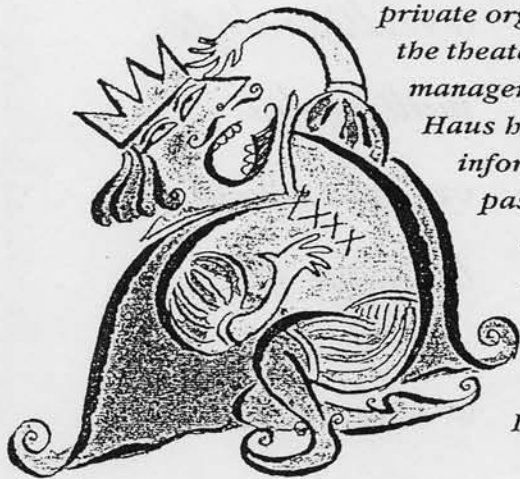
"We chose Oracle8 as the universal management system for our data because it is a multiplatform system and has all the user-friendliness that is needed for the network," he says. "Oracle8 is also a distributed solution and is particularly able to cope with the management of information in all formats, including audio, graphics, and video."

"We evaluated several other object-relational systems, but they did not satisfy our requirements for multiplatform support and the distributed database," adds Dr. Galli. "Also, we know that Oracle is the world leader in databases, which makes us feel confident in the products and support."

Universal Data Management

Oracle8's universal data-management capabilities are critical to the final stage of the project, which will expand on the second stage by putting La Scala operas online in graphic as well as audio format. More than 1.2 million pages of musical scores will eventually be available through a graphical display associated with MIDI, NIFF, and SMDL-ANSI sound codes. This format will enable users to view scores or excerpts while listening to them. The database will also contain a compelling visual history of La Scala, including photos and video clips of conductors, stage settings, and costumes.

"The system is organized around La Scala 'nights,'" explains Dr. Galli. "Each night encompasses the phonic items, score, and other graphical and video items relating to a performance. Our system is unique in its extensive treatment of musical and graphical items, as well as its specific organization systems, cataloging, and browsing functions for audio and scores."

According to Professor Haus, LIM intends to develop and implement a cartridge for Oracle8 that will enable users to perform pattern searches on the database. "They will be able to sing a few bars into a microphone linked to the computer," he explains, "and the search will bring up all the similar pieces of music that are stored within the system." Users will be able to view the graphical musical scores, or excerpts from them, and simultane-

La Scala's Multimedia Archives

racle8 manages the many types of data within the Teatro alla Scala archives. Oracle8's object-relational technology allows it to support complex data types, complex objects, object-oriented programming, and compatibility with the relational-database world.

Its greater scalability, reliability, manageability, and flexibility make it possible to handle the immense amount of information and data in the La Scala project, including:

- Digital-audio recordings of operas and excerpts
- Graphical representations of opera scores, including notations made by various conductors over the years
- Representation of the scores in coded sound files, enabling users to view the scores and simultaneously play the music
- Photos of conductors
- Multimedia reproductions of historical scenography and costumes
- Videos of opera performances
- Documentary videos

ously play the music, pointing a computer mouse to specific parts of the score for playback.

"Oracle's advanced object-relational database technology has proved extremely important for a project of this nature," says Haus. "In this system, the purely relational part of the data is limited to brief captions and descriptions, whereas the amount of object-oriented data—sounds, videos, pictures—is truly enormous. Oracle's ability to manage this type of data has been a tremendous advantage."

Scores of Terabytes

The La Scala archive system is designed to run across UNIX, Microsoft Windows NT and Windows 95, and Macintosh platforms in a client/server architecture. Oracle Application Server enables the distribution of content information via the Internet or intranets. The first database

developed—the Phonic Archive—is 5 terabytes in size, and LIM expects that the second database, which will hold the graphical information, will be considerably larger. (Each score is about 500 pages long, resulting in approximately 7 gigabytes of graphical data and 13 gigabytes of audio data.)

Together, the archives will occupy dozens of terabytes. To maintain high system performance and keep response times low, most of this information will be stored on a jukebox and the Oracle server will contain descriptions of the information for rapid retrieval.

LIM is using Designer/2000, Developer/2000, and Personal Oracle for application development and prototyping. A client/server interface has been developed for internal use, along with an intranet/Internet-browser interface for wider distribution.

LIM expects to bring the La Scala

TOOLBOX

Hardware

**Hewlett-Packard
UNIX servers
Hewlett-Packard and PC
client systems
Apple Macintosh
PowerPC systems**

Software

**Oracle8
Oracle Application Server
Oracle Designer/2000
Oracle Developer/2000
Personal Oracle
Microsoft Windows NT
and Windows 95**

archives fully online in December 1999. In the meantime, all La Scala performances are being immediately digitized and added to the archives.

Building on the Past

Conductors—known as maestros—play the leading role in La Scala productions, where they have control over both casting and rehearsals. Conductors also adapt the original scores to reflect and accommodate their personal interpretation of the opera being staged. As a result, every La Scala production is a unique revelation of the conductor's vision and imagination.

When the La Scala archives come online, conductors and musical scholars will be able to trace the evolution of performances of a particular opera over the last five decades. A conductor today will be able to see how another conductor performed a certain opera and see what specific changes were made to the score. Photos—and, in some cases, video—of sets, costumes, and performances will also be available for viewing. Conductors will then have the option of using some of the previous ideas, discarding others, and building on others. Their interpretations will in turn be recorded for the benefit of future conductors, scholars, and opera aficionados.

"With the support of Oracle and its products, we are creating an invaluable tool for scholars and musicians and providing a real service for professionals throughout the world," says Professor Haus. "Because the archive makes full use of all the features and potential offered by Internet and intranet technology, it will be possible to access this information from anywhere in the world." ▣

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