

Making Laws with XML: The View from the State of California's Legislative Counsel Bureau

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Published by

Dynamic Content Software
Strategies Consulting Service

Abstract

The process of creating and enacting new state laws, like many business processes, is document-based and is built on years of tradition. The Office of the Legislative Counsel Bureau (LCB) has operated in the California state government for over 90 years by providing nonpartisan legal services, including drafting of legislation. This case study highlights the re-vamped state legislative publishing and drafting process, and the benefits received. More importantly, it describes the deployment of a highly-structured, XML-based content creation and management solution built on top of Oracle Database and XML DB that business professionals (in this case, attorneys) have adopted to speed the publishing process.

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Introduction

The process of creating and enacting new state laws, like many business processes, is document-based. Although the process itself is built upon hundreds of years of tradition and protocol, the document remains the communication vehicle for the proposals to, changes of, and final renditions of the law. What has changed and what continues to change are the ways in which the legislatures create, manage, and access bills and amendments.

The Office of the Legislative Counsel Bureau (LCB) has continuously operated in the California state government for over 90 years to assist the Legislature, the governor, and other state officers by providing nonpartisan legal services relating to the legislative process.

The State of California had previously been using the TextDBMS system, which was implemented well over a decade ago, to support the bill and amendment drafting processes. The system, however, was showing its age, having been developed on an older generation of technology. Extending the system to support new business needs was difficult, if not altogether impossible. Without the ability to add new functionality to support evolving needs, the overall effectiveness of the Legislative Counsel IT system was limited. This issue was compounded by the inability to extend the system, and there were concerns that supporting it would become increasingly problematic.

Based on the state of the existing system—which was meeting current needs but was not extensible—and a mandate to better support its constituents, the Legislative Counsel made the decision to invest in a new authoring, content management, and publishing system based on Oracle Database with XML DB.

The State of California Legislative Counsel Bureau's experience is documented in this case study, and provides an excellent example of a government agency that is successfully deploying a leading-edge solution (based on open standards) running on Oracle Database and its XML DB technology with numerous workflow benefits. Highlights include:

- Tags-free authoring, editing, and publishing interface provide augmented efficiency, ease-of-use, and accuracy for users across a wide gamut of skill levels.
- XML-based content and style sheets enable seamless transitions between documents and document formats for simpler and quicker editing and publishing.
- Automated, reference-based audit trail expedites workflow and greatly enhances traceability while working within strict legislative process requirements.
- Automated legacy conversion for approximately 98% of preexisting content.

Although this case study highlights the state legislative drafting and publishing process, its approach, requirements, and benefits received have applicability elsewhere. In particular, it provides an excellent example of the deployment of a highly-structured, XML-based content creation and management solution built with Oracle Database and Oracle XML DB as well as XMetal, which business professionals (in this case, attorneys) have adopted to speed the drafting process.

State of California Legislative Counsel At A Glance

Headquarters: Sacramento, California

Founded: 1913

Business: Non-partisan public agency

Employees: 500+ employees

Business focus: Provide legal and computer services to the California Legislature

Project Background

The Legislative Counsel Bureau operates the Legislative Data Center (LDC), which maintains the legislative information systems and processes legislative measures. Investing in an in-house data center affords the LCB with an IT group that is familiar with existing architectures and technologies as well as with the California legislative process. By understanding how the business runs, the data center is able to make implementation decisions that correspond with the culture and existing workflows, which cannot change overnight (if ever).

Since 1994, the Legislative Data Center has maintained an Internet site for public information on legislation that includes information regarding pending legislation. A high volume of documents using time-driven business processes are involved. Bills are 4 to 5 pages on average, but they can be as long as 600-700 pages. On average, active bills have 5-10 sets of amendments

The law-making process takes place within a 9-month window between December and September. To support the bill drafting and amendment processes, the legal division of the LCB employs attorneys, support supervisors, and support staff.

Since the 1980s, the California Legislative Counsel Bureau had used TextDBMS, a mainframe system inspired by SGML but with fewer rules regarding structure. This posed problems for the LCB: pseudo-tagging aided the publishing process, but there was a need to share information with other customers outside of the LCB. Diane Boyer-Vine, the Legislative Counsel, explained, "It was very difficult to share information, either between people or between different systems." The desire for a standards-based approach utilizing XML was a major reason for the LCB to seek a new system solution.

Moreover, using TextDBMS required specialized computer skills. The workflow required that documents be drafted twice—once by the attorneys outside of the system and again by the support staff in TextDBMS. The system was also becoming obsolete, and TextDBMS's developers no longer enhanced or supported the product. Furthermore, the number of LCB staff members that were knowledgeable in the nuances of the system was waning, making it increasingly difficult to keep the system running effectively.

Beyond basic support, the LCB was also encountering problems in meeting the evolving needs of its customers. "We were finding it very difficult to introduce any new business functionality to the TextDBMS system," stated John Saxon, Deputy Director of Architected Services. With the growing volume of documents—well over 300,000—that needed to be maintained, the LCB recognized the need to migrate to a new system.

The Challenge

The State of California Legislative Counsel Bureau's goal of deploying an integrated authoring and publishing service is a multi-year, multi-phase implementation under the umbrella of a "Legal Services" project. A needs assessment was conducted, and it was determined that an end-to-end system would be the focal point.

The challenge to the LCB project team was to develop and implement an Oracle-based, end-to-end solution that could:

- Support the creation, amendment, and publication of Legislative Counsel Bureau documents, without impacting the California legislative calendar
- Support a diverse range of users including support staff and attorneys who were using different tools in addition to having varied expertise in the authoring and publishing process
- Eliminate double-drafting by enabling attorneys to draft directly in the system
- Conform to the Legislative Counsel Bureau's enterprise architecture goals

LCB staff members and lawyers had to adapt to a new authoring and publishing service for the daily workflow while continuing to meet the demands of the legislative calendar.

New System Requirements

The new Legal Services model had to be an end-to-end system to manage the drafts, bills, and amendments throughout the legislative lifecycle. The requirements included:

- Full lifecycle event tracking from first draft through introduced bill to statute
- Revisions tracking
- Publishing in multiple formats (i.e. print, PDF, Web)
- Automating the codification process (compiling bills into the State's 29 codes)

These needs are typical of a leading-edge authoring and publishing system used by a legislature, but due to the complexity of the documents and processes, there was also a restrictive set of requirements. Most state legislative operations (including LCB) deal with a legislative process that is not subject to change, with rules established long before automation was an objective and with the need to integrate existing legacy systems. It was this challenge that encouraged the LCB to manage the project in-house, retaining consultants and leveraging in-house IT personnel that were familiar with California's legislative drafting and publishing process as well as the history of the LCB's technologies. The new system required flexibility and scalability to deal with complex rules and a high volume as well as a variety of documents dating back over decades.

Cultural Challenges

The California Legislative Counsel Bureau's primary users are administrative staff and lawyers. Some of these people had used the existing system for over twenty years, while others had little or no experience with a structured system. Most of these lawyers used Word for drafting bills and amendments. Introducing any new system—let alone one that used a structured authoring approach—could prove problematic.

Cultural issues are typical with most new system implementations. From the start, the LCB was aware of this challenge and understood that it would need to meet it head-on. For example, some of the users had little or no experience with Web-based authoring or navigating and were wary of new technologies. Those intricately involved with the LCB's IT infrastructure would also need to develop new skills. Although these users and administrators had some experience with Java, Oracle, and WebLogic, they had little knowledge of XML and Web Services.

The Solution

The LCB was seeking a leading-edge solution that it could grow with, and one that would take it from being two steps behind to being one step ahead. From a technological perspective, XML was considered key to the solution. There also needed to be a unified composite schema that could be built from other schemas to include RDF-like metadata, XHTML text fragments, and XLink references. The system had to support 21 different document types such as bills, resolutions, amendments, and codes. Fortunately, these documents had a large degree of commonality, and information was often reused and repurposed (for which XML is ideal).

When evaluating the potential solutions, California's Legislative Counsel Bureau's top priorities were (a) the products' viability, (b) the vendors' commitment to using industry standards and to providing customer support, and (c) the track record of the vendor.

After a review of the available technologies on the market, the State of California Legislative Counsel Bureau chose an XML solution built on top of XMetaL's XML editing application that was designed specifically to create, manage, and amend legislative and regulatory data. At the heart of the system would be the XML-based repository, Oracle Database 10g.

Transitioning to J2EE and Web Services

The LCB decided on a “mixed” architecture that would provide a flexible approach, supplying the foundation to evolve the system over time while meeting the LCB’s immediate business and technical objectives.

Already managing a large number of solutions that were developed in over 40 languages, the LCB opted for a set of mainstream, stable, and easily integrated technologies: a Java application platform supported by JMS and Web Services was the architecture envisioned. The LCB’s previous experience with Java coupled with their intention to leverage Java and Web Services in future implementations encouraged this vision.

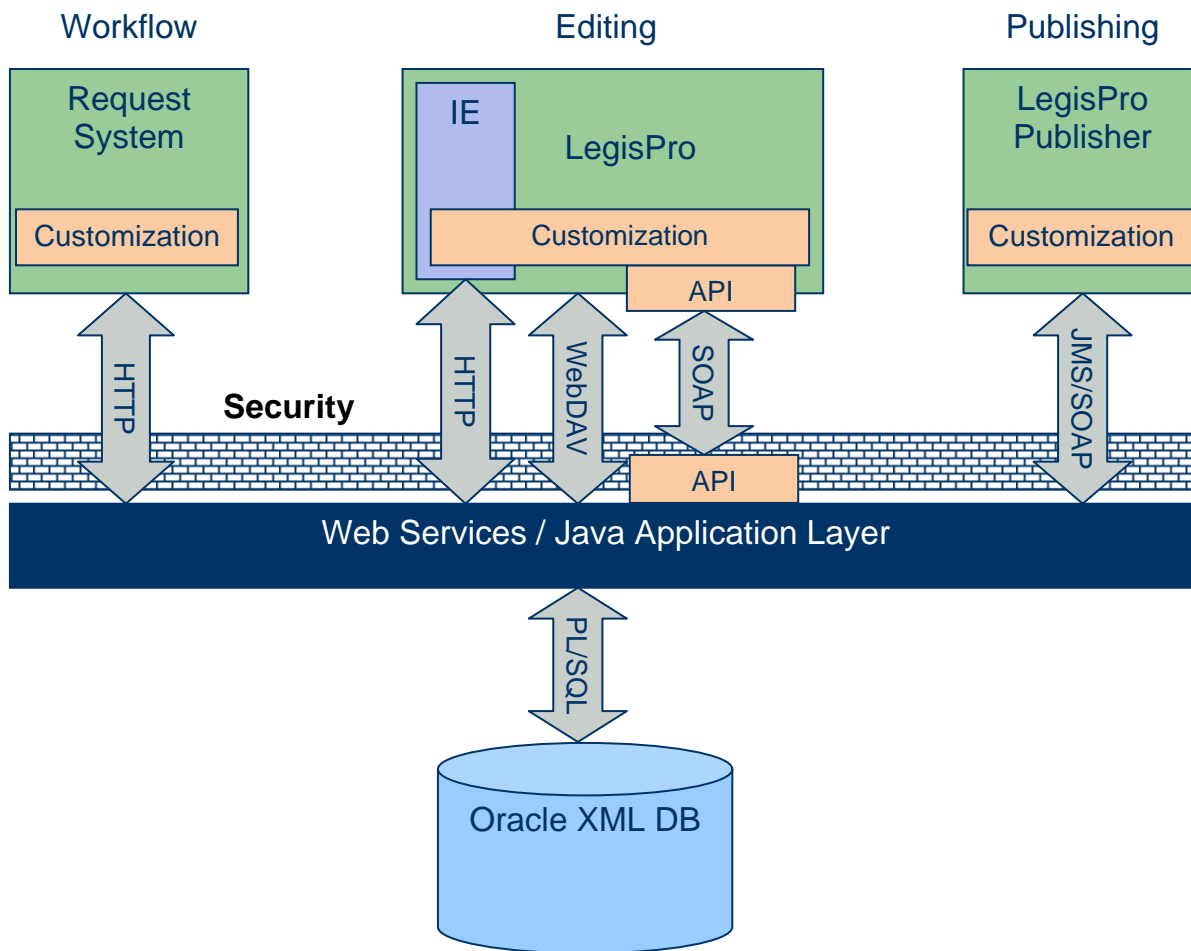
The Web Services architecture designated three roles: LDC as the provider, LCB staff as the users, and Legal Services (the authoring and publishing system) as the “broker”; as well as a number of services: request management, draft management, measure management, law management, publishing, content access, and external interfaces.

The LCB’s publishing component primarily employed a JMS interface to communicate with the Java application layer (although SOAP was made available for future Web Services communications). For its editing component, however, the LCB chose a purely Web Services architecture. Some of the technical benefits of this architecture include:

- Self-contained, modular applications that can be described, published, located, and used over a network or the Internet using standard protocols such as SOAP, HTTP, and WebDAV.
- Easier connections to disparate systems and reduced client footprints at run-time.
- Incremental security as well as support for strict workflow models, configured through environmental prerequisites (i.e. authentication, revising, tracking) to control and manage interactions.

This architecture addressed LCB requirements for a standard application platform (J2EE), a central XML database and single-source publishing extension, strictly governed workflow, and granular security. The Web Services architecture also provided for a Web-based editor GUI which was simple in design but powerful enough to fulfill the LCB’s criteria and communicate with the enterprise-class Oracle repository.

Figure 1: Legal Services Architecture



Focus on the Information Model

The data modeling was critical to this project. Ultimately, the information model would need to:

- Enable the sharing of information between systems and users
- Support publishing to print, PDF, and other formats such as HTML
- Provide an environment in which users—support staff and attorneys—could create content following the schemas without becoming XML experts

Whereas most information modeling exercises look at the final, published document to define the schema, the emphasis for the LCB was on the construction of the XML schema as a data model, and not just a document model. The data model supports the creation, editing, and publishing process in addition to data evolution and the interface to other, existing systems in the LCB. This approach would ultimately provide the best user interface to help users consistently create XML-compliant content without interruption.

Steps to Success

The LCB needed to implement the new system in time for it to be deployed at the beginning of a legislative session, which occurs every two years. The existing legislative lifecycle process and delivery of the legislative products also had to be maintained while the implementation took place.

Forging the Way

To begin the project, the LCB had a business group made of legal and support staff and a technical group made up of two people who knew the old system. According to Mendora Servin, Senior Information Technology Specialist, "We had to start with the business requirements. We had separate teams to look at different customers outside of legal to meet their requirements for an enterprise view. We also had different groups that overlapped looking at publishing, editing, and workflow and looking at databases and the technologies they were going to use." The advantage of an in-house data center was realized here, as technical personnel were already familiar with the heritage and nuances of the LCB's workflows and requirements.

With the teams and requirements in place, LCB worked on designing the solution architecture. John Saxon described the process: "We had an enterprise architecture strategy, which included a service-oriented architecture that would aid in building an enterprise database. Our goal was to have a single repository of data with integrity, with the system giving the same results to the same questions each time. We had wanted to always be aligned with industry standards and best practices."

Product Selection and Implementation

When it came to selecting products to meet the solution needs and architecture, the LCB realized that it was important to look at requirements not only from a high level, but also at the very detailed process level. Mendora Servin explained, "We had to be careful about the detailed requirements due to drafting of a bill, which is very meticulous. We looked at several XML databases and they were not where we needed to be. We looked at major products and even small vendors, but in the end had to pick a product we could grow with. We looked at the major things the products could do today, along with long-term viability, company commitment to the solution, our working relationship with the vendors, and their willingness to work with us. We looked at standards to meet our needs, and that the vendor would commit to growing with those standards. And of course, we assessed how close the products were to meeting our needs."

"We looked at major products and even small vendors, but in the end had to pick a product we could grow with."

The LCB selected XMetaL for authoring, Oracle Database 10g for its XML DB capability, and RenderX for dynamic content publishing. In particular, Oracle's database was chosen because it addressed all of the LCB's needs:

- The database uses a native XML data type with XML-specific optimizations for data management
- XML DB can incorporate an XML Schema data model that can be used to validate the strict requirements for (legislative) documents

- Support for industry-standard protocols such as FTP, HTTP, and WebDAV—coupled with many exposed APIs—provides easier integration of the database with other systems and applications.

When it came to implementing the solution, the LCB was faced with the evolving and maturing of selected software tools that required many changes. During the development, XMetaL went through four version updates, while Oracle went through three version updates. It was difficult to keep up with updates such as enhanced change tracking, critical bug fixes, and line numbering, resulting in delays in development and implementation. In summary, the LCB team was learning new technologies while implementing them. Despite these challenges, the vendors were dedicated to their products and the success of the LCB.

Legacy Migration and Rollout

With the solution well underway, the next big concern for the LCB was the migration of a large quantity of documents from the old system to the new solution. Mendora Servin explained, “One of the areas that worried us the most was the legacy conversion. There have not been a lot of known successes, and we had a lot to migrate. We were at a disadvantage and we were not sure that the old system and tagging structure would enable us to easily migrate. However, we were confident about adopting the new technology. So, we had to figure out how to migrate the data from the former system. We were very fortunate that in the end, we were able to automate most of the conversion, approximately 98% of it, with the remaining documents converted by hand. Despite the worries, it was a big win for us!”

When it came time to start rolling out the new solution, a pilot program was introduced. In planning the pilot of the new system, the LCB decided to use people who were skeptical about changing to a new system, those who believed that the new solution was not an advantageous move, and other users to obtain a varied response and balanced feedback on the new system. Diane Boyer-Vine explained, “During the pilot program, we selected persons who were resistant to change to try to break the system and one of them was won over and became a champion of the system. We also developed user groups to help with the culture and tweak the products and processes that furthered the development and implementation of the new system.” For example, the user group was particularly helpful with solutions and methods to deal with a new system and a heavy concurrent usage that had not been anticipated.

Implementation Summary

To implement and deploy a new architecture and solution that was aimed at meeting a complex set of requirements, the California Legislative Counsel Bureau broke the project into multiple phases. The primary focus of this case study centers on the success of Phase 1, with the architecture in place to help ensure the success of the remaining phases. Phase 2 is currently in development.

Weaving the Solution into the Workflow Process

The legislative process is subject to change, but only by decree of the law. As a result, the technology could not dictate how content would move through the system. The new solution had to work within the existing workflow process parameters. The LCB's in-house data center provided a pool of technicians and managers that—unlike temporary consultants—had experience with these requirements. The new authoring and publishing service provided system capabilities and output that enhanced the business and technical needs of the LCB while remaining in line with the needs of the California legislative drafting and publishing process.

For the new solution to be absorbed into the environment, support staff and attorneys would need to use it. The need for an easy-to-use authoring tool that could be used by both types of users required extensive customization of XMetaL by the LCB, but the effort was a success. A familiar, easy-to-use interface integrated with new, context-based commands and details provided enhanced editing capabilities. Tags-free editing also made tags seamless, whereas in the old system they were apparent. With the authoring tool in place, it was virtually impossible for a user to create an invalid document.

An important part of the workflow and the new solution as a whole was the ability to integrate and use legacy content. With the new architecture, content reuse was integrated into the workflow. Existing bills and amendments were directly accessible in the database and easily re-usable by dragging and dropping them into a new document.

Automated tracking of changes was available to users, expediting the workflow process. When working on a document, it was visually apparent what had been added, inserted, or deleted. This became a critical component for Legal Services' "instruction amendment" workflow. Using a split-screen interface, Legal Services allows for visually obvious tracking of changes between the original and updated drafts. With the instruction amendment in one window and the original draft in another, LCB staff members can implement and verify modifications to drafts in a straightforward way.

On the back-end and seamless to users, the single publishing service used the XML content and XSL-FO style sheets, allowing for efficient handling of different documents and their formats. The integration of publishing technology provided high-quality typography as well as easier viewing and control of the published output. Redlining the differences between two versions resulted in workflow improvements as well.

The new system used parallel processing, which provided greater scalability. Additionally, other enterprise systems taking advantage of the SOAP and JMS interfaces could access information contained within the system.

Benefits Summary

Built on top of Oracle's Database and XML DB, the LCB's customized editing and publishing solution—coined “LegisPro” by systems integrator Xcential—provided some immediate business and technical benefits:

- Established an integrated authoring and publishing service that can support its publishing needs
- Migrated a legacy legislative repository and workflow to a Web-based solution that integrates with existing processes, information, and law-making schedules to facilitate the legislative lifecycle process
- Established a best practice for other states to consider for their legislative lifecycle process
- Provided an electronic archive of the bills and amendments for historical purposes
- Utilized XML to provide structure for effective management and publishing with a user-friendly interface to enable attorneys to directly create the content

From a business perspective, the legislative lifecycle process was improved with the ability to produce a bill more quickly. For example, lawyers who had previously written the bill on a piece of paper with a hand-off to administrative staff for the creation of the draft were now able to use the system and draft the bill themselves.

While the workflow could not be changed, new features such as direct authoring by legal staff, easy access to legacy content, and multiple formats and higher scalability improved the efficiency of LCB staff. LCB staff managers are already seeing time improvements. Users also embraced tools and became involved in promoting the new service as well as helping with the next phase. Mendora Servin mentioned, “Both new and experienced staff members can immediately use the system, as they do not need to know the tagging and it is now seamless, whereas before, only experienced staff could use it.”

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Technically, LegisPro and its leading-edge technology were able to support the current LCB workflow and improve the authoring and publishing process for users. XML was integral to this process, with its schema and vendor neutrality, making it easier for any schema or client to be integrated and adapted.

LegisPro was also easier to maintain with automated application updates via the Web. The publishing service could support enterprise publishing needs such as queuing, monitoring, and priority management.

Lessons Learned

The LCB’s implementation of a Web-based authoring, content management, and publishing solution provided some immediate results in workflow and legislative lifecycle improvements. The LCB also learned important lessons during the implementation process while leaping the hurdles that arose. Each lesson evolved into a useful set of recommendations that would be applicable to any organization undertaking projects of this nature. In the LCB’s case, the knowledge gained through this process will be applicable to many of the organization's future endeavors.

✓	Solid sponsorship and reiterative customer involvement is a must. The LCB realized early on that succeeding with this type of implementation would require the involvement of constituents that would benefit from or use the solution.
✓	Benefits of XML need to be understood by business managers. “In talking with other state legislatures, there is a big knowledge gap with XML. Business communities need to understand the benefits of XML,” explained John Saxon. XML provides the structure to ensure consistent information capture, resulting in a single-source model for storage. From the neutrally-encoded data, documents can be produced in any format (print, Web, etc.) necessary.
✓	Leading-edge technologies require keeping up with new versions. Products are constantly being updated by vendors. An organization needs to keep abreast of these changes, and must also anticipate potential challenges that could impact the solution.
✓	Culture change should not be underestimated. A needs assessment and discussion with potential users should take place. In addition, it is beneficial to have a beta test of a specific application to work out the bugs and potential problems. If possible, usability testing is also quite helpful. Using “contrarians” can also be beneficial in testing and winning over advocates for a new system and in managing the change that is taking place.
✓	Business processes should be reviewed earlier rather than later. For the LCB, it was critical that the solution be tightly integrated with the business process. Understanding the process requirements and developing an architecture and data model to support them was paramount to success.
✓	Developers should be involved in the training and implementation. The role of the developer should extend beyond the design. Developers can observe through training and implementation how the tools are being used, and may be able to make quick fixes that might not be recognizable under other circumstances. Additionally, they can help to make changes to the solution so that it more directly reflects the working environment.
✓	Focus on heavy loads: Either institute a mock session with the maximum number of users working under tight timeframes or ensure that enough personnel will be available to help during peak cycles. The LCB focused on the system processing scalability but discovered that it was also important to understand the volume of resources that will be necessary to assist users during heavy loads.

Product Reference: Oracle Database 10g by Oracle

Oracle Corporation is a leading provider of database management systems, tools for database development, enterprise resource planning software, customer relationship management (CRM) software, and supply chain planning (SCM) software. Oracle was founded in 1977 and has offices in more than 145 countries around the world. As of 2005, it employed over 50,000 people worldwide. Oracle's main product lines include Oracle Database 10g (g-grid) and Oracle Application Server 10g. The strong relationship between Oracle Database 10g and Java has enabled the company to allow developers to set up stored procedures written in the Java language, as well as those written in the traditional Oracle database programming language, PL/SQL.

Oracle XML DB is a feature of the Oracle database. It provides a high-performance, native XML storage and retrieval technology. With Oracle XML DB, an organization is able to leverage relational database technology as well as the advantages of XML. These advantages include:

- Improved efficiency for XML-based applications
- Direct access to XML content and documents that delivers performance similar to relational tables
- A simple deployment platform that eliminates complexity and reduces components
- Secure and scalable database that is also reliable
- Reduced application development costs with faster development cycles
- XML stored as XML
- Improved application performance
- High-performance XSLT engine for sparse transformations
- XQuery rewrite and text-based indexing for optimized query capabilities
- An XML repository that enables a single platform for content-centric and data-centric applications

Because data and content converge, it is ideal for one database to manage both. Developers have the flexibility to use PL/SQL or XML to interact with the database to suit their needs, expertise, and application requirements.

Product Reference: LegisPro by Xcential

Xcential develops software that enables state, local, and federal governments to create, amend, manage, and deliver legislative and regulatory information for their constituents. Xcential solutions reduce the time and cost of these processes by encompassing the document requirements and business rules that are common in this arena.

Xcential's LegisPro editor empowers all users to contribute to and modify content directly, without requiring specialized technical or XML skills. LegisPro implements the business rules associated with legislative documents and can be customized to implement the unique business rules of each organization.

Xcential's LegisPro publisher is an XML publishing service that implements advanced features such as line numbering, variable headers and footers, column balancing, multi-volume documents, compound documents (e.g. mixed XML and MSWord content), and queue management.

Xcential's solutions allow for the delivery of information in a variety of media formats, including print, Web, and wireless technologies. Its solutions are designed to integrate with legacy systems (found in all levels of government) and are compliant with industry standards.

InfoTrends' Perspective

The LCB story is an excellent example of a government agency that has made an investment in an authoring, content management, and publishing solution and has applied it to improve its legislative workflow processes. Like many new systems built on evolving standards and technologies, the implementation had its share of business, technology, and change management issues, but the LCB project team was committed to the task and had solid support from management. With full participation from its user community, the issues have been addressed and improvements have been made in the user experience, productivity, integration, and output.

The impact of an XML-based authoring and publishing solution also provides an excellent best practice to other state legislatures that are dealing with outdated systems, dwindling expertise, and shrinking resources to maintain their system while keeping up with a high volume of documents. Most notable is the fact that a variety of users, including support staff and attorneys, create XML-compliant documents on a daily basis without being technical experts. This single-source publishing model not only helps expedite the legislative process today, but it also gives the California Legislative Counsel Bureau the architecture to add new functionality and document output options without making changes to the underlying architecture.

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