Diginaut

"PowerDesigner has proven to be a most reliable tool. Ever since we first started using it, we have recommended it to all our clients."

—Momir Boskovic, , CEO, Diginaut

KEY BENEFITS

- Large-team results with a small team
- Creates a flexible tool that dramatically increases productivity
- UML, XML, database definitions, and multiple language support from a single tool
- Manages utility power demands efficiently

SYBASE TECHNOLOGY

- Sybase PowerDesigner®
- Sybase iAnywhere® SQL Anywhere™

Sybase PowerDesigner is the cornerstone of ZORA, a Model-Driven software package for Rapid Application Development. Diginaut's flagship product, ZORA is used by the Electric Utility of Belgrade for the dual purposes of power distribution and fault isolation within the power grid. Using the ZORA package, a small team has been instrumental in modernizing Serbia's power system, a feat normally reserved for large, resource-rich utility giants. Their impressive work in Belgrade qualified them to be participants in the international standards body associated with power distribution.

BEYOND THE ENTERPRISE—REINFORCING A NATIONAL INFRASTRUCTURE

There is a small Serbian company of four full-time developers that plays a major role in keeping the lights on in greater metropolitan Belgrade. The company's name is Diginaut, and the team developed a highly-functional Model-Driven Environment toolset built using both Sybase PowerDesigner and Sybase SQL Anywhere.

The toolset is named ZORA which means 'dawn' in the Serbian language. Diginaut has used ZORA to create a Common Information Model (CIM) application to communicate between the power grid and the central monitoring station. The CIM includes a high-volume messaging infrastructure with interfaces to a variety of power utility devices. The CIM also communicates with multiple subsystems, including a geographic information system (GIS) application. The system uses a comprehensive data model that captures enough information to drive the systems that provide power to over two million people.

Historically, Belgrade's geography and cultural mix has fostered political instability. It was part of the Roman and Ottoman Empires, and between 1918 and 2003 it was the capital of successive incarnations of Yugoslavia. Instability and isolation due to economic embargos had resulted in an antiquated, patchwork utilities infrastructure with little funding available for modernization. Winters are cold in Belgrade and power outages were common as electric heating requirements overloaded the system.

One does not often hear the word 'heroic' linked with coding, but in some development projects, a lack of financial resources coupled with real need can foster software greatness. The necessity to achieve more with less provides challenging opportunities to developers with the right stuff. The Electric Utility of Belgrade was fortunate to encounter Diginaut.

RUNNING WITH THE BIG DOGS

Though small, Diginaut's expertise and central role in one of largest projects for the Electric Utility of Belgrade has earned them participation in National committee of IEC TC 57 (Power System Control and Associated Communications).

The Diginaut team was qualified because they have created a modern system for managing power distribution across a power grid composed of many different devices from multiple manufacturers. They were also qualified because they have built a mechanism for isolating faults in the power grid and flagging them for repairs. They actively helped design and draft the IEC 61968 and IEC 61970 standards for Energy Management Systems (EMS) and Distribution Management Systems (DMS).

"We take pride in what we have achieved with our architecture. Without Sybase PowerDesigner and SQL Anywhere, most of it would not have been possible."

—Milan Milicevic,
Chief Technology Officer

This association placed them squarely in the company of the utility industry's power players. Diginaut's solutions contain many features found in more expensive applications, but Diginaut's were built on a shoestring budget, by a little company of four full-time employees.

ZORA—RAPID APPLICATION DEVELOPMENT, BUILT ON POWERDESIGNER

This minor David and Goliath miracle was made possible by Diginaut's ZORA toolkit. Diginaut built ZORA as a productivity tool to help them become a rapid application development consulting company that was agile enough to meet each customer's unique needs. Diginaut CEO, Momir Boskovic says, "Our goal is not to sell ZORA; we developed it as an internal tool for our consulting engagements. We are now a very good consulting company with a powerful tool to help clients manage their data. By increasing our productivity, ZORA lets us set competitive prices for the services we offer our clients, especially for big projects."

ZORA is a Model Driven Environment built on the bedrock of Sybase PowerDesigner. Momir Boskovic recalls their original vision, "We decided to build a rapid application development environment. We knew that once the data model was created in this environment, we could quickly build sophisticated multi-tier information systems directly from the model. After extensive investigation, we chose Sybase PowerDesigner as the backbone of ZORA."

ZORA-generated applications begin with a rich UML meta-model specification. The database components are model-aware, as are the middleware and user interface layers. The user interface renders the data model into screens and input forms. It is a very dynamic system that lets users completely explore the data model with the only limits being the boundaries imposed by the user's security. A single underlying model drives the entire system. ZORA applications are flexible because they are context aware, meaning information is dynamically rendered in real-time to suit the needs of the user's role.

Sybase PowerDesigner was an excellent choice for their purposes because it supports UML object modeling, data modeling, and business process modeling. It also generates the user interface layer in multiple programming languages.

SQL ANYWHERE—LIGHT AND CAPABLE

While designing ZORA, Diginaut also chose Sybase iAnywhere SQL Anywhere to act as a meta-model database manager for storing the rich information model used to drive the rest of the system. Diginaut liked SQL Anywhere's small size and, being a small company, liked its affordability.

Momir Boskovic tells about SQL Anywhere's role in the ZORA architecture, "We store the ZORA metamodel in SQL Anywhere and then generate to Sybase PowerDesigner. PowerDesigner generates the physical database which again uses SQL Anywhere. PowerDesigner also creates scripts for many other database management systems. We use SQL Anywhere because it has a small footprint, and it's a very fast, efficient database management system. SQL Anywhere also works very well with PowerDesigner. We also recommend SQL Anywhere to our clients."

One of the clients they recommended it to was the Electric Utility of Belgrade. The Electric Utility has been using Sybase SQL Anywhere for four years in their messaging system to store the messages being routed, and to ensure no messages are lost. Mr. Boskovic adds, "The SQL Anywhere server has worked perfectly at the Electric Utility for four years. Over those years, we've stored several million real-time objects in that database and had no problems."

SCADA SYSTEMS FOR POWER DISTRIBUTION AND FAULT ISOLATION

The large power lines on tall steel towers stretched across the landscape between towns are distribution lines with high voltage levels on the order of 110,000 volts. Balancing the power to meet consumer demand requires a Distribution Management System (DMS) that sends signals to relays at the substations to step down voltages and direct power to where it is most needed.

"After many years of isolation, The Electric Utility of Belgrade has regained its position in this region. Our Model-Driven Environment has played a role in the speed of this transformation."

—Momir Boskovic

Municipal utilities like gas, water, and electric are controlled by a real-time distribution and monitoring system called a SCADA which stands for Supervisory Control and Data Acquisition. This system combines hardware and software to create a geographically-distributed, closed-feedback loop to constantly monitor the state of the utility and make adjustments or take corrective action where warranted.

On the monitoring side, one of the functions of a SCADA system is to raise alarm conditions when measured values fall outside allowable ranges, or, as in the case of an outage, when a measuring point stops sending information. In the control room of a power plant it is important to isolate the fault, work around it, and fix the problem.

When developing the SCADA system used by the Electric Utility of Belgrade, Diginaut added a tight COM integration with the Autodesk MapGuide GIS application. By assigning a unique ID and location to each measurement device stored in the Sybase SQL Anywhere database, malfunctioning devices can be identified and highlighted on a map so operators can open a trouble ticket and send a work crew out to fix the problem.

This constant monitoring and active control requires a bulletproof, high-volume messaging system with visual displays and user interfaces for controlling the system. Momir Boskovic explains this portion of Belgrade's SCADA architecture, "Our software is between the controlling system and maintenance system. We provide an enterprise-class message box. The model-driven environment sends messages and presents status to the control center operators, and the control centers also send messages to other services and substations. All this information is transferred, confirmed, and stored through our SCADA system."

Historically, SCADA systems were often purchased from one of the large vendors that supplied a complete, proprietary solution for the utility. With increasing standards like IEC 61968 and IEC 61970, the industry is moving to a more mix-and-match approach using interoperability standards to insure compatibility. Mix and match interoperability makes financial sense with increasing power industry deregulation and acquisition, or, as in the case of Serbia, when political boundaries are restructured.

MAKING A BIG DIFFERENCE ON A SMALL BUDGET

Agile and nimble—these adjectives are often used to describe an elite class of small, successful development teams that prove themselves capable of outperforming large development organizations by a ratio of 10:1 or better. What enables these teams to blow the doors off the big companies? The essence of their success usually comes down to hiring, process, and tools. By basing ZORA on Sybase PowerDesigner and Sybase SQL Anywhere, the Diginaut developers have accelerated their consulting process. During the course of the Belgrade Electric Utility consulting engagement they have become experts on power industry automation and are now pursuing additional utilities-based opportunities where they can apply their tools and expertise to create affordable automation on a national or metropolitan scale.

Times are changing in the power industry. Large, single-vendor approaches are becoming less common because evolving standards favor more affordable solutions that are assembled from the best offerings across multiple vendors. Using productivity tools like ZORA, Diginaut's small team of engineers focus their energies on developing the underlying descriptive model. Once the model is in place, Sybase PowerDesigner does much of the remaining work. Diginaut, with a team of four people and a productivity solution built from a couple of intelligent Sybase tools, is helping Serbia keep the lights on and its children warm.

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