Revitalizing an aging child support system
Deloitte Application Modernization
Using automated refactoring to help Colorado modernize a 30-year-old mainframe

The challenge
When the state of Colorado implemented its Automated Child Support Enforcement System (ACSES) in 1986, it was a cutting-edge mainframe application built on the Natural programming language.¹

For the next three decades, this mission-critical system served the Colorado Department of Human Services (CDHS) well; it processed more than 5,000 child support payments a day, totaling $500 million a year.²

Although the legacy system remained reliable, it became increasingly inefficient, as well as time-consuming and costly to maintain. Operating costs continued to rise as experienced staff retired, leaving CDHS hard pressed to find workers skilled in the legacy code on which the system had been built. What’s more, as those employees left, they took with them years of knowledge about the application, including system updates that hadn’t been documented.

The outdated ACSES mainframe also impeded CDHS’ ability to implement new functionality because it was difficult to integrate with modern technologies and solutions. This incompatibility not only prevented the department from deploying new technologies to meet its business needs, it also made compliance with ever-changing state and federal regulations increasingly cumbersome.

CDHS knew that its ACSES system could not be easily modified to create operational efficiencies that would enable the department to better serve 200,000 Colorado children and their parents. The legacy code needed to be migrated to a modern platform like Java and the existing Adabas data needed to be housed in a modern relational database-management system. The question was how to do so.

The most obvious option would have been to build a new system from the ground up, but CDHS knew it would take several years just to develop requirements. The department ultimately concluded the “rip and replace” option was too expensive, too high risk, and too protracted.

CDHS leaders began exploring modernization options that would more quickly migrate legacy code to an open-system platform, while retaining existing functionality and logic. This was crucial because the ACSES application contained a vast, 30-year reserve of highly valuable business logic. The department wanted to make sure that every single line of code and logic was replicated, and that all functionality was retained. They also wanted to include the remaining developers who had built, maintained, and updated the ACSES software over the years.

“Our legacy child support system contained nearly 30 years of dependable business logic and system refinements, and a primary requirement was that every line of this code be accurately converted and that all existing functionality be preserved,” said Craig Goellner, CSS Systems Director, Colorado Division of Child Support Services. “We also understood that our experienced developers had the institutional knowledge to develop and maintain the system, and we wanted to make sure that the migrated system could be maintained by these developers.”

Given these requirements, IT leaders determined that a migration of the application from the mainframe to an open-system platform would be the most efficient way to preserve logic and functionality. After migration, CDHS could then incrementally integrate ACSES with essential technologies like cloud, mobility, and data analytics.

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¹. The National Museum of American History, COBOL, accessed April 23, 2018
². Policy & Practice, The Best Route to Take, December 2016
The application modernization approach

While the migration approach seemed straightforward, CDHS knew that executing an overhaul of a mission-critical application would be complex and risky. They wanted an experienced and reliable team that could handle all aspects of the project—without relying on third parties. CDHS formed a selection committee and solicited RFPs, ultimately meeting with more than a dozen migration specialists.

One was innoWake International, Inc. (Deloitte Consulting LLP acquired innoWake International Inc., which is hereinafter referred to as “Deloitte.”) Deloitte’s Application Modernization services team demonstrated its automated refactoring offering, which accurately replicates 100% of legacy code like COBOL and Natural, to a modern platform like Java and .NET. The selection committee was impressed by the Java implementation of Natural code, which could be read by both Natural and Java programmers. In the end, they were convinced that automated refactoring would deliver effective, low-risk modernization without data loss and code freezes.

The application modernization process

CDHS engaged Deloitte to guide the transition of ACSES to an open-system platform using Deloitte’s proprietary automated refactoring technology and processes.

Working closely with state technology leaders, the Deloitte team used its Discovery product to perform a diagnostic assessment of the agency’s technology ecosystem to understand its codebase, complexity, and dependencies. This enabled Deloitte to chart a migration roadmap based on the specific priorities and needs of CDHS.

This Transformation project comprised two major initiatives: migrating 1.4 million lines of Natural code to Java and transferring more than 500GB of Adabas data to Oracle. To do this, we employed our Application Modernization powered by innoWake™ software suite. The one-to-one refactoring tool converted each line of legacy code to equivalent programming instructions in Java, while retaining the functionality and interfaces of the existing application. It also preserved nearly 30 years of business rules and application refinements, a primary goal of CDHS.

When converted to Java, the code is very similar to the original Natural code, giving legacy developers access to the new development environment without the need for in-depth training. And, because all business logic and functionality was retained, the 600 users required minimal training.

Throughout the project, Deloitte and CDHS used a parallel testing model and automated test scripts to compare functionality, performance, and accuracy of the refactored system with the legacy application. The team also conducted user-acceptance testing to ensure that workers were comfortable using the new Web-based interface for ACSES.

Results

Deloitte delivered this low-risk, automated refactoring project under budget and on time—without disruption to CDHS operations. After this two-year initiative, the ACSES application was running smoothly on an open-system Java environment, with virtually no user impact and improved system performance.

CDHS no longer has to support an antiquated mainframe, saving the state time, resources, and millions of dollars in annual operating costs. Automated refactoring has also enabled CDHS to develop new services using agile, contemporary technologies that can be easily integrated with other enterprise systems and applications.

CDHS is now positioned to harness the power of flexible Web-based tools to build new services on its modern Java platform. Deloitte continues to work with the department to identify additional key functions of ACSES and other systems that can be enhanced for future-state innovation.

Refactoring by the numbers

The project refactored 1.4 million lines of Natural code, more than 8,000 Natural programs, 500GB of Adabas data, 250 interfaces, 2,000 JCL batch jobs, and 800 online screens

Deloitte powered by innoWake™ tools used:
- development
- operations
- enable, and data

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