Re-engineering of a business simulation software using C and LAMP

THE CUSTOMER
A key player in the experiential learning space; their business simulation software suite is considered one of the best-ever learning tools for students and executives alike. Their simulations are designed by leading academic specialists from top business schools and cover the areas of marketing, strategy, management, and international business. Their products have been used by more than 100,000 people, including students from the top 10 business schools in the world to community colleges, and executives from hundreds of companies.

THEIR NEED
To enhance and re-engineer their existing desktop based simulation software (written in VB) to meet the changing demands of worldwide customers. They also wanted their various simulation solutions available through a web interface with internationalization (I18N) support for multiple languages and accessible to global users.

OUR DEED
Aspire helped the customer to re-engineer their simulation software engine from scratch using C and provided a flexible new web platform using the open source architecture of LAMP. Aspire also internationalized their software and enhanced it by building a scalable, MVC framework, customized data access and abstraction layers to improve performance and provide better usability. New simulation models for specific industries were also designed, developed and implemented by Aspire.

TECHNOLOGY AND TOOLS
Languages: PHP 5.1.2, GCC
Framework: Customized PHP MVC framework.
IDE: EclipsePDT.
Database: MySQL 5.0
Web Server: Apache
Configuration Management: SVN repository
Operating System: RHEL

Experiential learning – Business simulation software
The customer offers different types of business simulation software to help students practice making decisions in a low-risk, highly engaging environment. Complex
problems are tackled through the simulations and it allows students to experience working with teams of people with diverse opinions and personalities and make decisions in this kind of environment.

Every simulation tool that they offer is different and is an integral part of the curriculum of many top business schools. Their simulation product suite covers the areas of marketing, strategy, management, and international business and also addresses specific verticals, like pharmaceuticals, retail, textiles and others.

Students get an interactive learning experience through the customer’s simulation products – for example, students can wear the hat of a brand manager in their Marketing Principles tool. In this fully administered simulation event, students manage the marketing mix for different “star” products in the OTC pharmaceutical industry, reformulate brands, introduce line extensions, and launch new products over a 6 year simulation period. This gives students a basic understanding of market segments, channels, and buyer behavior in a 4Ps context.

Re-engineering a complex simulation engine

The customer’s business simulation software was a desktop product containing a simulation algorithm which formed the basis of the simulation engine for their various simulation tools. This simulation engine, including the interfaces, was written in VB and it was not very flexible. All simulation decisions had to be entered by users in a single form and they could not be decoupled into different decision making areas. Aspire therefore needed to re-engineer the simulation engine from scratch.

The logic behind the simulation algorithms and the decision making process of the simulations were thoroughly analyzed by the Aspire development team and the engine was completely re-written in C (a native language was chosen as complex calculations are involved and processing is generally easier in C). The re-engineered software made entering decisions easier and also made report generation simple and easy for users to figure out.

As the simulation engine was developed in C (and the web interfaces required, were to be developed on the LAMP stack), Aspire created an abstraction layer, using a client-interface library provided by MySQL, to allow C to communicate easily with MySQL. This customized data access layer allows the simulation engine to efficiently access the database, and this improved the performance of the simulations.

Web enablement and internationalization

As the customer wanted to web-enable and internationalize its simulation tools, Aspire designed, developed and implemented web interfaces for the customer’s entire product suite using PHP. Using a custom-built MVC framework (common for the web interfaces and the simulation engine), the web interfaces were created using JQuery (for performing Ajax and DOM requests) and the PHP Smarty template for internationalization.

Smarty supports multiple languages by separating multi-lingual text to different language files based on the languages supported. Hence, when translations are done,
only these language files need to be changed.

PHP PDO, one of the fastest open source database abstraction libraries available for PHP, was used for database abstraction. This separates the presentation layer from the database layer making future database portability a simple issue.

Integration with the support system

For every simulation tool that the customer offers, there are two game categories: competitive and benchmark games. In competitive games, there are several teams who become part of an industry, they compete against each other and the game is run by a common administrator. A benchmark game is played by a single team and the team leader administers the game.

The customer had a separate game admin support system (also built in PHP) to create users and administer the games. Aspire built a closed web service using JSON RPC (Remote procedure call) to integrate their game admin support system and all their simulation tools, making administration easier and secure.

Interfacing and Reporting

Every simulation game has defined periods (month, quarter, etc.) during which the game progresses. When a specified period is over, the game is advanced to the next level. At the end of every period, the simulation engine collects all relevant data that the participants enter. This data from participants is captured through web forms (PHP) and transferred to the database.

The abstraction layer (built in C) interacts with the database, performs calculations based on the type of simulation game involved and sends the results back to the database. The subsequent results are then displayed both as web forms and also as graphical reports where appropriate. Aspire made use of a commercial web based Flash charting component for reporting data in the form of charts and graphs.

Targeted simulation models

Aspire also developed entirely new simulation models for specific industries that were targeted by the customer. One example was the case of a simulation involving taking over a retail clothing store and making decisions regarding store location, financing options, pricing options, amount and type of stock, discount policies and so on. Based on these decisions, at the end of every period, Cash flow statements, P/L statements and other such reports are generated.

Key benefits to the customer

Aspire re-engineered the customer’s simulation software delivering better performance in terms of the simulation response times, and also made the product more user-friendly. Through custom-built abstraction layers which provided faster database access, charting components for better presentation, web services for tighter and more secure integration, and interfacing between different systems and
technologies, Aspire significantly improved the customer’s existing product suite.

Aspire also web-enabled and internationalized the entire software suite through a scalable, customizable MVC framework using free and open-source software like PHP, MySQL, Apache and several other commercial and open-source plug-ins. Several entirely new simulation models were also developed by Aspire leveraging existing logic and reusable components.

ABOUT ASPIRE SYSTEMS

Aspire Systems is an Outsourced Product Development firm committed to helping our customers build software products better and faster. We work with some of the world’s most innovative Independent Software Vendors and software-enabled businesses, ranging from start-ups to established industry leaders, transforming the way software is built.

Aspire provides complete product lifecycle services, ranging from new product development and product advancement to product migration, re-engineering, sustenance and support. Our product development teams are spread between our Global Innovation Center in Chennai, India and offices in the United States.

For more information contact:

Website : www.aspiresys.com
E-mail : info@aspiresys.com
Tel
USA : +1-408-260-2076
UK : +44 203 170 6115
India : +91-44-6740 4000