

# Success Story

“Enosis adopts Performance-Driven Development to surpass stringent performance targets for Business Intelligence solution”



## Background

The client discovered that their traditional approaches to product pricing fail to provide maximum sales and profit productivity from their sales force. Before shifting to 'Scientific Pricing', the client used to follow the trivial "cost plus pricing" approach of examining the costs of a product and placing a set margin to produce the final offer price. This approach did not take into account the different levels of value that different parts of the market ascribe to the product. By pricing a product according to the perceived value that a specific part of the market will place on that product, significant increases in revenue and profitability can be realized. The client wanted to adopt 'Scientific Pricing' which seeks to charge each customer's total willingness to pay for each product using a customized Business Intelligence tool to examine the universe of data that the organization has accumulated over the years.



**SUMMARY**

The price recommendations generated by the “Scientific Pricing” application are derived from statistical and econometric models that are being updated continuously using the most recent and historic sales data. The process is computationally quite expensive, and the results must be generated within a very short time window i.e. 12AM and 4AM each night to generate the optimal prices for that business day. The Solution requires support for ad-hoc queries, pinpointing cross-sell items and best prices by using historical data and the subjective market expertise, abundant flexibilities for creating business rules to validate the recommended prices, collecting market feedbacks on the recommended prices, tracking financial gain from scientific pricing, capabilities to visualize and explore the price recommendations, constructing ad-hoc SQL queries, building customized reports and effective user administration. The derived 40 billion unique customer-product combinations along with optimal price recommendations are to be optimized to yield a maximum increase in revenue, gross profit, and market share.

**The Client**

A US based market leader in the ‘Business Intelligence’ and ‘Data Mining’ solutions space meeting the needs of Global 2000 companies in retail, manufacturing, semiconductor and food service industry.

**MOST SIGNIFICANT HURDLES CONFRONTED BY THE ENOSIS TEAM:**

- Defining a scalable architecture to satisfy the solution’s ambitious requirement and stringent Service Level Agreements (SLA)
- Supporting more than 3000 users with an expected 100% growth in the total user base for coming years
- Designing the solution to achieve extremely low latency in information retrieval and high throughput

- Handling huge data volumes where the database is larger than 1.8 Terabytes in size with an expected growth rate of more than 35% per year
- Choosing the right degree of parallelism was a challenge as it was constrained by the availability of the CPU
- Achieve zero downtime during the peak hour when almost all the users log-on to the ‘Business Intelligence’ application server to synchronize data in the client-end

**Application User**

The largest foodservice distributor in North America distributing frozen foods, various canned and dry foods, imported specialties along with various non-food items to over 400,000 customers with a wide product range of 100,000, employing 51,000 associates and generating USD 37.5 Billion as annual revenue.

**ENOSIS’ APPROACH**

The client collaborated with Enosis to build a platform to address these extremely challenging requirements. As part of the engagement, Enosis used a proactive and holistic performance-driven development approach to amplify the performance and scalability of the application. The approach involved an agile software development model, the key activities of which include:

- Defining non-functional requirements of the application in a manner that ensured a common understanding of the performance and availability parameters and manage user expectations
- Validating non-functional requirements and conducting a feasibility analysis
- Characterizing and modeling the business workload
- Defining the performance strategy
- Defining the solution architecture, validating performance and scalability via a proof-of-concept

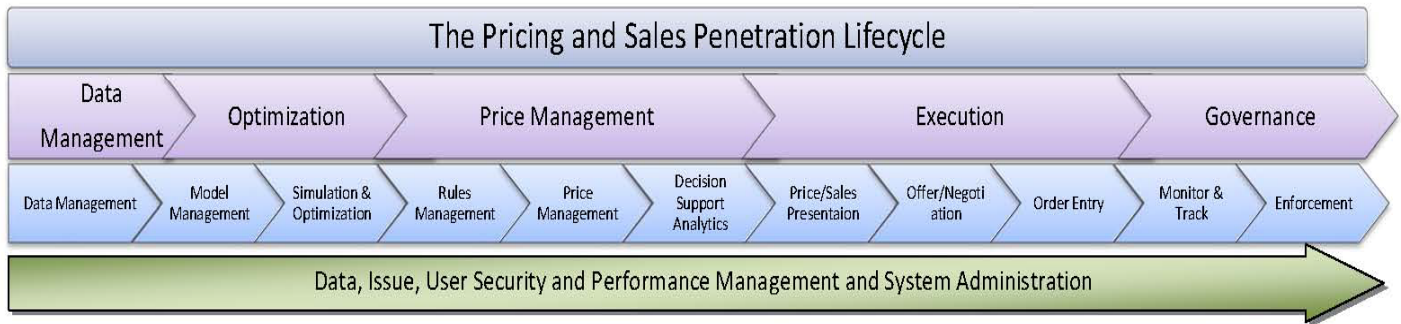
- Arriving at performance baselines for various architecture and technology components individually, as well as a composite application, as part of the build cycle
- Reviewing the different architecture alternatives with a view to addressing performance concerns
- Reviewing the database design and application code to identify opportunities for improvement
- Analyzing and testing for performance
- Recommending measures for performance enhancements
- Implementing the performance enhancement measures
- Capacity planning

**Performance Tuning**

The modules developed were subjected to rigorous performance testing for tuning them to achieve high-performance application expectations.

**Application Architecture**

Design and develop a set of framework components and application blocks which implement all of the best practices for Microsoft .NET Framework languages, Microsoft ASP.NET, and Microsoft ADO.NET. This would ensure that all components and feature elements of the solution would meet the performance, scalability, security, reliability, and availability metrics of the application.

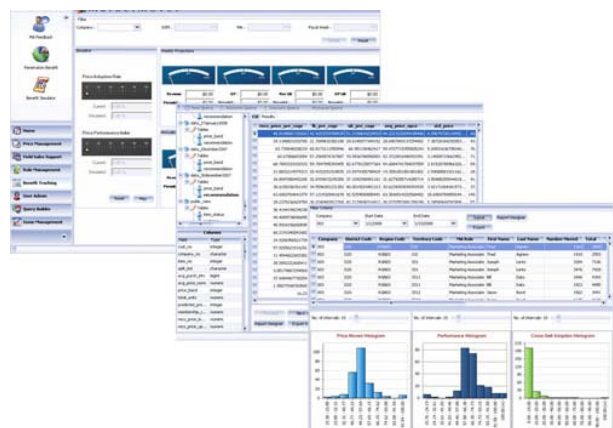


- Modeling the system via performance benchmarking for scalability analysis
- Analyzing and optimizing code response time as a part of daily unit testing cycles
- Testing and tuning system performance

Enosis first developed a proof-of-concept (POC) over a period of several months to meet the stringent performance and scalability requirements. The POC covered 20 per cent of the functionality and 80 per cent of the non-functional complexities. This helped in generating a capacity planning document for hardware and software investment over the next few years. During the POC phase, Enosis gained valuable insights on performance, tuning, and handling with very large databases. After the successful execution of the POC, Enosis started the full scale application development which includes:

**Performance Expectations**

Client was very particular about the performance, making the Enosis team confront this challenge by building stringently reviewed and tested application blocks and using best practices from the start.



Software Screen Shots

Best practice checklists were produced to make sure that the code of each component was carefully designed and developed to meet performance expectations. Enosis has a small dedicated team for running performance and stress tests; analyzing and tuning the application to meet such requirements.

**Database Optimization**

Another requirement of the project was to ensure that the application could scale to handle a database larger than 1.8 Terabyte in size. With the help of the Microsoft SQL Server™, Enosis team used best practices for tuning Very Large Databases (VLDB). The schema of the existing database had evolved over a decade, so one of the constraints of the project was not to alter the schema, as the impact on the application would be significant. Endeavors were limited to tuning queries, indexes, and stored procedures. Using best practices, we were able to tune the query execution times by multiple factors.

The application comprises of two key facets:

- **Back-end modeling & optimization system:** This module imports customer transaction information from database, on a daily basis and optimizes the econometric demand models.
- **Client facing application:** The .Net application provides wide range of functionality to support the enterprise users engaged in execution of the entire pricing cycle, as efficiently as possible.

***Distribution of Roles***

While our counterpart in Washington, DC, USA has been refining & re-estimating the demand models, regenerating optimization results and cross-selling recommendations, Enosis has been performing continuous ETL, providing application layer support to the solution, data warehouse queries, workflow management, price & rules management, user administration, data visualization & system monitoring

**DISCERNIBLE BENEFITS:**

- The platform achieved and exceeded every performance target specified in the requirements
- Time reduction in calculating optimum price allows more simulations and higher precision in price recommendations since such pricing involves complex mathematical calculations
- Reduced the database size by 13 GB by tuning the database design with no impact on performance
- Significant increase in batch throughput by focusing on SQL tuning

**TOOLS AND TECHNOLOGIES**

**Programming Language:** C#.NET

**Database:** Greenplum, SQLServer2008, SQLite