

How a Financial Services Company Delivers Giga-Scale Offer Management With the FICO® Blaze Advisor® Decision Rules Management System

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Executive Summary

This technical case study of a medium-sized financial services company provides a view into the power of modern decisioning technology. The complexity of the direct marketing application cited in this case study and the data volumes processed by this medium-sized company are more in keeping with those of a large enterprise. Therefore, this case study demonstrates how decision rules and big data technology can enable a smaller financial services company to compete with enterprises many times its size while simultaneously driving significant net-new revenue that otherwise would have been a lost business opportunity.

Introduction

Decision rules management technology has a long and distinguished association with the financial services industry. The reason for this stems from the timeliness, complexity, and precision that is required to assess credit risk, examine fraud, and engage in targeted direct marketing. Not only are there many criteria to be evaluated, but how these criteria are evaluated changes frequently, the window for evaluation can be exceedingly short, and the data that describes each opportunity or concern is continually changing. This is exactly the use case that decision rules management technology was designed to address.

The client in this case study is a well-established financial services company in EMEA. Their challenge was to enable new business and revenue growth through more timely and relevant product offers that complied with risk management criteria. This would be accomplished by developing a detailed and up-to-date understanding of a prospect's financial status and then presenting an offer that was relevant to the customer and fit within the company's risk parameters. A new direct marketing business application was designed and developed in under two months to implement the following capabilities:

- Proactively identify prospects for financial services and assess eligibility for inclusion in marketing campaigns.
- For each eligible prospect, select the most relevant product offer and approach through optimal channel of direct marketing.
- Process large volumes of data efficiently, extend timely enticements, and improve deal-close and performance metrics.

Analysis

This direct marketing solution is a single-batch application driven by two distinct decision rule services. The first decision service focuses on eligibility and uses an evaluation of credit risk to determine inclusion in financial service marketing campaigns. The second decision service centers on offer management. It decides how prospects should be aligned with relevant product offers and then determines the prospect's propensity to engage, which drives the choice of channel for outreach. The complexity of identifying highly qualified prospects, the scale of processing, and resource/timing limitations make this solution a significant technical challenge to implement.

Although we will describe the eligibility and offer management decision services separately, the two services are invoked sequentially. Prior to running this decision service, an extract/transform/load (ETL) process updates prospect records based on real-time financial events that could impact their eligibility. Once the prospect updates are complete, the eligibility decision service evaluates the credit risk of each of the 20 million prospects. These results are then passed to the offer management decision service, which determines what offers to make to the prospect and assigns a delivery channel for each offer.

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Eligibility Decision Service

In this direct marketing application, the eligibility decision service must process close to 20 million prospects to identify qualified leads. While this is clearly a significant workload, the window for overall processing of the direct marketing application is just six hours resourced by five virtual x64 nodes where each CPU has eight cores and 16 GB of RAM. More than 250 decision rules are needed in the eligibility decision service to determine the credit risk of a prospect. Using decision rules was very important to the financial service company because the ease with which nontechnical staff can modify rules allowed them to avoid the alternative: having developers code and maintain the rules in Java.

The infrastructural platform for this processing was paired with the Spring Batch framework because of its lightweight yet comprehensive set of services for processing high-volume datasets and its support for a wide variety of distributed processing models. Apache HBase was also a critical part of the solution because of its columnar database design, which enables read/write actions to be performed between one and two orders of magnitude faster than conventional relational databases. Using HBase was necessary in order to fit within the six-hour processing window. Because HBase runs on top of the Hadoop Distributed File System (HDFS), this also meant that the decision rules management system needed to support Hadoop in writing and executing decision logic with big data.

The FICO® Blaze Advisor® decision rules management system was the preferred technology for decision rules management for a variety of reasons. First, Blaze Advisor can be deployed in an Apache Hadoop framework. Second, Blaze Advisor also delivers best-in-class performance for both inference-based and sequential rules execution. Performance was a critical consideration due to the high volume of prospects to evaluate, limited resources, and short processing window. Inference-based execution in Blaze Advisor was ideal due its flexibility in supporting real-time processing of events, data, rules, and processes. In this application, compiled sequential rule execution was selected because it was better aligned with the batch processing characteristics of the application and its performance was outstanding—more than 20 times faster than sequential rule execution in Blaze Advisor.

Offer Management Decision Service

The offer management decision service of this direct marketing application uses predictive analytics to identify and select product offers for each eligible prospect. It then prioritizes those offers and determines the most appropriate channel (mail, phone, or digital) for delivering an offer to the prospect. The offer management decision service requires nearly 1,400 decision rules to select, prioritize, and assign offer delivery channels for eligible prospects.

The platform for processing these decision services was the company's five-node cluster. Overall processing time for both decision services (a total of 1,650 rules) was 1.5 hours. This not only easily fit within the six-hour processing window, but analysis showed that the complex decision rules processing took only 1.4 milliseconds per record. This shows the tremendous performance advantage that the Blaze Advisor system's compiled sequential processing offers in a straight-through processing scenario.

The integration of real-time financial events combined with the precision of a sizable number of decision rules enabled the company to deliver offers that were perfectly aligned with customer needs. The result was a much higher conversion rate, which drove significant new revenues. These deals also performed within the company's risk profile and delivered better margins due to the increased precision in prioritizing offers and channels based on current customer needs.

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Direct Marketing Application Architecture

Activities of the direct marketing application are primarily orchestrated by the Batch Decision Engine, which runs on top of Spring Batch and manages operation of the eligibility and offer management decision services. Those decision services are executed by the FICO Blaze Advisor Rule Server. A columnar database (HBase) is used to manage source data and intermediate results and is accessed through the HBase Java API. Spring Batch services drive job processing and transaction management and facilitate partition-based distributed processing. Figure 1 provides a schematic of how processing occurs in the direct marketing application.

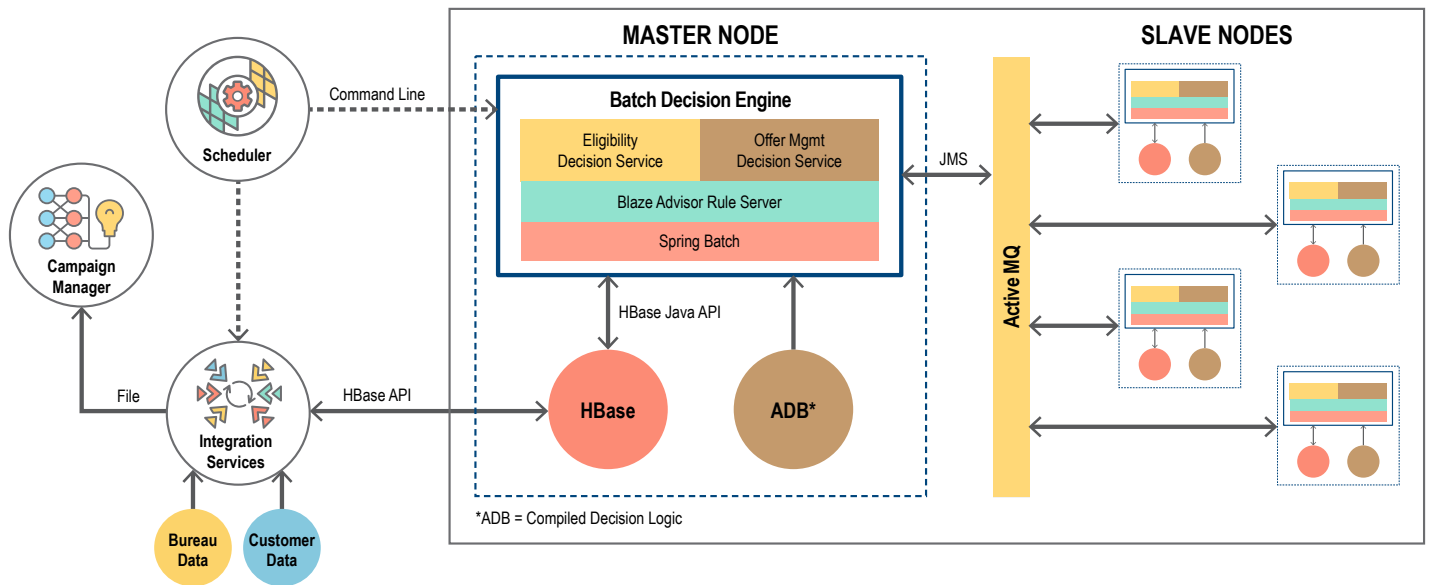


Figure 1. Direct Marketing Application Architecture

The master node in Figure 1 includes all of the components and processes necessary to address the direct marketing application needs. However, due to the narrow processing window and high volume of records to be processed, the data is partitioned (segmented) and reliably queued/distributed through a combination of JMS and Active MQ to the slave nodes for processing. Each slave node is effectively an identical replica of the master node, and all nodes share the workload partition processing. When processing of a partition is complete, the results are routed back to the master node. Once all partitions are processed and the results are aggregated and stored back in the HBase master-node database, the processing is complete.

Once processing is complete, the results are leveraged by the Campaign Manager, which is used by the marketing team to run and monitor marketing campaigns.

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EMA Perspective

The success of this application demonstrates the extraordinary power of decision rules in delivering a highly precise method to determine the most appropriate actions specific to each prospect. When hundreds or thousands of rules are necessary to make effective decisions, the operational scale of defining, managing, and updating these rules requires the use of a decision rules management system. The Blaze Advisor system's ability to execute decision rules through inferencing, sequential, or compiled sequential methods provides the flexibility to meet a wide range of use cases with varying application complexity, latency, performance, manageability, and scalability demands. This application also shows the high-performance capabilities of Blaze Advisor, a characteristic that is often overlooked.

The ability to deploy Blaze Advisor on top of a Spring Batch framework or alternatively on an Apache Spark/Hadoop framework has been a feature of Blaze Advisor for many years. Combining Blaze Advisor with Hadoop or Spring Batch provides the opportunity for massive distributed processing of data and decision services while leveraging a denormalized schema that can be optimized for rapid row-oriented data access. These features enable the high-performance processing that is necessary to process gigabytes or terabytes of data in ultra-short time frames.

While this financial services company did not share application results in financial terms, the ability of Blaze Advisor to apply compiled sequential execution mode to decision logic without changes or added complexity in rule repository implementation significantly improved decision performance. This resulted in less process burden, which drove operational costs down while driving net-new revenue up. By including decision rules in the offer management application, which aligned the choice of delivery channel with the expected value of the offer, the company was able to further improve the margin on accepted offers. However, the most compelling financial result was that, through the combination of Blaze Advisor, a big data technology stack, and event-driven updates, this company rapidly developed a modern revenue-generating solution that would otherwise simply have been a missed business opportunity.

Finally, this case study comes from a medium-sized financial services company and is a perfect example of how decision rules can bring agility and a software-driven solution to new business development. Agility enabled not just the rapid development of complex decision logic but also provided a way to quickly test new business ideas. This agility and transition toward software-driven business is an important characteristic of the digital transformation that is the hallmark of successful enterprises today. This case study also shows the utility of using decision rules to mine big data in effective new ways as this data mining enabled the company to address new business opportunities and compete with larger enterprises many times its size.

About FICO

FICO (NYSE: FICO) powers decisions that help people and businesses around the world prosper. Founded in 1956 and based in Silicon Valley, the company is a pioneer in the use of predictive analytics and data science to improve operational decisions. FICO holds more than 165 US and foreign patents on technologies that increase profitability, customer satisfaction, and growth for businesses in financial services, telecommunications, health care, retail, and many other industries. Using FICO solutions, businesses in more than 100 countries do everything from protecting 2.6 billion payment cards from fraud, to helping people get credit, to ensuring that millions of airplanes and rental cars are in the right place at the right time. Learn more at www.fico.com.

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