MODERNSYSTEMS

CASE STUDY

GE CAPITAL

ASSESSING, CONVERTING, & REPLATFORMING A MASSIVE BUSINESS CRITICAL APPLICATION WITH ASTONISHING RESULTS

Introduction

GE Capital is the financial services unit of the American conglomerate General Electric, it provides commercial lending and leasing, as well as a range of financial services for consumers. Most of GE Capital's commercial loans are to small and midsized companies, spread across multiple industries and geographies, and secured by tangible assets. GE Capital's consumer lending activities are also diversified by product and geography and include operations in 55 countries.

Project Summary

GE Capital was looking to move their PMS suite of applications from ADS/O and COBOL/IDMS running on a mainframe, to COBOL running with Oracle on Unix without changing the user interface in the process. PMS was built by GE Capital in 1987 and began its life as a 20,000 account schedule system without any interfaces.

As with most homegrown systems, it was built out of necessity and to serve the business as it existed at the time. Over the decades, this small system grew in size and complexity to become the central nervous system of both GE Capital's direct and indirect business units comprised of four highly customized implementations. With over 5 million account schedules, 382 interfaces, 1,700 concurrent users, and 3.5 million transactions per day running against 71 million lines of code, the PMS system had come a long way from its humble roots. "PMS is the sun in the universe of the GE Capital leasing business. This is a system that if it goes down, we are out of business at a very expensive cost" explained Marc Rubel, Executive Director of Application Development at GE Capital.

GE Capital

$ 2014 Net Income: $7.0 billion

2014 Assets: $499 billion

Operations in 40+ Countries

500,000+ Commercial Customers

35,000+ Employees
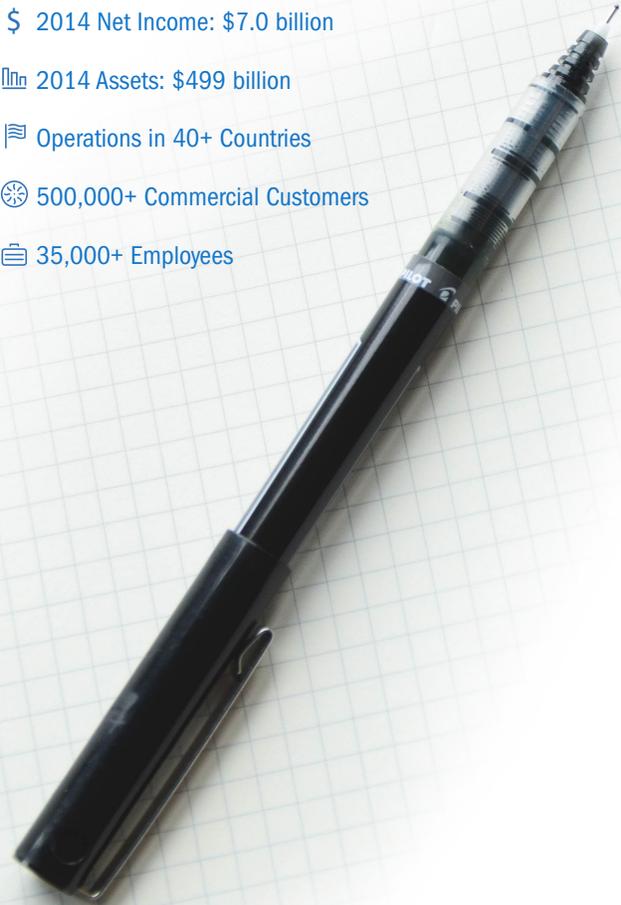
The Approach

To tackle this project, GE Capital selected Modern Systems for the conversion work, TmaxSoft for their OpenFrame Linux-based replatforming solution, and MicroFocus for their COBOL Compiler. Modern Systems was responsible for the mainframe assessment, ADS/O conversion to COBOL, database design, and data migration. OpenFrame provided various components to emulate the functionality of the different sections of the mainframe (CICS COBOL emulation, batch procsssing, etc.) and was the ultimate landing place for the new open systems environment hosting the PMS suite of applications.

Project Summary

Why Modernize

For GE Capital, the need to modernize came down to three key issues:

· The present generation of application designers and programmers were unfamiliar with the technologies and methods used in legacy systems development. This knowledge gap rendered the systems almost impossible to understand, maintain, modify, and adapt to changing needs. As Rubel put it, "The kids coming out of school don't want to know about IDMS and ADS/Online, it's just not attractive from an employee standpoint."

· Modern disaster recovery systems are not designed to provide the same security and continuity for mainframes as for newer environments. While the DR and high availability framework that was in place for the mainframe at the time was marginally acceptable, there was clearly room for improvement.

· The rate of change is increasing, not just for GE Capital, but for the financial space in general. With the ratification of new rules and regulations occurring at an increasing rate, the need for nimble change has become paramount. "… but we're on the mainframe. It's not fast, it's not efficient, we can't change as fast as we need to", said Rubel. He continued, "In fact, the firm's ability to innovate was actually hampered by the fact that we were on this flat file database. You had to go through the mainframe, through a middleware conversion, then from EBCDIC to ASCII… we were slowing down the rest of our business."
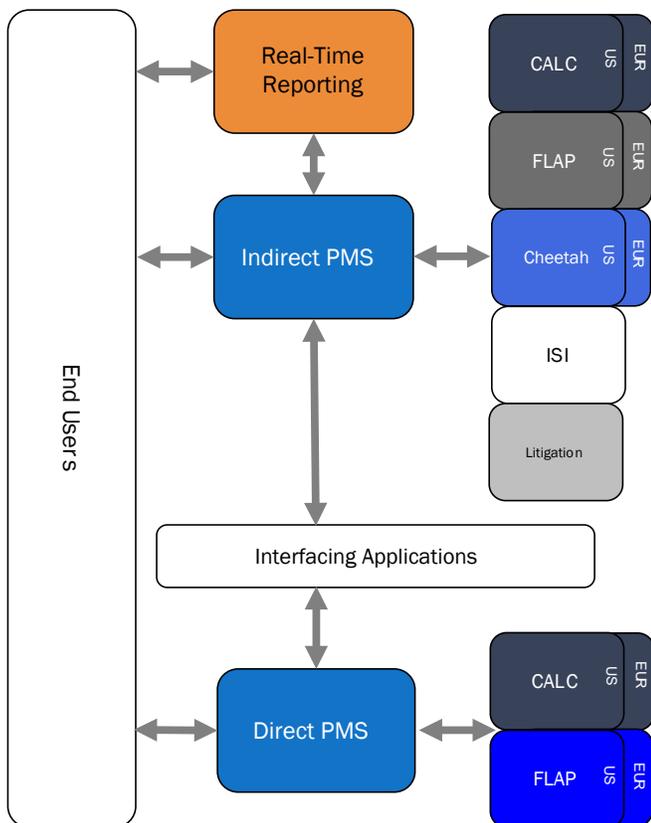
PMS Environment Statistics	
Applications	8
Databases	5
Interfaces	382
MIPS	900
Concurrent Users	1,731
User Screens	2,000
Batch Jobs	9,000
Transactions/Day	3,492,907
Lines of Code	71,000,000

PMS Technical Stack	
Hardware	IBM Z9
Operating System	Z/OS
Database Management System	CA-IDMS v16
Programming Languages	ADS/O
	OS/VS COBOL
	DC COBOL
	Fortran
	REXX
	Easytrieve/Culprit

GE CAPITAL PMS ARCHITECTURE

Diagram labels: End Users, Real-Time Reporting, Indirect PMS, Interfacing Applications, Direct PMS, CALC, FLAP, Cheetah, ISI, Litigation, US, EUR

Project Phases

Phase 1: Proof of Concept

GE Capital chose to test drive the Modern Systems and TmaxSoft technologies through a proof of concept.

"We spent a very little amount of time, a little amount of money," recalled Marc Rubel. "And we did this proof of concept within a month. We converted a small amount of code and we really wanted to see what the compile and promote process inside of Openframe looked like. Do I need to retrain my entire staff to be able to support this application?" To the delight of Rubel and his team, the proof of concept demonstrated that the target code was well-formed and easily maintainable, and the IDMS database converted as they expected with no surprises.

Phase 2: Assessment

The assessment began with a question-and-answer session and ended with the presentation of findings and plans for the modernization effort. In the end, the Assessment resulted in a complete understanding of the PMS processing environment.

While it was obvious that PMS had outgrown its humble beginnings and its current state was more of a hindrance to the business than a help, Rubel was faced with a vexing problem, "The motto, when I joined this organization was 'don't delete anything, we might need it again'." With 71 million lines of code to sift through, he needed a well devised plan to have any chance of success with such a massive undertaking.

Modern Systems was responsible for conducting a mainframe Assessment and formulating a plan of attack to ensure the PMS suite of applications could be replatformed successfully without the users noticing, while delivering an ROI in under 24 months.

In addition, Modern Systems used DB-Shuttle™ automation technology to allow preliminary conversion of the database design and application software to further define areas of concentration, an effort that was instrumental in preparation of the project plan for the full conversion and replatforming effort.

"These areas of concentration are the things Modern Systems found that made us unique. Some of them were big, some of them were very small. Regardless, we identified 22 of these unique areas that needed to be addressed before we could move forward. We found languages that nobody knows anymore, so it was critical information and reduced the cost and the scope of this project greatly", explained Rubel.

When asked what the major benefits of going through an Assessment with Modern Systems were, Marc Rubel and his team at GE Capital pointed out three:

· **Reduced Scope** - By understanding the PMS application suite at its core, GE Capital and Modern Systems were able to reduce the scope of the project by 78%. "It turns out that of the 71 million lines of code we had in PMS, we only used 16 million. Insane, absolutely insane" recalled Rubel.

· **Informed Decision Making** - One of the many reports delivered to GE Capital as a result of the Assessment detailed all of the different languages and technologies found hiding in their legacy environment. In GE Capital's case, 27 different code syntaxes. Much of the contents of the PMS system was a mystery to the team. Through interpretation of reports and collaborative discussions with Modern Systems, Rubel was in a position to make smarter and more effective decisions about how to approach the modernization effort.

· **A Plan** - Armed with the information to make better decisions, a reduced scope, a true understanding of their applications, and more than 30 years of experience from the Modern Systems team, GE Capital devised a clear plan backed by specific tactics and highlighted areas of concentration to ensure the project was a success.

Project Phases

> **I have to be honest, I wondered why I was paying Modern Systems to figure out what my application did. I thought I knew what my application did, but I was wrong. I wasn't even close. They showed me how much more there was than I assumed. My skepticism evolved into the realization that this Assessment was one of the best things we did in this project.**
>
> **Marc Rubel, Executive Director of Application Development, GE Capital**

Phase 3: Pilot

In maintaining a conservative approach to revamping the PMS system, GE Capital's senior management team preferred to move from a proof of concept to a pilot. The key difference being that the pilot would take a relatively large chunk (roughly 5%) of the legacy application, convert the ADS/O to COBOL, transform the data and databases into the relational Oracle DB, and deploy it into the TmaxSoft OpenFrame product running on a Unix environment in GE Capital's own data center.

"We were looking to accomplish two things with the pilot. The first was to prove out that the solution would work on GE hardware under our roof, and the second was to prove beyond a shadow of a doubt to the user base that their UI wasn't going to change", explained Marc Rubel.

The pilot phase also gave GE Capital, Modern Systems, and TmaxSoft the opportunity to work through a larger population of technical nuances such as popups and testing of critical path functionality.

Once the pilot was complete, Rubel and his team knew the OpenFrame software and converted applications would run well in their newly replatformed home at GE Capital and the user base would retain all of the functionality they were used to, down to the very last detail. "One of my systems analysts was attempting to help one of our users with a data problem. He searched high and low, driving himself crazy trying to find it. After a number of screen shares and troubleshooting steps, he realized that while he thought he was on the mainframe looking for this data, he was actually on the newly replatformed Unix environment. In other words, even my most senior guys, the guys who designed and built the original setup, couldn't tell the difference", Rubel explained excitedly.

> **"The applications in general looked the same to me. I utilized the same key functions as I would in normal PMS. It felt like just another PMS mainframe session. I didn't see any issues as far as the look and the maneuvering from one option to the next."**
> **GE Capital PMS User**

> **"Of everything that I saw and tested, there was no noticeable difference between the replatformed system and production PMS."**
> **GE Capital PMS User**

Project Phases

Phase 4: Build

As the cross-functional teams continued to build out the project plan for PMS replatforming, it became apparent that the system was so deeply tied into ancillary platforms and services that GE Capital had to plan seven additional sub-projects in parallel with the PMS application modernization effort. While some of these were small and manageable, others such as the modernization of GE Capital's FLAP pricing system required a separate budget, its own project manager, its own development resources, and project plan. Marc says "Look, it's important to understand that these systems are huge by nature, they're going to touch other systems, there will be effort needed in places you didn't expect. The key is to get the right kind of visibility to understand where these roadblocks might come up before they're screaming in your face."

During the build phase, Modern Systems converted all of the source application code to COBOL, converted the IDMS databases to Oracle, and delivered the DDLs and extract/load programs to GE Capital. In parallel, TmaxSoft translated the JCL streams, converted EBCDIC to ASCII, and installed and configured OpenFrame in Unix to host the replatformed PMS application.

In the end, the remaining 95% of the PMS application suite, data, and databases were converted and ready to begin their new life in a Unix world within four months and were on track to deliver an ROI of 1.8 years. On the relatively short build timeframe, Rubel noted "Once you do the pre-work, and that's why I stress that assessment so much, the build is easy. The automation Modern Systems has for that code is really cool."

Phase 5: User Acceptance Testing

The PMS application's tentacles wrapped their way around so many systems and processes at GE Capital, a failure in testing could have spelled certain disaster. In fact, the business spent more time and energy in the testing phase than in any other. Rubel, his team, and the departments dependent on PMS created over 4,800 test scripts which they ran multiple times. The testing process was so comprehensive, all 303 business users responsible for testing and signing off on the newly replatformed system were also responsible for doing their day jobs.

"There were three, four, five rounds of this testing. When users' tests passed, they didn't want to believe it. That's how important the smooth operation of this system was to these users", recalled Rubel.

Although the testing phase was carried out over thirteen months, longer than most projects of this magnitude, GE Capital's situation was complicated. He continued, "We didn't have a professional testing organization, these are the super users that are running a test script and in the middle picking up a call to service a customer, and then coming back and trying to pick up where they were again."

Addressing the results, Rubel said "The defects were pretty much what we expected. Most of them were in batch and online, they were easy to resolve. A sprinkling of others were in the performance category, which were to be expected. A few adjustments and we were on our way. Nothing monumental or out of the ordinary."

Project Phases

Phase 6: Deployments

PMS' transition into the Unix world was split into two initiatives, the direct business system and the indirect business system. The first deployment took place over a weekend, taking roughly 34 hours of GE Capital, Modern Systems, and TmaxSoft time.

"The extract and load process took sixteen hours in that first implementation, almost half the deployment time", remarked Rubel. "Amazingly," he continued, "in the first 72 hours there were only 29 minor issues opened during final testing. Pretty cool."

The second implementation, an instance of the PMS application suite that was ten times the size of the first implementation's, took slightly longer than the first. After 48 hours of deployment exercises, including 24 hours of extract and load time, the enormous vendor system was up and running. "The direct side system that we implemented first was nothing compared to the vendor system that we did second. It was a do-or-die situation. After it was all over, I was floored by the fact that there were only fourteen issues raised in final testing in the first 72 hours. That's unheard of. These deployments went well. They went really, really well," Rubel remembered.

Conclusion

The modernization of GE Capital's PMS application suite and the data that drove it took more than a year to complete. The 71 million lines-of-code system moved from an ancient mainframe environment to a modern, open Unix environment with astonishing results.

GE Capital's annual run cost for the PMS system and related applications fell by 66%, the time it took for PMS to recover from disaster decreased by 240%, and the overall application footprint shrunk by 78%. While the cost savings were enormous, the most positive result for Rubel was moving to a platform that integrated easily with the rest of the business that supported growth and innovation.

About Modern Systems

Modern Systems, Inc. is the leading provider of legacy language and database modernization. Leveraging over 30 years of best-practice domain expertise, Modern Systems works closely with its customers to minimize risk and provide a clear path from legacy platforms like COBOL, Natural/Adabas and others to modern solutions like SQL, DB2, Java and more. Modern Systems was chosen by WAL-Mart to modernize the world's largest order system. We've also modernized the world's largest trading platform. Modern Systems has offices in the USA, UK, Italy, Romania, and Israel.