McKesson software group embraces RPG IV, ILE, WebFacing, and Java to transform its own

While also helping to transform its customers into modern, efficient, and quality-driven healthcare

“Tell it to me straight, Doc,” is a familiar American idiom that is a perfect way to begin this story. So here is the punch line to this information-packed story about McKesson Series 2000 (a group within McKesson Provider Technologies)…

Moving to RPG IV and the IBM integrated language environment (ILE) on the IBM iSeries platform will allow this developer group to reduce its six million lines of RPG/400 code by 40% to 55%, dramatically cutting its maintenance costs, shortening its development cycle, and thus increasing the new functionality it can cost-effectively bring to its customers in very short deployment timeframes.

Now, let's back up and explain who we are talking about. McKesson Corporation is no small player in the health industry. Founded in 1833, with annual revenues of more than $80 billion (US), McKesson ranks as the 15th largest industrial company in the United States, and is the leading provider of health-related supply, information, and care management products, and services. It should be no surprise that one of its divisions, McKesson Provider Technologies, is the leader in software, hardware, automation, services, and consulting to hospitals, physician offices, and home health facilities. Its solutions are designed to improve patient safety and reduce the cost and variability of care, improve healthcare efficiency and better manage revenue streams and resources.

Self-diagnosis: Modularize the code

The common theme throughout the healthcare giant's many Web sites is to improve, modernize, streamline, and instill quality. So it is not surprising that these would be the drivers that have motivated the McKesson Series 2000 group to focus intently on lifting the quality of its widely popular hospital admissions, registration, and order entry applications that run on the IBM iSeries platform. According to Chuck Gerlach, a senior technical development advisor for Series, and co-leader of its ongoing application modernization tasks, “We have come a long, long way from the green-screen RPG applications that were our mainstay in 1978. In fact, our code was originally migrated from the IBM System 3 platform where its user interface was driven by CCP code. That's longevity!” The code ultimately migrated to RPG III for the IBM System/38 environment and then to RPG/400 when the applications were moved to the IBM AS/400® platform in 1990.
With six million lines of code, these recurring code migrations represented quite a significant effort. And the migrating wasn’t done yet. Developers began hitting the capacity limits of the programming technologies (Control Language Program [CLP], data description specifications [DDS], and RPG III).

**Preliminary clinical treatment**

**Migrate to RPG IV**

In 2000, after much research, as well as guidance from respected IBM consultants, the decision was made to migrate once again, this time, to RPG IV. Steve Baumann, who is also a technical development advisor with the Series group, points out that moving to RPG IV does not require the use of RPG integrated language environment (ILE) concepts and has many benefits in its own right. So, the development team began using RPG IV immediately for all new and rewritten programs. Internal standards were updated and education was given to the entire staff, who then began changing the internal utilities to support RPG IV. This process went quickly, considering the volume of existing code. All these changes were reflected in the 2001 application software release.

**Primary care treatment:**

**Embrace ILE**

Importantly, RPG IV also serves as the building block for the RPG integrated language environment. Both Baumann and Gerlach are clear that, from the first self-diagnosis, the ILE benefits were the primary objective for this McKesson group:

- Reusable modules can be created to reduce program sizes and cut development costs.
- Activation groups isolate programs and procedures.
- Support for service programs centralizes common procedures.
- Integration with other languages (including C and Java) is inherent.
- Coding and testing times are reduced when the ILE is implemented.

Because of the size of future enhancements on the Series 2000 to-do list, including Web services and portlets, implementing the ILE concepts needed to commence very quickly. Baumann describes 2001 as the “year of the ILE,” further explaining that “This was the year we began exploiting the development environment we had been hearing about, and yearning for, during the past two years. The ILE concepts were implemented in small amounts as early as the 2002 application release. In parallel, the team also implemented system-wide functional enhancements to take advantage of ILE concepts and improve development and maintenance efficiencies. Gerlach is quite clear that a great deal of planning is necessary to utilize the ILE well. We also had to expend a lot of energy holding the developers to the plan. “We outlined changes to implement with ILE standards to support future enhancements. We put together a team to create a prototype. Several types of programs were selected to test various approaches. The ILE was great, allowing us to use a trial-and-error process.”

The McKesson group also needed to design a set of methodologies so that RPG III programs (that used the original program model) and RPG IV programs (that used ILE concepts) could co-exist. “That, alone, was a tricky thing, but was well worth constructing because it allowed us to move forward incrementally and cost-efficiently,” Gerlach says.

Baumann and Gerlach were willing to go into some level of detail about this effort, and for the sake of those readers who need to accomplish a similar move to ILE, here are some of the more critical recommendations that worked well for them. The prototype, which took three people and four or five well-invested months to develop, included:

- Standards for activation group, RPG IV, and ILE usage
- Service programs for some initial common procedures
- Bindable modules for common tasks
- A plan for additional common routines
- A new utility program for use after initial program conversion to RPG IV (to automate some code changes based on new standards)
- An list of changes needed to the utility programs
- A step-by-step guide for use by the development staff

*Of all the modernization efforts we embarked upon, by far, our diligent foray into the integrated language environment has delivered the most enormous set of benefits. We like to say we took one small step to RPG IV and one giant leap from RPG IV to ILE!”*  

— Chuck Gerlach and Steve Baumann, technical development advisors  
McKesson Provider Technologies
Designing the standards was its own challenge. Gerlach explains, "We had to come up with naming conventions and define relationships between activation groups, service programs, and modules. We also had to stipulate (and police) when to create service programs, modules, or stand alone programs."

One small step to RPG IV...

```
*** Patient sex code must be in table file.
*
C  eval        xxqkey = iwsex
C  eval        xxqtid = 'SX'
C  chn        PFQTSX
C  if         not %found(BSYMQTU)
C  eval        xxmuid = 'UHP4224'
C  eval        SMSGQ
C  eval        *IN35 = *ON
C  end f
```

Other recommendations this duo would make to developer teams include focusing heavily on staff education. Training was required at IBM locations for RPG IV and the ILE, and additional education was needed back at the office regarding the new internal standards. Baumann laughed about the "iterate, iterate, iterate" phrase that caught on a few years ago in reference to code reuse. In regard to education, his version of this thrice-repeated mantra is, "Clarity, clarity, clarity. When you think they've got a grasp of the new internal standards, explain it again, anyway."

One internal standard invoked by this McKesson development group was that new procedures and common task modules must be approved and controlled by the systems team. This was important because the systems team maintained a master list of available procedures. They were in a position to ensure unique procedure names and verify the appropriateness of new procedures.

Baumann mentions that many times a staffer wanted to write a new procedure when one already existed. "This is one of the cultural phenomena of shifting traditional RPG programmers to work in an integrated language environment," he continues. "These guys have spent decades coding in an RPG III environment where reusable procedures were not available. The systems team was charged with supporting the developers in not writing redundant functionality. Instead, we wanted to write it once and use it a million times."

It goes without saying that common code was reviewed and pulled from individual programs to become a common use module. "Part of the database I/O was externalized to reduce future development efforts, which was an enormously productive change to make," states Gerlach.

The important final step in the move to the ILE was that after each project was written, again according to Gerlach (who also seems to like stressing things three times), "We tested, tested, tested! We tested internally, we did coordinated load testing, we used performance tools, and we tested in real world environments. The ILE is quite conducive to testing and tweaking, so we are now delivering better quality releases, Day-1."

When asked about the "best bang for the buck," Gerlach and Baumann had some ready answers. The following list is presented in their exuberant words:

- Replacing common code with procedures (We love this!)
- Creating the step-by-step guide (It was invaluable to our staff.)
- Improving readability by using mixed case in the code
- Documenting the available procedures and common-use modules thoroughly
- Establishing detailed programming standards
- Using activation groups
Recreating the interfaces
Like the IBM iSeries platform, McKesson Series customers (whose facilities generally support from 10 to 500 beds) are very dedicated to their applications. But as has been true for IBM Business Partners around the world, McKesson faced the immovable need to provide graphical interfaces to keep its products sellable to new customers. Because of this, a separate team also began a project in 2000 (in parallel with the move to RPG IV and the ILE) to use the IBM WebFacing Tool to put a browser-based set of user interfaces into its applications mix. This project is now complete. The Series 2000 group offers both its 5250 interfaces and its browser-based interfaces, though more and more of its customers are moving to the easier-to-learn and use graphical screens.

Delivering a Web presence
The IBM WebFacing Tool is part of a strategic plan for McKesson. Along with the ILE, it supports the group’s commitment to build portlets and Web services that link in with McKesson Development Technologies’ division-wide portal. Even though the master McKesson portal is driven by the Bea WebLogic Portal Server and is running in a UNIX® environment on a Microsoft® Windows® server, the Series 2000 interfaces easily adapt the same look and feel of the portal that links to them. Gerlach, Baumann, and the rest of the development team have learned to use JavaServer™ Pages (JSPs™) and other Web methodologies, coupled with the classes provided in the IBM Toolbox for Java that support connectivity with IBM DB2 Universal Database™ (DB2® UDB) for iSeries data. This toolbox also provides McKesson with classes to call RPG procedures from the ILE. Blending Java and RPG is part of the daily routine for Series 2000.

Future prognosis
When Gerlach and Baumann describe the actual results of moving to RPG IV and the integrated development environment, you can’t help but feel their grins, even through the telephone. The original 6 million lines of code can be reduced by as much as 55%. Yet, the function delivered by this reduced codeset has expanded, and development of new functions and applications is, according to these two guys, “light-years ahead of the old development process, deployment time, and costs that were incurred just five years ago.

Coupled with the new browser-based graphical interfaces and Java connectivity, McKesson Series 2000 is truly more energetic and younger than ever. This division is continuing to do more of the same. They are rewriting remaining OPM functions when affected by enhancements. Everything is written using ILE standards. Happily, the company’s no-other-choice decision to move to RPG IV, embrace the ILE, and put graphical faces on its applications has been the miracle everyone had prayed for.

For more information
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