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How to Leverage RPG and RDi as Modern Development Business Tools

Tim Rowe, Charlie Guarino and Paul Tuohy on what sets RPG apart from other programming languages, how RDi automates and simplifies development, and what's next in the RPG roadmap

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RPG and RDi: Modern Development Business Tools



Although RPG boasts a rich history, it's anything but dated. RPG is more than a programming language—it's a business tool that's integrated neatly within IBM i, making it a must-have in any developer's toolkit.

Logically, modern languages should be supported by modern development tools. That's where Rational Developer for i (RDi) comes in. RDi provides an integrated development environment—featuring tools, debuggers and refactoring capabilities—that's designed to allow users to quickly and more simply create, maintain and modernize applications on the IBM i platform. Combined, RDi serves as an extension of RPG's capabilities.

This e-book features insight from experts including IBM's Tim Rowe, Central Park Data Systems' Charlie Guarino and veteran RPG programmer and developer Paul Tuohy. You'll learn what sets RPG apart from other programming languages, how RDi automates and simplifies development and what's next in the RPG roadmap.

Keelia Estrada Moeller, Senior Editor

Alive and Evolving: The RPG Roadmap

Tim Rowe on IBM's strategic RPG changes, and the role customers play in the modern RPG roadmap

BY SCOTT MCKINNEY

Security. Uptime. Modernization. Hiring. These are chief concerns among IT professionals in general. They also are the top concerns among IBM i shops, according to a [2022 HelpSystems survey](#).

They're also key milestones in the RPG roadmap. RPG, which originated along with COBOL in the late 1950s, is one of the few surviving languages that were used on punch card machines. It evolved into RPG II on IBM System/3 and continues to update into what Tim Rowe, business architect for application development for the IBM i development team, calls "modern RPG."

The fact that many shops have decades-old business-critical applications built in RPG is a testament to the reliability of IBM i. Thanks to IBM's investment protection concept, older RPG II code still runs today. But since RPG has been on a continual path of reinvention throughout its lifespan, those earlier versions don't take advantage of updates in how RPG compiles code to make full use of the underlying infrastructure.

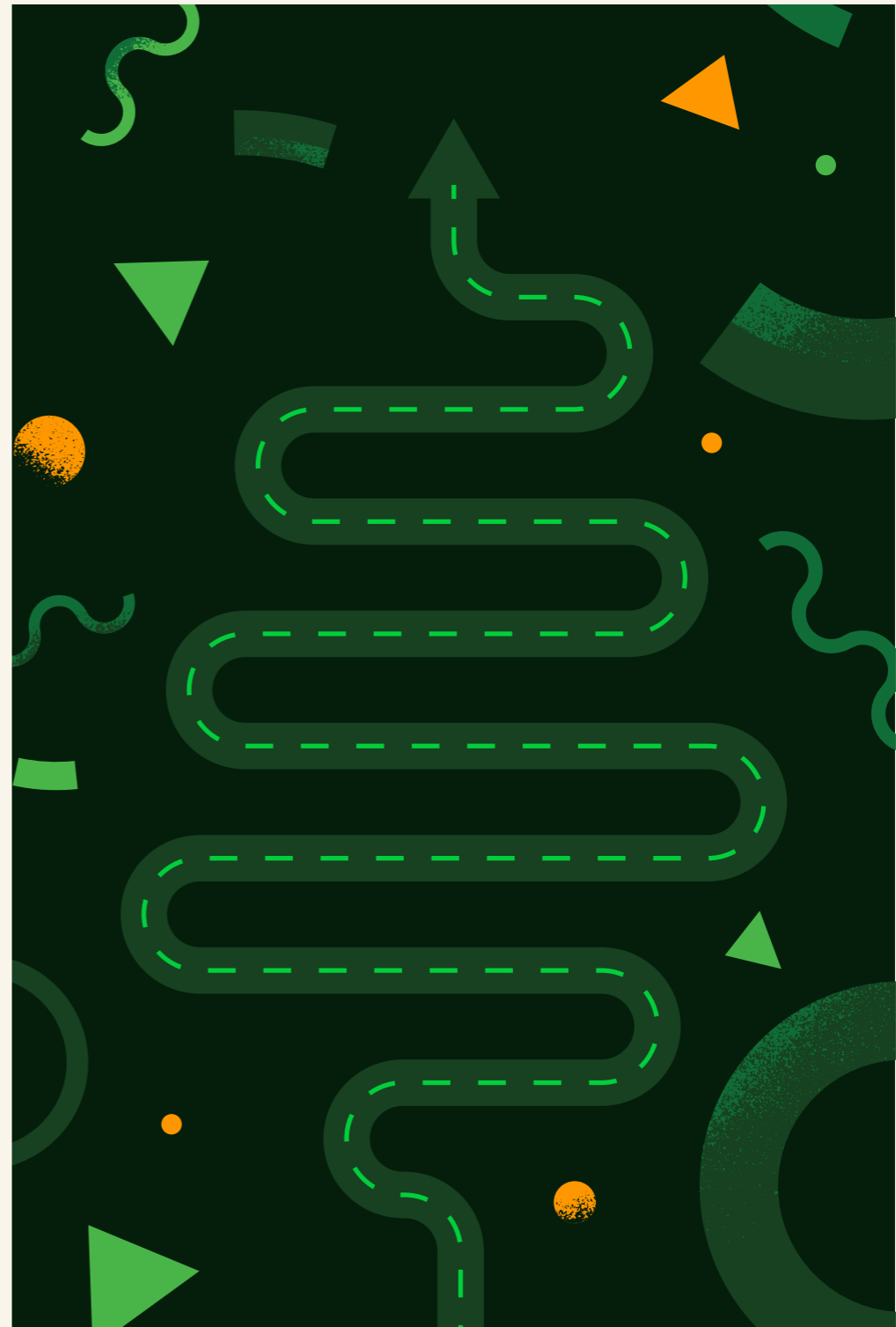
2 Categories of RPG Changes

RPG remains the language of choice for IBM i developers, with about 87% of them using RPG for new development, according to the HelpSystems 2022 survey. One reason is its tightly integrated nature. If you try to write an equivalent program in other languages, it will almost always require more system resources to accomplish the same tasks.

But the real benefits are what's been changed in the language so that the modern developer, who isn't trained in cryptic column base layouts designed for punch cards or standards of older RPG languages, can program and understand it.

“Feature updates over the last decade or so have focused on two major areas: adding base functionality to help programmers perform tasks easier, better and with less code and adding features that are expected in a modern language,” says Rowe.

A lot of built-in functions fall in the first category: for instance, tools to help scan or find text within strings. An example of the second category is free-formatting. Developers of today don't expect languages to have column restrictions, so it was obsolete to maintain a column-dependent format for RPG code.



What's New With RPG

The list of improvements IBM has added into RPG goes on and on. Many of these are topics that the development community asked for as part of the Request for Enhancements (RFE) process.

The ability to work with embedded SQL in RPG, and the SQL services IBM has added, for example, allows users to move from record-based access to set-based access.

“SQL is a modern language, so the fact you can integrate RPG and SQL together and deal with multiple data sets

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like XML and JSON in a reasonable manner is a huge step forward in being able to do things in a modern way,” says Rowe. “The SQL services we’ve added are so powerful, it’s crazy.”

The first SQL services went live with IBM i 7.2 in 2014, and there are now about 100 SQL services. These allow getting user profile information, job information, libraries, programs, objects and information from the IFS in ways that weren’t possible before.

Other improvements include:

- Overloading, as in Java (where you have two features with the same name but distinguished by the number or type of parameters they accept), was added to RPG in 2019.

- Last fall a table function was added that allows you to call REST APIs natively from RPG, using native ILE-based code. “The ability to take an RPG program and interact with REST API conversation in easy, native ways opens the possibility for some new and exciting opportunities,” says Rowe.

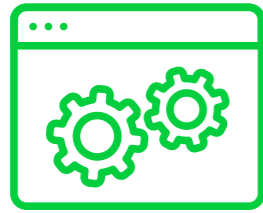
Customers Have an Active Role in Modern RPG

IBM has been proactive in making core strategic changes to RPG, but customers play a key role in adopting modern RPG and using the right development talent to move forward. Part of this is following best development practices to leverage the security, auditability and performance that are tightly built into IBM languages, applications and OSes.

Some organizations take the approach that it’s still working, so why fix it? But using modern, modular code that’s self-documented offers significant benefits. One benefit is broadening the pool of talent who can work in RPG.

“Free-form went in over 10 years ago, yet we still have customers saying they can’t find an RPG programmer,” says Rowe. “Stop looking. If you are doing things in a modern way, you can hire a competent programmer and they can become very successful very quickly with modern RPG.”

Development tools like RDi, along with the **new VS Code editor that Liam Allan developed**, and partnerships with standardized infrastructure source control management like GitHub further help programmers develop RPG in a modern way on IBM i.



“RPG has the ability to be a very modern language if you take advantage of what we put into the OS and into the language.”

—Tim Rowe, business architect for application development, IBM i development team

The process of modernizing RPG code can be broken into smaller steps using these tools. For instance, a small step that many customers would benefit from is a refactoring exercise. RDi has tools that allow you to extract code, create procedures, highlight variables and change cryptic names so they're self-documenting and more maintainable in the future. Additionally, IBM sells the **ARCAD Transformer tool** that will magically convert code to free-form.

What's Next in the RPG Roadmap?

Through the RFE process, IBM continues to deliver RPG updates every six months, adding new functions to the RPG compiler. Those enhancements mainly sit within the

two overarching categories: core new functions to support developers and the features that are expected in modern languages.

“As part of our user community, you have an opportunity to help us determine the key things we're going to be working on,” says Rowe. “RPG has the ability to be a very modern language if you take advantage of what we put into the OS and into the language. What the user chooses to take advantage of will dictate if they're running a modern application or not.” ■

The Latest in RPG Built-in Functions

BY JON PARIS

In the same announcement as the IBM i 7.4 TR4, three new RPG built-in functions—%Upper, %Lower and %Split—were introduced: %Upper, %Lower and %Split.

The purpose of %Upper and %Lower is fairly obvious from their names, and they do exactly what you would expect them to. Namely they take an input string and convert it to all upper (or lower) case.

At first glance these new arrivals might seem somewhat underwhelming. After all, we've all been coding our own versions of these functions for years—normally using %XLATE or SQL's upper/lower case capabilities. So why am I so happy to see them added to the language?

Two reasons: First, in recent years I have spent a lot of time training new RPG programmers. These trainees are usually experienced in other languages and expect such functionality to be available. The lack of this capability in RPG was a "black mark." Second, there is a growing awareness among IBM i users that their applications need to be able to handle text, particularly things like names and addresses, in languages other than English.

The significance of %Split is a bit more obvious. It takes a character string and breaks it up into individual elements. By default, the separator is a space, but it can be any one of several characters specified by the programmer. The result is a temporary array which can be directly processed via a For-each loop or assigned to a regular array.

[Learn more about the new built-in functions](#)

Why RPG Developers Should Be Using RDi

Charlie Guarino and Paul Tuohy explain what sets modern RPG apart from other programming languages and how RDi automates and simplifies the development process

BY NEIL TARDY

That 30+-year-old RPG code continues to be processed in current business applications is a fun piece of trivia, but this factoid doesn't begin to explain the value of modern RPG. It would be like using names such as Silverlake and AS/400 as stand-ins to describe the capabilities of Power10 hardware and IBM i.

To be clear, RPG is a modern language—every bit as modern as JavaScript or Python or anything else programmers currently use. With IBM providing steady updates and enhancements, RPG has advanced and evolved over time.

"RPG is now pretty much indistinguishable from other languages. That's what makes it modern," says veteran RPG programmer and developer Paul Tuohy. "Sure, the old stuff is still out there and it still works, as everything on IBM i does. But if you're new to RPG, you can pick up the basics in a few days, just as you can with any other language."

As neatly as RPG fits into today's programming landscape, it of course still stands apart for the simple reason that—in contrast to more widely recognized programming languages—RPG is a business tool. It's integrated with the system. That's what makes it the primary language of IBM i.

"For any other language to deal with the database, it must do so through SQL. Of course, in a lot of cases, SQL is what you want to use to get at the database, but with RPG you have the advantage of using static SQL, which just makes for an easier integration," says Tuohy.

He adds: "RPG wasn't designed for computing; it wasn't designed for formulas. It's designed for business. Once you're using it for the business part, RPG is absolutely fantastic. No other language comes near."

RPG and RDi: A Potent Combination

Logically, a modern language would be supported by modern development tools. However, for a still-significant number of IBM i shops, this isn't the case. Whether it's a matter of choice or a lack of awareness, many enterprises continue to rely on SEU, PDM or other traditional text-based tools. But there is an alternative: Rational Developer for IBM i (RDi).

RDi provides an integrated development environment—featuring tools, debuggers



and refactoring capabilities—that's designed to allow users to quickly and more simply create, maintain and modernize applications on the IBM i platform. In 2017, HelpSystems, the long-time provider of automation solutions for IBM Power Systems platforms, acquired the RDi product. Under this arrangement, ongoing RDi development is a collaborative effort between HelpSystems and IBM's Toronto-based RPG developers.

Charlie Guarino, president of Central Park Data Systems, which provides consulting services and training on RDi and other IBM i tools and functionality, views RDi as an extension of RPG's capabilities.

"RDi offers such an in-depth view and scope of any programs you're working on. Equally important is that it walks in lockstep with IBM's RPG development. As new features are added to the language, RDi is kept up to date. SEU hasn't been current in almost two decades," says Guarino. "RDi is clearly the tool that you want to use."



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—Charlie Guarino, president, Central Park Data Systems

RDi Purchase Options

RDi can be purchased directly from IBM, through IBM's software sales or systems sales groups or through affiliated business partners. Two versions are available: RDi RPG and COBOL Tools, and RDi and COBOL + Modernization Tools, Java Edition. IBM Support provides a detailed explanation of purchase options.

Using RDi also offers three other benefits:

1. It shortens the learning curve for newbie programmers

The familiar feel of RDi's graphical nature using the PDM perspective allows inexperienced programmers to get comfortable in short order. Guarino believes user productivity spikes with RDi as opposed to text-based editors like SEU, which doesn't fully recognize free-form RPG.

"I've seen it and I've lived it. I speak to people all over the world. They tell me: 'I can't believe I've gone so long without this,' " he says. "IBM has gone to great lengths to make RDi more comfortable and natural to anyone who is new to the platform. With very little training, anyone can easily navigate into RDi and start making basic use of it."

2. The availability of support and resources, starting with the RDi Developer Hub

The RDi Hub, which is hosted within IBM's RDi product website, provides an array of information and resources. New users can get up to speed by participating in online labs and sampling educational resources (articles and videos) created by prominent RPG experts. Ongoing users can post questions and comments in the support forum, download fixes, pay for IBM Support licenses, open new cases and much more.

The Hub page also links to IBM's request for enhancements (RFE) community. RFE is the program by which IBM solicits customer input on solutions across its line of server and software products (IBM registration is required). Take a few moments to peruse the status of specific requests for RDi, and it's clear that the RFE process plays a major role in its development.

"It would be hard to explain the value of RDi without mentioning the RFE community," Guarino says. "You can post suggestions to IBM, then others vote on them. That's how IBM gets the community's feedback on RDi and all these other tools and solutions."

3. The free trial, now extended to 120 days

New users can download the fully featured version of the RDi product and evaluate it for 120 days. One reason IBM elected to extend the RDi evaluation period, which had been 60 days, is to accommodate colleges that offer semester-length RPG courses. But, as Tuohy notes, one need not be a student to take advantage of this offer.

"As a programmer, in that amount of time I can make a no-brainer business case to my boss: 'Look, I've learned all this and I'm so much more productive now. Now I need to buy it,'" he says. ■

Using Modern IBM i Tools

Throughout RPG's long history, the primary tool for editing and compiling code has been green screen and text based. But today's modern RPG is barely recognizable compared to its earlier versions—not only in format and syntax, but also in capability and flexibility.

The modern toolset IBM introduced is the only one updated for the new syntax and features of RPG. Even more significantly, it optimizes code development to allow developers to get their jobs done faster and better.

The development tool for modern RPG applications is Rational Developer for i (RDi). Just as today's modern syntax makes it easier for developers with no RPG experience to quickly jump into the language, RDi allows developers familiar with many other IDEs to more quickly learn, edit and compile IBM i applications.

RDi is, in fact, an incredibly modern tool that's a must-have in any developer's toolbox. In case you missed it from our last TechChannel e-book on RDi and RPG, "Using Modern IBM i Tools," here are Susan Gantner's five favorite things about RDi:

- 1. Ability to edit multiple source members**
- 2. Help for understanding code**
- 3. Direct access to code metadata**
- 4. Code navigation**
- 5. Ability to quickly find and fix compile errors**

Similarly, RPG is a modern and relevant programming language that new developers can easily pick up. As Jon Paris points out, RPG is a fully free-form language that will look so familiar to today's programmers that few will have any difficulty picking it up.

In fact, RPG's most modern features include:

- Embedded SQL
- A comprehensive (and constantly growing) set of built-in functions
- Ability to create and utilize custom function libraries
- Ability to directly tap into C and Java functions
- Built-in functionality for processing XML
- Files as parameters
- Procedure overloading
- Dynamic arrays
- Nested data structures
- Built-in support for processing and generating structured data such as JSON

[Get more RPG and RDi insight from Jon Paris and Susan Gantner](#)

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