



# GLOBAL TIRE MANUFACTURER FULLY AUTOMATES INTEGRATION TESTING WITH GENROCKET TEST DATA AUTOMATION

A multinational tire company designs tires for every type of vehicle, including airplanes, automobiles, bicycles, earthmovers, farm equipment, heavy-duty trucks and motorcycles. The company sells their diverse product line through retail channels around the world and operates manufacturing facilities in distributed locations to streamline their supply chain and provide quick delivery to customers.

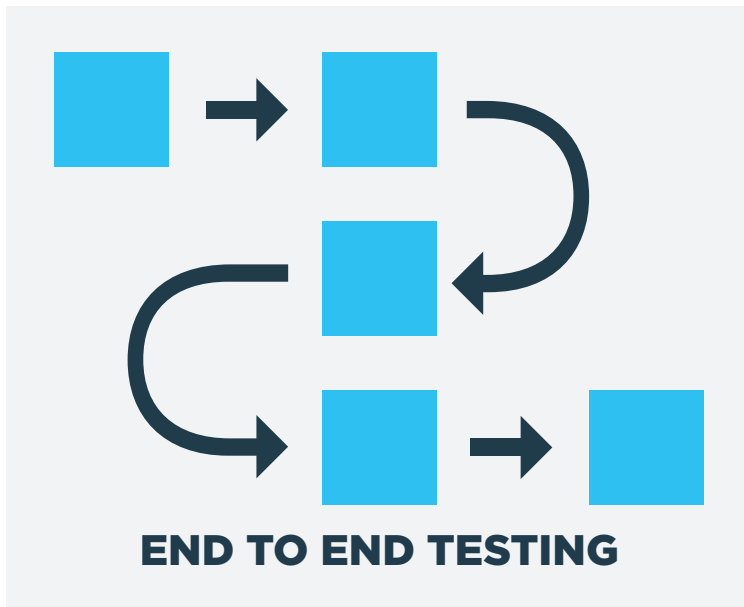
The company's global workforce takes pride in their corporate values of innovation, environmental sustainability and safety. In addition to its offshore headquarters, the company maintains several major manufacturing plants in the U.S. and Canada staffed with thousands of employees.

## THE APPLICATION ENVIRONMENT

As a digital enterprise, the company has evolved its software development environment to follow DevOps practices. This has allowed the IT organization to transition several monolithic applications to modular information systems using a microservices architecture with code continuously deployment to production. The approach has accelerated their development cycles and allows systems to be more adaptable and responsive to a dynamic business environment.

Because the central goal of any DevOps model is *quality at speed*, continuous integration and testing of each code build is an integral part of the development process. Integration testing is critical for ensuring end-to-end system accuracy, integrity and performance.





Critical to the performance of integrated systems is an efficient and accurate flow of messages between connected applications. The company's data architects defined a standard messaging structure to streamline the flow of information between all connected systems. This data structure employs a fixed outer message envelope that carries a variable inner message payload. The approach enables a wide variety of data types and formats to be exchanged between diverse systems located around the world using a common data structure.

To support full scale end-to-end testing for all integration applications, the Quality Assurance team decided to modernize

a critical software testing platform used to perform end-to-end testing for all integrated applications. The platform, known as E2E, required a total transformation to become a fully automated framework capable of testing all messaging components exchanged by integration middleware - the services that allow connected applications to share information during complex workflows across diverse systems, databases and network resources.

E2E is now a state-of-the-art testing environment that incorporates containerization, NoSQL databases and seamless integration with the company's Jenkins CI/CD pipeline. It has become an essential quality assurance resource for providing continuous testing at the accelerated development pace now practiced by the company's DevOps teams.

## THE TEST DATA CHALLENGE

For E2E to be truly effective as a testing platform for integration middleware, it needed high volume test data in a wide variety of data patterns. The message flow between integrated systems can have an extremely high degree of variability. Payloads may vary in size from 2KB to 50 MB and are received in a variety of formats like JSON, XML, CSV, etc. Applications may send just a few rows of data at a time, or aggregate data into millions of rows, depending on the nature of the application, time of day or external factors driven by the business environment.

The QA team began to write code that would generate the necessary data for testing E2E and quickly found the complexity of solving the test data challenge to be overwhelming - spending as much time creating test data as spent on actual testing. They began to search the web for test data tools and discovered the GenRocket Test Data Automation (TDA) solution.

GenRocket has unique TDA technology that allows any tester to create any kind of synthetic test data in volume and on-demand. The QA staff was intrigued by the concepts behind GenRocket's *Real-Time Test Data Generation* platform and invited the company to present the technology to its leadership team.

# THE GENROCKET SOLUTION

After a demonstration of GenRocket to the QA team a Proof of Concept (POC) was conducted to validate the capabilities of GenRocket for meeting their needs. The team went through GenRocket University to familiarize themselves with the platform and in just few days' time, completed the training course. They also learned additional techniques for using GenRocket's API to trigger Real-Time Synthetic Test Data Generation directly from the E2E testing framework. The team created a schedule for GenRocket TDA to generate on-demand test data continuously throughout a 24-hour testing cycle and specified the volume and variability of data that was needed for their test cases.

Placing a realistic load on the system with high variability of data was a key requirement for testing E2E. Date fields, for example, may be used by global applications in a variety of formats as shown by the table to the right. The E2E framework must be able to handle multiple data formats and respond appropriately to missing or invalid field attributes. Therefore, test data must be conditioned to represent all potential data variations to ensure accurate error detection.

The QA team was able generate synthetic data using GenRocket with total with control over data format, variability and volume and then augment that data with actual data from the production database to formulate even more realistic messages for testing E2E.

The component architecture used by GenRocket proved to be the perfect match for meeting E2E test data requirements. Over 250 GenRocket Data Generators can replicate database tables, columns and rows containing virtually any data attribute and are based on the database data model to ensure referential integrity. Over 60 different Data Receivers can then be used to format that data to match any required data format used for messaging between applications.

Formatted Date	Format
23/01/13	dd/mm/yy
01/23/13	mm/dd/yy
23 1 13	dd m yy
23 01 13	d mm yy
23 Jan 13	d mmm yy
23 January 13	d mmmm yy
23 January 2013	d mmmm yyy
23 January 2013	d mmmm yyyy
23/01/13 12:30	dd/mm/yy hh:mm
23/01/13 12:30:05	dd/mm/yy hh:mm:ss
23/01/13 12:30:05.123	dd/mm/yy hh:mm:ss.000

With GenRocket, testers are now able to accomplish their goal of combining Test Data Automation with automated integration testing performed by E2E.

- Test data can be provisioning in any pattern or permutation to control variability
- Synthetic test can be generated in real-time and on-demand in any data format
- High volume data (e.g., millions of rows) can be generated in a matter of seconds
- Seamless integration with the E2E framework can be achieved using the GenRocket API

The integration of GenRocket into the company's automated test environment has resulted in more comprehensive testing, at a faster pace, with more defects identified during QA to greatly improve the quality of code released to production. Also, the affordability of GenRocket, with license fees less than one tenth the cost of traditional Test Data Management (TDM) tools, was very attractive to QA management.

“Not only is GenRocket a comprehensive solution for meeting our test data needs, I truly appreciate the relationship we have with the GenRocket executive team and the company's technical support staff”, commented one technical lead. “Any time I encountered a question or challenge during implementation, GenRocket was there to help with advice on best practices, new ways to use the tool or to provide new forms of technical documentation to resolve the issue.”

In GenRocket, this global tire manufacturer found a sophisticated Test Data Automation solution that could produce synthetic test data in a highly controlled fashion, in real-time and in a way that could be easily integrated into an automated testing environment. In addition, the power of GenRocket TDA was a fraction of the cost when compared with traditional TDM systems that offered a less-sophisticated solution. Finally, and perhaps most importantly, the QA staff found the support team at GenRocket to be extremely knowledgeable and responsive in helping to formulate a solution for handling the diverse flow of messages tested by their integration testing framework.

