Agentic AI Testing for End-to-End Inbound Process

ORGANIZATION

Client is a leading healthcare supply chain solutions provider that delivers business, distribution, and commercialization services to healthcare manufacturers and distributors across North America. The organization operates a large-scale distribution network, serving over 450 manufacturers and 1,500 distributors, while shipping more than 105 million healthcare products annually.

CHALLENGE

The client's Drug Supply Chain Security Act (DSCSA) inbound process involved multiple enterprise applications, system integrations, and compliance-driven workflows, making end-to-end quality assurance complex and time-intensive. Manual validation of EPCIS XML files, serialized product data, portal workflows, and cross-system transactions increased regression effort and extended release cycles. Existing automation was limited to UI testing and lacked comprehensive validation of business workflows, integrations, and regulatory compliance.

Key challenges included:

- Executing end-to-end regression testing across multiple interconnected enterprise applications.
- Validating EPCIS 2.0 XML files, serialized GTINs, lot numbers, expiration dates, and business events manually, which significantly increased testing effort.
- Performing repetitive browser-based validation for XML uploads, portal processing, transaction verification, and scan-in workflows within the Application.
- Verifying asynchronous data flow and transaction processing across Jitterbit integrations, FTP, and downstream enterprise systems.
- Ensuring end-to-end data consistency by validating purchase orders, serialized product information, transaction statuses, and processed files across multiple applications.
- Accommodating regulated business processes that required mandatory human intervention, limiting the effectiveness of conventional automation frameworks.
- Supporting frequent application releases with a scalable, maintainable regression automation framework capable of delivering consistent, repeatable, and reliable test execution.
- Eliminating gaps in existing automation by extending validation beyond the user interface to include integration testing, business process validation, and enterprise-wide workflow verification.

TECHNICAL SOLUTION

The QA Automation team designed and implemented an Agentic AI-powered intelligent test automation framework that combined Playwright, AI reasoning models, and a Custom Model Context Protocol (MCP) Server to automate the DSCSA inbound validation process.

Unlike traditional UI automation, the framework orchestrated complete business workflow validation across multiple enterprise systems using a single execution pipeline while maintaining human oversight for regulated activities.

The automation solution included:

- Developed an intelligent end-to-end QA automation framework for the DSCSA inbound workflow.
- Automated EPCIS 2.0 XML generation and schema validation using AI-assisted reasoning.
- Implemented Playwright automation to validate XML upload, transaction processing, portal navigation, and scan-in workflows within the application.
- Automated verification of serialized GTINs, lot information, expiration dates, business steps, and transaction integrity.
- Built automated integration validation to verify integration processing and FTP file generation.
- Implemented automated assertions for file integrity, transaction metadata, timestamps, and naming conventions.
- Designed a human-in-the-loop execution model allowing automation to pause at regulated checkpoints and resume seamlessly after operator confirmation.
- Automatically captured screenshots, execution logs, validation reports, and evidence to support compliance and audit requirements.
- Designed the framework with reusable components, modular architecture, and scalable workflows to support future WMS validation and enterprise-wide regression testing.
- Enabled natural language-driven execution through an MCP server, reducing operational complexity while improving automation efficiency.

BUSINESS RESULT

The QA automation solution significantly improved the efficiency, reliability, and scalability of the client's DSCSA validation process.

Key outcomes included:

- Reduced manual regression testing effort across implemented workflow stages.
- Improved regression coverage through automated validation of UI, integration, and business workflows.

- Accelerated defect detection across enterprise integrations before production deployment.
- Established a reusable enterprise QA automation framework for future compliance initiatives.
- Enhanced audit readiness through automated evidence collection, execution logs, and validation artifacts.
- Increased confidence in software releases by validating business workflows across multiple application integrations.
- Provided a scalable Quality Engineering solution capable of supporting continuous testing for complex enterprise applications.

KEYWORDS

Playwright Automation, Agentic AI, Model Context Protocol (MCP), AI-Assisted Testing

SOFTWARE

Azure DevOps, Microsoft Tools, Playwright, TypeScript, Cursor IDE, Custom MCP Server, Git Bash, AI Models

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