

Transformation of Legacy Automotive Systems: A Case Study on AS400 to Oracle Applications for a Migration Project

Jagan Mohan Rao Doddapaneni

Jaganmohanrao.d@gmail.com

Abstract

This paper presents a comprehensive case study on a project, an initiative to modernize and transform the legacy AS400 system into Oracle applications. This transformation aimed to enhance operational efficiency, scalability, and transparency across auction centers in the USA, Canada, and global markets. The project addressed critical functionalities, including vehicle check-in, reconditioning and repair services, invoicing, buy and sell fee calculations, arbitration processes, bulk file transfers for mega-dealers, and payment handling through floorplan financing services. As a QA lead, I played a pivotal role in developing a robust test strategy, ensuring end-to-end testing coverage, and integrating multiple platforms like Salesforce, SOA middleware, and web applications.

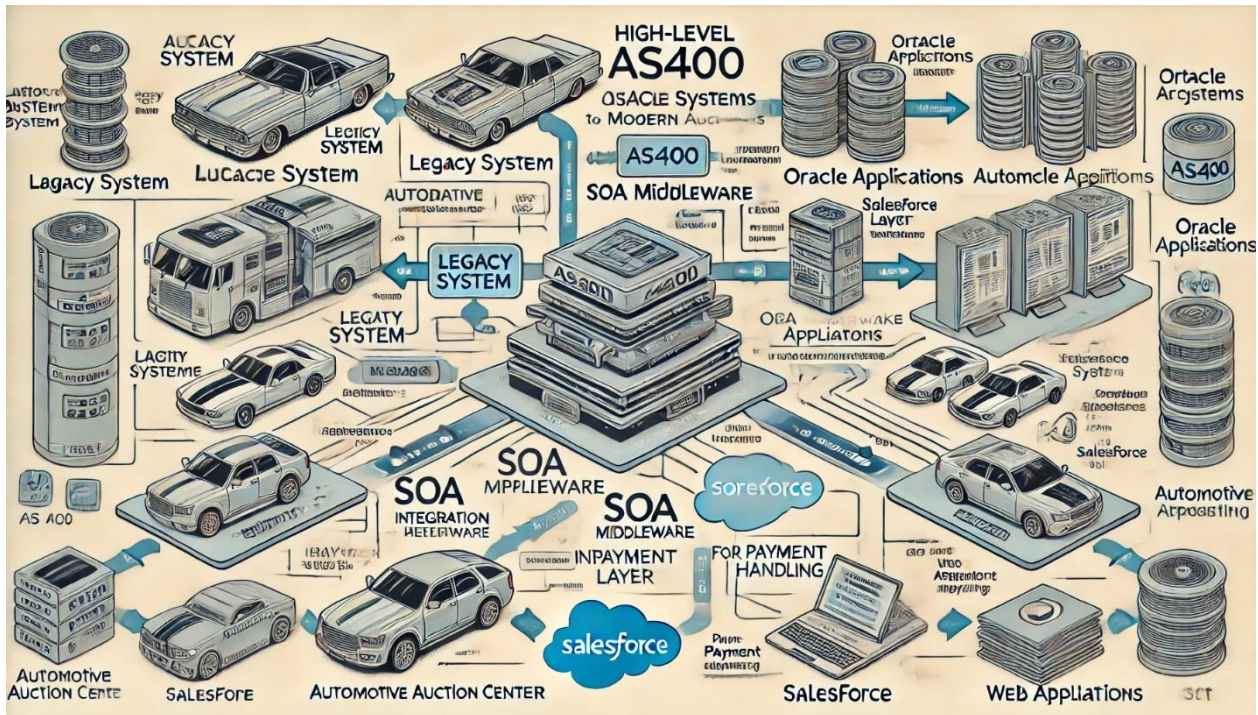
A significant milestone of the project was the development and deployment of an automation framework using TestComplete and Python, which automated over 1,000 regression test cases. This automation reduced manual effort, increased efficiency, and enhanced test reliability during SIT and UAT phases. Agile methodologies and tools like Rally for test management and HP ALM for defect tracking further streamlined project execution. This article discusses the challenges faced during the transition, the strategies employed to ensure seamless cross-functional collaboration, and the role of automation in achieving project milestones. The project's success culminated in a go-live across 10 pilot auction centers, serving as a model for operational excellence and scalability in legacy system transformation.

Keywords: Auction Process, Presale Processes, Legacy AS400 System, Oracle Workflow Integration, Operational Efficiency, QA Strategy, Automation, Delivery Methods

Introduction:

The systems project was an ambitious endeavor by the Automotive sector to transition its auction center operations from a legacy AS400 system to a modern Oracle-based platform. The auction centers operated globally, managing complex processes for used vehicle transactions. With the AS400 system aging and unable to meet growing demands, the modernization effort aimed to bring enhanced functionality, scalability, and compliance with evolving business needs.

The legacy AS400 system was central to managing auction processes, but its limitations included lack of integration with modern tools, cumbersome workflows, and limited automation capabilities. This paper explores the end-to-end transformation of these systems, with a focus on test strategy development, integration testing, and automation.



Project Scope and Objectives:

The Gavel to Gate project covered multiple facets of auction center operations. Key functionalities addressed included:

1. ****Presale Processes:**** Vehicle check-in, cataloging, and preparation for auction.
2. ****Reconditioning and Repairs:**** Workflow management for vehicle services.
3. ****Invoicing and Payments:**** Calculation of buy and sell fees, handling arbitration, and supporting floorplan financing for dealers.
4. ****Mega-Dealer Bulk Transfers:**** Streamlined file transfers and integration with payment systems.
5. ****Payment Services:**** Secure and efficient payment handling for sellers and buyers.

The primary objectives of the project were:

- To modernize and integrate disparate systems.
- To improve operational efficiency and scalability.
- To enable seamless data flow between AS400, Oracle applications, and middleware.
- To implement robust testing and automation frameworks for high-quality deliverables.

Testing Strategy and Implementation:

As the QA lead, I developed a comprehensive testing strategy that aligned with the project’s Agile methodology. The strategy addressed the following:

1. **Entry and Exit Criteria:** Defined clear metrics to measure readiness for each testing phase, ensuring thorough test coverage.
2. **Integration Testing:** Focused on ensuring seamless communication between AS400, Oracle applications, SOA middleware, and web platforms.
3. **Regression Testing:** Created and automated over 1,000 test cases to validate existing functionality across multiple releases.
4. **User Acceptance Testing (UAT):** Collaborated with business users to validate system readiness and ensure alignment with real-world scenarios.

The test coverage spanned across various interfaces, including:

- Salesforce for customer relationship management.
- SOA middleware for service orchestration.
- Web applications for payment handling and dealer interactions.

Automation Framework:

A key innovation of the project was the development of an automation framework using TestComplete and Python. The framework delivered the following benefits:

- **Efficiency:** Reduced the manual effort required for regression testing by automating repetitive tasks.
- **Reliability:** Improved the consistency and accuracy of test execution.
- **Scalability:** Allowed the framework to adapt to evolving requirements and new functionalities.
- **Cost Savings:** Delivered significant cost savings by reducing the time and resources needed for manual testing cycles.

The automated regression suite, comprising over 1,000 test scripts, was implemented in both SIT and UAT environments. This ensured that new functionalities did not introduce regressions and maintained overall system integrity.

Challenges and Mitigation Strategies:

The project faced several challenges, including:

1. **Legacy System Dependencies:**
 - The AS400 system's architecture posed difficulties in extracting and integrating data with modern platforms.
 - **Mitigation:** Developed custom middleware solutions and performed rigorous integration testing to ensure data accuracy.
2. **Cross-Functional Collaboration:**

- Aligning stakeholders from diverse functional areas required effective communication and coordination.

- **Mitigation:** Conducted regular sprint reviews and cross-team workshops to ensure alignment.

3. **Data Migration:**

- Ensuring the accuracy and completeness of data migration from AS400 to Oracle was critical.

- **Mitigation:** Implemented multiple validation cycles and reconciliation processes.

Results and Impact:

The Gavel to Gate project achieved significant milestones:

1. **Operational Efficiency:** Streamlined processes and reduced manual intervention across auction center operations.

2. **Scalability:** Enabled the system to handle higher transaction volumes and expand to new locations.

3. **Cost Savings:** Delivered cost efficiencies through automation and reduced maintenance of legacy systems.

4. **Business Value:** Improved customer satisfaction through faster and more transparent processes.

The successful go-live across 10 pilot auction centers demonstrated the system's robustness and readiness for broader rollout.

Conclusion:

The Gavel to Gate project exemplifies the potential of modernizing legacy systems to meet evolving business needs. By leveraging robust test strategies, automation frameworks, and cross-functional collaboration, the project delivered significant operational and business value. This case study serves as a model for organizations seeking to undertake similar transformations, highlighting the importance of a strategic approach to testing and automation in achieving project success.

Acknowledgments:

The success of this project was made possible through the collaboration and expertise of cross-functional teams, including developers, business analysts, quality assurance professionals, and end-users. Their collective efforts ensured the seamless transition from legacy systems to a modern, scalable platform.

References:

1) Bass, L., Clements, P., & Kazman, R. (2012). *Software Architecture in Practice* (3rd ed.). Addison-Wesley Professional.

Relevance: Explains architectural strategies for transitioning from legacy systems to modern platforms.

2) Brodie, M. L., & Stonebraker, M. (1995). *Migrating Legacy Systems: Gateways, Interfaces, and the Incremental Approach*. Morgan Kaufmann.



Relevance: Discusses best practices for migrating from legacy systems like AS400 to modern enterprise solutions.

- 3) Erl, T. (2005). *Service-Oriented Architecture: Concepts, Technology, and Design*. Prentice Hall.

Relevance: Focuses on middleware integration and service-oriented architecture (SOA), a key aspect of the described system transition.

- 4) IEEE Xplore Digital Library. *Research Articles on Legacy System Modernization and Testing Frameworks*.

Relevance: Offers a collection of papers on system transformation and test automation.

- 5) Journal of Systems and Software. Special Issue on Legacy Systems Migration and Integration.

- 6) Proceedings of the International Conference on Software Engineering (ICSE).

Relevance: Presents cutting-edge research on software engineering challenges, including legacy system integration and modernization.