

Jabil Software Services (JSS)



Embedded
Systems



Web &
Mobile

IoT



Cloud

Wireless
Networking

Wireline
Networking



CASE STUDY

Jabil Supply Chain Machine Vision

JABIL

Customer Needs

Jabil's *Supply Chain* organization provides crucial support to the Jabil manufacturing business in ensuring the efficient just-in-time provision of parts and equipment to facilitate manufacturing operations across all Jabil segments. The Jabil Supply Chain organization is a global function which is crucial to Jabil's success.

Jabil Supply Chain is responsible for the worldwide shipping of parts and equipment. The efficiency of this process directly impacts Jabil's performance and associated customer satisfaction.

Supply Chain desired a solution which would automate warehouse receiving processes and minimize manual data input. This approach would reduce material handling costs, reduce processing errors, and improve overall quality and performance. The solution would be applied across all Jabil plants to manage warehouse receiving processes.

Scope

The development of the "Auto Receiving Tool" is executed in several phases, as follows:

- *Phase 1: Minimal Viable Product*
 - Investigate OCR/barcode/label/logo recognition libraries/services and provide a recognition engine delivering stable template-based recognition of text, barcodes, and logos.
 - Develop a Minimum Viable Product with a fully functional user interface to manage the solution.
- *Phase 2: Semi Automated Processing*
 - Further develop the system so that it only interacts with the user when strictly necessary.
 - Include features to filter possible label templates, preselect label templates, and validate all mandatory fields on a largely autonomous basis.
- *Phase 3: Fully Automated Processing*
 - Develop a fully automated system, including interaction with material handling machines (such as conveyors) via Web API's.
 - Develop a mobile user interface.

Phase 1 of the project has been executed by JSS, including the development of a detailed SOW, and supporting investigations. JSS leveraged various OCR libraries and engines to provide stable and consistent label recognition, including OpenCV, Tesseract, FineReader Engine, Google OCR API, Azure OCR API and AWS OCR API.

The development of the Machine Vision solution for shipping label recognition is non-trivial because labels are often dirty or damaged, and contain many elements including text, barcodes, vendor logos, and special markings (such as ROHS).

This project leverages various staff for the different project components, including embedded developers for OCR components, web front-end/back-end/full-stack developers, QA staff and UI/UX staff.

Deliverables

JSS delivered the following items as part of the initial engagement with Jabil Supply Chain:

- Comprehensive investigative report detailing results achieved with various Machine Vision engines/libraries, and the methodology used for such tests.
- System architecture diagrams and comprehensive design documentation.
- Back-end binaries, PC-based client and mobile client.
- Database schema.
- Installation guide.
- Full source code for all system components.

The Jabil Supply Chain Machine Vision solution was developed by JSS leveraging an Agile methodology across several sprints. JSS and Jabil Supply Chain clearly agreed scope and schedule expectations, and JSS leveraged a formal project management methodology to ensure efficient delivery.

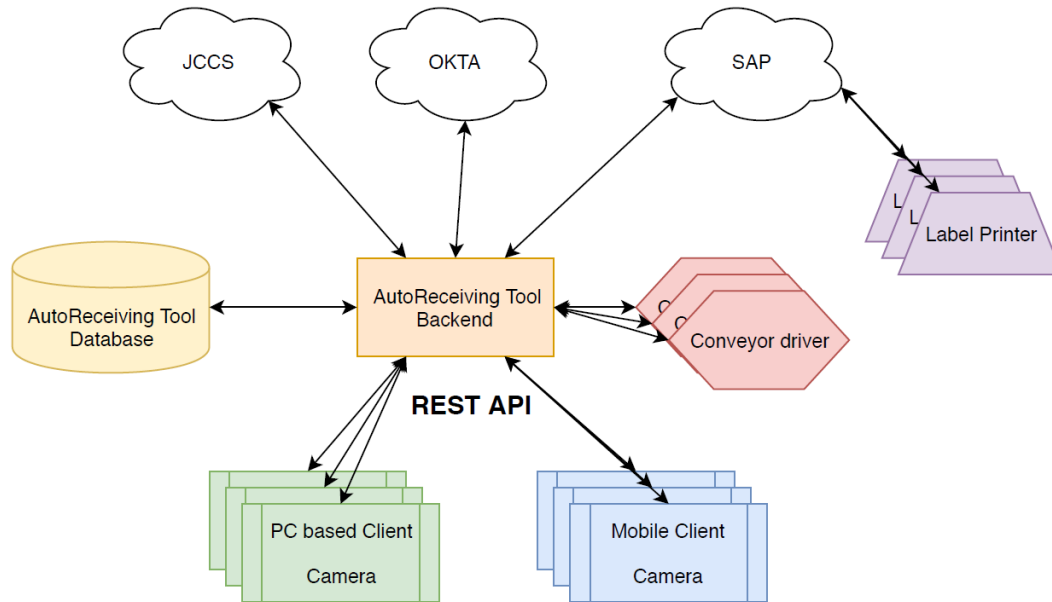
The back-end server includes the following key features:

- Label recognition engine.
- REST web server.
- On-prem or cloud hosted solution.
- Conveyor control.
- Database with label recognition templates, neural network data, and settings.
- Integration with SAP/Mulesoft to maintain alignment with label formats and other factors.

The PC-based and mobile clients include the following key features:

- Capturing pictures and transmitting them to the back-end for processing.
- Mobile and tablet support.
- Triggering additional parcel processing (via conveyor) based on image processing results.

The high-level system architecture is represented in the following image:



Strategic Value

The Jabil Supply Chain Machine Vision solution automates warehouse receiving activities, reducing material handling costs, reducing processing errors, maximizing efficiency, and improving overall quality and performance.

“JSS was instrumental in developing Phase 1 of the Jabil Supply Chain Machine Vision solution. JSS quickly laid the groundwork for the remaining phases by undertaking comprehensive analyses of various engines, developing a Minimum Viable Product, and thoroughly documenting their results. I look forward to further engagement with JSS as part of subsequent project phases.”

Marek Repinski, Jabil Supply Chain Sr. Solutions Innovation Manager

About Jabil Supply Chain

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About Jabil Software Services (JSS)

Jabil Software Services (JSS) delivers a broad range of advanced software services across several industries, leveraging an experienced team of architects, software developers and quality assurance engineers. JSS specializes in the efficient development of embedded systems, web & mobile apps, IoT solutions, cloud solutions, and networking solutions (wireless/wireline).