

Jabil Software Services (JSS)



Embedded
Systems



Web &
Mobile

IoT

Cloud

Wireless
Networking

Wireline
Networking



CASE STUDY

Intelligent Vending

JABIL

Customer Needs

The *Print & Retail (P&R)* sector within Jabil's *Engineering Services Group (ESG)* division manufactures a broad range of innovative customer solutions, including laser printers, payment processing terminals, and a wide range of automated retail solutions. Many products in this field include smart technologies such as touch-enabled displays, wireless connectivity, and remote management capabilities.

A growing trend in the retail sector is to improve the intelligence and connectivity of automated vending solutions already deployed in the field, as opposed to the wholesale replacement of deployed machines (which would be expensive and time consuming). Most legacy vending solutions lack Internet-connectivity which makes it difficult to collect operational data, receive failure alerts, handle different payment methods, and schedule products refills.

Having perceived this trend, the P&R sector conceived the development of a reference platform with the ability to be quickly customized to provide connectivity and advanced services for legacy automated vending solutions. A project was scoped to develop an Intelligent Vending Module (IVM) which could be retrofitted into legacy automated vending machines to provide smart features leveraging Internet connectivity (including support for additional sensors and new payment methods). The IVM is designed to be quickly tailored to meet the specific needs of any given customer at minimal overhead and cost. This significantly reduces time-to-market and significantly lowers deployment costs.

The Intelligent Vending solution facilitates advanced functions including remote management, customer metrics, centralized pricing, integrated video advertisements, ERP integration, predictive maintenance, remote software upgrades, and centralized revenue management.

Scope

JSS developed all software components for the IVM, including embedded components and the cloud interface. JSS retains full end-to-end responsibility for the ongoing development and maintenance of the IVM platform, including configuring the platform to meet the needs of specific customers. The specific components developed by JSS included:

- *Vending Back-end Module*: Software for managing intelligent vending machine functions including, cash/cashless payment, dispensing items, vending logic, wireless connectivity, product pricing, product counters/statistics, touchscreen management, and telemetry interfaces (including alarms and events). The vending back-end module is entirely event driven and provides an open and secure interface to cloud-based management software.

- *User Interface*: A Qt-based touch-screen GUI driver. The user-interface components are designed to be easily customizable to meet the specific requirements of any given customer.
- *Drivers*: MCU firmware to manage interfaces with peripheral devices and deliver commands between the vending back-end module and peripherals.

The solution developed by JSS leverages an x86-based control board specifically developed by Intel to add Internet connectivity and new features to legacy vending machines, including support for legacy peripherals (such as motor boards for product dispensers and cash receivers) and support for new peripherals such as touch screens, credit card payment units, keyboards, and additional sensors. The board is designed to replace the existing control board in legacy machines whilst retaining existing peripherals and sensors, thus reducing the upgrade cost.

JSS leveraged Intel's vending SDK and hardware solution to build an easily customizable automated vending solution with integrated support for touchscreen GUI's. The architecture is designed to support the use of any cloud, leveraging open API's. The solution conforms with vending standards including EVA-DTS and VDI-D2S which simplifies porting for new customers.

JSS dedicated a team of 10 staff to developing the IVM solution, including architects, embedded developers, and testers. Technologies leveraged as part of the project included C/C++, Qt, SQLite, Intel's Vending API, DEX, EVA-DTS, MQTT, and MS Project.

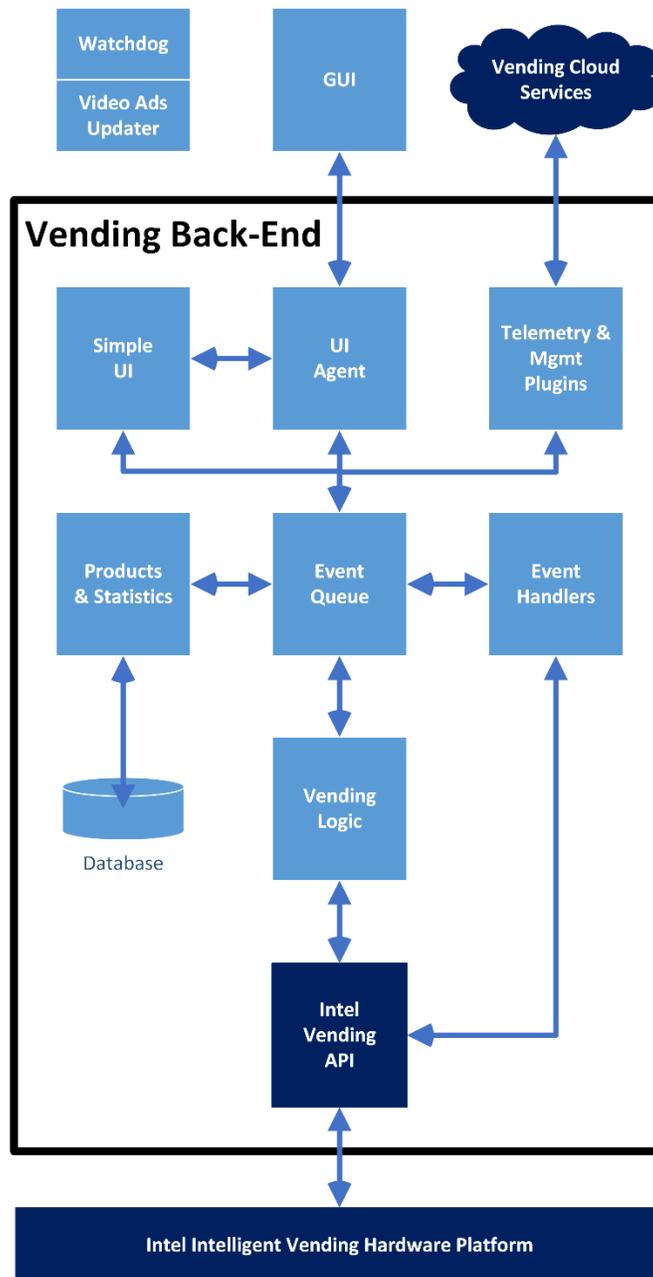
Deliverables

JSS developed and delivered the Intelligent Vending software stack, including the management plane, control plane, and data plane. Deliverables included:

- Embedded IVM software package, including bootable Linux image.
- Source code for the back-end, GUI, and all other components.
- Test plans, test results, and automated test scripts.
- Architecture and design specifications.
- Comprehensive documentation, including user guide and installation guide.

The IVM platform was developed by JSS leveraging a Waterfall methodology over a 12-month period. JSS and P&R clearly agreed scope and schedule expectations, and JSS leveraged a formal project management methodology to ensure efficient delivery.

A block diagram of the architecture is shown below:



Strategic Value

The Intelligent Vending platform provides P&R's customers with a curated, integrated, easily extensible and well supported platform for retrofitting and developing customized intelligent vending solutions. JSS has agreed a long-term roadmap for the ongoing development and maintenance of the Intelligent Vending platform with the P&R sector.

“JSS provided professional and cost-effective services in developing the Intelligent Vending platform for Print & Retail. JSS proved to be a dependable and flexible partner. They developed a comprehensive and extensible platform which is being used as the basis for delivering advanced intelligent vending customer solutions.”

Steve Geraghty, Retail Business Unit Director

About Print & Retail (P&R)

The *Print & Retail* (P&R) sector within Jabil's *Engineering Services Group* (ESG) division manufactures a broad range of innovative customer solutions, including laser printers, payment processing terminals, and a wide range of automated retail solutions. Many products in this field include smart technologies such as touch-enabled displays, wireless connectivity, and remote management capabilities.

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).