

MACHINE LEARNING ON IOT DATA WITH SAP LEONARDO AND RED HAT JBOSS MIDDLEWARE

TECHNOLOGY BRIEF



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INTRODUCTION

Bring together the power of machine learning to analyze big data and the wizardry of Internet of Things (IoT) devices and you have a formula for deep insights into minute details that positively impact real-world events and processes.

Internet of Things devices provide voluminous and detailed data about the characteristics and operating conditions of a particular thing. Applications are broad and stretch across industries, including manufacturing, transportation, healthcare, financial services, and more. Often, the real value in IoT use cases comes from comparing the data from a given thing with a large dataset of other similar things. It takes machine learning techniques to extract the important signals from these datasets and create predictive models.

For industrial and transportation use cases, predictive maintenance can be performed by examining the detailed operating characteristics of a piece of equipment and comparing it against large datasets of operational and maintenance data. Vital signs and medical history for a stroke patient might be compared against large anonymized patient datasets to provide life-saving treatment. Point-of-sale transactions can be flagged as fraudulent in real-time based on machine learning on both customer history and the latest fraud patterns.

IoT and machine learning drive many use cases with real-world impact, like [Positive Train Control](#), to improve the safety of passenger trains. But these technologies can improve many aspects of our lives, including, as in this demo, our golf game.

THE USE CASE

This brief outlines a demo for machine learning on IoT data using Red Hat and SAP technologies, leveraging an IoT gateway along with technology from TrackMan. TrackMan uses machine learning on large datasets from professional sports players to help individual players improve their game.

TrackMan uses specialized radar to capture more than 25 data points about the golf club and the ball. TrackMan metrics include the club angle of a swing, speed of the swing, the angle of the club head when it hits the ball, the speed of the ball, and distance.

Once collected, an individual player's data can be compared with the data of the top golf players around the world, using machine learning to help players improve their swing.

THE DEMO

The demo outlined below dives into detail about how the architecture works using technology from TrackMan, Red Hat and SAP.

AT THE EDGE

At the edge, at a TrackMan equipped golf course, TrackMan radar monitors send data to an intelligent IoT gateway. Trackman devices send data as JSON over WebSockets.

The IoT gateway is running Red Hat JBoss Fuse using the Kura integration. Eclipse Kura is an open source OSGi-based gateway component that ingests IoT device data.

LEARN MORE:

- Red Hat JBoss Fuse redhat.com/fuse
- Red Hat JBoss BRMS redhat.com/BRMS
- Apache Camel camel.apache.org
- Eclipse Kura eclipse.org/kura
- SAP Leonardo sap.com/leonardo
- SAP HANA sap.com/hana
- SAP Cloud Platform cloudplatform.sap.com
- SAP SQL Anywhere sap.com/products/sql-anywhere.html
- TrackMan trackmangolf.com

Red Hat JBoss Fuse includes Apache Camel, an enterprise message routing framework, which orchestrates message flow. Camel has more than 200 OSGi-ready connectors to handle a large number of device protocols (JMS, REST, CoAP, AMQP, MQTT, and more).

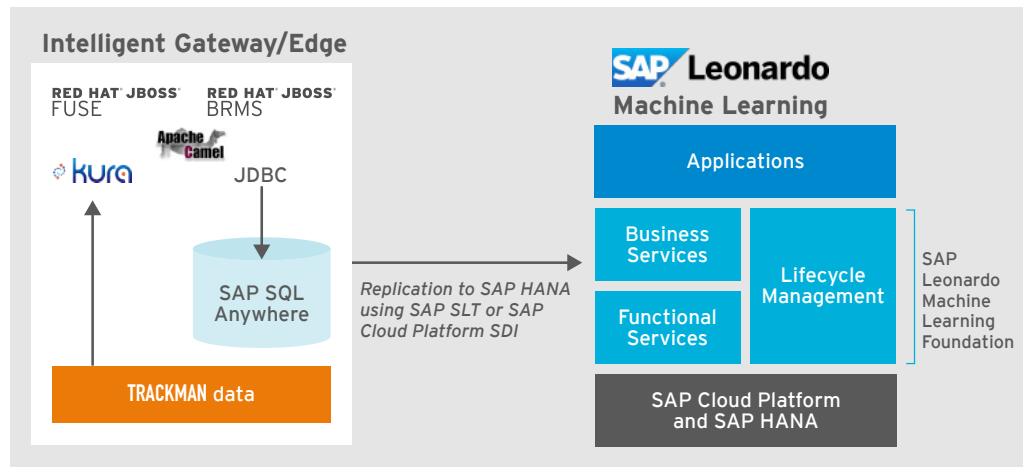
Red Hat JBoss Fuse subscribes to messages from TrackMan using the Camel Kura component. Red Hat JBoss BRMS can then be used to apply business rules to those messages to filter outliers or messages that are just noise.

The Apache Camel JDBC component takes those messages, formats them, and inserts them into SAP SQL Anywhere for persistence at the edge.

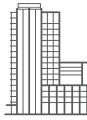
FROM THE EDGE TO THE CLOUD

To run machine learning on the data, comparing it with large datasets of professional golfer data, it is transmitted from SAP SQL Anywhere to SAP HANA running on the SAP Cloud Platform using SAP System Landscape Transformation (SAP SLT) Replication Services or SAP Cloud Platform Smart Data Integration (SAP Cloud Platform SDI).

The SAP Leonardo platform takes large datasets from TrackMan that have millions of shots stored over the course of years, and based on machine learning on those datasets, compares the characteristics of the player’s performance. Using predictive or corrective analytics, SAP Leonardo then creates a training plan tailored to help that player improve his or her game.



Red Hat/TrackMan/SAP Leonardo Architecture



ABOUT RED HAT

Red Hat is the world's leading provider of open source software solutions, using a community-powered approach to provide reliable and high-performing cloud, Linux, middleware, storage, and virtualization technologies. Red Hat also offers award-winning support, training, and consulting services. As a connective hub in a global network of enterprises, partners, and open source communities, Red Hat helps create relevant, innovative technologies that liberate resources for growth and prepare customers for the future of IT.

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WHY RED HAT AND SAP FOR IOT?

Red Hat and SAP offer a flexible architecture to meet the demands of IoT use cases across industries.

Red Hat provides rigorous, multi-layered security for IoT data, protecting data at the edge at every level, from the operating system to messaging infrastructure.

Red Hat® JBoss® Fuse is a lightweight, flexible integration platform suitable for the diverse data types and messaging required to support the many protocols that IoT devices use.

Red Hat® JBoss® BRMS can be used to apply business rules to IoT data. Frequently, IoT use cases require filtering or summarizing data before storing it. Business rules can also be used to drive action at the edge, such as sending alerts if values from an IoT device reach certain thresholds.

SAP SQL Anywhere is a lightweight flexible database that can be used to support IoT use cases, storing IoT data at the edge as required for the use case and the connectivity of the environment. IoT data can be transmitted to the SAP Cloud Platform using SAP LT Replication Server or SAP Cloud Platform Smart Data Integration.

SAP Leonardo Machine Learning provides out-of-the-box machine learning capabilities embedded in the SAP Cloud Platform, empowering businesses with advanced analytics capabilities to drive cutting-edge IoT use cases.

CONCLUSION

For more than 17 years, Red Hat and SAP have been partners in innovation, working side by side in the Linux Lab. Red Hat offers proven enterprise open source technology and professional services to help you design and implement solutions to extract the full value of your IoT use case, leveraging the powerful machine learning capabilities of SAP Leonardo. Contact us by emailing sap@redhat.com or learn more at redhat.com/iot or redhat.com/sap.