

Oracle IoT Intelligent Applications

Oracle IoT Intelligent Applications uses sensor data from connected devices to provide you with more visibility, insights and efficiencies for smart manufacturing, predictive maintenance, connected logistics, workplace safety monitoring and a connected customer service. Our applications have built-in predictive analytics and integrations with SCM, ERP and HCM to help you drive better business outcomes across your organization.

Real-time, end-to-end visibility with IoT

Improve profitability and drive real-time operational efficiencies through automated monitoring of assets, logistics, production, and workers. Digital supply chains will enable businesses to detect, analyze, and respond to IoT signals, then incorporate those insights into rapidly evolving market capabilities.

Empower your line-of-business users with ready-to-use IoT applications to achieve business outcomes that were previously hampered due to interoperability gaps between operations technology and information technology. Built with highly scalable, robust proven IoT technology running on Oracle Cloud Infrastructure, Oracle IoT Intelligent Applications provides the tools and technologies to integrate, analyze, build, and deploy IoT solutions that deliver analytical insights from real-time IoT data into your existing business applications. All backed by Oracle's value-added ecosystem of partners and experts that help you rapidly scale and realize business value.

Ready-to-deploy IoT business use cases for fast time-to-value

Oracle IoT Intelligent Applications makes IoT easy by enabling a wide range of use cases with identified business outcomes and returns on investment, applicable across multiple industry segments such as:

- **Oracle IoT Intelligent Applications | Smart Manufacturing**
Use sensor data from connected devices to manage work-in-progress, prevent unplanned downtime and maximize product quality for manufacturing. To achieve smart manufacturing, Oracle brings together **IoT production monitoring, cloud maintenance and cloud manufacturing** products.
 - **Smart Manufacturing — Work In-Progress Monitoring:** Gain real-time visibility of work-in-progress for just-in-time production operation to maximize production line utilization and avoid shipment delays. Continuously tracked, built-in business metrics include; percentage behind plan for work orders and production quantity, overall equipment efficiency (OEE), production completions at each operation including good units, scraps and rejects, and number of operations pending for each work order or batch.
 - **Smart Manufacturing — Maximizing Product Quality:** Benefit from real-time visibility of production completions by monitoring product item specific scrap and rejects by operation, by machine and by factory to minimize operations cost and achieve on-time customer deliveries.

- **Smart Manufacturing — Preventing Unplanned Downtime:** Avoid unplanned downtime with real-time monitoring of machine current and predicted health. Using standard and user-defined machine and factory health metrics, the automated detection of anomalies and trends, machine-learning based failure predictions and performance deterioration forecasts, machine maintenance schedules can be optimized to maximize factory's production.

- **Oracle IoT Intelligent Applications | Predictive Maintenance**
 With sensor data from connected devices, monitor and ensure uptime, reduce loss and understand usage of equipment. IoT Predictive maintenance consists of two primary products, **Oracle IoT Asset Monitoring** and **Oracle Cloud Maintenance**.
 - **Connected Assets — Predictive Maintenance:** Unplanned asset downtime can have a significantly detrimental impact on business goals and outcomes, optimize asset availability and utilization through the continuous remote tracking and visualization of usage, condition, performance and operating environments to optimize maintenance and increase asset value. Increase the capabilities, reach and productivity of the maintenance and field service teams through auto-generation of alerts and maintenance work orders, remote diagnostics and maintenance, adjustment of scheduled maintenance to reflect actual and predicted asset condition.
 - **Connected Products— Product-as-a-Service:** In business models where the product is an expression of a service, revenue and return is directly linked to asset availability, usage and customer value. Key metrics to be measured focus on product and service team returns. These will include product performance, efficiency, usage, availability, condition along with the costs of service such as number of service trips per incident, incident duration, and overall efficiency of the service operation such as first-time fix, The use of custom metrics can further extend the value for the service provider and their customers providing insights into areas such as product usage (e.g., % of asset capacity utilization, asset performance and efficiency), asset lifetime – actual and predicted, and rental revenue– actual and predicted.

- **Oracle IoT Intelligent Applications | Connected Logistics**
 Connect devices to monitor products with sensors across transportation and warehouse systems. IoT Connected Logistics consists of **Oracle IoT Fleet and Shipment Monitoring**, **Oracle Transportation Management** and **Oracle Warehouse Management** systems.
 - **Connected Logistics — Shipment Monitoring:** Monitor shipments on your private fleet and/or 3rd party carriers for unforeseen situations and circumstances leading to delayed deliveries. Gain real-time visibility of shipment location and conditions from pick-up to delivery. Benefit from pre-built dashboards with exception widgets providing real-time insights on transportation assets, in-transit movements and above threshold deviations. Streamline receiving operations at warehouse for real-time tracking of incoming shipments and likely delays.
 - **Connected Logistics — Warehouse Automation:** Monitor warehouse facilities for yard and dock operations to effectively handle any unforeseen situations and circumstances leading to excessive dwell time or turn-around time for deliveries. Gain real-time visibility of incoming vehicles and in-transit delays. Benefit from pre-built dashboards with exception widgets (KPIs) providing real-time insights on warehouse facilities operations, utilization of assets, in-transit movements and above threshold dwell times.

- **Oracle IoT Intelligent Applications | Worker Safety**

Apply sensor data from employee wearables to track worker locations in real-time and ensure regulatory compliancy. IoT Worker Safety consists of Oracle IoT Connected Worker, Oracle HCM and other SCM systems. Gain a better understanding of environmental conditions and reduce safety violations.

- **Connected Worker – Safety Monitoring:** Increase workplace safety by minimizing near misses and unsafe acts before they escalate into major incidents. Key capabilities: deliver real-time monitoring of worker movement to prevent unsafe acts such as entering hazardous or unauthorized areas, reducing time-to-respond in case of accidents and monitoring compliance by automated rules-driven enforcement of safety policies.

The prebuilt Oracle IoT Intelligent Applications named below support the defined business use cases listed above.

1. **IoT Production Monitoring:** Continuous tracking and prediction of production performance across factories, products, lines and machines
2. **IoT Asset Monitoring:** Real-time visibility of asset health, location and utilization, and predict maintenance needs
3. **IoT Fleet & Shipment Monitoring:** Optimize end-to-end logistics operations with proactive detection of anomalies and deviations
4. **IoT Connected Worker:** Ensure worker health and safety, improve compliance, and automate time and labor tracking to improve productivity.

Proven, robust IoT technology foundation

Oracle IoT Intelligent Applications simplifies IoT so you can rapidly assimilate the concepts and technologies into your digital strategy and create innovative services with less risk.

Managing and analyzing the enormous amount of real-time data generated by all the IoT-connected devices demands a multi-faceted, yet robust IoT solution that incorporates latest innovations such as Digital Twins, Machine-Learning/AI and Edge Computing.

Oracle IoT Intelligent Applications includes a full featured IoT technology stack that incorporates:

- Digital Twin modeling and wide range of device connectivity and edge processing capabilities.
- Analytics capabilities customized for time series data, spatial-temporal analysis and real time data processing with built in domain specific dashboards and metrics. A highly scalable industry-standard big data analytics stack based on for operationalizing AI & Machine Learning based algorithms for anomaly detection, predictive analytics & recommendations is included as part of the standard subscription.
- Pre-built Digital Threads with enterprise applications such as manufacturing, maintenance, transportation, warehouse management, and human capital management make it easy to quickly deploy pre-configured business workflows that automate exception management. Integrations with 3rd party applications can be easily established using REST API or Oracle Integration Cloud.
- Secure and reliable edge computing components enabling bidirectional communication between IoT devices and the cloud, and advanced edge analytics to conserve bandwidth and reduce latency for actions. IoT devices may connect to the cloud directly, or indirectly through a certified partner gateway over a variety of supported IoT protocols.

Digital Twins for Industrial Assets

Oracle IoT Intelligent Applications Cloud Service includes Digital Twin capabilities as standard functionality, that consists of three different areas:

Virtual Twin: Allows creation of a software representation of a physical asset, including things like the set of attributes and controls that the physical device supports, software-synthesizable simulators that allow creation of simulated assets to test out the entire IoT value-proposition before connecting physical devices.

Predictive Twin: This describes the behavioral of the asset. Examples include a predictive model that can be evaluated to forecast a future state of the asset or its environment.

Twin Projections: Digital twins are integrated in manufacturing, maintenance, field-service, supply chain-planning, transportation, utilities, and warehousing products

In addition, the digital twin supports integrated what-if analysis capabilities. The what-if analysis tool creates synthetic conditions to validate end-to-end business processes for safety, compliance or audits.

3D Visualization with IoT context

The digital twin enables users to get a complete, contextualized view of their asset in a single place, including the hierarchy of asset components and the relevant functional aspects or “state” of the asset as represented by real-time values of key variables.

Exploded views of the asset and its component hierarchy are available, along with the ability to rotate the asset and examine it from different angles. Contextual data relevant for each subsystem is displayed.

This capability requires a subscription to Oracle IoT, 3D Digital Twin, which is an optional SKU for Oracle IoT Intelligent Applications.

Upload Industry standard 3d file formats

Subscriptions of Oracle IoT that include the optional 3D Digital Twin SKU provides users the ability to upload 3D CAD models in a variety of file formats which are standard in the CAD industry. These are then converted to web-viewable forms. Supported 3D CAD file formats include commonly used file formats such as STEP, 3DS, AutoCAD DWG, AutoCAD DXF, CATIA, OBJ, STL, among others.

Key business benefits

- Pre-built interoperability with a number of enterprise applications including Manufacturing, Maintenance, Transportation, Warehouse Management and Worker Health & Safety Management
- Purpose-built, ready- to-use applications to achieve clear business outcomes
- Built on a proven, robust and scalable IoT technology foundation running on Oracle Cloud Infrastructure
- Incorporates latest innovations in the IoT space, including Digital Twins, Machine Learning and AI for streaming time-series machine data, and edge computing
- Extensive global partner ecosystem of IoT device and implementation vendors

Technical details

Device to cloud connectivity protocols

- MQTT over SSL

- HTTPS

Built-in industrial IOT connectivity

- OPC UA
- Historians
- OBD II
- SAE J1939

Supported IOT message data formats

- JSON
- Binary

Certified partners based IOT device connectivity

- MODBUS
- Bacnet
- Ethernet/IP
- Many others

Supported platforms for Oracle IOT client software

- Java SE 5 and above
- C/C++ (POSIX, Linux)
- iOS
- Android
- Python
- JavaScript

More information available at <https://www.oracle.com/internet-of-things/>

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