

Oracle Internet of Things Cloud Service

ORACLE[®] INTERNET OF THINGS CLOUD SERVICE

KEY FEATURES

- Integrates device data with enterprise applications and business processes
- Pre-integrated with many Oracle services
- Provides end-to-end security for devices and applications
- Enables advanced real-time, streaming analytics with comprehensive exploration editor
- Built-in Asset Monitoring IoT application
- Runs on Oracle's enterprise-grade cloud infrastructure

In today's world billions of connected devices, from smart vehicles to smart meters, generate ever-increasing quantities of data. This worldwide network of connected devices is the Internet of Things (IoT). Oracle Internet of Things Cloud Service is a secure and scalable platform to help organizations quickly build and deploy IoT applications and fully capture and analyze their IoT data. Only then can organizations begin to realize the efficiencies, opportunities, reductions in cost, and improvements in products and customer service promised by IoT.

Connect, Analyze, Integrate

To derive value from the IoT, enterprises need to securely connect their IoT-enabled devices to collect data, then analyze and integrate that data with enterprise applications and processes. At this point, enterprises can begin realizing value from the deployment of an IoT solution.

- **Connect.** Securely and reliably connect any device in any market to bidirectionally transact data, accelerating your time to market with an open, secure, and scalable platform.
- **Analyze.** Perform real-time, big data, and predictive analytics to deliver enriched data that enables you to identify new services and improve customer satisfaction.
- **Integrate.** Ensure that the right data is available for the right application, at the right time using open interfaces and pre-integrations with Oracle's platform-as-a-service (PaaS), software-as-a-service (SaaS), and on-premises enterprise applications to reduce total cost of ownership for IoT, data-enriched applications and processes.

Connect

Devices may be deployed in a variety of network topologies and outside the direct control of an IT staff, creating communications and security challenges. Oracle Internet of Things Cloud Service provides the following features that enable organizations to easily and securely connect IoT devices, collect data from them, and interact with them using simple programmatic interfaces.

- **Device virtualization.** Oracle Internet of Things Cloud Service exposes every connected device as a set of resources called a *device model*. The use of device virtualization abstracts any complexity associated with device connectivity and standardizes device integration with the enterprise. With it, enterprise applications can directly address any device from Oracle Internet of Things Cloud Service regardless of network protocol and firewall restrictions.
- **Reliable communication.** Oracle Internet of Things Cloud Service enables reliable, bidirectional communication for guaranteed delivery of messages over unreliable networks and from/to occasionally awake or connected devices.

KEY BUSINESS BENEFITS

- **Faster time to market.** Extend manufacturing processes and logistics operations by leveraging connected devices.
 - **Real-time insight.** Optimize asset tracking by analyzing and acting on in-flight IoT data.
 - **Integrated.** Drive predictive maintenance using prebuilt integrations with applications, analytics, and mobile services.
 - **Secure and scalable.** Benefit from an enterprise-grade platform for mission-critical IoT applications.
- **Flexible topology.** Devices can connect to Oracle Internet of Things Cloud Service using the following types of network topologies:
 - **Client library.** Available directly from the Oracle Technology Network (OTN) in source and binary form under open source license, these components are available to the device developer for inclusion in their device applications to enable secure, reliable connectivity of their device with Oracle Internet of Things Cloud Service. Libraries are available for Java SE, Java ME, Android, and POSIX C.
 - **Gateway software.** This Oracle Java SE Embedded application provides capabilities for reliable and secure messaging. It also includes a device adapter framework to enable the development of interfaces to Oracle Internet of Things Cloud Service to devices only supporting non-IP protocols, such as Bluetooth, Z-Wave, Modbus, and OPC.
 - **REST APIs.** These enable HTTPS-capable devices to integrate with Oracle Internet of Things Cloud Service using a comprehensive set of RESTful APIs.
 - **Device identity.** Oracle Internet of Things Cloud Service handles the device security and identity out of the box, simplifying the secure deployment of IoT applications.

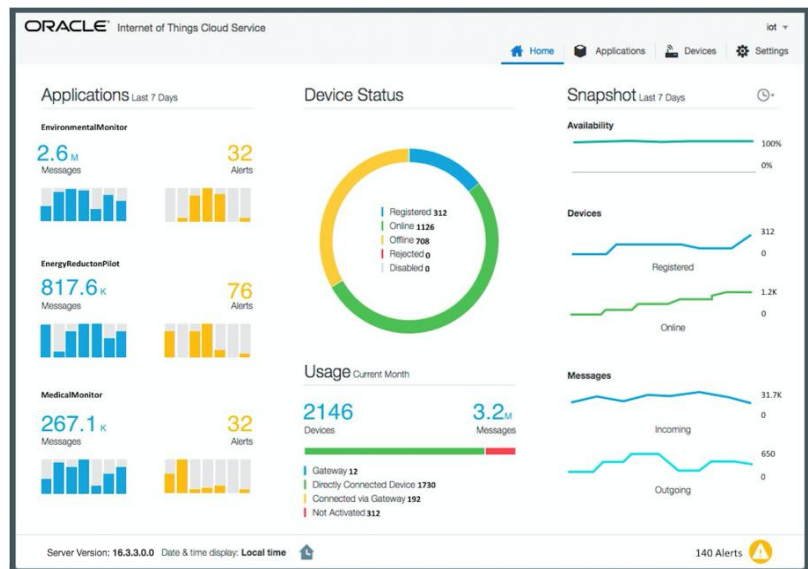


Figure 1: Oracle Internet of Things Cloud Service dashboard

Analyze

Oracle Internet of Things Cloud Service enables you to perform the following real-time analytics on IoT streams and events, so you can identify new services and improve customer satisfaction.

- **Stream processing.** Analyze data streams in real time with event aggregation, filtering, and correlation. A user-friendly interface offers a choice of data analysis patterns to apply to your streams from a built-in assortment of well-known patterns.
- **Data enrichment.** Enrich raw data streams with contextual information and generate composite streams. Data may be processed as raw data streams from the device or enriched with device metadata for improved correlation of data streams and more-comprehensive analysis.
- **Event store.** Analyzed data streams can be sent to your integrated cloud services or enterprise applications for further processing and to drive business workflows. Query and visualize massive amounts of data with integrated Oracle Business Intelligence Cloud Service support.

“The world will see 25 billion internet-connected things by 2020—just a short five years away. We estimate that IoT will produce close to US\$2 trillion of economic benefit globally.”

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 “THE INTERNET OF THINGS IS A REVOLUTION
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 APRIL 30, 2015
gartner.com/smarterwithgartner/the-internet-of-things-is-a-revolution-waiting-to-happen

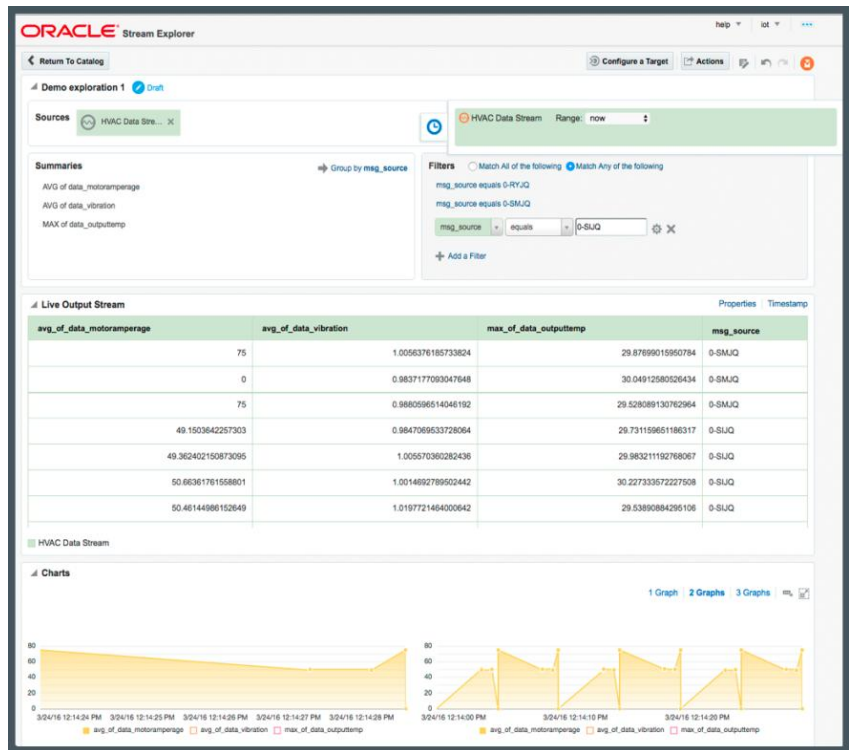


Figure 2: Real-time streaming analytics

The latest service update of Oracle Internet of Things Cloud Service includes an enhanced Stream Explorations Editor feature. The Stream Explorations Editor provides an intuitive visual interface for integration of device data streams and enables simple creation of advanced real-time stream analytics applications without writing any code. This includes advanced editing capabilities such as an expressions editor for dynamically computed fields, a business rules editor for adding conditional logic and a range of built-in patterns that provide logic templates for common use cases.

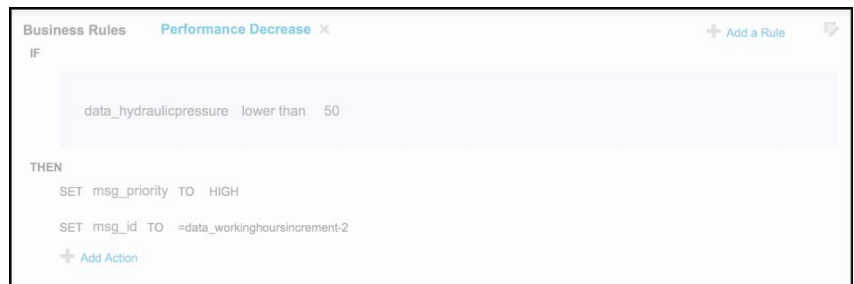


Figure 3: Stream Explorations Editor

ORACLE INTERNET OF THINGS CLOUD SERVICE

Oracle Internet of Things Cloud Service is a secure and scalable platform to help organizations quickly build and deploy IoT applications.

RELATED PRODUCTS

Oracle Internet of Things Cloud Service integrates with the following products out-of-the-box:

- Oracle Business Intelligence Cloud Service
- Oracle Integration Cloud Service
- Oracle Mobile Cloud Service
- Oracle's JD Edwards Enterprise One
- Oracle Storage Cloud Service

Integrate

Oracle Internet of Things Cloud Service seamlessly extends enterprise applications and processes with IoT data. The solution uses open interfaces and pre-integration with other Oracle PaaS, SaaS, and on-premises enterprise applications to reduce total cost of ownership for IoT data-enriched applications and processes.

- **Out-of-the-box integration.** Dynamically dispatch critical IoT data and events to applications and feed business process flows. Using built-in integrations, customers can quickly integrate device data with enterprise applications and hosted services. Oracle Internet of Things Cloud Service provides built-in integration with Oracle Mobile Cloud Service, Oracle Business Intelligence Cloud Service, Oracle's JD Edwards EnterpriseOne and Oracle Storage Cloud Service. In addition, customers can connect to enterprise applications including Oracle E-Business Suite, Oracle Transportation Management, and Oracle Storage Cloud Service. Oracle Storage Cloud Service allows creation of IoT data lakes for use in big data analytics. In addition, customers can easily connect to enterprise applications including Oracle E-Business Suite, Oracle Transportation Management, and Oracle Service Cloud.
- **REST APIs.** These provide API-based integration with Oracle's PaaS and SaaS applications as well as with non-Oracle applications and IoT devices. For example, users can visualize IoT data and drive command/control from enterprise mobile apps through integration with Oracle Mobile Cloud Service. In addition, a comprehensive set of APIs provides authenticated access to all aspects of the service. These APIs can be used to integrate with non-Oracle applications that are capable of consuming RESTful web services using HTTPS and JSON.
- **Command and control.** Send messages to devices from enterprise and mobile applications, independent of device connectivity. Enterprise applications can also use the Oracle Internet of Things Cloud Service REST API to issue commands and make queries to devices—providing customized, intelligent orchestration for your business.

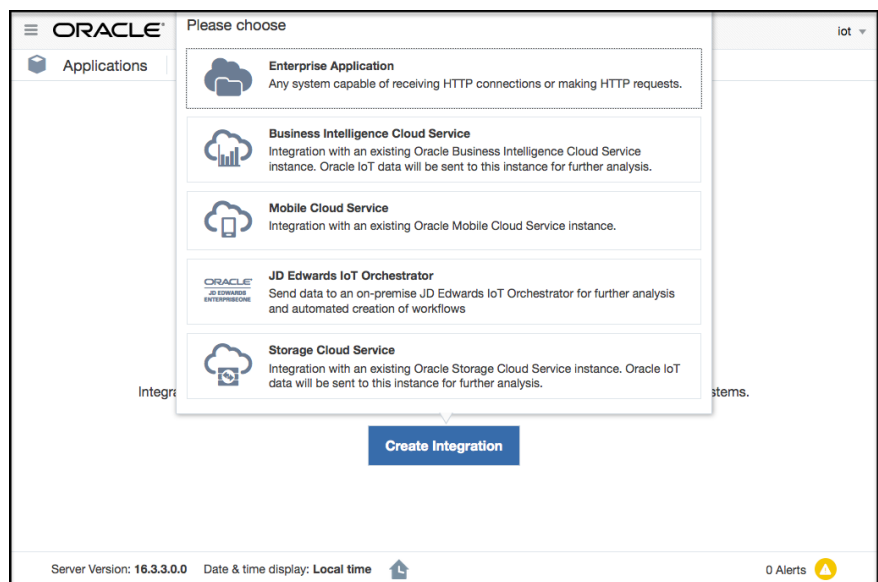


Figure 4: Out-of-the-box integrations with Oracle products and services

Asset Monitoring

Oracle Internet of Things Cloud Service now offers SaaS-style, built-in IoT applications that are included with the service and immediately runnable. The Asset Monitoring application is the first in the series of built-in IoT applications. It enables users working with both fixed and movable assets to perform tasks such as rapidly locating available assets for a job, assessing the health of their assets, and reviewing asset specifications while in the field or office. It also enables field operations staff such as technicians to register assets, locate assets, and monitor asset health as well as maintenance, outage, and other asset incidents. A set of key performance indicators give operations management staff a real-time indication of how assets are being utilized and maintained.

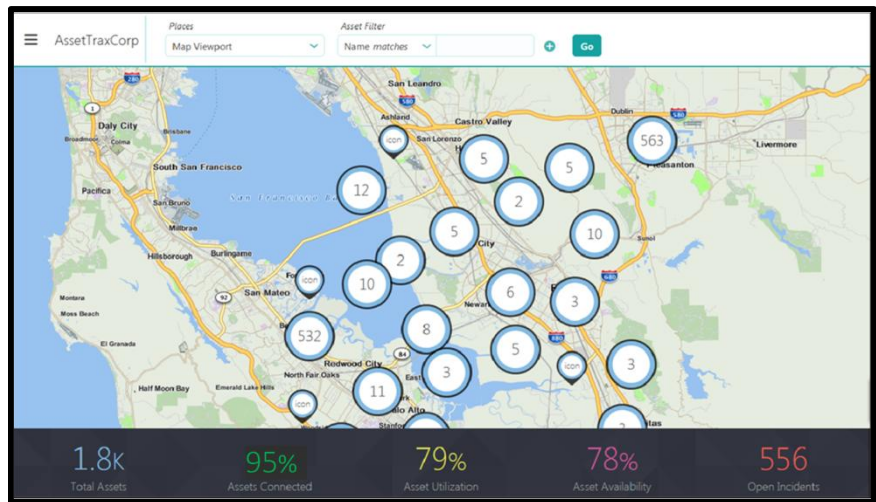


Figure 5: Oracle Internet of Things Cloud Service's Asset Monitoring application

Security

Security is a primary concern for any business considering bringing IoT-based solutions onboard. Oracle Internet of Things Cloud Service provides the following tools for establishing and managing end-to-end security for your connected IoT devices:

- Oracle Internet of Things Cloud Service registration and activation mechanisms provide secure provisioning and management of the trust relationships needed to make all your devices part of a secure IoT solution.
- To ensure the security of your IoT network communications and data streaming, Oracle Internet of Things Cloud Service implements OATH2 authentication prior to communication with any device or enterprise software, enabling proof-of-origin for data and ensuring that all components in the data flow are part of your IoT network. Transport-level security via HTTPS is used for all communications in your network, ensuring that your data is not vulnerable to snooping or corruption from the outside.
- Oracle Internet of Things Cloud Service manages device endpoint metadata and lifecycle states. Multiple lifecycle states are supported, including registered, disabled, activated, and decommissioned.

Oracle Cloud

Deploying your business applications in the cloud can deliver both short- and long-term benefits, including cost savings, improved agility, and faster innovation—but only if your cloud is enterprise-grade. When evaluating your cloud strategy, it's important to consider the level of control and choice you will either maintain or give up to achieve some of these benefits. There are also additional risks to consider when outsourcing all or part of your applications to a third-party cloud provider, making it important to always evaluate the quality of these services as key purchasing criteria.





Oracle has been delivering cloud services to large and small organizations around the globe for more than a decade and has a strong legacy of providing best-of-breed functionality for business and industry applications. Oracle Internet of Things Cloud Service is part of Oracle Public Cloud and currently is integrated with Oracle Business Intelligence Cloud Service and Oracle Mobile Cloud Service. In the future, it will be integrated with a growing number of powerful Oracle Cloud services. Customers can drive rapid IoT innovation using prebuilt integrations to extend manufacturing processes and logistics operations.

CONTACT US

For more information about Oracle Internet of Things Cloud Service, visit oracle.com or call +1.800.ORACLE1 to speak to an Oracle representative.

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Integrated Cloud Applications & Platform Services

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