

ORACLE SENSOR EDGE SERVER

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KEY FEATURES

- Sensor Event Processing
- Server Management and Administrator Console
- Device Management
- Sensor Edge Mobile
- Built-in Reporting
- Sensor Data Repository
- Pure J2EE
- Developer Application Platform
- JMX Administration Interface
- EPC Compliance Integration

STANDARDS COMPLIANCE

Oracle believes that standards are an important part of this rapidly evolving technology, particularly in RFID. As a participant in the EPCGlobal standards groups, one of our priorities is to keep our customers in constant compliance with emerging standards in Sensor Based Technology.

Standards bodies that Oracle is actively participating in or closely monitoring include:

- EPCGlobal
- OGC
- OPC
- RFID UID Alliance

Oracle Sensor Edge Server is an integral component of Oracle Application Server 10g that allows your technology stack to cost-effectively incorporate sensor based information into your decision making process. Residing at the outer edges of your IT infrastructure, the Sensor Edge Server operates at the peripheries of your IT system to channel sensor-based information back to the core part of your infrastructure.

Oracle Sensor Edge Server

Sensor based technologies such as RFID are increasingly becoming an integral part of enterprise information architectures. As a component of the Oracle 10g Application Server the Oracle Sensor Edge Server enables companies to quickly and easily integrate sensor-based information into their enterprise systems such as WMS, ERP, etc. The Oracle Sensor Edge Server serves both as a middleware that connects sensors to your enterprise applications and as integrated solution for application developers. It provides the following functionality to reduce costs for sensor enabling enterprise information systems: Managing and monitoring the performance of the sensor devices integrated with your Information Infrastructure; local sensor event processing and filtering data; securely and reliably dispatching event data back to enterprise applications and databases.

Oracle Edge Server Architecture

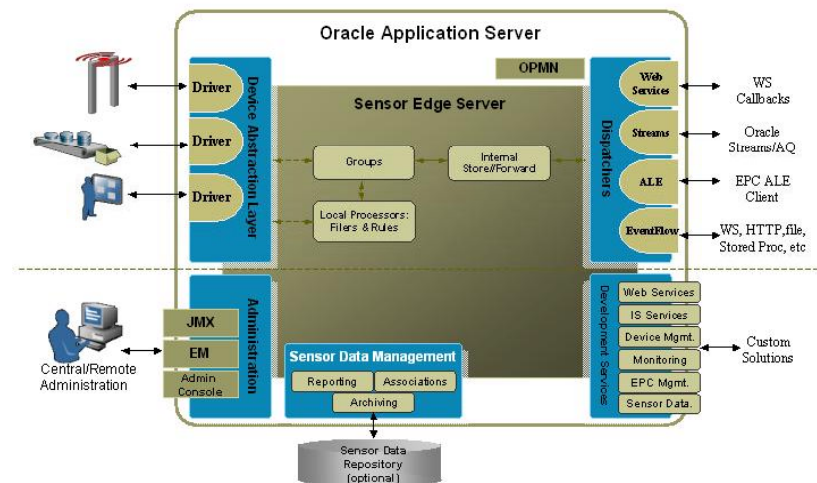


Figure 1: Sensor Edge Server Architecture

Sensor Event Processing

The data flow the functionality of the Oracle Sensor Edge Server can be assigned to three parts: data collecting, event processing and event dissemination. The Oracle Sensor Edge Server provides a platform that can easily be extended to guarantee fast adaptation to new hardware or requirements. The Extension framework is provided for: devices, filters and dispatchers.

Data Collecting

To bridge the physical world of sensors and the IT world of information systems, Oracle Sensor Edge Server provides an extensible driver architecture to integrate with any sensor source including RFID readers, printers, temperature, motion, pressure, location, and any response device such as light stacks, message boards and sound systems. Oracle Sensor Edge Server includes many pre-built drivers for leading RFID hardware vendors:

- **Readers (Gen1/Gen2):** Alien, Intermec, SAMSys, Symbol/Matrices, Tyco
- **Printers:** Intermec, Printronix, Sato, Zebra
- **Display/ Notification:** Animation, Audio, EdgeSimulator, HTML, Prolite, Patlite, Remote

The extensible framework allows system integrators and hardware manufacturers to easily implement and add their own devices.

Event Processing

Data streaming in from sensors connected to the Oracle Sensor Edge Server arrive in a wide range of formats, and include unnecessary or redundant information. Enterprise applications are often not interested in raw data but in meaningful business events. For this purpose Oracle Sensor Edge Server normalizes all incoming data and provides a pluggable filter framework for data cleansing. The filter framework allows developers to implement custom event processing and behavior based on their specific needs. Filters can be applied both to individual or logically grouped sensors. Oracle Sensor Edge Server provides a wide range of predefined filters:

- **Predefined:** Pass Filter, Movement Filter, Shelf Filter, Cross Reader Filter, Check Tag Filter, Pallet Shelf Filter, Pallet Pass Filter, Debug Filter

Programmable filters allow local processing and immediate response to devices.

- **Programmable:** JavaScript Filter, RegexFilter

Event Dispatching

Oracle Sensor Edge Server allows several integration points for RFID and sensor-enabled applications. Due to the pluggable dispatcher architecture, users can choose to use custom implemented Dispatchers or to select from several out-of-the-box Dispatchers to send sensor data back to the rest of your IT infrastructure. The following is a list of out-of-the-box Event Dispatchers:

- **HTTP** – Post events to http websites to quickly integrate to existing backend systems.
- **Web Services (WS)** – Standard web services protocol using WS.
- **JMS** – Java based messaging provides all of the JMS functionality between the Sensor

Edge Server and the rest of your IT infrastructure.

- **Oracle Streams** – Oracle Streams provides a secure, scalable and reliable transportation method to send data back to a central Oracle Database. Oracle Streams allows higher-level applications to communicate back to sensor and response devices.
- **Event Flow Dispatcher** – Configurable dispatcher that allows “if-then-actions” on how and where events should be sent to. Supports functionality off other dispatchers and can call and pool database stored procedure (e.g. PL/SQL).
- **ALE Dispatcher**: - Notifies any ALE subscribers when a repost specification is satisfied

By using a bi-directional “store-and-forward” technique no data will be lost if the dispatcher link will be down. The Sensor Edge Server is able to dynamically switch between transient and persistent store and forward for maximal reliability.

Device Management

To reduce maintenance and upkeep costs for sensor infrastructure, Oracle Sensor Edge Server provides a uniform management interface for device management. Device management and monitoring features include: heartbeat monitoring, error status reporting, driver updating and the ability to expose custom configurations to the user through the standard Sensor Edge Server configuration interfaces. Included also is the ability to remotely control devices from the application layer through response events, providing a detailed and automated mechanism for higher level processes to partially automate the monitoring and maintenance of the enterprise sensor infrastructure.

Server Management and Admin Console

The admin console provides a clean user-friendly GUI to administrate, monitor and configure the Sensor Edge Server. The thin browser architecture is also suitable for remote management. The tools provided by the console help to decrease deployment and maintenance costs. The console allows to

- configure general server settings
- add, view and manage extensions such as filters, drivers and dispatchers
- monitor and manage devices and groups
- navigate between different instances
- monitor server event statistics and generate event reports

Sensor Edge Mobile

Designed for mobile devices in warehouses and on factory floors, Oracle Sensor Edge Mobile runs on handheld RFID readers that run on Pocket PC 2003 and later platforms. The Sensor Edge Mobile software can communicate with other applications or services that are external to it, or operate entirely offline, collecting data for later synchronization with an outside application. The Sensor Edge Mobile includes the Driver Manager, Event Manager, Configuration Manager, and the Dispatcher.

Sensor Data Repository

Besides the Dispatcher functionality Oracle Sensor Edge Server offers a Sensor Data Repository (SDR). The SDR is specifically designed to store various types of sensor data such as EPCs, temperature readings, etc. The database schema stores status and diagnostic information from Sensor Edge Server, and serves as the single repository for sensor data. The events are normalized on their way into the SDR to facilitate business intelligence, such as reporting. The SDR can be enabled and configured so that multiple Oracle Sensor Edge servers can use it for storing event data and querying the event archive. The SDR provides a set of database tables, views, and PL/SQL packages to facilitate the storage and retrieval of sensor events data. To reduce the impact on main data streams it utilizes thread pooling and throttling. The SDR contains information for:

- Management
- Sensor Data and Context
- Tag information
- EPC Compliance Data

Built-in Reporting

The admin console includes several out-of-the-box reports. These reports provide event information and searching. Basic reporting is available for tags and devices. The reporting functionality is solely based on the SDR without any external dependencies. The following reports are available

- Tags: tracing and attribute queering
- Devices: performance and device diagnostic
- Advance Search: customizable reports

Developer Application Platform

In addition to the data dispatching Oracle Sensor Edge Server also provides interfaces for direct application access. Following services are exposed for external applications:

- Web Services, for both local and remote application
- Java API
- PL/SQL

The Sensor Edge Server is can be queried by Information Service accessing application in both push or pull mode.

JMX Administration Interface

In the 10.1.3 Sensor Edge Server release, Java Management Extensions (JMX) interface has been integrated into the Application Server management console to increase accessibility and ease of management. The administrative tasks that are integrated into Application Server include startup, shutdown, process management, and recovery. Also, all extensions are JMX-objects and can be managed and configured directly with the JMX interface. These enhancements will help to decrease deployment and maintenance costs.

ORACLE SENSOR-BASED SERVICES**KEY BENEFITS**

- Oracle Sensor Edge Server allows you to quickly incorporate RFID and sensor information into your enterprise applications.
- Extensible framework for rapid development of
 - Drivers
 - Filters
 - Dispatchers

RELATED PRODUCTS AND SERVICES:

Oracle Sensor-Based Services offers enterprises the ability to start small and grow to global RFID and sensor-enabled deployments.

- RFID Supplier Compliance Workspace
- RFID Infrastructure
- Oracle E-Business Suite

ADDITIONAL INFORMATION:

Additional Information can be found at:

- www.oracle.com/technology/products/sensor_edge_server
- www.oracle.com/technologies/rfid

Enhanced Security

The data, which is collected and processed, can contain sensitive and valuable information. Therefore security is an integral part of the Oracle Sensor Edge Server. All connections are managed over JNDI and can make use of the java build in security. Oracle Sensor Edge Server supports encryption on parameters and all web services are using OWSM. All user interfaces are implemented with JAZN that allow roll based user management.

Standards Compliance

Oracle believes that standards are an important part of this rapidly evolving technology, particularly RFID. As a participant in the EPCGlobal working groups one of our priorities is to keep our customers in constant compliance with emerging standards in Sensor Based Technology. In addition to EPCGlobal, Oracle is closely monitoring other international standards organizations (e.g. OGC, OPC, RFID UID Alliance.) Oracle is committed to ensuring that our products adhere to these open standards, providing customers with maximum interoperability.

EPC Tag Formats

The Sensor Edge Server provides out of the box support for all the standards specified by EPCGlobal (DOD-64/96, GIAI-64/96, GID-96, GRAI-64/96, SGLN-64/96, SGTIN-64/96, SSCC-64/96). The declarative engine allows customizable parsing and encoding to easily adapt future changes. New Gen2 Tags encoding are supported as well

ALE

The Sensor Edge Server supports the Application Level Events (ALE) interface. ALE provides a standardized format for reporting accumulated, filtered EPC data and abstracts the source in a high level notation of the location. The Sensor Edge Server offers both push and pull models, allows extended pattern matching, and supports persistent and transients subscriptions.

Information Services

One component of EPC will be the Information Services. The Sensor Edge Server already offers this functionality. Information Services allows static and transitional data exchange between EPCGlobal subscribers. It allows partners to gain to get information access of objects not in their direct control.

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