



RFID – Technology Overview and Oracle’s Solution

Atlanta OAUG

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Agenda

▶ RFID Technology Overview

- What is RFID
- Tags
- Readers
- EPC Network
- Middleware
- Using RFID in the Supply Chain

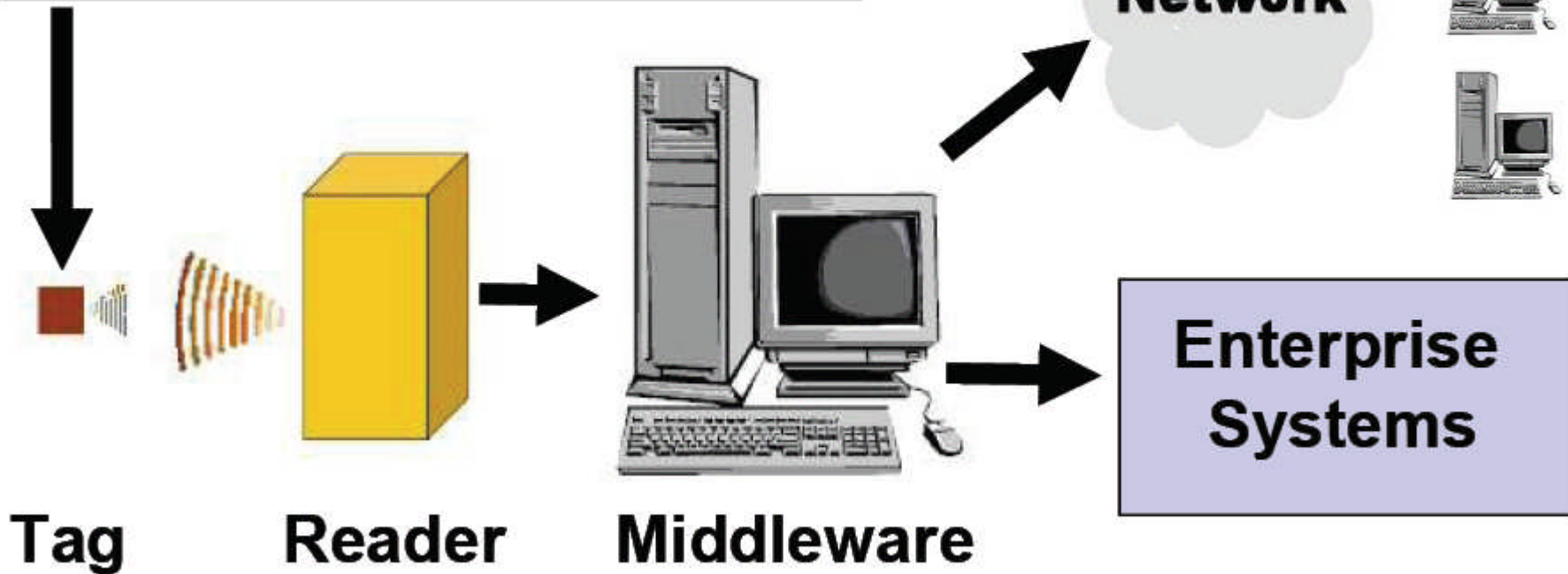
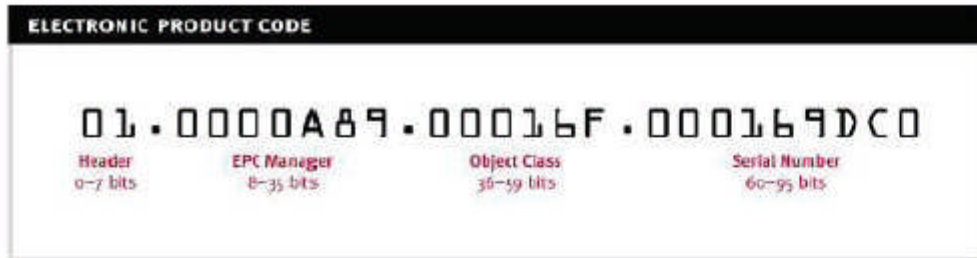
▶ Oracle's RFID Solution

- Oracle's presence in the RFID Supply Chain
- Edge Server
- WMS

Radio Frequency Identification (RFID)

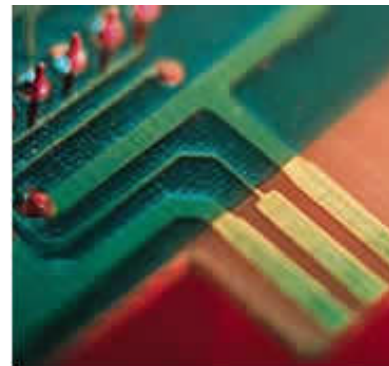
- ▶ Radio Frequency Identification is a technology which uses tags as a component in an integrated supply chain solution set that will evolve over the next several years.
- ▶ RFID tags contain a chip which holds an electronic product code (EPC) number that points to additional data detailing the contents of the package.
- ▶ Readers identify the EPC numbers at a distance, without line-of-sight scanning or involving physical contact. Middleware can perform initial filtering on data from the readers.
- ▶ Applications are evolving to comply with shipping products to automatically processing transactions based on RFID technology.

Radio Frequency Identification (RFID)



Tags

- ▶ A Tag is a transponder which receives a radio signal and in response to it sends out a radio signal.
 - Tag contains an antenna, and a small chip that stores a small amount of data
 - Tag can be programmed at manufacture or on installation
 - Tag is powered by the high power electromagnetic field generated by the antennas – usually in doorways
 - The field allows the chip/antenna to reflect back an extremely weak signal containing the data
 - Collision Detection – recognition of multiple tags in the read range – is employed to separately read the individual tags



Tag Attributes

Passive Tags

Active Tags

- | | | |
|-----------------------------------|---|---|
| ▶ Tag Power | ▶ Energy transferred using RF from reader | ▶ Internal to Tag |
| ▶ Tag Battery | ▶ No | ▶ Yes |
| ▶ Availability of Power | ▶ Only in the field of Radar | ▶ Continuous |
| ▶ Required Signal Strength to Tag | ▶ Very High | ▶ Very Low |
| ▶ Range | ▶ Up to 3-5 M | ▶ Up to 100 M |
| ▶ Multi Tag Reading | ▶ Few Hundred within 3M of reader | ▶ 1000's of tags recognized – up to 100mph |
| ▶ Data Storage | ▶ 128 bytes of R/W | ▶ 128 bytes of R/W with sophisticated search and access |

Readers

- ▶ An **RFID reader** is a device that is used to interrogate an RFID tag. The reader has an antenna that emits radio waves; the tag responds by sending back its data.

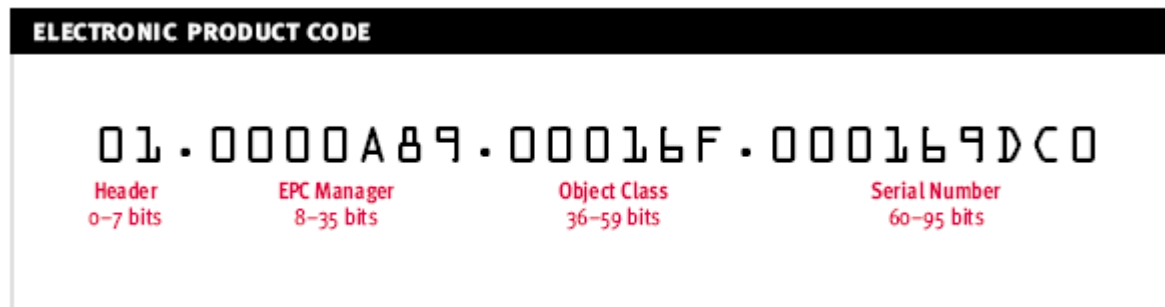
- ▶ The reader has two basic components –
 - A scanning antenna
 - A transceiver with a decoder to interpret the data



▶ Some Reader Examples

The EPC Code

- ▶ The objective of the Electronic Product Code (EPC) is to provide unique identification of physical objects.
- ▶ The EPC will be used to address and access individual objects from the computer network, much as the Internet Protocol (IP) Address allows computers to identify, organize and communicate with one another.

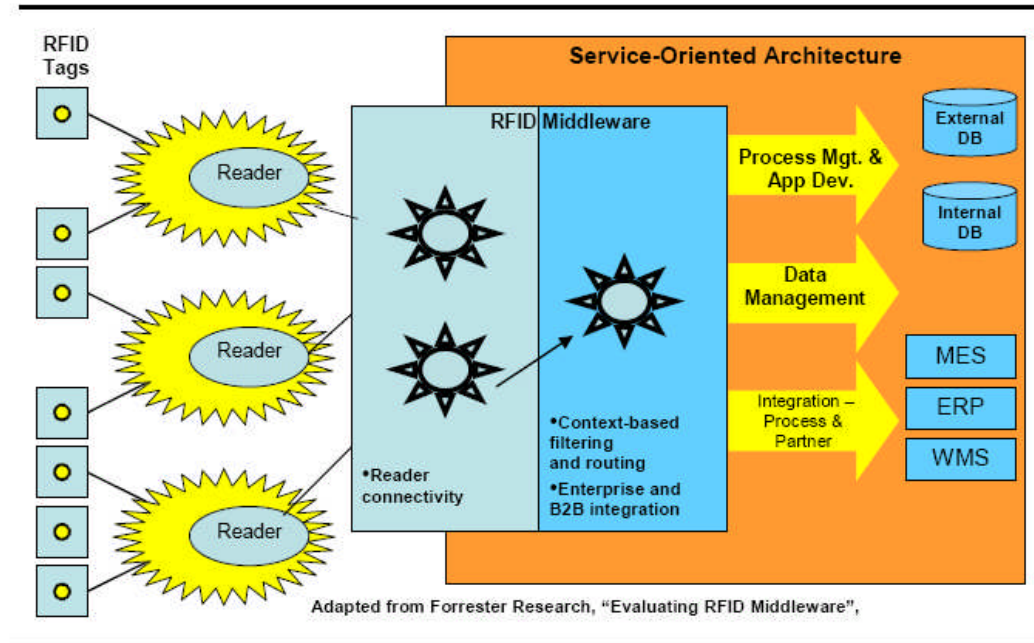


The EPC Code

- ▶ Eg. 613.23000.123456.123456789 (96 bits)
- ▶ Header – defines data type (8 bits)
- ▶ EPC Manager – describes originator of EPC (Product manufacturer) (34 bits)
- ▶ Object Class - Could describe the product type (20 Bits)
- ▶ Serial Number – Unique ID for that product item (34 Bits)

RFID Middleware

- ▶ Middleware provides reader connectivity to other systems on the network, translates that data and transmits it to other applications.

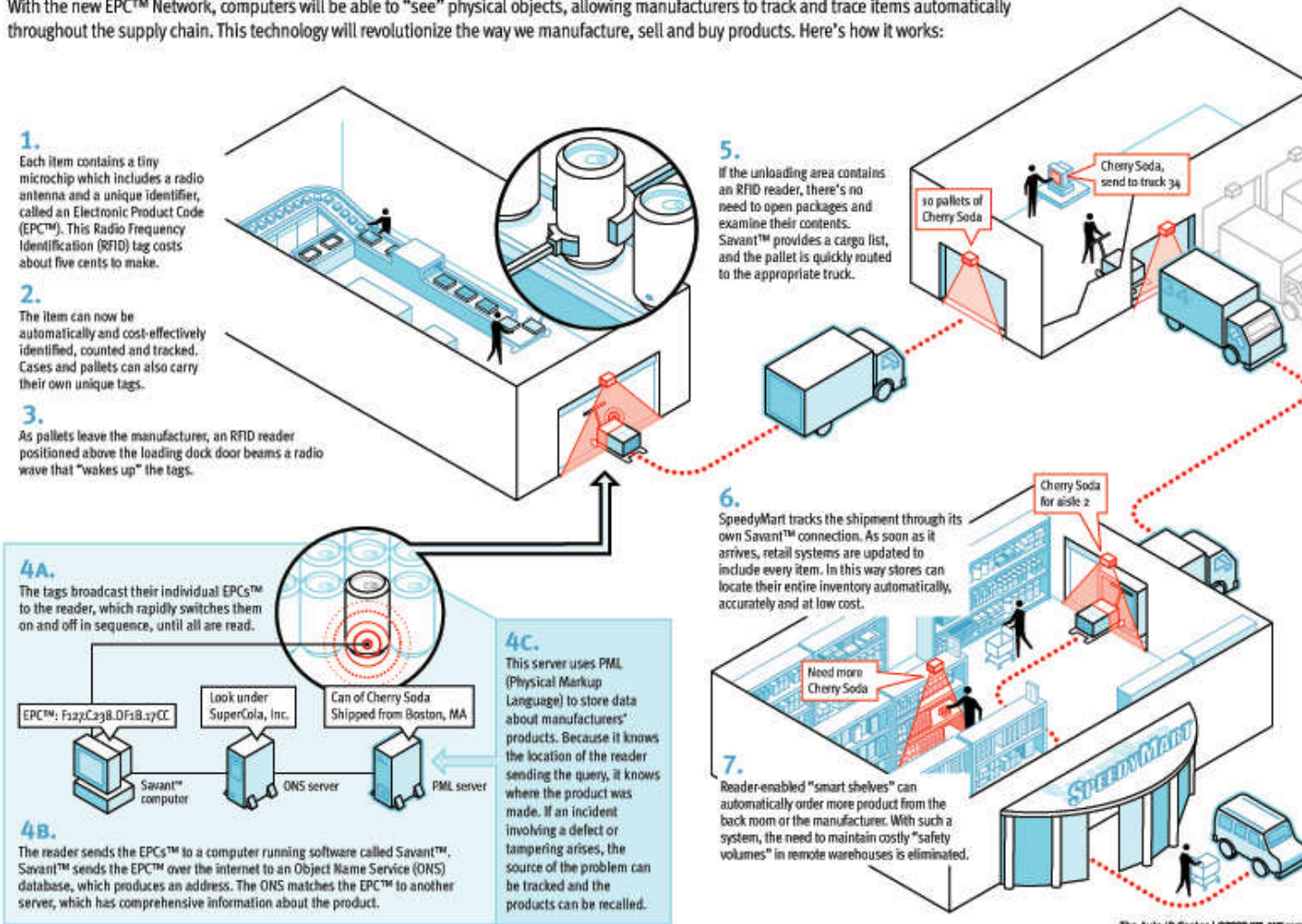


Using RFID in the Supply Chain

HOW THE EPC™ NETWORK WILL AUTOMATE THE SUPPLY CHAIN

XPLANATIONS™ by XPLANE®

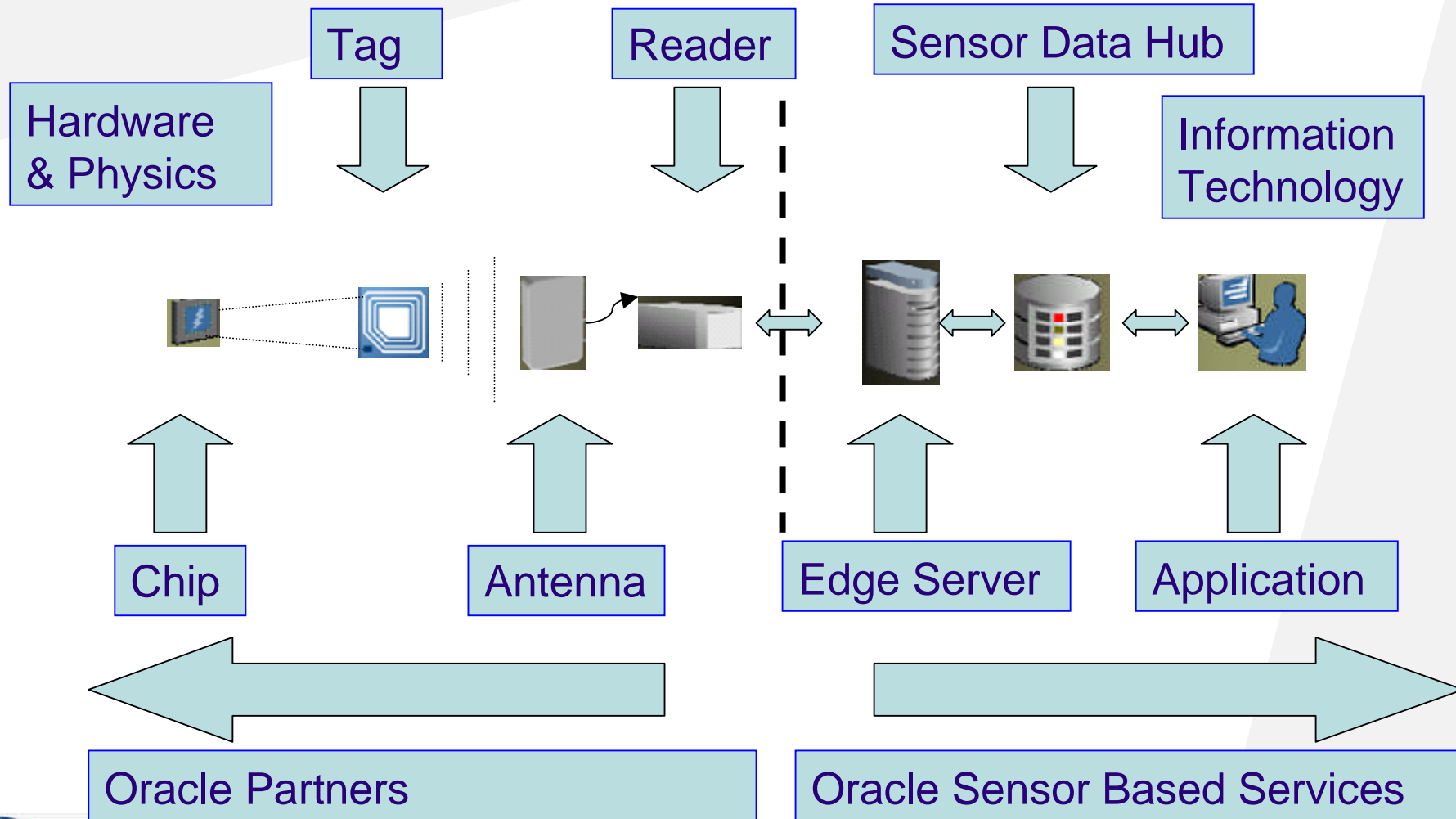
With the new EPC™ Network, computers will be able to “see” physical objects, allowing manufacturers to track and trace items automatically throughout the supply chain. This technology will revolutionize the way we manufacture, sell and buy products. Here’s how it works:



The Auto ID Center | ©2002 XPLANE.com®

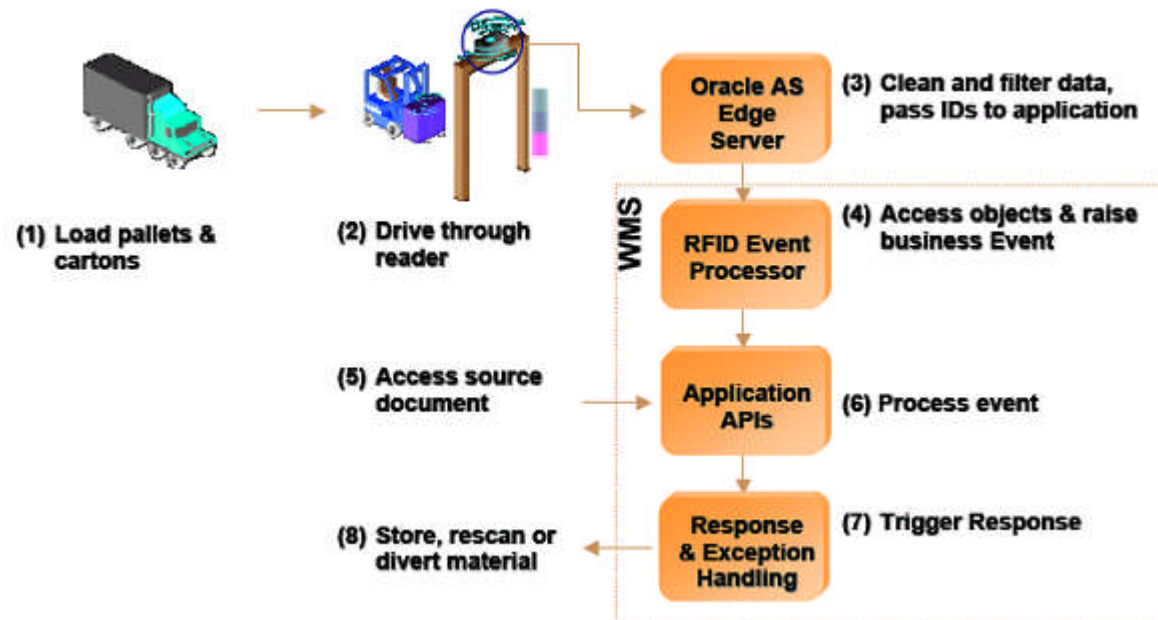
Oracle's RFID Solution

Components in the Supply Chain which Oracle handles



Oracle's IT Solution

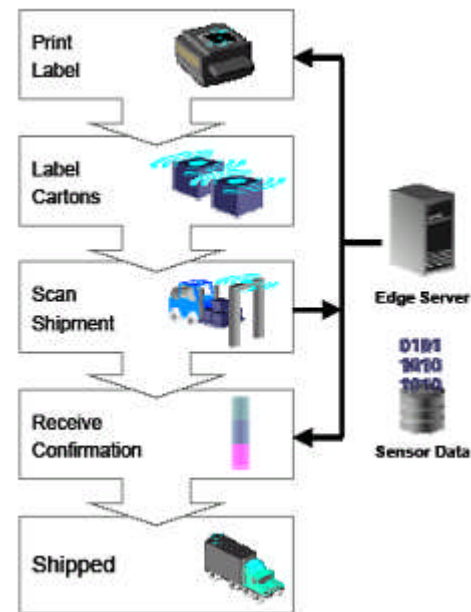
▶ Oracle provides Middleware and applications



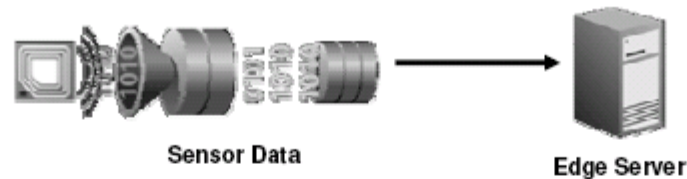
Oracle Edge Server

▶ The Oracle Sensor Edge Server is a middle-tier component that integrates sensors and other types of command or response indication equipment with applications. Sensors are hardware or software endpoints that make observations of certain changes of state. The Sensor Edge Server uses these sensors to integrate sensor data and applications.

- ▶ Sensor Data Collection
- ▶ Data Cleansing
- ▶ Dispatch Sensor Data
- ▶ Device Management

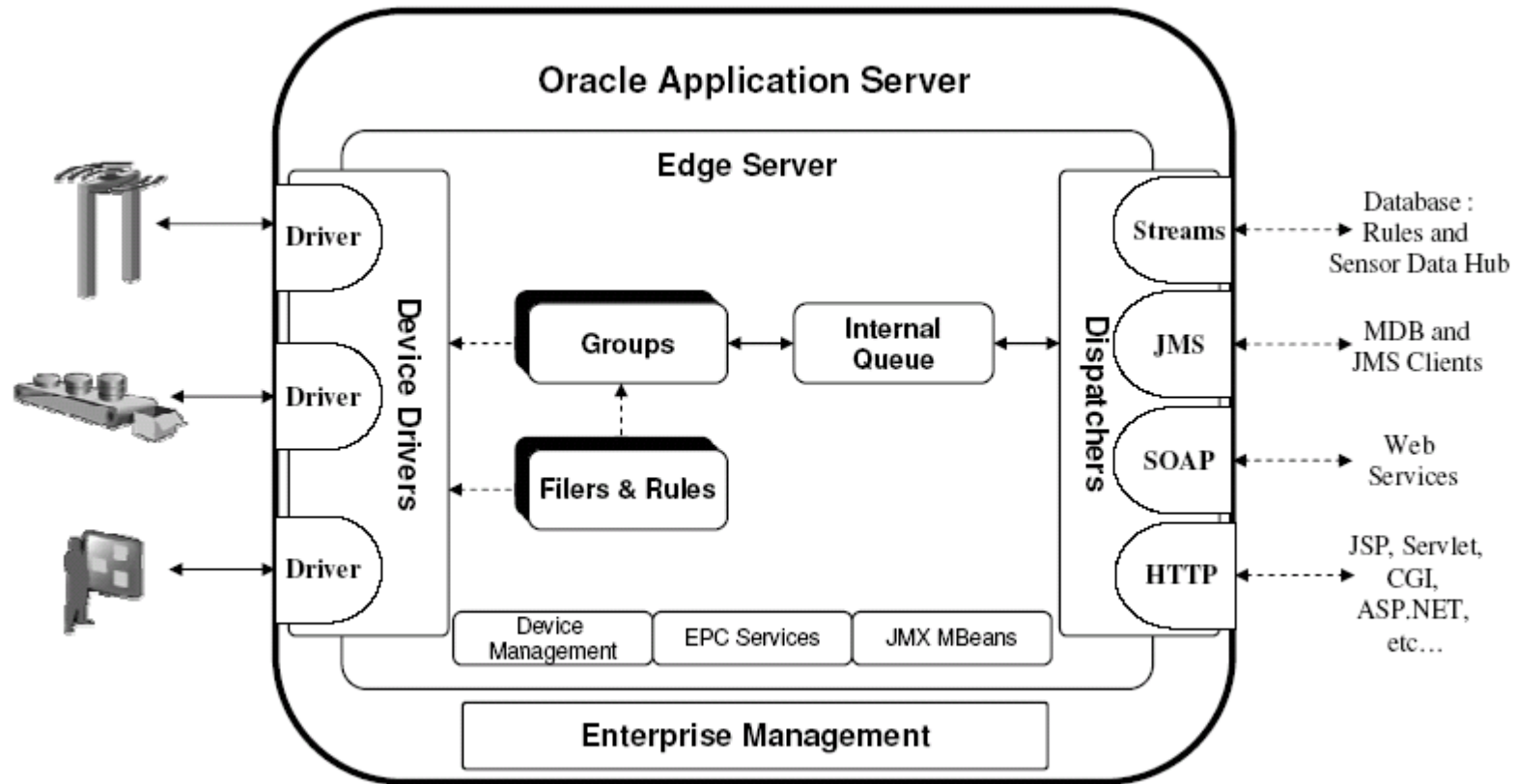


Edge Server



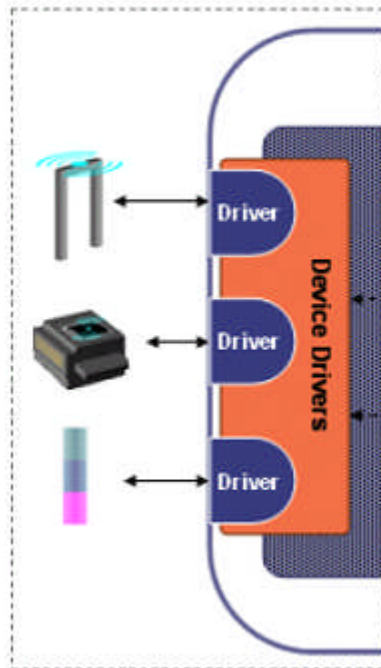
- **Collect Sensor Data**
 - RFID Readers, RFID Label Printers, Temp. Sensors, Laser Diodes, etc
- **Cleanse Sensor Data**
 - Cleanse, Normalize, Filter observations
 - Only "Relevant" events are forwarded
- **Dispatch Sensor Data**
 - Deliver Sensor Data to various distribution systems
- **Device Management**
 - Manage and Monitor Sensors and Response Devices
 - Sensors, Light Stacks, Message Boards, Carousels, etc
- **Edge Developer Kit**
 - Develop and test Applications and Agents
 - Extend Edge Server by developing custom Edge Extension components (Device Drivers, Filters, Dispatchers, etc)

Edge Server



Sensor Devices Support

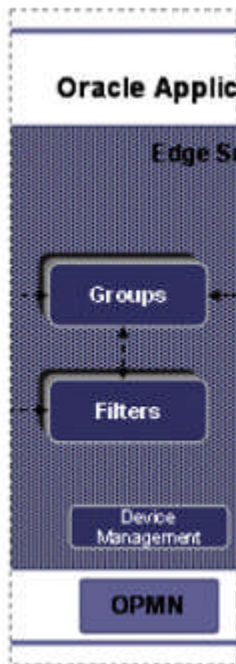
- ▶ Support for hardware devices like Readers and Printers



- **Driver Framework**
 - Plug-and-play architecture
 - Develop new drivers anytime
 - Applications are device agnostic
- **Sensor and Device Support**
 - RFID Readers
 - RFID Label Printers
 - Light Stacks
 - Extensible to other devices
- **Drivers (Available in 10.1.2)**
 - Alien RFID Readers
 - Intermec RFID Readers
 - Patlite Light Stacks
 - Zebra RFID Label Printers (OTN)

Device Groups and Filters

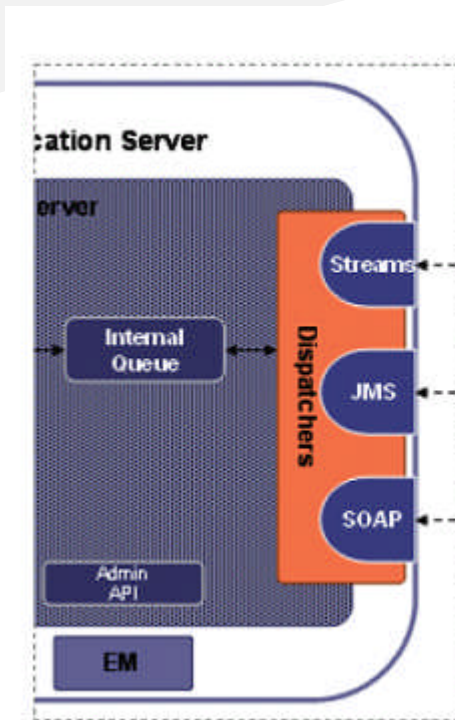
- ▶ Edge Server has robust filtering capacity



- **Device Groups**
 - Allows administrators to logically group devices together
 - Group devices for cross filtering
- **Filter Framework**
 - Remove unwanted or low-level events
 - Extensible filter architecture
 - Centralized filter management
- **Filters (Available in 10.1.2)**
 - **PassThru** : Filter for portal readers, produces 'detected' event
 - **Shelf** : Filters for shelf and proximity readers producing enter/exit events
 - **PalletPass, PalletShelf** : Aggregation filtering for both Pass and Pallet filters
 - **Group** : All filters can be applied to groups and individual devices
 - **CheckTag** : Test tag to verify reader health

Internal Queue and Dispatcher

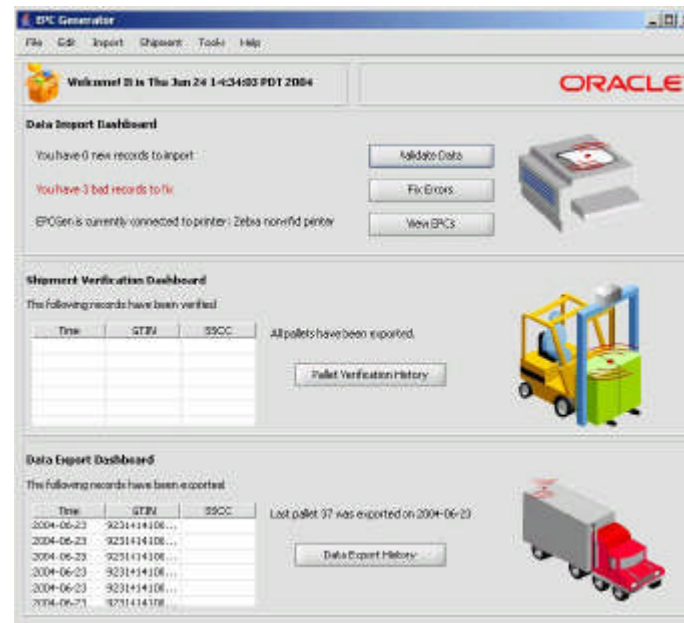
- ▶ Dispatch to different applications down the line



- **Internal Queue**
 - Guarantees data will not be lost if dispatch link is down
 - Dynamically switches between transient and persistent store and forward
- **Dispatcher Framework**
 - Send normalized and “relevant” events to database and applications
 - Extensible dispatcher framework
 - Centralized dispatcher management
- **Dispatchers (Available in 10.1.2)**
 - **Streams** : Applications can be written as PL/SQL, C++, or Java code that is called by the database upon satisfying specific rules, or JMS listener on the Application Server.
 - **JMS (OC4J)** : Applications can be written as JMS Listener or Message Driven Beans
 - **Web Services** : Call out to customer application SOAP routines when events are received
 - **HTTP** : Post to specified URL when events are received

EPC Compliance Enabler

- ▶ Quick to Install
- ▶ Generates EPC
- ▶ Seamlessly integrates with WMS
- ▶ RFID Label Printing



Oracle WMS Support for RFID

- ▶ Oracle WMS provides a Device Integration Tool Kit
- ▶ A RFID device can export a RFID event to warehouse management in the form of a PL/SQL API.
- ▶ Warehouse management can return the success or failure of the transaction to the device in the form of PL/SQL API, XML or CSV

Genpact's Services in RFID

- ▶ **RFID Assessment Tool**
 - Quantitative and Qualitative Analysis of Financials, Infrastructure and “Mindset” readiness

- ▶ **RFID Pilot Implementation**
 - End to end Program Management for RFID technology based implementations.
 - Not limited to Supply Chain

- ▶ **Systems Integration**
 - Integrate existing applications to RFID hardware

- ▶ **Training**



Contact Information

Deep Krishna

Deep.Krishna@genpact.com

Kirit Goyal

Kirit.Goyal@genpact.com

404 513 1378

www.genpact.com

