



# Agenda

- Oracle's IoT View
- Oracle이 보는 IoT Technology
- Oracle IoT Business Cases
- Oracle Partnership on IoT

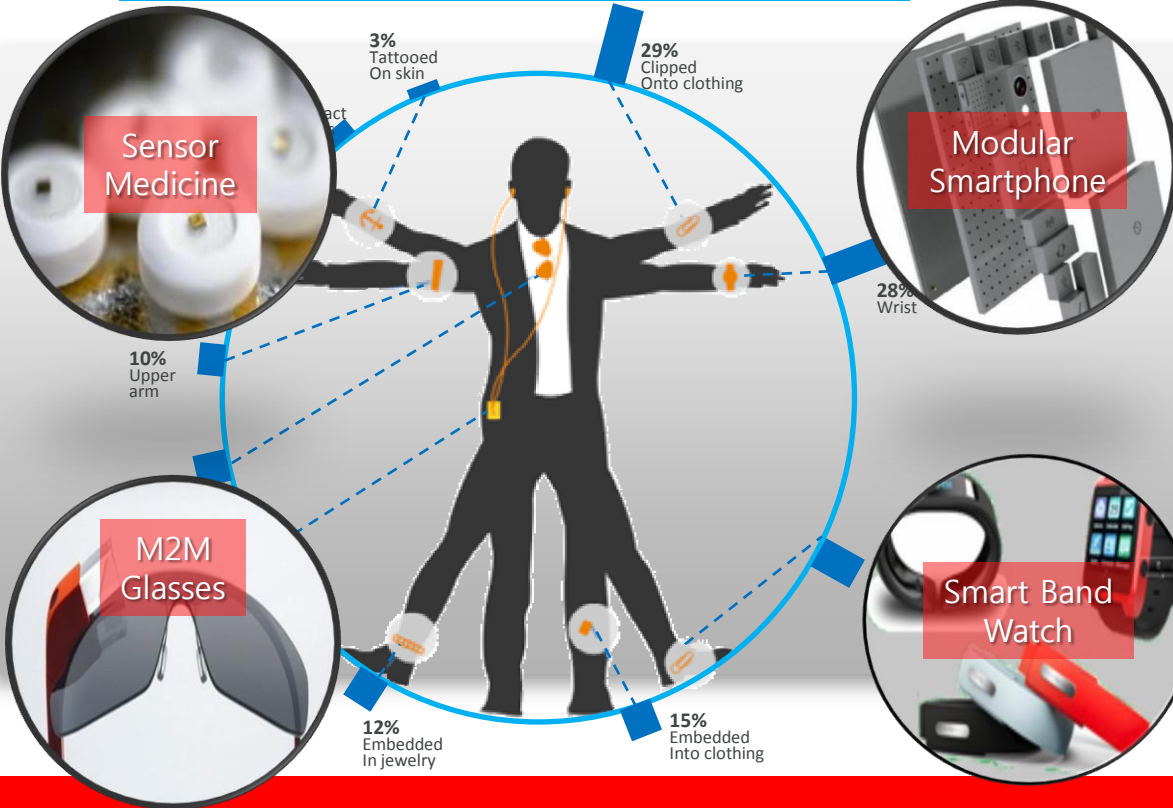
The background features a red-to-dark-red gradient. In the upper half, there are clusters of semi-transparent, light-colored 3D cubes. In the lower half, there are clusters of darker, more solid 3D cubes, some of which have a small 'X' mark on their side.

# ORACLE'S IOT VIEW



# Visible Things in IoT

## Wearable Device



## Telematics



## Smart Energy

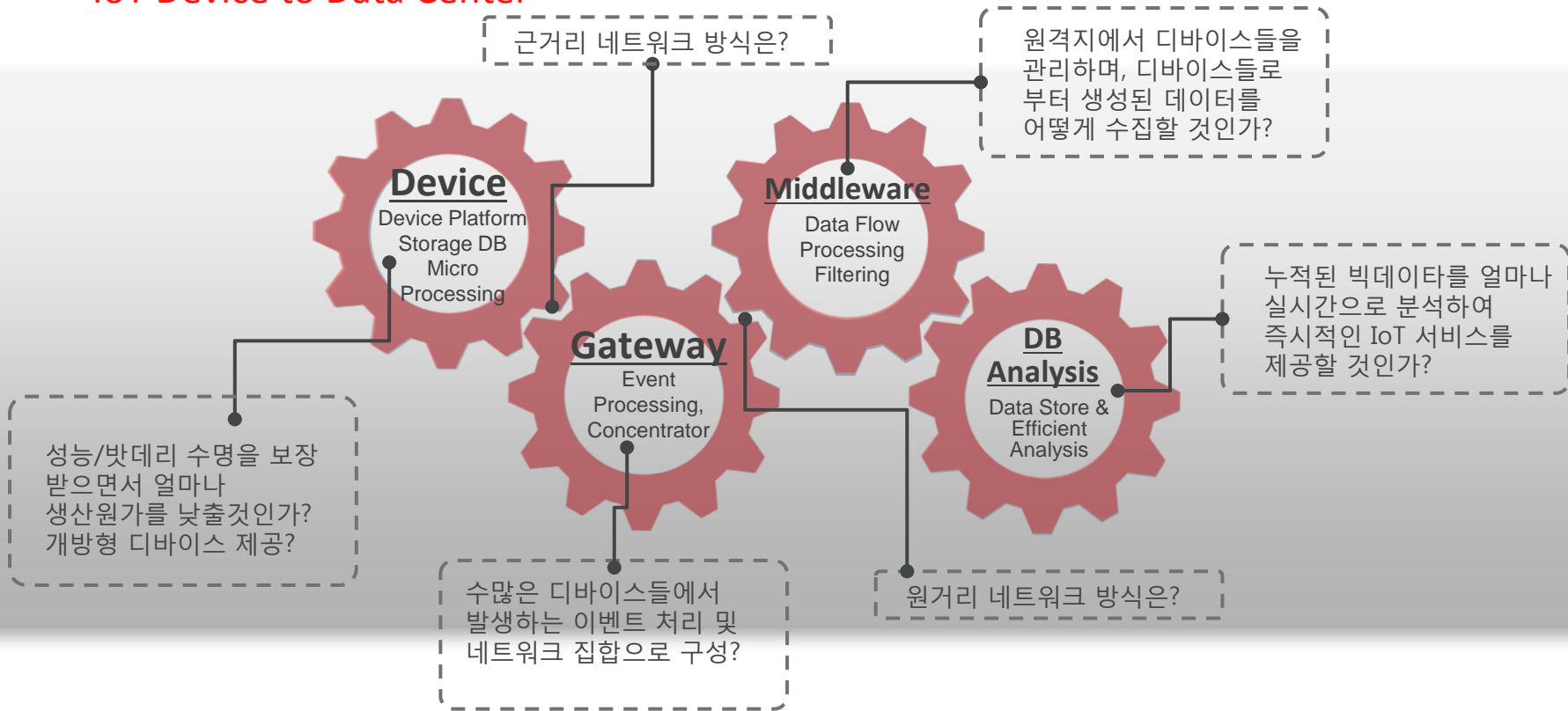


## Smart Home

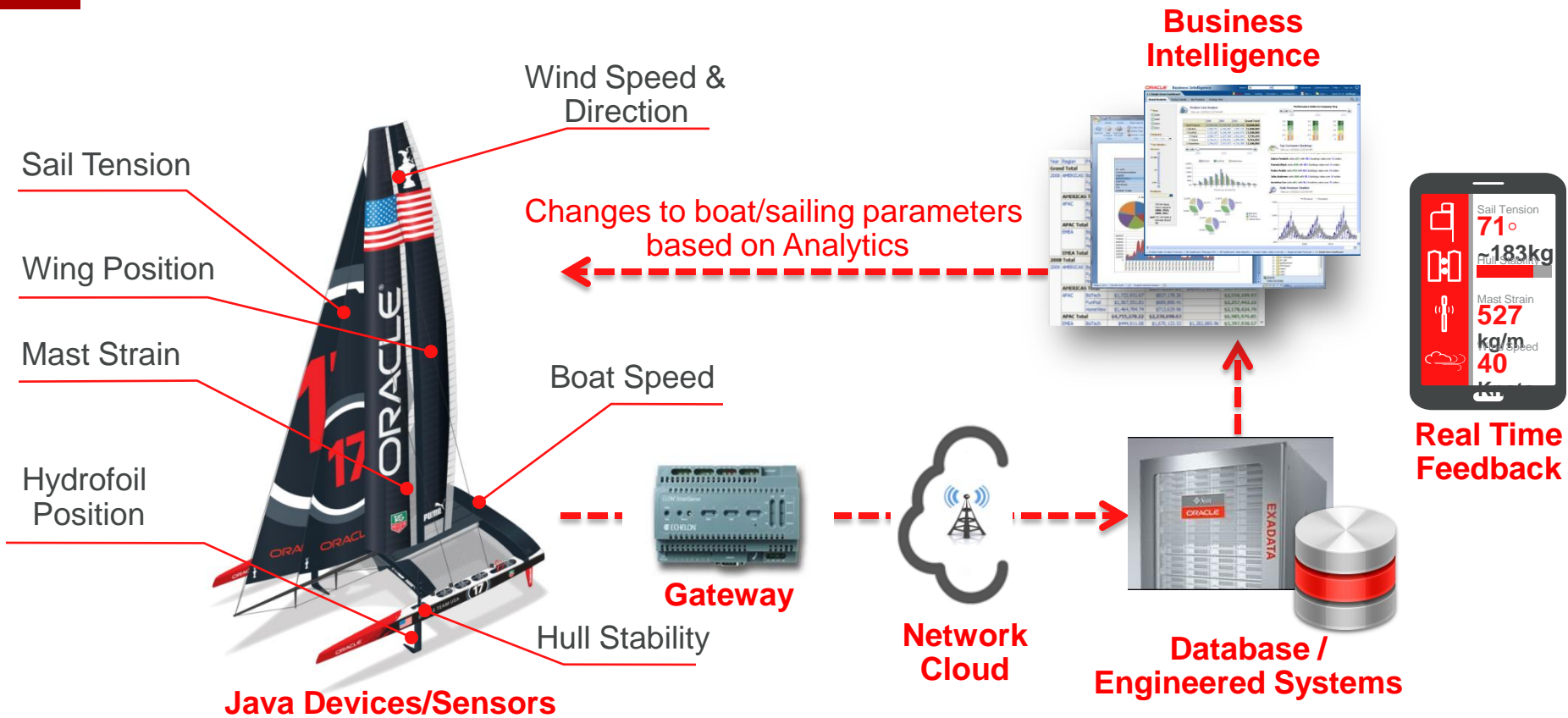


# Invisible Things in IoT

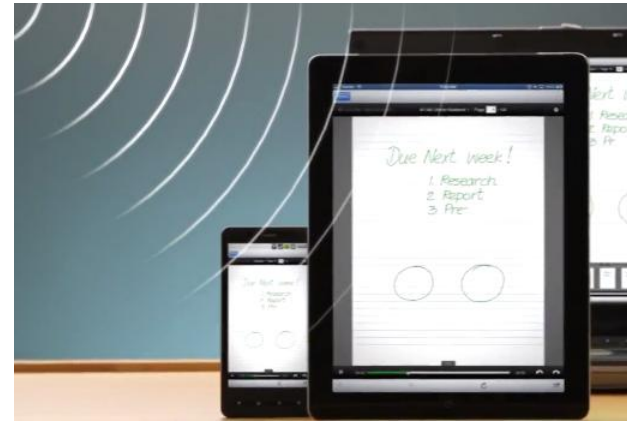
## IoT Device to Data Center



# Case Study: America's Cup Oracle Team USA Boat



# IoT Case - Livescribe





# IoT Case - Livescribe

- Smart Pen
- Open System / Development Platform
- App Store / PenCast
- Java ME Technology



ORACLE™

# IoT Case - JobClock Hornet



Because we've **always**  
done it **this way**



**\$20,101.48**

**Thousands** of dollars

**Waste** countless ho



1.5 hours

5.1 hours

6.2 hours

**Automatically**



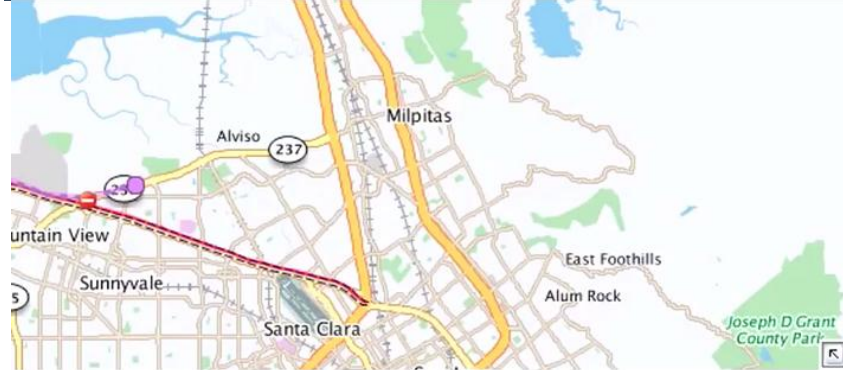
# IoT Case - JobClock Hornet

## Portable Device

- Jobsite management device
  - Mobile time recorder for
    - Employee payroll
    - Real-time staffing information
  - Improved time-to-market
  - Easy application development

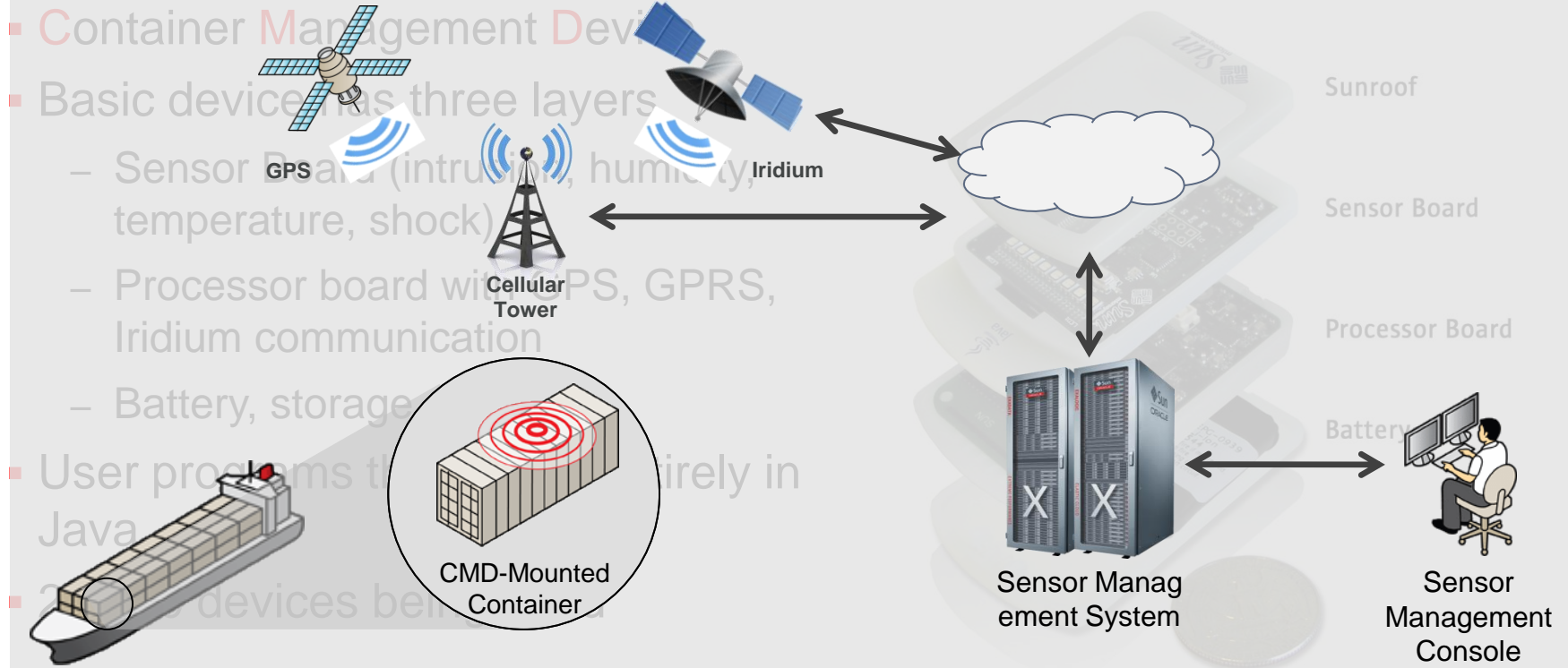


# IoT Case – Transportation



Geofence Alerts				
CMD	Container	Shipment	Time	Message
7C6D	DEMO-OOW-4	Demo-OOW4	5 minutes ago	Event. Exiting Geozo US-101
7C6D	DEMO-OOW-4	Demo-OOW4	31 minutes ago	Event. Entering Geozo US-101
7C6D	DEMO-OOW-4	Demo-OOW4	31 minutes ago	Event. Exiting Geozo HQ

# IoT Case – Transportation



# IoT Case - Smart Metering

- Freescale:

- ZigBee Electric Meter
- 1322X ZigBee Coordinator
- DC P1025 RDB

- Oracle:

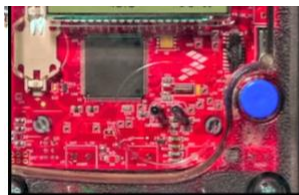
- Java FX 2.2
- Java SE Embedded 7.0 PPC



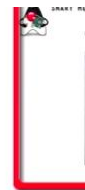
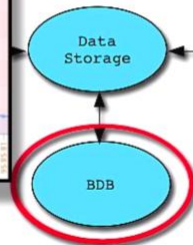
Freescale  
ZigBee Electric Meter



Freescale Data Concentrator P1025RDB  
and  
Java SE Embedded 7.0 PPC

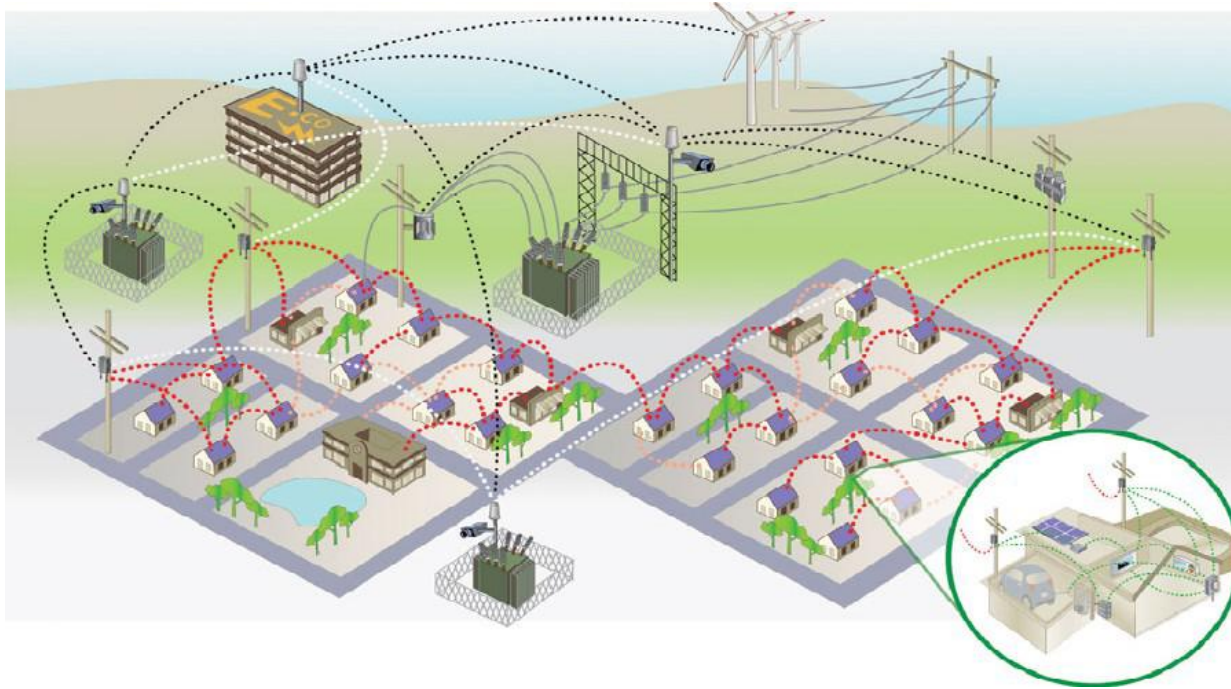


...aneous computation  
...ript rule

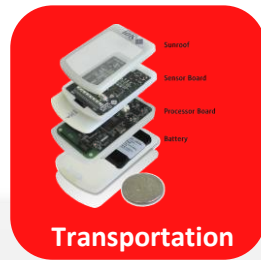


# IoT Case - Smart Metering

Intelligent Monitoring of Energy Use and Distribution



EnergyICT  
Java SE Embedded Based  
Smart Meter Concentrator



IoT Device

No display



Simple UI



저해상도/작은 Screen



고화질 screen



IoT Server



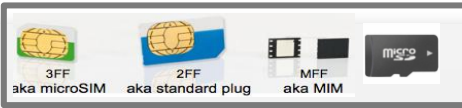
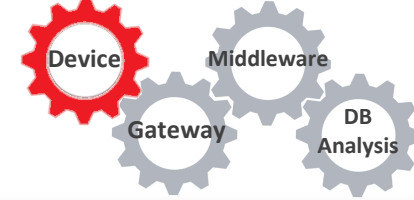


The background is a vibrant red gradient. At the top, there are several clusters of 3D cubes in various shades of red and white, some appearing to float or be in motion. At the bottom, there is a 3D rendering of a computer keyboard, with several keys highlighted in a darker red. The overall aesthetic is modern and tech-oriented.

# ORACLE이 보는 IOT TECHNOLOGY?

# Building IoT Device

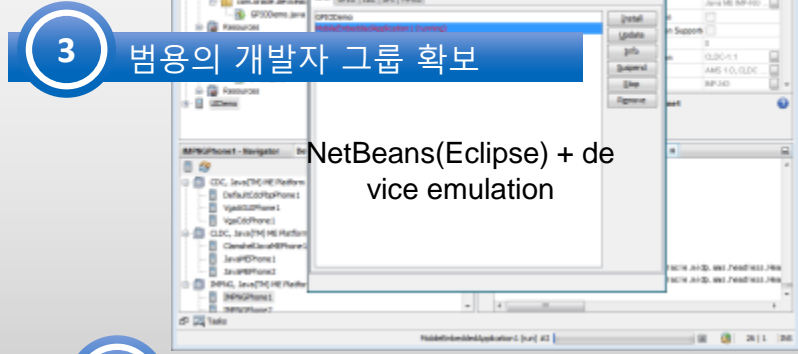
IoT Device를 위한 주요 고려 사항 : 원가, 개발생산성, 다양성



1 50KB (Java Card), 2MB(Java ME)



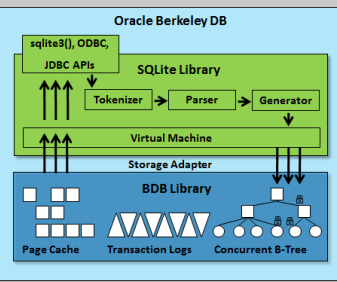
128MHz 이상  
Lightweight  
(Ex: CortexM3Chip)  
ROM: 1MB이상  
RAM: 2MB이상  
exROM: 8MB 이상



3 범용의 개발자 그룹 확보

NetBeans(Eclipse) + de vice emulation

4 디바이스의 데이터 관리



- 1MB footprint 동작가능
- 다양한 인덱싱 요구 Btree, Hash, Queue&Recno, Heap (그래픽, SNS 처리 능력 요구사항)
- NoSQL + SQL 모두 지원
- C, C++, Perl, PHP, Java 다양한 개발환경 이용
- Google, AT&T, EMC 등 다수의 디바이스 임베디드 사례

2 초경량/Battery 사용 최소화 다양한 센서/통신을 지원하는 디바이스



- 정보 수집 (No display device)
- Simple UI로 간단한 정보 표현이 가능한 device
- 저해상도의 작은 Screen을 가진 device
- 고성능 processor에 고화질 screen을 가진 device



스마트 폰과 연동하는 Watch계열 Wearable Device 예 Bluetooth, Battery, Storage, Logging, UI등 Open API를 이용하여 SDK로 개발한 App을 App Store를 통해 다른 목적으로 활용가능, Cloud와 연계가능

TURN ON YOUR PEBBLE

Make sure your Pebble is turned on if it's not already

If you're a brand new user, you'll see this screen:

Continue once your Pebble is turned on and nearby

CONTINUE

< Back TOOLS & UTILITIES SEARCH

education What3Words Tools & Utilities ADD

tirades

locator

What3Words integration for your Pebble! Gets your current location, and shows you the three...

May 2013 Pebble Calen... Tools & Utilities ADD

Universal Calendar, configuration screen available from the Phone Pebble App, allowing to...

AutoPebble Tools & Utilities ADD

Automate your Pebble with Tasker. Set customized lists that let you browse anything you wa...

Battery Status Tools & Utilities ADD

Displays all battery and information provided by the Pebble OS. Battery state is shown bo...

YELP

SEE ALL FROM DEVELOPER

Looking to feed a lunchtime craving, find a quiet coffee shop or hit up happy hour? Yelp is here to help. Find places near you to eat, shop,

UNLOAD

WATCHFACES SEARCH

Dotz

Animate your time

- Over 15 animations
- Battery friendly
- Bold and easy to read

ALL APPS SEE ALL >

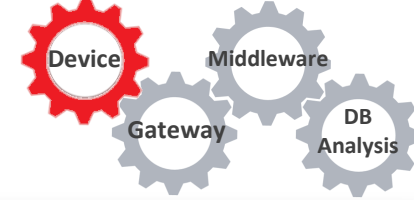
MOST LOVED APPS SEE ALL >

PEBBLE PICKS SEE ALL >

예시 화면

# Oracle IoT Device

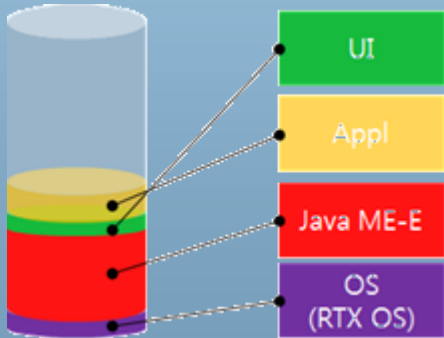
Oracle Java ME-Embedded 플랫폼을 활용한 IoT Device 구성



## KEIL Board



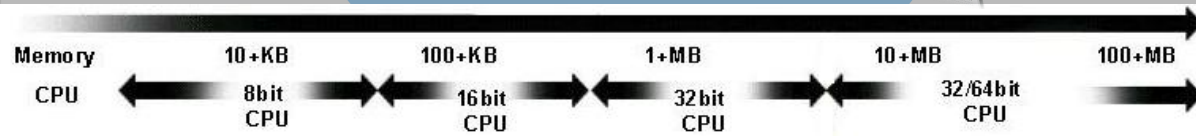
128MHz정도의 초경량(예: Cortex M3칩)  
ROM1MB, RAM 2MB  
외장ROM 8MB



RAM = 총 2MB이상으로 동작가능  
(Display이 필요없으면, 1MB정도)

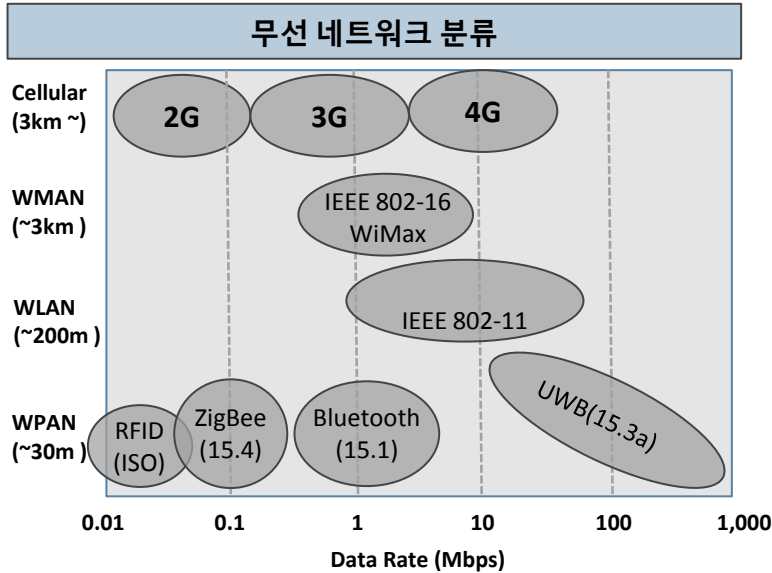
Usage :

Java ME-E 플랫폼을 활용 가능한 영역



# IoT Device – 네트워크 영역

근거리 무선네트워크의 국제표준화는 IEEE에서의 표준과 Alliance의 표준으로 구분되어 각각 하드웨어, 소프트웨어 관련 표준 제정을 추진하고 있습니다.



WPAN(Wireless Personal Area Network): IEEE 802.15  
 WLAN(Wireless Local Area Network) : IEEE 802.11  
 WMAN(Wireless Metro Area Network) : IEEE 802.16

## WiMax

- ▶ Notebook, PDA, 단말기

## 무선 랜

- ▶ Notebook, PC, PDA, 프린터
- ▶ 무선 TV, 스피커, 캠코더

## Bluetooth/BLE

- ▶ 단말기, PDA, 프린터
- ▶ 핸드프리, 헤드셋 기기, 원폰

## UWB

- ▶ PC/주변기기간 고속 데이터 전송
- ▶ 무선 TV, STB, Mobile 기기

## ZigBee/SUN

- ▶ Home Automation, 공장 자동화
- ▶ Ubiquitous Sensor Network

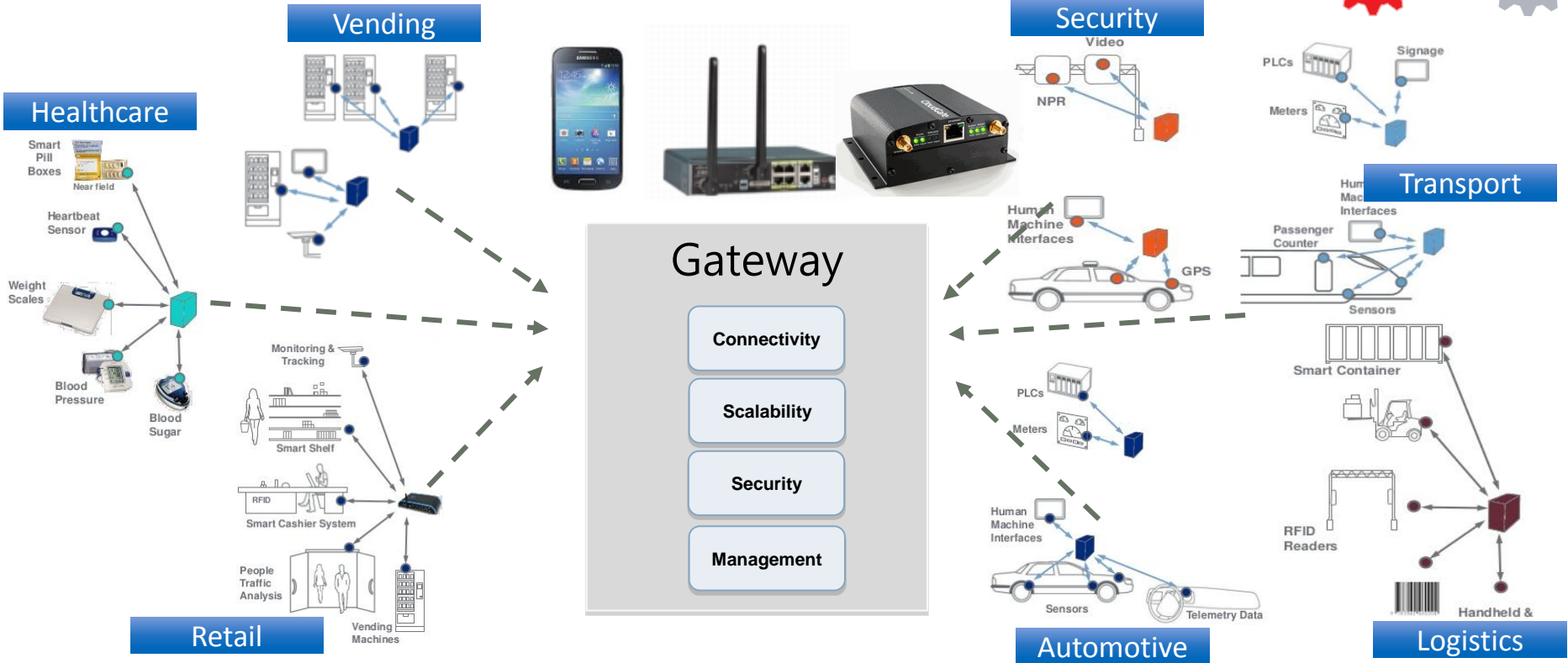
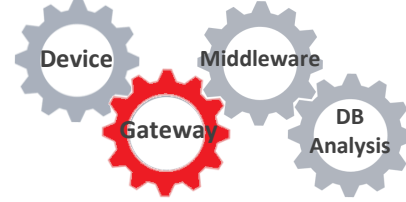
## RFID

- ▶ 유통/물류 분야, 출입통제 보안 분야
- ▶ 인증, 위조관리, 전자화폐

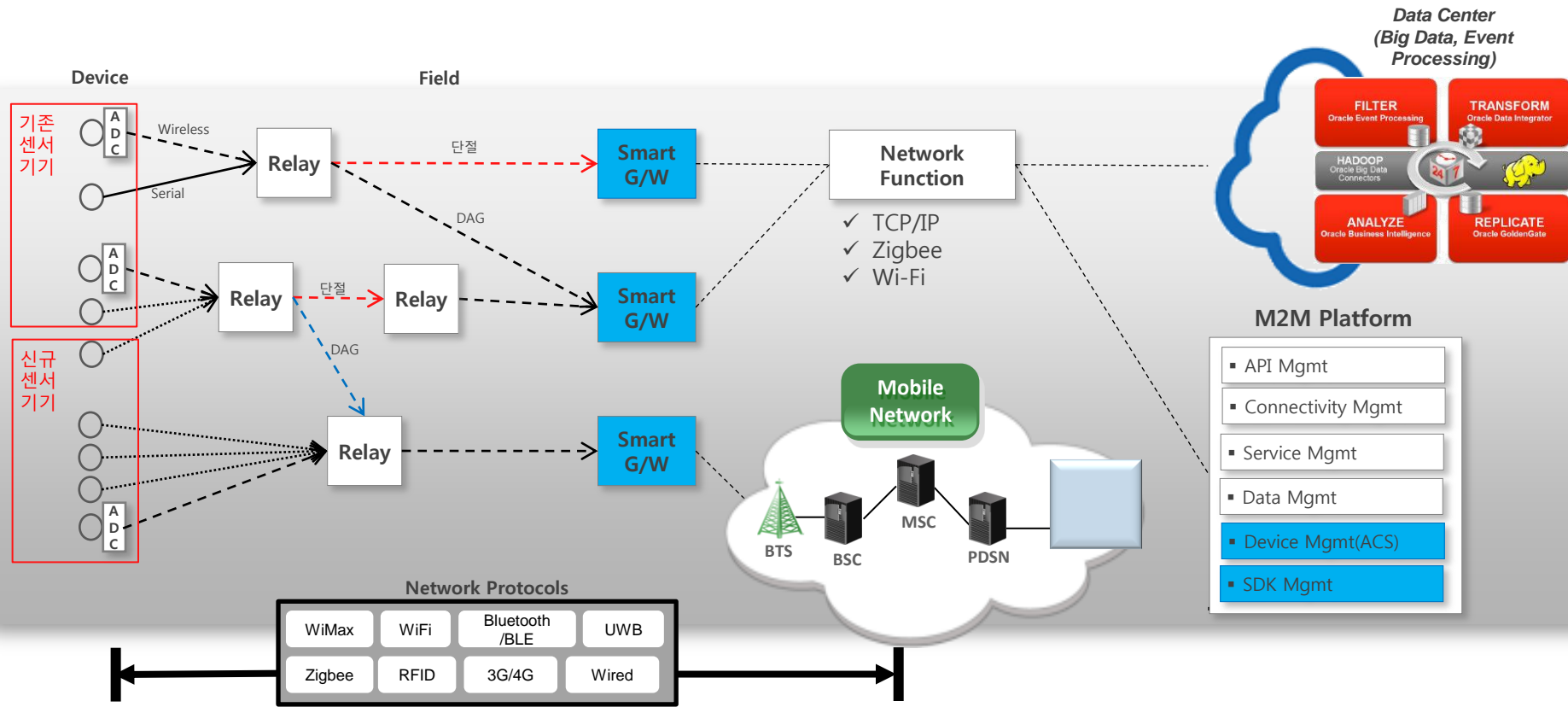
구분	WLAN (802.11n)	Bluetooth v4.0 (Bluetooth SIG)	ZigBee (802.15.4)	UWB(802.15.3x)		
				3a	3c	4a
주파수 대역	2.4GHz, 5GHz	2.4GHz	2.4GHz, 868MHz(유럽), 915MHz(미/호)	2.4GHz, 3.1-10.6GHz	57-66GHz	2.4GHz, 3.1-10.6GHz
채널대역폭 (MHz)	20/40MHz	1MHz	300-400MHz	500MHz-7.5GHz	2.08GHz	1.4GHz
최대 전송 속도	130/600Mbps	1-24Mbps	20, 40, 250Kbps	100Mbps	2Gbps	1Kbps~1Mbps
핵심기술	MIMO-OFDM	FHSS	DSSS	MB-OFDM DS-CDMA	Single-Carrier	IR-UWB
서비스	인터넷/VoIP	주변기기 간 통신/제어	출/발달 감시 및 제어	PC-프린터, 무선 USB	무압축 영상전송	지하 매설물 등 위치추적
표준완료	2009	2009	2004	(2006)	2009	2007

# IoT Gateway

IoT / M2M 디바이스의 통신 확장 관리 보안 영역을 Gateway를 통해서 구현함  
 IoT / M2M 의 infra 성격을 가짐.

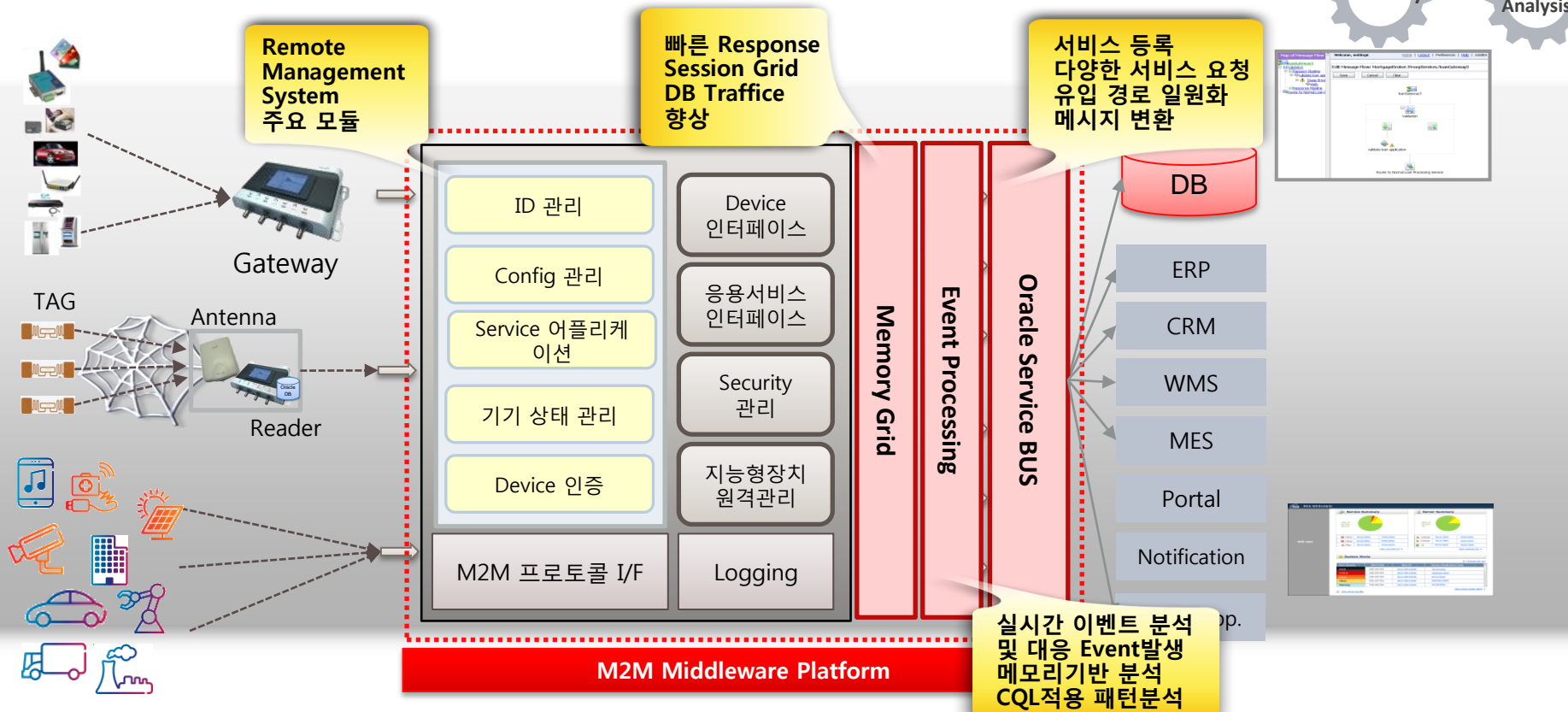
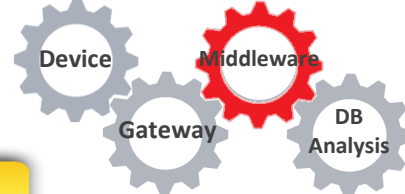


# IoT Device-GW Network



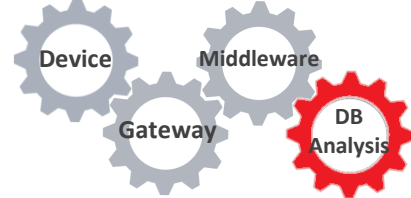
# IoT Middleware

IoT 디바이스 또는 IoT Gateway로부터 디바이스 정보 수집, 서비스와 데이터를 운영/관리





# IoT Data Center



IoT Device 관점

사용부담을 줄여주는 대용량 데이터

Machine  
Generated

Social  
Media

Text, Image  
Video, Audio

비정형 데이터

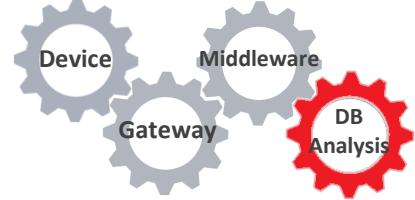


Compression

No SQL

Multi-Tenant

# IoT Data Center



**In-Memory**  
**Enterprise R**  
**Pattern Matching**



## IoT Service 관점

TID	NAME	PRICE	TIME
2415	ORCL	33.21	10:11:58
2241	ORCL	197.34	10:11:57
2401	IBM	410.11	10:12:00
7202	AAPL	409.21	10:12:00
7389	ORCL	33.10	10:12:01
7499	ORCL	33.11	10:12:02
7499	ORCL	33.12	10:12:03
7521	ORCL	33.11	10:12:04
7566	IBM	196.85	10:12:05
7624	IBM	196.58	10:12:06
7688	APPL	409.22	10:12:06
7688	APPL	409.53	10:12:07
7688	APPL	409.56	10:12:07
7688	APPL	410.11	10:12:07
7688	APPL	410.56	10:12:07
7688	APPL	409.66	10:12:07

```

    Select * from
    Ticker MATCH_RECOGNIZE (
    ...
    PATTERN (X+ Y+ W+ Z+)
    DEFINE X AS (price < PREV(price)),
           Y AS (price > PREV(price)),
           W AS (price < PREV(price)),
           Z AS (price > PREV(price))
    ...)
  
```

itabase

Analy

event defined  
regular expression

원분석


Compression  
No SQL  
Multi-Tenant




# ORACLE의 IOT BUSINESS CASES

# 산업별 IoT/M2M사례 요약

## Automotive & Telematics

 Fleet Management Solution

 Verizon Telematics

 Location Tracking Solution

 Connected Vehicle Services

 Hughes Telematics

 Telenor Connexion

 Vehicle Capacity & Flow Control


 Bluelink TMS

## Hitech


 Multi-Function Printer

 Vending Machine

## Healthcare

 FuelBand Wearable Healthcare

 Garmin Connect Fitness

 Remote Service Monitoring

## Public/Defense

 National Geo-fenced Service

 Smart City

 Smart Parking Management


 City e-Service

 Unmanned Combat Vehicle

## Smart Energy

 Smart Data Center/Energy Mgmt


 Commercial Smart Grid

 Advanced Metering Solution


 Smart Grid/AMI


## Smart Manufacturing

 Plant Floor Data Mgmt

 Drilling Data Analysis Solution

## M2M Platform

 Location-based Mobile Billboard


 Realtime Telecom Visability

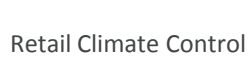
 Inspire the Next

 seecontrol M2M Platform

 AT&T

 Alcatel-Lucent

 Climate Technologies

 Retail Climate Control

# Automotive Telematics

## Sascar Fleet Management



ORACLE Container Monitoring System

디바이스 역할

- Sensor Board( , , , )
- (GPS, GPRS)
- Battery, Storage

ID	Name	Type	Buffer (m)	Report
NPO	Destination	Area	900	300
RT1	Planned Route	Route	100	300
SPO	Destination	Area	900	300
atlantic	atlantic	Route	1000	3000

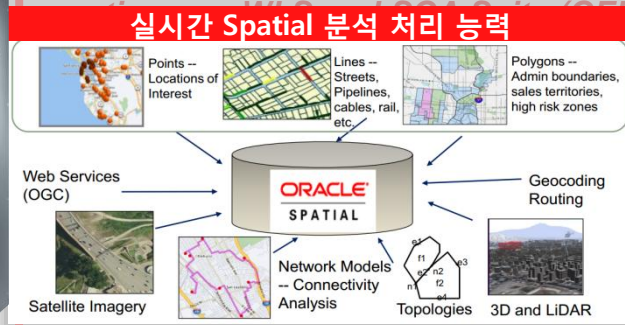
Device ID	DateTime	Position	fix	light	temperature	humidity	accelX	accelY	accelZ	PRR	HCK	Door	Lig
sp04-7500	2011-09-16 12:24:06 PDT	37.49645, -122.23388	1	0	31.1	54.1	0.04	-0.06	0.0	0	102	0	0
sp04-7500	2011-09-16 12:21:06 PDT	37.52243, -122.26613	1	0	31.7	53.6	0.06	-0.03	-0.06	0	19	0	0
sp04-7500	2011-09-16 12:20:06 PDT	37.52588, -122.27156	1	0	31.3	53.5	0.03	-0.05	-0.09	0	31	0	0
sp04-7500	2011-09-16 12:19:06 PDT	37.52948, -122.26956	1	0	30.3	50.3	0.08	-0.06	-0.04	0	0	0	0
sp04-7500	2011-09-16 12:09:06 PDT	37.52953, -122.26968	1	1000	25.4	69.7	0.08	-0.05	-0.04	0	0	0	0
sp04-7500	2011-09-16 11:50:06 PDT	37.52963, -122.26963	1	1000	24.4	62.5	0.08	-0.06	-0.05	0	0	0	0
sp04-7500	2011-09-16 11:40:06 PDT	37.52978, -122.26956	1	1000	24.6	63.0	0.08	-0.05	-0.04	0	0	0	0
sp04-7500	2011-09-16 11:38:06 PDT	37.52955, -122.27006	1	1000	23.8	64.2	0.09	-0.05	-0.04	0	0	0	0

### PROJECT OBJECTIVES

- Automotive Telematics, essentially they need to manage their vehicles in terms of route, speed, time of arrival, etc

### RESULTS

- Exalogic to consolidate all Java applic



# Healthcare

## Nike Fuelband



- Business Case

### 디바이스 역할

- /
- Bluetooth
- Device Database



GARMIN™



### 대용량 트래픽 처리 및 실시간 분석

- Fuelband that monitors active lifestyle of **8 million users** on a daily basis
- Current data grid volume is approximately **150,000 request per minute** with about 40 million objects at any given time on the grid



ORACLE™

# Public Sector : Vehicle Capacity & Flow Control

## Motorola Smart IPVS



Cloud for running video processing, recording and analysis  
(OVM, ZFSSA, Sun Server 3X-2/2-8 / Blades)

### 데이터 Consolidation

- Projects worldwide using a reusable scalable architecture supporting **2800 or more cameras**
- Streaming video meta data interfaces with IOmniscient processing for Face recognition and License plate monitoring
- Event patterns for duplicate plates within temporal period beyond distance capabilities
- Speeding analysis with driver recognition
- **1.8 zettabytes** being created and replicated (Streaming Video)
- 57.5 billion 32 GB iPads, How much is that? About **\$34.4 trillion** worth.



Historical analysis  
(Oracle NoSQL  
Big Data Appliance)

Road charging and billing  
(Oracle RDBMS,  
Exadata)

VM Storage

Video Analytics

Real time event analysis  
(OEP, Exalogic)

Tier 1  
(ZFSSA)  
Long Term Storage

Command and control, GIS  
(Moto Locator & Mapping)

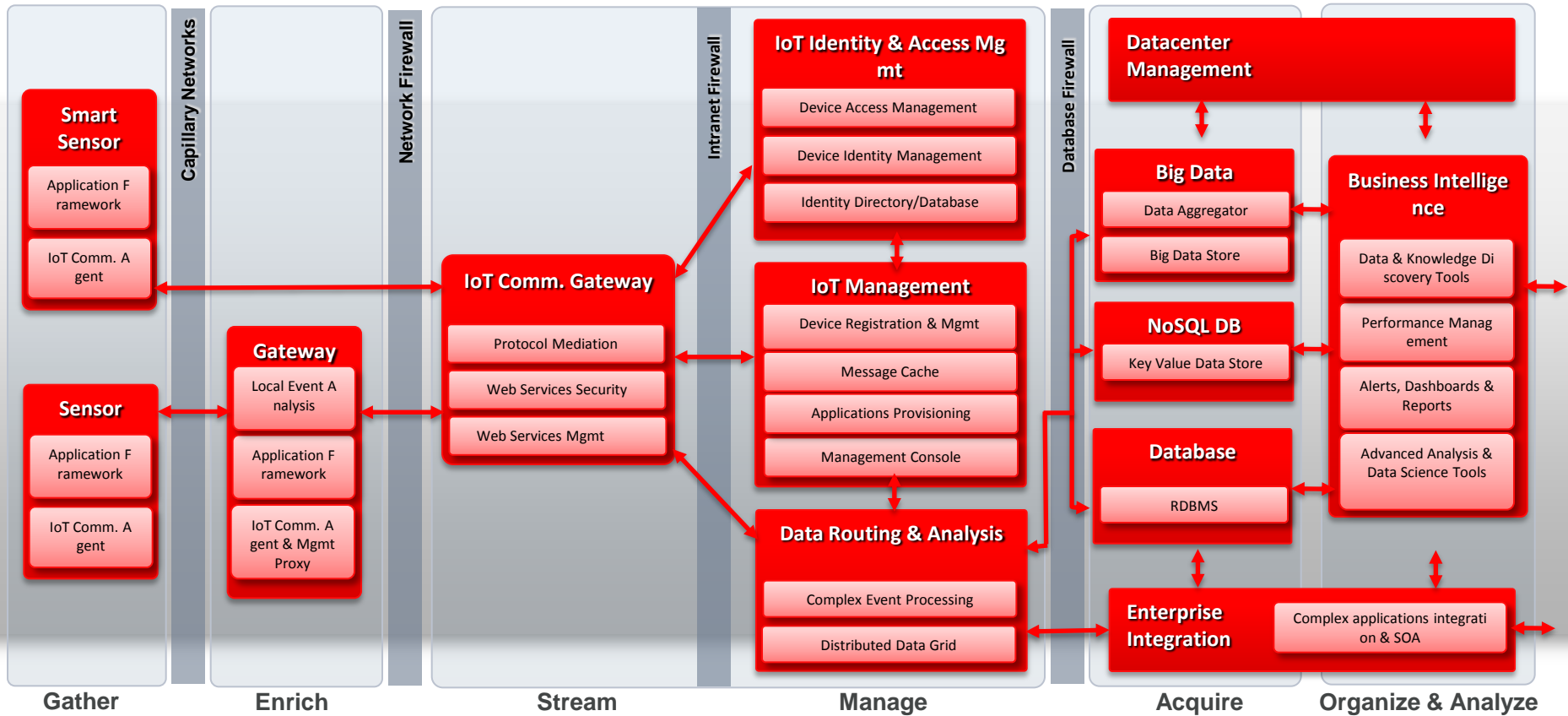


# ORACLE PARTNERSHIP ON IOT

ORACLE



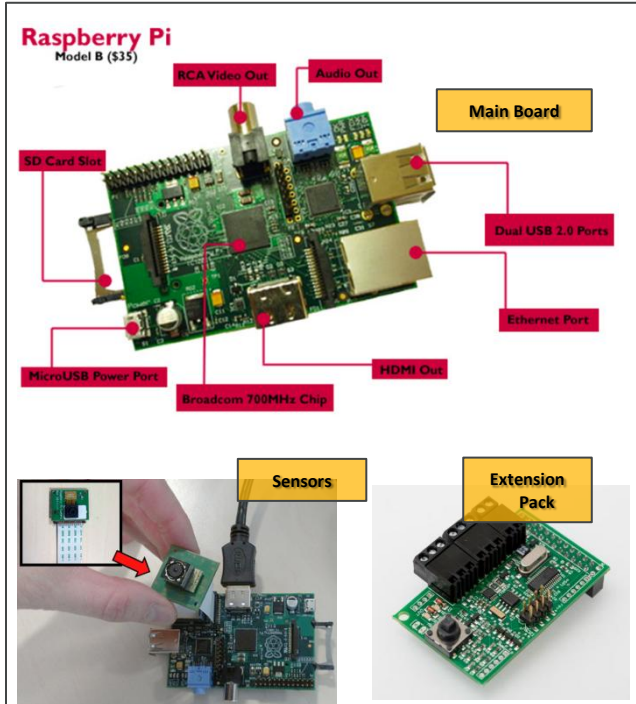
# Oracle IoT Reference Architecture



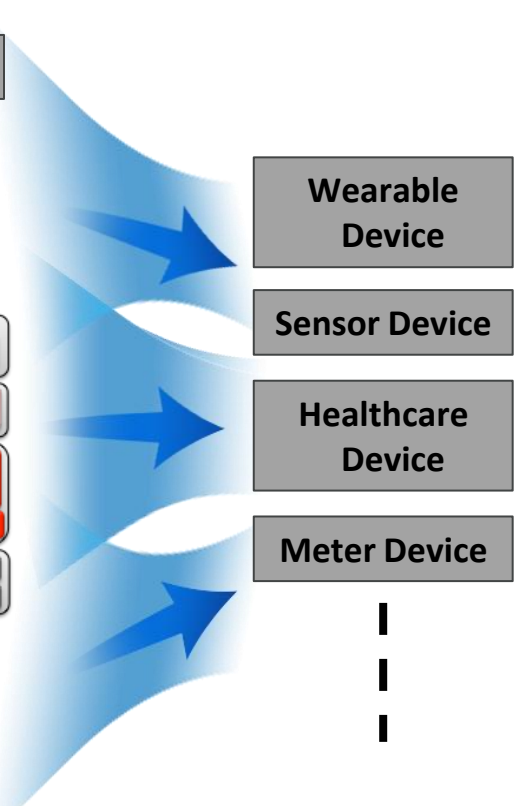
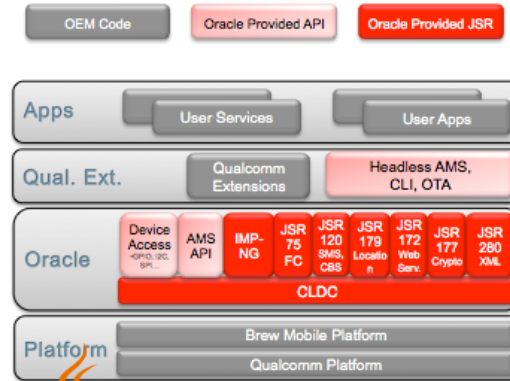
# IoT 디바이스 개발/연구

디바이스/센서를 선행연구목적으로 H/W와 S/W를 활용가능성 검증

## 디바이스 개발 보드 (H/W)

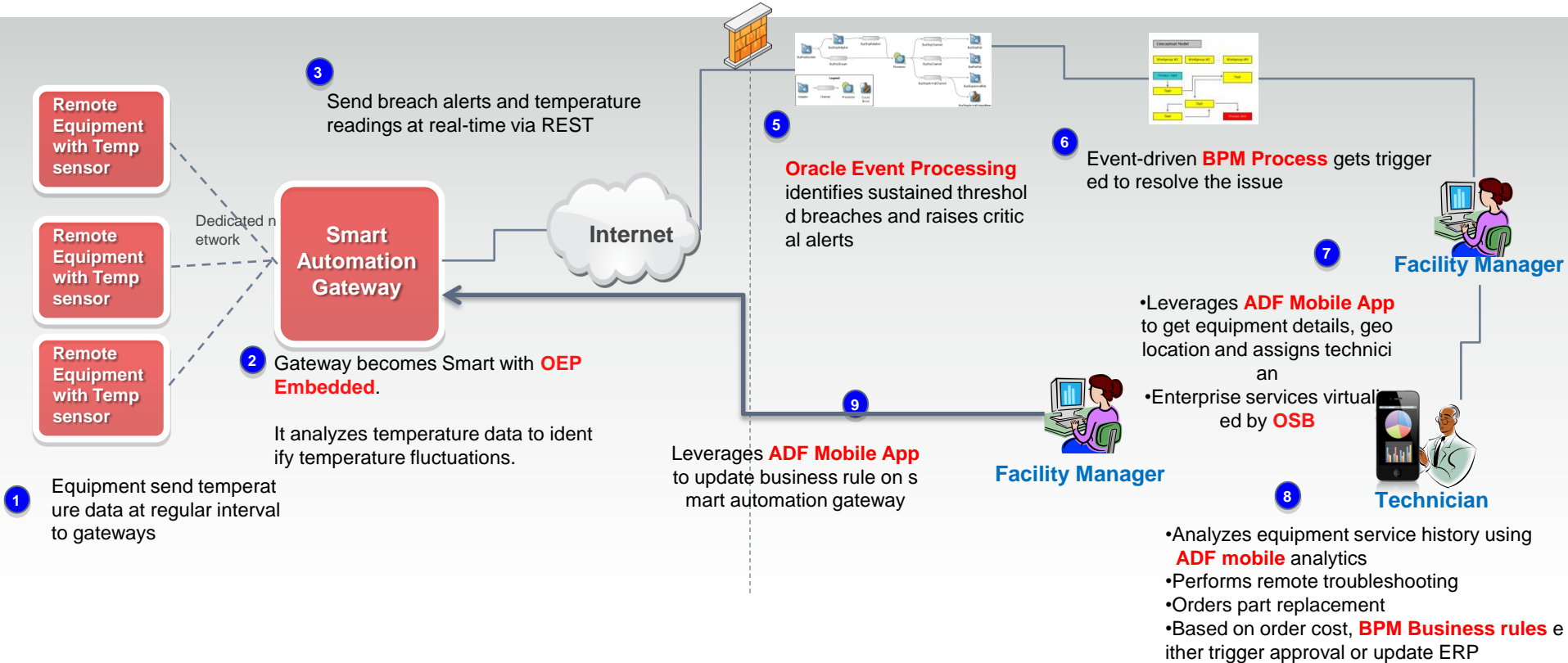


## 디바이스 플랫폼 (S/W)



# IoT Technical Consulting/Workshop for IoT Biz

## Smart Automation from Device to Data Center



**Hardware and Software**

**ORACLE®**

**Engineered to Work Together**

ORACLE®