CON3437

Smart Devices for the Internet of Things: Java ME Embedded 8.2 and Beyond

Terrence Barr
Senior Technologist and Principal Product Manager
Alexander Belokrylov
Principal Product Manager
Java Embedded and Internet of Things, Oracle

October, 2015

20 YEARS
1995–2015

Keep Learning with Oracle University

ORACLE®

UNIVERSITY

Classroom Training

Learning Subscription

Live Virtual Class

Training On Demand

Cloud

Technology

Applications

Industries

education.oracle.com

Session Surveys

Help us help you!!

- Oracle would like to invite you to take a moment to give us your session feedback. Your feedback will help us to improve your conference.

- Please be sure to add your feedback for your attended sessions by using the Mobile Survey or in Schedule Builder.

Program Agenda

1 Enabling Intelligence at the Edge: Java ME Embedded 8

2 Demo

3 Oracle Java ME Embedded 8.2

4 Futures & Roadmap

5 Summary/Call to Action

Enabling Intelligence at the Edge: Java ME Embedded 8
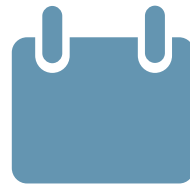
Subtitle

The Internet of Things Momentum
Demand for an Intelligent Edge

Scalable, Reliable
Update In-Field

On-demand Business
Logic Changes

Time-To-Market
Device Lifetime

Safety
and Security
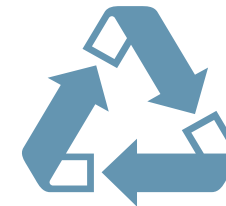
Code Reuse: App,
Integration, Porting

IoT Innovation
High Rate of Change

ROI,
Lower Costs

Open Standards
Support

Concept   **Deployment**   **Update**

JavaOne™
ORACLE®

Now is the right time …

Intelligent Devices address the demands of IoT Requirements Today

Intelligent Devices

+ ubiquitous **Internet Connectivity**

+ integration with the Cloud

+ Distributed Intelligence

…are enabling Opportunities

for Embedded Java Developers

Oracle Java ME Embedded: Embedded-By-Design
Paving the way for developer innovation

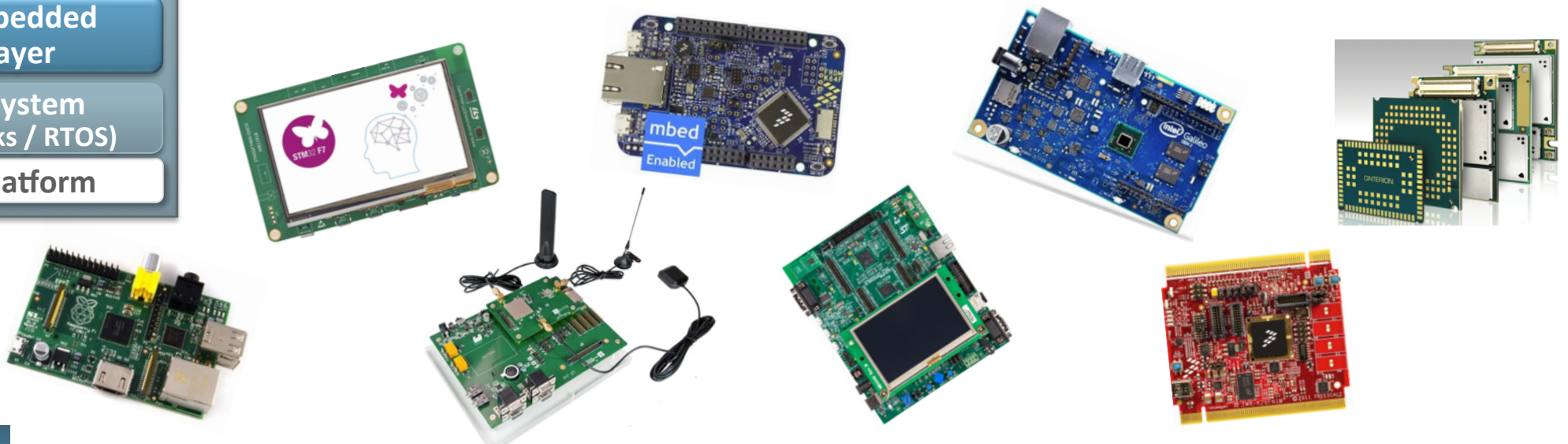| Java ME Embedded Platform |
| --- |
| **Java ME EP 8 Application Platform** |
| **Java ME CLDC 8 Virtual Machine** |
| **Java ME Embedded Porting Layer** |
| **Operating System (Linux / VxWorks / RTOS)** |
| **Hardware Platform** |

- Modern, Compact and Configurable
- Dedicated to Embedded
- Java Intelligence for the IoT Edge

Oracle Java ME Embedded 8
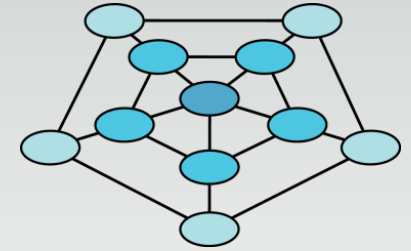
Features at a Glance

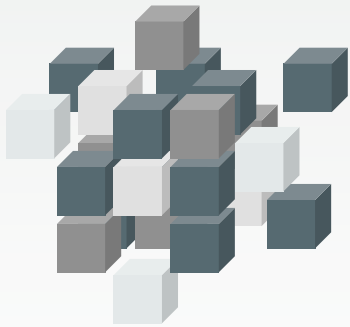Proven Java embedded platform based latest Java ME 8 standards

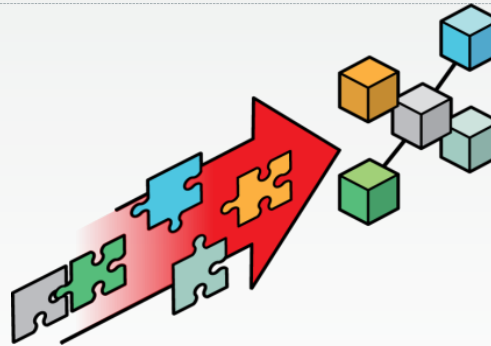Highly optimized, robust multitasking Java Virtual Machine

Fully headless operation with wired & wireless connectivity

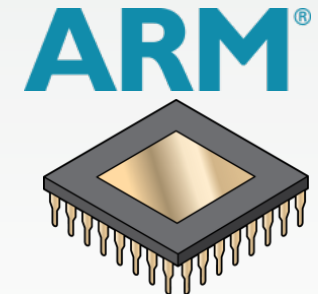Versatile, cross-platform access to peripherals and networks

Modular software platform, ideal for granular in-field upgrades

Remote software deployment and management
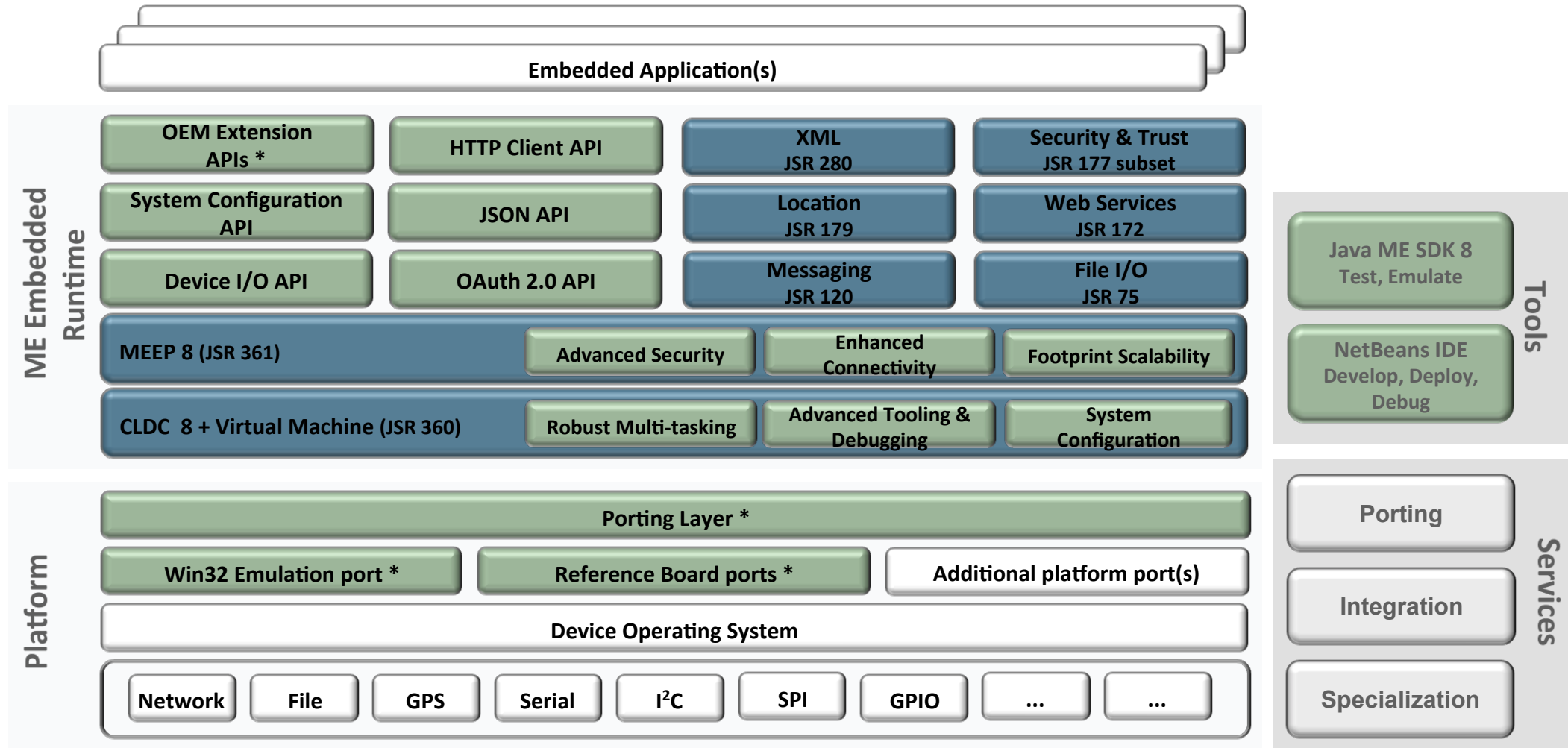
Multiple RTOS or bare metal supported

Scalable from microcontroller-class systems upwards

Built-In Embedded Features

Feature	Description
Software Managent (SWM) API	Remote app management (install, start, update, etc.)
SWM lifecycle notifications	Application monitoring (e.g. errors, termination)
Robust software execution	Application execution in resource-managed containers
Application autostart/auto-restart	Autostart or restart applications
Device I/O API	Enhanced access to peripherals from Java apps
AccessPoint API / Cellular API	Support for multiple communication channels
Memory Monitor	Monitor memory usage during development
Network Monitor	Monitor network traffic during development
Headless On-Device Debug (ODD)	Full source-level Java debugging
VM Configurator	Remote configuration of VM
OEM Extensibility	Product specialization through extension mechanism
Build Configuration Options	Configure feature/footprint optimization for target use case

Oracle Java ME Embedded 8 Stack

A rich, flexible, portable embedded software platform

Embedded Application(s)

ME Embedded Runtime

OEM Extension APIs *	HTTP Client API	XML JSR 280	Security & Trust JSR 177 subset
System Configuration API	JSON API	Location JSR 179	Web Services JSR 172
Device I/O API	OAuth 2.0 API	Messaging JSR 120	File I/O JSR 75

MEEP 8 (JSR 361) | Advanced Security | Enhanced Connectivity | Footprint Scalability

CLDC 8 + Virtual Machine (JSR 360) | Robust Multi-tasking | Advanced Tooling & Debugging | System Configuration

Tools

Java ME SDK 8 Test, Emulate

NetBeans IDE Develop, Deploy, Debug

Platform

Porting Layer *

| Win32 Emulation port * | Reference Board ports * | Additional platform port(s) |

Device Operating System

| Network | File | GPS | Serial | I²C | SPI | GPIO | ... | ... |

Services

Porting

Integration

Specialization

Legend:
- Standardized Components
- Oracle Unique Features
- Hardware
- 3rd Party Components

(*) : Modifiable Components

JavaOne ORACLE

Oracle Java ME Embedded 8 Values
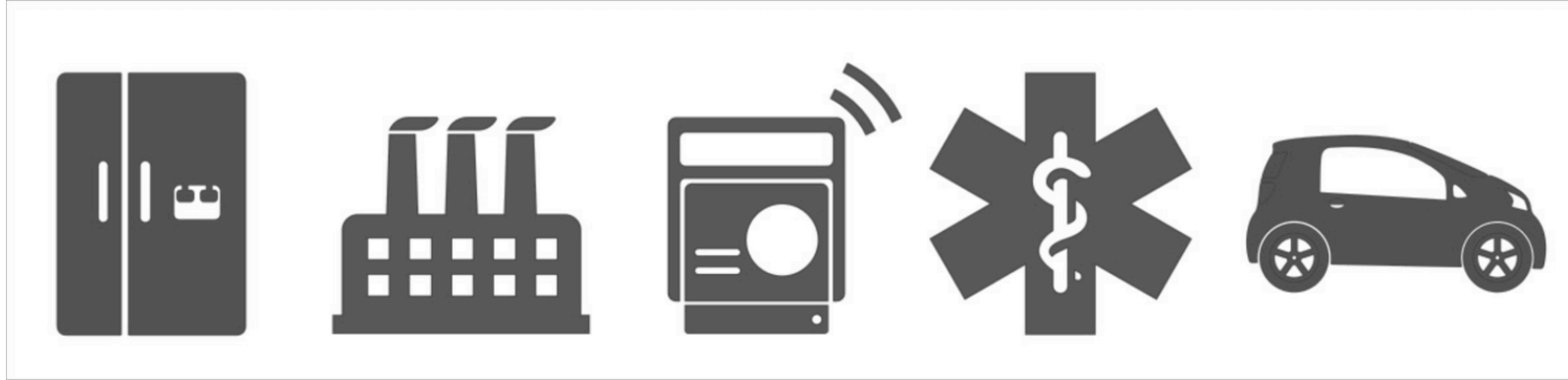## Developer and Deployment Benefits

- **Developer Value – Java Platform**
  - Mature, feature-rich
    - Proven, secure*, performant – 20+ years
  - Fast-time-market
    - Programmability, dynamic / in-field updates*
    - Designed for embedded
    - Pre-integrated and –tested*
  - Large, established ecosystem*
    - Java Community
  - ROI*
    - Cross platform, portability, code reuse

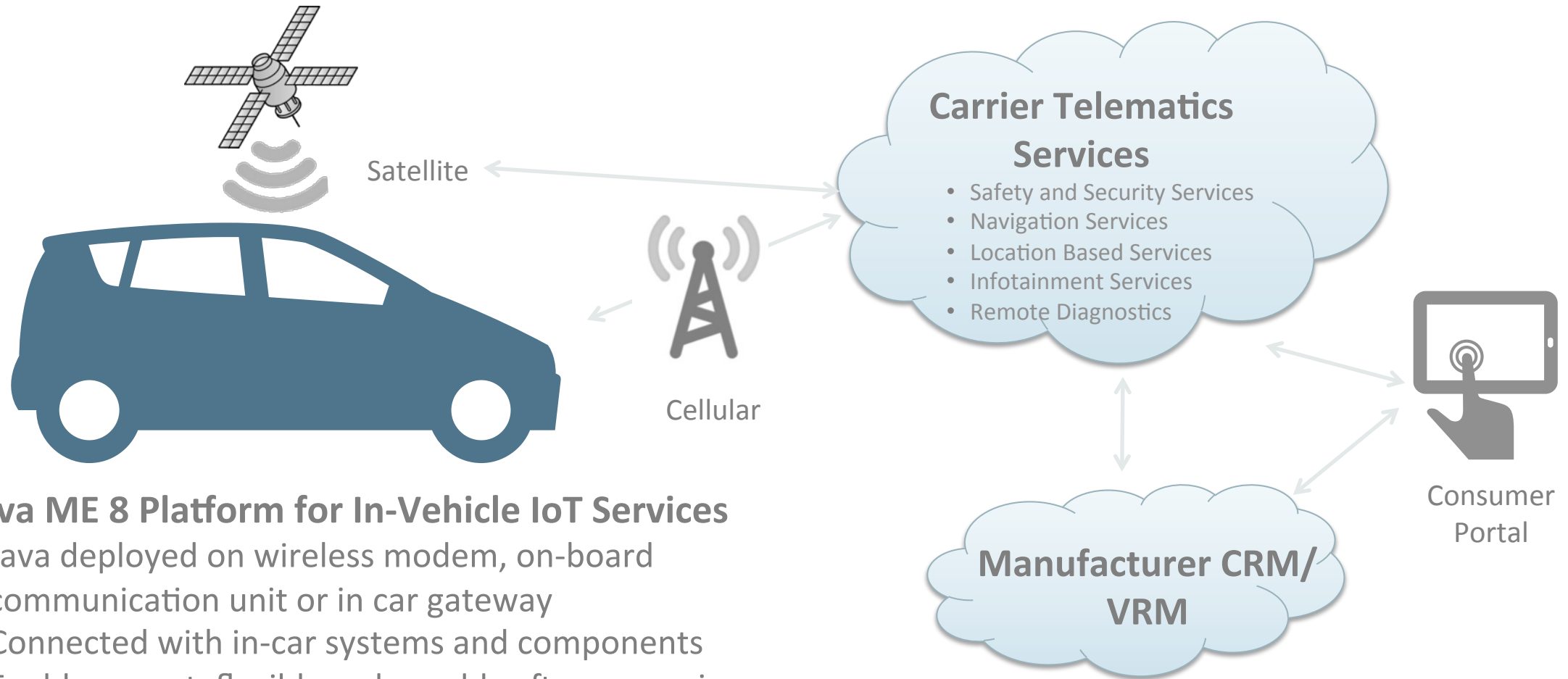- **Deployment Value for IoT-CS**
  - Edge-to-Cloud OOTB* Integration
    - IoT CS Client Libraries: Tightly engineered-in, multi-platform, drop-in integration*
  - Enterprise grade features
    - Built-in software provisioning and management*
    - Full-stack end-to-end testing*
  - On-demand distributed intelligence*
    - Application logic can dynamically change or be added/pushed to Java ME-E devices

Typically no or limited supported in native platforms

Oracle Java ME Embedded 8 Demo

Background: Connected Car Platform with Java ME 8

Satellite

Cellular

Carrier Telematics Services
- Safety and Security Services
- Navigation Services
- Location Based Services
- Infotainment Services
- Remote Diagnostics

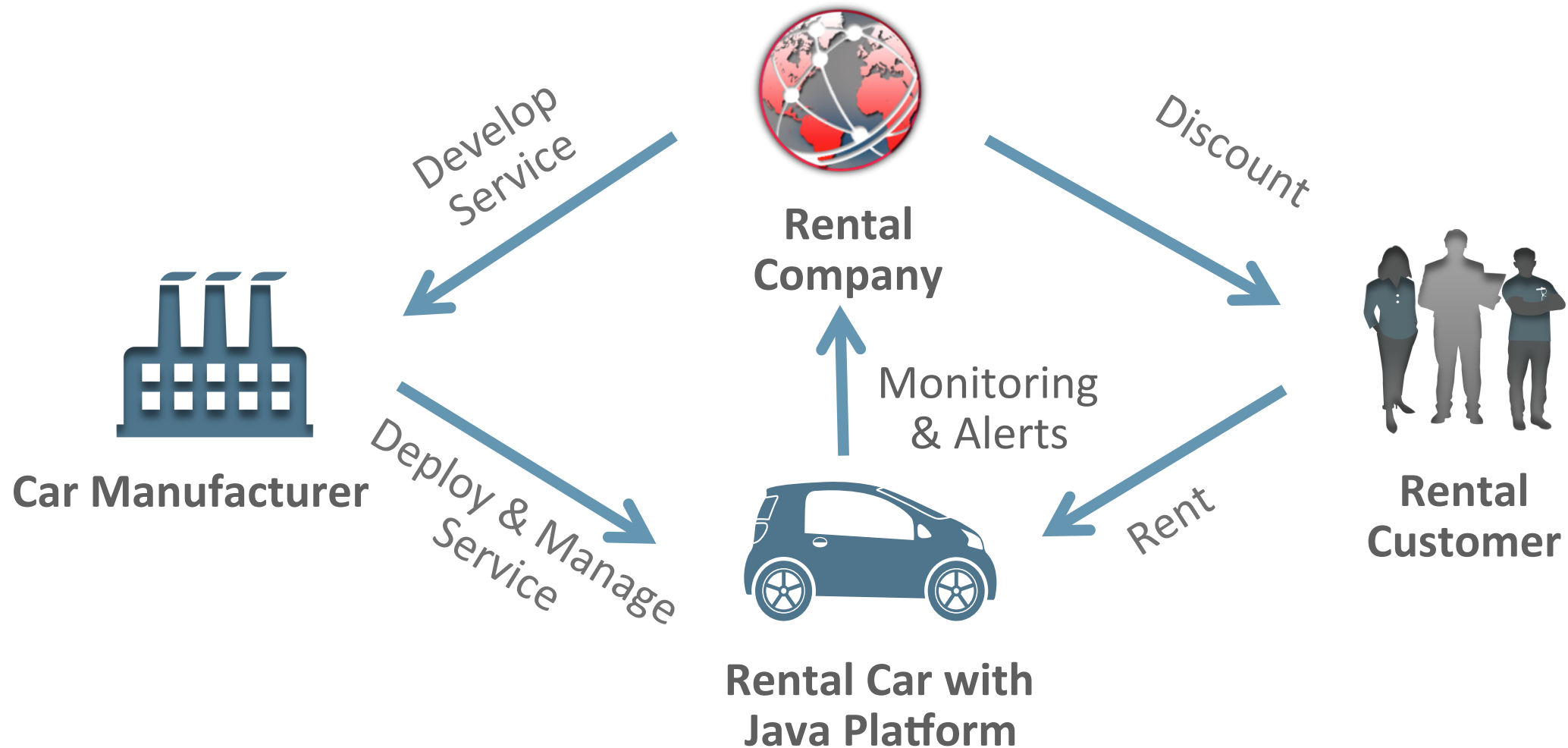**Manufacturer CRM/ VRM**

Consumer Portal

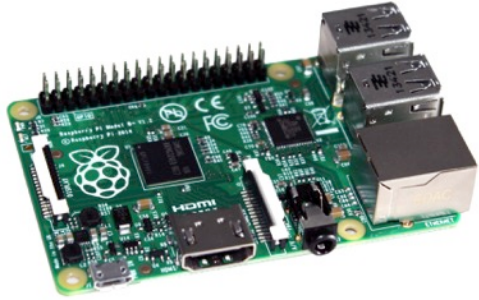**Java ME 8 Platform for In-Vehicle IoT Services**
- Java deployed on wireless modem, on-board communication unit or in car gateway
- Connected with in-car systems and components
- Enables smart, flexible, value-add software services

Demo Use Case: Rental Car Driving Monitoring
Custom End-to-End Value-Add Telematics Service

Develop Service

Discount

Rental Company

Car Manufacturer

Deploy & Manage Service

Monitoring & Alerts

Rent

Rental Car with Java Platform
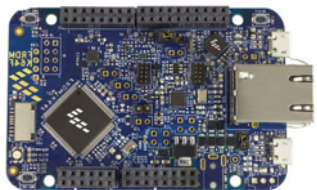
Rental Customer

JavaOne™ ORACLE®

Raspberry Pi model B+

STM32429I-EVAL

Freescale K64 Freedom

Demo case with Network
connection and power

Demo laptop
connected with WiFi

110/220v

JavaOne™
ORACLE®

Smart Monitoring Use Case Benefits

- Rental Car Driving Monitoring
  - Car manufacturer enables Rental Company to deploy driving monitoring service application to their rental fleet
  - Service enables collection of acceleration data to monitor driving style, generate alerts, and perform data analysis in enterprise back-end
- Benefits
  - Rental company: Reduced insurance and car wear & tear, good driver discounts
  - Car manufacturer: Improved product value, revenue, and customer satisfaction
- Similar Smart Monitoring Use Cases in other industries
  - Logistics (containers), healthcare (patients), Manufacturing (equipment)

Oracle Java ME Embedded 8.2

Subtitle

Oracle Java ME Embedded 8.2

Key New Features (1)

- Significant increase of free RAM on small MCU platforms
  - System footprint optimization more than double the free RAM for Java applications
    On FRDM-K64F (256 KB RAM total) approx. 150 KB RAM are available (up from 60 KB in 8.1)
  - Enables developers to create more advanced applications even on small devices

- Extended security and communication functionality
  - DTLS client socket, pre-shared Key (PSK) support, crypto H/W acceleration (on supported platforms)

- Updated Device I/O API
  - New version 1.1 make access to peripheral devices more robust and covers additional use cases
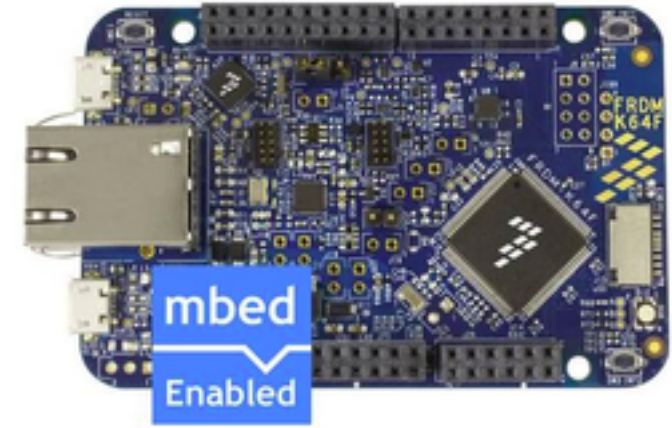
Oracle Java ME Embedded 8.2

Key New Features (2)

- Improved application deployment/update
  - Improved pre-provisioning of software components
  - Minimize need for updates of installed software over lifetime of product
  - Simplifies pre-installation and updates of software at device production time for device manufacturers and solution providers, especially for mass deployments
- Other improvements
  - A number of smaller enhancements as part of ongoing product maintenance (performance, configurability, usability)

Oracle Java ME Embedded 8.2
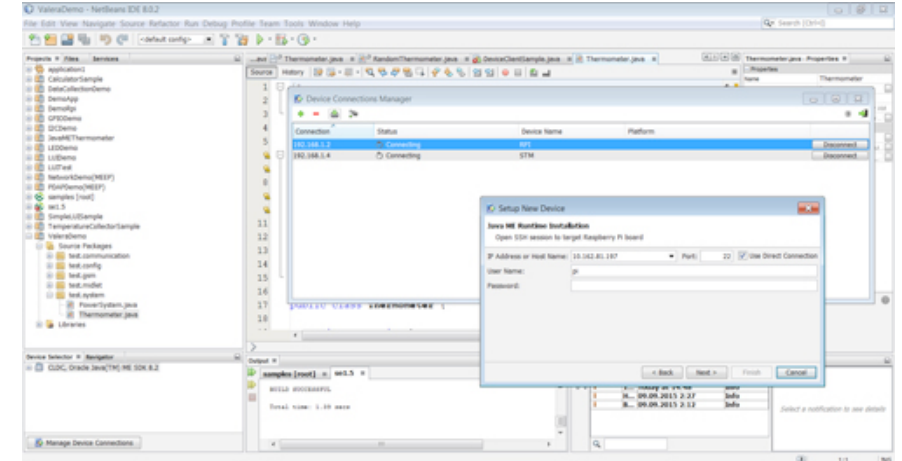**Supported Platforms**

- Raspberry Pi (ARM/Linux)
  - Binary on OTN, source for OJPI partners

- Freescale FRDM-K64F (Cortex-M4/mbed OS), Developer Preview
  - Binary on OTN

- Freescale TWR-K70F120M (Cortex-M4/MQX OS ready)
  - Source for OJPI partners

- Foundation support for ARM CMSIS and STM32F4XX + STM32F7XX

- Windows X86 and Linux X86 runtime emulations
  - Binary via ME SDK, source for OJPI partners

Oracle Java ME SDK 8.2: Embedded Toolchain

Key New Features

- ## Improved Device Manager

  - Connect to multiple target devices, now easier to use and more robust

- ## Simplified runtime installation

  - Install Java ME Embedded runtime on target device with a few clicks

- ## New Heap Analyzer tool

  - Analyze memory usage of your Java ME Embedded applications

- ## Supported platforms & IDEs

  - Linux Desktop x86 (new), Windows Desktop x86
  - Supported IDEs: Eclipse, NetBeans

Futures/Roadmap

Subtitle

Oracle Java ME Embedded 8.3 Release: Highlights

Planned release: H1, 2016

- Enhanced Oracle IoT Cloud Service support
  - Out-of-the-Box pre-integrated, pre-tested, ready-to-use

- Increased range of target platforms
  - Added support for STM F4/F7, Intel
  - Configurable binaries supporting a range of platforms within a device family

- Other new features
  - Over-the-Air update of Java runtime
  - New cipher suites and security enhancements
  - Bluetooth LE support
  - more …

Oracle Java ME SDK 8.3 Release: Highlights

- Improved productivity for IoT development
  - Pre-integrated Oracle IoT CS libraries and IoT vertical application templates
- Development in the Cloud
  - New support for Oracle Developer Cloud and web-based IDE
- Other Features and Improvements
  - Maven & Gradle support
  - Headless emulator for and cloud-based development and automated testing
  - Usability improvements

Java ME Embedded Progress

Java ME Embedded 8.2

- Optimized app memory usage (MCUs) – Up to double
- Security features (DTLS sockets, PSK, crypto H/W)
- Enhanced pre-provisioning, software updates
- Support for CMSIS architecture
- Windows/Linux, Linux/ARM, Cortex-M3/M4

Java ME SDK 8.2

- Productivity enhancements, new heap analyzer tool
- Desktop Linux support

Java ME Embedded 8.3 (CY16-H1)*

- Increased range of target platforms: STM F4/F7, Intel
- Enhanced Oracle IoT CS support
- New features, time-to-market savings for embedded, IoT
- Footprint optimizations

Java ME SDK 8.3*

- Improved productivity for IoT development
- New: Oracle Developer Cloud and web-based IDE support

`2015` `2016` `2017`

Java ME Embedded 8.2
Developers Preview STM

- STM32F429I-EVAL support

Java ME Embedded 9 (H2 2016)*

- Increased alignment between Java ME and SE
- Advanced IoT CS integration
- Additional ports on commercial/IoT embedded platforms

Java ME SDK 9 (H2 2016)*

- Enhanced Developer Cloud support, tooling-driven software development
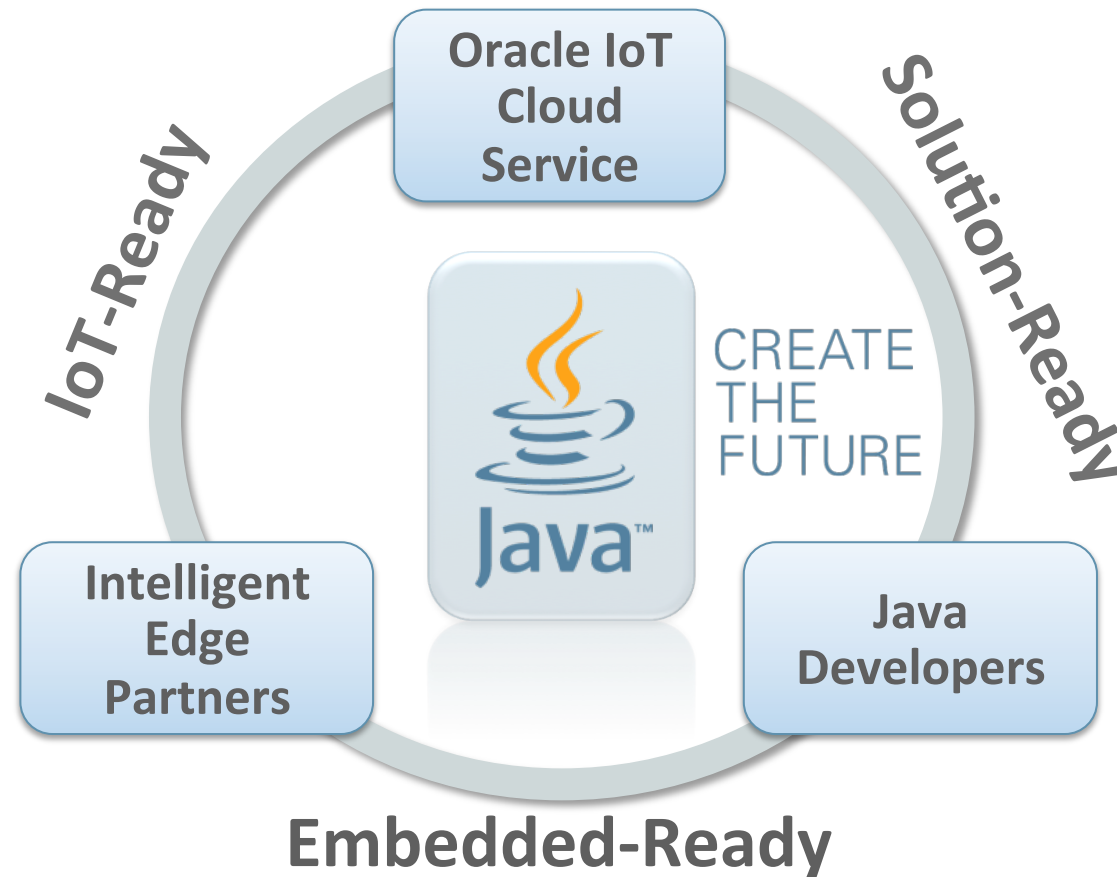- Productivity/usability improvements

*Subject to change

JavaOne™ ORACLE

Summary/Call to Action

Subtitle

Java ME Embedded 8: Enabling the Intelligent Edge

Accelerating Developer Innovation and IoT Deployments

IoT-Ready

Solution-Ready

Oracle IoT Cloud Service

Intelligent Edge Partners

Java Developers

CREATE THE FUTURE

Embedded-Ready

Summary / Call to Action

- The Internet of Things needs intelligence at the edge

- Oracle Java ME Embedded has a rich set of out-of-the-box features making it easy to
  – Connect securely to the cloud
  – Deploy intelligence to the edge
  – Build more valuable end-to-end IoT solutions

- Call to Action
  – Download Oracle Java ME Embedded 8.2 today and try it out
  – Leverage your Java skills to harness the Opportunities in IoT!

Resources

- Oracle Java ME Embedded 8.2 Overview and Download:
  - oracle.com/technetwork/java/embedded/javame/embed-me/overview/index.html
- All Java ME documentation
  - Release Notes, Getting Started Guides, etc
  - docs.oracle.com/javame/8.2/
- Blogs
  - https://blogs.oracle.com/javame
  - https://terrencebarr.wordpress.com/

Safe Harbor Statement

The preceding is intended to outline our general product direction. It is intended for information purposes only, and may not be incorporated into any contract. It is not a commitment to deliver any material, code, or functionality, and should not be relied upon in making purchasing decisions. The development, release, and timing of any features or functionality described for Oracle's products remains at the sole discretion of Oracle.

Integrated Cloud
Applications & Platform Services