Oracle Java ME Embedded 8
Overview and Frequently Asked Questions

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JAVA EMBEDDED

Overview

Oracle Java ME Embedded 8 enables device software intelligence that can be delivered via modules and in-market upgrades, allowing device manufacturers to extend the lifetime, flexibility, and value of embedded solutions.

Oracle Java ME Embedded 8

Oracle Java ME Embedded 8 is a complete Java runtime client, optimized for ARM architecture connected microcontrollers and other resource-constrained systems. The product provides dedicated embedded functionality and is targeted for low-power, limited memory devices requiring support for a range of network services and I/O interfaces.

Built on an optimized implementation of Java Platform, Micro Edition (Java ME) 8 standard, Oracle Java ME Embedded 8 enables a robust and proven application platform supporting in-field software updates and system management without compromising system integrity and extending the value of the device:

- Best-in-class Java Virtual Machine, including advanced multi-tasking capabilities, tuned for efficiency, footprint and robustness

- Supports headless operations (for devices with no UI)

- Remote application configuration, management and updatability

- Pre-Integrated APIs for standard services; Access to peripheral I/O through easy to use Device I/O APIs

- Support for key functionality of embedded devices such as auto-start and recovery, flexible networking; also offers extensibility for devices' target use cases

- Available for x86/Windows as an emulation environment, and implementations for ARM 9/BREW MP, and ARM 11/Linux OS

Customer Benefits

Oracle Java ME Embedded 8 is designed to meet the needs of intelligent and connected services on resource constrained devices in the Internet of Things (IoT), such as those found in Wireless Modules, Building and Industrial Controllers, Smart Meters, Tracking Systems, Environmental Monitors, Heathcare, Home Automation devices, Vending Machines, and more.

Enables IoT Technology in Small Embedded Devices

Oracle Java ME Embedded 8 is designed and optimized to meet the unique requirements of small embedded, low power devices such as micro-controllers and other resource-constrained hardware without screens or user interfaces.

- Ready-to-run client Java runtime stack optimized for embedded systems

- Scalable from resource-constrained microcontroller devices to more powerful embedded systems

- Foundation for downstream specialization, customization, and development

- Functionality for 24x7 operations, remote manageability, and connectivity

- Complete solution - high-performance, comprehensive implementation of Java ME standards with free and easy to use development and debugging tools

- Faster time-to-market – reference implementations for evaluation and prototyping on industry standard devices and chipset types

- A mature ecosystem – harnesses the advantages of an established ecosystem of Java developers and knowledgebase

- Secure software environment - Built on Java standards thus providing a cross platform, robust and secure environment that the applications and services on connected devices need

Frequently Asked Questions

What is Oracle Java ME Embedded 8?

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What is Java ME 8?

Java ME 8 is a major evolution of the Java ME standard and comprises of JSR 360, Java ME Connected Limited Device Configuration (CLDC) 8 and JSR 361, Java ME Embedded

Profile (MEEP) 8. Together, these new JSRs provide significant enhancements to the Java ME platform:

- CLDC 8 defines support for key Java SE 8 language features and APIs, thus enabling a unified Java Embedded developer platform and ecosystem and easy portability of software and skills across the Java platform

- MEEP 8 provides a modern, embedded application platform with a number of new and improved features and APIs, such a services-enabled software model, software modularity, the ability to "right-size" the platform for a target device, and enhanced security concepts.

What standard platform features and APIs does Oracle Java ME Embedded 8 provide?

Oracle Java ME Embedded 8 is a complete Java runtime based on the Java ME 8 standard, additional optional standard JSRs, and Oracle value-add features.

The runtime and virtual machine (VM) are highly optimized for embedded use, including the ability to run multiple applications concurrently, robust 24x7 operation, and are tuned for low footprint and efficiency.

Also included in the product are the following optional standard JSRs:

- File I/O API's (JSR-75)
- Wireless Messaging API's (JSR-120)
- Web Services (JSR-172)
- Security and Trust Services subset (JSR-177)
- Location API's (JSR-179)
- XML API's (JSR-280)

Oracle Java ME Embedded 8 also adds a number of Oracle value-add features to support embedded-specific use cases (see below).

What embedded-specific features and APIs does Oracle Java ME Embedded 8 provide?

Oracle Java ME Embedded 8 is designed for embedded, always-on, resource-constrained, headless (no graphics/no UI), connected (wired or wireless) devices with a variety of peripheral I/O. The product features dedicated embedded functionality to target a wide range of embedded platforms and use cases. These features include:

- Remote application provisioning and management system

- Support for continuous 24x7 operation, application monitoring, auto-start, and system recovery

- Device I/O API for application access to peripheral interfaces such as GPIO, I2C, SPI, ADC/DAC, PWM, and more

- Versatile wired and wireless connectivity, including multi-interface support and advanced cellular options

- Enhanced security functionality such as support for TLS 1.2 connection options and advanced encryption

- RESTful APIs for access to web services and related functionality

- Headless Java source-level application debugging over device connection

- Network and Memory monitoring: Runtime application memory status and network traffic monitoring

- System Configuration of the Java runtime

What is new in the release of Oracle Java ME Embedded, version 8 compared to previous versions?

Oracle Java ME Embedded 8 provides a number of significant advantages over previous versions of the product such as Oracle Java ME Embedded 3.4, including:

- All new benefits of the Java ME 8 standard, including alignment with the Java SE platform, a modern and flexible application model, enhanced security features, and greater modularity

- New Oracle value-add APIs such as RESTful APIs

- Enhanced and more flexible connectivity

- Higher levels of optimization and scalability

- Improved developer tooling

Why should I choose Oracle Java ME Embedded 8 for my embedded projects?

Java provides a cross-platform, robust, and secure software environment to deliver feature-rich embedded solutions. Hardware-independent, the highly productive Java language, flexibility, and best-in class tools enable feature-rich products and services while reducing time-to-market. Furthermore, Java enables the device as a **flexible service platform** providing a long lifetime and the ability to deliver new features and

support upgrades in the field by means of over-the-air software provisioning in a controlled and secure way.

Oracle Java ME Embedded 8 delivers the benefits of the Java platform to resource-constrained devices, enabling you to build small, connected, and intelligent embedded products while leveraging existing Java expertise and the Java ecosystem

What types of applications can I develop with Oracle Java ME Embedded 8?

The Oracle Java ME Embedded 8 product is a full-featured embedded Java runtime supporting applications based on the MIDP application model derived from the well-known MIDP 2 specification.

The runtime supports execution of multiple concurrent applications, remote application management, versatile connectivity, and a rich set of APIs and features relevant for embedded use cases, including the ability to interact with peripheral I/O directly from Java applications.

This rich feature set, coupled with familiar and best-in class software development tools, allows developers to quickly build and deploy sophisticated embedded solutions for a wide range of use cases. Target markets well supported by Oracle Java ME Embedded 8 include wireless modules for M2M, industrial and building control, smart grid infrastructure, home automation, and environmental sensors and tracking, and other IoT applications.

What platforms does Oracle Java ME Embedded 8 support?

Oracle Java ME Embedded 8 is available as ready-to-run binaries for various development platforms with the hardware/OS that is representative of the hardware/software support that Oracle Java ME Embedded is intended to provide. In addition, the product is delivered as a device emulation environment for x86/Windows desktop computers, via Oracle Java ME SDK.

With the release of Oracle Java ME Embedded 8, the following platforms are supported:

- ARM11, Linux OS: Complete, ready-to-run product binary for Raspberry Pi Model B development board using BCM 2835 chipset.

- ARM9, BREW MP: Complete, ready-to-run product binary for Qualcomm IoE developer platform using QSC6270T chipset

- X86, Windows 7: Complete product emulation, including I/O emulation and tooling, which enables Java ME 8 software development on Windows desktops independent of the target device

Note that the list of supported platforms is updated and extended on an ongoing basis.

What are the system requirements for Oracle Java ME Embedded 8?

The high-level system requirements are as follows:

- System based on ARM architecture SOCs

- Memory footprint as low as 128 KB RAM and 1 MB ROM **(see note)**

- Very simple embedded kernel, or a more capable embedded OS/RTOS

- At least one type of network connection (wired or wireless)

Note: Footprint based on MEEP 8 Minimal Profile Set, optimized for single-function devices. Actual footprint will vary based on target device and use case.

How is Oracle Java ME Embedded 8 different from Oracle Java Embedded Client and Oracle Java SE Embedded?

The three products are intended to provide Java implementations for their respective device categories thus enabling the Java platform for a wider set of embedded devices in total.

Oracle Java ME Embedded 8 is based on the Java ME 8 standard, whereas *Oracle Java Embedded Client* is based on Java ME CDC and *Oracle Java SE Embedded* is based on Java SE (and is fully Java SE compliant).

The target hardware/device OS types and use cases for the three products are different. Oracle Java ME Embedded 8 is a product targeted to microcontroller-class small embedded devices with limited memory footprint and processing power and running simple embedded kernels.

In contrast, Oracle Java Embedded Client and Oracle Java SE Embedded are aimed at more capable mid-range to high-end

devices running full OS kernels, and providing a larger budget in terms of memory, power, processor capabilities, and cost.

For an overview and comparison of Oracle's Java technologies for embedded devices, please see the section *"Where can I find more information?"*.

Does Oracle Java ME Embedded 8 support local graphics or a graphical UI?

Not at this time. The release is targeted at embedded use cases, which do not require local graphics or a graphical user interface. If you require such functionality for your project, please contact Oracle or an Oracle partner for further information (see *"Where can I find more information?"*).

Is Oracle Java ME Embedded 8 real-time capable?

The Java application level of the Oracle Java ME Embedded 8 runtime does not support hard real-time capabilities, as this functionality would require dedicated semantics and resources, which are not typically applicable to the targeted range of use cases.

There are several possibilities to provide additional real-time behavior in small-embedded systems, such as leveraging the underlying RTOS for native real-time operations or by coupling the Oracle Java ME Embedded runtime with a small, dedicated real-time system.

If you require real-time capabilities in your project, please contact Oracle or an Oracle partner for more information (see *"Where can I find more information?"*).

What tools are available for embedded Java development?

The Oracle Java ME Software Development Kit (SDK) 8, together with provided plug-ins for the NetBeans IDE, delivers a complete development environment for embedded application development. With these tools, Java developers can write, edit, compile, package, sign, and obfuscate their applications.

The applications can then be tested and debugged on Windows desktops using embedded device emulators and built-in support for profiling and network monitoring. Also provided is the ability to deploy, debug (at Java source level) and test the applications directly on the target hardware, thus enabling developers to produce better quality, higher performance applications.

For more information, including creating embedded projects and building, deploying, and testing your application, please see the section *"Where can I find more information?"*.

How do I debug my embedded Java application?

Oracle Java ME Embedded 8 supports full source-level Java application debugging, both locally using the x86/Windows device emulation as well as remotely on the target hardware.

How is Oracle Java ME Embedded 8 licensed?

The reference and the emulation environment binaries are available for evaluation and development purposes under the OTN Developer License: http://www.oracle.com/technetwork/licenses/standard-license-152015.html.

For commercial binary and source licenses please contact Oracle (see *"Where can I find more information?"*).

I don't see the platform I need supported, what can I do?

Oracle Java ME Embedded 8 has a portable and extensible architecture to address a diverse range of embedded environments.

Porting and customization of Oracle Java ME Embedded 8 to specific platforms can either be done by Oracle or by Oracle partners, depending on the specific needs of your project. See the Oracle Java Platform Integrator program for more information, or contact Oracle or an Oracle partner for more information (see *"Where can I find more information?"*).

What type of support is available for Oracle Java ME Embedded 8?

For community-based support developers are encouraged to visit the OTN "Java ME Embedded" forum: https://forums.oracle.com/community/developer/english/java/java_embedded/java_me_embedded/content

For commercial support, please contact Oracle or an Oracle partner (see *"Where can I find more information?"*).

How can I get started?

Developers can get started right away with the Oracle Java ME SDK 8, the reference binaries for development boards, release notes, getting started guides, sample code, video tutorials and more. Please see the section *"Where can I find more information?"* for a list of resources and downloads.

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Where can I ask questions about the product?

For community support, please see the OTN "Java ME Embedded" forum:
https://forums.oracle.com/community/developer/english/java/java_embedded/java_me_embedded/content

For inquiries on the product and licensing, please refer to section *"Where can I find more information?"*.

Where can I find more information?

- For inquiries on the product and licensing, please call +1.800.ORACLE1 or email javasales_ww@oracle.com
- Oracle Java ME Embedded 8 data sheet: http://www.oracle.com/us/technologies/java/java-me-embedded-ds-1851546.pdf
- Oracle Java ME Embedded 8 product page: http://www.oracle.com/technetwork/java/embedded/overview/javame/index.html
- Oracle Java ME Embedded 8 documentation page: http://docs.oracle.com/javame/embedded/embedded.html
- Oracle Java ME SDK 8 download page: http://www.oracle.com/technetwork/java/javame/javamobile/download/sdk/index.html
- JSR 360, Java ME Connected Limited Device Configuration 8 (CLDC 8) specification: http://jcp.org/en/jsr/detail?id=360
- JSR 361, Java ME Embedded Profile 8 (MEEP 8) specification: http://jcp.org/en/jsr/detail?id=361
- OTN forum "Java ME Embedded": https://forums.oracle.com/community/developer/english/java/java_embedded/java_me_embedded/content
- Oracle Java Platform Integrator program: http://www.oracle.com/technetwork/java/embedded/overview/getstarted/ojpi-1972433.html
- Terence Barr's blog: http://terrencebarr.wordpress.com

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