



## Embedded Java Technology Enables End-to-End Healthcare Solutions

Java technology helps you develop highly functional, reliable, portable, and secure healthcare solutions for small to large embedded devices—improving care by extending the reach of healthcare providers. A Java embedded platform can also reduce costs, improve product quality, and accelerate time to market.

An aging population, the increased prevalence of chronic illnesses, and changes to reimbursement and regulatory policy are all factors driving developers of healthcare solutions to continually innovate. Fortunately, technological advances—including embedded Java technology—have heightened the power of many healthcare solutions. Telecare, or remote patient monitoring, has particularly benefitted from increasingly diverse and robust sensors, and more affordable and available telecommunications. With the expansion in computing power, embedded devices can now include the features and capabilities of PCs and work in conjunction with many of the networked “smart” tools used in healthcare.

Independent software vendors (ISVs) and original equipment manufacturers (OEMs) in the healthcare industry can leverage proven Java technology to create special-purpose solutions that securely access resources while protecting sensitive health data. Java helps you simplify the design of your solution, speeding development as you create richer, larger, connected applications.

You gain a competitive advantage by focusing not on the underlying technology, but on delivering value-added services such as better operator interfaces and desktop applications for many types of medical equipment. You can also use telecare to extend healthcare boundaries by providing interactive links between patients at home and their providers, or linking medical experts with facilities worldwide—so care can be delivered without delay.

### Embedded Java Offers Developers Flexibility and Choice

With Java it's easy to develop secure connections with other applications over the internet, as well as to back-end databases—letting you build healthcare solutions that deliver end-to-end connectivity. Embedded systems differ from traditional implementations in a few key areas, including RAM; permanent local storage; keyboard, video, and mouse resources; and hardware and operating system (OS) platform support. Special features of the Java Virtual Machine (VM) have been optimized for embedded use, so they will

### BUILD ON A PLATFORM OPTIMIZED FOR EMBEDDING

An embedded Java platform helps make your healthcare solutions safer, more robust, and easier to develop by delivering benefits such as the following.

- The widely used Java platform allows easy access to the world's largest community of skilled developers and the most-comprehensive runtime tools, ensuring high code quality and low cost.
- Java libraries and tools can be used across all nodes of the total solution, offering a unified environment that speeds development and simplifies management.
- Java VM eases the move to new hardware platforms by enabling application portability across a wide range of hardware and operating systems.
- Java VM provides many security mechanisms to control how applications interact and are loaded and executed. And a number of libraries and APIs are available to help you rapidly develop secure embedded applications.

**FACT:** The Java platform is the #1 choice for more than 9 million developers, making it a massive ecosystem of tools, books, code, libraries, and applications running across a wide range of hardware and operating system platforms.



*"Java's open standards, powerful security features and huge worldwide skills base make it the safest and most flexible platform for developers of embedded healthcare applications. Convinced that Java is ideal for machine-to-machine communication-enabled devices, we look forward to continue incorporating new developments of Java into our market-leading products."*

**Manfred Kube**, Director, Business Development, mHealth, CINTERION Wireless Modules

work with a wide range of devices, including many specialized telecare systems.

- **Java Standard Edition (Java SE) for Embedded Devices**—The world's most robust and best performing Java platform, supporting close to 30 different hardware and OS combinations, including embedded-only configurations for ARM and PowerPC. Configuration options enable you to perform deployment-specific tuning and achieve optimal performance. Java Standard Edition for Embedded Devices is becoming common in many embedded systems, including healthcare gateways, aggregation managers, and patient monitoring systems.
- **Java Platform, Micro Edition (Java ME)**—Frequently used in personal medical equipment including glucose management systems and sleep therapy management systems. Configurations for Java ME can run on devices with limited memory, processing power, and graphics capabilities (such as mobile devices), as well as on network-connected devices that have more memory and processing power, (such as home healthcare monitoring devices).
- **Java Card**—Originally designed for use primarily within smart cards, Java Card has evolved into a more-general-purpose platform. The technology allows multiple, Java-based applications to run securely on devices with very limited

footprints (such as a smart meter) that collect and transmit health data in the home. Java Card technology opens a range of new opportunities for ISV and OEM developers in the healthcare market. In particular, the application interoperability and strong, proven security features let you combine your healthcare-specific solution with third-party applications for standard payment, computer authorization, data management, and many more—helping you get a full-functioned solution to market faster.

#### Create Reliable, Smarter Solutions

Low-cost, broadband, in-home health management solutions are currently being used in millions of homes worldwide, securely managing protected information and delivering services. Increased consumer acceptance and the greater prevalence of a communication infrastructure in the home present a huge growth opportunity. Embedded Java technology helps you build solutions that deliver affordable, reliable, two-way interaction between patients and caregivers.

Java is the best cross-platform application technology for building secure, end-to-end remote patient monitoring systems. For example, devices that measure a patient's temperature, blood pressure, blood glucose, peak flow readings, activity levels,

or sleep patterns can be connected to an in-home health gateway or directly to the healthcare provider system using wireless technologies. This health information can then be analyzed and processed and subsequent instructions regarding ongoing care can be sent to patients by the devices located in the home. Java allows you to embed intelligence into devices that can be used, for instance, to perform direct adjustments in patient care. Regardless of the network configuration, embedded Java technology helps increase the ease-of-use, reliability, and data security of your healthcare solutions while decreasing the time for development and time-to-market.

#### Java Protects Your Investment

Java is built on open standards through the Java Community Process, which gives developers a way to provide direct input into Java product development and ensure it continues to meet healthcare requirements. Moreover, because embedded solutions require long-term support, it is important that a software platform have a support commitment that reaches well into the future. With Oracle behind the stewardship of Java, you can be assured that your investment in Java embedded technology will continue to benefit you and your customers.



Oracle is committed to developing practices and products that help protect the environment.

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