Oracle's Internet of Things Platform
Solutions for a Connected World

ORACLE

The Connected World

We live in a world where billions of connected devices, from smart vehicles to intelligent utility meters, generate increasing quantities of data.

In this connected world, the proliferation of intelligent devices has created a market for entirely new solutions based on Machine to Machine (M2M) connectivity. As intelligence spreads beyond devices to everyday things, this connectivity will play a crucial role in driving the broader vision of the Internet of Things (IoT). This will blur the boundaries between virtual and physical objects and enable seamless interconnectivity across devices, things and humans. Organizations are finding more innovative ways to harness this data, using it to drive smarter decisions, enable new services and business models, and reduce costs.

The key to gaining real business value from IoT services is effective communication between all elements of the architecture. With an integrated, end-to-end platform it is possible to deploy applications faster, process and analyze data at lightning speeds and act on events as they occur.

The Challenges
Harnessing the Value of Fast Data. There are many opportunities to extract value from the data generated in the connected world, but the rapid growth in the number of intelligent devices presents many challenges, and has a significant impact on the architecture of IoT services.

End-to-end security. Valuable data must always be protected, from the data center to the network's edge, while still being instantly available to users.

Integration with IT systems and applications. To maximize the value of data it must be accessible across critical operational systems, from ERP and CRM, to specialized custom and vertical applications.

Data management and analysis. Massive quantities of structured and unstructured data must be securely stored, processed and analyzed.

Rapid change. Device chipsets evolve far quicker than server technologies, so any IoT architecture must be able to quickly adapt to fast product lifecycles at the edge of the network.

The IoT value chain can be extremely complex, from smart devices that process data locally, through intelligent gateways that enable local decision making and manage traffic between the network and devices, to decision support systems that analyze data to provide actionable information to business users.

To coordinate activities effectively across this value chain, it is essential to have an integrated end-to-end platform that manages data from the edge to the enterprise. (See Figure 1)

The Opportunities
New Markets in the Connected World
The connected world offers significant opportunities for organizations that can derive business value from the data collected by billions of connected devices and things, using it to drive innovation and deliver new services that differentiate them from their competitors.

The Internet of Things enables the creation of new products and services across all industries. Already, utility companies use smart meters to help consumers manage their energy bills; healthcare providers use remote patient monitoring to deliver high-quality, in-home care at a fraction of the cost; automobile manufacturers use telemetry data to make their cars safer and more eco-efficient; and consumers use home gateways to connect to networks and services.

But this is just the beginning: the possibilities for using data to develop innovative solutions in any industry, from smart homes to smart cities, are almost endless.

Figure 1. Oracle's Internet of Things Platform
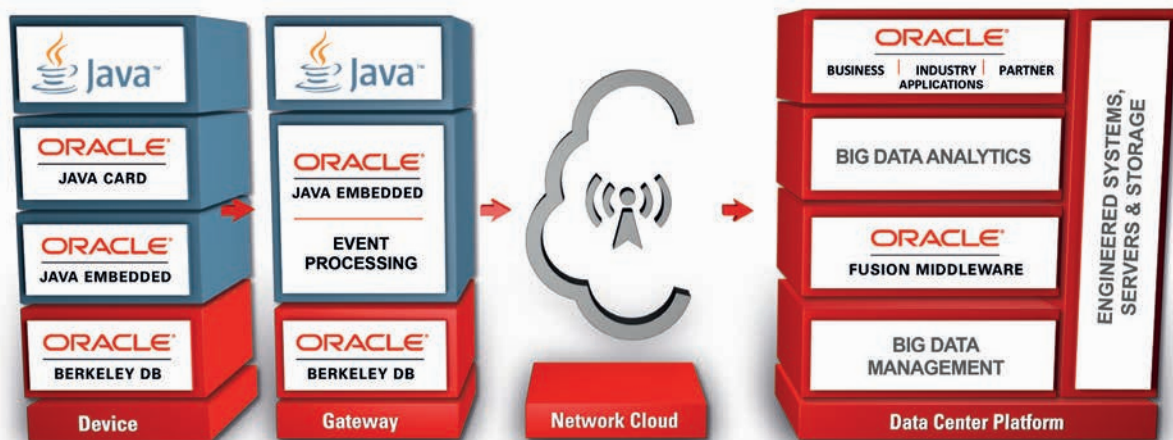
Oracle's Internet of Things Platform

No single company can deliver every application in the connected world. But one company can deliver the platform that makes these applications possible.

Oracle's Internet of Things platform provides an end-to-end solution for a comprehensive, scalable, and cost-effective IoT architecture, enabling organizations to:

Develop and Deploy applications faster, shrinking development costs and time to market

Manage and Analyze large volumes of device data throughout the lifecycle, from collection to analysis

Integrate and Automate, using data from connected devices to make decisions closer to the network edge

Protect and Comply with security and regulatory requirements with robust, end-to-end data protection

Optimize and Innovate, integrating with Oracle business and industry applications to reduce costs and accelerate new service delivery
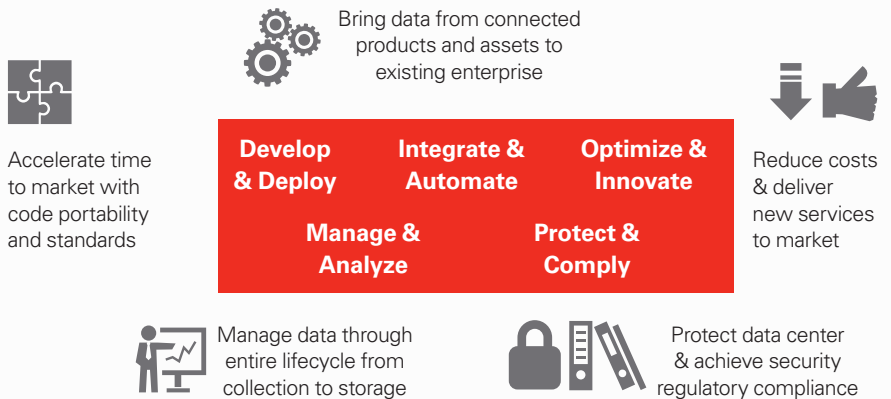
Connecting Intelligent Devices...
There are many reasons why **Oracle's Java Embedded technologies** are ideal for smart devices in IoT architectures. Java offers comprehensive functionality for resource-constrained devices, with the highest level of functionality, security, connectivity and scalability in the industry – all delivered through a massive ecosystem of more than nine million Java developers worldwide.

And, as an open, standards-based platform, Java provides code portability in IoT environments, accelerating time to market as new generations of sensor technology emerge.   In addition, secure, in-market device software updates extend product lifecycles and allow new services to be provisioned remotely.

Using **Oracle Java ME Embedded** in devices helps ensure systems can be built efficiently, using the same language throughout the end-to-end solution; and cost-effectively, with device portability and reduced support costs.

Figure 2. Oracle provides a complete end-to-end solution

Bring data from connected products and assets to existing enterprise

Accelerate time to market with code portability and standards

Develop & Deploy | **Integrate & Automate** | **Optimize & Innovate**
Manage & Analyze | **Protect & Comply**

Reduce costs & deliver new services to market

Manage data through entire lifecycle from collection to storage

Protect data center & achieve security regulatory compliance

Oracle Java SE Embedded brings industry-leading reliability, robust performance, throughput, security, and cross-platform support to a wide range of embedded IoT systems, including gateways for healthcare, manufacturing and industrial automation.

Oracle Event Processing for Oracle Java Embedded allows for intelligent processing of in-flight data on edge devices, driving faster decisions by eliminating the latencies associated with backend processing.

...to Smart Data Centers
Managing data from sensor devices requires data center technology to turn massive streams of data into real-time information for end users. In addition, organizations need to provide anytime, anywhere access while maintaining robust security. The Internet of Things platform must also have the scalability to meet future processing and storage needs.

Oracle Fusion Middleware offers a scalable platform to move, process and accelerate automated action on data from connected devices by enabling structured and unstructured data to be processed, analyzed and integrated with transactional systems in real-time, providing actionable business intelligence and supporting better informed decision-making throughout the enterprise. Its event processing capabilities include device-level analysis, filtering and pattern matching tools.

Oracle Fusion Middleware also brings the standards-based advantages of Java to the data center, delivering a platform for secure, integrated automation of key business processes.

Oracle's Big Data Analytics - Getting business value from big data in general, and from IoT data in particular, requires analysis. Oracle has a wide range of tools for business analytics, discovery, and in-database analytics.

Oracle's Big Data Management simplifies storage and analysis of diverse data from connected devices in the Internet of Things. Organizations need to combine both new data in stores like Hadoop or NoSQL with an existing data warehouse. Oracle seamlessly integrates these critical components.

Oracle Business Applications and Oracle Industry Applications enable organizations to use device data in areas such as CRM, ERP, HR, and finance across industries, speeding time to market, reducing costs, and delivering competitive advantage.

Oracle Engineered Systems provide the ideal foundation for IoT deployments. These pre-tested, preconfigured, pre-certified hardware systems are designed to optimize performance, keep costs down, and scale seamlessly to address changing business demands.

A Complete Internet of Things Platform: from Oracle

With a single engineering team developing the Java platform and embedded data management systems; the back-end database, middleware and analytics technologies; and the extreme performance hardware that turns data into insight, Oracle can deliver an integrated, reliable and secure platform for the entire IoT architecture.

Oracle's comprehensive portfolio of products provides a complete IoT platform, allowing organizations to:

Streamline application development and deployment with Oracle Java Embedded technologies

Handle massive data growth with Java-based gateways, and powerful data management and analytics systems

Automate the movement and integration of data throughout the IoT architecture

Protect data across the IoT value chain and simplify regulatory compliance with market-leading security

Optimize organizational performance and enable the innovations that drive competitive advantage

Find out More
To learn more about how Oracle's Internet of Things platform can help you develop new IoT services quickly and profitably, contact your local Oracle representative, or visit www.oracle.com/iot

Key Benefits

– **Accelerate time to market** for innovative applications

– **Plan for future growth** with unmatched flexibility and seamless scalability

– **Reduce total cost of ownership** with simplified management across the IoT architecture

– **Simplify storage and analysis** of diverse data from connected devices

– **Ensure tight integration** between IoT applications and operational systems

– **Protect valuable data** throughout the extended IoT value chain

– **Keep pace with rapid changes** by adapting with ease to new sensor technologies

– **Gain actionable insight into Big Data** with event processing capabilities and 'speed of thought' analytics

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Hardware and Software, Engineered to Work Together

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