

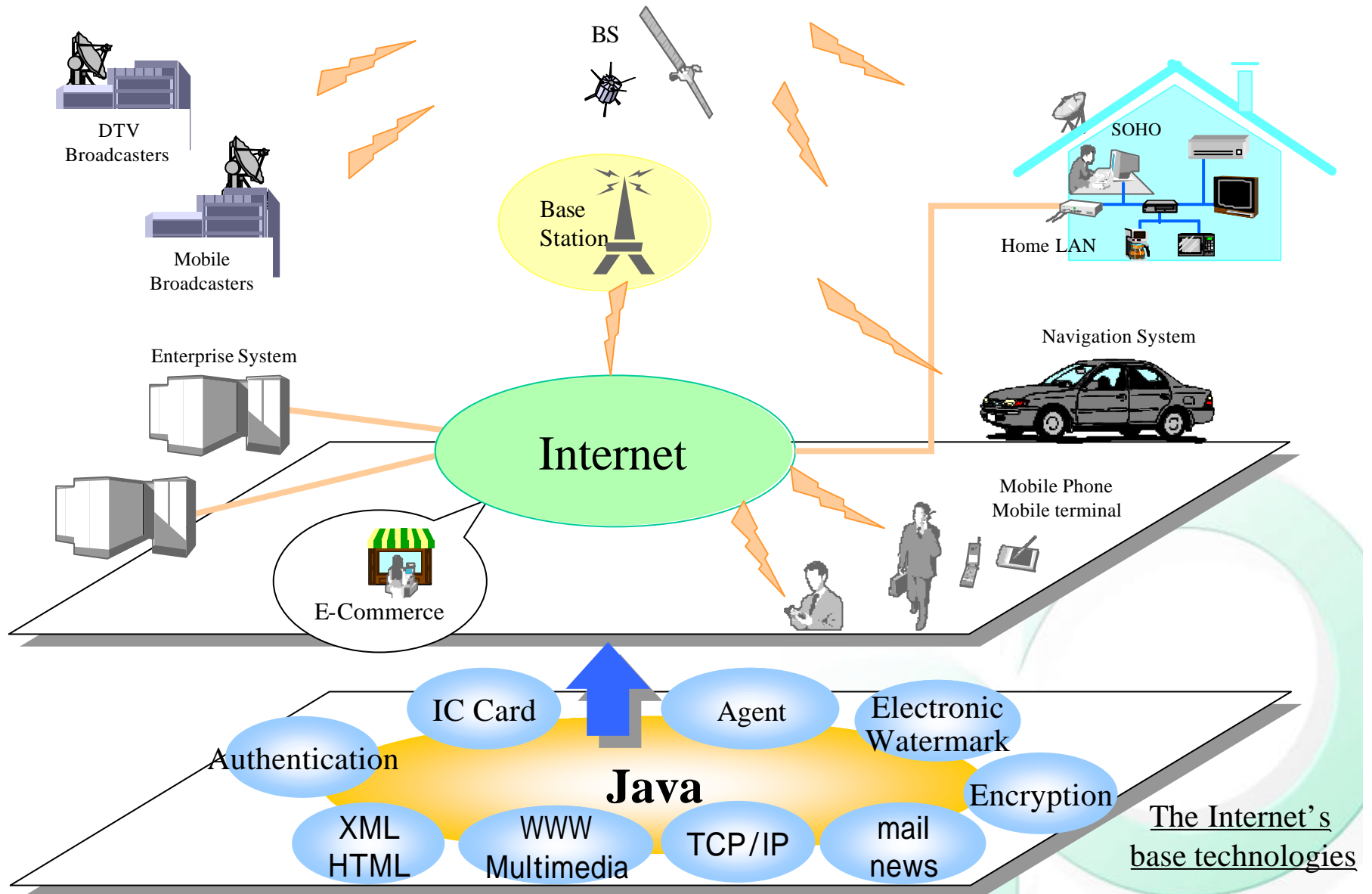


# **Java™ Solutions for Embedded Appliances**

**JTRON on picoJava II™**

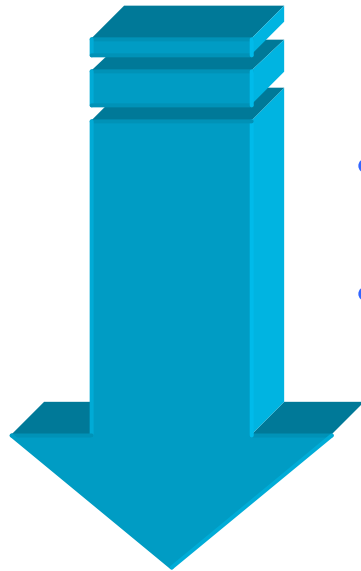
**Electronic Devices Group  
FUJITSU LIMITED  
Haruyasu Ito**

# Java™ - Infrastructure for a Connected World



# Java™ Characteristics

Java™ refers to a application programming language as well as an execution environment developed by Sun Microsystems, that is platform independent.



- **High programmer productivity**

Improved productivity in software development due to being object oriented language, and high reusability etc.

- **Platform independence**

Doesn't depend on CPU. 'Write once, run anywhere'.

- **Ideal for networked communications**

Downloadable Java applets (small program + data)

Compact bytecode for transmission.

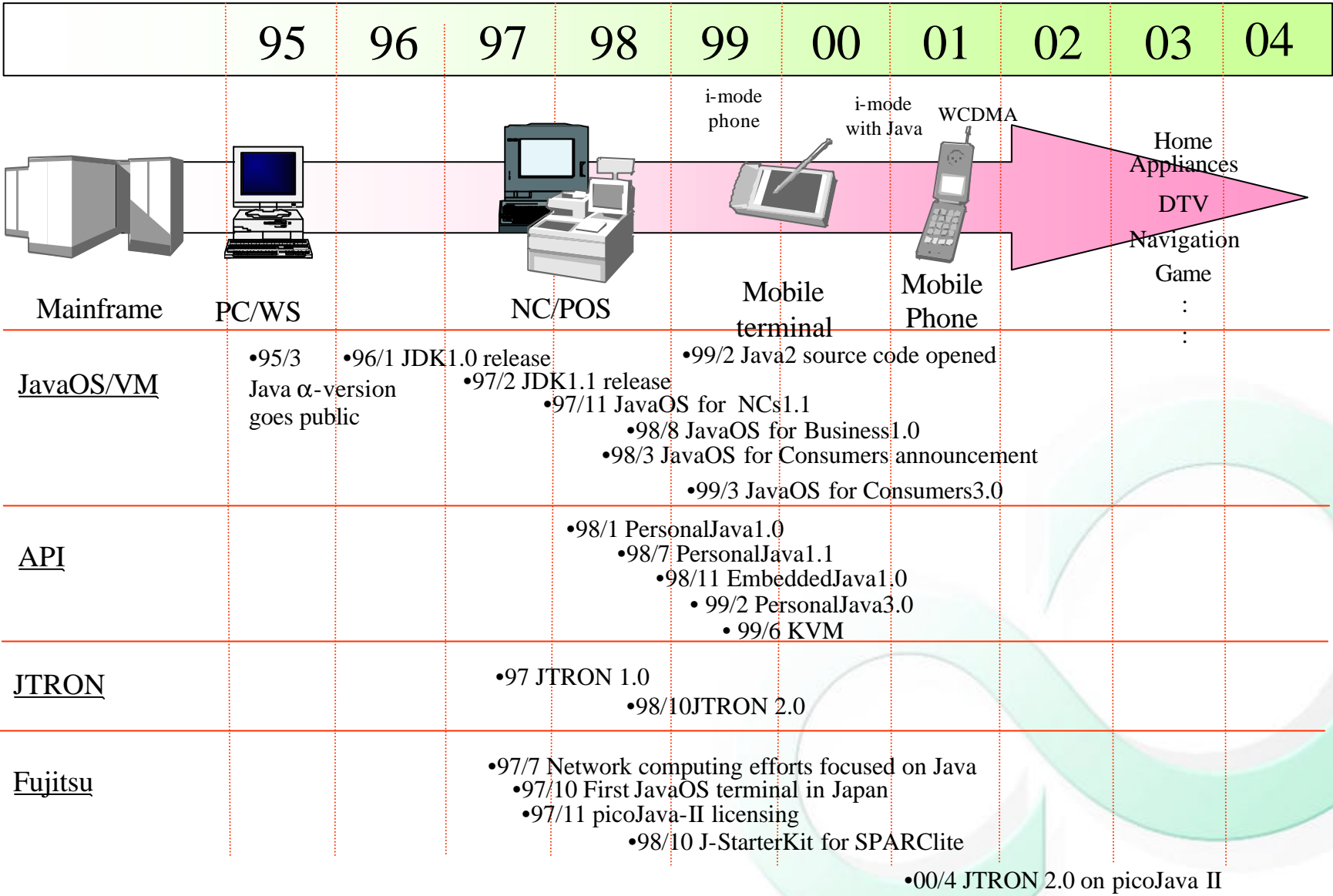
Built in security for safe network communications.

Equipped with TCP/IP protocol.

Through the Internet, **Java** has spread rapidly

# Java™ Developments

## Downsizing - Expanding into Embedded Devices



# Fujitsu's Java™ Solutions for Embedded Applications

## Java One-Stop-Shop for Embedded Applications

picoJava-II core based LSI (MB86799)

Software Support Package (J-REALOS/PJ)

Evaluation Kit

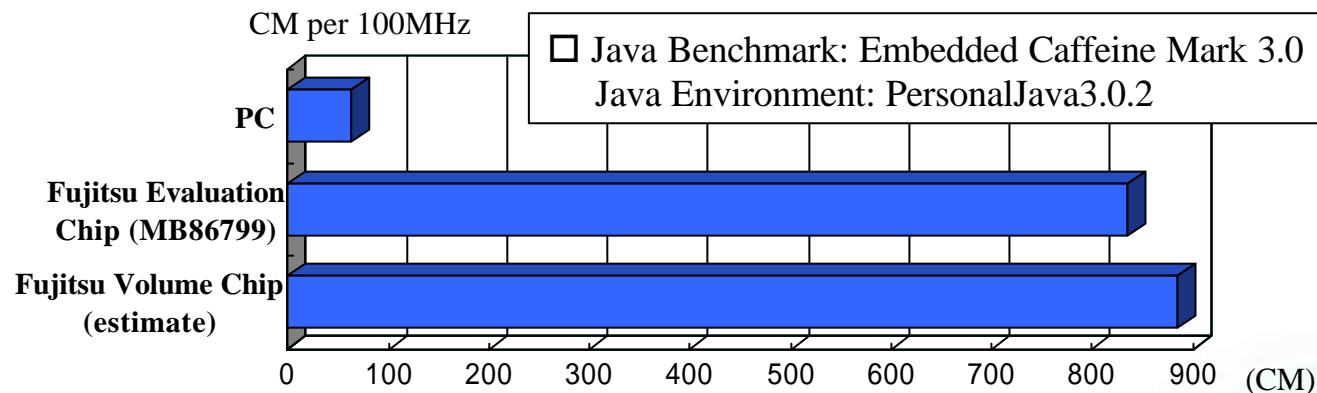
Software License

Development Tools

# picoJava-II™ Core Based Chip (MB86799)

## □ High Speed Execution of Java Applets

Direct execution of Java bytecodes Java



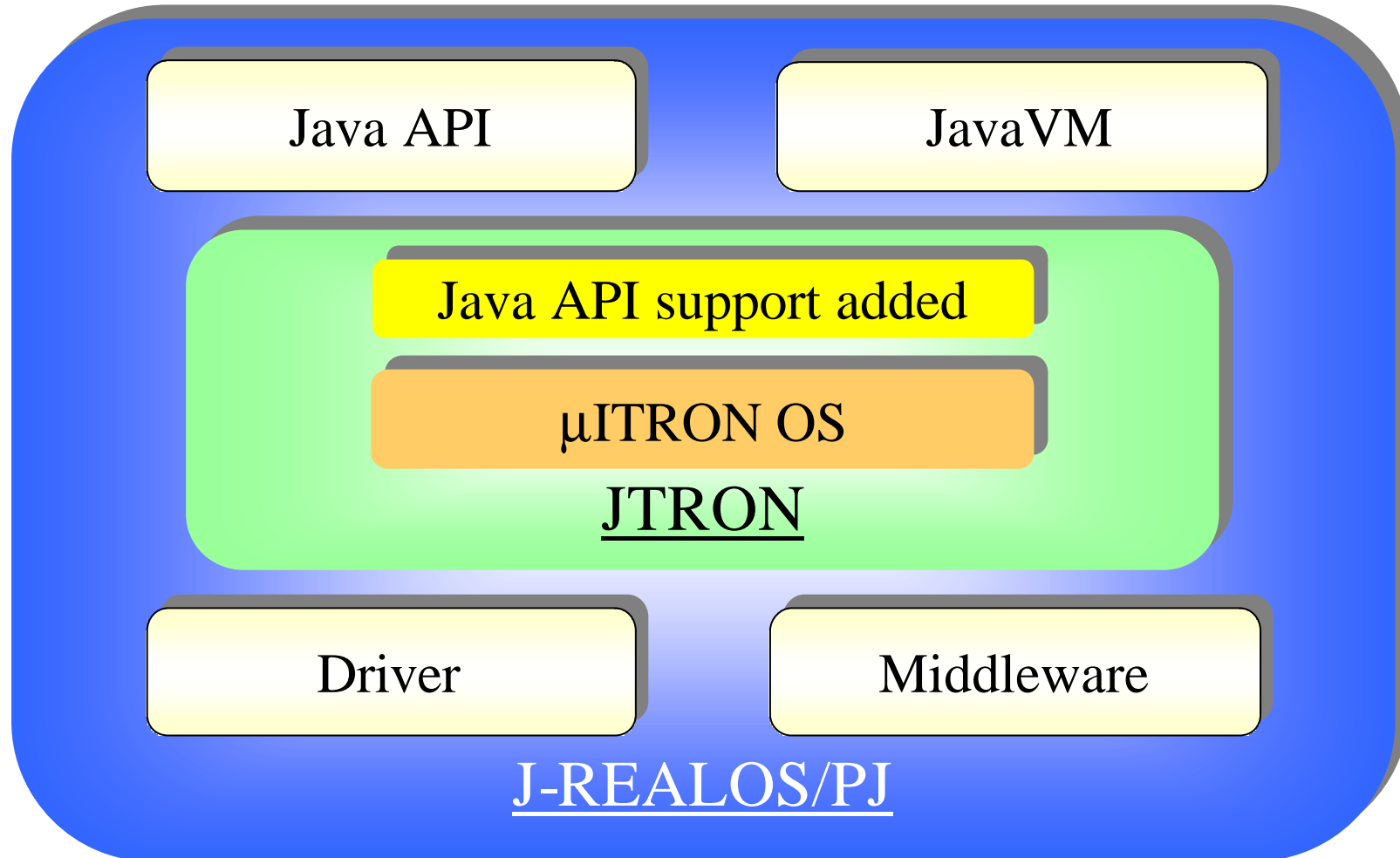
## □ High Performance/Power Consumption

Frequency	Power Consumption	Voltage
66MHz	360mW	2.5V
40MHz	90mW	1.7V

## □ High speed execution of C/C++ applications

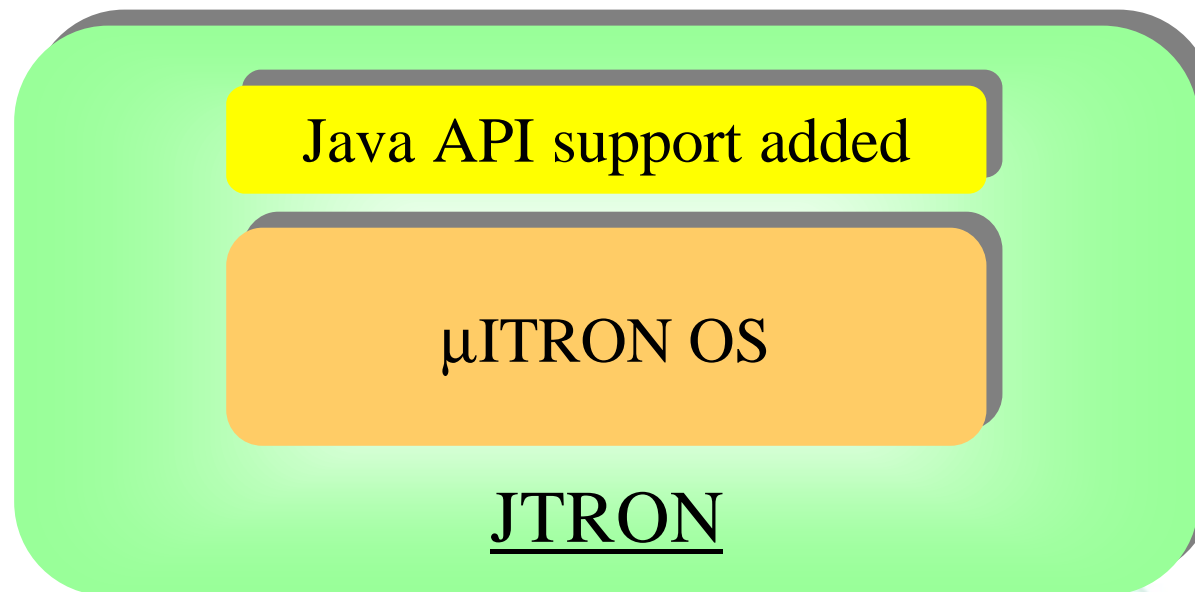
Evaluation chip (MB86799)	: 0.9MIPS/MHz
Volume Chip (estimate)	: 1MIPS/MHz

# Software Support Package (J-REALOS/PJ)



## What is the ITRON OS & JTRON ?

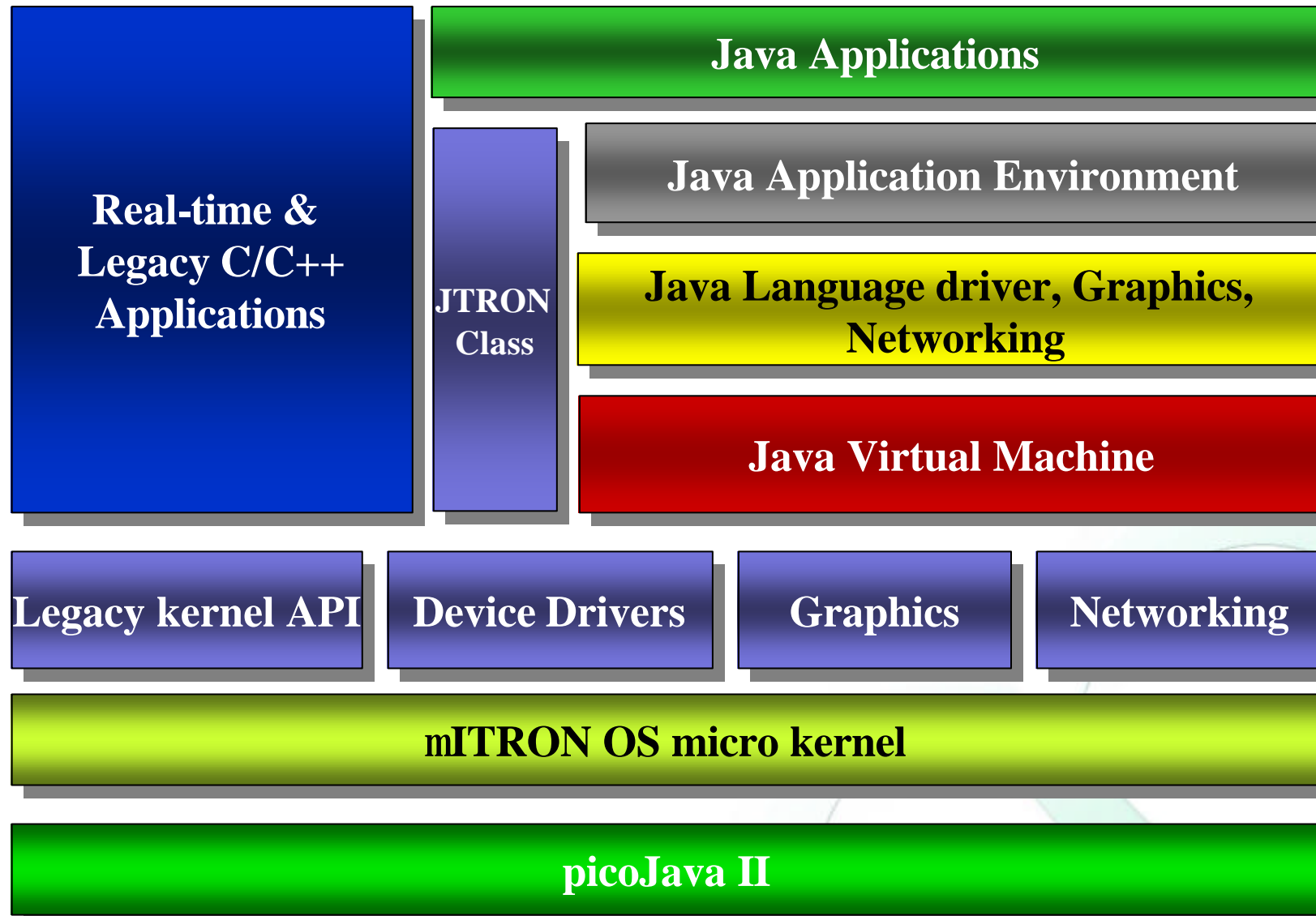
- The **ITRON OS** is a real-time OS that is popular in Japanese consumer electronics, as defined by the TRON Association.
- The **JTRON** specification defines the addition of Java API to the ITRON OS, as defined by the TRON Association.



JTRON class: Allows Java to call a C/C++ program, or a C/C++ program can call a Java program.



# Java™ Execution Environment



# J-REALOS/PJ

## JavaVM

Fujitsu, in cooperation with Fujitsu Laboratories, and under the authority of Sun, has developed the first Java virtual machine (VM) specially for picoJava II, and combined it with the PersonalJava™ and EmbeddedJava™ APIs.

## Java API

PersonalJava:

A light Java environment defined for uses such home, office, and mobile devices with GUI.

EmbeddedJava:

A small Java environment defined for embedded devices.

## Middleware

Necessary Java system features such as TCP/IP, PPP, storage system, graphics library etc.

## Drivers

Necessary drivers: Keyboard/mouse, serial, parallel, graphics, sound, Ethernet, etc. (USB, Bluetooth planned).

# Evaluation Kit

