



Java for Small Devices: The Squawk Java Virtual Machine

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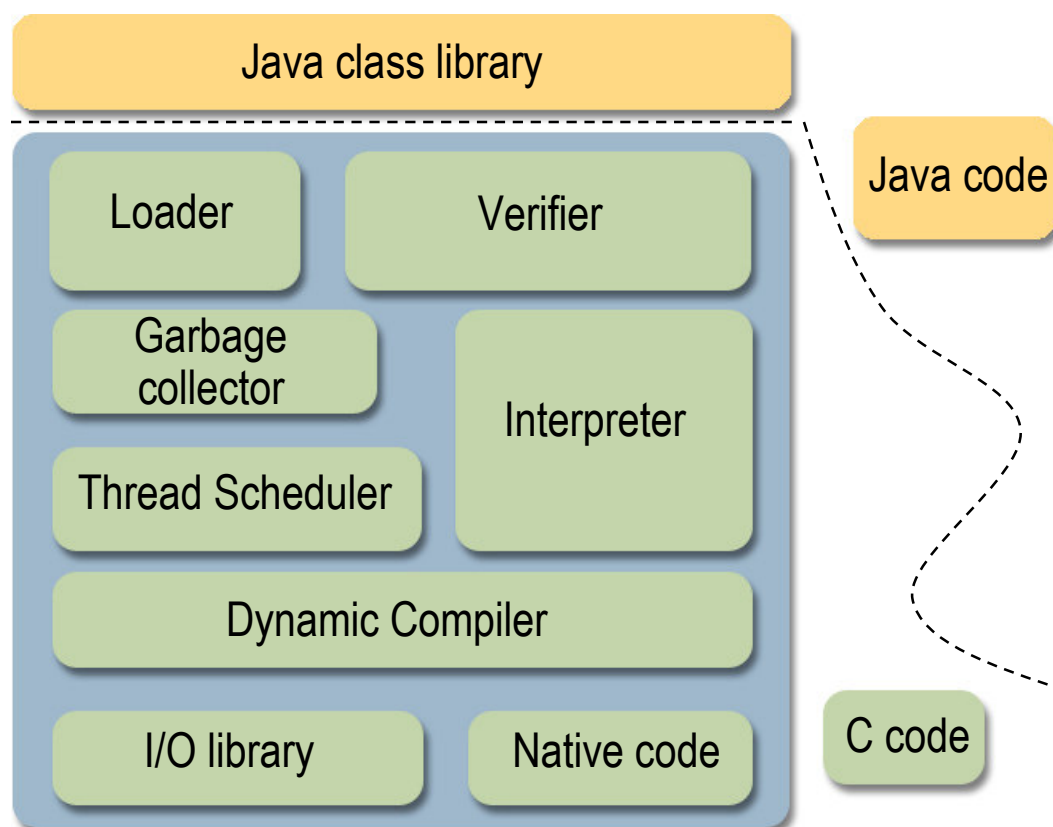
Sun Labs

The Squawk JVM: J2ME + OS Functionality

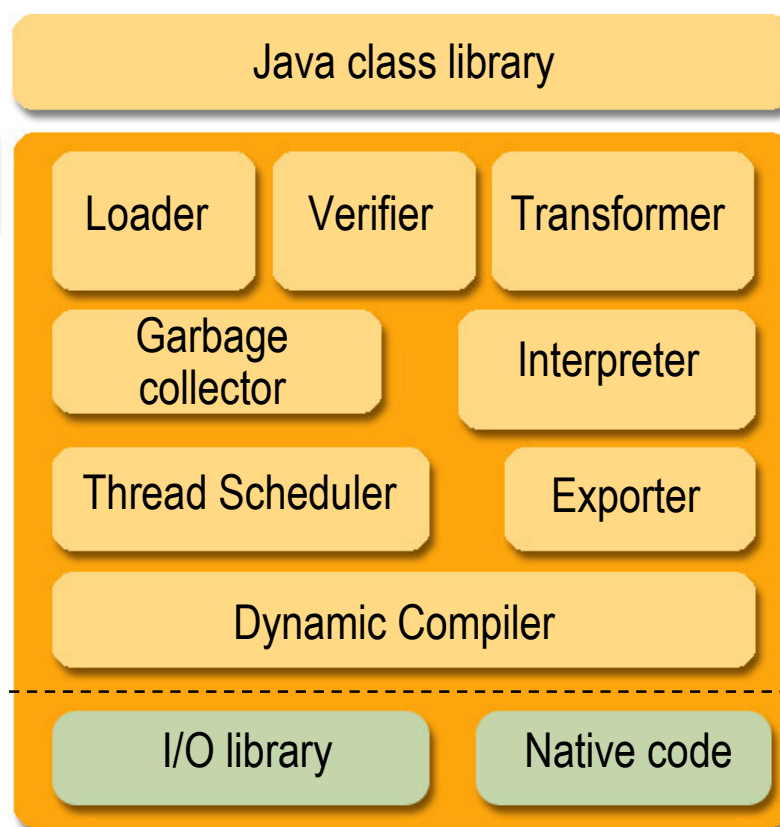
- Written in Java
- Programmable, i.e., extensible, flexible
- Runs without an OS on ARM
- Runs also on Solaris, Linux, MacOS, Windows
- Optimized for small devices
- AppServer model (isolates)
- Connected: network/wireless/sensors/actuators
- Ports easily

Standard JVM vs Squawk JVM

Standard JVM

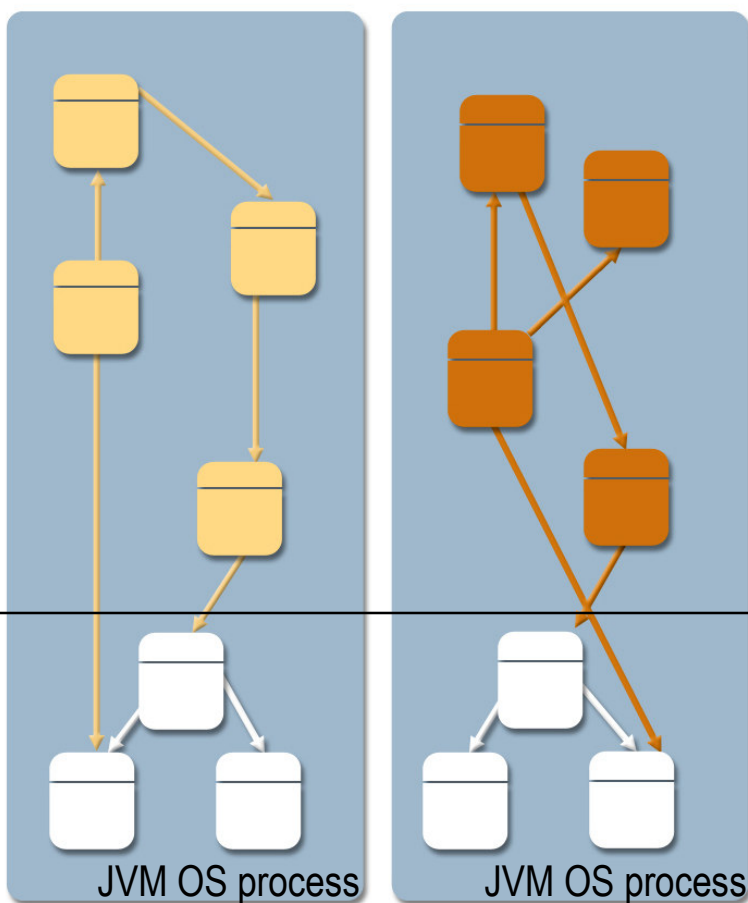


Squawk JVM

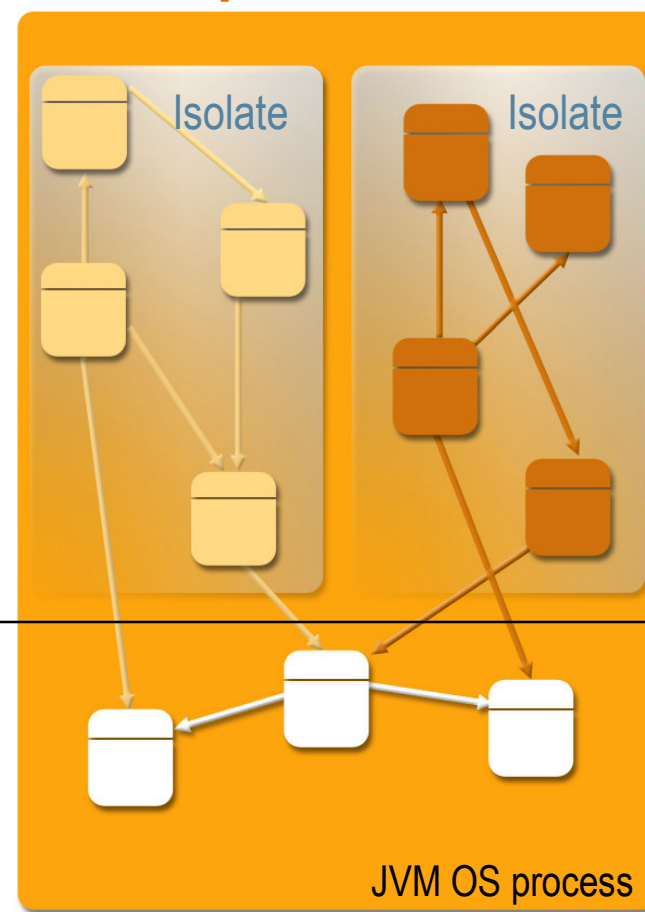


AppServer Model Allows Multiple Applications Within One VM (JSR121)

Standard JVM



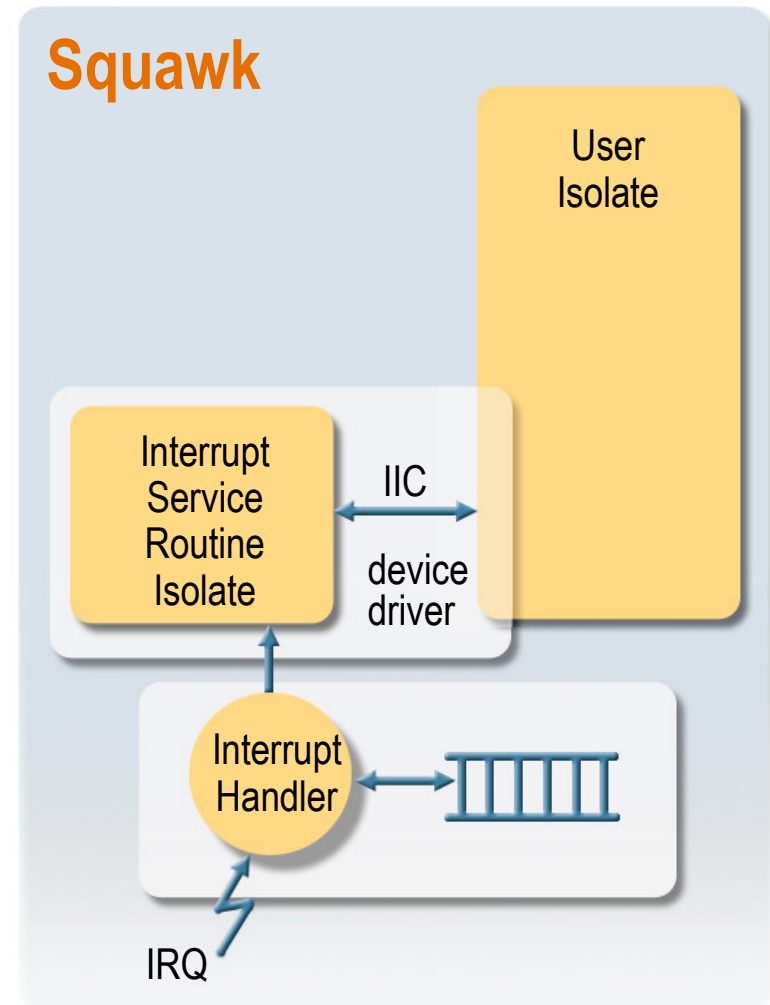
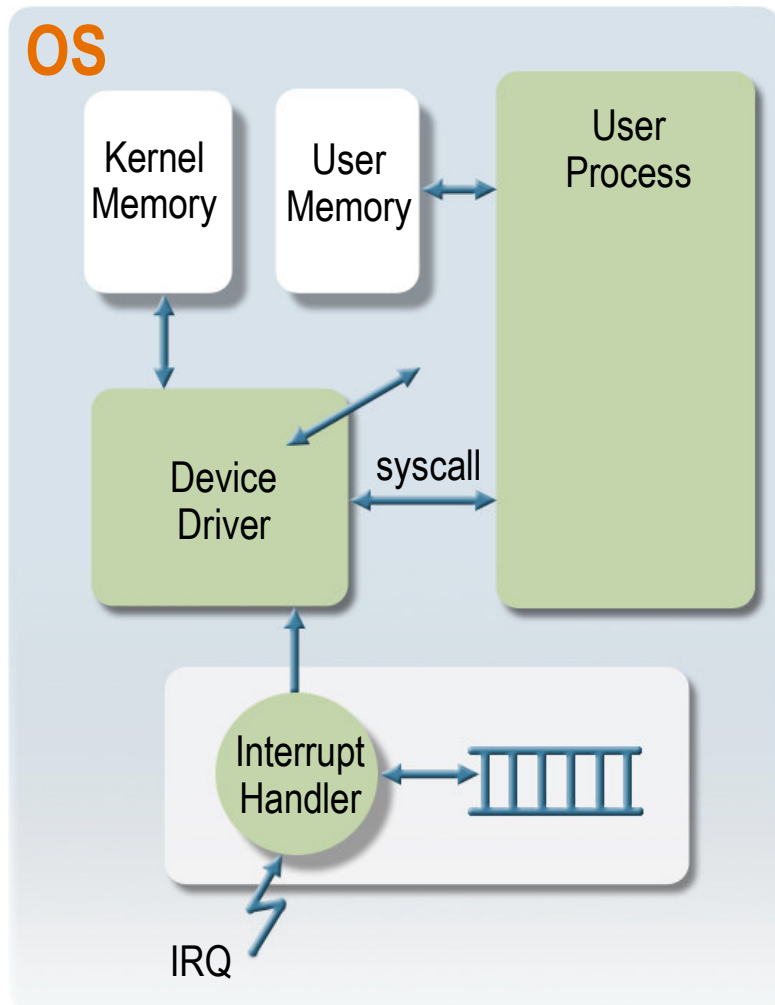
Squawk JVM



Non-
shareable
object
memory

Shareable
object
memory

Low-Level Hardware Support from Java (“Device Drivers in Java”)



Current Squawk Deployment: Sun Labs SunSpots Platform

- Hardware
 - > 32-bit ARM core
 - > Chipcon CC2420 based wireless platform
 - > SPI based peripherals
 - > Simple sensor board
 - > “Bot”-type device with variety of interfaces
- Software
 - > Squawk Java VM
 - > Desktop build and deploy scripts
 - > Libraries for
 - Driving hardware: radio, sensor boards, ...
 - Basic 802.15.4 network functionality
 - > SpotWorld: graphical desktop interface

Squawk on SunSpot Facts

- Java VM written in Java
- Interpreter based (at present)
- Memory sizes:
 - > 80K RAM for VM
 - > Libraries 380K flash
- Suites
 - > 38% smaller than jar'd class files
- Performance: comparable to KVM
- Device drivers written in Java (no C)
- 802.15.4 MAC layer in Java (no C)

Future: A Platform for Cooperating Devices



- Network/
wireless
 - > Cell phones
 - > Set top boxes
 - > Home appliances
 - > Robots

Summary

- Developers
 - > Fully capable J2ME that runs on “bare” metal
 - > Portable: no native code nor OS needed
 - > Standard Java development and debugging tools
- Business
 - > Powerful and flexible technology for connecting mobile devices and big computers using Java
 - > Reduces programming and testing complexity across multiple OS/CPU configurations



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