Language Runtimes on Embedded Architectures

Eclipse OpenJ9 & Eclipse OMR on ARM aarch64

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Background

Eclipse OpenJ9: An open-source version of IBM's proprietary closed-source J9 Java Virtual Machine. runs on top of Eclipse OMR

Eclipse OMR: An open source set of C and C++ components that can be used to build robust language runtimes that support many different hardware and operating system platforms."

Compared to equivalent Software:

40%
Smaller footprint during ramp up

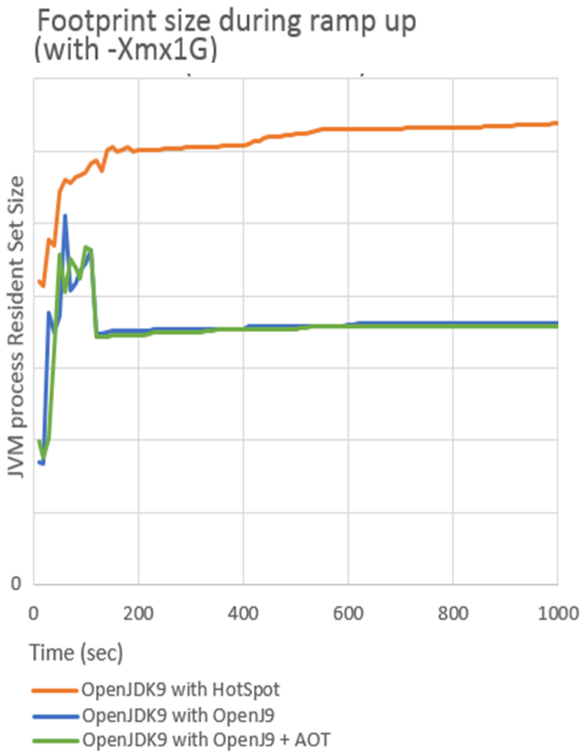
60%
Smaller footprint after startup

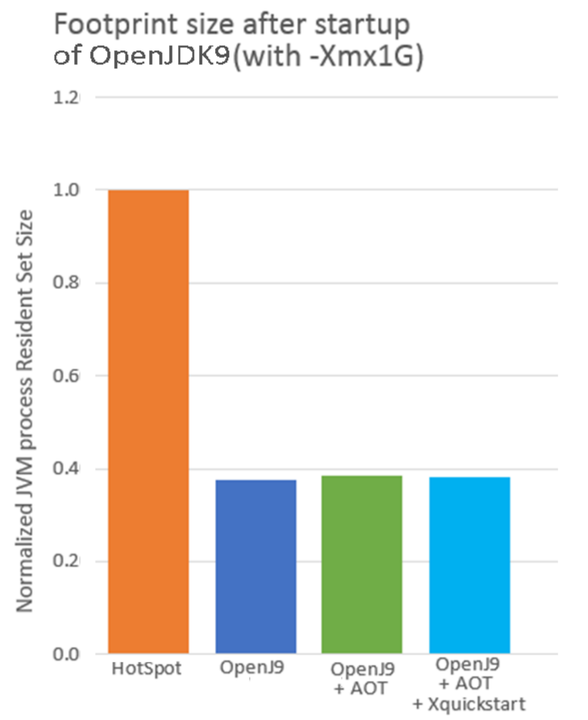
2x
Faster startup time

Embedded Architecture: Use the RISC instruction set.

ARM: A family of CPU based on the RISC instruction set.

aarch64: a subset of ARM that is based on a 64 bit architecture.





* Graphs from github.com/eclipse/openj9

Motivation

Better Hardware Footprint, Power Usage and Heat Management

ARM System on Chip (SoC) devices deliver everything in a single package allowing for easier product development.
ARM has been targeting mobile and battery powered devices for years making them an obvious choice for decreased power consumption. ARM SoCs are easier to confine in closed spaces and have easier heat management, half a cubic centimeter of aluminum is generally sufficient to keep the SoC operating near room temperature.

Lower Cost to Buy and Maintain

Due to the open design of the ARM chip, many manufacturers can make their own SoCs, thus allowing for a competitive market where the buyer has multiple options. The SoCs, having such a low price point to manufacture make them almost disposable. A stateless infrastructure allows for rapid removal and replacement of a defective unit; or addition of a new one lowering downtime and scalability issues in server infrastructure.

Easier Hardware Implementation

With the chip being an open design, many manufacturers can create more complex chips with more features embedded into the silicon. This means that at manufacturing time, designers need to worry less about board layout and features needed; as they are in many cases already available.

Porting OpenJ9 + OMR to the ARM architecture would allow a plethora of devices to gain from each of the runtime optimization inside OMR.