Java on the embedded hardware

Java on the desktop

Java in your head

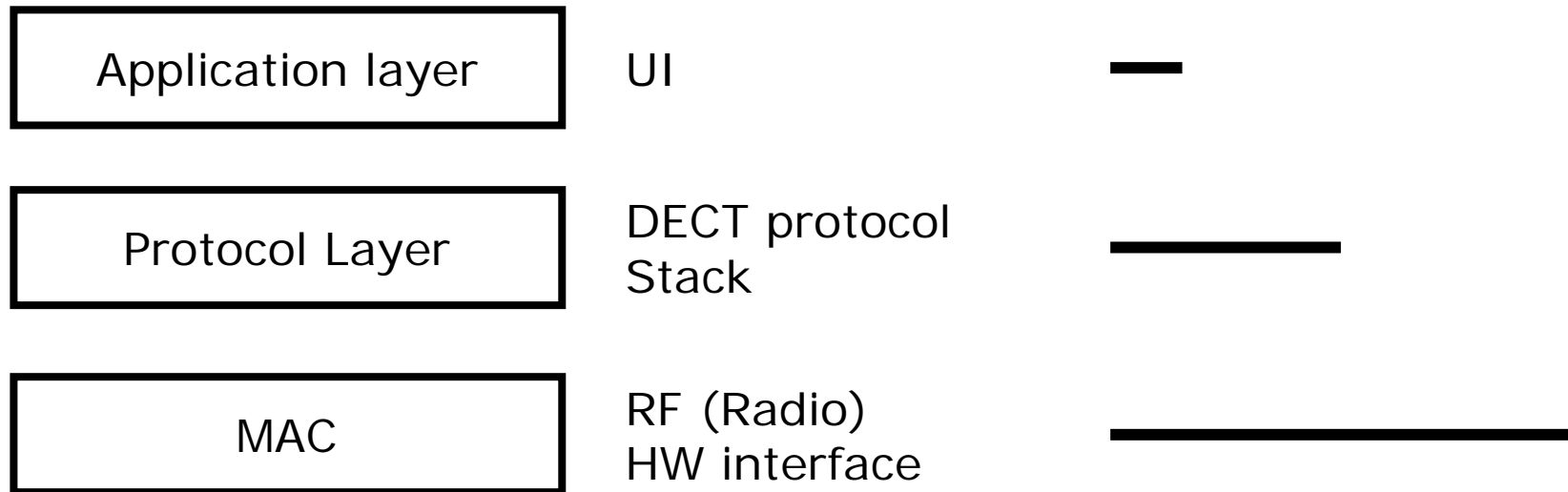Stephan Korsholm (stk@kirktelecom.dk)

Why Java?

Why Java?

A chance to introduce new work processes!

Java on the hardware

Java on the hardware

Kirk software architecture:

Application layer	UI

—

Protocol Layer	DECT protocol Stack

——

MAC	RF (Radio) HW interface

———

Real time critical?

Java on the hardware

Kirk software architecture:
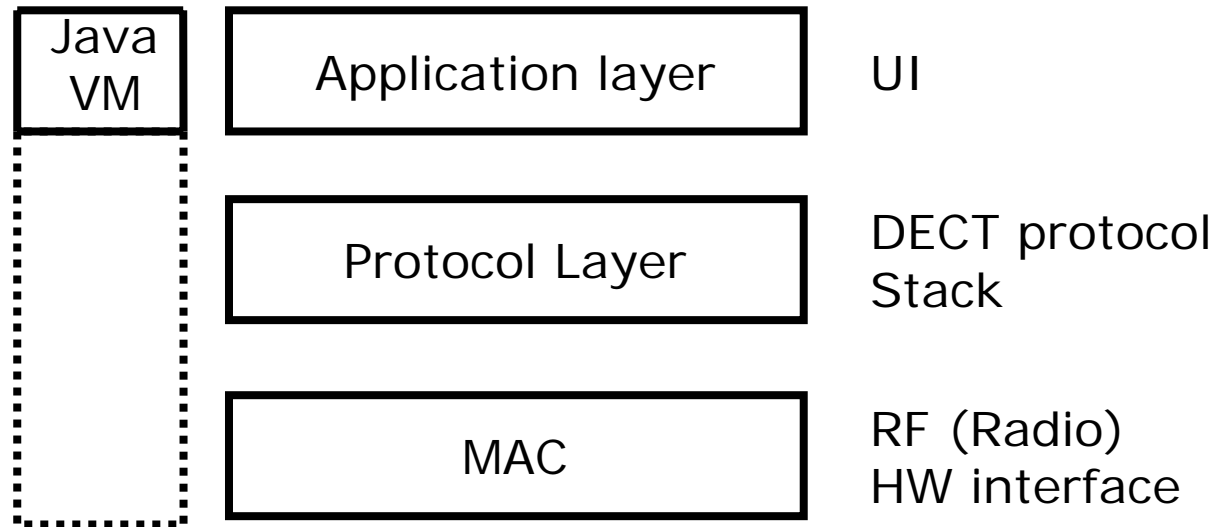
|		
Java VM	Application layer	UI
	Protocol Layer	DECT protocol Stack
	MAC	RF (Radio) HW interface

Challenges in introducing Java on the hardware:

- Obtain a Java VM source compilable for your platform.
  Easy!

- Include the Java VM source in your build environment.
  Easy!

- Run the Java VM in parallel with existing software without compromising real time requirements.
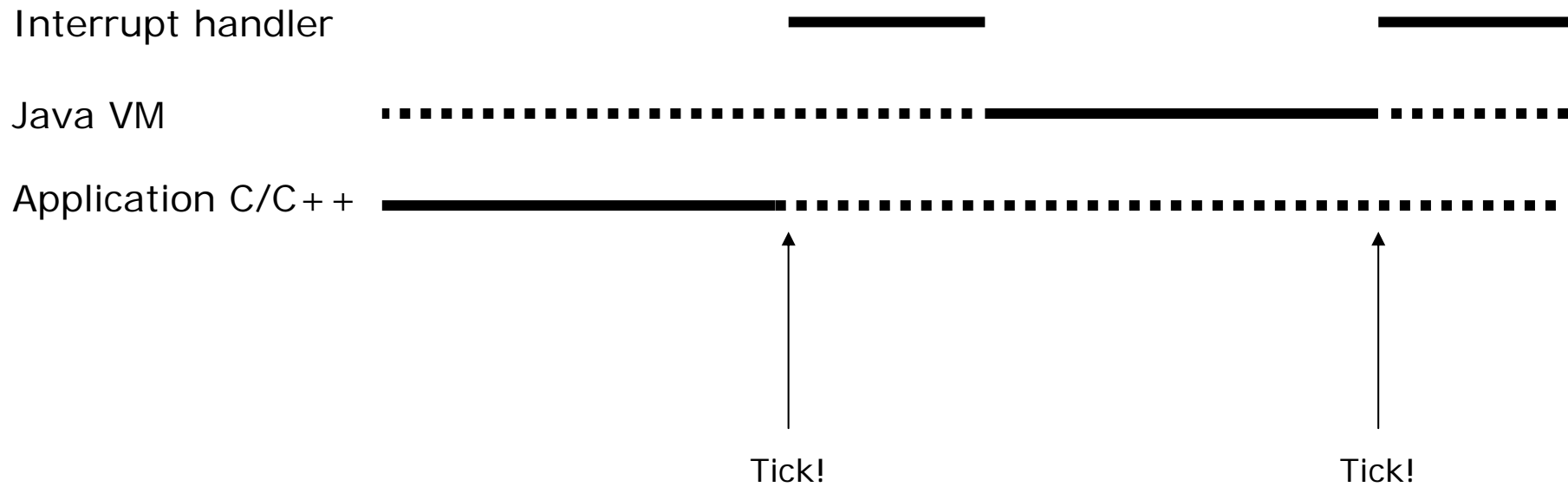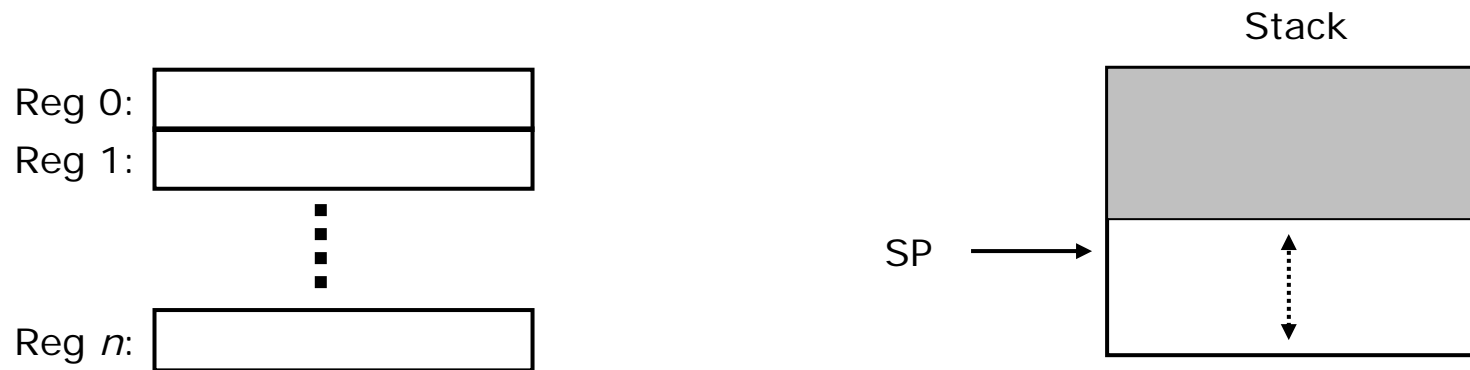 Difficult!

Execution Scheduling – Without Java

Interrupt handler

Application C/C++

Tick!   Tick!
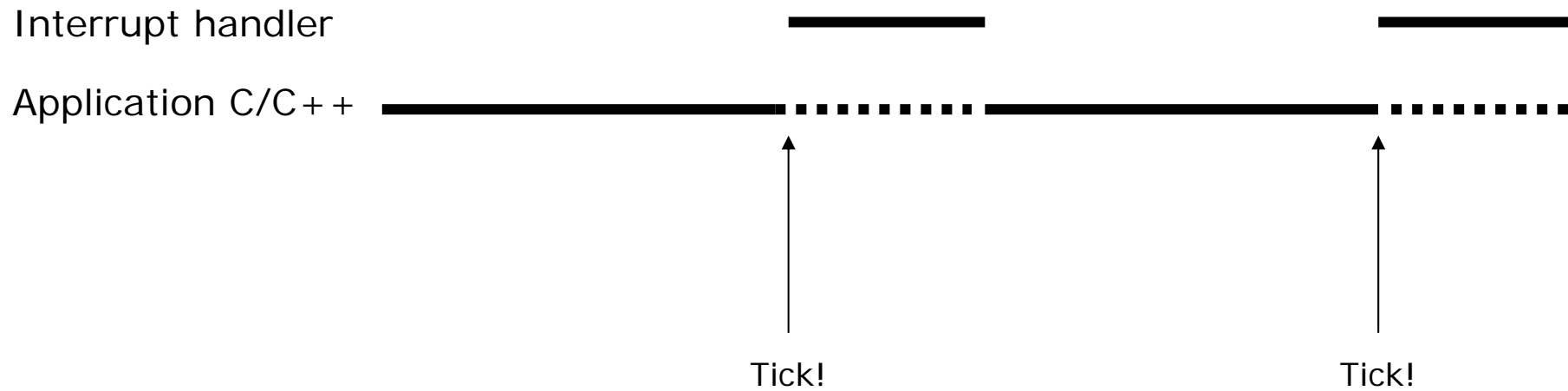
Java on the hardware

Execution Scheduling - With Java VM

Interrupt handler

Java VM

Application C/C++

Tick!   Tick!

Java on the hardware

Switching from the Application to Java

Reg 0:

Reg 1:

Reg *n*:

Stack

SP

Snapshot at interrupt

Interrupt Stack

SP

ISP

PC

Program

PC
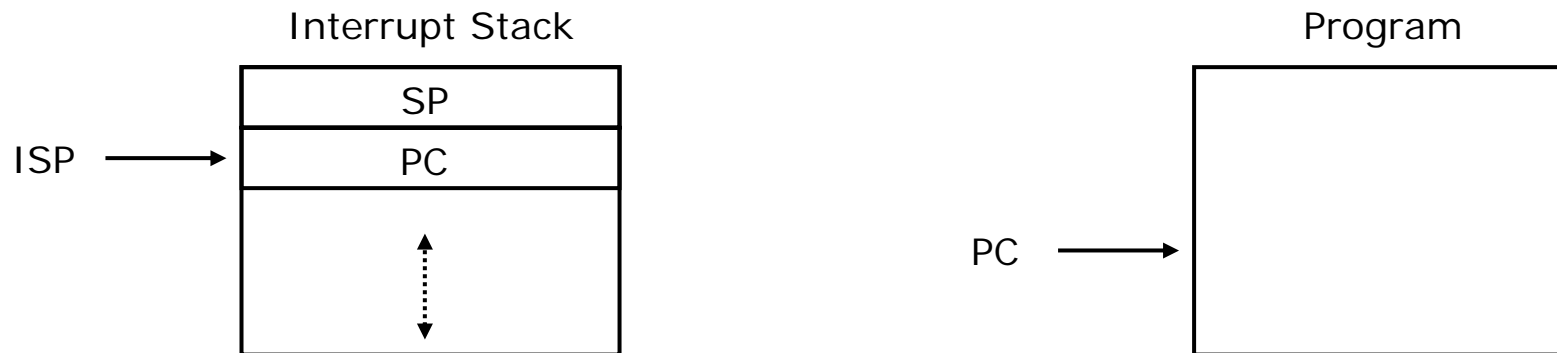
Java on the hardware

Switching from the Application to Java
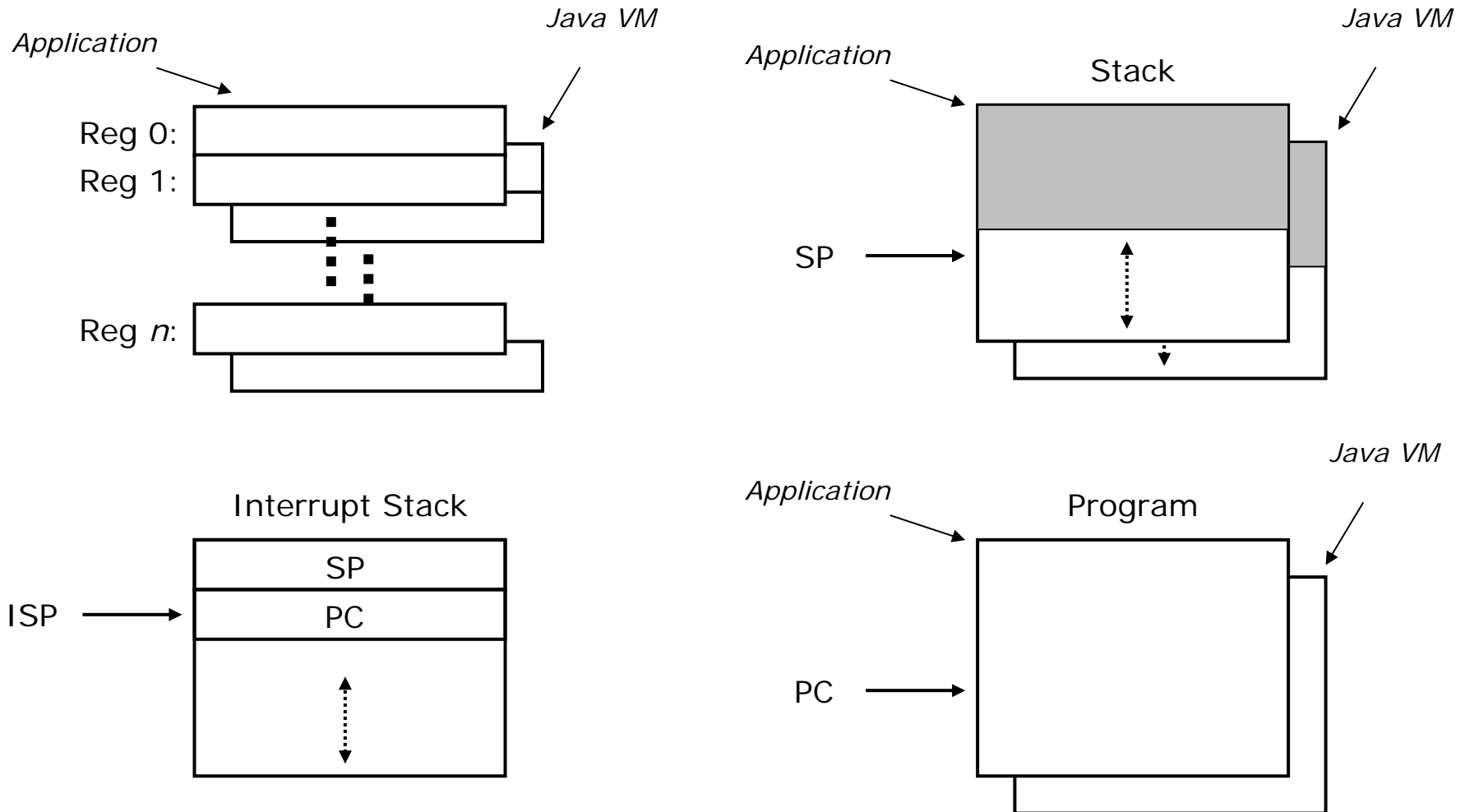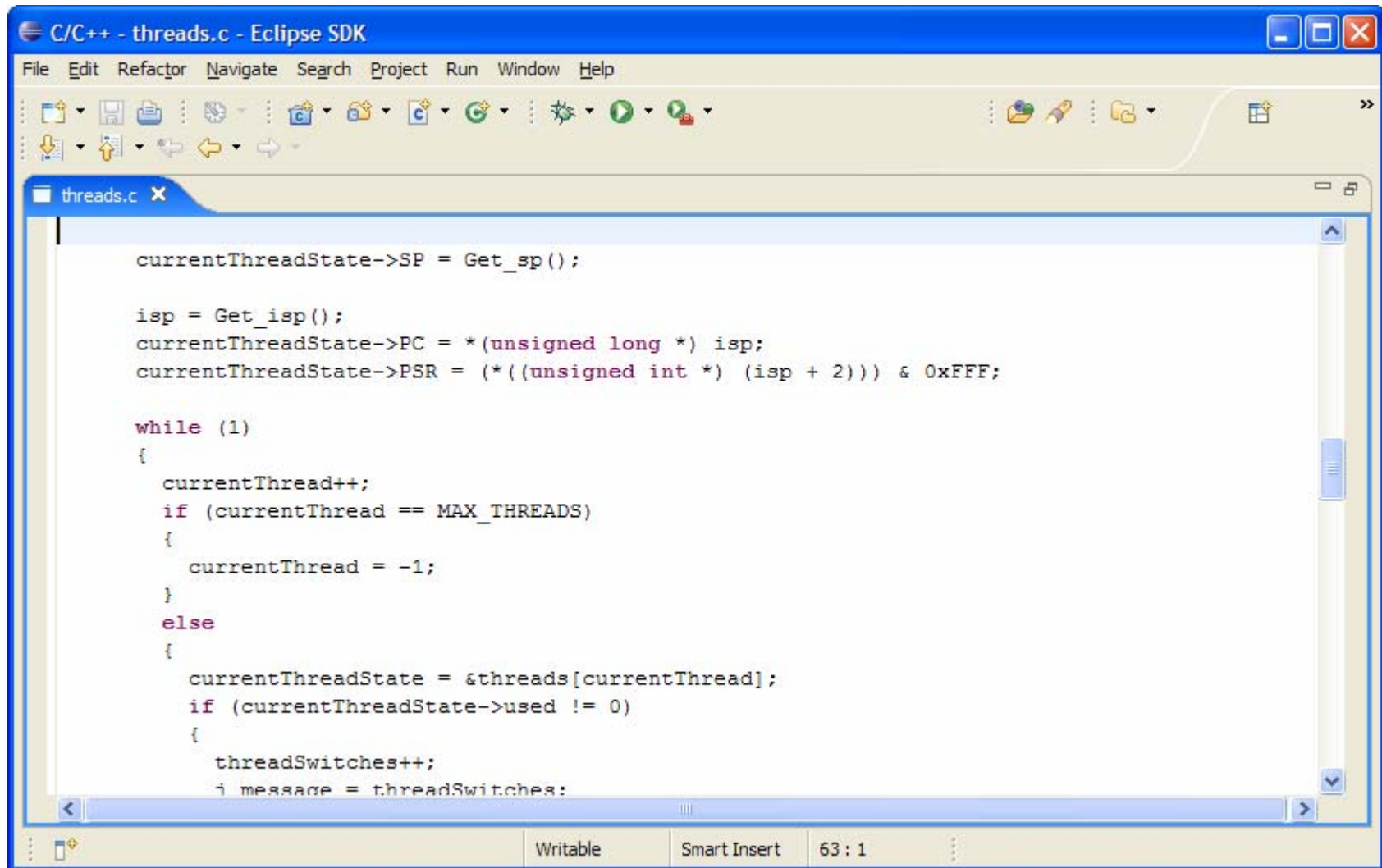
Java on the hardware

Switching from the Application to Java

Tick! ⟶

1. Handle interrupt

2. Save application registers

3. Save application SP

4. Save application PC

5. Load Java VM registers

6. Load Java VM SP

7. Load Java VM PC

8. Return ⟵

Java on the hardware

threads.c: 167 lines

Java on the desktop

Java on the desktop

Compiling Java

```
                    ┌─────────────────┐
                    │  JavaApp.java   │
                    └─────────────────┘
                             │
                             │              javac
                             ▼
                    ┌─────────────────┐
                    │  JavaApp.class  │
                    └─────────────────┘
                        ╱         ╲
                     tool          ╲
                      ╱             ╲
         ┌───────────┐   ┌───────────────┐   ┌──────────────┐   ┌──────────┐
         │  native.c │   │   JavaApp.c   │   │   JavaVM.c   │   │  CApp.c  │
         └───────────┘   └───────────────┘   └──────────────┘   └──────────┘
                  ╲            ╲                  ╱             ╱
                   ╲            ╲                ╱             ╱
                    ╲            ╲              ╱             ╱
                     ╲            ╲            ╱             ╱
                      ╲            ╲          ╱  C cross compiler
                       ╲           ┌──────────┐
                        ╲──────────│ App.exe  │
                                   └──────────┘
```
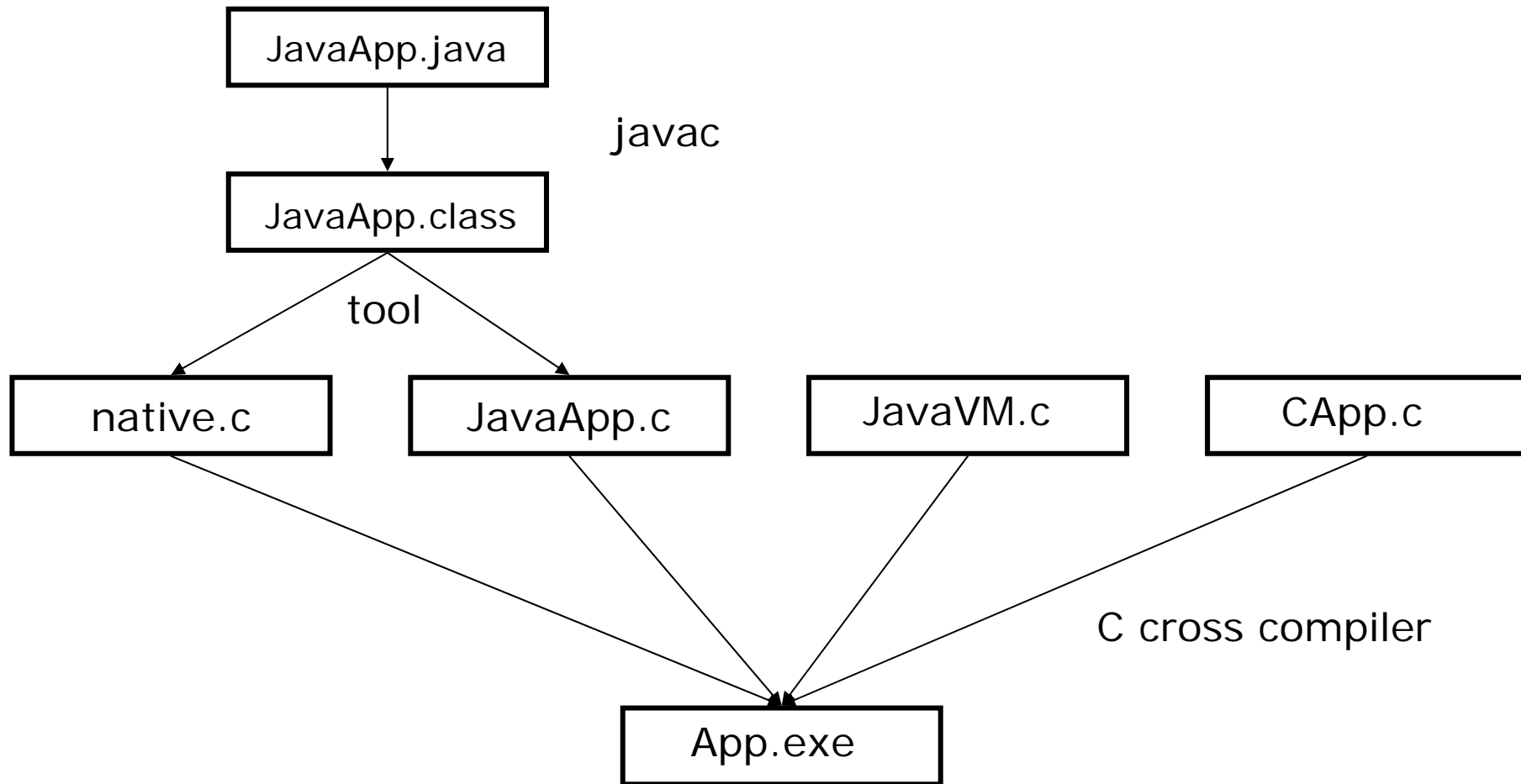
Java on the desktop

Compiling Java with Eclipse

Java in your head

Much more than a language

- Java is platform independent.

- Java is OO methods and practices,

  - Unit tests
  - Automated regression tests
  - Well designed, pretty, simple, even beautiful code.
  - Independent modules.
  - Toolboxes, frameworks and libraries.

- Java is fast prototype based development.

- Java is better predictability in software projects.

- Java is clarity instead of obscurity.

Much more than a language

India

- CMMI level 4/5

- State-of-the art work methods

- Well educated

- Professional

- Unlimited resources

Denmark

- ☺

- Legacy code

- Legacy work methods

- Old school

- Limited resources

We need a revolution!