

# Aspect Oriented Software Development (AOSD)

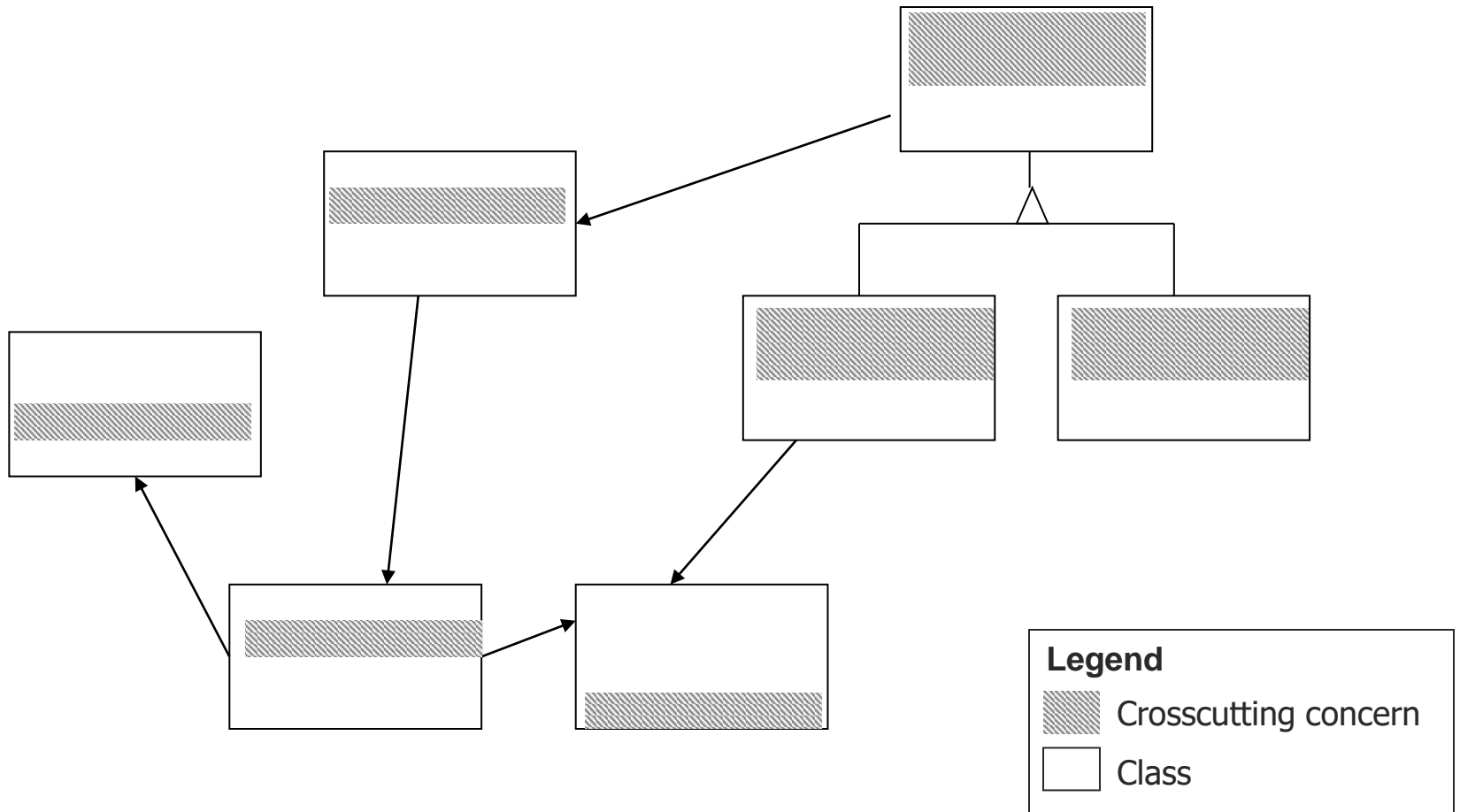
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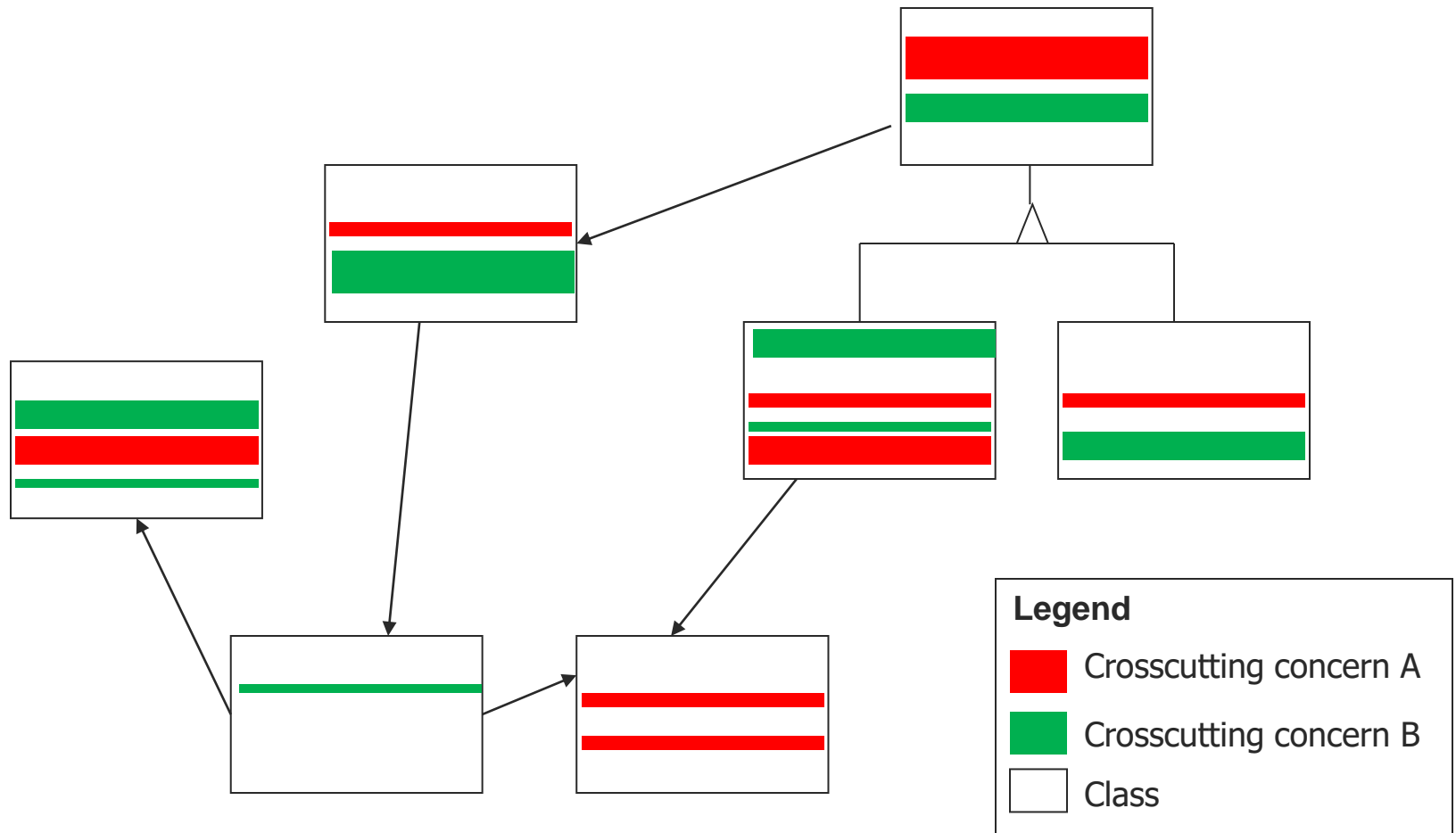
# [ Crosscutting Concerns ]

- Concerns implemented by several modules of the system and mix up with other concerns
- Two typical problems
  - *Scattering*
  - *Tangling*
- It is hard to change, remove or evolve a crosscutting concern of the system

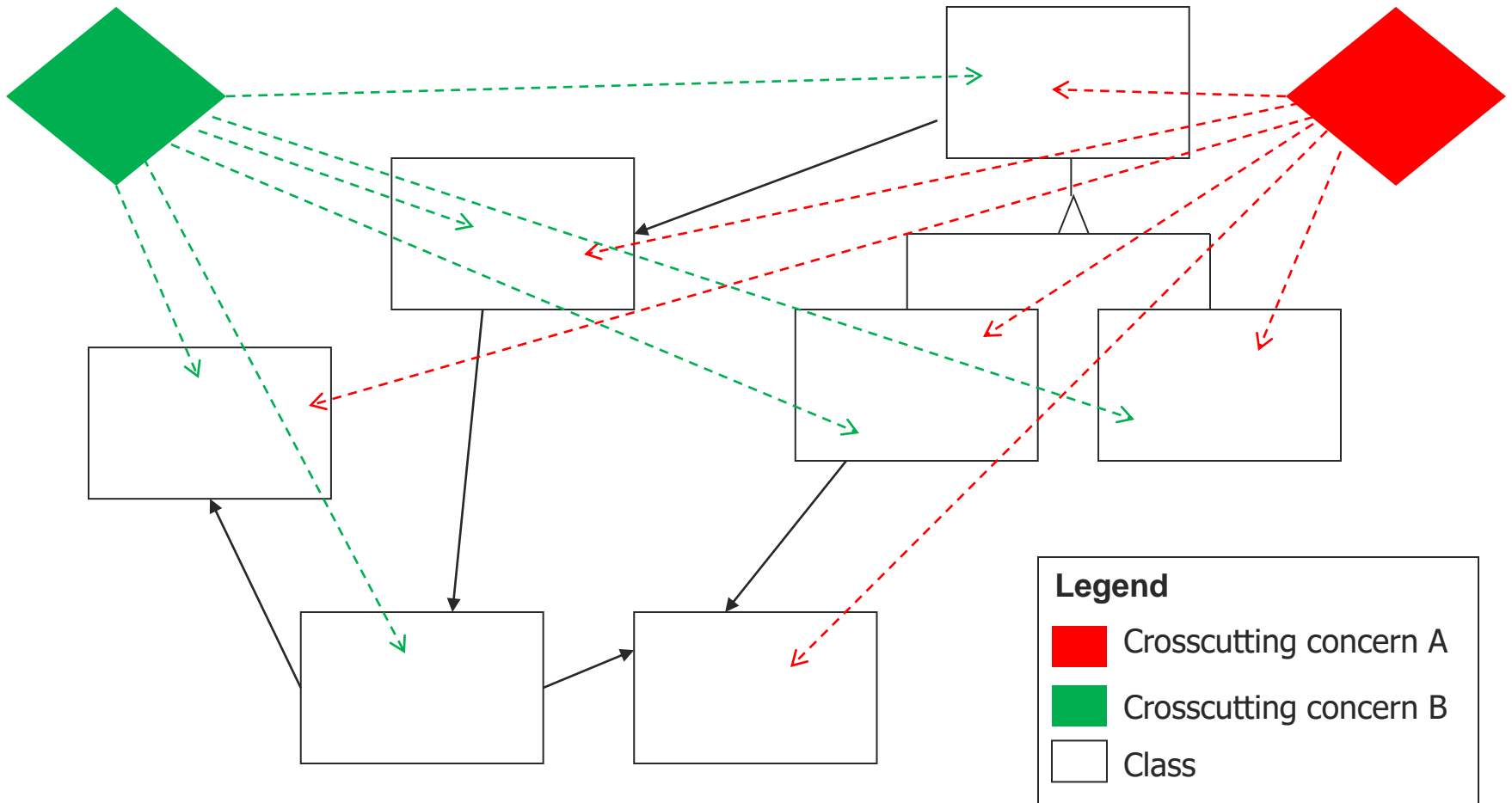
# [ Scattering ]



# [Tangling



# [ Solution with Aspects ]



# [ AOSD ]

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- Aspect-Oriented Software Development
  - A development technique with a new modular unit: aspect
- AOSD can be used together with other techniques
  - It is often used with object-oriented development (OO)

# [ AOSD Main Definitions ]

- An **aspect** is a modular unit to implement a crosscutting concern
  - It defines joint points, pointcuts, advices, and inter-type declarations
- A **joint point** is a place in code where crosscutting concern should be included
- A **pointcut** is a set of joint points

# [ AOSD Main Definitions ]

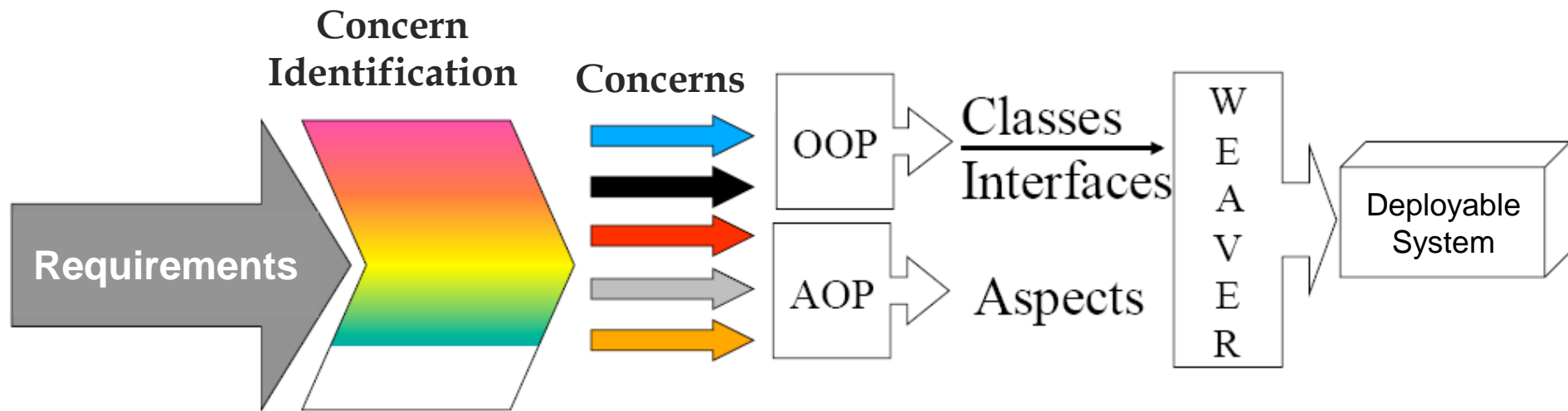
- **Advice** is a piece of code that implements behavior of a concern
  - It is similar to a method in a class (OO)
- **Inter-type declarations** are methods, attributes, or relationships of a crosscutting concern
  - These elements have static binding with classes (at weaving time)



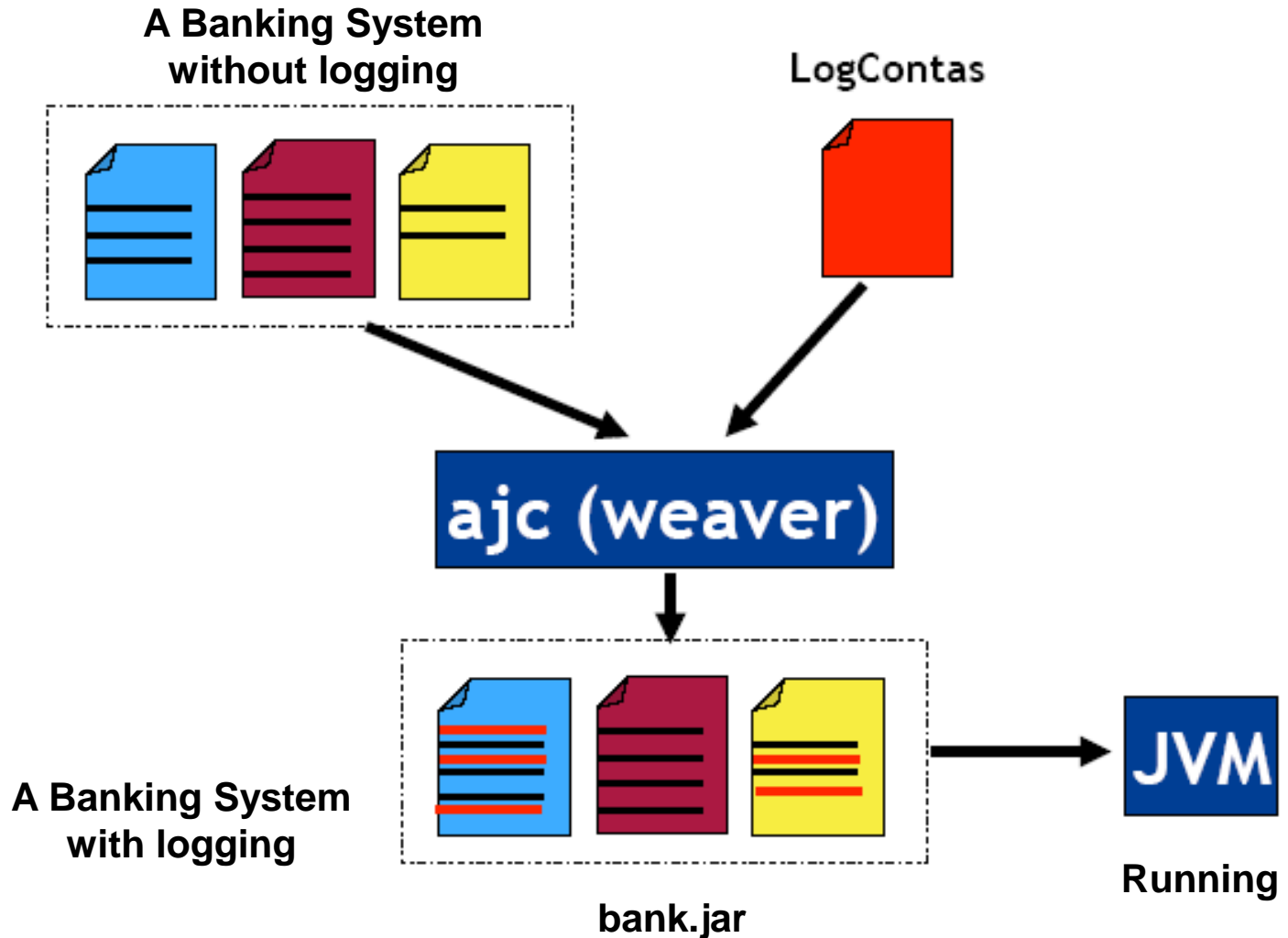


# The AOSD Process

# [ AOSD Process Overview ]



# [ An AspectJ Example ]



# [ AOSD Advantages ]

- Separation of crosscutting concerns
  - It improves modularity, reduces complexity of each class, makes software reuse easier, etc.
- Obliviness and productiveness
  - A class does not know aspects
  - Different concerns can be implemented in parallel
- Configurability (plugability)

# [ AOSD Drawbacks ]

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- A different development technique
  - It requires learning and training (a new way of thinking)
- Code fragmentation
  - Several small classes and aspects
- Lack of tool support
  - There are a few tools and IDE extensions
- Immature programming languages

# [ Bibliography ]

- Ian Sommerville. **Software Engineering**, 9th Edition. Addison-Wesley, 2010.
  - Chapter 21