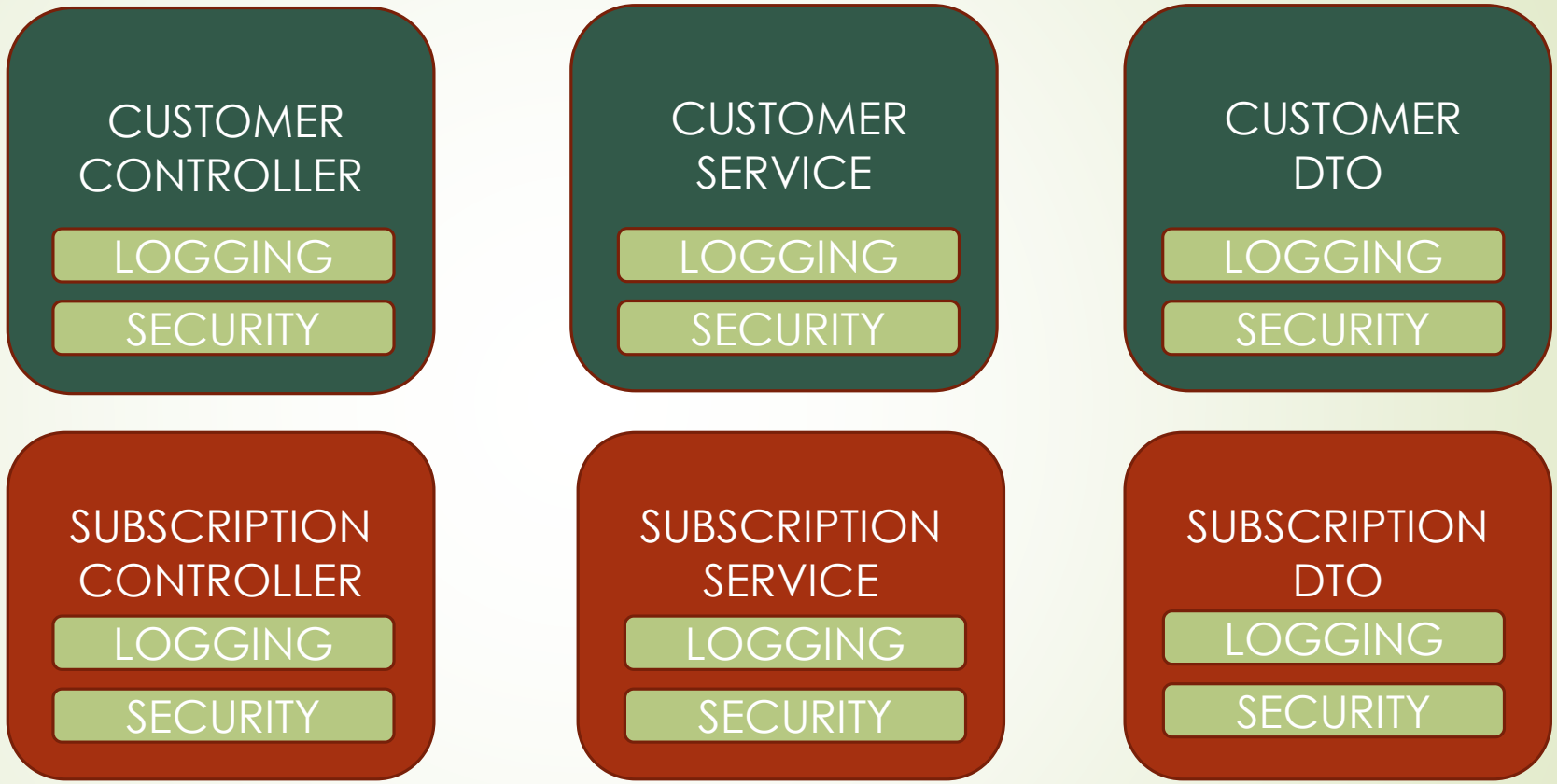
JAVA SPRING CURS 3: AOP

AOP

Aspect Oriented Programming basic concepts

Aspect Oriented Programming

- Technique based on the concept of Aspect
- Add additional behavior without modification of the existing code.
- An aspect encapsulates **cross-cutting logic (corss-cutting concerns).**
- An aspect can be reused in different functionalities.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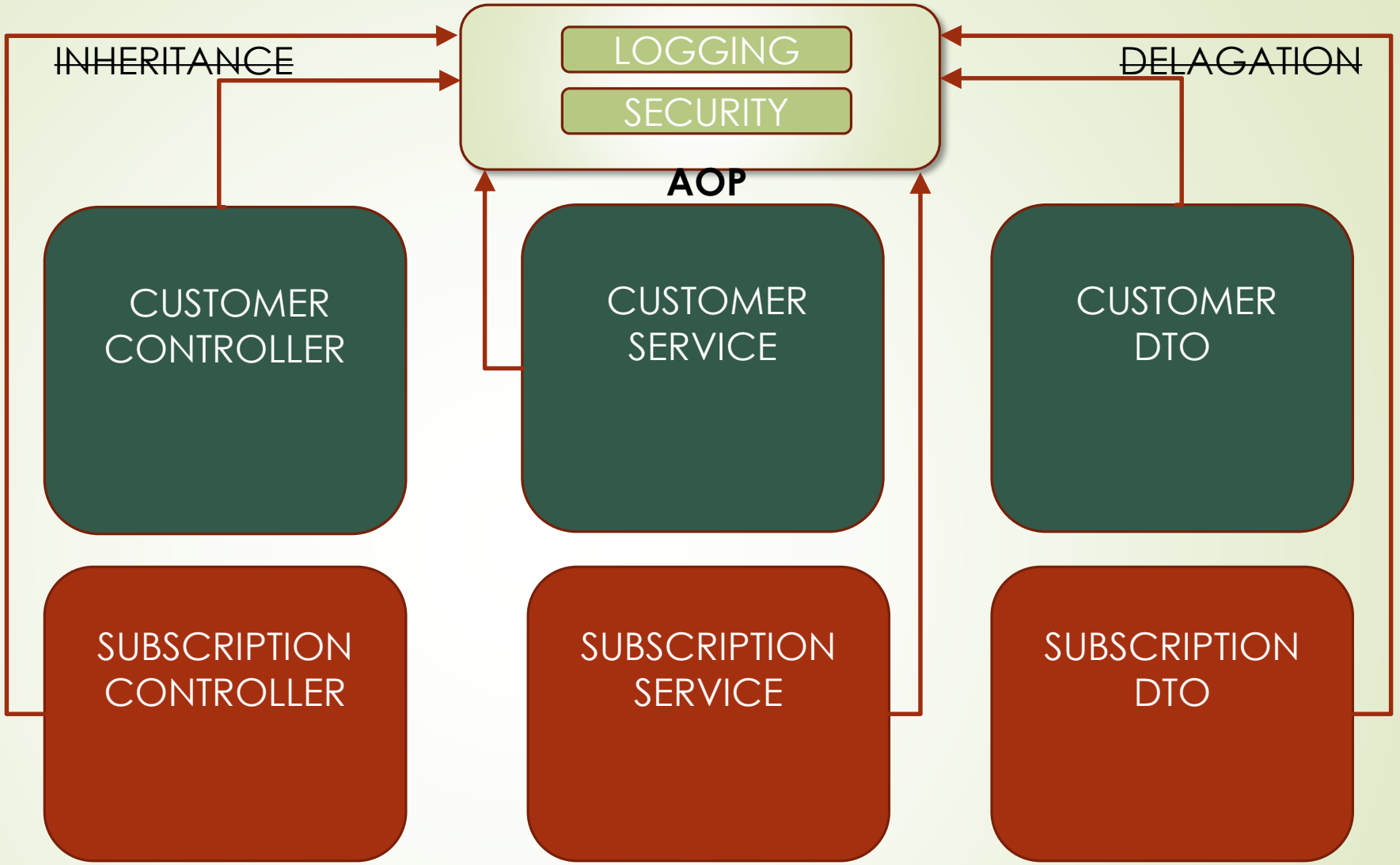
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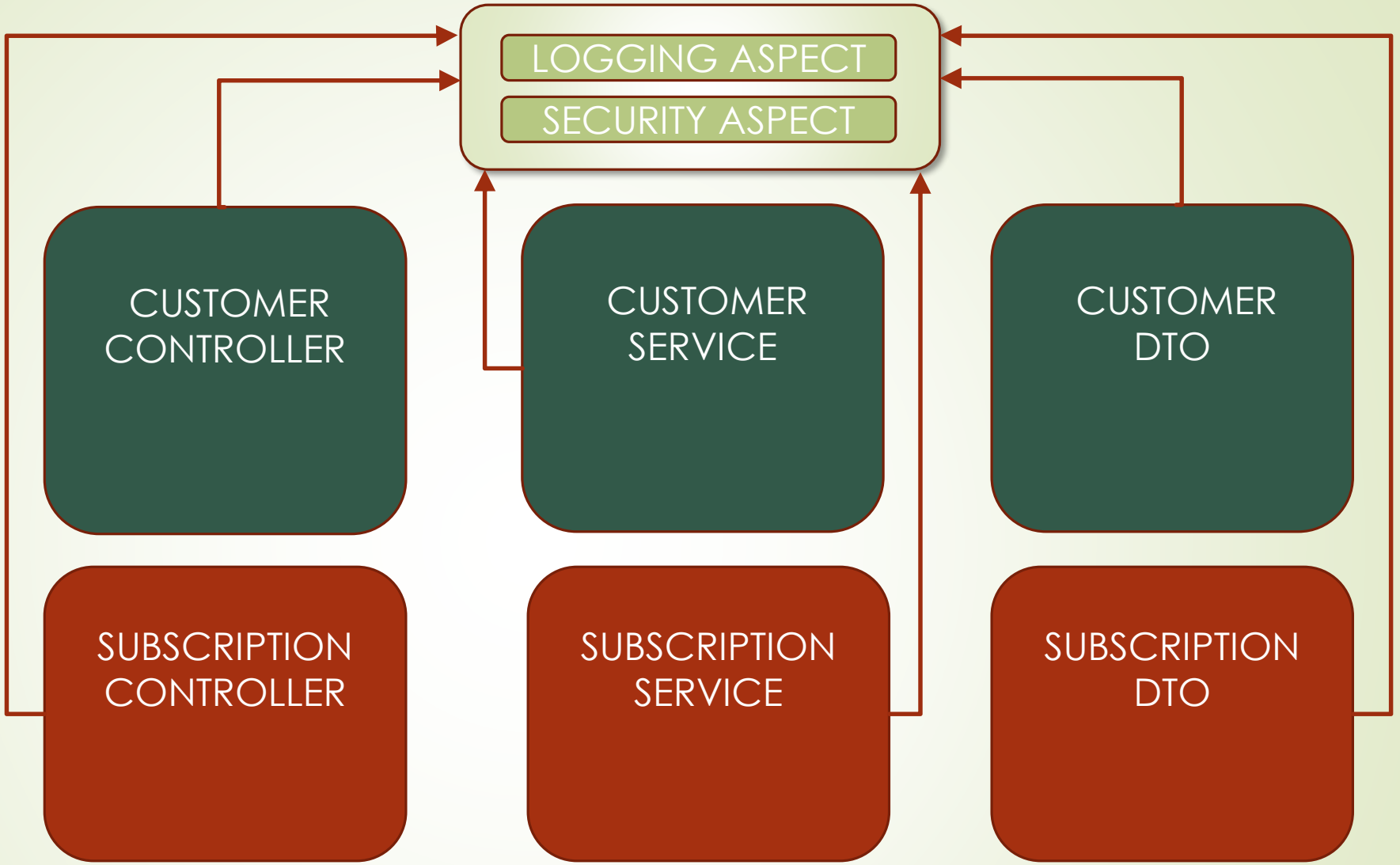
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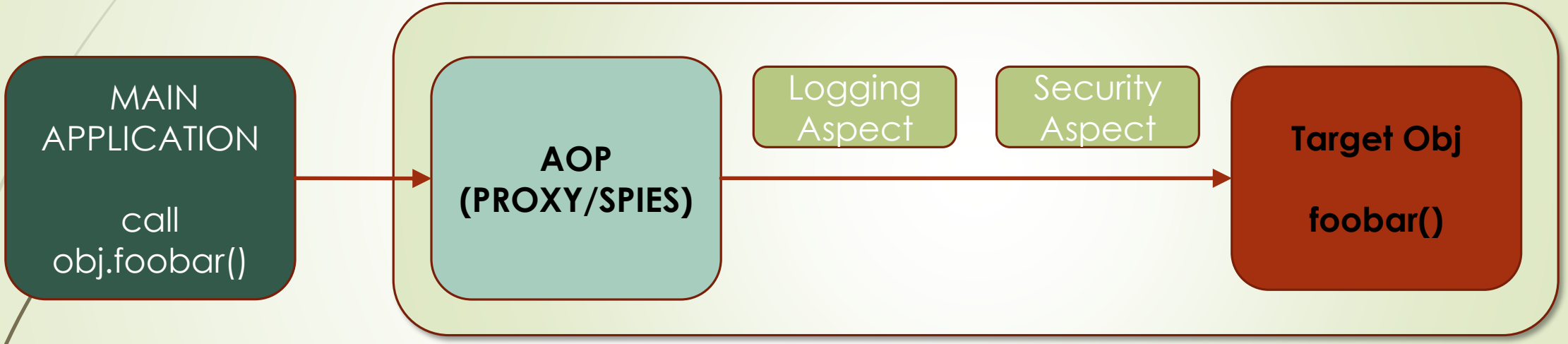
Proxy design pattern



- **Weaving**: connectiong aspects to target objects (compile-time, load-time or run-time).

Aspect Oriented Programming

- Avoids scattered code.
- Makes code easy to reuse or change.
- Based on configurations an ascpect can be selectively applyed to different modules of application.
- Applications: logging, security, audit logging, notifications etc.

- May be hard to follow.
- Performance costs.

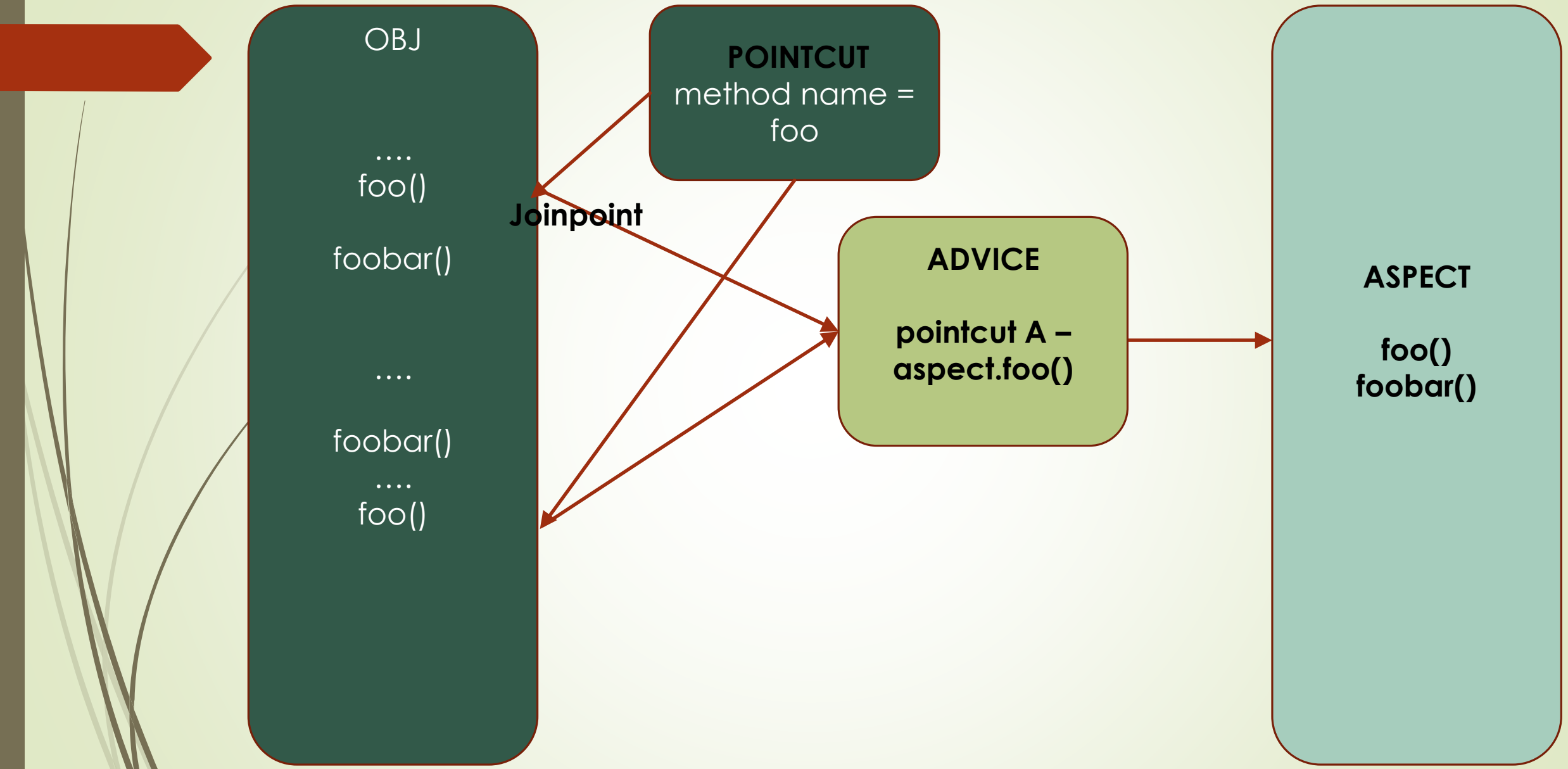
AOP

Aspect Oriented Programming basic terminology

AOP

- **Aspect**: module of code for a cross-cut concern
- **Join point**: a point during the execution of a program
- **Advice**: action taken by an aspect at a particular join point
- **Pointcut**: predicate that matches join points
  example: call a method with a certain name

Advice is associated with a **pointcut expression** and runs at any **join point** matched by the pointcut


OBJ
....
foo()
foobar()
....
foobar()
....
foo()
POINTCUT
method name = foo
Joinpoint
ADVICE
pointcut A – aspect.foo()
ASPECT
foo()
foobar()

Advice types

- **Before**: run the code before the join point
- **After returning**: run the code after a join point completes normally
- **After throwing**: run the code if a method exits by throwing an exception
- **After finally**: run the code after join point exits (normal or by throwing exception)
- **Around advice**: run the code before and after join point

Advice types

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AOP Java frameworks

AspectJ and Spring

AOP Java frameworks

- **Aspect J**:
  - First AOP Java framework
  - Complete support for AOP
  - Faster than Spring
  - More complex than Spring AOP
  - Apply aspects to POJOs

AOP Java frameworks

- **Spring AOP**:
  - Uses AOP for security, transactions etc
  - Uses run-time weaving
  - Only supports method-level join points
  - Apply aspects to beans only

AOP Java frameworks

- **Spring AOP**:
  - Can use @Aspect annotation
  - Uses proxy pattern
  - Light implementation of AspectJ (easy tot use)

AOP Configuration

AOP Configuration Class

- **@EnableAspectJAutoProxy**

```
@Configuration
@EnableAspectJAutoProxy
@ComponentScan(basePackages = "com.apbdoo.lab8")
public class AOPConfig {

}
```

@Before advice

Before/After/Around Advice

- **@Before(poincut expression)**

```
@Aspect
@Component
public class LoggingAspect{
    @Before("execution(public void saveCustomer(..))")
    public void beforeSaveCustomerAdvice
}
```

Pointcut expression method designator

- **execution**
- **withincode** **all statements**
- **call** **all calling statements**

- **execution ([modifiers-pattern] [return-type-pattern] [declaring-type-pattern] method-name-pattern(param-pattern) [throws-pattern])**
- **wildcard ***
- **param-pattern: () (*) (..) (declaring-type-pattern)**

JoinPoint

- **@Before(poincut expression)**

```
@Aspect
@Component
public class LoggingAspect{
    @Before("execution(public void saveCustomer(..))")
    public void beforeSaveCustomerAdvice( JoinPoint joinPoint )
}
```

JoinPoint

- **getSignature**
- **getArgs**

- **execution ([modifiers-pattern] [return-type-pattern] [declaring-type-pattern] method-name-pattern(param-pattern) [throws-pattern])**
- **wildcard ***
- **param-pattern: () (*) (..) (declaring-type-pattern)**

Bibliografie

- https://docs.spring.io/spring/docs/2.5.x/reference/aop.html
- https://www.baeldung.com/spring-aop