CSE 3421

Design Pattern

MD. RAFI-UR-RASHID

LECTURER, DEPT. OF CSE, UIU

Structural Patterns

- How objects / classes can be combined

- Seven structural patterns
  - **Adapter**
  - Bridge
  - Composite
  - **Decorator**
  - Façade
  - Flyweight
  - Proxy

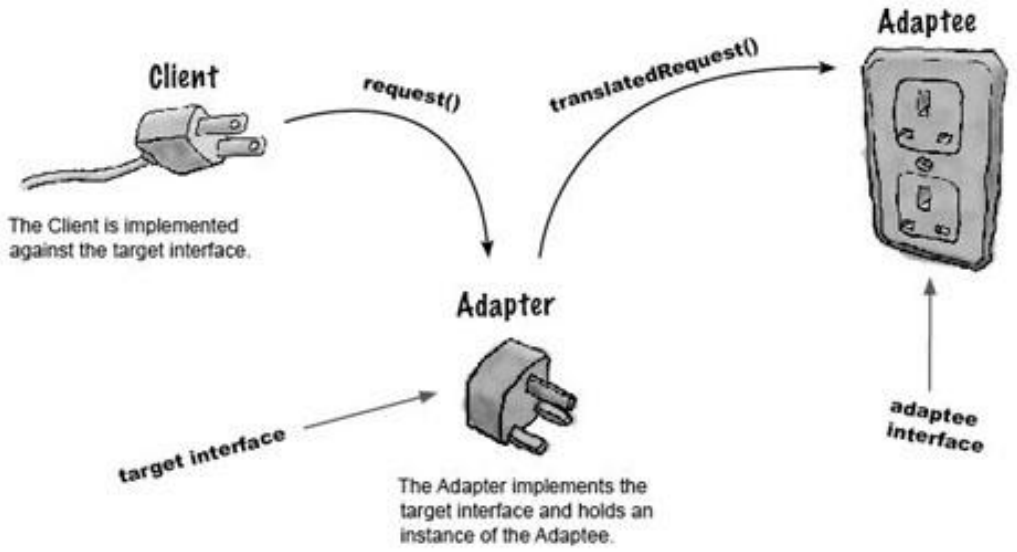
Adapter Pattern

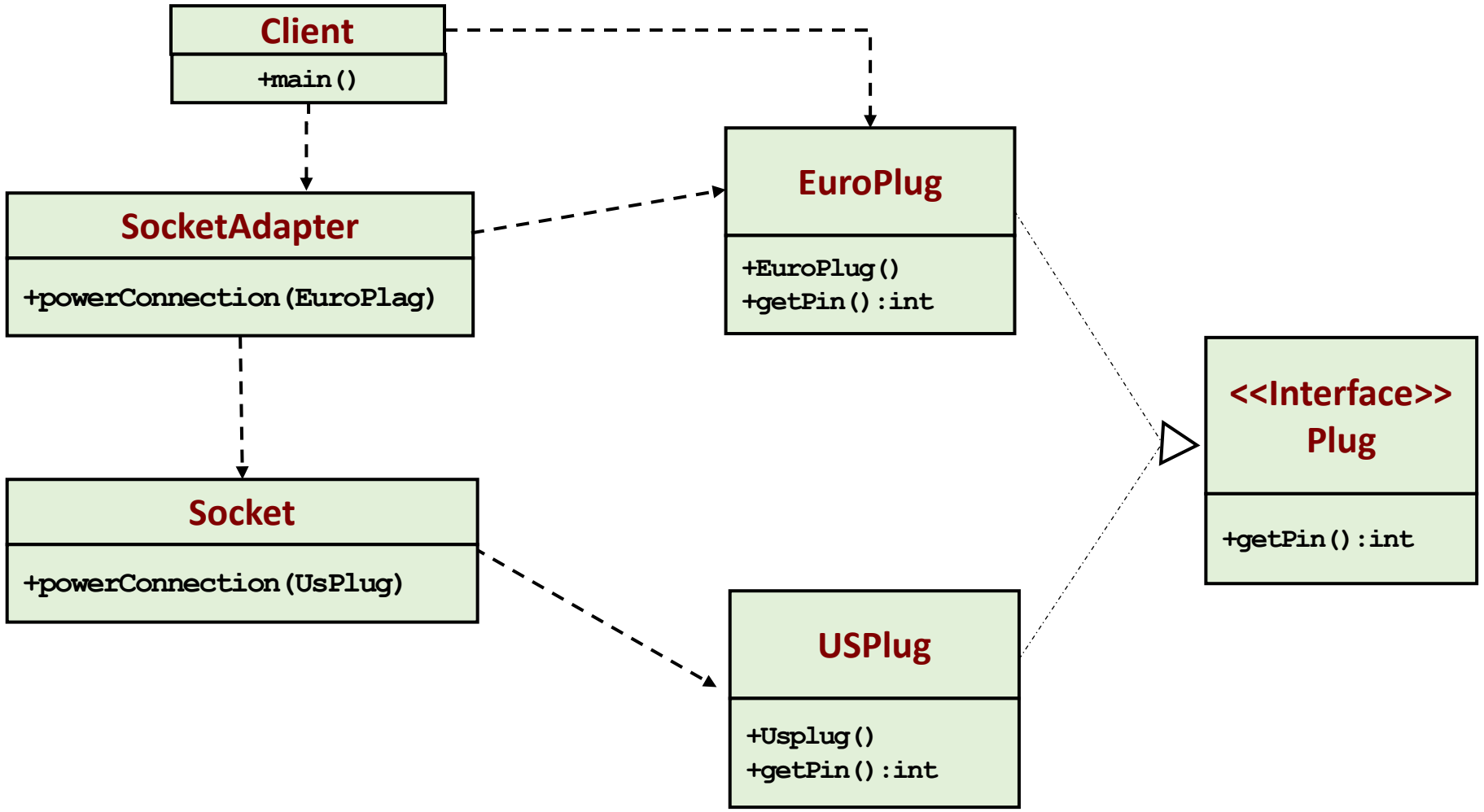
Motivation: Adapter

Adapter Method

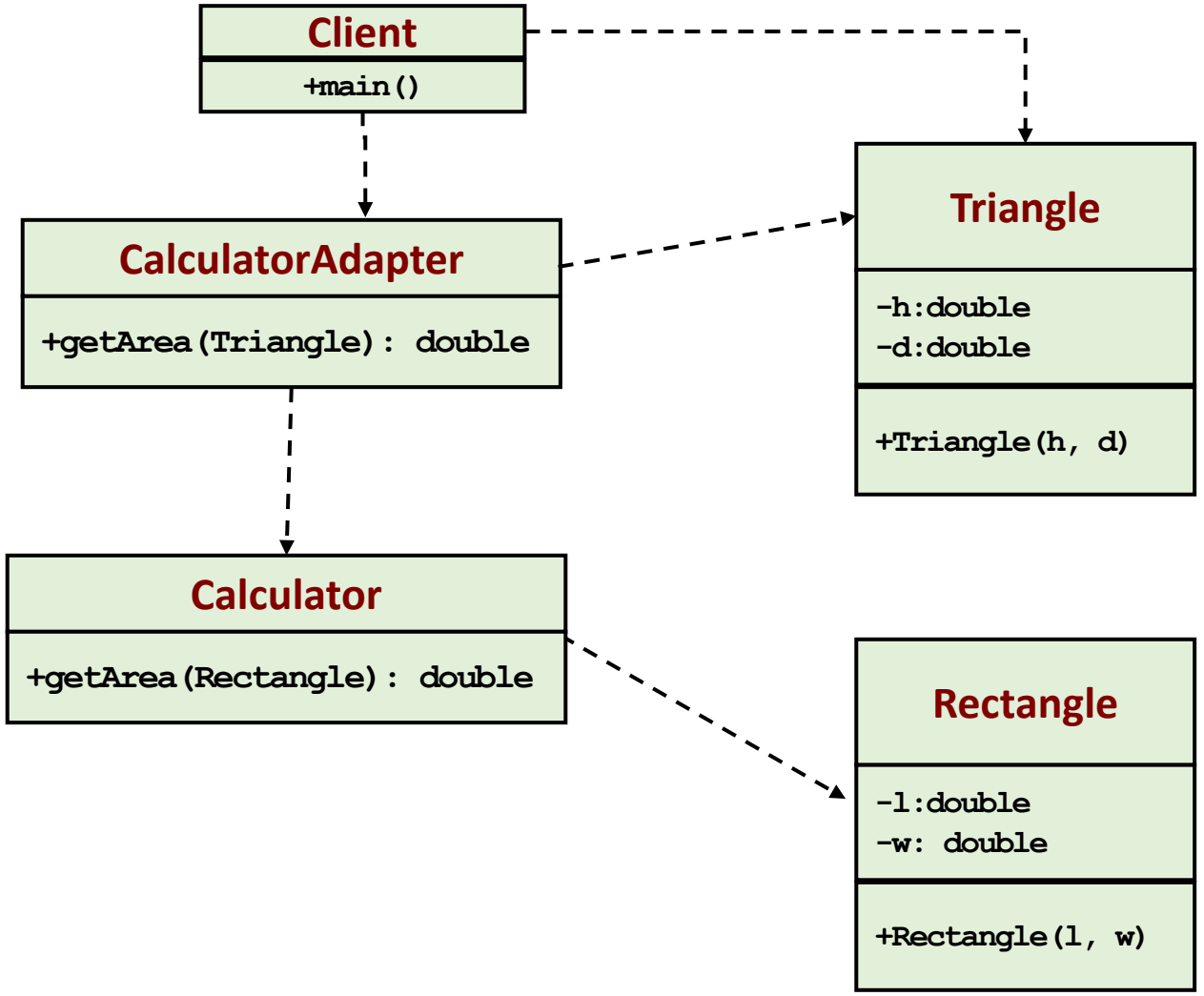
- Help communication between two **incompatible** classes/ interfaces
- An **Adapter class** takes responsibility of resolving such incompatibilities
- Clients are unaware of the complexity of the incompatibility issues
- Allows pre-existing classes to be used in your code.

Example: Plug




Client
+main()
SocketAdapter
+powerConnection(EuroPlag)
EuroPlug
+EuroPlug()
+getPin():int
<<Interface>>
Plug
+getPin():int
Socket
+powerConnection(UsPlug)
USPlug
+Usplug()
+getPin():int

Example: Calculator



Practice Problems

Draw UML diagram for following scenarios using appropriate design patterns:

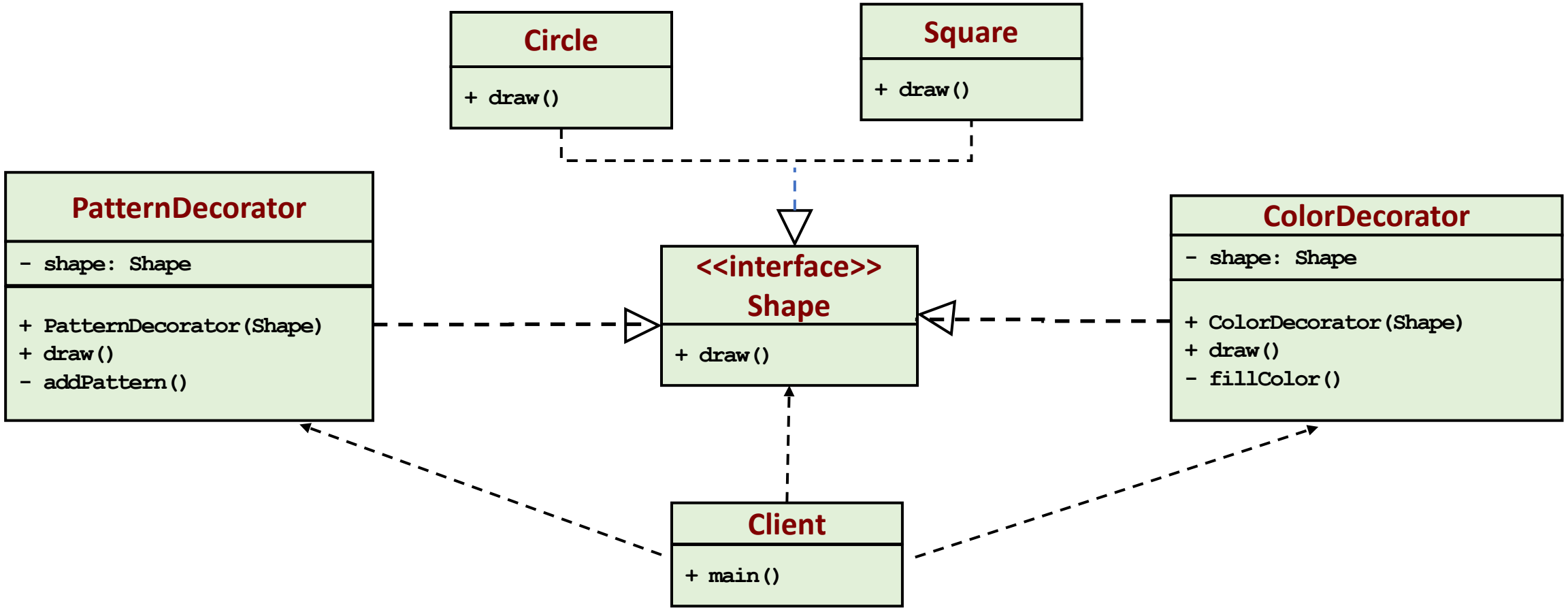
- In our system there is a video player which can play mp4, 3gp and vlc files. But client wants to play some audio files (e.g. mp3. wav) using our system.

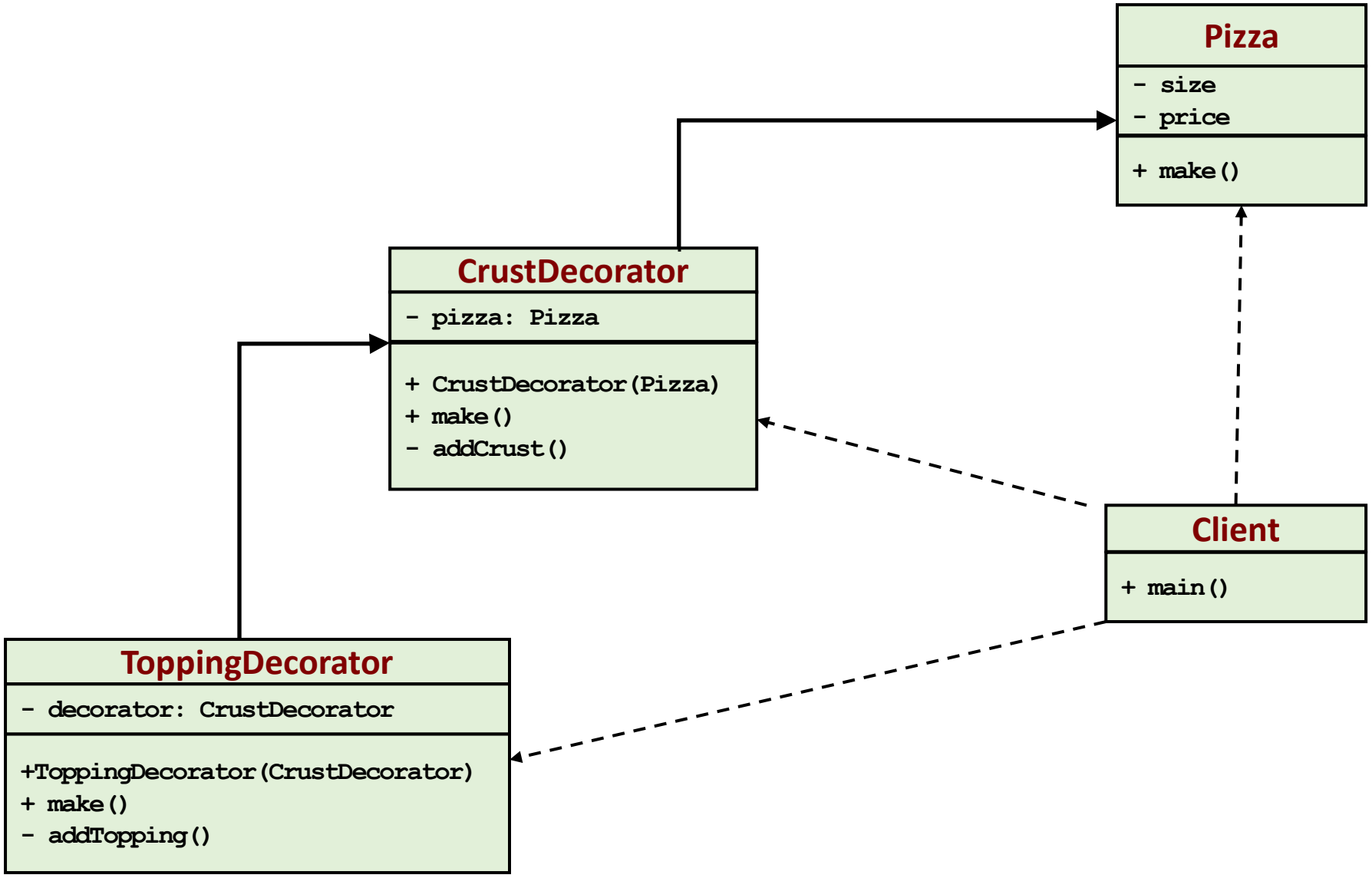
- In our system there is a function which sorts an input array in ascending order. But client wants to find the second largest number using our system.

Decorator Pattern

Decorator Method

- We **cannot modify** existing functionalities but we can **extend** them.
- In other words, this pattern is open for extension but closed for modification
- Client-specified embellishment of a core object by recursively wrapping it. Like-wrapping a gift, putting it in a box, and wrapping the box.
- Pay as you go approach


Circle
+ draw()
Square
+ draw()
PatternDecorator
- shape: Shape
+ PatternDecorator(Shape)
+ draw()
- addPattern()
<<interface>>
Shape
+ draw()
ColorDecorator
- shape: Shape
+ ColorDecorator(Shape)
+ draw()
- fillColor()
Client
+ main()


Pizza
- size
- price
+ make()
CrustDecorator
- pizza: Pizza
+ CrustDecorator(Pizza)
+ make()
- addCrust()
Client
+ main()
ToppingDecorator
- decorator: CrustDecorator
+ToppingDecorator(CrustDecorator)
+ make()
- addTopping()

Practice Problems

Draw UML diagram for following scenarios using appropriate design patterns:

- Think of the power-point software. You can make a very basic presentation. Then you can add different features like annotations, transitions, animations etc.

- Think of a website builder (e.g. WordPress). You can start with a very basic template. Then you can gradually add fonts, colors and widgets.

Thank You