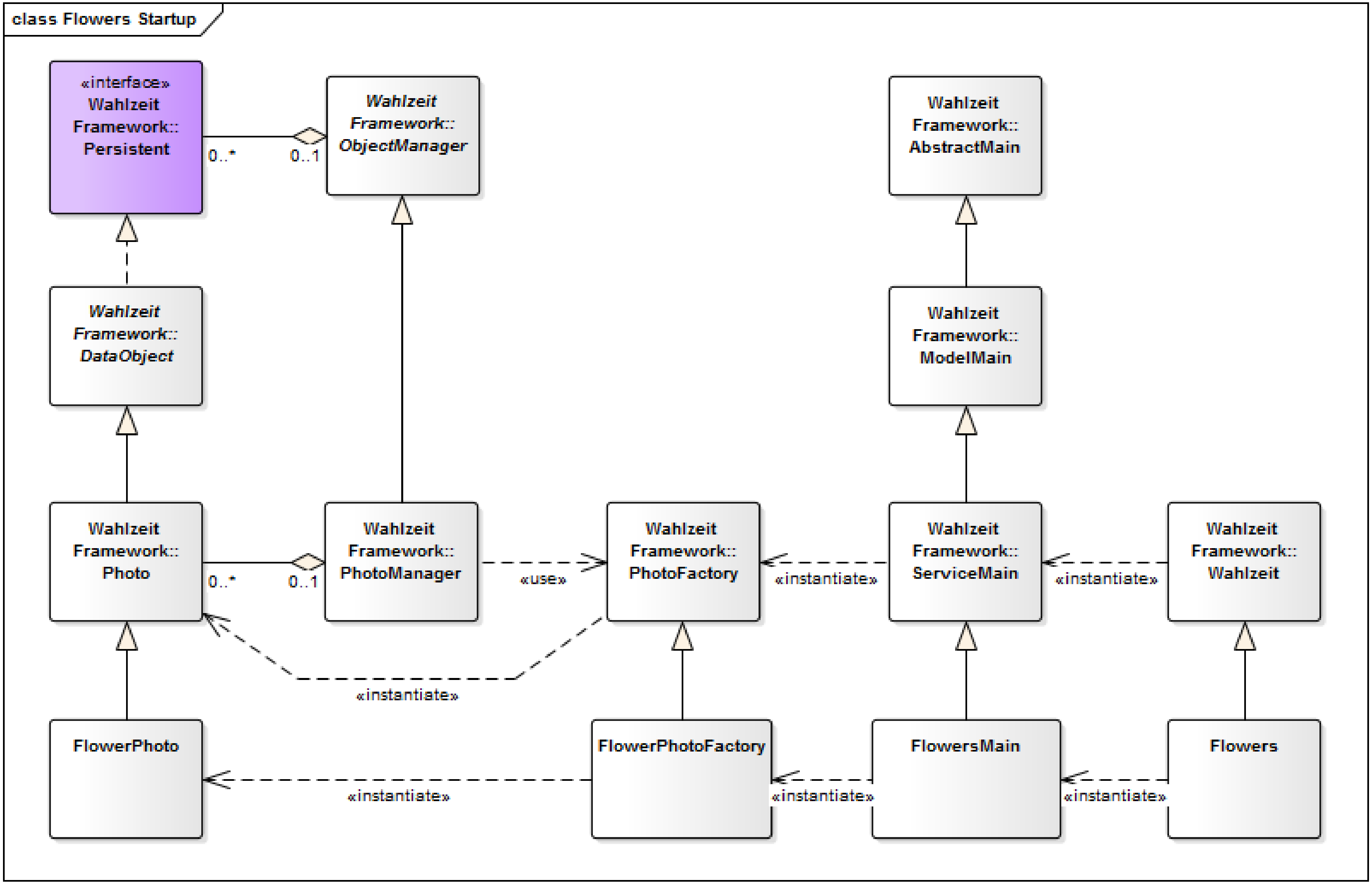
Object Oriented Frameworks (in Work)

Prof. Dr. Dirk Riehle

Friedrich-Alexander University Erlangen-Nürnberg

ADAP C12

Wahlzeit Start-up


class Flowers Startup
«interface» Wahlzeit Framework:: Persistent
Wahlzeit Framework:: ObjectManager
0..*
0..1
Wahlzeit Framework:: AbstractMain
Wahlzeit Framework:: DataObject
Wahlzeit Framework:: ModelMain
Wahlzeit Framework:: Photo
0..*
0..1
Wahlzeit Framework:: PhotoManager
«use»
Wahlzeit Framework:: PhotoFactory
«instantiate»
Wahlzeit Framework:: ServiceMain
«instantiate»
Wahlzeit Framework:: Wahlzeit
«instantiate»
FlowerPhoto
FlowerPhotoFactory
FlowersMain
Flowers
«instantiate»
«instantiate»
«instantiate»

Topics

1. Definition
2. Interfaces
3. Packaging
4. Layering

Object-Oriented Framework

- Definition of object-oriented framework
  - Is an abstract object-oriented design that can be reused
  - Has default implementation classes that can be used
  - Typically covers one particular technical domain
- White-box framework
  - An object-oriented framework mostly used by implementing subclasses
  - Requires user to understand internal workings of framework
  - Typically form of a framework in its early stages
- Black-box framework
  - An object-oriented framework mostly used by composing instances
  - Easier to use by less flexible than white-box framework
  - Typically form of a framework in its mature stages

Frameworks vs. Libraries (Toolkits)

- Frameworks
  - Reuse of abstract design
    - Inheritance and delegation
      - Inheritance interface
    - High cohesion of classes
    - More difficult to use than library
  - Examples
    - Java Object framework
    - Wahlzeit domain model

- Libraries
  - No reuse of abstract design
    - No or little use of inheritance
      - Only use-relationship
    - Loose class relationships
    - Easier to use than framework
  - Examples
    - Java utility classes
    - Wahlzeit utility classes

Framework Interfaces

1. Use-client interface
2. Inheritance interface
3. Meta-object Protocol

Use-Client Interface

- The use-client interface is the traditional interface
  - Invoked using method calls by client objects on framework objects

- Best practices of defining use-client interfaces
  - An abstract object-oriented design that reflects the domain
    - Using interfaces, abstract classes, and implementation classes
    - Using collaborations spelling out roles and their responsibilities
    - Using exceptions properly to document behavior in case of failure

  - With clear idea of types of objects, for example, value objects
  - With clear idea of patterns employed to structure the design

Inheritance Interface

- The inheritance interface uses polymorphism
  - Subclasses extend the design while conforming to it
  - Leads to inverted control-flow, a.k.a. “Hollywood principle”

- Best practices of defining inheritance interfaces
  - An abstract object-oriented design that reflects the domain
    - Using the abstract superclass rule
    - Using the narrow inheritance interface principle

  - With clear idea of patterns employed to structure the interface, e.g.
    - Primitive and composed methods
    - Factory method, template, method, etc.
      -

  - Document extension points

Meta-object Protocol (Java Annotations)

Framework Packaging

- Frameworks **have** a design but **are** code components
- Package a framework as a code component
  - Group by object collaborations, not class inheritance
  - Utilize language-specific packaging mechanism
- If necessary, separate functional packages
  - Interface, implementation, and testing packages

Framework Layering

- Frameworks use and extend other frameworks
  - Use = utilizing use-client interfaces
  - Extend = utilizing inheritance interfaces
- Use needs to be prepared for, foreseen by designers
  - Utilizing the two general types of interfaces
  - Using specific mechanisms like role objects
- Code layers in an application reflect framework layers

Thanks! Questions?

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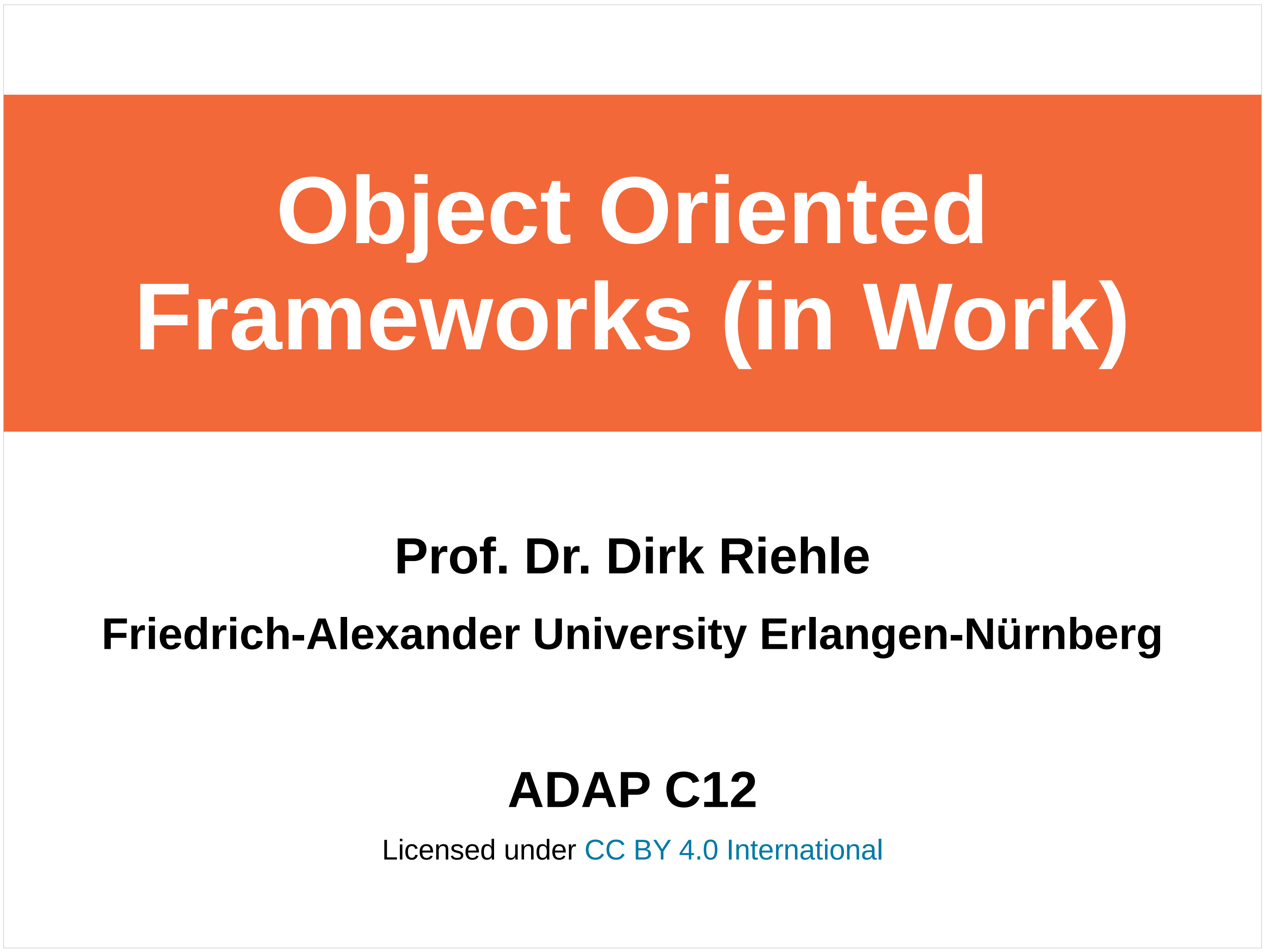

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It is Friedrich-Alexander University Erlangen-Nürnberg – FAU, in short.

Corporate identity wants us to say “Friedrich-Alexander University”.

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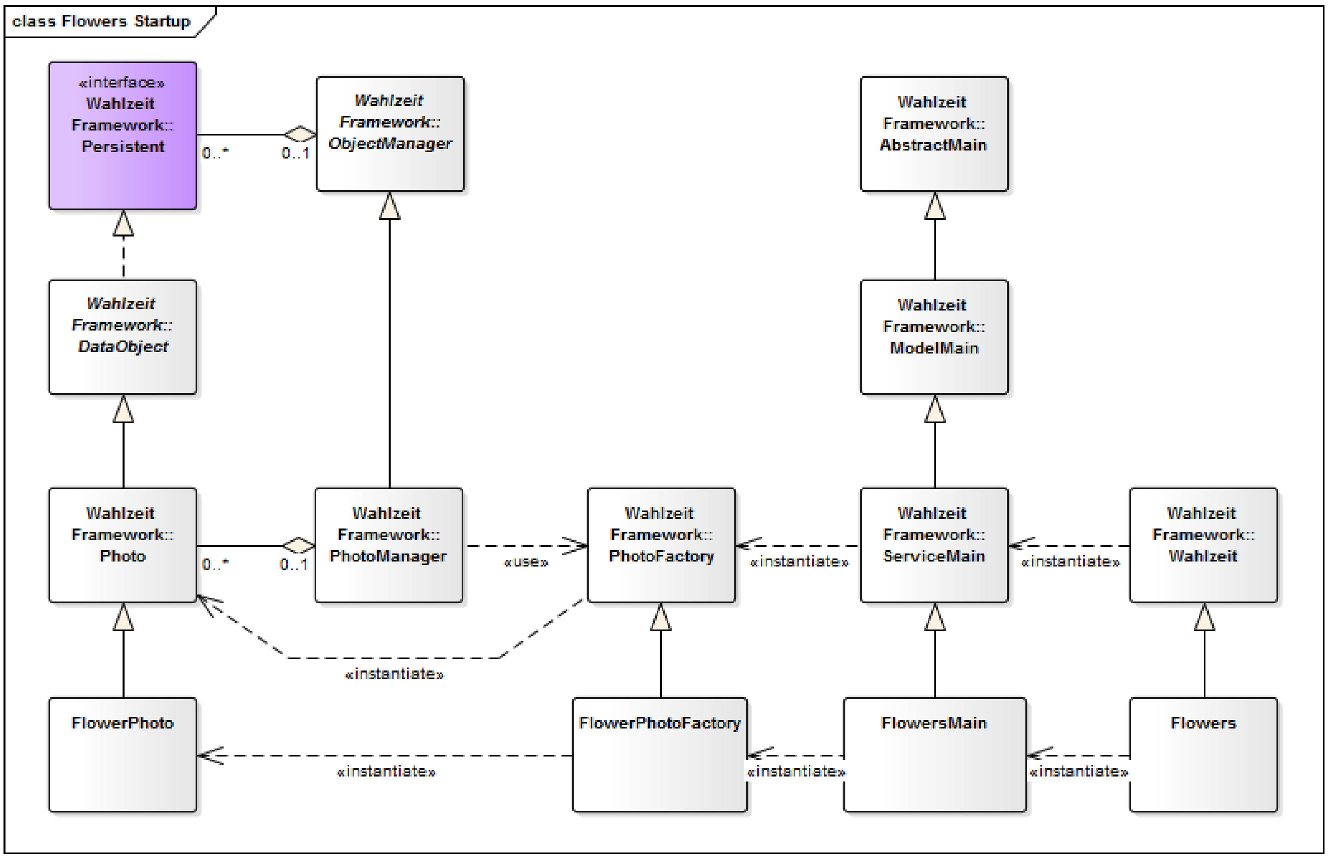
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