

Layered Architectures: the Layers

Architecture Pattern

Douglas C. Schmidt

d.schmidt@vanderbilt.edu

www.dre.vanderbilt.edu/~schmidt

Professor of Computer Science

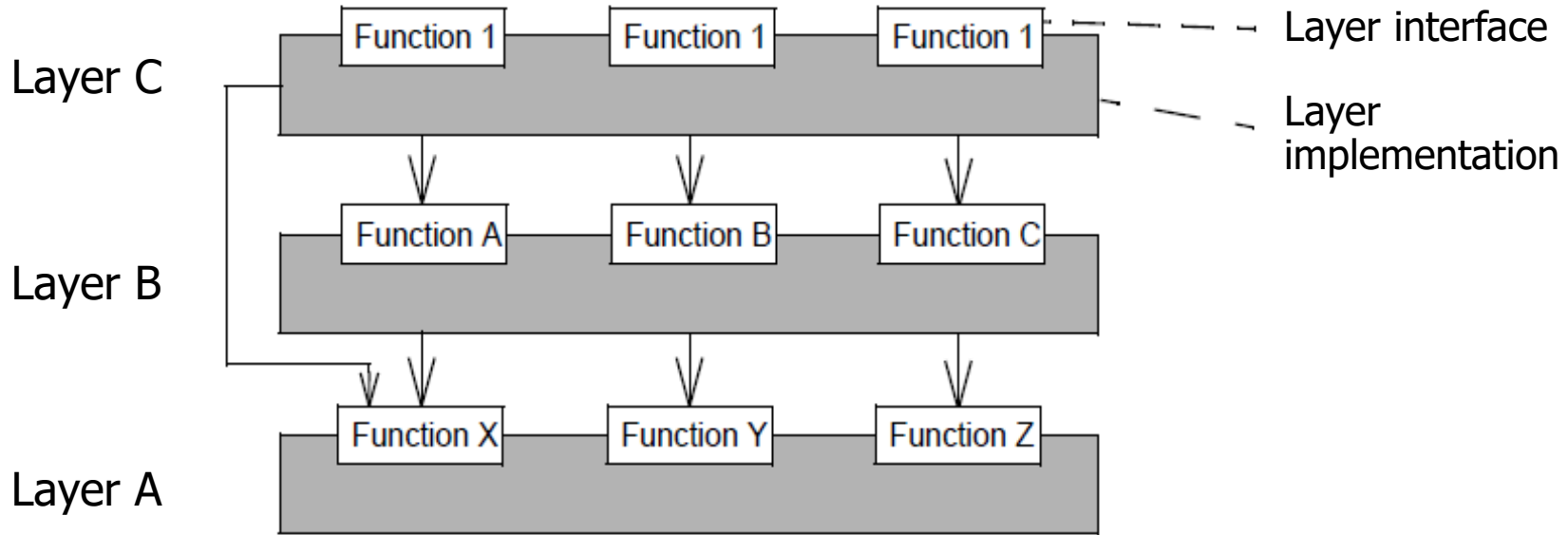
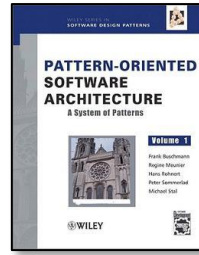
**Institute for Software Integrated
Systems**

**Vanderbilt University
Nashville, Tennessee, USA**



Learning Objectives in this Part of the Lesson

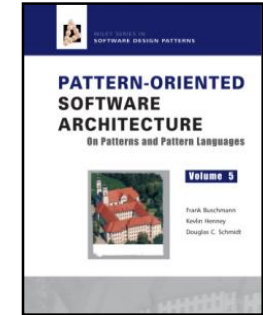
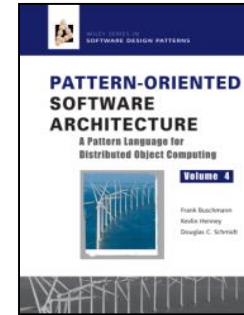
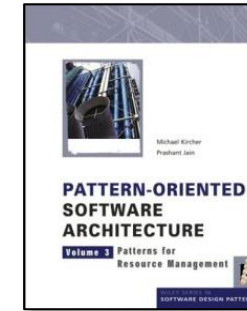
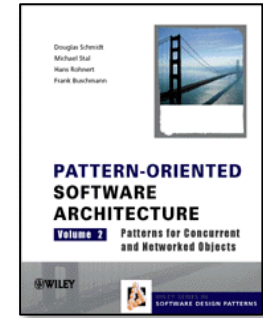
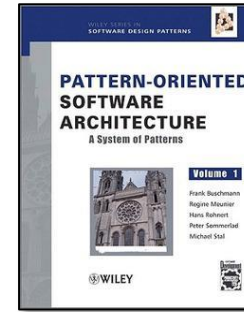
- Know what layered architectures are
- Understand the *Layers* architectural pattern



Overview of the Layers Architectural Pattern

An Overview of the Layers Architectural Pattern

- The concept of layering has been expressed as an *architectural pattern*



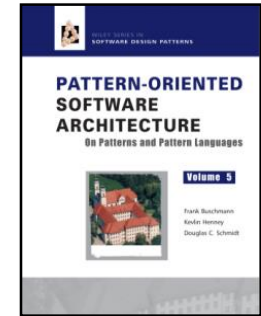
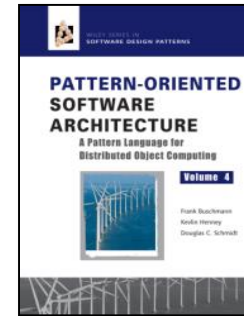
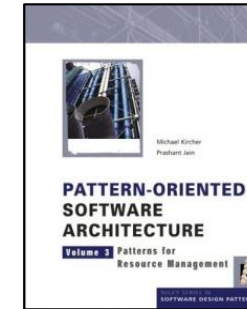
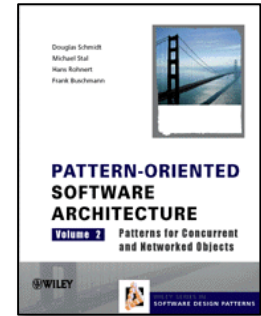
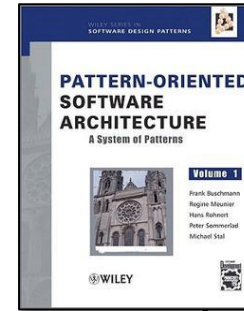
See www.dre.vanderbilt.edu/~schmidt/POSA

An Overview of the Layers Architectural Pattern

- The concept of layering has been expressed as an *architectural pattern*

"a structural organization schema for software systems that

- provides a set of predefined subsystems*
- specifies their responsibilities &*
- includes rules & guidelines for organizing the relationships between these roles"*



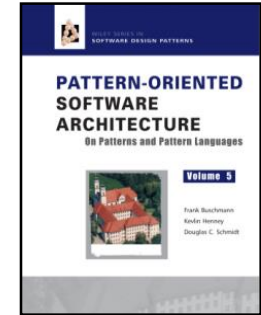
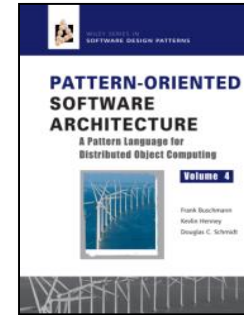
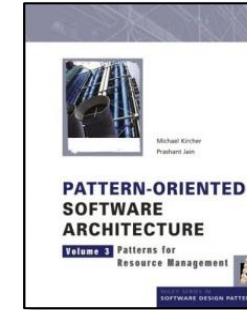
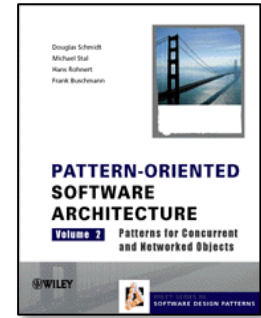
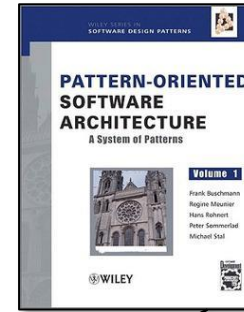
See en.wikipedia.org/wiki/Architectural_pattern

An Overview of the Layers Architectural Pattern

- The concept of layering has been expressed as an *architectural pattern*

"a structural organization schema for software systems that

- provides a set of predefined subsystems*
- specifies their responsibilities &*
- includes rules & guidelines for organizing the relationships between these roles*"



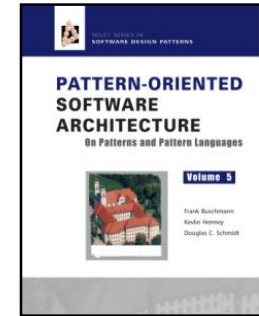
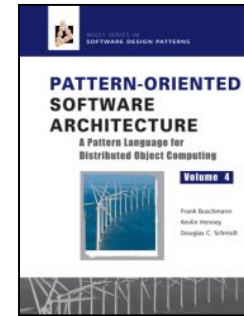
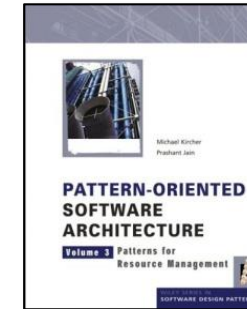
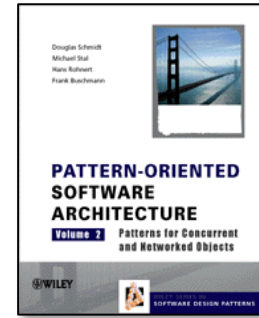
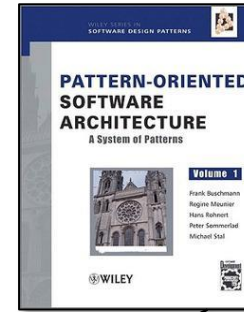
See en.wikipedia.org/wiki/Architectural_pattern

An Overview of the Layers Architectural Pattern

- The concept of layering has been expressed as an *architectural pattern*

"a structural organization schema for software systems that

- provides a set of predefined subsystems*
- specifies their responsibilities &*
- includes rules & guidelines for organizing the relationships between these roles"*



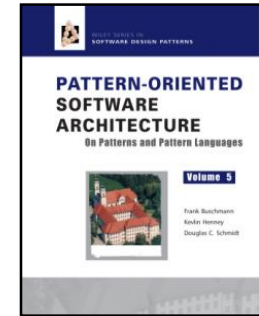
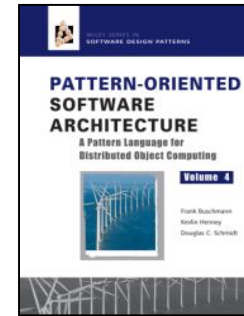
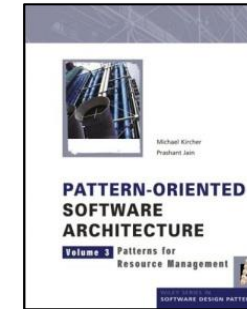
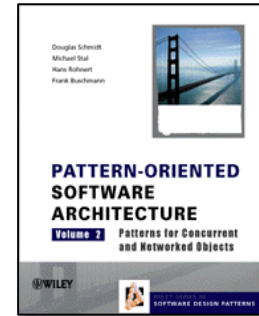
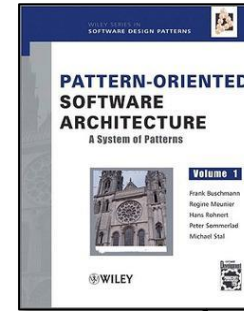
See en.wikipedia.org/wiki/Architectural_pattern

An Overview of the Layers Architectural Pattern

- The concept of layering has been expressed as an *architectural pattern*

"a structural organization schema for software systems that

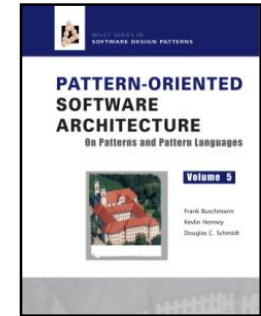
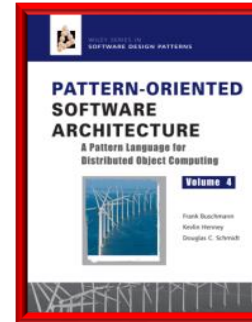
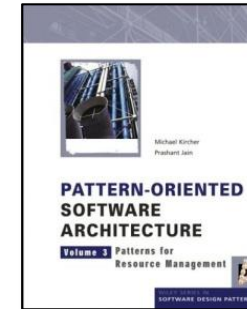
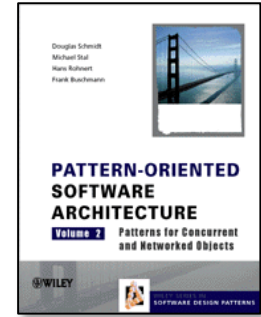
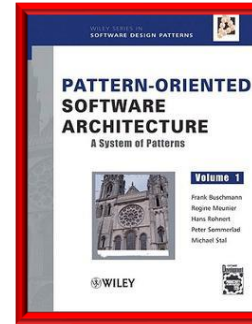
- provides a set of predefined subsystems*
- specifies their responsibilities &*
- includes rules & guidelines for organizing the relationships between these roles"*



See en.wikipedia.org/wiki/Architectural_pattern

An Overview of the Layers Architectural Pattern

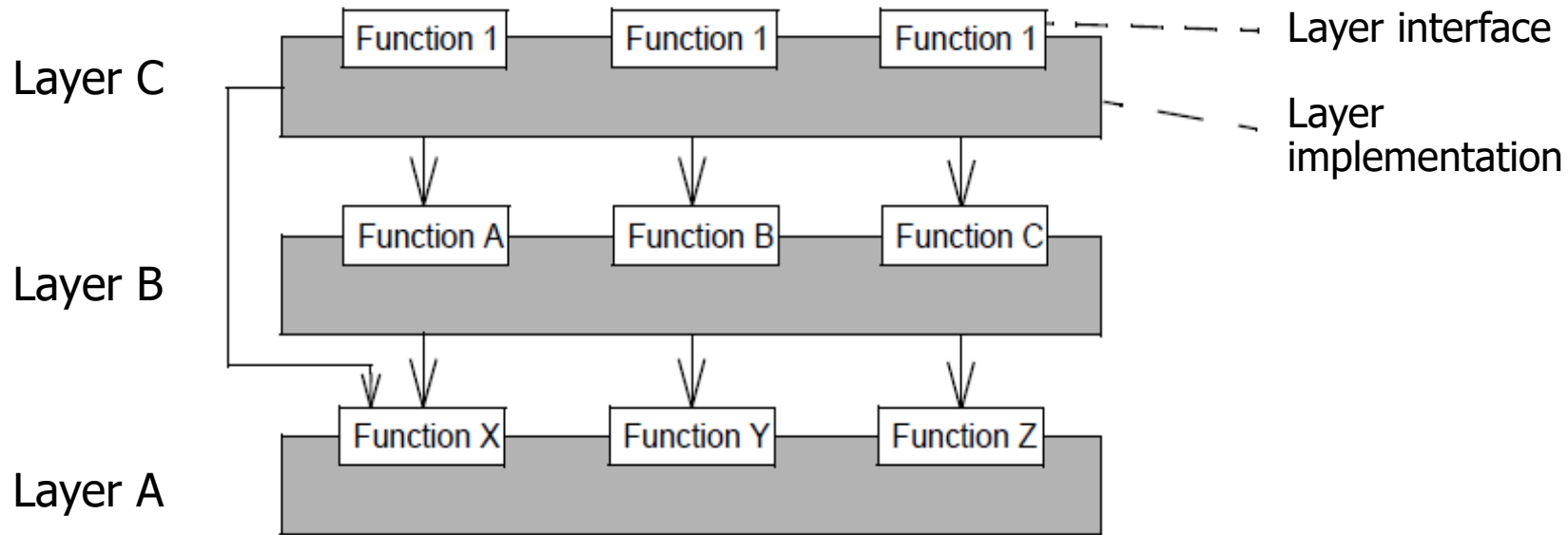
- The *Layers* architectural pattern has been described in various publications



See en.wikipedia.org/wiki/Multilayered_architecture

An Overview of the Layers Architectural Pattern

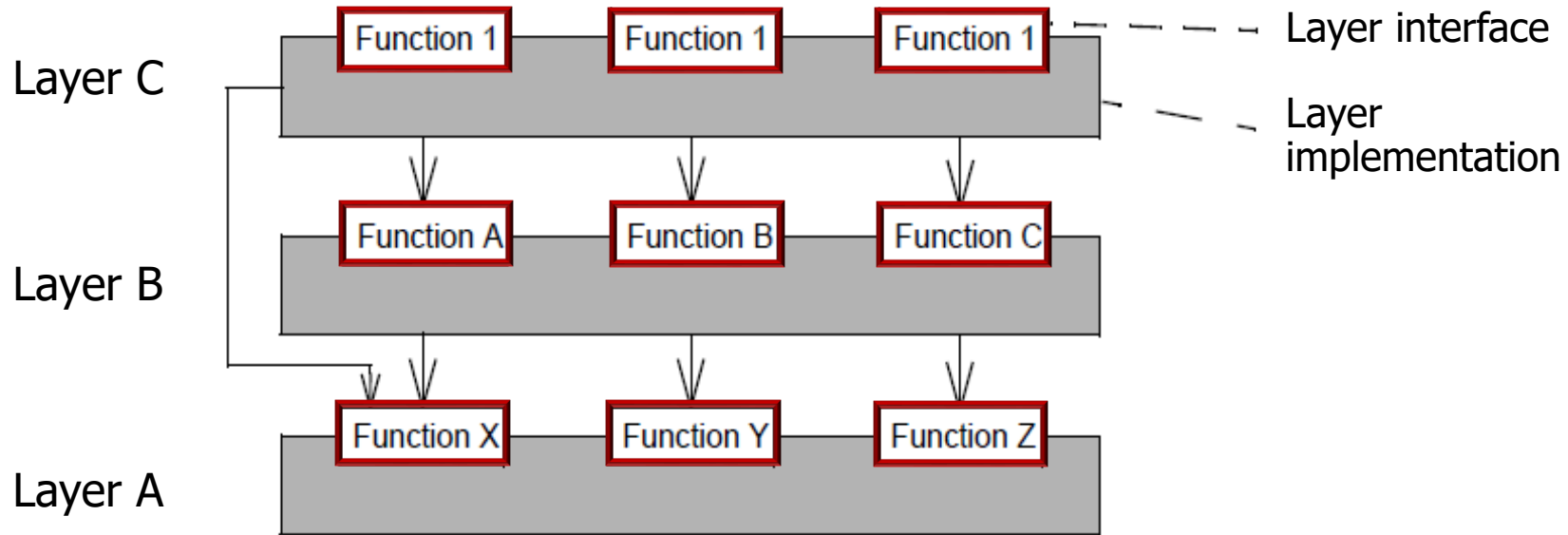
- The *Layers* pattern structures software apps & infrastructure in several ways



See posa1.blogspot.com/2008/05/layered-architecture-pattern.html

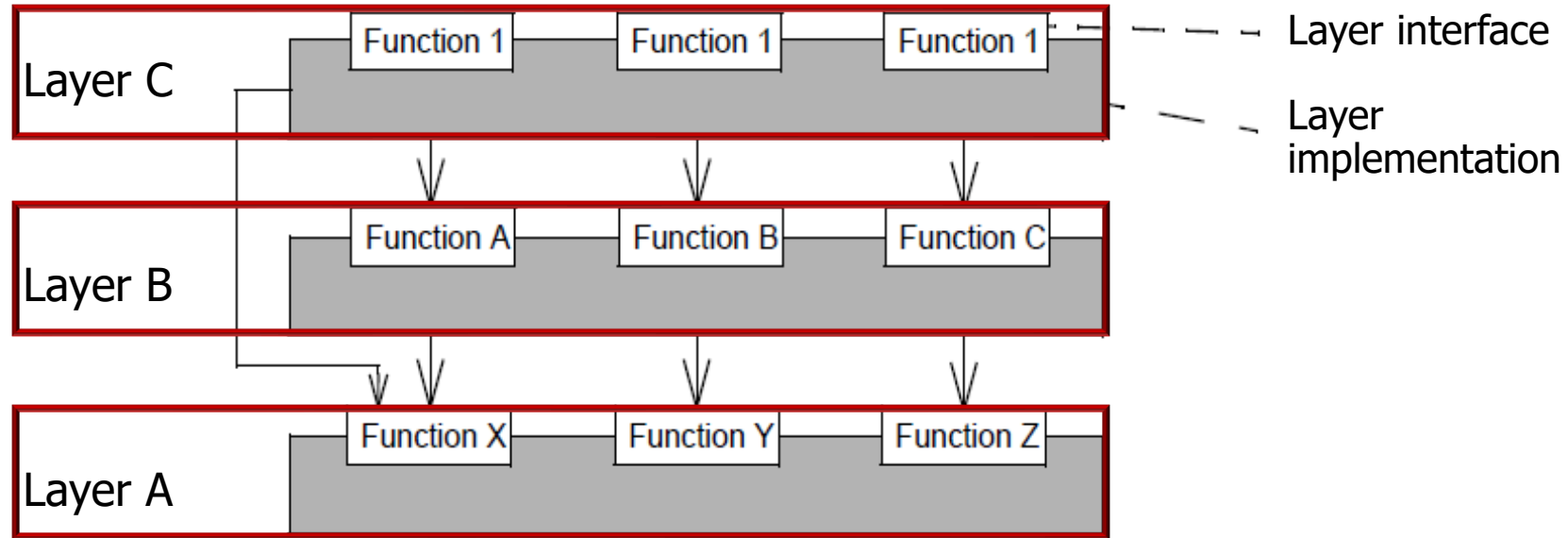
An Overview of the Layers Architectural Pattern

- The *Layers* pattern structures software apps & infrastructure in several ways
 - Partitions an overall system architecture into groups of subtasks



An Overview of the Layers Architectural Pattern

- The *Layers* pattern structures software apps & infrastructure in several ways
 - a. Partitions an overall system architecture into groups of subtasks
 - b. Decomposes groups of subtasks into levels of abstraction



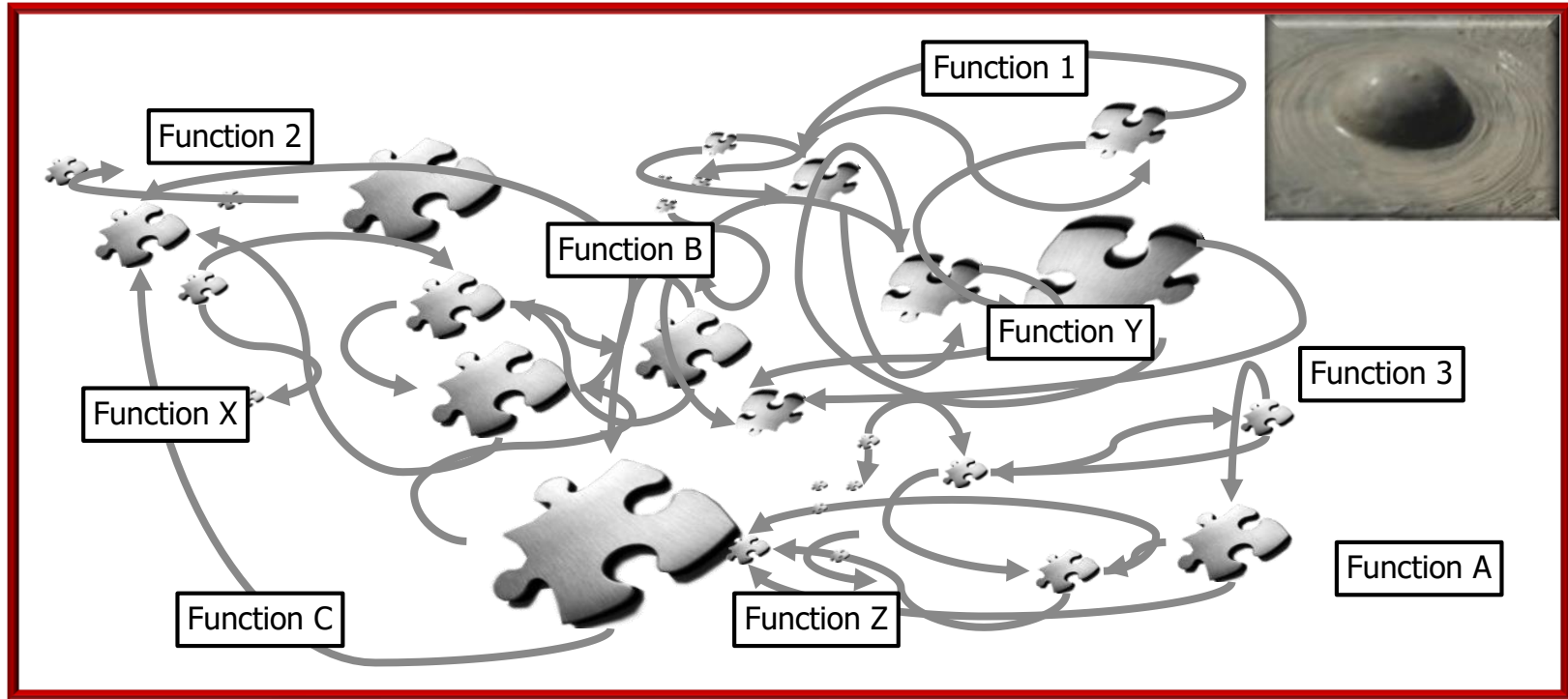
An Overview of the Layers Architectural Pattern

- The *Layers* pattern helps to simplify software development & evolution



An Overview of the Layers Architectural Pattern

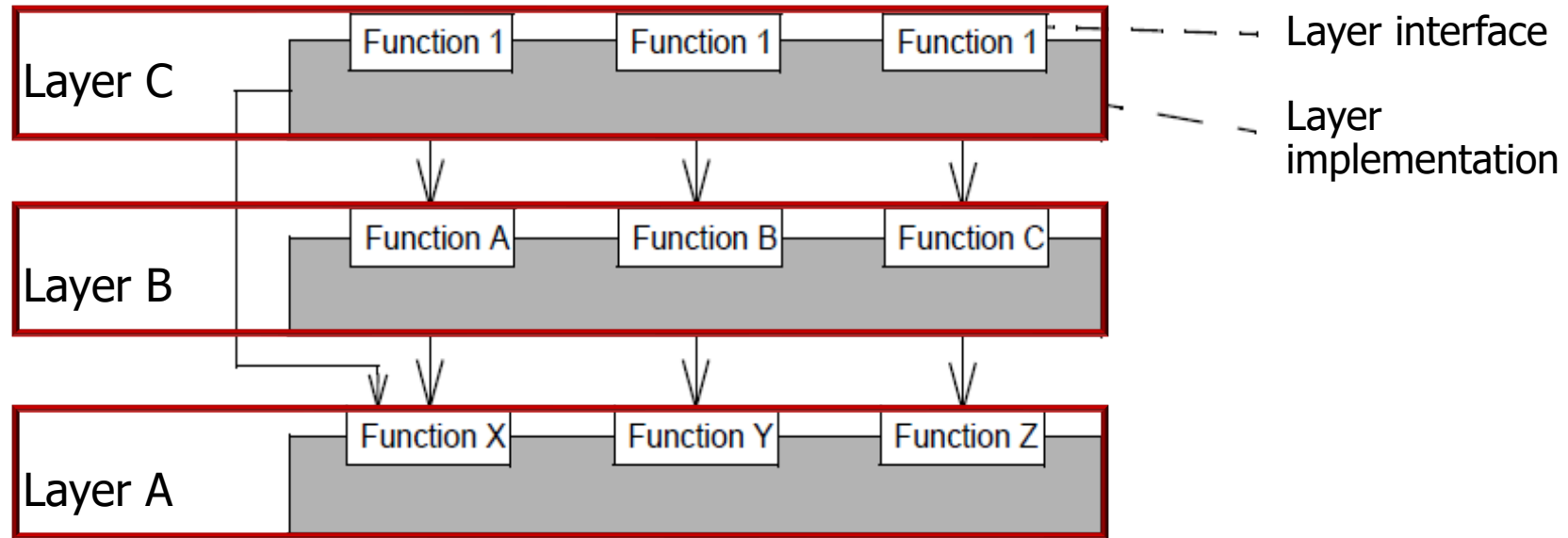
- The *Layers* pattern helps to simplify software development & evolution
 - e.g., it replaces tightly coupled “big balls of mud”...



See en.wikipedia.org/wiki/Big_ball_of_mud

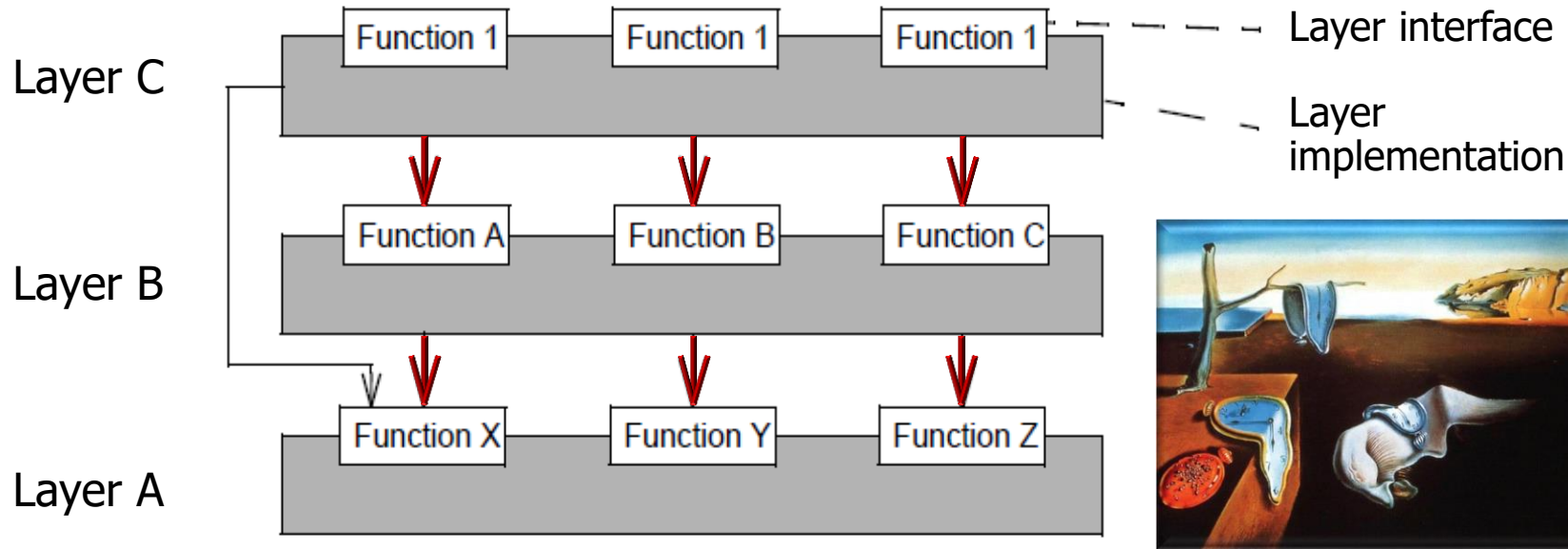
An Overview of the Layers Architectural Pattern

- The *Layers* pattern helps to simplify software development & evolution
 - e.g., it replaces tightly coupled “big balls of mud”... with modular solutions that can be extended & contracted more easily



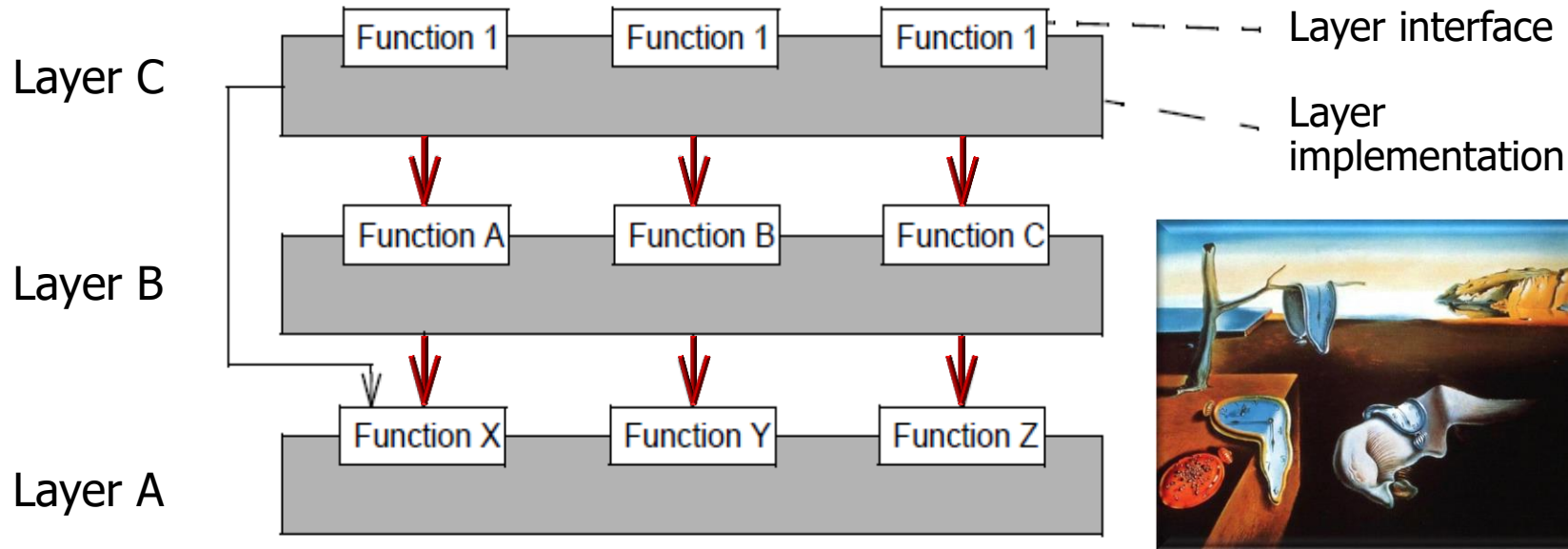
An Overview of the Layers Architectural Pattern

- Be careful when implementing a layered architecture to avoid unnecessary overhead when exchanging data between the layers



An Overview of the Layers Architectural Pattern

- Be careful when implementing a layered architecture to avoid unnecessary overhead when exchanging data between the layers
 - e.g., minimize context switching, synchronization, & data copying overhead



End of Layered Architectures: The Layers Architecture Pattern