

Interface Designs and Implementation Approaches


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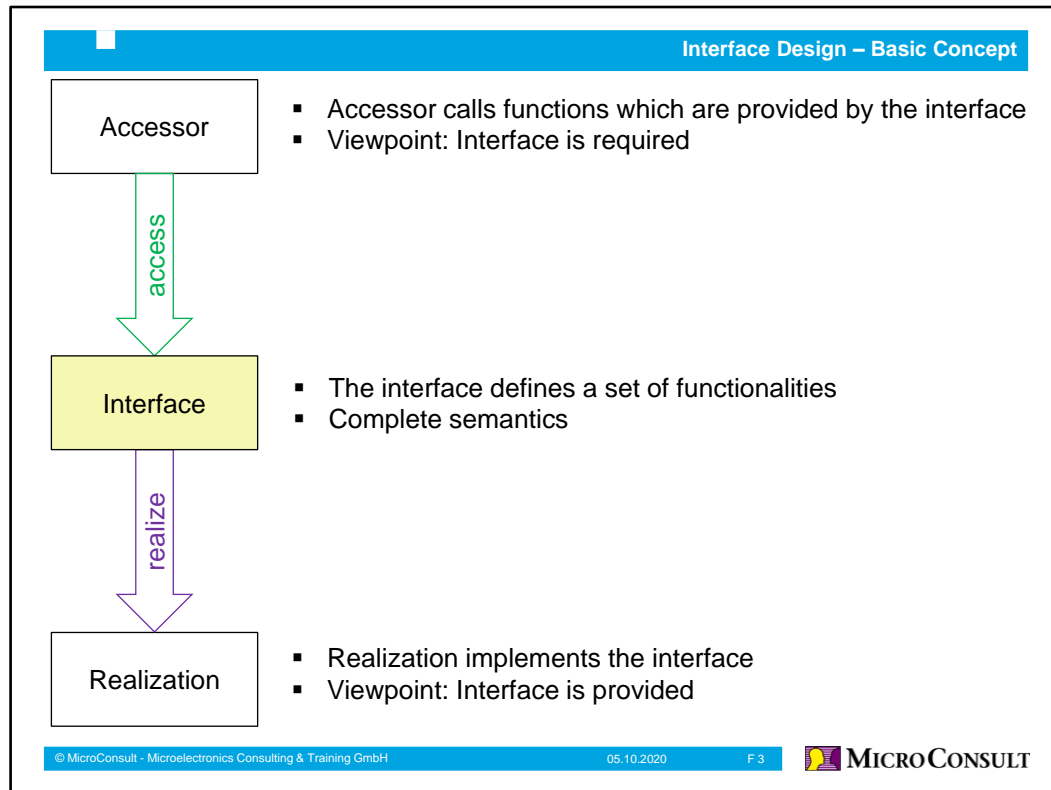
1 Content

Content
▪ Interface Concept Introduction
▪ Interface Design: Single, Multiple, Different Levels
▪ Interface Design: Different Types
▪ Interface Design: Function Semantics
▪ Interface Implementation: Example and Approaches
▪ Summary and Outlook

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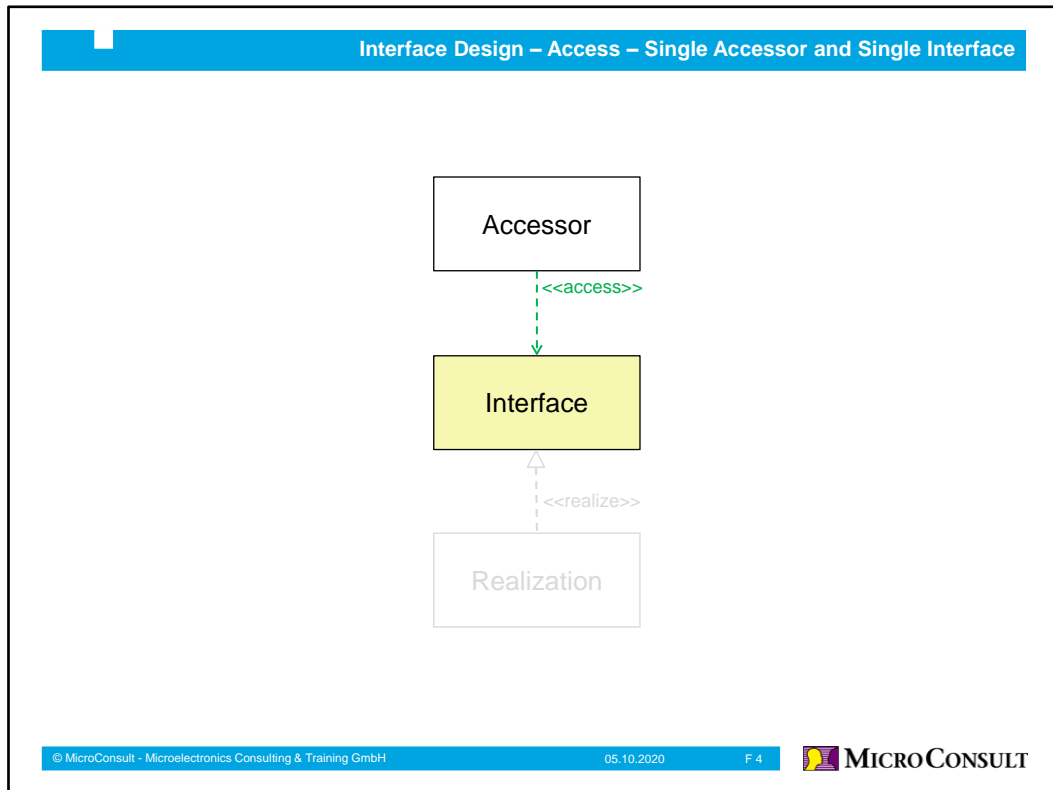
2 Interface Design

2.1 Basis Concept

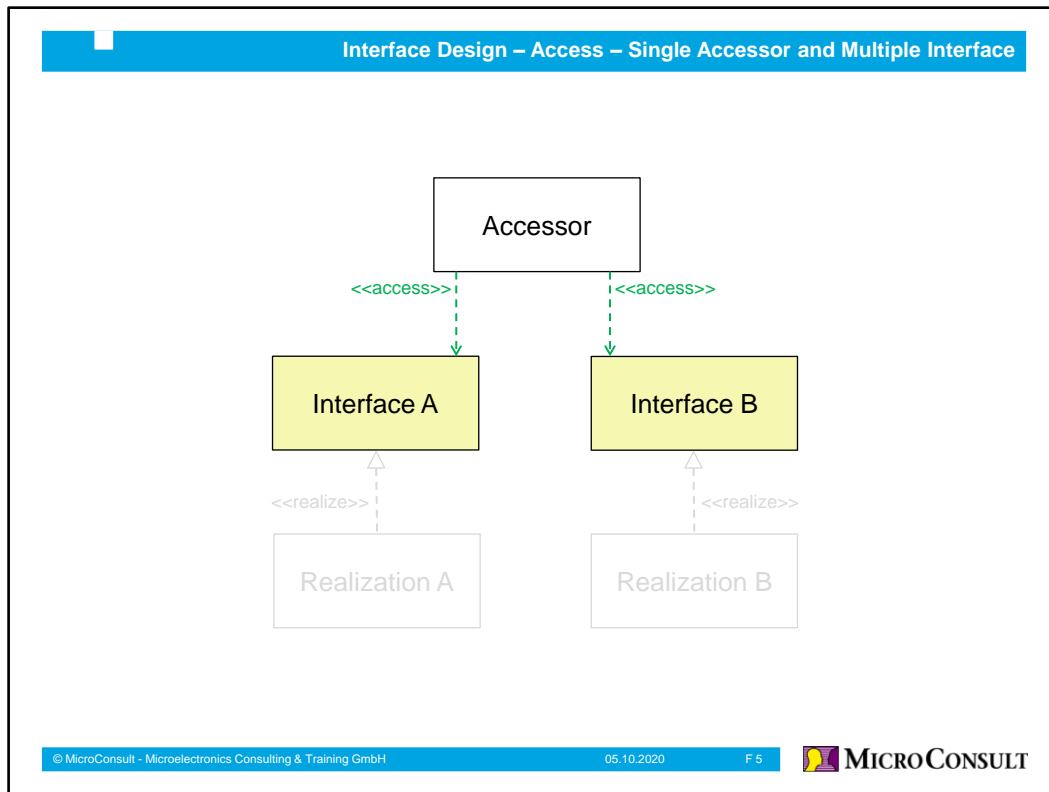


2.2 Access

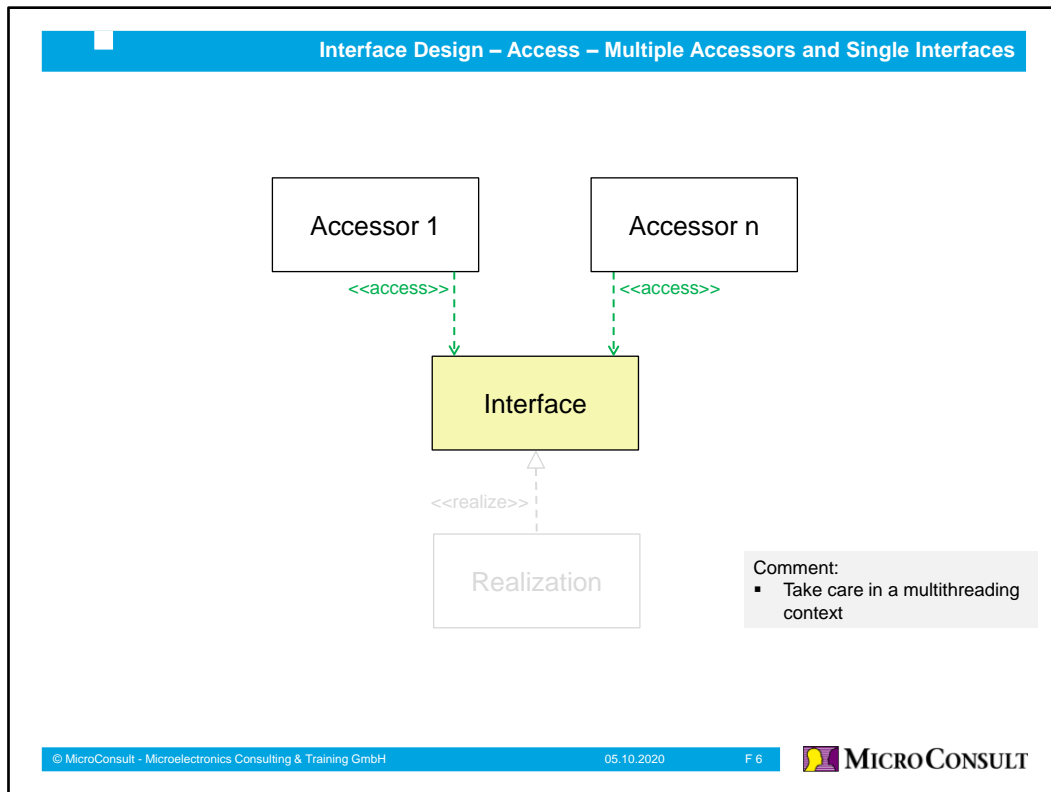
2.2.1 Single Accessor and Single Interface



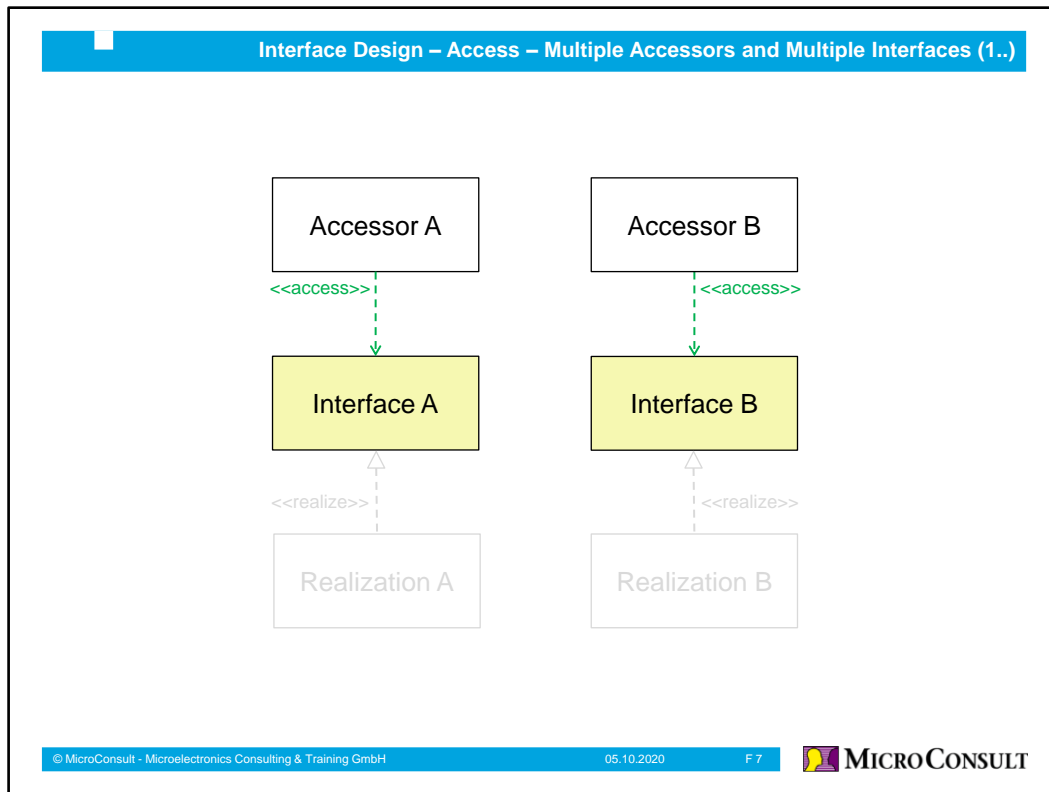
2.2.2 Single Accessor and Multiple Interfaces

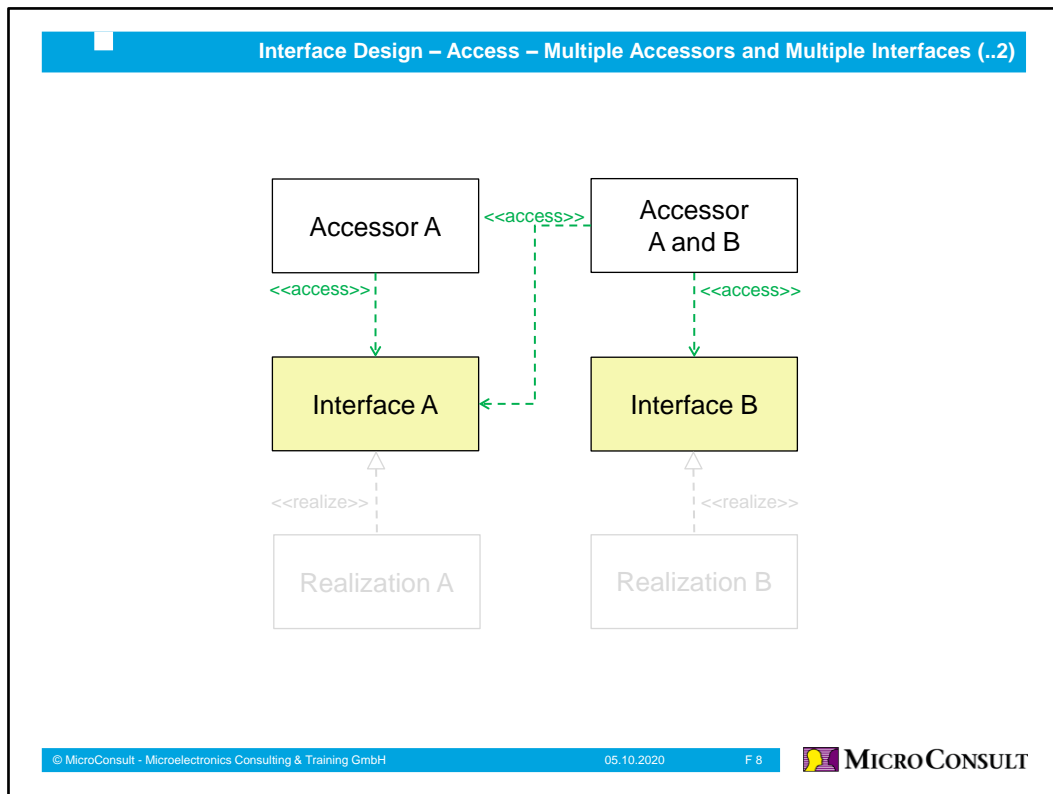


2.2.3 Multiple Accessors and Single Interface

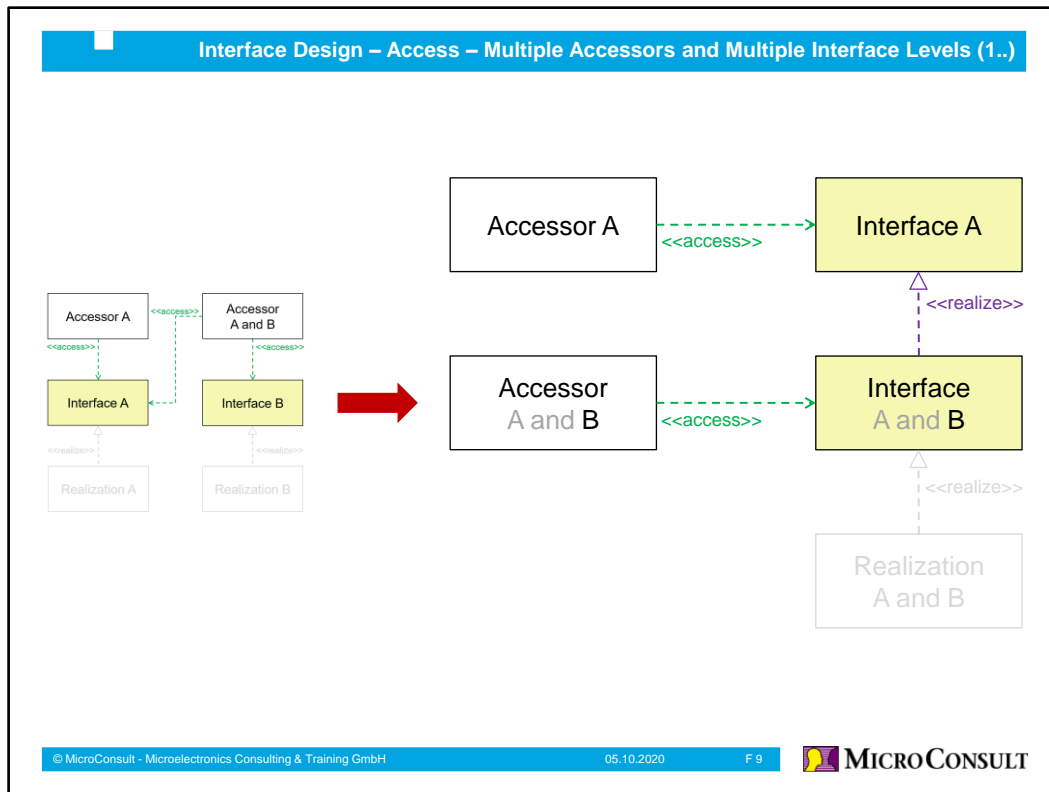


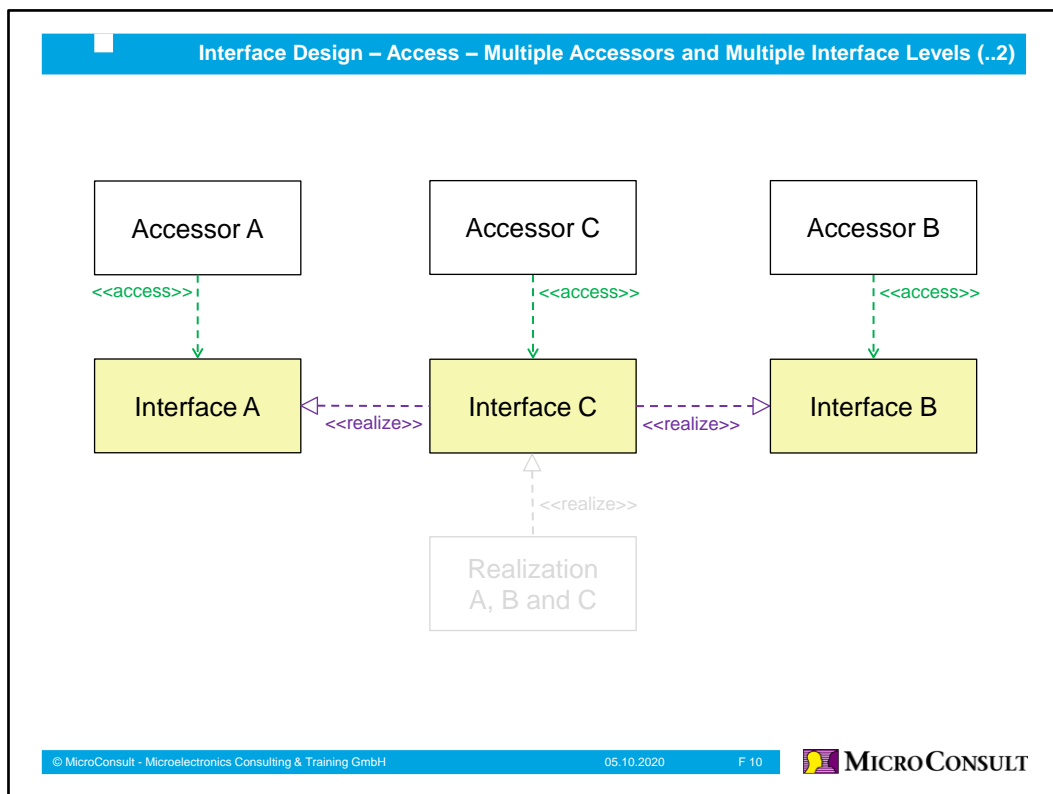
2.2.4 Multiple Accessors and Multiple Interfaces





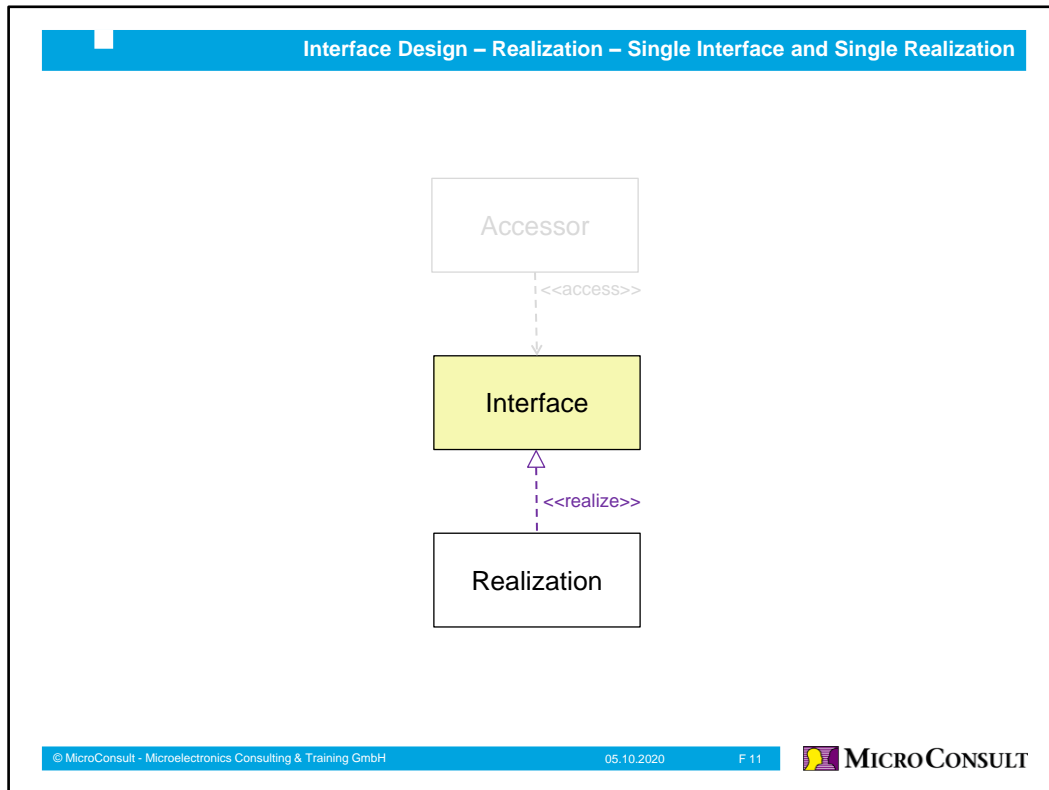
2.2.5 Multiple Accessors and Multiple Interface Levels



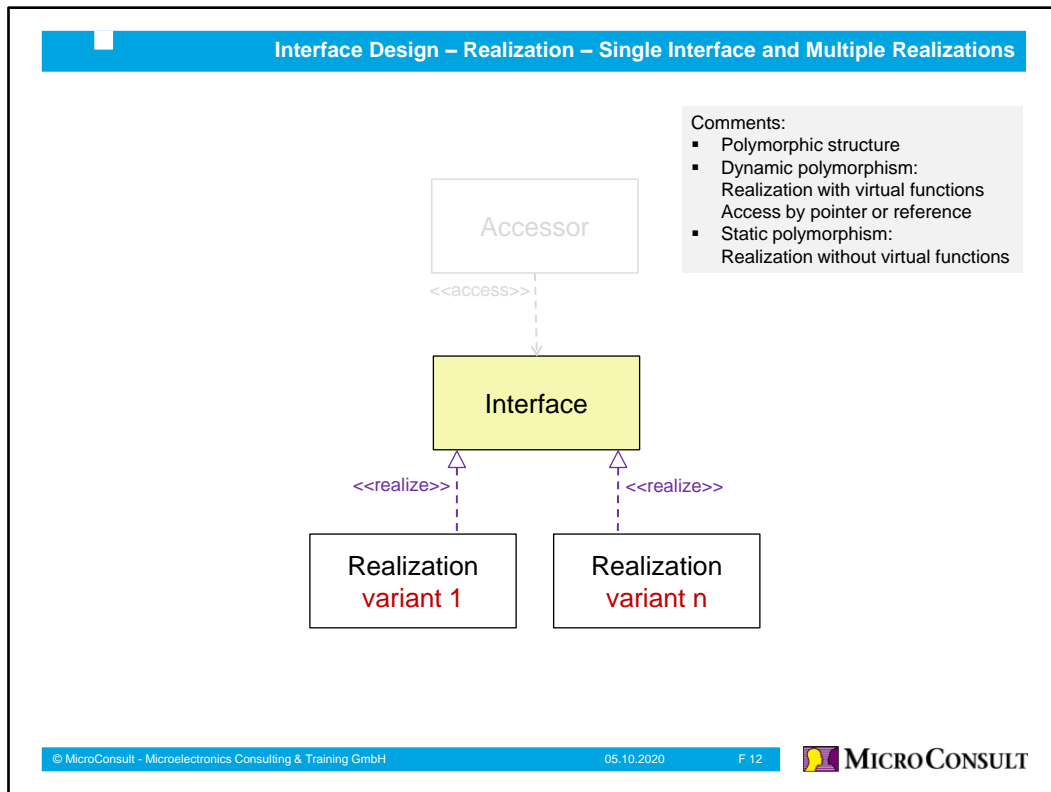


2.3 Realization

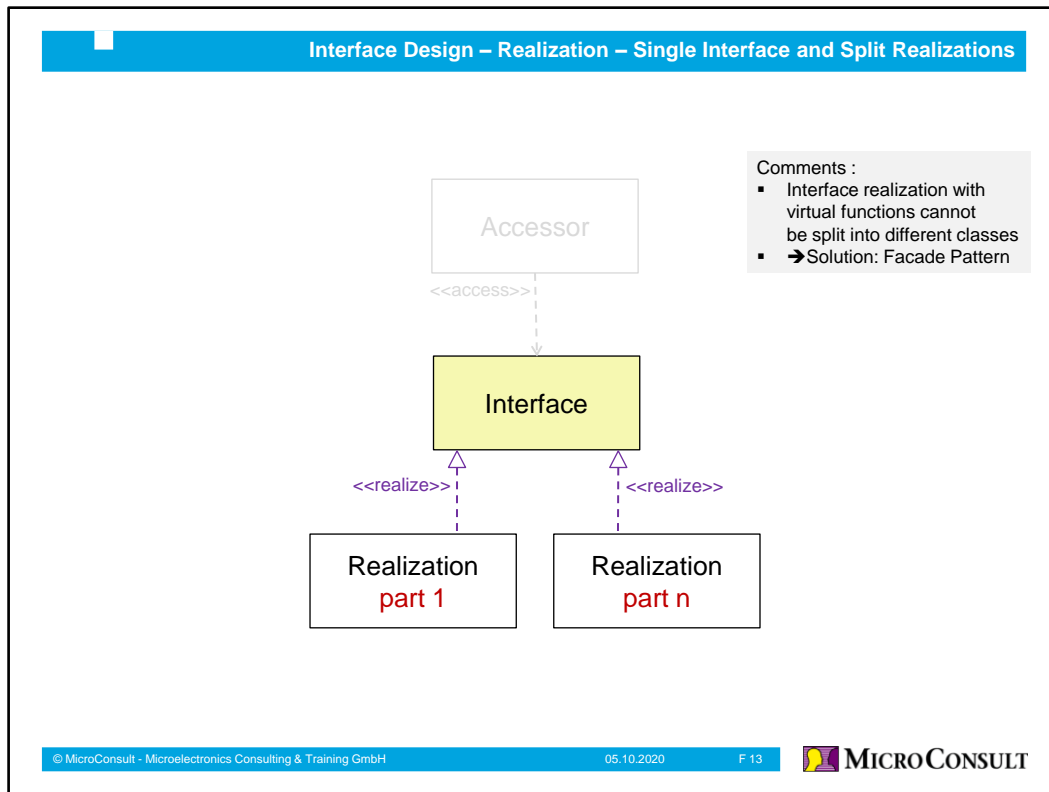
2.3.1 Single Interface and Single Realization



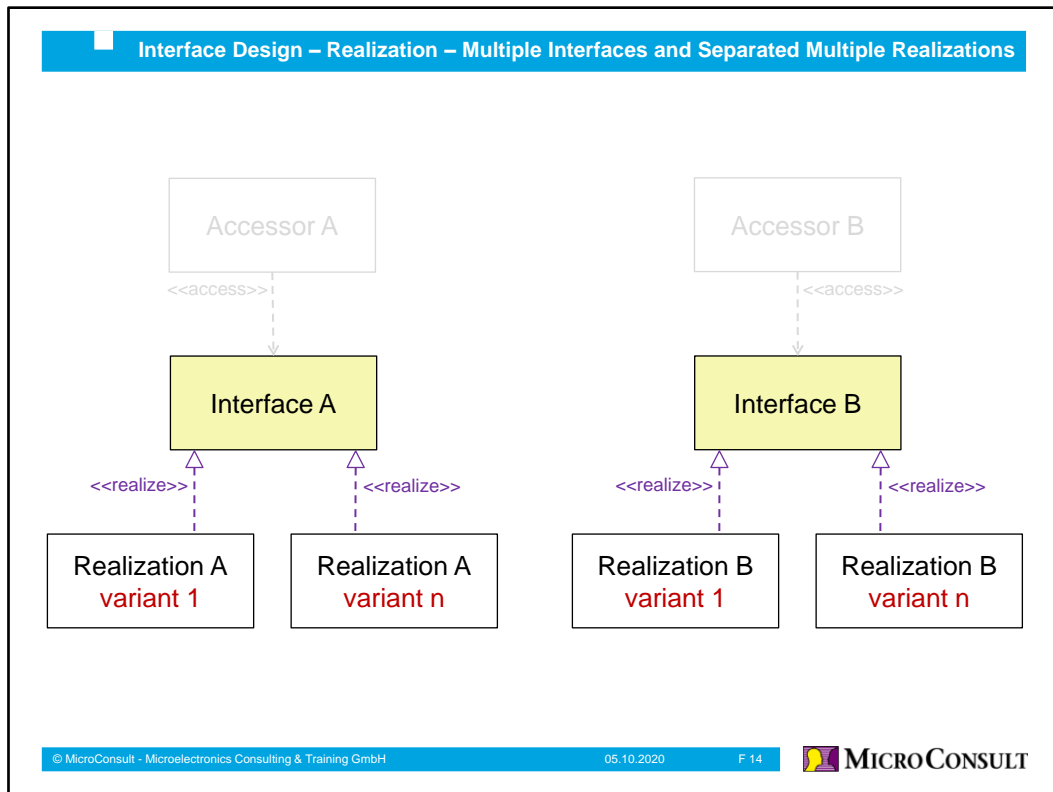
2.3.2 Single Interface and Multiple Realizations



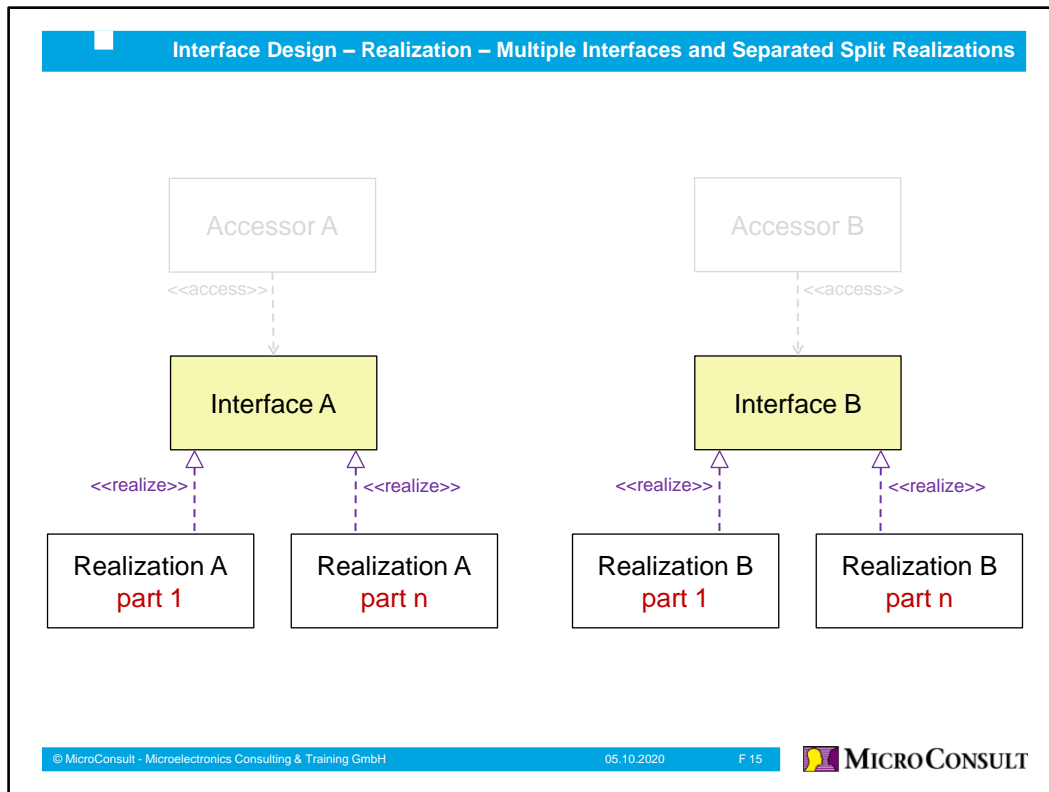
2.3.3 Single Interface and Split Realizations



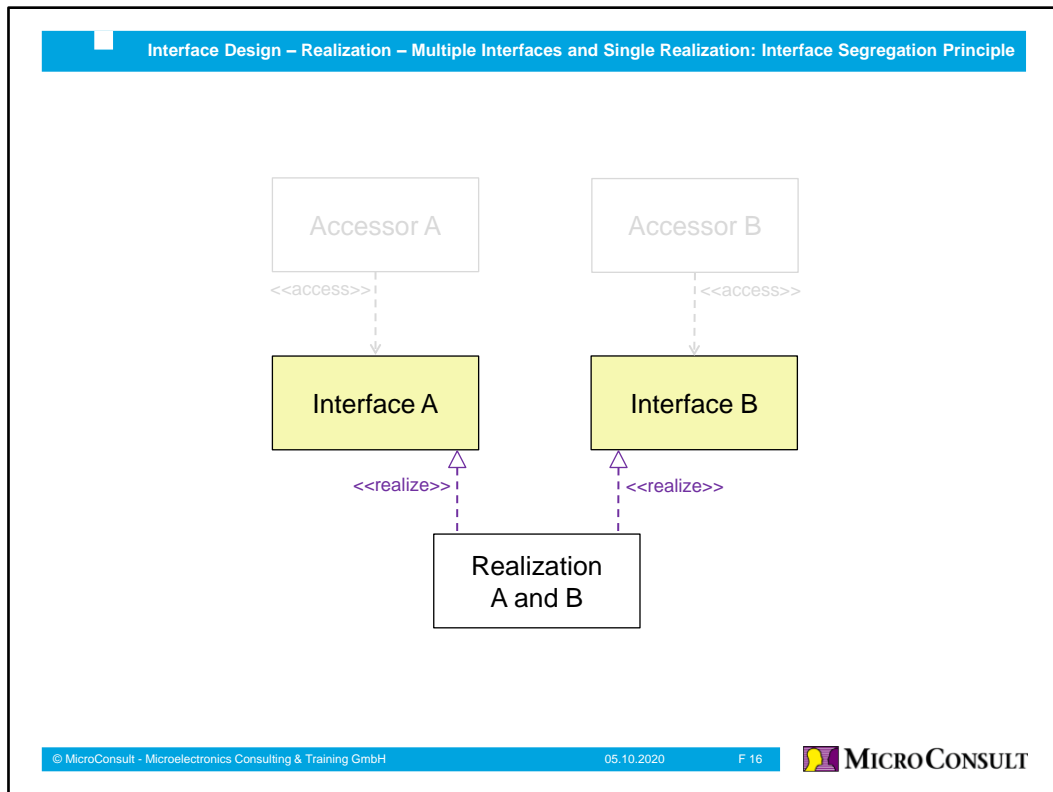
2.3.4 Multiple Interfaces and Separated Multiple Realizations



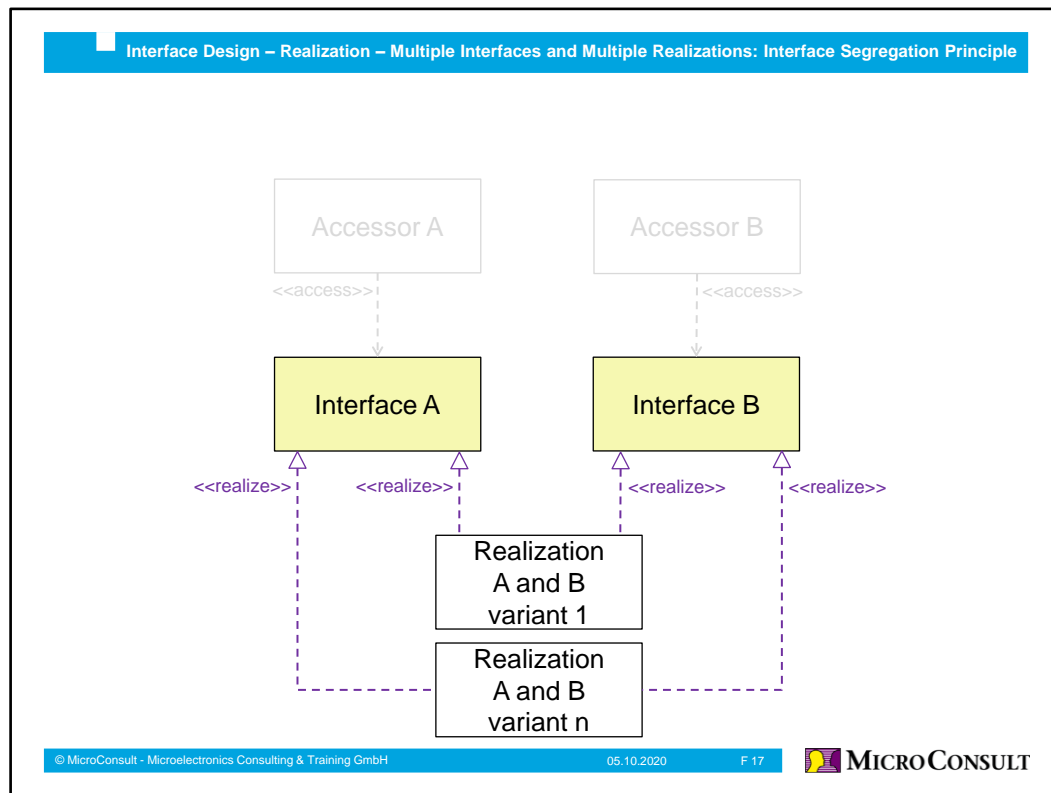
2.3.5 Multiple Interfaces and Separated Split Realizations



2.3.6 Multiple Interfaces and Single Realization: Interface Segregation Principle

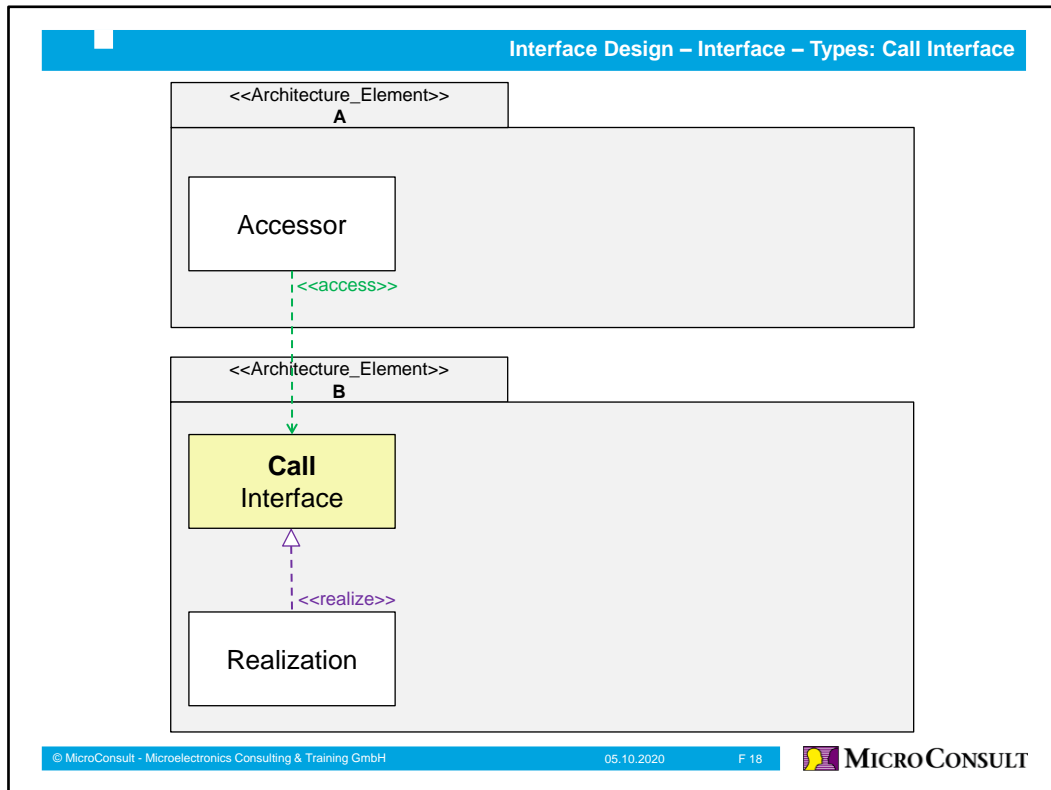


2.3.7 Multiple Interfaces and Multiple Realizations: Interface Segregation Principle

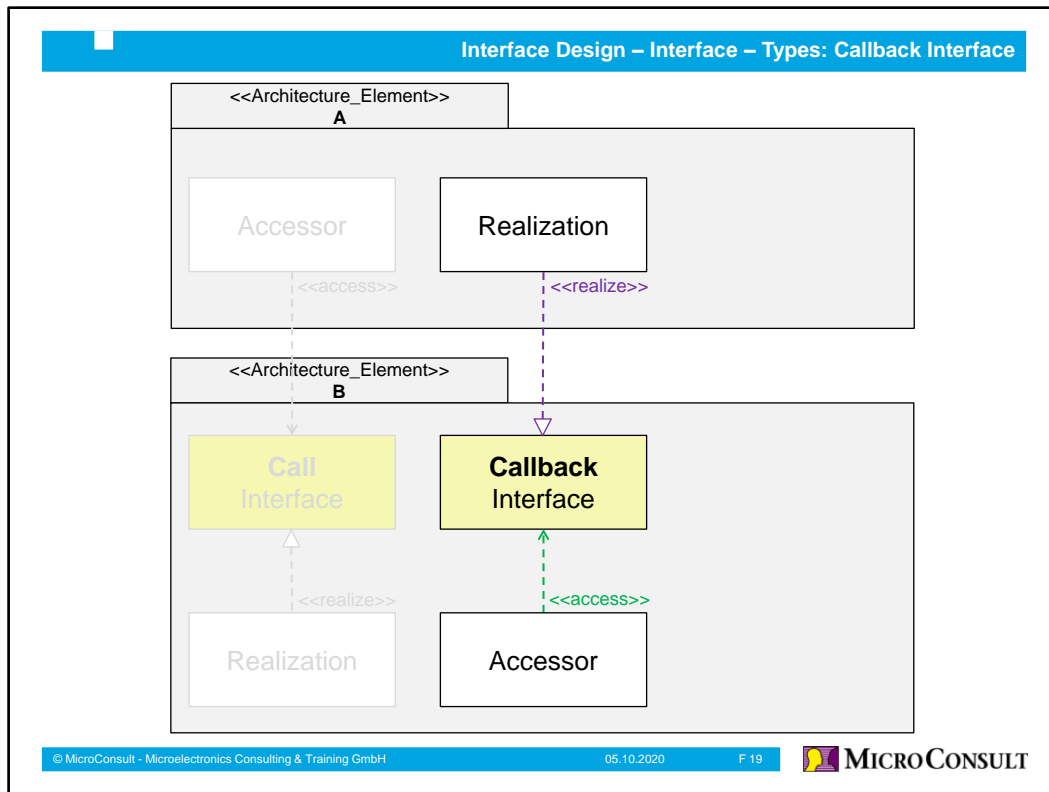


2.4 Interface

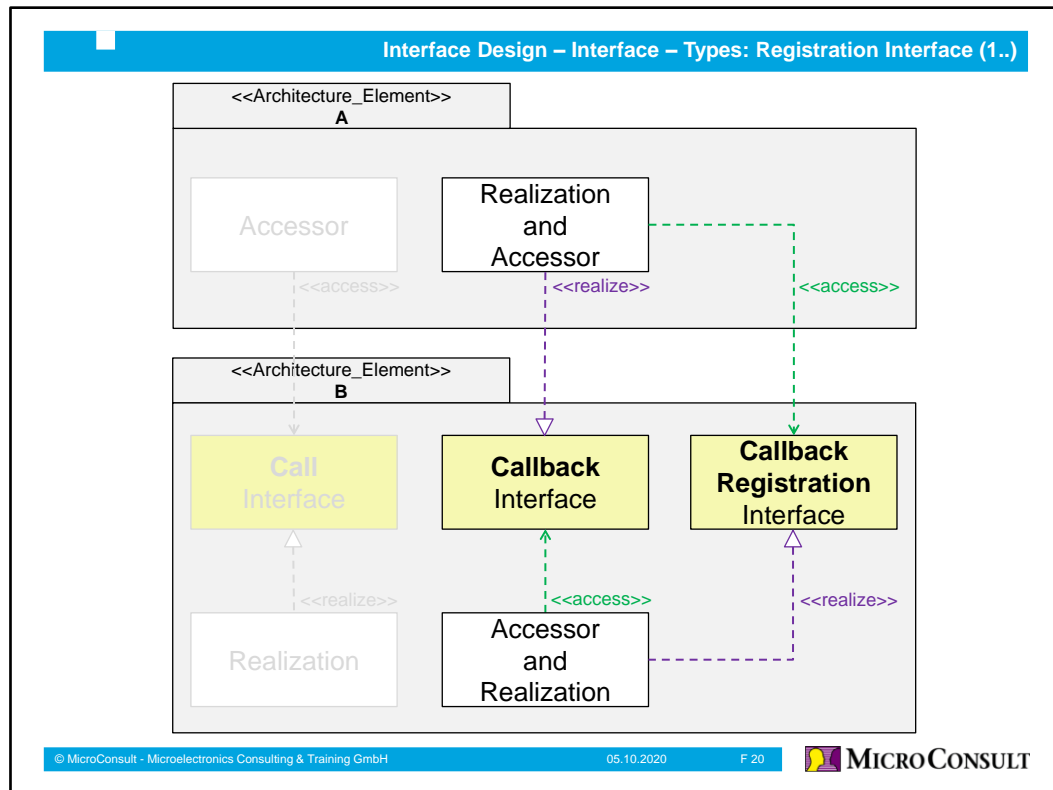
2.4.1 Types: Call-Interface

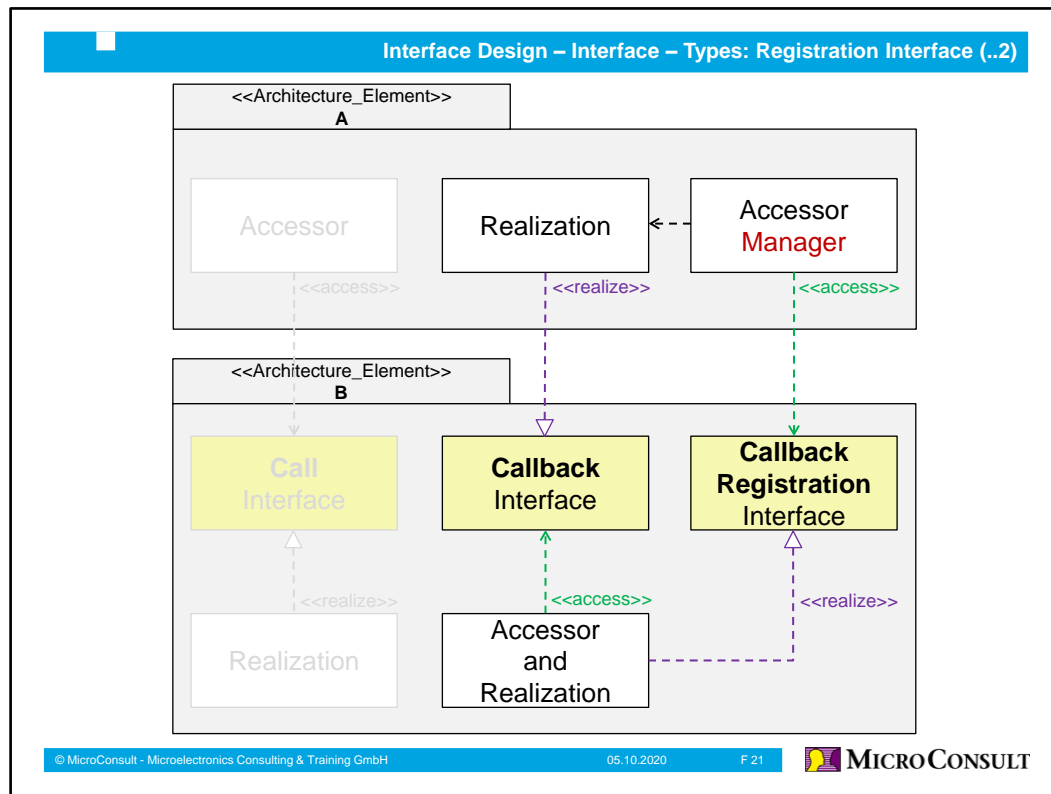


2.4.2 Types: Callback-Interface

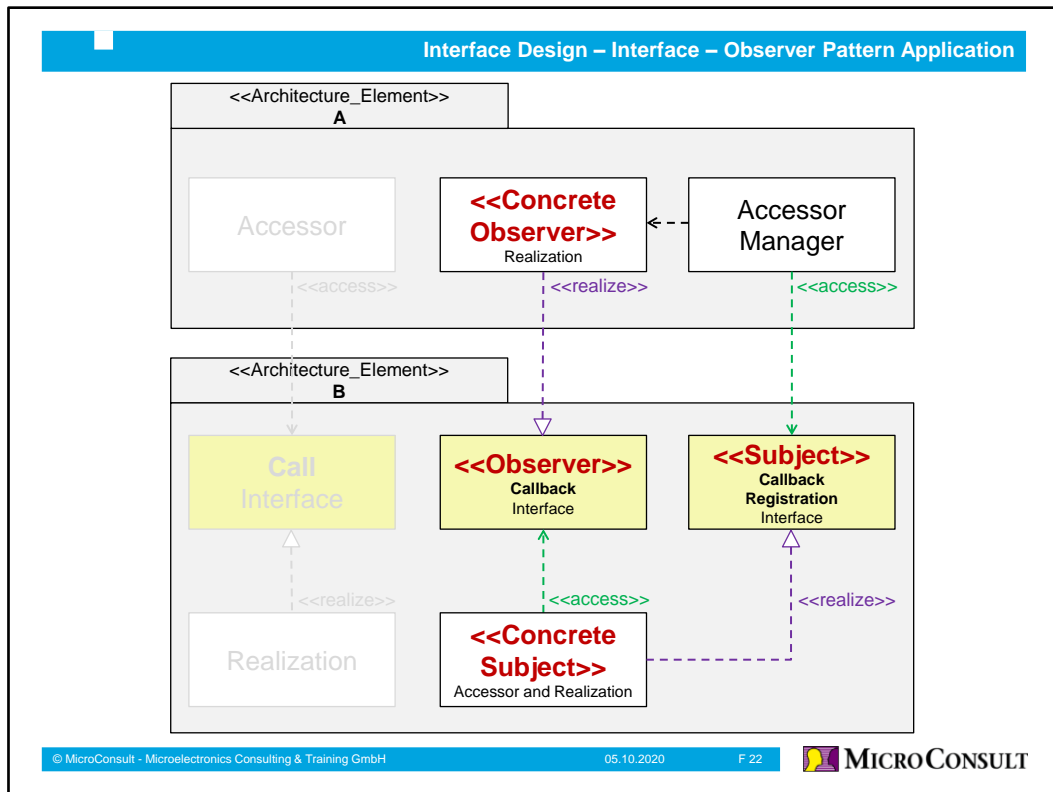


2.4.3 Types: Registration-Interface

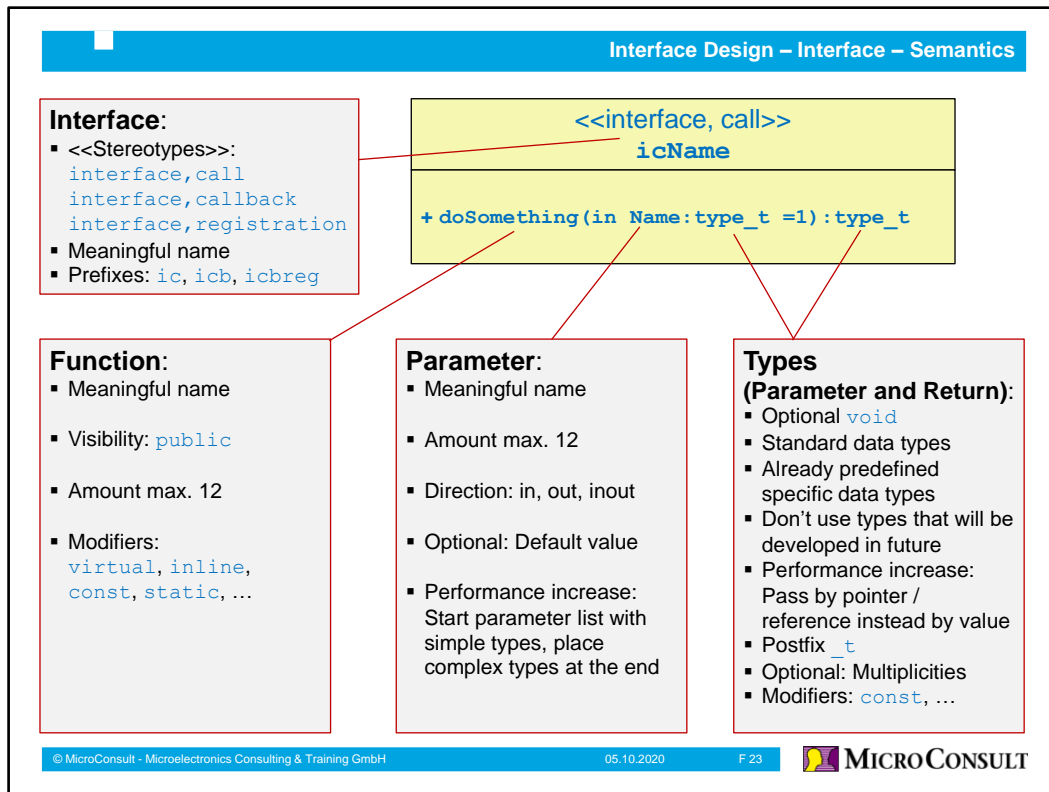




2.4.4 Observer Pattern Application

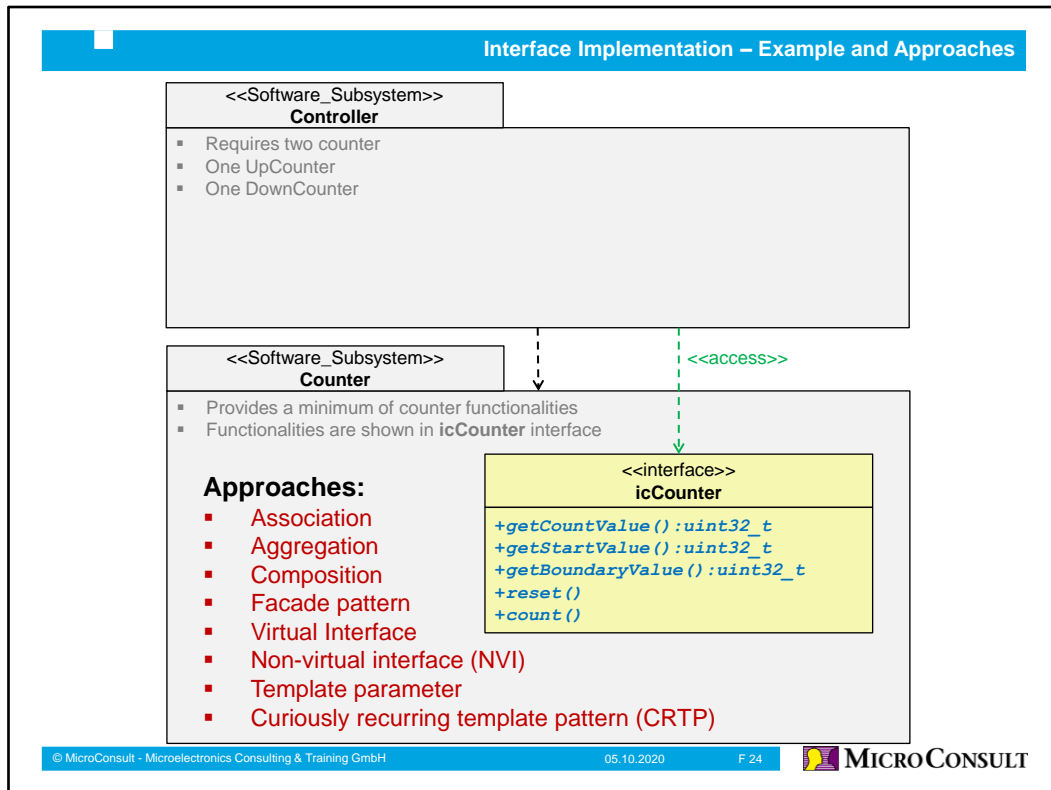


2.4.5 Semantics



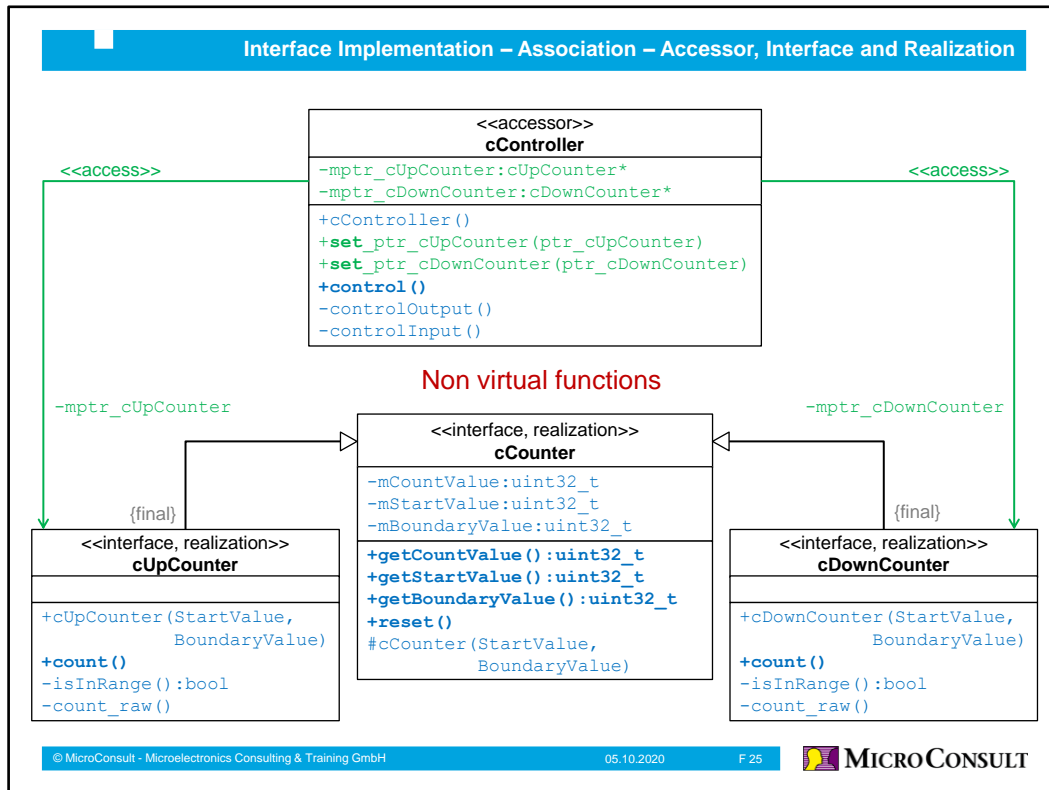
3 Interface Implementation

3.1 Example and Approaches



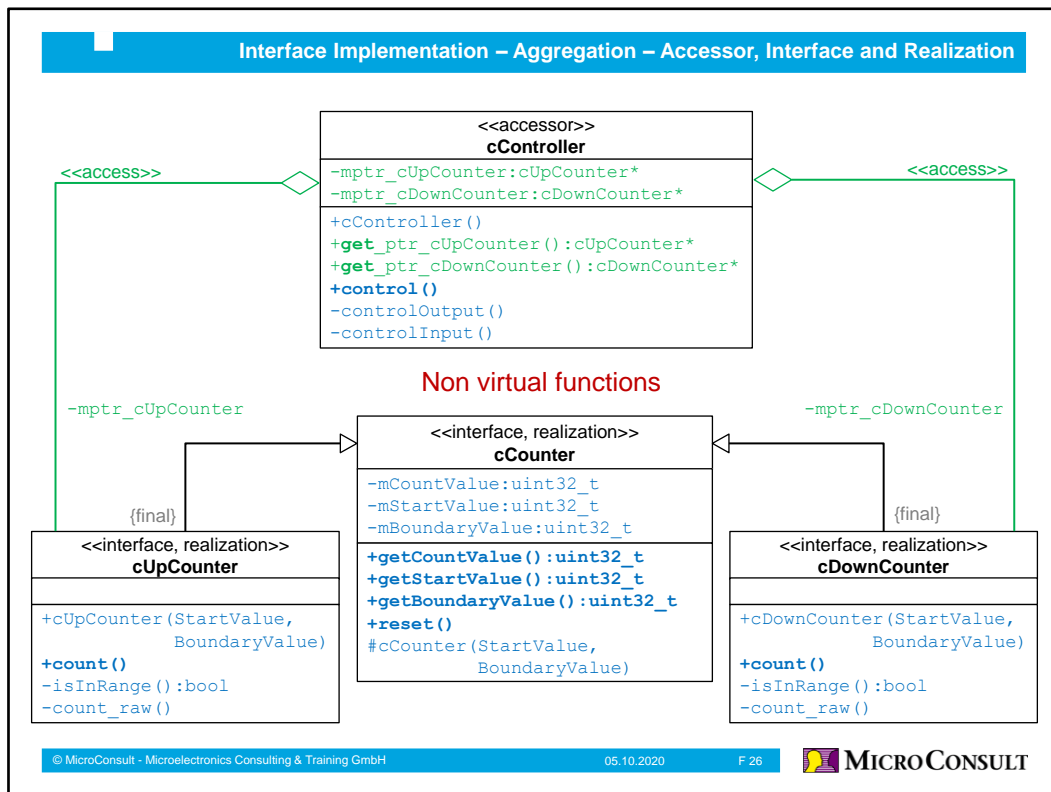
3.2 Association

3.2.1 Accessor, Interface and Realization



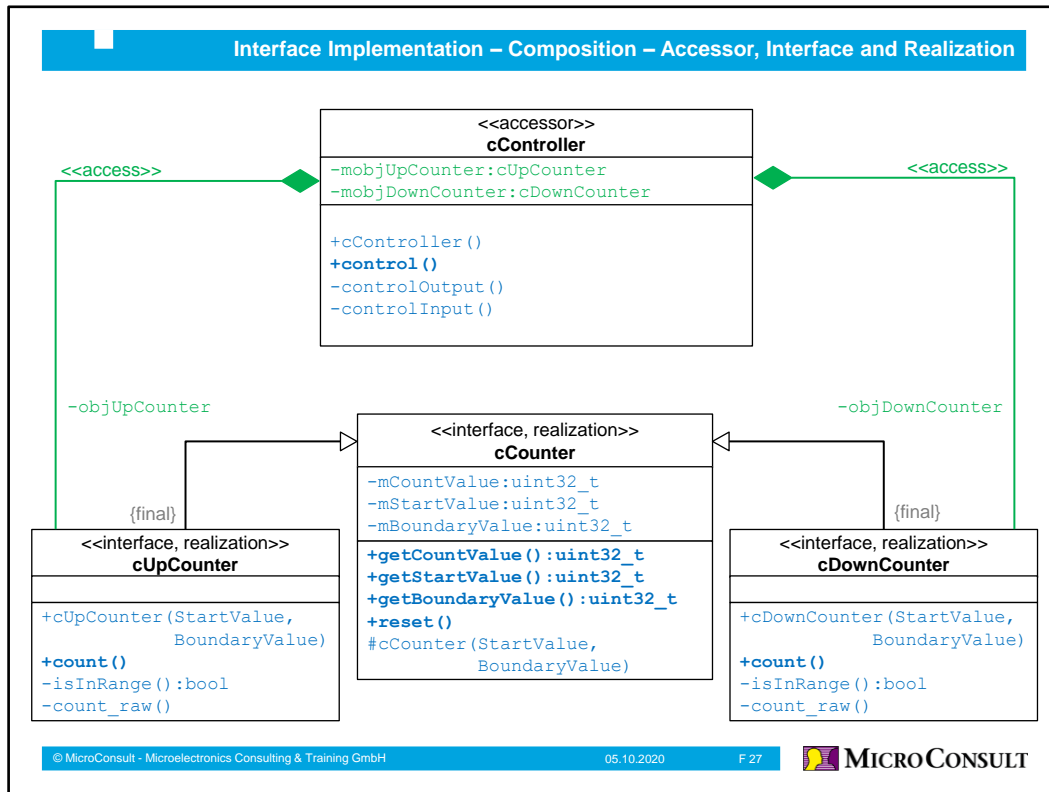
3.3 Aggregation

3.3.1 Accessor, Interface and Realization



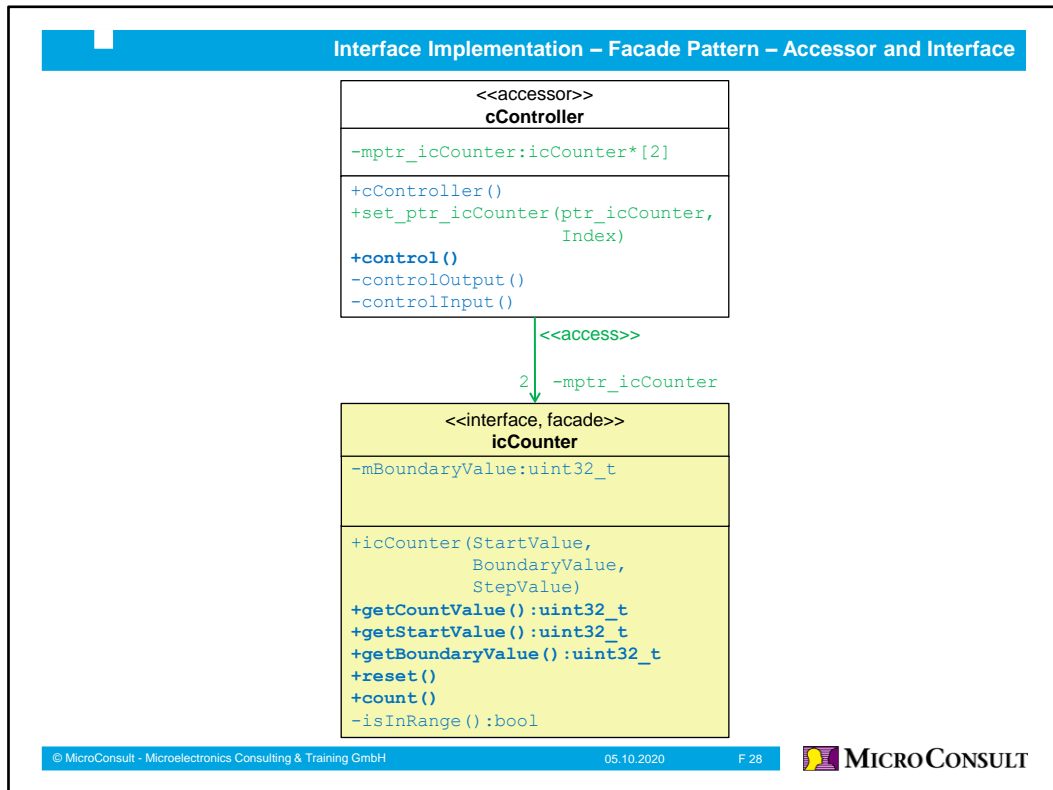
3.4 Composition

3.4.1 Accessor, Interface and Realization

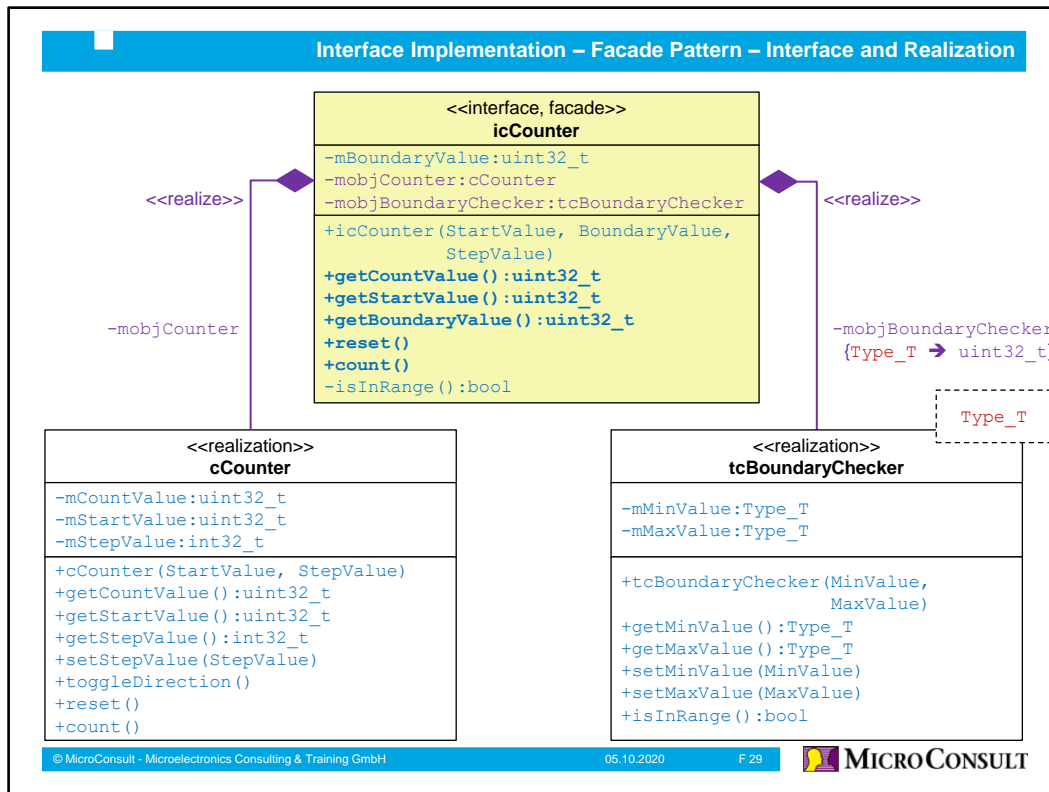


3.5 Facade Pattern

3.5.1 Accessor and Interface

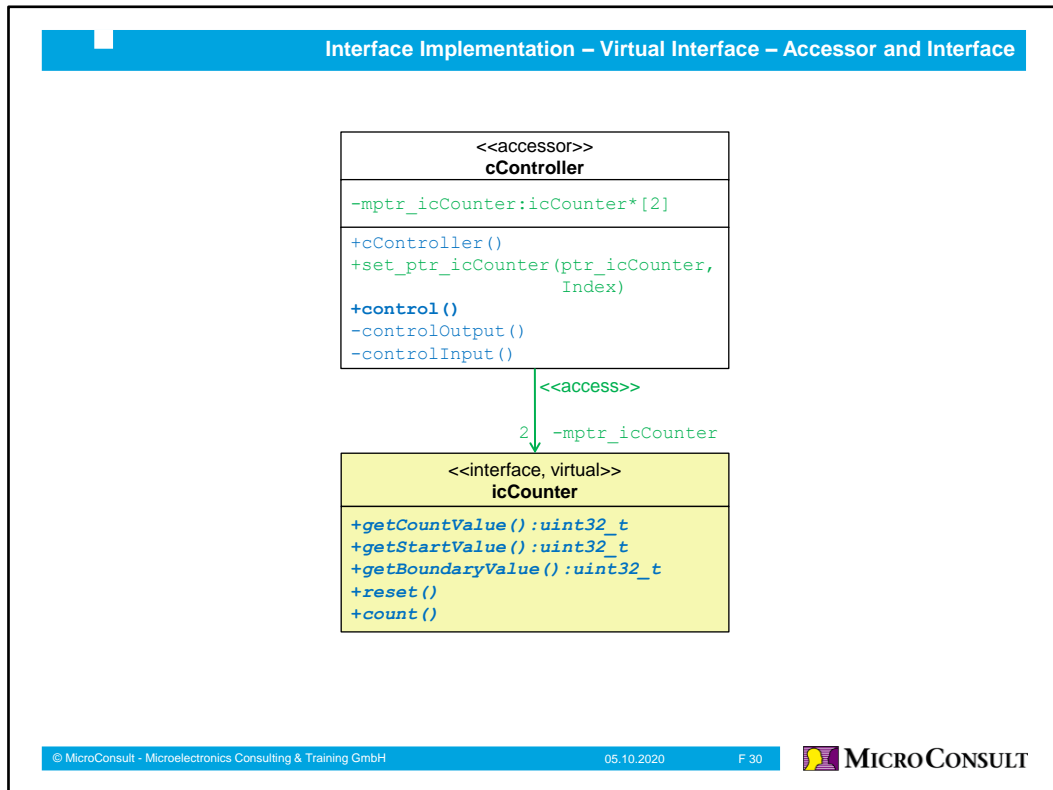


3.5.2 Interface and Realization

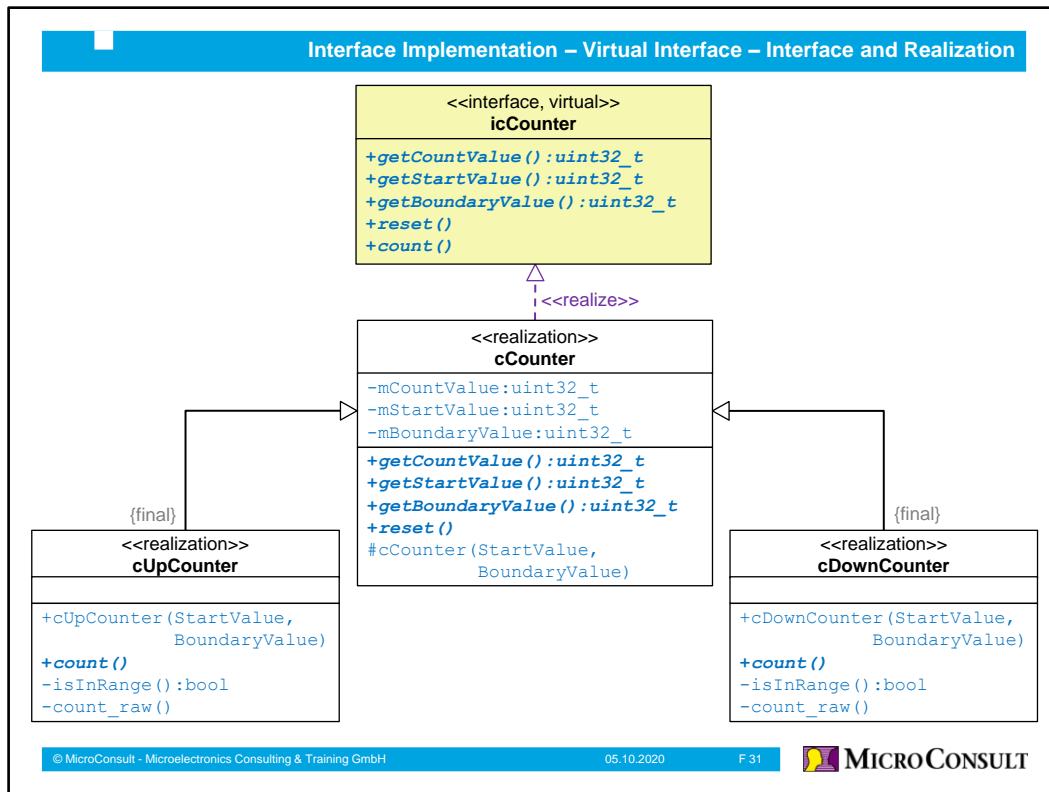


3.6 Virtual Interface

3.6.1 Accessor and Interface

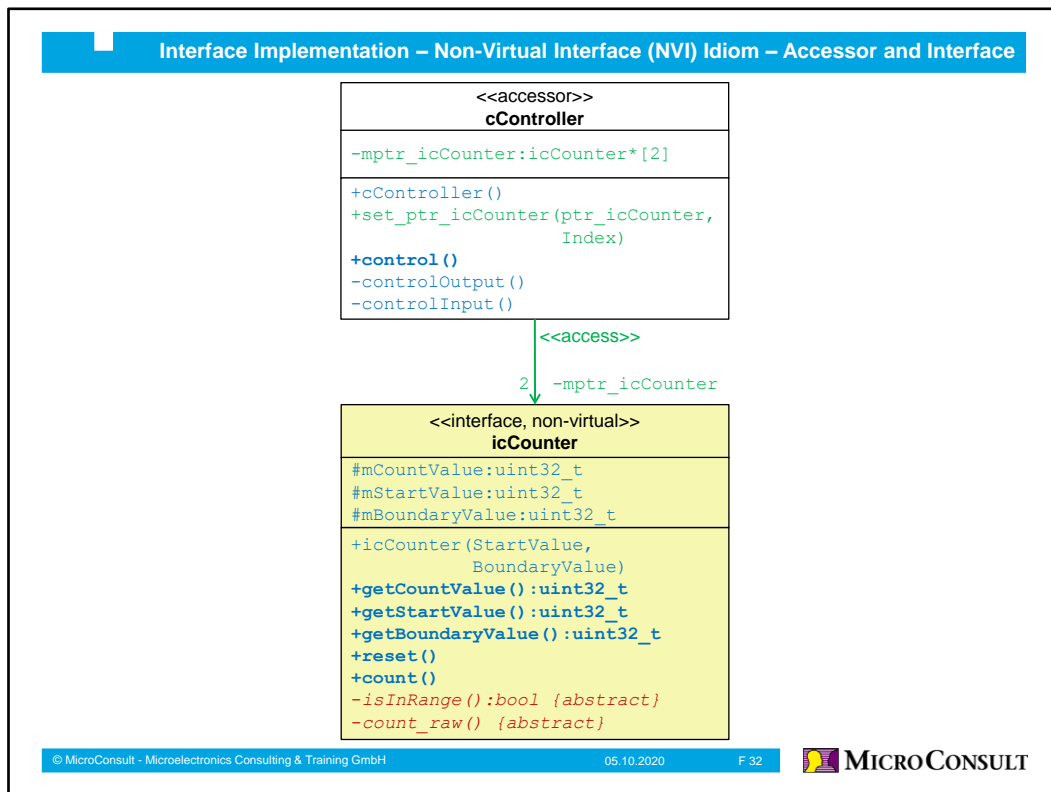


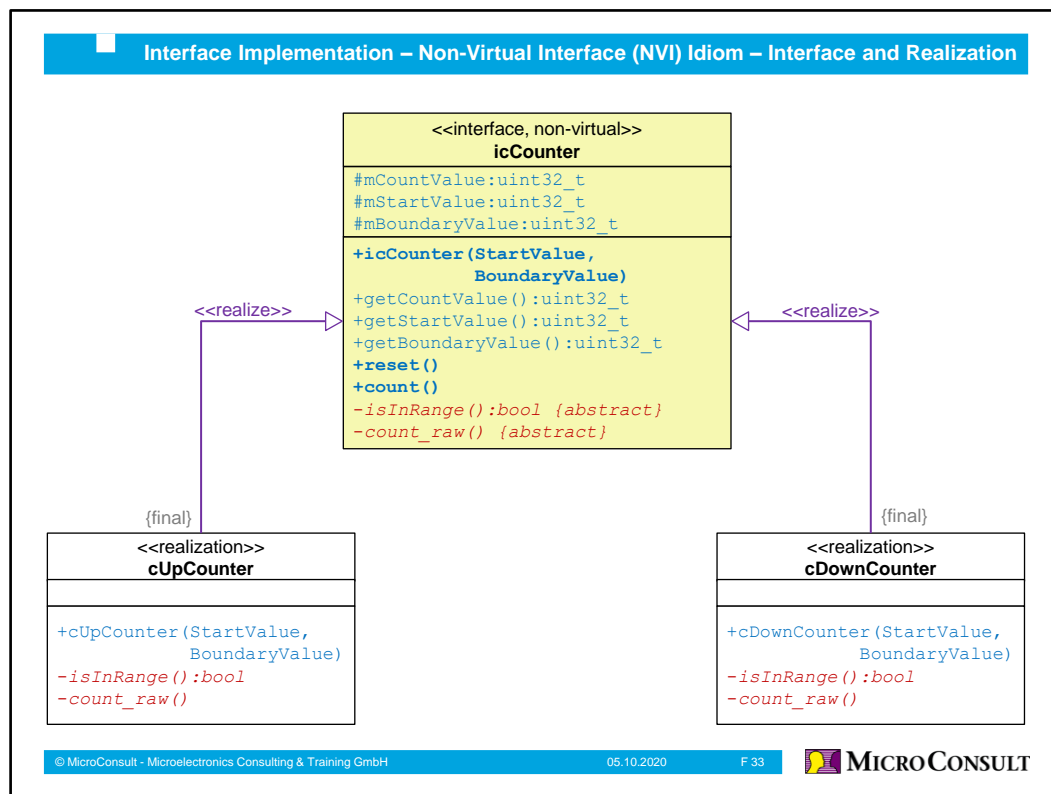
3.6.2 Interface and Realization



3.7 Non-Virtual Interface (NVI) Idiom

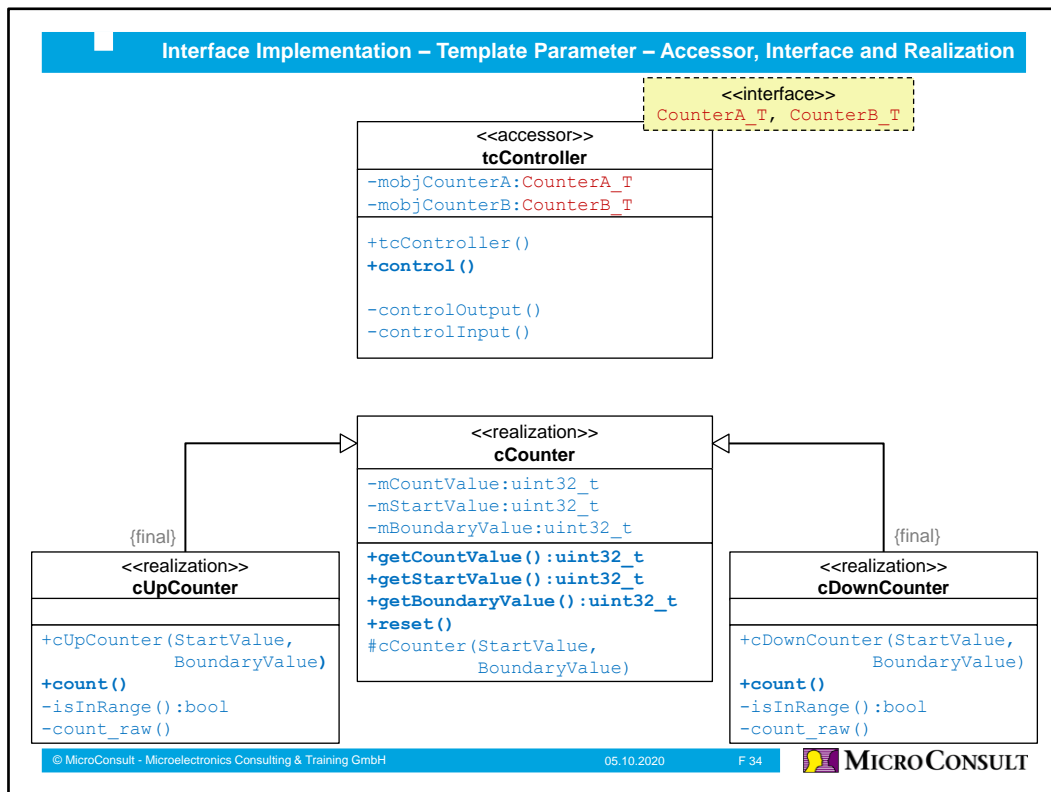
3.7.1 Accessor and Interface





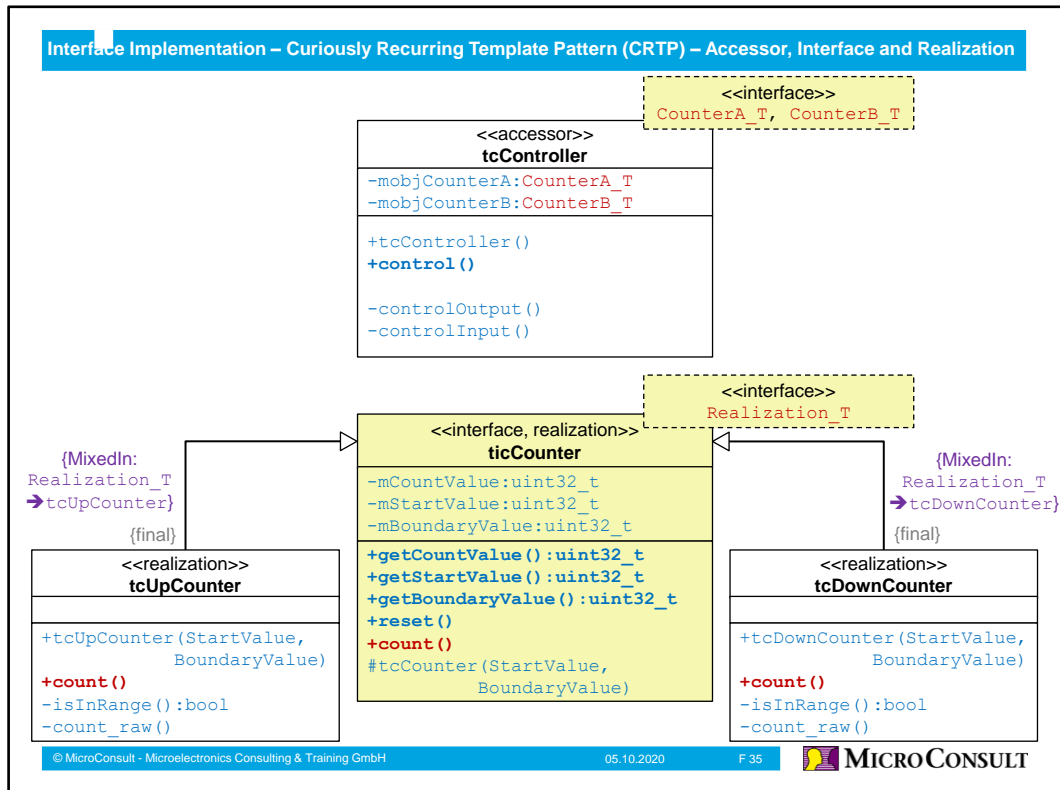
3.8 Template Parameter

3.8.1 Accessor, Interface and Realization



3.9 Curiously Recurring Template Pattern (CRTP)


3.9.1 Accessor, Interface and Realization



4 Summary and Outlook

Summary and Outlook

- In a very early software architecture development step,
 - ✓ establish interfaces
 - ✓ try to get the interfaces stable
- During software development,
the **architect has to agree to any changes to the interface**
- Define a suitable interface **implementation**
according to the software **requirements**
- Interface concepts support software **quality properties**:
 - ✓ Reusability, portability
 - ✓ Exchangeability, expandability, ...
- Interface concepts support software **principles**:
 - ✓ Loose coupling, externalization of dependencies
 - ✓ Modularization, high cohesion, ...
- The interface concept can be enhanced with the **port concept**.
- Download: <http://download.microconsult.net/ese2020/interface-designs.zip>

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5 MicroConsult Training and Coaching on Interface Design

MicroConsult Training and Coaching on Interface Design

Training [English and German]:

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[English](#) [German](#)

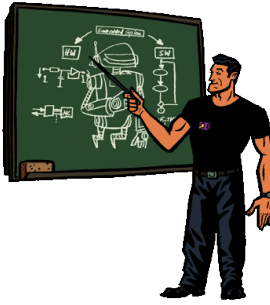
Embedded C++ Advanced: Object-Oriented Programming for μ C with C++/EC++
[English](#) [German](#)

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Coaching [English and German]:
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