

Design Defects and Restructuring

Lecture 2

Sat, Sep 18, 2021

Object Oriented Concepts

- Abstraction
- Class
- Object
- Encapsulation
- Information Hiding (Scope)
- Inheritance
- Polymorphism
 - Ad hoc – Overload
 - Subtype – Override
 - Parametric – Templates or Generics
- Interface
- Messaging
- Delegate (Function Pointer)
- Relationship

Object Oriented Analysis

- Person (Role)
- Organization – Group
- Product
- Relationship – Group of Objects
- Event – Result of Happening, Action or Association (Time?)
- Spatial – Location
- Temporal – Time

Relationships

- Association
- Classification ***
- Generalization and Specialization ***
- Aggregation **
- Composition **

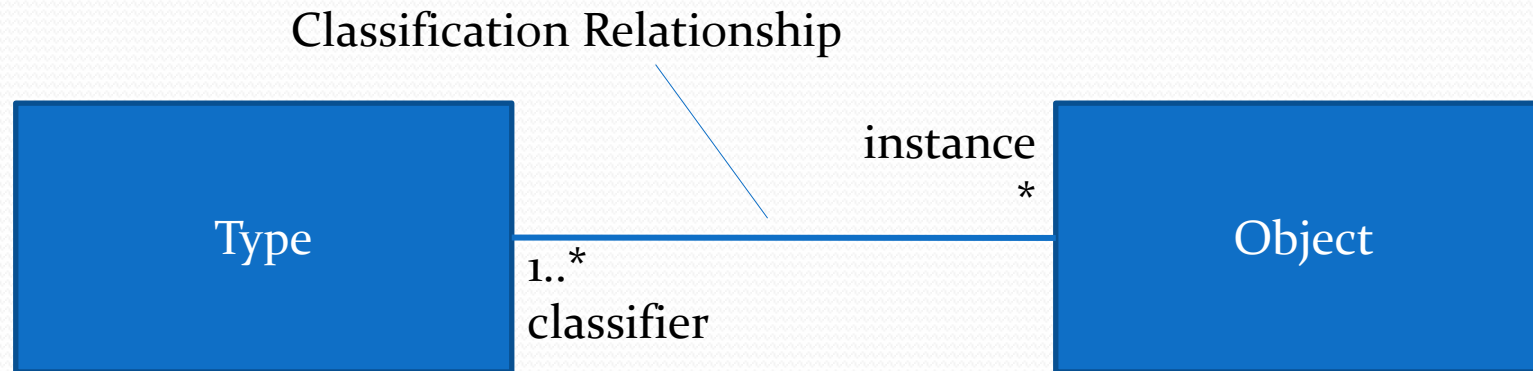
Association

- An association is a user defined relationship



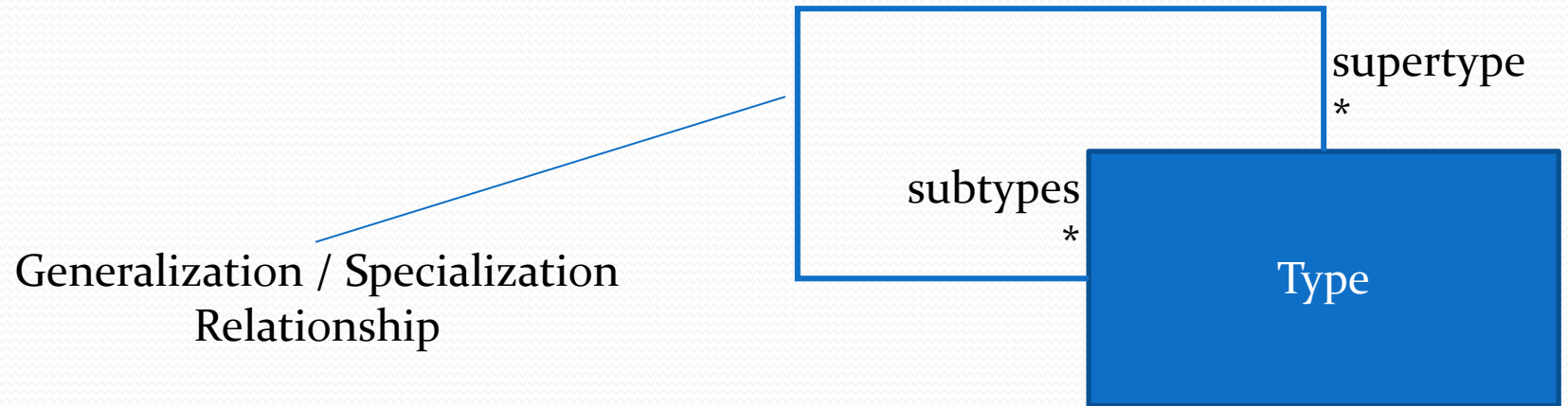
Classification

- It is the act or result of applying a concept (type) to an object



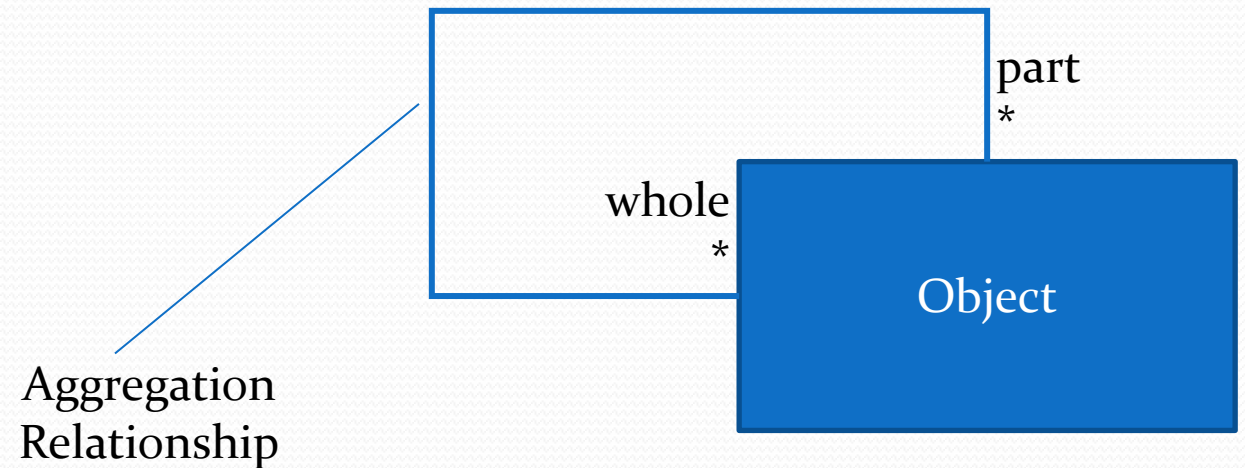
Generalization / Specialization

- It is the act or result of distinguishing a concept (type) that completely includes or encompasses another
- Generalization enables us to define our types in more general terms by using super-types
- Specialization allows us to be more specific about our types by using subtypes



Aggregation / Composition

- It is the act or result of forming an object whole using other objects as its parts
- Aggregation is a mechanism for forming a whole from component parts



Generalization / Classification

- Objects are instances because they have been classified
- Type of objects are subtypes because they have been specialized
- Classification and Generalization / Specialization are two different phenomenon and have different hierarchies
- Classification is the relationship between object and type
- Generalization / Specialization is the relationship between types only

Example

Consider the following phrases

1. Fido is an Alsatian
2. An Alsatian is a Dog
3. Dogs are Animals
4. An Alsatian is a Breed
5. Dog is a Species

1 & 2

• Fido is a Dog ✓

2 & 3

• Alsatians are Animals ✓

1 & 2 & 3

• Fido is an Animal ✓

1 & 4

• Fido is a Breed ✗

2 & 5

• An Alsatian is a Species ✗

Example – Continued...

Fido is an Alsatian

- Classification

An Alsatian is a Dog

- Generalization

Dogs are Animals

- Generalization

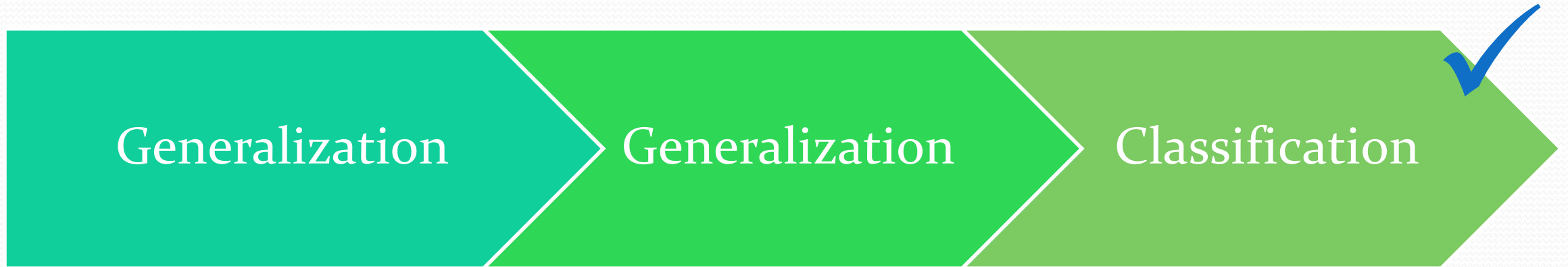
An Alsatian is a Breed

- Classification

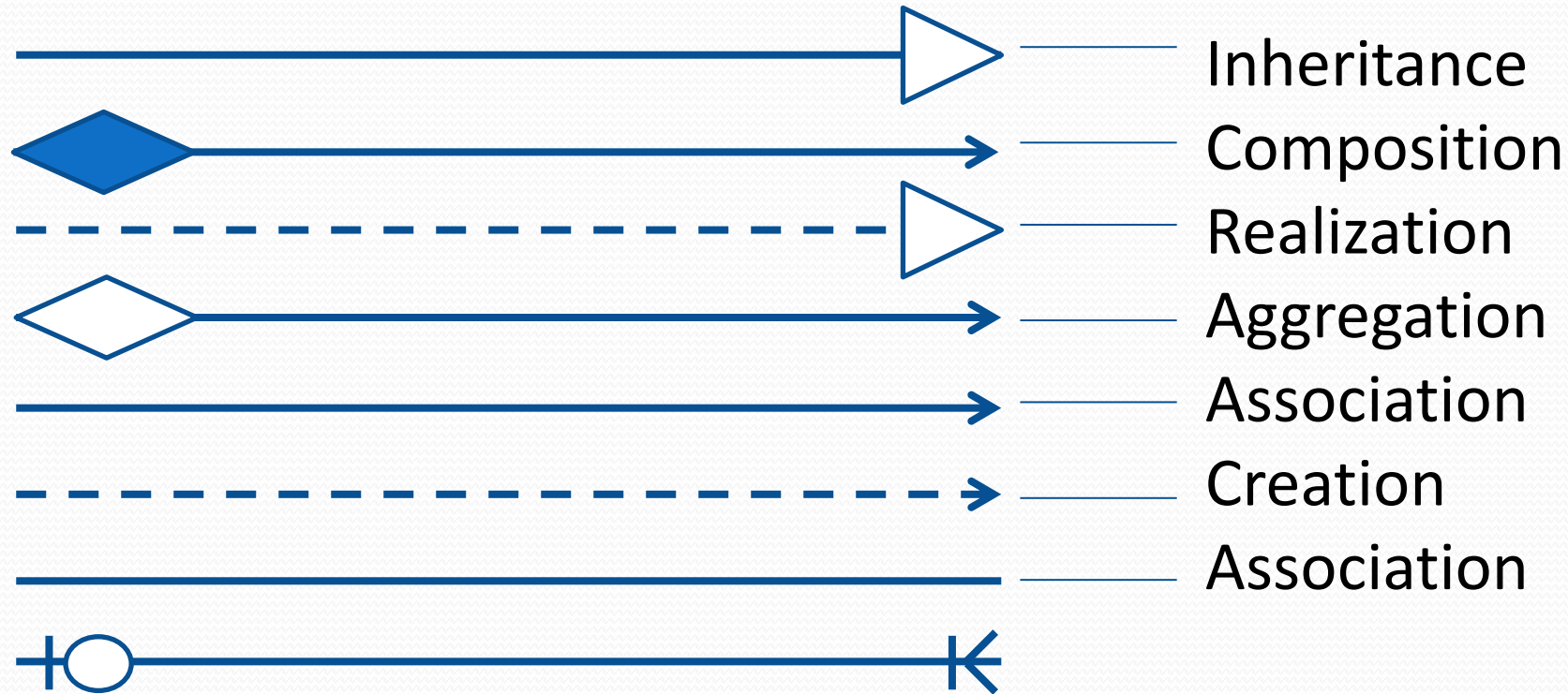
Dog is a Species

- Classification

Generalization / Classification



Links – Relationships (UML Notations)



Program Structure

- Don'ts for Structured Programming
 - Goto
 - Break (unless under switch statement)
 - Continue
 - Return (other than last line in a function)
- Side effects to avoid
 - Global Variables
 - Global Objects (unless they are read only)
 - Static Variables and Objects (unless they are initialized once)

Program Structure

- Don'ts for better programming practices
 - Getters and Setters (unless they have purposeful names)
 - Mutation
 - Type Casting