

# *COEN-244*

## *Tutorial #4*

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February 09<sup>th</sup>, 2023

# OUTLINE

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- Copy Constructor: Deep vs Shallow copying
- Pointers, how to deal with them in your objects
- Association
- Aggregation
- Composition

# Copy Constructor

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The goal of copy constructors is to clone data fields of an object.

## **2 ways to copy:**

- Shallow copying
- Deep copying

**Alternatively:** you can have a `clone()` member function.

# Dealing with Dynamic Objects and Pointers

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-> Pointers to objects:

- Objects are stored in memory so we can always point to them.

Destructor:

- What to do in the destructor?
- What do pointers signify in the program execution?
- Deleting pointers and arrays

# Association

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- There is a link just for communication but there is no dependency.

## UML representation:

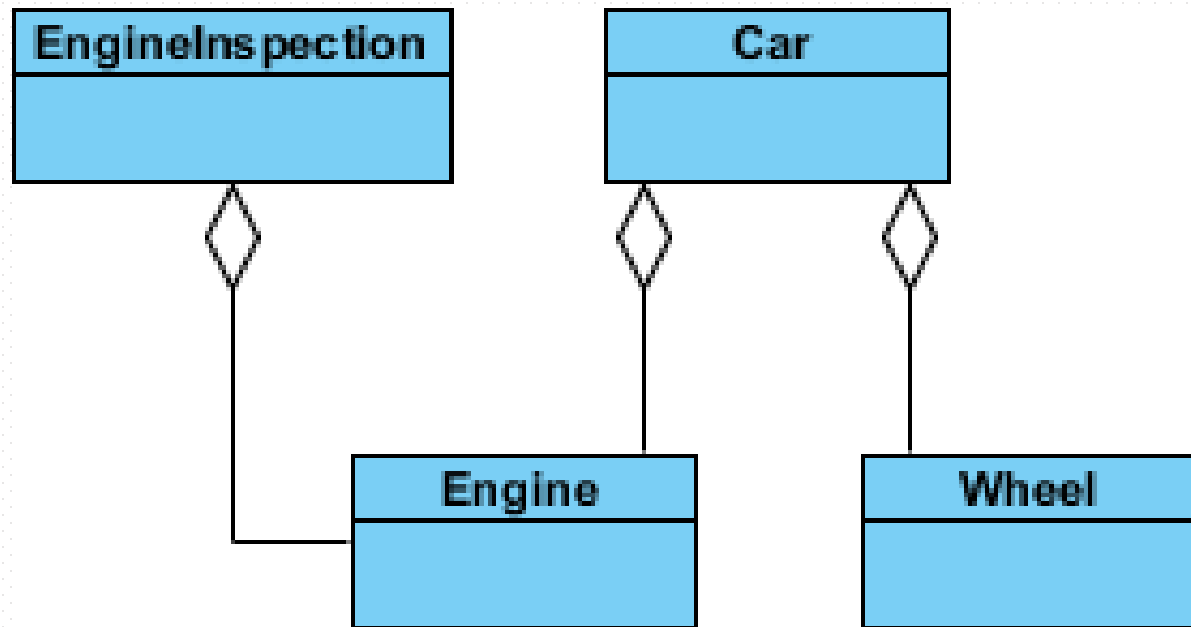


Source: <https://www.javatpoint.com/uml-association>

# Aggregation

- It is similar to association but shows a has-a relationship.
  - The aggregated object is independent
  - Aggregation is a subset of association

## UML representation:

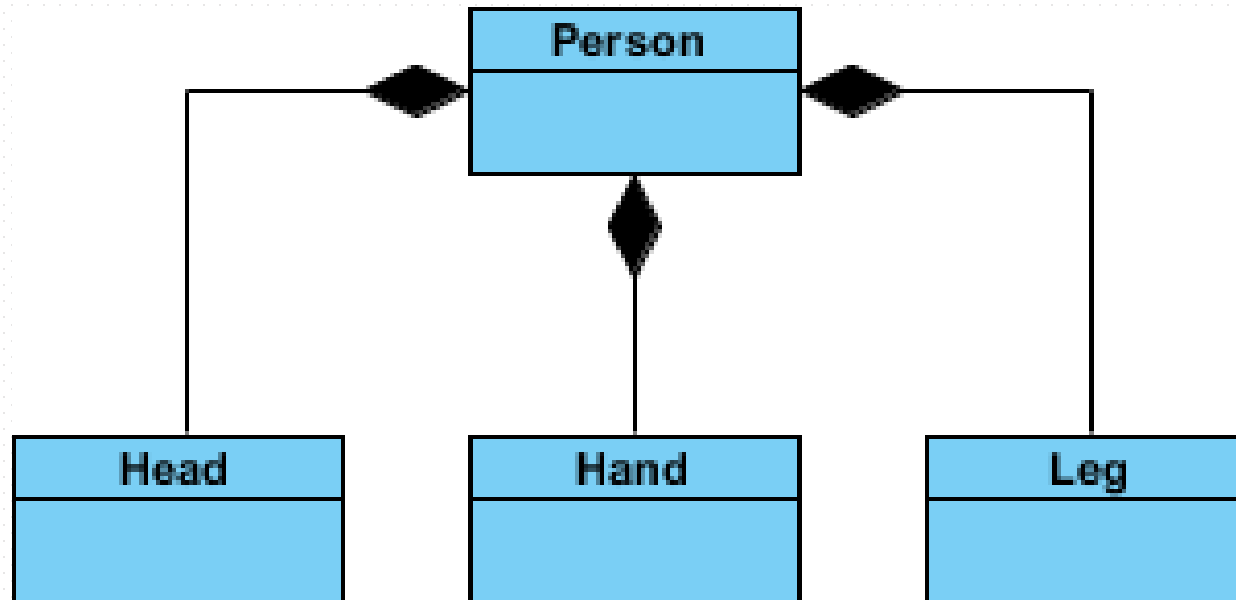


Source: <https://www.visual-paradigm.com/guide/uml-unified-modeling-language/uml-aggregation-vs-composition/>

# Composition

- Very strong and exclusive link between two instances
  - The child object can only exist within its parent object
  - It is a part-whole relationship

## UML representation:

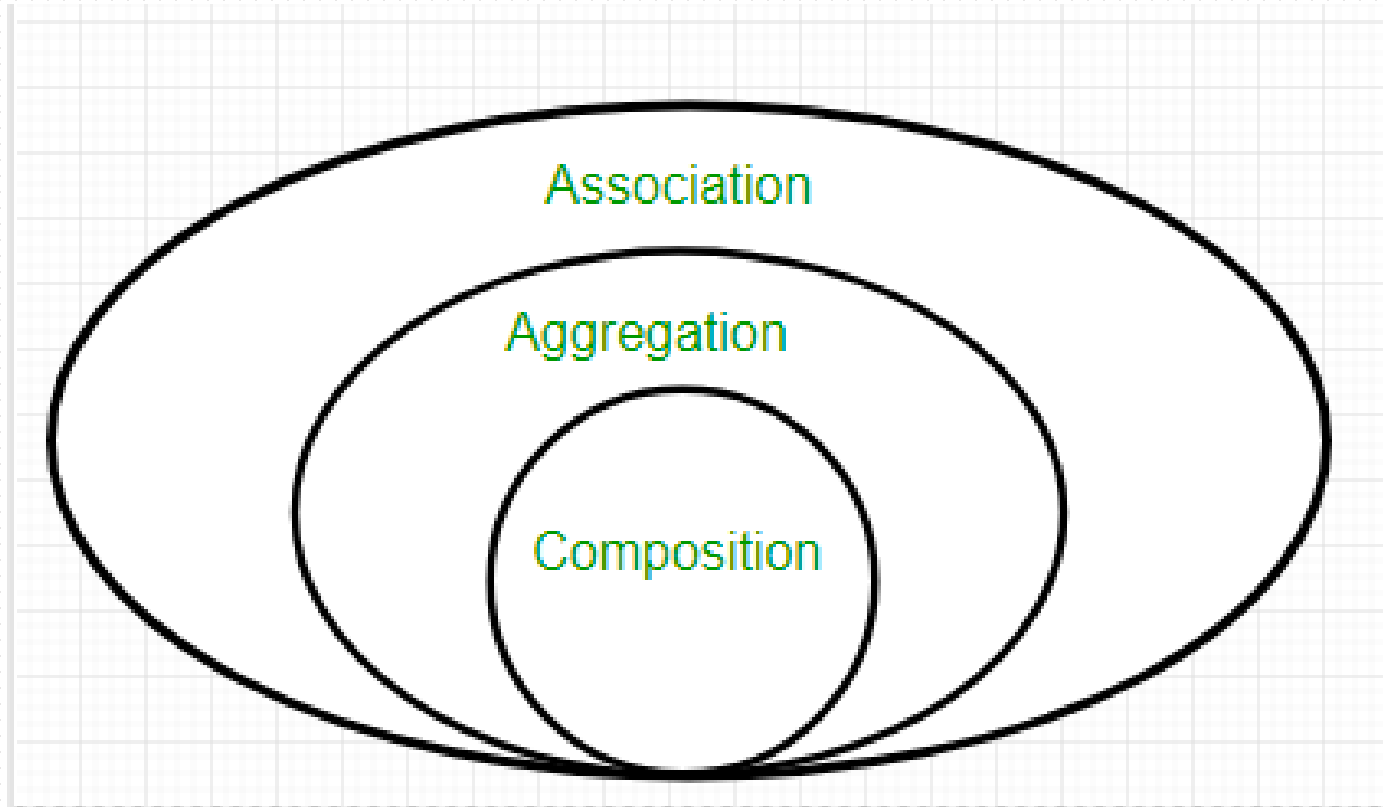


Source: <https://www.visual-paradigm.com/guide/uml-unified-modeling-language/uml-aggregation-vs-composition/>

# Association, Aggregation, and Composition

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The composition and aggregation are two subsets of association.



Source: <https://www.geeksforgeeks.org/association-composition-aggregation-java/>



# Association vs Aggregation vs Composition

Property	Composition	Aggregation	Association
Relationship type	Whole/part	Whole/part	Otherwise unrelated
Members can belong to multiple classes	No	Yes	Yes
Members' existence managed by class	Yes	No	No
Directionality	Unidirectional	Unidirectional	Unidirectional or bidirectional
Relationship verb	Part-of	Has-a	Uses-a

*THANK YOU*

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