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CHANGE THE WORLD FROM HERE

Inheritance

An Introduction

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Relationship Types

- **Composition**
  - "has-a" relationship
  - *e.g.* X **has a** Y
- **Inheritance**
  - "is-a" relationship
  - *e.g.* X **is a** Y

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Relationship Examples

- A rectangle — width and height
- A rectangle — area
- A square — rectangle
- A rectangle — polygon
- A polygon — 2D shape

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Relationship Examples

- A rectangle **has-a** width and height
- A rectangle **has-a** area
- A square **is-a** rectangle
- A rectangle **is-a** polygon
- A polygon **is-a** 2D shape

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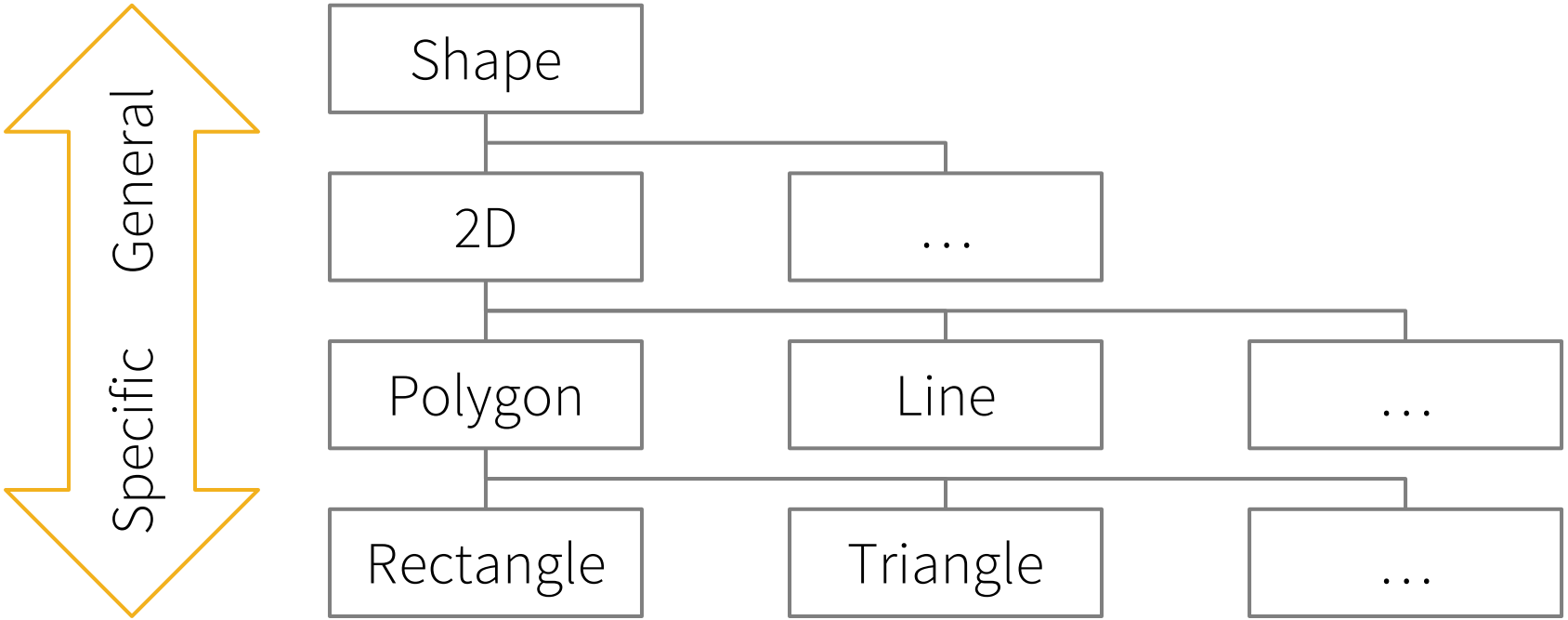
Inheritance Hierarchy



Terminology

Rectangle is-a Polygon is-a 2D Shape

- Polygon is a of Rectangle
- 2D shape is an of Rectangle
- Rectangle is a of Polygon
- Rectangle is an of 2D Shape

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Terminology

Rectangle is-a Polygon is-a 2D Shape

- Rectangle from Polygon
- Polygon from 2D Shape
- Rectangle Polygon
- Polygon 2D Shape

Access

Rectangle extends Polygon extends 2D Shape

- Rectangle may not access **private** methods or members in Polygon or 2D Shape
- Rectangle may access **public** or **protected** methods or members in Polygon and 2D Shape

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Behavior

Rectangle extends Polygon extends 2D Shape

- Rectangle may **override** methods in Polygon (use the `@Override` annotation)
- Rectangle may add additional methods not already defined in Polygon

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Behavior

Rectangle extends Polygon extends 2D Shape

- Rectangle may explicitly call the constructor for Polygon using the `super()` method
- Chain constructors so Rectangle calls Polygon constructor, which calls 2D Shape constructor

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Behavior

Rectangle extends Polygon extends 2D Shape

- Rectangle eventually inherits from the `Object` class (explicitly or implicitly)
- Rectangle inherits default `toString()` and other methods from the `Object` class

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