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CS111: PROGRAMMING LANGUAGE II

Computer Science
Department

Lecture 5: Inheritance Hierarchy



Lecture Contents

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- Inheritance Hierarchy
- Constructors call chain
- Case study : Campus Community





Inheritance Hierarchy

- A superclass exists in a hierarchical relationship with its subclasses.
- Each arrow in the Inheritance hierarchy represents an *is-a relationship*.
- The **direct superclass** is the superclass from which the subclass explicitly inherits.
- An **indirect superclass** is any class above the direct superclass in the **class hierarchy**.





Inheritance Hierarchy

Starting from the bottom, you can follow the arrows and apply the is-a relationship up to the topmost superclass.

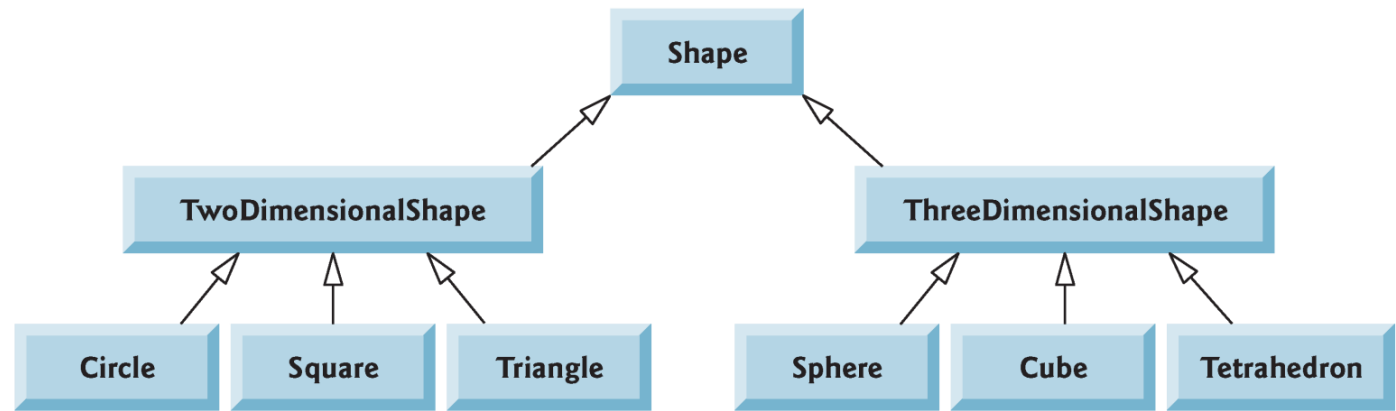


Fig. 9.3 | Inheritance hierarchy for Shapes.

A **Triangle** is a **TwoDimensionalShape** and is a **Shape**

A **Sphere** is a **ThreeDimensionalShape** and is a **Shape**.



Constructors call chain

- Instantiating a subclass object begins a chain of constructor calls
 - The subclass constructor, before performing its own tasks, invokes its direct superclass's constructor
- If the superclass is derived from another class, the superclass constructor invokes the constructor of the next class up the hierarchy, and so on.
- The last constructor called in the chain is always class `Object`'s constructor.
- Original subclass constructor's body finishes executing last.
- Each superclass's constructor manipulates the superclass instance variables that the subclass object inherits.





Case Study: Campus Community

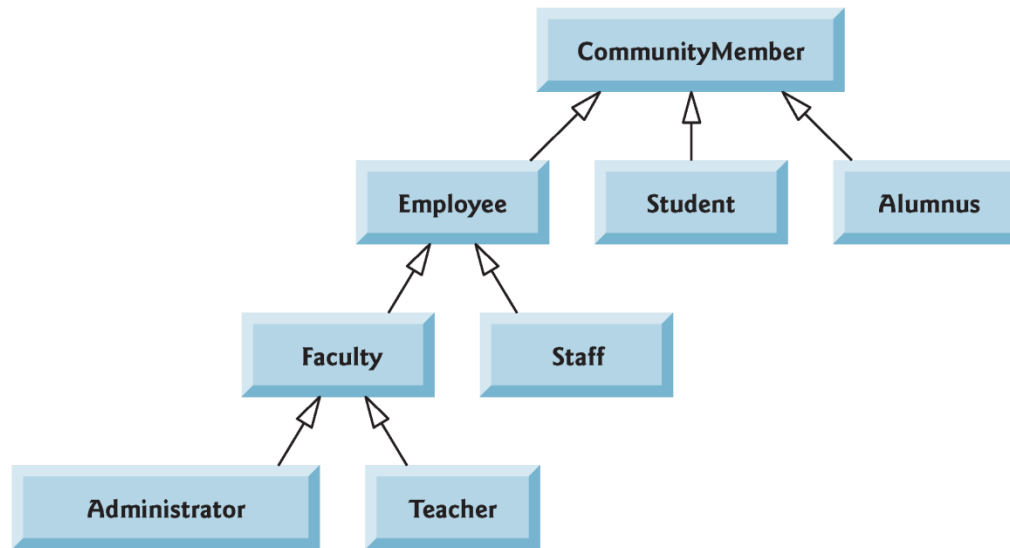


Fig. 9.2 | Inheritance hierarchy for university CommunityMembers.

CommunityMember is the **direct superclass** of Employee, Student and Alumnus and is an **indirect superclass** of all the other classes in the diagram.



Class Design

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CommunityMember

- First Name
- Last Name
- SSN
- BirthDate





Class Design

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Employee

- Title
- HireDate
- Salary

Student

- UnvID
- Faculty
- Level





Class Design

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Faculty

- Degree(BSc, MSc, PhD)
- Specialty

Staff

- Full/partTime





Constructors in Subclasses

- ❑ Constructors are not inherited.
- ❑ The first task of a subclass constructor is to call its direct superclass's constructor explicitly or implicitly
 - ▣ Ensures that the instance variables inherited from the superclass are initialized properly.
- ❑ If the code does not include an explicit call to the superclass constructor, Java implicitly calls the superclass's default or no-argument constructor.
- ❑ A class's default constructor calls the superclass's default or no-argument constructor.



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That's all for today,,,



Text Book ref.

Chapter 9