

Advanced Programming

Object-Oriented Programming Introduction

Instructor: Ali Najimi

Author: Hossein Masihi

Department of Computer Engineering

Sharif University of Technology

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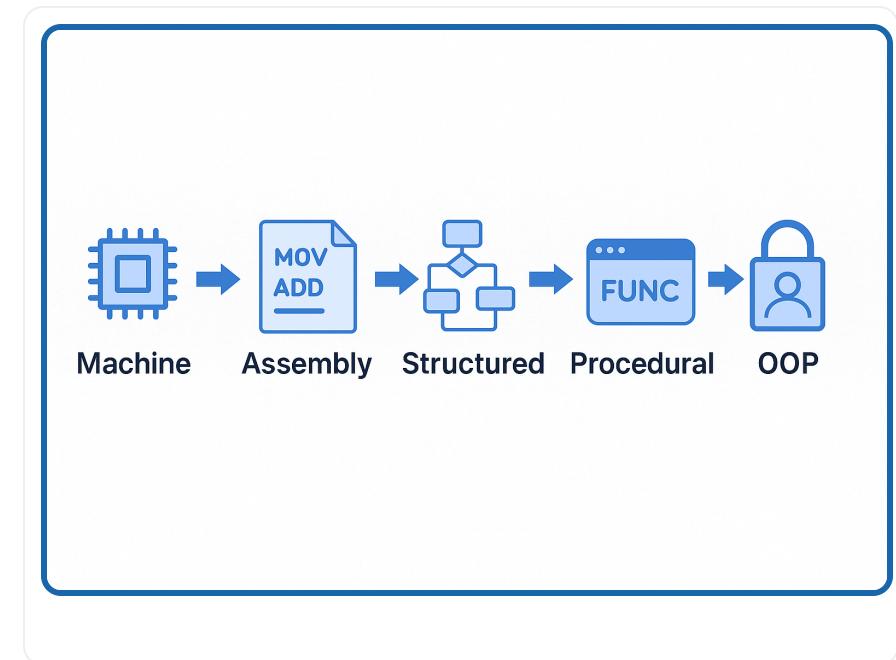
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History of Programming Paradigms

- Machine → Assembly → Structured → Procedural → OOP
- Each paradigm solved the growing complexity of software.
- OOP combines **data and behavior** into one logical unit.



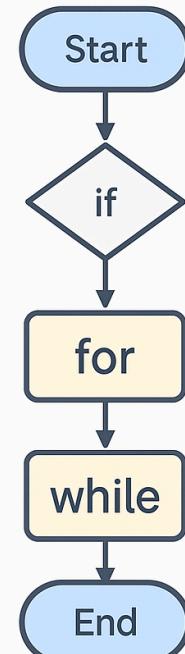


Structured Programming

- Introduced loops, functions, and modules.
- Removed “spaghetti code”.
- Example:

```
for(int i = 0; i < 5; i++) {  
    printf("%d", i);  
}
```

Structured Programming



- functions

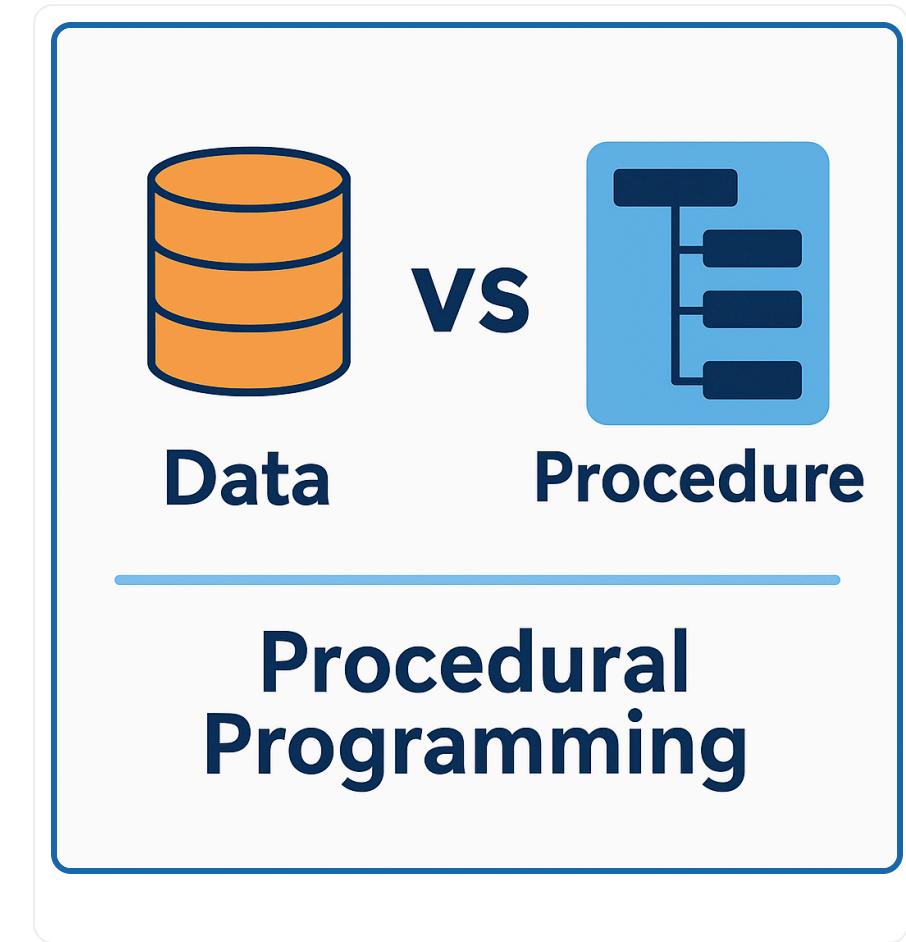
```
printf("%d", i);
```



Procedural Programming

- Uses **functions (procedures)** to organize logic.
- Data and logic are separate.
- Example:

```
void deposit(float amount) {  
    balance += amount;  
}
```

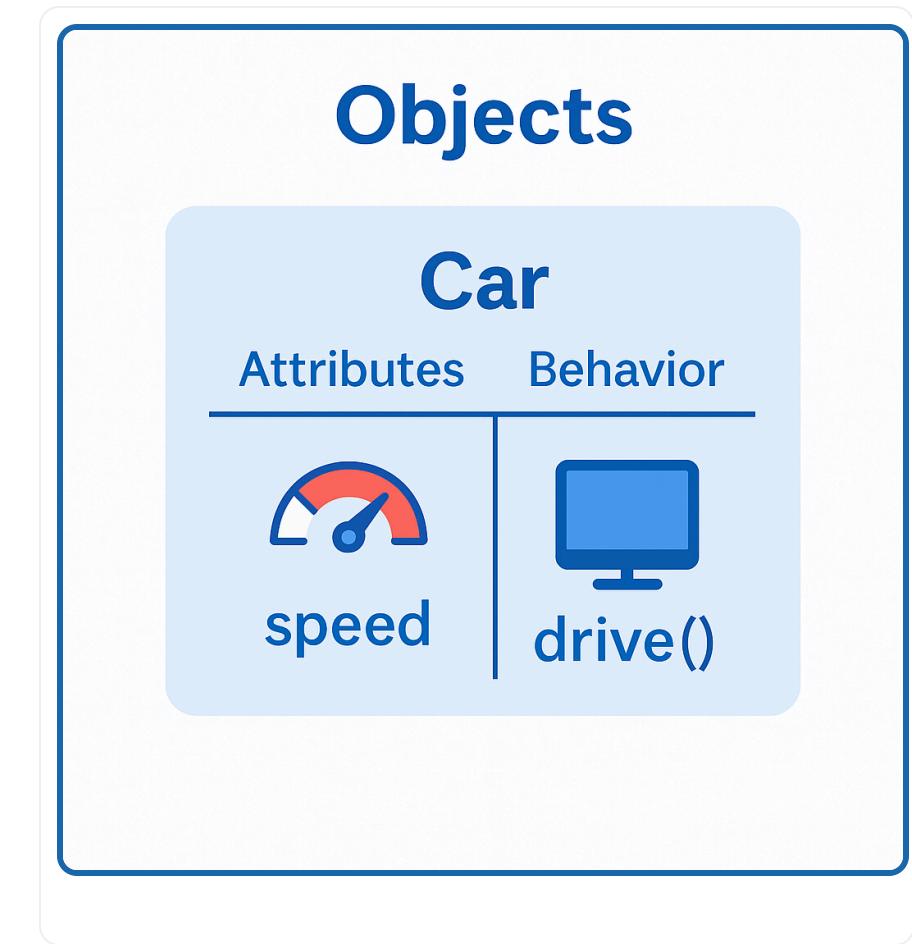




Object-Oriented Programming (OOP)

- Introduced in **Simula (1967)**, popularized by **C++ and Java**.
- Models real-world entities as **objects**.
- Example:

```
class Car {  
    int speed;  
    void drive() {  
        System.out.println("Driving...");  
    }  
}
```

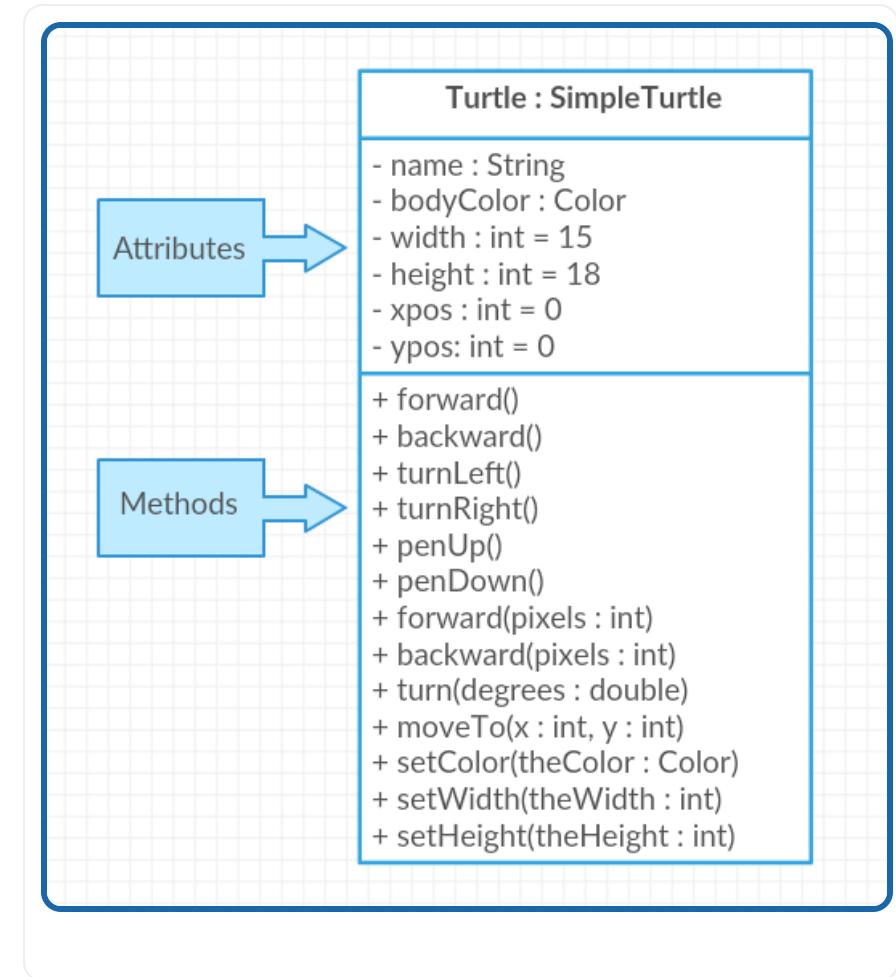




Classes and Objects

- **Class:** blueprint (e.g., Car, Student).
- **Object:** instance of a class.
- **Properties:** Attributes
- **Procedures:** Methods

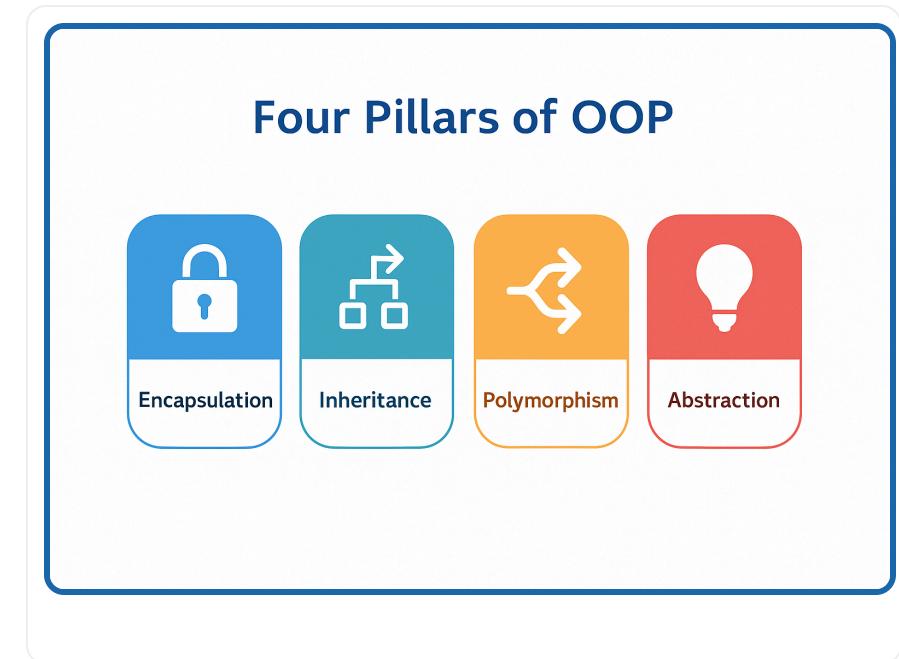
```
class Circle {  
    double radius;  
    double area() {  
        return Math.PI * radius * radius;  
    }  
}  
Circle c = new Circle();  
c.radius = 5;  
System.out.println(c.area());
```





Four Pillars of OOP

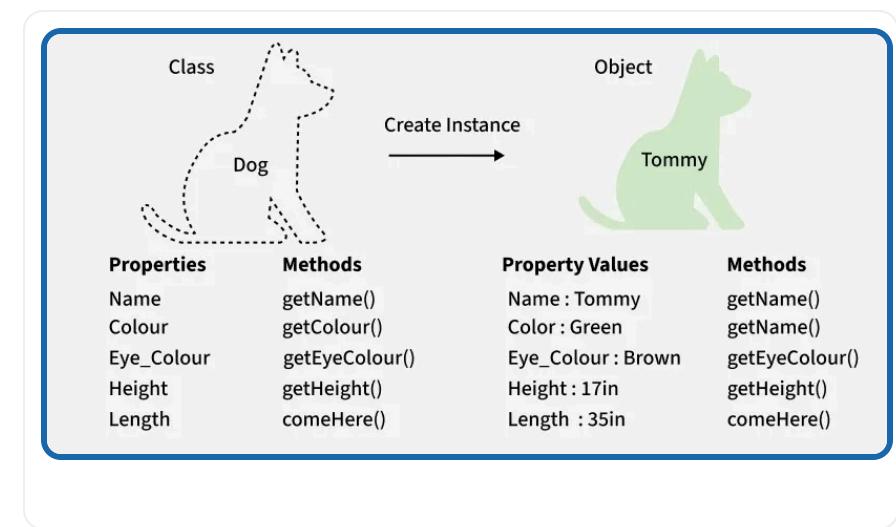
1. **Encapsulation** – Hide internal data
2. **Inheritance** – Reuse behavior
3. **Polymorphism** – Many forms of one interface
4. **Abstraction** – Show essentials, hide details





Classes and Objects: Example

- Define Animal
- Define Dog
- Define Cat
- Define Table
- Define Chair

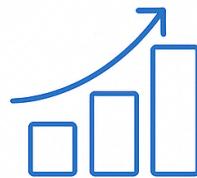




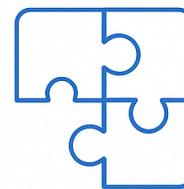
Advantages of OOP

- Improves reusability
- Supports modular design
- Easier debugging
- Enables teamwork
- Better mapping to real-world problems

Benefits of OOP



Reusability



Modularity



Maintainability



Teamwork



Thank You

AP — OOP Introduction



I choose a lazy person to do a hard job. Because a lazy person will find an easy way to do it.

— Bill Gates —

AZ QUOTES