Object-Oriented Programming
A Brief History of Programming Paradigms

Functional Programming (1930s - present)

• a function is like a definition of what something is, not a set of actions
• if you call a function twice with the same arguments, you get the same result
• there are no state changes or side effects
• Examples: lambda calculus, logic programming, Lisp, Scheme, Haskell

Imperative Programming (50s - 70s)

• uses statements to change a program's state
• a variable contains a value, an assignment statement changes it
• a print statement sends a value to output
• a "go to" transfers control to another statement
• "verbs" are the most important thing
• Functions / subprograms not really emphasized - used for reuse
• Examples: FORTRAN, COBOL, Algol, Basic
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Procedural Programming

- Similar to Imperative, but state changes are localized within subprograms
- State changes are communicated to other subprograms by parameters (arguments, return values)

Structured Programming (70s-80s)

- Focus on making programs easier to write, debug, and understand by use of subprograms, block structures, and for/while loops
- "go to" statements are blasphemous
- Ex: Pascal, C

Object-Oriented Programming (80s - present)

- Imperative in style, structured, but features added to support "objects"
- Ex: Smalltalk, Simula, C++, Python, Visual Basic, Java, Ruby
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In Procedural programs, you:
• break down a task into variables, data structures, and subprograms
• you use subprograms to operate on data structures

In Object-Oriented programs, you:
• define objects that expose behavior (methods) and data (attributes) using well-defined interfaces
• bundle everything together, so that an object only operates on its own attributes using methods
Four Basic Programming Concepts in OOP:

• **Encapsulation**: hiding implementation details of a class from other objects.

• **Abstraction**: simplifying complex reality by modeling classes appropriate to the problem.

• **Inheritance**: a way to define new classes using parts of classes that have already been defined.

• **Polymorphism**: the process of interpreting an operator or function in different ways for different data types.