Object-Oriented Modeling

Object-Oriented Programming

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Outline

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Design Before Code

- **Design** should come before coding.
- Jumping into *code without a plan* leads to confusion and rework.
- **Good design** clarifies the `problem` and guides the `solution`.

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Object-Oriented Approach

- The **object-oriented approach** models the system as a collection of interacting objects.
- Each `object represents` a real-world entity or concept.
- **Objects** encapsulate data and behavior.

Conceptual Design and Technical Design

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- **Technical Design**: How the system will be implemented, using `detailed diagrams` and specifications.
- Both are essential for a successful software project.

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- **Paradigms**: `Imperative`, `Procedural`, `Object-Oriented`, `Functional`, `Logic`.
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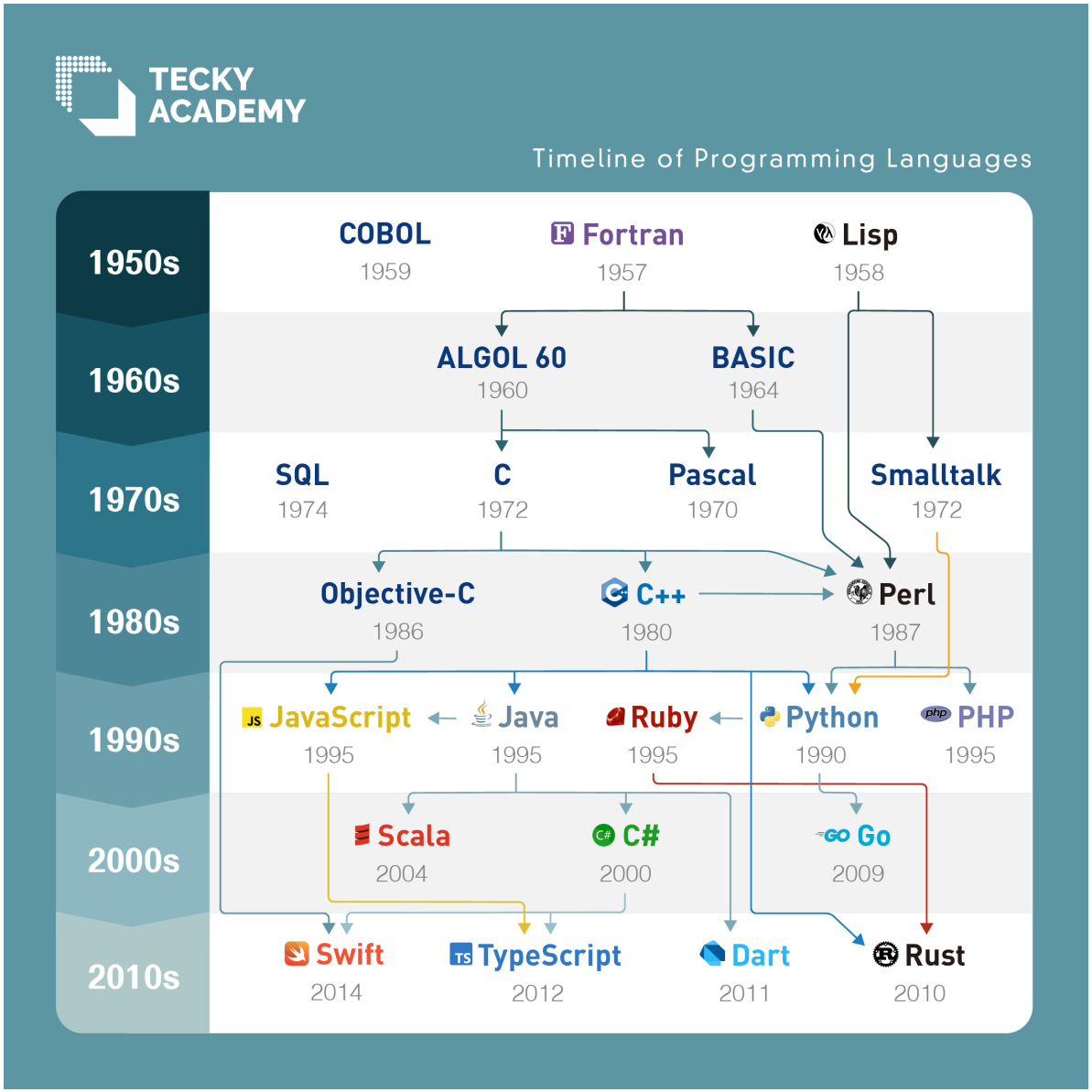
History of Programming Languages



Strategies to Solve Problems

- **Top-Down**: Start from the big picture and break it down into smaller parts.
- **Bottom-Up**: Start from small, well-defined components and integrate them into a complete system.
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Abstraction & CRC Cards

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Encapsulation & UML

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- **Black box**: Focus on what an object does, not how it does it.

Demo time!

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Data Integrity: `Getters` and `Setters`

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Decomposition Example: Kitchen in a House

Association

A **relationship** between two classes where one class uses or interacts with another class.

Aggregation

An **aggregation** is a **whole-part relationship** where one class is a part of another class, but can exist independently.

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Generalization

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- **D.R.Y. Principle**: Don't Repeat Yourself.
- `Behaviors` can be generalized using **inheritance**, interface inheritance, and abstract classes.
- **Polymorphism**: Objects can be treated as instances of their parent class.
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Inheritance & UML

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- **Single Responsibility Principle (SRP)**: A class should have only one reason to change.
- **Open/Closed Principle (OCP)**: A class should be open for `extension`, but closed for `modification`.
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Good Practices

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- **Code to Interfaces, not Implementations**: This principle is about designing your classes so that they depend on interfaces rather than concrete classes.

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