Overview

- Why and Aims
- Prescriptive vs. Descriptive
- Programming Languages Paradigms
- 50 years of Programming Languages
- Overview of the Module
Why and Aims

Why Study Programming Paradigms?
To have the right knowledge of the fundamental tools (i.e. Languages) for developing computer applications.

Aims

- Choose the most appropriate language for any given task;
- Understand obscure features of current languages;
- Have the right competence for learning the novel Programming Languages (syntax, semantics, implementation, and use) of the next future
Prescriptive vs. Descriptive

- Remember:
  - Algorithms = Logic + Control
  - Programs = A Way to Express Algorithms

- Two Main Classes of Programming Languages:
  
  **Prescriptive = How Computation must behave**
  - Imperative Languages: State + Mutable Value + Assignment + Sequence Control

  **Descriptive = What Computation must produce**
  - Declarative Languages: Immutable Value + Application + Composition
The main ones:

- **Procedural**: Fortran, Cobol, Algol, Pascal, C, ADA, ...
- **Functional**: Lisp, Scheme, ML, Haskell, OCAML, ...
- **Algebraic**: Lucid, OBJ, OPAL, ActOne
- **Logic, Constraint-based**: Prolog, LogLisp, Datalog, Parlog (SQL, spreadsheets languages, )...
- **Object Oriented**: Simula67, SmallTalk, C++, OCAML, Java, C#, F#, ...
- **Scripting**: Perl, Python, PHP, JavaScript...
- **Concurrency**: Lucid, OCCAM, C-Linda, PrologLinda, SPARK, Parlog, Java, C#, ...
- **Dataflow**: Lucid, C-Linda, PrologLinda,...
- **Multi-paradigms**: most of the most recent ones
Overview of the Module

**Specific Aim.** The knowledge of the main Programming Paradigms (including, Procedural, Functional, Logic, and Object, for sure) from the following viewpoints:

- **Syntax and Semantics:** Formalization of the constructs
- **Programming Methodologies:** Use of the constructs in the Program Development Approaches
- **Supporting Structures:** Implementation of constructs
- **ACRONYM:** FUI

**Material.**

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http://didawiki.cli.di.unipi.it/doku.php/magistraleinformatica/plp/start

Complementary Readings