Programming Languages

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  - but we will use examples from many languages to examine more general principles
- "Language wars" ("Which is better, Python, Java or C++?")
  - but you will learn about criteria that can be used to compare different languages

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  - Example: How should recursive calls be implemented? How does "garbage collection" work?
- What are the different programming paradigms?
  - Example: Why would anyone ever use a language like ML rather than C++ or Java?

Why Study Programming Languages?

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- Help you choose a language.
- Make it easier to learn new languages.
- Help you make better use of whatever language you use.

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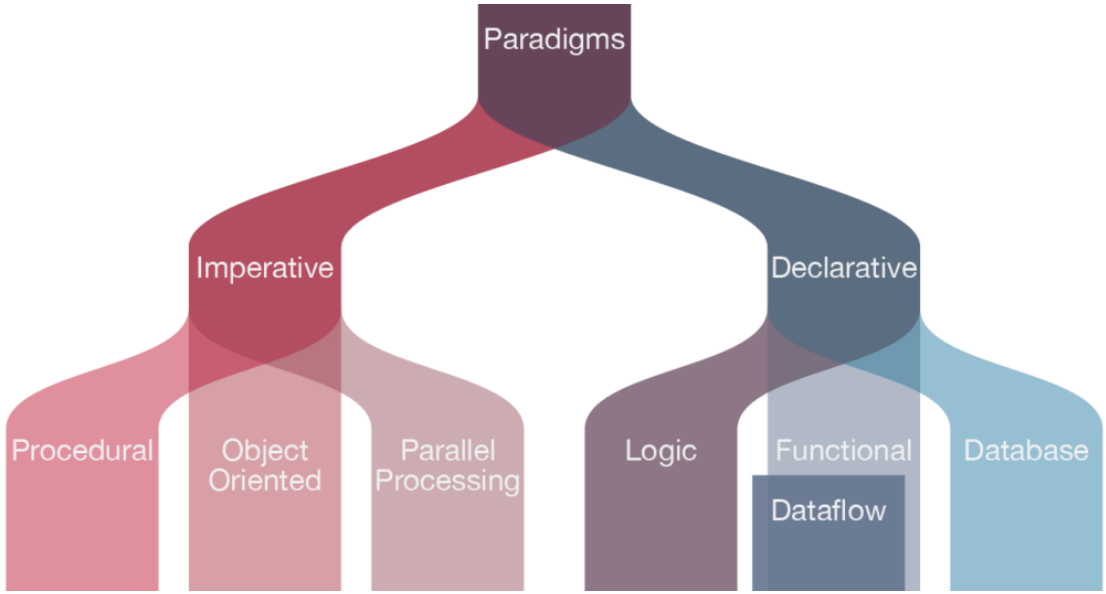
Programming Language Paradigms



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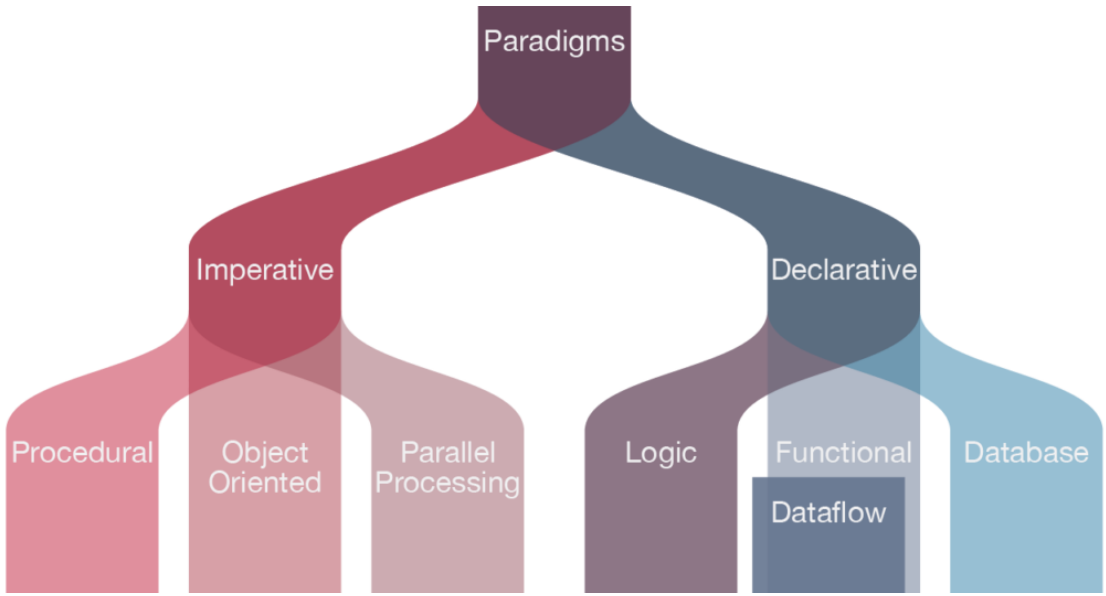

declarative	
functional	Lisp/Scheme, ML, Haskell
dataflow	Id, Val
logic, constraint-based	Prolog, spreadsheets
template-based	XSLT
imperative	
von Neumann	C, Ada, Fortran, . . .
scripting	Perl, Python, PHP, . . .
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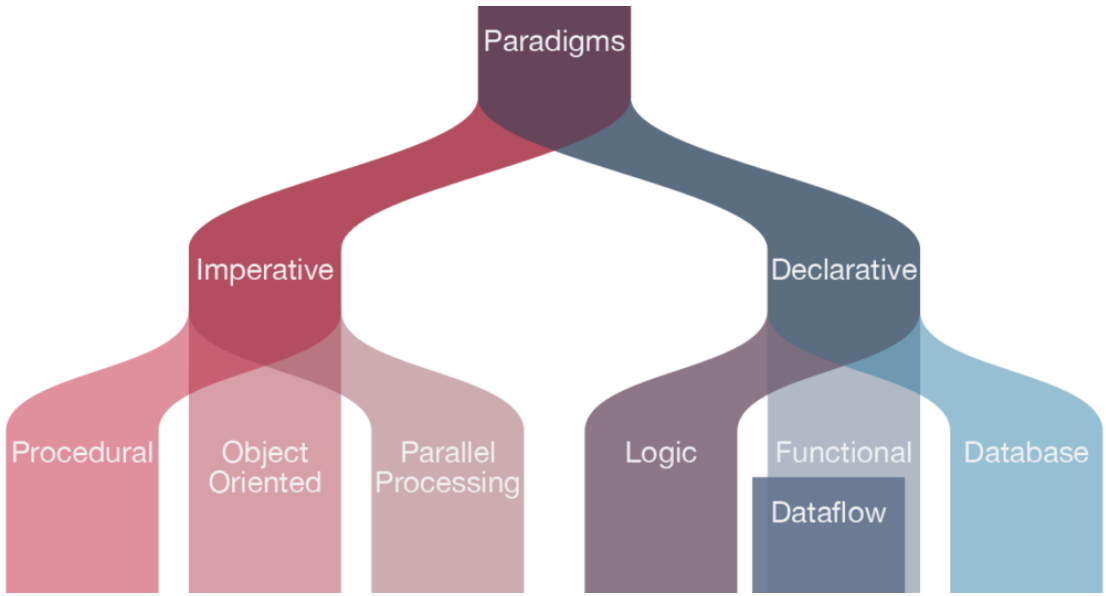

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Image credits: https://thepafhelper.blogspot.com and PLP book

What makes a language successful?

Language Evaluation Criteria

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- **Cost**: the ultimate total cost

Art of Programming Language Design Activity

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- Choose one programming language
- Working in a group, investigate the following:
  1. Key characteristics of the language **design**.
  2. Historical context (how it started, when, by whom, the first language, etc.).
  3. The purpose/usage (why is it there).
- Prepare to share your findings.

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- Evolution
- Socio-economic factors
- Special purposes
- Special hardware
- Range of ideas