How computers understand your instructions

* Compilers: Whole program is converted into machine language before execution
* Interpreters: Program is converted into machine language as the program runs
* Hybrids: Combination of compiler and interpreter
* Transpiler: Program is translated into a different programming language

Program Domains

* Scientific Applications
* Business Applications
* Artificial Intelligence
* Systems Programming
* Web Software

What Makes a Language Good?

* Readability
* Writability
* Reliability
* Cost
* Others
  + Portability
  + Generality
  + Well-definedness

Language Categories

* Imperative
* Functional
* Logic
* Markup/programming hybrid

History of Languages

* Fortran:
* Lisp: Designed for AI research
* ALGOL 60: The first step towards sophistication
* COBOL: Computerizing business records
* Basic: Designed for anyone to be able to learn
* PL/I: First language with exception handling and pointers
* APL: Highly expressive hardware description language
* SNOBOL: Dynamic string manipulation language
* Pascal: Designed for teaching structured programming
* C: Designed for systems programming with powerful operators
* Prolog: Logic based programming
* Ada: Largest design effort, containing packages and concurrency
* Smalltalk: Object oriented programming
* C++: Combining imperative and object-oriented programming
* Objective-C: C++, but for Apple’s systems programming
* Java: Imperative-based, object-oriented language
* Perl: CGI programming on the web
* JavaScript: Client-side scripting language for creating dynamic HTML documents
* PHP: Server-side scripting languages for form processing and database access
* Python: Object-oriented scripting language that’s type checked and dynamically typed
* Ruby: Pure object-oriented scripting language
* Lua: Object-oriented scripting language that’s easily extendable
* C#: The flagship .NET language

Terminology

* Lexeme: Lowest level syntactic unit of a language (\*, sum, begin)
* Token: Category of lexemes (identifier)
* Sentence: String of characters over some alphabet
* Language: Set of sentences