

Foundations: program definition

- Syntax

- “... *the rules and principles that govern the sentence structure of any individual language*” -- Wikipedia
- Standard: base a programming language syntax on a *context free grammar*

- Semantics

- “*the meaning or relationship of meanings of a sign or set of signs*” -- Merriam-Webster Dictionary
- Standards for defining semantics vary

Context free grammar

- *Nonterminal symbols* for key syntactic categories
- A *start symbol* (a nonterminal)
- *Terminal symbols*, which appear in “sentences”
- *Productions*, rules showing how symbols compose to form sentences

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Example nonterminals:

P - programs ← start

S - statements

e - expressions

Example terminals:

0 3.14 15 'a' "hi" ... *literals*

if then else end... *keywords*

x y time len ... *identifiers*

< => + * / ... *operators*

Our examples will use:

num - for numeric literals

id - for identifiers

op - for operators