How Can We Define Languages in Computer Science?

Several scientific methods have been developed to precisely define the syntactic rules of languages.

Backus-Naur Form (BNF):

A **meta-language** used to describe the syntax of languages.

<name>	meta-symbol
::=	definition
|	alternative
{expression}	repetition (minimum and maximum repetitions can be specified using subscripts)
GOTO	terminal symbol (in quotes for clarity, can also use apostrophes instead)

1. Example: Syntax of License Plates

Let’s start with a few typical examples and try to generalize:

`ABC-1234, GHT-234, HSD-333, AI-BB-654`

Syntax definition: $$ <license_plate>::=<newType> | <oldType> \\ <oldType>::=\{<letter>\}_3^3 − \{<number>\}_3^3 \\ <newType>::=\{<letter>\}_2^2 − \{<letter>\}_2^2 − \{<number>\}_3^3 \\ <letter>::=A|B|C...|Z \\ <number>::=0|1|2|3|4|5|6|7|8|9 \\ $$

2. Example: Syntax of Phone Calls in Hungary

Let’s list a few examples and try to generalize:

`062012345, +36301234567, 0680460046`

Syntax definition: $$ <phone call>::= \{<prefix>\}_0^1 <city> <customer> \\ <prefix>::=\{+\}_0^1 36|06 \\ <city>::=\{<number>\}_1^2\\ <customer>::=\{<number>\}_6^7\\ <number>::=0|1|2|3|4|5|6|7|8|9 \\ $$

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