

7 languages in 30 minutes

RETHINK COMPUTATION AND LANGUAGE



contents

1. a linear memory based language
2. a pattern matching based language
3. a meta language
4. a stack based language
5. a (markup) language
6. a macro language
7. a modeling language

Linear memory

Memory cells

Addressing

Pointer

Increment/Decrement

Program Counter

PC-Stack

Brainfuck

MINIMAL MODEL FOR COMPUTATION

Pattern matching

$a = a;$
 $X = a;$ $//\Rightarrow X \text{ results } a$
 $a(b, c) = X;$ $//\Rightarrow X \text{ results } a(b, c)$
 $a(X, c) = a(b, Y);$ $//\Rightarrow X \text{ results } b, Y \text{ results } c$
 $[H|T] = [1,2,3,4,5];$ $//\Rightarrow H \text{ results } 1, T \text{ results } [2,3,4,5]$

length of a list

```
len([], 0).  
len([_:_], X) :- len(T, Y), X is Y+1.
```

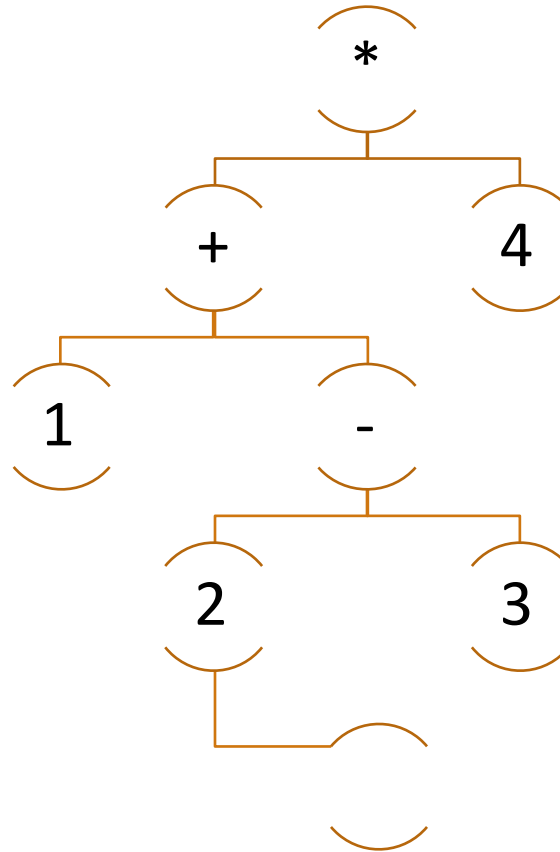
Prolog

PROGRAMMING LOGIC

program as data

$$(1 + (2 - 3)) \times 4$$

program as data



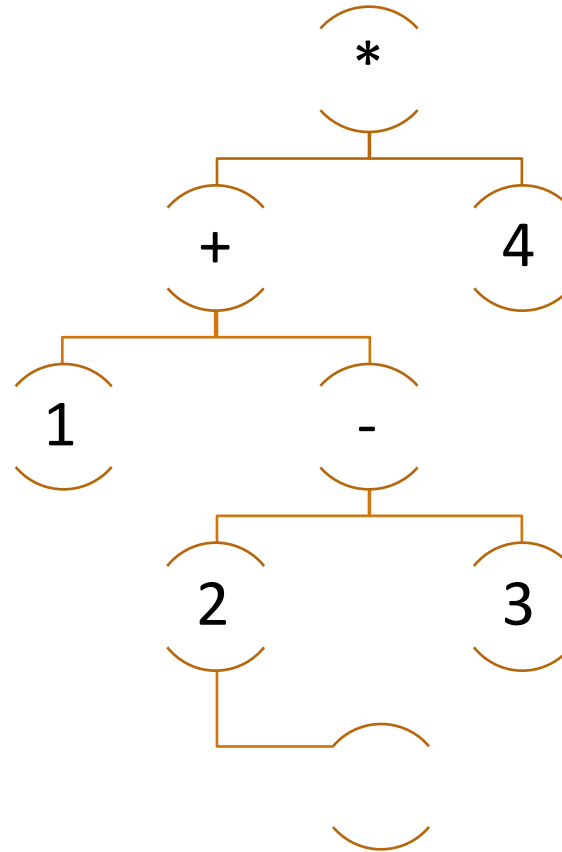
program as data

`(* (+ 1 (- 2 3)) 4)`

Scheme

LOST IN STUPID PARENS

stack-based operations



postfix expression

1 2 3 - + 4 *

stack-based operations

see <04/fix.cpp>

JVM bytecode

0: iconst_2	18: irem
1: istore_1	19: ifne 25
2: iload_1	22: goto 38
3: sipush 1000	25: iinc 2, 1
6: if_icmpge 44	28: goto 11
9: iconst_2	31: getstatic #84; // Field java/lang/System.out:Ljava/io/PrintStream;
10: istore_2	34: iload_1
11: iload_2	35: invokevirtual #85; // Method java/io/PrintStream.println:(I)V
12: iload_1	38: iinc 1, 1
13: if_icmpge 31	41: goto 2
16: iload_1	44: return
17: iload_2	

PostScript/Forth

PROGRAMMING LANGUAGE FOR PUBLISHING AND PRINTING



represent a math expression

$$a \times b \Rightarrow a \times b ?$$

$$\frac{a}{b} \Rightarrow a / b ?$$

$$\lim_{x \rightarrow 0} \sin x \Rightarrow \lim x \rightarrow 0 \sin x ?$$

$$\sum x^2 \Rightarrow \text{SIGMA } x^2 ?$$

represent a math expression

$$a \times b \Rightarrow a \backslash \text{times } b$$

$$\frac{a}{b} \Rightarrow \backslash \text{frac}\{a\}\{b\}$$

$$\lim_{x \rightarrow 0} \sin x \Rightarrow \backslash \text{lim_}\{x \rightarrow 0\}\{\sin x\}$$

$$\sum x^2 \Rightarrow \backslash \text{sum}\{x^2\}$$

represent an article

\article

\section

\subsection

\paragraph

\theorem

...

XML

<article>

<section>

<subsection>

<p></p>

<subsection>

</section>

</article>

XSLT

LaTeX

ALL YOU NEED IS A SUITABLE DISTRIBUTION



magic of string substitution

- ❖ Define
- ❖ Quote
- ❖ Eval
- ❖ Meta-programming
- ❖ Tokens
- ❖ Recursion

m4

LAZYPYMAN'S LAZY TOOL

?

WHAT YOU CAN MAKE

