Script generated by TTT

Title: Petter: Compiler Construction (23.04.2020) - 02: Regular Expressions

Date: Tue Apr 21 15:09:35 CEST 2020

Duration: 20:10 min

Pages: 4

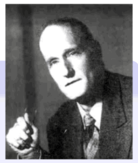
Chapter 1:

Basics: Regular Expressions

Regular Expressions

Basics

- Program code is composed from a finite alphabet Σ of input characters, e.g. Unicode
- The sets of textfragments of a token class is in general regular.
- Regular languages can be specified by regular expressions.


Stephen Kleene

Definition Regular Expressions

The set $\mathcal{E}_\Sigma$ of (non-empty) regular expressions is the smallest set $\mathcal{E}$ with:

- $\epsilon \in \mathcal{E}$ (ϵ a new symbol not from Σ);
- $a \in \mathcal{E}$ for all $a \in \Sigma$;
- $(e_1 \mid e_2), (e_1 \cdot e_2), e_1{}^* \in \mathcal{E}$ if $e_1, e_2 \in \mathcal{E}$.

Regular Expressions

... Example:

$((a \cdot b^*) \cdot a)$
$(a \mid b)$
$((a \cdot b) \cdot (a \cdot b))$

Regular Expressions

Specification needs Semantics

...Example:

Specification	Semantics
$abab$	$\{abab\}$
$a \mid b$	$\{a, b\}$
ab^*a	$\{ab^n a \mid n \geq 0\}$

For $e \in \mathcal{E}_\Sigma$ we define the specified language $[\![e]\!] \subseteq \Sigma^*$ inductively by:

$$\begin{array}{lcl}
[\![\epsilon]\!] & = & \{\epsilon\} \\
[\![a]\!] & = & \{a\} \\
[\![e^*]\!] & = & ([\![e]\!])^* \\
[\![e_1|e_2]\!] & = & [\![e_1]\!] \cup [\![e_2]\!] \\
[\![e_1 \cdot e_2]\!] & = & [\![e_1]\!] \cdot [\![e_2]\!]
\end{array}$$