CSC 220

9/17/2020

Languages

. The description of a language begins with the identification of its alphabet.

. dög ⟶ not an English word

. Alphabet: the set of symbols that occur in the language.

. A string over an alphabet is a sequence of words and symbols.

. The alphabet of computer language consists of the keywords, symbols, ...

. The set of strings over an alphabet is defined recursively.

. A string is a finite ordered sequence of zero or more elements that are placed next to each other.

. A language is a set of strings.

a : a member of an alphabet

aaa : A string

{aaaa} : A language

$L_1 = \{a, aa, ab\}$

$L_2 = \{a, aa, aaa, aaaa, \ldots\}$

A string containing no elements is called null string and denoted by λ. ----> read as Lambda

Few strings over $\{a, b, c\}$:

a, ab, cb, cba, cccb, ...

. The # of elements that occur in a string S is called the length of S. $|S|$

$|abc| = 3$ $|aa| = 2$

$|\lambda| = 0$

. Concatenation: the operation of placing 2 strings S and t next to each other to form a new string St.

. Concatenation aab, a ⇒ aaba

. $a\lambda = \lambda a = a$

If $A = \{a\}$ is my alphabet

$L_1 = \{a\}$

$L_2 = \{aa, aaa, \lambda\}$

$L_3 = \{\lambda\}$

$L_4 = \{aa, b\}$ is not defined over A.

$S^2 = S.S$

if $S = a$ $\quad SS = a.a = aa$

$S^3 = S.S.S = a.aa = aaa$

$S^1 = S$, $S^0 = \lambda$

Language : $\{ a^n | n \in N \}$

$L = \{ a^0, a^1, a^2, a^3, -- \}$

$= \{ \lambda, a, aa, aaa, -- \}$

$$L_1 = \{ a^m \mid m \in \mathbb{N},\ m \geq 1 \}$$

$\lambda \notin L_1$

$L_1 = \{ a, aa, aaa, aaaa, \ldots \}$

$m = 1$, $m = 2$, $m = 3$, $m = 4$

$a^0 = \lambda$

$$L_2 = \{(ab)^n \mid n \in N\} = \{\lambda, ab, abab, \cdots\}$$

if $n=0$ $\quad (ab)^0 = \lambda$

if $n=1$ $\quad (ab)^1 = ab$

if $n=2$ $\quad (ab)^2 = abab$

if $n=3$ $\quad (ab)^3 = ababab$

λ may be part of a language.

$|\lambda| = 0$

$a\lambda = \lambda a = a$