Lecture 4

Lexical Analysis

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- Recognize tokens and ignore white spaces and comments

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tokens	id	ASSIGN	id	ADDOP	ID
lexeme	a	=	b	+	c

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- Use high-level languages like C
  Efficient but difficult to implement
- Use tools like `lex`, `flex`
  Easy to implement but not as efficient as the first two cases

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Allow white spaces, numbers, and arithmetic operators in an expression

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#include <stdio.h>
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  int t;
  while (1) {
    t = getchar ();
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    else if (isdigit (t) ) {
      tokenval = t - '0'
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      while (isdigit(t)) {
        tokenval=tokenval * 10 + t - '0'
        t = getchar();
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      ungetc(t,stdin);
      return num;
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just like yytext in lex/flex tool

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- Check for the new line
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- Else return the scanned character

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- The first character cannot determine what kind of token we are going to read

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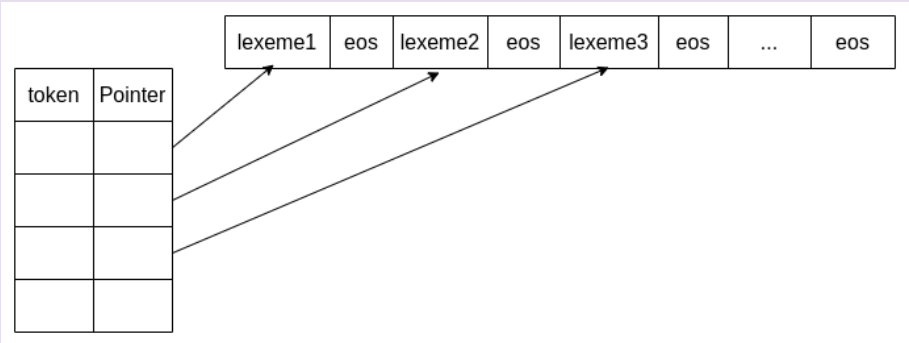

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in entry of every scope, whenever a new symbol table created then initialize it with keywords so that they can't be mistaken for identifiers

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- Initialize symbol table with `insert( "int" , INT )` and `insert( "char" , CHAR)`.
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- Not an error at lexical analysis phase.

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if then then then = else else else = then // valid in PL/1
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- Requires arbitrary lookahead and very large buffers. Worse, the buffers may have to be reloaded.

  ```
  Declare(arg1,arg2,arg3,.......,argn)
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  ```

  it is function call

  it is variable initialization

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- Even today `Foo<Bar<Bazz>>`

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  - Tokens may have similar prefixes.
  - Each character should be looked at only once.

efficiency and robustness of lexical analyzer

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- Where each r_i is a regular expression over $\sum \cup d_1 \cup d_2 \cup \ldots \cup d_{i-1}$

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4. Remove $x_1 \ldots x_i$ from input; go to (2)

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  - The principle of **maximal munch**
- Regular expressions provide a concise and useful notation for string patterns
- Good algorithms require a single pass over the input

Firstly, match longest prefix with the regular expression. If lexeme is matching with two or more RE, then use priority.