Compiler Construction

Lecture # 04

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Phases of Compiler: Lexical Analysis

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   - discards white space and comments

Lexical Analysis: Tokens

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  - **Token-name:** is an abstract symbol that is used during syntax analysis
  - **Attribute-value:** points to an entry in the symbol table for this token. Information from the symbol-table entry is needed for semantic analysis and code generation

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position	(id,1)
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+	(+)
rate	(id,3)
*	(*)
60	(60)

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+	(+)
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- After lexical analysis,

```
(id,1) (=) (id,2) (+) (id,3) (*) (60)
```

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- 2^{nd} phase of Compiler, also known as Parser
- the first component of the tokens, i.e., token-name, is used to construct a syntax tree
- reflects the grammatical structure of the token stream
- in Syntax tree, each inner node represents an operation and the children of the node represents the arguments of the operation

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   - the syntax tree and symbol table is used as input in parallel to check the semantic consistency
   - an important role of semantic analysis is type checking
   - An an example, compiler report an error if a floating point number is used in index array

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   - ```
     t1 = intofloat (60)
     t2 = id3 * t1
     t3 = id2 + t2
     id1 = t3
     ```
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  ```
- each three- address code has at most one operator on the right side
- temporary names such as `t1`, `t2` and `t3` are used to store the computed value
  ```

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- the optimized code (in the previous example) would be

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LDF R2, id3
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LDF R1, id2
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   - `R1`, `R2` and `R2` are memory registers

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   - `R1`, `R2` and `R2` are memory registers
   - The `F` in each instruction depicts floating-point numbers