

CSE 440 - Compiler Construction I

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1 Week of August 14th, 2016

1.1 Compiler Components

1. Syntax
 - (a) Lexical Analysis
 - (b) Parsing
2. Semantics
 - (a) Type Checking (*Project 1*)
 - (b) Code Generation
 - i. Intermediate Representation (*Project 2*)
 - ii. Analysis/Optimization (*Project 2*)
 - iii. Low Level Code Generation & Optimization (*Project 3 & 4*)

1.2 Language Components

1. Character Set
2. Tokens: sequence of characters
 - (a) identifiers
 - (b) keywords
 - (c) separators
 - (d) operators
 - (e) built-in types
 - (f) modifiers

Tokens are defined using regular expressions.

1.3 Regular Expressions

Regular Expression	String Representation
\emptyset	<i>empty set</i>
ϵ	<i>empty string</i>
a	$\{a\}$
$R_1 R_2$	$L(R_1) \cup L(R_2)$
$R_1 \cdot R_2$	$L(R_1) \cdot L(R_2)$
R^*	$\{\epsilon\} \cup L(R) \cup L(R) \cdot L(R) \cup \dots$
(R)	<i>grouping</i>

$L(R)$ The set of strings that R represents, also known as the *language of R*.
Precedence $*$ \rightarrow \cdot \rightarrow $|$

Regular Expression Example:

ID	<i>letter followed by 0 or more letters or digits</i>
letter	$a \mid b \mid \dots \mid z \mid A \mid B \mid \dots \mid Z$
digit	$0 \mid 1 \mid \dots \mid 9$
ID	$\text{letter} \cdot (\text{letter} \mid \text{digit})^*$

From regular expressions	\longrightarrow	non-deterministic finite state automata
	\hookrightarrow	deterministic finite state automata
	\hookrightarrow	program

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