

# CSE4061 – Compiler Design New Grammar

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## 1 - Grammar of our programming language:

Start  $\rightarrow$  method decls compoundstmt

decls  $\rightarrow$  declaration ; decls |  $\epsilon$

declaration  $\rightarrow$  type ID

type  $\rightarrow$  int | double | short

methoddecls  $\rightarrow$  declaration , methoddecls |  $\epsilon$

method  $\rightarrow$  { methodStatements } | e

methodStatements  $\rightarrow$  methodStatement methodStatements | e

methodStatement  $\rightarrow$  type ID ( methoddecls ) { statements }

compoundstmt  $\rightarrow$  { statements }

statements  $\rightarrow$  statement statements |  $\epsilon$

statement  $\rightarrow$  ifstmt | whilestmt | assignment | compoundstmt | methodCall |

statementDec

statementDec  $\rightarrow$  declaration ;

methodCall  $\rightarrow$  ID ( optparameters ) ;

optparameters  $\rightarrow$  params |  $\epsilon$

params  $\rightarrow$  param A'

A'  $\rightarrow$  , param A' |  $\epsilon$

param  $\rightarrow$  ID | intNumber | doubleNumber | shortNumber

ifstmt  $\rightarrow$  if ( booleanExp ) statement else statement

whilestmt  $\rightarrow$  while ( booleanExp ) statement

booleanExp  $\rightarrow$  arithmeticExp booleanOp arithmeticExp

booleanOp  $\rightarrow$  < | > | <= | >= | == | !=

assignment  $\rightarrow$  ID = arithmeticExp ; | ID = unaryExp ;

unaryExp  $\rightarrow$  ++ ID ;

arithmeticExp  $\rightarrow$  multexpr B'

B'  $\rightarrow$  + multexpr B' | - multexpr B' |  $\epsilon$

multexpr  $\rightarrow$  simpleexpr C'

C'  $\rightarrow$  \* simpleexpr C' | / simpleexpr C' |  $\epsilon$

simpleexpr  $\rightarrow$  ID | intNumber | doubleNumber | shortNumber | ( arithmeticExp )

## 2 - Lexical structure of our programming language:

- Keywords: if, else, while, int, double, short
- Identifiers: An identifier starts with a letter or underscore or dollar sign and continues with letter or digit. Any of the keywords cannot become identifier. Maximum length of the identifier should be at most 64 characters.
- Operator: The followings are operators: + - / \* = == < <= > >= !=
- Delimiters: whitespace
- Numbers: The numbers are defined as follows:

digit  $\leftarrow$  0|1|2|3|4|5|6|7|8|9

intNumber  $\leftarrow$  digit+ (the maximum integer number is 127)

doubleNumber  $\leftarrow$  digit+ (the maximum integer number is 255)

shortNumber  $\leftarrow$  digit+ (the maximum integer number is 63)