

grammar – moses0.1

// GRAMMAR OF A STATEMENT

statement -> **compound-statement**

| **if-statement**
| **while-statement**
| **break-statement**
| **continue-statement**
| **return-statement**
| **expression-statement**
| **declaration-statement**

if-statement ->

"if" **expression** **compound-statement** **"else"** **compound-statement**

while-statement -> **"while"** **expression** **compound-statement**

break-statement -> **"break"** **","**

compound-statement -> **"{"** **statement*** **"}"**

continue-statement -> **"continue"** **","**

return-statement -> **"return"** **expression?** **","**

expression-statement -> **expression?** **","**

class-body -> **"{"** **variable-declaration*** **"}"**

// GRAMMAR OF EXPRESSION

expression -> **assignment-expression**

assignment-expression -> **condition-or-expression**

| **unary-expression** **assignment-operator** **condition-or-expression**

assignment-operator -> **"="** | **"*="** | **"/="** | **"+="** | **"-="** | **"&&="** | **"||="**

cond-or-expression -> **condition-and-expression**

| **condition-or-expression** **"||"** **cond-andition-expression**

cond-and-expression -> **equality-expression**

| **condition-and-expression** **"&&"** **equality-expression**

equality-expression -> **rel-expression**

| **equality-expression** **"=="** **rel-expression**

| **equality-expression** **"!="** **rel-expression**

rel-expression -> **additive-expression**

| **rel-expression** **"<"** **additive-expression**

| rel-expression "<=" additive-expression
| rel-expression ">" additive-expression
| rel-expression ">=" additive-expression

additive-expression -> m-d-expression

| additive-expression "+" m-d-expression
| additive-expression "-" m-d-expression

multiply-expression -> u-expression

| multiply-expression "*" u-expression
| multiply-expression "/" u-expression

u-expression -> "-" u-expression

| "!" u-expression
| ++ u-expression
| -- u-expression
| post-expression

postfix-expression -> primary-expression

| post-expression . identifier
| post-expression ++
| post-expression --

primary-expression -> identifier arg-list?

| "(" expression ")"
| INTLITERAL
| BOOLLITERAL

// GRAMMAR OF PARAMETERS

para-list -> "(" proper-para-list? ")"

proper-para-list -> para-declaration (";" para-decl) *

para-decl -> type identifier

arg-list -> "(" proper-arg-list ? ")"

proper-arg-list -> arg (";" arg) *

arg -> expression

// GRAMMAR OF DECLARATION

declaration-statement -> function-declaration

| constant-declaration
| variable-declaration
| class-declaration

function-declaration -> identifier para-list compound-statement

variable-declaration -> "var" identifier initializer ";"

| "var" identifier type-annotation ";"

| type identifier initializer ";"
| type identifier ";"

class-declaration -> "class" identifier class-body ";"

constant-declaration -> "const" identifier init-expression ";"
| "const" identifier type-annotation ";"

init-expression -> "=" expression

type-annotation -> ":" type

// GRAMMAR OF PRIMITIVE TYPES

type -> "int" | "bool"

// GRAMMAR OF IDENTIFIERS

identifier -> ID

// TOP-LEVEL

top_level : statement*

moses 0.1 – LL(1)

statement -> *compound-statement* | *if-statement* | *while-statement* | *break-statement* | *continue-statement* | *return-statement* | *expression-statement* | *declaration-statement*

if-statement -> **if** *expression* *compound-statement* *else* *compound-statement*

while-statement -> **while** *expression* *compound-statement*

break-statement -> **break** ;

compound-statement -> { *statement-list* }

statement-list -> **EPSILON** | *statement* *statement-list*

continue-statement -> **continue** ;

return-statement -> **return** *expression* ;

return-statement -> **return** ;

expression-statement -> *expression-list* ;

expression-list -> *expression* | **EPSILON**

class-body -> { *variable-declaration-list* }

variable-declaration-list -> *variable-declaration* *variable-declaration-list* | **EPSILON**

expression -> *assignment-expression*

assignment-expression -> *condition-or-expression*
| *u-expression* *assignment-operator* *condition-expression*

assignment-operator -> = | *= | /= | += | -= | &&= | **XX**=

condition-or-expression -> *condition-and-expression* *condition-or-expression-tail*

condition-or-expression-tail -> **EPSILON** | **XX** *condition-and-expression*
condition-or-expression-tail

condition-and-expression -> *equality-expression* *condition-and-expression-tail*

condition-and-expression-tail -> **&& equality-expression equality-expression-tail** | **EPSILON**

equality-expression -> **rel-expression equality-expression-tail**

equality-expression-tail -> **EPSILON** | **== rel-expression equality-expression-tail** | **!= rel-expression equality-expression-tail**

rel-expression -> **additive-expression rel-expression-tail**

rel-expression-tail -> **EPSILON** | **< additive-expression rel-expression-tail** | **<= additive-expression rel-expression-tail** | **> additive-expression rel-expression-tail** | **>= additive-expression rel-expression-tail**

additive-expression -> **m-d-expression additive-expression-tail**

additive-expression-tail -> **EPSILON** | **+ m-d-expression additive-expression-tail** | **- m-d-expression additive-expression-tail**

m-d-expression -> **u-expression m-d-expression-tail**

m-d-expression-tail -> **EPSILON** | *** u-expression m-d-expression-tail** | **/ u-expression m-d-expression-tail**

u-expression -> **- u-expression** | **! u-expression** | **++ u-expression** | **-- u-expression**
| **post-expression**

post-expression -> **primary-expression** | **primary-expression post-expression-tail**

post-expression-tail -> **. identifier post-expression-tail** | **++ post-expression-tail**
| **-- post-expression-tail** | **EPSILON**

primary-expression -> **identifier** | **identifier arg-list** | **(expression)** | **INT-LITERAL** | **BOOL-LITERAL**

para-list -> **()** | **(proper-para-list)**

proper-para-list -> **para-declaration proper-para-list-tail**

proper-para-list-tail -> **, para-declaration proper-para-list-tail** | **EPSILON**

para-declaration -> **type identifier**

arg-list -> **()** | **(proper-arg-list)**

proper-arg-list -> **arg proper-arg-list-tail**

proper-arg-list-tail -> , *arg proper-arg-list-tail* | **EPSILON**

arg -> **expression**

declaration-statement -> *function-declaration* | *constant-declaration* | *variable-declaration* | **class-declaration**

function-declaration -> **identifier** *para-list* *compound-statement*

variable-declaration -> **var identifier** *init-expression* ; | **var identifier** *type-annotation* ;
| **type identifier** *init-expression* ; | **type identifier** ;

class-declaration -> **class identifier** *init-expression* ; | **class identifier** *type-annotation* ;

constant-declaration -> **const identifier** *init-expression* ; | **const identifier** *type-annotation* ;

init-expression -> = **expression**

type-annotation -> : **type**

type -> **int** | **bool**

top-level -> *statement top-level* | **EPSILON**

(注：由于 ‘||’ 运算会被识别为分隔符，所以使用 **xx** 代替)