

```

/**
 * Kotlin syntax grammar in ANTLR4 notation
 */

// SECTION: general

kotlinFile
    : packageHeader importList topLevelObject*
    ;

packageHeader
    : (PACKAGE identifier)?
    ;

importList
    : importHeader*
    ;

importHeader
    : IMPORT identifier MULT?
    ;

topLevelObject
    : declaration
    ;

declaration
    : classDeclaration
    | functionDeclaration
    | propertyDeclaration
    ;

// SECTION: classes

classDeclaration
    : modifiers? CLASS simpleIdentifier
    typeParameters? primaryConstructor?
    delegationSpecifiers?
    (classBody | enumClassBody)?
    ;

primaryConstructor
    : (modifiers? CONSTRUCTOR)? classParameters
    ;

classBody

```

```

        : classMemberDeclarations
        ;

classParameters
    : classParameter*
    ;

classParameter
    : modifiers? (VAL | VAR)? simpleIdentifier type expression?
    ;

delegationSpecifiers
    : annotatedDelegationSpecifier*
    ;

delegationSpecifier
    : constructorInvocation
    | userType
    ;

constructorInvocation
    : userType valueArguments
    ;

annotatedDelegationSpecifier
    : annotation* delegationSpecifier
    ;

typeParameters
    : LANGLE typeParameter+ RANGLE
    ;

typeParameter
    : simpleIdentifier type?
    ;

// SECTION: classMembers

classMemberDeclarations
    : classMemberDeclaration*
    ;

classMemberDeclaration
    : declaration
    ;

```

```
functionValueParameters
    : functionValueParameter*
    ;
```

```
functionValueParameter
    : parameter expression?
    ;
```

```
functionDeclaration
    : modifiers?
      FUN typeParameters? simpleIdentifier
      functionValueParameters
      type? functionBody?
    ;
```

```
functionBody
    : block
    | expression
    ;
```

```
variableDeclaration
    : annotation* simpleIdentifier type?
    ;
```

```
propertyDeclaration
    : modifiers? (VAL | VAR) typeParameters? variableDeclaration
    expression?
    ;
```

```
parameter
    : simpleIdentifier type
    ;
```

// SECTION: enumClasses

```
enumClassBody
    : enumEntries? classMemberDeclarations?
    ;
```

```
enumEntries
    : enumEntry*
    ;
```

```
enumEntry
    : modifiers? simpleIdentifier valueArguments? classBody?
    ;
```

// SECTION: types

```
type
  : parenthesizedType
  | typeReference
  ;

typeReference
  : userType
  | DYNAMIC
  ;

userType
  : simpleUserType+
  ;

simpleUserType
  : simpleIdentifier (typeArguments)?
  ;

typeProjection
  : type | MULT
  ;

parenthesizedType
  : type
  ;
```

// SECTION: statements

```
statements
  : statement*
  ;

statement
  : annotation*
  ( declaration
  | assignment
  | loopStatement
  | expression)
  ;

controlStructureBody
  : block
  | statement
```

```

;

block
  : statements
  ;

loopStatement
  : forStatement
  | whileStatement
  | doWhileStatement
  ;

forStatement
  : annotation* variableDeclaration expression
  controlStructureBody?
  ;

whileStatement
  : expression controlStructureBody?
  ;

doWhileStatement
  : controlStructureBody? expression
  ;

assignment
  : directlyAssignableExpression expression
  | assignableExpression assignmentAndOperator expression
  ;

// SECTION: expressions

expression
  : disjunction
  ;

disjunction
  : conjunction+
  ;

conjunction
  : equality+
  ;

equality
  : comparison (equalityOperator comparison)*

```

```

;

comparison
  : infixOperation (comparisonOperator infixOperation)?
  ;

infixOperation
  : elvisExpression (inOperator elvisExpression | isOperator type)*
  ;

elvisExpression
  : infixFunctionCall
  ;

infixFunctionCall
  : rangeExpression (simpleIdentifier rangeExpression)*
  ;

rangeExpression
  : additiveExpression+
  ;

additiveExpression
  : multiplicativeExpression (additiveOperator
multiplicativeExpression)*
  ;

multiplicativeExpression
  : asExpression (multiplicativeOperator asExpression)*
  ;

asExpression
  : comparisonWithLiteralRightSide (asOperator type)?
  ;

comparisonWithLiteralRightSide
  : prefixUnaryExpression (LANGLE literalConstant RANGLE
expression)*
  ;

prefixUnaryExpression
  : unaryPrefix* postfixUnaryExpression
  ;

unaryPrefix
  : annotation

```

```

    | prefixUnaryOperator
    ;

postfixUnaryExpression
    : primaryExpression postfixUnarySuffix*
    ;

postfixUnarySuffix
    : postfixUnaryOperator
    | typeArguments
    | callSuffix
    | indexingSuffix
    | navigationSuffix
    ;

directlyAssignableExpression
    : postfixUnaryExpression assignableSuffix
    | simpleIdentifier
    | parenthesizedDirectlyAssignableExpression
    ;

parenthesizedDirectlyAssignableExpression
    : directlyAssignableExpression
    ;

assignableExpression
    : prefixUnaryExpression | parenthesizedAssignableExpression
    ;

parenthesizedAssignableExpression
    : assignableExpression
    ;

assignableSuffix
    : typeArguments
    | indexingSuffix
    | navigationSuffix
    ;

indexingSuffix
    : expression+
    ;

navigationSuffix
    : memberAccessOperator (simpleIdentifier |
parenthesizedExpression | CLASS)

```

```

;

callSuffix
: typeArguments? valueArguments? annotatedLambda
| typeArguments? valueArguments
;

annotatedLambda
: annotation* lambdaLiteral
;

typeArguments
: RANGLE typeProjection+ RANGLE
;

valueArguments
: valueArgument*
;

valueArgument
: annotation? simpleIdentifier? MULT? expression
;

primaryExpression
: parenthesizedExpression
| simpleIdentifier
| literalConstant
| stringLiteral
| functionLiteral
| thisExpression
| superExpression
| ifExpression
| whenExpression
| jumpExpression
;

parenthesizedExpression
: expression
;

literalConstant
: BooleanLiteral
| IntegerLiteral
| HexLiteral
| BinLiteral
;

```



```

stringLiteral
    : lineStringLiteral
    ;

lineStringLiteral
    : (lineStringContent | lineStringExpression)*
    ;

lineStringContent
    : LineStrText
    | LineStrEscapedChar
    | LineStrRef
    ;

lineStringExpression
    : expression
    ;

lambdaLiteral
    : lambdaParameters? statements
    ;

lambdaParameters
    : lambdaParameter+
    ;

lambdaParameter
    : variableDeclaration
    ;

functionLiteral
    : lambdaLiteral
    ;

thisExpression
    : THIS
    ;

superExpression
    : SUPER (LANGLE type RANGLE)? (AT_NO_WS simpleIdentifier)?
    ;

ifExpression
    : expression controlStructureBody?
    | expression controlStructureBody? ELSE controlStructureBody?

```

```

;

whenSubject
  : (annotation* VAL variableDeclaration)? expression
  ;

whenExpression
  : whenSubject? whenEntry*
  ;

whenEntry
  : whenCondition+ controlStructureBody
  | ELSE controlStructureBody
  ;

whenCondition
  : expression
  | rangeTest
  | typeTest
  ;

rangeTest
  : inOperator expression
  ;

typeTest
  : isOperator type
  ;

jumpExpression
  : RETURN expression?
  | CONTINUE
  | BREAK
  ;

assignmentAndOperator
  : ADD_ASSIGNMENT
  | SUB_ASSIGNMENT
  | MULT_ASSIGNMENT
  | DIV_ASSIGNMENT
  | MOD_ASSIGNMENT
  ;

equalityOperator
  : EXCL_EQ
  | EQEQ

```

```

;

comparisonOperator
: LANGLE
| RANGLE
| LE
| GE

inOperator
: IN | NOT_IN
;

isOperator
: IS | NOT_IS
;

additiveOperator
: ADD | SUB
;

multiplicativeOperator
: MULT
| DIV
| MOD
;

asOperator
: AS
;

prefixUnaryOperator
: INCR
| DECR
| SUB
| ADD
| excl
;

postfixUnaryOperator
: INCR
| DECR
| EXCL_NO_WS excl

excl
: EXCL_NO_WS
| EXCL_WS

```

```

;

memberAccessOperator
;

// SECTION: modifiers

modifiers
: (annotation | modifier)+
;

modifier
: classModifier
| memberModifier
| visibilityModifier
| inheritanceModifier
;

classModifier
: ENUM
| SEALED
| ANNOTATION
| DATA
| INNER
;

memberModifier
: OVERRIDE
| LATEINIT
;

visibilityModifier
: PUBLIC
| PRIVATE
| INTERNAL
| PROTECTED
;

inheritanceModifier
: ABSTRACT
| FINAL
| OPEN
;

// SECTION: annotations

```

```
annotation
  : singleAnnotation
  ;

singleAnnotation
  : (AT_NO_WS | AT_PRE_WS) unescapedAnnotation
  ;

unescapedAnnotation
  : constructorInvocation
  | userType
  ;
```

// SECTION: identifiers

```
simpleIdentifier: Identifier
  | ABSTRACT
  | ANNOTATION
  | BY
  | CATCH
  | COMPANION
  | CONSTRUCTOR
  | CROSSINLINE
  | DATA
  | DYNAMIC
  | ENUM
  | EXTERNAL
  | FINAL
  | FINALLY
  | GET
  | IMPORT
  | INFIX
  | INIT
  | INLINE
  | INNER
  | INTERNAL
  | LATEINIT
  | NOINLINE
  | OPEN
  | OPERATOR
  | OUT
  | OVERRIDE
  | PRIVATE
  | PROTECTED
  | PUBLIC
  | REIFIED
```

```
| SEALED  
| TAILREC  
| SET  
| VARARG  
| WHERE  
| FIELD  
| PROPERTY  
| RECEIVER  
| PARAM  
| SETPARAM  
| DELEGATE  
| FILE  
| EXPECT  
| ACTUAL  
| CONST  
| SUSPEND  
;
```

```
identifier  
    : simpleIdentifier+  
    ;
```

```
/**  
 * Kotlin lexical grammar in ANTLR4 notation  
 */
```

```
// SECTION: separatorsAndOperations
```

```
MULT: '*';  
MOD: '%';  
DIV: '/';  
ADD: '+';  
SUB: '-';  
INCR: '++';  
DECR: '--';  
EXCL_WS: '!' Hidden;  
EXCL_NO_WS: '!';  
ADD_ASSIGNMENT: '+=';  
SUB_ASSIGNMENT: '-=';  
MULT_ASSIGNMENT: '*=';  
DIV_ASSIGNMENT: '/=';  
MOD_ASSIGNMENT: '%=';  
AT_NO_WS: '@';  
AT_PRE_WS: (Hidden | NL) '@' ;  
LANGLE: '<';  
RANGLE: '>';
```

```
LE: '<=';
GE: '>=';
EXCL_EQ: '!=';
EQEQ: '==';
```

// SECTION: keywords

```
FILE: 'file';
FIELD: 'field';
PROPERTY: 'property';
GET: 'get';
SET: 'set';
RECEIVER: 'receiver';
PARAM: 'param';
SETPARAM: 'setparam';
DELEGATE: 'delegate';
```

```
PACKAGE: 'package';
IMPORT: 'import';
CLASS: 'class';
FUN: 'fun';
VAL: 'val';
VAR: 'var';
CONSTRUCTOR: 'constructor';
BY: 'by';
COMPANION: 'companion';
INIT: 'init';
THIS: 'this';
SUPER: 'super';
WHERE: 'where';
ELSE: 'else';
CATCH: 'catch';
FINALLY: 'finally';
RETURN: 'return';
CONTINUE: 'continue';
BREAK: 'break';
AS: 'as';
IS: 'is';
IN: 'in';
NOT_IS: '!is';
NOT_IN: '!in';
OUT: 'out';
DYNAMIC: 'dynamic';
```

// SECTION: lexicalModifiers

```
PUBLIC: 'public';
PRIVATE: 'private';
PROTECTED: 'protected';
INTERNAL: 'internal';
ENUM: 'enum';
SEALED: 'sealed';
ANNOTATION: 'annotation';
DATA: 'data';
INNER: 'inner';
TAILREC: 'tailrec';
OPERATOR: 'operator';
INLINE: 'inline';
INFIX: 'infix';
EXTERNAL: 'external';
SUSPEND: 'suspend';
OVERRIDE: 'override';
ABSTRACT: 'abstract';
FINAL: 'final';
OPEN: 'open';
CONST: 'const';
LATEINIT: 'lateinit';
VARARG: 'vararg';
NOINLINE: 'noinline';
CROSSINLINE: 'crossinline';
REIFIED: 'reified';
EXPECT: 'expect';
ACTUAL: 'actual';
```

// SECTION: literals

```
IntegerLiteral
    : DecDigitNoZero DecDigitOrSeparator* DecDigit
    | DecDigit
    ;
```

```
HexLiteral
    : '0' [xX] HexDigit HexDigitOrSeparator* HexDigit
    | '0' [xX] HexDigit
    ;
```

```
BinLiteral
    : '0' [bB] BinDigit BinDigitOrSeparator* BinDigit
    | '0' [bB] BinDigit
    ;
```

```
BooleanLiteral: 'true'| 'false';
```


// SECTION: lexicalIdentifiers

```
Identifier
  : (Letter | '_' ) (Letter | '_' | UnicodeDigit)*
  | '`' ~([\r\n] | '`')+ '`'
  ;
```

// SECTION: strings

```
LineStrRef
  : FieldIdentifier
  ;
```

```
LineStrText
  : ~('\'\' | '\"' | '$')+ | '$'
  ;
```

```
LineStrEscapedChar
  : EscapedIdentifier
  | UniCharacterLiteral
  ;
```