

```

/**
 * 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
    | objectDeclaration
    | 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
    | anonymousInitializer

```

```

    | companionObject
    ;

anonymousInitializer
    : INIT block
    ;

companionObject
    : modifiers? COMPANION OBJECT simpleIdentifier?
      delegationSpecifiers? classBody?
    ;

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
    ;

```

```
objectDeclaration
    : modifiers? OBJECT simpleIdentifier
    delegationSpecifiers? classBody?
    ;
```

// 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
: LANGLE 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';
OBJECT: 'object';
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
    ;
```