

INCLUDED	item is used
MODIFIED	item is used and modified
RESTRICTED	item is used but not in this context
EXCLUDED	item is not used
IGNORED	item is ignored

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

```
parser grammar KotlinParser;
```

```
options { tokenVocab = KotlinLexer; }
```

```
// SECTION: general
```

```
kotlinFile
    : shebangLine? NL* fileAnnotation* packageHeader
    importList topLevelObject* EOF
    ;
```

```
script
    : shebangLine? NL* fileAnnotation* packageHeader
    importList (statement semi)* EOF
    ;
```

```
shebangLine
    : ShebangLine NL+
    ;
```

```
fileAnnotation
    : (AT_NO_WS | AT_PRE_WS) FILE NL* COLON NL*
    (LSQUARE unescapedAnnotation+ RSQUARE | unescapedAnnotation) NL*
    ;
```

```
packageHeader
    : (PACKAGE identifier semi)?
    ;
```

```
importList
    : importHeader*
    ;
```

```
importHeader
    : IMPORT identifier (DOT MULT | importAlias)? semi?
    ;
```

```
importAlias
    : AS simpleIdentifier
    ;
```

```
topLevelObject
    : declaration semis?
    ;
```

```
typeAlias
: modifiers? TYPE_ALIAS NL* simpleIdentifier
(NL* typeParameters)? NL* ASSIGNMENT NL* type
;
```

```
declaration
: classDeclaration
| objectDeclaration
| functionDeclaration
| propertyDeclaration
| typeAlias
;
```

// SECTION: classes

```
classDeclaration
: modifiers? (CLASS | (FUN NL*)? INTERFACE) NL* simpleIdentifier
(NL* typeParameters)? (NL* primaryConstructor)?
(NL* COLON NL* delegationSpecifiers)?
(NL* typeConstraints)?
(NL* classBody | NL* enumClassBody)?
;
```

```
primaryConstructor
: (modifiers? CONSTRUCTOR NL*)? classParameters
;
```

```
classBody
: LCURL NL* classMemberDeclarations NL* RCURL
;
```

```
classParameters
: LPAREN NL* (classParameter (NL* COMMA NL* classParameter)*
(NL* COMMA)? )? NL* RPAREN
;
```

```
classParameter
: modifiers? (VAL | VAR)? NL* simpleIdentifier COLON NL* type
(NL* ASSIGNMENT NL* expression)?
;
```

```
delegationSpecifiers
: annotatedDelegationSpecifier (NL* COMMA NL* annotatedDelegationSpecifier)*
;
```

```
delegationSpecifier
: constructorInvocation
| explicitDelegation
| userType
| functionType
;
```

```
constructorInvocation
: userType valueArguments
;
```

```
annotatedDelegationSpecifier
: annotation* NL* delegationSpecifier
;
```

```
explicitDelegation
: (userType | functionType) NL* BY NL* expression
;
```

```
typeParameters
: LANGLE NL* typeParameter (NL* COMMA NL* typeParameter)*
(NL* COMMA)? NL* RANGLE
;
```

```
typeParameter
: typeParameterModifiers? NL* simpleIdentifier (NL* COLON NL* type)?
;
```

```
typeConstraints
: WHERE NL* typeConstraint (NL* COMMA NL* typeConstraint)*
;
```

```
typeConstraint
: annotation* simpleIdentifier NL* COLON NL* type
;
```

// SECTION: classMembers

```
classMemberDeclarations
: (classMemberDeclaration semis?)*
;
```

```
classMemberDeclaration
: declaration
| companionObject
| anonymousInitializer
| secondaryConstructor
;
```

```
anonymousInitializer
: INIT NL* block
;
```

```
companionObject
: modifiers? COMPANION NL* OBJECT
(NL* simpleIdentifier)?
(NL* COLON NL* delegationSpecifiers)?
(NL* classBody)?
;
```

```
functionValueParameters
: LPAREN NL* (functionValueParameter (NL* COMMA NL* functionValueParameter)*
(NL* COMMA)?)? NL* RPAREN
;
```

```
functionValueParameter
: parameterModifiers? parameter (NL* ASSIGNMENT NL* expression)?
;
```

```
functionDeclaration
: modifiers?
  FUN (NL* typeParameters)? (NL* receiverType NL* DOT)? NL* simpleIdentifier
  NL* functionValueParameters
  (NL* COLON NL* type)?
  (NL* typeConstraints)?
  (NL* functionBody)?
;
```

```
functionBody
: block
| ASSIGNMENT NL* expression
;
```

```
variableDeclaration
: annotation* NL* simpleIdentifier (NL* COLON NL* type)?
;
```

```
multiVariableDeclaration
: LPAREN NL* variableDeclaration (NL* COMMA NL* variableDeclaration)* (NL*
COMMA)? NL* RPAREN
;
```

```
propertyDeclaration
: modifiers? (VAL | VAR)
  (NL* typeParameters)?
  (NL* receiverType NL* DOT)?
  (NL* (multiVariableDeclaration | variableDeclaration))
  (NL* typeConstraints)?
  (NL* (ASSIGNMENT NL* expression | propertyDelegate))?
  (NL+ SEMICOLON)? NL*
  (getter? (NL* semi? setter)? | setter? (NL* semi? getter)? )?
;
```

```
propertyDelegate
: BY NL* expression
;
```

```
getter
: modifiers? GET
| modifiers? GET NL* LPAREN NL* RPAREN (NL* COLON NL* type)? NL* functionBody
;
```

```
setter
: modifiers? SET
| modifiers? SET NL* LPAREN NL* parameterWithOptionalType
  (NL* COMMA)? NL* RPAREN (NL* COLON NL* type)? NL* functionBody
;
```

```
parametersWithOptionalType
: LPAREN NL*
```

```
(parameterWithOptionalType (NL* COMMA NL* parameterWithOptionalType)*  
(NL* COMMA)?)? NL* RPAREN  
;
```

```
parameterWithOptionalType  
: parameterModifiers? simpleIdentifier NL* (COLON NL* type)?  
;
```

```
parameter  
: simpleIdentifier NL* COLON NL* type  
;
```

```
objectDeclaration  
: modifiers? OBJECT  
NL* simpleIdentifier  
(NL* COLON NL* delegationSpecifiers)?  
(NL* classBody)?  
;
```

```
secondaryConstructor  
: modifiers? CONSTRUCTOR NL* functionValueParameters  
(NL* COLON NL* constructorDelegationCall)? NL* block?  
;
```

```
constructorDelegationCall  
: THIS NL* valueArguments  
| SUPER NL* valueArguments  
;
```

// SECTION: enumClasses

```
enumClassBody  
: LCURL NL* enumEntries? (NL* SEMICOLON NL* classMemberDeclarations)? NL* RCURL  
;
```

```
enumEntries  
: enumEntry (NL* COMMA NL* enumEntry)* NL* COMMA?  
;
```

```
enumEntry  
: (modifiers NL*)? simpleIdentifier (NL* valueArguments)? (NL* classBody)?  
;
```

// SECTION: types

```
type  
: typeModifiers?  
( parenthesizedType  
| nullableType  
| typeReference  
| functionType)  
;
```

```
typeReference  
: userType
```

```
| DYNAMIC  
;
```

```
nullableType  
: (typeReference | parenthesizedType) NL* quest+  
;
```

```
quest  
: QUEST_NO_WS  
| QUEST_WS  
;
```

```
userType  
: simpleUserType (NL* DOT NL* simpleUserType)*  
;
```

```
simpleUserType  
: simpleIdentifier (NL* typeArguments)?  
;
```

```
typeProjection  
: typeProjectionModifiers? type | MULT  
;
```

```
typeProjectionModifiers  
: typeProjectionModifier+  
;
```

```
typeProjectionModifier  
: varianceModifier NL*  
| annotation  
;
```

```
functionType  
: (receiverType NL* DOT NL*)? functionTypeParameters NL* ARROW NL* type  
;
```

```
functionTypeParameters  
: LPAREN NL* (parameter | type)? (NL* COMMA NL* (parameter | type))*  
(NL* COMMA)? NL* RPAREN  
;
```

```
parenthesizedType  
: LPAREN NL* type NL* RPAREN  
;
```

```
receiverType  
: typeModifiers?  
( parenthesizedType  
| nullableType  
| typeReference)  
;
```

```
parenthesizedUserType  
: LPAREN NL* userType NL* RPAREN
```

```
| LPAREN NL* parenthesizedUserType NL* RPAREN  
;
```

// SECTION: statements

```
statements  
: (statement (semis statement)*)? semis?  
;
```

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

```
label  
: simpleIdentifier (AT_NO_WS | AT_POST_WS) NL*  
;
```

```
controlStructureBody  
: block  
| statement  
;
```

```
block  
: LCURL NL* statements NL* RCURL  
;
```

```
loopStatement  
: forStatement  
| whileStatement  
| doWhileStatement  
;
```

```
forStatement  
: FOR NL* LPAREN annotation* (variableDeclaration | multiVariableDeclaration)  
  IN expression RPAREN NL* controlStructureBody?  
;
```

```
whileStatement  
: WHILE NL* LPAREN expression RPAREN NL* controlStructureBody  
| WHILE NL* LPAREN expression RPAREN NL* SEMICOLON  
;
```

```
doWhileStatement  
: DO NL* controlStructureBody? NL* WHILE NL* LPAREN expression RPAREN  
;
```

```
assignment  
: directlyAssignableExpression ASSIGNMENT NL* expression  
| assignableExpression assignmentAndOperator NL* expression  
;
```

```
semi
: (SEMICOLON | NL) NL*
| EOF;
```

```
semis
: (SEMICOLON | NL)+
| EOF
;
```

// SECTION: expressions

```
expression
: disjunction
;
```

```
disjunction
: conjunction (NL* DISJ NL* conjunction)*
;
```

```
conjunction
: equality (NL* CONJ NL* equality)*
;
```

```
equality
: comparison (equalityOperator NL* comparison)*
;
```

```
comparison
: infixOperation (comparisonOperator NL* infixOperation)?
;
```

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

```
elvisExpression
: infixFunctionCall (NL* elvis NL* infixFunctionCall)*
;
```

```
elvis
: QUEST_NO_WS COLON
;
```

```
infixFunctionCall
: rangeExpression (simpleIdentifier NL* rangeExpression)*
;
```

```
rangeExpression
: additiveExpression (RANGE NL* additiveExpression)*
;
```

```
additiveExpression
: multiplicativeExpression (additiveOperator NL* multiplicativeExpression)*
;
```



```
multiplicativeExpression
: asExpression (multiplicativeOperator NL* asExpression)*
;
```

```
asExpression
: comparisonWithLiteralRightSide (NL* asOperator NL* type)?
;
```

```
comparisonWithLiteralRightSide
: prefixUnaryExpression (NL* LANGLE NL* literalConstant NL* RANGLE NL*
(expression | parenthesizedExpression))*
;
```

```
prefixUnaryExpression
: unaryPrefix* postfixUnaryExpression
;
```

```
unaryPrefix
: annotation
| label
| prefixUnaryOperator NL*
;
```

```
postfixUnaryExpression
: primaryExpression
| primaryExpression postfixUnarySuffix+
;
```

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

```
directlyAssignableExpression
: postfixUnaryExpression assignableSuffix
| simpleIdentifier
| parenthesizedDirectlyAssignableExpression
;
```

```
parenthesizedDirectlyAssignableExpression
: LPAREN NL* directlyAssignableExpression NL* RPAREN
;
```

```
assignableExpression
: prefixUnaryExpression | parenthesizedAssignableExpression
;
```

```
parenthesizedAssignableExpression
: LPAREN NL* assignableExpression NL* RPAREN
;
```

```
assignableSuffix
```

```
      : typeArguments
      | indexingSuffix
      | navigationSuffix
      ;
```

```
indexingSuffix
      : LSQUARE NL* expression (NL* COMMA NL* expression)* (NL* COMMA)? NL* RSQUARE
      ;
```

```
navigationSuffix
      : NL* memberAccessOperator NL*
      (simpleIdentifier | parenthesizedExpression | CLASS)
      ;
```

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

```
annotatedLambda
      : annotation* label? NL* lambdaLiteral
      ;
```

```
typeArguments
      : LANGLE NL* typeProjection (NL* COMMA NL* typeProjection)*
      (NL* COMMA)? NL* RANGLE
      ;
```

```
valueArguments
      : LPAREN NL* RPAREN
      | LPAREN NL* valueArgument (NL* COMMA NL* valueArgument)*
      (NL* COMMA)? NL* RPAREN
      ;
```

```
valueArgument
      : annotation? NL* (simpleIdentifier NL* ASSIGNMENT NL*)? MULT? NL* expression
      ;
```

```
primaryExpression
      : parenthesizedExpression
      | simpleIdentifier
      | literalConstant
      | stringLiteral
      | callableReference
      | functionLiteral
      | objectLiteral
      | collectionLiteral
      | thisExpression
      | superExpression
      | ifExpression
      | whenExpression
      | tryExpression
      | jumpExpression
      ;
```

```
parenthesizedExpression
: LPAREN NL* expression NL* RPAREN
;
```

```
collectionLiteral
: LSQUARE NL* expression (NL* COMMA NL* expression)* (NL* COMMA)? NL* RSQUARE
| LSQUARE NL* RSQUARE
;
```

```
literalConstant
: BooleanLiteral
| IntegerLiteral
| HexLiteral
| BinLiteral
| CharacterLiteral
| RealLiteral
| NullLiteral
| LongLiteral
| UnsignedLiteral
;
```

```
stringLiteral
: lineStringLiteral
| multiLineStringLiteral
;
```

```
lineStringLiteral
: QUOTE_OPEN (lineStringContent | lineStringExpression)* QUOTE_CLOSE
;
```

```
multiLineStringLiteral
: TRIPLE_QUOTE_OPEN
(multiLineStringContent | multiLineStringExpression | MultiLineStringQuote)*
TRIPLE_QUOTE_CLOSE
;
```

```
lineStringContent
: LineStrText
| LineStrEscapedChar
| LineStrRef
;
```

```
lineStringExpression
: LineStrExprStart expression RCURL
;
```

```
multiLineStringContent
: MultiLineStrText
| MultiLineStringQuote
| MultiLineStrRef
;
```

```
multiLineStringExpression
: MultiLineStrExprStart NL* expression NL* RCURL
;
```

```
lambdaLiteral
: LCURL NL* statements NL* RCURL
| LCURL NL* lambdaParameters? NL* ARROW NL* statements NL* RCURL
;
```

```
lambdaParameters
: lambdaParameter (NL* COMMA NL* lambdaParameter)* (NL* COMMA)?
;
```

```
lambdaParameter
: variableDeclaration
| multiVariableDeclaration (NL* COLON NL* type)?
;
```

```
anonymousFunction
: FUN
(NL* type NL* DOT)?
NL* parametersWithOptionalType
(NL* COLON NL* type)?
(NL* typeConstraints)?
(NL* functionBody)?
;
```

```
functionLiteral
: lambdaLiteral
| anonymousFunction
;
```

```
objectLiteral
: OBJECT NL* COLON NL* delegationSpecifiers NL* classBody
| OBJECT NL* classBody
;
```

```
thisExpression
: THIS
| THIS_AT
;
```

```
superExpression
: SUPER (LANGLE NL* type NL* RANGLE)? (AT_NO_WS simpleIdentifier)?
| SUPER_AT
;
```

```
ifExpression
: IF NL* LPAREN NL* expression NL* RPAREN NL*
(controlStructureBody | SEMICOLON)
| IF NL* LPAREN NL* expression NL* RPAREN NL*
controlStructureBody? NL* SEMICOLON? NL* ELSE NL*
(controlStructureBody | SEMICOLON)
;
```

```
whenSubject
: LPAREN (annotation* NL* VAL NL* variableDeclaration NL* ASSIGNMENT NL*)?
expression RPAREN
```

```
;
```

```
whenExpression
```

```
: WHEN NL* whenSubject? NL* LCURL NL* (whenEntry NL*)* NL* RCURL  
;
```

```
whenEntry
```

```
: whenCondition (NL* COMMA NL* whenCondition)* (NL* COMMA)?  
  NL* ARROW NL* controlStructureBody semi?  
  | ELSE NL* ARROW NL* controlStructureBody semi?  
;
```

```
whenCondition
```

```
: expression  
  | rangeTest  
  | typeTest  
;
```

```
rangeTest
```

```
: inOperator NL* expression  
;
```

```
typeTest
```

```
: isOperator NL* type  
;
```

```
tryExpression
```

```
: TRY NL* block ((NL* catchBlock)+ (NL* finallyBlock)? | NL* finallyBlock)  
;
```

```
catchBlock
```

```
: CATCH NL* LPAREN annotation* simpleIdentifier COLON type  
  (NL* COMMA)? RPAREN NL* block  
;
```

```
finallyBlock
```

```
: FINALLY NL* block  
;
```

```
jumpExpression
```

```
: THROW NL* expression  
  | (RETURN | RETURN_AT) expression?  
  | CONTINUE | CONTINUE_AT  
  | BREAK | BREAK_AT  
;
```

```
callableReference
```

```
: (receiverType? NL* COLONCOLON NL* (simpleIdentifier | CLASS))  
;
```

```
assignmentAndOperator
```

```
: ADD_ASSIGNMENT  
  | SUB_ASSIGNMENT  
  | MULT_ASSIGNMENT  
  | DIV_ASSIGNMENT
```

```
    | MOD_ASSIGNMENT
    ;
```

```
equalityOperator
    : EXCL_EQ
    | EXCL_EQEQ
    | EQEQ
    | EQEQEQ
    ;
```

```
comparisonOperator
    : LANGLE
    | RANGLE
    | LE
    | GE
    ;
```

```
inOperator
    : IN | NOT_IN
    ;
```

```
isOperator
    : IS | NOT_IS
    ;
```

```
additiveOperator
    : ADD | SUB
    ;
```

```
multiplicativeOperator
    : MULT
    | DIV
    | MOD
    ;
```

```
asOperator
    : AS
    | AS_SAFE
    ;
```

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

```
postfixUnaryOperator
    : INCR
    | DECR
    | EXCL_NO_WS excl
    ;
```

```
excl
```

```
    : EXCL_NO_WS  
    | EXCL_WS  
    ;
```

```
memberAccessOperator  
    : DOT | safeNav | COLONCOLON  
    ;
```

```
safeNav  
    : QUEST_NO_WS DOT  
    ;
```

// SECTION: modifiers

```
modifiers  
    : (annotation | modifier)+  
    ;
```

```
parameterModifiers  
    : (annotation | parameterModifier)+  
    ;
```

```
modifier  
    : (classModifier  
    | memberModifier  
    | visibilityModifier  
    | functionModifier  
    | propertyModifier  
    | inheritanceModifier  
    | parameterModifier  
    | platformModifier) NL*  
    ;
```

```
typeModifiers  
    : typeModifier+  
    ;
```

```
typeModifier  
    : annotation | SUSPEND NL*  
    ;
```

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

```
memberModifier  
    : OVERRIDE  
    | LATEINIT  
    ;
```

```
visibilityModifier
```

```
: PUBLIC  
| PRIVATE  
| INTERNAL  
| PROTECTED  
;
```

```
varianceModifier  
: IN  
| OUT  
;
```

```
typeParameterModifiers  
: typeParameterModifier+  
;
```

```
typeParameterModifier  
: reificationModifier NL*  
| varianceModifier NL*  
| annotation  
;
```

```
functionModifier  
: TAILREC  
| OPERATOR  
| INFIX  
| INLINE  
| EXTERNAL  
| SUSPEND  
;
```

```
propertyModifier  
: CONST  
;
```

```
inheritanceModifier  
: ABSTRACT  
| FINAL  
| OPEN  
;
```

```
parameterModifier  
: VARARG  
| NOINLINE  
| CROSSINLINE  
;
```

```
reificationModifier  
: REIFIED  
;
```

```
platformModifier  
: EXPECT  
| ACTUAL  
;
```


// SECTION: annotations

```
annotation
: (singleAnnotation | multiAnnotation) NL*
;
```

```
singleAnnotation
: annotationUseSiteTarget NL* unescapedAnnotation
| (AT_NO_WS | AT_PRE_WS) unescapedAnnotation
;
```

```
multiAnnotation
: annotationUseSiteTarget NL* LSQUARE unescapedAnnotation+ RSQUARE
| (AT_NO_WS | AT_PRE_WS) LSQUARE unescapedAnnotation+ RSQUARE
;
```

```
annotationUseSiteTarget
: (AT_NO_WS | AT_PRE_WS)
(FIELD | PROPERTY | GET | SET | RECEIVER | PARAM | SETPARAM | DELEGATE)
NL* COLON
;
```

```
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 (NL* DOT simpleIdentifier)*
;

```

```

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

```

```

lexer grammar KotlinLexer;

```

```

// SECTION: lexicalGeneral

```

```

ShebangLine
: '#' ~[\r\n]*
;

```

```

DelimitedComment
: '/*' ( DelimitedComment | . )?* '/' -> channel(HIDDEN)
;

```

```

LineComment
: '//' ~[\r\n]* -> channel(HIDDEN)
;

```

```

WS
: [\u0020\u0009\u000C] -> channel(HIDDEN)
;

```

```

NL: '\n' | '\r' '\n'?;

```

```

fragment Hidden: DelimitedComment | LineComment | WS;

```

// SECTION: separatorsAndOperations

```
RESERVED: '...';
DOT: '.';
COMMA: ',';
LPAREN: '(' -> pushMode(Inside);
RPAREN: ')';
LSQUARE: '[' -> pushMode(Inside);
RSQUARE: ']';
LCURL: '{' -> pushMode(DEFAULT_MODE);
RCURL: '}' { if (!_modeStack.isEmpty()) { popMode(); } };
MULT: '*';
MOD: '%';
DIV: '/';
ADD: '+';
SUB: '-';
INCR: '++';
DECR: '--';
CONJ: '&&';
DISJ: '||';
EXCL_WS: '!' Hidden;
EXCL_NO_WS: '!';
COLON: ':';
SEMICOLON: ';';
ASSIGNMENT: '=';
ADD_ASSIGNMENT: '+=';
SUB_ASSIGNMENT: '-=';
MULT_ASSIGNMENT: '*=';
DIV_ASSIGNMENT: '/=';
MOD_ASSIGNMENT: '%=';
ARROW: '->';
DOUBLE_ARROW: '=>';
RANGE: '..';
COLONCOLON: '::';
DOUBLE_SEMICOLON: ';;';
HASH: '#';
AT_NO_WS: '@';
AT_POST_WS: '@' (Hidden | NL);
AT_PRE_WS: (Hidden | NL) '@';
AT_BOTH_WS: (Hidden | NL) '@' (Hidden | NL);
QUEST_WS: '?' Hidden;
QUEST_NO_WS: '?';
LANGLE: '<';
RANGLE: '>';
LE: '<=';
GE: '>=';
EXCL_EQ: '!=';
EXCL_EQEQ: '!==';
AS_SAFE: 'as?';
EQEQ: '==';
EQEQEQ: '===';
SINGLE_QUOTE: '\'';
```

// SECTION: keywords

RETURN_AT: 'return@' Identifier;
CONTINUE_AT: 'continue@' Identifier;
BREAK_AT: 'break@' Identifier;

THIS_AT: 'this@' Identifier;
SUPER_AT: 'super@' Identifier;

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

PACKAGE: 'package';
IMPORT: 'import';
CLASS: 'class';
INTERFACE: 'interface';
FUN: 'fun';
OBJECT: 'object';
VAL: 'val';
VAR: 'var';
TYPE_ALIAS: 'typealias';
CONSTRUCTOR: 'constructor';
BY: 'by';
COMPANION: 'companion';
INIT: 'init';
THIS: 'this';
SUPER: 'super';
TYPEOF: 'typeof';
WHERE: 'where';
IF: 'if';
ELSE: 'else';
WHEN: 'when';
TRY: 'try';
CATCH: 'catch';
FINALLY: 'finally';
FOR: 'for';
DO: 'do';
WHILE: 'while';
THROW: 'throw';
RETURN: 'return';
CONTINUE: 'continue';
BREAK: 'break';
AS: 'as';
IS: 'is';
IN: 'in';
NOT_IS: '!is' (Hidden | NL);
NOT_IN: '!in' (Hidden | NL);
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
```

```
fragment DecDigit: '0'..'9';  
fragment DecDigitNoZero: '1'..'9';  
fragment DecDigitOrSeparator: DecDigit | '_';
```

```
fragment DecDigits  
    : DecDigit DecDigitOrSeparator* DecDigit  
    | DecDigit  
    ;
```

```
fragment DoubleExponent: [eE] [+-]? DecDigits;
```

```
RealLiteral  
    : FloatLiteral  
    | DoubleLiteral  
    ;
```

```
FloatLiteral  
    : DoubleLiteral [fF]  
    | DecDigits [fF]  
    ;
```

```
DoubleLiteral
```

```
    : DecDigits? '.' DecDigits DoubleExponent?  
    | DecDigits DoubleExponent  
    ;
```

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

```
fragment HexDigit: [0-9a-fA-F];  
fragment HexDigitOrSeparator: HexDigit | '_';
```

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

```
fragment BinDigit: [01];  
fragment BinDigitOrSeparator: BinDigit | '_';
```

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

```
UnsignedLiteral  
    : (IntegerLiteral | HexLiteral | BinLiteral) [uU] 'L'?  
    ;
```

```
LongLiteral  
    : (IntegerLiteral | HexLiteral | BinLiteral) 'L'  
    ;
```

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

```
NullLiteral: 'null';
```

```
CharacterLiteral  
    : '\\' (EscapeSeq | ~[\n\r'\\]) '\\'   
    ;
```

```
// SECTION: lexicalIdentifiers
```

```
Identifier  
    : [_a-zA-Z] [_a-zA-Z0-9]*  
    ;
```

```
IdentifierOrSoftKey  
    : Identifier  
    | ABSTRACT  
    | ANNOTATION  
    | BY  
    | CATCH  
    | COMPANION  
    | CONSTRUCTOR
```

```

; CROSSINLINE
; DATA
; DYNAMIC
; ENUM
; EXTERNAL
; FINAL
; FINALLY
; IMPORT
; INFIX
; INIT
; INLINE
; INNER
; INTERNAL
; LATEINIT
; NOINLINE
; OPEN
; OPERATOR
; OUT
; OVERRIDE
; PRIVATE
; PROTECTED
; PUBLIC
; REIFIED
; SEALED
; TAILREC
; VARARG
; WHERE
; GET
; SET
; FIELD
; PROPERTY
; RECEIVER
; PARAM
; SETPARAM
; DELEGATE
; FILE
; EXPECT
; ACTUAL
; CONST
; SUSPEND
;

```

```

FieldIdentifier
: '$' IdentifierOrSoftKey
;

```

```

fragment EscapedIdentifier
: '\\ ' ('t' | 'b' | 'r' | 'n' | '\\' | '"' | '\\ ' | '$')
;

```

```

fragment EscapeSeq
| EscapedIdentifier
;

```

```

// SECTION: strings

```

```
QUOTE_OPEN
: ''' -> pushMode(LineString)
;
```

```
TRIPLE_QUOTE_OPEN
: ''' -> pushMode(MultiLineString)
;
```

mode LineString;

```
QUOTE_CLOSE
: ''' -> popMode
;
```

```
LineStrRef
: FieldIdentifier
;
```

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

```
LineStrEscapedChar
: EscapedIdentifier
;
```

```
LineStrExprStart
: '${' -> pushMode(DEFAULT_MODE)
;
```

mode MultiLineString;

```
TRIPLE_QUOTE_CLOSE
: MultiLineStringQuote? ''' -> popMode
;
```

```
MultiLineStringQuote
: ''' +
;
```

```
MultiLineStrRef
: FieldIdentifier
;
```

```
MultiLineStrText
: ~('' | '$')+ | '$'
;
```

```
MultiLineStrExprStart
: '${' -> pushMode(DEFAULT_MODE)
;
```