무료 전자 책

배우기

ANTLR

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#antlr

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1: ANTLR

ANTLR ( ) , , , . , . , ANTLR .

- antlr ( )

Antlr
Antlr ( ) . antlr V1.V2.V3 .

- V1 : V1 .
- V2 : V2 (:)
- V3 : .

Antlr Java . antlr . ( ) .

-
- #
- (2 3)
-

2.0	1997-05-01
3.0	2011 1 19
4.0	2013-01-21
4.1	2013-07-01
4.2	2014-02-05
4.2.1	2014-03-25
4.2.2	2014-04-07
4.3	2014-06-19
4.4	2014-07-16
4.5	2015-01-23
4.5.1	2016-07-16
4.5.2	2016-01-30
4.5.3	2016-03-31

4.6	2016-12-15
4.7	2017-03-30

Examples

hello world .

```
// define a grammar called Hello
grammar Hello;
r   : 'hello' ID;
ID  : [a-z]+ ;
WS  : [ \t\r\n]+ -> skip ;
```

.g4 / .

```
Java -jar antlr-4.5.3-complete.jar Hello.g4

//OR if you have setup an alias or use the recommended batch file

antlr4 Hello.g4
```

Hello.g4 .

1. Hello.tokens
2. HelloBaseListener.java
3. HelloLexer.java
4. HelloLexer.tokens
5. HelloListener.java
6. HelloParser.java

ANTLR jar . Java .

```
javac *.java
```

ANTLR : https://riptutorial.com/ko/antlr/topic/4453/antlr-

2: ANTLR v3

Examples

Eclipse ANTLR

(Indigo and ANTLR IDE 2.1.2)

1. Eclipse .
2. ANTLR v2 ANTLR jar . temp . antlr-nn (: Eclipse) .
3. Eclipse ANTLR IDE .
   - Eclipse Help Install New Software .
   - ... .
   - http://antlrv3ide.sourceforge.net/updates ANTLR IDE .
   - ANTLR IDE vn.nn . Eclipse .
4. ANTLR IDE .
   - Eclipse .
   - ANTLR .
   - ... .
   - ANTLR ... antlr-nn .
   - ANTLR .
   - . . : antlr-java antlr-generated.
   - Building General -nfa -dfa . ANTLR Java .
   - .
5. Java ANTLR .
   - Eclipse File, New, Java Project . .
   - ANTLR ( ) , ANTLR .
   - ANTLR jar . , Java , JAR ... ANTLR jar . .
6. ANTLR .
   - ANTLR : src , , , ANTLR . .
   - ".g" . language = Java, @header, @lexer :: header @members ( ). (Ctrl +).
7. .
   - Java . Building General ANTLR Preferences -nfa -dfa (4g). [: CLASSPATH Eclipse (32 64) Java7 Windows Java7 SDK .]
   - " "Java Java , .

```
grammar test; //must match filename.g

options {
    language = Java;
}

@header { //parser
    package pkgName; //optional
    import java.<whatever you need>.*;
}
```

```
@members { //parser
    // java code here
}

@lexer::header { //lexer
    package pkgName; //optional
    import java.<whatever you need>.*;
}

@lexer::members {
    // java code here
}
/*------------------------------------------------------------------
 * PARSER RULES (convention is all lowercase)
 *------------------------------------------------------------------*/
parserule: LEXRULE;

/*------------------------------------------------------------------
 * LEXER RULES (convention is all uppercase)
 *------------------------------------------------------------------*/
LEXRULE: 'a'..'z';
```

ANTLR v3 : https://riptutorial.com/ko/antlr/topic/6629/antlr-v3-

3: ANTLR v4

ANTLR v4 / . ANTLR (, AST) . . ANTLR v4 Java, C #, JavaScript, Python2 Python3 . C ++ . GUI IDE Visual Studio, Intellij, NetBeans Eclipse .

ANTLR . ANTLR Terrence Parr (ANTLR) ANTLR 4 Reference .

- 4.5 : 01/22/15 - JavaScript C # . 4.5
- 4.4 : 07/16/14 - Python2 Python3 . 4.4
- 4.3 : 06/18/14 - . . 4.3
- 4.2 : 02/04/14 - / . 4.2
- 4.1 : 06/30/13 - . AST PNG . 4.1
- 4.0 : 01/21/13 - .

Examples

ANTLR Java Jar . . ANTLR jar Java . .

ANTLR JAR JAR ANTLR .

```
Java -jar antlr-4.5.3-complete.jar
```

antlr-4.5.3-complete.jar .

.

```
ANTLR Parser Generator  Version 4.5.3
 -o ___              specify output directory where all output is generated
 -lib ___            specify location of grammars, tokens files
 -atn                generate rule augmented transition network diagrams
 -encoding ___       specify grammar file encoding; e.g., euc-jp
 -message-format ___ specify output style for messages in antlr, gnu, vs2005
 -long-messages      show exception details when available for errors and warnings
 -listener           generate parse tree listener (default)
 -no-listener        don't generate parse tree listener
 -visitor            generate parse tree visitor
 -no-visitor         don't generate parse tree visitor (default)
 -package ___        specify a package/namespace for the generated code
 -depend             generate file dependencies
 -D<option>=value    set/override a grammar-level option
 -Werror             treat warnings as errors
 -XdbgST             launch StringTemplate visualizer on generated code
 -XdbgSTWait         wait for STViz to close before continuing
 -Xforce-atn         use the ATN simulator for all predictions
 -Xlog               dump lots of logging info to antlr-timestamp.log
```

.

```
     1. Add antlr4-complete.jar to CLASSPATH, either: Permanently:
Using System Properties dialog > Environment variables > Create or append to CLASSPATH
```

```
variable Temporarily, at command line: SET CLASSPATH=.;C:\Javalib\antlr4-
complete.jar;%CLASSPATH%
     3.Create batch commands for ANTLR Tool, TestRig in dir in PATH
         antlr4.bat: java org.antlr.v4.Tool %*
         grun.bat:   java org.antlr.v4.gui.TestRig %*
```

.g4 .

```
Java -jar antlr-4.5.3-complete.jar yourGrammar.g4
```

-Dlanguage . C # .

```
java -jar antlr-4.5.3-complete.jar yourGrammar.g4 -Dlanguage=CSharp
```

.

ANTLR .

Maven, Gradle ( ) `org.antlr:antlr4-runtime` .

- - Maven : `org.antlr:antlr4` .

Eclipse Hello World

(ANTLR 4.5.3, Eclipse Neon, ANTLR 4 IDE 0.3.5 Java 1.8)

1. ANTLR . ANTLR Java jar . (: Java) . .

2. Eclipse ANTLR IDE .

    - Eclipse Help Eclipse Marketplace .
    - : antlr .
    - ANTLR 4 IDE .
    - .
    - .
    - Eclipse .

3. " ..." .

    - Eclipse ANTLR 4 HOME . com.github.jknack.antlr-4ide.Antlr4 for com.github.jknack.antlr-4ide.Antlr4 . .
    - HOME . .
    - Xtext 2.7.3 antlr-nnn-complete.jar .
    - Eclipse Help Install New Software .
    - ... .
    - , xtext 2.7.3 Archive ... Xtext 2.7.3 OK .
    - > . .
    - Eclipse .

4. ANTLR Eclipse / Java .

    - Eclipse Window Preferences .
    - Java .
    - ... ... antlr-nnn-complete.jar . Classpath Variables OK .
    - .

5. ( ) ANTLR IDE .

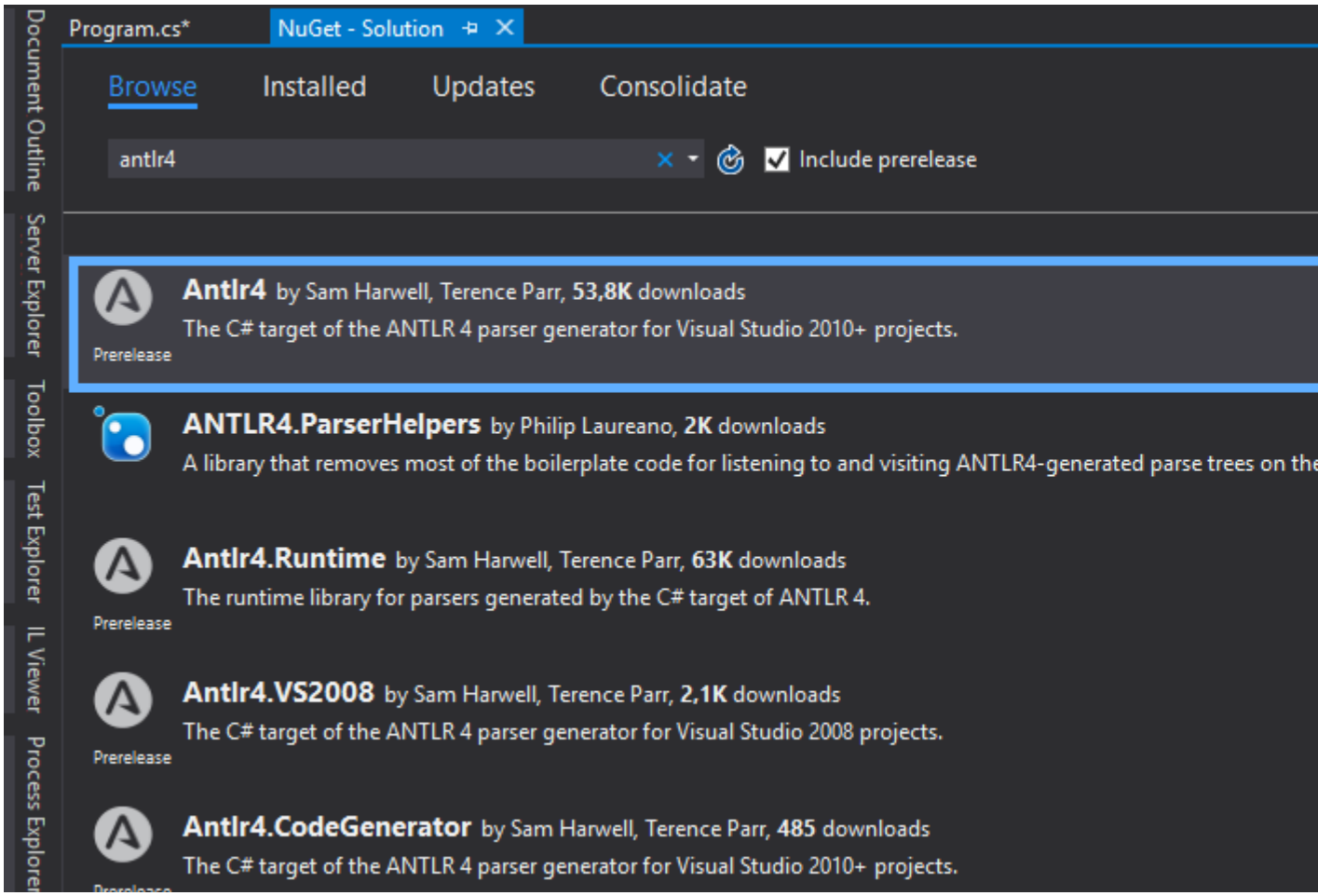
    - Eclipse .
    - ANTLR 4 5 .
    - . , java ./antlr-java .
    - .

6. ANTLR 4 .

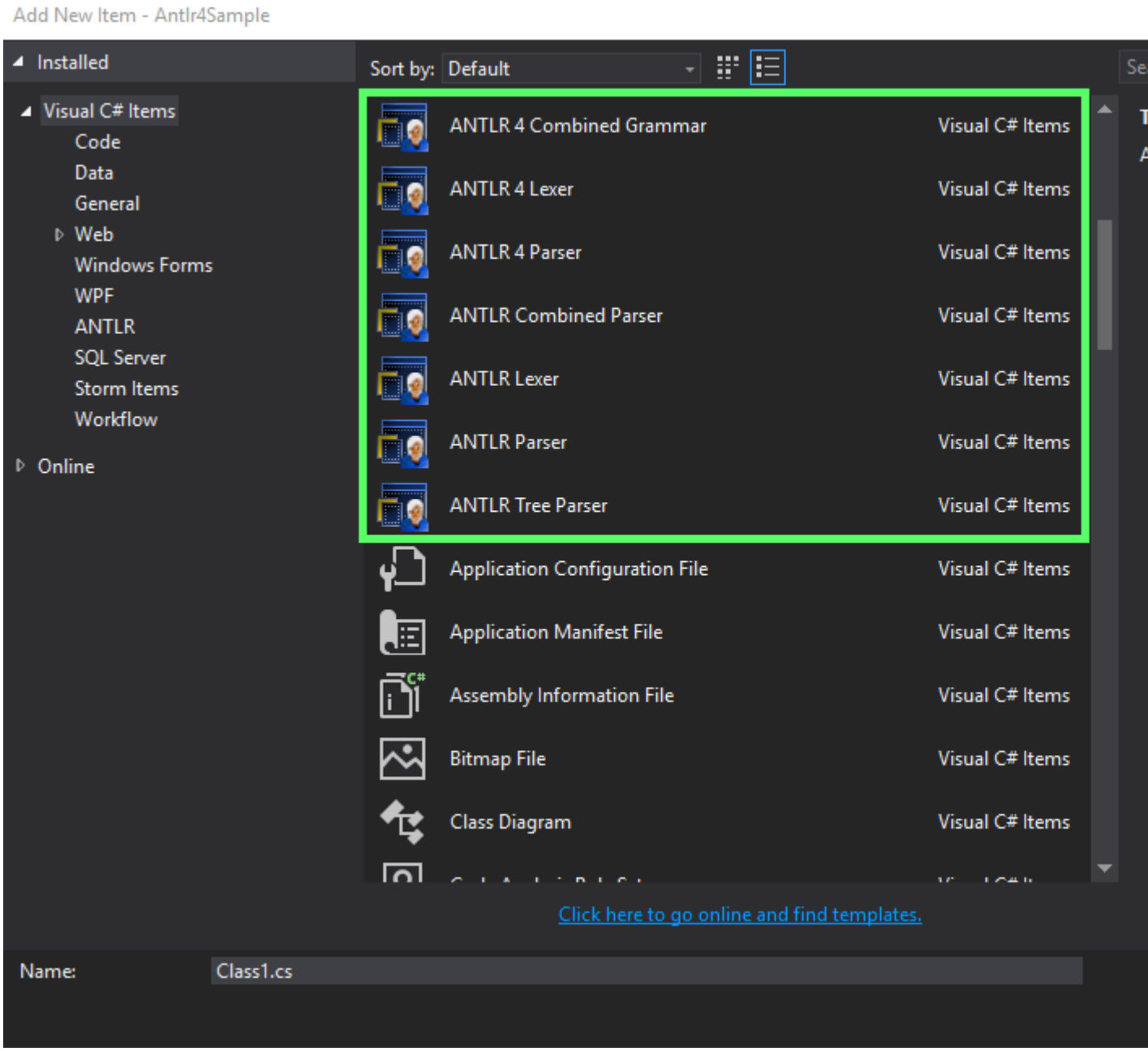
    - Eclipse File, New, Project .
    - ANTLR 4 .
    - .
    - Hello.g4 "Hello World" .
    - g4 target (5) .

Visual Studio 2015 ANTLR (Nuget)

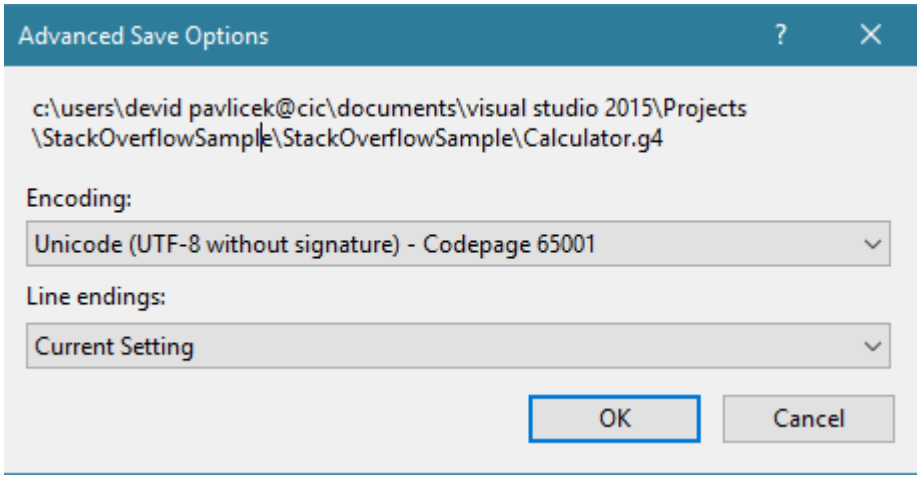
1. Visual Studio 2015 → → Antlr . ANTLR (Sam Harwell) Visual Studio .
2. . → Nuget Packages for Solution → Browse (Tab) Antlr4 .


Program.cs*
NuGet - Solution
Browse
Installed
Updates
Consolidate
antlr4
Include prerelease
Antlr4 by Sam Harwell, Terence Parr, 53,8K downloads
The C# target of the ANTLR 4 parser generator for Visual Studio 2010+ projects.
Prerelease
ANTLR4.ParserHelpers by Philip Laureano, 2K downloads
A library that removes most of the boilerplate code for listening to and visiting ANTLR4-generated parse trees on the
Antlr4.Runtime by Sam Harwell, Terence Parr, 63K downloads
The runtime library for parsers generated by the C# target of ANTLR 4.
Prerelease
Antlr4.VS2008 by Sam Harwell, Terence Parr, 2,1K downloads
The C# target of the ANTLR 4 parser generator for Visual Studio 2008 projects.
Prerelease
Antlr4.CodeGenerator by Sam Harwell, Terence Parr, 485 downloads
The C# target of the ANTLR 4 parser generator for Visual Studio 2010+ projects.
Document Outline
Server Explorer
Toolbox
Test Explorer
IL Viewer
Process Explorer

3. . ANTLR4 .

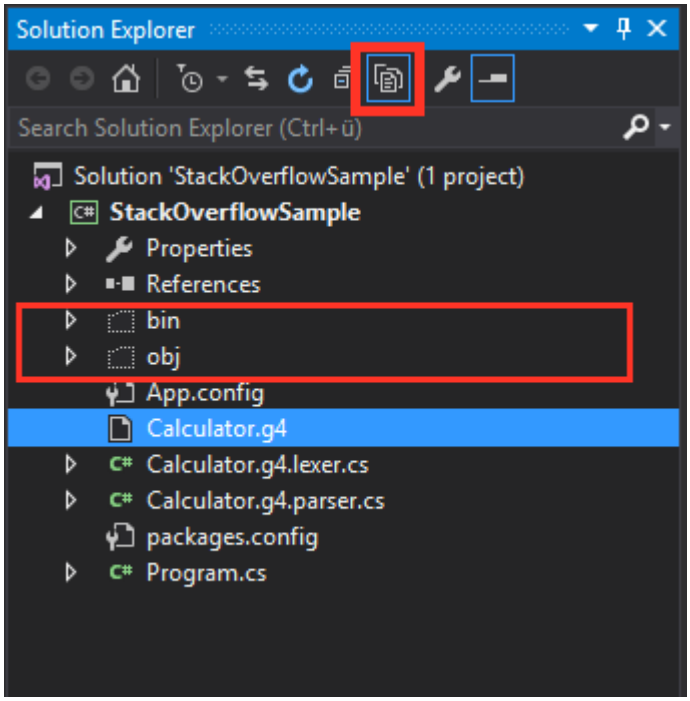


4. ANTLR (.g4) → (UTF-8) - 65001 . .

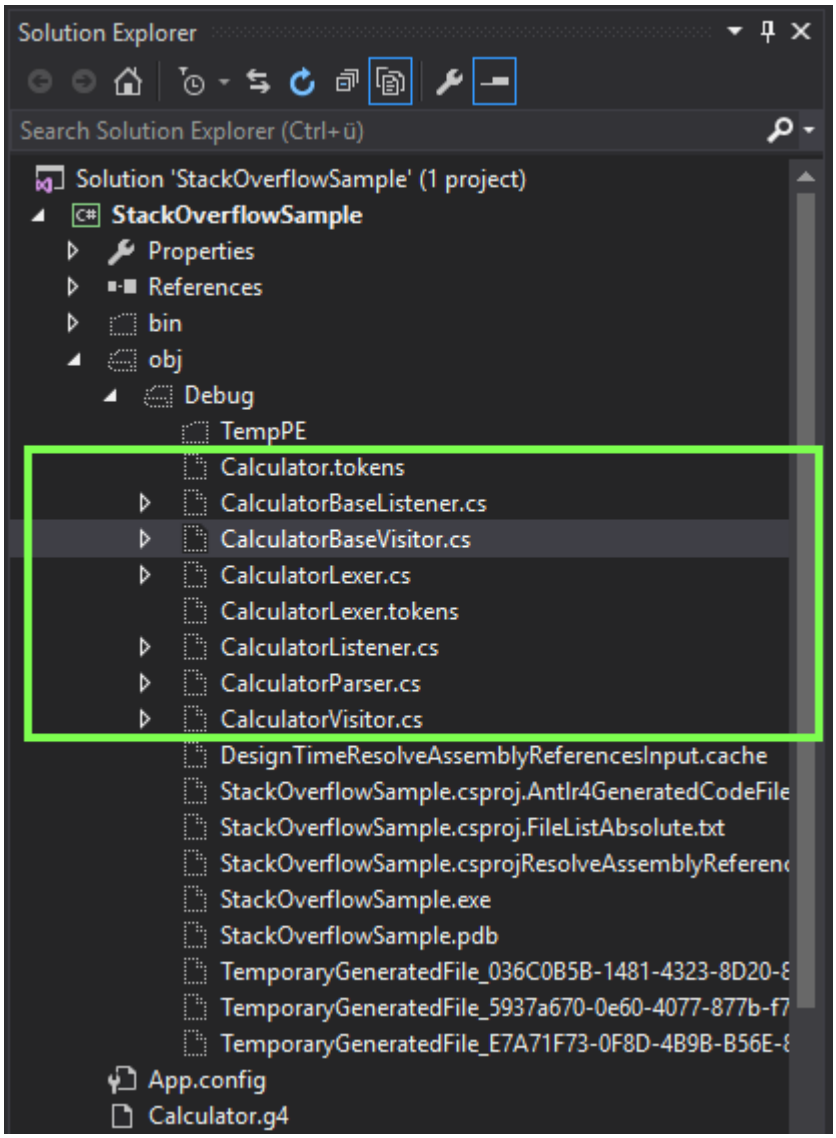


- ANTLR 4 Calculator.g4 .
- Github : Tom Everett

- .
- → .



- ()
- obj CS . . Visual Studio 2015 ANTLR .



ANTLR v4 : https://riptutorial.com/ko/antlr/topic/2856/antlr-v4-

4: ANTLR /

Examples

ANTLR .

1. C #
2. Python
3.
4.

ANTLR Java :

```
Java -jar antlr-4.5.3-complete.jar yourGrammar.g4 //Will output a
    java parser
```

OS / .

```
    antlr4 -Dlanguage=Python3 yourGrammar.g4
//with alias
    java -jar antlr-4.5.3-complete.jar -Dlanguage=Python3 yourGrammar.g4
//without alias
```

/ '-Dlanguage' .g4 .

```
options {
    language  = "CSharp";
}
//or
options {
    language="Python";
}
```

ANTLR .

1. CSharp
2. 2
3. 3

ANTLR

.g4 ANTLR.jar .

```
1.yourGrammarNameListener.py
2.yourGrammarNameParser.py
3.yourGrammarName.tokens
...
```

. ANTLR . IDE .

```
#main.py
import yourGrammarNameParser
import sys

#main method and entry point of application

def main(argv):
    """Main method calling a single debugger for an input script"""
    parser = yourGrammarNameParser
    parser.parse(argv)

if __name__ == '__main__':
    main(sys.argv)
```

.

```
#yourGrammarNameParser.py
from yourGrammarNameLexer import yourGrammarNameLexer
from yourGrammarNameListener import yourGrammarNameListener
from yourGrammarNameParser import yourGrammarNameParser
from antlr4 import *
import sys

class yourGrammarNameParser(object):
    """
    Debugger class - accepts a single input script and processes
    all subsequent requirements
    """
def __init__(self): # this method creates the class object.
    pass


#function used to parse an input file
def parse(argv):
    if len(sys.argv) > 1:
        input = FileStream(argv[1]) #read the first argument as a filestream
        lexer = yourGrammarNameLexer(input) #call your lexer
        stream = CommonTokenStream(lexer)
        parser = yourGrammarNameParser(stream)
        tree = parser.program() #start from the parser rule, however should be changed to your
entry rule for your specific grammar.
        printer = yourGrammarNameListener(tree,input)
        walker = ParseTreeWalker()
        walker.walk(printer, tree)
    else:
        print('Error : Expected a valid file')
```

ANTLR .

.

ANTLR / : https://riptutorial.com/ko/antlr/topic/3414/antlr-----

5: Lexer v4

Examples

. .

```
INTEGER: [0-9]+;
IDENTIFIER: [a-zA-Z_] [a-zA-Z_0-9]*;

OPEN_PAREN: '(';
CLOSE_PAREN: ')';
```

:

A	A
AB	A B
(A|B)	A B
'text'	""
A?	0 1 A
A*	0 A
A+	A A
[A-Z0-9]	(AZ 0-9) .
'a'..'z'	
~[AZ]	-
.	

.

```
INTEGER: DIGIT+
       | '0' [Xx] HEX_DIGIT+
       ;

fragment DIGIT: [0-9];
fragment HEX_DIGIT: [0-9A-Fa-f];
```

'{' .

, :

```
OPEN_BRACE: '{';
```

.

```
parserRule: '{';
parserRule: OPEN_BRACE;
```

OPEN_BRACE . . .

. .

- ,
- (: '{')
-

:

```
grammar LexerPriorityRulesExample;

// Parser rules

randomParserRule: 'foo'; // Implicitly declared token type

// Lexer rules

BAR: 'bar';
IDENTIFIER: [A-Za-z]+;
BAZ: 'baz';

WS: [ \t\r\n]+ -> skip;
```

:

```
aaa foo bar baz barz
```

:

```
IDENTIFIER 'foo' BAR IDENTIFIER IDENTIFIER
```

- aaa IDENTIFIER .

  IDENTIFIER .

- foo 'foo' .

  randomParserRule 'foo' , IDENTIFIER .

- bar BAR .

  IDENTIFIER BAR .

- baz IDENTIFIER .

  BAZ IDENTIFIER . BAR .

  , BAZ , IDENTIFIER BAZ .

- barz IDENTIFIER .

  BAR (bar) 3 IDENTIFIER 4 . IDENTIFIER BAR BAR .

, . .

'foo' .

Lexer

:

```
WHITESPACE: [ \r\n] -> skip;
```

-> .

- skip : skip .
- channel(n) : .
- type(n) : .
- mode(n) , pushMode(n) , popMode , more : .

{ ... } , .

```
IDENTIFIER: [A-Z]+ { log("matched rule"); };
```

{ ... }? }? . false .

```
IDENTIFIER: [A-Z]+ { identifierIsValid() }?;
```

.

Lexer v4 : https://riptutorial.com/ko/antlr/topic/3271/lexer--v4

6: TestRig / grun

Examples

TestRig

ANTLR . .

ANTLR jar ANTLR .

```
export CLASSPATH=".:/usr/local/lib/antlr-4.5.3-complete.jar:$CLASSPATH"
```

: java Dot .

Alises Linux / MAC / Unix :

```
alias antlr4='java -jar /usr/local/lib/antlr-4.5.3-complete.jar'
//or any directory where your jar is located
```

Windows . .

TestRig

TestRig . .

```
alias grun='java org.antlr.v4.runtime.misc.TestRig'
```

Windows ANTLR jar TestRig .

```
java -cp .;antlr.4.5.3-complete.jar org.antlr.v4.runtime.misc.TestRig
//or
java -cp .;antlr.4.5.3-complete.jar org.antlr.v4.gui.TestRig
```

TestRig .

```
grun yourGrammar yourRule -tree //using the setup alias
java -cp .;antlr.4.5.3-complete.jar org.antlr.v4.gui.TestRig yourGrammar YourRule -tree //on
windows with no alias
java -cp .;antlr.4.5.3-complete.jar org.antlr.v4.gui.TestRig yourGrammar Hello r -tree
//Windows with the grammar Hello.g4 starting from the rule 'r'.
```

ANTLR `-gui` . :

:

JSON.g4

```
/** Taken from "The Definitive ANTLR 4 Reference" by Terence Parr */

// Derived from http://json.org
grammar JSON;

json
   : value
   ;

object
   : '{' pair (',' pair)* '}'
   | '{' '}'
   ;

pair
   : STRING ':' value
   ;

array
   : '[' value (',' value)* ']'
   | '[' ']'
   ;

value
   : STRING
   | NUMBER
   | object
   | array
   | 'true'
   | 'false'
   | 'null'
   ;


STRING
   : '"' (ESC | ~ ["\\])* '"'
   ;
fragment ESC
   : '\\' (["\\/bfnrt] | UNICODE)
   ;
fragment UNICODE
   : 'u' HEX HEX HEX HEX
   ;
fragment HEX
   : [0-9a-fA-F]
   ;
NUMBER
   : '-'? INT '.' [0-9] + EXP? | '-'? INT EXP | '-'? INT
   ;
fragment INT
   : '0' | [1-9] [0-9]*
   ;
// no leading zeros
fragment EXP
   : [Ee] [+\-]? INT
   ;
// \- since - means "range" inside [...]
WS
   : [ \t\n\r] + -> skip
   ;
```

JSON :

example.json

```
{
  "name": "John Doe",
  "age": 25,
  "address": {
    "streetAddress": "21 2nd Street",
    "city": "New York",
    "state": "NY",
    "postalCode": "10021-3100"
  },
  "phoneNumbers": [
    {
      "type": "home",
      "number": "212 555-1234"
    },
    {
      "type": "mobile",
      "number": "123 456-7890"
    }
  ],
  "children": [],
  "spouse": null
}
```

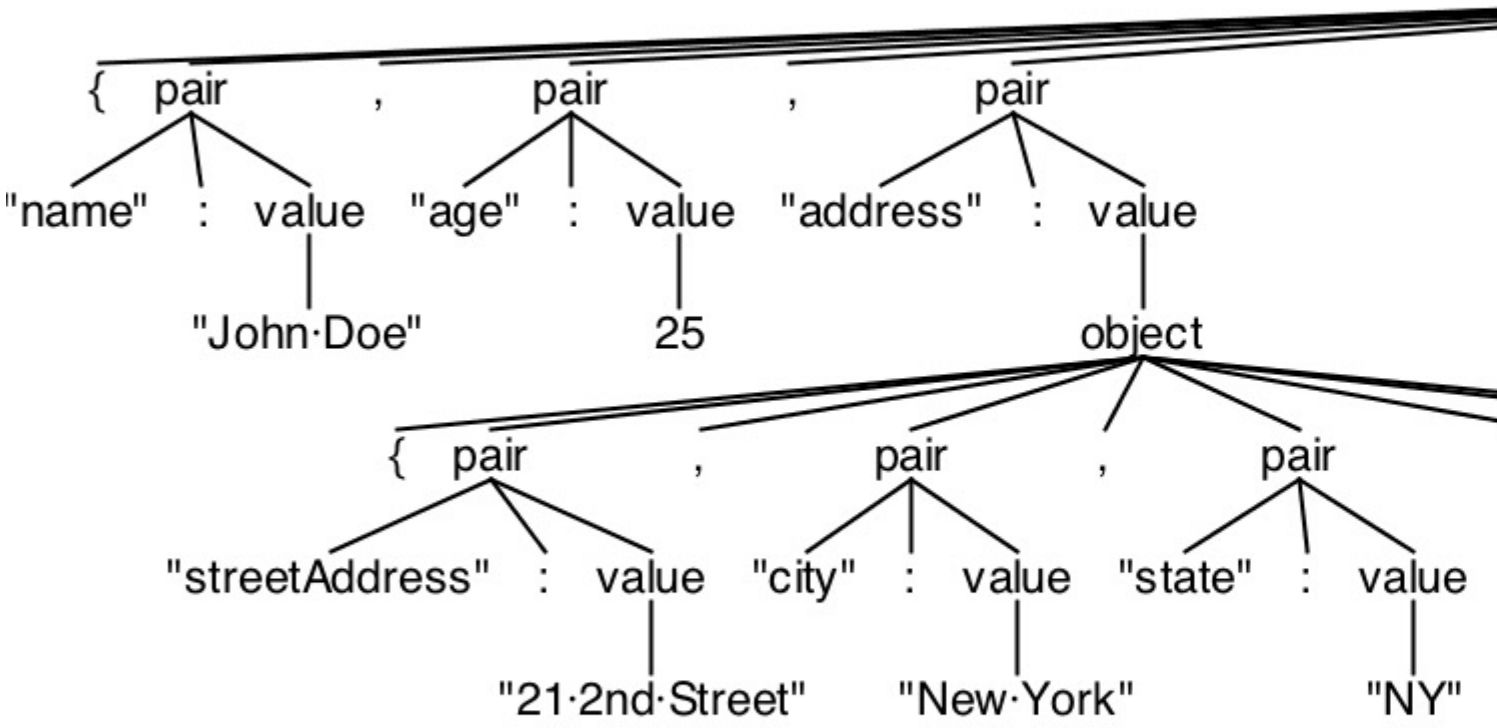
.

```
export CLASSPATH=".:/usr/local/lib/antlr-4.0-complete.jar:$CLASSPATH"

alias antlr4='java -jar /usr/local/lib/antlr-4.0-complete.jar'

alias grun='java org.antlr.v4.runtime.misc.TestRig'

antlr4 -o . -lib . -no-listener -no-visitor  JSON.g4; javac *.java; grun JSON json -gui
example.json
```

.java .tokens .class .

```
JSON.g4                         JSONLexer.class                JSONListener.java
JSONParser$PairContext.class    JSON.tokens                    JSONLexer.java
JSONParser$ArrayContext.class   JSONParser$ValueContext.class  JSONBaseListener.class
JSONLexer.tokens                JSONParser$JsonContext.class   JSONParser.class
JSONBaseListener.java           JSONListener.class
JSONParser$ObjectContext.class  JSONParser.java
```

:



TestRig / grun : https://riptutorial.com/ko/antlr/topic/3270/testrig---grun

7:

? ANTLR . visit () . . .

Examples

(Expr.g4)

```
grammar Expr;
prog:    (expr NEWLINE)* ;
expr:    expr ('*'|'/') expr

    |    expr ('+'|'-') expr
    |    INT
    |    '(' expr ')'
    ;
NEWLINE : [\r\n]+ ;
INT     : [0-9]+ ;
```

.

```
 -visitor           generate parse tree visitor
 -no-visitor        don't generate parse tree visitor (default)
```

/ .

```
java - jar antlr-4.5.3-complete.jar Expr.g4 -visitor
java - jar antlr-4.5.3-complete.jar Expr.g4 -no-visitor
```

/ .

ExprBaseVisitor.java ExprVisitor.java . Java . ExprBaseVisitor .

```
// Generated from Expr.g4 by ANTLR 4.5.3
import org.antlr.v4.runtime.tree.AbstractParseTreeVisitor;

/**
 * This class provides an empty implementation of {@link ExprVisitor},
 * which can be extended to create a visitor which only needs to handle a subset
 * of the available methods.
 *
 * @param <T> The return type of the visit operation. Use {@link Void} for
 * operations with no return type.
 */
public class ExprBaseVisitor<T> extends AbstractParseTreeVisitor<T> implements ExprVisitor<T>
{
    /**
     * {@inheritDoc}
     *
     * <p>The default implementation returns the result of calling
     * {@link #visitChildren} on {@code ctx}.</p>
     */
```

```
    @Override public T visitProg(ExprParser.ProgContext ctx) { return visitChildren(ctx); }
    /**
     * {@inheritDoc}
     *
     * <p>The default implementation returns the result of calling
     * {@link #visitChildren} on {@code ctx}.</p>
     */
    @Override public T visitExpr(ExprParser.ExprContext ctx) { return visitChildren(ctx); }
}
```

: https://riptutorial.com/ko/antlr/topic/8211/

8:

Examples

ANTLR .

.

```
// Rule
type : int     #typeInt
     | short   #typeShort
     | long    #typeLong
     | string  #typeString
     ;

// Tokens
int : 'int' ;
short : 'short' ;
long : 'long' ;
string : 'string' ;
```

ParseTreeListener .

```
public void enterTypeInt(TypeShortContext ctx);
public void enterTypeShort(TypeIntContext ctx);
public void enterTypeLong(TypeLongContext ctx);
public void enterTypeString(TypeStringContext ctx);
```

: https://riptutorial.com/ko/antlr/topic/6717/

S. No		Contributors
1	ANTLR	Athafoud, cb4, Community, D3181, Gábor Bakos, KvanTTT
2	ANTLR v3	Athafoud, cb4
3	ANTLR v4	Athafoud, cb4, Community, D3181, Devid, Gábor Bakos, GRosenberg, Lucas Trzesniewski
4	ANTLR /	D3181
5	Lexer v4	Athafoud, bn., Loxley, Lucas Trzesniewski
6	TestRig / grun	bn., D3181, Lucas Trzesniewski, Pascal Le Merrer
7		D3181
8		bn., Lucas Trzesniewski