19CSE401 - Compiler Design

Cup Parser

Lab sheet-6

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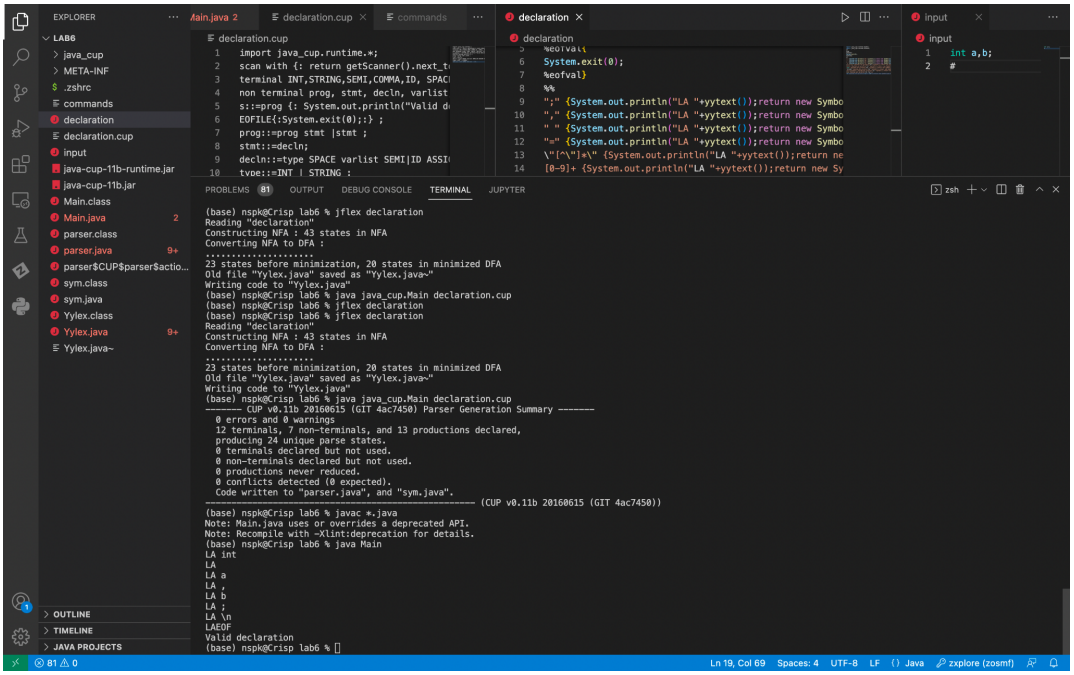
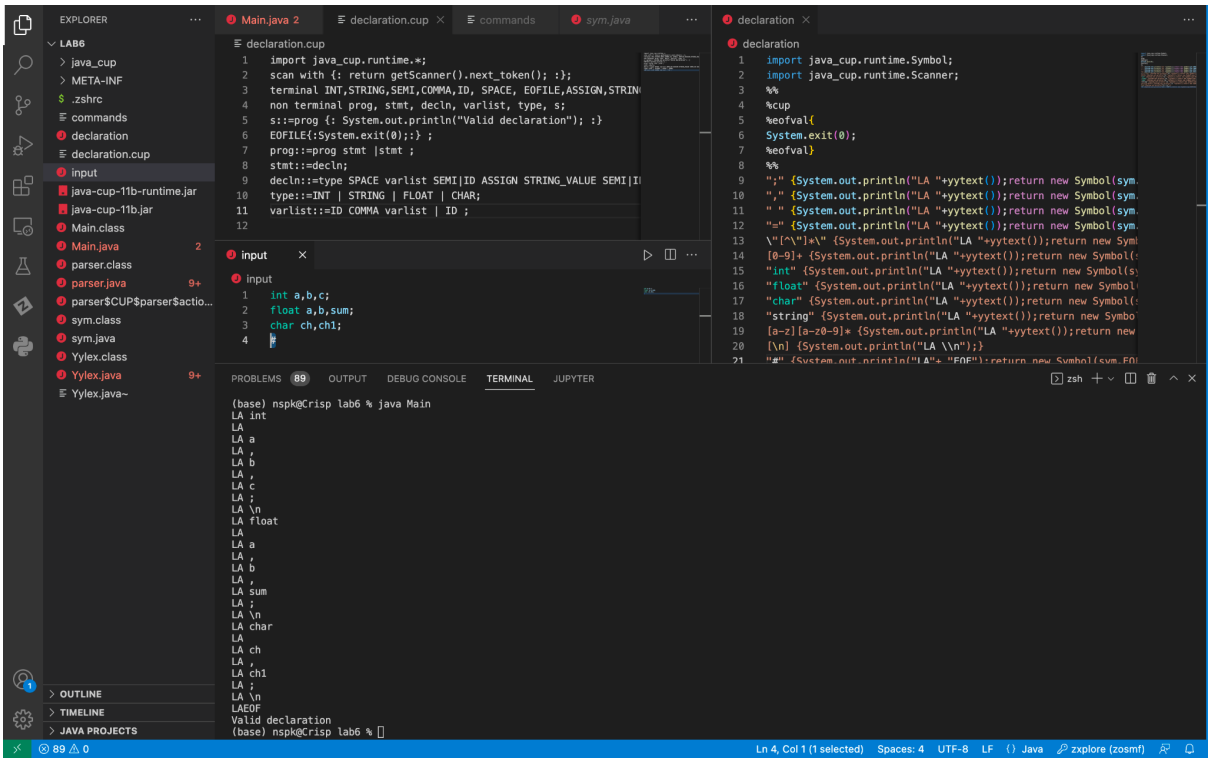
EXAMPLE 1: A grammar for simple declaration statement. Carefully go through the rules and make sure you understand the significance of every line in the grammar. Follow the step-by-step instructions below to create the grammar, compile and execute:



Exercises:

1. Extend the same grammar to accept the declarations of the form:
   - i. int a,b,c;
   - ii. float a,b,sum;
   - iii. char ch,ch1;



2. Given below are some exercises that enhances the simple declaration statement to recognize a wide variety of other declarations.

   a. Multiline declaration: Extend the syntax rules to accept declaration statements with newline in between.
   Example: int a,b,c;
   int c,d;

   b. Optional Definition: Extend the syntax rules to accept declaration statements of the form: var int tokens = 2, tip, args = 53; var string xyz = “hello”;

   c. Floating point: Extend the lexical and syntax rules to recognize floating point numbers (2.345) as FLOAT and in declaration statement.

   Example: var float time = 12.34;

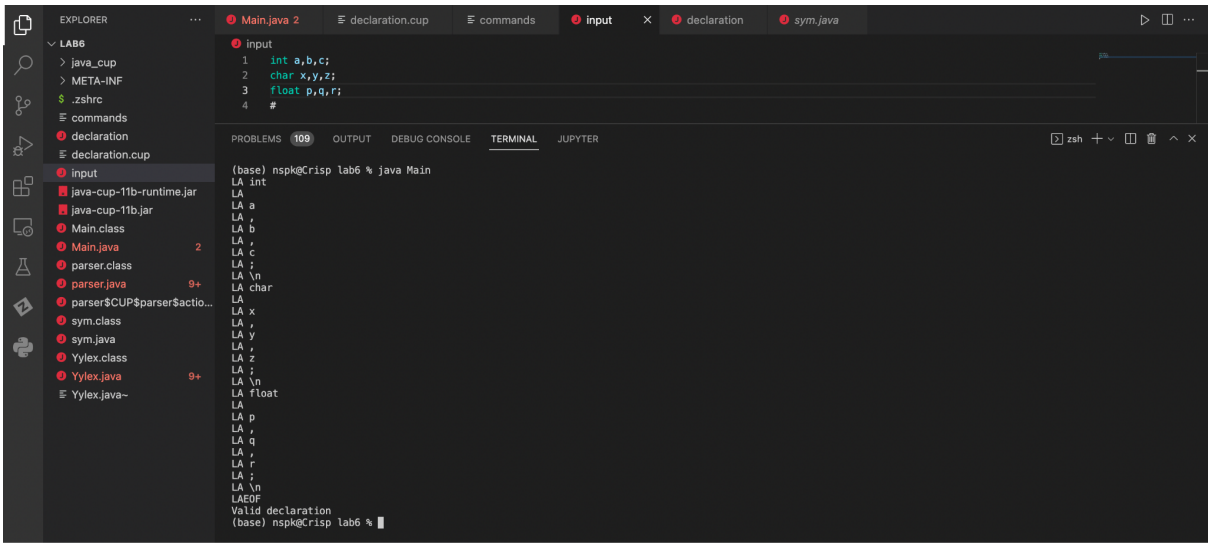
   d. Constant Declaration: Extend the syntax rules to recognize declaration of constants of the form: const int pi = 3.14;. Note, constant declaration can be done one at a time and definition during declaration is compulsory. i.e. const string xyz; is invalid whereas const string xyz = “hello”; is valid.

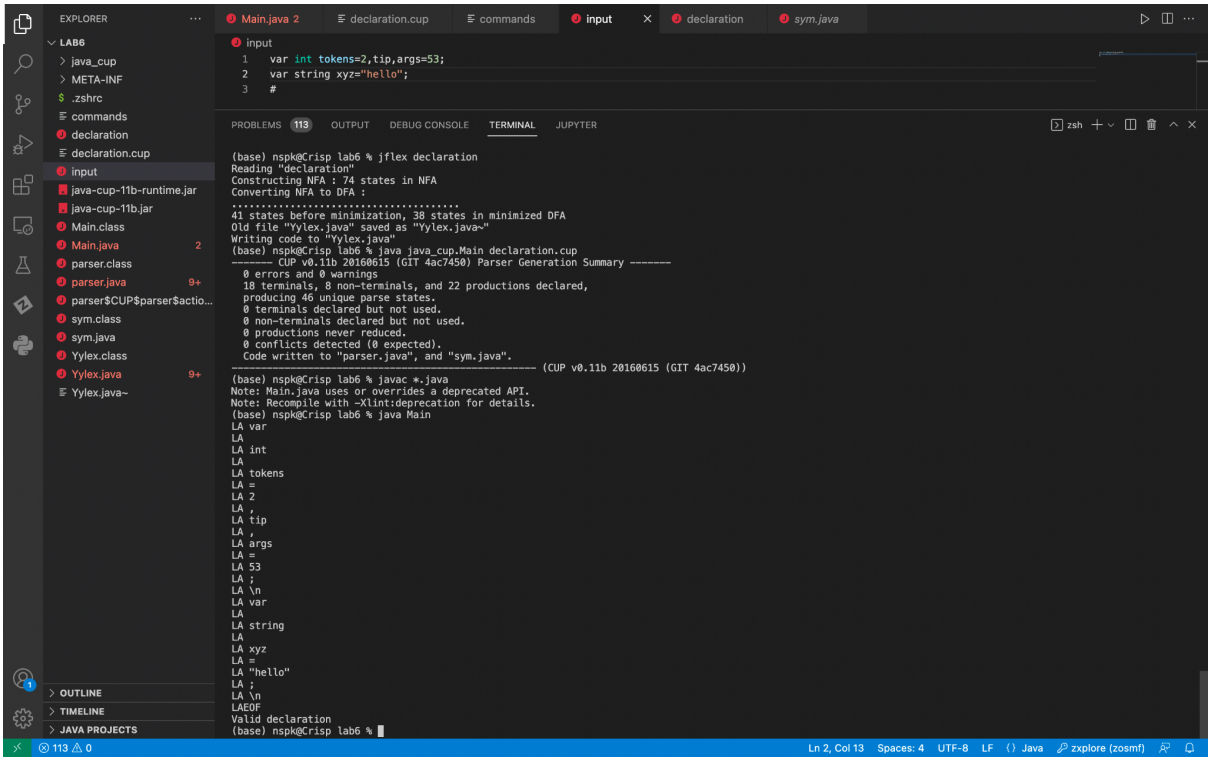
   e. NULL value: Extend your syntax rules to accept nil as a value during declaration

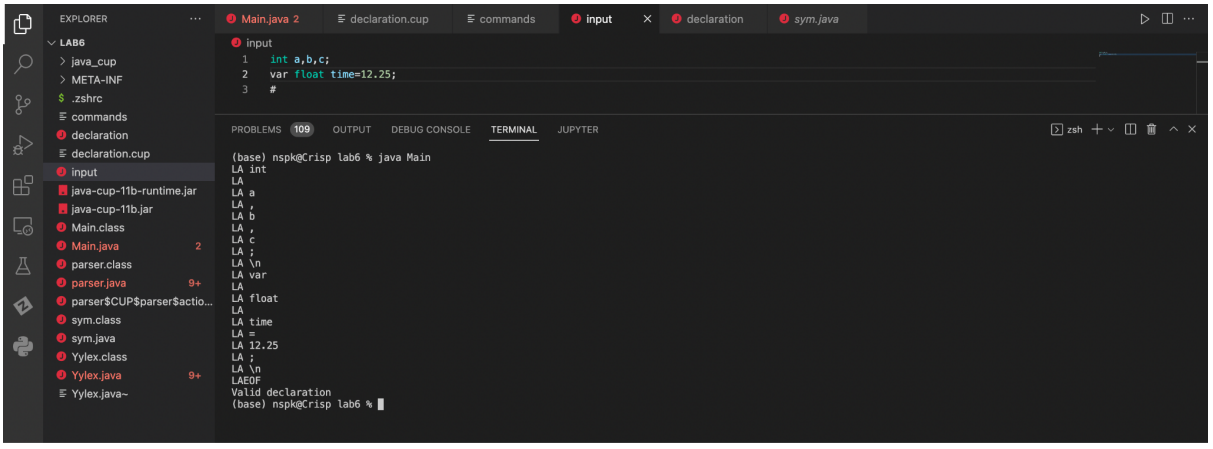
   Example: var int i = NULL; var string s = NULL;

   f. Array Declaration: Extend your rules to recognize array declarations of the form: int value[10]; string colours[5];

   f. Array Initialization: Extend your rules to recognize array initializations of the form: int value[10] = {1, 25, 43, ... }; string colors[5] = {“red”, “green”, “blue”, “orange”, “yellow”};




EXPLORER
LAB6
java_cup
META-INF
.zshrc
commands
declaration
declaration.cup
input
java-cup-11b-runtime.jar
java-cup-11b.jar
Main.class
Main.java
parser.class
parser.java
parserCUPparser$actio...
sym.class
sym.java
Ylex.class
Ylex.java
Ylex.java~
OUTLINE
TIMELINE
JAVA PROJECTS
Main.java 2
declaration.cup
commands
input
declaration
sym.java
input
1 var int tokens=2,tip,args=53;
2 var string xyz="hello";
3 #
PROBLEMS 113
OUTPUT
DEBUG CONSOLE
TERMINAL
JUPYTER
zsh
(base) nspk@Crisp lab6 % jflex declaration
Reading "declaration"
Constructing NFA : 74 states in NFA
Converting NFA to DFA :
....
41 states before minimization, 38 states in minimized DFA
Old file "Ylex.java" saved as "Ylex.java~"
Writing code to "Ylex.java"
(base) nspk@Crisp lab6 % java java_cup.Main declaration.cup
------- CUP v0.11b 20160615 (GIT 4ac7450) Parser Generation Summary -------
0 errors and 0 warnings
18 terminals, 8 non-terminals, and 22 productions declared,
producing 46 unique parse states.
0 terminals declared but not used.
0 non-terminals declared but not used.
0 productions never reduced.
0 conflicts detected (0 expected).
Code written to "parser.java", and "sym.java".
-- (CUP v0.11b 20160615 (GIT 4ac7450))
(base) nspk@Crisp lab6 % javac *.java
Note: Main.java uses or overrides a deprecated API.
Note: Recompile with -Xlint:deprecation for details.
(base) nspk@Crisp lab6 % java Main
LA var
LA
LA int
LA
LA tokens
LA =
LA 2
LA ,
LA tip
LA ,
LA args
LA =
LA 53
LA ;
LA \n
LA var
LA
LA string
LA
LA xyz
LA =
LA "hello"
LA ;
LA \n
LAEOF
Valid declaration
(base) nspk@Crisp lab6 %
113 0
Ln 2, Col 13
Spaces: 4
UTF-8
LF
Java
zxplore (zosmf)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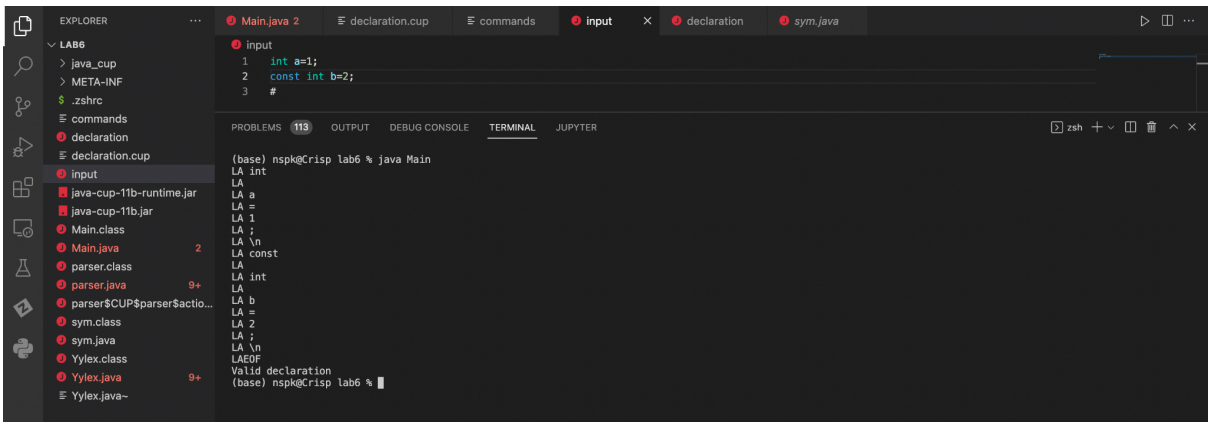
parser.java
parserCUPparser$actio...
sym.class
sym.java
Ylex.class
Ylex.java
Ylex.java~
Main.java 2
declaration.cup
commands
input
declaration
sym.java
input
1 int a,b,c;
2 var float time=12.25;
3 #
PROBLEMS 109
OUTPUT
DEBUG CONSOLE
TERMINAL
JUPYTER
zsh
(base) nspk@Crisp lab6 % java Main
LA int
LA
LA a
LA ,
LA b
LA ,
LA c
LA ;
LA \n
LA var
LA
LA float
LA
LA time
LA =
LA 12.25
LA ;
LA \n
LAEOF
Valid declaration
(base) nspk@Crisp lab6 %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parser.java
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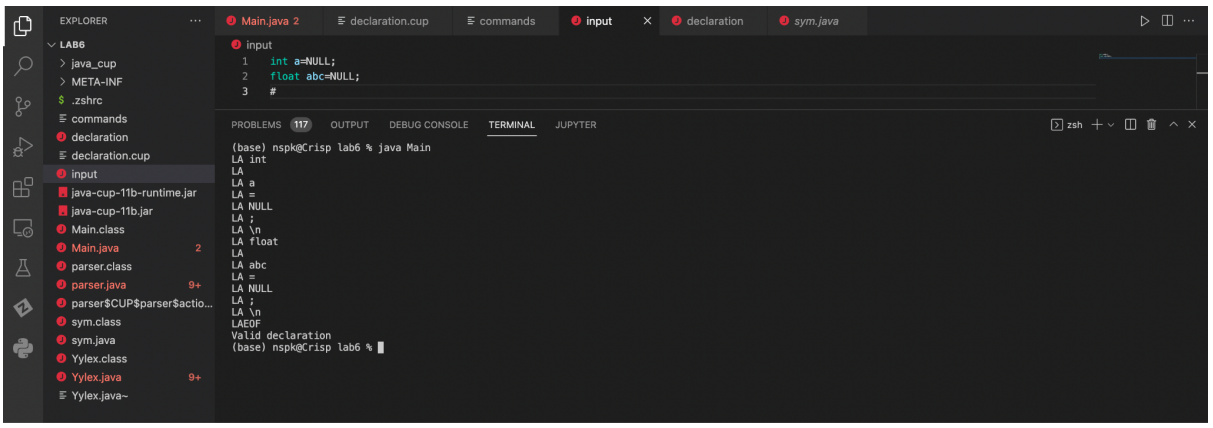
sym.class
sym.java
Ylex.class
Ylex.java
Ylex.java~
Main.java 2
declaration.cup
commands
input
declaration
sym.java
input
1 int a=1;
2 const int b=2;
3 #
PROBLEMS 113
OUTPUT
DEBUG CONSOLE
TERMINAL
JUPYTER
zsh
(base) nspk@Crisp lab6 % java Main
LA int
LA
LA a
LA =
LA 1
LA ;
LA \n
LA const
LA
LA int
LA
LA b
LA =
LA 2
LA ;
LA \n
LAEOF
Valid declaration
(base) nspk@Crisp lab6 %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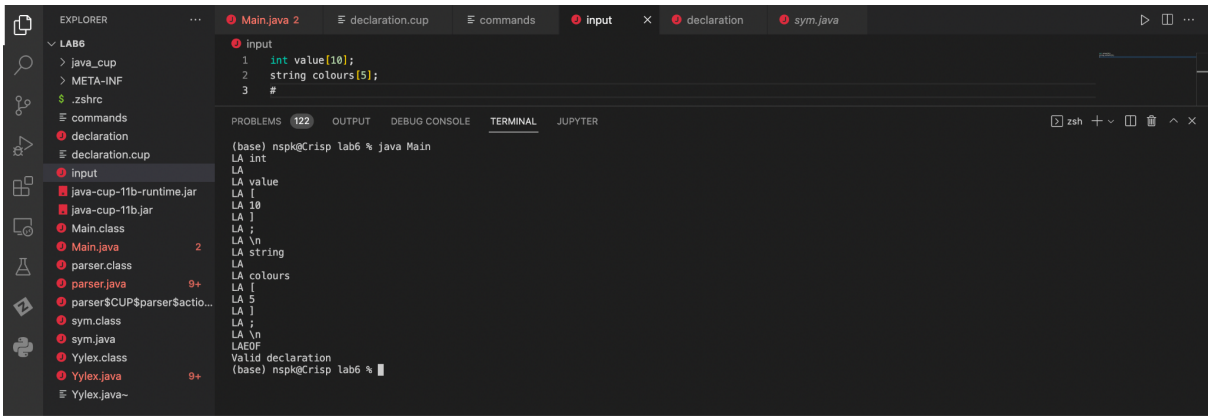
java-cup-11b.jar
Main.class
Main.java 2
parser.class
parser.java 9+
parserCUPparser$actio...
sym.class
sym.java
Yylex.class
Yylex.java 9+
Yylex.java~
Main.java 2
declaration.cup
commands
input
declaration
sym.java
input
1 int a=NULL;
2 float abc=NULL;
3 #
PROBLEMS 117
OUTPUT
DEBUG CONSOLE
TERMINAL
JUPYTER
zsh
(base) nspk@Crisp lab6 % java Main
LA int
LA
LA a
LA =
LA NULL
LA ;
LA \n
LA float
LA
LA abc
LA =
LA NULL
LA ;
LA \n
LAEOF
Valid declaration
(base) nspk@Crisp lab6 %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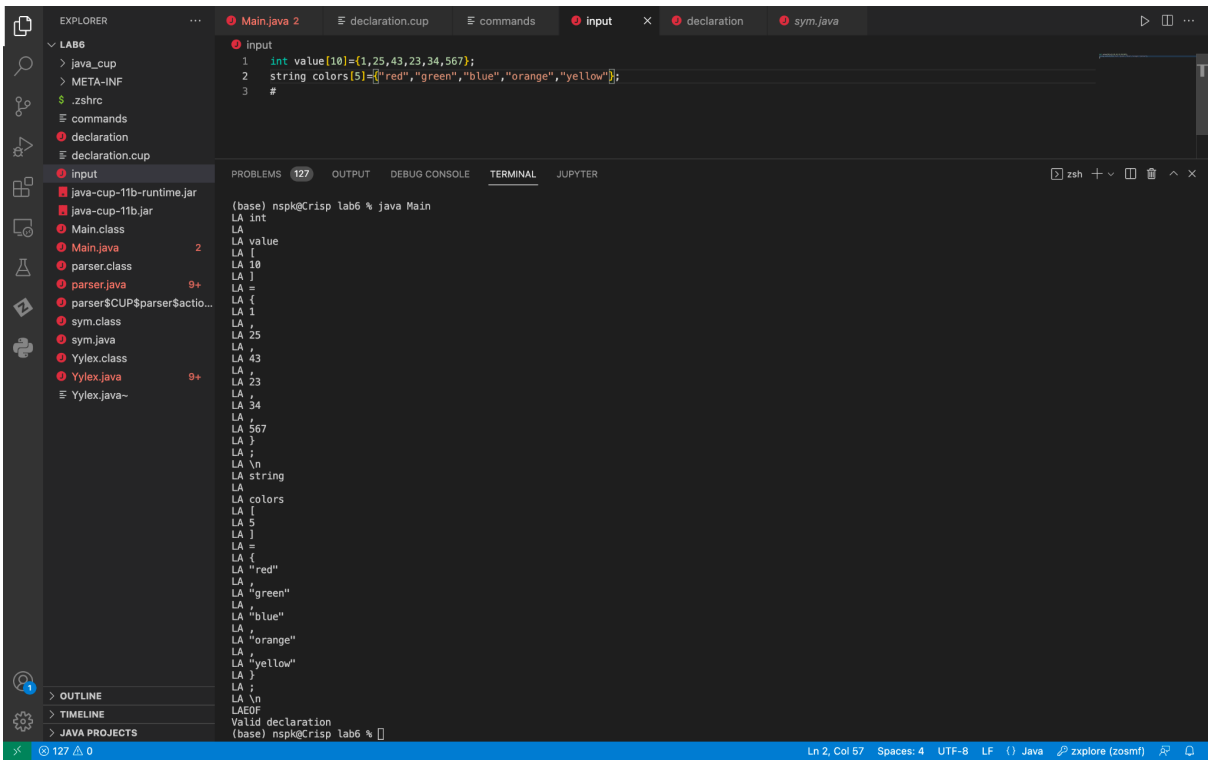
parser.class
parser.java 9+
parserCUPparser$actio...
sym.class
sym.java
Yylex.class
Yylex.java 9+
Yylex.java~
Main.java 2
declaration.cup
commands
input
declaration
sym.java
input
1 int value[10];
2 string colours[5];
3 #
PROBLEMS 122
OUTPUT
DEBUG CONSOLE
TERMINAL
JUPYTER
zsh
(base) nspk@Crisp lab6 % java Main
LA int
LA
LA value
LA [
LA 10
LA]
LA ;
LA \n
LA string
LA
LA colours
LA [
LA 5
LA]
LA ;
LA \n
LAEOF
Valid declaration
(base) nspk@Crisp lab6 %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parser.java 9+
parserCUPparser$actio...
sym.class
sym.java
Yylex.class
Yylex.java 9+
Yylex.java~
OUTLINE
TIMELINE
JAVA PROJECTS
Main.java 2
declaration.cup
commands
input
declaration
sym.java
input
1 int value[10]={1,25,43,23,34,567};
2 string colors[5]={"red","green","blue","orange","yellow"};
3 #
PROBLEMS 127
OUTPUT
DEBUG CONSOLE
TERMINAL
JUPYTER
zsh
(base) nspk@Crisp lab6 % java Main
LA int
LA
LA value
LA [
LA 10
LA]
LA =
LA {
LA 1
LA ,
LA 25
LA ,
LA 43
LA ,
LA 23
LA ,
LA 34
LA ,
LA 567
LA }
LA ;
LA \n
LA string
LA
LA colors
LA [
LA 5
LA]
LA =
LA {
LA "red"
LA ,
LA "green"
LA ,
LA "blue"
LA ,
LA "orange"
LA ,
LA "yellow"
LA }
LA ;
LA \n
LAEOF
Valid declaration
(base) nspk@Crisp lab6 %
127 0
Ln 2, Col 57
Spaces: 4
UTF-8
LF
Java
zxplore (zosmf)