

Upload Assignment: Create a Language

ASSIGNMENT INFORMATION

Due Date

Wednesday, November 17, 2021

8:00 AM

Points Possible

100

For this project, you will be creating a new programming language. This language will not be very complex (certainly not Turing complete!).

We are going to call our language Zoomjoystrong (thank you to some Internet word randomizer!). Zoomjoystrong will be written in C, with the help of Flex and Bison. As such, we will need the following pieces:

- A Flex file to define our tokens. We will call this zoomjoystrong.lex.
- A Bison file to define our grammar. This will be called zoomjoystrong.y.
- A graphics library with functions we can call to do the drawing. This will be provided to you in files called zoomjoystrong.h and zoomjoystrong.c.

Note that you don't have to create the graphics library; it is provided.

Project Specifications

Flex File

Your Flex file should define the following tokens:

- END. This statement exits the interpreter.
- END_STATEMENT. All commands should end with a semicolon.
- POINT. When we match the command to plot a point.
- LINE. When we match the command to draw a line.
- CIRCLE. When we match the command to draw a circle.
- RECTANGLE. When we match the command to draw a rectangle.
- SET_COLOR. Matches the command to change colors.
- INT. Matches an integer value.
- FLOAT. Matches a floating-point value.
- A way to match tabs, spaces, or newlines, and to ignore them.
- A way to match anything not listed above, and to tell the user they messed up.

Bison File

Your Bison file will define the grammar of the language. We want to support:

- A statement list of one or (arbitrarily) more statements followed by the END token.
- Valid statements followed by the END_STATEMENT token.
- A line command of the syntax line x y u v that will plot a line from x,y to u,v.
- A point command of the syntax point x y that plots a single point at x,y.
- A circle command with the syntax circle x y r that plots a circle of radius r around the center point at x, y.

- A rectangle command with the syntax `rectangle x y w h` that draw a rectangle of height `h` and width `w` beginning at the top left edge `x,y`.
- A set color statement with syntax `set_color r g b` that changes the current drawing color to the `r,g,b` tuple.

Compiling

Bison will create the `zoomjoystrong.tab.h` and `zoomjoystrong.tab.c` files when you run the command `bison -d zoomjoystrong.y`. You will need to include the `zoomjoystrong.tab.h` file in your `zoomjoystrong.lex` file so that the lexer will return the correct tokens to the parser.

Flex will create the `lex.yy.c` lexer code when you run the command `flex zoomjoystrong.lex`.

We then compile `zoomjoystrong.c`, `lex.yy.c`, and `zoomjoystrong.tab.c` into an executable called `zjs` with the command:

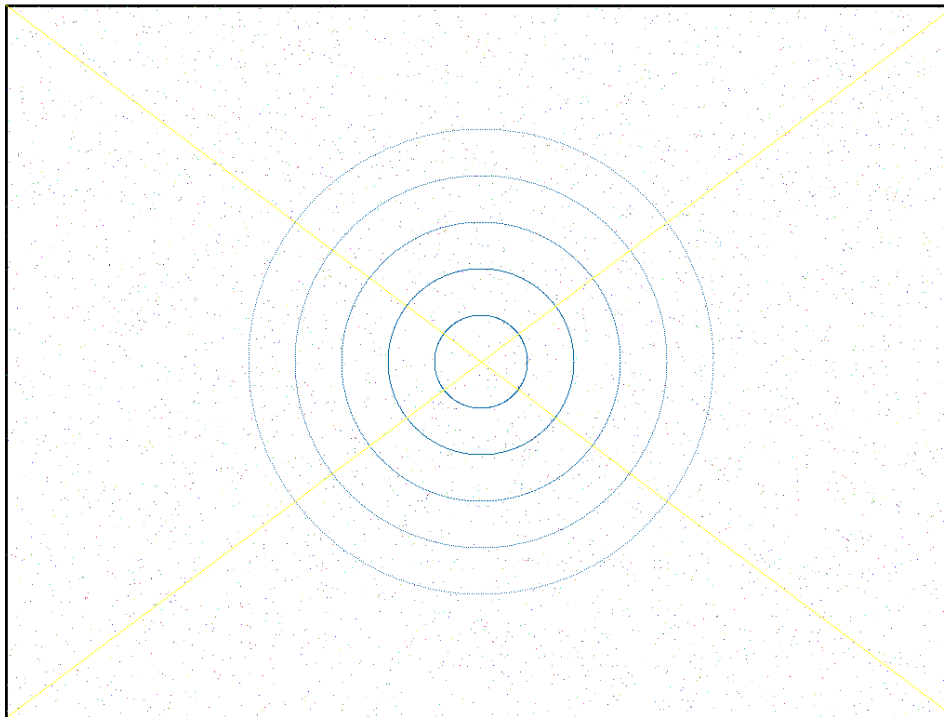
```
gcc -o zjs zoomjoystrong.c lex.yy.c zoomjoystrong.tab.c -lSDL2 -lm -I/usr/include,
```

on the EOS system. Please note that this graphics library will usually fail to draw if you are logged in remotely, meaning you either need to test in the EOS or Arch labs, or logged in via RDP. SSH ALONE WILL NOT WORK!

Rubric

Criteria	10 Points	Up
Compilation	Compiles with no errors or warnings	Co
Style Guide	Perfectly adheres to style guide	Mir
Follows Project Specifications	No requirements omitted, parses files correctly	1 -
Error handling	Gracefully handles user errors (i.e. if they type a command incorrectly we let them know instead of crashing with no message). Additionally, we need to make sure the numbers are in valid ranges; colors values should be in the range 0-255, points plotted should be between 0-width or height of our screen, etc.	Ha
On time	Submitted before due date and time	Sut

Sample files



Included in this repository are a sample Flex and sample Bison file for a calculator program. These should be sufficient to help you get started, but you will likely need to read documentation online.

Additionally, I have created a sample program for you. If you run the command `zjs < sample_program.zjs` you should see output like the following:

```
zoomjoystong.c
zoomjoystong.h
sample.zjs
calc.y
calc.l
```

ASSIGNMENT SUBMISSION

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For the toolbar, press ALT+F10 (PC) or ALT+FN+F10 (Mac).

ABC ✓

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0 WORDS POWERED BY TINY



*When finished, make sure to click **Submit**.*

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