



Shoo

Claire Adams, Cindy Le, Sam Jayasinghe, Crystal Ren

About the Language





Language Overview

Shoo is a general-purpose programming language that is statically scoped and strongly typed. It has imperative and functional programming features with C-like syntax. Supporting first class functions, structs, and arrays, it can perform reasonably complex tasks in a single-threaded setting.

Language Evolution

Iteration 0

- Inspired by the Go language
- Vision: concurrent programming, parallelizable problem solving, Go-routines
- Channels, locks, threads, and first class functions.

Iteration 1

- Discard concurrent programming, locks
- Discussion of linking a C library for Go's channels
- "Shoo-routines"

Current iteration

- Focus on first class functions (discard "shoo-routine" name)
- Discard channels
- Implement structs and nested arrays

Key Language Features

- ◀ First-class Functions
- ◀ Structs
- ◀ Arrays





First-Class Functions

- ▶ Functions are treated like variables
- ▶ Can be fields in structs or elements in arrays
- ▶ Can be arbitrarily nested
- ▶ Can have recursive function



Arrays And Structs

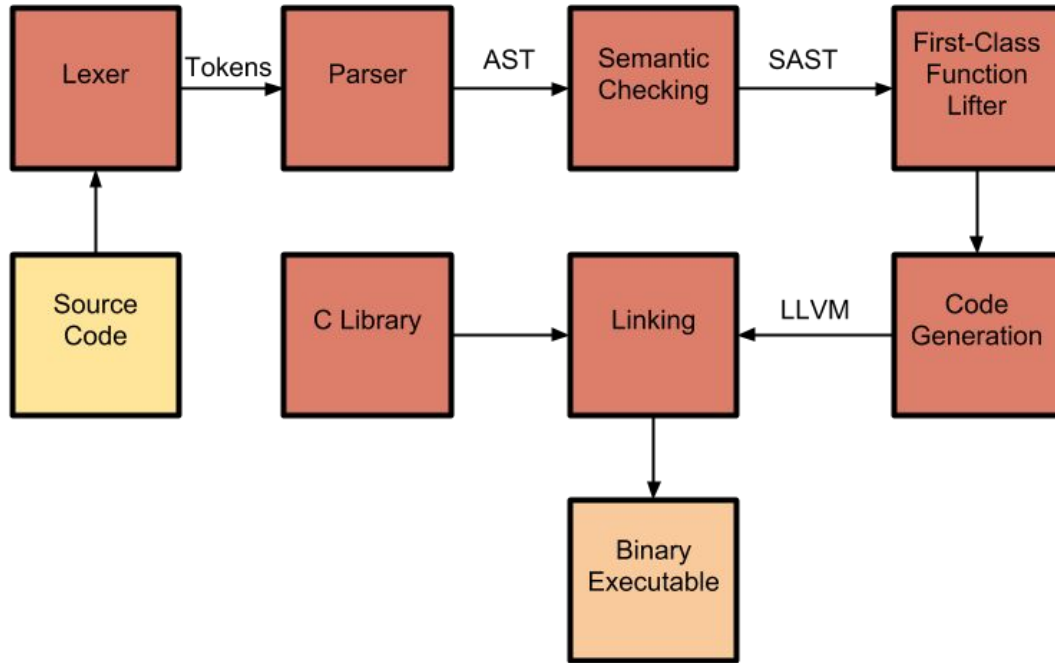
- ▶ Arrays can hold any type including arrays, user defined structs and functions
- ▶ Struct fields can have default values and can have any number and type of member fields



About the Compiler



Compiler Architecture

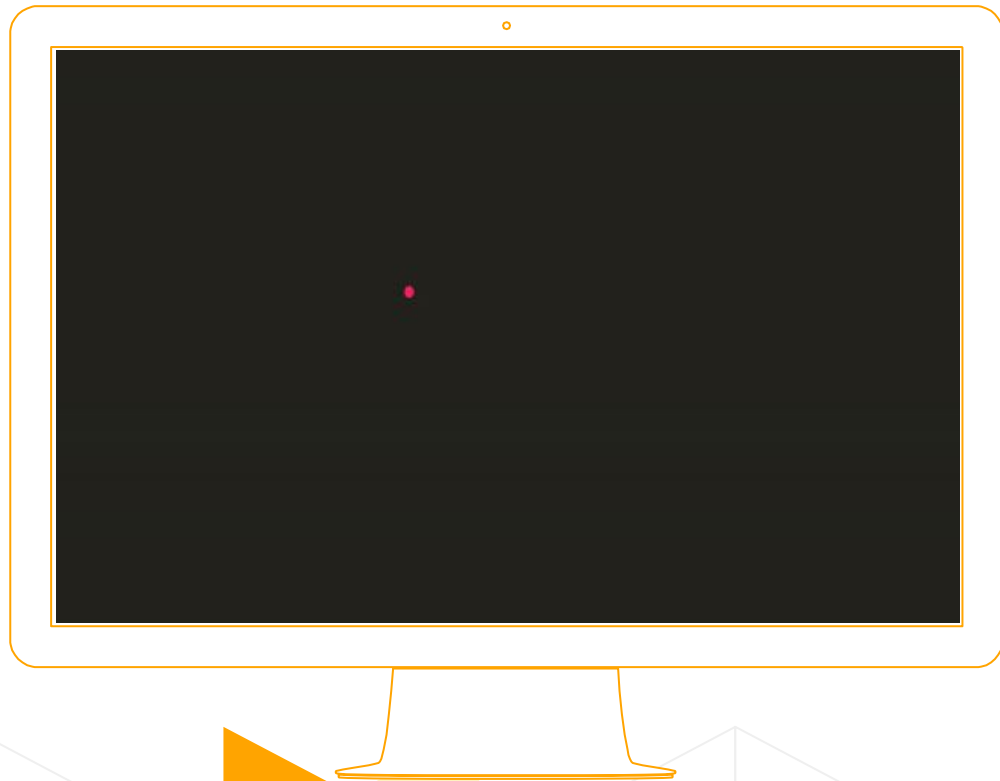


Code



Demo Sample Projects

Demonstration of interesting features in our languages such as first-class functions, structs, and arrays.



Demo 1



- ▶ Choose your own adventure with structs, functions and arrays:
 - ▶ Choose an array size (for the array of structs)
 - ▶ Choose a struct type (BankAccount, Rectangle, Point, Student)
 - ▶ The current array of these objects prints (initial values are randomly generated)
 - ▶ Choose a function to apply to the array of structs (these functions are stored in an array as well)
 - ▶ The array after the function application is printed

Demo 2: Bubble Sort

Array
of Structs

Index : 1
Data: 106

Index : 3
Data: 101

Index : 8
Data: 104

...

Index : 4
Data: 107

Index : 5
Data: 100

```
struct Object { /* ... */ }  
function compareData(Object a, Object b) bool { /* ... */ }  
function compareIndex(Object a, Object b) bool { /* ... */ }  
/* printIndex() and printData() definitions here */  
function bubbleSort(array<Object> arr, int n, func(Object, Object; bool) compare) array<Object> { /* ... */ }  
  
/* Some initializations here */
```

```
printIndex(objects, n);  
printData(objects, n);  
bubbleSort(objects, n, compareIndex);  
printIndex(objects, n);  
bubbleSort(objects, n, compareData);  
printData(objects, n);
```

```
// prints: 1 3 8 6 9 7 0 2 4 5  
// prints 106 101 104 108 105 103 102 109 107 100  
  
// prints: 0 1 2 3 4 5 6 7 8 9  
  
// prints: 100 101 102 103 104 105 106 107 108 109
```

Demo 3: Sudoku Solver

8								
		3	6					
	7					2		
	5				7			
				4	5	7		
			1				3	
		1						8
		8	5				1	
	9					4		

- ▶ Multi-dimensional arrays
- ▶ Operates on a default board

Bonus Demo

- ◀ Uses 2D arrays.
- ◀ Reads a string from stdin and then prints it in a fun ASCII format

```
al@numel:~/shoo-lang$ ./run.sh sample_programs/ascii.shoo
Here's a sample of the font
```

```
  ^
 / \
-   -
-   -
 \ /
```

```
  _
 | )
 | )
 | )
 | )
  _
```

```
  _
 | )
 | )
 | )
 | )
  _
```

```
Now ascii-fy your own string up to 10 characters
Please input a string of just lower case characters
hello
```

```
  _ _ _ _ _
 | | | | |
 | | | | |
 | | | | |
 | | | | |
  _ _ _ _ _
```

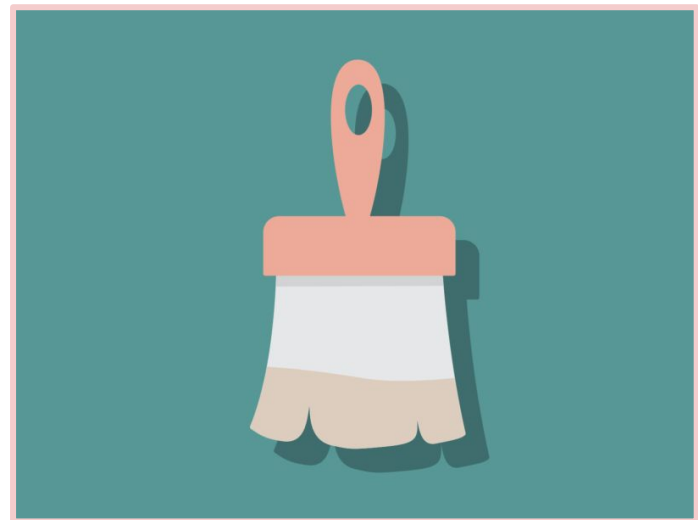
```
al@numel:~/shoo-lang$ █
```

Wrap Up



Future Work

- ▶ Automatic garbage collection
- ▶ Mutually recursive structs and functions
- ▶ Type inference



Questions?



Sources





Sources

This presentation uses images and gifs from the following sources:

- ▶ Key Language Features slide:
<https://giphy.com/gifs/key-nPlwhYMeBkis0>
- ▶ Demo Sample Projects slide:
<https://hackernoon.com/presenting-your-code-beautifully-fdbab9e6fb68>
- ▶ Arrays and Structs slide:
http://www.freblogg.com/2018/01/remove-duplicate-elements-from-array_6.html
- ▶ First-Class Functions slide:
<https://www.designcrowd.com/design/16148133>

Presentation template by [SlidesCarnival](#).