Introduction to

Golang

Advanced Web Topics | WMAD Sr. B

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Today’s agenda

What we will cover

History of Go

How Go works

Libraries & Packages

Variables

Arrays & Slices

Functions

Demo

Brief History of Go

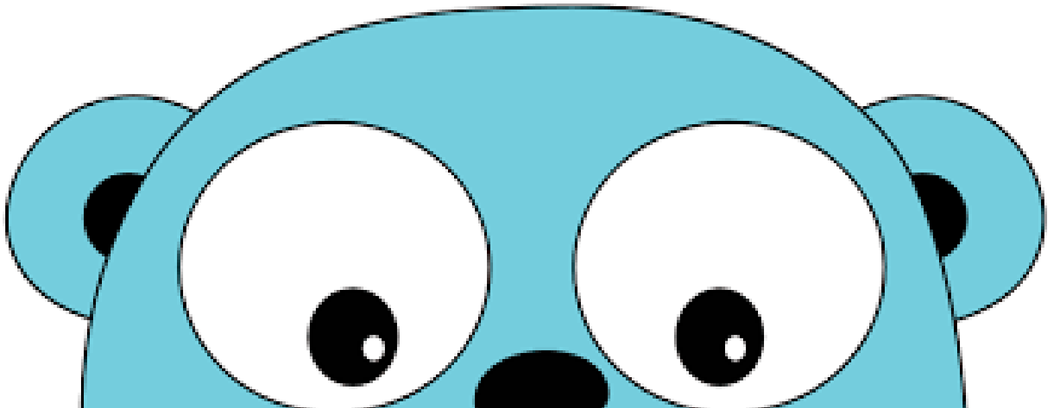
2009 Go was developed by Google developers

2012 Initial version was released

2023 Current version is **go1.20** released on Feb 14th, 2023

How Go works

Designed to be simple and easy to use, with a focus on developer productivity



Syntax

- Inspired by several other programming languages
- Similar to C in its syntax with a few key differences
- Around 25 keywords

Compilation

- Compiled into executables that can run anywhere, even if the machine doesn't have Go installed

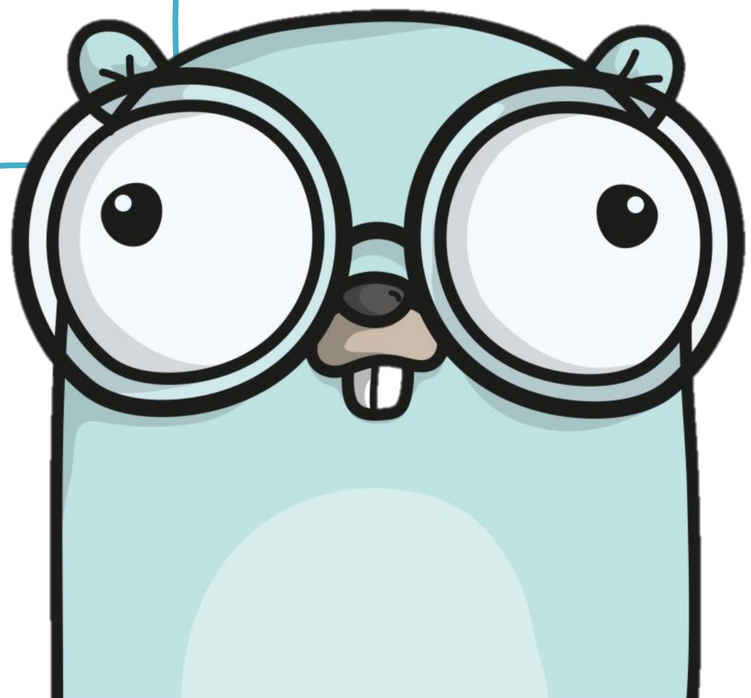
Concurrency

- Go's concurrency model is based on lightweight threads called goroutines and they can execute independently of each other

How Go works

Folders in Go needs to follow a certain structure

```
User/
└── go
    ├── bin
    ├── pkg
    └── src
```



bin

- It holds all compiled code, the executable files (binary files)

pkg

- It holds all shared packages of the applications

src

- Where we write our code for each application
- Hold the third-party packages

Libraries & Packages

Standard Library

Go already comes with a rich standard library, providing a wide range of functionality

Third-Party Packages

External packages and libraries can be easily installed and used

Variables

- There are only 5 types of variables
- We can’t declare a variable and not use it – that will cause a compilation error!
- We don’t need to explicitly declare the variable type

TYPE	DEFAULT VALUE
string	“”
int	0
float32 or float64	0
bool	false
*	nil

Variables

- Declaring variables

```
var variableName string = “Golang”  // explicitly declaring a string
var variableName = “Golang”         // Go already understands this is a string
variableName := “Golang”            // short declaration syntax

var example float32 = 2.023         // explicitly declaring a float32
var example = 2.023                 // Go is the one who decides which float it
example := 2023                     should be

const year = 2023
```

Variables

- Declaring variables

```
var firstName, lastName string

var (
    weight = 10.85
    name = “Golang”
    quantity := 3
)
```

```
// we can declare many

variables at the same time
```

Variables

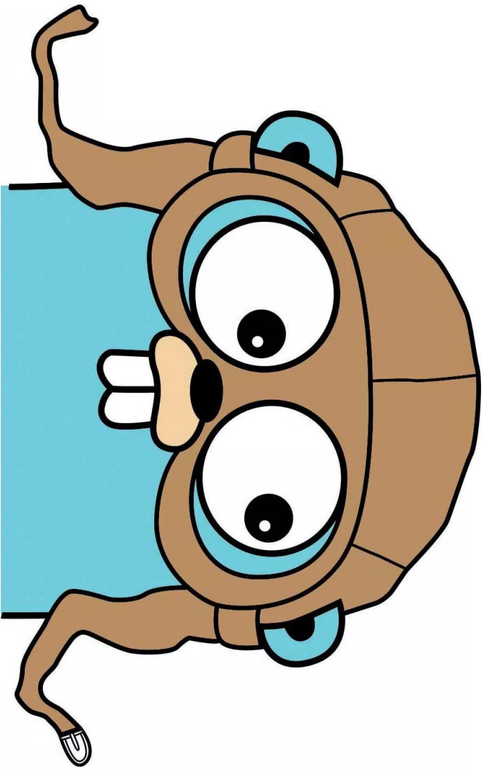
- To know the variable type, we need to use the function `TypeOf` inside the `reflect` package

```
example := 2023
typeOfExample := reflect.TypeOf(example)

fmt.Println(typeOfExample)          // fmt is another package

                                    // this will print float32 or float64
```

Arrays & Slices



- Slices are a type of an array
- The difference between arrays and slices is that arrays have a pre-determined size, while slices don’t
- When declared, arrays give the default value for its elements – that means that if you don’t initialize one of the elements, it will have an initial value based on its type

Arrays

- Declaring an array and changing the value for its elements

```
var arrayName [3]int
arrayName[0] = 10
arrayName[2] = 30

fmt.Println(arrayName)

// output:
// [10 0 30]
```

Slices

- Declaring and initializing a slice

```
sliceName := []string{“Red”, “Blue”}


fmt.Println(sliceName)

// output:

// [Red Blue]
```

Slices

- Slices have lengths and capacities:
  - Length is the number of items inside a slice – we can check it using `len(slice)`
  - Capacity is how many elements a slice can hold – we can check it using `cap(slice)`

```
colors := []string{“Red”, “Blue”, “Yellow”}

fmt.Println(len(colors))    // output: 3
fmt.Println(cap(colors))    // output: 3
```

Slices

- To add a new element to a slice, we use `append(slice, element)`
  - In this case, the capacity will double from its original capacity automatically

```
colors = append(colors, “Black”)


fmt.Println(colors)          // output: [Red Blue Yellow Black]
fmt.Println(len(colors))     // output: 4
fmt.Println(cap(colors))     // output: 6
```

Functions

- We use the keyword `func` to declare a function
- `func main()` is the primary function
  - It doesn't return anything and doesn't receive any parameters
  - When it ends, the application stops running
- A function can return one or more parameters
- Go doesn't have access modifiers. What will define the access control is the first letter case of a field , function or method name

camelCase	Private (unexported)
PascalCase	Public (exported)

Functions

- Declaring a function

```
func funcName(parameters) <return type> {
    // code
}
```

```
func sum(num1, num2 int) int {
    return num1 + num2
}
```

```
// Function to sum up 2 numbers
// This will return an integer
```

Functions

- Variadic function
  - Receives an undetermined number of parameters
  - We use ... to indicate it is a variadic function

```
func sum(numbers …int) int {
    total := 0
    for _, num := range numbers {
        total += num
    }
    return total
}
```

```
// Range returns two values:
the index and the value for each iteration
// We won’t need the index, so we name it _
// This way, Go won’t complain we are not
using this value
```

Functions

- Considering the previous variadic function

```
fmt.Println(sum())                  // output: 0
fmt.Println(sum(1, 2, 3))           // output: 6
fmt.Println(sum(10, 20, 30, 40, 50)) // output: 150
```

Let’s code!

References

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Courses

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