Let's get Go-ing

An introduction to Go
programming for COS 316

Today's Agenda

Just enough Go to get started on Assignment 1.

- What is Go?

- Variables, loops, and functions in Go

- Navigating the standard library documentation

Why learn Go?

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Go is a programming language designed for large, distributed systems.

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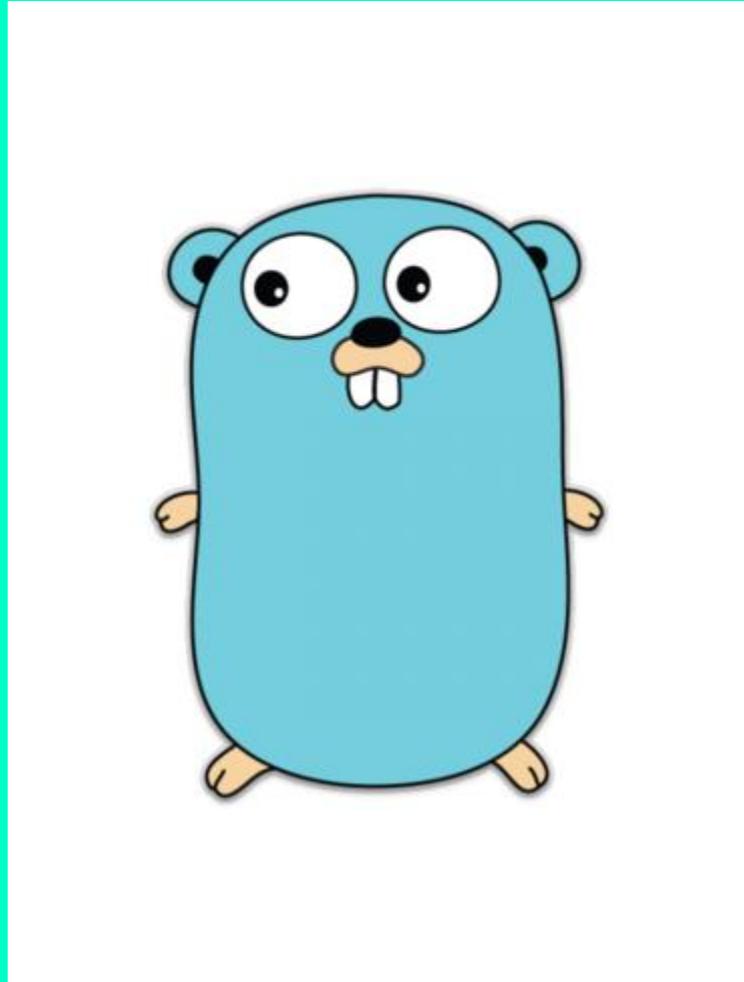Go is a programming language designed for large, distributed systems.

Widely used in industry.

Why learn Go?

Go is a programming language designed for large, distributed systems.

Widely used in industry.

Features native, efficient concurrency primitives (i.e., *goroutines* and *channels*).

Okay, let's write our first program

Variables

https://go.dev/play

Variables

```go
package main

func main() {

}
```

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```go
package main

func main() {
    var a int = 3
}
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Variables

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package main

func main() {
    var a int = 3
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```

Variable types come *after* variable names

VARIABLES

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func main() {
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    var b = 2
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Variable types can be omitted and inferred

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package main

func main() {
    var a int = 3
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    c := 1
}
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Can choose to accept default value (i.e., 0)

Variables

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package main

func main() {
    var a int = 3
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Can declare and init. multiple vars in 1 line

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Okay, looks good!
Let's run our code.

accept
e., 0)

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Okay, looks good!
Let's run our code.

> *go run main.go*

accept

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Variables

package main

Variable types come *after* variable names

Variable types can be

Compiler says nope!

x


```
./main.go:4:7: a declared and not used
./main.go:5:7: b declared and not used
./main.go:6:3: c declared and not used
./main.go:7:7: d declared and not used
./main.go:8:7: e declared and not used
./main.go:8:10: f declared and not used
```

default value (i.e., 0)

Can declare and init. multiple vars in 1 line

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Variable types come *after* variable names

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Go prevents you from compiling code with unused variables, so let's print them out

...accept ..e., O)

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Variables

```go
package main

import "fmt"

func main() {
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func main() {
  var a int = 3
  var b = 2
  c := 1
  var d int
  var e, f int = -1, -2

  fmt.Println(a, b, c)
}
```

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  fmt.Println(a, b, c)
  fmt.Println(d, e, f)
}
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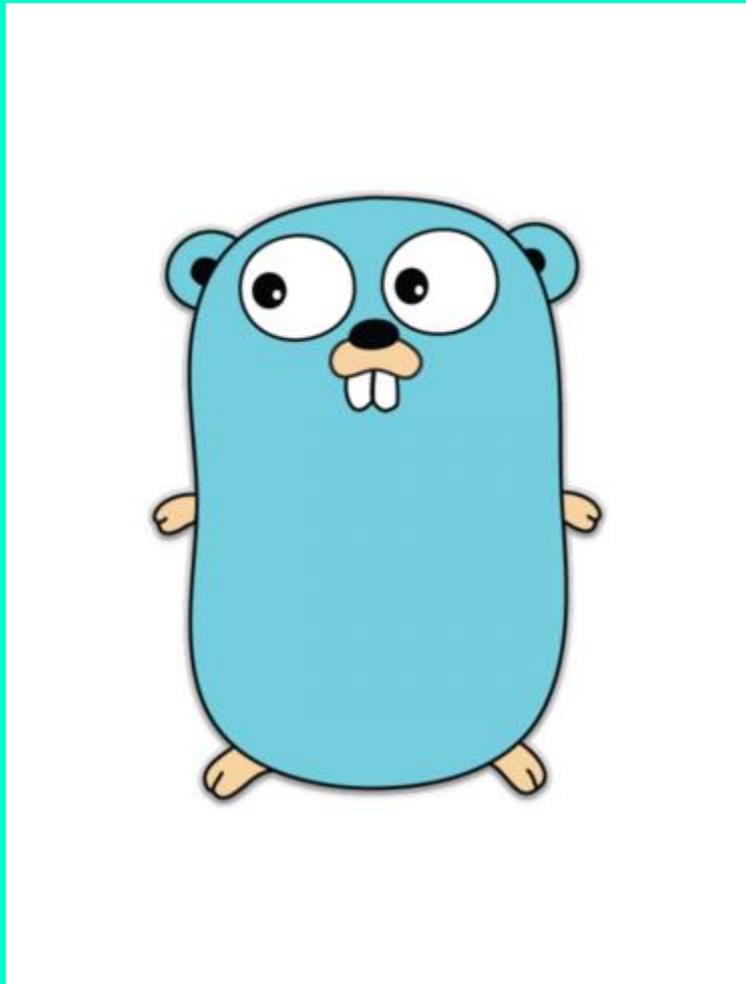
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A shorthand for 'var c =' is 'c :='

Can choose to accept default value (i.e., O)

Can declare and init. multiple vars in 1 line

Let's see this in action!

Play time!

"Go" to
go.dev/play and try
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"Go" to go.dev/play and try out some variable declarations.

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1. Can you declare multiple variables with different types on the same line?

2. Can you infer the types of variables when declaring more than one on a line?

3. What does fmt.Println() print when it's given multiple arguments?

PLAY TIME!

"Go" to go.dev/play and try out some variable declarations.

Here are some ideas.

Loops

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package main

func main() {

}
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Loops

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import "fmt"

func main() {
	for i := 1; i <= 3; i++ {
		fmt.Println(i)
	}
}
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import "fmt"

func main() {
	for i := 1; i <= 3; i++ {
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Loops

'for' loops work like in Java/C, but don't require ()

Must use { }, even for 1-line loops

```go
package main

import "fmt"

func main() {
    for i := 1; i <= 3; i++ {
        fmt.Println(i)
    }
    i := 4
    for i <= 10 {
        fmt.Println(i)
        i++
    }
}
```

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No such thing as 'while' loops in Go

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    for i := 1; i <= 3; i++ {
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    for i <= 10 {
        fmt.Println(i)
        i++
    }
    for {
        fmt.Println("done!")
        break
    }
}
```

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	}
}
```
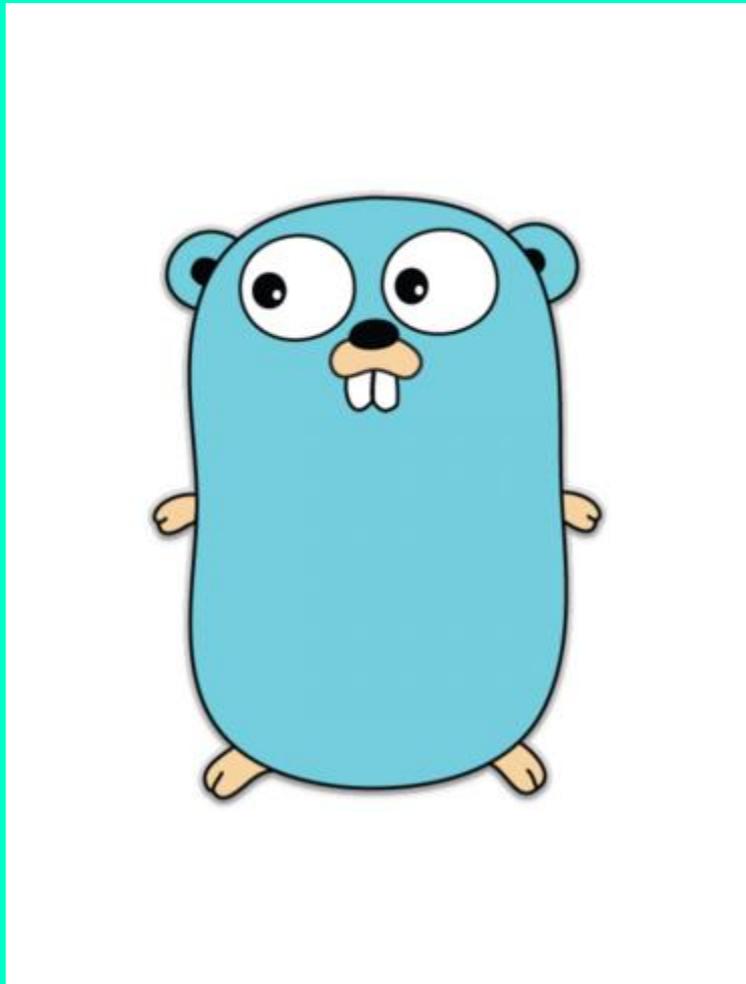
LOOPS

'for' loops work like in Java/C, but don't require ()

Must use { }, even for 1-line loops

No such thing as 'while' loops in Go

Can use 'break' and 'continue'

Let's try it ourselves

Let's Get Loopy

Navigate to go.dev/play and write a few Go loops.

1. Does the scoping of the index variable in a Go 'for' loop extend beyond the loop?

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1. Does the scoping of the index variable in a Go 'for' loop extend beyond the loop?

2. Can you skip the conditional part in a 'for' loop but still use the init and post statements?

3. Does Go support 'labeled breaks' that let you choose which loop to leave?

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func f(a int, b int) int {
    return a + b
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If args are same type, can specify type once at end

Functions

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func f(a int, b int) int {
  return a + b
}

func g(a, b int) int {
  return a * b
}

func h(a, b int) (int,int) {
  return f(a, b), g(a, b)
}
```

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Functions can return more than one result

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func h(a, b int) (int,int) {
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}

func main() {
    a, b := h(1, 2)
    _, c := h(3, 4)
}
```

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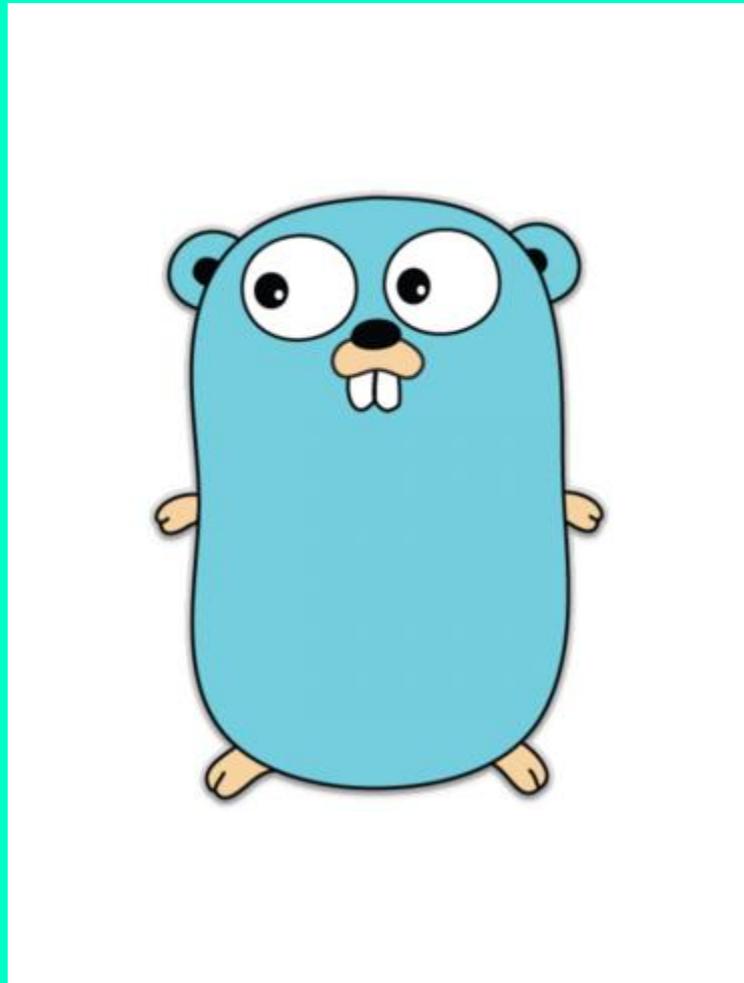
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Functions can return more than one result

'_' throws away a return value

Last programming exercise!

1. Does Go allow you to use '_' to ignore all the return values of a function?

2. Can you use recursion with a function that returns multiple values?

3. Does Go require a return value for each function?

Go Functions

Let's get back to go.dev/play and write a few programs using functions in Go.

Go Standard Library

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This collection of officially supported packages is one of the reasons Go is a useful language for systems programmers.

Reading The Documentation

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Expect to spend some time pouring over it.

External Sources

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Search for "golang" instead.
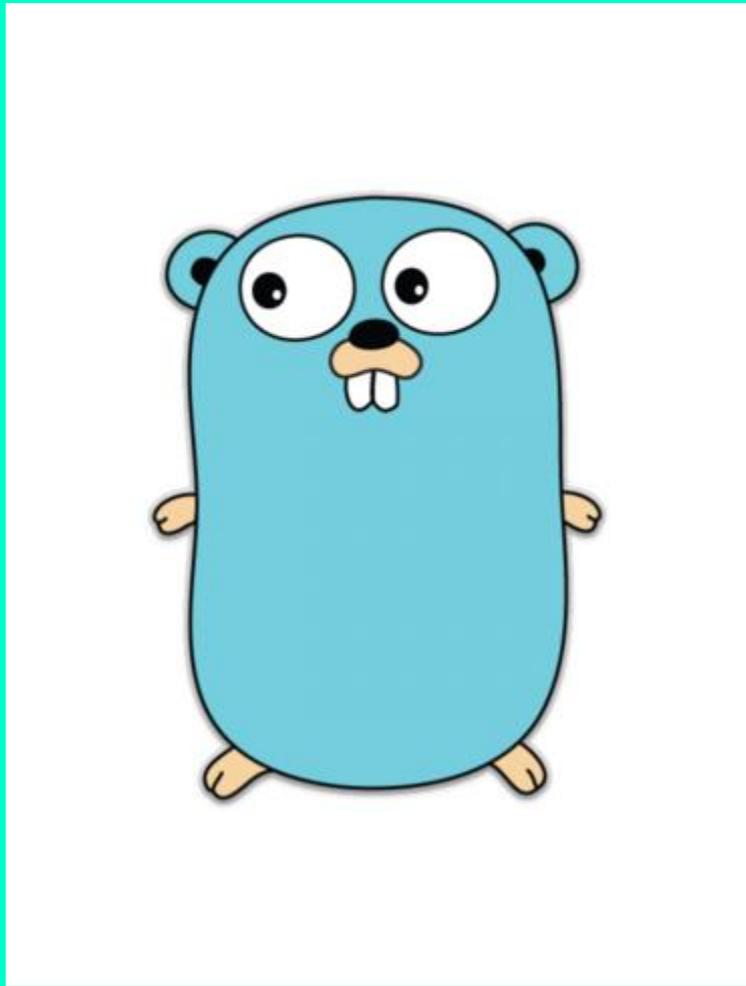
Let's see the docs

1. Find some "interesting" packages

2. Can you experiment using the provided examples?

Doc Hunt

Navigate to
pkg.go.dev

Use
go.dev/play

Questions?

Please don't hesitate to ask!

Additional Resources

- Go.dev
- Go Tutorial

- go.dev/play

- gobyexample.com

- "Learn Go Programming" (7 hour YouTube tutorial)