

# Hello Golang

A modern programming language

Martin Czygan

Gopher

June 8, 2017 18:00 CEST

[jenadevs](#) meetup at [Friedrich-Schiller-Universität Jena](#)

# About me

- Gopher since 2013
- Programmer at [Leipzig University Library](#)
- Co-Author of [Getting Started with Python Data Analysis](#)
- Consultant on data processing themes
- Trainer at [Python Academy](#)

# About me

A few open source projects: [esbulk](#), [solrbulk](#), [microblob](#), [gluish](#), [metha](#), [marctools](#).

Presentations at [LPUG](#) about [pandas](#), [luigi](#), [neural nets](#).

Workshop on Go interfaces at [Golab](#), an European Go conference in Italy.

# My language log

BASIC, Pascal, Perl, *Bash*, Ruby, *Java*, *C*, C++, *PHP*, *JavaScript*,  
*Python*, *Go*.

# Outline

First: slides

- Go: its users and critics, language constructs
- Go and OO, Go and Concurrency
- The Go development workflow

Then: hands-on, if you want:

- Get Go installed
- Write a simple (web service | concurrent program) in Go
- Write a Docker storage plugin

# Question: Is Go a modern language?

Go (programming language)

Programming Languages

+1



## Why does Go seem to be the most heavily criticised among the newer programming languages?

Related question: [Why has Google elected to rewind the software engineering clock at least 20 years with the Go programming language?](#) Same question goes for every "corporate" language?

Answer

Request ▾

Follow

62

Comments

2+

Share

4

Downvote



Dave Cheney liked



**Grazfather** @Grazfather · May 7

Writing **#Rustlang**: "Wtf. No. Fuck. Fuck you. Why? Please work!"

Writing **#Golang**: "Wow who would have thought I don't have to **hate** my life"



1



3

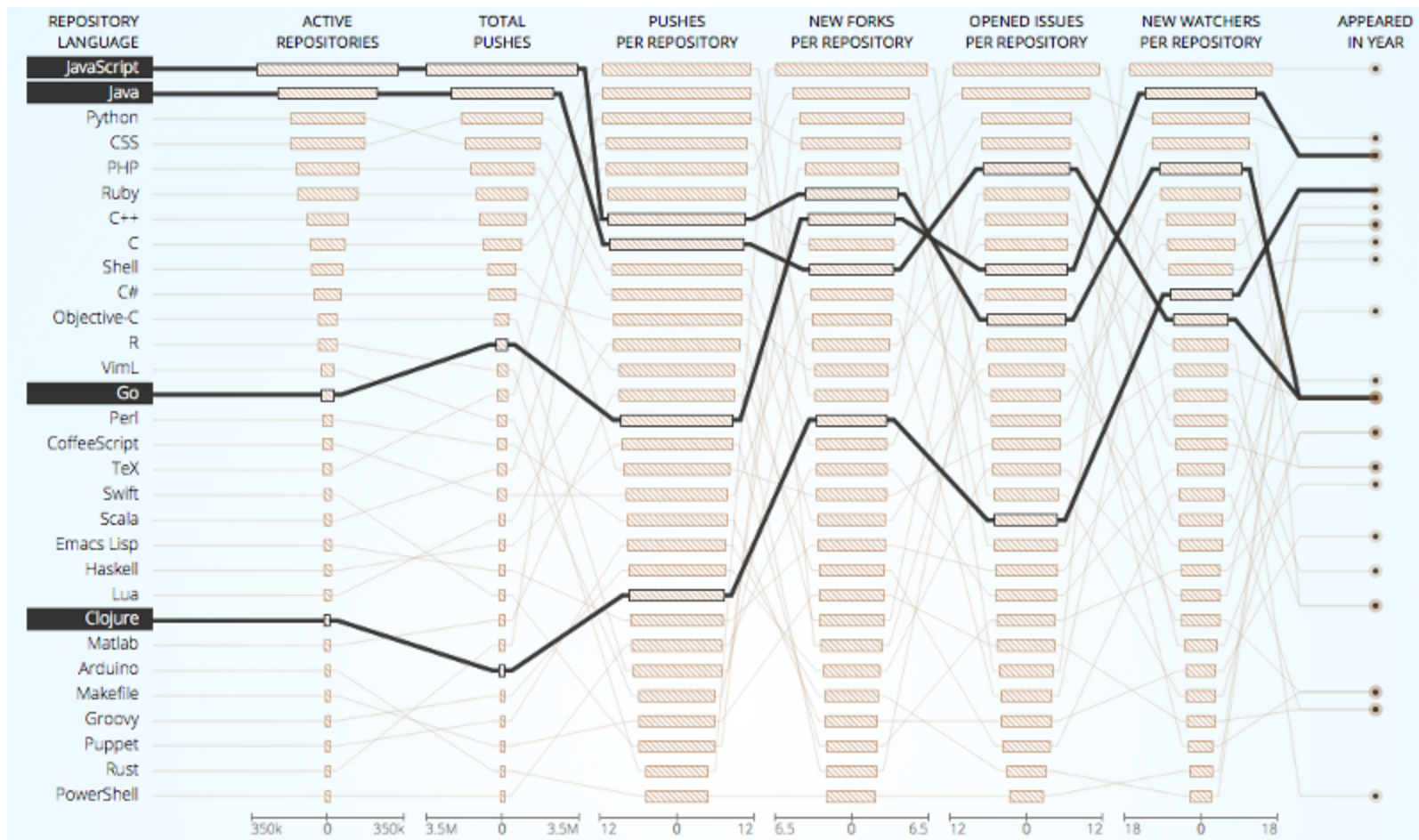


7



# GitHub Activity (2016)

From [GoLang](#) or the future of the dev:



# TIOBE

From June 2017:

Jun 2017	Jun 2016	Change	Programming Language	Ratings	Change
1	1		Java	14.493%	-6.30%
2	2		C	6.848%	-5.53%
3	3		C++	5.723%	-0.48%
4	4		Python	4.333%	+0.43%
5	5		C#	3.530%	-0.26%
6	9	▲	Visual Basic .NET	3.111%	+0.76%
7	7		JavaScript	3.025%	+0.44%
8	6	▼	PHP	2.774%	-0.45%
9	8	▼	Perl	2.309%	-0.09%
10	12	▲	Assembly language	2.252%	+0.13%
11	10	▼	Ruby	2.222%	-0.11%
12	14	▲	Swift	2.209%	+0.38%
13	13		Delphi/Object Pascal	2.158%	+0.22%
14	16	▲	R	2.150%	+0.61%
15	48	▲▲	Go	2.044%	+1.83%



# Golang is trash

## Golang is trash (2014):

But I think the bit that really captures the essence of golang, as well as the psuedointellectual arrogance of Rob Pike and everything he stands for, is this little gem:

Instructions, registers, and assembler directives are always in UPPER CASE to remind you that assembly programming is a fraught endeavor.

Wait, what? Are you being paternalistic or are you just an amateur? Writing in normal (that is, adult) assembly language is not fraught at all. While Mr. Pike was busying himself with Plan9, the rest of us

## [github.com/ksimka/go-is-not-good](https://github.com/ksimka/go-is-not-good) (1233 stars):

### What's this

---

This repository is a list of articles that complain about **golang**'s imperfection.

### Motivation

---

Seems like complaining about **go**'s flaws is becoming a trend. Any newbie must have a chance to read all the **go-is-bad** arguments before they go too far. So here it is.

# Why is Go not good?

- no generics
  - <http://jozefg.bitbucket.org/posts/2013-08-23-leaving-go.html> (Danny Gratzer 2013)
  - <http://how-bazaar.blogspot.ru/2013/04/the-go-language-my-thoughts.html> (Tim Penhey 2013)
  - <http://yager.io/programming/go.html> (Will Yager 2014)
  - <https://rule1.quora.com/Golang-Not-yet> (Jordan Zimmerman 2014)
  - <https://www.upguard.com/blog/our-experience-with-golang> (Mark Sheahan 2014)
  - <http://nomad.so/2015/03/why-gos-design-is-a-disservice-to-intelligent-programmers/> (Gary Willoughby 2015)
  - <https://kaushalsubedi.com/blog/2015/11/10/golang-sucks-heres-why/> (Kaushal Subedi 2015)
  - <http://blog.goodstuff.im/golang> (David Pollak 2015)
- stuck in 70's
  - <https://cowlark.com/2009-11-15-go/> (David Given 2009)
  - <https://uberpython.wordpress.com/2012/09/23/why-im-not-leaving-python-for-go/> (Yuval Greenfield 2012)
  - <http://www.darkcoding.net/software/go-lang-after-four-months/> (Graham King 2012)
  - <http://nomad.so/2015/03/why-gos-design-is-a-disservice-to-intelligent-programmers/> (Gary Willoughby 2015)
  - <http://blog.goodstuff.im/golang> (David Pollak 2015)

# Why is Go not good?

- bad dependency management
  - <https://rule1.quora.com/Golang-Not-yet> (Jordan Zimmerman 2014)
  - <http://nomad.so/2015/03/why-gos-design-is-a-disservice-to-intelligent-programmers/> (Gary Willoughby 2015)
  - <https://kaushalsubedi.com/blog/2015/11/10/golang-sucks-heres-why/> (Kaushal Subedi 2015)
  - <https://medium.com/@rgausnet/3-reasons-why-go-isnt-the-perfect-language-yet-25e0da5ec04c> (Ryan Gaus 2016)
- error handling
  - <https://uberpython.wordpress.com/2012/09/23/why-im-not-leaving-python-for-go/> (Yuval Greenfield 2012)
  - <http://how-bazaar.blogspot.ru/2013/04/the-go-language-my-thoughts.html> (Tim Penhey 2013)
  - <https://www.upguard.com/blog/our-experience-with-golang> (Mark Sheahan 2014)
  - <http://spaces-vs-tabs.com/4-weeks-of-golang-the-good-the-bad-and-the-ugly/> (Freddy Rangel 2015)
  - <http://blog.goodstuff.im/golang> (David Pollak 2015)
- weird mascot (gopher)
  - <http://magicmakerman.blogspot.ru/2013/07/why-googles-go-programming-language.html> (Magic Maker Man 2013)
  - <http://www.evanmiller.org/four-days-of-go.html> (Evan Miller 2015)

# Why is Go not good?

The list goes on and on:

- designed for stupid people
- no OOP
- no exceptions
- no versioning model
- too opinionated
- too simple

## So, why do I use it?

- I was curious about Ken Thompsons' [experiment](#).
- I like production code and low operational overhead (e.g. install, maybe config, run).
- With Go, I mostly think about the problem, not about the language.

# A small language

- 25 keywords

break	default	func	interface	<b>select</b>
<b>case</b>	defer	<b>go</b>	<b>map</b>	<b>struct</b>
chan	<b>else</b>	<b>goto</b>	<b>package</b>	<b>switch</b>
const	fallthrough	<b>if</b>	<b>range</b>	<b>type</b>
continue	<b>for</b>	<b>import</b>	<b>return</b>	<b>var</b>

# Hello World

```
package main

import "fmt"

func main() {
    fmt.Println("Hello 세계")
}
```

[Play.](#)

# Declaring variables

```
package main

import (
    "fmt"
    "time"
)

var timeout time.Duration
var N = 4

func main() {
    n, k := N, 2.0
    fmt.Printf("n=%d, k=%0.3f, timeout=%s", n, k, timeout)
}
```

[Play.](#)



# Every type has a zero value

```
package main

import "fmt"

func main() {
    var a float64
    var b int16
    var c string
    fmt.Printf("a=%v, b=%v, c=%v, len(c)=%v",
        a, b, c, len(c))
}
```

[Play.](#)

# Various numeric types

type	size in bytes
byte, uint8, int8	1
uint16, int16	2
uint32, int32, float32	4
uint64, int64, float64, complex64	8
complex128	16

- <https://golang.org/pkg/builtin/>

# Basic types

**bool**

**string**

**int int8 int16 int32 int64**

**uint uint8 uint16 uint32 uint64 uintptr**

**byte** *// alias for uint8*

**rune** *// alias for int32*  
*// represents a Unicode code point*

**float32 float64**

**complex64 complex128**

# Only one loop construct

```
package main

import "fmt"

const Prefix = ">> "

func main() {
    for i := 0; i < 5; i++ {
        log.Printf("%s %0d", Prefix, i)
    }
}
```

[Play](#). Break, continue as you expect.

# Slices

```
package main

import "fmt"

func main() {

    cities := []string{"Jena", "Weimar", "Erfurt"}

    for i, city := range cities {
        fmt.Println(i, city)
    }
}
```

# Functions

```
package main

import "fmt"

func Hello(name string) (string, error) {
    if len(name) < 2 {
        return "", fmt.Errorf("name too short")
    }
    return fmt.Sprintf("Hello %s", name), nil
}

func main() {
    greeting, err := Hello("a")
    fmt.Println(greeting, err)
}
```

[Play.](#)

# If needs no parentheses

```
package main

import "log"

func main() {
    a, b := 4, 3
    if a < b {
        log.Println("a smaller b")
    } else {
        log.Println("a not smaller b")
    }
}
```

[Play.](#)

# Keywords to go (13)

case	default		interface	select
chan	defer	go	map	struct
	fallthrough	goto		switch
				type



# Branching with switch, case and default

```
package main


import "fmt"

func main() {
    s := "A"
    switch s {
    case "A":
        fmt.Println("a")
    case "B":
        fmt.Println("b")
    default:
        fmt.Println("?")
    }
}
```

[Play.](#)

# Fallthrough

- A design mistake correction from the C language



[All](#) [Images](#) [News](#) [Shopping](#) [Videos](#) [More](#) [Settings](#) [Tools](#)

About 1,550 results (0.52 seconds)

**switch statement in C - TutorialsPoint**  
[https://www.tutorialspoint.com/cprogramming/switch\\_statement\\_in\\_c.htm](https://www.tutorialspoint.com/cprogramming/switch_statement_in_c.htm) ▼  
**Not every case needs to contain a break.** If no break appears, the flow of control will fall through to subsequent cases until a break is reached. A switch statement ...

**Not every case needs to contain a break IF no break - COMPUTER S ...**  
<https://www.coursehero.com> › ... › **COMPUTER S** › **COMPUTER S 340** ▼  
Mar 22, 2017 - **Not every case needs to contain a break.** IF no break appears, the flow of control will fall through to subsequent cases until a break is reached.

# Fallthrough

- Example, [ascii85](#)

```
var v uint32
switch len(src) {
default:
    v |= uint32(src[3])
    fallthrough
case 3:
    v |= uint32(src[2]) << 8
    fallthrough
case 2:
    v |= uint32(src[1]) << 16
    fallthrough
case 1:
    v |= uint32(src[0]) << 24
}
```

[Play.](#)

## Keywords to go (9)

chan

defer

go  
goto

interface  
map

select  
struct

type

# Defer

- Defer is wonderful.

```
package main

func f() error {
    defer fmt.Println("exiting f")
    if rand.Float64() > 0.5 {
        fmt.Println("f failed")
    }
    return nil
}

func main() {
    f()
}
```

[Play.](#)

# Defer

- Use cases: closing file, connections, response bodies, profiling
- make code much more readable, but has performance implications

## Keywords to go (8)

chan

go  
goto

interface  
map

select  
struct

type

# Keywords to go (7)

chan

go

interface  
map

select  
struct

type



**problem?**



# Hashmaps

```
package main

import "fmt"

func main() {
    m := map[string]string{
        "Meetup": "jenadevs",
        "Location": "FSU Jena",
    }
    fmt.Println(m)
}
```

[Play.](#)

# Keywords to go (6)

<b>chan</b>	<b>go</b>	<b>interface</b>	<b>select</b>
			<b>struct</b>
			<b>type</b>

- Concurrency: go, chan, select
- OO: type, struct, interface

# OO in Go

- no classes
- composition over inheritance
- small interfaces
- no explicit declarations

# Custom types

- before we see compound types, let's look at something simpler

# Custom types

```
package main

import "fmt"

type Celsius float64

func main() {
    var temp Celsius
    fmt.Printf("below %v degree", temp)
}
```

[Play.](#)

# Functions on custom types

```
package main

import "fmt"

type Celsius float64

func (c Celsius) String() string {
    return fmt.Sprintf("%0.1f°", c)
}

func main() {
    var temp Celsius
    fmt.Printf("below %s degree", temp)
}
```

# Compound types

```
package main

import "fmt"

type Meetup struct {
    Name      string
    Location  string
}

func main() {
    meetup := Meetup{
        Name:      "jenadevs",
        Location:  "FSU Jena",
    }
    fmt.Printf("%+v", meetup)
}
```

[Play.](#)

# Compound types (play)

```
package main

import "fmt"

type Address struct {
    City    string
    Street  string
}

type Meetup struct {
    Name      string
    Location  Address
}

func main() {
    meetup := Meetup{"jenadevs", Address{
        Street: "Fürstengraben 1",
        City:   "Jena"}}
    fmt.Printf("%+v", meetup)
}
```



# Defining Methods on Types

```
type Client struct {  
    scheme string  
    host    string  
    proto   string  
    ...  
}  
  
...  
  
func (cli *Client) ContainerList(...) (... , error) {  
    ...  
}
```

- [moby/client/client.go](#)
- [moby/client/container\\_list.go](#)

# Types

- basic types (int, float, complex64, string, rune, byte, bool)
- slices (variable sized array)
- maps (hashmaps)
- struct types (compound types)

# A few more types

A few more builtin types:

- pointer types (Pointers reference a location in memory where a value is stored rather than the value itself)
- function types (functions are first class objects)
- array types (fixed size)
- interface types
- channel types

# Pointers

```
package main

import "fmt"

func main() {
    var x = 42
    fmt.Printf("%v", &x)
}
```

[Play.](#)

# Pointers

```
package main

import "fmt"

func main() {
    x := new(int32)
    fmt.Printf("%T", x)
}
```

[Play.](#)

# Pointers

You will see (use) pointer receivers on struct methods:

```
func (cli *Client) ContainerList ...
```

- required, if a method mutates the compound type
- even, if it is just a single method, for consistency, all methods should use a pointer receiver

# Function types

- lots of fun
- closures

```
package main

import "fmt"

func main() {
    f := func(s string) string {
        return fmt.Sprintf("<%s>", s)
    }
    fmt.Println(f("functional"))
}
```

[Play.](#)

# Function types

```
package main

type Converter func(string) string

func convert(value string, f Converter) string {
    return f(value)
}

func main() {
    // ...
}
```

[Play.](#)