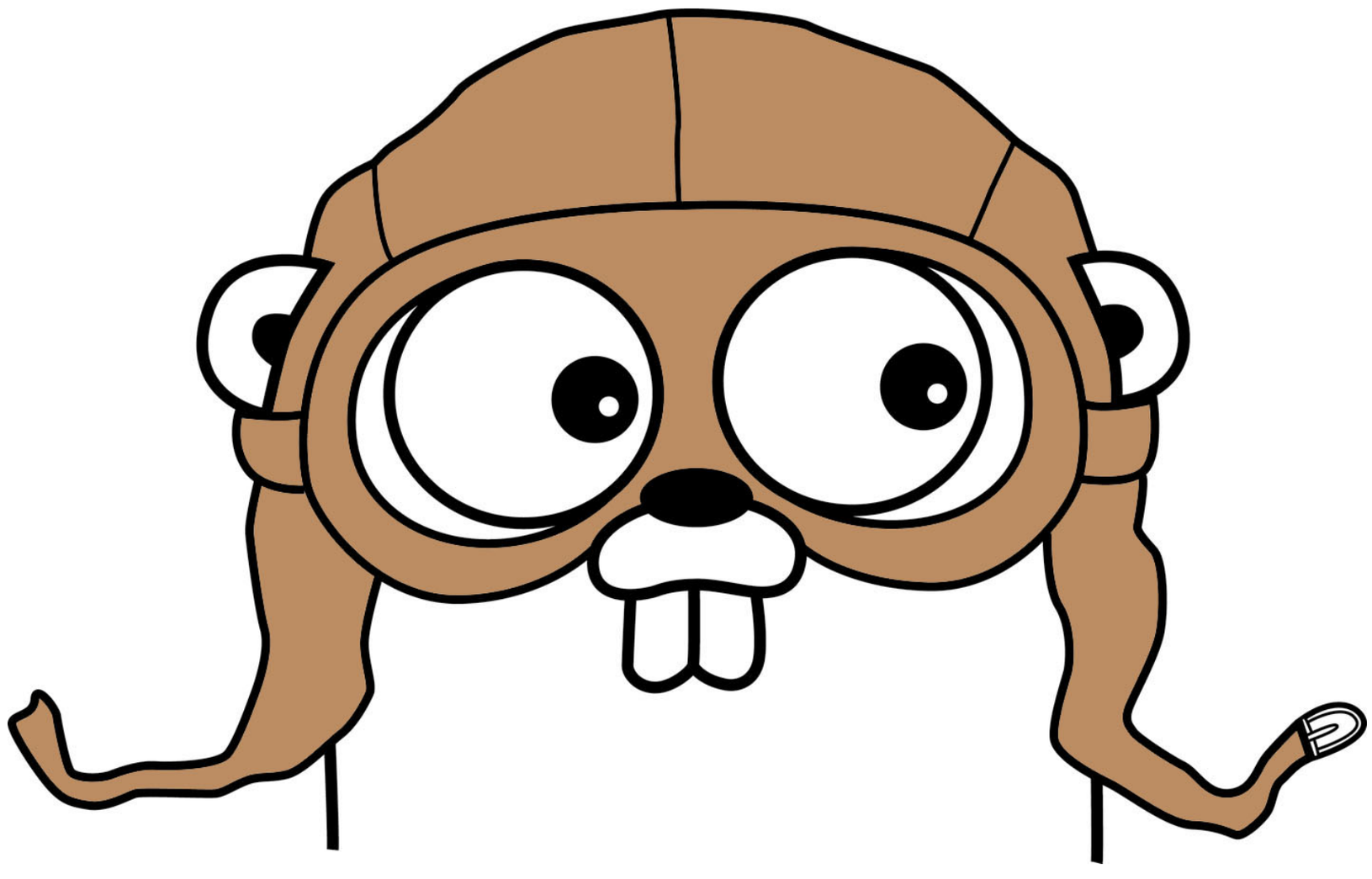
GET GO-ING WITH A NEW LANGUAGE



KAT ZIEŃ (@KASIAZIEN)

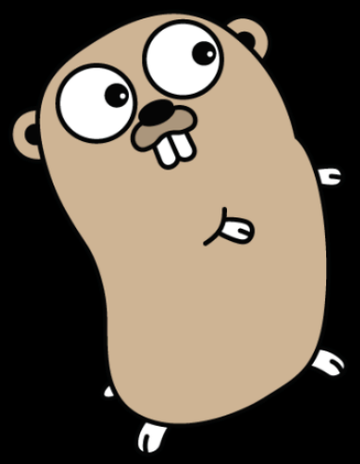
PHPSC 2017

IMAGE BY RENEE FRENCH

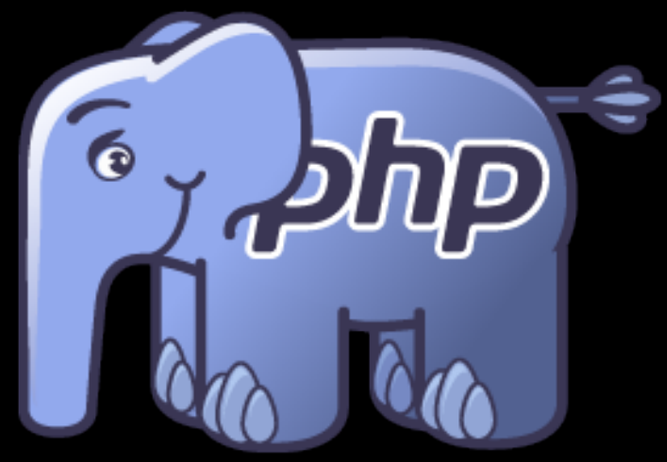

php
MADE BY IAN BAKER

GO(LANG)

DIFFERENCES



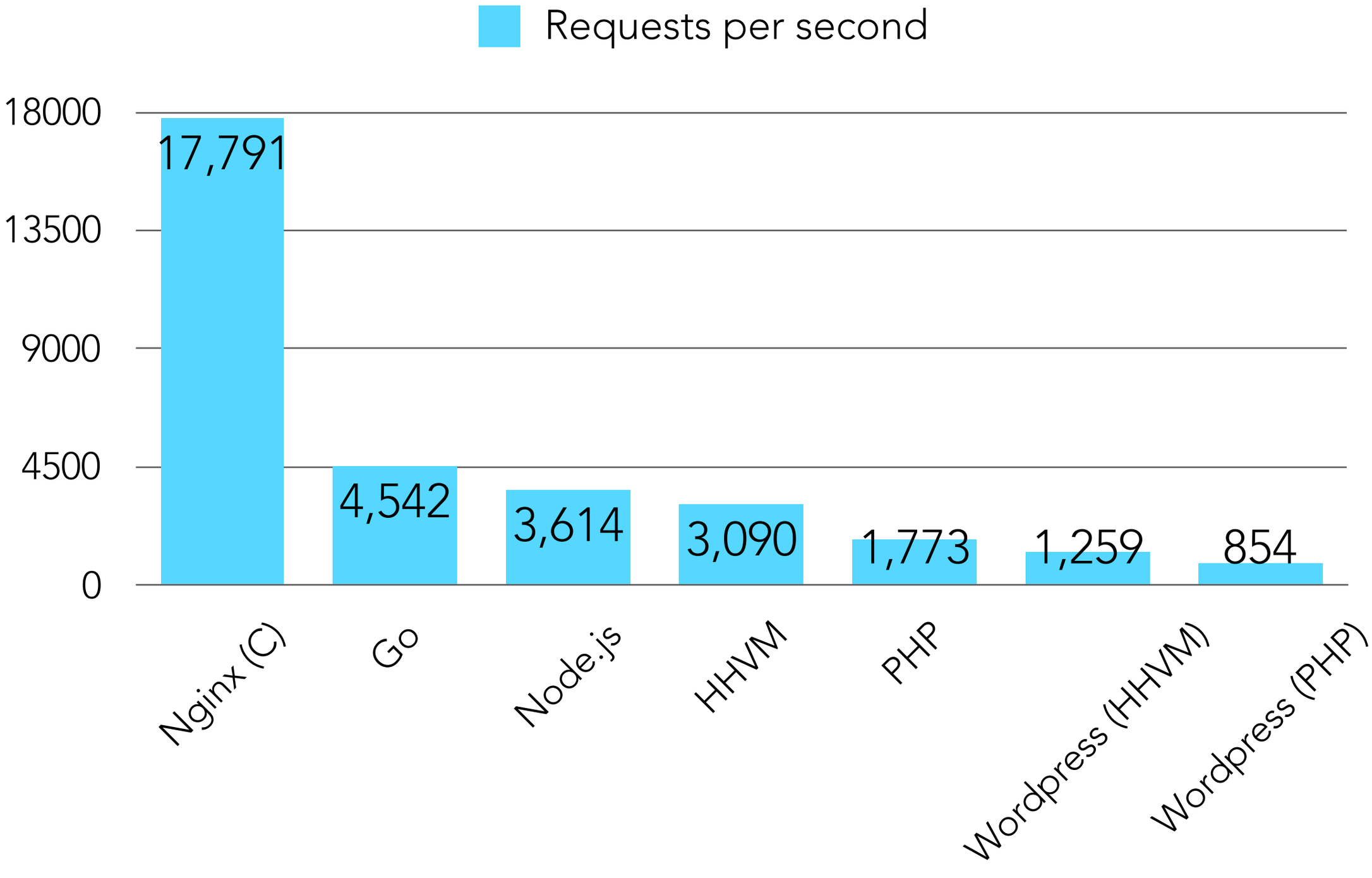
VS



INTERPRETED VS COMPILED

IMAGE: COMPILERS - PRINCIPLES, TECHNIQUES AND TOOLS

BENCHMARKS



SOURCE: HTTPS://DAN.HERSAM.COM/2015/02/25/GO-VS-NODE-VS-PHP-VS-HHVM-AND-WORDPRESS-BENCHMARKS/

```go
package main

import (
    "fmt"
    "math/rand"
)

func main() {
    var greeting string = "Hello! Is it %s you're looking for?\n"
    words := [2]string{"me", "tea"}

    rand.Seed(42)

    for i := 0; i < 5; i++ {
        fmt.Printf(greeting, words[rand.Intn(len(words))])
    }
}
```

```go
package main

import (
    "fmt"
    "math/rand"
)

func main() {
    var greeting string = "Hello! Is it %s you're looking for?\n"
    words := [2]string{"me", "tea"}

    rand.Seed(42)

    for i := 0; i < 5; i++ {
        fmt.Printf(greeting, words[rand.Intn(len(words))])
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}
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    words := [2]string{"me", "tea"}

    rand.Seed(42)

    for i := 0; i < 5; i++ {
        fmt.Printf(greeting, words[rand.Intn(len(words))])
    }
}
```

```go
package main

import (
    "fmt"
    "math/rand"
)

func main() {
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    words := [2]string{"me", "tea"}

    rand.Seed(42)

    for i := 0; i < 5; i++ {
        fmt.Printf(greeting, words[rand.Intn(len(words))])
    }
}
```

```go
package main

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    "fmt"
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func main() {
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    words := [2]string{"me", "tea"}

    rand.Seed(42)

    for i := 0; i < 5; i++ {
        fmt.Printf(greeting, words[rand.Intn(len(words))])
    }
}
```

```go
package main

import (
    "fmt"
    "math/rand"
)

func main() {
    var greeting string = "Hello! Is it %s you're looking for?\n"
    words := [2]string{"me", "tea"}

    rand.Seed(42)

    for i := 0; i < 5; i++ {
        fmt.Printf(greeting, words[rand.Intn(len(words))])
    }
}
```

```go
package main

import (
    "fmt"
    "math/rand"
)

func main() {
    var greeting string = "Hello! Is it %s you're looking for?\n"
    words := [2]string{"me", "tea"}

    rand.Seed(42)

    for i := 0; i < 5; i++ {
        fmt.Printf(greeting, words[rand.Intn(len(words))])
    }
}
```

```
$ go run lionel.go
Hello! Is it tea you're looking for?
Hello! Is it me you're looking for?
Hello! Is it me you're looking for?
Hello! Is it tea you're looking for?
```

```
$ go build lionel.go

$ ls
lionel     lionel.go

$ ./lionel

Hello! Is it tea you're looking for?
Hello! Is it tea you're looking for?
Hello! Is it me you're looking for?
Hello! Is it me you're looking for?
Hello! Is it tea you're looking for?
```

TOOLS

OUT OF THE BOX

- formatting
- linting
- testing
- documenting
- running
- profiling

IMAGE: LEGO.COM

TOOLS

OUT OF THE BOX

IMAGE: LEGO.COM

GOPATH

```
$GOPATH/src/<vendor>/<project-name>
```

e.g.

```
/Users/Kat/go-code/src/gitlab.com/katzien/hello

/Users/Kat/go-code/src/github.com/golang/go
```

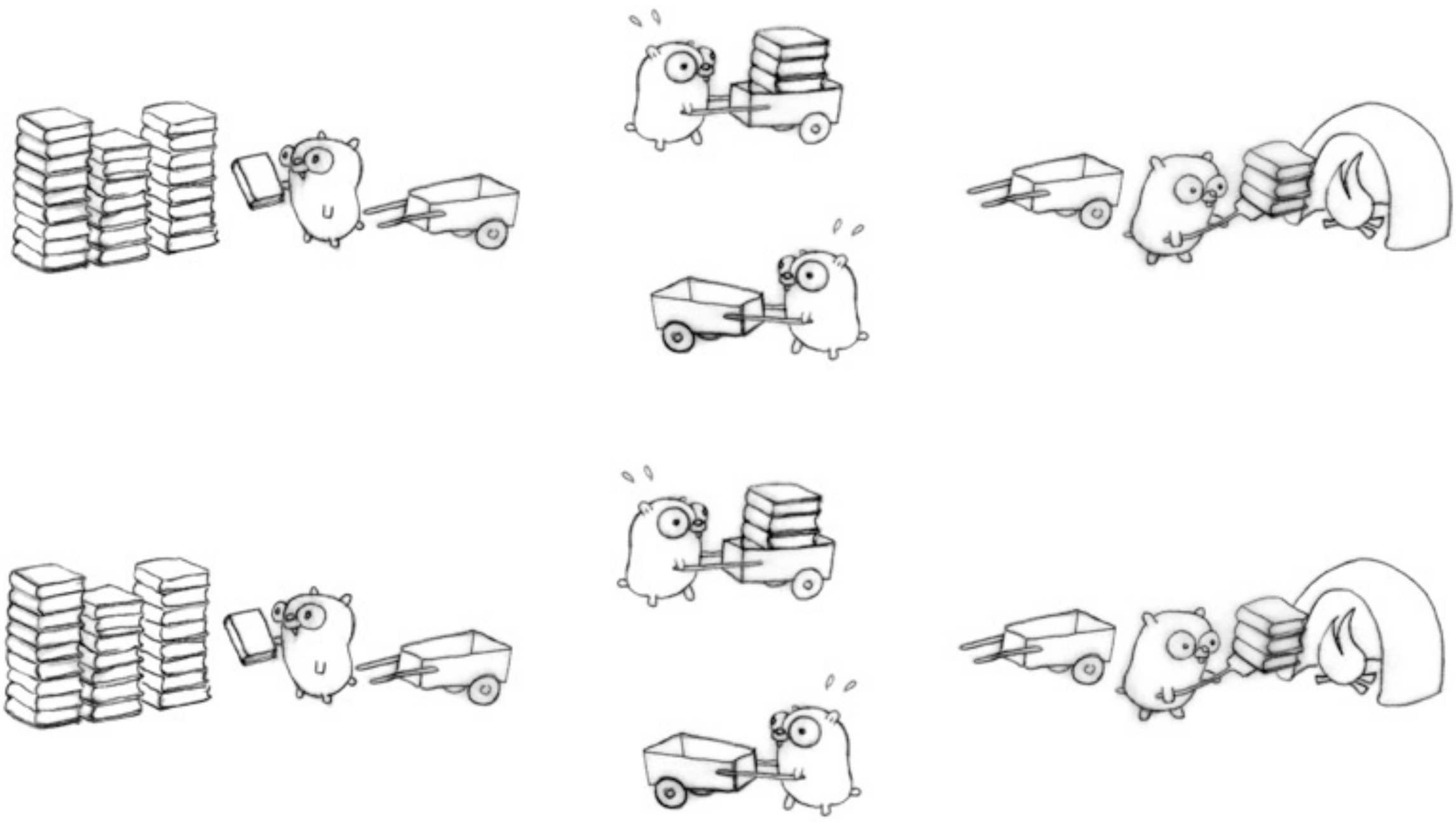
IMAGE: LEGO.COM

CONCURRENCY VS PARALLELISM

Concurrency: two threads are making progress

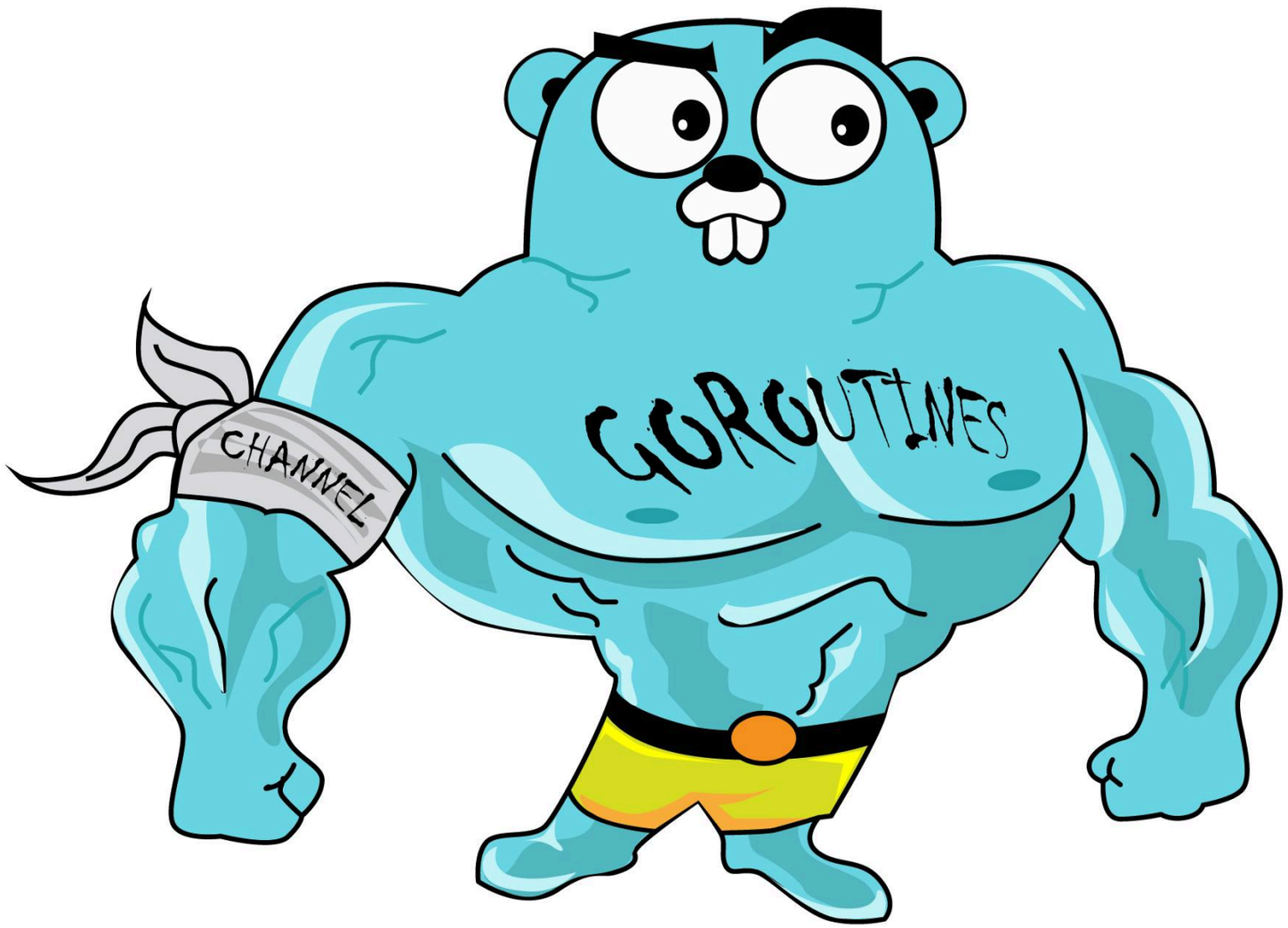
Parallelism: two threads are executing simultaneously

CONCURRENCY != PARALLELISM



SOURCE: HTTPS://TALKS.GOLANG.ORG/2012/WAZA.SLIDE#22

BUILT-IN CONCURRENCY



GOROUTINES

```
go myFunction()
```

```go
func say(word string) {
    for i := 0; i < 5; i++ {
        time.Sleep(100 * time.Millisecond)
        fmt.Println(word)
    }
}
```

```go
func main() {
    go say("world")
    say("hello")
}
```

```
func say(word string) {
    for i := 0; i < 5; i++ {
        time.Sleep(100 * time.Millisecond)
        fmt.Println(word)
    }
}
```

```
func main() {
    go say("world")
    say("hello")
}
```

```
func say(word string) {
    for i := 0; i < 5; i++ {
        time.Sleep(100 * time.Millisecond)
        fmt.Println(word)
    }
}
```

```
func main() {
    go say("world")
    say("hello")
}
```

```go
func say(word string) {
    for i := 0; i < 5; i++ {
        time.Sleep(100 * time.Millisecond)
        fmt.Println(word)
    }
}
```

```go
func main() {
    go say("world")
    say("hello")
}
```

```
$ go run goroutines.go

world
hello
world
hello
world
world
hello
world
hello
```

```
$ go run goroutines.go

world      world      hello      world
hello      hello      world      hello
world      hello      hello      world
hello      world      world      hello
hello      hello      world      world
world      world      hello      hello
world      hello      hello      hello
hello      world      world      world
world      world      world      world
hello      hello      hello      hello
```

CHANNELS

```
messenger := make(chan string)

// Send value to channel
messenger <- "Ohai!"

// Receive from channel and assign to variable
message := <-messenger
```

```go
func playSound(name string, freq time.Duration) <-chan string {
    c := make(chan string)
    go func() {
        for i := 1; i <= 3; i++ {
            c <- fmt.Sprintf("%s %d", name, i)
            time.Sleep(time.Second * freq)
        }
    }()
    return c
}

func main() {
    t1 := playSound("trumpet", 3)
    t2 := playSound("guitar", 2)
    t3 := playSound("drum", 1)

    for i := 1; i <= 3; i++ {
        println(<-t1)
        println(<-t2)
        println(<-t3)
    }
}
```

```go
func playSound(name string, freq time.Duration) <-chan string
{
    c := make(chan string)
    go func() {
        for i := 1; i <= 3; i++ {
            c <- fmt.Sprintf("%s %d", name, i)
            time.Sleep(time.Second * freq)
        }
    }()
    return c
}

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

```go
func playSound(name string, freq time.Duration) <-chan string
{
    c := make(chan string)
    go func() {
        for i := 1; i <= 3; i++ {
            c <- fmt.Sprintf("%s %d", name, i)
            time.Sleep(time.Second * freq)
        }
    }()
    return c
}

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

```go
func playSound(name string, freq time.Duration) <-chan string
{
    c := make(chan string)
    go func() {
        for i := 1; i <= 3; i++ {
            c <- fmt.Sprintf("%s %d", name, i)
            time.Sleep(time.Second * freq)
        }
    }()
    return c
}

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

```go
func playSound(name string, freq time.Duration) <-chan string
{
    ...
}

func main() {
    t1 := playSound("trumpet", 3)
    t2 := playSound("guitar", 2)
    t3 := playSound("drum", 1)

    for i := 1; i <= 3; i++ {
        println(<-t1)
        println(<-t2)
        println(<-t3)
    }
}
```

```go
func playSound(name string, freq time.Duration) <-chan string
{
    ...
}

func main() {
    t1 := playSound("trumpet", 3)
    t2 := playSound("guitar", 2)
    t3 := playSound("drum", 1)

    for i := 1; i <= 3; i++ {
        println(<-t1)
        println(<-t2)
        println(<-t3)
    }
}
```

```
$ go run concurrency.go

trumpet 1
guitar 1
drum 1
trumpet 2
guitar 2
drum 2
trumpet 3
guitar 3
drum 3
```

```go
func playSound(name string, freq time.Duration) <-chan string
{
    ...
}

func main() {
    t1 := playSound("trumpet", 3)
    t2 := playSound("guitar", 2)
    t3 := playSound("drum", 1)

    for i := 1; i <= 3; i++ {
        println(<-t1)
        println(<-t2)
        println(<-t3)
    }
}
```

```go
func playSound(name string, freq time.Duration) <-chan string {
    ...
}

func main() {
    t1 := playSound("trumpet", 3)
    t2 := playSound("guitar", 2)
    t3 := playSound("drum", 1)

    for i := 1; i <= 9; i++ {
        select {
        case msg := <-t1:
            println(msg)
        case msg := <-t2:
            println(msg)
        case msg := <-t3:
            println(msg)
        }
    }
}
```

```
$ go run concurrency.go
```

```
drum 1                          guitar 1
guitar 1                        trumpet 1
trumpet 1                       drum 1
drum 2                          drum 2
drum 3                          drum 3
guitar 2                        guitar 2
trumpet 2                       trumpet 2
guitar 3                        guitar 3
trumpet 3                       trumpet 3
```

```
$ go run concurrency.go

drum 1                          guitar 1
guitar 1                        trumpet 1
trumpet 1                       drum 1
drum 2                          drum 2
drum 3                          drum 3
guitar 2                        guitar 2
trumpet 2                       trumpet 2
guitar 3                        guitar 3
trumpet 3                       trumpet 3
```

```go
func worker(id int, jobs <-chan int, results chan<- int) {
    for j := range jobs {
        log.Println("worker", id, "started  job", j)
        time.Sleep(time.Second)
        log.Println("worker", id, "finished job", j)
        results <- j * 2
    }
}

func main() {
    jobs := make(chan int, 100)
    results := make(chan int, 100)

    for w := 1; w <= 3; w++ {
        go worker(w, jobs, results)
    }

    for j := 1; j <= 5; j++ {
        jobs <- j
    }

    close(jobs)

    for r := 1; r <= 5; r++ {
        fmt.Println("Result #", r, ": ", <-results)
    }
}
```

```go
func worker(id int, jobs <-chan int, results chan<- int) {
    for j := range jobs {
        log.Println("worker", id, "started  job", j)
        time.Sleep(time.Second)
        log.Println("worker", id, "finished job", j)
        results <- j * 2
    }
}

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

```go
func worker(id int, jobs <-chan int, results chan<- int) {
    for j := range jobs {
        log.Println("worker", id, "started  job", j)
        time.Sleep(time.Second)
        log.Println("worker", id, "finished job", j)
        results <- j * 2
    }
}

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

```go
func worker(id int, jobs <-chan int, results chan<- int) {
    for j := range jobs {
        log.Println("worker", id, "started  job", j)
        time.Sleep(time.Second)
        log.Println("worker", id, "finished job", j)
        results <- j * 2
    }
}

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

```go
func worker(id int, jobs <-chan int, results chan<- int) {
    ...
}

func main() {
    jobs := make(chan int, 100)
    results := make(chan int, 100)

    for w := 1; w <= 3; w++ {
        go worker(w, jobs, results)
    }

    for j := 1; j <= 5; j++ {
        jobs <- j
    }

    close(jobs)

    for r := 1; r <= 5; r++ {
        fmt.Println("Result #", r, ": ", <-results)
    }
}
```

```go
func worker(id int, jobs <-chan int, results chan<- int) {
    ...
}

func main() {
    jobs := make(chan int, 100)
    results := make(chan int, 100)

    for w := 1; w <= 3; w++ {
        go worker(w, jobs, results)
    }

    for j := 1; j <= 5; j++ {
        jobs <- j
    }

    close(jobs)

    for r := 1; r <= 5; r++ {
        fmt.Println("Result #", r, ": ", <-results)
    }
}
```

```go
func worker(id int, jobs <-chan int, results chan<- int) {
    ...
}

func main() {
    jobs := make(chan int, 100)
    results := make(chan int, 100)

    for w := 1; w <= 3; w++ {
        go worker(w, jobs, results)
    }
    for j := 1; j <= 5; j++ {
        jobs <- j
    }
    close(jobs)

    for r := 1; r <= 5; r++ {
        fmt.Println("Result #", r, ": ", <-results)
    }
}
```

```go
func worker(id int, jobs <-chan int, results chan<- int) {
    for j := range jobs {
        log.Println("worker", id, "started  job", j)
        time.Sleep(time.Second)
        log.Println("worker", id, "finished job", j)
        results <- j * 2
    }
}
```

```go
func main() {
    ...

    close(jobs)

    for r := 1; r <= 5; r++ {
        fmt.Println("Result #", r, ": ", <-results)
    }
}
```

```go
func worker(id int, jobs <-chan int, results chan<- int) {
    ...
}

func main() {
    jobs := make(chan int, 100)
    results := make(chan int, 100)

    for w := 1; w <= 3; w++ {
        go worker(w, jobs, results)
    }

    for j := 1; j <= 5; j++ {
        jobs <- j
    }

    close(jobs)

    for r := 1; r <= 5; r++ {
        fmt.Println("Result #", r, ": ", <-results)
    }
}
```

```
$ go run workerpool.go

worker 3 started  job 1
worker 1 started  job 2
worker 2 started  job 3
worker 3 finished job 1
worker 3 started  job 4
worker 2 finished job 3
worker 2 started  job 5
worker 1 finished job 2
Result # 1 :  2
Result # 2 :  6
Result # 3 :  4
worker 2 finished job 5
Result # 4 :  10
worker 3 finished job 4
Result # 5 :  8
```

```
$ go run workerpool.go

worker 3 started  job 1
worker 1 started  job 2
worker 2 started  job 3
worker 3 finished job 1
worker 3 started  job 4
worker 2 finished job 3
worker 2 started  job 5
worker 1 finished job 2
Result # 1 :  2
Result # 2 :  6
Result # 3 :  4
worker 2 finished job 5
Result # 4 :  10
worker 3 finished job 4
Result # 5 :  8
```

```
$ go run workerpool.go

worker 3 started  job 1
worker 1 started  job 2
worker 2 started  job 3
worker 3 finished job 1
worker 3 started  job 4
worker 2 finished job 3
worker 2 started  job 5
worker 1 finished job 2
Result # 1 :  2
Result # 2 :  6
Result # 3 :  4
worker 2 finished job 5
Result # 4 :  10
worker 3 finished job 4
Result # 5 :  8
```

```
$ go run workerpool.go

worker 3 started  job 1
worker 1 started  job 2
worker 2 started  job 3
worker 3 finished job 1
worker 3 started  job 4
worker 2 finished job 3
worker 2 started  job 5
worker 1 finished job 2
Result # 1 :  2
Result # 2 :  6
Result # 3 :  4
worker 2 finished job 5
Result # 4 :  10
worker 3 finished job 4
Result # 5 :  8
```

WE CAN SPEED THINGS UP

SOURCE: HTTP://ENGLISH.SINA.COM/SPORTS/P/2011/0519/374212.HTML

NEITHER IS BETTER OR WORSE: THEY'RE JUST DIFFERENT

IMAGE: HTTP://COGDOGBLOG.COM/2014/11/US-N-MACHINES

FAVOURITE THINGS

PHP

- quick to get things done
- mature frameworks and libraries
- PHP 7

GO

- strong types
- keeping things simple
- error checking policy
- multiple return values
- interfaces
- built-in tools
- easy to run
- concurrency
- speed
- strong leadership

COMMUNITY

FROM @JMIKOLA

COULD BE BETTER

PHP

- inconsistency
- type juggling
- no dead code checking
- bit verbose?

GO

- no polymorphism
- “Is there anything at least v1.0?”
- dependency injection
- “Ugh, do I really have to write it from scratch?”

FROM PHP TO GO AND BACK:

DID ANYTHING CHANGE?

IMAGE FROM GRACEHOPPERFILM.COM

SHORTER, SENSIBLE NAMES

```
namespace Controllers;

class HomePage~~Controller~~ { ... }
```

HANDLE ERRORS FIRST

```php
if (!empty($name)) {
    if (!is_string($name)) {
        return false;
    }
    return true;
} else {
    return false;
}
```

```php
if (empty($name)) {
    return false;
}

if (!is_string($name)) {
    return false;
}

return true;
```

INTERFACES

GO

```go
type Shape interface {
    Area() float64
}
type Circle struct {
    radius float64
}
```

```go
func (c Circle) Area() float64 {
    return math.Pi * c.radius * c.radius
}
```

PHP

```php
class Circle implements Shape { ... }
```

INTERFACES

GO

```go
type Shape interface {
    Area() float64
}
type Circle struct {
    radius float64
}

func (c Circle) Area() float64 {
    return math.Pi * c.radius * c.radius
}
```

PHP

```php
class Circle implements Shape { ... }
```

INTERFACES

GO

```go
type Shape interface {
    Area() float64
}
type Circle struct {
    radius float64
}
```

```go
func (c Circle) Area() float64 {
    return math.Pi * c.radius * c.radius
}
```

PHP

```php
class Circle implements Shape { ... }
```

WHERE DO I START?

https://golang.org/

https://play.golang.org/

https://tour.golang.org/

https://blog.golang.org/

https://gobyexample.com

@KASIAZIEN

TALKS

Concurrency is not parallelism

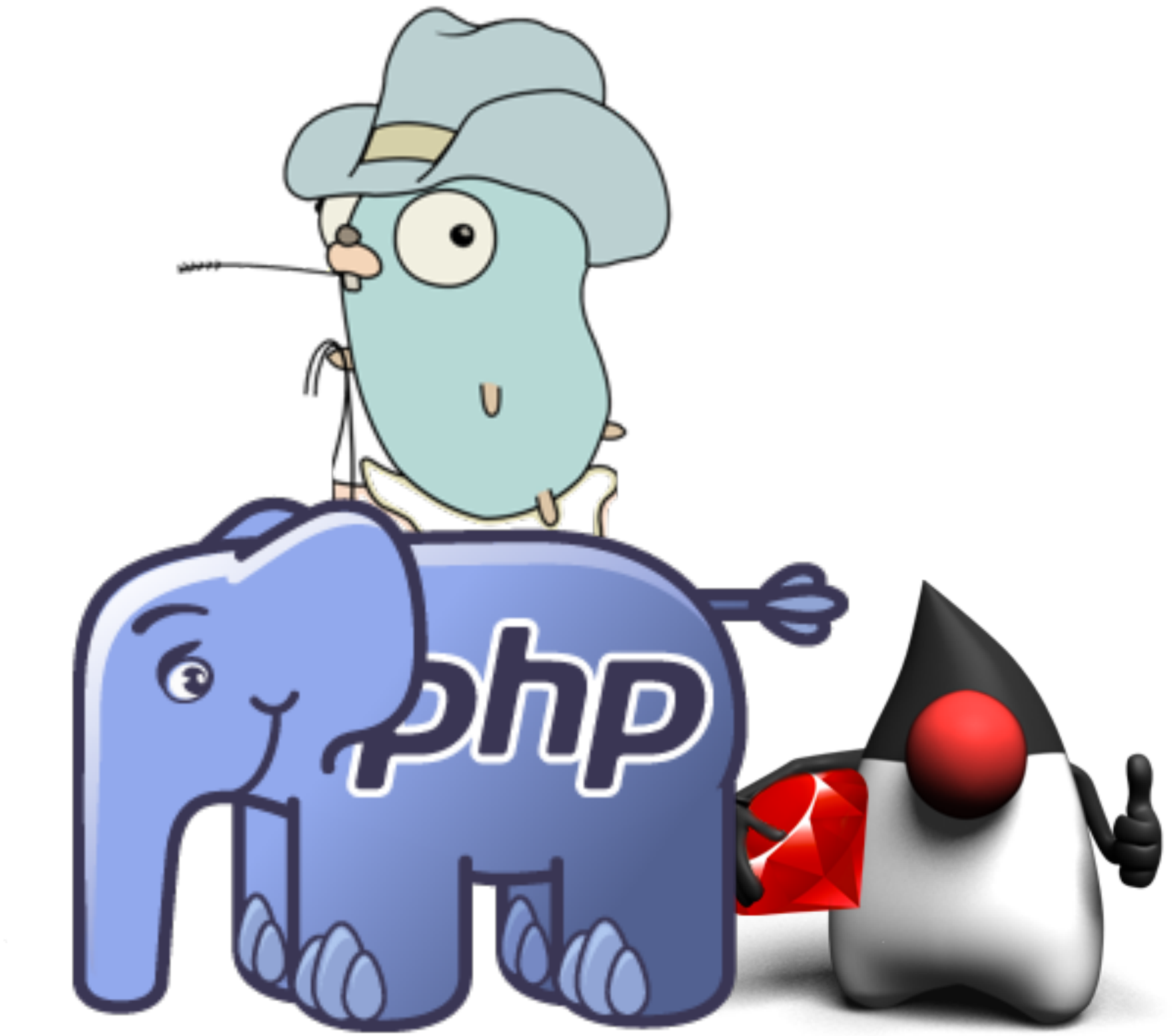
https://blog.golang.org/concurrency-is-not-parallelism

Simplicity is complicated

https://www.youtube.com/watch?v=rFejpH_tAHM

Building containers in Go

https://www.youtube.com/watch?v=HPuvDm8IC-4


php

THANKS FOR LISTENING!

@KASIAZIEN

IMAGE FROM HTTPS://GITHUB.COM/GENGO/GOSHIP