NEWSTORE

# Concurrency Patterns in Go

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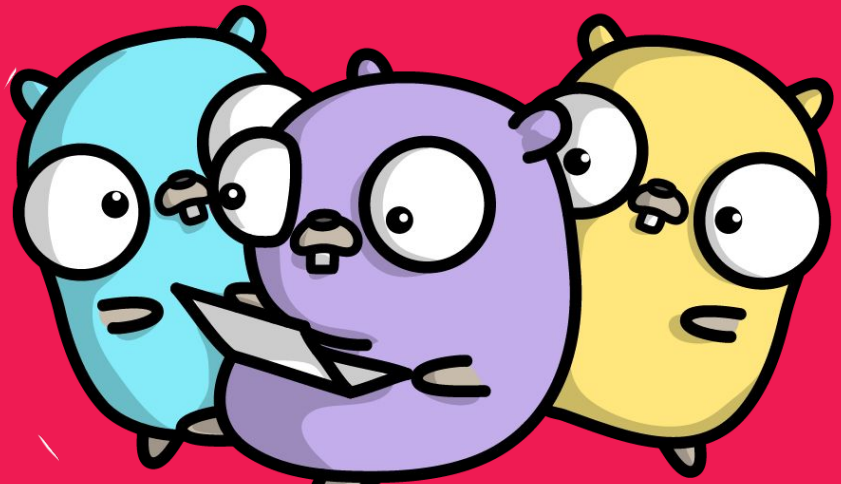
Codes & Presentation available @

https://github.com/seredot/go-concurrency

# Agenda

-> Concurrency vs Parallelism
-> CPU vs IO Bound Workloads
-> Goroutines
-> `sync.WaitGroup`
<- Demo: WaitGroup
-> Channels
<- Demo: Throttle
-> Atomic operations
<- Demo: Worker pool
-> `select`
<- Demo: Timeout
?: Q&A



# Concurrency vs Parallelism

**Parallelism**
Execution on different processing units at the same time.

**Concurrency**
Execution out of order.

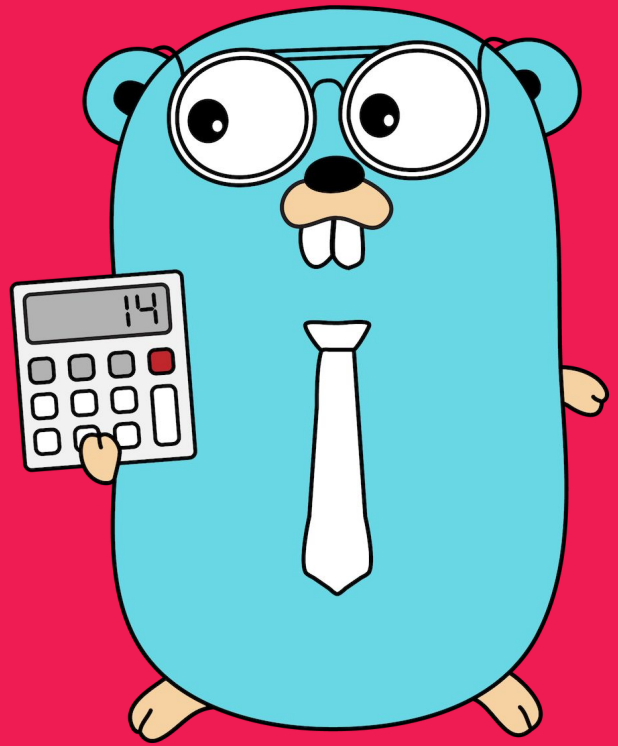
# CPU vs IO Bound Workloads

CPU Bound

Long calculations like: finding n-th prime, compression, encoding, encryption, etc.

IO Bound

Waiting for events, network operations, database queries, file operations, locks.

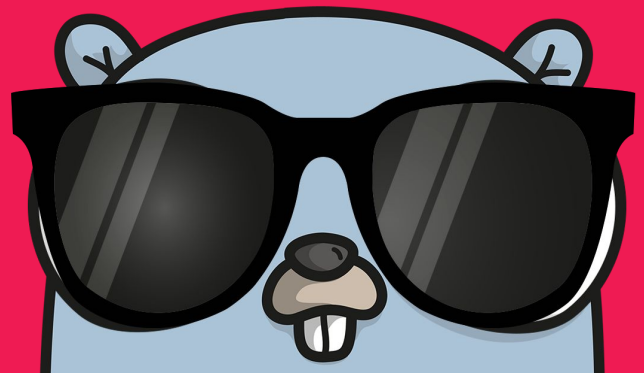


# Goroutines

A Goroutine is a function that runs concurrently.

A Goroutine can be thought like a lightweight thread.

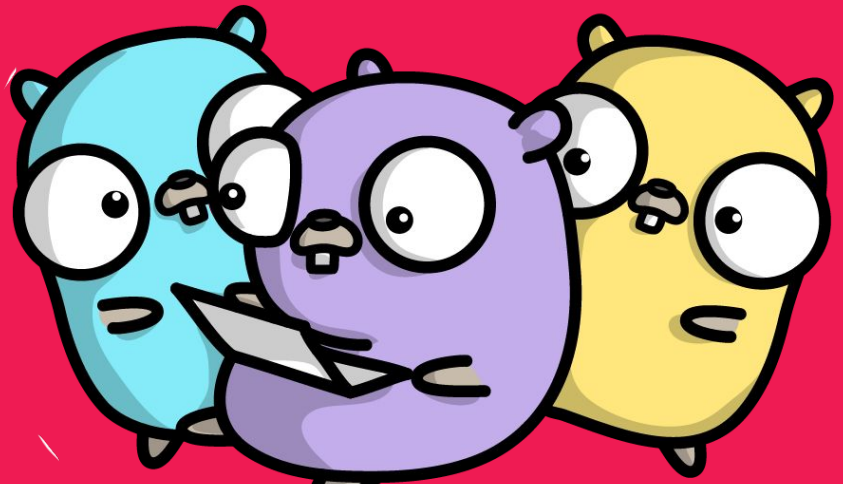
```
go functionForSomeTask()
```



# sync.WaitGroup

A WaitGroup waits for a collection of goroutines to finish.

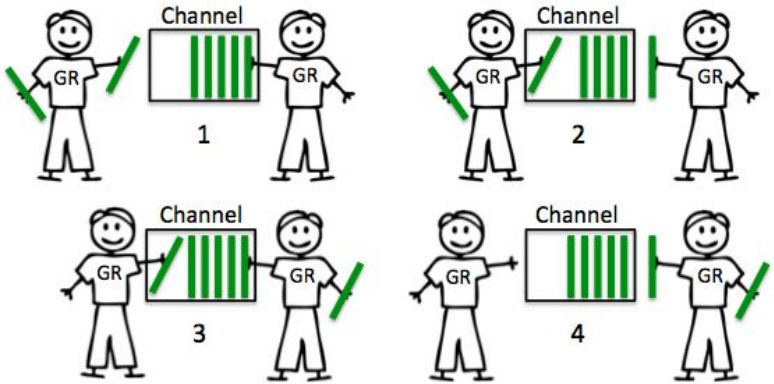
```
var wg sync.WaitGroup
wg.Add(1)
wg.Done()
wg.Wait()
```

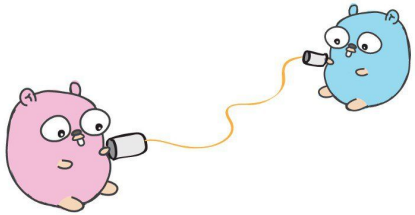


# DEMO

wait-group

# Channels



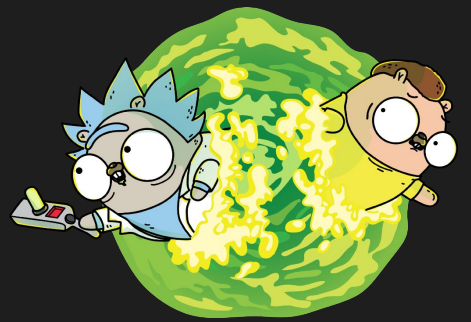
```go
// Create unbuffered channel.
c := make(chan string)

// Create buffered channel.
c := make(chan int, 10)

// Write to the channel.
c <- 3

// Read from the channel.
i := <-c

// Close the channel.
close(c)
```

# DEMO

`throttle`

# sync Package

```
atomic.AddUint64()
atomic.LoadInt64()
atomic.StoreInt64()
atomic.SwapInt64()
atomic.AddUint64()
```



# DEMO

`worker-pool`

# select

Tries to read from multiple channels or write to multiple channels.

Blocks until one of the cases is available.

If multiple are available, chooses **randomly**.

```
select {
  case i := <-c1:
    fmt.Printf("Operation 1 returned %d\n", i)
  case j := <-c2:
    fmt.Printf("Operation 2 returned %d\n", j)
}
```

# DEMO

`timeout`


# Thank You

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