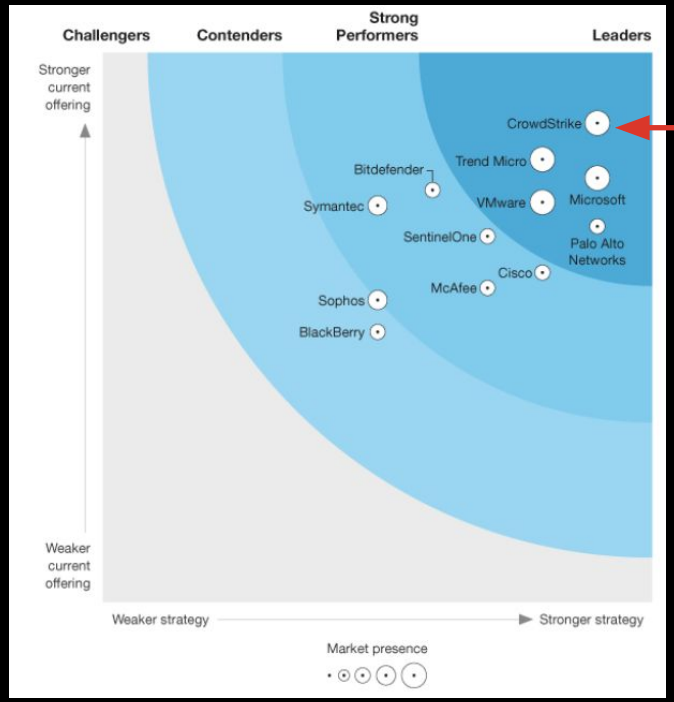
# Intro to golang

CrowdStrike HEROES - Cloud Workshop

# WHO IS CROWDSTRIKE?




Forrester Wave: Endpoint Security Software As A Service, Q2 2021

*A leader in the cybersecurity industry*

- Founded in 2011
- “Cloud native” security company
- Remote first since day 1

WE STOP BREACHES

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# THE "BIG" IN BIG DATA


**1 TRILLION+**
EVENTS/DAY

- Multiple production clouds
- ~300 microservices
- Tens of PB of data
- A *lot* of ML
- Security research & threat analysis

**65,000**
POTENTIAL INTRUSIONS STOPPED

# CS ROMANIA

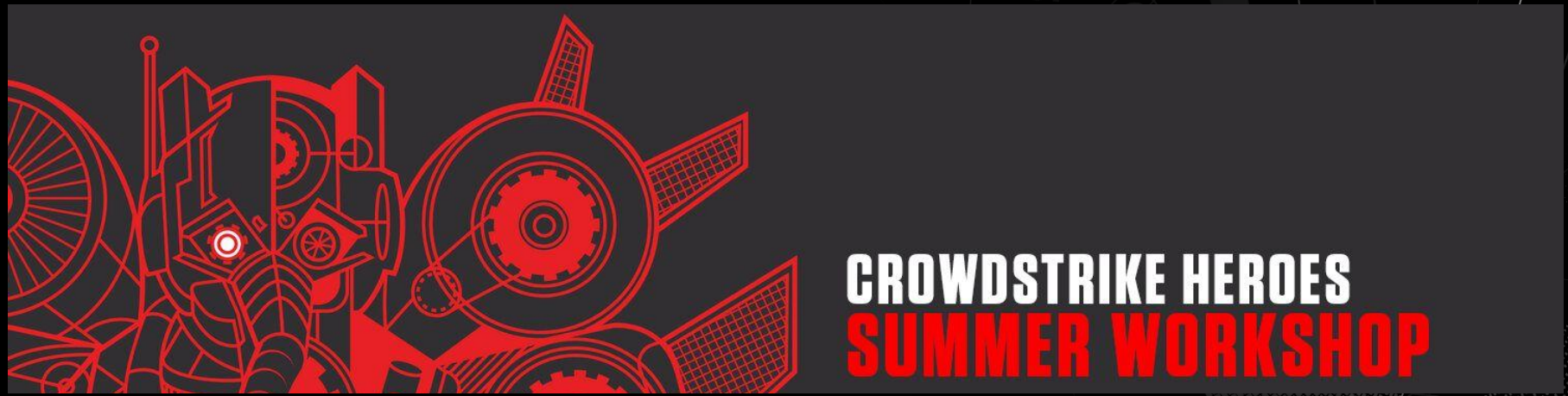
- R&D center since 2018
- People from Bucharest, Cluj, Brasov, Iasi etc.
- Cloud, Data science, SRE, Security research, SDET, UI etc.
- Full ownership over products
- 170 employees
  - We’re hiring btw!

# What those workshops will be about?

10 days - 9 workshops 16:00~20:00
1 contest 13:00~19:00 - Awards included

All the activities will take place in the same PR606 room.

Please be in time for the start, feel free to grab some snacks, a drink, or make yourself comfortable.



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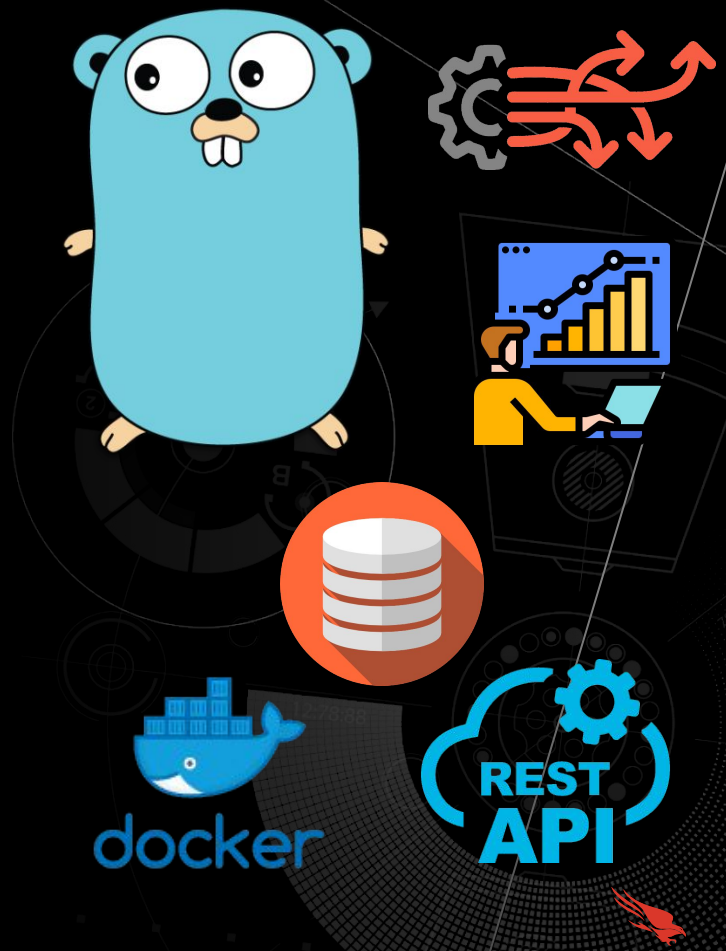
| Date | Topic |
|---|---|
| July 25 - 16:00 | Intro to golang |
| July 26 - 16:00 | Intro to golang (continuation) |
| July 27 - 16:00 | Multithreading |
| July 28 - 16:00 | Rest API |
| July 29 - 16:00 | Unit testing, logging and monitoring |
| August 1 - 16:00 | Workshop and Q&A |
| August 2 - 16:00 | Deployments/Docker |
| August 3 - 16:00 | Databases |
| August 4 - 16:00 | Databases extended |
| August 5 - 13:00 | Microservices contest (4h with Awards) |



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# Intro to golang

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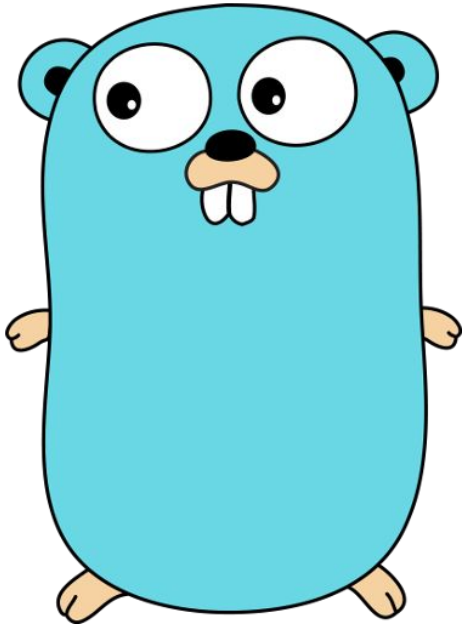
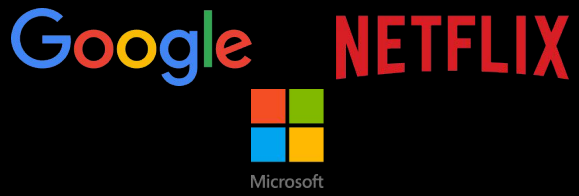
# What is go?

- Go was created at Google in 2007
- open source project
- similarly modeled after C
- compiled on most platforms
- based on packages
- garbage collection



# Why use go?





- lower latency than Java (where garbage collection pauses are an issue)
- more productive for developers than C
- built in concurrency
- support for unit testing

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# Hello World

- Entry point is in package main
  - Function main
- Packages imported explicitly
  - *import* keyword
- Import handle is the package name
- `import log "github.com/sirupsen/logrus"`
- Exported & private names
  - exported if it begins with a **capital letter**
  - private names are not visible outside the package (but can be used in other files in the package)

```
package main

import "fmt"

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

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# How to compile go

```
go build main.go
go build ./...
go run ./...
```

```
go test ./...
go test -race
```

```
go fmt examples.go
go vet examples.go
```

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# Go modules

- A module is a collection of Go packages
- `go.mod` file
  - Associated `go.sum` file - package hash
  - `go mod tidy` to download dependencies
- All packages can be found here https://pkg.go.dev/
- Demo: `demo/main.go`

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# Functions

- Function name first, arguments, then return type
- `func add(x int, y int) int`
  - `func add(x, y int) int`
- `x int` (GO) vs `int x` (C)
- Multiple results
  - Parentheses to delimit
- Names for return variables
- Demo: demo/examples.go

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# Variables & Constants

- Keyword **`var`**
  - `var i int`
- Declaring multiple variables at the same time
  - `var i, j, k int`
- Package level or function level
- Initialising variables
  - `var i, j int = 1, 2`
  - Default values are always set (unlike C)
- Short form: `k := 3`
  - Also multiples: `v1, v2, v3 := 42, false, "no!"`
- Demo: demo/main.go

- Keyword **`const`**
  - `const Pi = 3.14`
- High-precision *values*
- Multiple constants are usually in a group like imports

- No short form

# Basic types

- `int, uint` and any other unspecified size types depend on the architecture of the system
- Zero values
  - `0` for numeric types,
  - `false` for the boolean type, and
  - `""` (the empty string) for strings.
  - `nil` for pointers
    - strings are NEVER nil
- Statically typed => type conversions
  - `i := 42 // defaulted int`
  - `f := float64(i)`
- More in the demo

```
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
```

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# Flow control statements

for

if

else

switch

**defer**

# Loops

- Generic keyword `for`

```
for i := 0; i < 10; i++ {
    sum += i
}
```

- It is similar in syntax to C
  - No parentheses
  - Braces `{}` always required
- We can simulate a `while` loop by omitting statements
- We can omit everything XD
- Keywords: `break` and `continue`

# if & else

```
if crashingIntoThings {
    dont()
}
```

- No need for parentheses
- We can define variables inside the if statement

```
if v := executeSth(); v < lim {
    return v
}
```

```
if something {
    whatever()
} else {
    whateverElse()
}
```

- Defined vars are visible inside else too

# Switch

- Similar syntax to C
- No need for constants in the condition
- If a branch is taken others are skipped
- No need for condition at all actually
  - We can check completely different statements

```
switch {
case i == 0:
   // does not exec if i != 0
case t.Hour() < 12:
   // def
}
```

```
fmt.Println("When's Saturday?")
today := time.Now().Weekday()
switch time.Saturday {
case today + 0:
   fmt.Println("Today.")
case today + 1:
   fmt.Println("Tomorrow.")
case today + 2:
   fmt.Println("In two days.")
default:
   fmt.Println("Too far away.")
}
```

# Defer

- Delays the execution of a function until the surrounding function returns
- Accepts only “void” functions
- Defers are added onto a stack
  - remember the call stack? ;)
- More examples in the demo

```
func main() {
    defer fmt.Println("world")
    // do lot
    fmt.Println("hello")
}
```

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# Pointers & arrays

Anyone miss them?

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# Pointers

A pointer holds the **memory address** of a value.

```
var p *int
```

- Operator `&` for generating pointers
- Operator `*` for retrieving the value of a pointer
- Zero value `nil`
- NO pointer arithmetic

```
if p != nil {
    i := *p
}
```

- We get an explicit error for bad dereferences: panic
- Demo

# Arrays & slices

`var a [10]int`

- Array length is part of the type (cannot be resized)
- Accessing elements: `i := a[2]`
- Dynamically sized views: slices

`var b []int`

- Slices are formed by specifying limits: `a[low : high]`
  - We can omit one or both of these limits
- Slices are like references to arrays -> changes to a slice modify the array
- Length and capacity `len(s), cap(s)`
- Zero value `nil`
- Demo

# Constructing slices dynamically
# make & append

```
a := make([]int, 5)  // len(a)=5
b := make([]int, 0, 5) // len(b)=0, cap(b)=5
```

- We have a “constructor” built in function to declare slices
  - No need to import anything
- The second slice here is filled with zero values for its type
- Adding values to a slice is done with another built in function

```
a = append(a, 1)
b = append(b, 2, 3, 4)
b = append(b, a...) // appends the whole list
```

# Iterating over arrays made easy range

```
var pow = []int{1, 2, 4, 8, 16, 32, 64, 128}
for i, v := range pow {
    fmt.Printf("2**%d = %d\n", i, v)
}
```

- The range keyword returns the index and a ‘copy’ of the value
- We can omit either one of them
  - `for i := range pow`
  - `for _, v := range pow`

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# Any questions?