Go Lang Beginner's Workshop

Sathish VJ

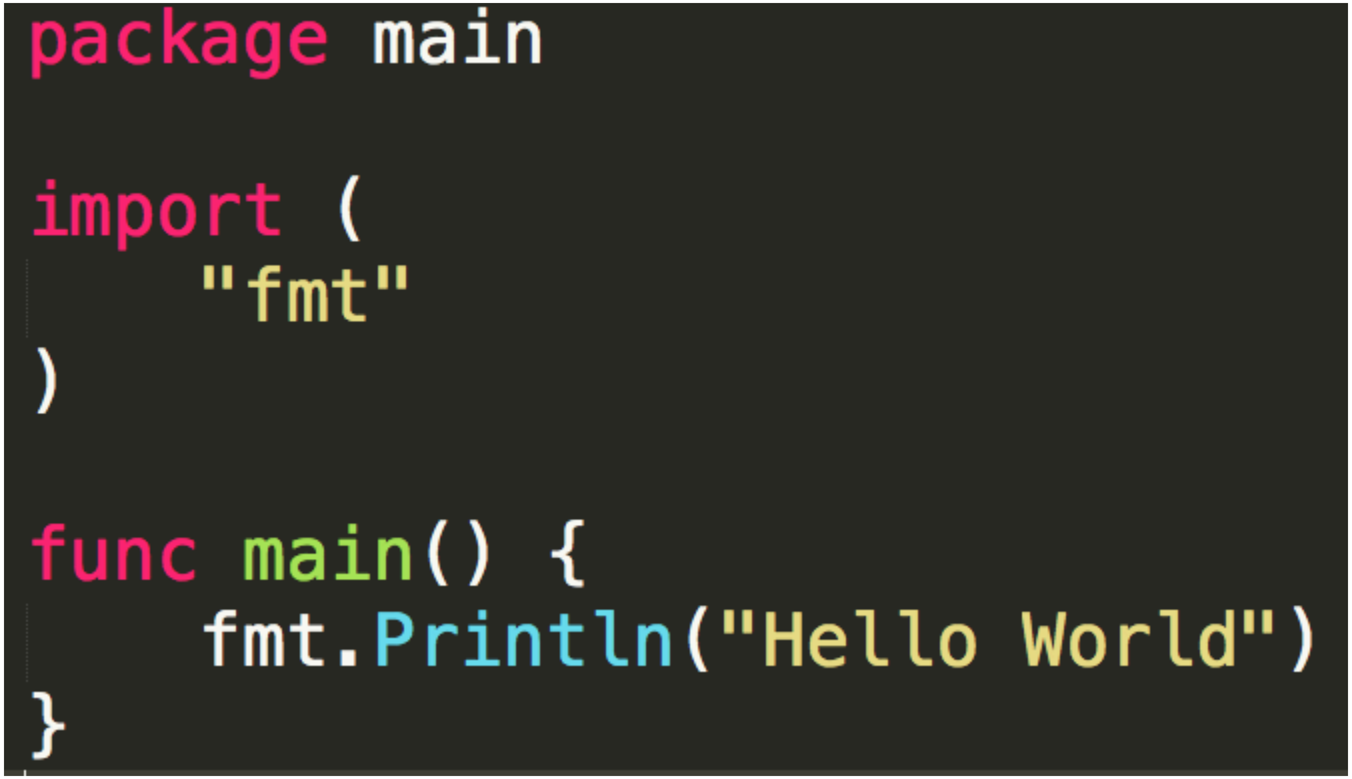
Installation

- Ref: http://golang.org/doc/install
- Download zip file for your platform
  - Downloads: https://code.google.com/p/go/downloads/list
- Extract it to a known location, say `[x]/golang`
  - You should now have `[x]/golang/go` directory
- Set `PATH` to `[x]/golang/go/bin`
- Check version on the command line with `go version`

Documentation

- To run documentation locally:
  `godoc -http=:6060`
  Then access via browser at: `http://localhost:6060`
- Also try `go doc fmt` or `go doc regexp` for documentation on specific packages
- If I'm slowing down for others, entertain yourself at `http://tour.golang.org`

1. Hello World



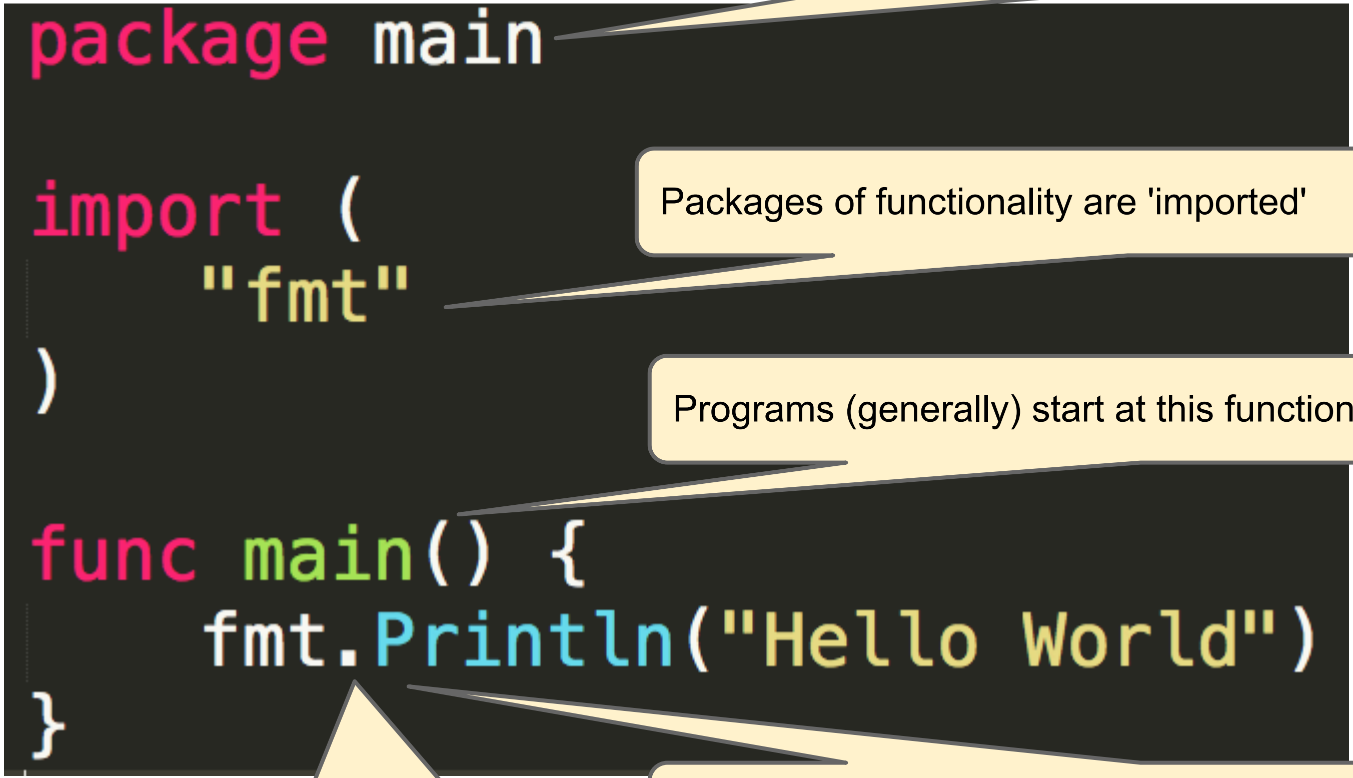
```go
package main

import (
	"fmt"
)

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

Use any editor.

Save as hw.go

Run it as go run hw.go

Hello World



```
package main

import (
    "fmt"
)

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

All functionality in a package. The main program has to be in 'main' package.

Packages of functionality are 'imported'

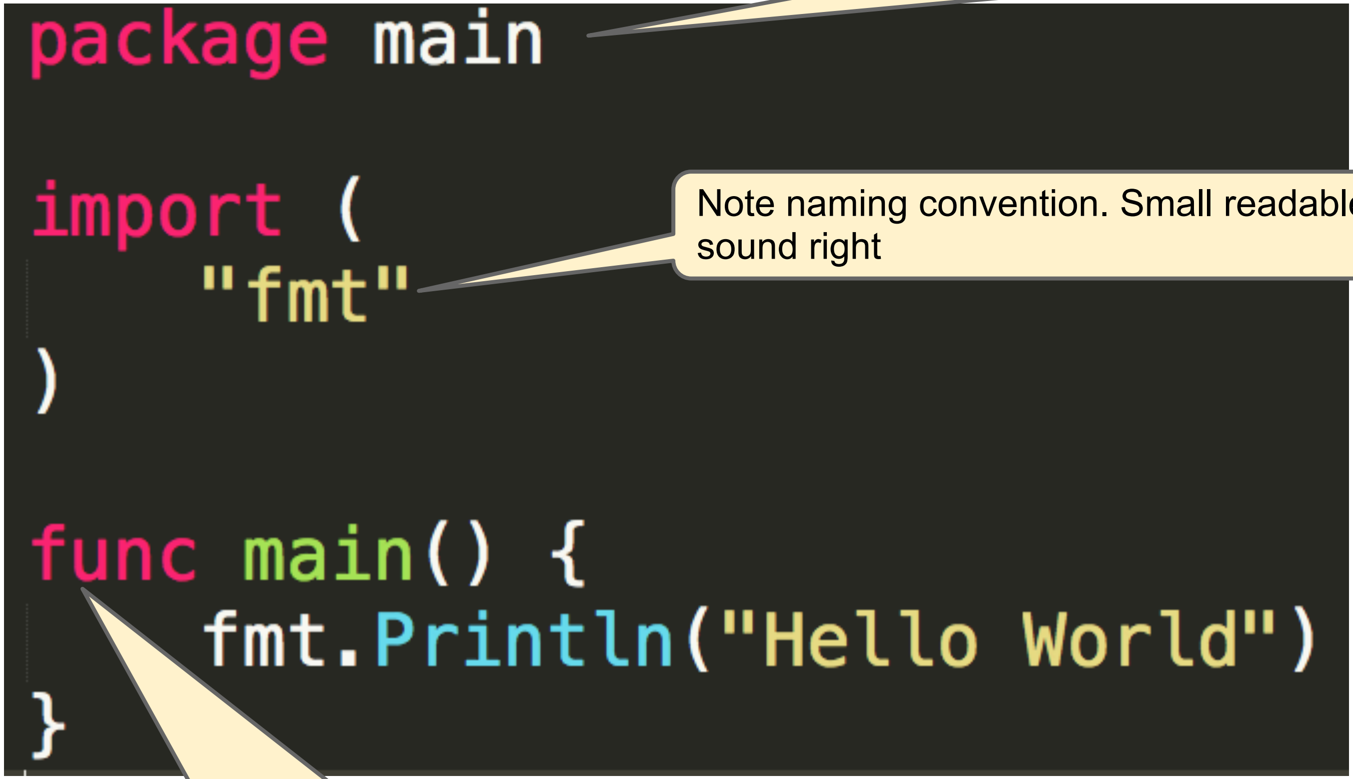
Programs (generally) start at this function signature.

Notice capital "P". Try what happens with "fmt.println"

Use dot notation to access package functions. Note capitalization of 'P' in Print. Note that all package names are in small.

Hello World

No semicolons



```
package main

import (
    "fmt"
)

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

Note naming convention. Small readable, variables that sound right

Functions/methods defined with "func" keyword

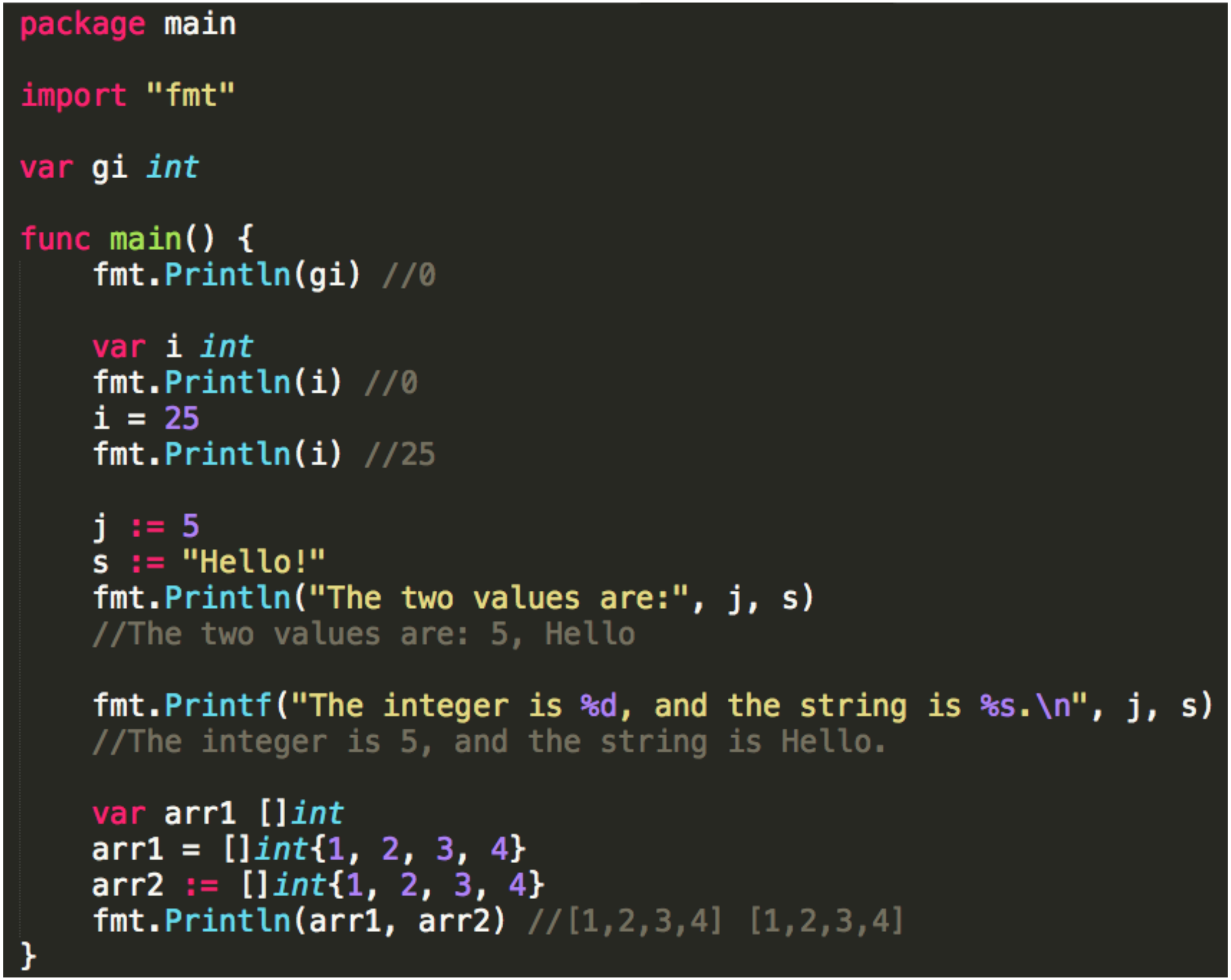
Immediately observable benefits

- Very fast building
- Compiled into native executable; real fast execution
- Works equally well on multiple platforms
- No virtual machines and repeated VM update reminders
- Clean, clear, concise code
- Familiar programming concepts

Go addresses ...

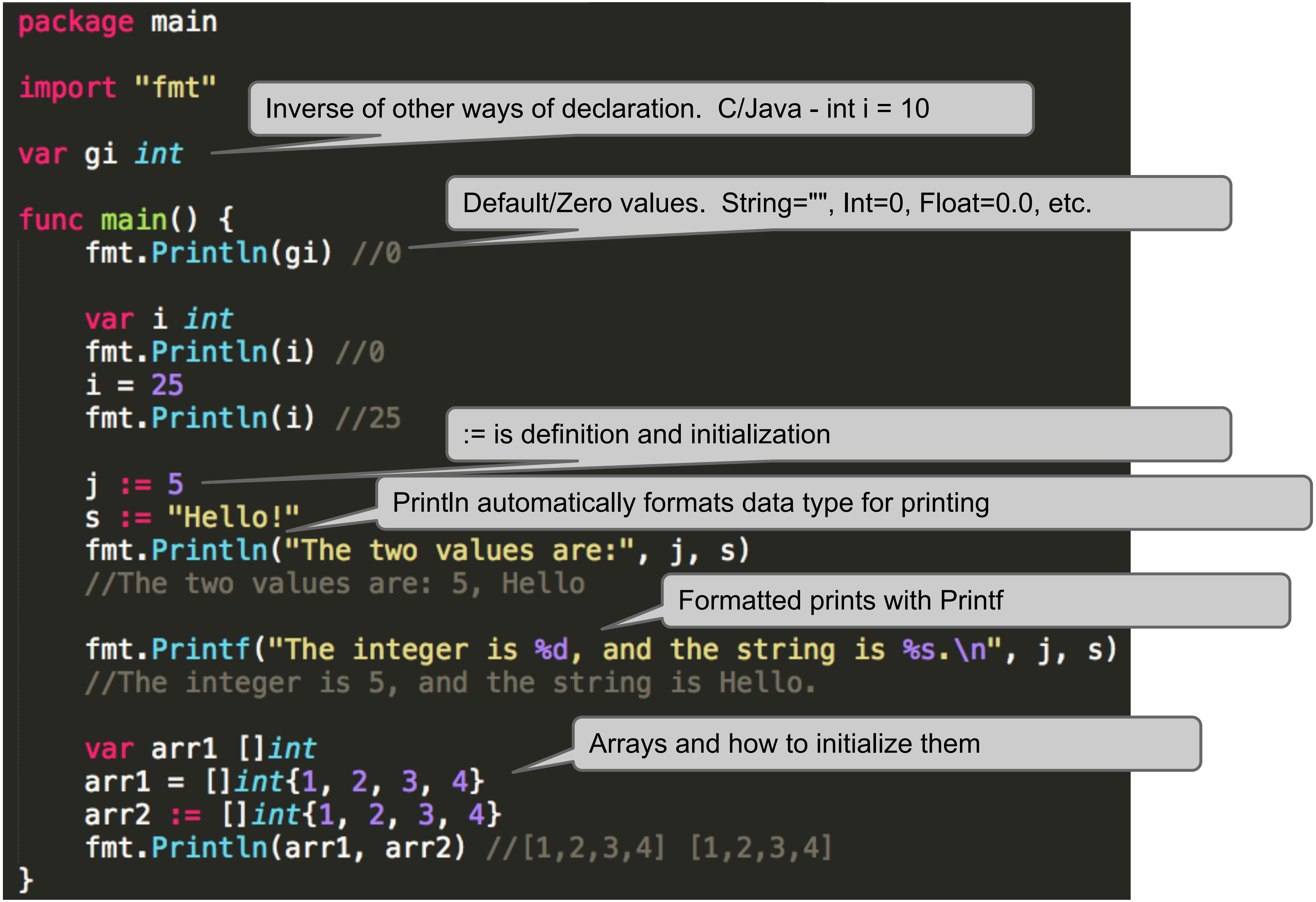
- Computers fast but software construction slow.
- Dependency analysis necessary for speed, safety.
- Types get in the way too much.
- Garbage collection, concurrency poorly supported.
- Multi-core seen as crisis not opportunity.

2. Variables



```go
package main

import "fmt"

var gi int

func main() {
    fmt.Println(gi) //0

    var i int
    fmt.Println(i) //0
    i = 25
    fmt.Println(i) //25

    j := 5
    s := "Hello!"
    fmt.Println("The two values are:", j, s)
    //The two values are: 5, Hello

    fmt.Printf("The integer is %d, and the string is %s.\n", j, s)
    //The integer is 5, and the string is Hello.

    var arr1 []int
    arr1 = []int{1, 2, 3, 4}
    arr2 := []int{1, 2, 3, 4}
    fmt.Println(arr1, arr2) //[1,2,3,4] [1,2,3,4]
}
```

Variables



```go
package main

import "fmt"

var gi int

func main() {
    fmt.Println(gi) //0

    var i int
    fmt.Println(i) //0
    i = 25
    fmt.Println(i) //25

    j := 5
    s := "Hello!"
    fmt.Println("The two values are:", j, s)
    //The two values are: 5, Hello

    fmt.Printf("The integer is %d, and the string is %s.\n", j, s)
    //The integer is 5, and the string is Hello.

    var arr1 []int
    arr1 = []int{1, 2, 3, 4}
    arr2 := []int{1, 2, 3, 4}
    fmt.Println(arr1, arr2) //[1,2,3,4] [1,2,3,4]
}
```

Inverse of other ways of declaration. C/Java - int i = 10

Default/Zero values. String="", Int=0, Float=0.0, etc.

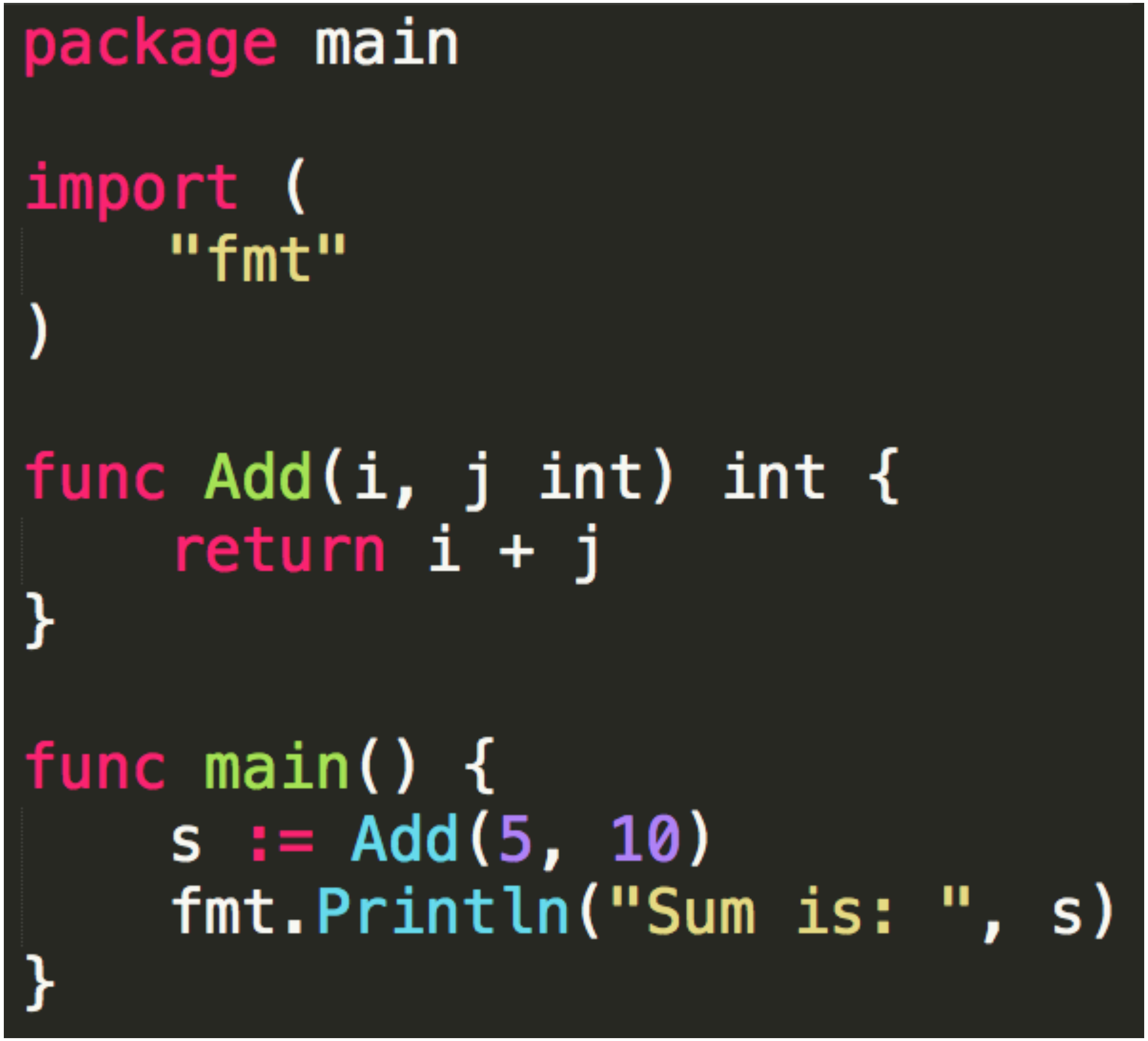
:= is definition and initialization

Println automatically formats data type for printing

Formatted prints with Printf

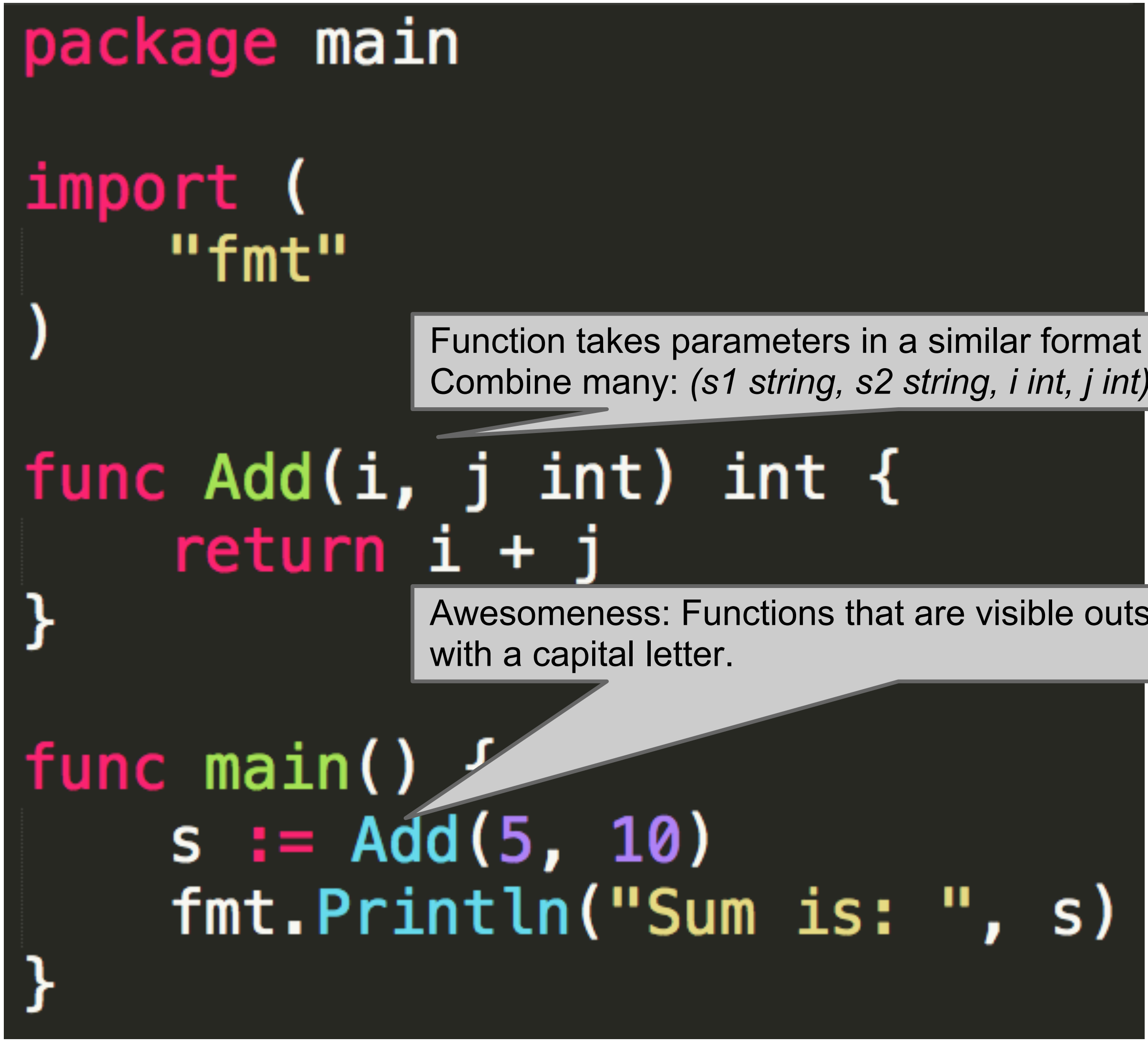
Arrays and how to initialize them

3. Functions



```go
package main

import (
    "fmt"
)

func Add(i, j int) int {
    return i + j
}

func main() {
    s := Add(5, 10)
    fmt.Println("Sum is: ", s)
}
```

3. Functions



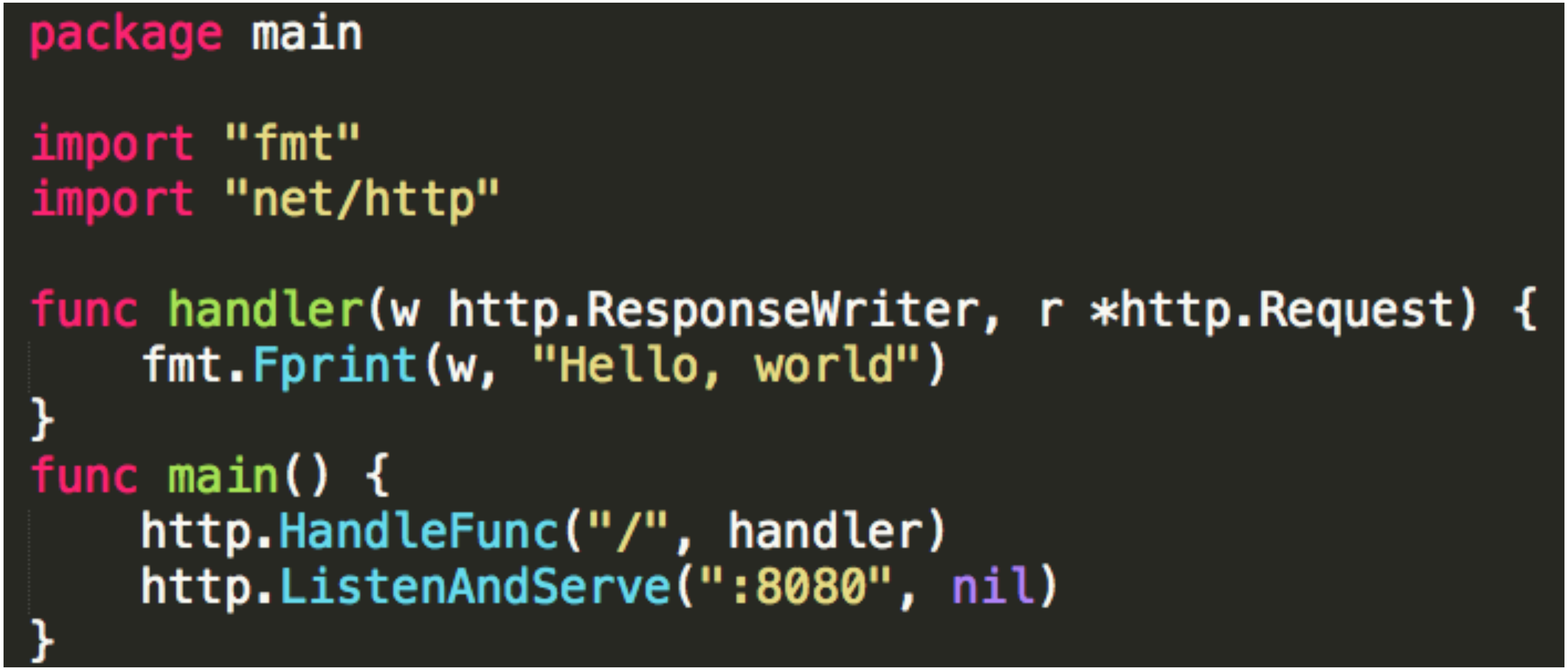
```
package main

import (
	"fmt"
)

func Add(i, j int) int {
	return i + j
}

func main() {
	s := Add(5, 10)
	fmt.Println("Sum is: ", s)
}
```

Function takes parameters in a similar format - *name type*
Combine many: *(s1 string, s2 string, i int, j int)* = *(s1, s2 string, i, j int)*

Awesomeness: Functions that are visible outside the package begin with a capital letter.

You can also ignore return values with an underscore.
_ := Add(5, 10)

3.5 Hello Web



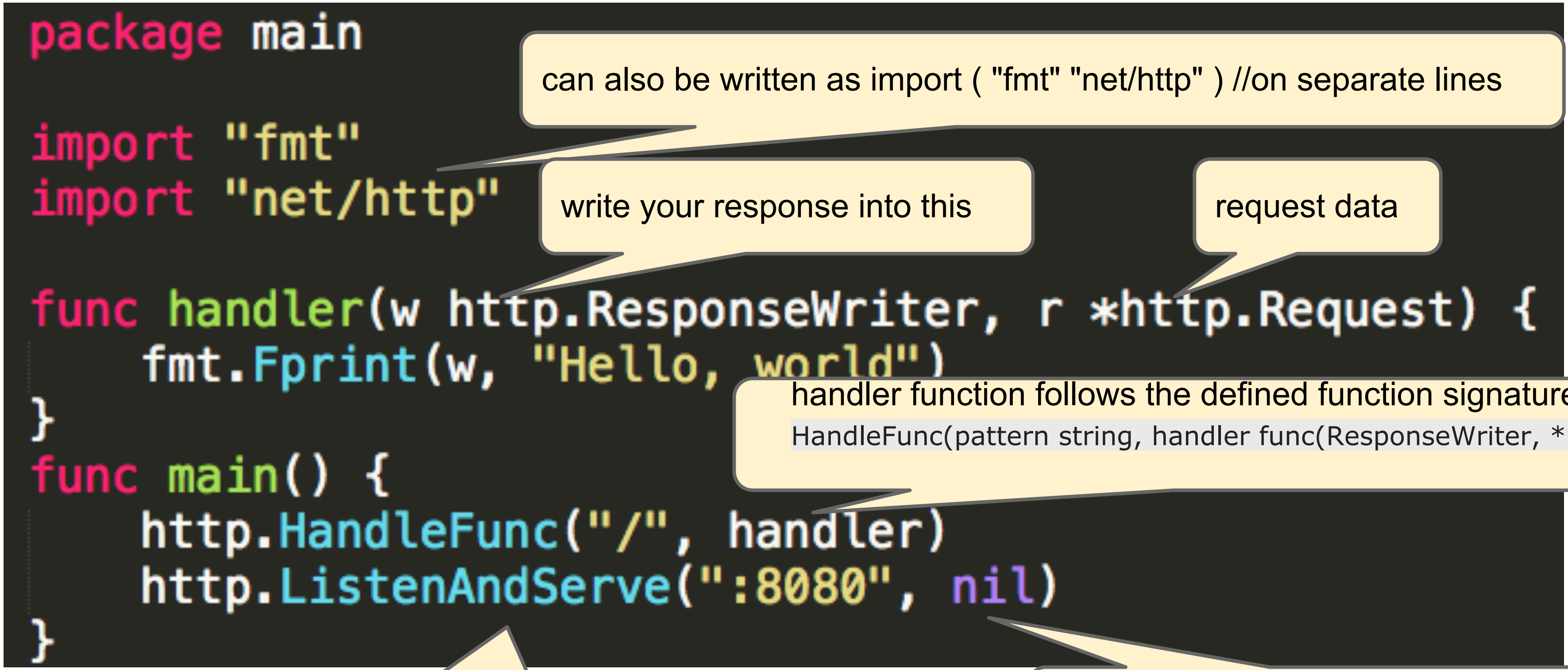
```go
package main

import "fmt"
import "net/http"

func handler(w http.ResponseWriter, r *http.Request) {
    fmt.Fprint(w, "Hello, world")
}
func main() {
    http.HandleFunc("/", handler)
    http.ListenAndServe(":8080", nil)
}
```

Save as hweb.go

Run it as go run hweb.go

In your browser, go to http://localhost:8080

Hello Web



```go
package main

import "fmt"
import "net/http"

func handler(w http.ResponseWriter, r *http.Request) {
    fmt.Fprint(w, "Hello, world")
}
func main() {
    http.HandleFunc("/", handler)
    http.ListenAndServe(":8080", nil)
}
```

can also be written as import ("fmt" "net/http") //on separate lines

write your response into this

request data

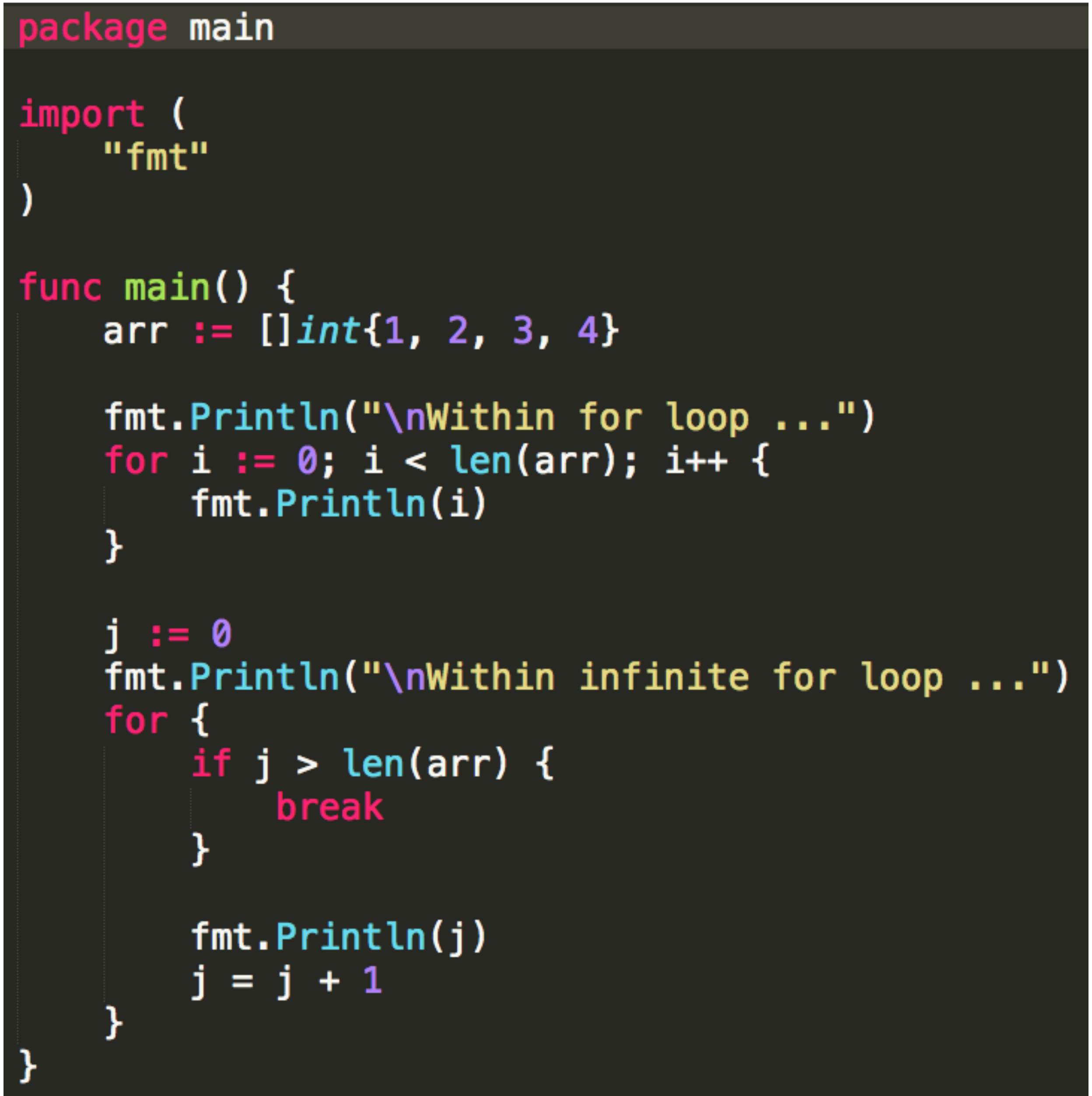
handler function follows the defined function signature: fun

HandleFunc(pattern string, handler func(ResponseWriter, *Reque

nil as empty value (not null)

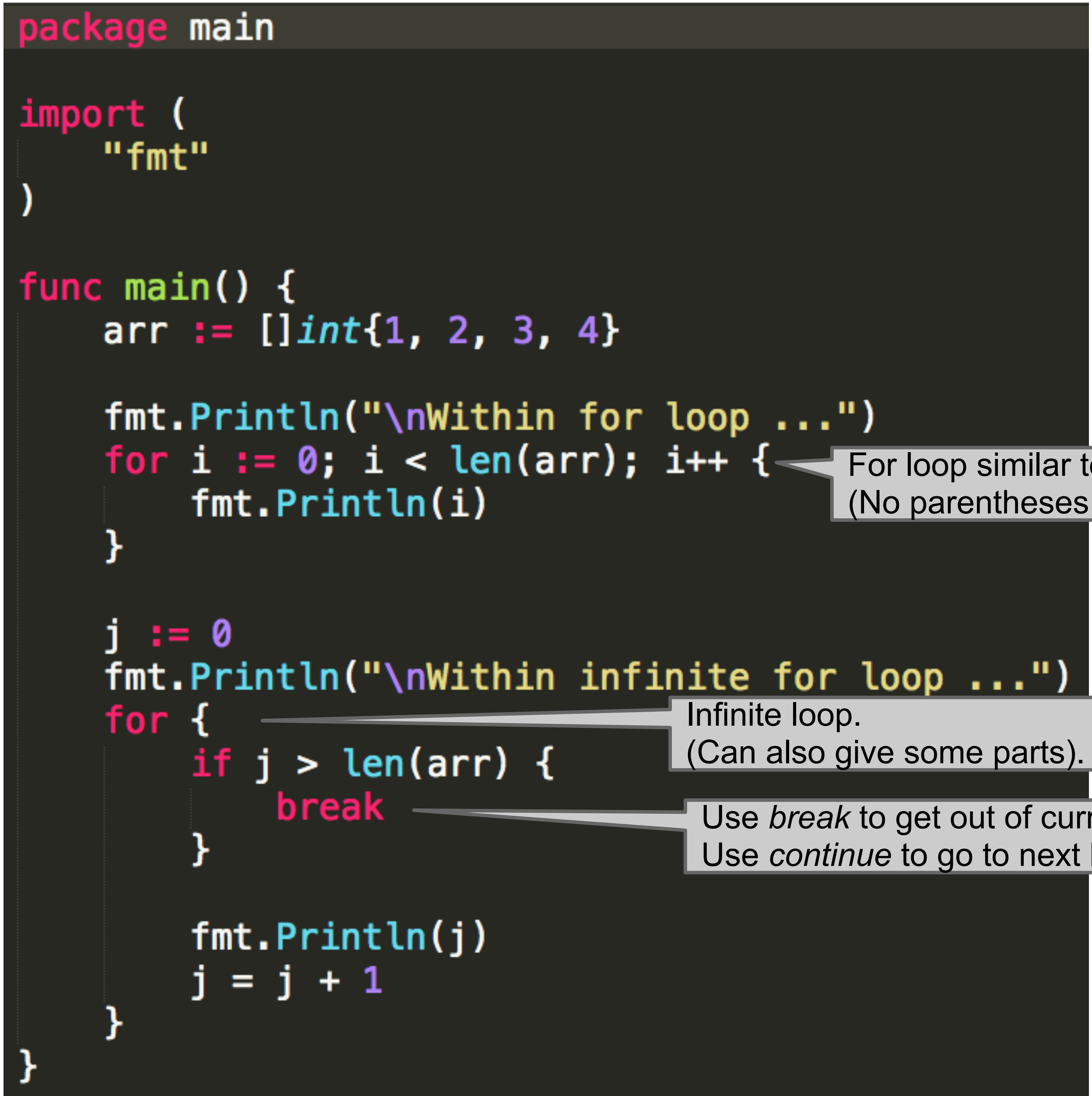
Start built in server. No external server required!

4. for loop



```go
package main

import (
    "fmt"
)

func main() {
    arr := []int{1, 2, 3, 4}

    fmt.Println("\nWithin for loop ...")
    for i := 0; i < len(arr); i++ {
        fmt.Println(i)
    }

    j := 0
    fmt.Println("\nWithin infinite for loop ...")
    for {
        if j > len(arr) {
            break
        }

        fmt.Println(j)
        j = j + 1
    }
}
```

4. for loop



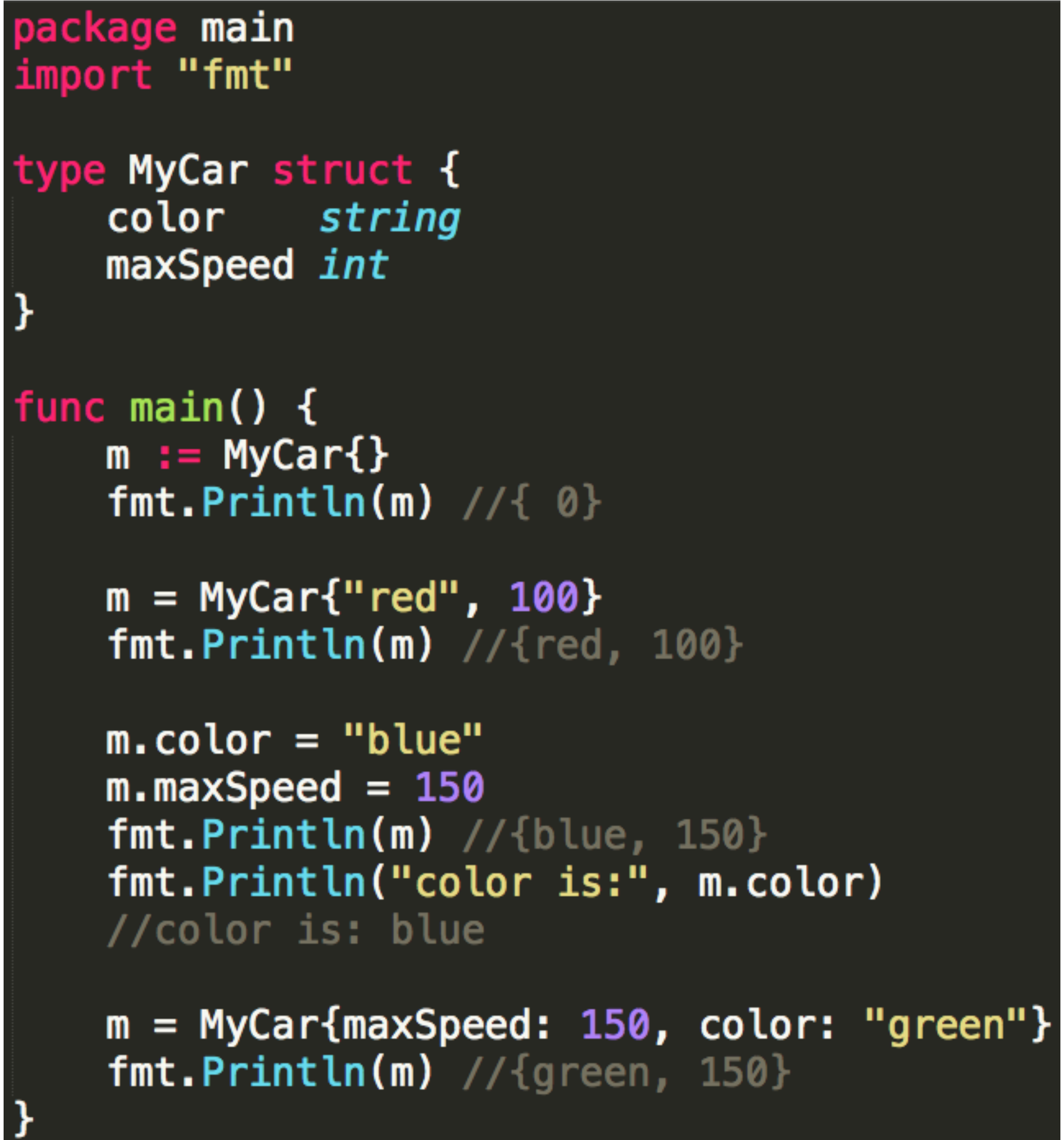
```go
package main

import (
    "fmt"
)

func main() {
    arr := []int{1, 2, 3, 4}

    fmt.Println("\nWithin for loop ...")
    for i := 0; i < len(arr); i++ {
        fmt.Println(i)
    }

    j := 0
    fmt.Println("\nWithin infinite for loop ...")
    for {
        if j > len(arr) {
            break
        }

        fmt.Println(j)
        j = j + 1
    }
}
```

For loop similar to Java, C
(No parentheses though)

Infinite loop.
(Can also give some parts). *for i:=0;; { ... }*

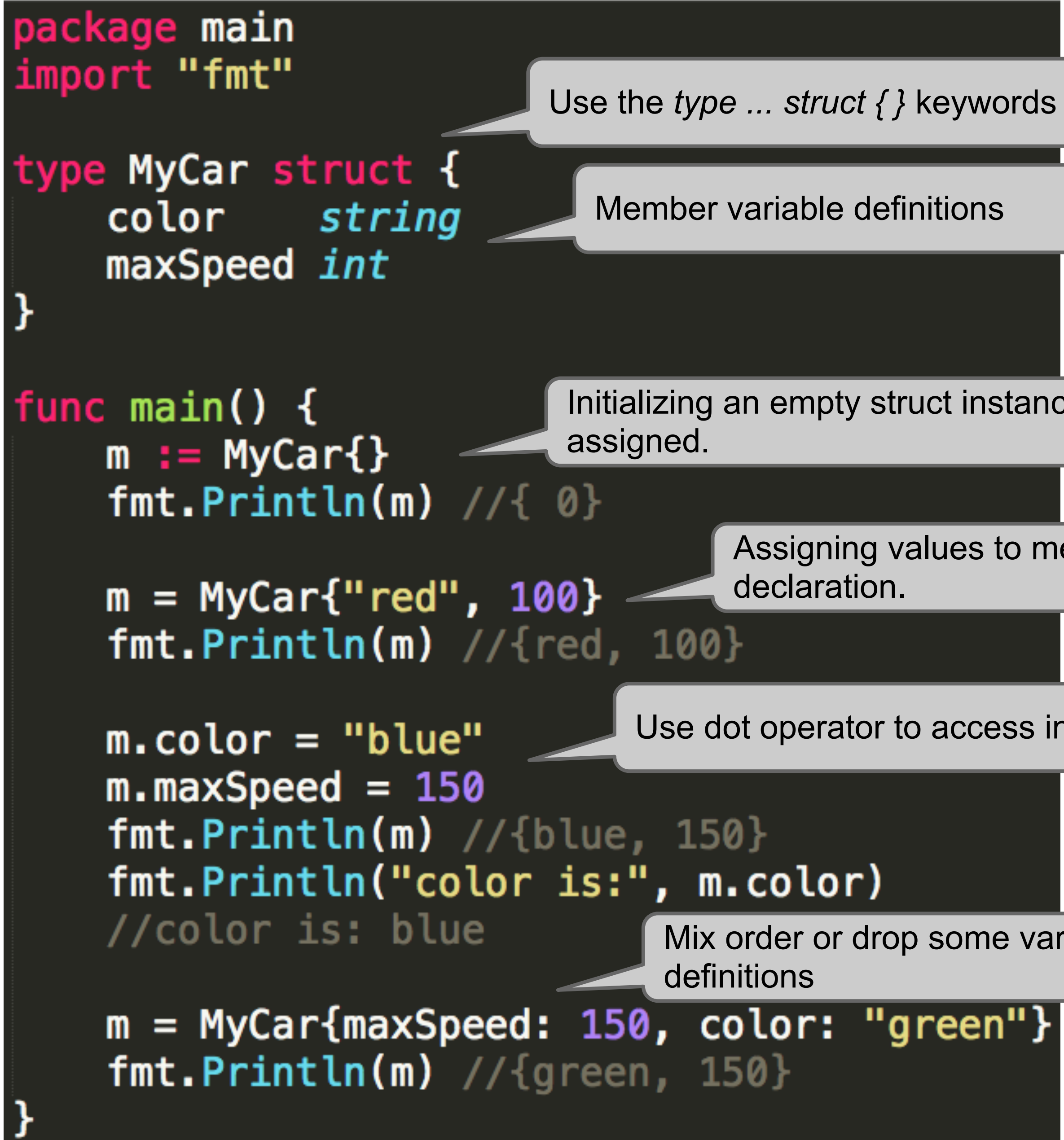
Use *break* to get out of current loop.
Use *continue* to go to next loop index.

5. struct and object representation



```go
package main
import "fmt"

type MyCar struct {
    color    string
    maxSpeed int
}

func main() {
    m := MyCar{}
    fmt.Println(m) //{ 0}

    m = MyCar{"red", 100}
    fmt.Println(m) //{red, 100}

    m.color = "blue"
    m.maxSpeed = 150
    fmt.Println(m) //{blue, 150}
    fmt.Println("color is:", m.color)
    //color is: blue

    m = MyCar{maxSpeed: 150, color: "green"}
    fmt.Println(m) //{green, 150}
}
```

5. struct and object representation



```go
package main
import "fmt"

type MyCar struct {
    color    string
    maxSpeed int
}

func main() {
    m := MyCar{}
    fmt.Println(m) //{ 0}

    m = MyCar{"red", 100}
    fmt.Println(m) //{red, 100}

    m.color = "blue"
    m.maxSpeed = 150
    fmt.Println(m) //{blue, 150}
    fmt.Println("color is:", m.color)
    //color is: blue

    m = MyCar{maxSpeed: 150, color: "green"}
    fmt.Println(m) //{green, 150}
}
```

Use the *type ... struct { }* keywords

Member variable definitions

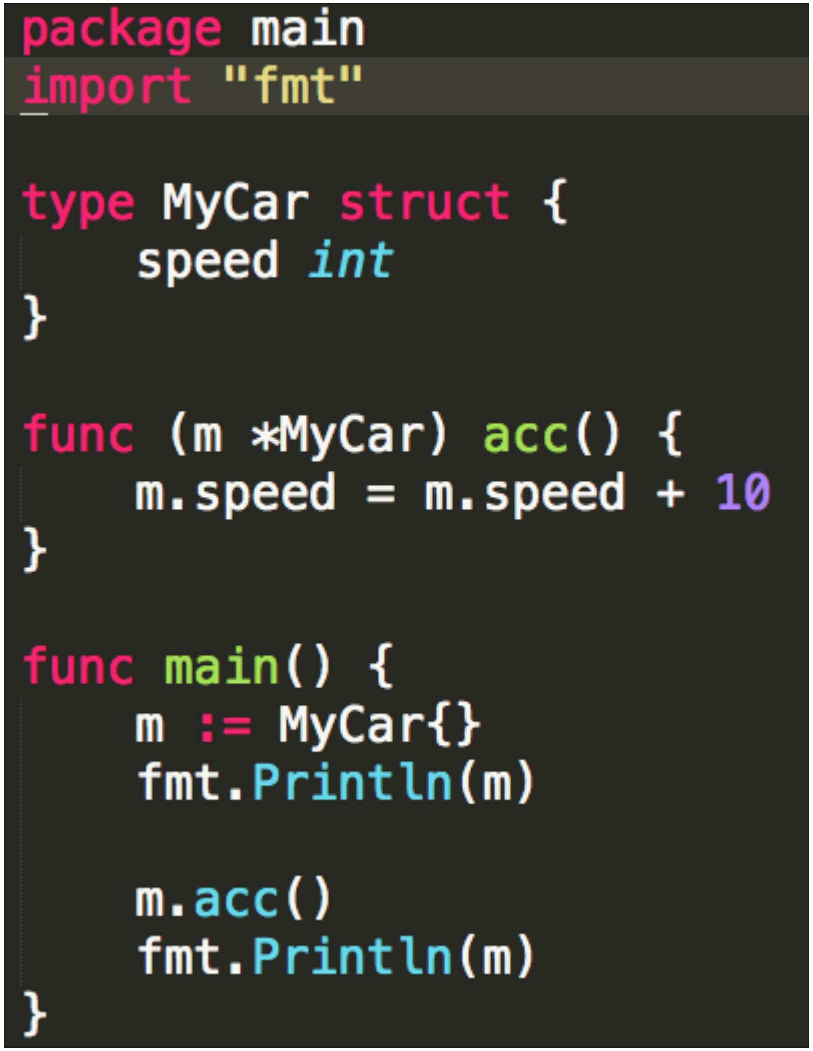
Initializing an empty struct instance. Default/zero values assigned.

Assigning values to member variables in order of struct declaration.

Use dot operator to access individual member variables.

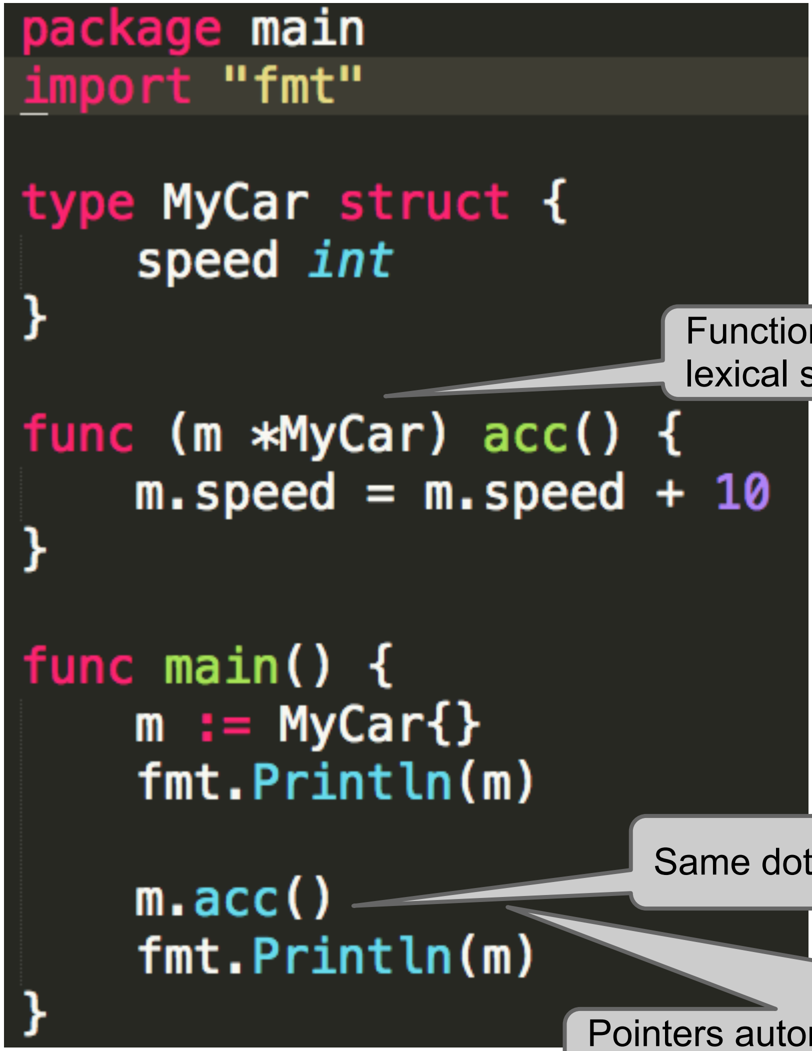
Mix order or drop some variables with named variable definitions

6. struct methods



```go
package main
import "fmt"

type MyCar struct {
    speed int
}

func (m *MyCar) acc() {
    m.speed = m.speed + 10
}

func main() {
    m := MyCar{}
    fmt.Println(m)

    m.acc()
    fmt.Println(m)
}
```

6. struct methods



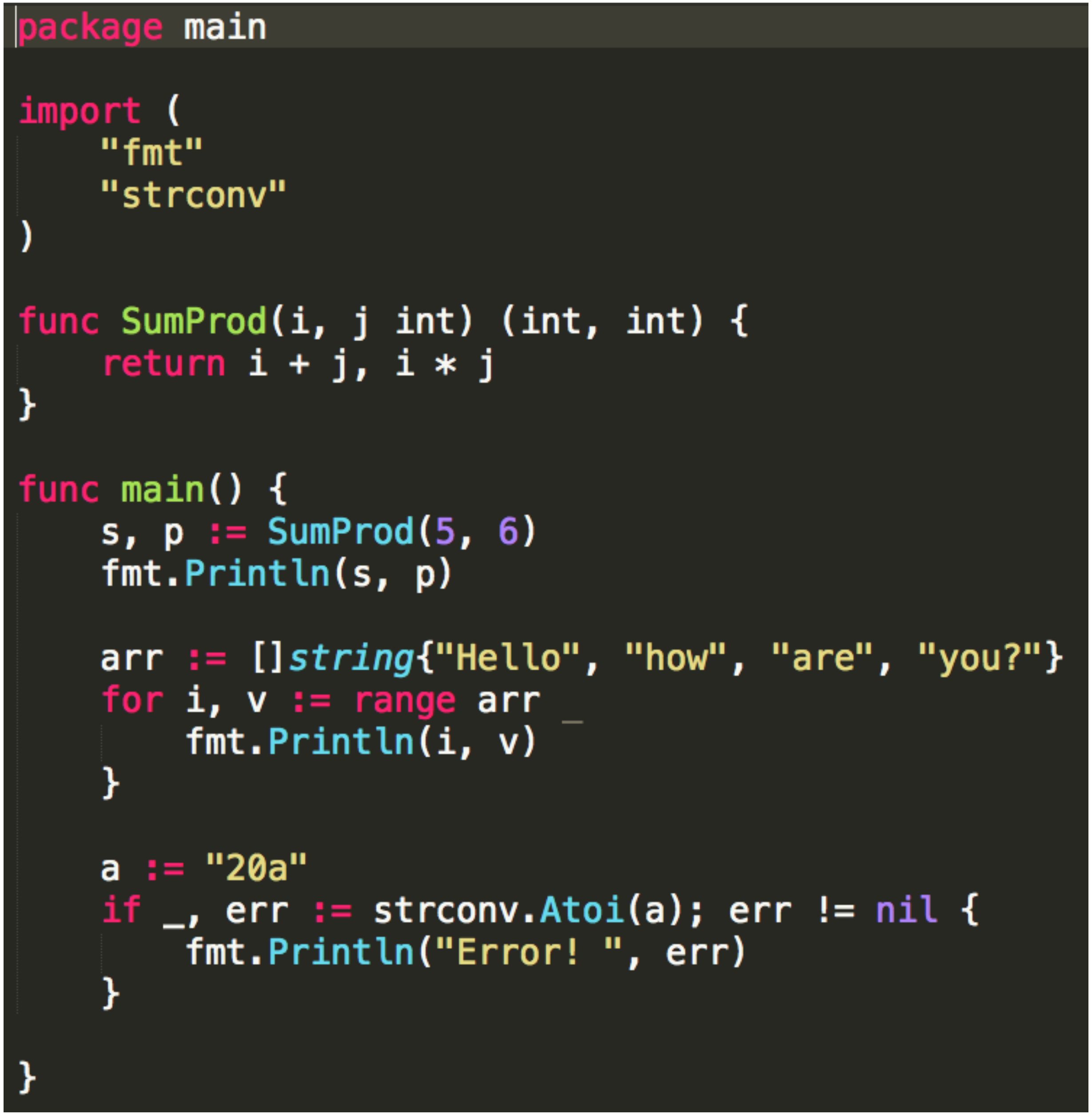
```go
package main
import "fmt"

type MyCar struct {
    speed int
}

func (m *MyCar) acc() {
    m.speed = m.speed + 10
}

func main() {
    m := MyCar{}
    fmt.Println(m)

    m.acc()
    fmt.Println(m)
}
```

Functions 'associated' with a type ... not physically in lexical scope of type.

Same dot notation to reach member methods.

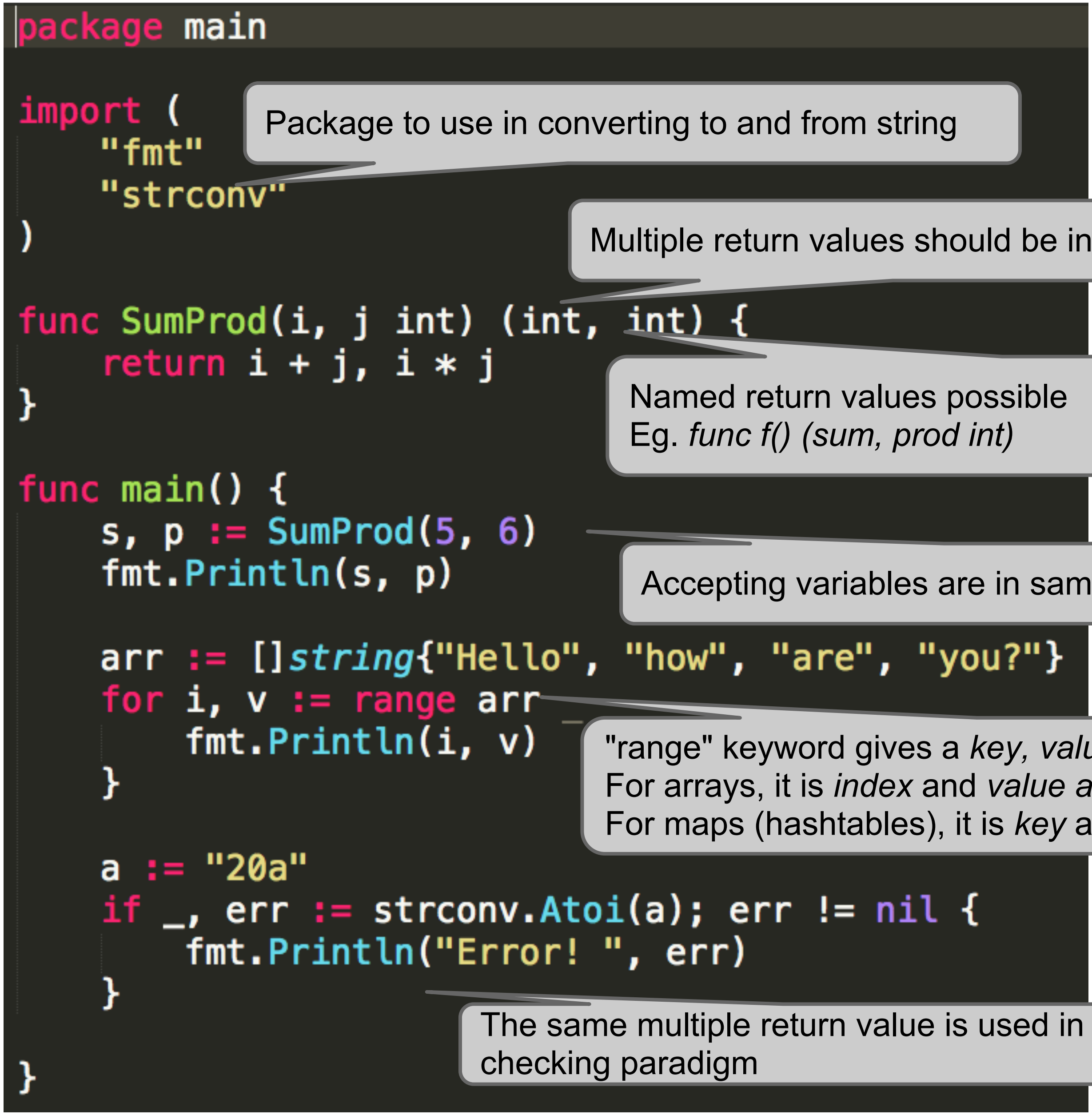
Pointers automatically resolved ... note that *acc()* requires a pointer to a MyCar instance.

7. multiple assignment,error handling



```go
package main

import (
    "fmt"
    "strconv"
)

func SumProd(i, j int) (int, int) {
    return i + j, i * j
}

func main() {
    s, p := SumProd(5, 6)
    fmt.Println(s, p)

    arr := []string{"Hello", "how", "are", "you?"}
    for i, v := range arr
        fmt.Println(i, v)
    }

    a := "20a"
    if _, err := strconv.Atoi(a); err != nil {
        fmt.Println("Error! ", err)
    }

}
```

multiple assignment,error handling



```
package main

import (
    "fmt"
    "strconv"
)

func SumProd(i, j int) (int, int) {
    return i + j, i * j
}

func main() {
    s, p := SumProd(5, 6)
    fmt.Println(s, p)

    arr := []string{"Hello", "how", "are", "you?"}
    for i, v := range arr
        fmt.Println(i, v)
    }

    a := "20a"
    if _, err := strconv.Atoi(a); err != nil {
        fmt.Println("Error! ", err)
    }
}
```

Package to use in converting to and from string

Multiple return values should be in parentheses

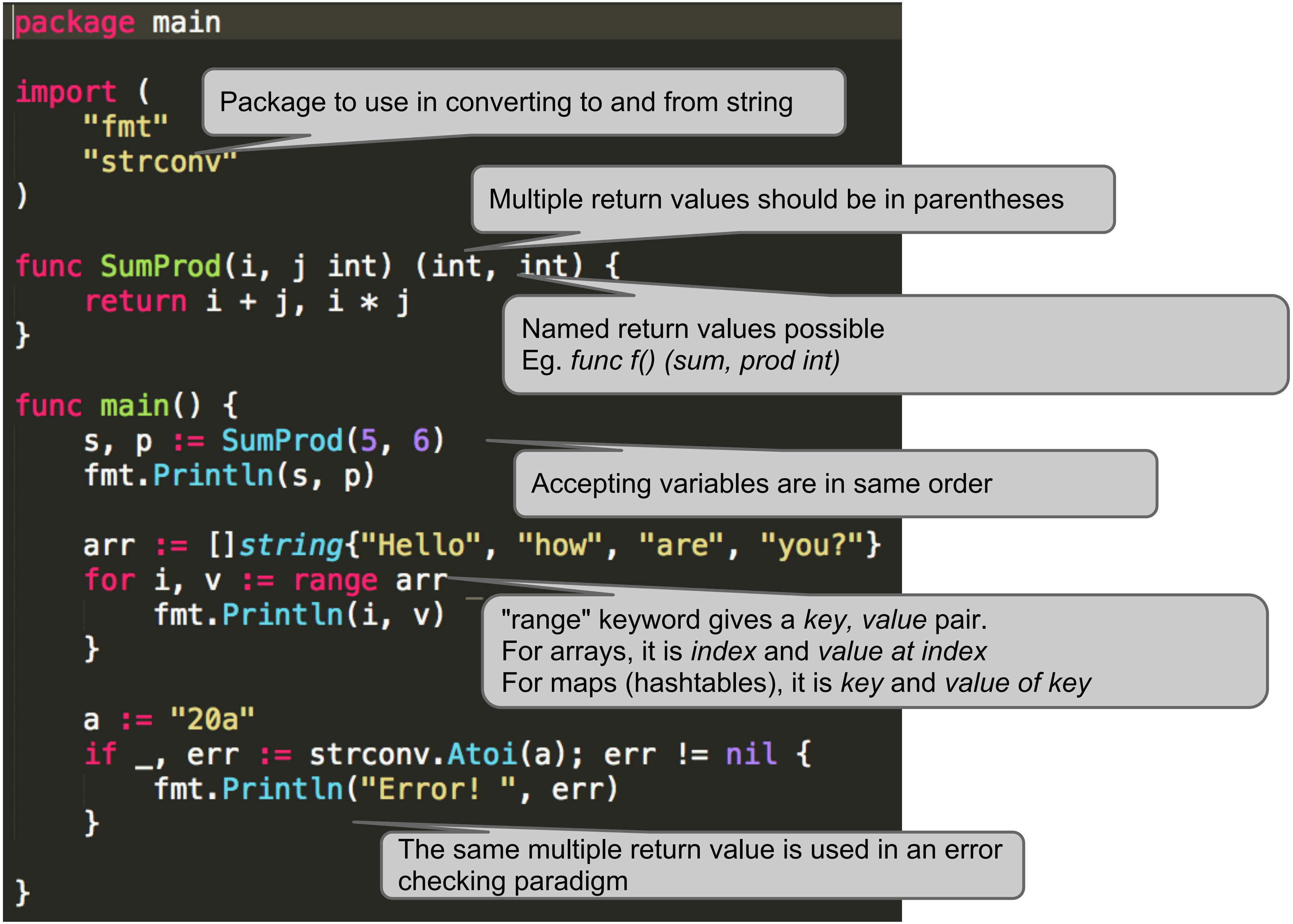
Named return values possible
Eg. *func f() (sum, prod int)*

Accepting variables are in same order

"range" keyword gives a *key, value* pair.
For arrays, it is *index* and *value at index*
For maps (hashtables), it is *key* and *value of key*

The same multiple return value is used in an error checking paradigm

8. Testing



```go
package main

import (
    "fmt"
    "strconv"
)

func SumProd(i, j int) (int, int) {
    return i + j, i * j
}

func main() {
    s, p := SumProd(5, 6)
    fmt.Println(s, p)

    arr := []string{"Hello", "how", "are", "you?"}
    for i, v := range arr {
        fmt.Println(i, v)
    }

    a := "20a"
    if _, err := strconv.Atoi(a); err != nil {
        fmt.Println("Error! ", err)
    }
}
```

Package to use in converting to and from string

Multiple return values should be in parentheses

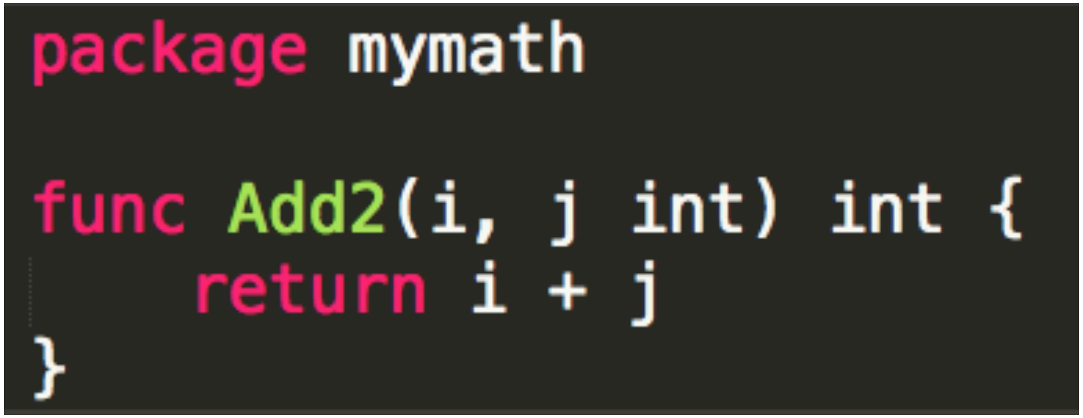
Named return values possible
Eg. *func f() (sum, prod int)*

Accepting variables are in same order

"range" keyword gives a *key, value* pair.
For arrays, it is *index* and *value at index*
For maps (hashtables), it is *key* and *value of key*

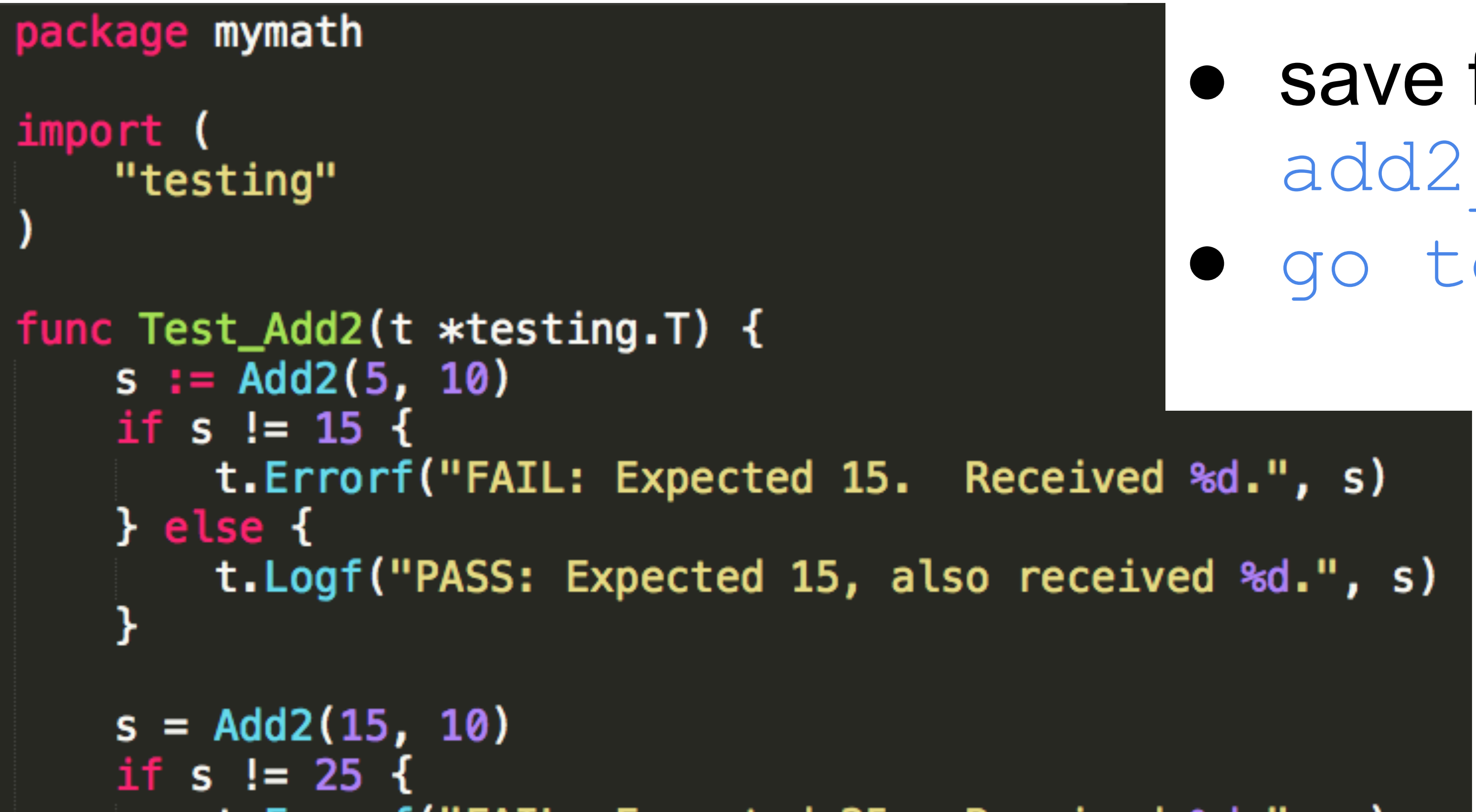
The same multiple return value is used in an error checking paradigm

8. Testing



```go
package mymath

func Add2(i, j int) int {
    return i + j
}
```

- create dir `mymath`
- save file as `add2.go`



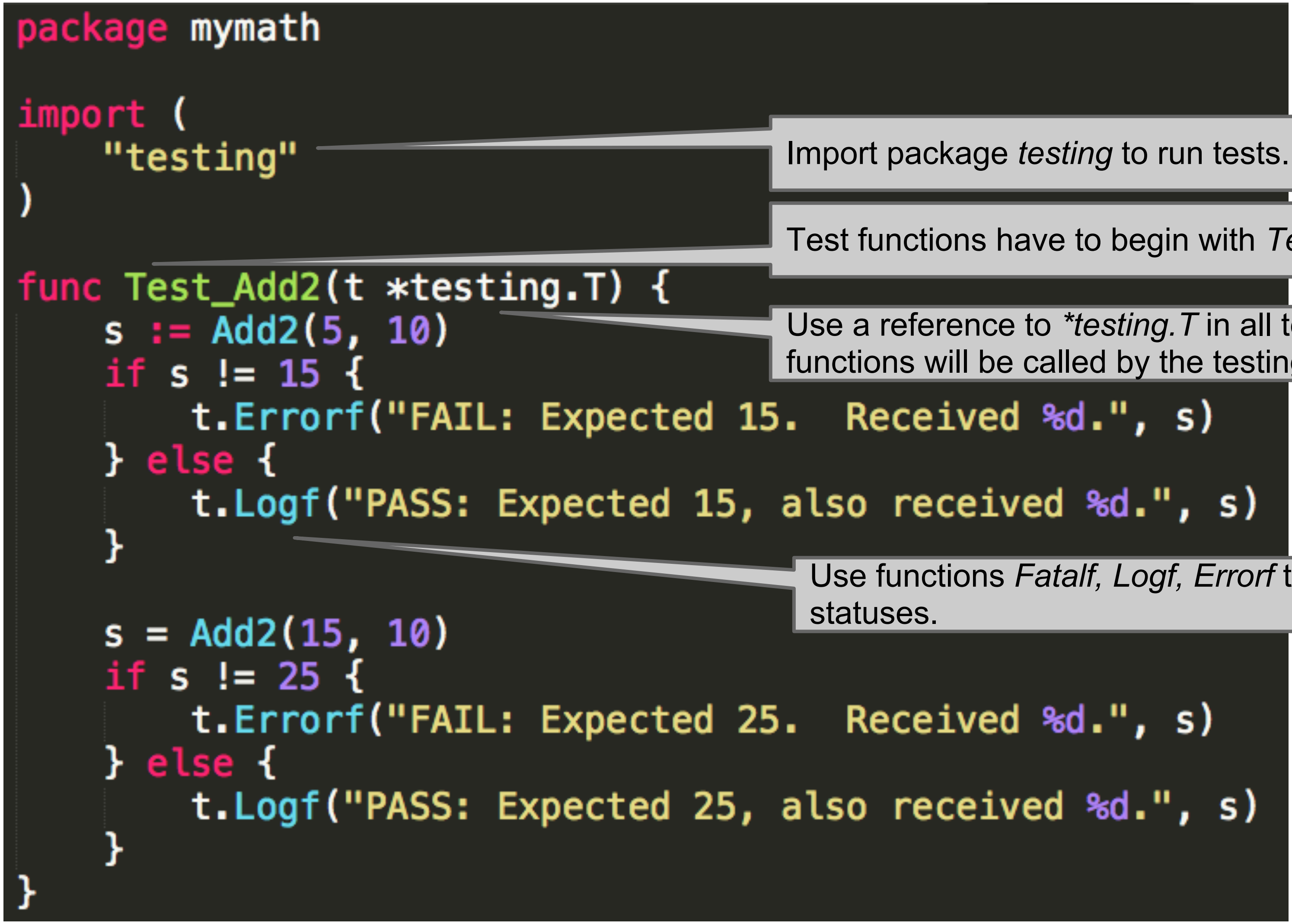
```go
package mymath

import (
    "testing"
)

func Test_Add2(t *testing.T) {
    s := Add2(5, 10)
    if s != 15 {
        t.Errorf("FAIL: Expected 15.  Received %d.", s)
    } else {
        t.Logf("PASS: Expected 15, also received %d.", s)
    }

    s = Add2(15, 10)
    if s != 25 {
```

- save file as `add2_test.go`
- `go test`

8. Testing

add2_test.go

File has to end in *_test.go*



```go
package mymath

import (
    "testing"
)

func Test_Add2(t *testing.T) {
    s := Add2(5, 10)
    if s != 15 {
        t.Errorf("FAIL: Expected 15.  Received %d.", s)
    } else {
        t.Logf("PASS: Expected 15, also received %d.", s)
    }

    s = Add2(15, 10)
    if s != 25 {
        t.Errorf("FAIL: Expected 25.  Received %d.", s)
    } else {
        t.Logf("PASS: Expected 25, also received %d.", s)
    }
}
```

Import package *testing* to run tests.

Test functions have to begin with *Test_*

Use a reference to **testing.T* in all tests. These functions will be called by the testing framework.

Use functions *Fatalf, Logf, Errorf* to report test statuses.

Questions

Thank You

Sathish VJ