

The Return of Vending Machine



Vending-machine



Vending Machine

Coin: TEN(10), Five(5), TWO(2), ONE(1)
T F TW 0

Item: Soft Drink(18),
Canned Coffee(12),
Drinking Water(7)

Coin Return: returns all inserted money

#Criteria

Unlimited items

Unlimited change

Currently inserted money



Vending-machine



1. Buy SD(soft drink) with exact change

Insert: T, F, TW, 0

Currently inserted money: 18

Choose: Select SD

Return: SD

2. Start adding change but hit coin return

Insert: T, T, F

Currently inserted money: 25

Choose: Coin Return

Return: T, T, F

3. Buy CC(canned coffee) without exact change

Insert: T, T

Currently inserted money: 20

Choose: Select CC

Return: CC, F, TW, 0



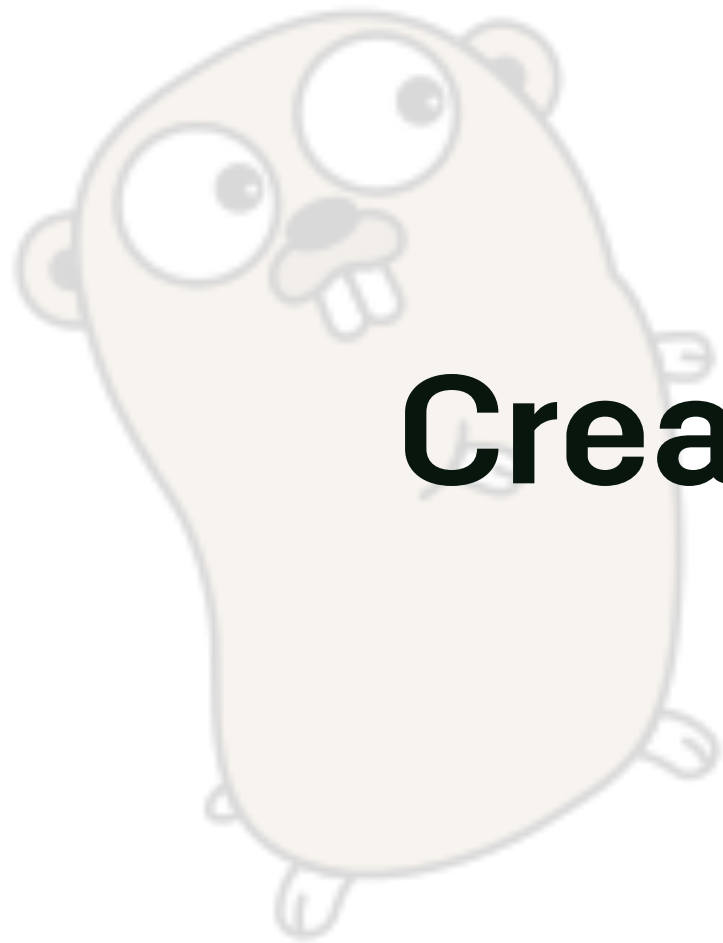
Vending-machine



List:

- [] when **vending machine** is created the **money** should be “**zero**”
- [] when we **adding coin** then we should know how much **money** we have added
- [] after **adding coins** with **exact change** when **select item** the output should show Item without change
- [] if we **adding coins without exact change** when **select item** the **output** should include change
- [] if we **adding coins** and choose “**Return Coin**” then the change should **equals** the value that we have added





Create vending machine



Vending-machine

[x] when vending machine is created the inserted money should be “zero”



```
type VendingMachine struct {  
}
```

```
func (m VendingMachine) InsertedMoney() int {  
    return 0  
}
```

```
func main() {  
    vm := VendingMachine{}  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 0  
}
```





Add coin

GO



Vending-machine

[] when we adding coin then we should know how much money we have added



```
func (m VendingMachine) InsertedMoney() int {  
    return 10  
}
```

```
func (m *VendingMachine) InsertCoin(coin string) {  
}
```

```
func main() {  
    vm := VendingMachine{}  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 0  
    vm.InsertCoin("T")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 10  
}
```





We do hard code to make it work.

Is it right?



Vending-machine

[] when we adding coin then we should know how much money we have added



```
type VendingMachine struct {  
    insertedMoney int  
}
```

```
func (m VendingMachine) InsertedMoney() int {  
    return m.insertedMoney  
}
```

```
func (m *VendingMachine) InsertCoin(coin string) {  
    m.insertedMoney = 10  
}
```

```
func main() {  
    vm := VendingMachine{}  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 0  
    vm.InsertCoin("T")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 10  
}
```





Add other coins

GO



Vending-machine

[] when we adding coin then we should know how much money we have added



```
func (m *VendingMachine) InsertCoin(coin string) {  
    if coin == "T" {  
        m.insertedMoney += 10  
    }  
    if coin == "F" {  
        m.insertedMoney += 5  
    }  
}
```

```
func main() {  
    vm := VendingMachine{}  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 0  
    vm.InsertCoin("T")  
    vm.InsertCoin("F")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 15  
}
```



Vending-machine

[] when we adding coin then we should know how much money we have added



```
func (m *VendingMachine) InsertCoin(coin string) {  
    if coin == "T" {  
        m.insertedMoney += 10  
    }  
    if coin == "F" {  
        m.insertedMoney += 5  
    }  
    if coin == "TW" {  
        m.insertedMoney += 2  
    }  
}
```

```
func main() {  
    vm := VendingMachine{}  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 0  
    vm.InsertCoin("T")  
    vm.InsertCoin("F")  
    vm.InsertCoin("TW")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 17  
}
```





Have you seen the pattern?
[Key : Value]



Vending-machine

[] when we adding coin then we should know how much money we have added



```
type VendingMachine struct {
    insertedMoney int
    coins         map[string]int
}

func (m *VendingMachine) InsertCoin(coin string) {
    m.insertedMoney += m.coins[coin]
}

func main() {
    vm := VendingMachine{}
    fmt.Println("Inserted Money:", vm.InsertedMoney())
    // Inserted Money: 0
    vm.InsertCoin("T")
    vm.InsertCoin("F")
    vm.InsertCoin("TW")
    fmt.Println("Inserted Money:", vm.InsertedMoney())
    // Inserted Money: 17
}
```





**What's happen?
nil**

GO



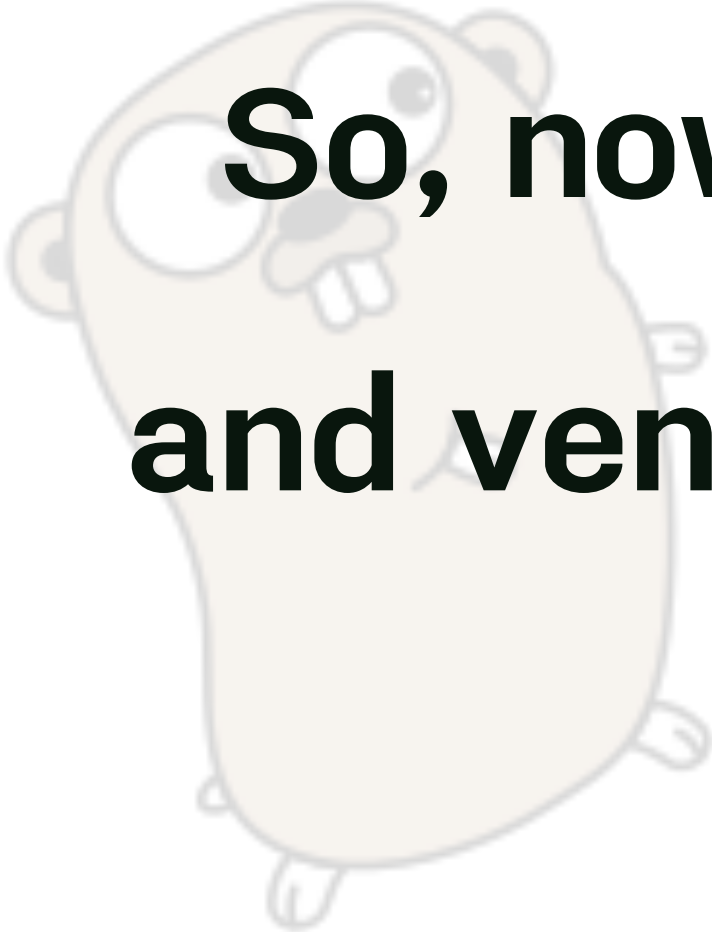
Vending-machine

[x] when we adding coin then we should know how much money we have added



```
type VendingMachine struct {  
    insertedMoney int  
    coins         map[string]int  
}  
  
func (m *VendingMachine) InsertCoin(coin string) {  
    m.insertedMoney += m.coins[coin]  
}  
  
func main() {  
    var coins = map[string]int{"T": 10, "F": 5,  
                               "TW": 2, "O": 1}  
    vm := VendingMachine{coins: coins}  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 0  
    vm.InsertCoin("T")  
    vm.InsertCoin("F")  
    vm.InsertCoin("TW")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 17  
}
```





**So, now we can add any coin
and vending machine can show
inserted money**





Buy Item with exact change



Vending-machine

[] after **adding coins** with **exact change** when **select item** the output should show Item without change



```
func (m *VendingMachine) SelectSD() string {  
    return "SD"  
}
```

```
func main() {  
    var coins = map[string]int{"T": 10, "F": 5,  
                               "TW": 2, "O": 1}  
    vm := VendingMachine{coins: coins}  
    vm.InsertCoin("T")  
    vm.InsertCoin("F")  
    vm.InsertCoin("TW")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 17  
    can := vm.SelectSD()  
    fmt.Println(can) // SD  
}
```



Vending-machine

[] after **adding coins** with **exact change** when **select item** the output should show Item without change



```
func (m *VendingMachine) SelectSD() string {  
    return "SD"  
}  
  
func (m *VendingMachine) SelectCC() string {  
    return "CC"  
}  
  
func main() {  
    ...  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 17  
    can = vm.SelectSD()  
    fmt.Println(can) // SD  
    vm.InsertCoin("T")  
    vm.InsertCoin("TW")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 12  
    can = vm.SelectCC()  
    fmt.Println(can) // CC  
}
```





Vending-machine

[x] after **adding coins** with **exact change** when **select item** the output should show Item without change



```
func (m *VendingMachine) SelectSD() string {  
    m.insertedMoney = 0  
    return "SD"  
}
```

```
func (m *VendingMachine) SelectCC() string {  
    m.insertedMoney = 0  
    return "CC"  
}
```

```
func main() {  
    ...  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 17  
    can = vm.SelectSD()  
    fmt.Println(can) // SD  
    vm.InsertCoin("T")  
    vm.InsertCoin("TW")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // Inserted Money: 12  
    can = vm.SelectCC()  
    fmt.Println(can) // CC  
}
```





Implement select DW (Drinking Water)



**Moving on: Buy item
without exact change**



Vending-machine

[] if we adding coins without exact change when select item the output should include change



```
func main() {  
    ...  
    vm.InsertCoin("T")  
    vm.InsertCoin("T")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // 20  
    can = vm.SelectCC()  
    fmt.Println(can) // CC, F, TW, 0  
}
```



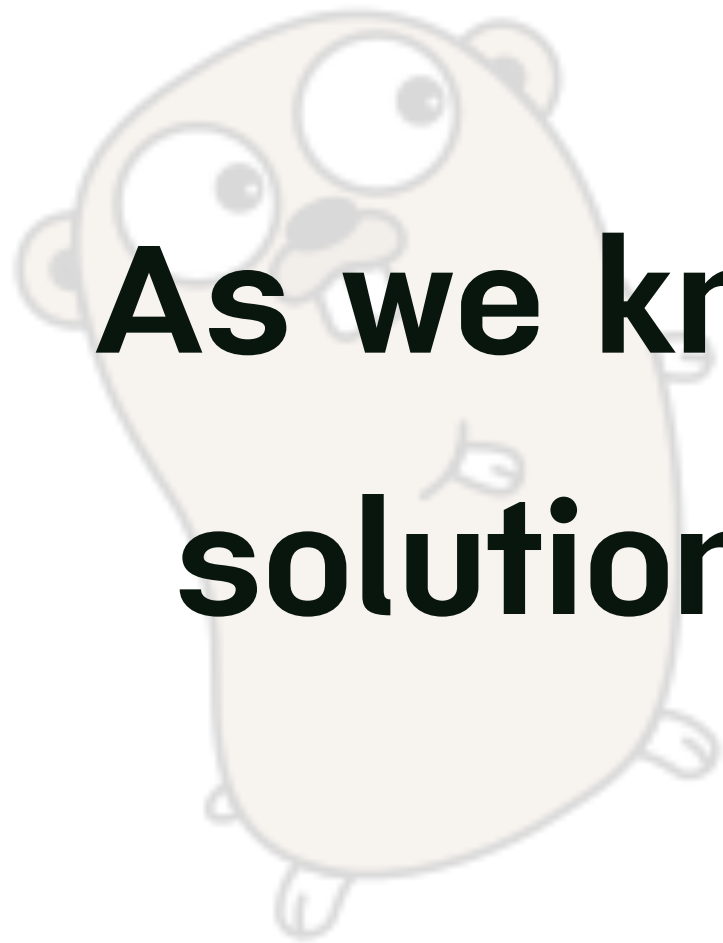
Vending-machine

[] if we adding coins without exact change when select item the output should include change



```
func (m *VendingMachine) SelectCC() string {  
    m.insertedMoney = 0  
    return "CC" + ", F, TW, 0"  
}  
  
func main() {  
    ...  
    vm.InsertCoin("T")  
    vm.InsertCoin("T")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // 20  
    can = vm.SelectCC()  
    fmt.Println(can) // CC, F, TW, 0  
}
```





**As we know hard code is not the
solution to solve this problem.**



?

What can I do?

Let's start with problem.

- We want to show coins that represent the **change**
- We want to know the change after **select item**
- We want to know the **item price**



Vending-machine

[] if we adding coins without exact change when select item the output should include change



```
func (m *VendingMachine) SelectCC() string {  
    price := 12  
    change := m.insertedMoney - price  
    return "CC" + m.change(change)  
}  
  
func (m VendingMachine) change(c int) (change string) {  
    return ", F, TW, 0"  
}  
  
func main() {  
    ...  
    vm.InsertCoin("T")  
    vm.InsertCoin("T")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // 20  
    can = vm.SelectCC()  
    fmt.Println(can) // CC, F, TW, 0  
}
```



Things we have done.

[x] design method that represent the **change**

[x] the change after select item

[] want to know the **item price**.

How come the magic number “12”?



Vending-machine

[] if we adding coins without exact change when select item the output should include change



```
func (m *VendingMachine) SelectSD() string {  
    price := 18  
    change := m.insertedMoney - price  
    return "SD" + m.change(change)  
}
```

```
func (m *VendingMachine) SelectCC() string {  
    price := 12  
    change := m.insertedMoney - price  
    return "CC" + m.change(change)  
}
```

```
func (m VendingMachine) change(c int) string {  
    if change == 0 {  
        return ""  
    }  
    return ", F, TW, 0"  
}
```





Have you seen the pattern?
[Key : Value]



Vending-machine

[] if we adding coins without exact change when select item the output should include change



```
type VendingMachine struct {
    insertedMoney int
    coins          map[string]int
    items          map[string]int
}

func (m *VendingMachine) SelectSD() string {
    price := m.items["SD"]
    change := m.insertedMoney - price
    return "SD" + m.change(change)
}

func (m *VendingMachine) SelectCC() string {
    price := m.items["CC"]
    change := m.insertedMoney - price
    return "CC" + m.change(change)
}

func main() {
    var coins = map[string]int{"T": 10, "F": 5,
                              "TW": 2, "O": 1}
    var items = map[string]int{"SD": 18, "CC": 12}
    vm := VendingMachine{coins: coins, items: items}
}
```



Things we have done.

[x] design method that represent the **change**

[x] the change after select item

[x] want to know the **item price**.

How come the magic number “12”?



Implement Vending Machine

Change method

- Adding coins: [T, T]
- Buy canned coffee: selectCC()
- Result should be “CC, F, TW, 0”

```
return "SD" + m.change(change)  
return "CC" + m.change(change)
```



Vending-machine

[] if we adding coins without exact change when select item the output should include change

c = 8, expected result = “, F, TW, 0”

c = 0, expected result = “”



```
func (m *VendingMachine) change(c int) string {  
    if c == 0 {  
        return ""  
    }  
    return “, F, TW, 0”  
}
```



It's work only case:

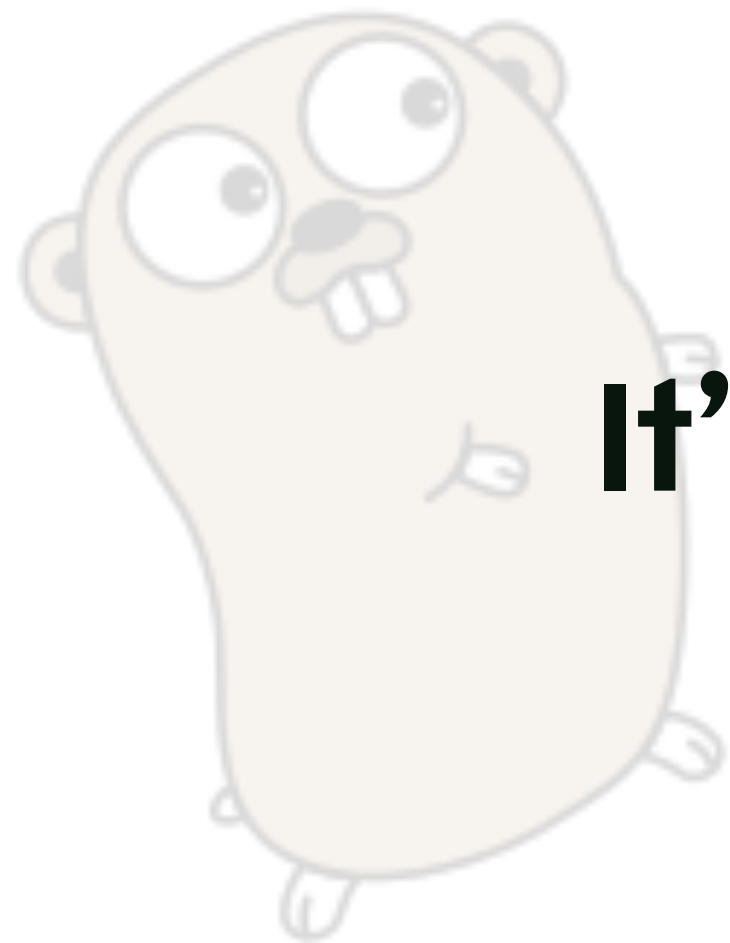
c = 8

c = 0

GO

But!!!! Hard code





It's time to refactor

GO



Vending-machine

c = 8, expected result = “, F, TW, 0”

c = 0, expected result = “”



```
func (m *VendingMachine) change(c int) string {  
    var str string  
    if c == 8 {  
        str += “, F, TW, 0”  
    }  
    return str  
}
```



Vending-machine

c = 8, expected result = “, F, TW, 0”

c = 0, expected result = “”



```
func (m *VendingMachine) change(c int) string {  
    var str string  
    if c >= 5 {  
        str += “, F”  
        c -= 5  
    }  
    if c >= 2 {  
        str += “, TW”  
        c -= 2  
    }  
    if c >= 1 {  
        str += “, 0”  
        c -= 1  
    }  
    return str  
}
```





Pattern?

GO



Vending-machine

c = 8, expected result = “, F, TW, 0”

c = 0, expected result = “”



```
func (m *VendingMachine) change(c int) string {  
    var str string  
    if c >= 5 {  
        str += “, F”  
        c -= 5  
    }  
    if c >= 2 {  
        str += “, TW”  
        c -= 2  
    }  
    if c >= 1 {  
        str += “, 0”  
        c -= 1  
    }  
    return str  
}
```



Vending-machine

c = 8, expected result = “, F, TW, 0”

c = 0, expected result = “”



```
func (m *VendingMachine) change(c int) string {  
    var str string  
    if c >= 5 {  
        str += “, F”  
        c -= 5  
    }  
    if c >= 2 {  
        str += “, TW”  
        c -= 2  
    }  
    if c >= 1 {  
        str += “, 0”  
        c -= 1  
    }  
    return str  
}
```



Vending-machine

c = 8, expected result = “, F, TW, 0”

c = 0, expected result = “”



```
func (m *VendingMachine) change(c int) string {  
    var str string  
    values := [...]int{10, 5, 2, 1}  
    if c >= values[0] {  
        str += “, F”  
        c -= values[0]  
    }  
    if c >= values[1] {  
        str += “, TW”  
        c -= values[1]  
    }  
    if c >= values[2] {  
        str += “, 0”  
        c -= values[2]  
    }  
    return str  
}
```



Vending-machine

c = 8, expected result = “, F, TW, 0”

c = 0, expected result = “”



```
func (m *VendingMachine) change(c int) string {  
    var str string  
    values := [...]int{10, 5, 2, 1}  
    coins := [...]string{"T", "F", "TW", "0"}  
    if c >= values[0] {  
        str += ", " + coins[0]  
        c -= values[0]  
    }  
    if c >= values[1] {  
        str += ", " + coins[1]  
        c -= values[1]  
    }  
    if c >= values[2] {  
        str += ", " + coins[2]  
        c -= values[2]  
    }  
    return str  
}
```



Vending-machine

c = 8, expected result = “, F, TW, 0”

c = 0, expected result = “”



```
func (m *VendingMachine) change(c int) string {  
    var str string  
    values := [...]int{10, 5, 2, 1}  
    coins := [...]string{"T", "F", "TW", "0"}  
  
    for i := 0; i < len(values); i++ {  
        if c >= values[i] {  
            str += ", " + coins[i]  
            c -= values[i]  
        }  
    }  
    if c >= values[1] {  
        str += ", " + coins[1]  
        c -= values[1]  
    }  
    if c >= values[2] {  
        str += ", " + coins[2]  
        c -= values[2]  
    }  
    return str  
}
```



Vending-machine

c = 8, expected result = “, F, TW, 0”

c = 0, expected result = “”



```
func (m *VendingMachine) change(c int) string {  
    var str string  
    values := [...]int{10, 5, 2, 1}  
    coins := [...]string{"T", "F", "TW", "0"}  
  
    for i := 0; i < len(values); i++ {  
        if c >= values[i] {  
            str += ", " + coins[i]  
            c -= values[i]  
        }  
    }  
    return str  
}
```



Vending-machine

[x] if we adding coins without exact change when select item the output should include change



```
func (m *VendingMachine) change(c int) string {  
    var str string  
    values := [...]int{10, 5, 2, 1}  
    coins := [...]string{"T", "F", "TW", "O"}  
  
    for i := 0; i < len(values); i++ {  
        if c >= values[i] {  
            str += "," + coins[i]  
            c -= values[i]  
        }  
    }  
    return str  
}
```





Return coins

GO



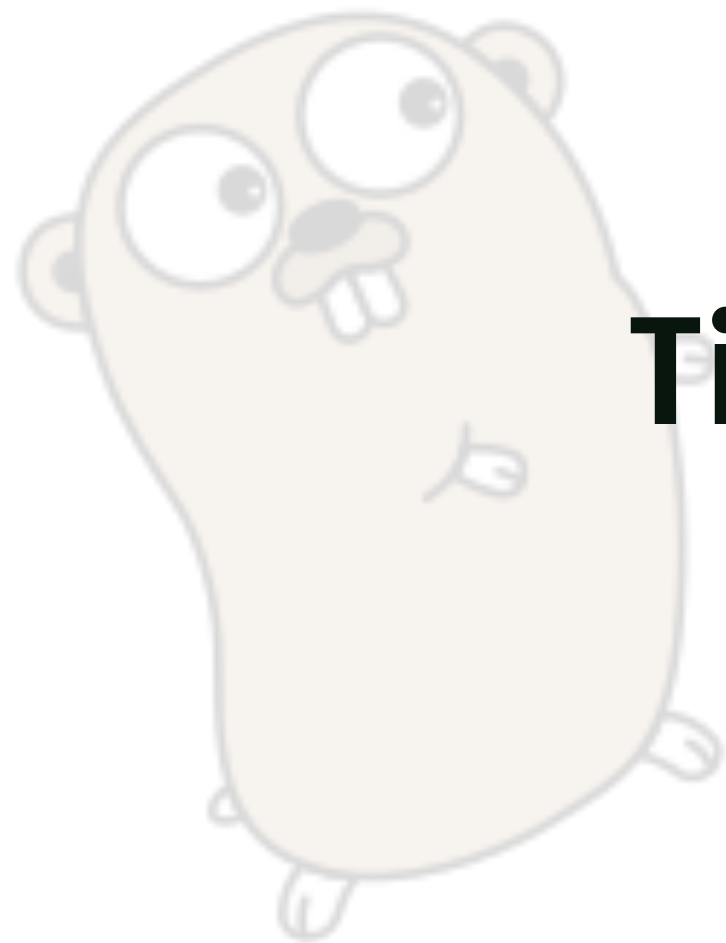
Vending-machine

[] if we **adding coins** and choose “**Return Coin**” then the change should **equals** the value that we have added



```
func (m *VendingMachine) CoinReturn() string {  
    return "T, T, F"  
}  
  
func main() {  
    ...  
    vm.InsertCoin("T")  
    vm.InsertCoin("T")  
    vm.InsertCoin("F")  
    fmt.Println("Inserted Money:", vm.InsertedMoney())  
    // 25  
    coin := vm.CoinReturn()  
    fmt.Println(coin) // T, T, F  
}
```





Time to implement

GO



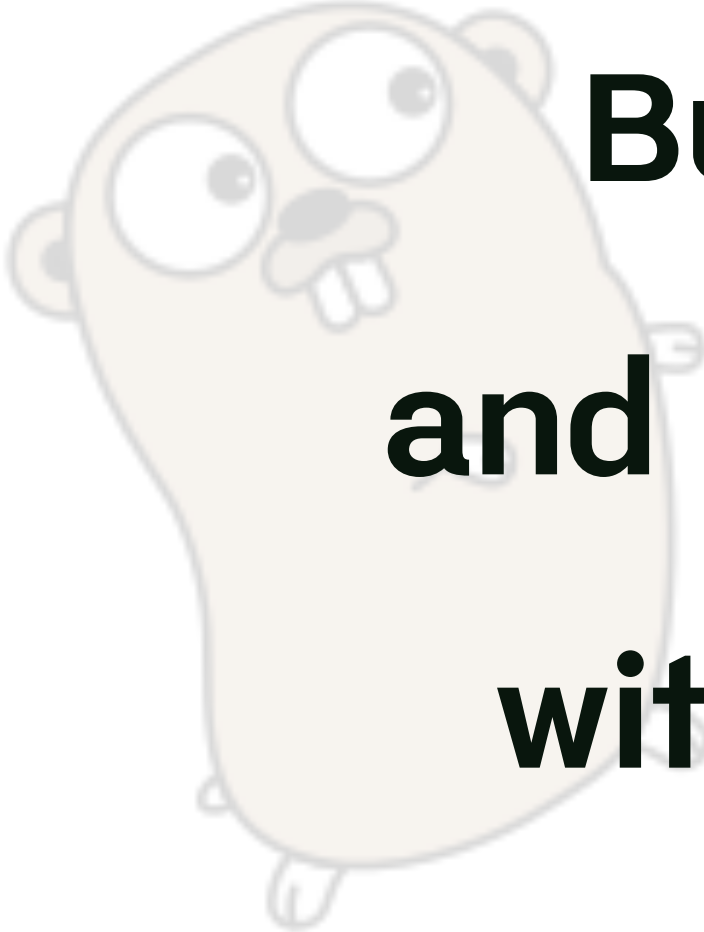
Vending-machine

[] if we **adding coins** and choose “**Return Coin**” then the change should **equals** the value that we have

```
func (vm *VendingMachine) CoinReturn() string {  
    coins := vm.change(vm.insertedMoney)  
    vm.insertedMoney = 0  
    return coins[2:len(coins)]  
}
```

```
func (m *VendingMachine) change(c int) string {  
    var str string  
    values := [...]int{10, 5, 2, 1}  
    coins := [...]string{"T", "F", "TW", "0"}  
  
    for i := 0; i < len(values); i++ {  
        if c >= values[i] {  
            str += ", " + coins[i]  
            c -= values[i]  
            i--  
        }  
    }  
    return str  
}
```





**Buy SD (Soft Drink)
and DW (Drinking Water)
without exact change**

