Slices in Go

This section explains the concept of slices in Go and its details such as slicing, appending slices, nil slices and finding slice length

WE'LL COVER THE FOLLOWING

- Slices
- Slicing a slice
  - Syntax
  - Making slices
  - Appending to a slice
- Length
  - Nil slices
- Resources

Slices

Slices wrap arrays to give a more general, powerful, and convenient interface to sequences of data. Except for items with an explicit dimension such as *transformation matrices*, most array programming in Go is done with slices rather than simple arrays.

Slices hold references to an underlying array, and if you assign one slice to another, both refer to the same array. If a function takes a slice argument, changes it makes to the elements of the slice will be visible to the caller, analogous to passing a pointer to the underlying array.

A slice points to an array of values and also includes a length. Slices can be resized since they are just a wrapper on top of another data structure.

`[]T` is a slice with elements of type `T`.

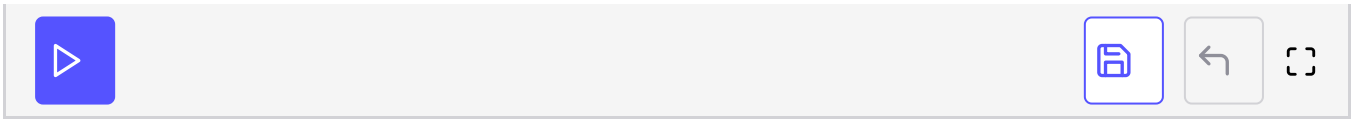
Environment Variables

Key:	Value:
GOPATH	/go

```
package main

import "fmt"

func main() {
    p := []int{2, 3, 5, 7, 11, 13}
    fmt.Println(p)
    // [2 3 5 7 11 13]
}
```



Slicing a slice

Slices can be re-sliced, creating a new slice value that points to the same array.

Syntax

```
s[lo:hi]
```

evaluates to a slice of the elements from `lo` through `hi-1`, inclusive. Thus

```
s[lo:lo]
```

is empty and

```
s[lo:lo+1]
```

has one element.

Note: `lo` and `hi` would be integers representing indexes.

Environment Variables

Key:	Value:
GOPATH	/go

```
package main
```

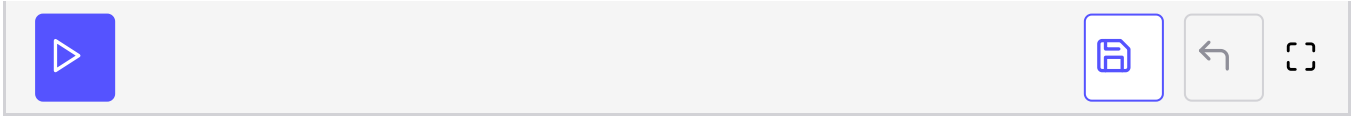
```
import "fmt"

func main() {
        mySlice := []int{2, 3, 5, 7, 11, 13}
        fmt.Println(mySlice)
        // [2 3 5 7 11 13]

        fmt.Println(mySlice[1:4])
        // [3 5 7]

        // missing low index implies 0
        fmt.Println(mySlice[:3])
        // [2 3 5]

        // missing high index implies len(s)
        fmt.Println(mySlice[4:])
        // [11 13]
}
```



Let's take a look at another example below:

Environment Variables

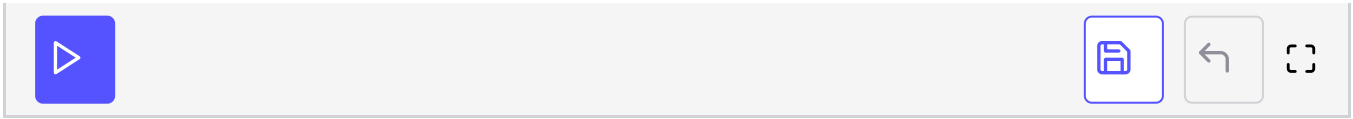
Key:	Value:
GOPATH	/go

```
package main
import "fmt"

func main() {
        names := [4]string{
                "John",
                "Paul",
                "George",
                "Ringo",
        }
        fmt.Println(names)

        a := names[0:2]    //slice a
        b := names[1:3]      //slice b
        fmt.Println(a, b)

        b[0] = "XXX"      // value at zeroth index of slice b changed
        fmt.Println(a, b)
        fmt.Println(names)
}
```



In the code above two slices, `a` and `b` are made. With `a` containing elements

at the index **0** and **1** of the array and `b` containing the elements at index **1** and **2** of the array.

Making slices

Besides creating slices by passing the values right away (slice literal), you can also use `make`. You create an empty slice of a specific length and then populate each entry:

It works by allocating a zeroed array and returning a slice that refers to that array.

Appending to a slice

Note however, that you would get a runtime error if you were to do that:

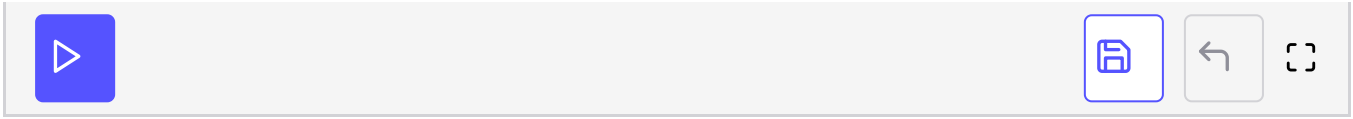
```
cities := []string{}
cities[0] = "Santa Monica"
```

As explained above, a slice is seating on top of an array, in this case, the array is empty and the slice can't set a value in the referred array. There is a way to do that though, and that is by using the `append` function:

```
package main

import "fmt"
```

```
func main() {
        cities := []string{}
        cities = append(cities, "San Diego")
        fmt.Println(cities)
        // [San Diego]
}
```

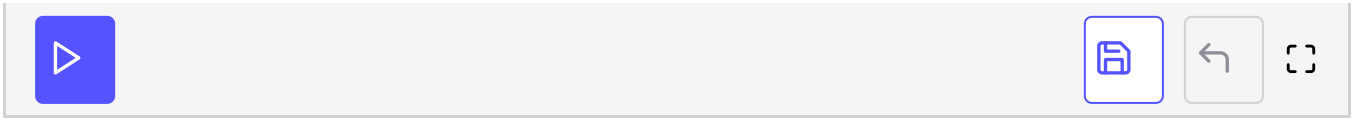


You can append more than one entry to a slice:

```
package main

import "fmt"

func main() {
        cities := []string{}
        cities = append(cities, "San Diego", "Mountain View")
        fmt.Printf("%q", cities)
        // ["San Diego" "Mountain View"]
}
```

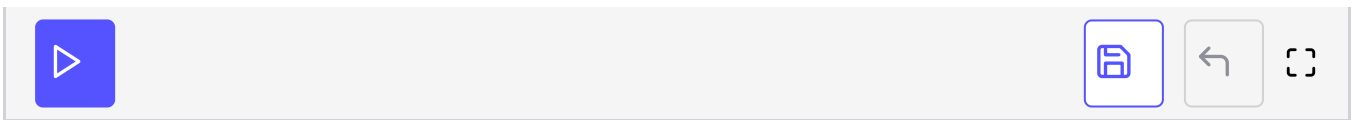


And you can also append a slice to another using an ellipsis:

```
package main

import "fmt"

func main() {
        cities := []string{"San Diego", "Mountain View"}
        otherCities := []string{"Santa Monica", "Venice"}
        cities = append(cities, otherCities...)
        fmt.Printf("%q", cities)
        // ["San Diego" "Mountain View" "Santa Monica" "Venice"]
}
```



Note that the ellipsis is a built-in feature of the language that means that the element is a collection. We can't append an element of type slice of strings (`[]string`) to a slice of strings, only strings can be appended. However, using the ellipsis (`...`) after our slice, we indicate that we want to append each element of our slice. Because we are appending strings from another slice, the

compiler will accept the operation since the types are matching.

You obviously can't append a slice of type `[]int` to another slice of type `[]string`.

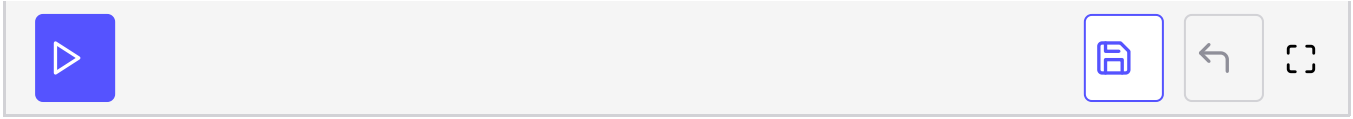
Length

At any time, you can check the length of a slice by using `len`:

```
package main

import "fmt"

func main() {
        cities := []string{
                "Santa Monica",
                "San Diego",
                "San Francisco",
        }
        fmt.Println(len(cities))
        // 3
        countries := make([]string, 42)
        fmt.Println(len(countries))
        // 42
}
```



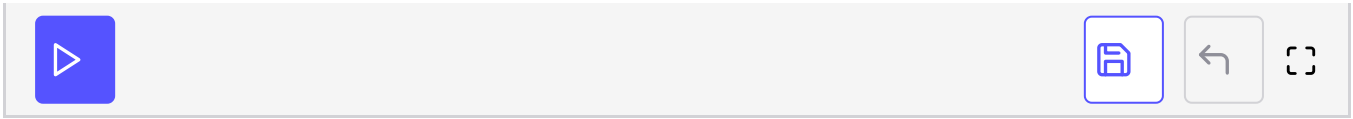
Nil slices

The zero value of a slice is nil. A nil slice has a *length* and *capacity* of **0**.

```
package main

import "fmt"

func main() {
    var z []int
    fmt.Println(z, len(z), cap(z))
    // [] 0 0
    if z == nil {
        fmt.Println("nil!")
    }
    // nil!
}
```



Resources

Resources

For more details about slices read the links below:

- Go slices, usage and internals
- Effective Go - slices
- Append function documentation
- Slice tricks
- Effective Go - slices
- Effective Go - two-dimensional slices
- Go by example - slices

Next lesson discusses *range* form of for loops for iterating over slices. Read on to find out more!