巨匠線上真人

iOS行動程式基礎開發上架

swift：泛型

本堂教學重點

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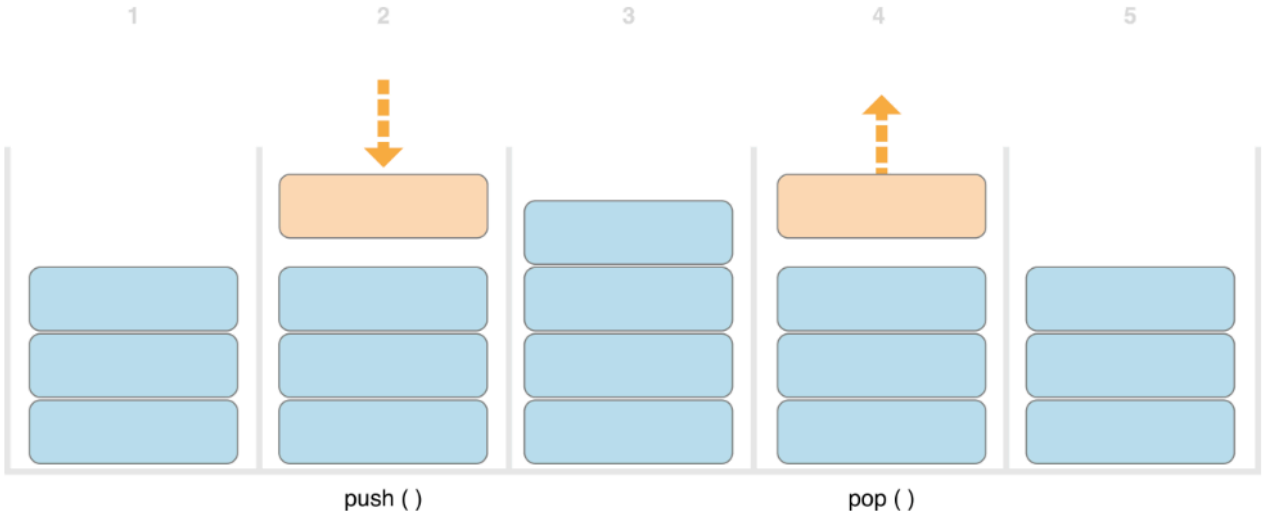
1.泛型解決的問題

```
func swapTwoInts(_ a: inout Int, _ b: inout Int) {
    let temporaryA = a
    a = b
    b = temporaryA
}
var someInt = 3
var anotherInt = 107
swapTwoInts(&someInt, &anotherInt)
print("someInt is now \(someInt), and anotherInt is now \(anotherInt)")


func swapTwoStrings(_ a: inout String, _ b: inout String) {
    let temporaryA = a
    a = b
    b = temporaryA
}

func swapTwoDoubles(_ a: inout Double, _ b: inout Double) {
    let temporaryA = a
    a = b
    b = temporaryA
}
```

2.泛型的function

```
func swapTwoValues<T>(_ a: inout T, _ b: inout T) {
    let temporaryA = a
    a = b
    b = temporaryA
}

func swapTwoInts(_ a: inout Int, _ b: inout Int)
func swapTwoValues<T>(_ a: inout T, _ b: inout T)


var someInt = 3
var anotherInt = 107
swapTwoValues(&someInt, &anotherInt)
// someInt is now 107, and anotherInt is now 3

var someString = "hello"
var anotherString = "world"
swapTwoValues(&someString, &anotherString)
// someString is now "world", and anotherString is now "hello"

```

3.泛型的類型



3.泛型的類型

```
struct IntStack {
    var items = [Int]()
    mutating func push(_ item: Int) {
        items.append(item)
    }
    mutating func pop() -> Int {
        return items.removeLast()
    }
}
```

```
struct Stack<Element> {
    var items = [Element]()
    mutating func push(_ item: Element) {
        items.append(item)
    }
    mutating func pop() -> Element {
        return items.removeLast()
    }
}
```

```
var stackOfStrings = Stack<String>()
stackOfStrings.push("uno")
stackOfStrings.push("dos")
stackOfStrings.push("tres")
stackOfStrings.push("cuatro")
```

4.擴充泛型

```
extension Stack {
    var topItem: Element? {
        return items.isEmpty ? nil : items[items.count - 1]
    }
}
```

```
if let topItem = stackOfStrings.topItem {
    print("The top item on the stack is \(topItem).")
}
```

5.類型限制

```
func someFunction<T: SomeClass, U: SomeProtocol>(someT: T, someU: U) {
    // function body goes here
}

func findIndex(ofString valueToFind: String, in array: [String]) -> Int? {
    for (index, value) in array.enumerated() {
        if value == valueToFind {
            return index
        }
    }
    return nil
}


let strings = ["cat", "dog", "llama", "parakeet", "terrapin"]
if let foundIndex = findIndex(ofString: "llama", in: strings) {
    print("The index of llama is \(foundIndex)")
}
// Prints "The index of llama is 2"
```

5.類型限制

```
func findIndex<T>(of valueToFind: T, in array:[T]) -> Int? {
    for (index, value) in array.enumerated() {
        if value == valueToFind {
            return index
        }
    }
    return nil
}

func findIndex<T: Equatable>(of valueToFind: T, in array:[T]) -> Int? {
    for (index, value) in array.enumerated() {
        if value == valueToFind {
            return index
        }
    }
    return nil
}
```

5.類型限制

```
let doubleIndex = findIndex(of: 9.3, in: [3.14159, 0.1, 0.25])
// doubleIndex is an optional Int with no value, because 9.3 isn't in the array
let stringIndex = findIndex(of: "Andrea", in: ["Mike", "Malcolm", "Andrea"])
// stringIndex is an optional Int containing a value of 2
```

6.關聯類型

```
protocol Container {
    associatedtype Item
    mutating func append(_ item: Item)
    var count: Int { get }
    subscript(i: Int) -> Item { get }
}
```

```
struct IntStack: Container {
    // original IntStack implementation
    var items = [Int]()
    mutating func push(_ item: Int) {
        items.append(item)
    }
    mutating func pop() -> Int {
        return items.removeLast()
    }
    // conformance to the Container protocol
    typealias Item = Int
    mutating func append(_ item: Int) {
        self.push(item)
    }
    var count: Int {
        return items.count
    }
    subscript(i: Int) -> Int {
        return items[i]
    }
}
```

6.關聯類型

```
struct Stack<Element>: Container {
    // original Stack<Element> implementation
    var items = [Element]()
    mutating func push(_ item: Element) {
        items.append(item)
    }
    mutating func pop() -> Element {
        return items.removeLast()
    }
    // conformance to the Container protocol
    mutating func append(_ item: Element) {
        self.push(item)
    }
    var count: Int {
        return items.count
    }
    subscript(i: Int) -> Element {
        return items[i]
    }
}
```