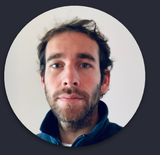
SORBONNE UNIVERSITÉ

Introduction to iOS development with Swift

Lesson 1



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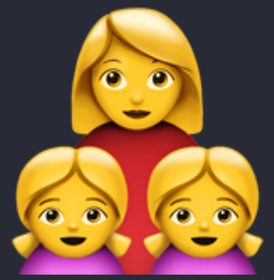
- → Classes and inheritance
- → Collections
- → Loops
- → Optionals
- → Type Casting and Inspection
- → Guard
- → Constant and Variable Scope
- → Closures

Classes and inheritance



```
class Person {
  let name: String

  init(name: String) {
    self.name = name
  }

  func sayHello() {
    print("Hello there!")
  }
}

let person = Person(name: "Jasmine")
print(person.name)
person.sayHello()
```

Inheritance

- Base class: `Vehicle`
- Subclass: `Tandem`
- Superclass: `Bicycle`

Inheritance

```
class Vehicle {
    var currentSpeed = 0.0

    var description: String {
        return "traveling at \(currentSpeed) km per hour"
    }

    func makeNoise() {
        // do nothing - a vehicle doesn't necessarily make noise
    }
}
```

Subclass

```
class SomeSubclass: SomeSuperclass {
    // subclass definition goes here
}
```

```
class Bicycle: Vehicle {
    var hasBasket = false
}
```

Subclass

```
class Tandem: Bicycle {
    var currentNumberOfPassengers = 0
}
```

Override methods

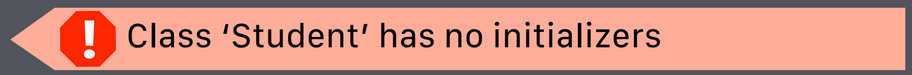
```
class Train: Vehicle {
    override func makeNoise() {
        print("Choo Choo!")
    }
}
```

Override computed properties

```
class Car: Vehicle {
    var gear = 1
    override var description: String {
        return super.description + " in gear \(gear)"
    }
}
```

Override init

```
class Person {
  let name: String

  init(name: String) {
    self.name = name
  }
}

class Student: Person {
  var favoriteSubject: String
}
```



```
class Person {
  let name: String

  init(name: String) {
    self.name = name
  }
}

class Student: Person {
  var favoriteSubject: String

  init(name: String, favoriteSubject: String) {
    self.favoriteSubject = favoriteSubject
    super.init(name: name)
  }
}
```

References

- **When you create an instance of a class:**
  - Swift returns the address of that instance
  - The returned address is assigned to the variable
- **When you assign the address of an instance to multiple variables:**
  - Each variable contains the same address
  - Update one instance, and all variables refer to the updated instance

```
class Person {
  let name: String
  var age: Int

  init(name: String, age: Int) {
    self.name = name
    self.age = age
  }
}

var jack = Person(name: "Jack", age: 24)
var myFriend = jack

jack.age += 1

print(jack.age) // 25
print(myFriend.age) // 25
```

```
struct Person {
  let name: String
  var age: Int
}

var jack = Person(name: "Jack", age: 24)
var myFriend = jack

jack.age += 1

print(jack.age) // 25
print(myFriend.age) // 24
```

Memberwise initializers

- Swift does not create memberwise initializers for classes
- Common practice is for developers to create their own for their defined classes

Class or structure?

- Start new types as structures
- Use a class:
  - When you're working with a framework that uses classes
  - When you want to refer to the same instance of a type in multiple places
  - When you want to model inheritance

Collections

Collection types

Arrays

```
[value1, value2, value3]
```

```
var names: [String] = ["Anne", "Gary", "Keith"]
```

Arrays

```
[value1, value2, value3]
```

```
var names = ["Anne", "Gary", "Keith"]
```

```
var numbers = [1, -3, 50, 72, -95, 115]
```

Arrays

```
[value1, value2, value3]
```

```
var names = ["Anne", "Gary", "Keith"]
```

```
var numbers: [Double] = [1, -3, 50, 72, -95, 115]
```

Arrays — contains

```
let numbers = [4, 5, 6]
if numbers.contains(5) {
  print("There is a 5")
}
```

Arrays types

```
var myArray: [Int] = []
var myArray: Array<Int> = []
var myArray = [Int]()
```

Working with arrays

```
var myArray = [Int](repeating: 0, count: 100)
let count = myArray.count
if myArray.isEmpty { }
```

Working with arrays

```
var names = ["Anne", "Gary", "Keith"]
let firstName = names[0]
print(firstName) // Anne
```

```
names[1] = "Paul"
print(names) // ["Anne", "Paul", "Keith"]
```

Working with arrays

```
var names = ["Amy"]
names.append("Joe")
names += ["Keith", "Jane"]
print(names) // ["Amy", "Joe", "Keith", "Jane"]
```

Working with arrays

```
var names = ["Amy", "Brad", "Chelsea", "Dan"]
names.insert("Bob", at: 0)
print(names) // ["Bob", "Amy", "Brad", "Chelsea", "Dan"]
```

Working with arrays

```
var names = ["Amy", "Brad", "Chelsea", "Dan"]
let chelsea = names.remove(at:2)
let dan = names.removeLast()
print(names) // ["Amy", "Brad"]
```

```
names.removeAll()
print(names) // []
```

Working with arrays

```
var myNewArray = firstArray + secondArray
```

Dictionaries

```
[key1: value1, key2: value2, key3: value3]
```

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]
```

Dictionaries

```
var myDictionary = [String: Int]()
var myDictionary = Dictionary<String, Int>()
var myDictionary: [String: Int] = [:]
```

Add/remove/modify a dictionary

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]

scores["Oli"] = 399

let oldValue = scores.updateValue(100, forKey: "Richard")
```

Add/remove/modify a dictionary

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]

scores["Oli"] = 399

if let oldValue = scores.updateValue(100, forKey: "Richard") {
  print("Richard's old value was \(oldValue)")
}
```

Add/remove/modify a dictionary

```
var scores = ["Richard": 100, "Luke": 400, "Cheryl": 800]
scores["Richard"] = nil
print(scores) // ["Cheryl": 800, "Luke": 400]

if let oldValue = scores.removeValue(forKey: "Luke") {
  print("Luke's score was \(oldValue) before he stopped playing")
}
print(scores) // ["Cheryl": 800]
```

Accessing a dictionary

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]

let players = Array(scores.keys) // ["Richard", "Luke", "Cheryl"]
let points = Array(scores.values) // [500, 400, 800]

print(myScore)
if let myScore = scores["Luke"] {
  print(myScore)
}
```

Accessing a dictionary

```
var scores = ["Richard": 500, "Luke": 400, "Cheryl": 800]

let players = Array(scores.keys) // ["Richard", "Luke", "Cheryl"]
let points = Array(scores.values) // [500, 400, 800]

print(scores["Luke"]) // Optional(400)
if let myScore = scores["Luke"] {
  print(myScore) // 400
}
```

Loops

Loops

for loops

```
for index in 1...5 {
  print("This is number \(index)")
}
```

```
for _ in 1...5 {
  print("Hello!")
}
```

for loops

```
let names = ["Joseph", "Cathy", "Winston"]
for name in names {
  print("Hello \(name)")
}
```

```
for letter in "ABCDEFG".characters {
  print("The letter is \(letter)")
}
```

for loops

```
for (index, letter) in "ABCDEFG".characters.enumerated() {
  print("\(index): \(letter)")
}
```

for loops

```
let vehicles = ["unicycle" : 1, "bicycle" : 2, "tricycle" : 3]
for (vehicleName, wheelCount) in vehicles {
  print("A \(vehicleName) has \(wheelCount) wheels")
}
```

while loops

```
var numberOfLives = 3

while numberOfLives > 0 {
  playMove()
  updateLivesCount()
}
```

while loops

```
var numberOfLives = 3
var stillAlive = true

while stillAlive {
  print("I still have \(numberOfLives) lives.")
  numberOfLives -= 1
  if numberOfLives == 0 {
    stillAlive = false
  }
}
```

Optionals

nil

```
struct Book {
  let name: String
  let publicationYear: Int
}

let firstHarryPotter = Book(name: "Harry Potter and the
Sorcerer's Stone", publicationYear: 1997)
let secondHarryPotter = Book(name: "Harry Potter and the
Chamber of Secrets", publicationYear: 1998)

let books = [firstHarryPotter, secondHarryPotter]
```

nil

```
let unannouncedBook = Book(name: "Harry Potter 8",
                           publicationYear: ???)
```

nil

```
let unannouncedBook = Book(name: "Harry Potter 8",
                           publicationYear: 0)
```

nil

```
let unannouncedBook = Book(name: "Harry Potter 8",
                           publicationYear: 2019)
```

nil

```
let unannouncedBook = Book(name: "Harry Potter 8",
                           publicationYear: nil)
```

Nil is not compatible with expected argument type ‘Int’

```
struct Book {
  let name: String
  let publicationYear: Int?
}

let firstHarryPotter = Book(name: "Harry Potter and the
Sorcerer's Stone", publicationYear: 1997)
let secondHarryPotter = Book(name: "Harry Potter and the
Chamber of Secrets", publicationYear: 1998)

let books = [firstHarryPotter, secondHarryPotter]

let unannouncedBook = Book(name: "Rebels and Lions",
publicationYear: nil)
```

Specifying the type of an optional

```
var serverResponseCode: Int = 404
```

```
var serverResponseCode: Int = nil
```


```
var serverResponseCode: Int? = 404
```

```
var serverResponseCode: Int? = nil
```

Working with optional values

```
if publicationYear != nil {
  let actualYear = publicationYear!
  print(actualYear)
}

let unwrappedYear = publicationYear!
```

error: Execution was interrupted

Working with optional values

```
if let constantName = someOptional {
  //constantName has been safely unwrapped for use within {}
}
```

```
if let unwrappedPublicationYear = book.publicationYear {
  print("The book was published in \(unwrappedPublicationYear)")
} else {
  print("The book does not have an official publication date.")
}
```

Functions and optionals

```
let string = "123"
let possibleNumber = Int(string)
```

```
let string = "Cynthia"
let possibleNumber = Int(string)
```

Functions and optionals

```
func printFullName(firstName: String, middleName: String?,
lastName: String)
```

```
func textFromURL(url: URL) -> String?
```

Failable initializers

```
struct Toddler {
  var birthName: String
  var monthsOld: Int
}
```

Failable initializers

```
init?(birthName: String, monthsOld: Int) {
  if monthsOld < 12 || monthsOld > 36 {
    return nil
  } else {
    self.birthName = birthName
    self.monthsOld = monthsOld
  }
}
```

Failable initializers

```
let possibleToddler = Toddler(birthName: "Joanna", monthsOld: 14)
if let toddler = possibleToddler {
  print("\(toddler.birthName) is \(toddler.monthsOld) months old")
} else {
  print("The age you specified for the toddler is not between 1
and 3 yrs of age")
}
```

Optional chaining

```
class Person {
  var age: Int
  var residence: Residence?
}

class Residence {
  var address: Address?
}
```

```
class Address {
  var buildingNumber: String?
  var streetName: String?
  var apartmentNumber: String?
}
```

Optional chaining

```
if let theResidence = person.residence {
  if let theAddress = theResidence.address {
    if let theApartmentNumber = theAddress.apartmentNumber {
      print("He/she lives in apartment number
            \(theApartmentNumber). »)
    }
  }
}

if let apartmentNumber =
          person.residence?.address?.apartmentNumber
```

Implicitly Unwrapped Optionals

```
class ViewController: UIViewController {
  @IBOutlet weak var label: UILabel!
}
```

Unwraps automatically
Should only be used when need to initialize an object without supplying the value and you'll be giving the object a value soon afterwards

Type Casting and Inspection

```
func getClientPet() -> Animal {
  //returns the pet
}

let pet = getClientPet() //`pet` is of type `Animal`
```

```
if pet is Dog {
  print("The client's pet is a dog")
} else if pet is Cat {
  print("The client's pet is a cat")
} else if pet is Bird {
  print("The client's pet is a bird")
} else {
  print("The client has a very exotic pet")
}
```

```
let pets = allPets() //`pets` is of type `[Animal]`
var dogCount = 0, catCount = 0, birdCount = 0
for pet in pets {
  if pet is Dog {
    dogCount += 1
  } else if pet is Cat {
    catCount += 1
  } else if pet is Bird {
    birdCount += 1
  }
}
print("Brad looks after \(dogCount) dogs, \(catCount) cats,
and \(birdCount) birds.")
```

Type casting

```
func walk(dog: Dog) {
  print("Walking \(dog.name)")
}

func cleanLitterBox(cat: Cat) {. . .}

func cleanCage(bird: Bird) {. . .}

for pet in pets {
  if pet is Dog {
    walk(dog: pet) // Compiler error
  }
  …
}
```

Type casting

```
for pet in pets {
  if let dog = pet as? Dog {
    walk(dog: dog)
  } else if let cat = pet as? Cat {
    cleanLitterBox(cat: cat)
  } else if let bird = pet as? Bird {
    cleanCage(bird: bird)
  }
}
```

Any

```
var items: [Any] = [5, "Bill", 6.7, Dog()]
```

Any

```
var items: [Any] = [5, "Bill", 6.7, Dog()]
let firstItem = items[0]

if firstItem is Int {
  print("The first element is an integer")
} else if firstItem is String {
  print("The first element is a string")
} else {
  print("The first element is neither an integer nor a string")
}
```

Any

```
var items: [Any] = [5, "Bill", 6.7, Dog()]

if let firstItem = items[0] as? Int {
  print(firstItem + 4)
}
```

Guard

```
func singHappyBirthday() {
  if birthdayIsToday {
    if invitedGuests > 0 {
      if cakeCandlesLit {
        print("Happy Birthday to you!")
      } else {
        print("The cake candle's haven't been lit.")
      }
    } else {
      print("It's just a family party.")
    }
  } else {
    print("No one has a birthday today.")
  }
}
```

```
func singHappyBirthday() {
  guard birthdayIsToday else {
    print("No one has a birthday today.")
    return
  }
  guard invitedGuests > 0 else {
    print("It's just a family party.")
    return
  }
  guard cakeCandlesLit else {
    print("The cake's candles haven't been lit.")
    return
  }
  print("Happy Birthday to you!")
}
```

guard

```
guard condition else {
  //false: execute some code
}

//true: execute some code
```

guard

```
func divide(_ number: Double, by divisor: Double) {
  if divisor != 0.0 {
    let result = number / divisor
    print(result)
  }
}
```

```
func divide(_ number: Double, by divisor: Double) {
  guard divisor != 0.0 else { return }

  let result = number / divisor
  print(result)
}
```

```
func processBook(title: String?, price: Double?, pages: Int?) {
  if let theTitle = title, let thePrice = price, let thePages =
pages {
    print("\(theTitle) costs $\(thePrice) and has \(thePages)
pages.")
  }
}
```

```
func processBook(title: String?, price: Double?, pages: Int?){
  guard let theTitle = title, let thePrice = price, let
thePages = pages else { return }
  print("\(theTitle) costs $\(thePrice) and has \(thePages)
pages.")
}
```

Constant and Variable Scope

Scope

Global scope — Defined outside of a function
Local scope — Defined within braces ({})

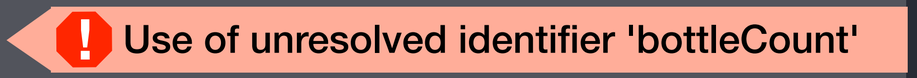
```
var globalVariable = true

if globalVariable {
  let localVariable = 7
}
```

Scope

```
var age = 55

func printMyAge() {
  print("My age: \(age)")
}

print(age)
printMyAge()
```

Scope

```
func printBottleCount() {
    let bottleCount = 99
    print(bottleCount)
}

printBottleCount()
print(bottleCount)
```



Scope

```
func printTenNames() {
  var name = "Richard"
  for index in 1...10 {
    print("\(index): \(name)")
  }
  print(index)
  print(name)
}

printTenNames()
```

Variable shadowing

```
let points = 100

for index in 1...3 {
  let points = 200
  print("Loop \(index): \(points+index)")
}
print(points)
```

Variable shadowing

```
var name: String? = "Robert"

if let name = name {
 print("My name is \(name)")
}
```

Variable shadowing

```
func exclaim(name: String?) {
  if let name = name {
    print("Exclaim function was passed: \(name)")
  }
}
```

```
func exclaim(name: String?) {
  guard let name = name else { return }
  print("Exclaim function was passed: \(name)")
}
```

Shadowing and initializers

```
struct Person {
  var name: String
  var age: Int
}

let todd = Person(name: "Todd", age: 50)
print(todd.name)
print(todd.age)
```

Shadowing and initializers

```
struct Person {
  var name: String
  var age: Int

  init(name: String, age: Int) {
    self.name = name
    self.age = age
  }
}
```

Closures

Closures

```
(firstTrack: Track, secondTrack: Track) -> Bool in
 return firstTrack.trackNumber < secondTrack.trackNumber
```

```
let sortedTracks = tracks.sorted (    )
```

Syntax

```
func sum(numbers: [Int]) -> Int {
  // Code that adds together the numbers array
  return total
}
```

```
let sumClosure = { (numbers: [Int]) -> Int in
  // Code that adds together the numbers array
  return total
}
```

```
let printClosure = { () -> Void in
  print("This closure does not take any parameters and does not
return a value.")
}

let printClosure = { (string: String) -> Void in
  print(string)
}

let randomNumberClosure = { () -> Int in
  // Code that returns a random number
}

let randomNumberClosure = { (minValue: Int, maxValue: Int) -> Int in
  // Code that returns a random number between `minValue` and
`maxValue`
}
```

Passing closures as arguments

```
let sortedTracks = tracks.sorted { (firstTrack: Track,
secondTrack: Track) -> Bool in
  return firstTrack.trackNumber < secondTrack.trackNumber
}
```

```
let sortedTracks = tracks.sorted { (firstTrack: Track,
secondTrack: Track) -> Bool in
  return firstTrack.starRating < secondTrack.starRating
}
```

Syntactic sugar

```
let sortedTracks = tracks.sorted { (firstTrack: Track,
secondTrack: Track) -> Bool in
  return firstTrack.starRating < secondTrack.starRating
}
```

Syntactic sugar

```
let sortedTracks = tracks.sorted { (firstTrack, secondTrack) ->
Bool in
  return firstTrack.starRating < secondTrack.starRating
}
```

Syntactic sugar

```
let sortedTracks = tracks.sorted { (firstTrack, secondTrack) in
  return firstTrack.starRating < secondTrack.starRating
}
```

Syntactic sugar

```
let sortedTracks = tracks.sorted { return $0.starRating <
$1.starRating }
```

Syntactic sugar

```
let sortedTracks = tracks.sorted { $0.starRating <
$1.starRating }
```

Collection functions using closures

- Map
- Filter
- Reduce

Collection functions using closures

```
// Initial array
let firstNames = ["Johnny", "Nellie", "Aaron", "Rachel"]

// Creates an empty array that will be used
// to store the full names
var fullNames: [String] = []

for name in firstNames {
    let fullName = name + " Smith"
    fullNames.append(fullName)
}
```

Collection functions using closures

```
// Initial array
let firstNames = ["Johnny", "Nellie", "Aaron", "Rachel"]

// Creates a new array of full names by adding "Smith"
// to each first name
let fullNames = firstNames.map { (name) -> String in
    return name + " Smith"
}
```

Collection functions using closures

```
// Initial array
let firstNames = ["Johnny", "Nellie", "Aaron", "Rachel"]

// Creates a new array of full names by adding "Smith"
// to each first name
let fullNames = firstNames.map{ $0 + " Smith" }
```

Collection functions using closures

```
let numbers = [4, 8, 15, 16, 23, 42]

var numbersLessThan20: [Int] = []

for number in numbers {
    if number < 20 {
        numbersLessThan20.append(number)
    }
}
```

Collection functions using closures

```
let numbers = [4, 8, 15, 16, 23, 42]

let numbersLessThan20 = numbers.filter { (number) -> Bool in
    return number < 20
}
```

Collection functions using closures

```
let numbers = [4, 8, 15, 16, 23, 42]

let numbersLessThan20 = numbers.filter{ $0 < 20 }
```

Collection functions using closures

```
let numbers = [8, 6, 7, 5, 3, 0, 9]

var total = 0

for number in numbers {
    total = total + number
}
```

Collection functions using closures

```
let numbers = [8, 6, 7, 5, 3, 0, 9]

let total = numbers.reduce(0) { (currentTotal, newValue) ->
Int in
    return currentTotal + newValue
}
```

Collection functions using closures

```
let numbers = [8, 6, 7, 5, 3, 0, 9]

let total = numbers.reduce(0,{ $0 + $1})
```