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Swift

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Swift

What's Swift

swift

adjective

1 *a swift decision*: PROMPT, rapid, sudden, immediate, instant, instantaneous; abrupt, hasty, hurried, precipitate, headlong. ANTONYMS unhurried.

2 *swift runners*: FAST, rapid, quick, speedy, high-speed, fast-paced, brisk, lively; express, breakneck; fleet-footed; informal nippy, supersonic. ANTONYMS slow, sluggish.

Variables

```
// variable
var name: String = "John Doe"
var temperature: Double = 36.5
var year: Int = 2014
var visible: Bool = true

year = 2015
```

Type Inference

```
// variable
var name: String = "John Doe"
var temperature: Double = 36.5
var year: Int = 2014
var visible: Bool = true

name = "Steve Jobs"       // OK
temperature = 36.8        // OK
year = 2015               // OK
visible = false           // OK
```

Type Inference

```
// variable
var name          = "John Doe"
var temperature          = 36.5
var year      = 2014
var visible        = true

name = "Steve Jobs"    // OK
temperature = 36.8     // OK
year = 2015            // OK
visible = false        // OK
```

Constants

```
// constants
let name: String = "John Doe"
let temperature: Double = 36.5
let year: Int = 2014
let visible: Bool = true

name = "Steve Jobs"     // error
temperature = 36.8      // error
year = 2015             // error
visible = false         // error
```

Unicode Names

```
let 🐶: Character = "🐶"
let 🐮: String = "🐮"
let dog: Character = "dog"  // error
let cow: String = "cow"
let π = 3.1415927
let 言語 = "Japanese"
```

String Operation

```
let hello = "Hello"
let world = "World"
let greeting = hello + " " + world
// "Hello World"

let a = 3, b = 5
let result = "\(a) + \(b) = \(a + b)"
// "3 + 5 = 8"
```

Array and Dictionary Literals

```
// Mixed Object Type Array
var array = ["Tokyo", 3, true]

// Typed Collection
var list1: String[] = ["Ja", "En", "Fr"]
var list2: String[] = ["Ja", "En", 2.0]

// Dictionary
var legs = ["cat":4, "snake":0, "dog":2]
```

Array Access

```
// declaration
var items = ["Ja", "En", "Fr"]

// accessors
let item = items[1]    // "En"
items.insert("De", atIndex: 0)  // De,Ja, …
items.append("It")     // De,Ja,En,Fr,It
items.removeAtIndex(1) // De,En,Fr,It
items.removeLast()     // De,En,Fr
```

Array Access

```
var names = ["Robert", "Ken"]

// append
names += "Joe"
names += ["Mike", "Paul"]

// replace
names[0] = "Bob"
names[2..4] = ["Jim", "Alex", "Bill"]
// Bob,Ken,Jim,Alex,Bill,Paul
```

Dictionary

```
var dict = ["Ja":"Japanese", "En":"English",
            "Fr":"French"]

// read access
let lang = dict["Ja"] // "Japanese"

// write access
dict["De"] = "German"
dict["Ja"] = nil
```

Tuple

```swift
let rgb = (128, 255, 0)
let result = (404, "Not Found")
let item = (2, "banana", 0.75)

let r = rgb.0              // 128
let code = result.0        // 404
let name = item.1          // "banana"
```

Optional & Non Optional

```
// non optional
var str1: String = nil  // error: non-opt
var str2: String = ""   // OK
var num1: Int = nil     // error: non-opt
var num2: Int = 496     // OK

// optional
var str3: String? = nil // OK: optional
var num3: Int? = nil    // OK: optional
```

If Statement

```
if items.count > 0 {
  // OK: some code here
}

if (items.count > 0) {
  // OK: parentheses are optional
}

// error (requires curly brace)
if (items.count > 0) println("")
```

If Statement

```
if foo == 0 {
  // some code here
} else if foo == 1 {
  // some code here
} else {
  // some code here
}
```

Switch Statement

```
// good
switch foo {
case 0: println("0")
case 1: println("1")
default: println("default")
}
// 1: break statement is not necessary!
// 2: default clause is mandatory!
// 3: fallthrough keyword available
```

Switch Statement

```
switch foo {
// multiple value
case 1, 3, 5: println("1,3,5");
case 2, 4, 6: println("2,4,6");
case 7...9: println("7,8,9");
case 10..100: println("10~99");
default: println("other");
}
```

Switch Statement with Tuple

```
switch rgb {
case (0.0...0.25, 0.0...0.25, 0.0...0.25):
    println("too dark")
case (0.75...1.0, 0.75...1.0, 0.75...1.0):
    println("too bright")


default:
    println("just right");
}
```

Switch Statement with where clause

```
switch rgb {
case (0.0...0.25, 0.0...0.25, 0.0...0.25):
    println("too dark")
case (0.75...1.0, 0.75...1.0, 0.75...1.0):
    println("too bright")
case let (r, g, b) where r==g && g==b:
    println("quite grey")
default:
    println("just right");
}
```

Loops

```
// while loop
while !done { /*code*/ }

// do while loop
do { /*code*/ } while !done

// for loop
for var i = 0 ; i < 100 ; ++i { /*code*/ }
```

For-In Statement

```
for ch in "123" {
 // "1", "2", "3"
}

for num in 1...5 {
 // 1, 2, 3, 4, 5
}

for num in 1..5 {
 // 1, 2, 3, 4, not 5
}
```

For-In

```
// array
for item in ["En", "Ja", "Fr"] {
  // "En", "Ja", "Fr"
}
// dictionary
var items = ["Ja":"Japanese","En":"English"]
for (code, name) in items {
  println("\(code): \(name)")
}
```

Functions

```
// no parameter
func foo() { … }
// with parameter
func bar(name: String) { … }
// with default parameter
func buz(name: String = "World") { … }

foo()
bar("Tokyo")
buz()
```

Functions with Returning Values

```
func foo() -> String {
    return "foo"
}
func bar() -> String? {
    return nil;
}
func buz() -> (Int, String) {
    return (404, "Not Found")
}
```

Optional Return Type

```
func indexOfString(string: String,
                   array: String[]) -> Int {
    for (index, value) in enumerate(array) {
        return index;
    }
    return nil; // error: non optional
}
```

Optional Return Type

```
func indexOfString(string: String,
                   array: String[]) -> Int? {
    for (index, value) in enumerate(array) {
        return index;
    }
    return nil; // OK: optional
}
```

Optional Parameters

```
func foo(name: String) {
}

func bar(name: String?) {
}

foo("Ken")    // OK
foo(nil)      // NG: not optional
bar("Ken")    // OK
bar(nil)      // OK: optional
```

Closures

```
// Closure
let foo: () -> () = { println("foo") }
// Closure (short form)
var bar = { println("bar") }
// function
func buz() -> () { println("buz") }

bar()                    // "bar"
bar = foo; bar()         // "foo"
bar = buz; bar()         // "buz"
```

Classes

```
class Shape {
    var center:CGPoint;
    init(center:CGPoint) {
        self.center = center;
    }
}
class Circle : Shape {
    var radius: Double;
    init(center:CGPoint, radius:Double) {
        self.radius = radius;
        super.init(center: center)
    }
}
```

Properties and Methods

```
class Counter {
    var value: Int = 0
    init() {
    }
    func increment() {
        value++
    }
}

var counter = Counter() // no alloc
counter.increment()
println(counter.value)  // 1
```

Getter & Setter

```
class Range {
    var location, length: Double;
    init(location:Double, length:Double) {
        self.location = location;
        self.length = length;
    }
    var mid: Double {
        get {
            return location + length/2.0;
        }
        set {
            location = newValue - length/2.0;
        }
    }   // if no setter then readonly property
}
```

Overriding Properties

```
class Ship {
    var health: Double
}

class Car : Mammal {
    override var description: String {
        return super.description + ".Ape"
    }
}
```

Property Observers

```
class User {
    var name: String = "";
}

class Admin : User {
    override var name: String {
        willSet {
            println("\(newValue)");
        }
        didSet {
            println("\(oldValue)");
        }
    }
}
```

Structures

```
struct Point {
    var x, y: Double
}
struct Size {
    var width, height: Double;
}
struct Rect {
    var origin: Point;
    var size: Size;
}
var point = Point(x:0, y:0)
var size = Size(width:640, height:480)
var rect = Rect(origin: point, size: size)
```

Structures

```
struct Rect {
    var origin: Point;
    var size: Size;

    var area: Double {
        return size.width * size.height;
    }
    func isSquare() -> Bool {
        return size.width == size.height;
    }
}
```

Classes & Structures

- Classes
  - instances are passed by reference
  - subclassing

- Structures
  - instances are passed by value
  - no subclassing

Mutating a Structure

```
struct Point {
    var x, y: Double
    mutating func hello(dx: Double, dy: Double)
{
        x += dx;
        y += dy;
    }
}

var pt1 = Point(x: 0.0, y: 0.0)
pt1.hello(10, dy: 0)

let pt2 = Point(x: 0.0, y: 0.0)
pt2.moveBy(10, dy: 0)    // error mutating const
```

enum

```
enum Direction {
    case Left, Right







}
var direction1 = Direction.Left;
direction1 = .Right;
```

enum

```
enum Direction {
    case Left, Right
    init() {
        self = .Left;
    }
    var description: String {
        switch self {
        case .Left: return "Left"
        case .Right: return "Right"
        }
    }
}
var direction1 = Direction.Left;
direction1 = .Right;
var direction2 = Direction()
println(direction1.description)
```

Nested Types

```
class Book
{
    enum Direction {
        case Left, Right
    }
    var direction: Direction;
    var title: String?;
    init () {
        self.direction = .Left;
    }
}
var book: Book = Book();
book.direction = .Right;
```

Extensions

```
extension Size {
    mutating func scaleBy(scale: Double) {
        width *= scale
        height *= scale
    }
}

var size = Size(width: 100, height: 100);
size.scaleBy(2.0)
```

Extensions

```
extension Int {
    func repetitions(task: () -> ()) {
        for i in 0..self {
            task()
        }
    }
}

32.repetitions({
    println("Hello")
})
```

Extension

```
extension Double {
    var km: Double { return self * 1_000.0 }
    var m: Double { return self }
    var cm: Double { return self / 100.0 }
    var mm: Double { return self / 1_000.0 }
    var ft: Double { return self / 3.28084 }
}

let marathon = 42.km + 195.m  // 42,195.0
```

Generic

```
struct Stack<T> {
    var elements = T[]()
    mutating func push(element: T) {
        elements.append(element)
    }
    mutating func pop() -> T {
        return elements.removeLast()
    }
}
var stack1 = Stack<Int>()
var stack2 = Stack<Point>()
var stack3 = Stack<Rect>()
```

Generic

```
var dic1: Dictionary =
        Dictionary<String, String>()

var dic2: Dictionary =
        Dictionary<String, Int>()

var dic3: Dictionary =
        Dictionary<String, AnyObject>()
```

Anonymous

```
for (key, _) in dictionary {
    println(key)
}

let (red, green, blue, _) = color.rgba;
```

Protocols

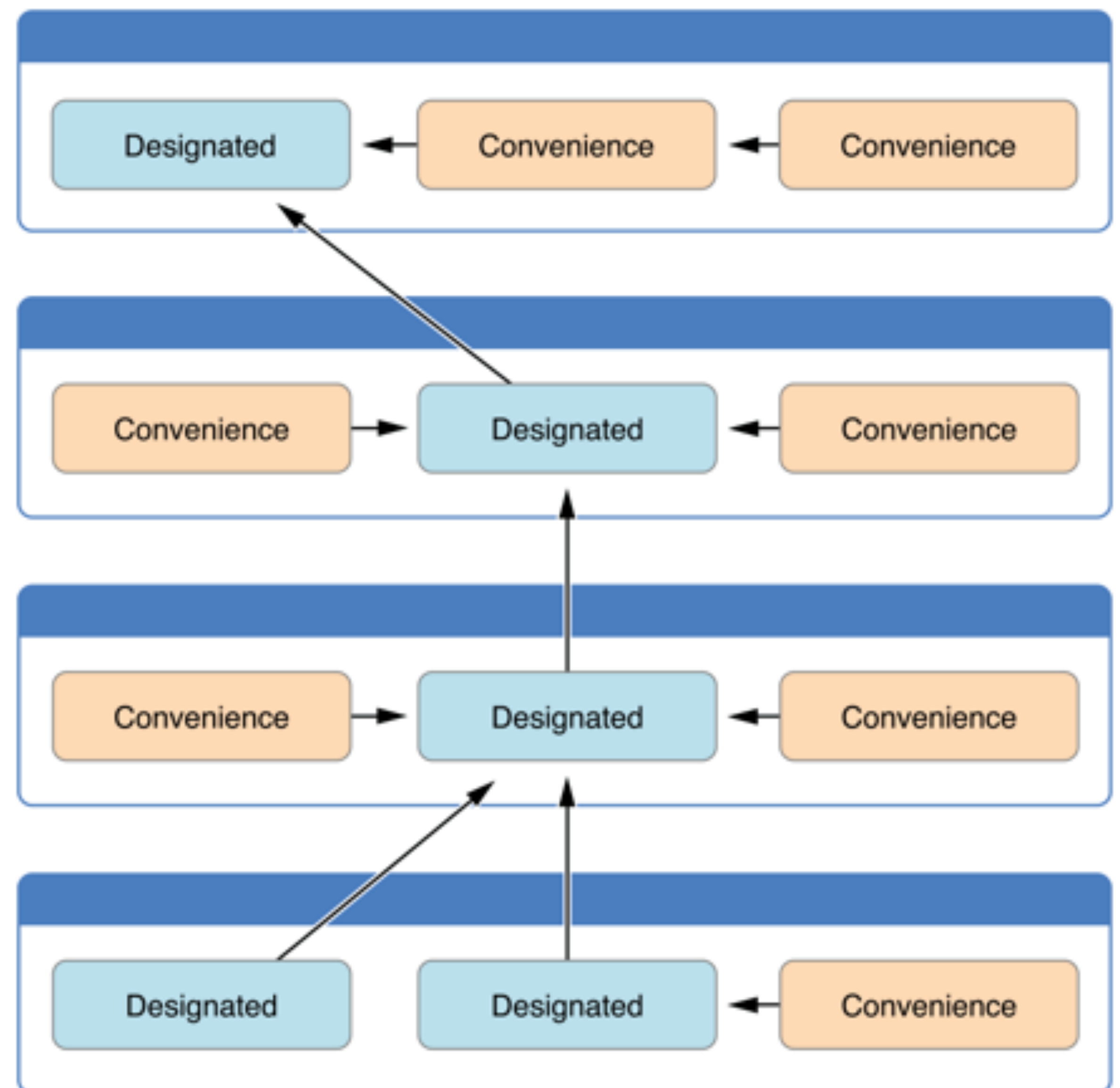
```
protocol Countable {
    var count : Int { get };
    func increment();
}

class PageCounter : Countable {
    var count : Int = 0;
    func increment()  {
        count++;
    }
}
```

Designated Initializers and Convenience Initializers

1. Designated initializers must call a designated initializer from their immediate superclass.

2. Convenience initializers must call another initializer available in the same class.

3. Convenience initializers must ultimately end up calling a designated initializer.



Deinitialization

deinit

Shorthand External Parameter Names

```
func stringFromInt(#value:Int) -> String {
    return "\(value)"
}
func stringFromDouble(value:Double) ->
        String {
    return "\(value)"
}
var a = stringFromInt(value:256);       // OK
var b = stringFromInt(256);             // NG
var c = stringFromDouble(value:256.3);  // NG
var d = stringFromDouble(256);          // OK
```

Variadic Parameters

```
func total(numbers: Int...) -> Int {
    var total: Int = 0;
    for number in numbers {
        total += number;
    }
    return total;
}

let sum = total(1, 2, 3, 4, 5)
```

In-Out Parameters

```
func swapInts(inout a: Int, inout b: Int) {
    let c = a;
    a = b;
    b = c;
}

var a = 100;
var b = 200;
swapInts(&a, &b)
```

In-Out Parameters

```
func swapValues<T>(inout a: T, inout b: T) {
    let temporaryA = a
    a = b
    b = temporaryA
}
// somehow rename to swap<T> causes error

var c = 1
var d = 2
swapValues(&c, &d)
```

Typealias

```
typealias AudioSample = UInt16
```

Labeled Statements

```
var strings: String[] =
    ["Hello World", "This is a pen", "Wow!"]

label: for string in strings {
    for ch in string {
        if (ch == "!") {
            break label;
        }
    }
}
```

```
label name: while condition {
    statements
}
```

Closure Expression Syntax

```
reversed = sort(array, {
    (s1: String, s2: String) -> Bool in
        return s1 > s2
})

reversed = sort(array, { s1, s2 in
    return s1 > s2 })

reversed = sort(array, { $0 > $1 })
```

```
{ (parameters) -> return type in
    statements
}
```

Lazy Stored Properties

```
class BookManager {
    init() {
        println("BookManager")
    }
}
class Book {
    @lazy var manager = BookManager()
    init() {
        println("Book")
    }
}
var book = Book()
book.manager
```

Subscript Syntax

```
class Paragraphs {
    var strings = String[]();
    // ...
    subscript(index: Int) -> String {
        get {
            return strings[index]
        }
        set {
            strings[index] = newValue
        }
    }
}
```

Identity Operators

- Identity Operators
- bridgeToObjectiveC

Downcasting

```
for object in objects {
    let view = object as UIView
    view.hidden = true
}

for view in objects as UIView[] {
    view.hidden = true
}
```

Type Evaluation

```
for thing in things {
    switch thing {
    case 0 as Int: println("0 as Int")
    case 0 as Double: println("0 as Double")
    case let value as Int: println("Int")
    case let value as Double where value > 0:
        println("Double value > 0")
    case is Double: println("Double")
    case let string as String: println("")
    case let (x, y) as (Double, Double):
        println("\(x),\(y)")
    case let v as Vector2D: println("Vector2D")
    default: println("other")
    }
}
```

operator

```
struct Vector2D {
    var x = 0.0, y = 0.0
}

@infix func + (lhs: Vector2D, rhs: Vector2D) ->
        Vector2D {
    return Vector2D(x: lhs.x + rhs.x,
                    y: lhs.y + rhs.y)
}

var v1 = Vector2D(x:10, y:20)
var v2 = v1 + Vector2D(x:3, y:4)
```

Note: `@prefix @infix @postfix`

Exception

Left Intentionally Blank

@synchronized

Left Intentionally Blank

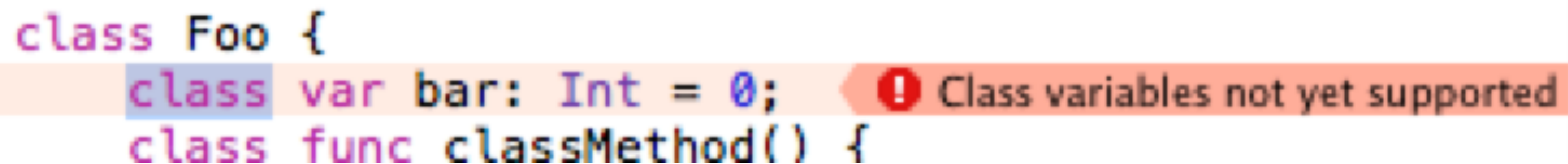
Key Value Observer

```
class Car : NSObject {
    var speed : Double = 0.0
    override var description : String {
        return "car: speed=\(speed)"
    }
}
class Dashboard : NSObject {
    var car : Car;
    init(car: Car) {
        self.car = car;
        super.init();
        car.addObserver(self, forKeyPath: "speed", options: .New, context: nil)
    }
    override func observeValueForKeyPath(keyPath: String!, ofObject: AnyObject!,
            change: NSDictionary!, context: CMutableVoidPointer) {
        if keyPath == "speed" {
            println(ofObject.description)
        }
    }
}
var car = Car()
var dashboard = Dashboard(car:car)
car.speed = 2
```

Call back from C

Class Method

```
class Foo {
//  class var bar: Int = 0;
    class func classMethod() {
    }
}

var foo = Foo()
foo.dynamicType.classMethod()
```



Exercise

```
var a : Int?
var b : Int? = 0
var c : Int = 0
var d : Int = 1

if a { "a" }
if a == nil { "a == nil" }

if b { "b" }
if b == nil { "b == nil" }

if c { "c" }
if c == nil { "c == nil" }

if d { "d" }
if d == nil { "d == nil" }
```

Exercise

```
var a : Int?
var b : Int? = 0
var c : Int = 0
var d : Int = 1

if a { "a" }                        false
if a == nil { "a == nil" }          true

if b { "b" }                        true
if b == nil { "b == nil" }          false

if c { "c" }                        error
if c == nil { "c == nil" }          false

if d { "d" }                        error
if d == nil { "d == nil" }          false
```

Thank you