

# Codable

A type that can convert itself into and out of an external representation.

```
public typealias Codable = Decodable & Encodable
```

```
public protocol Encodable {  
    /// Encodes this value into the given encoder.  
    /// - Parameter encoder: The encoder to write data to.  
    public func encode(to encoder: Encoder) throws  
}
```

```
public protocol Decodable {  
    /// Creates a new instance by decoding from the given decoder.  
    /// - Parameter decoder: The decoder to read data from.  
    public init(from decoder: Decoder) throws  
}
```

## [ Encoding, 부호화 ]

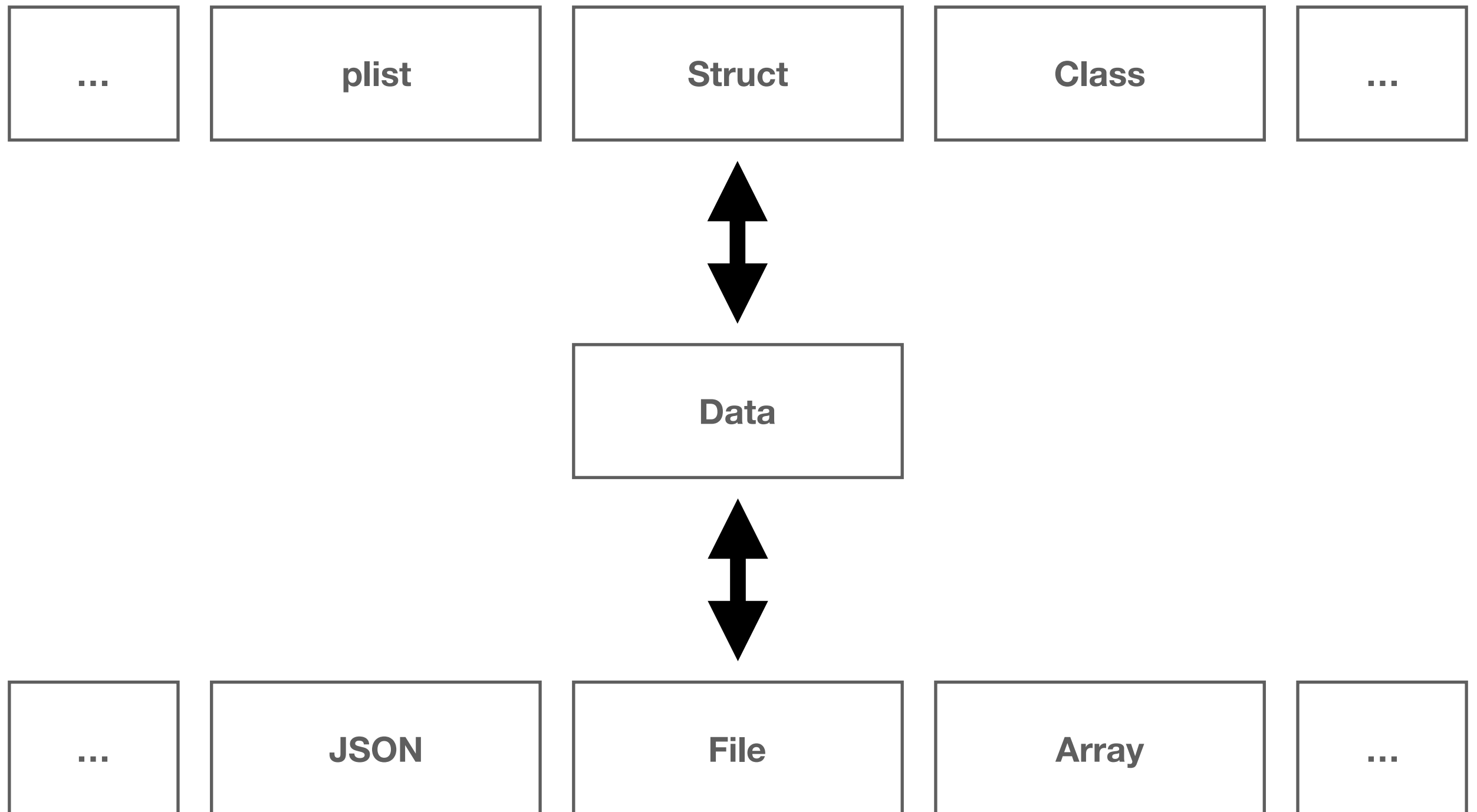
- 정보의 형태나 형식을 표준화, 보안, 처리 속도 향상, 저장 공간 절약 등을 위해서 목적에 맞는 다른 형태나 형식으로 변환하는 처리 혹은 그 처리 방식.
- **Encoder** : 인코딩을 수행하는 장치나 회로, 컴퓨터 소프트웨어, 알고리즘
- **A type that can encode values into a native format for external representation.**

## [ Decoding, 복호화 ]

- **Encoding(부호화)된 대상을 원래의 형태로 되돌리는 일**
- 예를 들어, 압축 파일을 다시 풀거나 암호화된 내용을 원래 내용으로 되돌리는 일
- **A type that can decode values from a native format into in-memory representations.**

# Encode & Decode

---



# Built-in Codable Types

- Swift Basic Types
  - Bool, Int, Int(N), UInt(N), Float, Double, String, RawRepresentable, Optional, Array, Set, Dictionary
- Foundation / CoreGraphics Types
  - AffineTransform, Calendar, CharacterSet, Data, Date, DateComponents, DateInterval, Decimal, IndexPath, IndexSet, Locale, Measurement, NSRange, TimeZone, URL, UUID, CGFloat, CGPoint, CGSize, CGRect, ...

# Conform to protocol Codable

```
struct CodableExample: Codable {  
    let bool: Bool  
    let int: Int  
    let double: Double  
    let string: String  
    let array: [Int]  
    let dict: [String: String]  
}
```

# Built-in Decoder / Encoder

---

/// `PropertyListEncoder` facilitates the encoding of `Encodable` values into property lists.

```
open class PropertyListEncoder { }
```

/// `PropertyListDecoder` facilitates the of property list values into semantic `Decodable` types.

```
open class PropertyListDecoder { }
```

/// `JSONEncoder` facilitates the encoding of `Encodable` values into JSON.

```
open class JSONEncoder { }
```

/// `JSONDecoder` facilitates the decoding of JSON into semantic `Decodable` types.

```
open class JSONDecoder { }
```

# Use Encoder

---

```
struct MacBook: Codable {  
    let model: String  
    let modelYear: Int  
    let display: Int  
}  
  
let macBook = MacBook(  
    model: "MacBook Pro", modelYear: 2018, display: 15  
)  
  
let encoder = JSONEncoder()  
let encodedData = try encoder.encode(macBook)  
print(type(of: encodedData))    // Data
```



# Use Decoder

---

```
let jsonData = """
{
  "model": "MacBook Pro",
  "modelYear": 2018,
  "display": 15,
}
"""

let decoder = JSONDecoder()
let decodedData = try decoder.decode(
  MacBook.self, from: jsonData
)
print(type(of: decodedData))    // MacBook
```

# SwiftyJSON

SwiftyJSON / SwiftyJSON

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The better way to deal with JSON data in Swift

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23 releases

124 contributors

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wongzigii Update README.md

Latest commit fb67763 on 8 Nov 2017

.github	Move files into .github directory	11 months ago
Example	Fix violations	3 months ago
Source	Fix SwiftLint violations	2 months ago
SwiftyJSON.xcodeproj	Fix broken path after renaming	4 months ago
SwiftyJSON.xcworkspace	Change example path for carthage. #276	3 years ago
Tests/SwiftyJSONTests	Fix SwiftLint violations	2 months ago

# ObjectMapper

Hearst-DD / ObjectMapper

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Simple JSON Object mapping written in Swift

924 commits

8 branches

48 releases

83 contributors

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tristanhimmelman Updated install versions in read me

Latest commit 883a6f1 15 days ago

.github

renamed github folder to .github

11 months ago

ObjectMapper.xcodeproj

swift 4 no deprecated warnings

3 months ago

ObjectMapper.xcworkspace

Xcode 8 beta 4 changes..

2 years ago

Sources

swift 4 no deprecated warnings

3 months ago

Tests

Fix typo

3 months ago

# Auto-synthesis example

---

```
struct User: Codable {  
    var userName: String  
    var score: Int  
}
```

# Auto-synthesis by compiler

```
struct User: Codable { // Auto-synthesis example
    var userName: String
    var score: Int

    @derived private enum CodingKeys: String, CodingKey { // @derived = auto-synthesized
        case userName
        case score
    }

    @derived init(from decoder: Decoder) throws {
        let container = try decoder.container(keyedBy: CodingKeys.self)
        userName = try container.decode(String.self, forKey: .userName)
        score = try container.decode(Int.self, forKey: .score)
    }

    @derived func encode(to encoder: Encoder) throws {
        var container = encoder.container(keyedBy: CodingKeys.self)
        try container.encode(userName, forKey: .userName)
        try container.encode(score, forKey: .score)
    }
}
```

# Manual Implementation

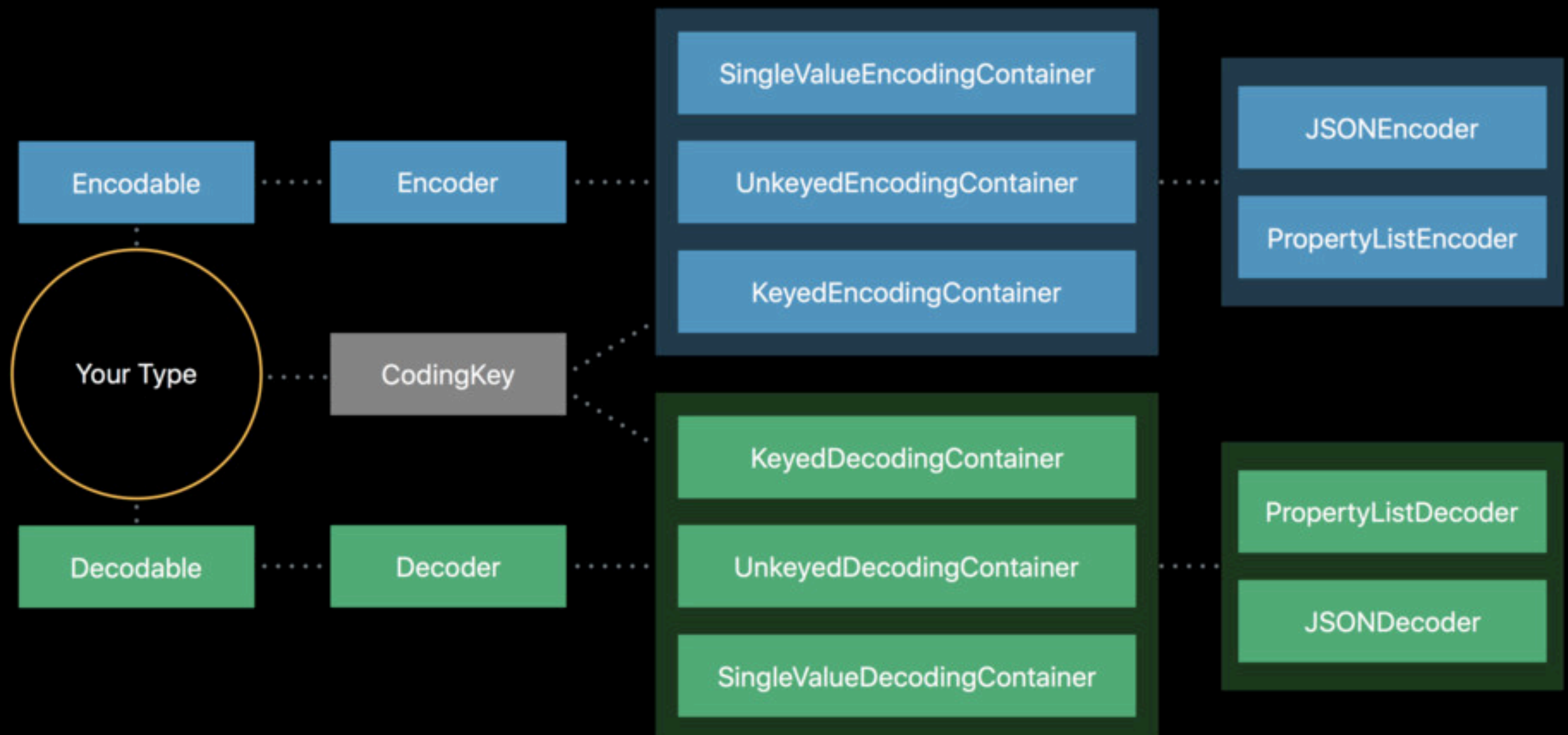
```
struct User: Codable { // Manual implementation example
    var userName: String // Let's say, JSON has "user_name" key
    var score: Int        // Let's limit to 0...100

    private enum CodingKeys: String, CodingKey { // manual implementation
        case userName = "user_name" // rename key
        case score
    }

    init(from decoder: Decoder) throws { // manual implementation
        let container = try decoder.container(keyedBy: CodingKeys.self)
        score = try container.decode(Int.self, forKey: .score)
        guard (0...100).contains(score) else { // add validation
            throw DecodingError.dataCorrupted(
                codingPath: container.codingPath + [CodingKeys.score],
                debugDescription: "score is not in range 0...100"
            )
        }
        userName = try container.decode(String.self, forKey: .userName)
    }
}
```



# Overview Codable Protocol



인코딩과 디코딩을 위한 키로 사용하기 위해 쓰이는 프로토콜

```
public protocol CodingKey {  
    /// The string to use in a named collection(e.g. a string-keyed dict)  
    public var stringValue: String { get }  
  
    /// Creates a new instance from the given string.  
    public init?(stringValue: String)  
  
    /// The value to use in an integer-indexed collection  
    /// (e.g. an int-keyed dictionary).  
    public var intValue: Int? { get }  
  
    /// Creates a new instance from the specified integer.  
    public init?(intValue: Int)  
}
```



# Basic

---

```
struct Dog: Decodable {  
    let age: Int  
    let name: String  
}
```

```
let jsonData = """
{
  "age": 3,
  "name": "Tory"
}
""".data(using: .utf8)!

let dog = try? JSONDecoder().decode(Dog.self, from: jsonData)
print(dog)
```

# Decode Manually

---

```
struct Dog: Decodable {
    let age: Int
    let name: String

    private enum CodingKeys: String, CodingKey {
        case age
        case name
    }

    init(from decoder: Decoder) throws {
        let values = try decoder.container(keyedBy: CodingKeys.self)
        age = try values.decode(Int.self, forKey: .age)
        name = try values.decode(String.self, forKey: .name)
    }
}
```

# Array

---

```
let jsonData = """
[
  {
    "age": 3,
    "name": "Tory"
  },
  {
    "age": 3,
    "name": "Tory"
  }
]
""".data(using: .utf8)!

let dogs = try! JSONDecoder().decode([Dog].self, from: jsonData)
print(dogs)
```

# Dictionary

---

```
let jsonData = """
{
  "first": {
    "age": 3,
    "name": "Tory"
  },
  "second": {
    "age": 3,
    "name": "Tory"
  }
}
""".data(using: .utf8)!
```

```
let decoder = JSONDecoder()
let dogs = try! decoder.decode([String: Dog].self, from: jsonData)
print(dogs)
```

# Nested Keys

---

```
struct Coordinate {  
  var latitude: Double  
  var longitude: Double  
  var elevation: Double  
  
  enum CodingKeys: String, CodingKey {  
    case latitude  
    case longitude  
    case additionalInfo  
  }  
  enum AdditionalInfoKeys: String, CodingKey {  
    case elevation  
  }  
}
```

# Nested Keys

---

```
extension Coordinate: Decodable {  
    init(from decoder: Decoder) throws {  
        let values = try decoder.container(keyedBy: CodingKeys.self)  
        latitude = try values.decode(Double.self, forKey: .latitude)  
        longitude = try values.decode(Double.self, forKey: .longitude)  
  
        let additionalInfo = try values.nestedContainer(  
            keyedBy: AdditionalInfoKeys.self, forKey: .additionalInfo  
        )  
        elevation = try additionalInfo.decode(  
            Double.self, forKey: .elevation  
        )  
    }  
}
```

# EncodingError

---

/// An error that occurs during the encoding of a value.

```
public enum EncodingError : Error {  
    /// 주어진 값으로 인코딩을 하지 못할 때  
    case invalidValue(Any, EncodingError.Context)  
}
```



# DecodingError

---

/// An error that occurs during the decoding of a value.

```
public enum DecodingError : Error {  
    /// 프로퍼티 타입 미스매치  
    case typeMismatch(Any.Type, DecodingError.Context)  
    /// 디코딩할 데이터의 키에 해당하는 Value 가 없을 경우  
    case valueNotFound(Any.Type, DecodingError.Context)]  
    /// 디코딩할 데이터에 지정한 키가 없는 경우  
    case keyNotFound(CodingKey, DecodingError.Context)  
    /// 데이터가 망가졌을 경우  
    case dataCorrupted(DecodingError.Context)  
}
```

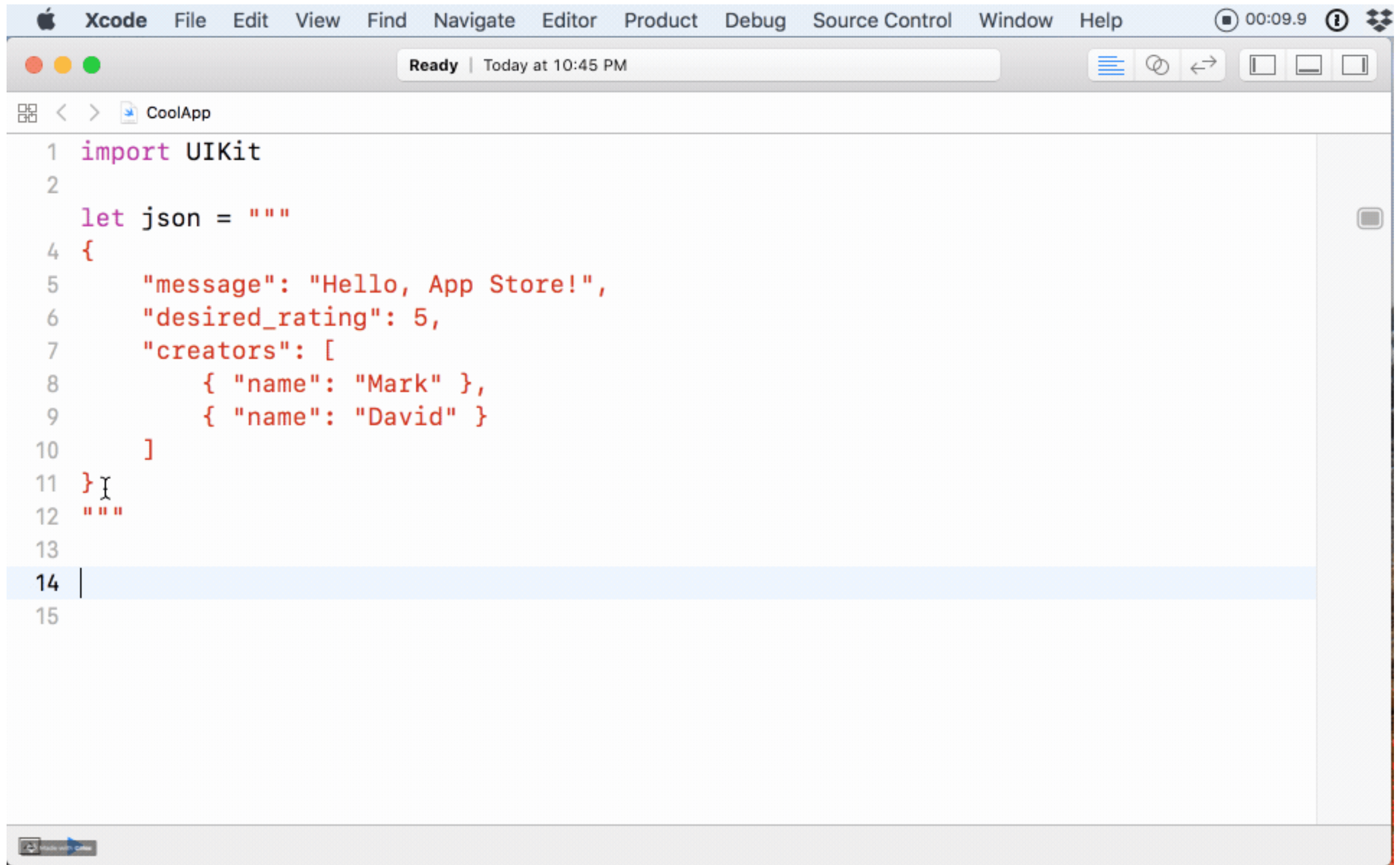
## Overview of Codable (1)

- Container Protocols
  - Keyed ... for dictionary coding
  - Unkeyed ... for array coding
  - SingleValue ... for single primitive value coding
- 3 containers are used as **intermediate hierarchical representation** for arbitrary (de)serialization (e.g. JSONSerialization with [String: Any]).

## Overview of Codable (2)

- `CodingKey`
  - Type-safe String-based key (and optionally, Int key)
- `superDecoder` / `superEncoder`
  - Used when subclassing
- Error Handling (`DecodingError` / `EncodingError`)
  - `codingPath` records the error path and outputs its detail

# Quicktype-xcode Library



The screenshot shows the Xcode IDE with a Swift file named 'CoolApp'. The code defines a JSON object with a message, a rating, and a list of creators. The code is as follows:

```
1 import UIKit
2
3 let json = ""
4 {
5     "message": "Hello, App Store!",
6     "desired_rating": 5,
7     "creators": [
8         { "name": "Mark" },
9         { "name": "David" }
10    ]
11 }
12 ""
13
14
15
```

The interface includes a menu bar with 'Xcode', 'File', 'Edit', 'View', 'Find', 'Navigate', 'Editor', 'Product', 'Debug', 'Source Control', 'Window', and 'Help'. A status bar at the bottom indicates 'Ready' and 'Today at 10:45 PM'. A toolbar on the right contains icons for document management and a search icon.