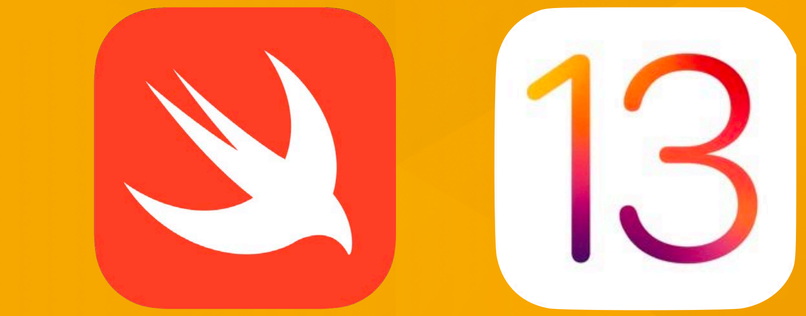

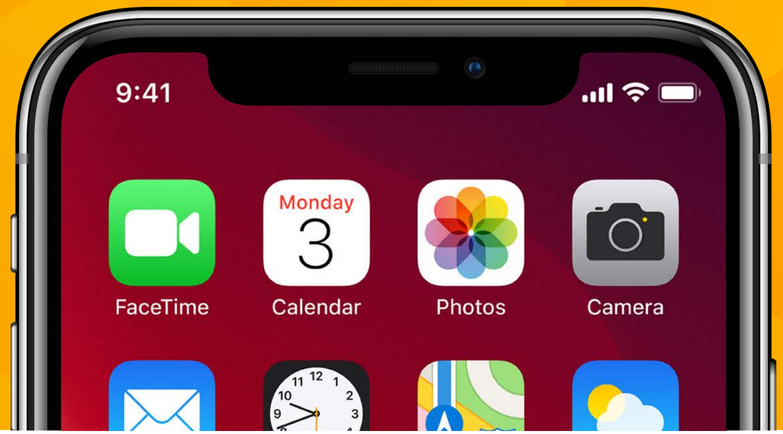


# iOS Application Development

## Lecture 6: Save Data and System View Controller

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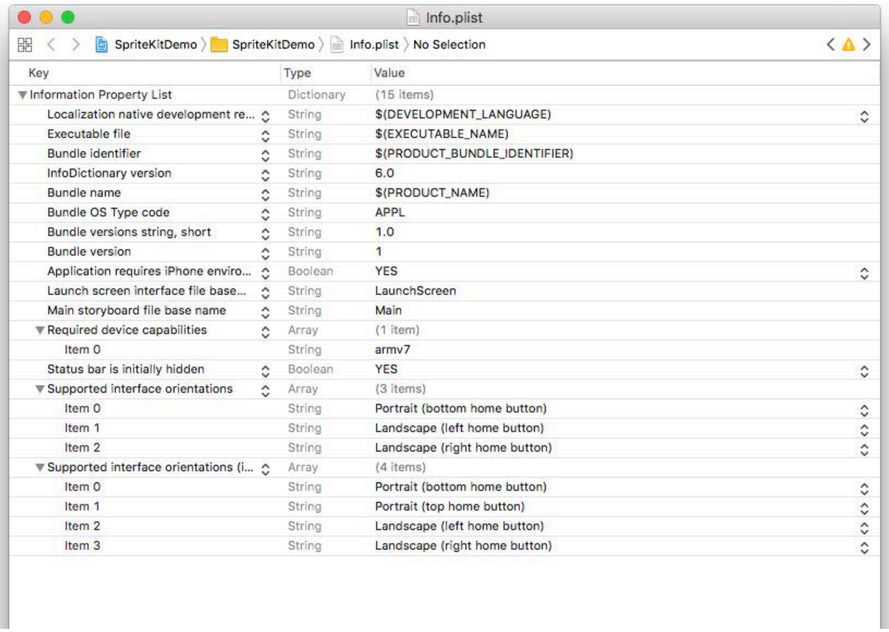
# Saving Data

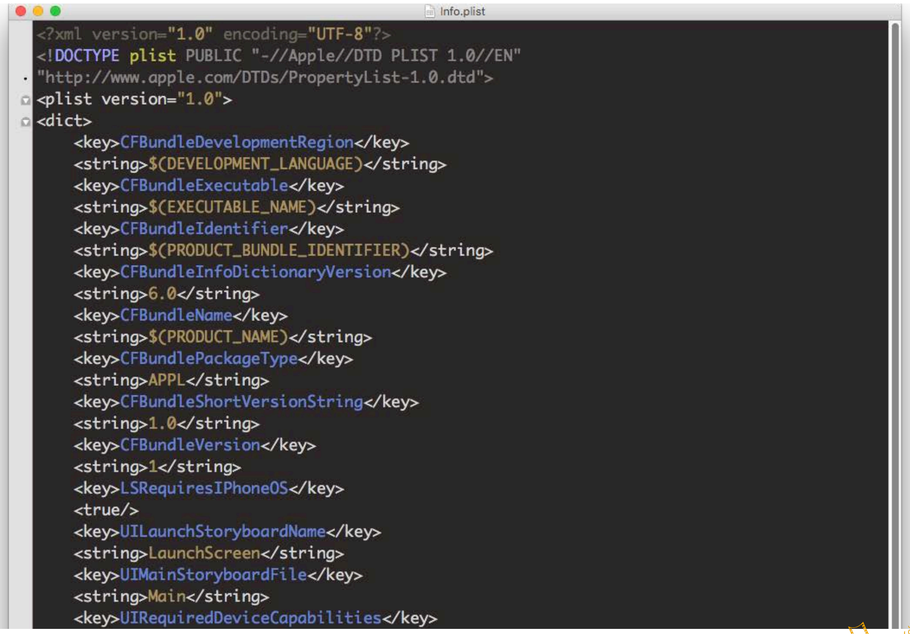
# Saving Data

- Save into a file using encoder (E.g. JSON, or XML pLists)
- Save data using CoreData
- Save data into a Database

# Saving data into a file

- A common way to store data in iOS is to use propertyList files (.plist)
- pList files are XML files
- To store data in these files they need to be encoded using `PropertyListEncoder()`



# Encoding data

- Classes and Structs that implement the `Codable` Protocol can be encoded
- The `Codable` Protocol requires the functions: `init(from:)` and `encode(to:)`
- If the classes and structs only contain properties that satisfies the `Codable` Protocol the functions: `init(from:)` and `encode(to:)`are not needed
- Almost all basic Swift types such as `String`, `Int`, and `Double` and Foundation types like `Date`, `Data`, and `URL` satisfies the `Codable` Protocol
- Also Collections such as `Arrays` and `Dictionaries` satisfies the `Codable` Protocol

# Encoding data

```
struct Note: Codable {
    let title: String
    let text: String
    let timestamp: Date
}

let newNote = Note(title: "Grocery run", text: "Pick up mayonnaise, mustard, lettuce, tomato,
and pickles.", timestamp:
    Date())
```

# Encoding data

```
struct Note: Codable {
    let title: String
    let text: String
    let timestamp: Date
}

let newNote = Note(title: "Grocery run", text: "Pick up mayonnaise, mustard, lettuce, tomato,
and pickles.", timestamp:
    Date())

let propertyListEncoder = PropertyListEncoder()
if let encodedNote = try? propertyListEncoder.encode(newNote) {
    print(encodedNote)
}
```

# Error Handling

- When trying to encode data or read and write files errors can occur
- Swift handles error with the `do-try-catch` syntax or the keyword `try`?
- Function, method, or initializer that can throw an error are marked with `throws`

```
func canThrowErrors() throws -> String
```

- Errors are represented by values of types that conform to the Error protocol

```
enum ErrorEnum: Error {
      case error1
      case error2
      case error3
}
```

# Error Handling

- A function that throws an error:

```
func canThrowErrors() throws -> String
{
    guard let unwrapOptional = someOptional else
    {
        throw ErrorEnum.error1
    }

    guard  unwrapOptional < 5 else
    {
        throw ErrorEnum.error2
    }

    guard self.numberOfItems > 0 else
    {
        throw ErrorEnum.error3
    }

    return "result"
}
```

# Error Handling

- Use `do-try-catch` syntax to catch an error and handle them differently:

```
do {
    try expression
    statements
} catch pattern 1 {
    statements
} catch pattern 2 where condition {
    statements
}
```

```
do {
    try canThrowErrors()
    // No Error
} catch ErrorEnum.Error1 {
    print("Error 1 occurred")
} catch ErrorEnum.Error2 {
    print("Error 2 occurred")
}
```

# Error Handling

- If you want to handle all errors in the same way use `try`?

```
func fetchData() -> Data? {

     if let data = try? fetchDataFromDisk() {
        return data
    }

     if let data = try? fetchDataFromServer() {
        return data
     }
     return nil
}
```

- You can also disable errors with `try!` if you are sure that they will not been thrown

```
let photo = try! loadImage(atPath: "./Resources/John Appleseed.jpg")
```

# Encoding data

```
struct Note: Codable {
    let title: String
    let text: String
    let timestamp: Date
}

let newNote = Note(title: "Grocery run", text: "Pick up mayonnaise, mustard, lettuce, tomato,
and pickles.", timestamp:
    Date())

let propertyListEncoder = PropertyListEncoder()
if let encodedNote = try? propertyListEncoder.encode(newNote) {
    print(encodedNote)
}
```

# Encoding data

```
struct Note: Codable {
    let title: String
    let text: String
    let timestamp: Date
}

let newNote = Note(title: "Grocery run", text: "Pick up mayonnaise, mustard, lettuce, tomato,
and pickles.", timestamp:
    Date())

let propertyListEncoder = PropertyListEncoder()
if let encodedNote = try? propertyListEncoder.encode(newNote) {
    print(encodedNote)
}
let propertyListDecoder = PropertyListDecoder()
if let decodedNote = try? propertyListDecoder.decode(Note.self, from: encodedNote)  {
    print(decodedNote)
}
```

# Writing data to a file

- iOS apps work in the sandbox model
- Your app can access the Documents directory to save data related to your app:

```
let documentsDirectory = FileManager.default.urls(for: .documentDirectory,
                         in: .userDomainMask).first!
```

- Create a plist file in in this directory:

```
let archiveURL = documentsDirectory.appendingPathComponent("notes_test")
                 .appendingPathExtension("plist")
```

# Writing the data

```
// Encode data
let propertyListEncoder = PropertyListEncoder()
if let encodedNote = try? propertyListEncoder.encode(newNote) {
    print(encodedNote)
}
// Create file
let documentsDirectory = FileManager.default.urls(for: .documentDirectory,
                         in: .userDomainMask).first!

let archiveURL = documentsDirectory.appendingPathComponent("notes_test")
                 .appendingPathExtension(“plist”)


 // Write to file
try? encodedNote?.write(to: archiveURL, options: .noFileProtection)
```

# Read the data from the file

```
let propertyListDecoder = PropertyListDecoder()

if let retrievedNoteData = try? Data(contentsOf: archiveURL),
   let decodedNote = try? propertyListDecoder.decode(Note.self, from: retrievedNoteData) {
    print(decodedNote)
}
```

# Emoji App Demo

# JSONEncoder and JSONDecoder

```
struct Employee: Codable {
    var name: String
    var id: Int
    var favoriteCar: Car
}

struct Car: Codable {
    var name: String
}
```

```
let car1 = Car(name: "Porsche");
let employee1 = Employee(name: "John Appleseed", id: 7, favoriteToy:
car1)

let jsonEncoder = JSONEncoder()
let jsonData = try jsonEncoder.encode(employee1)
// {"name":"John Appleseed","id":7,"favoriteCar":{"name":"Porsche"}}

let jsonDecoder = JSONDecoder()
let employee2 = try jsonDecoder.decode(Employee.self, from:
jsonData)
```

# Coding Keys

```
struct Employee: Codable {
    var name: String
    var id: Int
    var favoriteCar: Car

    enum CodingKeys: String, CodingKey {
        case id = "employeeId"
        case name
        case favoriteCar
    }
}
```

# Manual Encoding and Decoding

**{ "employeeId": 7, "name": "John Appleseed", "favoriteCar": {“name":"Porsche"}}**

**{ "employeeId": 7, "name": "John Appleseed", "car": "Porsche" }**

```
func encode(to encoder: Encoder) throws {
   var container = encoder.container(keyedBy: CodingKeys.self)
   try container.encode(name, forKey: .name)
  try container.encode(id, forKey: .id)
try container.encode(favoriteCar.name, forKey: .favoriteCar)
}
```

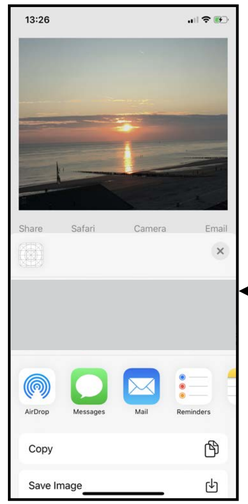
```
 init(from decoder: Decoder) throws {
        let values = try decoder.container(keyedBy: CodingKeys.self)
        name = try values.decode(String.self, forKey: .name)
        id = try values.decode(Int.self, forKey: .id)
        let favoriteCar = try values.decode(String.self, forKey: .favoriteCar)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

# System View Controllers

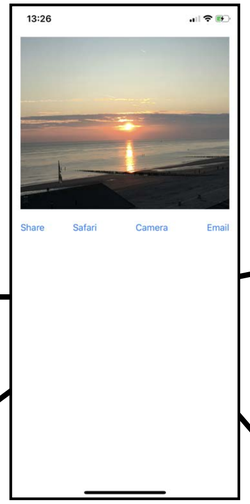
- System view controllers for displaying alerts, sharing content, sending messages, and accessing the camera and photo library on an iOS device

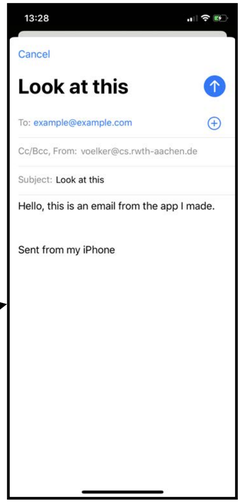
- The most common system view controllers are:
  - `UIActivityController`
  - `SFSafariViewController`
  - `UIAlertController`
  - `UIImagePickerViewController`
  - `MFMailComposeViewController`

# System View Controllers

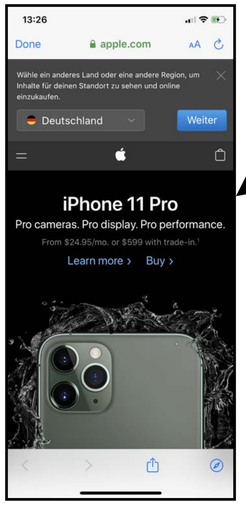



`UIActivityController`

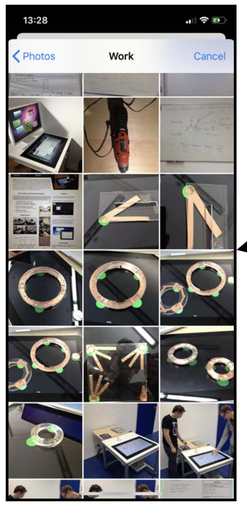


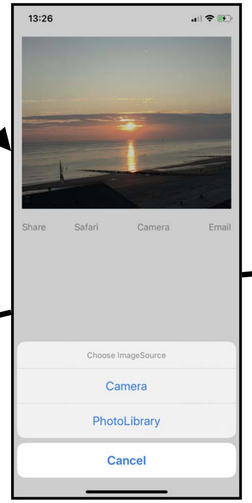

`MFMailComposeViewController`



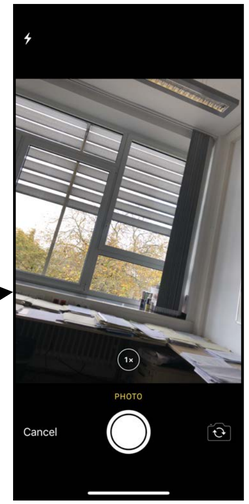

`SFSafariViewController`




`UIImagePickerViewController`




`UIAlertController`




`UIImagePickerViewController`

# System View Controller Demo