Functions and Collections

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Functions

- Self-contained chunks of code to perform a specific task

- Function name is called in order to perform the task

- A function call (outside of a class) looks like:

```
func function-name(argument) -> return-type { /* code here */ }
```

Hello World Example

```
func helloWorld() -> String {
  return “Hello World”
}
```

- Call using `helloWorld()`
- What does this do?

Hello Example with Parameters

```
func sayHello(personName: String) ->
String {
  return “Hello, ” + personName
}
```

- How do we pass in “Dave” as personName?
- What does this function then return?

Parameters

- Function call arguments correspond to function parameters
  - `personName` is the parameter
  - `"Dave"` is the argument
- Argument type must match parameter type
- Order of arguments must match order of parameters

Return Values

- Functions do not have to include return values (will return `void` if none are specified)
- If there's no return value, drop `-> return-type`

```
func sayGoodbye() { print("Goodbye!") }
```

- Functions can return multiple values (tuples)

```
func giveMeThings() -> (Int, Float,
String) { return(5, 300.0, "Foo") }
```

External Names

- Provide a convenient way to clarify argument names

```
func callMe(extName name: String) {
  print("Call me \(name).")
}
```

- If provided, must be used when calling the function

```
callMe(extName:"Tim")
```

Named Types

- Data type that can be named when defined
- Includes classes, structures, enumerations, protocols, and primitives
- Examples:
  - Int (Built-in)
  - myClass (user-defined)
- Behavior is extendable

Compound Types

- Unnamed data type
- Two compound types:
  - Tuple types
  - Function types
- Can contain named types or other compound types

Tuple Type

- List of zero or more types
- Comma-separated, enclosed in parenthesis

```
var origin:(Int, Int) = (0, 0)
```

- Tuple elements can be named

```
var origin:(x: Int, y: Int) = (0, 0)
```

or

```
var origin = (x: 0, y: 0)
```

Accessing Tuples

- Tuples have fixed size once created
- Tuples can contain multiple types
- Elements accessible (and modifiable) with dot

```
var origin:(Int, Int) = (0, 0)

print(origin.0) //prints 0

origin.0 = 20

print(origin.0) //prints 20
```

Zero and One Tuples

- Special cases for tuples

- A tuple with zero types is `()` or `void`

- A tuple with one type is that type

  `(Int)` has type `Int`

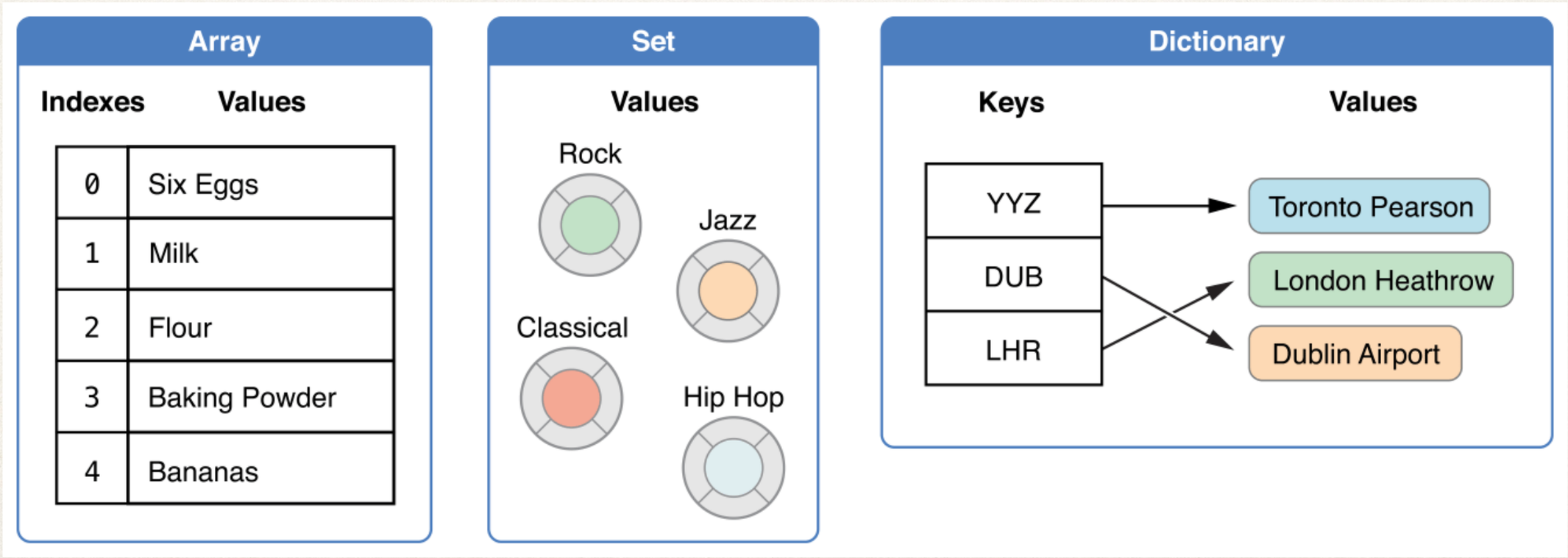
Function Types

- Represents type of function, method, or closure:
  - `parameter-type -> return-type`
- Parameter and return type can be tuples
- Can take multiple parameters and multiple return values
- What is the type of this function?

```
func sum(x: Int, y: Int) -> (output: Int)
```

Collection Types

- Three primary collection types in Swift
  - Arrays, sets, and dictionaries
- Can be mutable or immutable if `var` or `let` respectively



Arrays

- Stores values of same type in ordered list
- Create an empty array

```
var intArray = [Int] ()
```

- Create an array with default values

```
var defaultArray = [Int](repeating: 0, count: 3)
```

- Create an array with initial values (array literal)

```
var someArray:[Int] = [0, 1, 2, 3]
```

Modifying Arrays

- Concatenate arrays with addition operator

```
let newArray = defaultArray + someArray
```

- Append items with `append()` or `+=`
- Access items with subscript syntax `[index]`
- `count` returns number of items
- And many other properties/functions that you will discover on your own!

Iterating over an Array

- `for-in` loops access all items within an array

```
for number in defaultArray
{ print(number) }
```

- `forEach` method accesses each value in the array

```
defaultArray.forEach { value in

 print("Value is \(value)")}
```

Iterating over an Array

- `Enumerate()` method provides the item's index

```
for (index, value) in
defaultArray.enumerated()
{ print("Index \(index) is \(value)")}
```

Sets

- Store distinct values of the same type with no defined order
- Item can appear only once in a set
- Allow for set operations:
  - Union, Intersect, Subtract, ExclusiveOr
- Will not be discussing these in great detail…

Dictionaries

- Store associations between keys of same type and values of same type with no defined ordering

- Create an empty dictionary

```
var namesOfIntegers = [Int: String]()
```

- Create a dictionary with initial values (dictionary literal)

```
var airports:[String: String] = [“YYZ”: “Toronto”, “DUB”: “Dublin”]
```

Modifying Dictionaries

- Add new item with new key of appropriate type

```
airports[“LHR”] = “London”
```

- Change value associated with a key

```
airports[“LHR”] = “London Heathrow”
```

- Return and remove a key-value pair or return `nil`

```
airports.removeValueForKey(“DUB”)
```

Iterating over a Dictionary

- `for-in` loops can use key-value pairs as tuples

```
for (code, name) in airports { print(“\
(code): \(name)”) }
```

- Or access key or value properties

```
for code in airports.keys
{ print(“Code: \(code)”) }
```