

Digging into Objective-C

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Roadmap

How do you dig into Objective-C?

Memory management

Uses of categories

More on properties

Common Objective-C compiler directives

Architecture independence

Exceptions

Delegation

Memory Management

The Thanksgiving Turkey

Reference counting

- Reference count keeps track of how many people claim ownership of that object.
- If you want an object you didn't create to stay around, you say so by retaining (increases reference count by 1).
- When you are done with an object you've created or retained, you remove responsibility (decrease reference count by 1).
- When an object reaches a reference count of 0, it's finally actually deallocated.

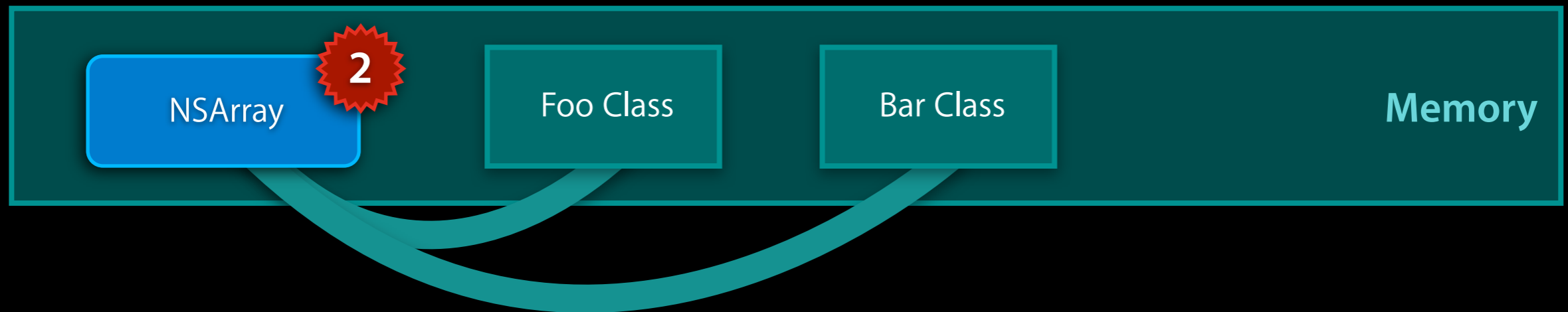
An example

Keeping track of an object



An example

Keeping track of an object



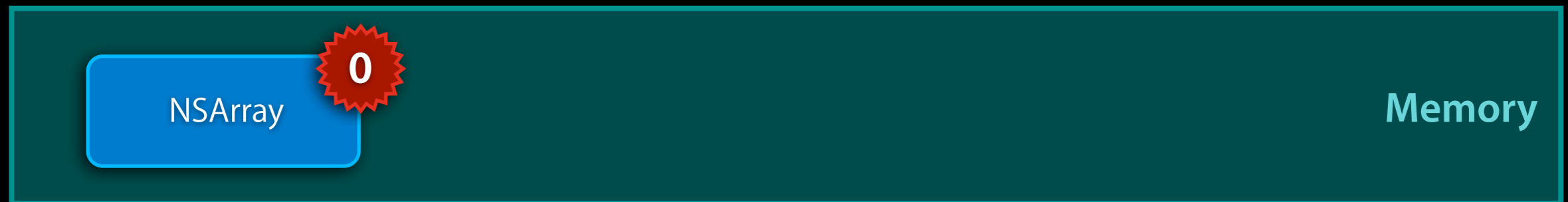
An example

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An example

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To review

- For objects you don't create (e.g. get from methods)
 - **Retain** only when saving to instance variable (or static variable).
 - **Release** only when explicitly told so, or if you retained it by saving it (as in above case).
- For objects you create with `[[SomeClass alloc] init]` or `[myInstance copy]` (without autoreleasing)
 - **Retain** should not need to be called.
 - **Release** when you are done using it.
- Match every **retain** with a **release**: `init` and `copy` both count as implicit retains.
- If you don't know whether you should retain or not, don't because over-releasing is easier to debug than over-retaining.

Autoreleasing

- What if you create an object and you are returning it from a method, how would you be able to release it?

```
- (NSArray *)objects {  
    NSArray *myArray = [[NSArray alloc] initWithObject:myObj];  
    return myArray;  
}
```

Leaks!

```
- (NSArray *)objects {  
    NSArray *myArray = [[NSArray alloc] initWithObject:myObj];  
    return [myArray autorelease];  
}
```

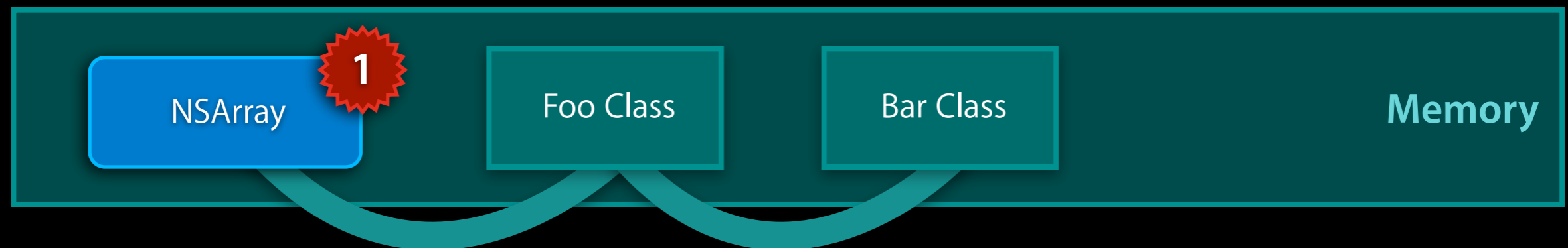
Right

Autoreleasing

- Instead of explicitly releasing something, you mark it for a later release.
- An object called a release pool manages a set of objects to release when the pool itself is released.
- Add an object to the release pool by calling `autorelease`.
- In Cocoa, always guaranteed to have an autorelease pool.

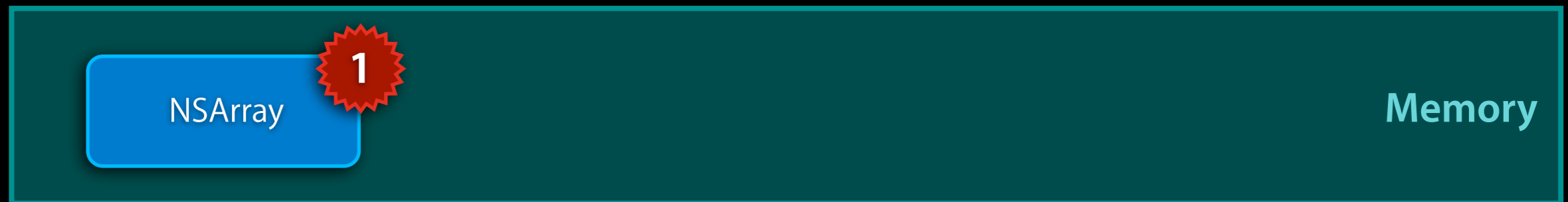
Returning to our earlier example

Keeping track of an object



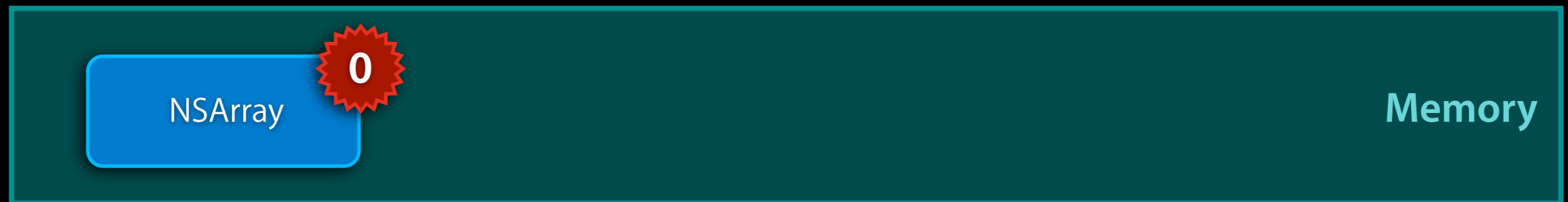
Returning to our earlier example

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Returning to our earlier example

Keeping track of an object



Methods and autorelease

- Objects returned from methods (class or instance) are understood to be autoreleased.
- An exception: `init` and variants.
- Examples:

Is the object returned from this method autoreleased?	
<code>- (NSArray *)allValues;</code>	✓
<code>- (id)init;</code>	✗
<code>+ (NSArray *)arrayWithObject:(id)obj;</code>	✓
<code>+ (id)alloc;</code>	✗

Autorelease semantics

- When you have an autoreleased object and you want to save it to an instance variable, retain it.
- When you create an autoreleased object and add it to a collection, it is retained.

```
// Save autoreleased object to ivar.  
NSDictionary *dict = [NSDictionary dictionary];  
myIvar = [dict retain];
```

```
// Above same as:  
myIvar = [[NSDictionary alloc] init];
```

```
// Adding autoreleased object to collection.  
// 'today' not going away b/c dict retains.  
NSDate *today = [NSDate date];  
[dict setObject:today forKey:@"dateToday"];
```

More on autorelease pools

- One per thread.
 - If you spawn your own thread (POSIX, Mach, or Cocoa), you'll have to create your own `NSAutoreleasePool`.
- Stack based.

```
// Outer autorelease pool.  
NSAutoreleasePool *outer = [[NSAutoreleasePool alloc] init];  
  
// ... do something here  
  
for (id obj in myCollection) {  
    NSAutoreleasePool *inner = [[NSAutoreleasePool alloc] init];  
    [obj doSomethingHuge];  
    [inner drain];  
}  
  
[outer drain];
```

Writing your own classes: init & dealloc

- `init`
 - Needs to call super. Period.
 - Setup instance variables.
 - Returns self.

```
@implementation MyClass

- (id)init {
    if ((self = [super init])) {
        myIVar = @"Hello";
    }
    return self;
}

@end
```

Writing your own classes: init & dealloc

- `dealloc`
 - Never call explicitly.
 - Release all retained (or copied) ivars
 - Calls `[super dealloc]`

```
@implementation MyClass
- (void)saveThis:(id)object {
    if (myIvar != object ) {
        [myIvar release];
        myIvar = [object retain];
    }
}

- (void)dealloc {
    [object release];
    [super dealloc];
}
@end
```

Everything Else

The gravy, stuffing, and mashed potatoes

Why use categories?

- Add private methods to a class.
 - Put category method in implementation file.
- Extend a class's functionality
 - `firstObject` on NSArray, for example.
- Delegation
 - Add methods to NSObject to call on your delegate.

Properties

```
@property (nonatomic, readwrite, retain) MyClass *someProp;
```

- Keywords
 - nonatomic or atomic
 - Only use nonatomic
 - Default is atomic, so change it
 - readonly or readwrite
 - Default is readwrite
 - assign, retain, copy
 - Assign is default. Use for integers, floats, constants.
 - Retain, well, retains it. Use for all objects (except delegates)
 - Copy calls **copy** on the object. Use for strings.
 - Don't need if using readonly.

Common Compiler Directives

- `@class`
 - Forward class declaration.
 - Don't have to import header, just say that class exists, I promise.
 - If you are using a class for a variable or method return/parameter type, forward declare it.
- `@selector`
 - Creates a selector.
 - `@selector(doSomething:withObject:)`
- `@""`
 - Constant string creator.
 - Created at compile time.
 - Release, retain, autorelease do nothing.

Architecture Independence

- For constant-type variables, use 64-bit types.
 - For integers: `NSUInteger` and `NSInteger`
 - For reals: `CGFloat`
- These are simply typedefs (not classes), and are changed depending on whether you are building 64-bit or not.
- Avoid `float`, `int`, `unsigned` if you can.

Exceptions

- When an exception is thrown, it is a cause of **programmer error**, not user error. This is vastly different from Java.
- Very few uses for `@try @catch` blocks.
- If you get an exception, it's your fault.

Delegation

- One of the greatest features of Objective-C.
- One object asks another for information or tells of what it is doing, and the asking class does not need to know anything about the delegate.
- This is how classes like `UITableView` work to get information.

