ABOUTOBJECTS

Streamlining JSON Mapping

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About Objects

- Reston, VA
- Full-stack consulting and training
- Roots in NeXT, OpenStep, WebObjects + enterprise middleware and backend
- iOS from day one

So Many Frameworks

Number of hits yielded by a recent Github search for *swift json*:

576

Seems it's on a lot of peoples' radar.

Automating Encode/Decode

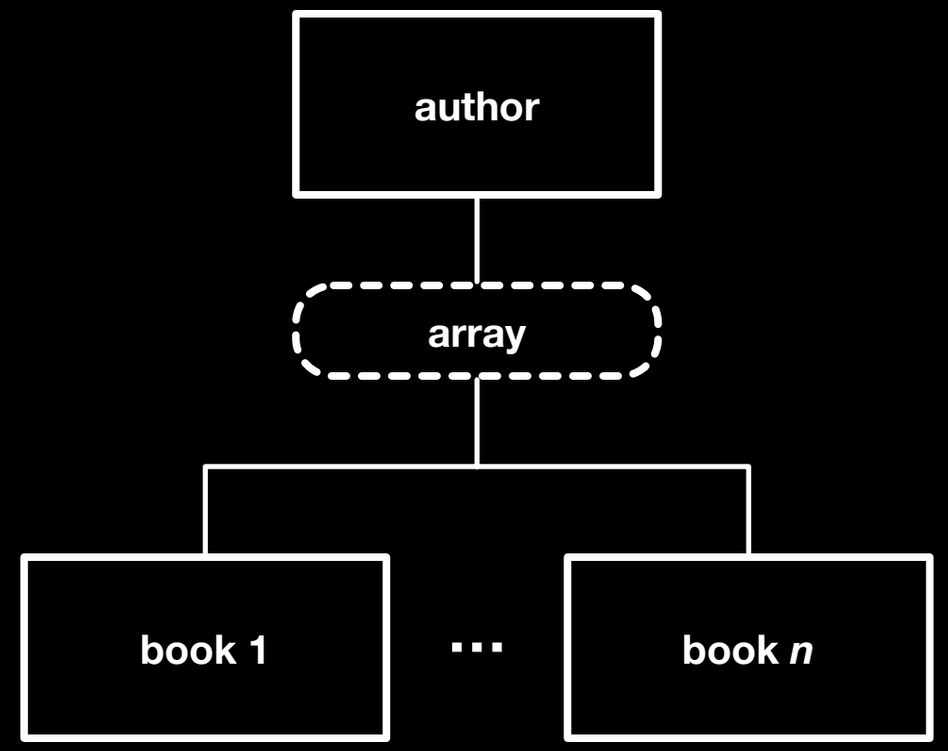
```
{ "book_id": 42,
  "title": "The Time Machine",
  "rating": 3 }
```

```
public class Book: NSObject {
    public var bookId: Int
    public var title: String?
    public var rating: Rating?
}
```

1. Map keys to property names
2. Perform value transformations
3. Encode and decode model objects

JSON <--> Object Graph

```
{ "author_id": 98,
  "first_name": "H. G.",
  "last_name": "Wells",
  "books": [
    { "book_id": 42,
      "title": "The Time Machine",
      "rating": 3 },
  ...
```



Mapping Frameworks

You define mappings programmatically by:

- Defining mappings per property in code (ObjectMapper, SwiftJSON)
- Providing dictionaries of mappings per class (RestKit)

RestKit Example

```
RKObjectMapping *bookMapping = [RKObjectMapping mappingForClass:Book.class];
[bookMapping addAttributeMappingsFromDictionary:@{
    @"book_id": @"bookId",
    @"title": @"title",
    @"rating": @"rating",
}];

RKResponseDescriptor *descriptor = [RKResponseDescriptor
responseDescriptorWithMapping:bookMapping
method:RKRequestMethodAny
pathPattern:nil
keyPath:@"books"
statusCodes:RKStatusCodeIndexSetForClass(RKStatusCodeClassSuccessful)];
```

ObjectMapper Example

```
class Book: Mappable {
    public var bookId: Int
    public var title: String?
    public var rating: Rating?

    required init?(_ map: Map) {
    }

    // Mappable
    func mapping(map: Map) {
        bookId <- map["book_id"]
        title <- map["title"]
        rating <- map["rating"]
    }
}
```

Issues

- Maintenance is awkward
- Model hard to visualize
- Strings in code reduce safety

The Modelmatic Framework

www.github.com/AboutObjects/modelmatic

Model Needs to Capture:

- Relationship info: to-many, target type
- Nice to have: inverse relationships
- Mapping keys to property names
- Value transformations

Framework Needs to:

- Traverse relationships defined in model
- Construct nested objects
- Use introspection to get and set values
- Map keys and transform values

Do all the above without manual coding (except for custom transformations)

Core Data Model Editor

- Awesome tool for data modeling
- Defines mappings in a visual format
- Framework-level programmatic access

But wait, it's only for Core Data, right?

Heh, heh

Managed Object Model (MOM)

- Defines mappings between model objects and their external data representation
- Designed to support relational databases (object-relational mapping)
- **Can be loaded as `NSManagedObjectModel` instance at runtime**

Entities

- Metadata description of domain object
- Lists two kinds of properties: attributes and relationships
- Defines mapping between JSON dictionary and Swift class
- **Instances of `NSEntityDescription` in `NSManagedObjectModel`**

Attributes

- Metadata descriptions of individual values
- Define mappings between data elements and Swift properties
- **Instances of** `NSAttributeDescription` **in** `NSEntityDescription`

Relationships

- Describe properties that refer to model objects
- Specify destination entity name, and optional inverse relationship
- Can be *to-one* or *to-many*
- **Instances of `NSRelationshipDescripton` in `NSEntityDescription`**

Demo: Xcode Model Editor

Encode/Decode Via KVC

Quick definition:

KVC is built-in **`NSObject`** *behavior that allows you to treat an object like a dictionary.*

Quick example:

```
// Set author's 'firstName' property to "Fred"
author.setValue("Fred", forKey: "firstName")

// Initialize 'name' with the value of the author's 'firstName' property
let name = author.value(forKey: "firstName")
```

The Modelmatic Framework

ModelMatic Cocoapod

- ModelObject base class
- Uses MOM + KVC to encode/decode
- Simple API
- Example app + unit tests show usage

Subclassing

```
@objc (MDLAuthor)
class Author: ModelObject
{
    static let entityName = "Author"

    var authorId: NSNumber?
    var firstName: String?
    var lastName: String?

    // Strong reference to children, to-many relationship
    var books: [Book]?
}
```

Basic Usage

```
// Decoding

let author = Author(dictionary: json, entity: entity)

// Encoding

let jsonDict = author.dictionaryRepresentation
```

ModelMatic Example

```
// Assume we fetched JSON and deserialized it:
let json = ["author_id": 123, "first_name": "Fred", "last_name": "Smith", "books": [
        ["book_id": 234, "title": "Yadda, Yadda", "rating": 3],
        ["book_id": 456, "title": "Whee!", "rating": 5]
    ]
]

// Encode
let author = Author(dictionary: json, entity: entity)

// Work with the objects
author.firstName = "Frederick"
author.books[0]?.title = "War and Peace"

// Decode
let newJson = author.dictionaryRepresentation

// Contents of newJson:


{ "author_id": 123, "first_name": "Frederick", "last_name": "Smith", "books": [
        { "book_id": 234, "title": "War and Peace", "rating": 3 },
        { "book_id": 456, "title": "Whee!", "rating": 5 }
    ]
}
```

Managing Relationships

Setting to-one relationships

```
public func set(modelObject: ModelObject, forKey: String) throws
```

Adding objects to to-many relationships

```
public func add(modelObject: ModelObject, forKey: String) throws

public func add(modelObjects: [ModelObject], forKey: String) throws
```

KVC and Swift Types

KVC handles automatically:

- ObjC types, even if wrapped in Optionals 👍🏻
- Bridged Swift types (`String`, `Int`, etc.) 👍🏻

KVC needs a little help with:

- Bridged Swift types wrapped in Optionals 👎🏻
- Non-bridged Swift types 👎🏻

Working with Swift Types

For non-Objc properties, add a computed property prefixed with **_kvc**, as shown below:

```
var retailPrice: Double?

var kvc_retailPrice: Double {
    get { return retailPrice ?? 0.0 }
    set { retailPrice = Optional(newValue) }
}
```

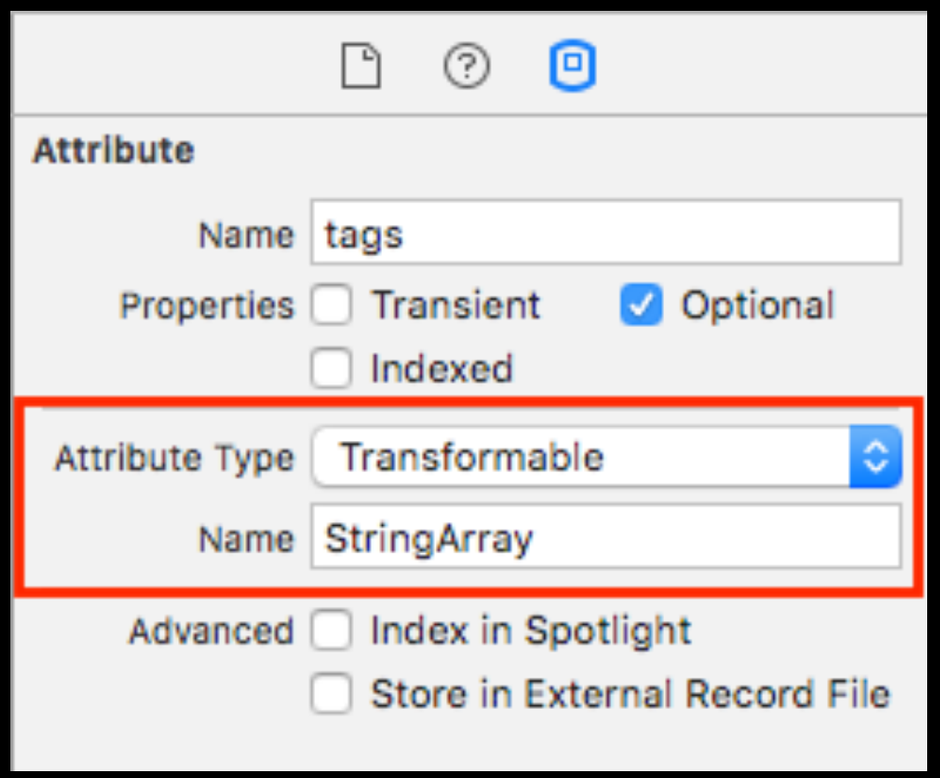
Transforming Values

To define custom transformation:

- Subclass `NSValueTransformer`
- Register subclass

```
NSValueTransformer.setValueTransformer(
    MyTransformer(),
    forName: MyTransformer.transformerName)
```

Apply to attributes by setting type to *Transformable*

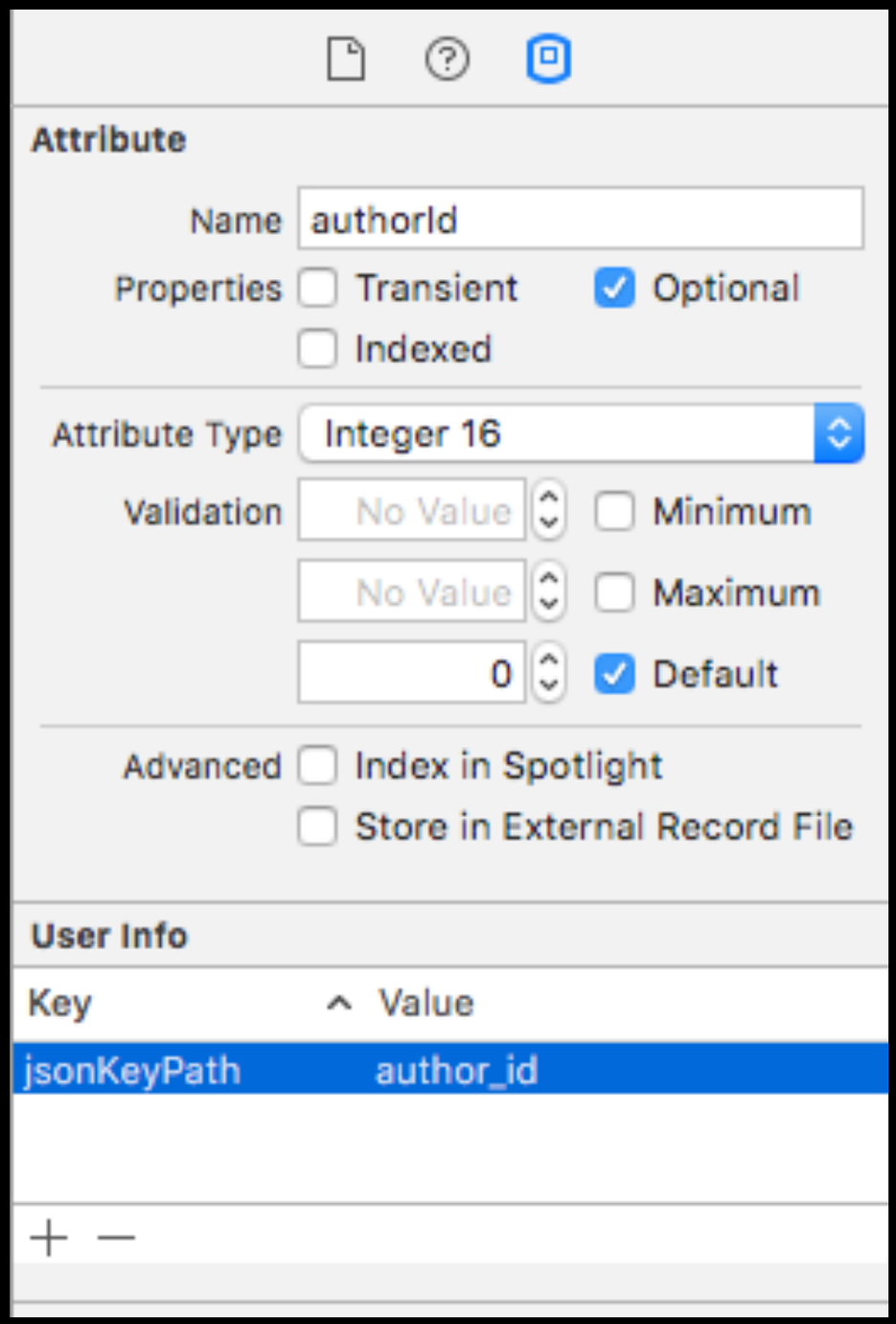


Value Transformer Example

```
private let delimiterString = ","

@objc (MDLStringArrayTransformer)
class StringArrayTransformer: NSValueTransformer
{
    static let transformerName = "StringArray"

    override class func transformedValueClass() -> AnyClass { return NSString.self }
    override class func allowsReverseTransformation() -> Bool { return true }

    override func transformedValue(value: AnyObject?) -> AnyObject? {
        guard let values = value as? NSArray else { return value }
        return values.componentsJoinedByString(delimiterString)
    }

    override func reverseTransformedValue(value: AnyObject?) -> AnyObject? {
        guard let stringVal = value as? String else { return nil }
        return stringVal.componentsSeparatedByString(delimiterString)
    }
}
```

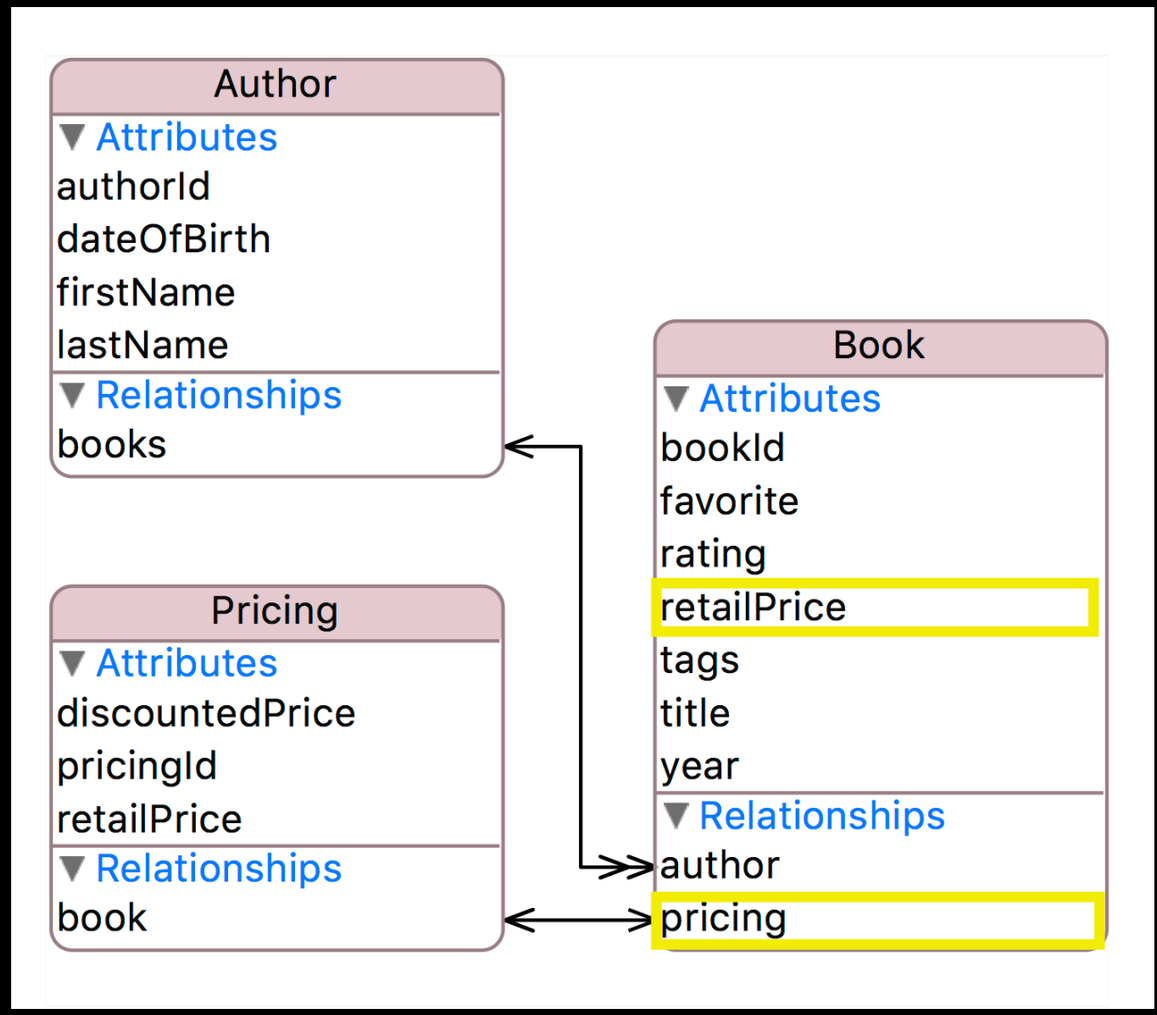
Mapping Key Paths

Set value for key *jsonKeyPath* in attribute's UserInfo dictionary



Flattened Attributes

Preserving JSON structure during encoding requires modeled relationship.

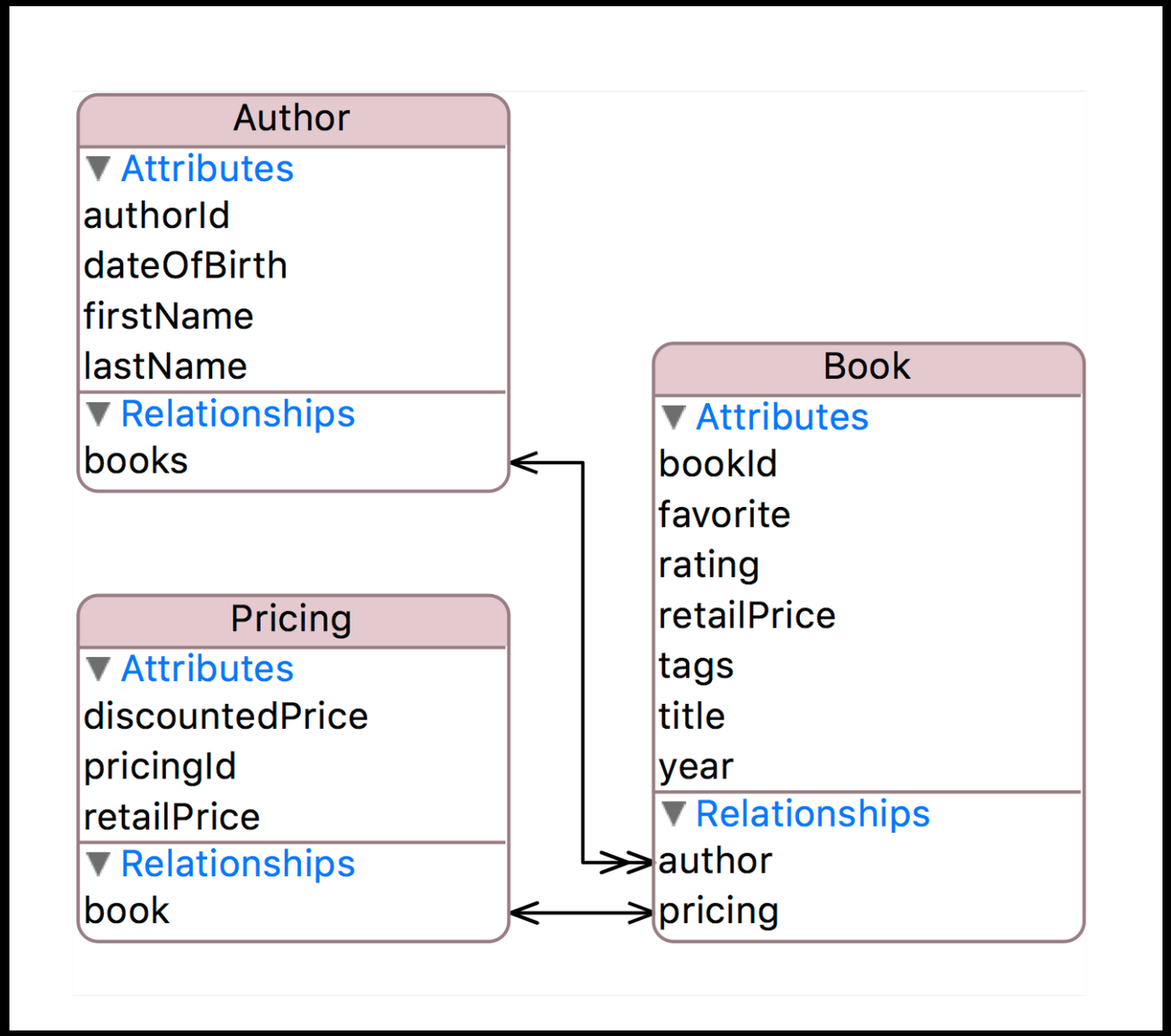


Example App

Object Store

- Accesses JSON via `NSURLSessionDataTask`
- Uses `NSURLProtocol` to intercept and access locally stored JSON
- Can switch modes to directly access local storage

Example App Data Model



Sample JSON

```
"version" : 0,
"authors" : [
  {
    "books" : [
      {
        "title" : "The Tempest",
        "year" : "2013",
        "tags" : "drama,fantasy",
        "pricing" : {
          "retail_price" : 14.99
        },
        "favorite" : true,
        "book_id" : "3001",
        "rating" : 4
      },
```

Demo: Example App

ModelMatic

- Comprehensive visual model
- Automates:
  - Object graph construction
  - Value transformation
  - Key path mappings
  - Flattening attributes
- Built-in model versioning

ModelMatic + mogenerator

- **mogenerator** – command-line tool that generates base classes for Core Data entities
- Base classes can be regenerated whenever model changes
- Allows templates used for generating classes to be customized

To Do:

- Testing and documentation
- Fully automate non-bridged types (dependent on Swift introspection)
- Add support for `NSManagedObject` subclasses
- Do clever things with model versions (TBD)
- Proposed: auto generate model from JSON

Contributors welcome!

Q & A

We're Hiring

consultants with backgrounds in:

- iOS
- Android
- Middleware – Ruby and Java
- Backend – Java

Upcoming Classes

Reston

10/3 - 10/7 • Advanced iOS Development

10/22 - 10/28 • iOS Development in Swift: Comprehensive

12/10 - 12/16 • iOS Development in Objective-C: Comprehensive

Cupertino

11/21 - 11/22 • WatchKit Development

1/30 - 2/3 • iOS Development in Swift: Comprehensive

- View online: Public schedule