

A lioness is lying down in a dense, green bush. She is looking towards the camera with a calm expression. The lighting is soft, suggesting a natural outdoor setting.

Core Data & the Big Five

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@timisted

All Photography ©2011 Tim Isted

An Intro to Core Data







STANDARD EQUIPMENT
MYFORD
Fixed in 38
THIS MAKING OF THE



Core Data Car Dealership
Reliably Old-Fashioned Leasing

Managed Objects

Managed Object Context

Persistent Store Coordinator

Persistent Store (s)

Persistent Store (s)

Persistent Store (s)

Persistent Store Coordinator

Persistent Store (s)

Persistent Store Coordinator

Persistent Store (s)

Persistent Store Coordinator

Persistent Store (s)

Managed Object Context

Persistent Store Coordinator

Persistent Store (s)

Managed Object Context

Persistent Store Coordinator

Persistent Store (s)

Managed Objects

Managed Object Context

Persistent Store Coordinator

Persistent Store (s)

Managed Objects

Managed Object Context

Persistent Store Coordinator

Persistent Store (s)

Don't think SQL

Don't think SQL

Think Objects

Don't think SQL

Think Objects™



Modeling Your Data

CoreDataCarDealership.xcodeproj — CoreDataCarDealership.xcdatamodel

Run Stop Scheme Breakpoints Xcode No Issues Editor View Organizer

CoreDataCarDealership CoreDataCarDealership CoreDataCarDealership.xcdat... CoreDataCarDealership.xcdatamodel No Selection

ENTITIES
FETCH REQUESTS
CONFIGURATIONS

Attributes

Attribute	Type

Relationships

Relationship	Destination	Inverse

Fetches Properties

Fetches Property	Predicate

Outline Style Add Entity Add Attribute Editor Style

CoreDataCarDealership.xcodeproj — CoreDataCarDealership.xcdatamodel

Run Stop Scheme Breakpoints Xcode No Issues Editor View Organizer

CoreDataCarDealership > CoreDataCarDealership > CoreDataCarDealership.xcdatamodel > CoreDataCarDealership.xcdatamodel > Entity

ENTITIES
Entity

FETCH REQUESTS

CONFIGURATIONS
Default

Attributes

Attribute	Type
+	-

Relationships

Relationship	Destination	Inverse
+	-	

Fetches Properties

Fetches Property	Predicate
+	-

Outline Style Add Entity Add Attribute Editor Style

CoreDataCarDealership.xcodeproj — CoreDataCarDealership.xcdatamodel

Run Stop Scheme Breakpoints Xcode No Issues Editor View Organizer

CoreDataCarDealership CoreDataCarDealership CoreDataCarDealership.xcdatamodel CoreDataCarDealership.xcdatamodel Car

ENTITIES
E Car

FETCH REQUESTS

CONFIGURATIONS
Default

Attributes

Attribute	Type

+ -

Relationships

Relationship	Destination	Inverse

+ -

Fetches Properties

Fetches Property	Predicate

+ -

Outline Style Add Entity Add Attribute Editor Style

CoreDataCarDealership.xcodeproj — CoreDataCarDealership.xcdatamodel

Run Stop Scheme Breakpoints Xcode Project 2 Editor View Organizer

CoreDataCarDealership CoreDataCarDealership CoreDataCarDealership... CoreDataCarDealership... Car model

ENTITIES
E Car

FETCH REQUESTS

CONFIGURATIONS
Default

Attributes

Attribute	Type
U make	Undefined
U model	Undefined

+ -

Relationships

Relationship	Destination	Inverse
--------------	-------------	---------

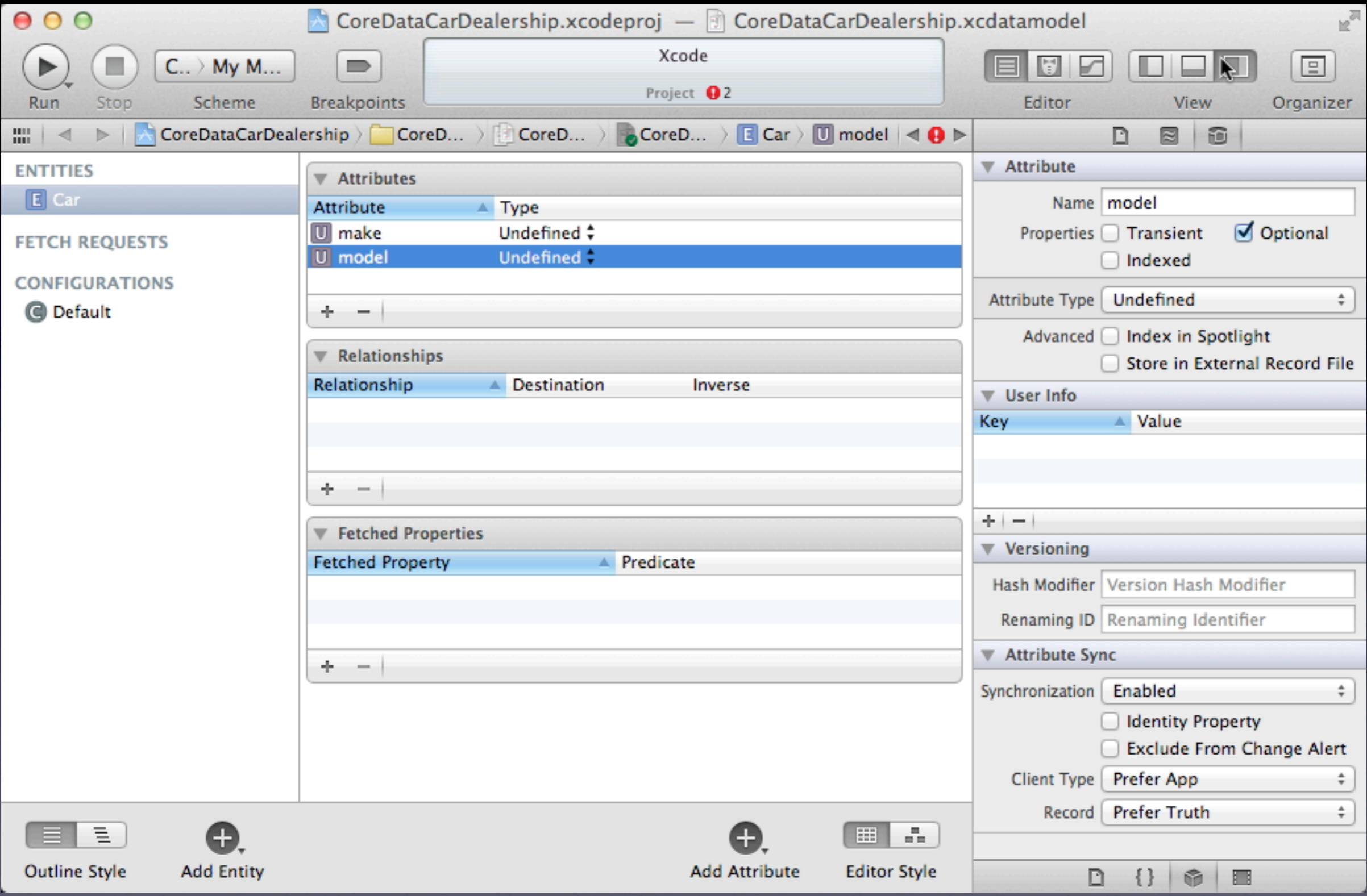
+ -

Fetches Properties

Fetches Property	Predicate
------------------	-----------

+ -

Outline Style Add Entity Add Attribute Editor Style



CoreDataCarDealership.xcodeproj — CoreDataCarDealership.xcdatamodel

Run Stop Scheme Breakpoints Xcode Project 2 Editor View Organizer

CoreDataCarDealership > CoreData... > CoreData... > CoreData... > Car > model

ENTITIES
Car
FETCH REQUESTS
CONFIGURATIONS
Default

Attributes

Attribute	Type
make	Undefined
model	Undefined

Relationships

Relationship	Destination	Inverse
--------------	-------------	---------

Fetched Properties

Fetches Property	Predicate
------------------	-----------

Attribute

Name: model

Properties: Transient Optional Indexed

Attribute Type: Undefined

Advanced: Index in Spotlight Store in External Record File

User Info

Key	Value
-----	-------

Versioning

Hash Modifier: Version Hash Modifier

Renaming ID: Renaming Identifier

Attribute Sync

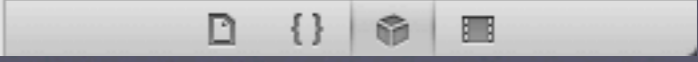
Synchronization: Enabled

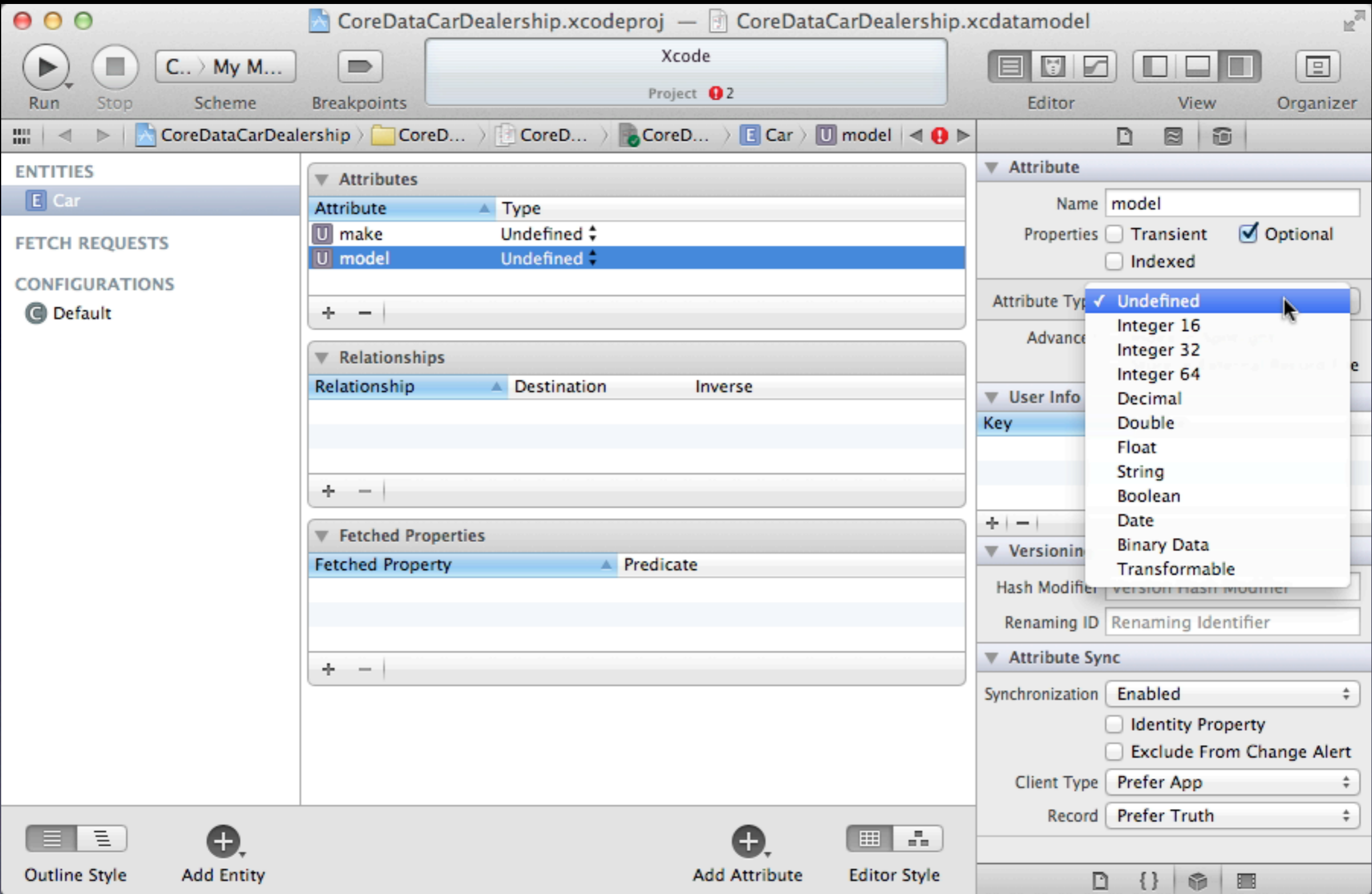
Identity Property Exclude From Change Alert

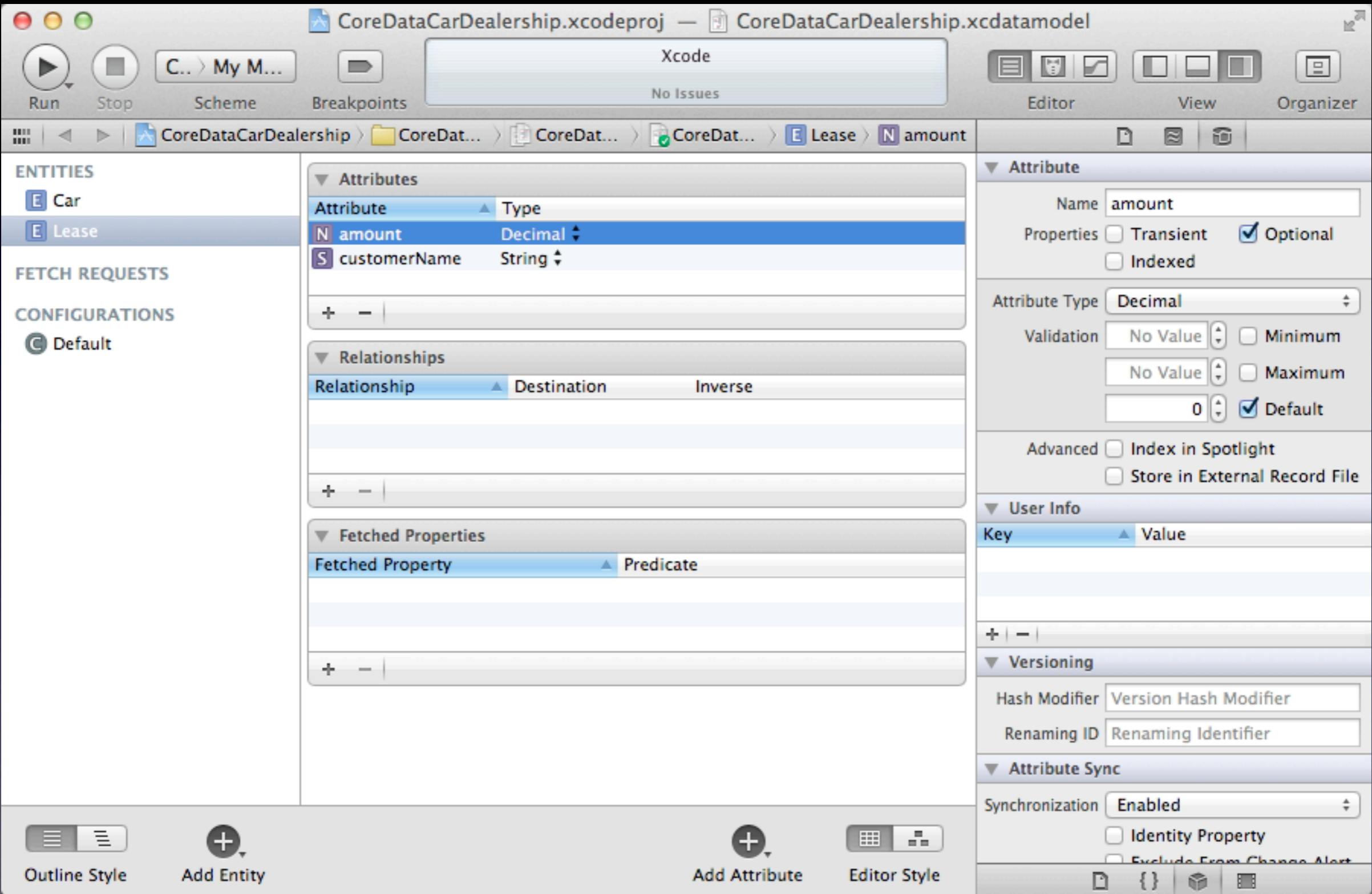
Client Type: Prefer App

Record: Prefer Truth

Outline Style Add Entity Add Attribute Editor Style







ENTITIES

- Car
- Lease**

FETCH REQUESTS

CONFIGURATIONS

- Default

Attributes

Attribute	Type
N amount	Decimal
S customerName	String

Relationships

Relationship	Destination	Inverse
--------------	-------------	---------

Fetched Properties

Fetched Property	Predicate
------------------	-----------

Attribute

Name: amount

Properties: Transient Optional Indexed

Attribute Type: Decimal

Validation: No Value Minimum No Value Maximum 0 Default

Advanced: Index in Spotlight Store in External Record File

User Info

Key	Value
-----	-------

Versioning

Hash Modifier: Version Hash Modifier

Renaming ID: Renaming Identifier

Attribute Sync

Synchronization: Enabled

Identity Property Exclude From Change Alert

CoreDataCarDealership.xcodeproj — CoreDataCarDealership.xcdatamodel

Run Stop Scheme Breakpoints Xcode No Issues Editor View Organizer

CoreDataCarDealership > CoreData... > CoreData... > CoreData... > Lease > amount

ENTITIES

- Car
- Lease

FETCH REQUESTS

CONFIGURATIONS

- Default

Attributes

Attribute	Type
N amount	Decimal
S customerName	String

Relationships

Relationship	Destination	Inverse

Fetches Properties

Fetches Property	Predicate

Attribute

Name: amount

Properties: Transient Optional Indexed

Attribute Type: Decimal

Validation: No Value Minimum No Value Maximum 0 Default

Advanced: Index in Spotlight Store in External Record File

User Info

Key	Value

Versioning

Hash Modifier: Version Hash Modifier

Renaming ID: Renaming Identifier

Attribute Sync

Synchronization: Enabled

Identity Property Exclude From Change Alert

Outline Style Add Entity Add Attribute Editor Style

CoreDataCarDealership.xcodeproj — CoreDataCarDealership.xcdatamodel

Run Stop Scheme Breakpoints Xcode Project 1

CoreDataCarDealership > CoreData... > CoreData... > CoreData... > Lease > car

ENTITIES

- Car
- Lease

FETCH REQUESTS

CONFIGURATIONS

- Default

Attributes

Attribute	Type
N amount	Decimal
S customerName	String

Relationships

Relationship	Destination	Inverse
car	Car	No Inverse

Fetches Properties

Fetches Property	Predicate
------------------	-----------

Relationship

Name: car

Destination: Car

Inverse: No Inverse Relationship

Properties: Transient Optional

Arranged: Ordered

Plural: To-Many Relationship

Count: 1 Minimum

1 Maximum

Delete Rule: Nullify

Advanced: Index in Spotlight Store in External Record File

User Info

Key	Value
-----	-------

Versioning

Hash Modifier: Version Hash Modifier

Renaming ID: Renaming Identifier

Relationship Sync

Synchronization: Enabled

Outline Style Add Entity Add Attribute Editor Style

CoreDataCarDealership.xcodeproj — CoreDataCarDealership.xcdatamodel

Run Stop Scheme Breakpoints Xcode No Issues Editor View Organizer

CoreDataCarDealership > CoreDataCarDealership.xcdatamodel > Lease

ENTITIES

- Car
- Lease**

FETCH REQUESTS

CONFIGURATIONS

- Default

Attributes

Attribute	Type
N amount	Decimal
S customerName	String

Relationships

Relationship	Destination	Inverse
car	Car	lease

Fetches Properties

Fetches Property	Predicate
------------------	-----------

Entity

Name: Lease

Class: NSObject

Abstract Entity

Parent Entity: No Parent Entity

Indexes

User Info

Key	Value
-----	-------

Versioning

Hash Modifier: Version Hash Modifier

Renaming ID: Renaming Identifier

Entity Sync

Synchronization: Enabled

Data Class:

Exclude From Change Alert

Outline Style Add Entity Add Attribute Editor Style

Creating Objects



```
NSPersistentStoreCoordinator *coordinator =  
    [[NSPersistentStoreCoordinator alloc]  
     initWithManagedObjectModel:model];
```

```
[coordinator  
 addPersistentStoreWithType:NSSQLiteStoreType  
 configuration:nil URL:fileUrl  
 options:nil error:&error];
```

```
NSManagedObjectContext *context =  
    [[NSManagedObjectContext alloc] init];
```

```
[context  
 setPersistentStoreCoordinator:coordinator];
```

```
NSManagedObject *car =
```



```
NSManagedObject *car =  
    [NSEntityDescription  
        insertNewObjectForEntityForName:@"Car"  
        inManagedObjectContext:context];
```

```
NSManagedObject *car =  
    [NSEntityDescription  
        insertNewObjectForEntityForName:@"Car"  
        inManagedObjectContext:context];
```

```
[car setValue:@"Mercedes" forKey:@"make"];  
[car setValue:@"SL55 AMG" forKey:@"model"];
```

```
NSManagedObject *lease =  
    [NSEntityDescription  
        insertNewObjectForEntityForName:@"Lease"  
        inManagedObjectContext:context];
```

```
NSManagedObject *lease =  
    [NSEntityDescription  
        insertNewObjectForEntityForName:@"Lease"  
        inManagedObjectContext:context];
```

```
[lease setValue:car forKey:@"car"];
```

(sets *both sides* of the relationship)

```
NSError *anyError = nil;  
BOOL success = [context save:&anyError];  
  
if (!success) {  
    // do something about anyError  
}
```



Fetching Objects

```
NSFetchRequest *request =  
    [[NSFetchRequest alloc] init];
```

```
[request setEntity:  
    [NSEntityDescription  
        entityForName:@"Car"  
        inManagedObjectContext:context]];
```

```
NSArray *results =  
    [context executeFetchRequest:request  
        error:&anyError];
```

```
NSFetchRequest *request =  
    [[NSFetchRequest alloc] init];
```

```
[request setEntity:  
    [NSEntityDescription  
        entityForName:@"Car"  
        inManagedObjectContext:context]];
```

```
[request setPredicate:  
    [NSPredicate  
        predicateWithFormat:@"make == %@",  
        @"Aston Martin"]];
```

```
NSArray *results =  
    [context executeFetchRequest:request  
        error:&anyError];
```




Faulting and Uniquing

- Information returned as “Faults”
- Request faulted information—“fault fires”
- One instance per persisted object



Core Data Problems



The managed object model version used to open the persistent store is incompatible with the one that was used to create the persistent store.

OK



The managed object model version used to open the persistent store is incompatible with the one that was used to create the persistent store.

OK

```
[coordinator  
  addPersistentStoreWithType:NSSQLiteStoreType  
  configuration:nil          URL:fileUrl  
  options:options error:&error];
```



The managed object model version used to open the persistent store is incompatible with the one that was used to create the persistent store.

OK

```
NSDictionary *options =  
    [NSDictionary dictionaryWithObjectsAndKeys:  
        [NSNumber numberWithInt:YES],  
        NSMigratePersistentStoresAutomaticallyOption,  
        [NSNumber numberWithInt:YES],  
        NSInferMappingModelAutomaticallyOption, nil];
```

```
[coordinator  
    addPersistentStoreWithType:NSSQLiteStoreType  
        configuration:nil        URL:fileUrl  
        options:options error:&error];
```

Xcode File Edit View Navigate Editor Product Window Help

CoreDataCarDealership.xcodeproj — CoreDataCarDealership.xcdatamodel

Build Succeeded | Today at 16:10

Run Stop Scheme Breakpoints Editor View Organizer

CoreDataCarDealership > CoreDataCarDealership.xcdatamodel > Lease

CoreDataCarDealership
1 target, Mac OS X SDK 10.7

- CoreDataCarDealership
 - TVAppDelegate.h
 - TVAppDelegate.m
 - MainMenu.xib
 - CoreDataCarDe...ip.xcdatamodeld
 - Supporting Files
 - CoreDataCarDealership-Info.plist
 - InfoPlist.strings
 - main.m
 - CoreDataCarD...ship-Prefix.pch
 - Credits.rtf
 - Frameworks
 - Products

ENTITIES

- Car
- Lease

FETCH REQUESTS

CONFIGURATIONS

- Default

Attributes

Attribute	Type
N amount	Decimal
S customerName	String

Relationships

Relationship	Destination	Inverse
car	Car	lease
lease	Lease	lease

Fetches Properties

Fetches Property	Predicate
------------------	-----------

Outline Style Add Entity Add Attribute Editor Style

**entityForName: could not locate an
NSManagedObjectModel for entity name 'Car'**

Suitable Core Data Stack?

Nil Managed Object Context?



Performance Optimization

Memory:	SQLite
Speed:	Binary / In-Memory
Readability:	XML

Optimize Predicates

- Scalar values
- Most-Restrictive
- Strings Last

Turn off Undo

- Contexts under Mac OS X have an Undo Manager by default—set it to nil when not needed
- Contexts under iOS do not have an Undo Manager by default

Set Argument:

`com.apple.CoreData.SQLDebug`

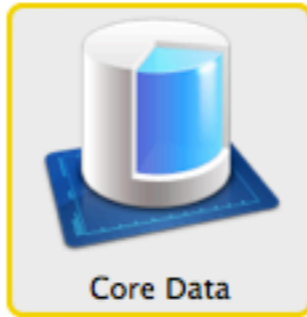
Greater than Zero for debug output

Choose Trace Template or Existing Document:

- Mac OS X
 - All
 - Memory
 - CPU
 - File System
 - Behavior
- User
 - All
- Document
 - Open
 - Recent



File Activity



Core Data



UI Recorder



Cocoa Layout



Sudden Termination



Core Data

This template traces Core Data filesystem activity, including fetches, cache misses, and saves.

To customize, place items from the Library window onto the Instruments list, then use the inspector to adjust the Instruments settings as desired.



Cancel

Profile



Lion &
iOS 5

Concurrency: The “Good Old Days”

One Context Per Thread

Concurrency: The “Good Old Days”

One Context Per Thread

`NSManagedObjectContextDidSaveNotification`

Concurrency: The “Good Old Days”

One Context Per Thread

```
NSManagedObjectContextDidSaveNotification
```

```
[context  
mergeChangesFromContextDidSaveNotification:  
aNotification];
```

Concurrency: The “New Era”

Concurrency: The “New Era”

- **(id)initWithConcurrencyType:
(NSManagedObjectContextConcurrencyType) type;**

Concurrency: The “New Era”

```
- (id)initWithConcurrencyType:  
    (NSManagedObjectContextConcurrencyType) type;
```

```
enum {  
    NSConfinementConcurrencyType,    (original)  
    NSPrivateQueueConcurrencyType,  (for blocks)  
    NSMainQueueConcurrencyType,     (main queue)  
};
```

Parent and Child Contexts



```
NSManagedObjectContext *parentContext =  
    [[NSManagedObjectContext alloc]  
     initWithConcurrencyType:  
         NSPrivateQueueConcurrencyType];  
[parentContext  
 setPersistentStoreCoordinator:coordinator];
```

```
NSManagedObjectContext *parentContext =  
    [[NSManagedObjectContext alloc]  
     initWithConcurrencyType:  
         NSPrivateQueueConcurrencyType];  
[parentContext  
 setPersistentStoreCoordinator:coordinator];
```

```
[childContext setParentContext:parentContext];
```



```
BOOL success = [childContext save:&anyError];
```

When Child Saves:

Changes pushed up one level to parent

```
BOOL success = [childContext save:&anyError];
```

When Child Saves:

Changes pushed up one level to parent

```
[parentContext performBlock:^(  
    // save parent context  
)];
```

When Parent Saves:

Changes pushed up one level to
persistent store coordinator



Ordered Relationships

Properties Transient Optional
Arranged Ordered
Plural To-Many Relationship

Properties Transient Optional
Arranged Ordered
Plural To-Many Relationship

Not Currently Compatible with iCloud

Attribute Type

Binary Data



Options

Allows External Storage



Custom Incremental Stores

iCloud



For Deltas, use SQLite store

Persistent Store Options:

`NSPersistentStoreUbiquitousContentNameKey`

`NSPersistentStoreUbiquitousContentURLKey`

Change Notification:

`NSPersistentStoreDidImportUbiquitousContentChangesNotification`



Thank you

Tim Isted

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