

Creating Models

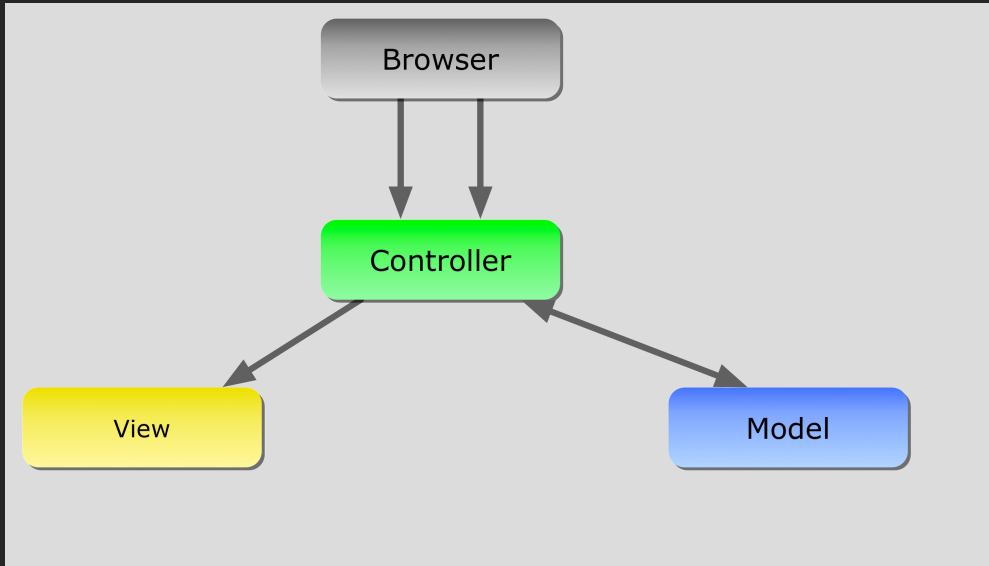
Rob Allen ~ October 2014

I make business websites

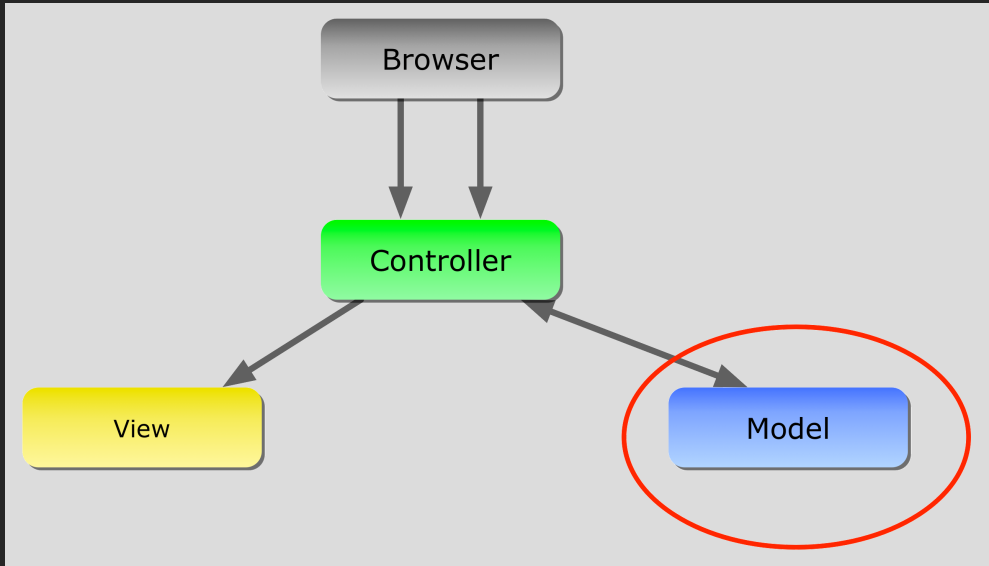
19ft.com

The business logic
is the hard part

MVC



MVC



The model is the
solution to a problem

Business rules

Application logic

Mappers

3rd party APIs

Database storage

Value objects

Sending emails

Invariants

Authentication

Entities

ORM

Logging

Business rules

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Value object

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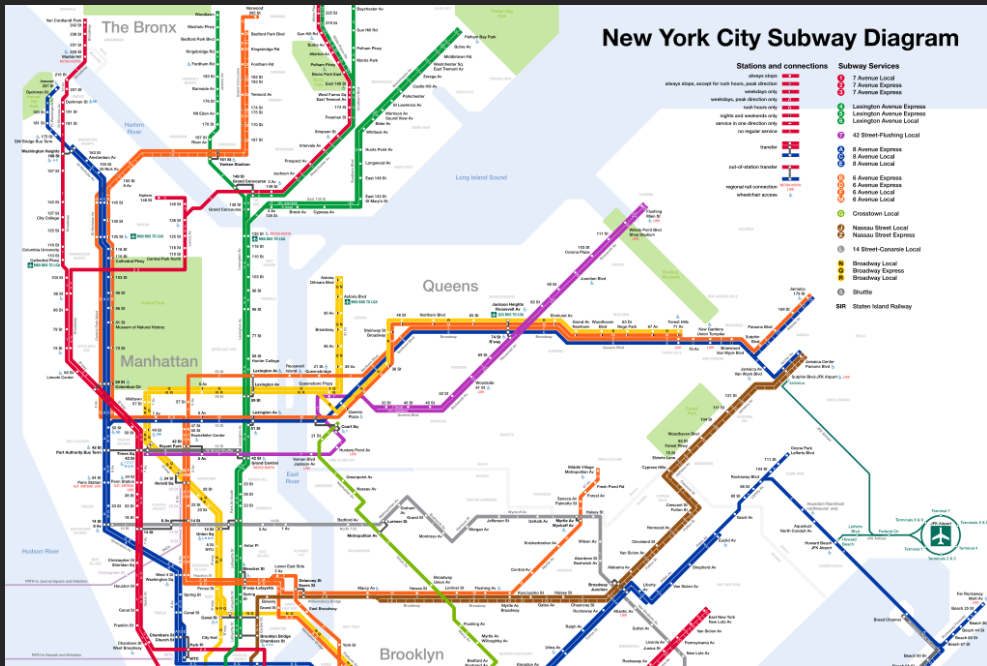
3rd party APIs

ORM

Authentication

Logging

New York City Subway Diagram



- Stations and connections**
- always open
 - closed station
 - weekdays only
 - weekends, peak direction only
 - weekends only
 - nights and weekends only
 - service to be discontinued
 - no regular service
 - transfer
 - end of station transfer
 - regional connection
 - intermodal access
- Subway Services**
- 7 Avenue Local
 - 7 Avenue Express
 - 7 Avenue Express
 - Lexington Avenue Express
 - Lexington Avenue Express
 - Lexington Avenue Local
 - 42 Street-Flushing Local
 - 8 Avenue Express
 - 8 Avenue Local
 - 8 Avenue Local
 - 6 Avenue Express
 - 6 Avenue Local
 - 6 Avenue Local
 - 6 Avenue Local
 - CrossTown Local
 - Nassau Street Local
 - Nassau Street Express
 - 14 Street-Canarsie Local
 - Broadway Local
 - Broadway Express
 - Broadway Local
 - Shuttle
 - SIR Station Island Railway

A problem

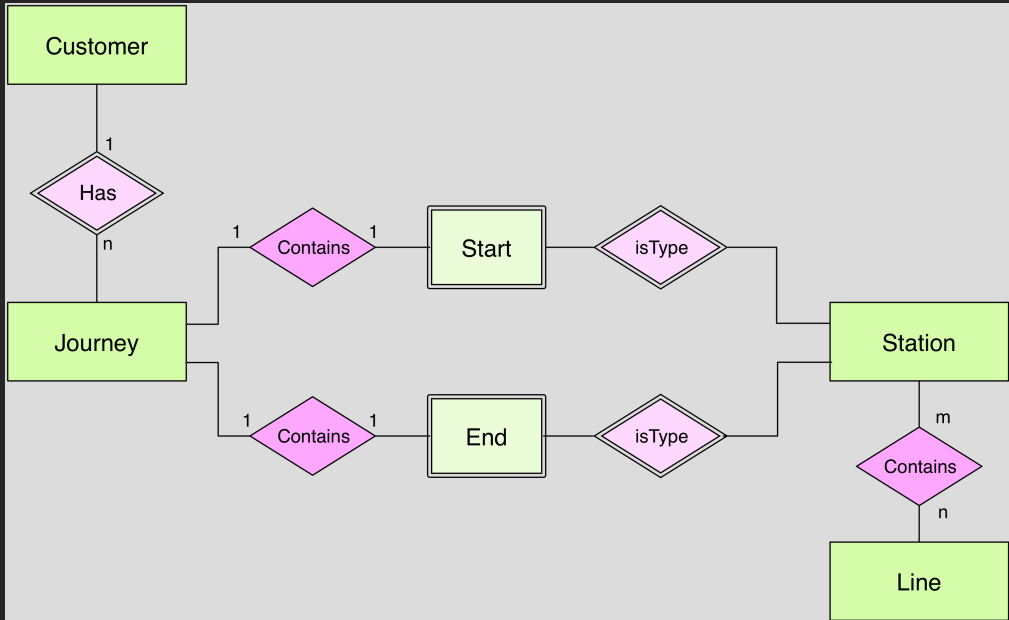
A customer wants to plan a journey between two stations.

How do we model this?

Identify the key objects

- Customer
- Journey
- Station
- Line

E-R Diagram



Entities represent things in the
problem-space

Entity

- Means something to the customer
- An object defined primarily by its identity
- Mutable
- Persisted
- Has a life cycle

Identity

- The identity of an object is what it means to the customer
- Unique within the scope of the domain

For a tube station, this is its *name*, not its database id.

My customer is never going to talk to me about station 43, they are going to say “Euston Square”.

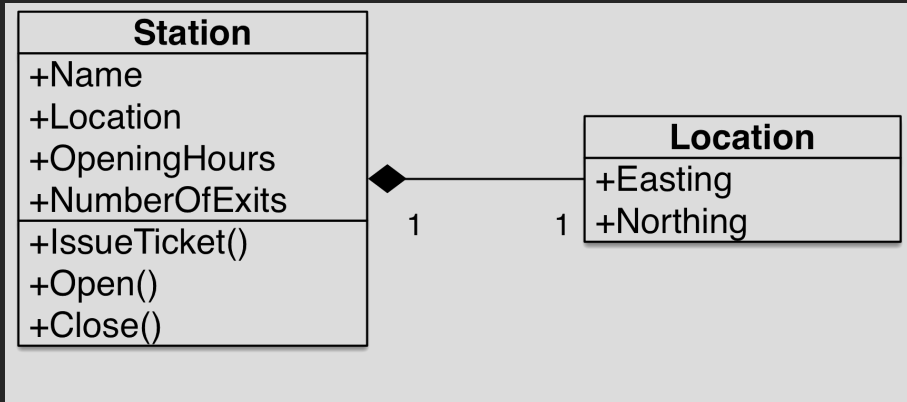
Value objects

- Defined primarily by its attributes
- Immutable
- Simple!
- Do not exist without an entity

A station has a location

Station
+Name
+Easting
+Northing
+OpeningHours
+NumberOfExits
+IssueTicket()
+Open()
+Close()

A station has a location



Domain services

If a SERVICE were devised to make appropriate debits and credits for a funds transfer, that capability would belong in the domain layer.

Eric Evans

Domain services

- We map the business processes to services
- Represents behaviour in the domain
- A service does not have internal state
- Usually a point of connection for many objects

Let's look at some code

Some code

```
class Journey {
  function getStart() {}
  function setStart(Station $start) {}

  function getStop() {}
  function setStop(Station $stop) {}

  function setRoute() {}
  function getRoute() {}
}

class RoutingService {
  function route(Station $start, Station $stop) {}
}
```

Anaemic domain model

When you look at the behavior, and you realize that there is hardly any behavior on these objects, making them little more than bags of getters and setters.

Instead there are a set of service objects which capture all the domain logic.

Martin Fowler

Entity with behaviour

```
class Journey {  
  function getStart() {}  
  function setStart(Station $start) {}  
  
  function getStop() {}  
  function setStop(Station $stop) {}  
  
  function route() {}  
}
```

What happens if route() is
complex?

Double dispatch

The entity calls the helper domain service, passing a reference to itself.

```
// Helper service
class JourneyRouter {
    function route(Journey $journey) {}
}

// Journey class
function route() {
    $router = $new JourneyRouter();
    $this->route = $router->route($this);
}
```

Persistence

Persistence options

A simple domain model can use ActiveRecord/TDG;
a complex one will require mapping.

I don't really care what you choose!

I lied.

Don't use ActiveRecord!

It integrates the database code into your domain model

Table Data Gateway

- Operates on a single database table
- Contains all the SQL for accessing the table
- Doesn't know anything about the entity.
- Simple to implement

Table Data Gateway

```
class JourneyGateway {  
    function __construct($dsn, $username, $password) {}  
  
    function find($id) {}  
    function findForStartingStation($stationId) {}  
  
    function insert($startId, $stopId) {}  
    function update($id, $startId, $stopId) {}  
}
```

Data Mapper

- Class to transfer data from objects to the database and back.
- Entity aware
- Isolates the domain model from the database
- Not limited to a single table

Data Mapper

```
class JourneyMapper {  
    function __construct($dsn, $username, $password) {}  
  
    function find($id) {}  
    function findForStartingStation($stationId) {}  
    public function save(Journey $journey) {}  
}
```

Increased scope: ORM

Data mappers can be limited in scope to an entity or generic enough to work with full object graphs.

This is known as Object Relational Mapping

Persistence layer is more complicated:

- Identity map to hold loaded objects
- Storage of entire object graphs to the database
- Unit of Work to track changed objects for saving

If you need this, then use a pre-written ORM library!

Web services

- The persistence storage could be a web service.
- Data mappers work really well

Integrating our model into the
application

The service layer*

It does not contain business rules or knowledge, but only coordinates tasks and delegates work to collaborations of domain objects in the next layer down.

Eric Evans

* (Known as *application layer* in DDD)

Service layer

We can sub-divide:

- Application services
- Infrastructural services

Application services

If the banking application can convert and export our transactions into a spreadsheet file for us to analyze, this is an application SERVICE.

Eric Evans

Infrastructural services

A bank might have an application that sends out an email to a customer when an account balance falls below a specific threshold. The interface that encapsulates the email system, and perhaps alternate means of notification, is a SERVICE in the infrastructure layer.

Eric Evans

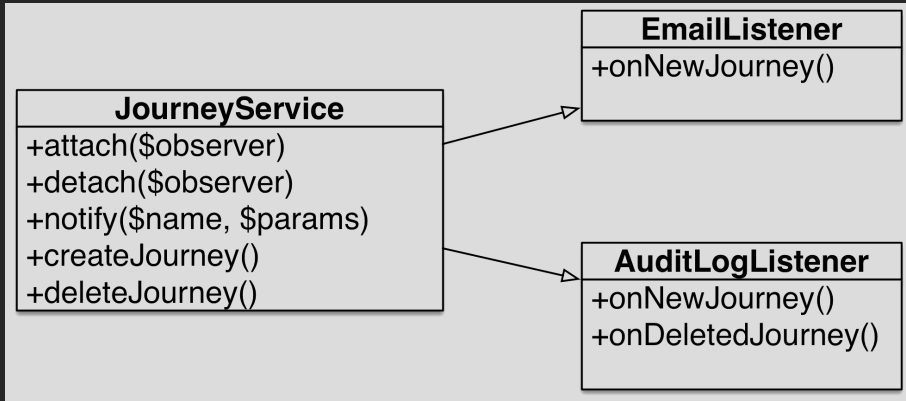
Application service

```
class JourneyService {
  function createJourney($customer, $start, $stop)
  {
    $journey = $customer->createJourney($start,$stop);
    $journey->route();

    $this->entityManager->flush();
    $this->mailer->newJourneyNofication($journey);
    $this->auditor->log('newJourney', $journey);
  }
}
```

Beware the Fat service

Decouple using Observer pattern



CQRS: Separating reading and writing

CQRS

Command Query Responsibility Segregation.

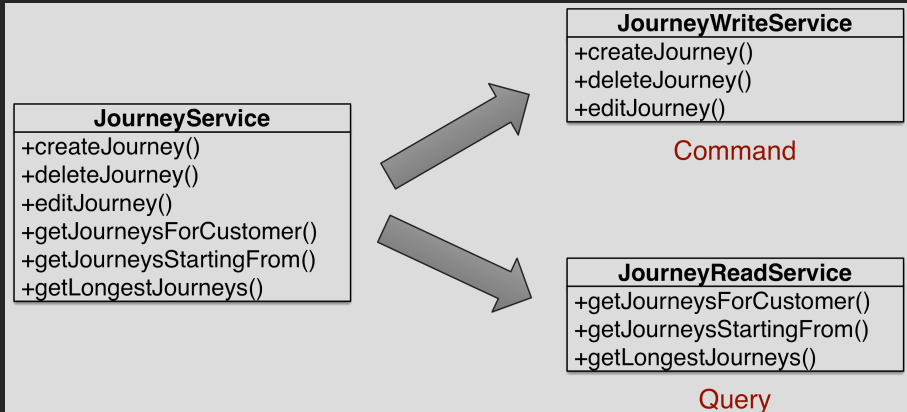
- *Commands* change data
- *Queries* read data

Most useful when:

- Separate hardware
- Optimise performance

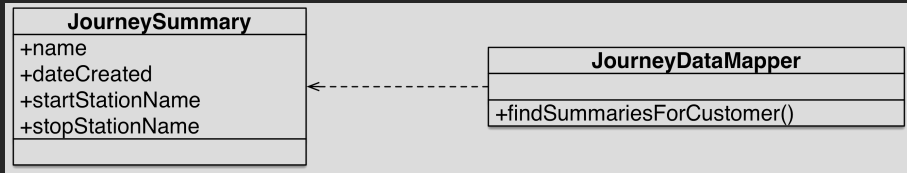
CQRS at its most basic

Two services where there was one



CQRS

One useful case is a summary object for a read-only list



Final point

The success of a design is not necessarily marked by its longevity. It is the nature of software to change.

Eric Evans

To sum up

Entity:

Object with identity that do stuff

Value object:

Immutable with no identity

Domain service:

Behaviours that don't belong to an entity

To sum up

Mappers / Repository:

Transfer your model to and from persistence

Application services:

Isolate your domain model from your controllers

Infrastructure services:

Support services for your application

Thank you!

<https://m.joinind.in/talk/316e1>

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