Intro to Rails

#NICAR16

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http://j.mp/nicar16-rails

```
> rails new nicar16
```

Do you need a web framework?

1. You have too much data to bake
2. You need user input
3. You need dynamic processing that can't be done in the browser

Do you need Rails?

1. Your app is bigger than a couple of pages
2. You have a big or complicated database
3. You need users and sessions
4. Or, you just want a place to organize your work

Sinatra

```
get '/' do
 "hello world"
end
```

Rails

Controller
ORM
Views
Assets
Authentication
Migrations
Email
JS
. . .

OK fine let's install it

```
> gem install rails

Fetching: activesupport-4.2.6.gem (100%)
Successfully installed activesupport-4.2.6
Fetching: actionview-4.2.6.gem (100%)
Successfully installed actionview-4.2.6
Fetching: actionpack-4.2.6.gem (100%)
Successfully installed actionpack-4.2.6
Fetching: activejob-4.2.6.gem (100%)
Successfully installed activejob-4.2.6
Fetching: actionmailer-4.2.6.gem (100%)
Successfully installed actionmailer-4.2.6
Fetching: activemodel-4.2.6.gem (100%)
Successfully installed activemodel-4.2.6
Fetching: activerecord-4.2.6.gem (100%)
Successfully installed activerecord-4.2.6
Fetching: railties-4.2.6.gem (100%)
Successfully installed railties-4.2.6
Fetching: rails-4.2.6.gem (100%)
Successfully installed rails-4.2.6
9 gems installed
```

whuu? I said I wanted rails

> rails new nicar16

```
create
create  README.rdoc
create  Rakefile
create  config.ru
create  .gitignore
create  Gemfile
create  app
create  app/assets/javascripts/application.js
create  app/assets/stylesheets/application.css
create  app/controllers/application_controller.rb
create  app/helpers/application_helper.rb
create  app/views/layouts/application.html.erb
create  app/assets/images/.keep
create  app/mailers/.keep
create  app/models/.keep
create  app/controllers/concerns/.keep
create  app/models/concerns/.keep
create  bin
create  bin/bundle
create  bin/rails
create  bin/rake
create  bin/setup
create  config
create  config/routes.rb
create  config/application.rb
create  config/environment.rb
create  config/secrets.yml
create  config/environments
create  config/environments/development.rb
create  config/environments/production.rb
create  config/environments/test.rb
create  config/initializers
create  config/initializers/assets.rb
create  config/initializers/backtrace_silencers.rb
create  config/initializers/cookies_serializer.rb
create  config/initializers/filter_parameter_logging.rb
```



```
create  config/initializers/filter_parameter_logging.rb
create  config/initializers/inflections.rb
create  config/initializers/mime_types.rb
create  config/initializers/session_store.rb
create  config/initializers/wrap_parameters.rb
create  config/locales
create  config/locales/en.yml
create  config/boot.rb
create  config/database.yml
create  db
create  db/seeds.rb
create  lib
create  lib/tasks
create  lib/tasks/.keep
create  lib/assets
create  lib/assets/.keep
create  log
create  log/.keep
create  public
create  public/404.html
create  public/422.html
create  public/500.html
create  public/favicon.ico
create  public/robots.txt
create  test/fixtures
create  test/fixtures/.keep
create  test/controllers
create  test/controllers/.keep
create  test/mailers
create  test/mailers/.keep
create  test/models
create  test/models/.keep
create  test/helpers
create  test/helpers/.keep
create  test/integration
create  test/integration/.keep
create  test/test_helper.rb
create  tmp/cache
create  tmp/cache/assets
create  vendor/assets/javascripts
create  vendor/assets/javascripts/.keep
create  vendor/assets/stylesheets
create  vendor/assets/stylesheets/.keep
   run  bundle install
```

What is all this stuff?

```
Gemfile
Gemfile.lock
README.rdoc
Rakefile
app          ←——————— 90% of your time
bin
config
config.ru              assets
db                     controllers
lib                    helpers
log                    mailers
public                 models
test                   views
tmp
vendor
```
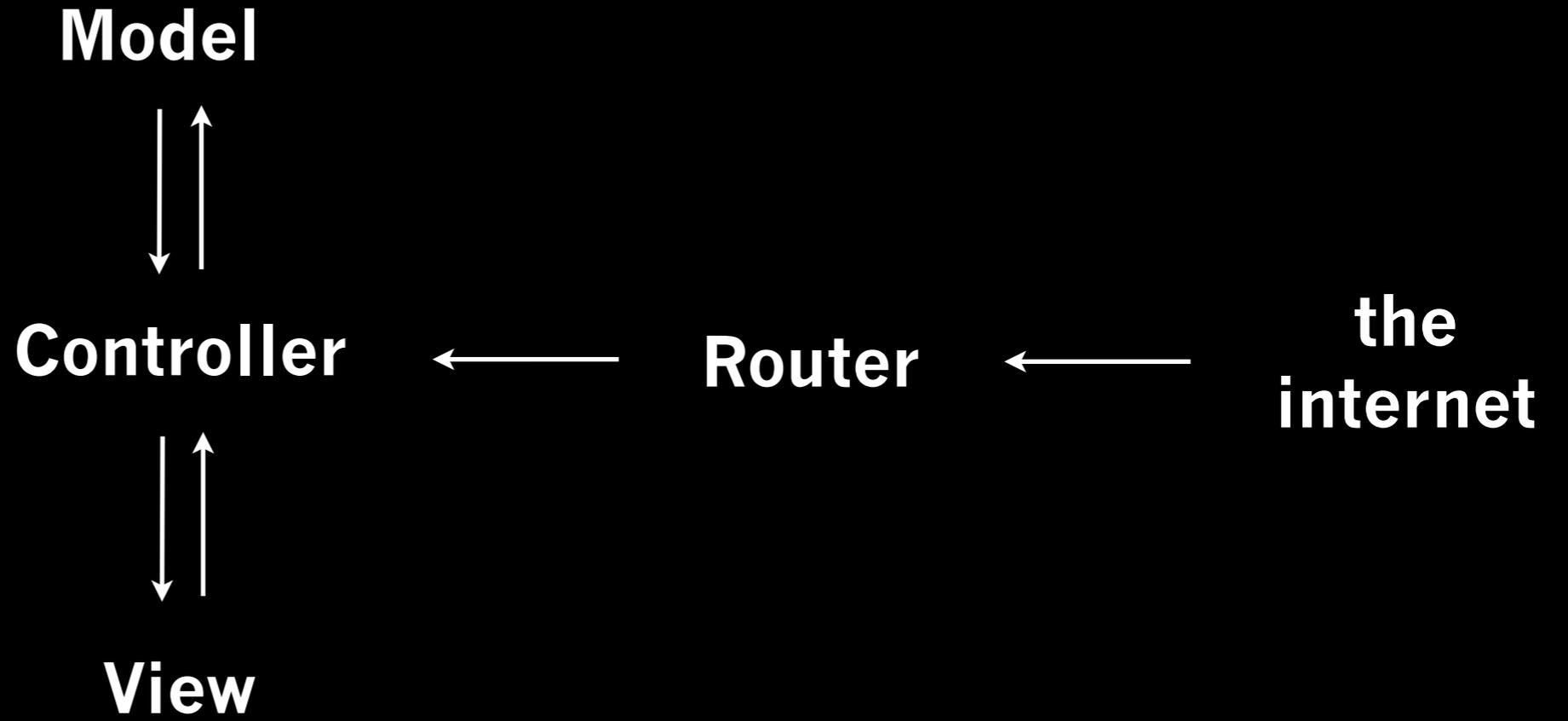
Sublime Text

```
▼ nicar16
  ▶ app
  ▶ bin
  ▶ config
  ▶ db
  ▶ lib
  ▶ log
  ▶ public
  ▶ test
  ▶ tmp
  ▶ vendor
    .gitignore
    config.ru
    Gemfile
    Gemfile.lock
    Rakefile
    README.rdoc
```

MVC

assets
controllers
helpers
mailers
models
views

Model

Controller ← Router ← the internet

View

Stay on the path!

"convention over configuration"

Flickr: wetwebwork

http://guides.rubyonrails.org/

MVC

Model

School

Controller

SchoolsController

View

views/schools/show.html.erb

Router

resources :schools

the internet
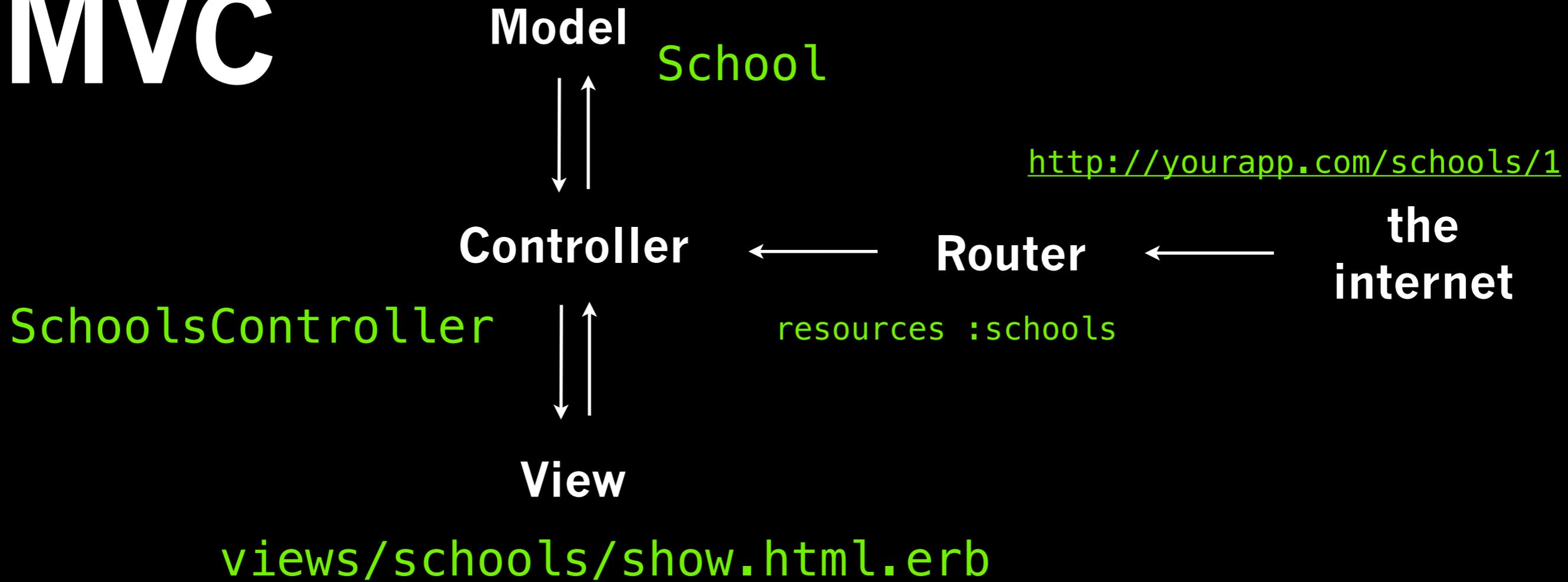
1. Migrations

```
> cd nicar16
> rails generate migration AddSchoolsTable

    invoke  active_record
    create    db/migrate/20160308170855_add_schools_table.rb
```

1. Migrations

db/migrate/20160308170855_add_schools_table.rb

```ruby
class AddSchoolsTable < ActiveRecord::Migration
  def change
  end
end
```

1. Migrations

db/migrate/20160308170855_add_schools_table.rb

```ruby
class AddSchoolsTable < ActiveRecord::Migration
  def change
    create_table :schools do |t|
      t.string  :name
      t.string  :kind
      t.integer :students
      t.integer :teachers
    end
  end
end
```

1. Migrations

```
> rake db:migrate

== 20160308170855 AddSchoolsTable: migrating ================================
-- create_table(:schools)
   -> 0.0009s
== 20160308170855 AddSchoolsTable: migrated (0.0009s) =======================
```

OK, where is this database?

config/database.yml

```
default: &default
  adapter: sqlite3
  pool: 5
  timeout: 5000

development:
  <<: *default
  database: db/development.sqlite3

production:
  <<: *default
  database: db/production.sqlite3
```

You can use Postgres or MySQL too!
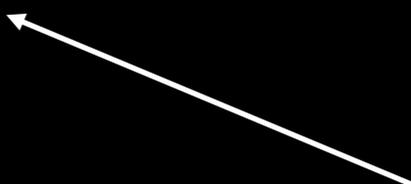
Or, mix n match between development and production

2. Add a model

app/models/**school.rb**

```
▼ nicar16
  ▼ app
    ▶ assets
    ▶ controllers
    ▶ helpers
    ▶ mailers
    ▼ models
      ▶ concerns
        .keep
        school.rb
```
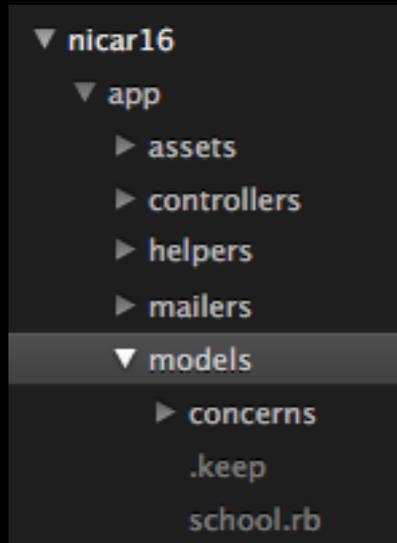
```ruby
class School < ActiveRecord::Base
end
```

3. Add some data

```
> rails console
Loading development environment (Rails 4.2.6)
irb(main):001:0>
```

3. Add some data

```
irb(main):002:0> s = School.new
=> #<School id: nil, name: nil, kind: nil,
students: nil, teachers: nil>
```

3. Add some data

```
irb(main):003:0> s.name = "Acme High School"
=> "Acme High School"
irb(main):004:0> s.kind = "high"
=> "high"
irb(main):005:0> s.students = 500
=> 500
irb(main):007:0> s.teachers = 80
=> 80
```

3. Add some data

```
irb(main):008:0> s.save

  (0.2ms)  begin transaction
  SQL (1.5ms)  INSERT INTO "schools" ("name", "kind",
"students", "teachers") VALUES (?, ?, ?, ?)  [["name", "Acme
High School"], ["kind", "high"], ["students", 500],
["teachers", 80]]
  (1.6ms)  commit transaction
=> true
```

Another way

```
irb(main):009:0> School.create({:name => "Magic High School",
:kind => "high", :students => 100, :teachers => 10})

   (1.1ms)  begin transaction
  SQL (0.3ms)  INSERT INTO "schools" ("name", "kind",
"students", "teachers") VALUES (?, ?, ?, ?)  [["name", "Magic
High School"], ["kind", "high"], ["students", 100],
["teachers", 10]]
   (1.4ms)  commit transaction
=> #<School id: 2, name: "Magic High School", kind: "high",
students: 100, teachers: 10>
```

ActiveRecord magic

```
irb(main):010:0> schools = School.all

  School Load (0.1ms)  SELECT "schools".* FROM "schools"
=> #<ActiveRecord::Relation [#<School id: 1, name: "Acme High School", kind: "high",
students: 500, teachers: 80>, #<School id: 2, name: "Magic High School", kind: "high",
students: 100, teachers: 10>]>

irb(main):011:0> schools = School.where(:kind => "high")

  School Load (0.1ms)  SELECT "schools".* FROM "schools" WHERE "schools"."kind" = ?
[["kind", "high"]]
=> #<ActiveRecord::Relation [#<School id: 1, name: "Acme High School", kind: "high",
students: 500, teachers: 80>, #<School id: 2, name: "Magic High School", kind: "high",
students: 100, teachers: 10>]>

irb(main):013:0> schools = School.where("students > ?", 100)

  School Load (0.1ms)  SELECT "schools".* FROM "schools" WHERE (students > 100)
=> #<ActiveRecord::Relation [#<School id: 1, name: "Acme High School", kind: "high",
students: 500, teachers: 80>]>
```

ActiveRecord magic

```
> School.find(1)
> School.first
> School.last
> School.find_by(:name => "Acme High School")
> School.where.not(:kind => "high")
> School.select("name").where(:kind => "high")
```

http://guides.rubyonrails.org/active_record_querying.html

Let's get it on a web page

app/controllers/**schools_controller.rb**
app/views/schools/**index.html.erb**
app/views/schools/**show.html.erb**

4. Controllers

app/controllers/**schools_controller.rb**

```ruby
class SchoolsController < ApplicationController
end
```

4. Controllers

app/controllers/**schools_controller.rb**

```ruby
class SchoolsController < ApplicationController
  def index
  end

  def show
  end
end
```

4. Controllers

app/controllers/**schools_controller.rb**

```ruby
class SchoolsController < ApplicationController
  def index
    @schools = School.all
  end


  def show
    @school = School.find(params[:id])
  end
end
```


stay on
the path

5. Views

app/views/**schools**/**index.html.erb**

```erb
<ul>
  <% @schools.each do |s| %>
    <li><%= link_to s do %><%= s.name %><% end %></li>
  <% end %>
<ul>
```


stay on
the path

5. Views

app/views/**schools**/**show.html.erb**

```erb
<h1><%= @school.name %></h1>
<p>Students: <%= @school.students %></p>
<p>Teachers: <%= @school.teachers %></p>
```


stay on the path

5. Routes: wire it together

config/routes.rb

```ruby
Rails.application.routes.draw do
  resources :schools
end
```

Did it work?

```
> rails server


=> Booting WEBrick
=> Rails 4.2.6 application starting in development on http://
localhost:3000
=> Run `rails server -h` for more startup options
=> Ctrl-C to shutdown server
[2016-03-08 13:47:25] INFO  WEBrick 1.3.1
[2016-03-08 13:47:25] INFO   ruby 2.2.2 (2015-04-13) [x86_64-
darwin14]
[2016-03-08 13:47:25] INFO  WEBrick::HTTPServer#start:
pid=3172 port=3000
```

Did it work?

```
> rails server
```

```
=> Booting WEBrick
=> Rails 4.2.6 applica                          //
localhost:3000
=> Run `rails server -
=> Ctrl-C to shutdown
[2016-03-08 13:47:25]
[2016-03-08 13:47:25]                           -
darwin14]
[2016-03-08 13:47:25]
pid=3172 port=3000
```

Did it work?

http://localhost:3000/schools

Did it work?

http://localhost:3000/schools/1
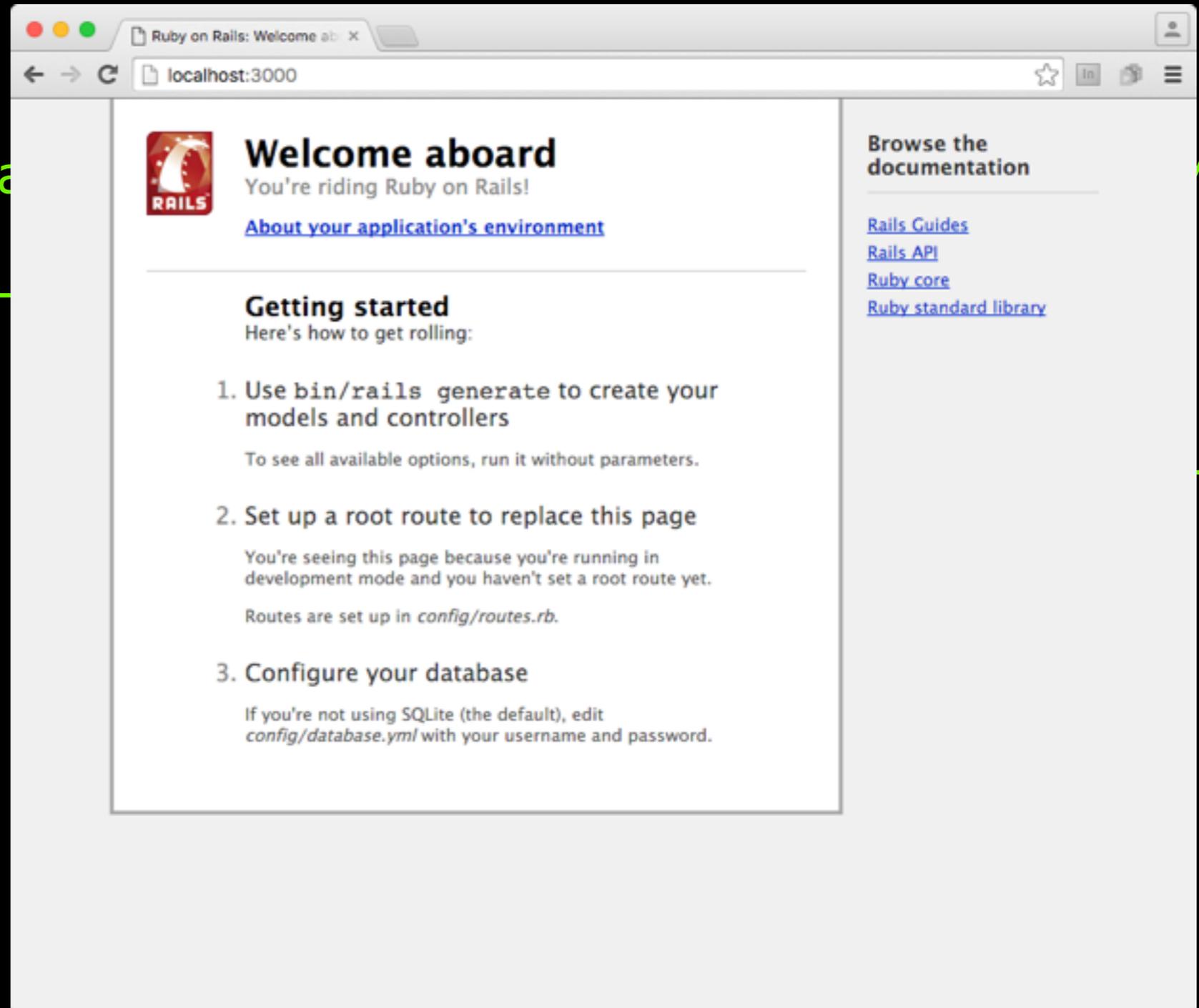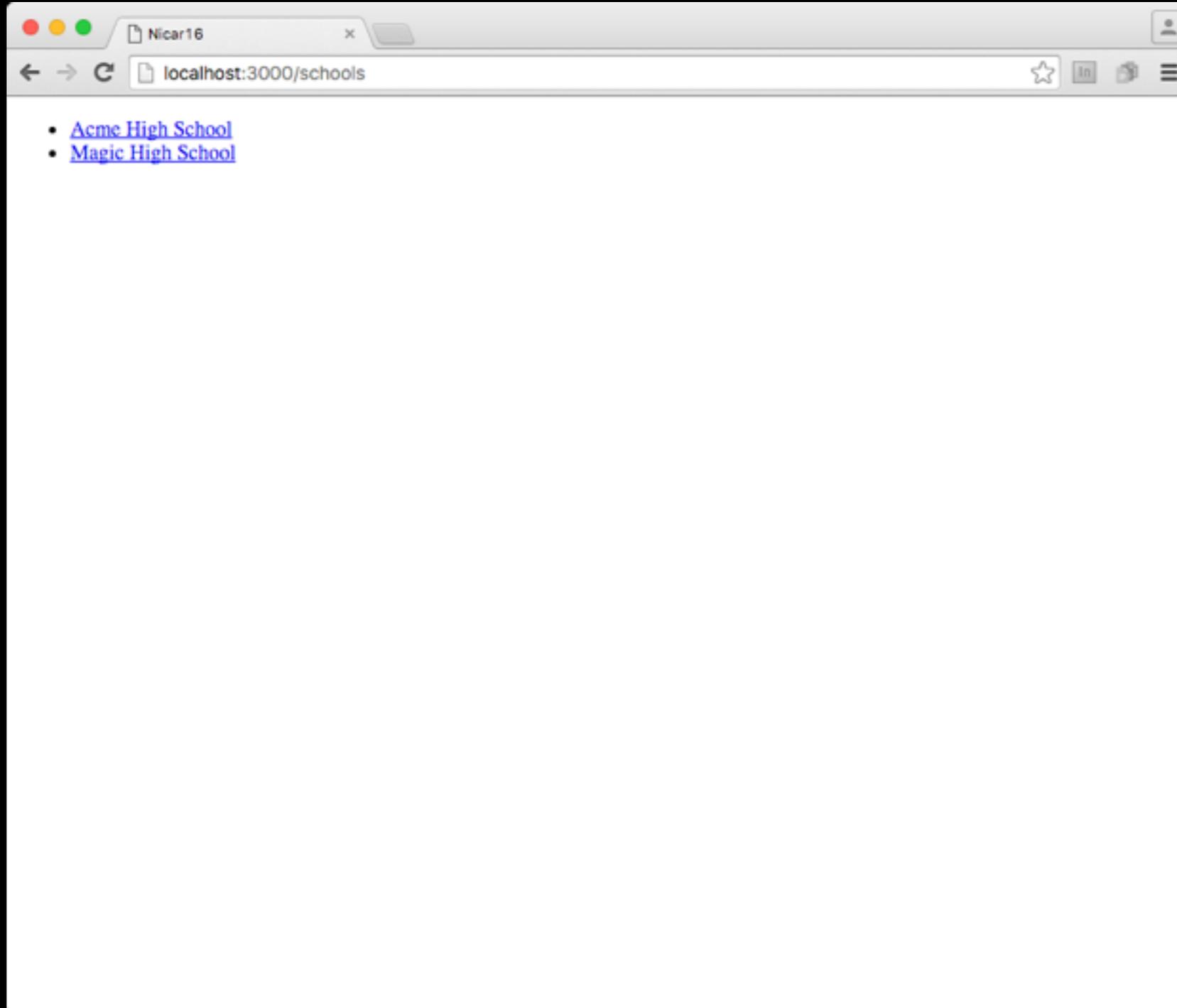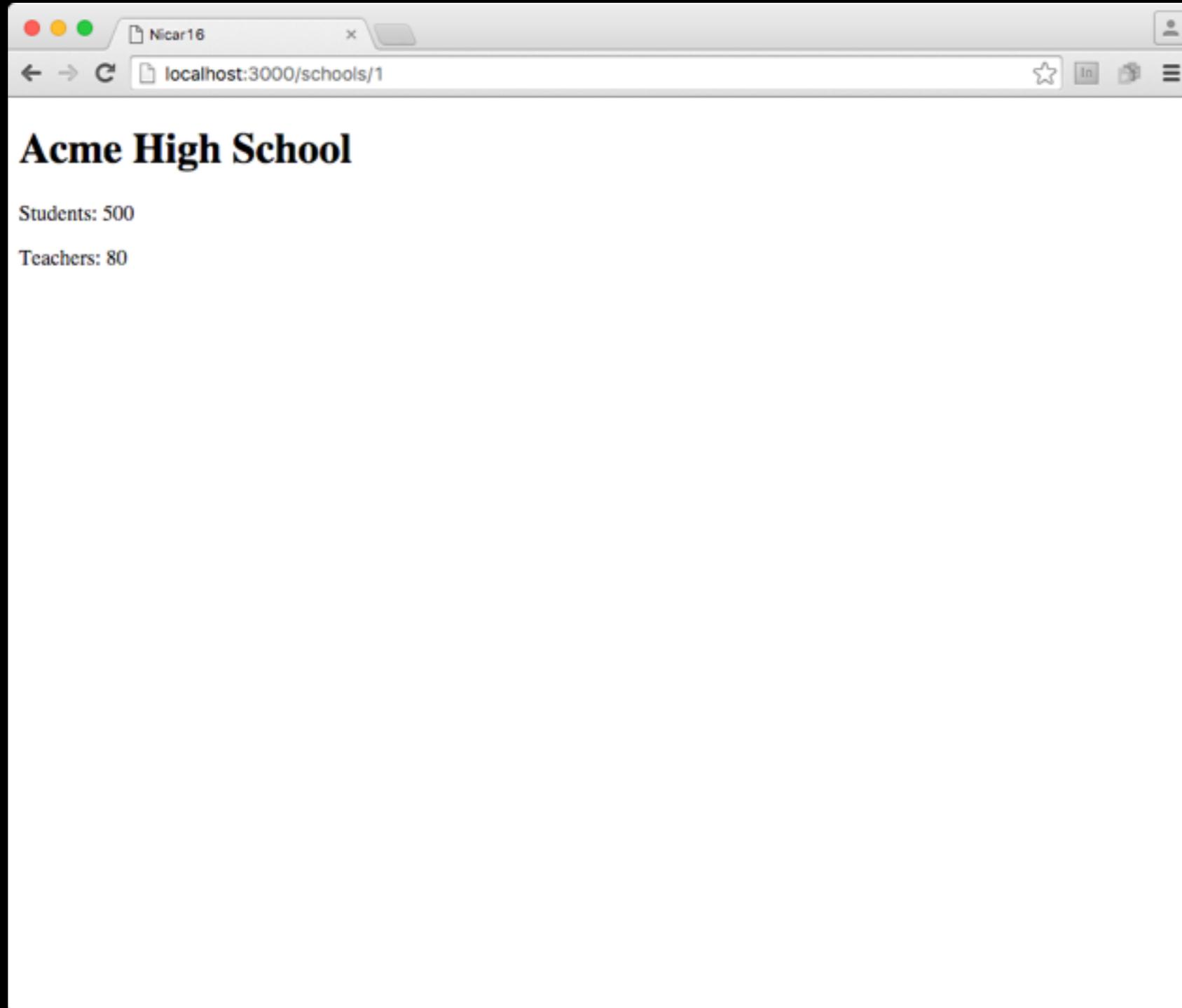
Route the homepage to schools#index

config/routes.rb

```
Rails.application.routes.draw do
  root :to => "schools#index"
  resources :schools
end
```
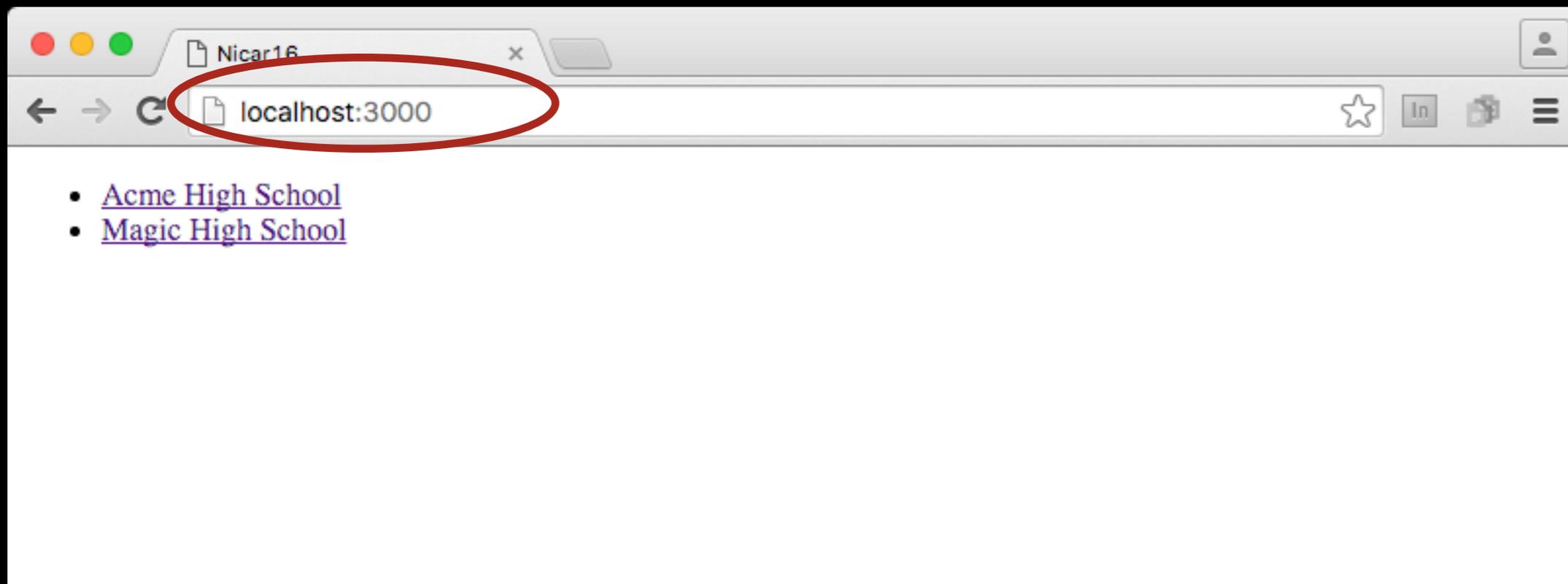
Now you know Rails!

Flickr: Wally Gobetz

What if I want to load an entire dataset at once?

rake

Rake for data loading

http://j.mp/nicar-rails-csv ⟶ db/**initial/schools.csv**

	A	B	C	D
1	name	kind	students	teachers
2	Kozey	elementary	500	120
3	Stoltenberg	high	2500	500
4	Sipes	middle	1000	200
5	Gottlieb	elementary	500	120
6	Boehm	elementary	500	120

Rake for data loading

lib/tasks/**load.rake**

```ruby
desc "load the data"
task :csv => :environment do
  # load code here
end
```

Rake for data loading

```
> rake –T csv

rake csv   # load the data
```

Remember our migration?

```
> rake –T migrate

rake db:migrate        # Migrate the database (options: VERSION=x, VERBOSE=false, SCOPE=blog)
rake db:migrate:status  # Display status of migrations
```

Rake for data loading

lib/tasks/**load.rake**

```ruby
desc "load the data"
task :csv => :environment do
  require 'csv'
  csv = "#{Rails.root.to_s}/db/initial/schools.csv"
  CSV.foreach(csv, :headers => true) do |row|
    s = School.new
    row.each do |key,val|
      s[key] = val
    end
    p s
    s.save
  end
end
```

Rake for data loading

lib/tasks/**load.rake**

```
> rake csv

#<School id: nil, name: "Kozey", kind: "elementary", students: 500, teachers: 120>
#<School id: nil, name: "Stoltenberg", kind: "high", students: 2500, teachers: 500>
#<School id: nil, name: "Sipes", kind: "middle", students: 1000, teachers: 200>
#<School id: nil, name: "Gottlieb", kind: "elementary", students: 500, teachers: 120>
#<School id: nil, name: "Boehm", kind: "elementary", students: 500, teachers: 120>
```

Rake for data loading

lib/tasks/**load.rake**

```
> rake csv

#<School id: nil, name: "Kozey", kind: "elementary", students: 500, teachers: 120>
#<School id: nil, name: "Stoltenberg", kind: "high", students: 2500, teachers: 500>
#<School id: nil, name: "Sipes", kind: "middle", students: 1000, teachers: 200>
#<School id: nil, name: "Gottlieb", kind: "elementary", students: 500, teachers: 120>
#<School id: nil, name: "Boehm", kind: "elementary", students: 500, teachers: 120>
```

Getting a little fancier

What if we want pages for school kind?

app/controllers/**schools_controller.rb**

```ruby
class SchoolsController < ApplicationController
  def index
    @schools = School.all
  end


  def show
    @school = School.find(params[:id])
  end

  def kind
    @schools = School.where(:kind => params[:kind])
  end
end
```

uh oh

app/views/schools/**kind.html.erb**

```
<ul>
  <% @schools.each do |s| %>
    <li><%= link_to s do %><%= s.name %><% end %></li>
  <% end %>
<ul>
```

Look familiar?

Route it up

config/routes.rb

```ruby
Rails.application.routes.draw do
 match "/schools/kind/:kind", => "schools#kind", :via => "get"
 root :to => "schools#index"
 resources :schools
end
```

uh oh

Route it up

config/routes.rb

```ruby
Rails.application.routes.draw do
 match "/schools/kind/:kind", => "schools#kind", :via => "get"
 root :to => "schools#index"
 resources :schools
end
```
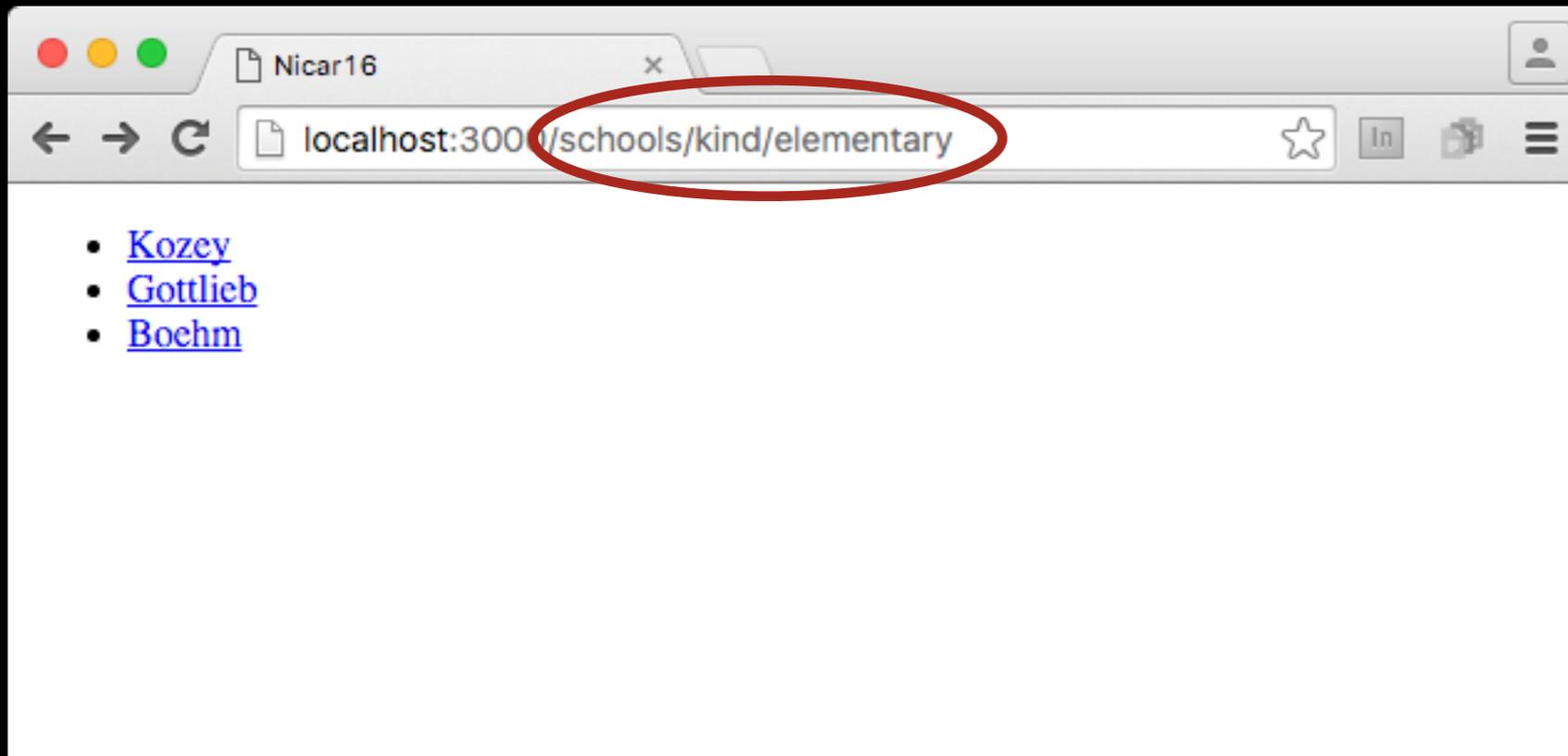
DRY it up with partials

views/schools/**_school_list.html.erb**

```erb
<ul>
  <% @schools.each do |s| %>
    <li><%= link_to s do %><%= s.name %><% end %></li>
  <% end %>
<ul>
```

whew

DRY it up with partials

views/schools/**index.html.erb**
views/schools/**kind.html.erb**

```
<%= render :partial => "school_list" %>
```

Link /kind/ pages to the homepage

views/schools/**index.html.erb**

```erb
<p>See all <%= link_to kind_path("elementary") do %>Elementary<% end %>,
  <%= link_to kind_path("middle") do %>Middle<% end %> and
  <%= link_to kind_path("high") do %>High<% end %> schools.</p>
<%= render :partial => "school_list" %>
```

Agh!

NoMethodError in Schools#index

Showing */Users/ashaw/nicar16/app/views/schools/index.html.erb* where line **#1** raised:

```
undefined method `kind_path' for #<#<Class:0x007fb942002c30>:0x007fb93c7e9418>
```

Extracted source (around line **#1**):

```
1  <p>See all <%= link_to kind_path("elementary") do %>Elementary<% end %>,
2    <%= link_to kind_path("middle") do %>Middle<% end %> and
3    <%= link_to kind_path("high") do %>High<% end %> schools.</p>
4  <%= render :partial => "school_list" %>
```

Rails.root: /Users/ashaw/nicar16

Application Trace | Framework Trace | Full Trace

app/views/schools/index.html.erb:1:in `_app_views_schools_index_html_erb__2958218504780603495_70216780288900'

Request

Parameters:

None

>>   x

Sometimes you have to add the magic yourself

config/routes.rb

```ruby
Rails.application.routes.draw do
  match "/schools/kind/:kind", => "schools#kind",
  :via => "get", :as => "kind"
  root :to => "schools#index"
  resources :schools
end
```
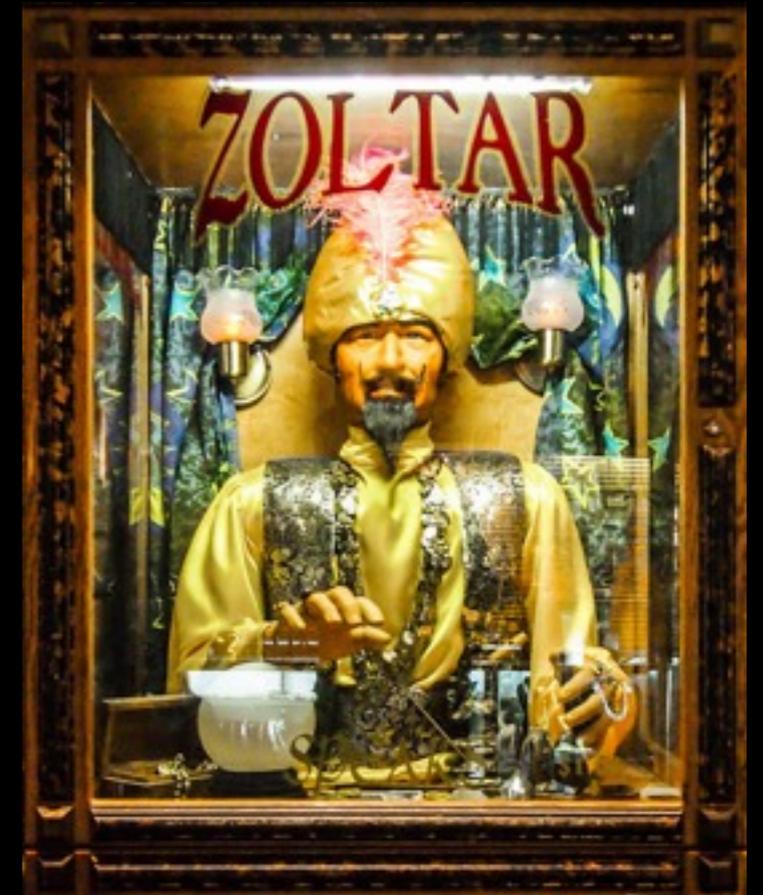

Flickr: nestor ferraro

Sometimes you have to add the magic yourself

config/routes.rb

```
Rails.application.routes.dr
  match "/schools/kind/:kind
  :via => "get", :as => "kir
  root :to => "schools#index
  resources :schools
end
```

localhost:3000/schools

See all Elementary, Middle and High schools.

- Acme High School
- Magic High School
- Kozey
- Stoltenberg
- Sipes
- Gottlieb
- Boehm
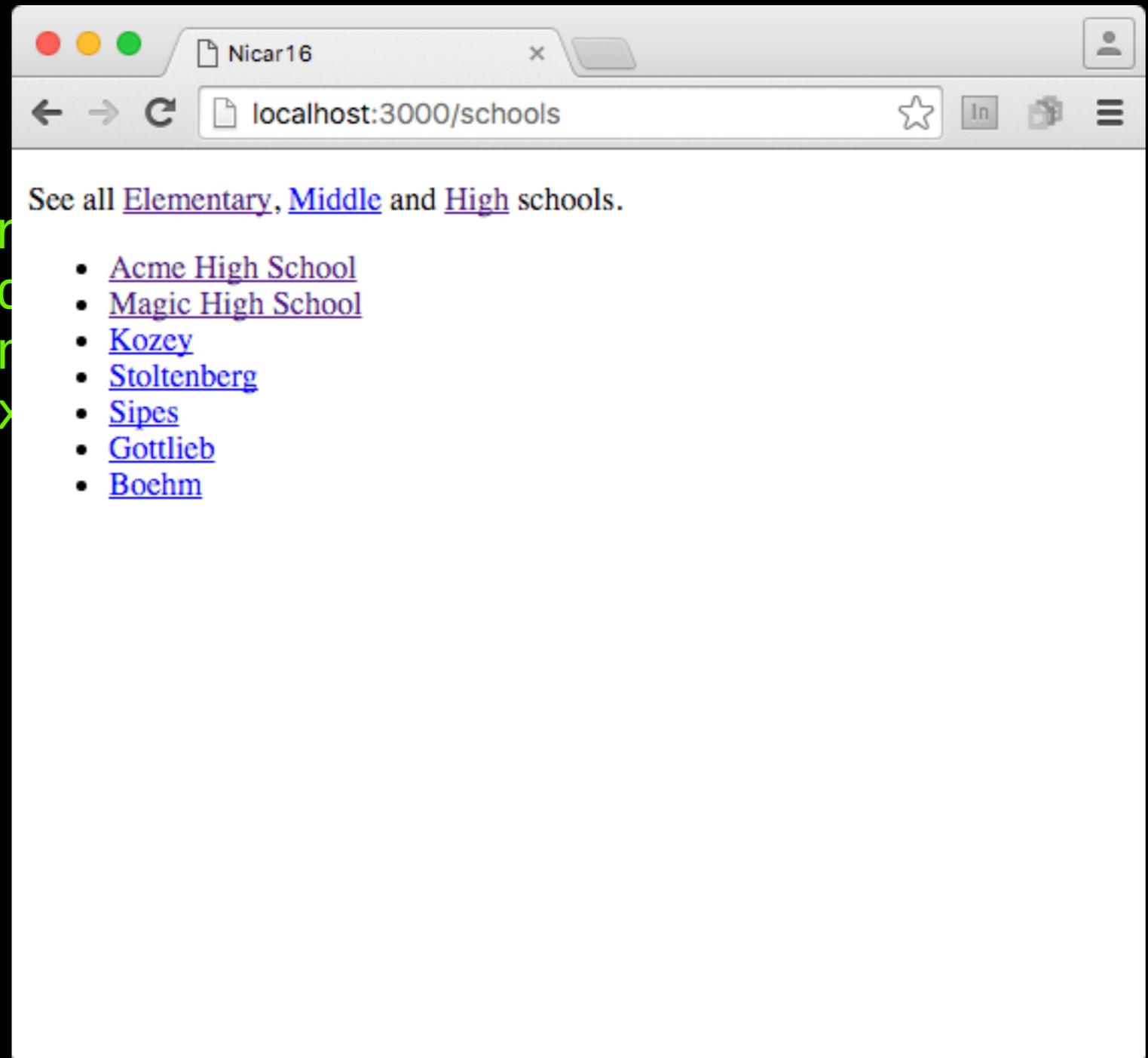
Joins!

Schools have districts, right?

Joins!

Schools have districts, right?

```
> rails generate migration AddDistrictsTable

      invoke  active_record
      create    db/migrate/20160309183752_add_districts_table.rb
```

db/migrate/**20160309183752_add_districts_table.rb**

```ruby
class AddDistrictsTable < ActiveRecord::Migration
  def change
    create_table :districts do |t|
      t.string :name
    end

    add_column :schools, :district_id, :integer
  end
end
```

app/models/**district.rb**

```ruby
class District < ActiveRecord::Base
end
```

app/models/**district.rb**

```ruby
class District < ActiveRecord::Base
  has_many :schools
end
```

app/models/**school.rb**

```ruby
class District < ActiveRecord::Base
  belongs_to :district
end
```

orders

Model: **Order**

belongs_to :customer

id	integer
customer_id	integer
order_date	datetime

customers

Model: **Customer**

id	integer
name	string
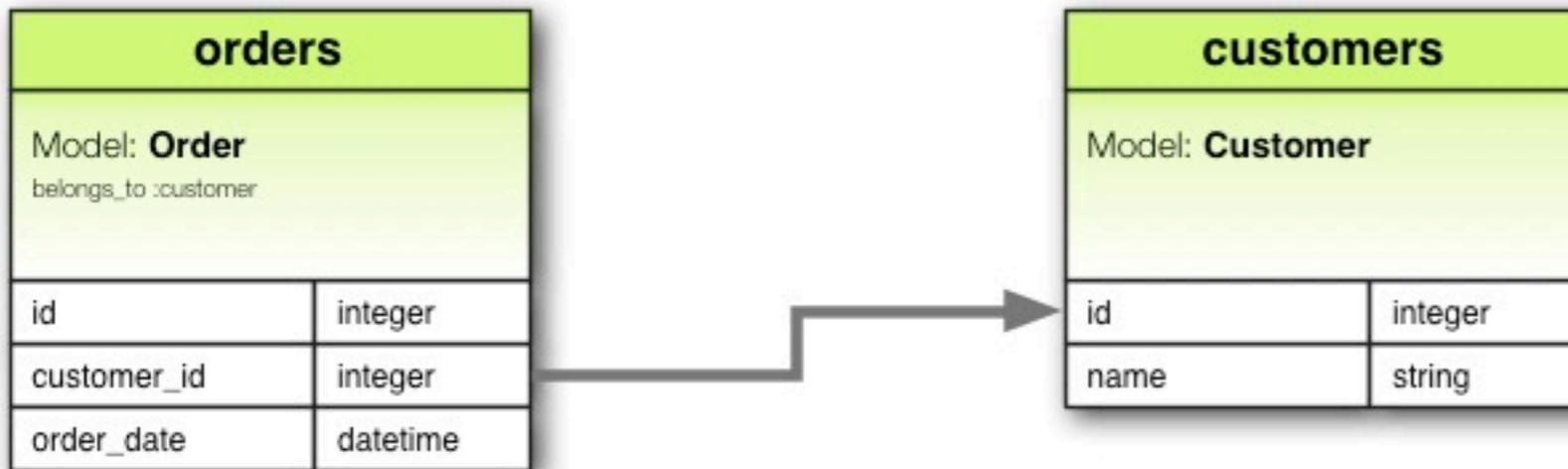
```
class Order < ActiveRecord::Base
  belongs_to :customer
end
```

customers

Model: **Customer**

has_many :orders

id	integer
name	string

orders

Model: **Order**

id	integer
customer_id	integer
order_date	datetime
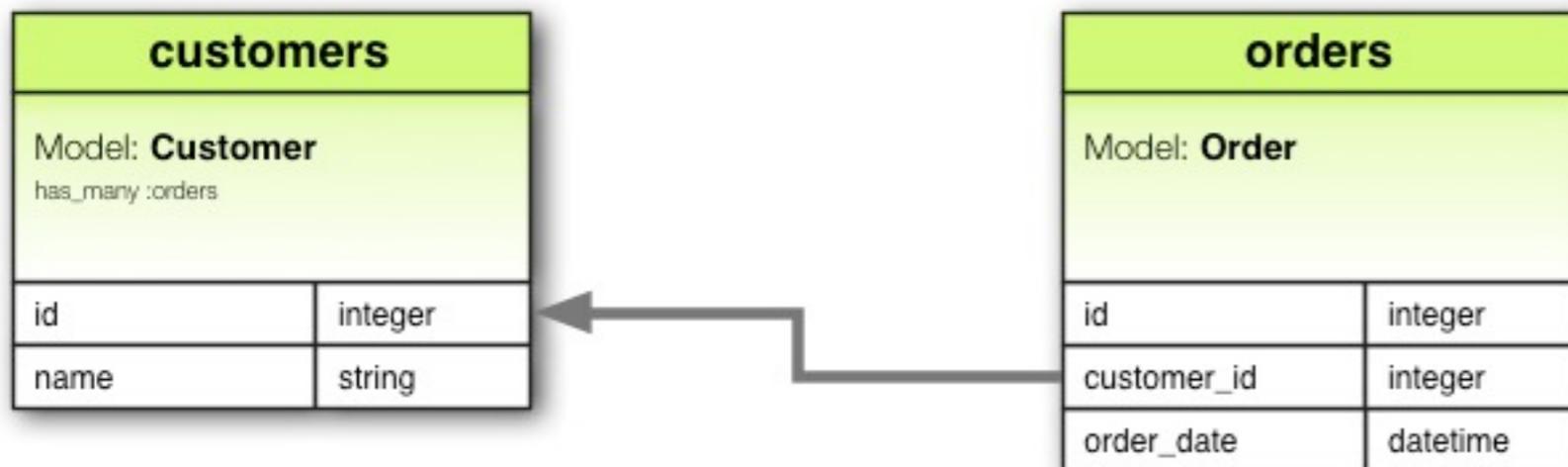
```
class Customer < ActiveRecord::Base
  has_many :orders
end
```

Create a district

```
irb(main):002:0> d = District.create({:name
=> "Denver Schools"})
   (0.2ms)  begin transaction
  SQL (0.4ms)  INSERT INTO
"districts" ("name") VALUES (?)  [["name",
"Denver Schools"]]
   (0.7ms)  commit transaction
=> #<District id: 1, name: "Denver Schools">
```

Add a school to our new district

```
irb(main):002:0> s = School.find(1)
irb(main):003:0> s.district = d
irb(main):004:0> s.save
irb(main):005:0> s
=> #<School id: 1, name: "Acme High School",
kind: "high", students: 500, teachers: 80,
district_id: 1>
```

Under the hood:

```
  SQL (0.4ms)  UPDATE "schools" SET
"district_id" = ? WHERE "schools"."id"
= ?  [["district_id", 1], ["id", 1]]
```

Get all the schools in a district

```
irb(main):001:0> District.first.schools
=>
#<ActiveRecord::Associations::CollectionProxy
[#<School id: 1, name: "Acme High School",
kind: "high", students: 500, teachers: 80,
district_id: 1>]>
```

Under the hood:

```
  District Load (0.7ms)  SELECT  "districts".* FROM "districts"
ORDER BY "districts"."id" ASC LIMIT 1
  School Load (0.6ms)  SELECT "schools".* FROM "schools" WHERE
"schools"."district_id" = ?  [["district_id", 1]]
```

Watch out, joins can get expensive!

You can figure out how to add controllers and views for districts, right?

app/controllers/**districts_controller.rb**
app/views**/districts/index.html.erb**
app/views**/districts/show.html.erb**
config/routes.rb

app/controllers/**districts_controller.rb**

```ruby
class DistrictsController < ApplicationController
  def show
    @district = District.find(params[:id])
    @schools  = @district.schools
  end
end
```

We basically just made this

projects.propublica.org/schools

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projects.propublica.org/schools

Next steps...

guides.rubyonrails.org

Next steps...

Pluralsight screencasts (formerly PeepCode)

Thank you!

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