APIs

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What’s an API?

“In computer programming, an application programming interface (API) specifies how some software components should interact with each other”

Basically an API is a computer-computer interface that allows programs to interact with each other.

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Web Services

A Web service is a method of communication between two electronic devices over a network.

One side is called the server and provides the API and the other side is the client and can obtain data from the server through the API and manipulate it.

They communicate through a common protocol: through HTTP requests and responses.

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HTTP request

HTTP requests consist of:

- URL (Uniform Resource Locator): a unique address for a resource
- Method: the kind of action the client wants the server to take
- Headers: meta-information about the request
- Body: the data the client wants to send the server.

HTTP response

Responses consist of:

- Status Code: tell whether the request was successful or not
- Headers: meta-information about the response
- Body: the data the server sends back to the client

Web services and HTTP

Web services provide a way so clients can access and modify entities on a remote server using HTTP requests and responses.

REST

REST (Representational State Transfer) is a software architecture style for building scalable web services:

- Protocol agnostic
- Uses standard HTTP
- Simple
- Scalable
- Performant
- Stateless

APIs that use REST principles are called RESTful APIs

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RESTful APIs

RESTful APIs are defined with these aspects:

- Base URL: The base address for our requests
- Internet media type: For the data
- Resources: Data you expose in your API
- Supported operations: Create, Read, Replace, Update, Delete.

Creating a basic API

Create a new project to create a basic API: `rails new taskly`

In our app there will be Users and Tasks.

```
$ rails new taskly
```

Adding users

Users will have name and email. Use `rails g resource User name:string email:string` as a shortcut to add the User model, controller, migration file and basic routes. Run `rake db:migrate` afterwards

```
$ rails g resource User name:string email:string
      invoke  active_record
      create db/migrate/20150809190834_create_users.rb
      create app/models/user.rb
      invoke test_unit
      create       test/models/user_test.rb
      create       test/fixtures/users.yml
      invoke  controller
      create app/controllers/users_controller.rb
      invoke erb
      create       app/views/users
      invoke test_unit
```

Seed database

Let's add some users to the seed file and run `rake db:seed`

FOLDERS
- MyApp
  - app
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  - README.rdoc

```
<%# db/seeds.rb %>

...

users = User.create([
  {name: 'Andrew Wiggin',    email: 'ender@bs.if.com'},
  {name: 'Julian Delphiki',  email: 'bean@bs.if.com'}
])

...
```

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Better routes

We'll remove unnecessary routes and use namespaces to keep things neat and tidy. Use `rake routes` to check them out.

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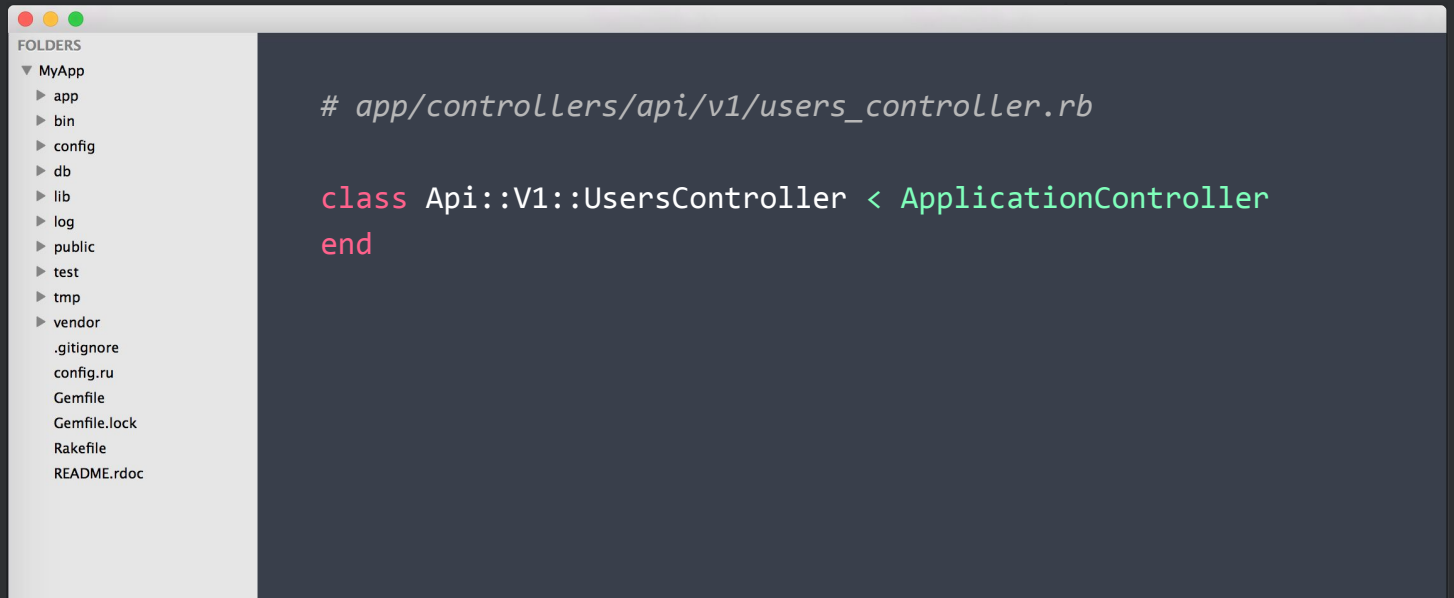
```ruby
# config/routes.rb

namespace :api do
  namespace :v1 do
    resources :users, except: [:new, :edit]
  end
end
```

Move the Users controller

Since we're using namespaces we need to move the controller to the `app/controllers/api/v1` folder and make some changes:



Listing users

Add a controller action to list all Users. We don't need a corresponding view. Go to `http://localhost:3000/api/v1/users` to check it out.

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```ruby
# app/controllers/api/v1/users_controller.rb

def index
    users = User.all
    render json: users
end
```

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Creating users

Add a controller action to create new users and the necessary strong parameters.

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```ruby
# app/controllers/api/v1/users_controller.rb

def create
   user = User.create(user_params)
   render json: user
end

private

  def user_params
    params.require(:user).permit(:name, :email)
  end
```

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Showing a user

Add a controller action to return all data for a user.

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```ruby
# app/controllers/api/v1/users_controller.rb

def show
  user = User.find_by(id: params[:id])
  unless user
    render json: { error: "user not found"}, status: 400
    return
  end
  render json: user
end
```

Updating a user

Add a controller action to return all data for a user.

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```ruby
# app/controllers/api/v1/users_controller.rb

def update
  user = User.find_by(id: params[:id])
  unless user
    render json: { error: "user not found"}, status: 400
    return
  end
  user.update(user_params)
  render json: user
end
```

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Delete a user

Add a controller action to destroy a user.

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```ruby
# app/controllers/api/v1/users_controller.rb

def destroy
  user = User.find_by(id: params[:id])
  unless user
    render json: { error: "user not found"}, status: 400
    return
  end
  user.destroy
  render json: user
end
```

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Testing you API with Postman

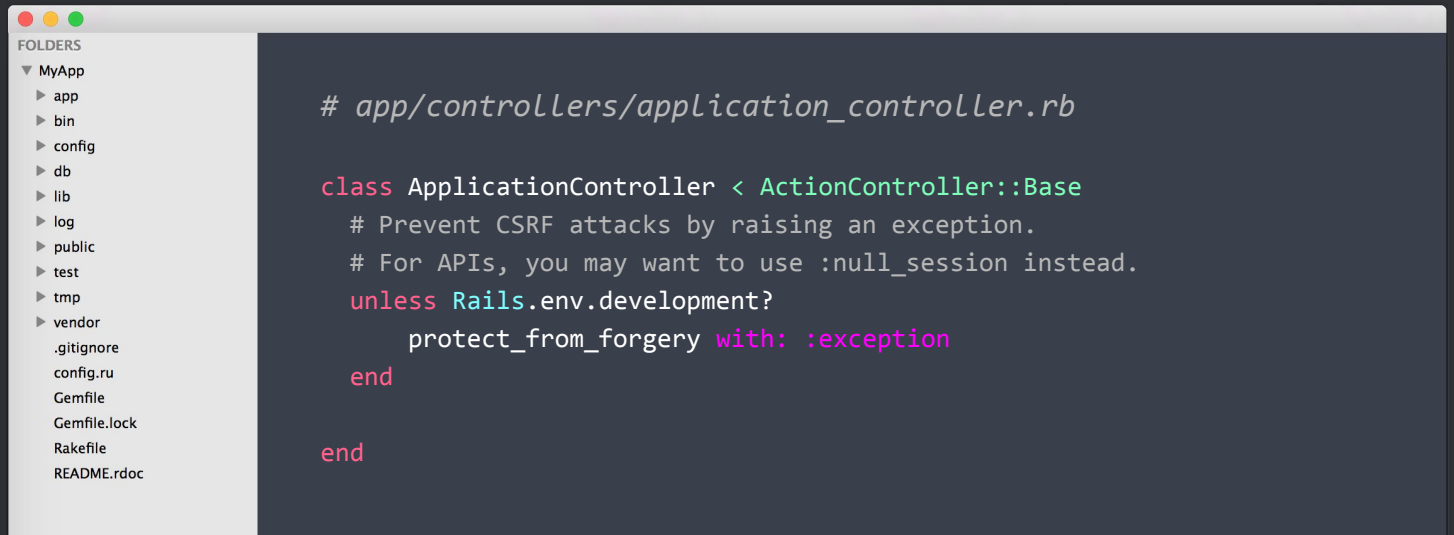
We can test the index action with our browser, but to test the other actions we'd need to create views and forms. It's too much work.

Instead we can use Postman, a Chrome extension that helps you build, test, and document APIs

Download it here:
https://chrome.google.com/webstore/detail/postman/fhbjgbiflinjbdggehcddcbncdddomop

Make the app work with Postman

There is a small thing to change so Postman can work: `protect_from_forgery` needs to be removed from the application controller.



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Adding Tasks

Tasks will have names and due dates and will belong to a User. We can use the `rails g resource` shortcut to create the resource, and make the necessary changes to namespace everything as before before running `rake db:migrate`

```
$ rails g resource task name:string due_date:datetime
user_id:integer
invoke  active_record
      create db/migrate/20150809211032_create_tasks.rb
      create app/models/task.rb
      invoke test_unit
      create       test/models/task_test.rb
      create       test/fixtures/tasks.yml
      invoke  controller
```

Nested resources

Remember that Tasks belong to Users. We'll change the routes file to capture this relationship. Use `rake routes` to check them out.

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```ruby
# config/routes.rb

namespace :api do
  namespace :v1 do
    resources :users, except: [:new, :edit] do
      resources :tasks
    end
  end
end
```

Seed database

Let’s add some tasks for our users to the seed file and run `rake db:seed`

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```ruby
<%# db/seeds.rb %>

...

tasks = Task.create([
  {name: 'User1 Task1',  due_date: DateTime.now, user_id: User.first.id},
  {name: 'User1 Task2',  due_date: DateTime.now, user_id: User.first.id},
  {name: 'UserΩ Task1',  due_date: DateTime.now, user_id: User.last.id},
])

...
```

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Exercise

Add the necessary controller methods so tasks can be:

- created
- shown
- deleted
- completed

Control the output

To control what is included in your JSON response, just add a `as_json` method to your model, make a call to its implementation in the superclass and include options:

- `:only` and `:except` options can be used to limit the attributes included
- `:method` to include the result of some method calls on the model
- `:include` to include associations

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to_json

An example for the User model:

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```
<%# app/models/user.rb %>

...

def as_json(options={})
  super(only: [:name,:email],
    methods: [:tasks_count],
    include: [tasks:  { only: :name }])
end

def tasks_count
  self.tasks.count
end
```

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Exercise

Make sure that:

- Tasks return no id, created_at or updated_at
- Group completed and pending tasks in the index