Chapter 10

Updating, showing, and deleting users

In this chapter, we will complete the REST actions for the Users resource (Table 7.1) by adding **`edit`**, **`update`**, **`index`**, and **`destroy`** actions. We'll start by giving users the ability to update their profiles, which will also provide a natural opportunity to enforce an authorization model (made possible by the authentication code in Chapter 8). Then we'll make a listing of all users (also requiring authentication), which will motivate the introduction of sample data and pagination. Finally, we'll add the ability to destroy users, wiping them clear from the database. Since we can't allow just any user to have such dangerous powers, we'll take care to create a privileged class of administrative users authorized to delete other users.

10.1 Updating users

The pattern for editing user information closely parallels that for creating new users (Chapter 7). Instead of a **`new`** action rendering a view for new users, we have an **`edit`** action rendering a view to edit users; instead of **`create`** responding to a `POST` request, we have an **`update`** action responding to a `PATCH` request (Box 3.2). The biggest difference is that, while anyone can sign up, only the current user should be able to update their information. The authentication machinery from Chapter 8 will allow us to use a *before filter* to ensure that this is the case.

To get started, let's start work on an **`updating-users`** topic branch:

```
$ git checkout -b updating-users
```

10.1.1 Edit form

We start with the edit form, whose mockup appears in Figure 10.1.[1] To turn the mockup in Figure 10.1 into a working page, we need to fill in both the Users controller **`edit`** action and the user edit view. We start with the **`edit`** action, which requires pulling the relevant user out of the database. Note from Table 7.1 that the proper URL for a user's edit page is /users/1/edit (assuming the user's id is `1`). Recall that the id of the user is available in the **`params[:id]`** variable, which means that we can find the user with the code in Listing 10.1.

Listing 10.1: The user **`edit`** action.
`app/controllers/users_controller.rb`

```
class UsersController < ApplicationController

  def show
    @user = User.find(params[:id])
  end

  def new
    @user = User.new
  end

  def create
    @user = User.new(user_params)
    if @user.save
      log_in @user
      flash[:success] = "Welcome to the Sample App!"
      redirect_to @user
    else
      render 'new'
```

[1]Image retrieved from https://www.flickr.com/photos/sashawolff/4598355045/ on 2014-08-25. Copyright © 2010 by Sasha Wolff and used unaltered under the terms of the Creative Commons Attribution 2.0 Generic license.

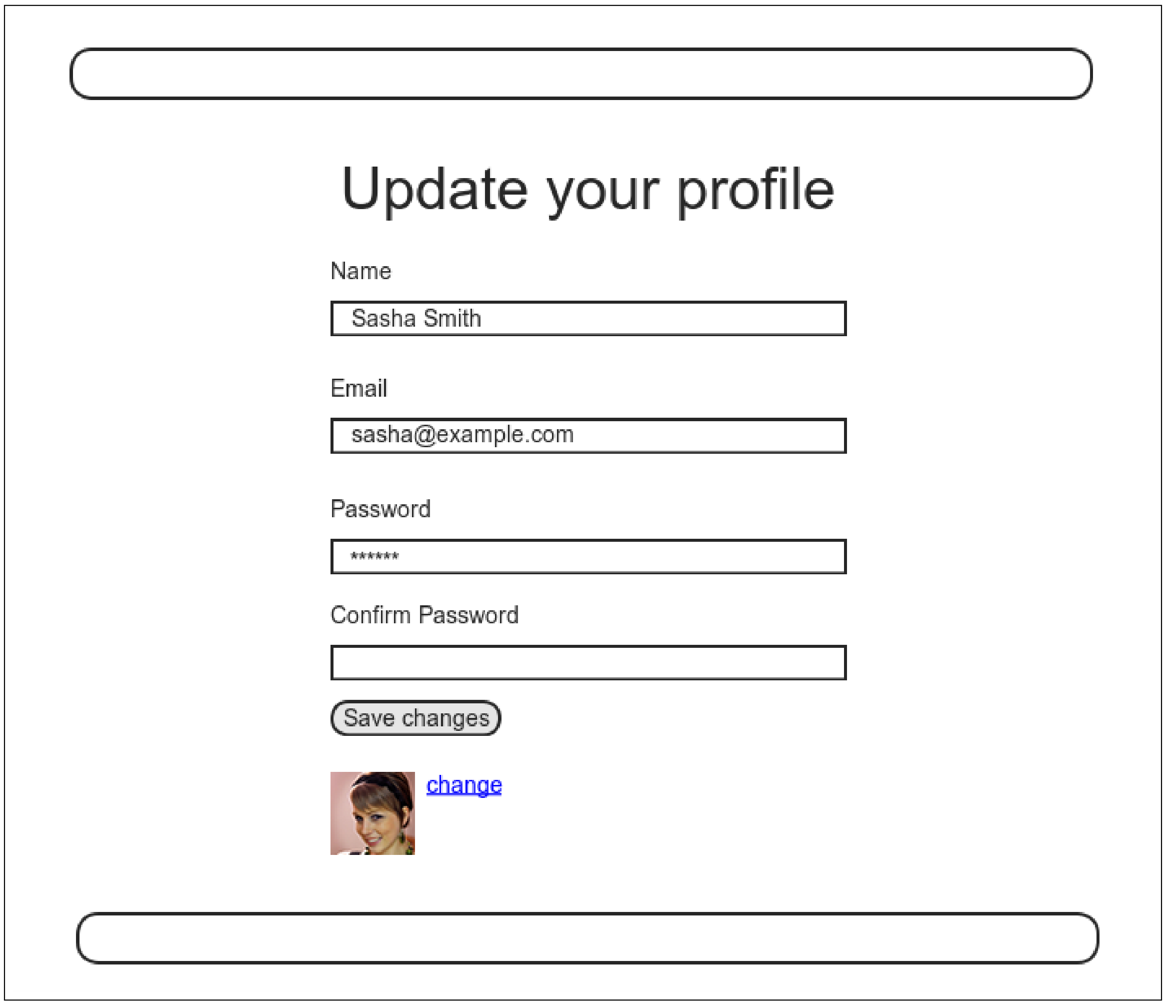


Figure 10.1: A mockup of the user edit page.

```
    end
  end

  def edit
    @user = User.find(params[:id])
  end

  private

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

The corresponding user edit view (which you will have to create by hand) is shown in Listing 10.2. Note how closely this resembles the new user view from Listing 7.15; the large overlap suggests factoring the repeated code into a partial, which is left as an exercise (Section 10.1.1).

Listing 10.2: The user edit view.
app/views/users/edit.html.erb

```
<% provide(:title, "Edit user") %>
<h1>Update your profile</h1>

<div class="row">
  <div class="col-md-6 col-md-offset-3">
    <%= form_with(model: @user, local: true) do |f| %>
      <%= render 'shared/error_messages' %>

      <%= f.label :name %>
      <%= f.text_field :name, class: 'form-control' %>

      <%= f.label :email %>
      <%= f.email_field :email, class: 'form-control' %>

      <%= f.label :password %>
      <%= f.password_field :password, class: 'form-control' %>

      <%= f.label :password_confirmation, "Confirmation" %>
      <%= f.password_field :password_confirmation, class: 'form-control' %>

      <%= f.submit "Save changes", class: "btn btn-primary" %>
    <% end %>
    <div class="gravatar_edit">
      <%= gravatar_for @user %>
      <a href="https://gravatar.com/emails" target="_blank">change</a>
    </div>
  </div>
</div>
```

Here we have reused the shared **`error_messages`** partial introduced in Section 7.3.3. By the way, the use of **`target="_blank"`** in the Gravatar link is a neat trick to get the browser to open the page in a new window or tab, which is sometimes convenient behavior when linking to third-party sites. (There's a minor security issue associated with **`target="_blank"`**; dealing with this detail is left as an exercise (Section 10.1.1).)

With the **`@user`** instance variable from Listing 10.1, the edit page should render properly, as shown in Figure 10.2. The "Name" and "Email" fields in Figure 10.2 also shows how Rails automatically pre-fills the Name and Email fields using the attributes of the existing **`@user`** variable.

Looking at the HTML source for Figure 10.2, we see a form tag as expected, as in Listing 10.3 (slight details may differ).

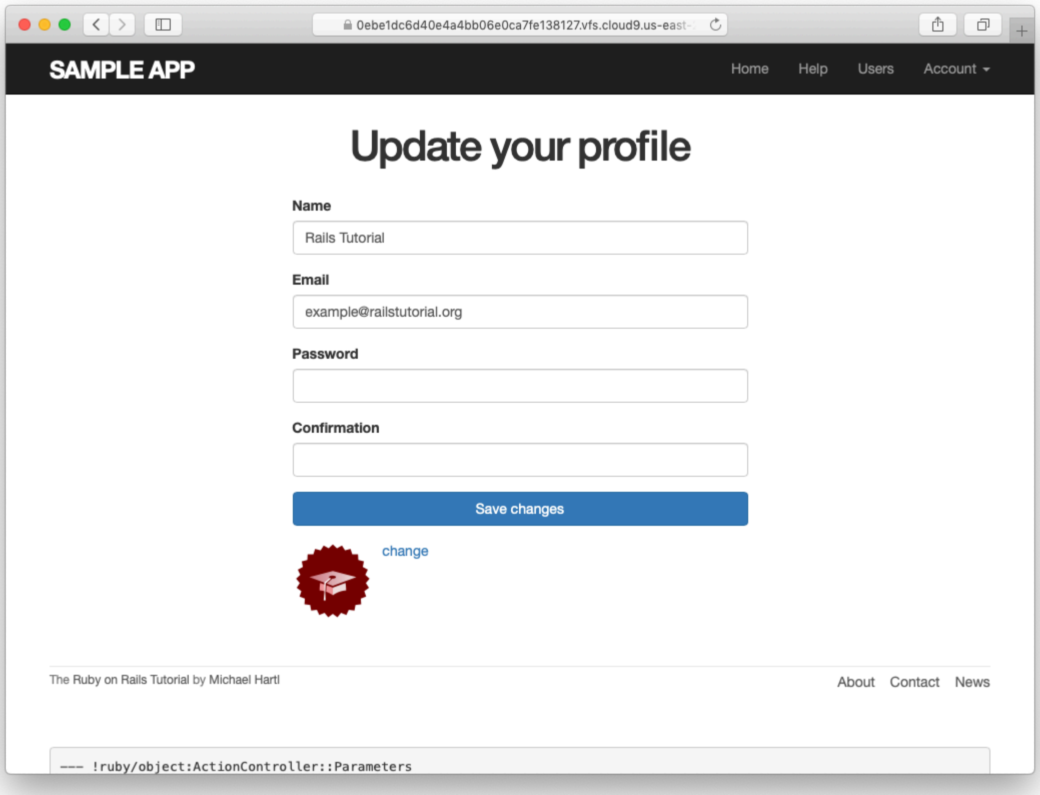
Listing 10.3: HTML for the edit form defined in Listing 10.2 and shown in Figure 10.2.

```
<form accept-charset="UTF-8" action="/users/1" class="edit_user"
      id="edit_user_1" method="post">
  <input name="_method" type="hidden" value="patch" />
  .
  .
  .
</form>
```

Note here the hidden input field:

```
<input name="_method" type="hidden" value="patch" />
```

Since web browsers can't natively send `PATCH` requests (as required by the REST conventions from Table 7.1), Rails fakes it with a `POST` request and a



```
--- !ruby/object:ActionController::Parameters
```

Figure 10.2: The initial user edit page with pre-filled name and email.

hidden **input** field.[2]

There's another subtlety to address here: the code **form_with(@user)** in Listing 10.2 is *exactly* the same as the code in Listing 7.15—so how does Rails know to use a POST request for new users and a PATCH for editing users? The answer is that it is possible to tell whether a user is new or already exists in the database via Active Record's **new_record?** boolean method:

```
$ rails console
>> User.new.new_record?
=> true
>> User.first.new_record?
=> false
```

When constructing a form using **form_with(@user)**, Rails uses POST if **@user.new_record?** is **true** and PATCH if it is **false**.

As a final touch, we'll fill in the URL of the settings link in the site navigation. This is easy using the named route **edit_user_path** from Table 7.1, together with the handy **current_user** helper method defined in Listing 9.9:

```
<%= link_to "Settings", edit_user_path(current_user) %>
```

The full application code appears in Listing 10.4).

Listing 10.4: Adding a URL to the "Settings" link in the site layout.
app/views/layouts/_header.html.erb

```
<header class="navbar navbar-fixed-top navbar-inverse">
  <div class="container">
    <%= link_to "sample app", root_path, id: "logo" %>
    <nav>
      <ul class="nav navbar-nav navbar-right">
        <li><%= link_to "Home", root_path %></li>
        <li><%= link_to "Help", help_path %></li>
        <% if logged_in? %>
          <li><%= link_to "Users", '#' %></li>
```

[2]Don't worry about how this works; the details are of interest to developers of the Rails framework itself, and by design are not important for Rails application developers.

```
          <li class="dropdown">
            <a href="#" class="dropdown-toggle" data-toggle="dropdown">
              Account <b class="caret"></b>
            </a>
            <ul class="dropdown-menu">
              <li><%= link_to "Profile", current_user %></li>
              <li><%= link_to "Settings", edit_user_path(current_user) %></li>
              <li class="divider"></li>
              <li>
                <%= link_to "Log out", logout_path, method: :delete %>
              </li>
            </ul>
          </li>
        <% else %>
          <li><%= link_to "Log in", login_path %></li>
        <% end %>
      </ul>
    </nav>
  </div>
</header>
```

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. As noted above, there's a minor security issue associated with using **`target="_blank"`** to open URLs, which is that the target site gains control of what's known as the "**`window`** object" associated with the HTML document. The result is that the target site could potentially introduce malicious content, such as a phishing page. This is extremely unlikely to happen when linking to a reputable site like Gravatar, but it turns out that we can eliminate the risk entirely by setting the **`rel`** attribute ("relationship") to **`"noopener"`** in the origin link. Add this attribute to the Gravatar edit link in Listing 10.2.

2. Remove the duplicated form code by refactoring the **`new.html.erb`** and **`edit.html.erb`** views to use the partial in Listing 10.5, as shown in Listing 10.6 and Listing 10.7. Note the use of the **`provide`** method,

which we used before in Section 3.4.3 to eliminate duplication in the layout.[3]

Listing 10.5: A partial for the **`new`** and **`edit`** form.
`app/views/users/_form.html.erb`

```
<%= form_with(model: @user, local: true) do |f| %>
  <%= render 'shared/error_messages', object: @user %>

  <%= f.label :name %>
  <%= f.text_field :name, class: 'form-control' %>

  <%= f.label :email %>
  <%= f.email_field :email, class: 'form-control' %>

  <%= f.label :password %>
  <%= f.password_field :password, class: 'form-control' %>

  <%= f.label :password_confirmation %>
  <%= f.password_field :password_confirmation, class: 'form-control' %>

  <%= f.submit yield(:button_text), class: "btn btn-primary" %>
<% end %>
```

Listing 10.6: The signup view with partial.
`app/views/users/new.html.erb`

```
<% provide(:title, 'Sign up') %>
<% provide(:button_text, 'Create my account') %>
<h1>Sign up</h1>
<div class="row">
  <div class="col-md-6 col-md-offset-3">
    <%= render 'form' %>
  </div>
</div>
```

Listing 10.7: The edit view with partial.
`app/views/users/edit.html.erb`

[3]Thanks to Jose Carlos Montero Gómez for a suggestion that further reduced duplication in the **`new`** and **`edit`** partials.

```
<% provide(:title, 'Edit user') %>
<% provide(:button_text, 'Save changes') %>
<h1>Update your profile</h1>
<div class="row">
  <div class="col-md-6 col-md-offset-3">
    <%= render 'form' %>
    <div class="gravatar_edit">
      <%= gravatar_for @user %>
      <a href="https://gravatar.com/emails" target="_blank">Change</a>
    </div>
  </div>
</div>
```

10.1.2 Unsuccessful edits

In this section we'll handle unsuccessful edits, following similar ideas to unsuccessful signups (Section 7.3). We start by creating an **`update`** action, which uses **`update`** (Section 6.1.5) to update the user based on the submitted **`params`** hash, as shown in Listing 10.8. With invalid information, the update attempt returns **`false`**, so the **`else`** branch renders the edit page. We've seen this pattern before; the structure closely parallels the first version of the **`create`** action (Listing 7.18).

Listing 10.8: The initial user **`update`** action.
`app/controllers/users_controller.rb`

```
class UsersController < ApplicationController

  def show
    @user = User.find(params[:id])
  end

  def new
    @user = User.new
  end

  def create
    @user = User.new(user_params)
    if @user.save
      log_in @user
      flash[:success] = "Welcome to the Sample App!"
      redirect_to @user
    else
```

```
      render 'new'
    end
  end

  def edit
    @user = User.find(params[:id])
  end

  def update
    @user = User.find(params[:id])
    if @user.update(user_params)
      # Handle a successful update.
    else
      render 'edit'
    end
  end

  private

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

Note the use of **`user_params`** in the call to **`update`**, which uses strong parameters to prevent mass assignment vulnerability (as described in Section 7.3.2).

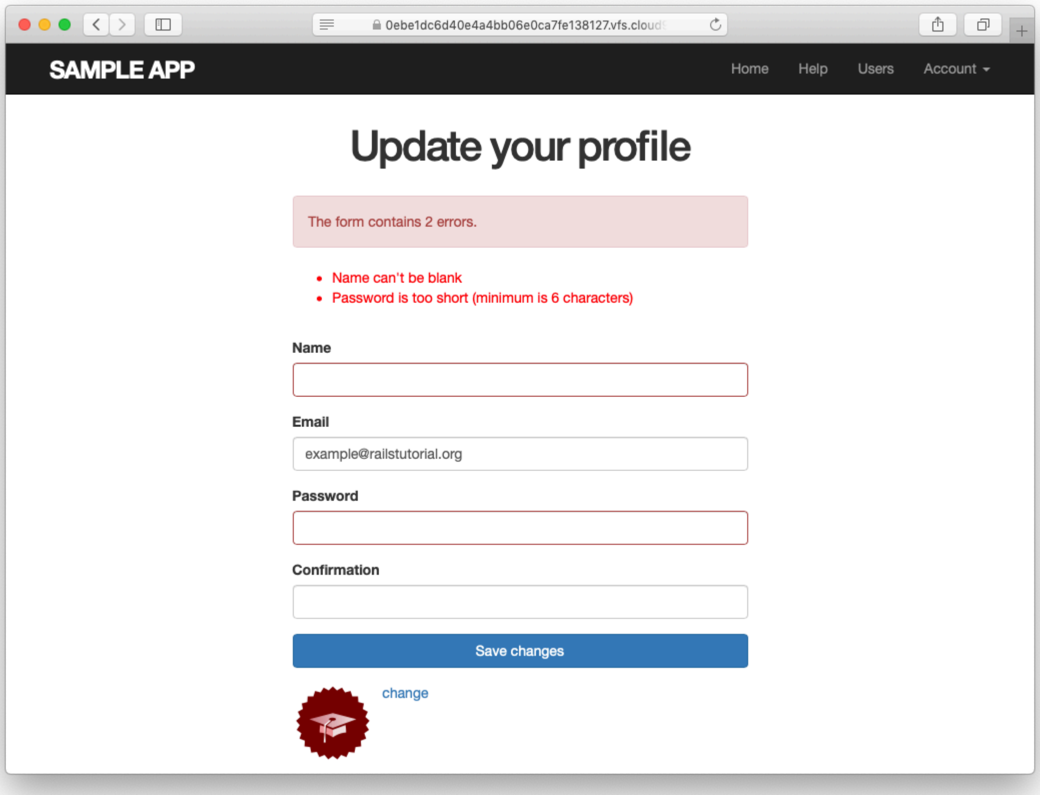
Because of the existing User model validations and the error-messages partial in Listing 10.2, submission of invalid information results in helpful error messages (Figure 10.3).

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. Confirm by submitting various invalid combinations of username, email, and password that the edit form won't accept invalid submissions.



Update your profile

The form contains 2 errors.

- Name can't be blank
- Password is too short (minimum is 6 characters)

Name	
Email	example@railstutorial.org
Password	
Confirmation	

Figure 10.3: Error messages from submitting the update form.

10.1.3 Testing unsuccessful edits

We left Section 10.1.2 with a working edit form. Following the testing guidelines from Box 3.3, we'll now write an integration test to catch any regressions. Our first step is to generate an integration test as usual:

```
$ rails generate integration_test users_edit
      invoke  test_unit
      create    test/integration/users_edit_test.rb
```

Then we'll write a simple test of an unsuccessful edit, as shown in Listing 10.9. The test in Listing 10.9 checks for the correct behavior by verifying that the edit template is rendered after getting the edit page and re-rendered upon submission of invalid information. Note the use of the **`patch`** method to issue a `PATCH` request, which follows the same pattern as **`get`**, **`post`**, and **`delete`**.

Listing 10.9: A test for an unsuccessful edit. GREEN
`test/integration/users_edit_test.rb`

```
require 'test_helper'

class UsersEditTest < ActionDispatch::IntegrationTest

  def setup
    @user = users(:michael)
  end

  test "unsuccessful edit" do
    get edit_user_path(@user)
    assert_template 'users/edit'
    patch user_path(@user), params: { user: { name:  "",
                                              email: "foo@invalid",
                                              password:              "foo",
                                              password_confirmation: "bar" } }

    assert_template 'users/edit'
  end
end
```

At this point, the test suite should still be GREEN:

Listing 10.10: GREEN

```
$ rails test
```

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

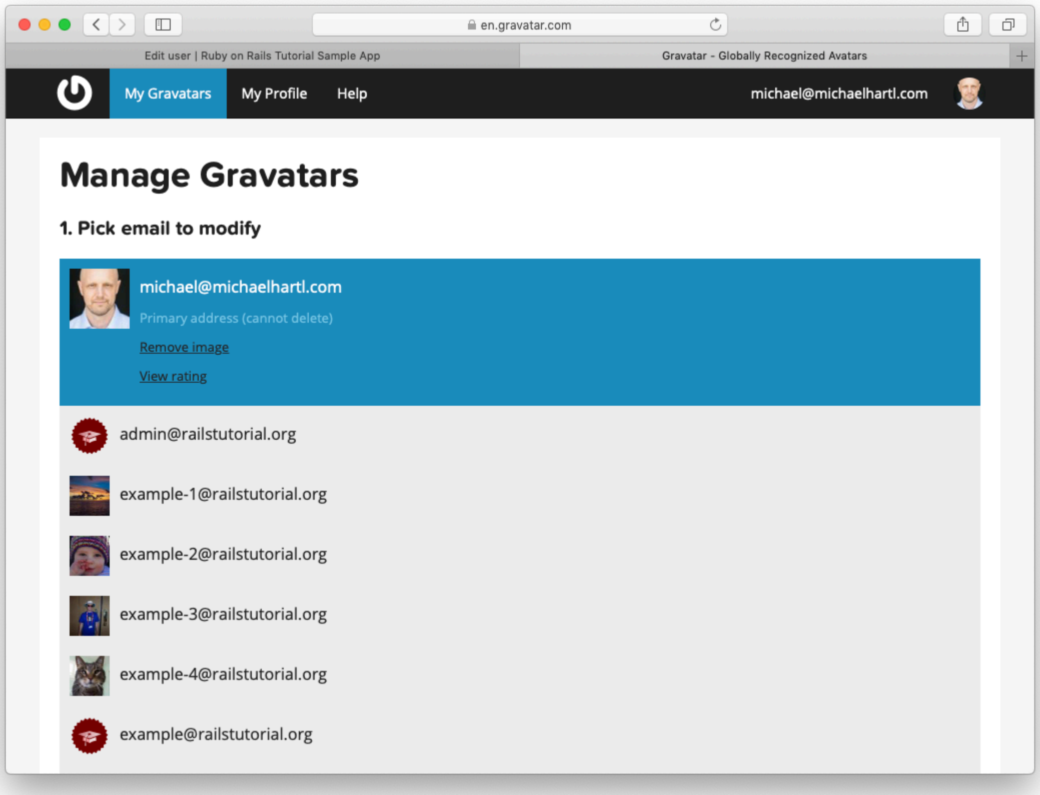
1. Add a line in Listing 10.9 to test for the correct *number* of error messages. *Hint*: Use an `assert_select` (Table 5.2) that tests for a `div` with class `alert` containing the text "The form contains 4 errors."

10.1.4 Successful edits (with TDD)

Now it's time to get the edit form to work. Editing the profile images is already functional since we've outsourced image upload to the Gravatar website: we can edit a Gravatar by clicking on the "change" link in Figure 10.2, which opens the Gravatar site in a new tab (due to `target="_blank"` in Listing 10.2), as shown in Figure 10.4. Let's get the rest of the user edit functionality working as well.

As you get more comfortable with testing, you might find that it's useful to write integration tests before writing the application code instead of after. In this context, such tests are sometimes known as *acceptance tests*, since they determine when a particular feature should be accepted as complete. To see how this works, we'll complete the user edit feature using test-driven development.

We'll test for the correct behavior of updating users by writing a test similar to the one shown in Listing 10.9, only this time we'll submit valid information. Then we'll check for a nonempty flash message and a successful redirect to the profile page, while also verifying that the user's information correctly changed in the database. The result appears in Listing 10.11. Note that the password and confirmation in Listing 10.11 are blank, which is convenient for


en.gravatar.com
Edit user | Ruby on Rails Tutorial Sample App
Gravatar - Globally Recognized Avatars
My Gravatars
My Profile
Help
michael@michaelhartl.com

Manage Gravatars

1. Pick email to modify

michael@michaelhartl.com
Primary address (cannot delete)
Remove image
View rating

admin@railstutorial.org
example-1@railstutorial.org
example-2@railstutorial.org
example-3@railstutorial.org
example-4@railstutorial.org
example@railstutorial.org

Figure 10.4: The Gravatar image-editing interface.

users who don't want to update their passwords every time they update their names or email addresses. Note also the use of **`@user.reload`** (first seen in Section 6.1.5) to reload the user's values from the database and confirm that they were successfully updated. (This is the kind of detail you could easily forget initially, which is why acceptance testing (and TDD generally) require a certain level of experience to be effective.)

Listing 10.11: A test of a successful edit. RED
`test/integration/users_edit_test.rb`

```
require 'test_helper'

class UsersEditTest < ActionDispatch::IntegrationTest

  def setup
    @user = users(:michael)
  end
  .
  .
  .
  test "successful edit" do
    get edit_user_path(@user)
    assert_template 'users/edit'
    name  = "Foo Bar"
    email = "foo@bar.com"
    patch user_path(@user), params: { user: { name:  name,
                                              email: email,
                                              password:              "",
                                              password_confirmation: "" } }
    assert_not flash.empty?
    assert_redirected_to @user
    @user.reload
    assert_equal name,  @user.name
    assert_equal email, @user.email
  end
end
```

The **`update`** action needed to get the tests in Listing 10.11 to pass is similar to the final form of the **`create`** action (Listing 8.29), as seen in Listing 10.12.

Listing 10.12: The user **`update`** action. RED
`app/controllers/users_controller.rb`

```
class UsersController < ApplicationController
  .
  .
  .
  def update
    @user = User.find(params[:id])
    if @user.update(user_params)
      flash[:success] = "Profile updated"
      redirect_to @user
    else
      render 'edit'
    end
  end
  .
  .
  .
end
```

As indicated in the caption to Listing 10.12, the test suite is still RED, which is the result of the password length validation (Listing 6.43) failing due to the empty password and confirmation in Listing 10.11. To get the tests to GREEN, we need to make an exception to the password validation if the password is empty. We can do this by passing the **`allow_nil: true`** option to **`validates`**, as seen in Listing 10.13.

Listing 10.13: Allowing empty passwords on update. GREEN
`app/models/user.rb`

```
class User < ApplicationRecord
  attr_accessor :remember_token
  before_save { self.email = email.downcase }
  validates :name, presence: true, length: { maximum: 50 }
  VALID_EMAIL_REGEX = /\A[\w+\-.]+@[a-z\d\-.]+\.[a-z]+\z/i
  validates :email, presence: true, length: { maximum: 255 },
                    format: { with: VALID_EMAIL_REGEX },
                    uniqueness: true
  has_secure_password
  validates :password, presence: true, length: { minimum: 6 }, allow_nil: true
  .
  .
  .
end
```

In case you're worried that Listing 10.13 might allow new users to sign up with empty passwords, recall from Section 6.3.3 that **`has_secure_password`** includes a separate presence validation that specifically catches **`nil`** passwords. (Because **`nil`** passwords now bypass the main presence validation but are still caught by **`has_secure_password`**, this also fixes the duplicate error message mentioned in Section 7.3.3.)

With the code in this section, the user edit page should be working (Figure 10.5), as you can double-check by re-running the test suite, which should now be GREEN:

Listing 10.14: GREEN

```
$ rails test
```

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

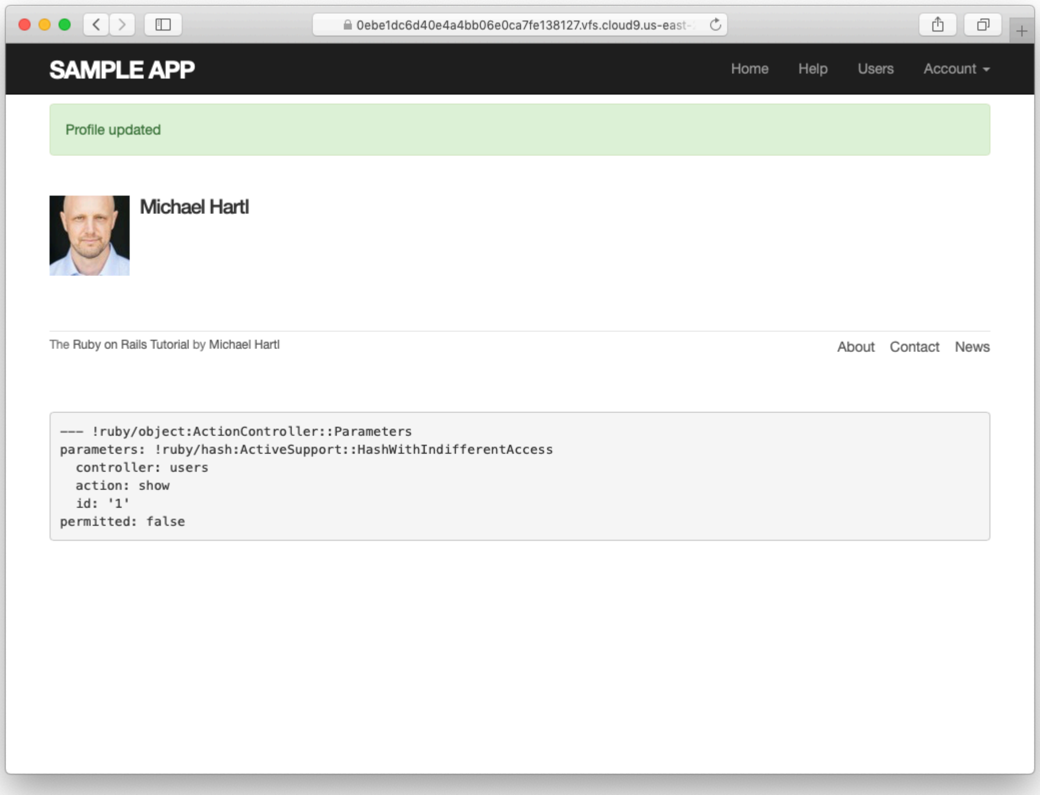
1. Double-check that you can now make edits by making a few changes on the development version of the application.

2. What happens when you change the email address to one without an associated Gravatar?

10.2 Authorization

In the context of web applications, *authentication* allows us to identify users of our site, while *authorization* lets us control what they can do. One nice effect of building the authentication machinery in Chapter 8 is that we are now in a position to implement authorization as well.

Although the edit and update actions from Section 10.1 are functionally complete, they suffer from a ridiculous security flaw: they allow anyone (even non-logged-in users) to access either action and update the information for any


0ebe1dc6d40e4a4bb06e0ca7fe138127.vfs.cloud9.us-east-
SAMPLE APP
Home
Help
Users
Account
Profile updated
Michael Hartl
The Ruby on Rails Tutorial by Michael Hartl
About
Contact
News

```
--- !ruby/object:ActionController::Parameters
parameters: !ruby/hash:ActiveSupport::HashWithIndifferentAccess
  controller: users
  action: show
  id: '1'
permitted: false
```

Figure 10.5: The result of a successful edit.

user. In this section, we'll implement a security model that requires users to be logged in and prevents them from updating any information other than their own.

In Section 10.2.1, we'll handle the case of non-logged-in users who try to access a protected page to which they might normally have access. Because this could easily happen in the normal course of using the application, such users will be forwarded to the login page with a helpful message, as mocked up in Figure 10.6. On the other hand, users who try to access a page for which they would never be authorized (such as a logged-in user trying to access a different user's edit page) will be redirected to the root URL (Section 10.2.2).

10.2.1 Requiring logged-in users

To implement the forwarding behavior shown in Figure 10.6, we'll use a *before filter* in the Users controller. Before filters use the **`before_action`** command to arrange for a particular method to be called before the given actions.[4] To require users to be logged in, we define a **`logged_in_user`** method and invoke it using **`before_action :logged_in_user`**, as shown in Listing 10.15.

Listing 10.15: Adding a **`logged_in_user`** before filter. RED
app/controllers/users_controller.rb

```
class UsersController < ApplicationController
  before_action :logged_in_user, only: [:edit, :update]
  .
  .
  .
  private

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

    # Before filters

    # Confirms a logged-in user.
```

[4]The command for before filters used to be called **`before_filter`**, but the Rails core team decided to rename it to emphasize that the filter takes place before particular controller actions.

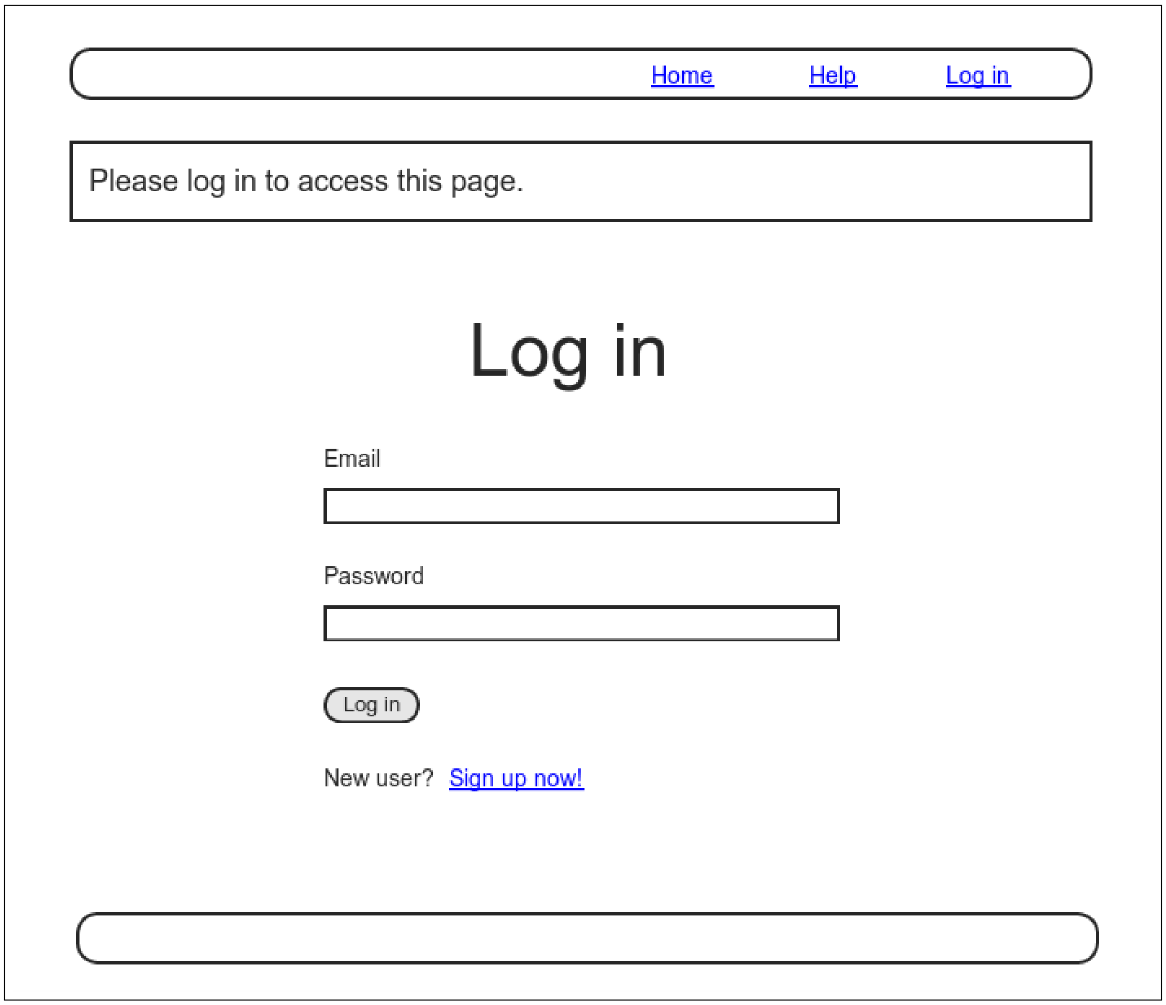


Figure 10.6: A mockup of the result of visiting a protected page

```
    def logged_in_user
      unless logged_in?
        flash[:danger] = "Please log in."
        redirect_to login_url
      end
    end
end
```

By default, before filters apply to *every* action in a controller, so here we restrict the filter to act only on the **:edit** and **:update** actions by passing the appropriate **only:** options hash.

We can see the result of the before filter in Listing 10.15 by logging out and attempting to access the user edit page /users/1/edit, as seen in Figure 10.7.

As indicated in the caption of Listing 10.15, our test suite is currently RED:

Listing 10.16: RED

```
$ rails test
```

The reason is that the edit and update actions now require a logged-in user, but no user is logged in inside the corresponding tests.

We'll fix our test suite by logging the user in before hitting the edit or update actions. This is easy using the **log_in_as** helper developed in Section 9.3 (Listing 9.24), as shown in Listing 10.17.

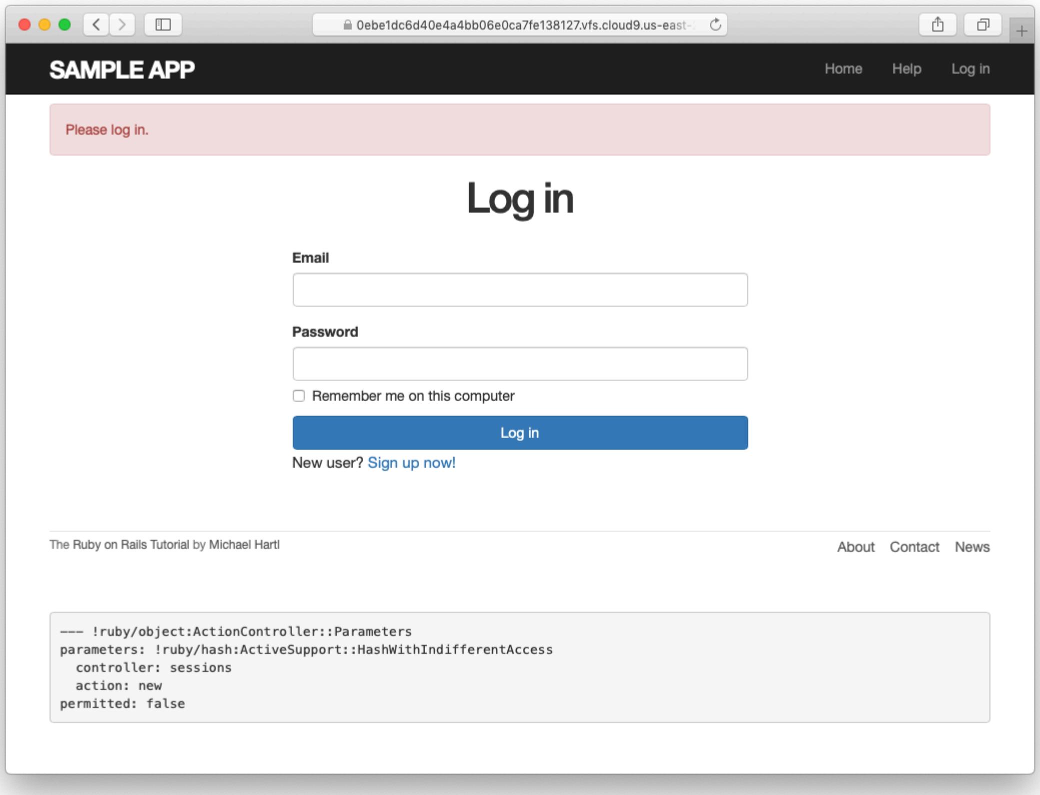
Listing 10.17: Logging in a test user. GREEN
test/integration/users_edit_test.rb

```
require 'test_helper'

class UsersEditTest < ActionDispatch::IntegrationTest

  def setup
    @user = users(:michael)
  end

  test "unsuccessful edit" do
    log_in_as(@user)
    get edit_user_path(@user)
    .
```


0ebe1dc6d40e4a4bb06e0ca7fe138127.vfs.cloud9.us-east-
SAMPLE APP
Home
Help
Log in
Please log in.
Log in
Email
Password
Remember me on this computer
Log in
New user? Sign up now!
The Ruby on Rails Tutorial by Michael Hartl
About
Contact
News

```
--- !ruby/object:ActionController::Parameters
parameters: !ruby/hash:ActiveSupport::HashWithIndifferentAccess
  controller: sessions
  action: new
permitted: false
```

Figure 10.7: The login form after trying to access a protected page.

```
    .
    .
  end

  test "successful edit" do
    log_in_as(@user)
    get edit_user_path(@user)
    .
    .
    .
  end
end
```

(We could eliminate some duplication by putting the test login in the **`setup`** method of Listing 10.17, but in Section 10.2.3 we'll change one of the tests to visit the edit page *before* logging in, which isn't possible if the login step happens during the test setup.)

At this point, our test suite should be green:

Listing 10.18: GREEN

```
$ rails test
```

Even though our test suite is now passing, we're not finished with the before filter, because the suite is still GREEN even if we remove our security model, as you can verify by commenting it out (Listing 10.19). This is a Bad Thing—of all the regressions we'd like our test suite to catch, a massive security hole is probably #1, so the code in Listing 10.19 should definitely be RED. Let's write tests to arrange that.

Listing 10.19: Commenting out the before filter to test our security model. GREEN
`app/controllers/users_controller.rb`

```
class UsersController < ApplicationController
  # before_action :logged_in_user, only: [:edit, :update]
  .
  .
  .
end
```

Because the before filter operates on a per-action basis, we'll put the corresponding tests in the Users controller test. The plan is to hit the **`edit`** and **`update`** actions with the right kinds of requests and verify that the flash is set and that the user is redirected to the login path. From Table 7.1, we see that the proper requests are `GET` and `PATCH`, respectively, which means using the **`get`** and **`patch`** methods inside the tests. The results (which include adding a **`setup`** method to define an **`@user`** variable) appear in Listing 10.20.

Listing 10.20: Testing that **`edit`** and **`update`** are protected. RED
`test/controllers/users_controller_test.rb`

```ruby
require 'test_helper'

class UsersControllerTest < ActionDispatch::IntegrationTest

  def setup
    @user = users(:michael)
  end
  .
  .
  .
  test "should redirect edit when not logged in" do
    get edit_user_path(@user)
    assert_not flash.empty?
    assert_redirected_to login_url
  end

  test "should redirect update when not logged in" do
    patch user_path(@user), params: { user: { name: @user.name,
                                              email: @user.email } }
    assert_not flash.empty?
    assert_redirected_to login_url
  end
end
```

Note that the second test shown in Listing 10.20 involves using the **`patch`** method to send a `PATCH` request to **`user_path(@user)`**. According to Table 7.1, such a request gets routed to the **`update`** action in the Users controller, as required.

The test suite should now be RED, as required. To get it to GREEN, just uncomment the before filter (Listing 10.21).

Listing 10.21: Uncommenting the before filter. GREEN
app/controllers/users_controller.rb

```
class UsersController < ApplicationController
  before_action :logged_in_user, only: [:edit, :update]
  .
  .
  .
end
```

With that, our test suite should be GREEN:

Listing 10.22: GREEN

```
$ rails test
```

Any accidental exposure of the edit methods to unauthorized users will now be caught immediately by our test suite.

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. As noted above, by default before filters apply to every action in a controller, which in our cases is an error (requiring, e.g., that users log in to hit the signup page, which is absurd). By commenting out the `only:` hash in Listing 10.15, confirm that the test suite catches this error.

10.2.2 Requiring the right user

Of course, requiring users to log in isn't quite enough; users should only be allowed to edit their *own* information. As we saw in Section 10.2.1, it's easy to have a test suite that misses an essential security flaw, so we'll proceed using test-driven development to be sure our code implements the security model correctly. To do this, we'll add tests to the Users controller test to complement the ones shown in Listing 10.20.

In order to make sure users can't edit other users' information, we need to be able to log in as a second user. This means adding a second user to our users fixture file, as shown in Listing 10.23.

Listing 10.23: Adding a second user to the fixture file.
test/fixtures/users.yml

```
michael:
  name: Michael Example
  email: michael@example.com
  password_digest: <%= User.digest('password') %>

archer:
  name: Sterling Archer
  email: duchess@example.gov
  password_digest: <%= User.digest('password') %>
```

By using the **log_in_as** method defined in Listing 9.24, we can test the **edit** and **update** actions as in Listing 10.24. Note that we expect to redirect users to the root path instead of the login path because a user trying to edit a different user would already be logged in.

Listing 10.24: Tests for trying to edit as the wrong user. RED
test/controllers/users_controller_test.rb

```
require 'test_helper'

class UsersControllerTest < ActionDispatch::IntegrationTest

  def setup
    @user       = users(:michael)
    @other_user = users(:archer)
  end
  .
  .
  .
  test "should redirect edit when logged in as wrong user" do
    log_in_as(@other_user)
    get edit_user_path(@user)
    assert flash.empty?
    assert_redirected_to root_url
  end

  test "should redirect update when logged in as wrong user" do
    log_in_as(@other_user)
    patch user_path(@user), params: { user: { name: @user.name,
                                              email: @user.email } }
    assert flash.empty?
    assert_redirected_to root_url
  end
end
```

To redirect users trying to edit another user's profile, we'll add a second method called **`correct_user`**, together with a before filter to call it (Listing 10.25). Note that the **`correct_user`** before filter defines the **`@user`** variable, so Listing 10.25 also shows that we can eliminate the **`@user`** assignments in the **`edit`** and **`update`** actions.

Listing 10.25: A before filter to protect the edit/update pages. GREEN
app/controllers/users_controller.rb

```
class UsersController < ApplicationController
  before_action :logged_in_user, only: [:edit, :update]
  before_action :correct_user,   only: [:edit, :update]
  .
  .
  .
  def edit
  end

  def update
    if @user.update(user_params)
      flash[:success] = "Profile updated"
      redirect_to @user
    else
      render 'edit'
    end
  end
  .
  .
  .
  private

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

    # Before filters

    # Confirms a logged-in user.
    def logged_in_user
      unless logged_in?
        flash[:danger] = "Please log in."
        redirect_to login_url
      end
    end

    # Confirms the correct user.
    def correct_user
      @user = User.find(params[:id])
      redirect_to(root_url) unless @user == current_user
    end
end
```

At this point, our test suite should be GREEN:

Listing 10.26: GREEN

```
$ rails test
```

As a final refactoring, we'll adopt a common convention and define a **current_user?** boolean method for use in the **correct_user** before filter. We'll use this method to replace code like

```
unless @user == current_user
```

with the more expressive

```
unless current_user?(@user)
```

The result appears in Listing 10.27. Note that by writing **user && user == current_user**, we also catch the edge case where **user** is **nil**.[5]

[5]Thanks to reader Andrew Moor for pointing this out. Andrew also noted that we can use the safe navigation operator introduced in Section 8.2.4 to write this as **user&. == current_user**.

Listing 10.27: The **`current_user?`** method.
`app/helpers/sessions_helper.rb`

```
module SessionsHelper

  # Logs in the given user.
  def log_in(user)
    session[:user_id] = user.id
  end

  # Remembers a user in a persistent session.
  def remember(user)
    user.remember
    cookies.permanent.signed[:user_id] = user.id
    cookies.permanent[:remember_token] = user.remember_token
  end

  # Returns the user corresponding to the remember token cookie.
  def current_user
    if (user_id = session[:user_id])
      @current_user ||= User.find_by(id: user_id)
    elsif (user_id = cookies.signed[:user_id])
      user = User.find_by(id: user_id)
      if user && user.authenticated?(cookies[:remember_token])
        log_in user
        @current_user = user
      end
    end
  end

  # Returns true if the given user is the current user.
  def current_user?(user)
    user && user == current_user
  end
   .
   .
   .
end
```

Replacing the direct comparison with the boolean method gives the code shown in Listing 10.28.

Listing 10.28: The final **`correct_user`** before filter. GREEN
`app/controllers/users_controller.rb`

```
class UsersController < ApplicationController
  before_action :logged_in_user, only: [:edit, :update]
  before_action :correct_user,   only: [:edit, :update]
  .
  .
  .
  def edit
  end

  def update
    if @user.update(user_params)
      flash[:success] = "Profile updated"
      redirect_to @user
    else
      render 'edit'
    end
  end
  .
  .
  .
  private

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

    # Before filters

    # Confirms a logged-in user.
    def logged_in_user
      unless logged_in?
        flash[:danger] = "Please log in."
        redirect_to login_url
      end
    end

    # Confirms the correct user.
    def correct_user
      @user = User.find(params[:id])
      redirect_to(root_url) unless current_user?(@user)
    end
end
```

Exercises

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To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. Why is it important to protect both the **`edit`** and **`update`** actions?
2. Which action could you more easily test in a browser?

10.2.3 Friendly forwarding

Our site authorization is complete as written, but there is one minor blemish: when users try to access a protected page, they are currently redirected to their profile pages regardless of where they were trying to go. In other words, if a non-logged-in user tries to visit the edit page, after logging in the user will be redirected to /users/1 instead of /users/1/edit. It would be much friendlier to redirect them to their intended destination instead.

The application code will turn out to be relatively complicated, but we can write a ridiculously simple test for friendly forwarding just by reversing the order of logging in and visiting the edit page in Listing 10.17. As seen in Listing 10.29, the resulting test tries to visit the edit page, then logs in, and then checks that the user is redirected to the *edit* page instead of the default profile page. (Listing 10.29 also removes the test for rendering the edit template since that's no longer the expected behavior.)

Listing 10.29: A test for friendly forwarding. RED
test/integration/users_edit_test.rb

```ruby
require 'test_helper'

class UsersEditTest < ActionDispatch::IntegrationTest

  def setup
    @user = users(:michael)
  end
  .
  .
  .
  test "successful edit with friendly forwarding" do
    get edit_user_path(@user)
    log_in_as(@user)
    assert_redirected_to edit_user_url(@user)
    name  = "Foo Bar"
    email = "foo@bar.com"
    patch user_path(@user), params: { user: { name:  name,
                                              email: email,
                                              password:              "",
                                              password_confirmation: "" } }
    assert_not flash.empty?
    assert_redirected_to @user
    @user.reload
    assert_equal name,  @user.name
    assert_equal email, @user.email
  end
end
```

Now that we have a failing test, we're ready to implement friendly forwarding.[6] In order to forward users to their intended destination, we need to store the location of the requested page somewhere, and then redirect to that location instead of to the default. We accomplish this with a pair of methods, **`store_location`** and **`redirect_back_or`**, both defined in the Sessions helper (Listing 10.30).

Listing 10.30: Code to implement friendly forwarding. RED
app/helpers/sessions_helper.rb

```
module SessionsHelper
  .
  .
  .
  # Redirects to stored location (or to the default).
  def redirect_back_or(default)
    redirect_to(session[:forwarding_url] || default)
    session.delete(:forwarding_url)
  end

  # Stores the URL trying to be accessed.
  def store_location
    session[:forwarding_url] = request.original_url if request.get?
  end
end
```

Here the storage mechanism for the forwarding URL is the same **`session`** facility we used in Section 8.2.1 to log the user in. Listing 10.30 also uses the **`request`** object (via **`request.original_url`**) to get the URL of the requested page.

[6]The code in this section is adapted from the Clearance gem by thoughtbot.

The **`store_location`** method in Listing 10.30 puts the requested URL in the **`session`** variable under the key **`:forwarding_url`**, but only for a **`GET`** request. This prevents storing the forwarding URL if a user, say, submits a form when not logged in (which is an edge case but could happen if, e.g., a user deleted the session cookies by hand before submitting the form). In such a case, the resulting redirect would issue a **`GET`** request to a URL expecting **`POST`**, **`PATCH`**, or **`DELETE`**, thereby causing an error. Including **`if request.get?`** prevents this from happening.[7]

To make use of **`store_location`**, we need to add it to the **`logged_in_user`** before filter, as shown in Listing 10.31.

Listing 10.31: Adding **`store_location`** to the logged-in user before filter. RED

app/controllers/users_controller.rb

```
class UsersController < ApplicationController
  before_action :logged_in_user, only: [:edit, :update]
  before_action :correct_user,   only: [:edit, :update]
  .
  .
  .
  def edit
  end
  .
  .
  .
  private

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

    # Before filters

    # Confirms a logged-in user.
    def logged_in_user
      unless logged_in?
        store_location
        flash[:danger] = "Please log in."
        redirect_to login_url
      end
```

[7]Thanks to reader Yoel Adler for pointing out this subtle issue, and for discovering the solution.

```
    end

    # Confirms the correct user.
    def correct_user
      @user = User.find(params[:id])
      redirect_to(root_url) unless current_user?(@user)
    end
end
```

To implement the forwarding itself, we use the **`redirect_back_or`** method to redirect to the requested URL if it exists, or some default URL otherwise, which we add to the Sessions controller **`create`** action to redirect after successful login (Listing 10.32). The **`redirect_back_or`** method uses the or operator **`||`** through

```
session[:forwarding_url] || default
```

This evaluates to **`session[:forwarding_url]`** unless it's **`nil`**, in which case it evaluates to the given default URL. Note that Listing 10.30 is careful to remove the forwarding URL (via **`session.delete(:forwarding_url)`**); otherwise, subsequent login attempts would forward to the protected page until the user closed their browser. (Testing for this is left as an exercise (Section 10.2.3).) Also note that the session deletion occurs even though the line with the redirect appears first; redirects don't happen until an explicit **`return`** or the end of the method, so any code appearing after the redirect is still executed.

Listing 10.32: The Sessions **`create`** action with friendly forwarding. GREEN
app/controllers/sessions_controller.rb

```
class SessionsController < ApplicationController
  .
  .
  .
  def create
    user = User.find_by(email: params[:session][:email].downcase)
    if user && user.authenticate(params[:session][:password])
      log_in user
      params[:session][:remember_me] == '1' ? remember(user) : forget(user)
      redirect_back_or user
    else
      flash.now[:danger] = 'Invalid email/password combination'
      render 'new'
    end
  end
  .
  .
  .
end
```

With that, the friendly forwarding integration test in Listing 10.29 should pass, and the basic user authentication and page protection implementation is complete. As usual, it's a good idea to verify that the test suite is GREEN before proceeding:

Listing 10.33: GREEN

```
$ rails test
```

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. Write a test to make sure that friendly forwarding only forwards to the given URL the first time. On subsequent login attempts, the forwarding URL should revert to the default (i.e., the profile page). *Hint*: Add to the test in Listing 10.29 by checking for the right value of **`session[:forwarding_url]`**.

2. Put a **`debugger`** (Section 7.1.3) in the Sessions controller's **`new`** action, then log out and try to visit /users/1/edit. Confirm in the debugger that the value of **`session[:forwarding_url]`** is correct. What is the value of **`request.get?`** for the **`new`** action? (Sometimes the terminal can freeze

up or act strangely when you're using the debugger; use your technical sophistication (Box 1.2) to resolve any issues.)

10.3 Showing all users

In this section, we'll add the penultimate user action, the **`index`** action, which is designed to display *all* the users instead of just one. Along the way, we'll learn how to seed the database with sample users and how to *paginate* the user output so that the index page can scale up to display a potentially large number of users. A mockup of the result—users, pagination links, and a "Users" navigation link—appears in Figure 10.8.[8] In Section 10.4, we'll add an administrative interface to the users index so that users can also be destroyed.

10.3.1 Users index

To get started with the users index, we'll first implement a security model. Although we'll keep individual user **`show`** pages visible to all site visitors, the user **`index`** will be restricted to logged-in users so that there's a limit to how much unregistered users can see by default.[9]

To protect the **`index`** page from unauthorized access, we'll first add a short test to verify that the **`index`** action is redirected properly (Listing 10.34).

Listing 10.34: Testing the **`index`** action redirect. RED
`test/controllers/users_controller_test.rb`

```
require 'test_helper'

class UsersControllerTest < ActionDispatch::IntegrationTest

  def setup
    @user       = users(:michael)
    @other_user = users(:archer)
  end
```

[8]Image retrieved from https://www.flickr.com/photos/glasgows/338937124/ on 2014-08-25. Copyright © 2008 by M&R Glasgow and used unaltered under the terms of the Creative Commons Attribution 2.0 Generic license.

[9]This is the same authorization model used by Twitter.

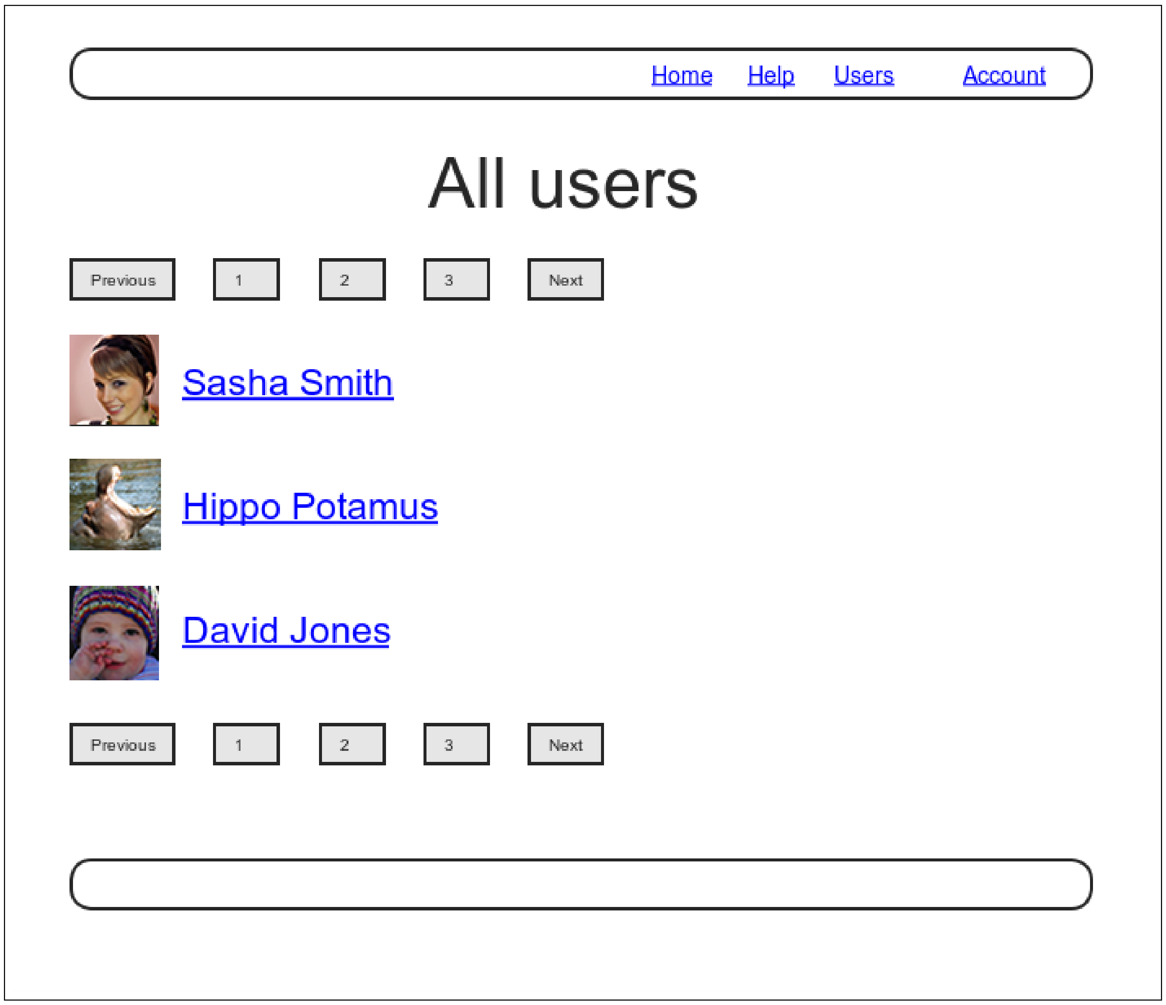


Figure 10.8: A mockup of the users index page.

```
  test "should get new" do
    get signup_path
    assert_response :success
  end

  test "should redirect index when not logged in" do
    get users_path
    assert_redirected_to login_url
  end
  .
  .
  .
end
```

Then we just need to add an **`index`** action and include it in the list of actions protected by the **`logged_in_user`** before filter (Listing 10.35).

Listing 10.35: Requiring a logged-in user for the **`index`** action. GREEN
`app/controllers/users_controller.rb`

```
class UsersController < ApplicationController
  before_action :logged_in_user, only: [:index, :edit, :update]
  before_action :correct_user,   only: [:edit, :update]

  def index
  end

  def show
    @user = User.find(params[:id])
  end
  .
  .
  .
end
```

To display the users themselves, we need to make a variable containing all the site's users and then render each one by iterating through them in the index view. As you may recall from the corresponding action in the toy app (Listing 2.9), we can use **`User.all`** to pull all the users out of the database, assigning them to an **`@users`** instance variable for use in the view, as seen in Listing 10.36. (If displaying all the users at once seems like a bad idea, you're right, and we'll remove this blemish in Section 10.3.3.)

Listing 10.36: The user **`index`** action.
`app/controllers/users_controller.rb`

```
class UsersController < ApplicationController
  before_action :logged_in_user, only: [:index, :edit, :update]
  .
  .
  .
  def index
    @users = User.all
  end
  .
  .
  .
end
```

To make the actual index page, we'll make a view (which you'll have to create) that iterates through the users and wraps each one in an **`li`** tag. We do this with the **`each`** method, displaying each user's Gravatar and name, while wrapping the whole thing in a **`ul`** tag (Listing 10.37).

Listing 10.37: The users index view.
`app/views/users/index.html.erb`

```
<% provide(:title, 'All users') %>
<h1>All users</h1>

<ul class="users">
  <% @users.each do |user| %>
    <li>
      <%= gravatar_for user, size: 50 %>
      <%= link_to user.name, user %>
    </li>
  <% end %>
</ul>
```

The code in Listing 10.37 uses the result of Listing 10.38 from Section 7.1.4, which allows us to pass an option to the Gravatar helper specifying a size other than the default. If you didn't do that exercise, update your Users helper file with the contents of Listing 10.38 before proceeding. (You are also welcome to use the Ruby 2.0–style version from Listing 7.13 instead.)

Listing 10.38: Adding an options hash in the **gravatar_for** helper.
app/helpers/users_helper.rb

```
module UsersHelper

  # Returns the Gravatar for the given user.
  def gravatar_for(user, options = { size: 80 })
    size         = options[:size]
    gravatar_id  = Digest::MD5::hexdigest(user.email.downcase)
    gravatar_url = "https://secure.gravatar.com/avatar/#{gravatar_id}?s=#{size}"
    image_tag(gravatar_url, alt: user.name, class: "gravatar")
  end
end
```

Let's also add a little CSS (or, rather, SCSS) for style (Listing 10.39).

Listing 10.39: CSS for the users index.
app/assets/stylesheets/custom.scss

```
.
.
.
/* Users index */

.users {
  list-style: none;
  margin: 0;
  li {
    overflow: auto;
    padding: 10px 0;
    border-bottom: 1px solid $gray-lighter;
  }
}
```

Finally, we'll add the URL to the users link in the site's navigation header using **users_path**, thereby using the last of the unused named routes in Table 7.1. The result appears in Listing 10.40.

Listing 10.40: Adding the URL to the users link.
app/views/layouts/_header.html.erb

```
<header class="navbar navbar-fixed-top navbar-inverse">
  <div class="container">
```

```
    <%= link_to "sample app", root_path, id: "logo" %>
    <nav>
      <ul class="nav navbar-nav navbar-right">
        <li><%= link_to "Home", root_path %></li>
        <li><%= link_to "Help", help_path %></li>
        <% if logged_in? %>
          <li><%= link_to "Users", users_path %></li>
          <li class="dropdown">
            <a href="#" class="dropdown-toggle" data-toggle="dropdown">
              Account <b class="caret"></b>
            </a>
            <ul class="dropdown-menu">
              <li><%= link_to "Profile", current_user %></li>
              <li><%= link_to "Settings", edit_user_path(current_user) %></li>
              <li class="divider"></li>
              <li>
                <%= link_to "Log out", logout_path, method: :delete %>
              </li>
            </ul>
          </li>
        <% else %>
          <li><%= link_to "Log in", login_path %></li>
        <% end %>
      </ul>
    </nav>
  </div>
</header>
```

With that, the users index is fully functional, with all tests GREEN:

Listing 10.41: GREEN

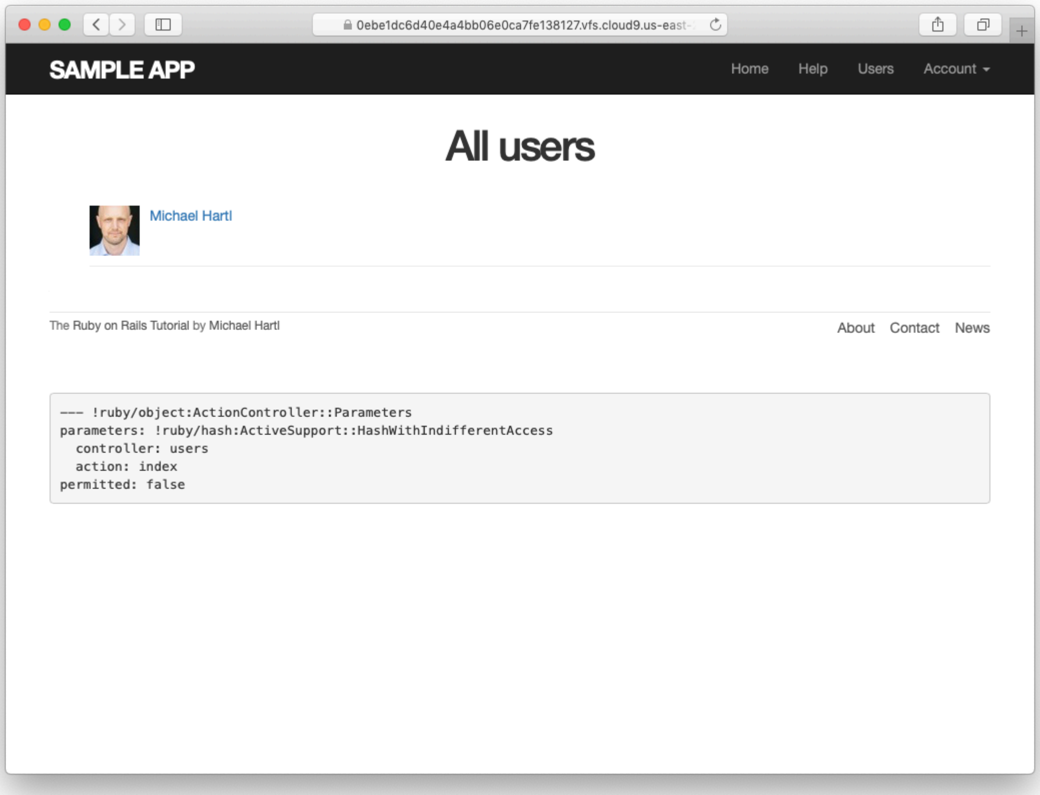
```
$ rails test
```

On the other hand, as seen in Figure 10.9, it is a bit… lonely. Let's remedy this sad situation.

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.


0ebe1dc6d40e4a4bb06e0ca7fe138127.vfs.cloud9.us-east-
SAMPLE APP
Home
Help
Users
Account
All users
Michael Hartl
The Ruby on Rails Tutorial by Michael Hartl
About
Contact
News

```
--- !ruby/object:ActionController::Parameters
parameters: !ruby/hash:ActiveSupport::HashWithIndifferentAccess
  controller: users
  action: index
permitted: false
```

Figure 10.9: The users index page with only one user.

1. We've now filled in all the links in the site layout. Write an integration test for all the layout links, including the proper behavior for logged-in and non-logged-in users. *Hint*: Use the **`log_in_as`** helper and add to the steps shown in Listing 5.32.

10.3.2 Sample users

In this section, we'll give our lonely sample user some company. Of course, to create enough users to make a decent users index, we *could* use our web browser to visit the signup page and make the new users one by one, but a far better solution is to use Ruby to make the users for us.

First, we'll add the *Faker* gem to the **`Gemfile`**, which will allow us to make sample users with semi-realistic names and email addresses (Listing 10.42).[10] (Ordinarily, you'd probably want to restrict the `faker` gem to a development environment, but in the case of the sample app we'll be using it on our production site as well (Section 10.5).)

Listing 10.42: Adding the Faker gem to the **`Gemfile`**.

```
source 'https://rubygems.org'

gem 'rails',          '6.0.1'
gem 'bcrypt',         '3.1.13'
gem 'faker',          '2.1.2'
gem 'bootstrap-sass', '3.4.1'
.
.
.
```

Then install as usual:

```
$ bundle install
```

Next, we'll add a Ruby program to seed the database with sample users, for which Rails uses the standard file **`db/seeds.rb`**. The result appears in

[10] As always, you should use the version numbers listed at gemfiles-6th-ed.railstutorial.org instead of the ones listed here.

Listing 10.43. (The code in Listing 10.43 is a bit advanced, so don't worry too much about the details.)

Listing 10.43: A program for seeding the database with sample users.
db/seeds.rb

```
# Create a main sample user.
User.create!(name:  "Example User",
             email: "example@railstutorial.org",
             password:              "foobar",
             password_confirmation: "foobar")

# Generate a bunch of additional users.
99.times do |n|
  name  = Faker::Name.name
  email = "example-#{n+1}@railstutorial.org"
  password = "password"
  User.create!(name:  name,
               email: email,
               password:              password,
               password_confirmation: password)
end
```

The code in Listing 10.43 creates an example user with name and email address replicating our previous one, and then makes 99 more. The **`create!`** method is just like the **`create`** method, except it raises an exception (Section 6.1.4) for an invalid user rather than returning **`false`**. This behavior makes debugging easier by avoiding silent errors.

With the code as in Listing 10.43, we can reset the database and then invoke the Rake task using **`db:seed`**:[11]

```
$ rails db:migrate:reset
$ rails db:seed
```

Seeding the database can be slow, and on some systems could take up to a few minutes. Also, some readers have reported that they are unable to run the reset command if the Rails server is running, so you may have to stop the server first before proceeding (Box 1.2).

[11]In principle, these two tasks can be combined in **`rails db:reset`**, but as of this writing this command doesn't work with the latest version of Rails.

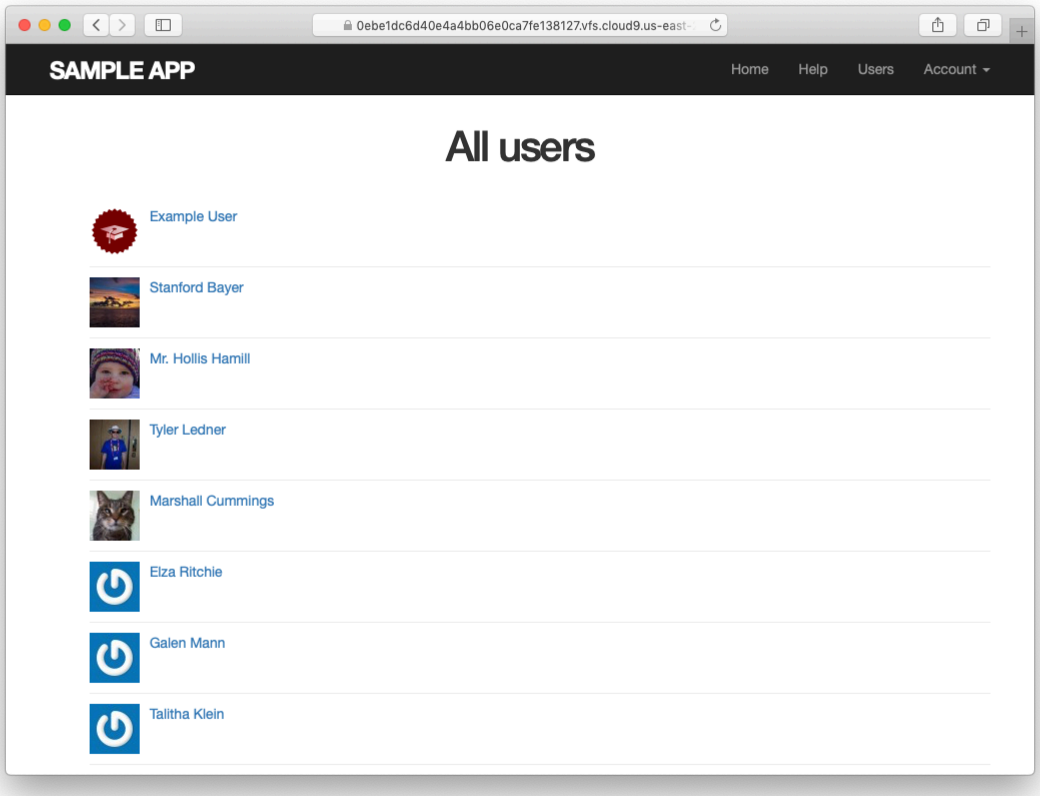


Figure 10.10: The users index page with 100 sample users.

After running the **db:seed** Rake task, our application should have 100 sample users. As seen in Figure 10.10, I've taken the liberty of associating the first few sample addresses with Gravatars so that they're not all the default Gravatar image.

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. Verify that trying to visit the edit page of another user results in a redirect as required by Section 10.2.2.

10.3.3 Pagination

Our original user doesn't suffer from loneliness any more, but now we have the opposite problem: our user has *too many* companions, and they all appear on the same page. Right now there are a hundred, which is already a reasonably large number, and on a real site it could be thousands. The solution is to *paginate* the users, so that (for example) only 30 show up on a page at any one time.

There are several pagination methods available in Rails; we'll use one of the simplest and most robust, called will_paginate. To use it, we need to include both the `will_paginate` gem and `bootstrap-will_paginate`, which configures will_paginate to use Bootstrap's pagination styles. The updated **`Gemfile`** appears in Listing 10.44.[12]

Listing 10.44: Including `will_paginate` in the **`Gemfile`**.

```
source 'https://rubygems.org'

gem 'rails',                   '6.0.1'
gem 'bcrypt',                  '3.1.13'
gem 'faker',                   '2.1.2'
gem 'will_paginate',           '3.1.8'
gem 'bootstrap-will_paginate', '1.0.0'
.
.
.
```

Then run **`bundle install`**:

```
$ bundle install
```

You should also restart the webserver to ensure that the new gems are loaded properly.

[12]As always, you should use the version numbers listed at gemfiles-6th-ed.railstutorial.org instead of the ones listed here.

To get pagination working, we need to add some code to the index view telling Rails to paginate the users, and we need to replace **`User.all`** in the **`index`** action with an object that knows about pagination. We'll start by adding the special **`will_paginate`** method in the view (Listing 10.45); we'll see in a moment why the code appears both above and below the user list.

Listing 10.45: The users index with pagination.
`app/views/users/index.html.erb`

```
<% provide(:title, 'All users') %>
<h1>All users</h1>

<%= will_paginate %>

<ul class="users">
  <% @users.each do |user| %>
    <li>
      <%= gravatar_for user, size: 50 %>
      <%= link_to user.name, user %>
    </li>
  <% end %>
</ul>

<%= will_paginate %>
```

The **`will_paginate`** method is a little magical; inside a **`users`** view, it automatically looks for an **`@users`** object, and then displays pagination links to access other pages. The view in Listing 10.45 doesn't work yet, though, because currently **`@users`** contains the results of **`User.all`** (Listing 10.36), whereas **`will_paginate`** requires that we paginate the results explicitly using the **`paginate`** method:

```
$ rails console
>> User.paginate(page: 1)
  User Load (1.5ms)  SELECT "users".* FROM "users" LIMIT 11 OFFSET 0
   (1.7ms)  SELECT COUNT(*) FROM "users"
=> #<ActiveRecord::Relation [#<User id: 1,...
>> User.paginate(page: 1).length
  User Load (3.0ms)  SELECT "users".* FROM "users" LIMIT ? OFFSET ?  [["LIMIT", 30],
  ["OFFSET", 0]]
=> 30
```

Note that **paginate** takes a hash argument with key **:page** and value equal to the page requested. **User.paginate** pulls the users out of the database one chunk at a time (30 by default), based on the **:page** parameter. So, for example, page 1 is users 1–30, page 2 is users 31–60, etc. If **page** is **nil**, **paginate** simply returns the first page. (The console result above shows 11 results rather than 30 due to a console limit in Active Record itself, but calling the **length** method bypasses this restriction.)

Using the **paginate** method, we can paginate the users in the sample application by using **paginate** in place of **all** in the **index** action (Listing 10.46). Here the **page** parameter comes from **params[:page]**, which is generated automatically by **will_paginate**.

Listing 10.46: Paginating the users in the **index** action.
app/controllers/users_controller.rb

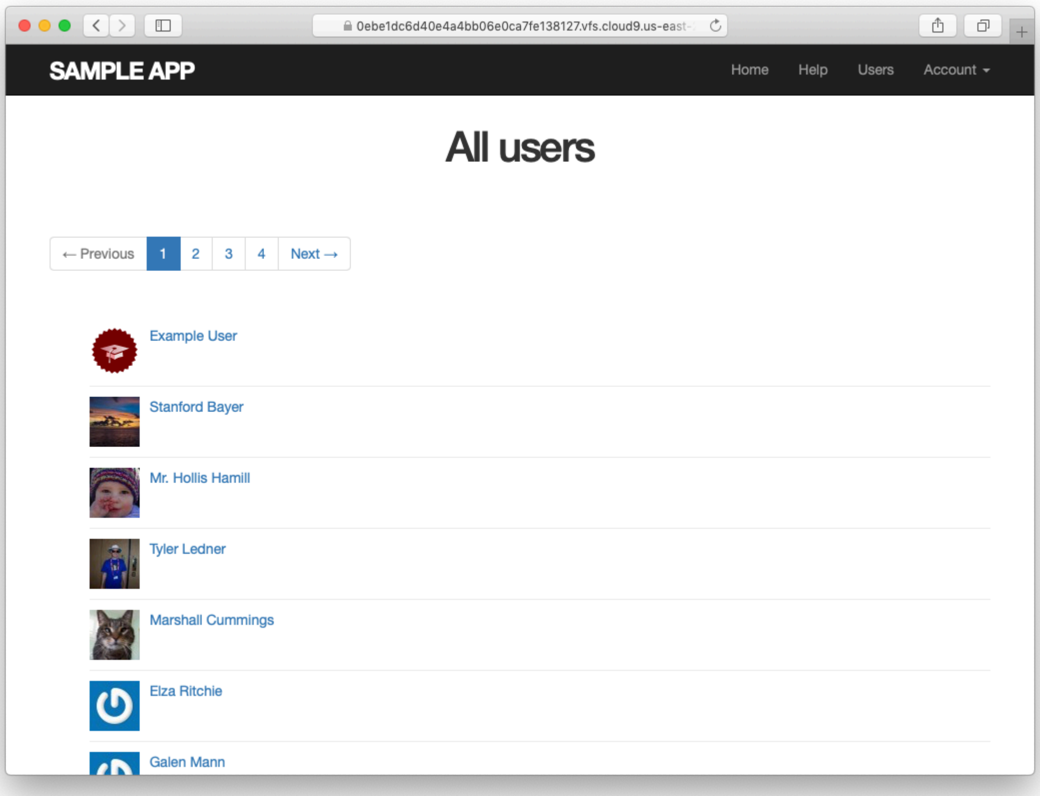
```
class UsersController < ApplicationController
  before_action :logged_in_user, only: [:index, :edit, :update]
  .
  .
  .
  def index
    @users = User.paginate(page: params[:page])
  end
  .
  .
  .
end
```

The users index page should now be working, appearing as in Figure 10.11. (On some systems, you may have to restart the Rails server at this point.) Because we included **will_paginate** both above and below the user list, the pagination links appear in both places.

If you now click on either the 2 link or Next link, you'll get the second page of results, as shown in Figure 10.12.

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.



All users

Example User
Stanford Bayer
Mr. Hollis Hamill
Tyler Ledner
Marshall Cummings
Elza Ritchie
Galen Mann

Figure 10.11: The users index page with pagination.

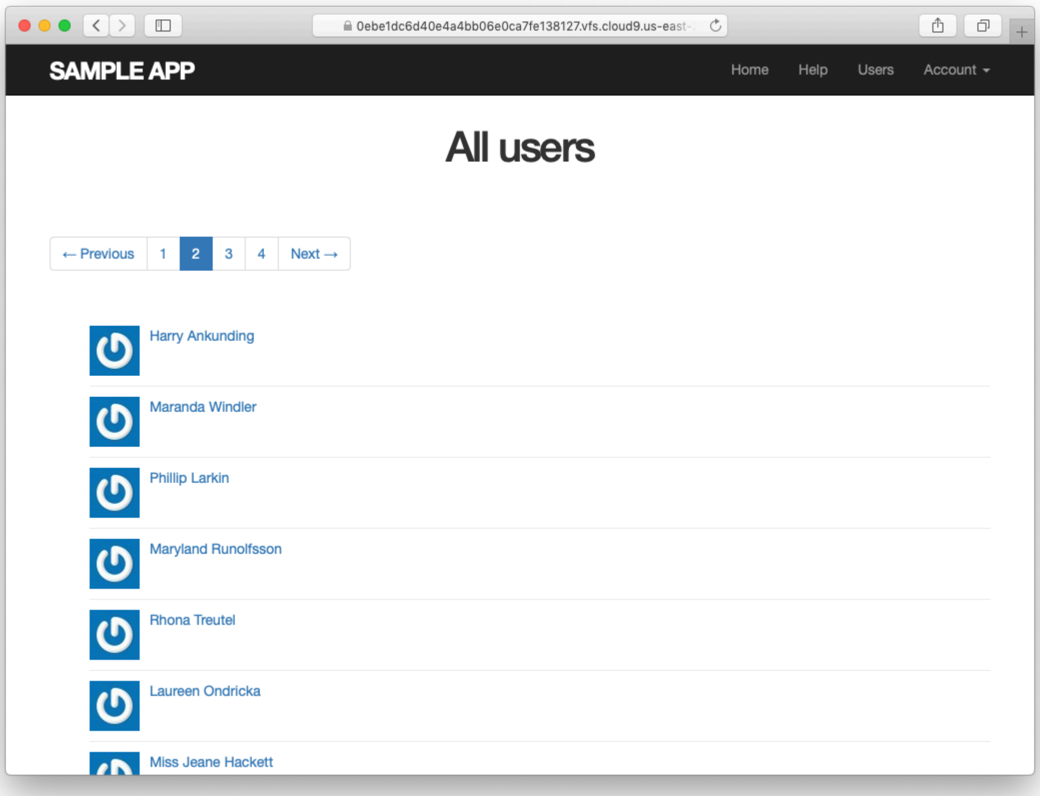


Figure 10.12: Page 2 of the users index.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. Confirm at the console that setting the page to **`nil`** pulls out the first page of users.
2. What is the Ruby class of the pagination object? How does it compare to the class of **`User.all`**?

10.3.4 Users index test

Now that our users index page is working, we'll write a lightweight test for it, including a minimal test for the pagination from Section 10.3.3. The idea is to log in, visit the index path, verify the first page of users is present, and then confirm that pagination is present on the page. For these last two steps to work, we need to have enough users in the test database to invoke pagination, i.e., more than 30.

We created a second user in the fixtures in Listing 10.23, but 30 or so more users is a lot to create by hand. Luckily, as we've seen with the user fixture's **`password_digest`** attribute, fixture files support embedded Ruby, which
means we can create 30 additional users as shown in Listing 10.47. (Listing 10.47 also creates a couple of other named users for future reference.)

Listing 10.47: Adding 30 extra users to the fixture.
`test/fixtures/users.yml`

```
michael:
  name: Michael Example
  email: michael@example.com
  password_digest: <%= User.digest('password') %>

archer:
  name: Sterling Archer
  email: duchess@example.gov
  password_digest: <%= User.digest('password') %>

lana:
  name: Lana Kane
  email: hands@example.gov
  password_digest: <%= User.digest('password') %>

malory:
  name: Malory Archer
  email: boss@example.gov
  password_digest: <%= User.digest('password') %>

<% 30.times do |n| %>
user_<%= n %>:
  name:  <%= "User #{n}" %>
  email: <%= "user-#{n}@example.com" %>
  password_digest: <%= User.digest('password') %>
<% end %>
```

With the fixtures defined in Listing 10.47, we're ready to write a test of the users index. First we generate the relevant test:

```
$ rails generate integration_test users_index
      invoke  test_unit
      create    test/integration/users_index_test.rb
```

The test itself involves checking for a **`div`** with the required **`pagination`** class and verifying that the first page of users is present. The result appears in Listing 10.48.

Listing 10.48: A test of the users index, including pagination. GREEN
`test/integration/users_index_test.rb`

```
require 'test_helper'

class UsersIndexTest < ActionDispatch::IntegrationTest

  def setup
    @user = users(:michael)
  end

  test "index including pagination" do
    log_in_as(@user)
    get users_path
    assert_template 'users/index'
    assert_select 'div.pagination'
    User.paginate(page: 1).each do |user|
      assert_select 'a[href=?]', user_path(user), text: user.name
    end
  end
end
```

The result should be a GREEN test suite:

Listing 10.49: GREEN

```
$ rails test
```

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. By commenting out the pagination links in Listing 10.45, confirm that the test in Listing 10.48 goes RED.

2. Confirm that commenting out only *one* of the calls to will_paginate leaves the tests GREEN. How would you test for the presence of both sets of will_paginate links? *Hint*: Use a count from Table 5.2.

10.3.5 Partial refactoring

The paginated users index is now complete, but there's one improvement I can't resist including: Rails has some incredibly slick tools for making compact views, and in this section we'll refactor the index page to use them. Because our code is well-tested, we can refactor with confidence, assured that we are unlikely to break our site's functionality.

The first step in our refactoring is to replace the user `li` from Listing 10.45 with a `render` call (Listing 10.50).

Listing 10.50: The first refactoring attempt in the index view. RED
app/views/users/index.html.erb

```
<% provide(:title, 'All users') %>
<h1>All users</h1>

<%= will_paginate %>

<ul class="users">
  <% @users.each do |user| %>
    <%= render user %>
  <% end %>
</ul>

<%= will_paginate %>
```

Here we call **`render`** not on a string with the name of a partial, but rather on a **`user`** variable of class **`User`**;[13] in this context, Rails automatically looks for a partial called **`_user.html.erb`**, which we must create (Listing 10.51).

Listing 10.51: A partial to render a single user. GREEN
app/views/users/_user.html.erb

```
<li>
  <%= gravatar_for user, size: 50 %>
  <%= link_to user.name, user %>
</li>
```

This is a definite improvement, but we can do even better: we can call **`render`** *directly* on the **`@users`** variable (Listing 10.52).

Listing 10.52: The fully refactored users index. GREEN
app/views/users/index.html.erb

```
<% provide(:title, 'All users') %>
<h1>All users</h1>
```

[13]The name **`user`** is immaterial—we could have written **`@users.each do |foobar|`** and then used **`render foobar`**. The key is the *class* of the object—in this case, **`User`**.

```
<%= will_paginate %>

<ul class="users">
  <%= render @users %>
</ul>

<%= will_paginate %>
```

Here Rails infers that **`@users`** is a list of **`User`** objects; moreover, when called with a collection of users, Rails automatically iterates through them and renders each one with the **`_user.html.erb`** partial (inferring the name of the partial from the name of the class). The result is the impressively compact code in Listing 10.52.

As with any refactoring, you should verify that the test suite is still GREEN after changing the application code:

Listing 10.53: GREEN

```
$ rails test
```

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. Comment out the **`render`** line in Listing 10.52 and confirm that the resulting tests are RED.

10.4 Deleting users

Now that the users index is complete, there's only one canonical REST action left: **`destroy`**. In this section, we'll add links to delete users, as mocked up in Figure 10.13, and define the **`destroy`** action necessary to accomplish the deletion. But first, we'll create the class of administrative users, or *admins*, authorized to do so. In the context of authorization, such a set of special privileges is known as a *role*.

10.4.1 Administrative users

We will identify privileged administrative users with a boolean **admin** attribute in the User model, which will lead automatically to an **admin?** boolean method to test for admin status. The resulting data model appears in Figure 10.14.

As usual, we add the **admin** attribute with a migration, indicating the **boolean** type on the command line:

```
$ rails generate migration add_admin_to_users admin:boolean
```

The migration adds the **admin** column to the **users** table, as shown in Listing 10.54. Note that we've added the argument **default: false** to **add_column** in Listing 10.54, which means that users will *not* be administrators by default. (Without the **default: false** argument, **admin** will be **nil** by default, which is still **false**, so this step is not strictly necessary. It is more explicit, though, and communicates our intentions more clearly both to Rails and to readers of our code.)

Listing 10.54: The migration to add a boolean **admin** attribute to users.
db/migrate/[timestamp]_add_admin_to_users.rb

```
class AddAdminToUsers < ActiveRecord::Migration[6.0]
  def change
    add_column :users, :admin, :boolean, default: false
  end
end
```

Next, we migrate as usual:

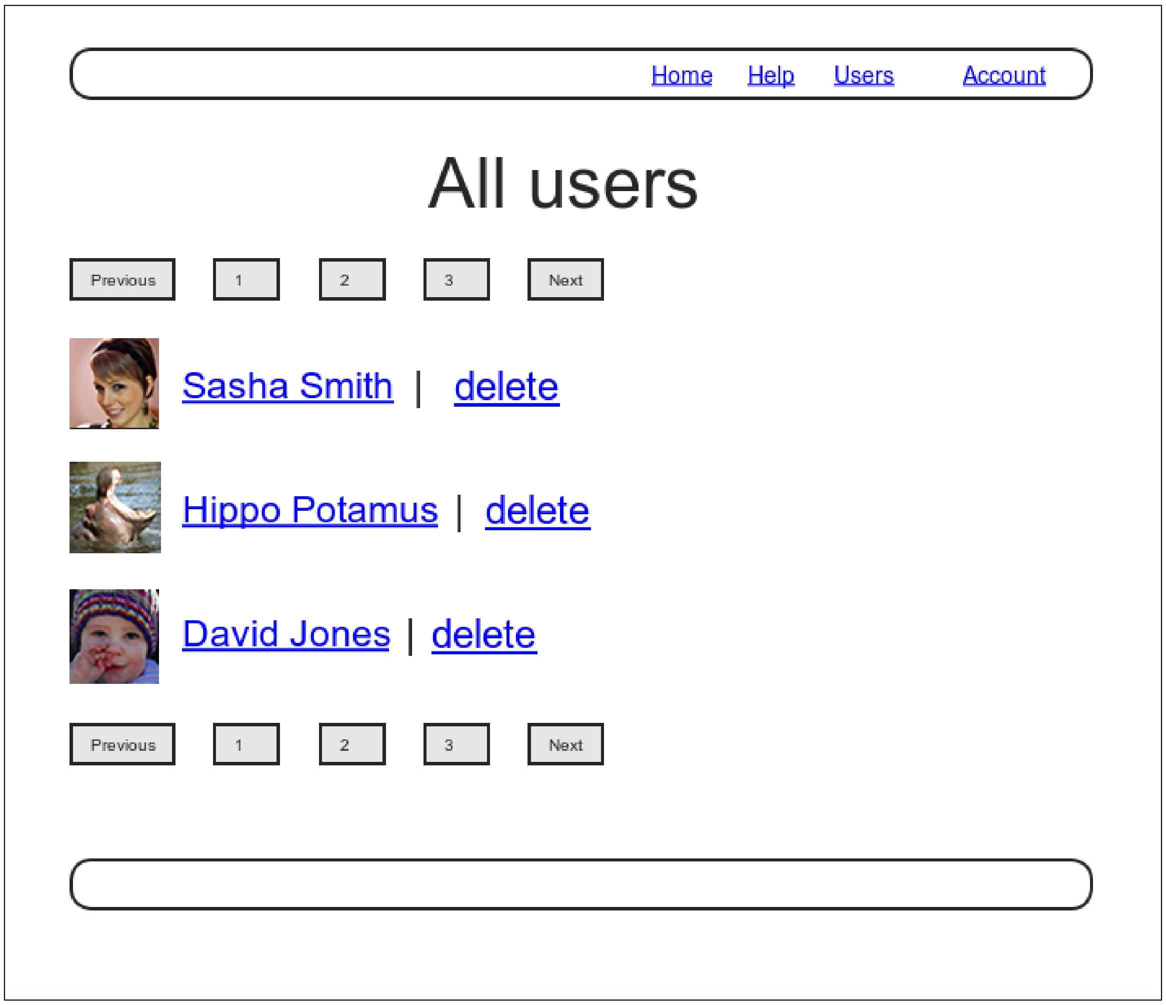
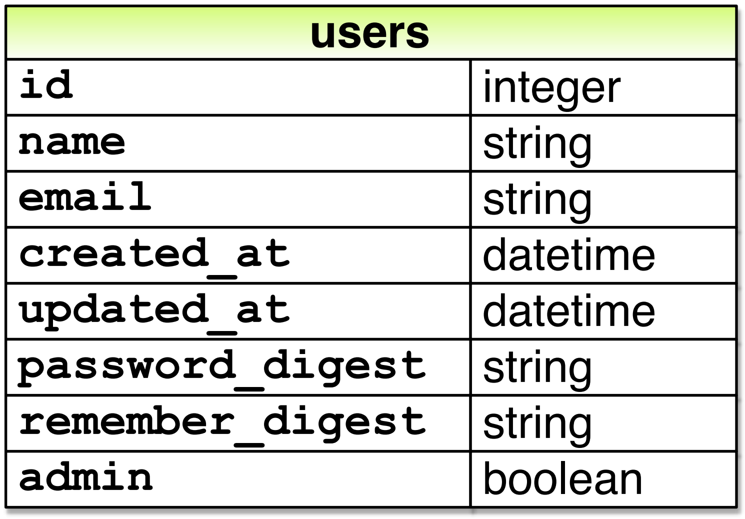


Figure 10.13: A mockup of the users index with delete links.



users	
id	integer
name	string
email	string
created_at	datetime
updated_at	datetime
password_digest	string
remember_digest	string
admin	boolean

Figure 10.14: The User model with an added **`admin`** boolean attribute.

```
$ rails db:migrate
```

As expected, Rails figures out the boolean nature of the **`admin`** attribute and automatically adds the question-mark method **`admin?`**:

```
$ rails console --sandbox
>> user = User.first
>> user.admin?
=> false
>> user.toggle!(:admin)
=> true
>> user.admin?
=> true
```

Here we've used the **`toggle!`** method to flip the **`admin`** attribute from **`false`** to **`true`**.

As a final step, let's update our seed data to make the first user an admin by default (Listing 10.55).

Listing 10.55: The seed data code with an admin user.
db/seeds.rb

```ruby
# Create a main sample user.
User.create!(name:  "Example User",
             email: "example@railstutorial.org",
             password:              "foobar",
             password_confirmation: "foobar",
             admin: true)

# Generate a bunch of additional users.
99.times do |n|
  name  = Faker::Name.name
  email = "example-#{n+1}@railstutorial.org"
  password = "password"
  User.create!(name:  name,
               email: email,
               password:              password,
               password_confirmation: password)
end
```

Then reset and reseed the database:

```
$ rails db:migrate:reset
$ rails db:seed
```

Revisiting strong parameters

You might have noticed that Listing 10.55 makes the user an admin by including **`admin: true`** in the initialization hash. This underscores the danger of exposing our objects to the wild Web—if we simply passed an initialization hash in from an arbitrary web request, a malicious user could send a `PATCH` request as follows:[14]

```
patch /users/17?admin=1
```

This request would make user 17 an admin, which would be a potentially serious security breach.

[14]Command-line tools such as `curl` can issue `PATCH` requests of this form.

Because of this danger, it is essential that we only update attributes that are safe to edit through the web. As noted in Section 7.3.2, this is accomplished using *strong parameters* by calling **require** and **permit** on the **params** hash:

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

Note in particular that **admin** is *not* in the list of permitted attributes. This is what prevents arbitrary users from granting themselves administrative access to our application. Because of its importance, it's a good idea to write a test for any attribute that isn't editable, and writing such a test for the **admin** attribute is left as an exercise (Section 10.4.1).

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. By issuing a PATCH request directly to the user path as shown in Listing 10.56, verify that the **admin** attribute isn't editable through the web. To be sure your test is covering the right thing, your first step should be to *add* **admin** to the list of permitted parameters in **user_params** so that the initial test is RED. For the final line, make sure to load the updated user information from the database (Section 6.1.5).

Listing 10.56: Testing that the **admin** attribute is forbidden.
test/controllers/users_controller_test.rb

```
require 'test_helper'

class UsersControllerTest < ActionDispatch::IntegrationTest

  def setup
    @user       = users(:michael)
    @other_user = users(:archer)
  end
  .
  .
  .
  test "should redirect update when not logged in" do
    patch user_path(@user), params: { user: { name: @user.name,
                                              email: @user.email } }
    assert_not flash.empty?
    assert_redirected_to login_url
  end

  test "should not allow the admin attribute to be edited via the web" do
    log_in_as(@other_user)
    assert_not @other_user.admin?
    patch user_path(@other_user), params: {
                                    user: { password:              "password",
                                            password_confirmation: "password",
                                            admin: FILL_IN } }
    assert_not @other_user.FILL_IN.admin?
  end
  .
  .
  .
end
```

10.4.2 The `destroy` action

The final step needed to complete the Users resource is to add delete links and a **`destroy`** action. We'll start by adding a delete link for each user on the users index page, restricting access to administrative users. The resulting **`"delete"`** links will be displayed only if the current user is an admin (Listing 10.57).

Listing 10.57: User delete links (viewable only by admins).
app/views/users/_user.html.erb

```
<li>
  <%= gravatar_for user, size: 50 %>
  <%= link_to user.name, user %>
  <% if current_user.admin? && !current_user?(user) %>
    | <%= link_to "delete", user, method: :delete,
                                  data: { confirm: "You sure?" } %>
  <% end %>
</li>
```

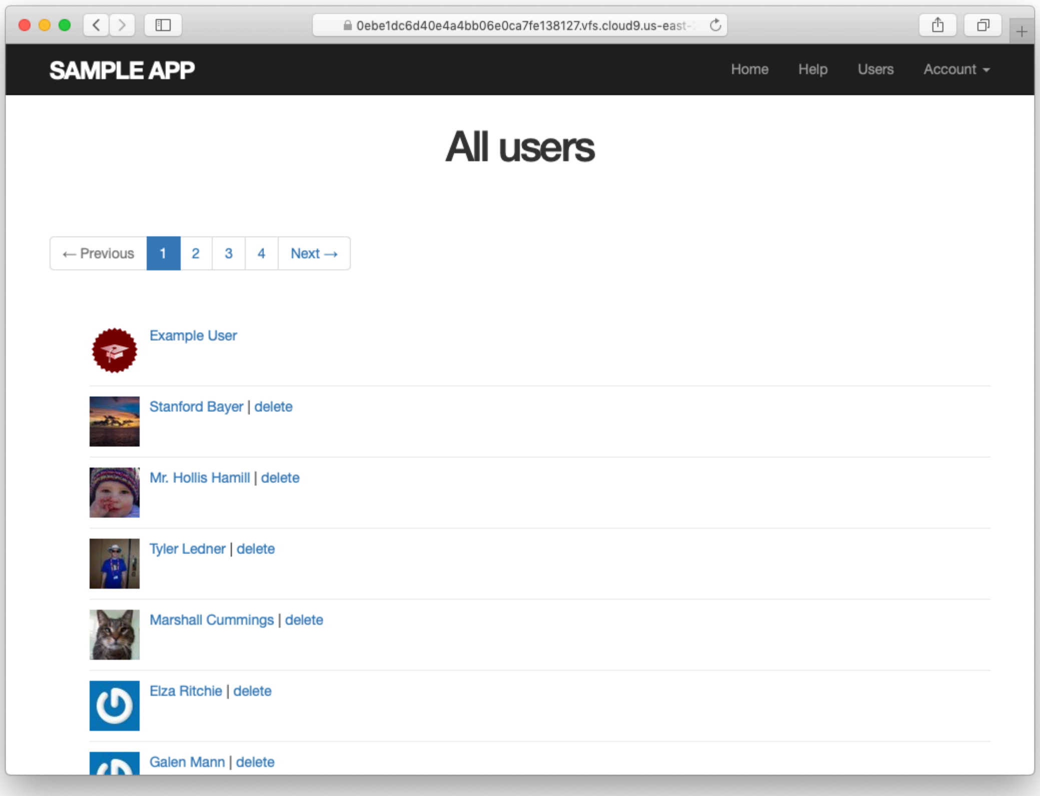


Figure 10.15: The users index with delete links.

Note the **`method: :delete`** argument, which arranges for the link to issue the necessary `DELETE` request. We've also wrapped each link inside an **`if`** statement so that only admins can see them. The result for our admin user appears in Figure 10.15.

Web browsers can't send `DELETE` requests natively, so Rails fakes them with JavaScript. This means that the delete links won't work if the user has JavaScript disabled. If you must support non-JavaScript-enabled browsers you can fake a `DELETE` request using a form and a `POST` request, which works even without JavaScript.[15]

[15] See the RailsCast on "Destroy Without JavaScript" for details.

To get the delete links to work, we need to add a **destroy** action (Table 7.1), which finds the corresponding user and destroys it with the Active Record **destroy** method, finally redirecting to the users index, as seen in Listing 10.58. Because users have to be logged in to delete users, Listing 10.58 also adds **:destroy** to the **logged_in_user** before filter.

Listing 10.58: Adding a working **destroy** action.
app/controllers/users_controller.rb

```
class UsersController < ApplicationController
  before_action :logged_in_user, only: [:index, :edit, :update, :destroy]
  before_action :correct_user,   only: [:edit, :update]
  .
  .
  .
  def destroy
    User.find(params[:id]).destroy
    flash[:success] = "User deleted"
    redirect_to users_url
  end

  private
  .
  .
  .
end
```

As constructed, only admins can destroy users through the web since only they can see the delete links, but there's still a terrible security hole: any sufficiently sophisticated attacker could simply issue a `DELETE` request directly from the command line to delete any user on the site. To secure the site properly, we also need access control on the **destroy** action, so that *only* admins can delete users.

As in Section 10.2.1 and Section 10.2.2, we'll enforce access control using a before filter, this time to restrict access to the **destroy** action to admins. The resulting **admin_user** before filter appears in Listing 10.59.

Listing 10.59: A before filter restricting the **destroy** action to admins.
app/controllers/users_controller.rb

```
class UsersController < ApplicationController
  before_action :logged_in_user, only: [:index, :edit, :update, :destroy]
  before_action :correct_user,   only: [:edit, :update]
  before_action :admin_user,     only: :destroy
  .
  .
  .
  private
    .
    .
    .
    # Confirms an admin user.
    def admin_user
      redirect_to(root_url) unless current_user.admin?
    end
end
```

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. As the admin user, destroy a few sample users through the web interface. What are the corresponding entries in the server log?

10.4.3 User destroy tests

With something as dangerous as destroying users, it's important to have good tests for the expected behavior. We start by arranging for one of our fixture users to be an admin, as shown in Listing 10.60.

Listing 10.60: Making one of the fixture users an admin.
test/fixtures/users.yml

```
michael:
  name: Michael Example
  email: michael@example.com
  password_digest: <%= User.digest('password') %>
  admin: true
```

```
archer:
  name: Sterling Archer
  email: duchess@example.gov
  password_digest: <%= User.digest('password') %>

lana:
  name: Lana Kane
  email: hands@example.gov
  password_digest: <%= User.digest('password') %>

malory:
  name: Malory Archer
  email: boss@example.gov
  password_digest: <%= User.digest('password') %>

<% 30.times do |n| %>
user_<%= n %>:
  name:  <%= "User #{n}" %>
  email: <%= "user-#{n}@example.com" %>
  password_digest: <%= User.digest('password') %>
<% end %>
```

Following the practice from Section 10.2.1, we'll put action-level tests of access control in the Users controller test file. As with the logout test in Listing 8.35, we'll use **`delete`** to issue a `DELETE` request directly to the **`destroy`** action. We need to check two cases: first, users who aren't logged in should be redirected to the login page; second, users who are logged in but who aren't admins should be redirected to the Home page. The result appears in Listing 10.61.

Listing 10.61: Action-level tests for admin access control. GREEN
`test/controllers/users_controller_test.rb`

```
require 'test_helper'

class UsersControllerTest < ActionDispatch::IntegrationTest

  def setup
    @user       = users(:michael)
    @other_user = users(:archer)
  end
  .
  .
  .
  test "should redirect destroy when not logged in" do
    assert_no_difference 'User.count' do
      delete user_path(@user)
    end
    assert_redirected_to login_url
  end

  test "should redirect destroy when logged in as a non-admin" do
    log_in_as(@other_user)
    assert_no_difference 'User.count' do
      delete user_path(@user)
    end
    assert_redirected_to root_url
  end
end
```

Note that Listing 10.61 also makes sure that the user count doesn't change using the **`assert_no_difference`** method (seen before in Listing 7.23).

The tests in Listing 10.61 verify the behavior in the case of an unauthorized (non-admin) user, but we also want to check that an admin can use a delete link to successfully destroy a user. Since the delete links appear on the users index, we'll add these tests to the users index test from Listing 10.48. The only really tricky part is verifying that a user gets deleted when an admin clicks on a delete link, which we'll accomplish as follows:

```
assert_difference 'User.count', -1 do
  delete user_path(@other_user)
end
```

This uses the **`assert_difference`** method first seen in Listing 7.31 when creating a user, this time verifying that a user is *destroyed* by checking that **`User.count`** changes by -1 when issuing a **`delete`** request to the corresponding user path.

Putting everything together gives the pagination and delete test in Listing 10.62, which includes tests for both admins and non-admins.

Listing 10.62: An integration test for delete links and destroying users. GREEN
`test/integration/users_index_test.rb`

```
require 'test_helper'

class UsersIndexTest < ActionDispatch::IntegrationTest

  def setup
    @admin     = users(:michael)
    @non_admin = users(:archer)
  end

  test "index as admin including pagination and delete links" do
    log_in_as(@admin)
    get users_path
    assert_template 'users/index'
    assert_select 'div.pagination'
    first_page_of_users = User.paginate(page: 1)
    first_page_of_users.each do |user|
      assert_select 'a[href=?]', user_path(user), text: user.name
      unless user == @admin
        assert_select 'a[href=?]', user_path(user), text: 'delete'
      end
    end
    assert_difference 'User.count', -1 do
      delete user_path(@non_admin)
    end
  end

  test "index as non-admin" do
    log_in_as(@non_admin)
    get users_path
    assert_select 'a', text: 'delete', count: 0
  end
end
```

Note that Listing 10.62 checks for the right delete links, including skipping the test if the user happens to be the admin (which lacks a delete link due to Listing 10.57).

At this point, our deletion code is well-tested, and the test suite should be GREEN:

Listing 10.63: GREEN

```
$ rails test
```

Exercises

Solutions to the exercises are available to all Rails Tutorial purchasers here.

To see other people's answers and to record your own, subscribe to the Rails Tutorial course or to the Learn Enough All Access Bundle.

1. By commenting out the admin user before filter in Listing 10.59, confirm that the tests go RED.

10.5 Conclusion

We've come a long way since introducing the Users controller way back in Section 5.4. Those users couldn't even sign up; now users can sign up, log in, log out, view their profiles, edit their settings, and see an index of all users—and some can even destroy other users.

As it presently stands, the sample application forms a solid foundation for any website requiring users with authentication and authorization. In Chapter 11 and Chapter 12, we'll add two additional refinements: an account activation link for newly registered users (verifying a valid email address in the process) and password resets to help users who forget their passwords.

Before moving on, be sure to merge all the changes into the master branch:

```
$ git add -A
$ git commit -m "Finish user edit, update, index, and destroy actions"
$ git checkout master
$ git merge updating-users
$ git push
```

You can also deploy the application and even populate the production database with sample users (using the `pg:reset` task to reset the production database):

```
$ rails test
$ git push heroku
$ heroku pg:reset DATABASE
$ heroku run rails db:migrate
$ heroku run rails db:seed
```

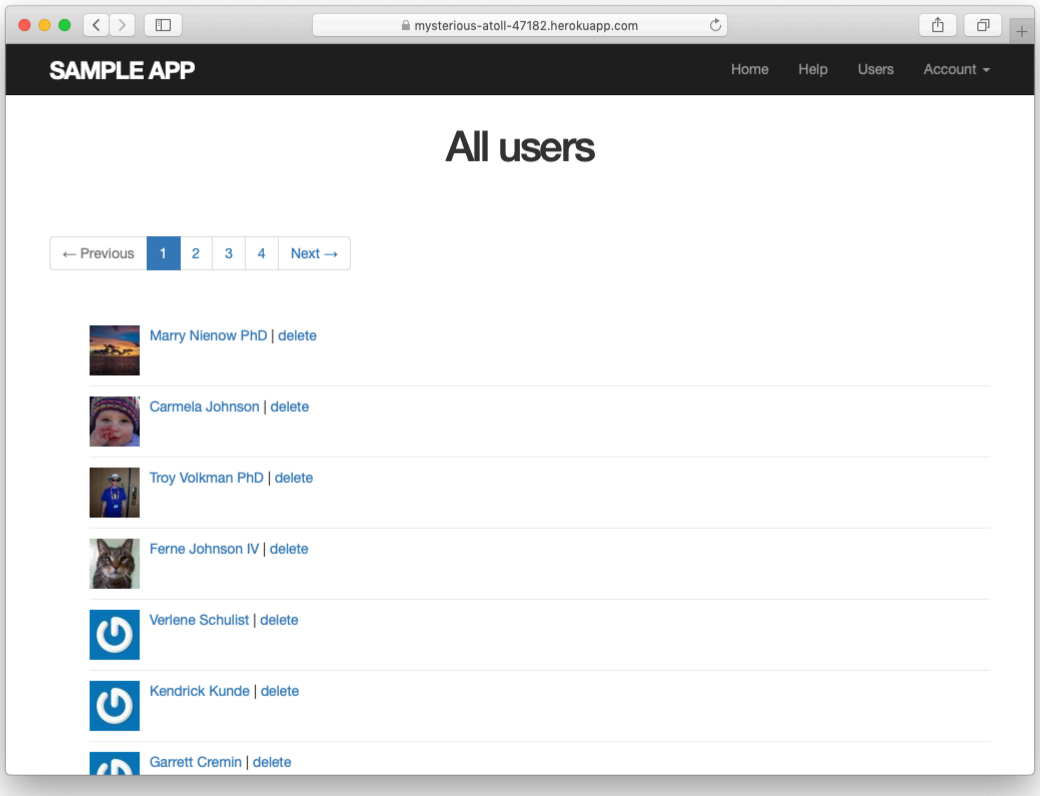

mysterious-atoll-47182.herokuapp.com
SAMPLE APP
Home
Help
Users
Account
All users
← Previous
1
2
3
4
Next →
Marry Nienow PhD | delete
Carmela Johnson | delete
Troy Volkman PhD | delete
Ferne Johnson IV | delete
Verlene Schulist | delete
Kendrick Kunde | delete
Garrett Cremin | delete

Figure 10.16: The sample users in production.

Of course, on a real site you probably wouldn't want to seed it with sample data, but I include it here for purposes of illustration (Figure 10.16). Incidentally, the order of the sample users in Figure 10.16 may vary, and on my system doesn't match the local version from Figure 10.11; this is because we haven't specified a default ordering for users when retrieved from the database, so the current order is database-dependent. This doesn't matter much for users, but it will for microposts, and we'll address this issue further in Section 13.1.4.

10.5.1 What we learned in this chapter

- Users can be updated using an edit form, which sends a `PATCH` request to the **`update`** action.
- Safe updating through the web is enforced using strong parameters.
- Before filters give a standard way to run methods before particular controller actions.
- We implement an authorization using before filters.
- Authorization tests use both low-level commands to submit particular HTTP requests directly to controller actions and high-level integration tests.
- Friendly forwarding redirects users where they wanted to go after logging in.
- The users index page shows all users, one page at a time.
- Rails uses the standard file **`db/seeds.rb`** to seed the database with sample data using **`rails db:seed`**.
- Running **`render @users`** automatically calls the **`_user.html.erb`** partial on each user in the collection.
- A boolean attribute called **`admin`** on the User model automatically creates an **`admin?`** boolean method on user objects.
- Admins can delete users through the web by clicking on delete links that issue `DELETE` requests to the Users controller **`destroy`** action.
- We can create a large number of test users using embedded Ruby inside fixtures.