Rails 3 Upgrade Handbook

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Rails Upgrade Handbook

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1. Introduction

Rails debuted in late 2004 and changed the way a lot of people think about web development. Today, in early 2010, we're looking at a totally new, more mature framework in Rails 3.0 that (I believe) will change the way a lot of Rails developers think about how they use it. The new features, performance improvements, and API changes aren't incredibly drastic, but they do present great opportunities (and challenges) to those looking to upgrade existing code to the newest version. This e-book looks at how to upgrade your existing Rails app to Rails 3, how to convert common patterns to new ones, and how to improve your existing code in light of the new Rails 3 features. First, though, we should go over some of the high-level philosophical and architectural changes in the Rails code between versions 2 and 3.

1.1. The Big Picture

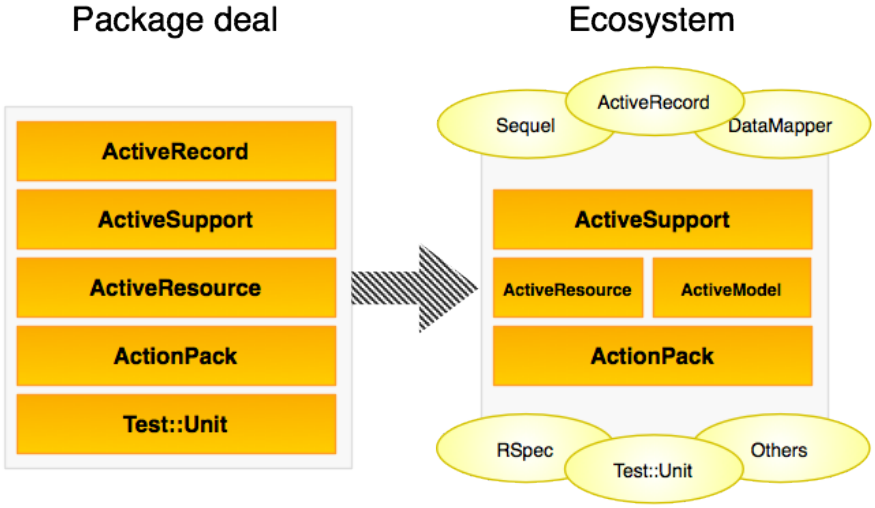
When the Merb/Rails merge was announced, some members of the Rails community were very interested to see how the final product ended up: was it going to be more of the same, something totally new, or simply Merb 2.0? But as the final product approaches, it turns out we're getting the best of both worlds: the ease of use and packaging of Rails with the juicy technical bits of Merb. Who can argue with that?

As the team worked out a vision for the project, obviously changes were made to the Rails way of doing things. These big-picture changes have concentrated on a few key areas:

- Decoupling Rails components from one another as much as possible, making things more modular and a la carte.[1]

- Pulling in improvements from Merb and rewriting/refactoring much of the internals to improve performance.[2]
- Exposing explicit, documented API's for common tasks, and integration of wider ecosystem components from testing, ORM, etc.

In order to hit these objectives, DHH, Yehuda, Josh, and the rest of the Rails team have extracted things into some new components, expanded others, and removed still others to allow for agnostic integration points for things like the ORM and testing framework.



The general movement seems to be from a monolithic, one-stop shop approach to a looser ecosystem of code that works together with a straightforward set of sensible defaults. You're

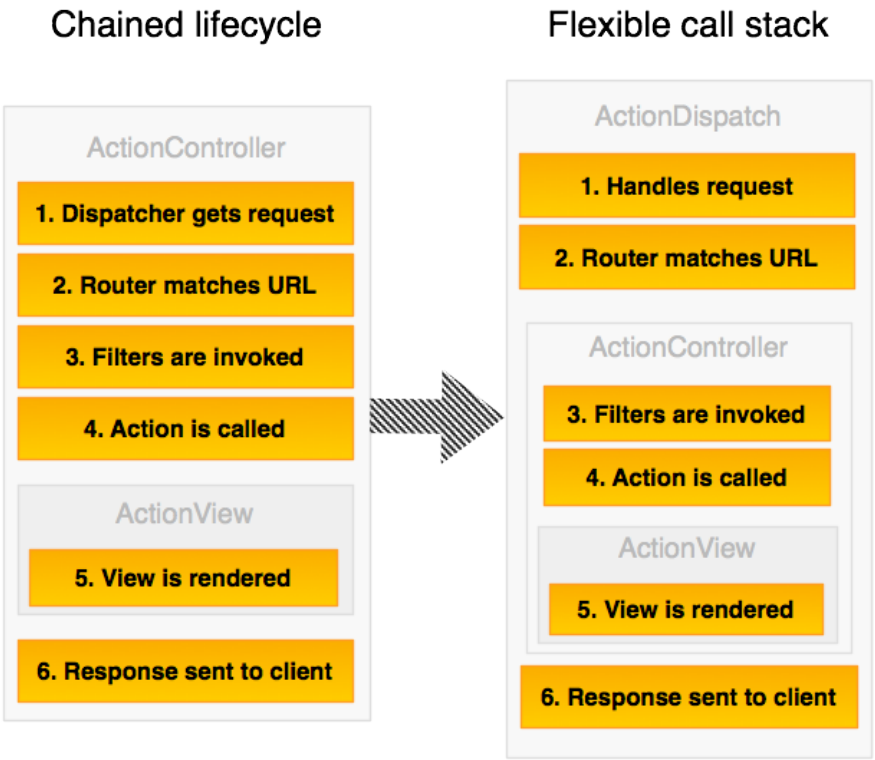
1.http://yehudakatz.com/2009/07/19/rails-3-the-great-decoupling/
2.http://www.engineyard.com/blog/2009/rails-and-merb-merge-performance-part-2-of-6/

no longer “locked in” to Active Record or made to use code injection and hacks and such to get your testing framework integrated. Instead, there are integration hooks all over the place to let generators generate components for the various options, or helpers include different modules. It’s a great way to support the existing plugin and tool ecosystem, except this time with an established API.

1.1.1. Lifecycle changes

One of the biggest shifts in the codebase has been toward using simple, composed components and a lot of Rack features in the request chain in place of specialized, one-off classes. This has affected a lot of things, but one of the major changes has been the addition of *Action Dispatch*.[3]

3.http://github.com/rails/rails/blob/master/actionpack/lib/action_dispatch.rb



Action Dispatch is a “new” component in Action Pack (extracted and expanded from the previous logic) that handles a number of things related to requests and responses:

- Request handling and parameter parsing
- Sessions, Rails’ flash, and cookie storage
- File uploads

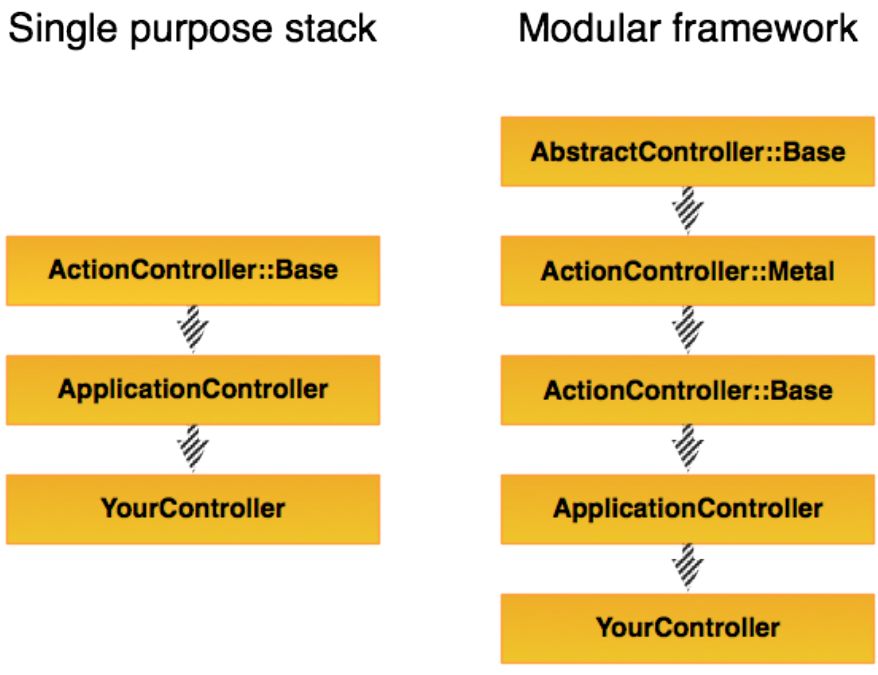
- Routing, URL matching, and rescuing errors
- HTTP conditional GETs
- Client response and HTTP status code

Breaking this functionality out into its own component and decoupling much of it creates a much more flexible call stack for requests. This means you can more easily jack into the process with your own logic or improve the existing functionality. I'm sure we'll see a lot of plugins taking advantage of this to create interesting middleware hacks, improve callbacks and lifecycle methods, hack in their own middlewares to handle specialized logic, or even plug in improved or application-specific routers.

1.1.2. Making controllers flexible

As a result of the changes in the request chain, the controller stack has also seen a significant overhaul. Previously, every controller inherited from `ActionController::Base`, either directly or by inheriting from `ApplicationController`. If you wanted to slim down the call stack, you had to either build a smaller app with Sinatra or Rack to sit next to your main Rails application (pre-Rails 2.3) or use Rails Metal/Rack middlewares (post-Rails 2.3).

In Rails 3.0, this concept of middleware plays an even more central role in the controller hierarchy.



The bottom of the stack is `AbstractController`, a very low level “controller.” Rails uses this class to abstract away essentials like rendering, layouts, managing template paths, and so on, while leaving more concrete implementation details to its subclasses. `AbstractController` exists only to provide these facilities to subclasses. Thus, you should not use this class directly; if you want something super-slim, create a subclass and implement `render` and the few other pieces you need.

Each subsequent jump up the hierarchy is actually a class that inherits from the previous, including modules to compose its behavior. So to create something slim without implementing

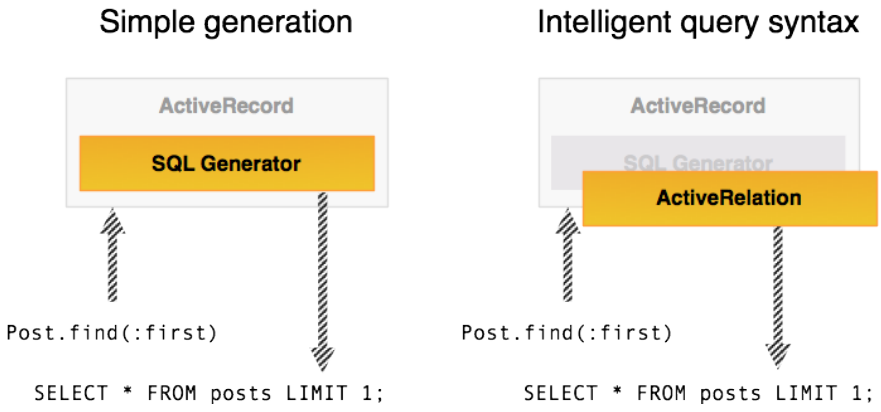
a lot of plumbing, you could use the next rung on the compositional ladder: `ActionController::Metal`. `Metal` essentially exposes super-simple Rack endpoints to which you can add more `ActionController` functionality just by including extra modules. These little classes are excellent for replacing those Rack/Sinatra apps for file uploads or what have you, while still having the power to easily build out to rather rich controller objects.

Finally, if you need the full monty (i.e., like a controller in Rails 2), then you'll need to inherit from `ActionController::Base`. This class inherits from `ActionController::Metal` and includes a slew of modules to handle things like redirecting the user, handling implicit rendering, and a number of helpers for other stuff like caching.

The advantage of this approach is that you can take one of the base classes like `Metal` and include your own modules to create specialized controllers. I foresee someone using this to create a simple way to serve up resources (e.g., `PostsController < ResourcesController(:posts)` or something like that), much like people have done previously, or using it as a way to quickly build API backends. This is the other piece of the major refactor that excites me, since we're looking at a new way to construct reusable code and assemble it into usable applications.

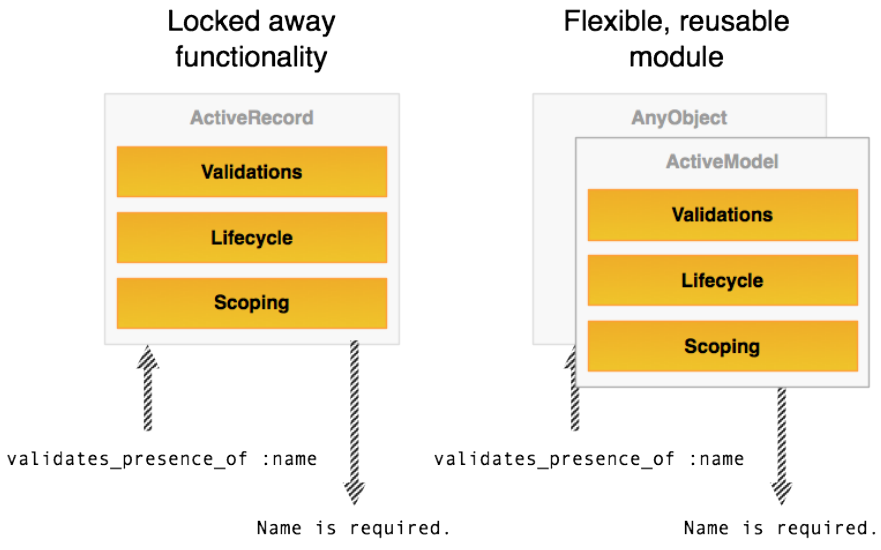
1.1.3. Where models are concerned

Though the public API for models is generally the same (with a few additions and changes I'll cover in a subsequent blog post), Active Record is now powered by the brain-melting Active Relation, a powerful relational algebra layer.



What does that mean for you? Well, basically it means Active Record will be smarter and more powerful. Rather than fairly naïve SQL generation, it uses some fancy mathemagical approach that should generate smarter queries. Frankly, I haven't had a lot of time to research these features for myself, but when I do, I'll be sure to post. If you've posted about this stuff somewhere, or seen a good post explaining it, then by all means let me know.

The second big change in Model Land is the extraction of much of the rich logic in Active Record objects like callbacks, validations, serialization, and so on into the Active Model module.



You can use this module to make any object behave like an Active Record object. For example, let's say you wanted to add some validations to a PORO (Plain Old Ruby Object) representing a host on a network:

```
class Host
  include ActiveModel::Validations

  validates_presence_of :hostname

  attr_accessor :ip_address, :hostname, :os
  def initialize(hostname, ip_address, os)
    @hostname, @ip_address, @os = host, ip_address, os
```

```
  end
end

h  = Host.new("skull", "24.44.129.10", "Linux")
h.valid?    # => true
h.hostname = nil
h.valid?    # => false
```

To get this functionality, simply include `ActiveModel::Validations` and start implementing the methods. It's possible to exercise fine-grained control over how the validations operate, how the validator gets the object's attributes, and so on. To get other functionality, like observing or callbacks, just include the relevant module (e.g., `ActiveModel::Observing`) and implement the required methods. It's fantastically clever.

1.1.4. Other pieces

ActionMailer is also getting some love in Rails 3, and the new API is looking especially delicious. Mailer classes are much more like a controller with some excellent helpers mixed in just for mailing, rather than some weird mashup of a model and a controller.

```
class MemberMailer < ActionMailer::Base
  def wall_post_notifier(post, member)
    mail(:to => member.email,
         :from => "notifier@network.example.com",
         :subject => "There is a new post on your wall.")
  end
end
```

```
mail = MemberMailer.wall_post_notifier(@post, @user)
mail.deliver
```

No more magical `deliver_*` methods, no more weird half-DSL methods for setting things up for the e-mail, and no more wishing we had the familiarity of controllers in mailers.

Rails is also getting a rather robust instrumentation framework. In essence, an instrumentation framework lets you subscribe to events inside of a system and respond to them in meaningful ways (e.g., an action renders and the logger logs its result). Internally the framework is used for things like logging and debugging, but you could easily repurpose the code for other things. For example, let's say you want to log to the system logger when a particular e-mail is sent out:

```
# Subscribe to the event...
ActiveSupport::Notifications.subscribe do |*args|
  @events << ActiveSupport::Notifications::Event.new(*args)
end

# Fire the event...
ActiveSupport::Notifications.instrument(:system_mail, :at => Time.now) do
  #SystemMailer.important_email.deliver
  log "Important system mail sent!"
end

# Do something with it...
event = @events.first
event.name        # => :system_mail
```

```
event.payload     # => { :at => Wed Jan 16 00:51:14 -0600 2010 }
event.duration    # => 0.063
system_log(event) # => <whatever>
```

Of course, this is arbitrary, but it adds a really powerful way to respond to certain events in your application. This framework is primarily geared towards supporting services like New Relic, which monitor various metrics within a Rails application, but I foresee a lot of interesting uses. For example, someone could probably rewrite the `exception_notification` plugin[4] to use the instrumentation framework to handle and send error e-mails.

1.2. That's great…but why bother?

With so much Rails 2.x code floating about, developers will need more compelling reasons than "it's new and shiny" to upgrade their applications to Rails 3. Of course, the obvious benefit of keeping up to date with the newest bugfixes and security patches is important, but there are larger reasons that developers should consider the move.

1.2.1. Performance

Yehuda has said numerous times that one of his prime objectives in doing a lot of the refactoring has been to improve performance. We won't see final numbers for some time (just as we won't see a final Rails release for a little while), but the general code simplification has added significantly to the performance of even the most menial of apps.

4.http://github.com/rails/exception_notification

Much of the refactoring of Rails internals has endeavored to reduce the request call stack so that there is less code between a request entering the application and data being sent back to the client. Significant attention has been given to previously slow components, such as partial rendering and URL generation. While many of these optimizations reduce the total request time by minuscule amounts (on the order of microseconds), pairing lots of these small speedups with a few that add significant speed make the overall speed increase fairly substantial.[5]

1.2.2. New features

Many of the newly added features are not only “new and shiny”, they could also greatly aid in cleaning up or actively improving your current codebase. The new routing DSL helps tame unruly routes files, and the new Active Record API can help in areas where programmatic composition of queries is necessary (e.g., building faceted filters). The new `Responder` cleans up and abstracts much of the common logic in RESTful controllers. Active Model can replace many of the hacks and extra libraries that developers use for object validation and relation. And that’s besides the minor conveniences, like automatic output escaping and XSS protection. In short, the new features add a lot of power to the framework and give you the ability to reduce your code maintenance effort.

It’s easy to say you can continue on without these features, but it might serve you well to figure out how many hours (and in turn, how much money) you’re wasting maintaining that gnarly routes file or debugging and updating those data class validation methods. How sure are you that your app’s output is totally covered with XSS protection? The attraction to upgrade to a

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5.http://www.engineyard.com/blog/2009/rails-and-merb-merge-performance-part-2-of-6/

new version of a tool isn't simply, "Oh, that feature's new and I want to play with it." Often the attraction is the new power, freedom, and security the new features afford to developers.

1.2.3. Easier segmentation

Lastly, segmenting a big app into smaller mountable apps has never been easier. With the addition of Rails Metal in Rails 2.3, developers were given a taste of deep Rack integration with Rails, but in Rails 3, Rack is a first-class citizen. Since Rack is now an integral part of the Rails request stack, it's a cinch to use it in a much more meaningful way.

No longer do you have to maintain a separate Merb or Sinatra application just for that simple, one-off task; now you can integrate that directly with your Rails app. Doing so will reduce your codebase dissonance (since everything is in Rails), cut down on integration issues, and, very likely, reduce the amount of hardware you'll need sitting under your application.

Now that we've taken a mile-high view of the changes and the upgrade landscape, let's dig in a little bit further.

2. Essentials

In this section we'll look at how to install the necessary components for Rails 3 and take the first steps toward upgrading your application.

2.1. Preliminary steps

The requirements for Rails 3 are a bit more demanding that Rails 2.x in that you must install newer, less common versions of many of the tools you use everyday.

2.1.1. Getting the right Ruby

Rails 3 requires at least Ruby 1.8.7 or a 1.9.2 or later series of Ruby 1.9 (1.9.1 will probably work, but it is not supported due to some major bugs). Getting one of these installed is pretty easy on most platforms.

2.1.1.1. Mac OS X or other Unix platforms

If you're on a Mac or other Unix platform, I highly recommend that you use `rvm` to manage your Ruby installations. It leaves your system Ruby untouched and lets you effortlessly switch among different versions. To do so, it manipulates your shell path using `bash` or `zsh` scripts; that means if you use another shell like `fish` or `csh`, then you're out of luck and will have to find another option. If you *are* a `bash` or `zsh` user, though, then you can install install `rvm` by simply installing the gem:

```
gem install rvm
```

Next, run the installation script:

```
rvm-install
```

Then, if using `bash`, it needs to be added to your profile. You can use this little script taken from the `rvm` documentation to do that:

```
for profile in .bash_profile .bashrc
  do echo 'if [[ -s "$HOME/.rvm/scripts/rvm" ]]
  then source "$HOME/.rvm/scripts/rvm"
fi' >> ~/.$profile fi
source ~/.rvm/scripts/rvm
```

And that's that. To install another Ruby version (like 1.8.7), then you simply run `rvm install 1.8.7` then `rvm use 1.8.7`. You can get a list of what Ruby versions you have installed with `rvm list` or switch back to your system setup using `rvm use system`.

If you aren't using `bash` or `zsh`, or would simply prefer to only have one version of Ruby running, you can likely install Ruby from your package manager. On Linux, your distribution probably has at least a 1.8.7 build available, and MacPorts has both 1.8.7 and a 1.9 build available. If none of these options suits you, then you can always of course build from source, but that's *so* 1997.

2.1.1.2. Windows

If you're on Windows and value your sanity, you'll probably want to stick to one of the precompiled stacks; attempting to compile Ruby on Windows can be an exercise in frustration. Ruby core provides basic binaries, but they require a lot of extra libraries and steps to get them working. Fortunately, there are a lot of great pre-compiled, one-stop options for Windows users. Though the de facto standard InstantRails hasn't been updated in quite some time (RubyForge says since 2007!) and the One-Click Ruby Installer is still 1.8.6, there are some new up and coming options out there that present newer stacks.

The newest community produced effort is RubyInstaller. It's currently still in pre-release (at time of writing, RC2), but it's available for download in a 1.8.7 or 1.9 build. From the chatter I've heard, it works quite well and will likely replace InstantRails as the default community stack fairly soon. There's also a company named Bitnami which produces the Bitnami RubyStack; this stack is based on 1.8.7 and comes with a significant set of extra things already installed.

Once you get a base Ruby installation working for you, you may want to look into `pik`, which is basically `rvm` for Windows. To install `pik`, simply install the gem:

```
`gem install pik`
```

Then you'll probably want to run `pik update` to get the latest version. Once it's updated, you can install Ruby versions using `pik install`, or add existing binary versions on your system using `pik add`. To use one of the installed Ruby versions, simple run `pik use 1.9.1` (or whatever the version identifier is).

2.1.2. Installing Rails 3

Now that you have a proper Ruby, it's time to get a proper Rails. At this point, installing the Rails 3 can be sort of tricky, since there are dependencies, it's a prerelease gem, and RubyGems basically poops the bed when those two scenarios collide. Hopefully that'll be fixed soon, but in the mean time, you can install Rails' dependencies like so:

```
# rails3b is a metagem for all the dependencies
gem install rails3b

# or if that gives you hassle, try the expanded version...
gem install i18n tzinfo builder memcache-client rack \
            rack-test rack-mount erubis mail text-format thor bundler
```

Once all those lovely gems are installed (add `--no-ri` and `--no-rdoc` if you want to skip those/speed up your install), then install the prerelease version of Rails:

```
gem install rails --pre
```

That should install a gem named `rails 3.0.0.beta`, and if you run `rails --version`, you should see "Rails 3.0.0.beta". Now you're ready to roll on with the Rails beta!

2.2. Automating some of the upgrade: `rails_upgrade`

I'm going to show you the process of manually upgrading a Rails application, but if you're lazy like me, then you can automate part of the process with a plugin I wrote named

`rails_upgrade`. `rails_upgrade` is an officially blessed upgrade tool that I and the Rails team will maintain throughout the 2.x to 3.0 transition period. To install the plugin, simply grab it from Github:

```
script/plugin install git://github.com/rails/rails_upgrade.git
```

The plugin adds the following Rake tasks to your application:

```
rake rails:upgrade:check
rake rails:upgrade:gems
rake rails:upgrade:routes
rake rails:upgrade:backup
rake rails:upgrade:configuration
```

The name of each task is probably self-explanatory, but here's a quick rundown of what each one is capable of.

2.2.1. `rails:upgrade:check`: Find out what needs to be upgraded

This task runs a battery of tests on your app for obvious things that need upgrading. To get a report, simply run this in a Rails root:

```
rake rails:upgrade:check
```

Depending on what it finds, the task generates a series of warnings similar to this:

```
named_scope is now just scope
The named_scope method has been renamed to just scope.
More information: http://github.com/rails/...

The culprits:
        - app/models/group.rb
        - app/models/post.rb
```

It explains the issue, where to get more information on it, and in which files the issue was found. It checks for a wide range of issues (e.g., old generators, busted plugins, environment.rb conversion requirements, old style routes and constants, etc.), so at least run this task, even if you don't use the rest of the plugin; it will save you a lot of time. It doesn't cover everything 100%, but I've found it's great for quickly identifying juicy, low-hanging upgrade fruit.

2.2.2. `rails:upgrade:routes`: Upgrading routes

This task will evaluate the routes in your current `routes.rb` file and generate new code for Rails 3. To generate a new routes file, simply run the task inside your Rails application:

```
rake rails:upgrade:routes
```

It will take a routes file like:

```
ActionController::Routing::Routes.draw do |map|
  map.resources :posts, :collection => {:drafts => :get, :published => :get}
```

```
  map.login  '/login',  :controller => 'sessions', :action => 'new'

  map.connect ':controller/:action/:id.:format'
  map.connect ':controller/:action/:id'
end
```

And make a new one like this:

```
YourApp::Application.routes do
  resources :posts do
    collection do
      get :drafts
      get :published
    end
  end

  match '/login' => 'sessions#new', :as => :login
  match '/:controller(/:action(/:id))'
end
```

The formatting isn't quite this nice when it comes straight out of the script, but you get the idea.

I've tested it on some quite complicated routes files and it did fine, but it does have some minor quirks (i.e., it flattens `with_options` blocks currently, expanding the options into the routes rather than retaining the `with_options` block).

This task is ideal for generating a base routes file quickly that you can refactor into something more manageable.

2.2.3. `rails:upgrade:gems`: Creating Gemfiles

The next piece is a Gemfile generator; essentially it takes your `config.gem` directives in `environment.rb` and generates a nice `Gemfile` for the new gem bundler (see Section 3.2.2 for more information on `bundler`). To run it, simply execute:

```
rake rails:upgrade:gems
```

That will take an `environment.rb` with these `config.gem` calls:

```
config.gem "bj"
config.gem "aws-s3", :lib => "aws/s3"
```

And generate this `Gemfile`:

```
directory "/path/to/rails", :glob => "{*/,}*.gemspec"
git "git://github.com/rails/rack.git"
gem "rails", "3.0.pre"

gem 'bj',
gem 'aws-s3', :require_as=>"aws/s3"
```

Then it's just as simple as `bundle install` to get your gems setup and installed (or `bundle pack` if you'd like to freeze everything). I've tested this on some fairly complex sets of gem requirements, so it should stand up to most sets of gem requirements.

2.2.4. `rails:upgrade:backup`: Backing up important files

Upgrading may require overwriting some files that you've probably modified heavily, so this task will back those files up. If you execute the task (`rake rails:upgrade:backup`), the code will take files like `test/test_helper.rb` and create a backup in the form of `test/test_helper.rb.rails2`. You can see a full list of what it will back up below when we actually begin the upgrade.

2.2.5. `rails:upgrade:configuration`: Generating your new configuration files

The last piece of the plugin is a configuration file generator. As mentioned previously, Rails has transitioned to using Rack pretty deep in the stack. Part of that transition has been to move your application's configuration from `environment.rb` to a new file named `application.rb`, where your Rails application creates a Rack endpoint and is configured. This task will take your Rails initializer configuration from `environment.rb` and create new configuration code that you can drop into `application.rb`.

2.3. Starting an upgrade with the plugin

Now it's time to start upgrading your application. There are three steps to starting an upgrade using the `rails_upgrade` plugin:

1. Run the application check
2. Back up your important files
3. Re-generate the application on top of your previous application

These preliminary steps, followed by some guided reconfiguration and code upgrading, will bring your Rails application up to version 3 compatibility. But first we need to figure out what those following steps will be.

2.3.1. Run the application checks

First, run `rake rails:upgrade:check`. This will generate a report on what needs to be upgraded in your application. You'll probably see things about deprecated API calls and changing DSL's, but don't start working on those problems yet! The next two steps will take care of a few of the issues this one points out. I just wanted you to run the check to lay out a roadmap for where we're going.

2.3.2. Back up important files

In the next step, we're going to "regenerate" the Rails app on top of your current Rails 2.x app (in effect, generating a new Rails 3 app with your application code in it). But be careful which files you let the generator replace, since a lot of them can be edited much more simply than they can be reconstructed (unless you really like digging around in `git diff` and previous revisions). Fortunately for you, the `rails:upgrade:backup` task will backup anything that you've likely modified. But if you don't use that task, here's a list of files you probably do not want to let it update (since you likely modified them):

- `.gitignore` (unless you don't really care; the new standard one is pretty good)

- `app/helpers/application_helper.rb`
- `config/routes.rb`
- `config/environment.rb`
- `config/environments/*` (unless you haven't touched these, as many people don't)
- `config/database.yml`
- `doc/README_FOR_APP` (you *do* write this, don't you?)
- `test/test_helper.rb`

Whether you use the plugin or not, you need to let Rails overwrite these:

- `Rakefile`
- `README`
- `config/boot.rb`
- `public/404.html` (unless you've customized it)
- `public/500.html` (unless you've customized it)
- `public/javascripts/*` (if you don't have a lot of version-dependent custom JavaScript; Rails is JavaScript framework agnostic now, so there have been changes and additions to the JavaScript included)

Of course, these lists won't apply in every situation, but in general I think that's how it'll break down. Now that you've generated the Rails 3 code, you can remove everything in `script/` except `script/rails`, since everything now revolves around the `rails` command (I'll get to that in more detail later).

2.4. Regenerate the application

Now that your application files are prepped, you need to “generate a new app” on top of your current one (i.e., run the generator and point the app path to your current Rails 2.x app’s path). You could go in and paste or change these files manually, but doing it this way is much quicker and less error prone.

```
rails ~/code/my_rails2_app/
```

The application generator is basically the same with two key differences:

- The parameter that was formerly the app name is now the app path. You can still give it a “name,” and it will create the folder like normal. But you can also give it a full path (e.g., `~code/my_application` rather than just `my_application`) and it will create the application there.
- All parameters for the generator must go after the app path. So, previously one could do `rails -d mysql test_app`, but now that has to be `rails test_app -d mysql`. This change is largely due to the major refactoring of the Rails generators. So even though it’s somewhat of a temporary annoyance, it’s definitely worth it for the flexibility and power the new generators bring (more on that soon).

PROTIP: Be sure to specify the right database adapter when regenerating the application; it will place the proper gem requirement for you in the `Gemfile` if you do.

If you get an error like “no value provided for required arguments ‘app_path’“, then you’ve gotten your parameters out of order. If you’d like to use another database driver, you can provide `postgresql` or `sqlite` (or nothing, since `sqlite` is the default). You’ll see a lot of text scroll by, and now we have a nice, fresh Rails 3 application to play with.

Note that the argument is a *path*, not a name as in previous Rails versions. When the generator runs, it will ask you if you want to replace a lot of files. If you’ve backed them up, just enter “a” and it will overwrite them without asking you about each and every file.

PROTIP: If you got an error about your Ruby version, upgrade it! If you use rvm (http://rvm.beginrescueend.com/) it’ll be as painless as possible.

Congratulations, you’ve got a probably-not-booting-but-still-existent Rails 3 application. Now, let’s get that application booting and running!

3. Getting bootable

So, you've prepped the application, got the new files generated, and are now ready to move forward with the upgrade. First, we're going to get the application reconfigured with the new-style configuration files, and then we'll make some essential code changes.

3.1. Configuring your app again

Now comes the task of configuration. There aren't a whole ton of changes, but navigating them can trip up the novice and journey(wo)man alike. Things like initializers and your settings in `database.yml` can generally stay the same; the main changes have to do with `environment.rb`, the router, and gem vendoring.

> **PROTIP:** When using SQLite, the database file is now the `database` key rather than the `dbfile` key.

3.2. Configuring the environment

In all previous Rails versions, most configuration and initialization happened in `config/environment.rb`. In Rails 3, most of this logic has moved to `config/application.rb` and a host of special initializers in `config/initializers`. If you open up `config/environment.rb`, you'll notice it's been seriously slimmed down, and looks like this now:

```
# Load the rails application
require File.expand_path('../application', __FILE__)

# Initialize the rails application
YourApp::Application.initialize!
```

Simple: the `application.rb` file is required and then the `Application` (Rack endpoint for your Rails application) is initialized. The `YourApp` constant is generated based on the folder name for your app (i.e., `rails ~/code/my_super_app` would make it `MySuperApp`). The constant doesn't have any special relationship to the folder the app lives in, so you can rename it at will (so long as you do it everywhere it's used). But be careful; since you'll be using this constant in a few places, if you change it be sure to make it something useful.

Now open up `application.rb`. If you generated the files using the Rails 3 generator, you should have one that looks something like this:

```
module TestDevApp
  class Application < Rails::Application
    # ...Insert lots of example comments here...

    # Configure sensitive parameters which will be filtered from the log file.
    config.filter_parameters << :password
  end
end
```

For the most part, all the code inside the Rails initializer block from your old `environment.rb` (i.e., all your `config.*` calls) should transfer straight over: just use the

`rails:upgrade:configuration` method or copy and paste them inside the class body. That part of the configuration is simple; if you have any extraneous code outside of that configuration block, I heartily recommend you move it either into an initializer or to the bottom of `application.rb`.

> **PROTIP:** You may be wondering, "What about `RAILS_GEM_VERSION`?" To specify what version of Rails to lock your application to, specify it in the `Gemfile` according to the `bundler` syntax (see Section 3.2.2 for more information).

Next, take a look at some of the newly generated code. You'll notice a block like this:

```
config.generators do |g|
  g.orm             :active_record
  g.template_engine :erb
  g.test_framework  :test_unit, :fixture => true
end
```

This is where you can configure what ORM, test framework, and template engine Rails will use. Since you're upgrading existing code, you'll probably stick with the defaults (unless, of course, you're already using something like `haml`), but you could substitute in something like `:datamapper` or `:sequel` for `:active_record`, `:haml` for `:erb`, or `:rspec` for `:test_unit` (once they get it working with Rails 3). Doing so will set the generators for models, views, etc., to use your tool of choice. For example, if you generate a scaffold with `haml` and `rspec` as your tools, it should in theory generate the templates with Haml syntax

and the tests using RSpec. (I don't know if all these generators are available yet, but they should be soon.)

The `config/application.rb` file also houses some configuration for other things.

- If you need to configure internationalization, it's been moved to `application.rb`. Rails 3 comes equipped with a really powerful i18n toolkit powered by the `i18n` gem[6]. The defaults that Rails sets up will work for most people (default locale is `en` and all translations in the default directory are automatically imported), so you may not need to touch anything. But if you need to customize, this is the place to do it.
- You may want to set a default timezone. I usually stick with UTC, since it's easy to convert on a per-user basis to their desired timezone, but you might want to set it to your timezone or the server's timezone.
- Your favorite old haunts from `config/environment.rb` such as `config.plugins`, `config.load_paths`, etc., are still there (even though `config.gems` is not).

Many of the other configuration bits that were once in `environment.rb`, like custom inflections, mime types, and so on, have been moved out into their own initializers in the `config/initializers` directory. While you can leave them in `application.rb` when you move them out of `environment.rb`, I highly recommend you place them in their proper place in an initializer.

If you opted to keep any custom initializers or specialized environment files during the generation process, you'll probably need to go in there and update the syntax. Many of

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6.http://github.com/svenfuchs/i18n

these (especially the environment files like `config/environments/production.rb`) now require a new block syntax:

```
# Rails 2.x
config.cache_classes = false
config.action_controller.perform_caching = true

# Rails 3.x
YourApp::Application.configure do
  config.cache_classes = false
  config.action_controller.perform_caching = true
end
```

All configuration happens inside the `Application` object for your Rails app, so these configuration files, too, need to be executed inside of it. As I said, most things in there should still work fine once wrapped in the block, but there are a few that have changed. For example, `config.active_record.default_timezone` is now `config.time_zone`, and it uses time zone strings (e.g., `'Central Time (US & Canada)'` rather than symbols like `:cst`. See the *Deprecation Checklist* for more information about what has changed.

3.2.1. Converting your routes file

The next step is to move your routes to the Rails 3 router syntax. The new router is great, but it's not incredibly easy to migrate existing routes over to the new syntax. Upgrading your routes is fairly simple so long as you haven't done anything complex; it's just not as easy as copying and pasting. Some things, like `namespaces`, work the same, but most other things have a much-changed syntax.

PROTIP: You don't *have* to upgrade your routes immediately; the Rails core team has a legacy mapper in place at least until Rails 3.1. It is recommended that you do it as soon as possible, though, since that mapper will not always be there.

You can automate upgrading your routes file with the `rails:upgrade:routes` task; it should handle nearly every case you throw at it. In case it doesn't, though, I'm going to walk you through some manual upgrade cases. To start with the simplest case, mapping the root route (i.e., for the "/" path) previously looked like this:

```
map.root :controller => 'home', :action => 'index'
```

This maps the root path to the `index` action on `HomeController`. In Rails 3, a functionally equivalent route is:

```
root :to => 'home#index'
```

Note that rather than specify the controller and action as hash arguments, they are now specified in a pattern typically seen in documentation (i.e., "class#method").

Moving up the complexity scale, to convert a simple, normal route, start with a route like:

```
map.connect '/posts/mine', :controller => 'posts', :action => 'index'
```

This connects the path “http://example.com/posts/mine” to the `index` action on `PostsController`. The equivalent route in Rails 3 looks like this:

```
match '/posts/mine', :to => 'posts#index'
```

If you wanted to provide extra parameters to the route (for example, a default value for a parameter or an extra parameter to an action that expects it from other routes), you do this in Rails 2.x:

```
map.connect '/by_date', :controller => 'pictures', :action => 'index',
                      :sort => 'date'
```

Notice in the following Rails 3 route that adding a default parameter looks very similar (i.e., simply add them as hash arguments to the end of the route definition):

```
match '/by_date', :to => 'pictures#index', :type => 'date'
```

The syntax for named routes (i.e., routes that generate a helper like `posts_path`) is also significantly different. A named route in Rails 2.x looks something like this:

```
map.login '/login', :controller => 'sessions', :action => 'new'
```

This route generates helper methods named `login_path` and `login_url` and connects the path ‘http://example.com/login’ to the `new` action on `SessionsController`. In Rails 3, this route looks like this:

```
match '/login', :to => 'sessions#new', :as => 'login'
```

Note that, unlike in Rails 2.x, the method called to define the route remains the same (`match`), but we add an `:as` parameter to indicate what the route is named.

Resource routes have seen a significant shift also. Previously, specifying special methods for the collection and members of the collection of resources required a sticky-looking set of hashes:

```
map.resources :users, :member => {:ban => :post} do |users|
  # Child routes here...
end
```

In Rails 3, these methods are broken out into their own block inside the `resources` block:

```
resources :users do
  member do
    post :ban
  end
end
```

Member methods go in a `member` block and `collection` methods go in a `collection` block. Also note the request method (`post`) ss the method call and the action name as a `Symbol` (`:ban`) is the argument; their order is reversed from the old Rails 2 hash-style syntax.

Nesting another set of resources inside a resource in Rails 2.x looked like this:

```
map.resources :posts do |post|
  post.resources :comments
  post.resources :spams
end
```

In Rails 3, this syntax is cleaned up a little bit:

```
resources :posts do
  resources :comments
  resources :spams
end
```

Note the lack of block variable and method calls on it; as you've seen in other route conversion examples, the new router does away with that sort of syntax.

If you have routes with requirements, such as a name parameter having to be a certain string or id's having to match a certain pattern, Rails 3 also supports those with a different syntax. For example, let's say you have a route that said a `participant_id` parameter had to start with 2 letters followed by numbers; in Rails 2.x, that would look like this:

```
map.connect '/people/participants/:participant_id', :controller => 'participants',
            :action => 'show', :requirements => { :participant_id => /^[a-z]{2}\d+/i}
```

The `:requirements` argument specifies what parameter to check and a pattern to check it with. The syntax is very similar in Rails 3, but with a different name:

```
match '/people/participants/:participant_id', :to => 'participants#show',
      :constraints => { :participant_id => /^[a-z]{2}\d+/i}
```

So, essentially the `requirements` argument is now the `constraints` argument, but it's not exactly the same: Rails 3 makes the constraints/requirements mechanism much more robust. You can read about some of the new features in Section 5.3.

3.2.2. Setting up the gem bundler

Rails 2's gem vendoring solution left much to be desired, from issues with properly requiring gems to problems with the gem detection (I can't tell you how many times I nixed a gem from the list because it kept telling me to install it even though it was already installed). Rails seriously needed a replacement for such a vital piece of infrastructure. These days we have Yehuda Katz's excellent bundler[7], which totally replaces `config.gem` in Rails 3.

Essentially, bundler works off of `Gemfiles` (kind of like `Rakefiles` in concept) that contain a description of what gems to get, how to get them, and when to get them. Moving your gem requirements to a `Gemfile` isn't as simple as copying them over. You can automate it using `rails:upgrade:gems`, but in the interest of greenfielding new apps with Rails 3 (or possibly using Bundler in non-Rails applications), I'm going to walk you through how to setup a Gemfile and convert your Rails 2 code to it.

Converting a Rails 2 `config.gem` call to a `Gemfile` directive isn't terribly difficult; for example, here's a pretty hairy `config.gem` call:

7.http://github.com/carlhuda/bundler

```
config.gem "aws-s3", :version => "0.5.1",
           :lib => "aws/s3", :source => "http://gems.omgbloglol.com"
```

So we want the `aws-s3` gem, version `0.5.1`, from a custom source, and it must be required as `aws/s3` in our app. In a `Gemfile`, it looks like this:

```
source "http://gems.omgbloglol.com"
gem "aws-s3", "0.5.1", :require => "aws/s3"
```

So `:source` parameters become `source` calls *before* the gem that you want to fetch; this call adds the source given to a list of sources to search for gems that we need to install.

> **PROTIP:** Sources don't have to be added immediately before the gem, but do have to be added before that particular gem requirement.

Sources resolve in order of addition, so you probably want to keep Gemcutter first, unless you need a specialized version of a gem that's on Gemcutter from a secondary source.

The version is now simply the second string requirement; if this is left out (i.e., you simply had `gem "aws-s3", :require => "aws/s3"`), it will assume you want the latest version. And finally, the `:lib` argument is now `:require` (which makes more sense). So, to sum up the changes:

- Remove the `config` object
- `:lib` key becomes the `:require` key
- The `:version` key becomes a second, optional string argument
- Move `:source` arguments to a `source` call to add it to the sources

Now let's take a look at the `Gemfile` that Rails generated for you:

```
# Edit this Gemfile to bundle your application's dependencies.
source 'http://rubygems.org'

gem "rails", "3.0.0.beta"

## Bundle edge rails:
# gem "rails", :git => "git://github.com/rails/rails.git"

gem "mysql"

# Use unicorn as the web server
# gem 'unicorn'

# Deploy with Capistrano
# gem 'capistrano'

# To use debugger
# gem 'ruby-debug'

# Bundle the extra gems:
# gem "bj"
# gem "nokogiri", "1.4.1"
```

```
# gem "sqlite3-ruby", :require => "sqlite3"
# gem "aws-s3", :require => "aws/s3"

# Bundle gems for the local environment. Make sure to
# put test-only gems in this group so their generators
# and rake tasks are available in development mode:
# group :development, :test do
#   gem 'webrat'
# end
```

Notice that it has added `mysql` as a dependency; when I generated this app, that's what I set as the database driver via the `-d` option. Were you to specify something else (like `pg` or `sqlite`) it would have the proper dependency.

As mentioned before, `bundler` is much more powerful than `config.gem`, and one of the great features it adds is the concept of a gem "group." You can specify a group of gems to only be required/activated in certain environments, so you can stop doing weird things with environment checks around your `config.gem` requirements. You can see an example of this technique in the commented-out requirements at the bottom of the generated `Gemfile`. So, let's say I want to use `mocha`, but only when testing (obviously). I would add this to `Gemfile`:

```
group :test do
  gem "mocha"
end

# or...

gem "mocha", :group => :test
```

Now this gem will only be added in when running the app in the `test` environment. This technique is also useful for production only gems related to caching and what not, or for specifying special gems for your development environment, such as debuggers and log analyzers.

Now that you've got a proper `Gemfile`, run `bundle pack` if you want to vendor everything or `bundle install` to install the gems to system gems. The `bundler` is much more powerful than `config.gem`, and it helps you do more advanced tasks (e.g., bundle directly from a Git repository, as you can see in the generated `Gemfile`, specify granular paths, etc.). So, once you move your `config.gem` calls over, you may want to look into the new features[8].

3.3. Code fixes

Your application should be properly configured now, so let's move on to changes you need to make in your application code. To get an application actually bootable, the changes will likely be fairly minimal if anything (unless you have a rogue plugin that will give you issues), but the following changes will be required in coming versions.

3.3.1. `RAILS_*` constants are deprecated

In all previous versions of Rails, one referred to the root directory of a Rails application with `RAILS_ROOT` or the environment with `RAILS_ENV`. Well, these constants are going away in lieu of a nice module[9] that houses all of them. For example, `RAILS_ROOT` is now `Rails.root`, `RAILS_ENV` is now `Rails.env`, etc.

8.http://github.com/carlhuda/bundler/blob/master/README.markdown
9.http://api.rubyonrails.org/classes/Rails.html

PROTIP: These conversions aren't absolutely required yet, but you will get a warning about them. The plan is to get rid of them very soon, so make sure you make the change as soon as you can.

The nice thing about these new module methods is that you can replace code that looks like this:

```
if RAILS_ENV == "production"
  # ...
end
```

…with something a little more readable:

```
if Rails.env.production?
  # ...
end
```

This works with custom environments like `staging_309` or `production_on_my_box`, too. This sugar comes from a special class named `ActiveSupport::StringInquirer` that lets you query the contents of the string (i.e., `"what".what?` would evaluate to `true`).[10] Just another little touch of syntactic sugar to add some elegance.

10.http://api.rubyonrails.org/classes/ActiveSupport/StringInquirer.html

3.3.2. Converting mailers to the new API

The Action Mailer API has always been a sore spot in the Rails world: is it a controller or a model? Why does it act like a controller but live in models? Where do these magic methods come from? Fortunately for Rails 3, they've greatly de-metafied the code and made its API much more straightforward.

> **PROTIP:** The old API currently works, but it's a compatibility shim, which will be removed in a future version, so you should upgrade your mailers. Plus, the old API is icky.

Let's take a look at a basic user notification mailer from Rails 2.x.

```
class UserMailer < ActionMailer::Base
  def new_friend_notification(user, friend)
    recipients      user.email
    from            "notifier@example.com"
    subject         "You have a new friend!"
    body            :user => user, :friend => friend
  end
end
```

This mailer simply alerts a user when they have a new friend in their social network in our hypothetical app: the user receives the e-mail, we send it from our notifier e-mail address,

and we pass the user and their new friend as body parameters (they will show up as instance variables to the template, oddly enough). This API is sort of confusing (we're setting attributes using simple method calls, which is sort of ugly) and looks nothing like anything else in Rails. Plus, it lacks anything like filters and so on, not to mention that to use it you have to use magical methods like `deliver_new_friend_notification`. Now here's the same mailer using the new Action Mailer API:

```
class UserMailer < ActionMailer::Base
  default :from => "notifier@example.com"

  def new_friend_notification(user, friend)
    @user = user
    @friend = friend

    mail(:to => user.email, :subject => "You have a new friend!")
  end
end
```

Much cleaner and closer to what we're used to. Instance variables are carried over from the parent class to the templates, and the object returned from the method is just an object that we call methods on to generate the e-mail or send it.

```
user = User.find(1337)
new_friend = User.find(42)

UserMailer.new_friend_notification(user, new_friend).deliver
```

If you wanted the message as a string, you simply call `to_s` on the object returned from the mailer method rather than calling the magical `create_*` method that the old Action Mailer had for getting a string version of a message.

The handling of attachments is a bit cleaner also. Previously, a mailer with attachments would look like this:

```
class AssetMailer < ActionMailer::Base
  def send_purchased_asset(user, asset)
    recipients      recipient.email
    from            "mailer@example.com"

    subject         "Here is your image: #{asset.name}"
    body            :account => recipient

    attachment :content_type => "image/jpeg",
               :body => File.read(asset.path)
  end
end
```

Not terrible, but the `:body` parameter is awkward since it's not really a "body." In Rails 3, this is just a bit more elegant:

```
class AssetMailer < ActionMailer::Base
  def send_purchased_asset(user, asset)
    @user = user
    @asset = asset
```

```
    fn = File.basename(asset.path)
    attachments[fn] = File.read(asset.path)

    mail(:to => user.email, :from => "mailer@example.com",
         :subject => "Here is your image: #{asset.name}")
  end
end
```

Simply populate the attachments hash with your attachment data and ActionMailer takes care of the rest. If you add an attachment, Rails does not implicitly render a template for the message; you will have to manually specify it (continue reading for information on how to do that).

Explicit multipart (i.e., specifying the parts manually rather than implicitly from the template names) has also been revamped; in Rails 2.x, you specified parts of a mail message like this:

```
class UserMailer < ActionMailer::Base
  def confirmation_message(recipient)
    recipients      recipient.email
    subject         "Welcome!"
    from            "notifier@example.com"
    content_type    "multipart/alternative"

    part :content_type => "text/html",
      :body => render_message("confirmation-html", :user => recipient)

    part "text/plain" do |p|
      p.body = render_message("confirmation-plain", :user => recipient)
```

```
      p.transfer_encoding = "base64"
    end
  end
end
```

To make the Action Mailer API more in line with controllers, Rails 3 adds a `respond_to`-like block syntax. So this is how the same mailer looks using the new syntax:

```
class UserMailer < ActionMailer::Base
  def confirmation_message(recipient)
    mail(:to => recipient.email,
         :content_type => "multipart/alternative",
         :from => "notifier@example.com",
         :subject => "Welcome!") do |format|

      format.html { render("confirmation_html", :user => recipient) }

      format.text(:transfer_encoding = "base64") do
        render("confirmation_plain", :user => recipient)
      end

    end
  end
end
```

As you can see, the `mail` method takes a block and provides a block variable that configures the formats available. This form is useful for specifying only certain templates to render or providing extra configuration information to the renderer for certain formats (as we've done

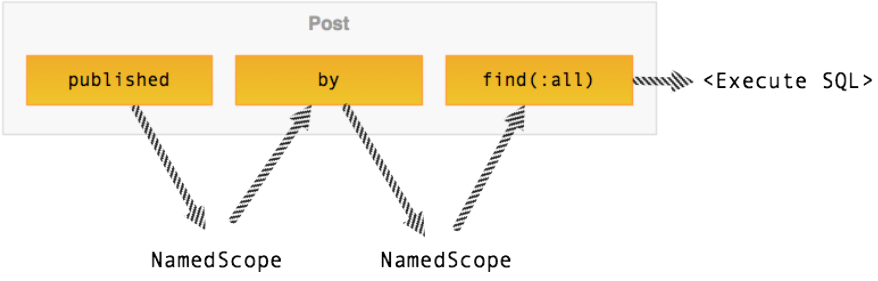
here with `:transfer_encoding` for the plaintext template). If you use this syntax, Rails does not implicitly render any mailer templates; you must explicitly provide every part you want included in the message.

3.3.3. New Active Record API

The Active Record DSL is radically different, largely thanks to its integration with Active Relation (see Section 1.1.3 for more information on the merge). The old API won't be deprecated until Rails 3.1, but it's probably a good idea to go ahead and start migrating as much as possible to the new API now. The simplest way to explain, at a practical level, how the new query API works is to explain it in terms of `named_scopes` (now just `scopes`, by the way). Let's say you have the following model in an app on Rails 2.3:

```
class Post < ActiveRecord::Base
  named_scope :published, :conditions => ['published_at NOT NULL']
  named_scope :by, lambda {|u| :conditions => {:user_id => u.id}}
end
```

You can chain together named scopes infinitely, so if you were to have code like `Post.published.by(@user)`, it would find posts that were already published and written by the specified user. What's actually going on there is that `Post.published` returns a `NamedScope` object, which is then operated on with the `by` method, adding more conditions, composing the SQL query you'll eventually execute with a call like `all` or `find`.



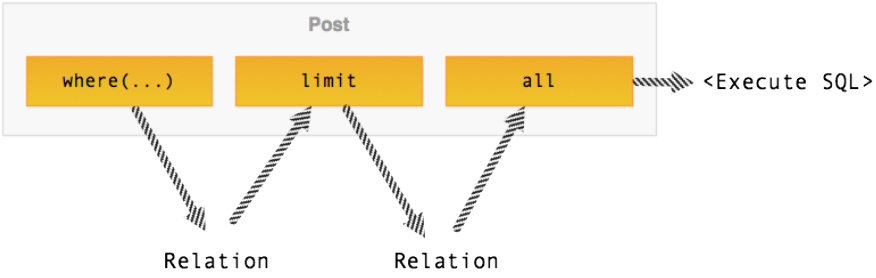
Active Record/Active Relation work much the same way. When you call a method, Active Record returns a `Relation`; these `Relation` objects are chained, composing a SQL query, until you execute that query by calling an enumerable method like `all`, `first`, or `each` (you may know this concept as *deferred execution* from other ORMs). So, if you wanted to find the first five `Site` records that are active, you might do this in Rails 2:

```
Site.find(:all, :conditions => {:active => true}, :limit => 5)
```

With Rails 3 and Active Relation, though, the code would look like this:

```
Site.where(:active => true).limit(5)
```

Just like a `named_scope`, these `Relation` objects chain up with each other and compose the SQL query: `Site.where` returns a `Relation` that we call `limit` on, which returns a `Relation` that we call `find` on.



As you'll see in Section 4.4, this new syntax opens up a lot of possibilities that either weren't possible or were quite ugly with the old API.

Now, let's take a look at converting some typical Rails 2.x model code into the new syntax. Not every piece of the API is changing; in fact, much of the large-scale ideas are staying the same. Calls like `Model.find(:all)`, `Model.find(:first)`, and `Model.find_by_field` will still work. It's mostly the code surrounding the actual composition of the SQL query that is changing: essentially you can't provide argument hashes for any of the finder and calculation methods anymore. In other words, these methods no longer take hash arguments:

- `find`
- `first`
- `all`
- `count`
- `calculate`
- `sum`
- `average`
- `maximum`
- `minimum`

- `update_all`

Active Record provides a new query interface for providing conditions and other parameters to these methods. For example, here's a simple query in Rails 2:

```
Post.find(:all, :conditions => {:category_id => @category.id})
```

In Rails 3, the `:conditions` hash is transformed into a call to `where`:

```
posts = Post.where(:category_id => @category.id)
```

You can then operate on the posts variable just like an `Array`, since it includes `Enumerable`:

```
posts.first       # => #<Post ...>
posts.all         # => [#<Post ...>]

posts.each {|post| post.destroy }
```

Other, similar hash arguments, like `:limit`, `:order`, and `:select`, are also methods now:

```
posts.limit(2).order("id DESC").select("body")
```

Even `:include`, which adds joins on, is now a method:

```
posts.include(:author).where("publshed NOT NULL")
```

That should get you started converting your code. If you need more help, there are some great blog entries[11] and, of course, the RDocs.[12]

3.4. Minor pre-booting issues

If you've fixed the issues detailed here, you should be very close to booting. Depending on your application's setup, though, you may need to do a few more things.

3.4.1. Delete `new_rails_defaults.rb`

As the Rails core team was moving towards Rails 3, an initializer was added to set a few of the configuration options to what they would be in Rails 3. This file makes transitioning to Rails 3 easier, and it's a great tool to see if any part of your app would totally break on Rails 3. Most of the settings in there relate to JSON (changes to which could easily break your API), with one determining whether or not Active Record does partial saves (something most developers don't need to worry about). Now that you're actually on Rails 3, you should just delete this file.

3.4.2. Rack configuration is required

If you regenerated your Rails application, you might have noticed that the Rails 3 generator gives you a `config.ru` file in your application root. If you're unfamiliar with how Rack[13] works, `config.ru` is basically a configuration file that tells Rack where to find its endpoints. Rails 3 is going seriously gung-ho on Rack, and as such, a `config.ru` is now required in your application to tell Rack how to mount it. As noted earlier, the Rails 3 generator will spit one out

11.My favorite is http://m.onkey.org/2010/1/22/active-record-query-interface
12.Currently only accessible at http://api.rails.info/
13.http://rack.rubyforge.org/

for you, but if you're doing a manual upgrade for some reason, then you'll need to add one yourself.

Interesting note: Remember that `YourApp::Application` class you created earlier in `application.rb`? That's your Rack endpoint; that's why your `config.ru` looks like this (or you should create one that looks like this if you're doing all this manually):

```
# This file is used by Rack-based servers to start the application.

require ::File.expand_path('../config/environment',  __FILE__)
run YourApp::Application.instance
```

Neat, eh? That's why I suggested you pick a meaningful name for that class: its touch runs quite deep in the request stack.

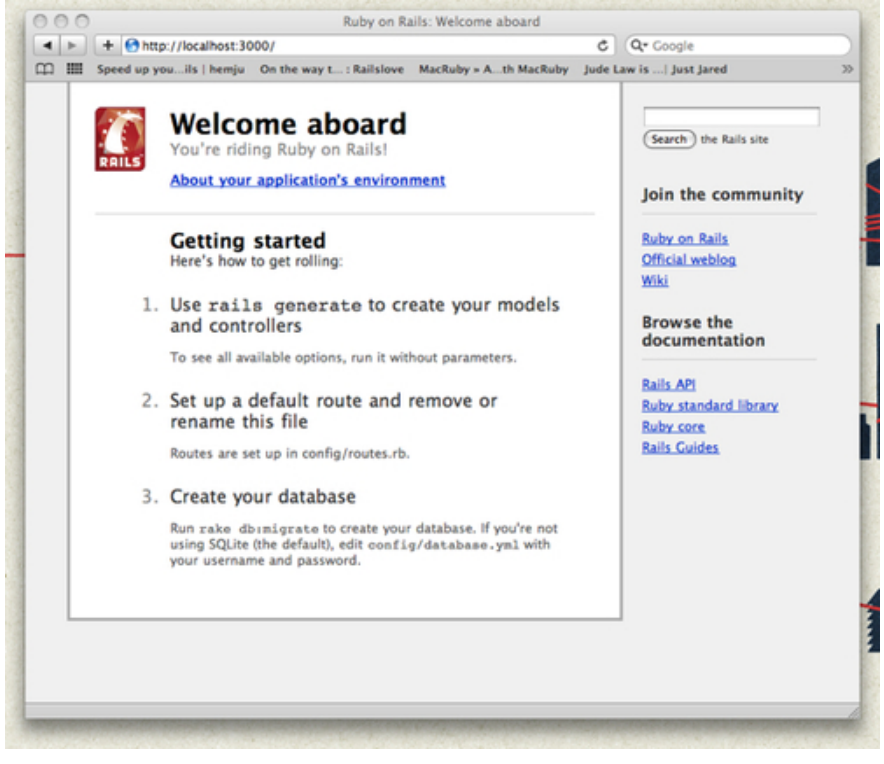
3.5. Booting the application

Rails went the "Merb way" and has consolidated its many `script/*` commands into the `rails` binscript (or the `script/rails` command). So things like `generate`, `server`, `plugin`, etc., are now `rails generate` and so on.

Was `script/...`	New command
`server`	`rails server` (or `rails s`)
`console`	`rails console` (or `rails c`)
`generate`	`rails generate` (or `rails g`)
`destroy`	`rails destroy`

Was `script/...`	New command
`plugin`	`rails plugin`
`runner`	`rails runner`
`performance/benchmark`	`rails benchmark`
`performance/profiler`	`rails profiler`
`about`	`rake about`
`dbconsole`	`rails dbconsole` (or `rails db`)

So to start the application up, just run `rails server` inside the application root (or, optionally, `ruby script/rails server`). Once the server's booted, navigate over to `http://localhost:3000` and you should see a familiar friend:



Click on “About your application’s environment” to see more information about the application; you should see the Rails version is “Rails 3.0.0”. Once you’ve verified it’s showing the right version, you’ll probably want to remove `public/index.html`.

3.6. It's booted! Now what…?

Your application is booted, you can at least get a request into a controller, so now what? Well there are a couple of things to keep in mind…

3.6.1. Check out your views

You'll want to give your views the once-over to make sure there's no deprecated code (the removal of `link_to_function` and friends is probably going to be the most common), usage of removed/bad plugins, or usage of Ruby that's not supported on 1.8.7 or later. Booting the application will catch many of these problems in models and controllers, but templates aren't evaluated until they're rendered, so something could still be lurking in there. Also keep in mind that all output strings (i.e., things you output using `<%=`) are escaped by default; this will cause problems for any helper or method that outputs HTML (especially in your tests; see Section 4.2 for how to fix it).

3.6.2. Deprecations coming soon

There are a lot of things that are being deprecated in Rails 3. Many of them won't break your application yet, but they will generate warnings you might not see in your logs. You can see a full list in the **Deprecation Checklist** section of the book, but there are a few that will bite you harder and probably sooner:

- **`allow_concurrency` is no longer needed** Since Rails is Enterprise Thread Safe™ now, you no longer need this setting.

- **Requiring `activerecord`/`activesupport`** People could never remember whether it was `active_record` or `activerecord`, so the Rails team made it so that both will work. Starting very soon, though, you will be required to use the underscored form (e.g., `active_record`).
- **`filter_parameter_logging` API is changing** The `filter_parameter_logging` lets you set which parameter names to filter out of logs (e.g., don't log your users' passwords). This feature is now available by setting them up in `application.rb` like this: `config.filter_parameters << :password`
- **Active Record's errors API is different** If you're used to using `errors.on_base` or `errors.add_to_base`, then you'll need to learn the new API (check the deprecations checklist).

4. Improving your application with Rails 3

A lot of the refactoring and new features in Rails can help you significantly improve your codebase if you take advantage of them. In this section, we'll take a look at some of those features and changes and how to put them to use in your code today.

4.1. Cleaning up controllers

Though the internals were torn apart, refactored, and greatly improved, the public API for controllers didn't change a whole lot in the move to Rails 3. Even so, there were a couple of new features that can help you clean those controllers up.

4.1.1. Responders

If you've got a lot of RESTful controllers chock full of methods that look like this:

```
def create
  @user = User.new(params[:user])

  respond_to do |format|
    if @user.save
      flash[:notice] = 'User was successfully created.'
      format.html { redirect_to(@user) }
      format.xml  { render :xml => @user, :status => :created, :location => @user }
    else
      format.html { render :action => "new" }
```

```
      format.xml  { render :xml => @user.errors, :status => :unprocessable_entity }
    end
  end
end
```

…then you'll really appreciate the new `Responder` feature of Action Controller. It can take all the logic in these boilerplate REST methods and wrap it into something that looks like this:

```
def create
  @user = User.new(params[:user])

  flash[:notice] = "User was successfully created." if @user.save

  respond_with @user
end
```

Essentially, it takes all the conventional REST logic and wraps it up in a nice little method `respond_with`. It works with all the standard REST methods: `index`, `new`, `create`, `edit`, `update`, and `destroy`. You're required to also tell the controller which formats to respond with like this:

```
class UsersController
  respond_to :html, :xml

  # Your REST methods here...
end
```

The `respond_to` method will accept any format for which you've defined a formatter (defaults are `:html`, `:xml`, and `:json`). Using this mechanism, you can cut about 50% of the code out of most RESTful controllers without sacrificing any of the control you'd have (unlike some of the plugins that do something similar, which make you sacrifice some control over the logic flow). To override any of the default behavior, simply provide a block to the `respond_with` call and add your overriding behavior. For example, let's say you wanted to change the behavior when a user requests HTML:

```
def create
  @user = User.new(params[:user])

  flash[:notice] = "User was successfully created." if @user.save

  respond_with(@user) do |format|
    format.html { redirect_to root_path }
  end
end
```

You can also use this method with nested resources by simply providing the nesting as the argument list to `respond_with` (e.g., `respond_with(@account, @user)`).

4.1.2. Cleaner flash messages

The Rails flash facility is a great way to pass simple objects or messages between requests, but adding an extra line of code just to stick a status message in the session gets annoying and verbose really quick. Rails 3 adds the nice ability to be able to put messages in conventional flash keys (`:alert` and `:notice`) right in `redirect_to` calls:

```
format.html { redirect_to(@user, :notice => 'User was successfully created.') }
```

This line of code will place `"User was successfully created."` in `flash[:notice]`. You can do the same with `:alert`:

```
format.html { render :action => "new", :alert => 'There was a problem creating that post
```

This shortcut doesn't affect the usage of the `flash` hash at all; it just adds some nice syntactic sugar on top.

4.2. Creating improved views

Action View is another component that got a significant internal refactoring, but it also received a bit of public API attention.

4.2.1. Making your views safer

In Rails 3, all output strings in views are automatically escaped; so rather than calling `h()` on a string (e.g., `h("my unsafe string!")`), it is automatically escaped. This change means that if you have a helper or model method that returns HTML markup, it will spit the markup out as escaped HTML entities rather than HTML markup unless you tell Rails to make it a raw string. You can do this in one of three ways. The first is to use the new `raw` method like you would have previously used `h`:

```
raw("This is <strong>safe</strong>!")
```

This will copy the string into the response body without escaping. Strings also have a notion of being HTML safe, so you can mark it as such using the `html_safe!` method:

```
"this is <em>really</em> safe!".html_safe!
```

Rails will then know that string is safe no matter where you pass it. If it's a helper that you need to allow to inject markup, then you can also use the `safe_helper` method:

```
module ApplicationHelper
  def join_and_bold(arr)
    arr.map {|e| "<strong>#{e}</strong>"}.join(" ")
  end
end

class MyController < ActionController::Base
  safe_helper :join_and_bold
end
```

Now any markup returned from the `join_and_bold` method will be marked as raw. If you have code that already uses the `h` method, don't worry: it gives the same result so it won't break anything.

4.2.2. Better JavaScript with Rails 3

As mentioned previously, the JavaScript helpers in Rails 3 have been totally rebuilt to facilitate a framework-agnostic approach. This change makes it dead easy to switch out your JavaScript

frameworks without impacting your existing helper-driven code. Unfortunately, though, this rewrite means that existing code that uses the JavaScript helpers is out of luck.

> **PROTIP:** You're not *totally* out of luck. The Rails team have extracted the previous Prototype helpers into their own plugin available at http://github.com/rails/prototype_legacy_helper

The new API for the pieces that still exist in their previous forms has changed. For example, this Rails 2.x code:

```
<%= remote_form_for @user do |f| %>
  <!-- form here -->
<% end %>
```

Now looks like this in Rails 3:

```
<%= form_for(@user, :remote => true) do |f| %>
  <!-- form here -->
<% end %>
```

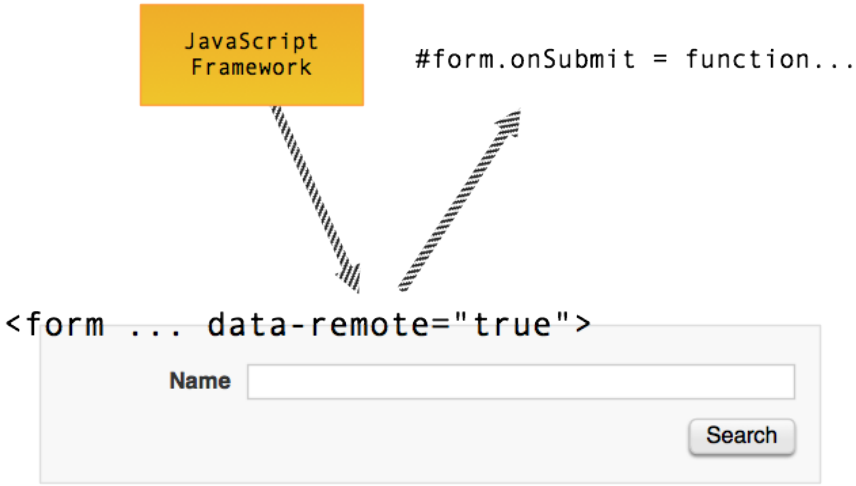
Essentially, AJAX forms use the same API as non-AJAX forms except for the extra `:remote => true` parameter.

Not only is the API different, but its operation is, too. Previously, a helper like `remote_form_for` would have emitted a `<form>` tag with some JavaScript attached to it. This technique was not only bad practice by modern standards, it also tied it to one JavaScript framework unless you wanted to write a plugin to support another one, like jRails did with jQuery. This process was annoying and, again, wasn't good practice.

So now these helpers emit HTML 5 markup with special data attributes which the framework drivers detect. For example, a simple `form_for` with `:remote => true` now emits this:

```
<form action="/things" class="new_thing" data-remote="true" id="new_thing" method="post
```

The `data-remote` attribute tells the JavaScript driver that this form is an AJAX form, so it needs to attach extra behavior to it. You can also give this option to `button_to` and the button will submit via AJAX.



If you have calls to `link_to_function` or the other helpers, you'd be better served by turning those into proper JavaScript-powered links, writing custom JavaScript to power links sort of like the new Rails helpers do, or downloading the aforementioned plugin to carry you over.

4.3. Building better routes

As you saw in Section 3.2.1, the Rails router DSL has changed significantly, and as part of the refactoring, the Rails core team has also added a number of new features. One of the best new router features in Rails 3 is optional segments; this means that you now have control over what route segments are not required to match the route (whereas before they were hardcoded names like `id`). So, for example, let's say you had an auction site with items that are categorized in categories and subcategories. You might have routes like this in Rails 2.x:

```
map.connect ':category/items', :controller => 'items', :action => 'index'
map.connect ':category/items/:subcategory', :controller => 'items', :action => 'index'
```

In Rails 3, though, you can combine those into one route:

```
match ':category/items(/:subcategory)', :to => 'items#index'
```

The two sets of routes are functionally equivalent; if `:subcategory` is left out, the `params` hash will simply not have the value. Another example of using these optional segments is the new default route in Rails 3. The default route(s) goes from:

```
map.connect ':controller/:action/:id.:format'
map.connect ':controller/:action/:id'
```

…to the elegant and concise form that Rails 3 has:

```
match '/:controller(/:action(/:id))'
```

In this route, the `action` and `id` segments are optional; if they are not given, a default value is supplied (e.g., in the case of `action` it becomes `index`) or is `nil` (in the case of `id`).

4.3.1. Routing to Rack applications

The new router is yet another example of Rails' commitment to Rack. My favorite new feature of the router is the ability to map routes to Rack endpoints other than your main application. So,

for example, if you had an extra little Sinatra[14] application to handle simple API calls, you would previously have had to run the app in a separate process. This setup is nice for scalability, but it makes maintenance a pain and requires more infrastructure than necessary in most cases.

In Rails 3, though, you can route directly to these extra Rack applications through the router. Let's say you have a Rack application class named `ApiApplication`. If you wanted to route any requests to `api/*` to that application, you would write a route like the following:

```
YourApp::Application.routes do
  match "/api/:action", :to => ApiApplication
end
```

You could then have a Sinatra or bare Rack app that would respond to that route. This is an extremely powerful tool for building service-based applications that are easily scalable. Building it in this manner, you could easily bust the pieces of the application out onto other servers, making your application massively scalable.

4.4. Improving your model logic

Models also got a nice boost in features from their refactoring; the addition of Active Relation's power opens up a wide world of possibilities.

14.http://sinatrarb.com

4.4.1. Better query composition

A common problem for developers who build apps that use a database is programmatically composing SQL queries intelligently. It's easy to naively slap some SQL together, but as your schema and domain get more complex, this sort of solutions fall down. Active Record's old API made it fairly easy to compose queries, but if you needed to apply a lot of complex logic to them, it got sticky fast.

Fortunately the new API alleviates a lot of these problems. For example, let's say you were working on a tumblog and had this `Post` model:

```
# Columns in posts:
#   id:           integer
#   user_id:      integer
#   content:      string
#   title:        string
#   body:         text
#   published_at: datetime
#   created_at:   datetime
#   updated_at:   datetime
class Post < ActiveRecord::Base
  belongs_to :user
end
```

Let's say you needed a filtering mechanism that allowed you to filter this tumblog's posts based on the content of the post (e.g., quote, picture, text, etc.), who wrote it, and whether it has any comments. First, you'd create a form that would pass something like the following to the controller parameters:

```
{
  :filter => {
    :content => "quote",
    :comments => true,
    :user_id => "1"
  }
}
```

The typical pattern in Rails 2.x would be to assemble a conditions hash based off of this, then pass it back to the model to find what you need. But that made it difficult to refine the query any further if you needed it. The addition of named scopes in 2.3 made this considerably easier, and since Active Relation works off the same ideas, it's even easier to add this sort of logic all the way around.

So let's add a `filtered_relation` method to our model:

```
class Post < ActiveRecord::Base
  belongs_to :user

  def filtered_relation(params)
    relation = scoped
  end
end
```

So far, all our method does is return an empty `Relation` to us, which will find any record in the table. Let's go ahead and get our test suite going:

PROTIP: I'm going to use a factory method here, but you should probably use your favorite fixture replacement instead if it works with Rails 3.

```
class PostTest < ActiveSupport::TestCase
  setup do
    create_posts
  end

  test "given a blank filter, returns all records" do
    assert_equal Post.all, Post.filtered_relation({}).all
  end

  def teardown
    Post.delete_all
  end

  def create_posts
    valid_attributes = {
                         :body => "Hello.",
                         :title => "Hi!",
                         :content => "text",
                         :user_id => 1,
                         :published_at => Time.now
                        }

    @base = Post.create(valid_attributes)
```

```
    @quote = Post.create(valid_attributes.merge(:content => "quote"))
    @number2 = Post.create(valid_attributes.merge(:user_id => 2))
    @old = Post.create(valid_attribtues.merge(:published_at => 1.year.ago))
  end
end
```

So create a basic unit test suite, add a factory method, and then test that if we give it a blank filter, it doesn't filter at all (i.e., we get all the records). The factory method I've made here just creates a few records and sticks them in instance variables. This setup isn't ideal, but I don't want to burden it with extra libraries and such. The test we've written will, of course, pass since we aren't doing any filtering at all yet.

OK, so let's write our first bit of filtering here. First, let's add a test:

```
test "given a content filter, only gives us the filtered records" do
  assert_equal @quote, Post.filtered_relation(:content => "quote").first
end
```

Run `rake` and the test should fail. Next, let's edit our `filtered_relation` method to accommodate filter methods; I'm taking a dynamic approach here:

```
def self.filtered_relation(params)
  relation = scoped

  params.each do |facet, value|
    relation = send("filter_by_#{facet}", value, relation)
  end
```

```
  relation
end
```

Now the method takes the parameters `Hash`, walks over each entry, and calls `filter_by_[the key]`. So, if we pass it `{{:content => "quote"}}`, it will call `filter_by_content` and pass the value (`"quote"`) and the current relation. Now we need to implement it:

```
def self.filter_by_content(value, relation)
  relation.where(:content => value)
end
```

So we take the `Relation` we're given and call `where`, adding a condition that `content` needs to be the passed `value`. Now let's write tests for the other filters:

```
test "given a date filter, only gives us the filtered records" do
  assert_equal @old, Post.filtered_relation(:published_at => true).first
end

test "given a comments count filter, only gives us the filtered records" do
  assert_equal @base, Post.filtered_relation(:comments => true).first
end
```

These are very similar to the previous test we wrote: given a filter set, give me the correct records. Now we need to implement those; we'll start with the date filter:

```
def self.filter_by_published_at(value, relation)
  value ? relation.where("published_at < ?", 1.month.ago) : relation
end
```

So if we're given a `value` of `true`, then filter the records based on whether or not the post is from more than a month ago; if it's `false` or `nil`, then just give back the relation we received. If you `rake`, that code's test should pass, and you should still have on failing test case. Let's implement the comments filter:

```
def self.filter_by_comments(value, relation)
  if value
    relation.preload(:comments).\
          select("posts.*, COUNT(comments.id) AS comment_count").\
          from("posts, comments").having("comment_count > 0")
  else
    relation
  end
end
```

Let's break down this code a little. First, we check the value and return the relation untouched if it's `false`. If `value` is `true`, then we tell Active Record to preload associated comments when the query is executed. Then we select the specific data we want (basically adding the comment count as an alias) from these tables (we have to add `comments`), asking for only records having these attributes (we use `having` here since we're using an alias, which requires a postselect comparison). If you `rake` now, all your tests should be passing.

This is great, but the real power in this approach is being able to chain even more things onto the returned relation. So, write some tests to make sure that works:

```
test "given a content and comment filter, gives us filtered records" do
  @base.update_attribute(:content, "picture")
  assert_equal @base, Post.filtered_relation(:content => "picture",
                                             :comments => true).first
end

test "given a date and comment filter, gives us filtered records" do
  @base.update_attribute(:published_at, 2.years.ago)
  assert_equal @base, Post.filtered_relation(:published_at => true,
                                             :comments => true).first
end

test "given a date and content filter, gives us filtered records" do
  @base.update_attribute(:published_at, 2.years.ago)
  @base.update_attribute(:content, "picture")
  record = Post.filtered_relation(:published_at => true,
                                  :content => "picture").first
  assert_equal @base, record
end
```

You could also write some tests that check for exclusion of records from the filtered set. So now you have some cool code to handle faceted filtering nicely. You could do things like this now:

```
posts = Post.filtered_relation(:comments => true).where(:user_id => 4)\
          .limit(3).order("id ASC")

posts.each do |post|
  # Do something here...
end
```

This approach is much easier and cleaner than the previous `Hash`-powered mess you would have to deal with. I now fully expect someone reading this to create a really great plugin to make this even nicer and easier (hint hint!).

4.4.2. Cleaning up your validations

Validations also received a nice little lift in Rails 3. The old API is still around, but there is also a variation on the old one:

```
validates :login, :presence => true, :length => {:minimum => 4},
          :uniqueness => true, :format => { :with => /[A-Za-z0-9]+/ }
```

This new form is excellent, since you can compress what would have previously been 4 lines of code into 1, making it dead simple to see all the validations related to a single attribute, all in one place. The valid keys/value types for this form are:

- `:presence => true`
- `:uniqueness => true`
- `:numericality => true`
- `:length => { :minimum => 0, maximum => 2000 }`

- `:format => { :with => /.*/ }`
- `:inclusion => { :in => [1,2,3] }`
- `:exclusion => { :in => [1,2,3] }`
- `:acceptance => true`
- `:confirmation => true`

Even though you can still use the old API, it makes sense to switch to this form since, when scanning your code, you're rarely looking for what sort of validation it is rather than the attribute that's being validated.

Another great new validation feature is the ability to have a custom validation class. It's fairly common for Rails developers to develop their own validation methods that look something like this:

```
def validates_has_proper_category
  validates_each :category_id do |record, attr, value|
    unless record.user.category_ids.include?(value)
      record.errors.add attr, 'has bad category.'
    end
  end
end
```

These methods are really useful, especially if you use this validation in a lot of different classes, but they often add a bit of ugly code. Fortunately, in Rails 3 a lot of that nastiness can go away. Those old methods should still work, but you could make them look like this instead:

```
class ProperCategoryValidator < ActiveModel::EachValidator
  def validate_each(record, attribute, value)
    unless record.user.category_ids.include?(value)
      record.errors.add attribute, 'has bad category.'
    end
  end
end
```

Basically, create a class that inherits from `ActiveModel::EachValidator` and implements a `validate_each` method; inheriting from this class will make it available to all Active Record classes. Not only is the code a bit cleaner, it also makes these validations easily testable without much hassle. Best of all, you can also integrate them into the short-form validations like this:

```
validate :category_id, :proper_category => true
```

Note that the key name is taken from the class name (i.e., `ProperCategoryValidator` becomes `:proper_category`). A similar new feature is the ability to have validator classes that bundle validations into a single object. If you have a lot of classes that need some very complex validation logic, you can create a class like this:

```
class ReallyComplexValidator < ActiveModel::Validator
  def validate(record)
    record.errors[:base] << "This check failed!" unless thing(record)
    record.errors[:base] << "This failed!" unless other(record)
    record.errors[:base] << "FAIL!" unless fail(record)
  end
```

```
private
  def thing(record)
    # Complex validation here...
  end

  def other(record)
    # Complex validation here...
  end

  def fail(record)
    # Complex validation here...
  end
end
```

The API is basically to inherit from `ActiveModel::Validator` and implement a `validate` method that takes a record as its only argument. Then in your model classes, use it like so:

```
class NewsPost < ActiveRecord::Base
  validates_with ReallyComplexValidator
end
```

This pattern is nice for wrapping up a lot of unruly validation code, but a more interesting variation on it will be building class factories based on parameters that build these validation classes. You can find a little more information these and other Active Model validation features in its API documentation.[15]

15.http://api.rails.info/classes/ActiveModel/Validator.html

4.4.3. Caching and relations

One of the smartest uses of the `Relation` objects is to alleviate your caching burden. Normally in a Rails application, you want to cache three things: template rendering, sticky controller logic, and database query results. Rails has facilities for each one, but it's difficult to balance each tier. Often times, people will cache templates but still let their controller logic run; or they will cache database objects and forget to properly cache their views.

But with the new Active Record functionality and `Relation` objects, it's simple to get a lot of speed out of just a little caching logic. The trick is that queries are not run until you call something like `all` or `each` on the `Relation` object. So if you push this logic into the view as much as possible and then cache the view, then you can get twice the caching power from a simple mechanism.

For example, let's say you had a controller action like this:

```
def index
  @posts = Post.where(:published => true).limit(20)
end
```

Currently, `@posts` is a `Relation` and has not executed a database query. If our view looked like this…

```
<% @posts.each do |post| %>
  <%= render :partial => 'post', :object => post %>
<% end %>
```

…then the query would be executed when we call `each`. But, if we wrap that in a `cache` block like so:

```
<% cache do %>
  <% @posts.each do |post| %>
    <%= render :partial => 'post', :object => post %>
  <% end %>
<% end %>
```

The query is never executed, nor do we hit the cache for our model objects when there is a cache hit in the view fragment; since we don't hit the cache twice, this code is actually even better than using a model and view caching setup. Of course, this won't work in *every* situation, but it does offer an excellent little bonus for this common pattern.

4.5. Building better data classes

When working with data classes other than database models (e.g., building objects based on API data for some remote service), building validation and attribute tracking logic can be a pain (especially if you end up doing it over and over again). Rails 3 extracts much of this kind of logic from Active Record into the new Active Model module, which you can include in your own data classes.

So, for example, let's say you had a data class that represented a simple microblog (e.g., Twitter) message; if you needed some validation logic, you could simply include the `ActiveModel::Validations` module:

```
class Message
  include ActiveModel::Validations

  validates_presence_of :body, :user_id

  attr_accessor :body, :user_id, :posted_at
  def initialize(body, user_id)
    @body, @user_id = body, user_id
  end
end

m = Message.new(nil, 13)
m.valid?   # => false
m.body = "Hello there!"
m.valid?   # => true
```

Now when you create these messages to be posted via some API library, you can validate their conformity to the API without a lot of extra hassle. A few API providers have already integrated this into their gems, making it simple to make sure you're posting valid data.

Another excellent feature you can mix in to any object is callbacks, just like `after_create`, `before_save`, and their friends in Active Record.

> **PROTIP:** If you've ever used `alias_method_chain`, let me recommend you take a look at this feature.

To define your own callbacks, you simply extend a class with `ActiveModel::Callbacks` and use `define_model_callbacks` to tell it what method to create a callback for. For example:

```
class Message
  extend ActiveModel::Callbacks

  define_model_callbacks :deliver
end
```

This code will now add a `before_deliver`, `after_deliver`, and `around_deliver` message to allow you to define callbacks for a call to `deliver`. To use them, you must first define your callback method with a block to handle the callback execution:

```
def deliver
  _run_deliver_callbacks do
    puts "DELIVER!"
  end
end
```

The `_run_*_callbacks` block will execute the `before_*` call before the block logic is executed, `after_*` after the exit of the block, and `around_*` callbacks around the logic as yielded. Setting up the syntax in this manner lets you run setup logic or teardown logic before/after the callbacks are executed. So, to define some callbacks on this class, we would do something like this:

```
before_deliver :do_this_before
after_deliver :do_this_after

def do_this_before
  puts "Before..."
end

def do_this_after
  puts "...After"
end
```

This will cause `do_this_before` to (obviously) be executed before the block is run in `deliver` and `do_this_after` to be executed after. If you create an object and call `deliver` on it, the result would look like this:

```
Before...
DELIVER!
...After
```

These callbacks are a fantastic alternative to `alias_method_chain`. Changing to callbacks would probably require a little more code but the performance boost would be worth it.

Active Model also provides facilities for (de)serializing objects, tracking attributes' dirty status, adding robust error tracking, and more. You can read up on them on blogs[16] and, of course, the API documentation.[17]

16.http://yehudakatz.com/2010/01/10/activemodel-make-any-ruby-object-feel-like-activerecord/
17.http://api.rails.info/

4.6. Exploiting Active Support

Active Support has received a serious retooling in Rails 3, improving performance and extracting a few new useful tools. In this section, we're going to take a look at two of those: `class_attribute` and `ActiveSupport::Concern`.

4.6.1. Inheriting attributes (the right way)

Since Rails 2.1, Active Support has provided a little method called `class_inheritable_accessor` for creating attribute accessors which are inheritable by child classes (normally these methods are only existent on the class they are defined).

```
class User
  class_inheritable_accessor :user_name
end

class Admin < User
end

a = Admin.new
a.user_name = "root"
```

It worked well, but it was a bit of a hack. Essentially, it created logic in an `inherited` hook that would rewrite the attribute accessors to the child class. Again, it worked, but it had its own share of issues and quirks that made it quite annoying to work with.

In Rails 3, though, Active Support now provides the `class_attribute` method to do the same thing, except the right way. The API for `class_attribute` is exactly the same as `class_inheritable_accessor` except you call `class_attribute`:

```
class User
  class_attribute :user_name
end
```

You can now the use same API as the previous example. The `class_attribute` method by using class instance variables and defining the method's on the class's singleton class. A problem with the previous implementation was that if you wrote the parent's accessor after inherited classes were defined, it wouldn't be properly propagated to the child classes. The new implementation fixes this problem while simultaneously appeasing the conscience of every thinking Ruby developer.

4.6.2. Cleaning up modules with `ActiveSupport::Concern`

A very common pattern among Ruby developers is to `include` or `extend` a module and then use the Ruby-provided hooks to then `include` or `extend` other modules into the base class. This pattern is commonly used to `include` a module and then `extend` with class methods or vice-versa (i.e., extend with the module and include instance methods). So, for example:

```
module Queueing
  def pop
    # ...
  end
```

```
  def push(obj)
    # ...
  end

  def setup_enumerable
    # ...
  end

  def self.included(base)
    setup_enumerable
    base.extend ClassMethods
  end

  module ClassMethods
    def stock_queue_with(*objs)
      # ...
    end
  end
end
```

So, when you `include` the module into a class, it will run our stub method `setup_enumerable` and extend the class with the `ClassMethods` module, adding the `stock_queue_with` method to the class methods. That's an excellent pattern to DRY up a lot of repeated `include`/`extend` logic, but it creates a lot of extra crufty logic in your modules. `ActiveSupport::Concern` is a solution for this. It does a few things:

- Automatically extends a `ClassMethods` module if it exists
- Automatically includes an `InstanceMethods` module if it exists

- Gives you an `included` method that replaces the `self.included` method

These little hooks will save you a lot of code if you do a lot of extending/including (e.g., writing a plugin). So, our example now becomes:

```
module Queueing
  extend ActiveSupport::Concern

  def pop
    # ...
  end

  def push(obj)
    # ...
  end

  def setup_enumerable
    # ...
  end

  included do
    setup_enumerable
  end

  module ClassMethods
    def stock_queue_with(*objs)
      # ...
    end
```

```
  end
end
```

You could wrap those instance methods into an `InstanceMethods` module so that if you extend or include, the behavior should be handled properly, but generally this practice is looked down upon (just pick a way to append your features and stick with it!).

5. Case Studies

Now that we've looked at the steps involved in upgrading a Rails application to Rails 3 and some ideas for improving your code using the new features, let's take a look at some practical case studies in upgrading. You should have received a Git repository in the .zip file for the book which has each of these applications; each repository has a `rails3` branch that you can follow as we go through these steps (some of them are out of order in the repository, mostly because I committed them out of order on accident).

5.1. Application Case Study: Perwikity

Last year sometime I wrote a small wiki system named Perwikity[18]. It was developed primarily to eventually (hopefully) be used as the official Rails wiki, but the wiki eventually became powered by the awesome DokuWiki rather than a dogfooded solution. Perwikity runs on Rails 2.3 and is backed by the database along with a Git repository for versioning. Grab the application from my Github and follow the install instructions (just a few `rake` tasks).

Next, install the `rails_upgrade` gem and run the `rails:upgrade:check` task to get an inventory of what's in need of upgrading:

```
Old gem bundling (config.gems)
The old way of bundling is gone now.  You need a Gemfile for bundler.
More information: http://omgbloglol.com/post...
```

18. http://github.com/jm/perwikity

```
Old Rails generator API
A plugin in the app is using the old generator API (a new one may be
available at http://github.com/trydionel/rails3-generators).
More information: http://blog.plataformatec.com.br...

Known broken plugins
At least one plugin in your app is broken (according to the wiki).
Most of project maintainers are rapidly working towards compatability,
but do be aware you may encounter issues.
More information: http://wiki.rubyonrails.org...

Old router API
The router API has totally changed.
More information: http://yehudakatz.com...

Deprecated test_help path
You now must require 'rails/test_help' not just 'test_help'.
More information: http://weblog.rubyonrails.org...

New file needed: config/application.rb
You need to add a config/application.rb.
More information: http://omgbloglol.com/post...
```

As you can see, it didn't fail *every* check (no mailers!), but there is significant work to be done. Run `rake rails:upgrade:backup` and regenerate the application (`rails . -d mysql` or whatever database you'd like).

5.1.1. Getting to bootable

Running any task or command related to the app will cause it to spew various errors about missing files and gems to be required, so the first step is to add our gems to the `Gemfile`. I didn't use `config.gem` in the original app because it didn't work well at the time, but since Bundler manages all gem imports in Rails 3, we'll need to make sure they're in the `Gemfile`. We know we'll need `grit`[19] to interface with Git and `RedCloth` to handle the Textile rendering (you can use `bluecloth` or something else; check the app's `README` for more information). We'll also need `will_paginate`, but we'll need the `3.0.pre` version of it for Rails 3 compatibility. So, add them to the `Gemfile`:

```
gem 'grit'
gem 'RedCloth'
gem 'will_paginate', '3.0.pre'
```

Changes in the API Adding those should take away the errors related to gem requirements, but now you'll probably encounter an error like this:

```
/Library/Ruby/Gems/1.8/gems/activerecord-3.0.0.beta/lib/
active_record/base.rb:1300:
in `method_missing': undefined method `evaluate_attribute_method'
for #<Class:0x1037406e0> (NoMethodError)
```

This error comes from inside `acts_like_git` where the attributes to version are configured (`lib/acts_like_git/active_record_ext/base.rb`, around line 33):

19.http://github.com/mojombo/grit

```
self.git_settings.versioned_fields.each do |column|
  git_read_method = "def #{column}(reload = true);
  reload ? read_git_method('#{column}') : read_attribute(:#{column}); end"

  evaluate_attribute_method column, git_read_method

  git_write_method = "def #{column}=(val); write_git_method('#{column}', val); end"
  evaluate_attribute_method column, git_write_method
end
```

To get it working properly under Rails 3, we can replace the `evaluate_attribute_method` call with a simple `class_eval` like this:

```
self.git_settings.versioned_fields.each do |column|
  class_eval("def #{column}(reload = true); reload ?
    read_git_method('#{column}') : read_attribute(:#{column}); end")

  class_eval("def #{column}=(val); write_git_method('#{column}', val); end")
end
```

This fix should remove any barriers to starting things like `rails console` or at least running `rake`. If you `rake`, you'll be confronted with an error related to the testing class syntax. This is because we're not requiring `context`, the test framework I used. First, you'll need to install the gem from my Github (the `context` gem on Gemcutter *isn't* the same) and then add it to the `Gemfile` in the `:test` group. Then you'll need to copy the old `test_helper.rb.rails2` code into the new `test_helper.rb` (or simply copy/move the file over). Another `rake` run will show another error related to `acts_like_git`:

```
NoMethodError: undefined method `callback' for #<Page:0x10371cfd8>
```

Previously, one could use the `callback` method to fire off the logic attached to a callback like `after_create`, but in Rails 3, this ability has been removed with the refactor of the callback code into Active Model. `acts_like_git` creates a callback for `after_commit`, but since we don't use it in this app, we can remove the calls to it. So, all lines like this in `lib/acts_like_git/active_record_ext/callbacks.rb`:

```
callback(:after_commit) if value
```

…can now become simple method calls like this:

```
after_commit if value
```

That should take care of upgrading `acts_like_git` to work with Rails 3.

Routes and the rest Now, `rake` again and you'll likely see something like this:

```
ActionController::RoutingError: No route matches {:controller=>"users",
:user=>{:password_confirmation=>"quire69", :password=>nil,
:email=>"quire@example.com", :login=>"quire"}, :action=>"create"}
```

This, obviously, means we haven't converted our routes yet. So, let's convert them now, from this:

```
ActionController::Routing::Routes.draw do |map|
  map.resources :pages, :member => {:revert => :post, :revisions => :get}

  map.logout '/logout', :controller => 'sessions', :action => 'destroy'
  map.login '/login', :controller => 'sessions', :action => 'new'
  map.register '/register', :controller => 'users', :action => 'create'
  map.signup '/signup', :controller => 'users', :action => 'new'
  map.resources :users

  map.resource :session
  map.root :controller => "pages", :action => 'show', :id => "home"
end
```

…to this:

```
Perwikity::Application.routes.draw do
  resources :pages do
    member do
      post :revert
      get :revisions
    end
  end

  match '/logout' => 'sessions#destroy', :as => :logout
  match '/login' => 'sessions#new', :as => :login
  match '/register' => 'users#create', :as => :register
  match '/signup' => 'users#new', :as => :signup
```

```
  resources :users
  resource :session

  root :to => 'pages#show'
end
```

Next, if you `rake` you'll get some errors about various methods missing. These errors stem from the fact that we haven't yet moved the code from our old `ApplicationHelper` and `ApplicationController` into the new files. Once you do that, those errors should disappear. If you run `rake` again, all the tests should be green.

> *PROTIP:* If you get strange failures with versioning, remove the test Git repository and add `Page.all.each(&:destroy)` to an `after(:all)` in `PagesControllerTest`. That error just means somehow the database and the Git repository got out of sync.

Next, delete `public/index.html` and boot the application with `rails server`.

5.1.2. A few dangling issues

Once the application boots, go ahead and click around, create some pages, edit a page, and so on. As you do, you'll notice there are still a few minor lingering issues that, while not affecting the general operation of the application, are still annoying nonetheless:

- If you click around the application, you'll notice in a lot of places it's just spitting out the HTML from helpers rather than rendering it. This ugliness is due to Rails' new XSS protection/escaping; to fix it, wrap the helper calls in `raw()`. This tweak should fix any of those issues.
- Next, you'll probably notice that the links that use the `:method` argument (specifically the "revert to this" links) will not function. Make sure you've installed the latest Prototype driver for UJS[20] and these problems should go away.

Now, if you run the `rails:upgrade:check` task again, you'll notice the only issues pertain to the `restful_authentication` plugin . Since we only used the plugin to generate the code the first time, and the *generated* code works fine, we don't care that the plugin doesn't work. The upgrade is complete! Now it's time to go back and fix all those nasty deprecation messages in the tests…

5.1.3. Lessons learned

I think we can draw a few general lessons from working on this application:

- **Plugins and gems can break things in unusual ways** A lot of plugins do weird things with Rails internals. Fortunately, `acts_like_git` is pretty straightforward, but others, like `has_many_polymorphs`, make things more complicated. Be on the lookout for weird issues that bubble up from these libraries.
- **Manually checking over views is vital** Issues in the views, such as the non-functioning `link_to ... :method`, would have never come up in tests (unless we're using Selenium) and probably would not have thrown any sort of error on boot. Nothing can replace manual testing, especially in situations like this.

20.http://github.com/rails/prototype-ujs

- **Tests are a God-send** Even though tests wouldn't catch some issues in the views, they are *essential* in verifying behavior in other parts of the code. If you're attempting this upgrade on a codebase without tests, may God have mercy on your soul.

5.2. Application Case Study: Jamis Buck's Bucketwise

Jamis Buck, Rails core alumni and developer at 37signals, wrote a neat little finance management application named Bucketwise[21]. It's very similar to the "envelope system" espoused by some financial experts: essentially, you divide and budget your income into "buckets" and place expenses and such into those buckets to track how you're spending your money. Very useful if you're looking to keep yourself on a tight budget! To get going, grab the app from Jamis' Github and follow its installation instructions.

After that, install `rails_upgrade` and run `rake rails:upgrade:check`. Now take a look at the report:

```
New file needed: config/application.rb
You need to add a config/application.rb.
More information: http://omgbloglol.com/post...

Deprecated constant(s)
Constants like RAILS_ENV, RAILS_ROOT, and RAILS_DEFAULT_LOGGER
are now deprecated.
More information: http://litanyagainstfear.com/blog...

Soon-to-be-deprecated ActiveRecord calls
```

21.http://github.com/jamis/bucketwise

```
Methods such as find(:all), find(:first), finds with conditions,
and the :joins option will soon be deprecated.
More information: http://m.onkey.org...

named_scope is now just scope
The named_scope method has been renamed to just scope.
More information: http://github.com/rails/rails...

Old router API
The router API has totally changed.
More information: http://yehudakatz.com...

Deprecated test_help path
You now must require 'rails/test_help' not just 'test_help'.
More information: http://weblog.rubyonrails.org...
```

Next, run `rake rails:upgrade:backup` and regenerate the application with Rails 3 in the current path using `rails .`.

5.2.1. Broken to bootable

If you `rake`, you'll find that just about every test is broken at this point (this is what we want, of course). The easiest way to get some tests passing is to convert the routes file using `rake rails:upgrade:routes`. You'll start with a `routes.rb` like this:

```
ActionController::Routing::Routes.draw do |map|
  map.resource :session
```

```
  map.resources :subscriptions, :has_many => [:accounts, :events, :tags]
  map.resources :events, :has_many => :tagged_items, :member => { :update => :post }
  map.resources :buckets, :has_many => :events
  map.resources :accounts, :has_many => [:buckets, :events, :statements]
  map.resources :tags, :has_many => :events
  map.resources :tagged_items, :statements

  map.with_options :controller => "subscriptions", :action => "index" do |home|
    home.root
    home.connect ""
  end
end
```

The task for converting the routes isn't perfect (e.g., at the time of writing, it doesn't support the `:has_many` option yet and has trouble with how Jamis wrote the root route), but after some tweaking you should end up with a routes file that looks like this:

```
Bucketwise::Application.routes.draw do
  resource :session

  resources :subscriptions do
    resources :accounts, :events, :tags
  end

  resources :events do
    member do
      post :update
```

```
    end
  end

  resources :buckets do
    resources :events
  end

  resources :accounts do
    resources :buckets, :events, :statements
  end

  resources :tags do
    resources :events
  end

  resources :tagged_items
  resources :statements

  root :to => "subscriptions#index"
end
```

If you have any trouble understanding this new routes file, refer to Section 3.2.1 for more information on the new router syntax.

Copying from old to new Next, you'll want to move the configuration information over from `environment.rb.rails2` to `application.rb`; you should end up with a `Bucketwise::Application` class in `application.rb` that looks like this:

```
module Bucketwise
  class Application < Rails::Application
    config.action_controller.session = YAML.load_file("#{RAILS_ROOT}/config/session.yml"
    config.load_paths += %W( #{RAILS_ROOT}/app/concerns )

    # Configure sensitive parameters which will be filtered from the log file.
    config.filter_parameters << :password
  end
end
```

You'll also want to create your `Gemfile` at this point; the only gem you'll need to add should be `haml`.

If you `rake` again, you'll hit some errors related to a missing method named `login_default_user`. To fix this error, you'll need to copy the code from the old `test_helper.rb` to the new file. Running `rake` again will produce an error like this:

```
NameError: undefined local variable or method `user' for #<TagsController:0x1059de800>
```

This error stems from code missing from `ApplicationController`; to fix it, copy the old `ApplicationController` and `ApplicationHelper` over to the new one. The next blob of errors you'll hit look like this:

```
ActionView::Template::Error: undefined method `filename' for app/views/tags/show.html.har
```

This error is caused by `haml` and its support for Rails 3; to fix this you'll need to require `'haml/template'` in `application.rb`. This should pull in the right code to make `haml` behave properly.

Running `rake` again will produce even more errors in your functional tests that look like this:

```
ActionView::Template::Error: undefined method `link_to_function' for #<Class>
```

The Rails Core team removed the `link_to_function`, `button_to_function`, etc., methods from Rails core. This removal, while a minor inconvenience, is part of the whole JavaScript agnosticism movement, which is a generally positive thing. To get those methods back, you need to install the `prototype_legacy_helper` plugin:

```
rails plugin install git://github.com/rails/prototype_legacy_helper
```

After installing that plugin, those errors should go away.

Rails issues The next error you'll likely hit in your tests is related to an undefined method `deposits` on `NamedScope`. If you look at the offending code, you'll see it's simply calling the `deposits` method on a collection of uncleared transactions:

```
- if uncleared.deposits.any?
  %fieldset#deposits
    %legend Deposits
```

The relationship there is that an `Account` instance `has_many` `AccountItem` instances. This association is extended by the `CategorizedItems` module, which defines a `deposits` method. The rub is that `AccountItem` also defines a `scope` named `uncleared`, which is what is being called here, and since it's a `scope`, it isn't extended by the same logic as the association. The problem is fixable by extending the `scope` with the same logic as the association:

```
scope :uncleared, lambda { |*args| AccountItem.options_for_uncleared(*args) } do
  def deposits
    @deposits ||= to_a.select { |item| item.amount > 0 }
  end

  def checks
    @checks ||= to_a.select { |item| item.amount < 0 && item.event.check_number.present?
  end

  def expenses
    @expenses ||= to_a.select { |item| item.amount < 0 && item.event.check_number.blank?
  end
end
```

Running `rake` again should present you with an error related to routes:

```
ActionView::Template::Error: undefined method `event_update_path' for #<Class>
```

We define a member route on `events` for the `update` action. I'm not entirely sure why Jamis has this route here (perhaps something in Rails 2.3 was causing strange behavior without it),

but we don't need it now. You can safely remove this route and change the single reference to it to be simply `event_path`.

A subtle shift The last error you'll encounter is rather cryptic. It will look something like this:

```
RuntimeError: Called id for nil, which would mistakenly be 4 --
  if you really wanted the id of nil, use object_id
    app/models/account.rb:110:in `set_starting_balance'
```

If you go look at the referenced code and the surrounding bits, you'll see it's a series of callbacks (the following is grabbed from a few points in the file):

```
after_create :create_default_buckets, :set_starting_balance

def create_default_buckets
  buckets.create({:name => DEFAULT_BUCKET_NAME, :role => "default"}, :author => author)
end

def set_starting_balance
  if starting_balance && !starting_balance[:amount].to_i.zero?
    amount = starting_balance[:amount].to_i
    role = amount > 0 ? "deposit" : "payment_source"
    subscription.events.create({:occurred_on => starting_balance[:occurred_on],
        :actor_name => "Starting balance",
        :line_items => [{:account_id => id, :bucket_id => buckets.default.id,   # line
          :amount => amount, :role => role}]
      }, :user => author)
    reload # make sure the balance is set correctly
```

```
  end
end
```

The issue is that the callbacks are out of order. On Line 110, it's grabbing `bucket.default.id`, which at this point doesn't exist, since it's created in the other callback. The callbacks are *specified* in order, but it seems they are executed in reverse order. So to fix it you simply need to reverse the order in which they are specified.

> *PROTIP:* You could also collapse these into a single callback; since the default bucket creation is a single line of code, it wouldn't be the worst thing to put them together.

That should take care of all the errors and such you'll encounter in the tests.

5.2.2. Finishing up

There are a couple of loose ends to tie up before we call this upgrade finished.

- Again you'll notice a number of places in need of a call to `html_safe` or `raw`, specifically calls to various helpers. Adding those in will make things look more sane.
- Currently, there are significant problems in the JavaScript code for this application, rendering it almost useless. I'm currently working to get these problems resolved (I

believe they are related to the Prototype version upgrade), but if you manage to fix them before I get a chance, please do ping me via Twitter at @jm or via Github.[22]
- If you run the `rake rails:upgrade:check` again you'll notice a few minor things you will need to fix, especially the use of the old style constants like `RAILS_ROOT`.

5.2.3. Things to remember

There a few things that this app teaches us about upgrading a Rails application:

- **Some deprecations can be "undone" if needed** Even though Rails Core removed the `link_to_function` method, we were able to bring it back using a plugin; this strategy makes sense since we're not going to use anything but Prototype in this application (they've also done this with `verify` and some of the dynamic form helpers in Rails 3). I would imagine that a number of deprecated features will live on in plugins (much like `acts_as_list`, `paginate`, and friends have already with Rails 2.x), so if you use one of these feature pervasively, you probably don't need to worry about it too terribly much.
- **Rails 3 still has bugs** In this upgrade, we sniffed out a few issues in the Rails 3 beta. These bugs are inevitable, being a beta and all, but it is something to keep in mind. If you encounter any odd behavior that you are pretty sure is a bug, please do help the Rails Core team out and file a bug at the Rails Lighthouse.[23]
- **Behavior has changed in subtle ways** A few errors we stumbled upon, such as the order of callbacks and the behavior of `scopes` and associations, are subtle changes in behavior. These changes are to be expected, but if undocumented, they can cause

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22.http://github.com/jm
23.http://rails.lighthouseapp.com/

you a lot of hassle (as they did here). Fortunately, we were covered by tests, but if we didn’t have such a good suite of tests, we might have been in a world of pain.

6. Checksheet: The Upgrade Process

This checklist should give you a general guide to upgrade to Rails 3.

6.1. First Steps

- ❏ Install `rails_upgrade` plugin from `http://github.com/rails/rails_upgrade`
- ❏ Run `rake rails:upgrade:check` and note the results
- ❏ Run `rake rails:upgrade:backup`
- ❏ Regenerate the application (i.e., `rails ./`)

6.2. Reconfiguration

- ❏ Move `Initializer` code from `environment.rb` to `application.rb`
- ❏ Convert routes to new API
- ❏ Create `Gemfile`
- ❏ Move `config.gem` calls to `Gemfile` syntax

6.3. Fix code

- ❏ Remove old constants
- ❏ Convert mailers to new API

- ❏ Move to new Active Record API
- ❏ Check for invalid and deprecated code in views

6.4. Booting

- ❏ Run tests, fix deprecation and other errors
- ❏ Boot with `rails server`
- ❏ Monkey click and verify things are *actually* working.

7. Checksheet: Deprecations

This check list contains nearly every deprecation in Rails 3. Many of them probably won't apply to you, but most of them will probably bite you in one place or another.

7.1. General/configuration

	Deprecation	How to fix it
❑	`RAILS_ENV` is deprecated.	Change it to `Rails.env`.
❑	`RAILS_ROOT` is deprecated.	Change it to `Rails.root`.
❑	`RAILS_DEFAULT_LOGGER` is deprecated.	Change it to `Rails.logger`.
❑	Calling `filter_parameter_logging` is no longer supported.	Set/append to `config.filter_parameters` instead.
❑	`AC::Dispatcher.before_dispatch` is deprecated.	Please use `ActionDispatch::Callbacks.before` instead.
❑	`AC::Dispatcher.to_prepare` is deprecated.	Please use `config.to_prepare` instead.
❑	Creating new `AC::Dispatcher` objects is deprecated.	Create/interact with the `Rails::Application` object instead.

Deprecation	How to fix it
❑ `config.frameworks` is deprecated.	Look in `boot.rb` for information on limiting the frameworks that are loaded.
❑ `config.gem` is deprecated.	Use a `Gemfile` with `bundler`.
❑ `config.action_controller.consider_all_requests_local` is deprecated.	Use `Rails.application.config.consider_all_requests_local`.
❑ `config.action_controller.allow_concurrency` is deprecated.	Use `Rails.application.config.allow_concurrency` instead.
❑ `benchmark(:level)` has been deprecated.	Use `benchmark("message", :level => level)` instead.
❑ `config.view_path` / `config.view_path=` are deprecated.	Use `paths.app.views` / `paths.app.views=` instead.
❑ `config.routes_configuration_file` / `config.routes_configuration_file=` are deprecated.	Use `paths.config.routes` / `paths.config.routes=`.
❑ `config.routes_configuration_file` / `config.routes_configuration_file=` are deprecated.	Use `paths.config.routes` / `paths.config.routes=` instead.
❑ `config.database_configuration_file` / `config.database_configuration_file=` have been deprecated.	Do `paths.config.database`/`paths.config.database=` instead.

	Deprecation	How to fix it
❑	`config.controller_paths` / `config.controller_paths=` are deprecated.	Use `paths.app.controllers` / `paths.app.controllers=`.
❑	`config.log_path` / `config.log_path=` are deprecated.	Do `paths.log` / `paths.log=` instead.
❑	The `gem` method in application templates deprecated the `:env` key.	Change it to `:only`
❑	The `freeze!` method in application templates is deprecated.	It's no longer needed.
❑	`Object#metaclass` is deprecated.	Use `Object#singleton_class`.
❑	`rails:freeze:gems` is deprecated.	Use Bundler and `bundle install`.
❑	`rails:freeze:edge` is deprecated.	Use Bundler's Git support and `bundle install`.
❑	`rails:unfreeze` is deprecated.	Use Bundler.
❑	`Date#last_year` is deprecated.	Use `Date#prev_year`.
❑	`Date#last_month` is deprecated.	Use `Date#prev_month`.

7.2. Plugins

	Deprecation	How to fix it
❑	Putting Rake tasks in `[path]/tasks` or `[path]/rails/tasks` is no longer supported.	Place them in `[path]/lib/tasks`.
❑	The use of `rails/init.rb` is deprecated.	Put the logic in a top level/plugin root `init.rb`.

7.3. Controllers/dispatch

	Deprecation	How to fix it
❑	Disabling sessions for a single controller has been deprecated.	Sessions are lazy loaded, so don't worry about them if you don't use them.
❑	Setting `AC::Base.session_store` directly is deprecated.	Use `config.action_controller.session_store`.
❑	Setting `AC::Base.session_options` directly is deprecated.	Use `config.action_controller.session_options`.
❑	Setting `AC::Base.relative_url_root` is no longer effective.	Use a Rack middleware for the same effect.
❑	`session.update` is no longer effective.	Use `session.replace` instead.
❑	`session.delete` is deprecated.	Use `session.clear` instead.

Deprecation	How to fix it
❑ `SessionHash#session_id` is deprecated.	Use `request.session_options[:id]` instead.
❑ `SessionHash#data` is deprecated.	Use `SessionHash#to_hash` instead.
❑ Overriding `default_url_options` is deprecated.	Use `self.url_options=` instead (usually in a `before_filter`).
❑ `Request#path` is deprecated.	Use `Request#path` instead.
❑ `Request#request_uri` is deprecated.	Use `Request#request_uri` instead.
❑ `AC::Base.use_accept_header` is deprecated.	(No fix; the accept header is always taken into account now)
❑ `AC::Base.resource_action_separator` is deprecated.	(No fix; only works with legacy router API)
❑ `AC::Base.ip_spoofing_check` is deprecated.	Configure it on your application with `Rails.application.config.action_dispatch.ip_spoofing_check=`
❑ `AC::Base.trusted_proxies=` is deprecated.	Configure it on your application with `Rails.application.config.action_dispatch.trusted_proxies`
❑ `AC::Base.cookie_verifier_secret=` is deprecated.	Configure it on your application with `Rails.application.config.secret_token=`

Deprecation	How to fix it
❑ `AC::Base.perform_caching=` is deprecated.	Configure it on your application with `Rails.application.config.perform_caching=`
❑ `AC::Base.page_cache_directory=` is deprecated.	Configure it on your application with `Rails.application.config.page_cache_directory=`
❑ `AC::Base.asset_path=` is deprecated.	Configure it on your application with `Rails.application.config.asset_path=`
❑ `AC::Base.helpers_path=` is deprecated.	Configure it on your application with `Rails.application.config.helpers_path=`
❑ `verify` and its related functionality has been removed.	Install the verify plugin (`http://github.com/rails/verify`)
❑ The `:name_prefix` option in the router DSL has been deprecated.	Use `:as` instead.
❑ The Rails 2.x router DSL has been deprecated.	(No fix; it will be totally removed in 3.1)

7.4. Models

	Deprecation	How to fix it
❑	Providing hash arguments to finder methods such as `find`, `first`, and `all` is deprecated.	Use `where` or other appropriate Active Record method.
❑	Providing hash arguments to calculation methods such as `count`, `sum`, `average`, `calculate`, `maximum`, and `minimum` has been deprecated.	Chain these methods with `where` and other appropriate Active Record methods.
❑	Providing hash arguments to `update_all` or `delete_all` is deprecated.	Use the appropriate Active Record methods to compose the query instead.
❑	`named_scope` is deprecated.	Change to `scope`.
❑	`Model.human_name` is deprecated.	Use `Model.model_name.human`.
❑	Adding callback methods named `after_save`, `after_create`, etc. is deprecated.	Create a method then call `after_save :method_name` (or whatever callback).
❑	`errors.on_base` is deprecated.	Use `errors[:base]`.
❑	`errors.add_to_base` is deprecated.	Use `errors[:base] << error` instead.
❑	`errors.invalid?(attr)` has been deprecated.	Use `errors[attr].any?`.

Deprecation	How to fix it
❑ `errors.each_full` is deprecated.	Use `errors.to_a.each` instead.
❑ Providing a block to `composed_of` is deprecated.	Provide a `:converter` argument with a lambda/`Proc`.
❑ `colorize_logging` has been moved.	Change the calls to `Rails::Subscriber.colorize_logging`.
❑ `save(false)` has been removed.	Use `save(:validate => false)` instead.
❑ `with_exclusive_scope` does not work with Active Relation.	Remove the exclusive scope by calling `unscoped` on the object.

7.5. Views

Deprecation	How to fix it
❑ `link_to_function` and `button_to_function` are gone.	Use standard JavaScript and HTML to build these links and buttons.
❑ `remote_form_for` and `link_to_remote` are deprecated.	Use standard `form_for` and `link_to` with the `:remote => true` option.
❑ `error_message_on` takes an option hash instead of separate arguments.	Pass an options hash with `:prepend_text`, `:append_text`, and `:css_class` keys.

Deprecation	How to fix it
❑ `number_with_delimiter` takes an options hash instead of arguments.	Pass a hash with `:delimiter` and `:precision` keys.
❑ `number_with_precision` takes an options hash rather than an argument.	Pass an options hash with a `:precision` key.
❑ `number_to_human_size` takes an options hash rather than an argument.	Pass an options hash with a `:precision` key.
❑ `truncate` takes an options hash instead of arguments.	Pass a hash with `:length` and `:omission` keys.
❑ `:popup` is deprecated on `link_to`.	(No fix)
❑ `form_for(:model)` is deprecated.	Use `form_for(@obj, :object_name => :model)`.
❑ Helpers that add output can not use `concat` with `<% / %>`.	Return a string and it will be appended to the output.

7.6. Testing

Deprecation	How to fix it
❑ `model_instance.assert_valid` is deprecated.	Use `assert model_instance.valid?` instead.
❑ `response.template` is deprecated.	Use `controller.template`.

Deprecation	How to fix it
❑ `response.session` has been deprecated.	Use `request.session` instead.
❑ `response.assigns` is deprecated.	Use `controller.assigns` instead.
❑ `response.layout` is deprecated.	Use `controller.template.layout`.
❑ `response.redirected_to` has been deprecated.	Use `response.redirect_url` instead.
❑ `response.redirect_url_match?` is deprecated.	Use `assert_match` and `response.redirect_url` instead.
❑ `response.rendered` has been deprecated.	Use `template.rendered` instead.
❑ `response.flash` is deprecated.	Use `request.flash`.
❑ `response.has_flash?` has been deprecated.	Use `request.flash.any?` instead.
❑ `response.has_flash_with_contents?` is deprecated.	Use `request.flash.any?`.
❑ `response.has_flash_object?` has been deprecated.	Use `request.flash[name]`.
❑ `response.has_session_object?` has been deprecated.	Use `request.session[name]` instead.

Deprecation	How to fix it
❑ `response.template_objects` is deprecated.	Use `template.assigns`.
❑ `response.has_template_object?` is deprecated.	Use `tempate.assigns[name].nil?`.
❑ `response.binary_content` is deprecated.	Use `response.body` instead.
❑ `test/mocks` won't be added to load paths automatically.	Add it yourself.

7.7. Mailers

Deprecation	How to fix it
❑ `recipients` is deprecated.	Provide a `:to` option to the new `mail` method.
❑ `from` is deprecated.	Provide a `:from` option to the new `mail` method.
❑ `subject` is deprecated.	Provide a `:subject` option to the new `mail` method.
❑ `body` is deprecated.	Use instance variable (like a controller)
❑ Setting `:body` variables has been deprecated.	Use normal instance variables (like a controller)

Deprecation	How to fix it
❑ `attachment` is deprecated.	Place attachments' data keyed to their filename in the `attachments Hash`.
❑ `default_charset` is deprecated.	Change it to `default :charset => value`.
❑ `default_content_type` is deprecated.	Change it to `default :content_type => value`.
❑ `default_mime_version` is deprecated.	Change it to `default :mime_version => value`.
❑ `default_implicit_parts_order` is deprecated.	Change it to `default :implicit_parts_order => value`.
❑ Calling `deliver` on the class instance	Call `deliver` on the mail object instance.
❑ Setting `template_root=`	Use `prepend_view_path` instead.
❑ Delivering mail with `deliver_*`	Use the `deliver` on the mailer instance instead.
❑ Creating a mail message with `create_*`	Call the mailer method and call `to_s` on the returned mail object
❑ `render_message` on `Message` is deprecated.	Use `render` instead.
❑ `set_content_type` on `Message` is deprecated.	Use `content_type` instead.

Deprecation	How to fix it
❑ `transfer_encoding` on `Message` is deprecated.	Use `content_transfer_encoding` instead.
❑ Setting `transfer_encoding=` on `Message` is deprecated.	Set `content_transfer_encoding=` instead.
❑ `original_filename` on `Message` is deprecated.	Use `filename` instead.