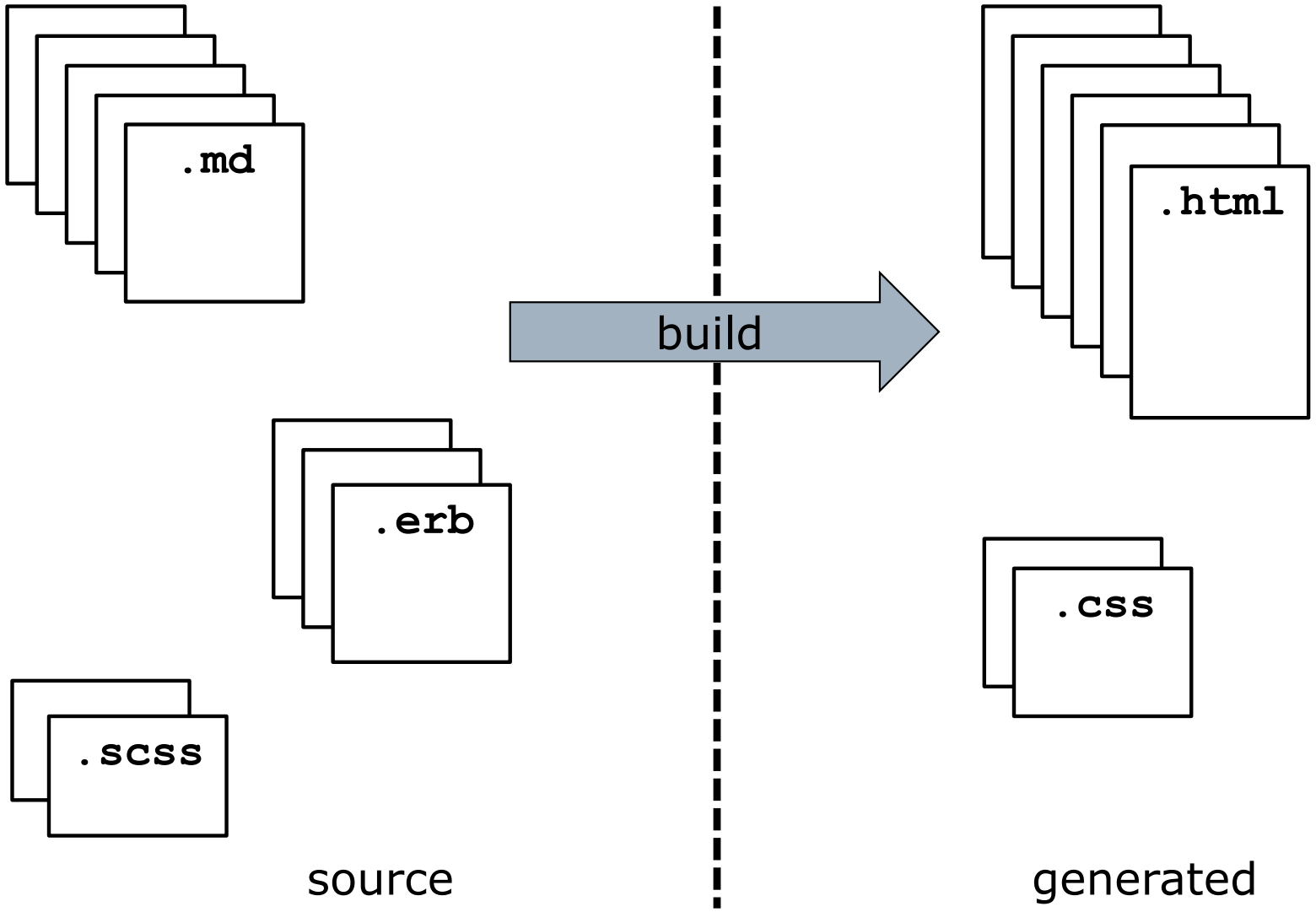
Static Site Generation

Lecture 21

What is Static Site Generation?

- Use a *program* to produce HTML pages
  - Analogous to compiling programs
  - Translation: source code → machine code
- Development cycle:
  - Write source
  - Compile (aka *build*)
  - Test/inspect result
- Examples of translators
  - Jekyll (used for GitHub Pages, aka github.io)
  - Middleman
  - Lots more, see: staticsitegenerators.net

Picture



Middleman: A Ruby Gem

- Project is a directory (eg myproj)

```
$ middleman init myproj
```

  - Configuration files, README, Gemfile, etc
- Create source files in **myproj/source**
  - Subdirectories for CSS, images, etc
- Compile all the source files

```
$ bundle exec middleman build
```

- Result is placed in **myproj/build**
- Deploy: copy/rsync/ftp contents to server

```
$ rsync -avz --del myproj/build ~/WWW
```

- Preview locally (no build needed)

```
$ bundle exec middleman server
```

Advice: Middleman 4.5

- Problem: scss isn't processed

```
TypeError: Cannot read properties of
undefined (reading 'version')
```

- Solution: Bump autoprefixer to 3.0

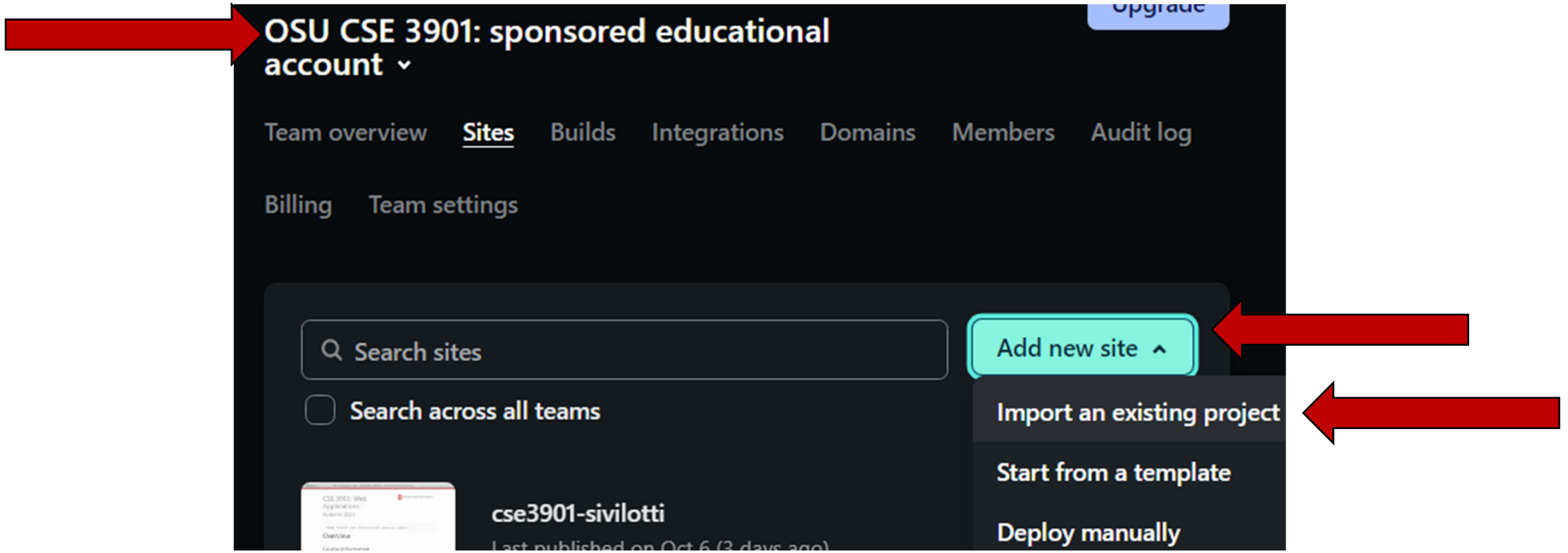
```
# Gemfile
gem 'middleman-autoprefixer', '~> 3.0'
```

- Helpful: live reload
  - See site changes as *source* is edited

```
# Gemfile
gem 'middleman-livereload'
# config.rb
activate :livereload
```

Deployment: Netlify

- Hosts and builds web sites
  - Create a "site", connect to a GitHub repo
  - Every push to repo's main results in a build, followed by publishing the result
- Free for sites in "OSU CSE 3901" team



Deployment: GitHub

- GitHub Pages: serves repo as web site
  - URL https://org.github.io/repo/
  - Settings > Pages > Build > Source
  - Branch (gh-pages), subdirectory
  - Alternative: GitHub Action
- GitHub Action
  - Responds to an event (eg push on main)
  - Runs the build process
  - Deploys the result
- Use relative links (notice path in URL)

```
# config.rb
activate :relative_assets
set :relative_links, true
```

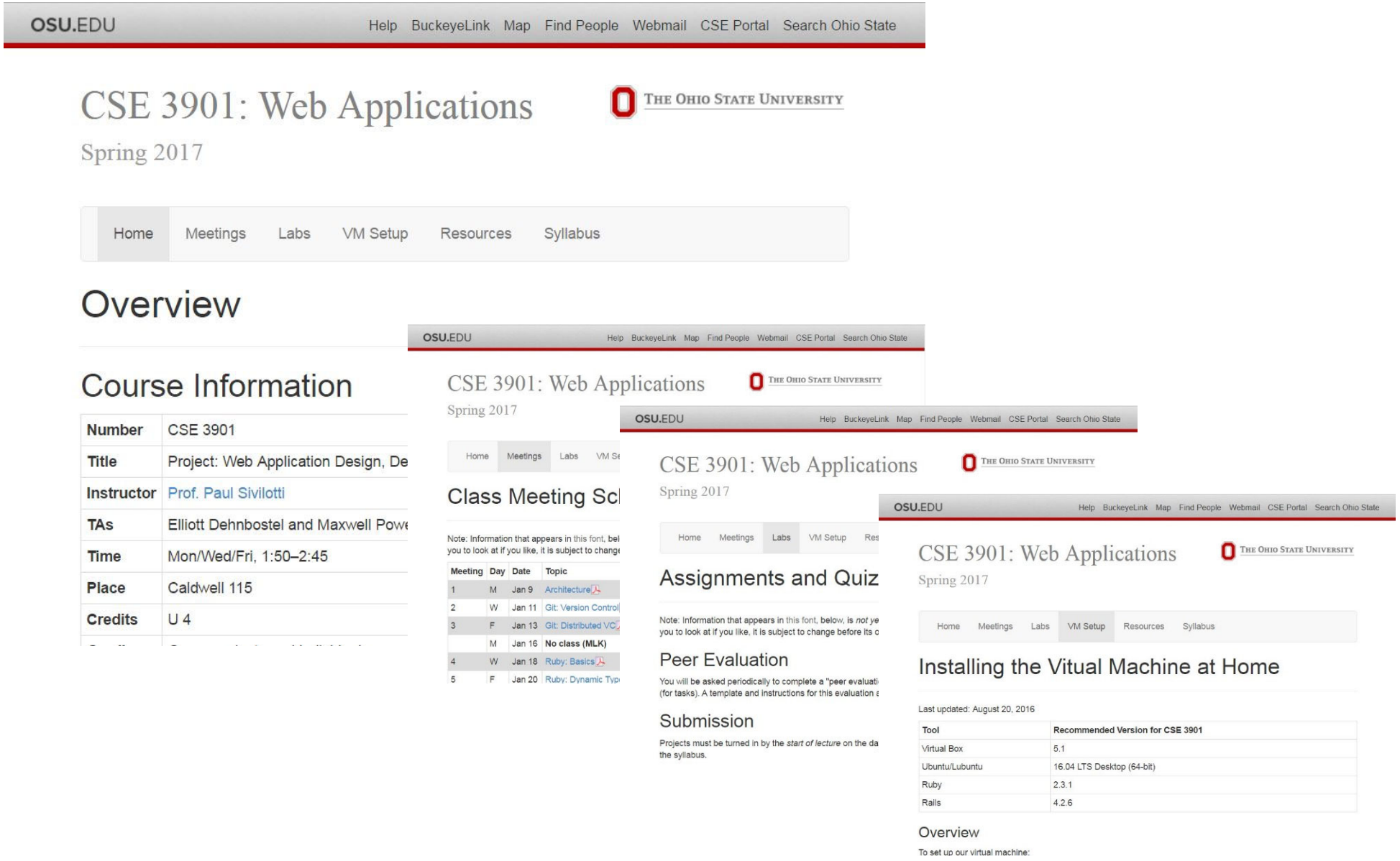
- Helpful: add URL to repo's About

Why Bother?

1. Code reuse and single-point-of-control over change
2. Authoring of content in a language that is more human-friendly
3. Parameterized generation of markup and content

Let's look at each of these benefits in turn…

Motivation #1: Visual Identity



Motivation #1: Visual Identity

- Common headers & footers
  - Example: OSU web sites share nav bar
  - Example: course web site
- Duplication of code is evil
  - Corollary: cut-and-paste is evil
  - Destroys single-point-of-control over change
- Solution:
  - Put common HTML in one file (a *partial*)
  - Every document includes that file

ERb: Embedded Ruby

- General templating mechanism
  - "Template" = a string (usually contents of some file)
  - Contains (escaped) bits of ruby
    - `<% code %>` execute ruby code ("scriplet")
    - `<%= expr %>` replace with result of ruby expr
    - `<%# text %>` ignore (a comment)
- Example: a text file

```
This is some text.
<% 5.times do %>
Current Time is <%= Time.now %>!
<% end %>
```

- Process using erb tool to generate result

```
$ erb example.txt.erb > example.txt
```

- Naming convention: ***filename.outputlang*.erb**
  - Example **index.html.erb**
- Many alternatives, eg HAML

Generation of Site

- Source files in myproj/source

```
$ ls source
index.html.erb  syll.html.erb
meet.html.erb
```

- Compile

```
$ bundle exec middleman build
```

- Result after building

```
$ ls build
index.html meet.html syll.html
```

Partials

- A document *fragment* included in other documents
- Include in template with **`partial`** function

```
<body>
  <%= partial "navigation" %>
  …
  <%= partial "footer" %>
</body>
```

- Partial's *filename* begins with '_'
  - ie **`_navigation.erb`**

```
<div class="navbar">
  <ul id="site-nav"> <li> … </li> </ul>
</div>
```

  - Note: '_' omitted in argument to function

Generation of Site with Partials

- Source files in myproj/source

```
$ ls source
_footer.erb          meet.html.erb
_navigation.erb      syll.html.erb
index.html.erb
```

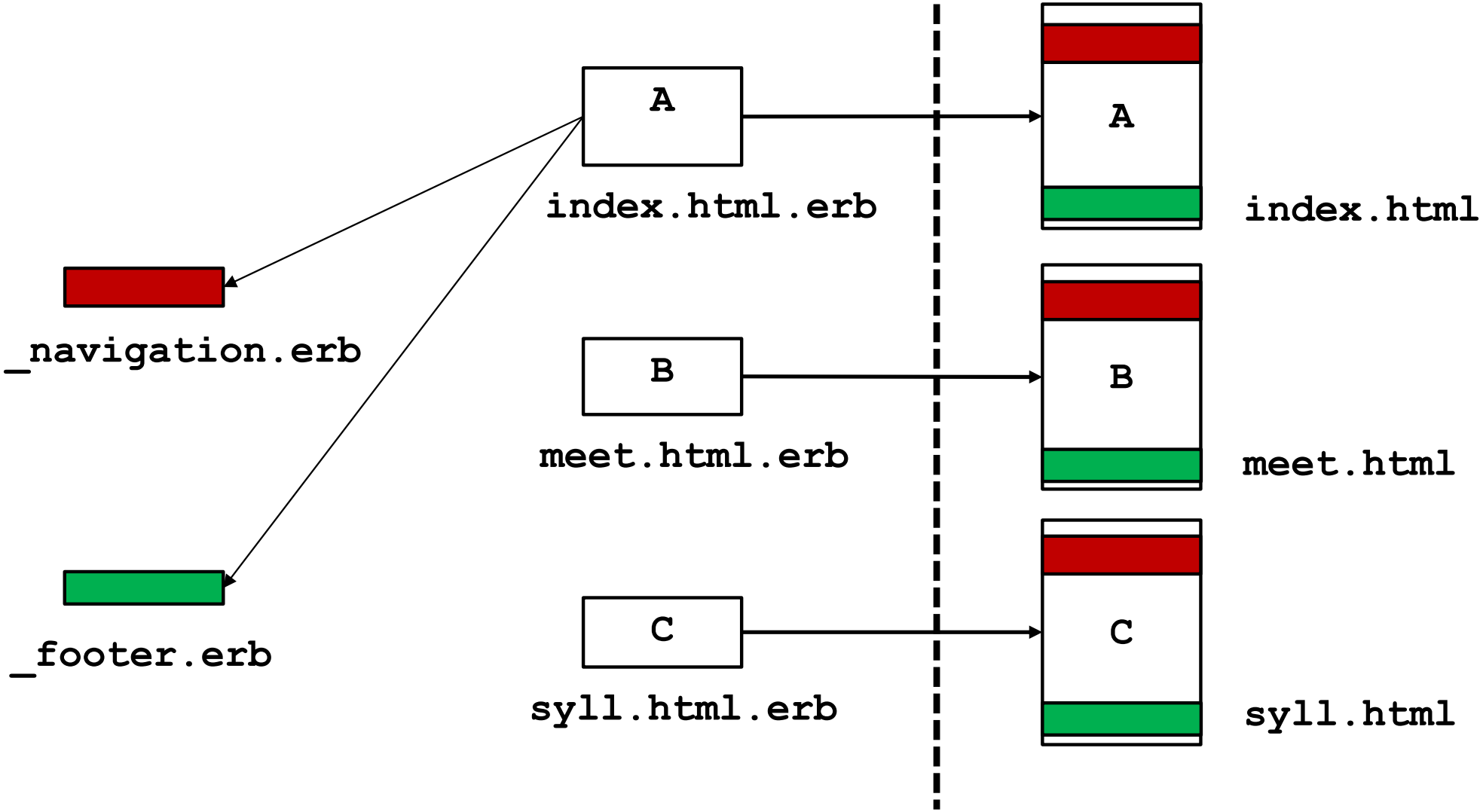
- Compile

```
$ bundle exec middleman build
```

- Result after building

```
$ ls build
index.html meet.html syll.html
```

Site Generation With Partials



Tricks with Partials

- Content of partial can be customized with arguments in call
- In call: pass a hash called :locals

```
<%= partial "banner",
        locals: { name: "Syllabus",
                  amount: 34 } %>
```

- In partial: access hash with *variables*

```
<h3> <%= name %> </h3>
<p> Costs <%= "$#{amount}.00" %></p>
```

Problem

- How to guarantee every page includes partial(s)
  - Partials don't ensure one page *structure* across the site
- Every page should look like:

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title>Class Meetings</title>
    <link rel="stylesheet" type="text/css"
      href="osu_style.css">
  </head>
  <body>
    <%= partial "navigation" %>
    … <!-- different for each page -->
    <%= partial "footer" %>
  </body>
</html>
```

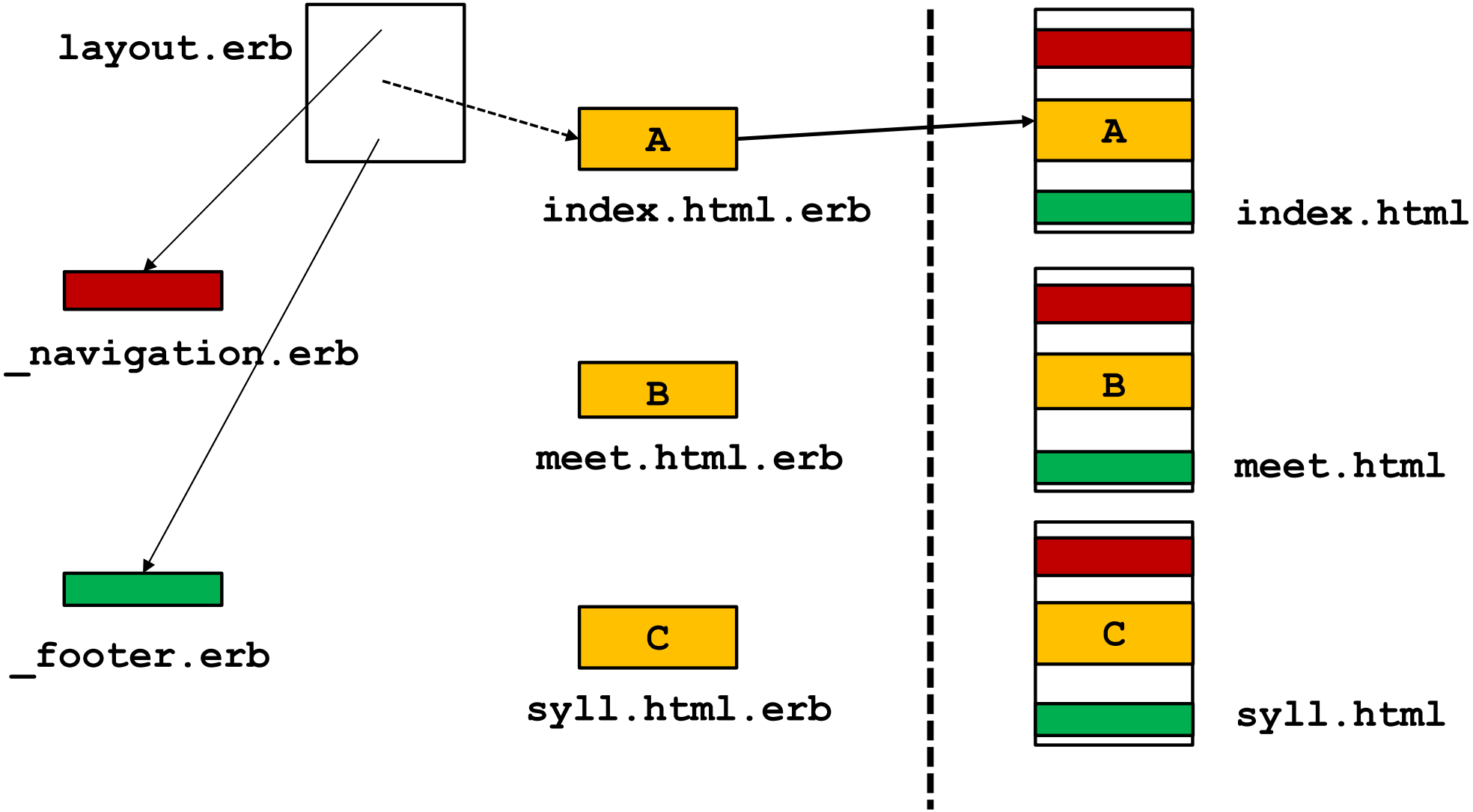
Solution: Layouts

- HTML formed from: Layout + Template
  - Layout is the common structure of HTML pages
  - Layout uses **`yield`** to include (page-specific) template
- File: layout.erb

```
<!DOCTYPE html>
<html>
  <head>
    <meta charset="utf-8">
    <title> … etc
  </head>
  <body>
    <%= partial "navigation" %>
    <%= yield %>
    <%= partial "footer" %>
  </body>
<html>
```

- Layout is where you put site-wide styling
  - *e.g.*, navigation bar, div's with CSS classes, footers

Site Generation With Layouts



Generation of Site with Layouts

- Default layout in **source/layouts/layout.erb**

```
$ ls -F source
index.html.erb meet.html.erb
layouts/           syll.html.erb
$ ls source/layouts
_footer.erb _navigation.erb layout.erb
```

- Result after building

```
$ ls build
index.html meet.html syll.html
```

Page-Specific Data in Layout

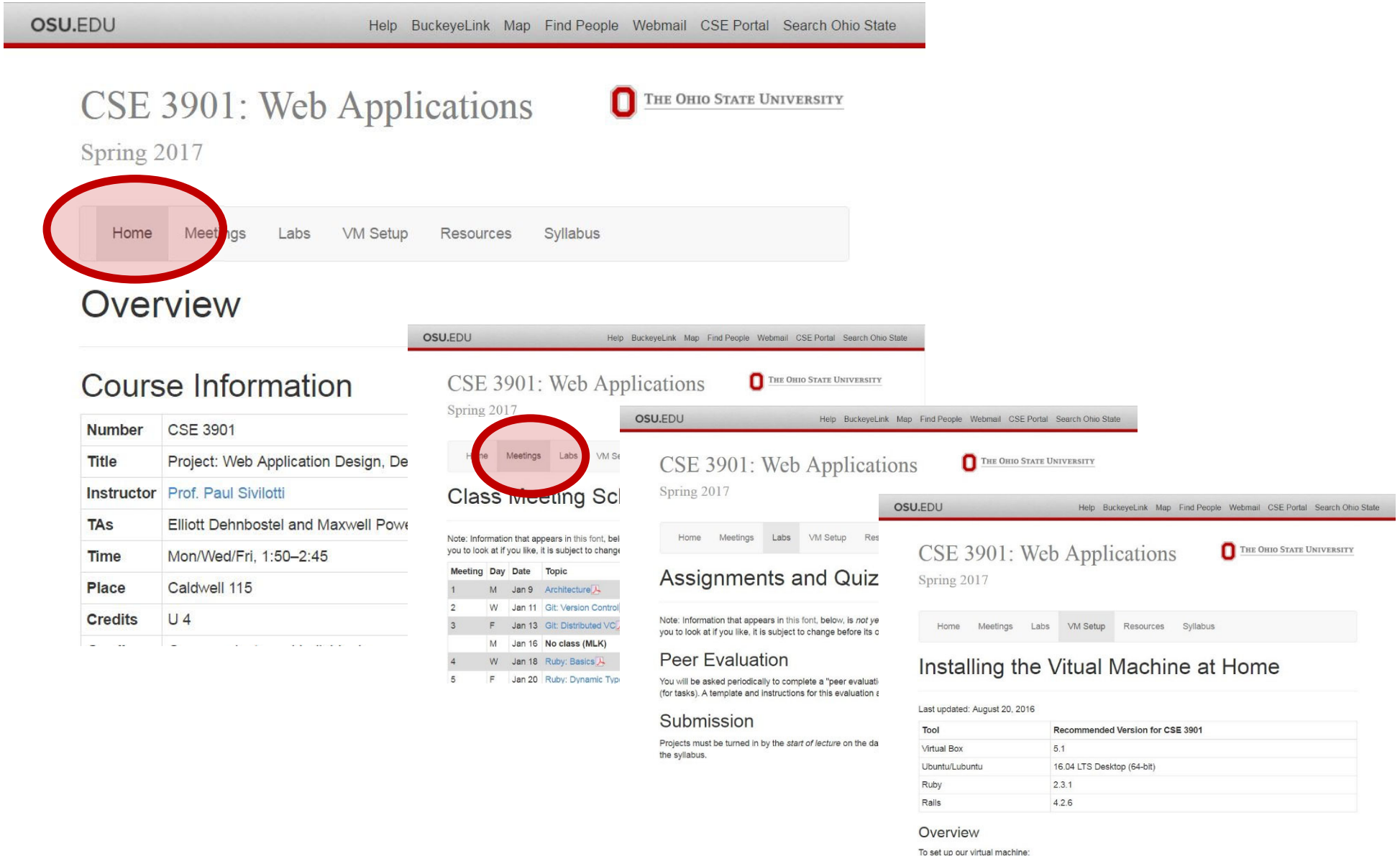
- Some layout content is page-specific
  - Example: `<title>` in document's head
- Solution: Ruby variable **`current_page`**
  - Example: **`current_page.path`**
- Template contains "frontmatter" that sets the value of **`current_page.data`**
  - In template (**`meet.html.erb`**)

```
---
title: "Class Meetings"
---
```

  - In layout (**`layout.erb`**)

```
<title> <%= current_page.data.title %>
</title>
```

Example: Navbar Highlights



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Let's look at each of these benefits in turn…

Motivation #2: Improved Syntax

- HTML tags make content hard to read
  - `<p>`, `<h2>`, `<em>`, `<a href="…">` etc
  - vs plain text, which is easier to read
- Common plain text conventions:
  - Blank lines between paragraphs
  - Underline titles with –'s or ='s
  - Emphasize *words*, _words_, **words**
  - Links as [text](url)
  - Unordered lists with bullets using * or -
  - Numbered lists with 1., 2., 3.

Why Middleman?

The last few years have seen an explosion in the amount and variety of tools developers can use to build web applications. Ruby on Rails selects a handful of these tools:

- Sass for DRY stylesheets
- CoffeeScript for safer and less verbose javascript
- Multiple asset management solutions, including Sprockets
- ERb & Haml for dynamic pages and simplified HTML syntax

Middleman gives the stand-alone developer access to all these tools and many, many more. Why would you use a

```
<h2>Why Middleman?</h2>

<p>The last few years have seen an explosion in the amount and
variety of tools developers can use to build web applications.
Ruby on Rails selects a handful of these tools:</p>

<ul>
<li><a href="http://sass-lang.com/">Sass</a> for DRY
stylesheets</li>
<li><a href="http://coffeescript.org/">CoffeeScript</a> for safer
and less verbose javascript</li>
<li>Multiple asset management solutions, including <a
href="https://github.com/sstephenson/sprockets">Sprockets</a></li
>
<li><a href="http://ruby-doc.org/stdlib-
2.0.0/libdoc/erb/rdoc/ERB.html">ERb</a> &amp;amp; <a
href="http://haml.info/">Haml</a> for dynamic pages and
simplified HTML syntax</li>
</ul>

<p><strong>Middleman</strong> gives the stand-alone developer…
```

```
## Why Middleman?

The last few years have seen an explosion in the amount and
variety of tools developers can use to build web applications.
Ruby on Rails selects a handful of these tools:

* [Sass](http://sass-lang.com/) for DRY stylesheets
* [CoffeeScript](http://coffeescript.org/) for safer and less
verbose javascript
* Multiple asset management solutions, including
[Sprockets](https://github.com/sstephenson/sprockets)
* [ERb](http://ruby-doc.org/stdlib-
2.0.0/libdoc/erb/rdoc/ERB.html) & [Haml](http://haml.info/) for
dynamic pages and simplified HTML syntax

**Middleman** gives the stand-alone developer…
```

Markdown

- Formalizes these ASCII conventions
  - Filename extension: `.md`
  - Adds some less familiar ones (eg `` ` ``)
- Translator generates HTML from markdown
  - Examples: GitHub readme's, user-posted comments on web boards (StackOverflow)
  - Other target languages possible too
- See Middleman's README.md
  - Regular view
  - Raw view
- Warning: many Markdown dialects/engines
  - daringfireball.net (original, 2004, stale)
  - Common Mark, GitHub-flavored markdown (GFM), Markdown Extra
  - kramdown, rdiscount, redcarpet, …

CSS: Magic Numbers

- Literals are common in CSS

```
h1 { background-color: #ff14a6; }
h2 { color: #ff14a6; }
```

- Result: Lack of single-point-of-control
- Solution: SASS allows variables

```
$primary: #ff14a6;
h1 { background-color: $primary; }
h2 { color: $primary; }
```

- Translator generates CSS from SASS
- Note: CSS has something similar (custom properties)

CSS: Repeated Ancestors

- CSS requires separate rules for different elements with same ancestor

```
.navbar ul { … }
.navbar li { … }
```

- Changing classname requires changing all these rules
- Solution: SASS allows nested selectors

```
.navbar {
  ul { … }
  li { … }
}
```

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Motiv'n #3: Content Generation

- Problem: Parameterized/repeated content
  - Example: Course offering term
- Solution: Read content from data
  - Files in subdirectory data/ define variables

```
# data/dates.yml
term: "Autumn 2023"
```

  - Variables then available in templates

```
<%= data.dates.term %>
```

- Problem: Repeated structure
  - Example: Each row in table
- Solution: Generate structure with code
  - Iterate over array, creating table rows
  - See course web site

```
<% meetings.each do |meet| %>
  <tr> <td> <%= meet.date %> </td>…
```

Generating Random Content

- Want placeholder content for prototype
  - Useful for making style/layout decisions
  - Don't care about actual content
- Solution: use a *method* that returns an HTML string

```
<%= lorem.sentence %>
```

- Many lorem methods available

```
lorem.paragraphs 2
lorem.date
lorem.last_name
lorem.image('300x400')
   #=> http://placehold.it/300x400
```

Helper Functions

- Used to generate common HTML snippets
- Example: hyperlinks

```
<a href="/about.html">About us</a>
```

- With link_to helper in template:

```
<%= link_to('About us', '/about.html') %>
  #=> <a href="/about.html">About us</a>
```

- Many optional arguments

```
<%= link_to('My Blog', '/blog.html',
            class: 'happy') %>
 #=> <a href="/blog.html" class="happy">
       My Blog</a>
```

(Many) More Helper Functions

- Format helpers

```
pluralize 2, 'person' #=> "2 people"
```

- Tag helpers

```
tag :img, src: '/kittens/png'
content_tag :p, class: 'warning' do … end
```

- Form helpers

```
form_tag '/login', method: 'post'
button_tag 'cancel', class: 'clear'
```

- Asset helpers

```
stylesheet_link_tag 'all'
javascript_include_tag 'jquery'
favicon_tag 'images/favicon.png'
image_tag 'padrino.png',
      width: '35', class: 'logo'
```

Summary

- ERb
  - Template for generating HTML
  - Scriplets and expressions
- Reuse of views with partials
  - Included with partial (eg <%= partial…)
  - Filename is prepended with underscore
  - Parameter passing from parent template
- Layouts and templates
- Markdown, SASS
- Content generation and helpers