

CS169 Week 3 Section

9/17/19

Attendance

<http://j.mp/cs169section>

Discussion Feedback

tinyurl.com/169disc

Administrivia & Agenda

- HW2 is due this Friday 9/20
- HW3 to be released this week
- Project groups/lists to be released later this week

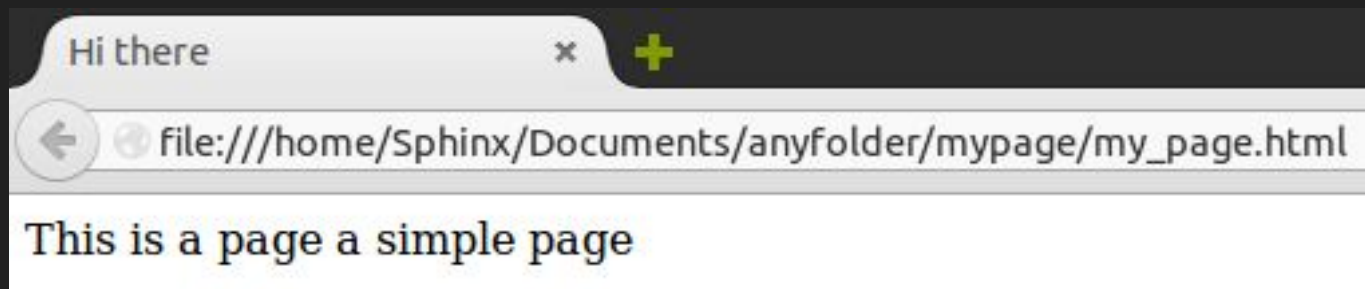
Today's goal: Explain the concepts of MVC by going through a basic TODO app (in Sinatra)



Template

HTML

```
<!DOCTYPE html>  
<html>  
  <head>  
    <title>Hi there</title>  
  </head>  
  <body> This is a page a simple page </body>  
</html>
```



HTML

```
<!DOCTYPE html>
```

```
<html>
```

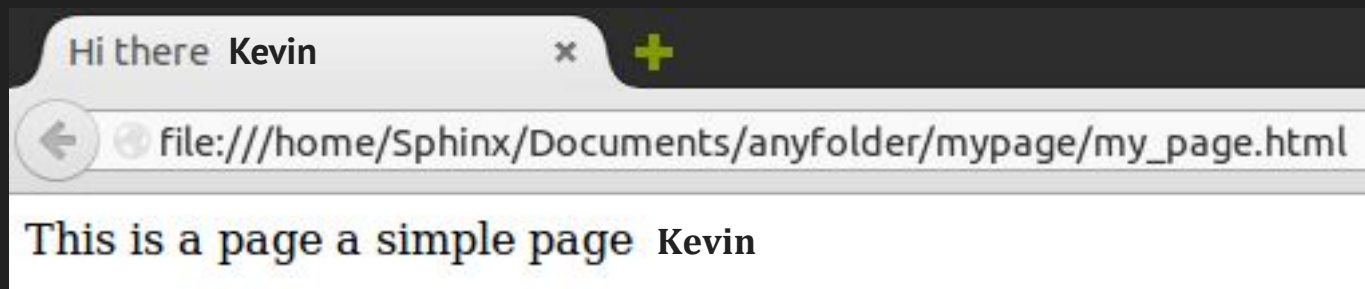
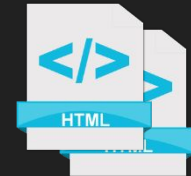
```
  <head>
```

```
    <title>Hi there Kevin</title>
```

```
  </head>
```

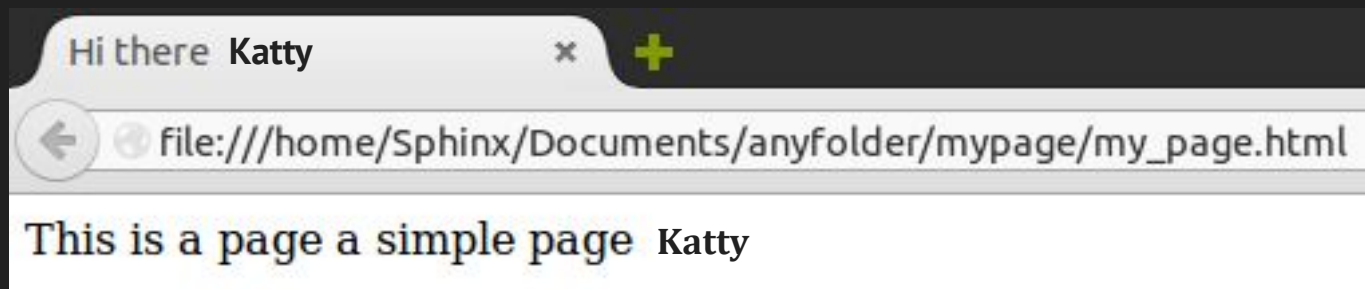
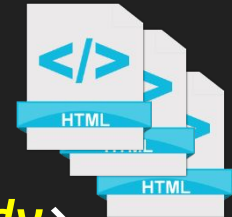
```
  <body> This is a page a simple page Kevin </body>
```

```
</html>
```

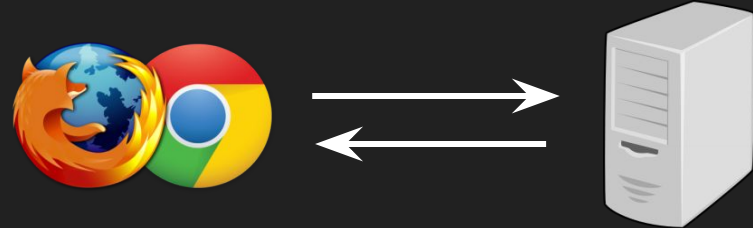
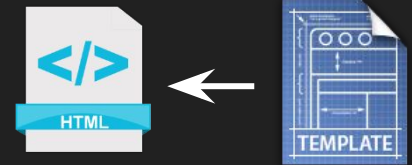


HTML

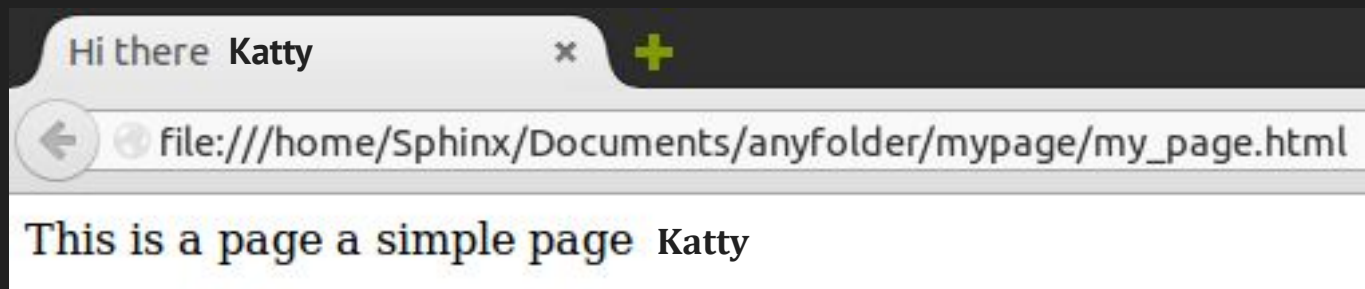
```
<!DOCTYPE html>  
<html>  
  <head>  
    <title>Hi there Katty</title>  
  </head>  
  <body> This is a page a simple page Katty </body>  
</html>
```



HTML

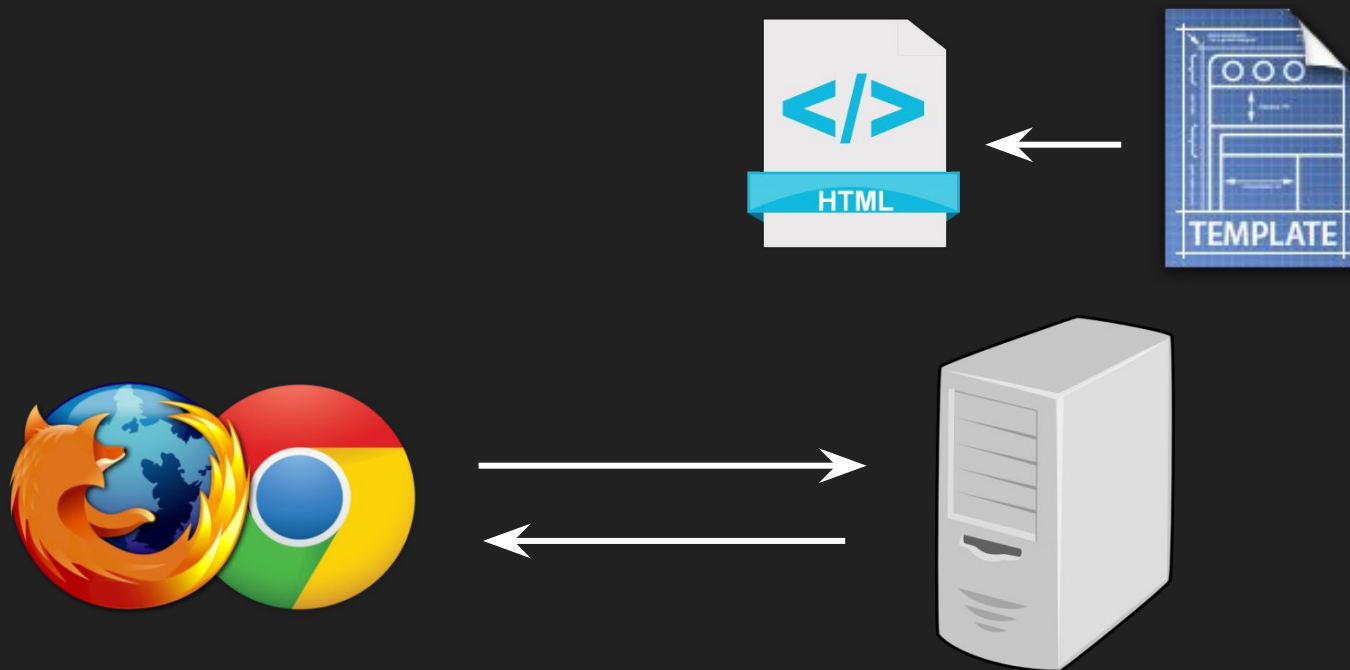


```
<!DOCTYPE html>  
<html>  
  <head>  
    <title>Hi there <%= @name %></title>  
  </head>  
  <body> This is a page a simple page <%= @name %>  
  </body>  
</html>
```



Web Programming

Dynamically generate HTML from template according to user's request.



Web Programming

Dynamically generate HTML from template according to user's request.

Ruby (Sinatra, Rails)

PHP (Wordpress)

Python (Django)

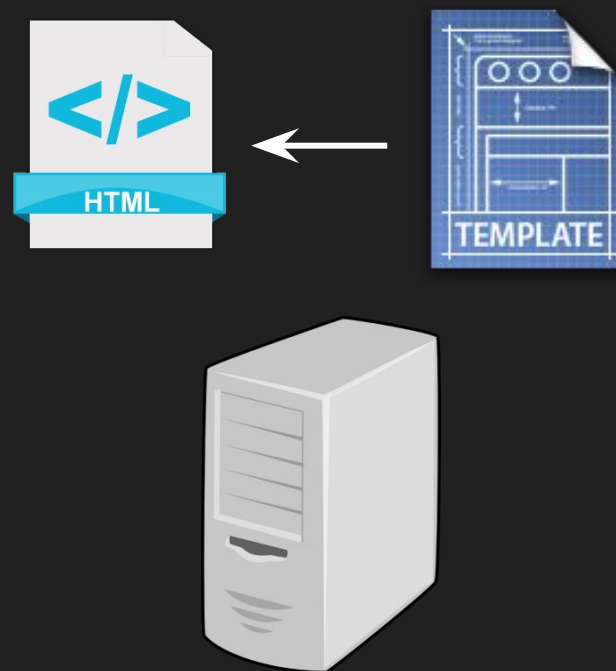
Java → JSP

C# → ASP.NET

JavaScript → Node.js

C++ → CGI

...



Do not put everything into the template!

```
<!DOCTYPE html>
<html>
  <%
    @user = User.find(params[:id])
  %>
  <head>
    <title>Hi there <%=@user.name%></title>
  </head>
  <body> This is a page a simple page </body>
</html>
```

Do not put everything into the template!

```
<!DOCTYPE html>
<html>
  <%
    @user = User.find(params[:id])
    @movies = Movies.find_by_user_id(@user.id)
  %>
  <head>
    <title>Hi there <%=@user.name%></title>
  </head>
  <body> This is a page a simple page
    <%= @movies... %>
  </body>
</html>
```

Do not put everything into the template!

```
<!DOCTYPE html>
<html>
  <%
    @user = User.find(params[:id])
    @movies = Movies.find_by_user_id(@user.id)
    config.active_record.raise_in_transactional_callbacks = true
    ...
  %>
  <head>
    <title>Hi there <%=@user.name%></title>
  </head>
  <body> This is a page a simple page
    <%= @movies... %>
  </body>
</html>
```

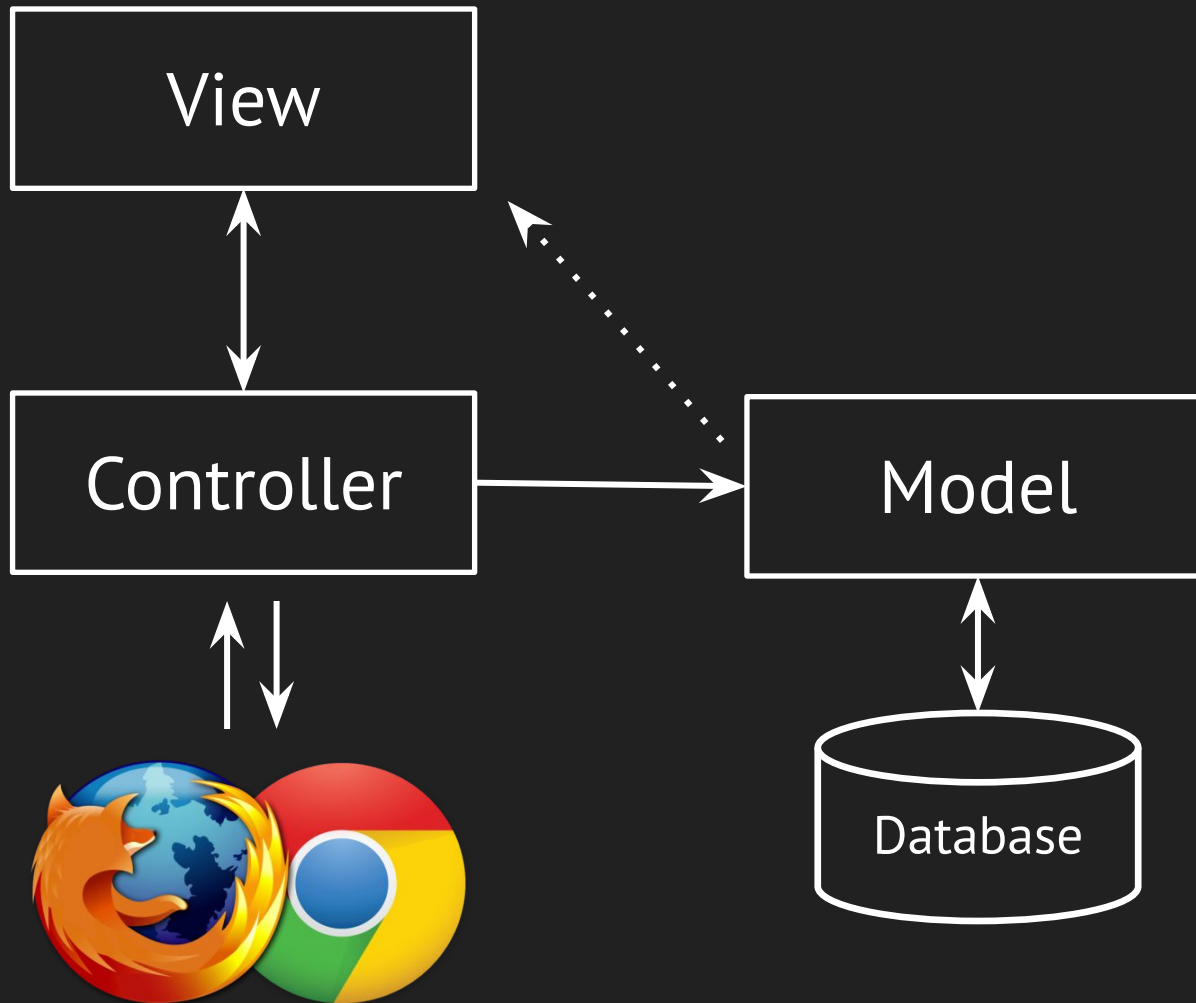
```
nd easier to go from searching to doing." name="description"/><meta content="NOODP" name="ROBOTS"/></head><body class="en
orm_q&#39;).focus();if(!_w.lb)lb();"><script type="text/javascript">/*! [CDATA[
var g_hasVid=0;var g_hasTb=1;var g_HPRMSAOL = 0;var g_IMVL = 0;var g_NPLE = 0;var g_hptse = 1;var g_crsInst = 0;_H.rbc = 0
seStart : null;_H.crsEL = 0;_H.focusHideCrs = 0;;var sj_b=_d.body;var wlc_d = 1500,wlc_t = 63590233900;;
><table id="hp_table"><tr><td id="hp_cellCenter" class="hp_hd"><div id="hp_container"><div id="bgDiv"><div id="hp_vidwrp">
e" data-tag="" /></div><div id="sc_hst1" class="sh_hst" style="left:22%;top:49%"><div class="sh_hto"><div class="hp_hot"><
y+Castle%2c+Derbyshire%2c+England&amp;form=hphot1" id="sc_hs1" class="sh_hs" target="_self" h="ID=SERP,5042.1"><p></p><spa
/div></div></a><div id="sc_hst2" class="sh_hst" style="left:40%;top:40%"><div class="sh_hto"><div class="hp_hot"></div><
ss="sh_hs" target="_self" h="ID=SERP,5043.1"><p></p><span class="sh_hq"></span>&nbsp;<span class="sh_hi">&#187;</span><div
<div class="sh_hto"><div class="hp_hot"></div></div></div><a href="/videos/search?
3&amp;mid=5B2BF34A230F36C62A4E5B2BF34A230F36C62A4E" id="sc_hs3" class="sh_hs" target="_self" h="ID=SERP,5044.1"><p></p><sp
/div></div></a><div id="sbox" class="sw_sform" role="search"><div class="hp_sw_logo hpclogoWhite">Bing</div><div class="se
form action="/search" onsubmit="var id = _ge('hpinsthk').getAttribute('h'); return si_T(id);" id="sb_form" class="sw_box">
nter your search term" type="search" value="" maxlength="1000" autocapitalize="off" autocorrect="off" autocomplete="off" s
rch" tabIndex="0" name="go"/><input id="sa_qs" name="qs" value="ds" type="hidden"/><input type="hidden" value="QBLH" name=
" class="sc_hl1 hp_head_nav" role="navigation"><li id="scpt0" class=""><a href="https://www.bing.com/images?FORM=Z9LH" id=
ages');" h="ID=SERP,5021.1">Images</a><div id="scpc0" role="group" aria-labelledby="scpl0" aria-hidden="true" aria-expande
1" aria-controls="scpc1" aria-expanded="false" onclick="selectScope(this, 'video');" h="ID=SERP,5022.1">Videos</a><div id=
d="scpt2" class=""><a href="https://www.bing.com/maps/?FORM=Z9LH2" id="scpl2" aria-owns="scpc2" aria-controls="scpc2" aria
" role="group" aria-labelledby="scpl2" aria-hidden="true" aria-expanded="false"></div></li><li id="scpt3" class=""><a href=
d="false" onclick="selectScope(this, 'news');" h="ID=SERP,5024.1">News</a><div id="scpc3" role="group" aria-labelledby="sc
ng.com/explore?FORM=Z9LH3" id="scpl4" aria-owns="scpc4" aria-controls="scpc4" aria-expanded="false" onclick="selectScope(t
-hidden="true" aria-expanded="false" addid="scpl4" id="scpl4" role="group" aria-labelledby="scpl4" aria-hidden="true" aria-expande
ctScope(this, 'history');" h="ID=SERP,5026.1">Search History</a><div id="scpc5" role="group" aria-labelledby="scpl5" aria-
/www.msn.com/" id="off_link" aria-owns="off_menu_cont" aria-controls="off_menu_cont" aria-expanded="false" target="_blank"
"off_link" aria-owns="off_menu_cont" aria-controls="off_menu_cont" aria-expanded="false" target="_blank" h="ID=SERP,5011.1
den="true" class="sc_pc" data-officemenuroot="office"><ul class="om"><li><a href="https://office.live.com/start/Word.aspx?
1"><div><div class="oml_img" id="officemenu_word_img"></div><div class="itm_desc">Word Online</div></div></a></li><li><a href=
cel Online" target="_blank" h="ID=SERP,5028.1"><div><div class="oml_img" id="officemenu_excel_img"></div><div class="itm_d
WT.mc_id=016_BingHP" id="officemenu_powerpoint" title="PowerPoint Online" target="_blank" h="ID=SERP,5029.1"><div><div cla
/a></li><li><a href="https://www.onenote.com/notebooks?WT.mc_id=016_BingHP" id="officemenu_onenote" title="OneNote Online"
div class="itm_desc">OneNote Online</div></div></a></li><li><a href="https://www.sway.com?WT.mc_id=016_BingHP&amp;utm_sourc
"ID=SERP,5031.1"><div><div class="oml_img" id="officemenu_sway_img"></div><div class="itm_desc">Sway</div></div></a></li><
Docs.com" target="_blank" h="ID=SERP,5032.1"><div><div class="oml_img" id="officemenu_docscom_img"></div><div class="itm_d
_id=016_BingHP" id="officemenu_onedrive" title="OneDrive" target="_blank" h="ID=SERP,5033.1"><div><div class="oml_img" id=
href="https://calendar.live.com/?WT.mc_id=016_BingHP" id="officemenu_calendar" title="Calendar" target="_blank" h="ID=SER
desc">Calendar</div></div></a></li><li><a href="https://people.live.com/?WT.mc_id=016_BingHP" id="officemenu_people" title=
v><div class="itm_desc">People</div></div></a></li></ul></div></li><li id="outlook"><a href="https://outlook.com/?WT.mc_id
aria-expanded="false" target="_blank" h="ID=SERP,5012.1">Outlook.com</a></li></ul><div id="hp_id_hdr"><div id="id_h" role="
id="id_s">Sign in</span><span class="sw_spd id_avatar" id="id_a"></span><span id="id_n" style="display:none"></span><img
OD1hAQABATAIAAAAAAAP///yH5BAEAAAEALAAAAAABAAEAAAIBTAA7" onError="if(src==='/s/a/anon.png'){this.onerror=null;} this.src='/s/
" id_button" id="id_rh" h="ID=SERP,5069.1"><span id="id_rc">140</span><span class="id_avatar sw_meIc" title="Bing Rewards">
"b_hide" id="id_rwl" h="ID=SERP,5068.1"></a><span id="nc_iid" _IG="1BF021AF4E2E48FEA4268CF408E5DF28" _iid="SERP.5067" _cid
```

Soon, your code will look like this!

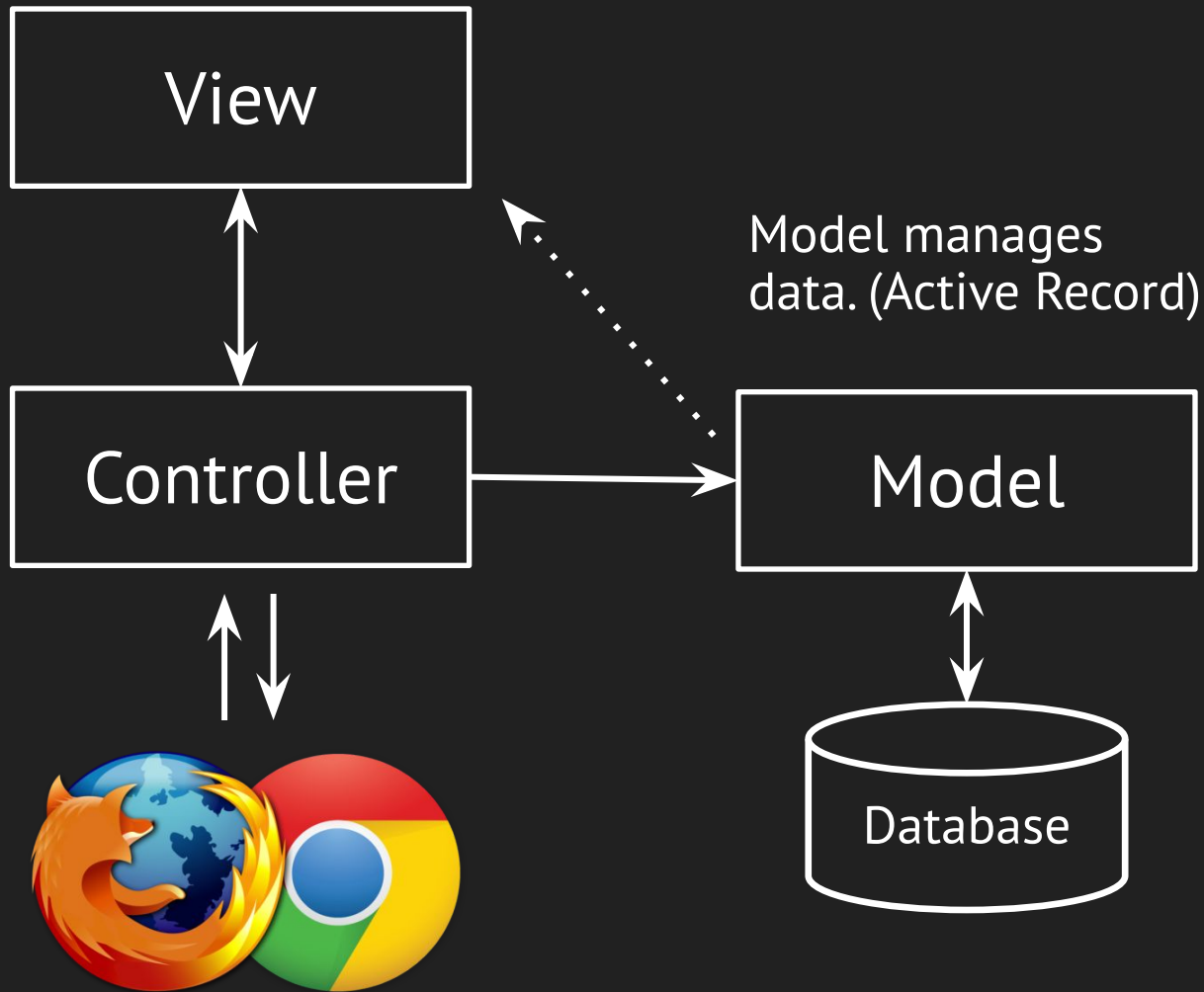
The image shows the interior of a grand, historic building with a massive, arched glass and iron roof. The structure is composed of a complex network of dark green-painted iron beams and supports, creating a series of high, vaulted arches. Sunlight streams through the glass panels, casting long, rhythmic shadows across the light-colored floor. The architecture is reminiscent of the Crystal Palace in London. In the center of the image, the text "Structure: MVC" is overlaid in a clean, white, sans-serif font.

Structure: MVC

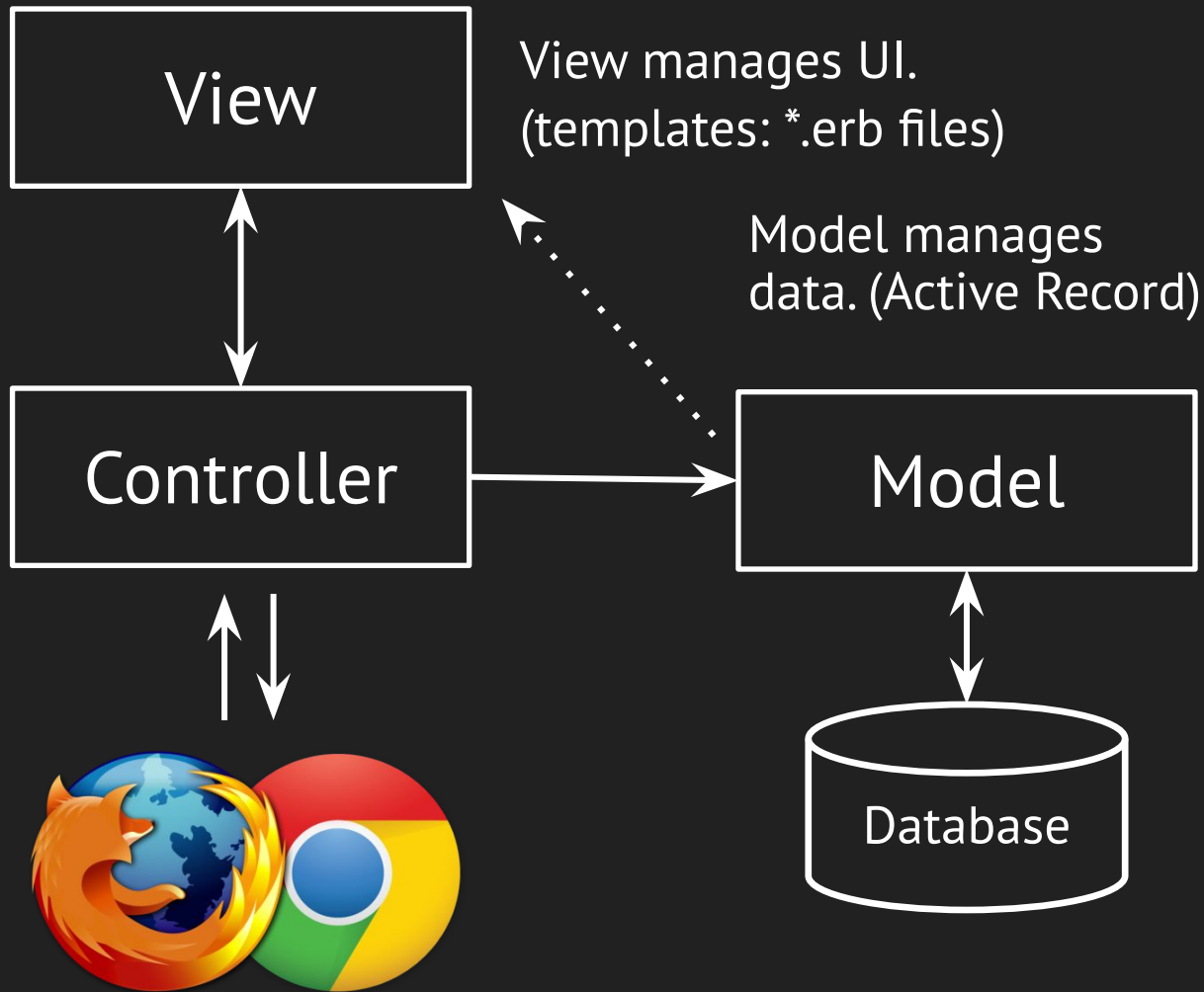
MVC



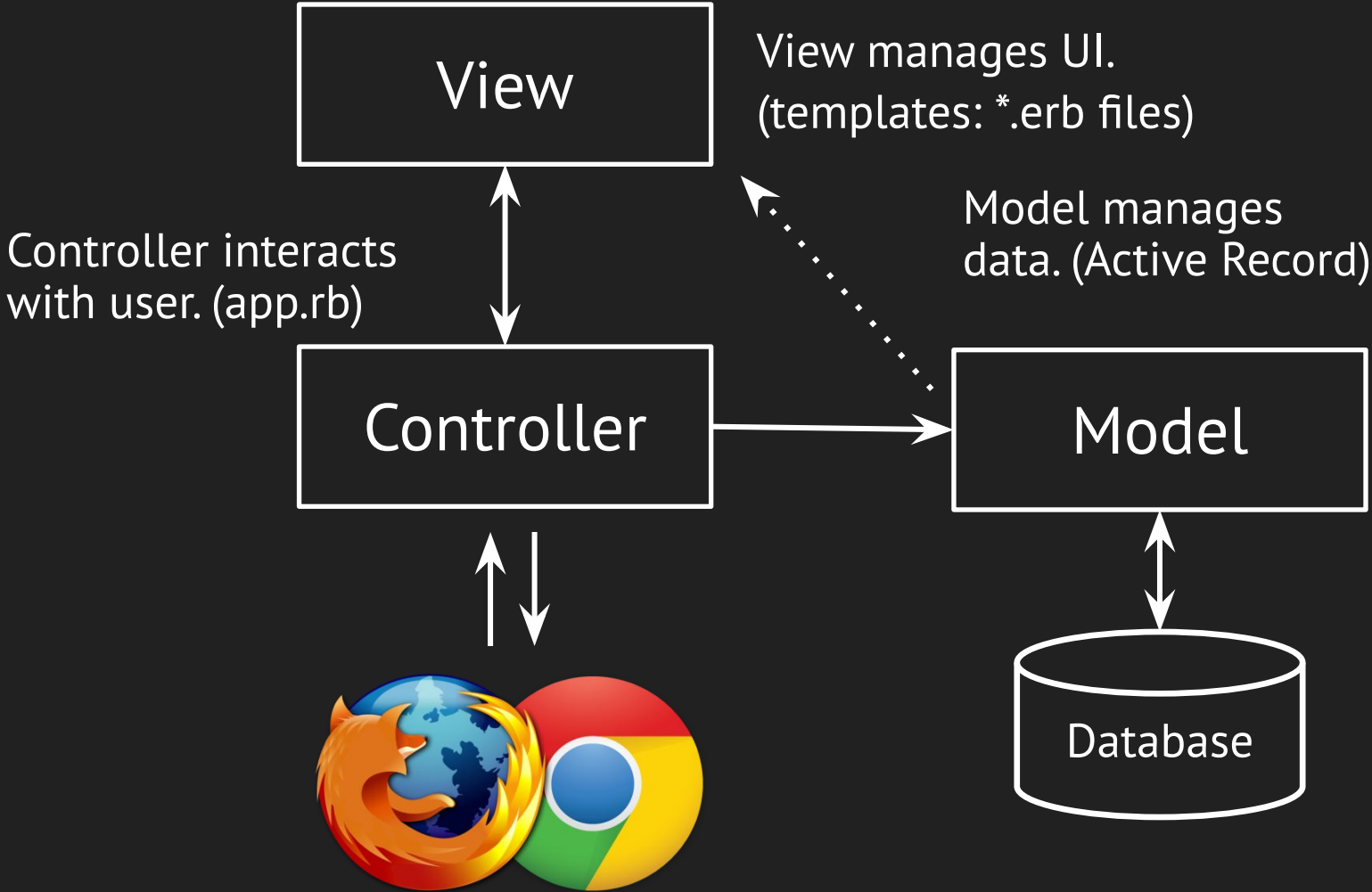
MVC



MVC



MVC



Sinatra vs Rails

Sinatra is a library

- dealing with HTTP from the server side.
- Your code invokes Sinatra's code
- Sinatra does not contain MVC, you can use MVC with Sinatra though.

Rails is a MVC framework

- boost productivity
- Rails generates code that invokes your code
- Rails supports MVC

Sinatra

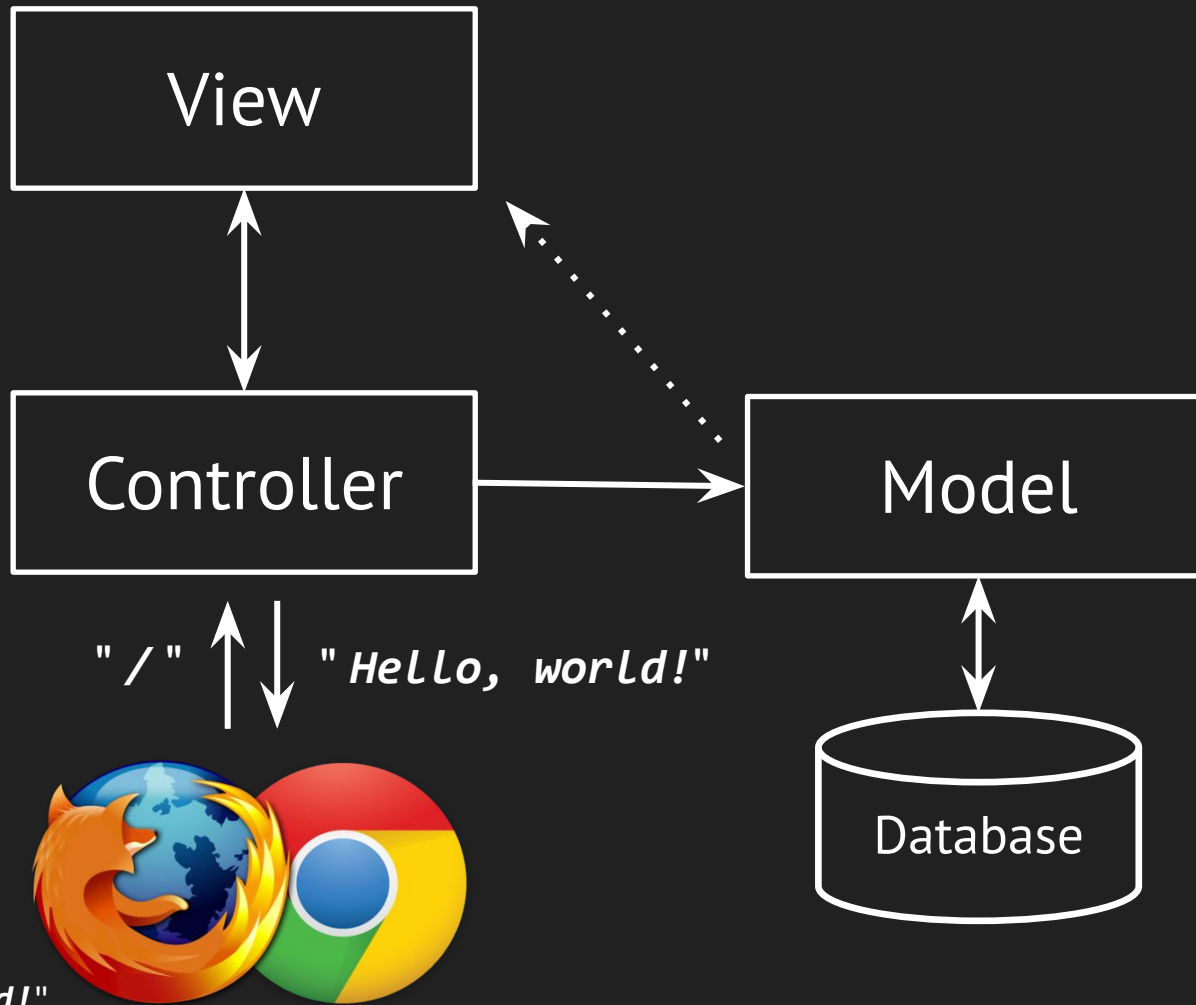
```
require "sinatra"
```

```
get "/" do
```

```
  "Hello, world!"
```

```
end
```

MVC



```
get "/" do  
  "Hello, world!"  
end
```

Sinatra

```
require "sinatra "  
  
get "/getname/:name" do  
  "#{params[:name]}"  
end
```


Sinatra

```
get " /form " do  
  erb: form  
end
```

```
post " /form " do  
  " You said #{params[:message]}"  
end
```

Sinatra

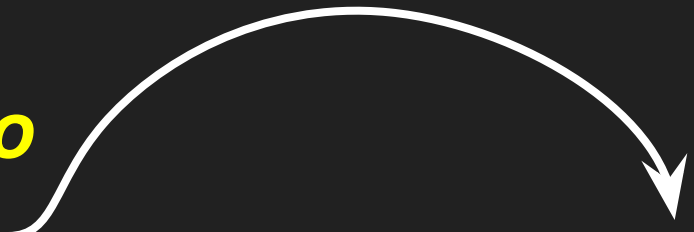
```
get "/form" do
  erb: form
end
```

```
<form action="/form" method="post">
  <input type="text" name="message">
  <input type="submit">
</form>
```

```
post "/form" do
  " You said #{params[:message]}"
end
```

Sinatra

```
get "/form" do
  erb: form
end
```



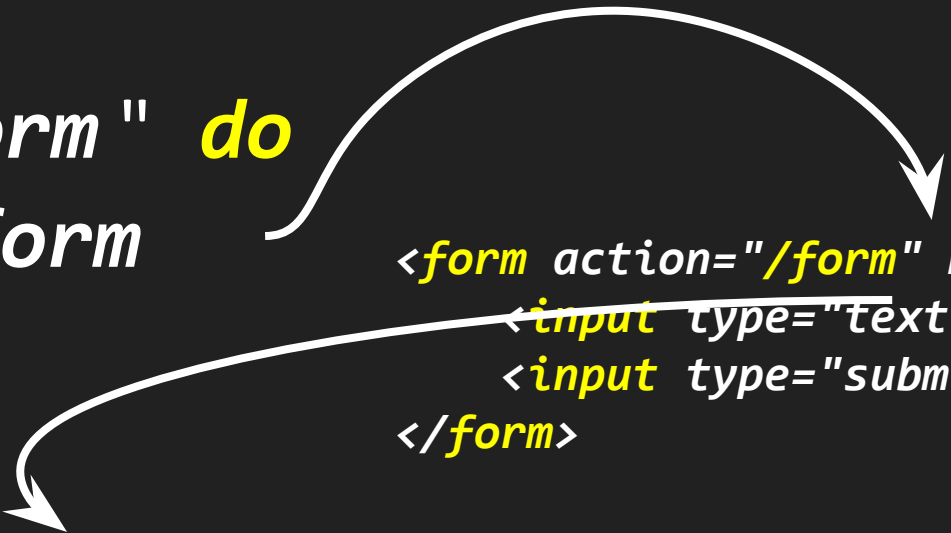
```
<form action="/form" method="post">
  <input type="text" name="message">
  <input type="submit">
</form>
```

```
post "/form" do
  " You said #{params[:message]}"
end
```

Sinatra

```
get "/form" do
  erb: form
end
```

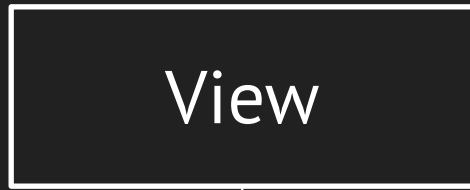
```
<form action="/form" method="post">
  <input type="text" name="message">
  <input type="submit">
</form>
```



The diagram consists of two white curved arrows. The first arrow starts at the `erb: form` line in the GET route and points to the ERB template code. The second arrow starts at the rendered HTML code and points to the `post "/form" do` route, indicating that the HTML is rendered when the POST method is used on the same path.

```
post "/form" do
  " You said #{params[:message]}"
end
```

MVC



```
<form action="/form" method="post">  
  <input type="text" name="message">  
  <input type="submit">  
</form>
```



```
get "/form" do  
  erb: form  
end
```

"/form"
GET



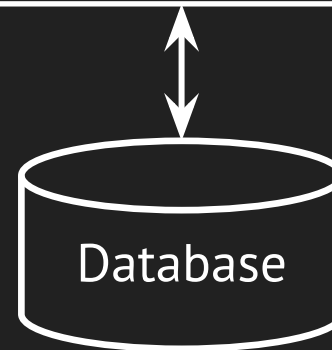
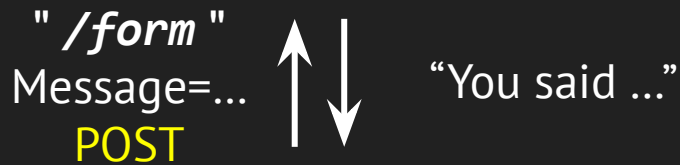
```
<form action="/form" method="post">  
  <input type="text" name="message">  
  <input type="submit">  
</form>
```



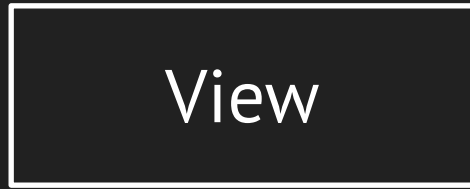
MVC



```
post "/form" do  
  " You said  
  #{params[:message]}"  
end
```



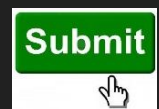
MVC



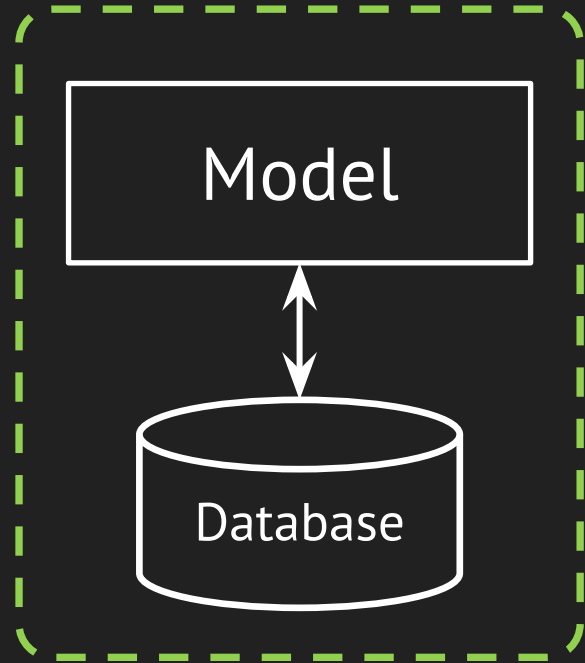
```
post "/form" do
  " You said
  #{params[:message]}"
end
```



"/form "
Message=... "You said ..."
POST



What about model?



Active Record

- An Implementation of the **object-relational mapping (ORM)** pattern.
- Automated **mapping** between classes and tables, attributes and columns
 - Basic operations on object: CRUD
 - (**C**reate, **R**ead, **U**ppdate, **D**elete)
- **Associations** between objects defined by simple class methods (will be covered later)

Example

```
class Article < ActiveRecord::Base {  
  :id      => :integer,  
  :title   => :string,  
  :content => :text  
}
```

AR automatically handles the mapping between:

- **objects** in **memory**
- **Records** in **database**

id	title	content
1	First record	Hello world
2	Week 3 section	Active record etc.
3	Week 4 section	Rails etc.

Example

```
class Article < ActiveRecord::Base {  
  :id      => :integer,  
  :title   => :string,  
  :content => :text  
}
```

AR automatically handles the mapping between:

- **objects** in **memory**
- **Records** in **database**

```
a = Article.new  
a.title = "Week 5"  
a.save
```

id	title	content
1	First record	Hello world
2	Week 3 section	Active record etc.
3	Week 4 section	Rails etc.
4	Week 5	

Example

```
class Article < ActiveRecord::Base {  
  :id      => :integer,  
  :title   => :string,  
  :content => :text  
}
```

AR automatically handles the mapping between:

- **objects** in **memory**
- **Records** in **database**

```
Article.create(  
  :title => "Week 5"  
)
```

id	title	content
1	First record	Hello world
2	Week 3 section	Active record etc.
3	Week 4 section	Rails etc.
4	Week 5	

ActiveRecord & SQL

AR automatically handles the mapping between:

- objects in memory
- Records in database

AR will **translate** the query API call to **SQL** commands:

```
Article.where(:title => "Week 5")
```

```
> select * from Article where title = "Week 5"
```

The result will be put into objects in memory.

id	title	content
1	First record	Hello world
2	Week 3 section	Active record etc.
3	Week 4 section	Rails etc.
4	Week 5	

ActiveRecord Methods

```
class Article < ActiveRecord::Base {  
  :id      => :integer,  
  :title   => :string,  
  :content => :text  
}
```

ActiveRecord will dynamically “generate” methods based on the attributes in the table:

- *Article.find_by_title("Week 5")*
- *Article.find_by_title_and_content("First Record", "Hello world")*

Use ActiveRecord in Sinatra

```
require 'sinatra'
# db configuration
db_options = {adapter: 'sqlite3', database: 'todos_db' }
# establish connection
ActiveRecord::Base.establish_connection(db_options);
# write migration
```

No need to memorize this.
Rails generates this for you.

```
class CreateTodos < ActiveRecord::Migration
  def change; create_table :todos; end
end
```

However, it is good to know how things works under the hood!

A small Sinatra-with-ActiveRecord Demo:

```
# enforce migration
createTodos.new.change
# define the active record
class Todo < ActiveRecord::Base
  ...
end
```

<http://bit.ly/2kkfYJu>