

# CS 188

## Scalable Internet Services

Andrew Mutz

October 13, 2016



# Today's Agenda

Motivation

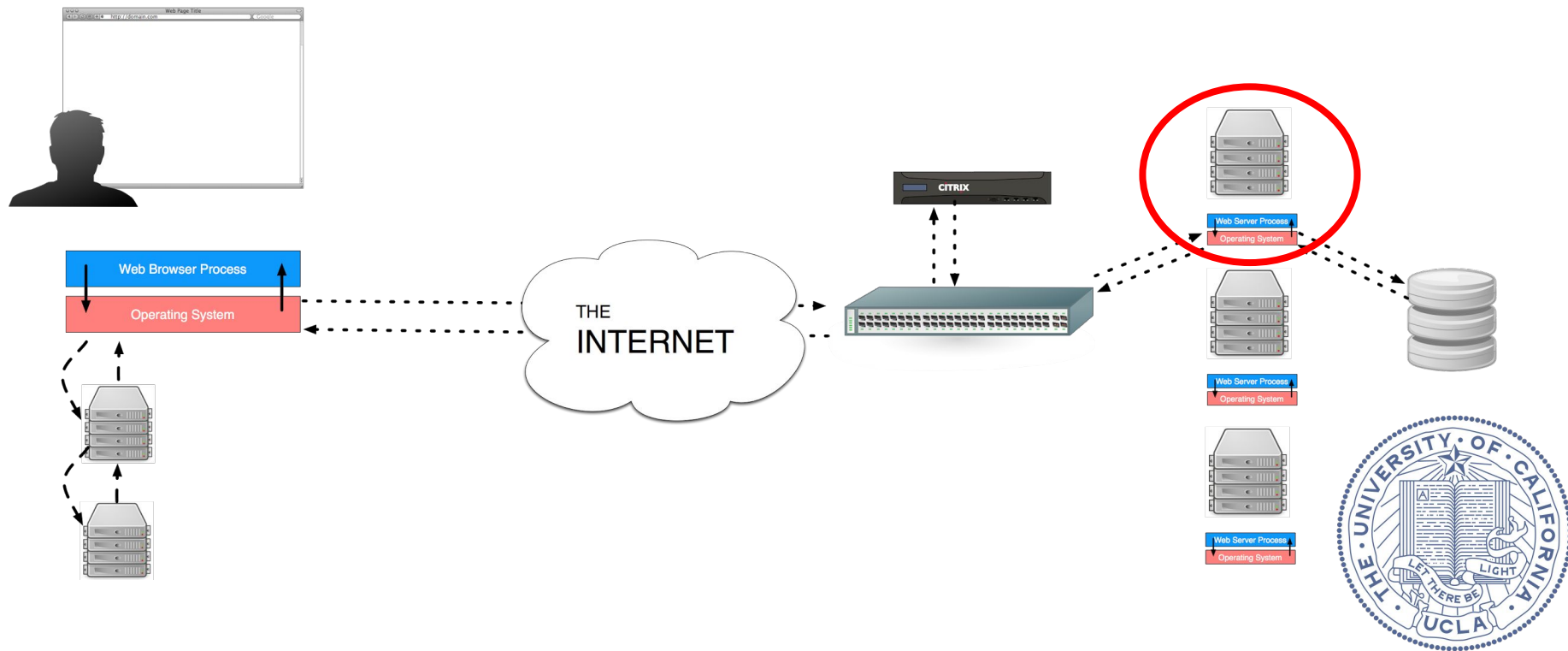
Server-side Caching

Deploying on AWS

For Next Time



# Server-side Caching



# Motivation

**After today you should understand**

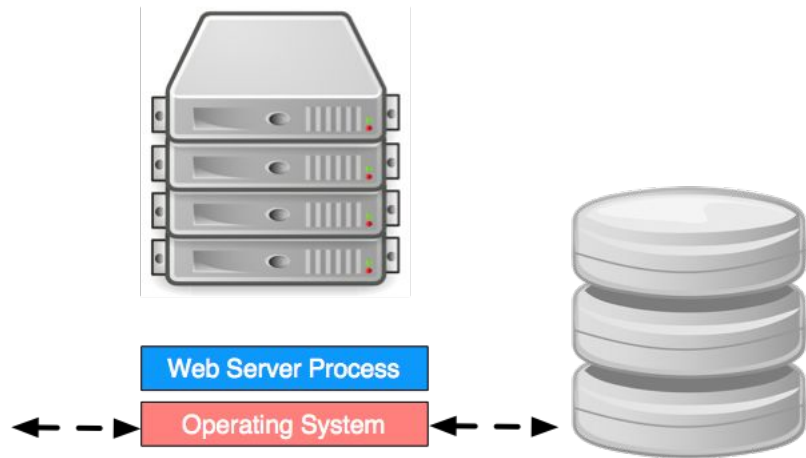
- Why server side caching exists
- What options you have when using server side caching
- How to use this in your projects
- How to deploy on AWS using CloudFormation



# Server-side Caching

We have a web server process that is repeatedly responding to HTTP requests from a variety of clients.

Responding to each request requires computation and I/O to be performed, and this can be expensive.

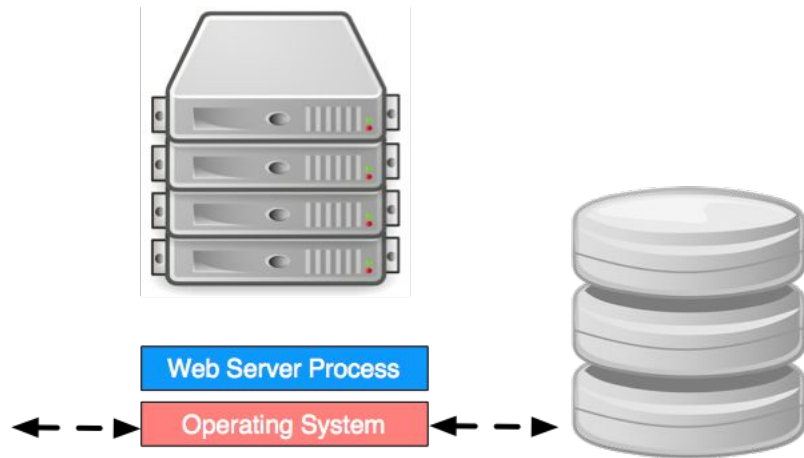


# Server-side Caching

In practice, there is a great deal of similarity between responses.

In the last lecture (HTTP Caching) we looked at optimizing scenarios where repeated responses are identical.

In this lecture we will look at optimizing scenarios where repeated responses are not identical, but are similar.

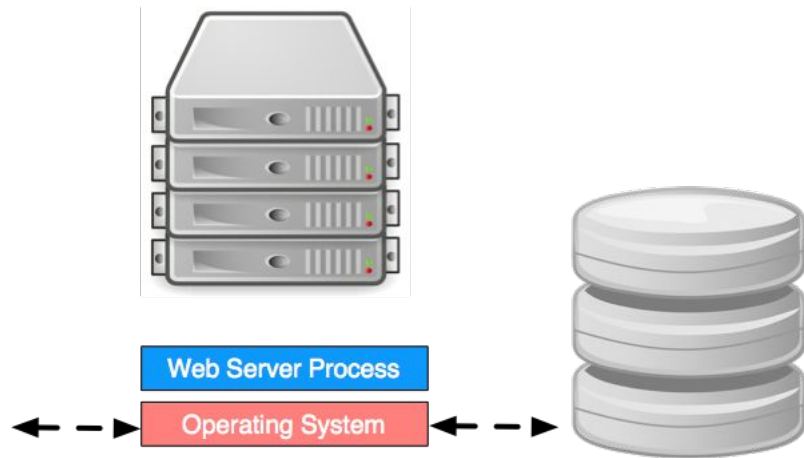


# Server-side Caching

There are many parts of a response that are similar.

There are many steps to creating a response that are repeated.

What can you think of?



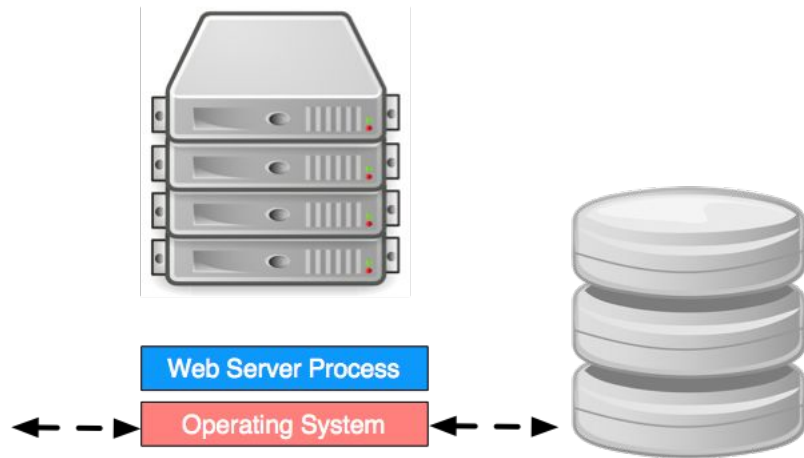
# Server-side Caching

There are many parts of a response that are similar.

There are many steps to creating a response that are repeated.

**What can you think of?**

- View Fragments
- Rarely modified ORM objects
- Any summarized data that is expensive to compute





# Server-side Caching

## View Fragments: Similarity between pages

```
<html><head><meta name="referrer" content="origin"><link rel="stylesheet" type="text/css" href="news.css?Dc4WHhDIHIntIL20h45C">

<link rel="shortcut icon" href="favicon.ico">

<link rel="alternate" type="application/rss+xml" title="RSS" href="rss">

<script type="text/javascript">

    function hide(id) { var el = document.getElementById(id); if (el) { el.style.visibility = 'hidden'; } }

    function vote(node) { var v = node.id.split(/_/); var item = v[1]; hide('up_' + item); hide('down_' + item); var ping = new Image(); ping.src = node.href;
return false;}

</script><title>Hacker News</title></head><body><center><table id="hnmain" op="news" border="0" cellpadding="0" cellspacing="0" width="85%" bgcolor="#f6f6ef">

<tr><td bgcolor="#fff660"><table border="0" cellpadding="0" cellspacing="0" width="100%" style="padding:2px"><tr><td style="width:18px;padding-right:4px"><a
href="http://www.ycombinator.com"></a></td>

<td style="line-height:12pt; height:10px;"><span class="pagetop">

        <b><a href="news">Hacker News</a></b><a href="newest">new</a> | <a href="newcomments">comments</a> | <a
href="show">show</a> | <a href="ask">ask</a> | <a href="jobs">jobs</a> | <a href="submit">submit</a></span></td><td style="text-align:right;padding-right:4px;"><span
class="pagetop">

        <a href="login?goto=news">login</a></span></td></tr></table></td></tr><tr style="height:10px"></tr><tr><td><table border="0" cellpadding="0"
cellspacing="0">

    <tr><td align="right" valign="top" class="title"><span class="rank">1.</span></td>

    <td><center><a id="up_9403571" href="vote?for=9403571&dir=up&goto=news"><div class="votearrow" title="upvote"></div></a></center></td><td
class="title"><span class="deadmark"></span><a href="http://fossdroid.com/">Fossdroid.com: Free and open source Android applications</a><span class="sitebit comhead">
(fossdroid.com)</span></td></tr><tr><td colspan="2"></td><td class="subtext">

    <span class="score" id="score_9403571">164 points</span> by <a href="user?id=SnaKeZ">SnaKeZ</a> <a href="item?id=9403571">4 hours ago</a>

    | <a
href="item?id=9403571">38 comments</a></td></tr>

<tr class="spacer" style="height:5px"></tr></tr></tr></pre></div>
```



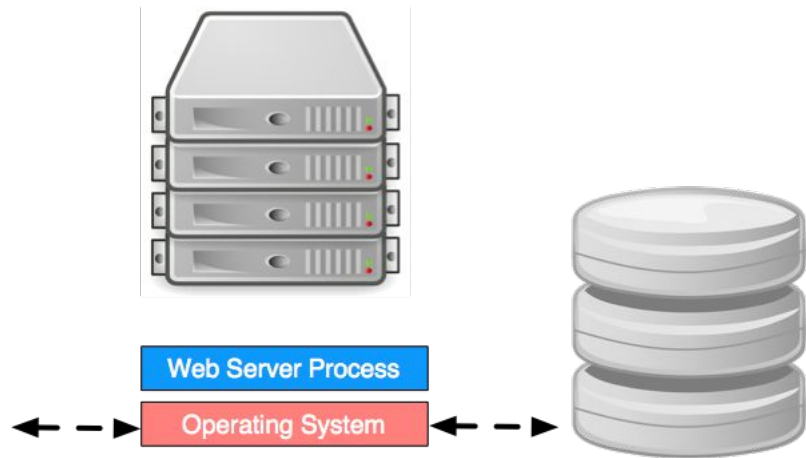
# Server-side Caching

Rarely modified ORM objects?

- User permissions
- Configuration options
- Any database-backed data that changes rarely

Summarized data that is difficult to compute

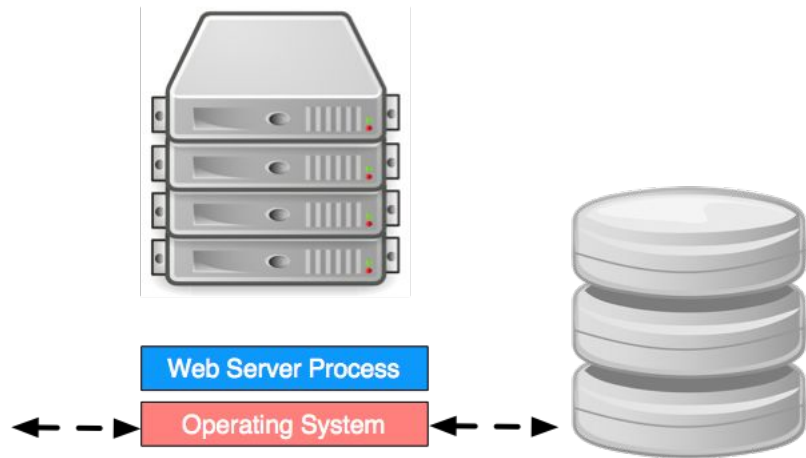
- Any particularly heavyweight SQL query
- Example: Total account balance on Mint.com



# Server-side Caching

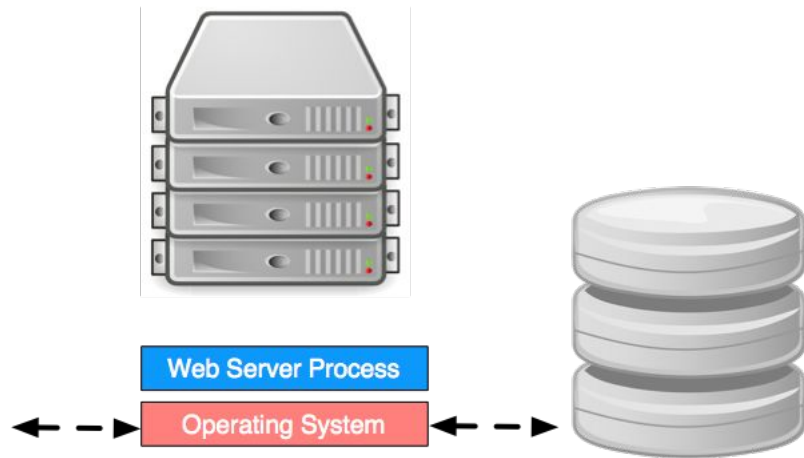
Some of these things are expensive to materialize

- View fragments are produced by extensive string manipulation.
  - Ruby optimizes humans over CPU
- The database can be a bottleneck in our current architecture
- Some SQL queries are necessarily heavyweight



# Server-side Caching

So if we want to keep previously computed results around between requests, how should we do it? Where should we put it?

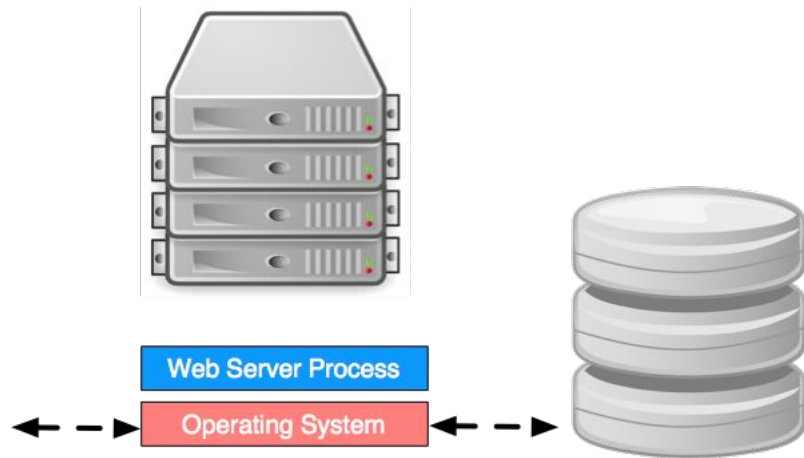


# Server-side Caching

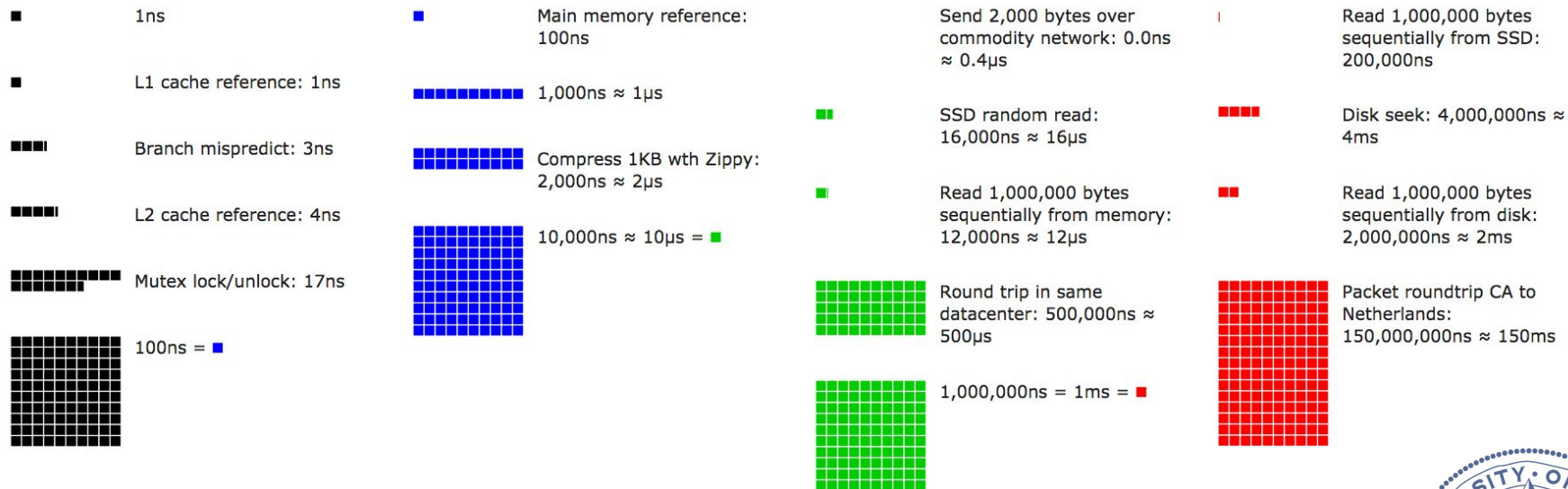
So if we want to keep previously computed results around between requests, how should we do it? Where should we put it?

- Just keep it in memory between requests?
- Store it on the filesystem?
- Store it in memory on another machine?

All of these are reasonable options. Lets look into each in more depth.



# Server-side Caching



# Server-side Caching

## What can we conclude from these numbers?

- Storing in memory and reading later is fast:
  - Random reads from memory will be  $0.1\mu\text{s}$ , reading 1MB will be  $12\mu\text{s}$
- Storing on disk is slow *without SSD*:
  - Disk seek is  $4000\mu\text{s}$ , subsequent sequential read of 1MB is  $2000\mu\text{s}$
- Storing on disk *with SSD* is much more reasonable:
  - Random read is  $16\mu\text{s}$ , sequential read of 1MB will be  $200\mu\text{s}$
- Storing on another machine is reasonable:
  - Round trip within datacenter is  $500\mu\text{s}$ .



# Server-side Caching

## Summary

- In memory: tens of  $\mu\text{s}$
- On SSD: hundreds of  $\mu\text{s}$
- On Disk: thousands of  $\mu\text{s}$
- And if it's on a remote machine, add hundreds of  $\mu\text{s}$ .

## Conclusion

- Always use SSD
- Memory > local SSD > Remote?





# Server-side Caching

**It's not that simple. Why?**



# Server-side Caching

**It's not that simple.**

What effect on the cache hit rate does each of these designs have?

- In memory: Cache per process
- On local SSD: Cache per machine
- On (single) remote machine: Cache per cluster



# Server-side Caching

## Conclusion:

- **In memory:** highest performance, lowest hit rate
- **On SSD:** lower performance, higher hit rate
- **On remote cache server:** lowest performance, highest hit rate

There is no silver bullet. How will each of these affect system performance:

- Number of processes per machine?
- Concurrency model of Application Server: threads vs. processes?
- Number of machines per cluster?



# Memcached

**Memcached is a commonly used implementation of a remote cache server**

- Keeps a cache in memory
- Accepts TCP connections and returns lookup requests
- Distributed key-value store
  - Keys can be up to 250 bytes, values can be up to 1MB
  - Can scale horizontally
- When it runs out of space, it uses a simple LRU mechanism to make more space
- Lightweight features, everything is constant time.
- Originally developed at LiveJournal

Another commonly used tool is Redis



# Rails Caching

The good news for your projects is that Rails has great support for server-side caching.

Rails emphasizes three types of caching:

- HTTP caching
- Fragment caching
- Low level caching

We covered HTTP caching in the last lecture, so today we will talk about fragment caching and low-level caching



# Rails Caching

By default, caching is disabled in development and test, and enabled in production

- If you want to use it in development mode, add this to your environment:

```
config.action_controller.perform_caching = true
```

Rails can be configured to store cached data in a few different places:

- In memory
- Local file system
- Remote in-memory store



# Rails Caching

## ActiveSupport::Cache::MemoryStore

- Cached data is stored in memory, in the same address space as the ruby process and is retained between requests.
- Defaults to 32 megs, but is configurable.

## ActiveSupport::Cache::FileStore

- Cached data is stored on the local file system.
- Can configure the location of the storage in Rails environment:
  - `config.cache_store = :file_store, "/path/to/cache/"`



# Rails Caching

## ActiveSupport::Cache::MemcacheStore

- Cached data is stored in memory on another machine.
- Can configure the location of the server in Rails environment:
  - `config.cache_store = :mem_cache_store, "cache-1.example.com"`





# Rails Caching - Fragment Caching

Fragment caching caches a portion of a rendered view for reuse on future requests.

Let's take a look at the demo app...



# Rails Caching - Fragment Caching

Demo App		
Submissions		
Title	Url	Community
A id ea officia.	http://williamson.net/rebekah	Est distinctio qui aut quis doloribus dignissimos sit sed. 20 comments
Earum sequi veniam libero quibusdam est corporis omnis voluptatem.	http://dare.biz/adolph_pouros	Est distinctio qui aut quis doloribus dignissimos sit sed. 20 comments
Deleniti vel expedita sint voluptate repellat.	http://schamberger.org/raphaelle	Est distinctio qui aut quis doloribus dignissimos sit sed. 20 comments
Neque eum sint cum magni.	http://vonruedenborer.name/edythe	Est distinctio qui aut quis doloribus dignissimos sit sed. 20 comments

We can cache each line of this markup.

Regardless of anything else that changes on the page, we can rerender this if it stays fresh



# Rails Caching - Fragment Caching

```
<tbody>
  <% @submissions.each do |submission| %>
    <tr>
      <td><%= link_to(submission.title, submission.url) %></td>
      <td><%= submission.url %></td>
      <td><%= submission.community.name %></td>
      <td><%= link_to "#{submission.comments.size} comments", submission, class: 'btn
btn-primary btn-xs' %></td>
    </tr>
  <% end %>
</tbody>
</table>
```



# Rails Caching - Fragment Caching

```
<tbody>
  <% @submissions.each do |submission| %>
    <% cache(cache_key_for_submission_row(submission)) do %>
      <tr>
        <td><%= link_to(submission.title, submission.url) %></td>
        <td><%= submission.url %></td>
        <td><%= submission.community.name %></td>
        <td><%= link_to "#{submission.comments.size} comments", submission, class: 'btn
btn-primary btn-xs' %></td>
      </tr>
    <% end %>
  <% end %>
</tbody>
</table>
```



# Rails Caching - Fragment Caching

How should we choose a cache key?

```
module SubmissionsHelper
  def cache_key_for_submission_row(submission)
    "submission-#{submission.id}"
  end
end
```

What are the weaknesses with the above approach?



# Rails Caching - Fragment Caching

How should we choose a cache key?

```
module SubmissionsHelper
  def cache_key_for_submission_row(submission)
    "submission-#{submission.id}"
  end
end
```

What are the weaknesses with the above approach?

- Invalidation will be annoying: clear out the cache on possible action causing staleness?



# Rails Caching - Fragment Caching

Instead, let's make the key change whenever the data gets stale.

```
module SubmissionsHelper
  def cache_key_for_submission_row(submission)
    "submission-#{submission.id}-#{submission.updated_at}-#{submission.comments.count}"
  end
end
```

There is no action needed to invalidate the cache: the cache key changes.



# Rails Caching - Fragment Caching

Demo App		
Submissions		
Title	Url	Community
A id ea officia.	http://williamson.net/rebekah	Est distinctio qui aut quis doloribus dignissimos sit sed. 20 comments
Earum sequi veniam libero quibusdam est corporis omnis voluptatem.	http://dare.biz/adolph_pouros	Est distinctio qui aut quis doloribus dignissimos sit sed. 20 comments
Deleniti vel expedita sint voluptate repellat.	http://schamberger.org/raphaelle	Est distinctio qui aut quis doloribus dignissimos sit sed. 20 comments
Neque eum sint cum magni.	http://vonruedenborer.name/edythe	Est distinctio qui aut quis doloribus dignissimos sit sed. 20 comments

If we step back and look at this page, we can observe that the whole table is expensive to compute and stays fresh for awhile.





# Rails Caching - Fragment Caching

```
<h3>Submissions</h3>
<table class="table">
  <thead>
    <tr>
      <th>Title</th>
      <th>Url</th>
      <th>Community</th>
      <th colspan="3"></th>
    </tr>
  </thead>

  <tbody>
    <% @submissions.each do |submission| %>
      <% cache(cache_key_for_submission_row(submission)) do %>
        <tr>
          <td><%= link_to(submission.title, submission.url) %></td>
          <td><%= submission.url %></td>
          <td><%= submission.community.name %></td>
          <td><%= link_to "#{submission.comments.size} comments", submission, class: 'btn btn-primary btn-xs' %></td>
        </tr>
      <% end %>
    <% end %>
  </tbody>
</table>

<br>
<%= link_to 'New Submission', new_submission_path, class: 'btn btn-primary' %>
<%= link_to 'New Community', new_community_path, class: 'btn btn-primary' %>
```



# Rails Caching - Fragment Caching

```
<% cache(cache_key_for_submission_table) do %>
  <h3>Submissions</h3>
  <table class="table">
    <thead>
      <tr>
        <th>Title</th>
        <th>Url</th>
        <th>Community</th>
        <th colspan="3"></th>
      </tr>
    </thead>

    <tbody>
      <% @submissions.each do |submission| %>
        <% cache(cache_key_for_submission_row(submission)) do %>
          <tr>
            <td><%= link_to(submission.title, submission.url) %></td>
            <td><%= submission.url %></td>
            <td><%= submission.community.name %></td>
            <td><%= link_to "#{submission.comments.size} comments", submission, class: 'btn btn-primary btn-xs' %></td>
          </tr>
        <% end %>
      <% end %>
    </tbody>
  </table>

  <br>
  <%= link_to 'New Submission', new_submission_path, class: 'btn btn-primary' %>
  <%= link_to 'New Community', new_community_path, class: 'btn btn-primary' %>
<% end %>
```



# Rails Caching - Fragment Caching

```
module SubmissionsHelper
  def cache_key_for_submission_row(submission)
    "submission-#{submission.id}-#{submission.updated_at}-#{submission.comments.count}"
  end
  def cache_key_for_submission_table
    "submission-table-#{Submission.maximum(:updated_at)}-#{Comment.maximum(:updated_at)}"
  end
end
```

This technique of nesting cache fragments is known as “Russian Doll” caching.



# Rails Caching - Low-level Caching

You can use the same mechanisms to cache anything:

```
class Product < ActiveRecord::Base
  def competing_price
    Rails.cache.fetch("#{cache_key}/competing_price", expires_in: 12.hours) do
      Competitor::API.find_price(id)
    end
  end
end
```



# Rails Caching - Low-level Caching

Let's compare the demo app's performance!

For these tests I will compare the performance of the branch master, with the branch “server\_side\_caching”, which implements the caching shown in the previous slides.

Master intentionally includes no optimizations to the way we interact with the database.

We will use the default (memory) caching.



# Rails Caching

We'll use an M3-medium instance with the usual workload.

When we test we will have 12 phases, of 60 seconds each:

Phase	1	2	3	4	5	6	7	8	9	10	11	12
Users/sec	1	1.5	2	4	6	10	16	20	25	35	45	55

Deployed using nginx & passenger.



# Rails Caching

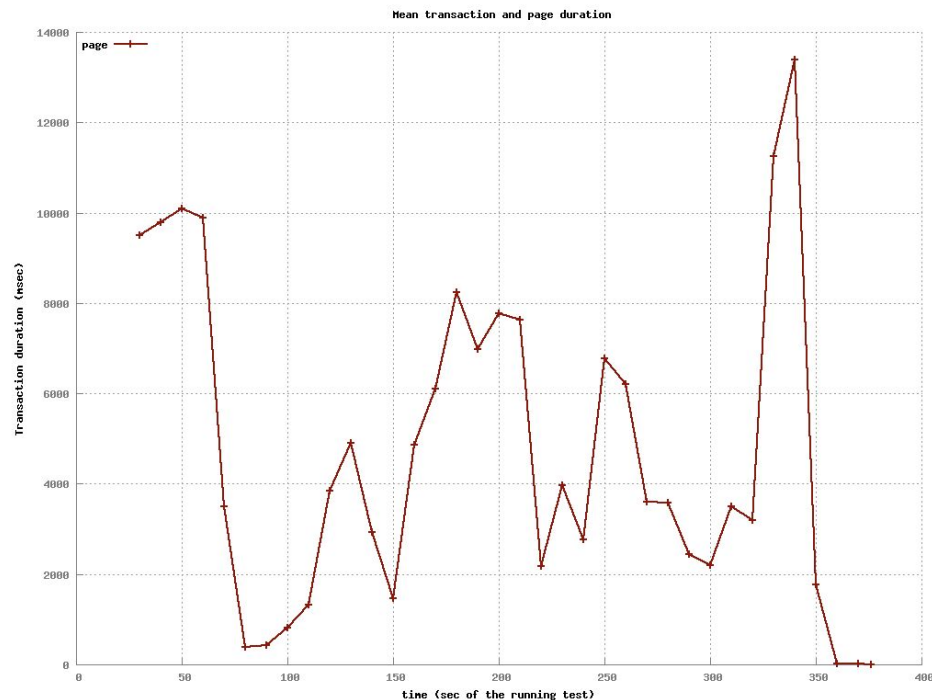
**We will use the same testing script from before...**

1. Going to the homepage
2. Waiting for up to 2 seconds
3. Requesting a form to create a new community
4. Waiting for up to 2 seconds
5. Submitting the new community
6. Requesting a form to create a new link submission
7. Waiting for up to 2 seconds
8. Submitting the new link
9. Waiting for up to 2 seconds
10. Delete the link
11. Waiting for up to 2 seconds
12. Delete the community



# Rails Caching

Performance on master:



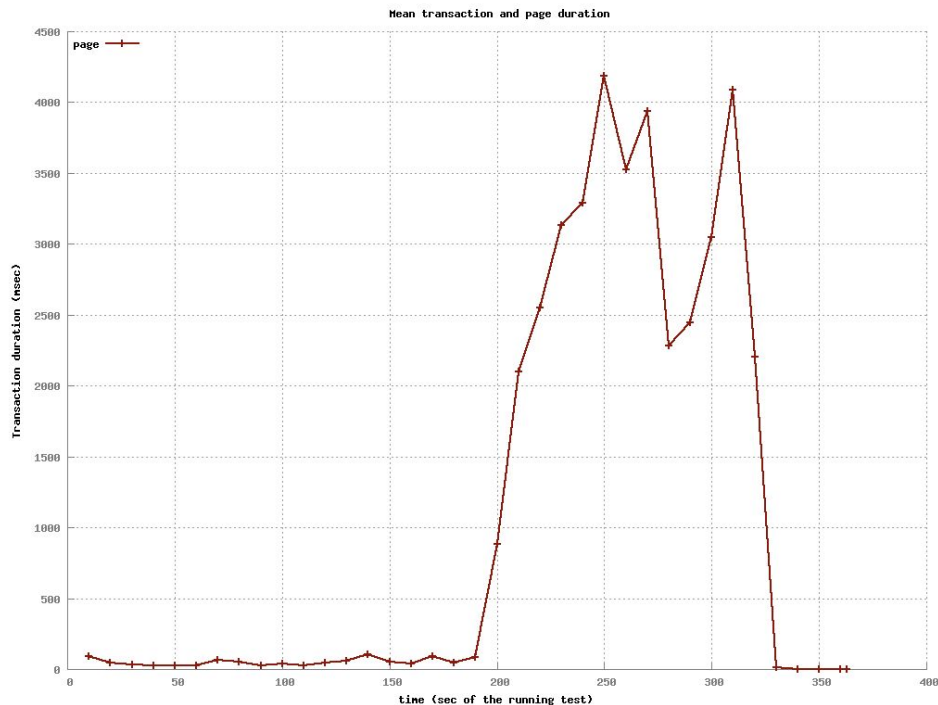
From the start, the application can't handle a single user arriving each second





# Rails Caching

Performance on server\_side\_caching:



With the server-side caching implemented, the server can handle up to two new users a second easily.



# AWS Instructions

Now that you've all got a blank Rails app (or more) pushed to Github, it's time to learn how to deploy to AWS.

We will be using CloudFormation, and here are step-by-step instructions for deploying.

**But first, some warnings and rules.**



# AWS Instructions

## These are scarce resources

- This is free time on Amazon's infrastructure, and it's not unlimited.
- Unless you have a specific reason to do otherwise, always use micro instances.
  - Example of a good reason: testing vertical scaling.



# AWS Instructions

## These are scarce resources

- Our AWS budget has a fixed limit.
- Whenever you are done with an instance, shut it down.
- Never keep important data on the instance, because it can go down at any time.
  - SCP important data back to your laptop.
- I will periodically run a script that terminates all instances that have been up longer than 8 hours.



# AWS Instructions

**Treat these credentials as secrets.**

- Do not check into any publicly accessible repository
- There are automated scripts that actively seek out AWS credentials
  - Why?



# AWS Instructions

Today you will receive an email with AWS credentials. These include:

- A.txt file
  - Username: what you use to log in to the AWS web interface
  - Password: the password you use to log in to the AWS web interface
- A.pem file
  - Contains a private key that you will use to ssh into the instances that you launch.



# AWS Instructions

Go to <https://scalable-internet-services.signin.aws.amazon.com/console>



Account:

User Name:

Password:

☐ I have an MFA Token [\(more info\)](#)

Sign In

[Sign-in using root account credentials](#)

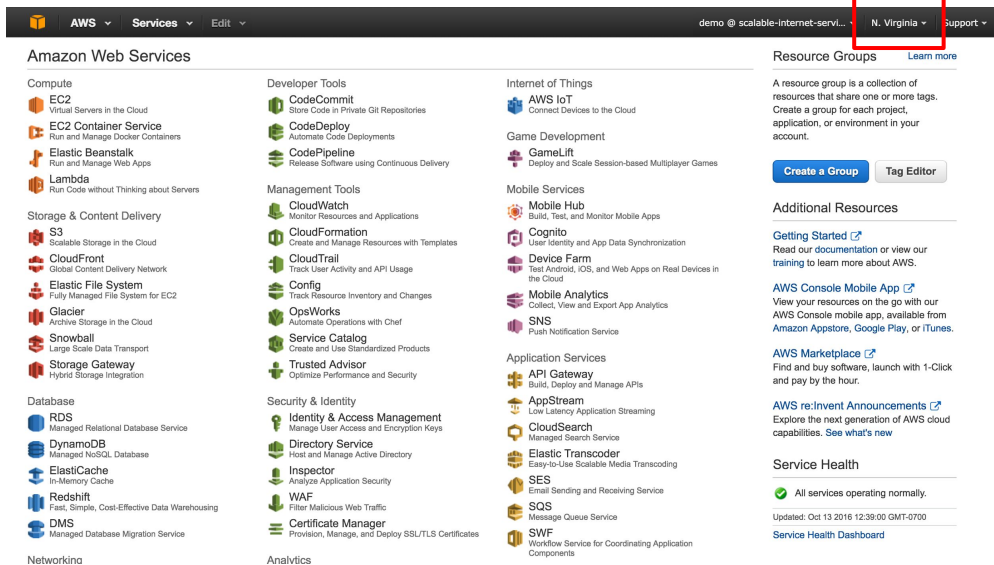
English

[Terms of Use](#) [Privacy Policy](#) © 1996-2015, Amazon Web Services, Inc. or its affiliates.

Login with Username and Password provided in txt file in email.



# AWS Instructions



The screenshot shows the AWS Management Console interface. At the top, the navigation bar includes the AWS logo, 'AWS', 'Services', 'Edit', and a user profile 'demo @ scalable-internet-serv...'. The region dropdown menu is highlighted with a red box and shows 'N. Virginia' selected. Below the navigation bar, the console is divided into several sections: 'Amazon Web Services' (listing categories like Compute, Storage & Content Delivery, Database, and Networking), 'Developer Tools', 'Internet of Things', 'Resource Groups', 'Additional Resources', 'Service Health', and 'Analytics'. The 'Resource Groups' section is expanded, showing a description of resource groups and buttons for 'Create a Group' and 'Tag Editor'.

Make sure your region is set to  
“US-East N. Virginia”





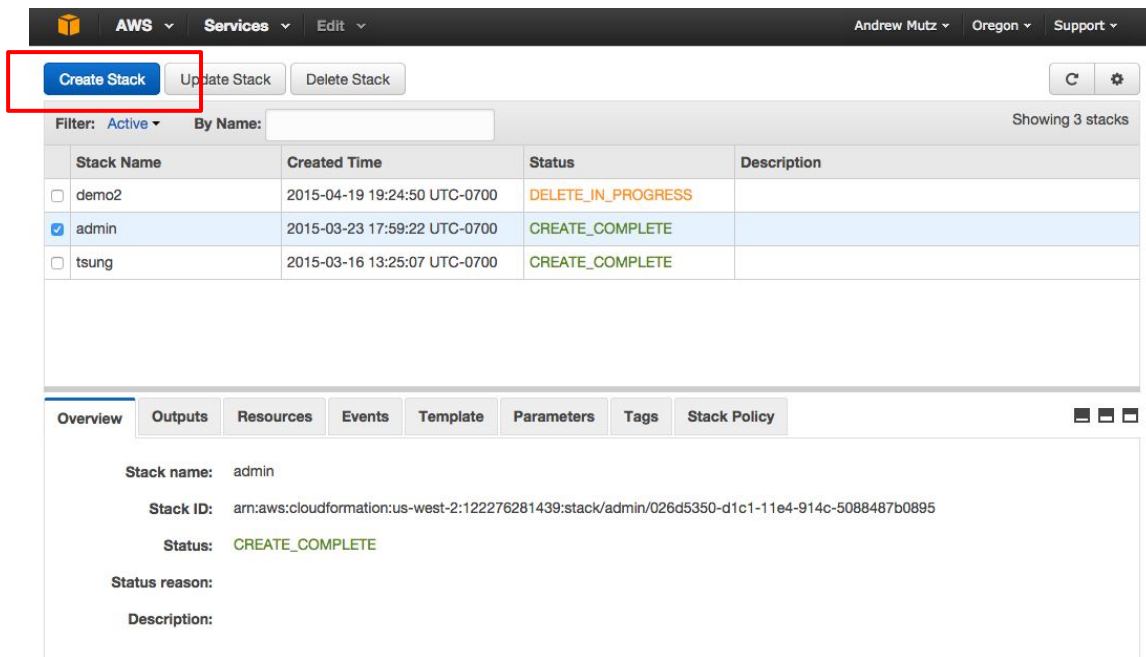
# AWS Instructions

We will be deploying with  
cloudformation, so click on that

The screenshot shows the AWS Management Console interface. At the top, there's a navigation bar with the AWS logo, 'Services' dropdown, 'Edit' dropdown, and a user profile section showing 'demo @ scalable-internet-serv...' and 'N. Virginia' with a 'Support' link. Below the navigation bar, the 'Amazon Web Services' page is displayed. The page is organized into several columns. The first column lists various services under categories like 'Compute', 'Storage & Content Delivery', 'Database', and 'Networking'. The second column, 'Management Tools', contains 'CloudWatch', 'CloudFormation' (highlighted with a red box), and 'CloudTrail'. The third column, 'Developer Tools', includes 'CodeCommit', 'CodeDeploy', and 'CodePipeline'. The fourth column, 'Internet of Things', lists 'AWS IoT', 'Game Development', and 'Mobile Services'. The fifth column, 'Resource Groups', explains that a resource group is a collection of resources that share one or more tags and provides buttons for 'Create a Group' and 'Tag Editor'. The sixth column, 'Additional Resources', includes links for 'Getting Started', 'AWS Console Mobile App', 'AWS Marketplace', 'AWS re:Invent Announcements', and 'Service Health'. The 'Service Health' section shows a green checkmark indicating 'All services operating normally' and provides an update timestamp of 'Oct 13 2016 12:39:00 GMT-0700' and a link to the 'Service Health Dashboard'.



# AWS Instructions



The screenshot shows the AWS CloudFormation console interface. At the top, there's a navigation bar with 'AWS', 'Services', and 'Edit' dropdowns, along with user information 'Andrew Mutz', region 'Oregon', and 'Support'. Below this, there are three buttons: 'Create Stack' (highlighted with a red box), 'Update Stack', and 'Delete Stack'. To the right of these buttons are icons for refresh and settings. Below the buttons, there's a filter section with 'Filter: Active' and a search box 'By Name:'. A table lists three stacks:

Stack Name	Created Time	Status	Description
<input type="checkbox"/> demo2	2015-04-19 19:24:50 UTC-0700	DELETE_IN_PROGRESS	
<input checked="" type="checkbox"/> admin	2015-03-23 17:59:22 UTC-0700	CREATE_COMPLETE	
<input type="checkbox"/> tsung	2015-03-16 13:25:07 UTC-0700	CREATE_COMPLETE	


Below the table, there's a section for the selected stack 'admin'. It includes tabs for 'Overview', 'Outputs', 'Resources', 'Events', 'Template', 'Parameters', 'Tags', and 'Stack Policy'. The 'Overview' tab is active, showing details for the stack 'admin':

- Stack name: admin
- Stack ID: arn:aws:cloudformation:us-west-2:122276281439:stack/admin/026d5350-d1c1-11e4-914c-5088487b0895
- Status: CREATE\_COMPLETE
- Status reason:
- Description:

Click on “Create Stack”



# AWS Instructions

 AWS

Services

Edit

demo @ scalable-Internet-servi... Oregon Support

Select Template

Specify Details

Options

Review

Select Template

Select the template that describes the stack that you want to create. A stack is a group of related resources that you manage as a single unit.

Design a template

Use AWS CloudFormation Designer to create or modify an existing template. [Learn more.](#)

Design template

Choose a template

A template is a JSON-formatted text file that describes your stack's resources and their properties. [Learn more.](#)

☒ Select a sample template

☐ Upload a template to Amazon S3

☐ Specify an Amazon S3 template URL

Choose File no file selected








Cancel

Next

We want to specify an Amazon S3 template URL.



# AWS Instructions

 bboe	Fix issue with constant import.	Latest commit a3e0f1d 27 days ago
 scalable_admin	Fix issue with constant import.	27 days ago
 .gitignore	Complete module to package transition.	a year ago
 Bootstrap.json	fixing bootstrap.json	a year ago
 MANIFEST.in	Extract INIT segments into their own files.	a year ago
 README.md	Fix minor formatting issues.	27 days ago
 setup.py	Fix minor formatting issues.	27 days ago

 README.md

## Scalable Internet Services Templates

### Single Instance Templates

Both the app server, and database are located on a single EC2 instance.

- **NGINX + Passenger** (Recommended for regular testing):  
NGINX handles requests to port 80 and passes connections to instances of the app through Passenger. Multiple concurrent connections are supported.
  - (UCLA) <https://scalableinternetservices.s3.amazonaws.com/SinglePassenger.json>
  - (UCSB) <https://cs290b.s3.amazonaws.com/SinglePassenger.json>
- **NGINX + Passenger + memcached**:  
Same as above, with the addition of using memcached through the `dalli` gem.
  - (UCLA) <https://scalableinternetservices.s3.amazonaws.com/SinglePassengerMemcached.json>
  - (UCSB) <https://cs290b.s3.amazonaws.com/SinglePassengerMemcached.json>

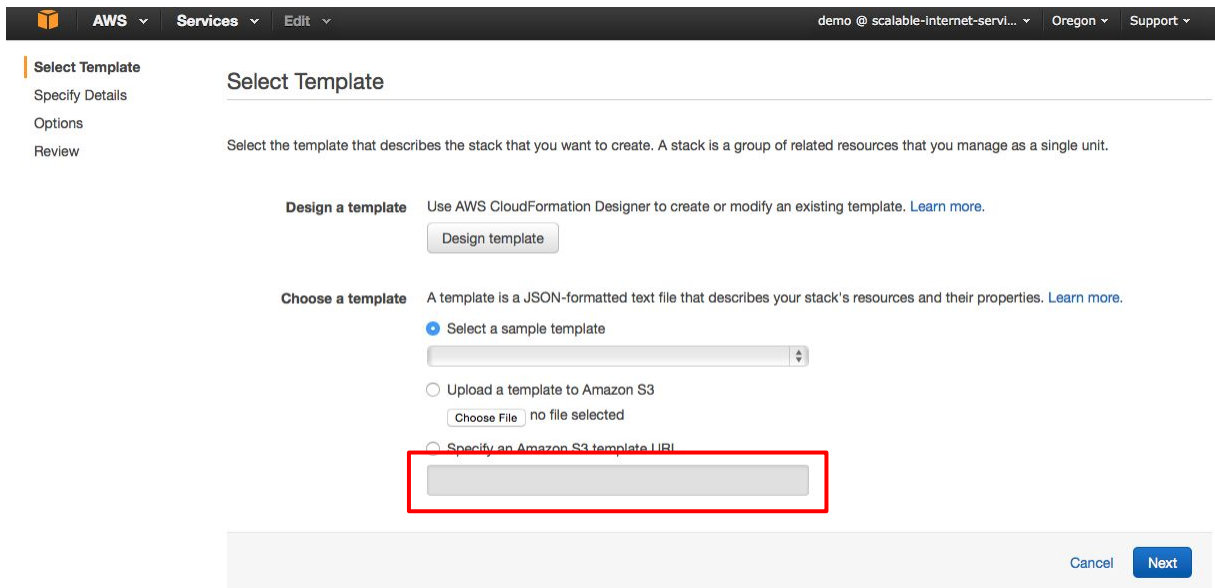
Go to  
<https://github.com/scalableinternetservices/utls>  
and choose your template.

Today just choose the UCLA passenger template.

Copy the link.



# AWS Instructions



The screenshot shows the AWS CloudFormation console's 'Select Template' page. The top navigation bar includes the AWS logo, 'AWS', 'Services', 'Edit', and a user profile 'demo @ scalable-Internet-servi...'. The left sidebar has links for 'Select Template', 'Specify Details', 'Options', and 'Review'. The main content area is titled 'Select Template' and includes a description: 'Select the template that describes the stack that you want to create. A stack is a group of related resources that you manage as a single unit.'

There are three main sections:

- Design a template:** 'Use AWS CloudFormation Designer to create or modify an existing template. [Learn more.](#)' with a 'Design template' button.
- Choose a template:** 'A template is a JSON-formatted text file that describes your stack's resources and their properties. [Learn more.](#)'
  - ☒ **Select a sample template:** A dropdown menu.
  - ☐ **Upload a template to Amazon S3:** Includes a 'Choose File' button and the text 'no file selected'.
  - ☐ **Specify an Amazon S3 template URL:** This option is highlighted with a red rectangular box, and it has an empty text input field below it.

At the bottom right, there are 'Cancel' and 'Next' buttons.

Paste the link to the template in the field labeled “Specify an Amazon S3 Template URL”



# AWS Instructions

The screenshot shows the AWS CloudFormation console interface. At the top, there's a navigation bar with 'AWS', 'Services', and 'Edit' tabs. Below this, the 'Specify Details' section is active. It contains a text input for 'Stack name' which is highlighted with a red rectangle. Below the 'Stack name' field, there's a 'Parameters' section with three parameters: 'AppInstanceType' (set to 't1.micro'), 'Branch' (set to 'master'), and 'TeamName' (set to an empty field). A red error message at the bottom states 'TeamName has an invalid value.' The 'Next' button is disabled.

The stack name must begin with your team name.

For example: “demo-test”



# AWS Instructions

AWS Services Edit demo @ scalable-internet-servi... Oregon Support

Select Template

**Specify Details**

Options

Review

Specify a stack name and parameter values. You can use or change the default parameter values, which are defined in the AWS CloudFormation template. [Learn more.](#)

Stack name

**Parameters**

**AppInstanceType**  The AppServer instance type.

**Branch**  The git branch to deploy.

**TeamName**  Your team name.

▲ Parameters with AllowedValues must not be empty

▲ TeamName has an invalid value.

Cancel Previous **Next**

Choose your fields.

Select your TeamName from the dropdown.

The teamname is how the template knows where to get your code.



# AWS Instructions

## Options

### Tags

You can specify tags (key-value pairs) for resources in your stack. You can add up to 10 unique key-value pairs for each stack. [Learn more.](#)

	Key (127 characters maximum)	Value (255 characters maximum)	
1	<input type="text"/>	<input type="text"/>	<input type="button" value="+"/>

### Advanced

You can set additional options for your stack, like notification options and a stack policy. [Learn more.](#)

#### Notification options

☒ No notification

☐ New Amazon SNS topic

Topic

Email

☐ Existing Amazon SNS topic

Timeout ⓘ

Minutes

Rollback on failure ⓘ

☒ Yes

☐ No

Stack policy ⓘ

☐ Enter policy

☒ Upload policy file

No file chosen

[Learn more](#)

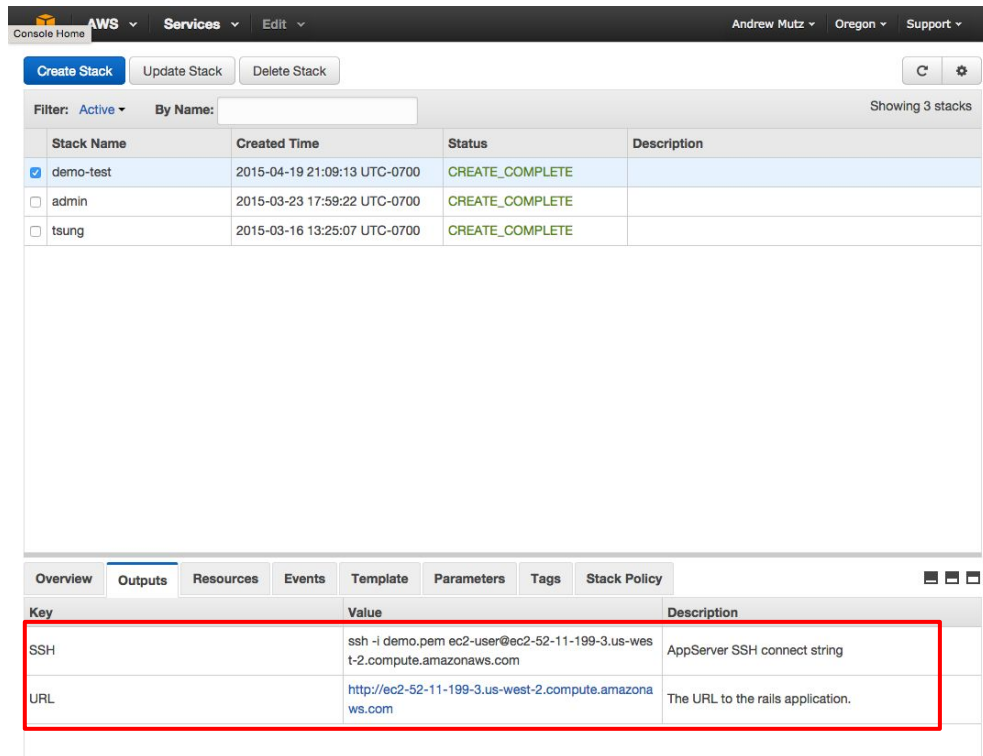
On the next screen just choose “Next”

If you are having problems deploying, you can disable rollback.





# AWS Instructions



The screenshot shows the AWS Management Console interface. At the top, there's a navigation bar with 'AWS', 'Services', and 'Edit' dropdowns, along with the user 'Andrew Mutz' and region 'Oregon'. Below this, there are buttons for 'Create Stack', 'Update Stack', and 'Delete Stack'. A filter section shows 'Filter: Active' and 'By Name:'. A table lists three stacks: 'demo-test' (created 2015-04-19, status 'CREATE\_COMPLETE'), 'admin' (created 2015-03-23, status 'CREATE\_COMPLETE'), and 'tsung' (created 2015-03-16, status 'CREATE\_COMPLETE'). The bottom pane shows the 'Outputs' tab for the 'demo-test' stack. It contains a table with two rows: 'SSH' with the value 'ssh -i demo.pem ec2-user@ec2-52-11-199-3.us-west-2.compute.amazonaws.com' and description 'AppServer SSH connect string', and 'URL' with the value 'http://ec2-52-11-199-3.us-west-2.compute.amazonaws.com' and description 'The URL to the rails application.'.

Stack Name	Created Time	Status	Description
<input checked="" type="checkbox"/> demo-test	2015-04-19 21:09:13 UTC-0700	CREATE_COMPLETE	
<input type="checkbox"/> admin	2015-03-23 17:59:22 UTC-0700	CREATE_COMPLETE	
<input type="checkbox"/> tsung	2015-03-16 13:25:07 UTC-0700	CREATE_COMPLETE	

Key	Value	Description
SSH	ssh -i demo.pem ec2-user@ec2-52-11-199-3.us-west-2.compute.amazonaws.com	AppServer SSH connect string
URL	http://ec2-52-11-199-3.us-west-2.compute.amazonaws.com	The URL to the rails application.

After creation, the outputs tab in the bottom pane will tell you how to reach your server via HTTP and SSH.

The PEM file mentioned in the SSH command was emailed to you.

SCP accepts the same `-i FILE.pem` argument



# AWS Instructions

How do I SSH into my instance?

- `ssh -i [your pemfile here] ec2-user@ec2-something.us-west-2.compute.amazonaws.com`

How do I copy files to/from my instance?

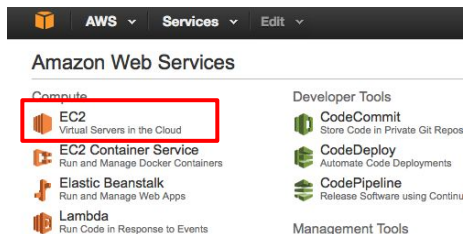
- `scp -i [your pemfile here] ec2-user@ec2-something.us-west-2.compute.amazonaws.com:fromfile tofile`



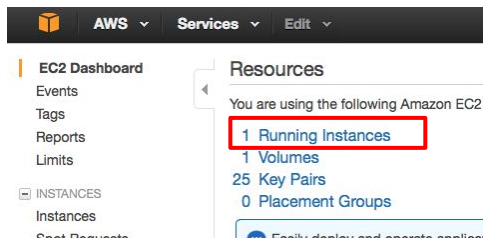
# AWS Instructions

My cloudformation stack failed to deploy. How do I debug this?

1. Go to the AWS dashboard and select EC2



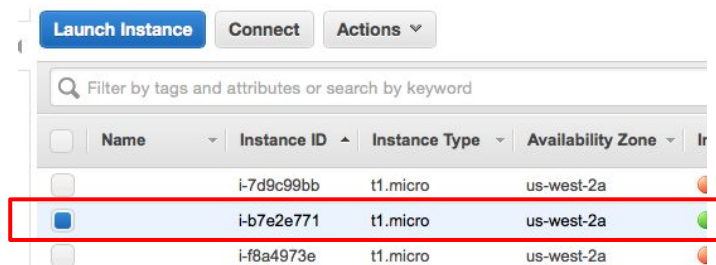
2. Click on “X Running Instances”



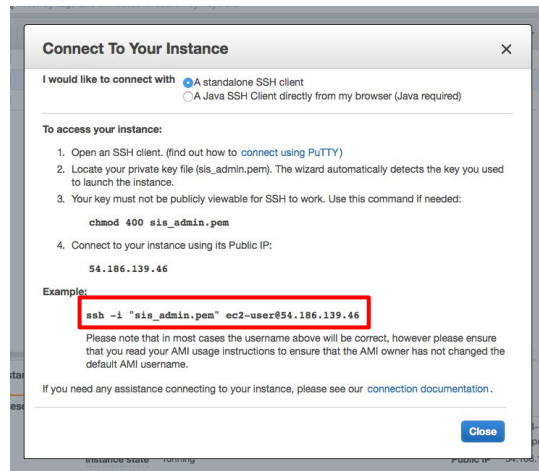
# AWS Instructions

My cloudformation stack failed to deploy. How do I debug this?

3. Select the instance corresponding to your team



4. Click the connect button and copy and paste the ssh command.



# AWS Instructions

**My cloudformation stack failed to deploy. How do I debug this?**

Once you have SSHed into your instance, you can find details of problems at:

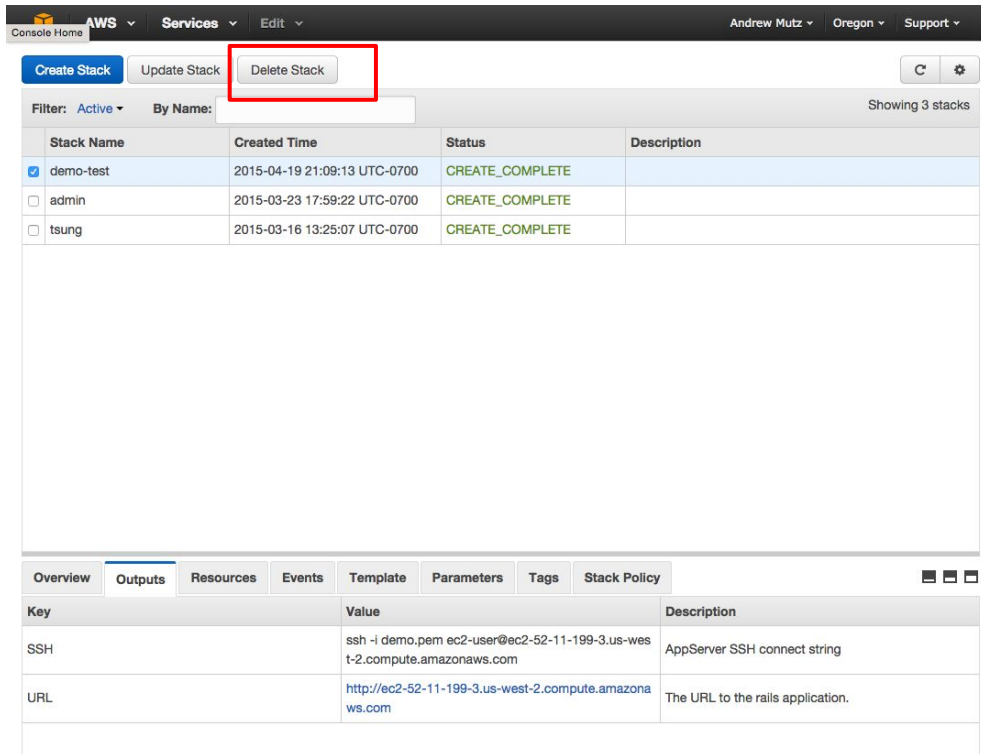
```
/var/log/cloud-init-output.log
```

You can also read the script that was executed on CF startup here:

```
/var/lib/cloud/instance/scripts/part-001
```



# AWS Instructions



The screenshot shows the AWS Management Console interface. At the top, there's a navigation bar with 'AWS', 'Services', and 'Edit' dropdowns, along with the user 'Andrew Mutz', region 'Oregon', and 'Support' link. Below this, there are three buttons: 'Create Stack', 'Update Stack', and 'Delete Stack'. The 'Delete Stack' button is highlighted with a red rectangular box. Below the buttons, there's a filter section with 'Filter: Active' and 'By Name:' dropdowns, and a 'Showing 3 stacks' indicator. A table lists three stacks: 'demo-test', 'admin', and 'tsung'. The 'demo-test' stack is selected with a blue checkbox. Below the table, there's a section for 'Outputs' with tabs for 'Overview', 'Outputs', 'Resources', 'Events', 'Template', 'Parameters', 'Tags', and 'Stack Policy'. The 'Outputs' tab is active, showing a table with columns 'Key', 'Value', and 'Description'. The table contains two rows: 'SSH' with a value 'ssh -i demo.pem ec2-user@ec2-52-11-199-3.us-west-2.compute.amazonaws.com' and description 'AppServer SSH connect string', and 'URL' with a value 'http://ec2-52-11-199-3.us-west-2.compute.amazonaws.com' and description 'The URL to the rails application.'

Stack Name	Created Time	Status	Description
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Key	Value	Description
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URL	http://ec2-52-11-199-3.us-west-2.compute.amazonaws.com	The URL to the rails application.

When you are done with your stack, remember to delete it!

If you have any questions, please post to Piazza!



# Motivation

**After today you should understand**

- Why server side caching exists
- What options you have when using server side caching
- How to use this in your projects
- How to deploy on AWS using CloudFormation



# For Next Time...

Continue to work on sprint 1 stories. We will demo your progress at tomorrow's lab.

Try and get your app deployed on AWS. If you run into problems please post on Piazza

