

@home in the Cloud

WPCampus Online 2018



Jason Cauwels
Senior Web Developer
USC ITS Web Services

@troutacular
#AtHomeInTheCloud

Big Shout Out

None of this project was possible
without my colleague James Hong

What if...

There were tornadoes... with sharks!!

SyFy



When sharks start raining on LA

We suddenly have...

- Over 50,000 people trying to access our Homepage
- Communications trying to post updates to two versions of CMS admins
- All while possibly fighting off sharks!

So why would we change anything?

In an emergency, we needed the following

1. Mitigation for huge traffic spikes in both emergency and non emergency cases
2. Ability to use emergency messaging and visual presentation of messaging
3. Technical stability

A Major Emergency

Our Emergency Blogger page would take over the Homepage.

The screenshot shows the USC homepage with a large red banner at the top. The banner contains the text "USC Emergency Information". Below the banner, there is a section titled "Safety and Preparedness" with a yellow background. This section includes a heading "In the Event of an Emergency" and a paragraph explaining that the page will be updated with the latest information available to the university. It also states that during a major event, this page will replace the university's home page. Another section titled "To Report an Emergency" provides contact information for the USC Department of Public Safety. At the bottom of the page, there is a footer with links to various USC websites and social media icons.

students alumni parents faculty employees sports [popular links](#) Search USC >

USC Emergency Information

Safety and Preparedness

In the Event of an Emergency

This page will be updated with the latest information available to the university. During a major event, this page will replace the university's home page.

If you are seeing this page and there is no known emergency, the USC web site may be experiencing technical difficulties. The university is in the process of migrating to a new system, and this may increase the likelihood of occasional redirects during that migration period.

To Report an Emergency

Call the USC Department of Public Safety
University Park campus:
213-740-4321
Health Sciences campus:
323-442-1000

FRIDAY, JANUARY 26, 2018

Sharks!

Sharks are raining down on LA! Take cover or arm yourself with chainsaws!

Posted at 1/26/2018 02:08:00 PM [M](#) [C](#) [T](#) [F](#) [G+](#)

[Home](#)

USC University of Southern California



A minor notice

A featured story or news story would announce the alert.

[about](#) [administration](#) [admission](#) [academics](#) [research](#) [patient care](#) [community](#) [arts](#) [global initiatives](#)



[Can strategies like fasting lead to](#)



[5 ways artificial intelligence will](#)



[How exercise can boost the](#)



[Explore USC](#)

Everything works, right?

- The complete publishing environment was so complicated that only a few people knew how it fully worked
- Unless it was an Emergency site takeover, the updates blended into the content
- The primary editors used
 - WordPress for all other sites
 - Older CMS for the Homepage
 - Blogger for the Emergency site

And then there was mobile

There were no emergency notifications on mobile.

If you are running from a shark, you are probably not getting updates on a laptop.

The screenshot shows the mobile version of the University of Southern California's website. At the top, the USC logo and "University of Southern California" are displayed against a red background. Below this, a black header bar contains the text "USCmobile services for your device" in white. Underneath the header are eight service icons arranged in two rows of four: Maps, News, Directory, Photos; Events, Library, Classes, and Tram. A horizontal ellipsis "..." is positioned between the second and third columns of icons. Below the icons is a navigation menu with three tabs: "Navigation" (which is highlighted with a yellow arrow pointing to it), "Popular Links", and "News". The "Navigation" tab has a dropdown menu with seven items: "About", "Administration", "Admission", "Academics", "Research", "Patient Care", and "Community", each preceded by a right-pointing arrow.

Navigation	Popular Links	News
About >		
Administration >		
Admission >		
Academics >		
Research >		
Patient Care >		
Community >		

We needed to get
messages out faster

Sharks wait for no one

Primary Criteria

UX and Design

- Responsive Homepage
- Emergency notifications on Homepage
- Update the Emergency site branding

Administration and Usability

- Migrate to WordPress from older CMS

Security and Technical Considerations

- Resilient and scalable for traffic spikes
- Decrease load time
- Move application to the Cloud

Considerations

Security and Technical Considerations

- Moving our www to AWS
- 301 redirects (over 1,000)
- Authentication for admin users
- Traffic
 - Averaging just under 1MM views per month for our Homepage
- Scaling
 - How do we autoscale for planned and unplanned traffic spikes
- Are we exposing ourselves to security issues?

Implementation

- Do we have the resources?
 - Current projects
 - Maintenance
 - New initiatives
- Do we have the skill sets needed?
 - Do we develop this in WordPress?
 - Do we create a Single Page App (SPA)?

How did we choose AWS?

Vendor Decision

- Why not use a third party WordPress solution?
- There are plenty of great choices available
- In fact, we submitted RFP's to several vendors

There was one deciding factor for AWS

*“We just signed a
huge contract with
AWS and we should
really use them”*

OK, we have a vendor

Now what?

How do we do this?

- How are we going to set up WordPress in AWS?
- What about our security setup for the admin?
- What about the redirects, how will we handle those?
- Are we thinking of moving our DNS to Amazon?
- A lot of questions ensued...

Discovery

- What options do we have within AWS?
- You can host a traditional WordPress environment in AWS
- However, since we were moving www to the platform:
 - Redirects were going to ramp up costs quickly
 - We had to build all large instances of services to handle normal traffic and spikes

Phased Approach

We needed to break up our project into phases.

There were just too many other items running simultaneously:

- Client projects
- Maintenance
- Day-to-day operations
- Stocking shark repellent

Phase I

We had this idea

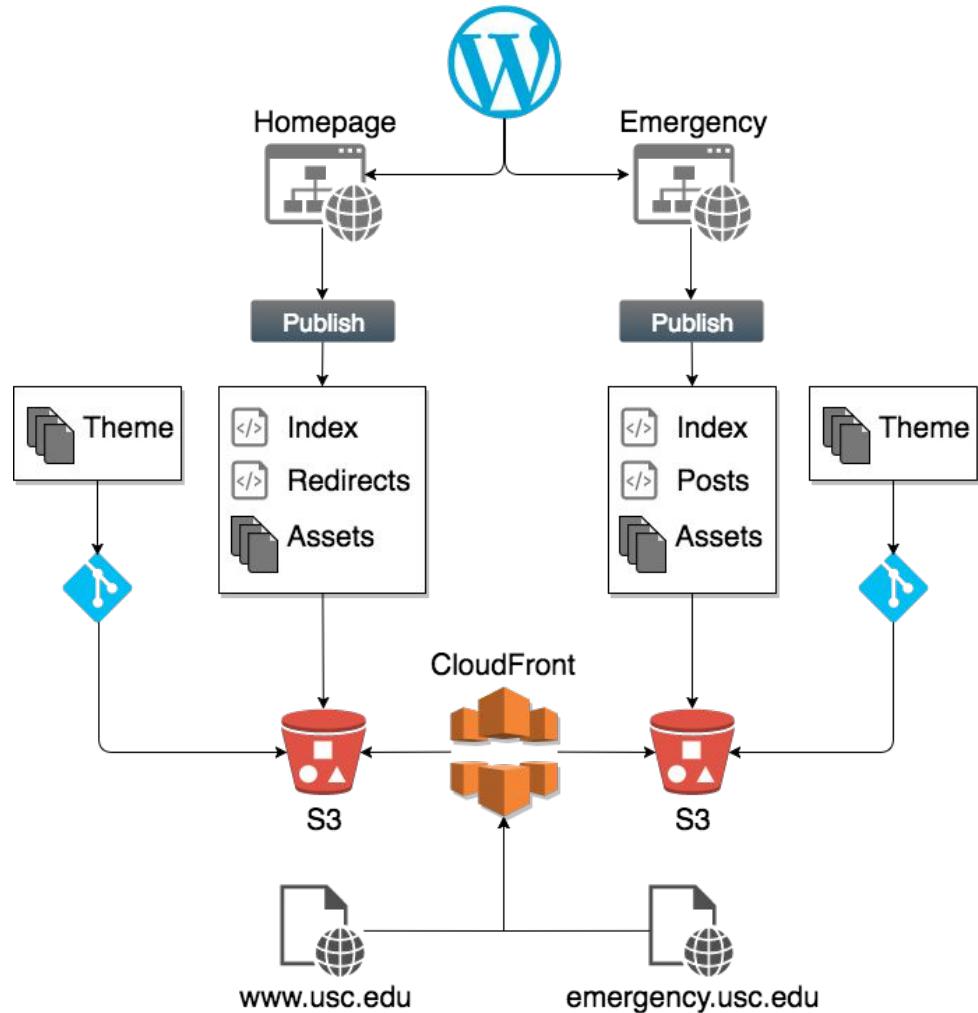
What if we made everything static in AWS S3?

- It's fast
- It doesn't expose the admin so it's secure
- It's available in multiple regions and zones

Publishing Workflow

WordPress Multisite
(Admin) that also acts as a
staging site.

When ready, an admin
publishes content to AWS
S3 buckets.



It works!

We launched in May of 2017

But did it make a difference?

Primary Criteria

UX and Design

Responsive Homepage

Emergency notifications on Homepage

Update the Emergency site branding

Administration and Usability

Migrate to WordPress from older CMS

Security and Technical Considerations

Resilient and scalable for traffic spikes

Decrease load time

Move application to the Cloud

USCmobile services for your device



Navigation Popular Links News

- About >
- Administration >
- Admission >
- Academics >
- Research >
- Patient Care >
- Community >

students alumni parents faculty employees sports popular links Search USC >

USC University of Southern California

about administration admission academics research patient care community arts global initiatives

Sharks attack LA
Sharks are raining down on LA! Take cover or arm yourself with chainsaws.

Can strategies like fasting lead to 5 ways artificial intelligence will How exercise can boost the Explore USC



Menus

Illustration/iStock; Diana Mollela

Millennials and mortgages?

They're moving less and buying homes later — if at all. When it comes to real estate, millennials are very different from the generations before them.

A large green arrow points from the left side of the image towards the right side, indicating a transition or flow.

Primary Criteria

UX and Design

- ✓ Responsive Homepage
- Emergency notifications on Homepage
- Update the Emergency site branding

Administration and Usability

- Migrate to WordPress from older CMS

Security and Technical Considerations

- Resilient and scalable for traffic spikes
- Decrease load time
- Move application to the Cloud

USC Emergency Information

Safety and Preparedness

In the Event of an Emergency
This page will be updated with the latest information available to the university. During a major event, this page will replace the university's home page.

If you are seeing this page and there is no known emergency, this may mean the university is experiencing technical difficulties. The university is in the process of migrating to a new system, and this may increase the likelihood of occasional redirects during that migration period.

To Report an Emergency
Call the USC Department of Public Safety
University Park campus:
213-740-4321
Health Sciences campus:
323-442-1000

FRIDAY, JANUARY 26, 2018

Sharks!

Students alumni parents faculty employees sports

Popular links Search USC >

Posted at 10:00 AM by USC University of Southern California

Sharks attack LA

Sharks are raining down on LA! Take cover or arm yourself with chainsaws.

Sharks

about administration admission academics research patient care community arts global initiatives

Sharks are raining down on LA! Take cover or arm yourself with chainsaws.

Can strategies like fasting lead to 5 ways artificial intelligence will How exercise can boost

Emergency Information

TO REPORT AN EMERGENCY
Call the USC Department of Public Safety
Safety
University Park Campus: 213-740-4321

Shark Avoidance

If you are near a tornado of sharks or sharks are raining down on LA! The first step is to take shelter! Do not try to fight the sharks. If you feel like you've had enough of these sharks and you're ready to leave, please band together and form posse's and try to get away from them.

Text Alerts

Mobile Site

Shark Attacks

Shark tornadoes in LA!
Sharks are raining down on LA! Take cover or arm yourself with chainsaws. Get more information.

They're moving less and buying homes later — if at all. When it comes to real estate, millennials are very different from the generations before them.

Sharks

about administration admission academics research patient care community arts global initiatives

Sharks are raining down on LA! Take cover or arm yourself with chainsaws.

Can strategies like fasting lead to 5 ways artificial intelligence will How exercise can boost

Primary Criteria

UX and Design

- ✓ Responsive Homepage
- ✓ Emergency notifications on Homepage
- Update the Emergency site branding

Administration and Usability

Migrate to WordPress from older CMS

Security and Technical Considerations

- Resilient and scalable for traffic spikes
- Decrease load time
- Move application to the Cloud

USC Emergency Information

Safety and Preparedness

In the Event of an
Emergency

This page will be updated with the latest information available to the university. During a major event, this page will replace the university's home page.

If you are seeing this page and there is no known emergency, the USC web site may be experiencing technical difficulties. The university is in the process of migrating to a new system, and this may increase the likelihood of occasional redirects during that migration period.

To Report an Emergency

Call the USC Department of Public Safety
University Park campus:
213-740-4321
Health Sciences campus:
323-442-1000

FRIDAY, JANUARY 26, 2018

Sharks!

Sharks are raining down on LA! Take cover or arm yourself with chainsaws!

Posted at [1/26/2018 02:08:00 PM](#)

Home

Emergency Information



! Shark tornadoes in LA!

USC is urging everyone to take shelter

[Edit](#)

TO REPORT AN EMERGENCY

Call the USC Department of Public Safety

University Park Campus: **213-740-4321**

Health Sciences Campus: **323-442-1000**

Shark Avoidance

If you are near a tornado of sharks or sharks are hunting you down. The first step is to take shelter! Do not try to fight the sharks on your own. If you feel like you've had enough of these sharks and want to fight back - please band together and form posse's and try [Read more](#)

POSTED:

2:41 PM

Friday, January 26

[Edit](#)[Text Alerts](#)[Mobile Safety App](#)[Safety Tips](#)

Primary Criteria

UX and Design

- ✓ Responsive Homepage
- ✓ Emergency notifications on Homepage
- ✓ Update the Emergency site branding

Administration and Usability

Migrate to WordPress from older CMS

Security and Technical Considerations

- Resilient and scalable for traffic spikes
- Decrease load time
- Move application to the Cloud

Primary Criteria

UX and Design

- ✓ Responsive Homepage
- ✓ Emergency notifications on Homepage
- ✓ Update the Emergency site branding

Administration and Usability

- ✓ Migrate to WordPress from older CMS

Security and Technical Considerations

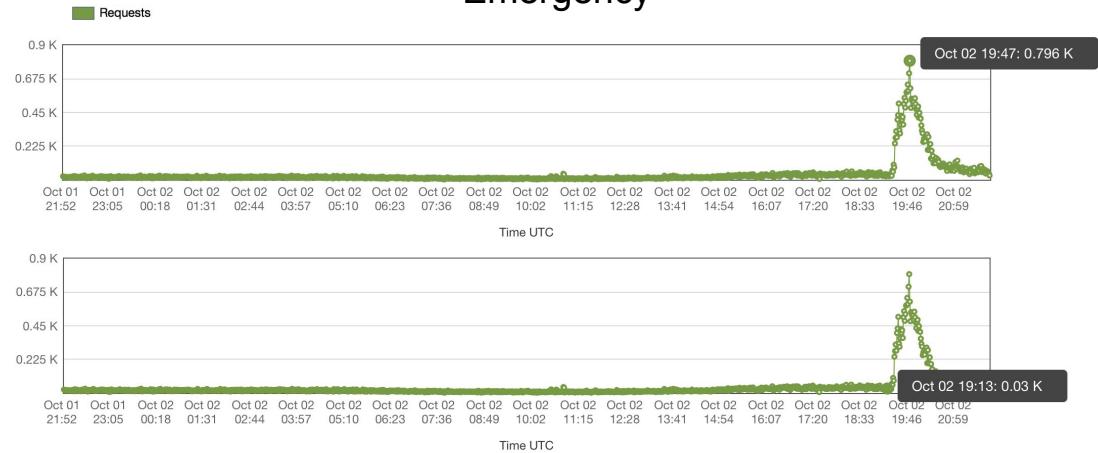
- Resilient and scalable for traffic spikes
- Decrease load time
- Move application to the Cloud

Emergency False Alarm

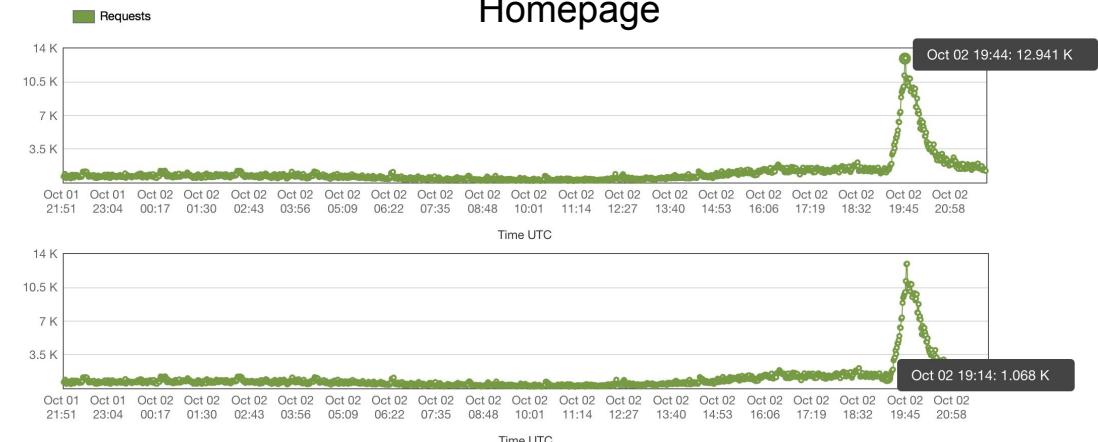
USC experienced an event that turned out to be a false alarm (whew!).

During that period we experienced a traffic spike with no outage or reduction in speed of our pages.

Emergency



Homepage



1,000+%

Homepage Traffic Increase

2,500+%

Emergency Traffic Increase

Primary Criteria

UX and Design

- ✓ Responsive Homepage
- ✓ Emergency notifications on Homepage
- ✓ Update the Emergency site branding

Administration and Usability

- ✓ Migrate to WordPress from older CMS

Security and Technical Considerations

- ✓ Resilient and scalable for traffic spikes
- Decrease load time
- Move application to the Cloud

Speed Tests



* Additional requests were adding the Emergency feeds, additional features, scripts, and images in the footer.

	Original	Refactored	AWS
Speed Index	2380	2200	1295
First Interactive Byte	> 3.276	> 2.498	>0.774
Fully Loaded	4.141	2.816	1.725
Requests	50	25	*41
Bytes	1470	852	846
First Byte Time	A	A	A
Keep-alive Enabled	A	A	A
Compress Transfer	F	F	A
Compress Images	F	F	A
Cache Static Content	F	F	B
Effective use of CDN	X	X	✓

Primary Criteria

UX and Design

- ✓ Responsive Homepage
- ✓ Emergency notifications on Homepage
- ✓ Update the Emergency site branding

Administration and Usability

- ✓ Migrate to WordPress from older CMS

Security and Technical Considerations

- ✓ Resilient and scalable for traffic spikes
- ✓ Decrease load time
- Move application to the Cloud

Remember the Phased Approach...

- After research and prototyping, we knew that we couldn't do all of it
- We put WordPress on our internal VM's and used the instance to publish the content and assets to AWS
- Allowed us to get the public facing view on AWS much quicker

Primary Criteria

UX and Design

- ✓ Responsive Homepage
- ✓ Emergency notifications on Homepage
- ✓ Update the Emergency site branding

Administration and Usability

- ✓ Migrate to WordPress from older CMS

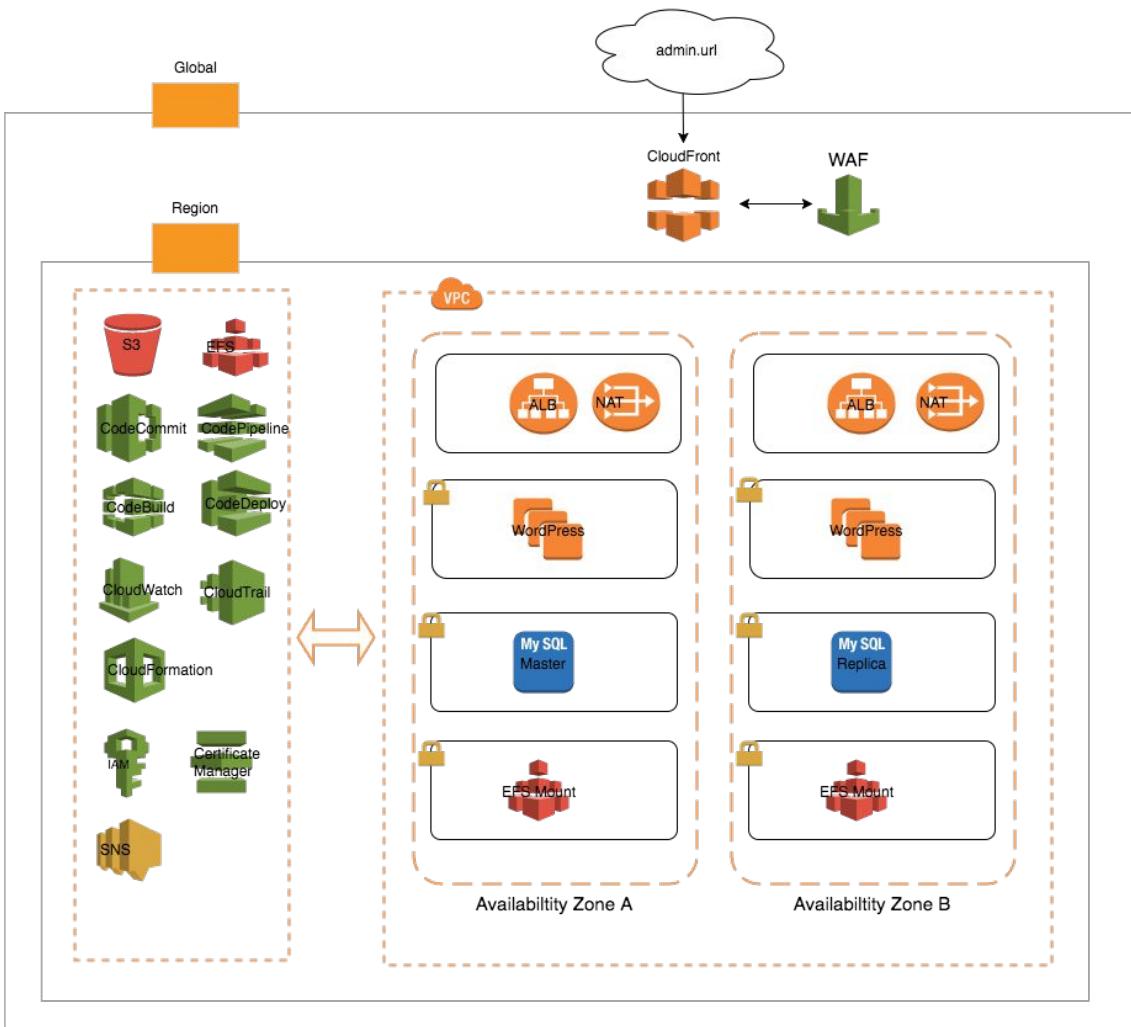
Security and Technical Considerations

- ✓ Resilient and scalable for traffic spikes
- ✓ Decrease load time
- ✗/✓ Move application to the Cloud

Phase II

In Progress

WordPress in AWS



We are nearly there!

But then...

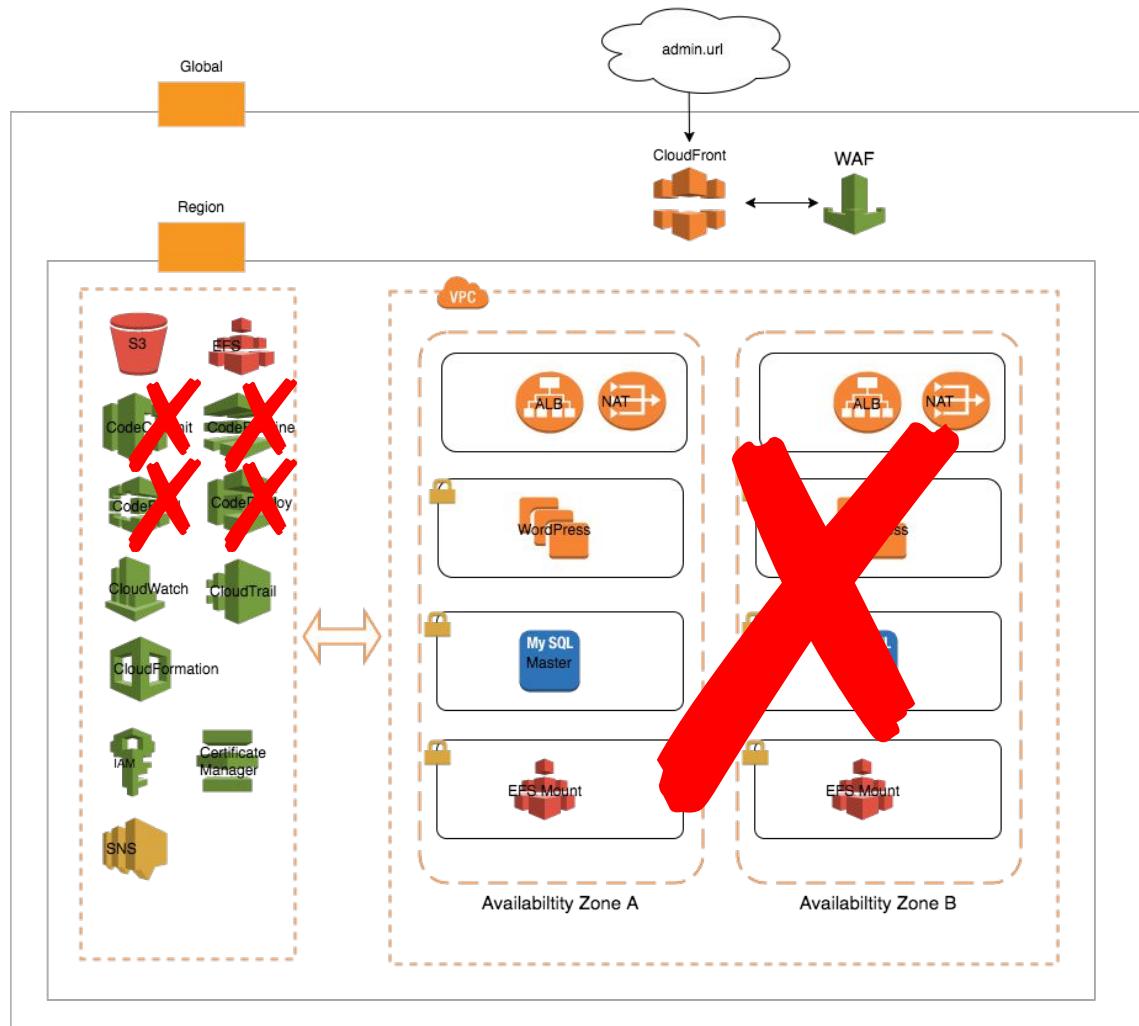
*“We need to
standardize our
development and
use Docker for all
projects.”*



This wasn't bad, just a different approach

- Amazon Machine Images (AMI) are like VM's in AWS
- They are optimized to run in AWS
- They also have their issues with maintenance and bug creep
- Docker segments the build into individual containers
- This may be a good thing

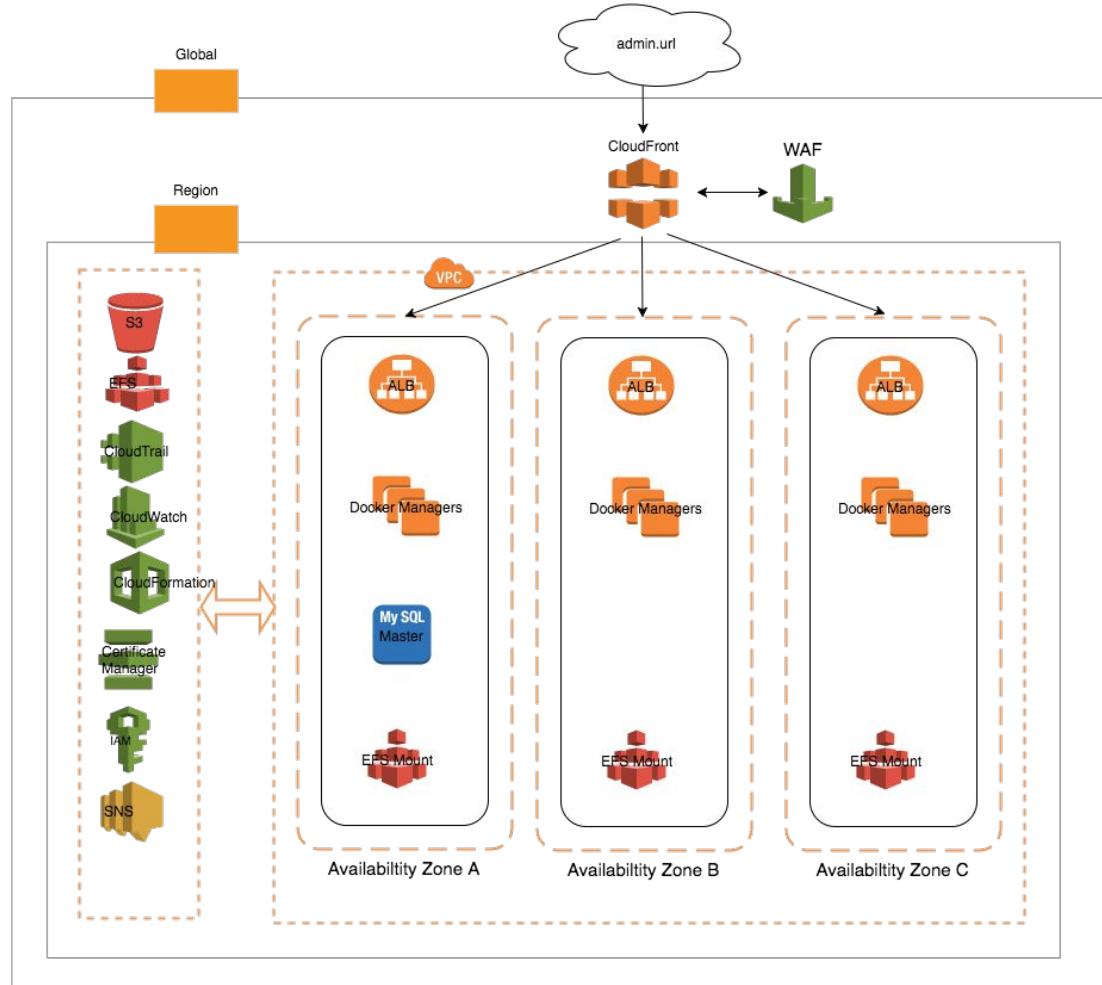
WordPress in AWS



WordPress in AWS

*Now with
Docker!*

*Continuous Integration and Continuous
Delivery/Deployment in prototyping
phase*



What did we learn?

AWS Discoveries

- AWS isn't a one size fits all approach
- Your traffic matters for your AWS setup if implementing a traditional stack
 - Provisioning EC2 instances
 - Databases
- There are restrictions to putting your site in S3
 - URL endpoints are not dynamic
 - /dynamic-category-name/post-name becomes
 - /posts/post-name

Takeaways

- Determine what you want from AWS
 - Full stack?
 - SPA?
- A phased approach allowed us to release updates more quickly
- Your project shouldn't have an end but an enhancement delivery program
- Having a CI/CD architecture allows you to iterate and address issues and requests

Disclaimers

- We are not affiliated with AWS
- We are not perfect
 - If you see this and think “there’s a better way” - great! Please let us know!

One final note

Not all sharks are bad

COME IN AND PLAY



THE WATER IS BEAUTIFUL

Thank you

@troutacular



Jason Cauwels
Senior Web Developer
USC ITS Web Services

@troutacular
#AtHomeInTheCloud