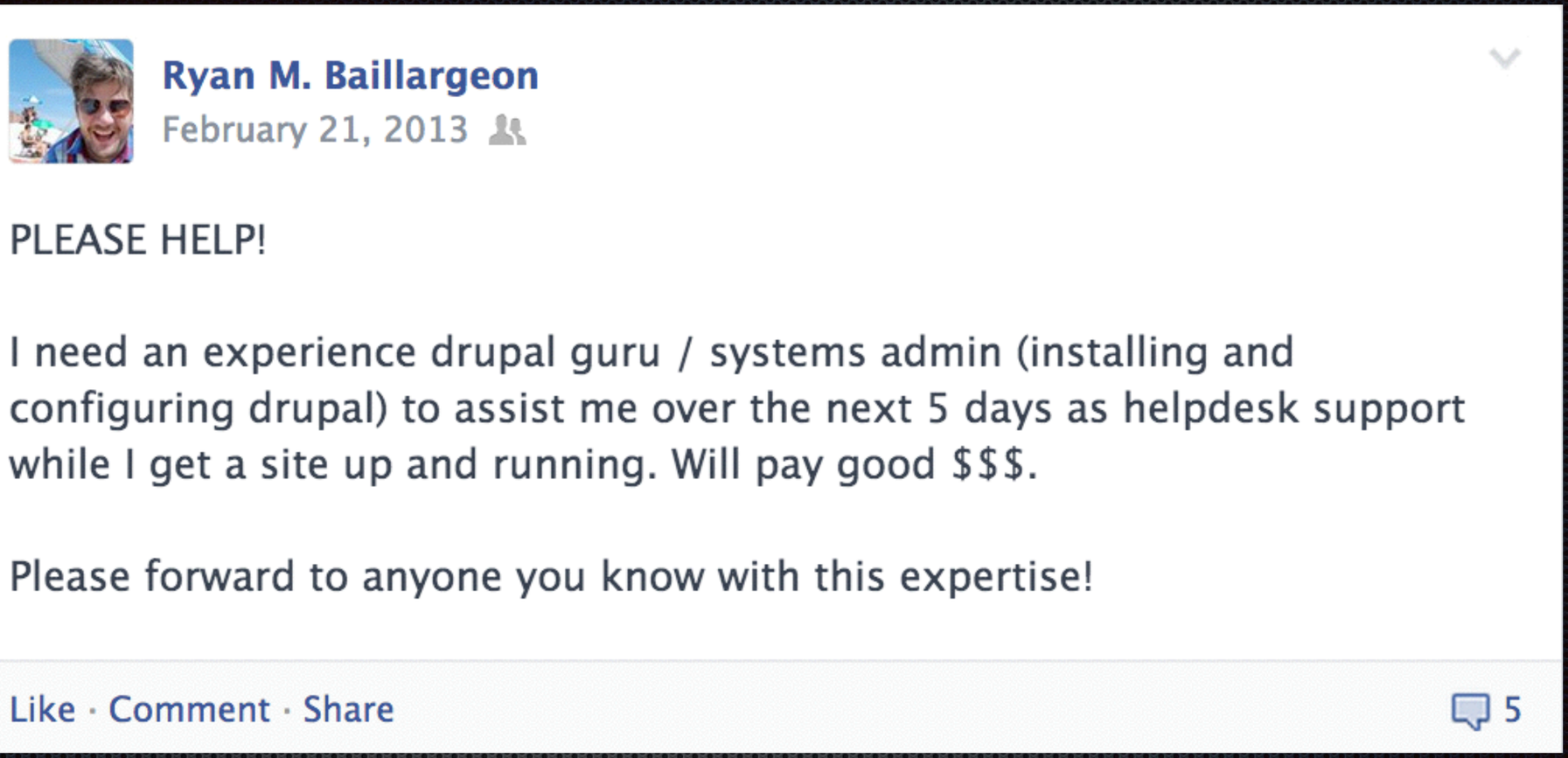
Scaling WordPress for the world and on a (relatively small) budget

Alan Lok

WordCamp Ottawa - May 2014

Who is Alan?

- Presently:
  - Principal at WirelessLinx Inc.
  - Technical advisor for start-ups such as Kiinzel
  - Co-own a music school

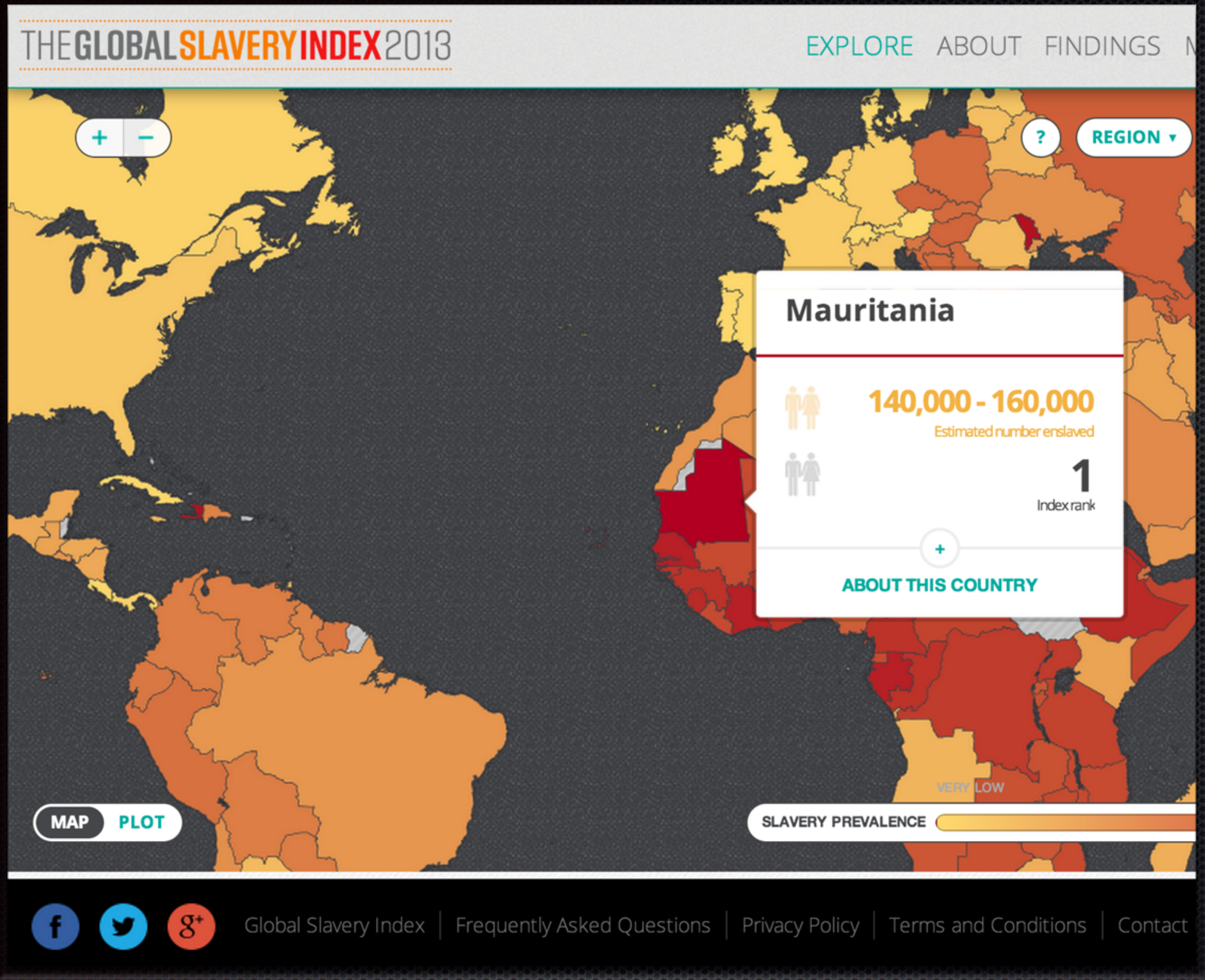


It started like this…

a plea from my good high school friend

The mandate

- GrassRiots called and needed to release a WordPress site in 2 days, and mentioned that it needed *scaling*
- Must be deployed in multiple continents while making it editable live
- The deadline is *firm*. GrassRiots' client already had PR lined up!


THE GLOBAL SLAVERY INDEX 2013
EXPLORE ABOUT FINDINGS
REGION
Mauritania
140,000 - 160,000
Estimated number enslaved
1
Index rank
ABOUT THIS COUNTRY
MAP PLOT
SLAVERY PREVALENCE
VERY LOW
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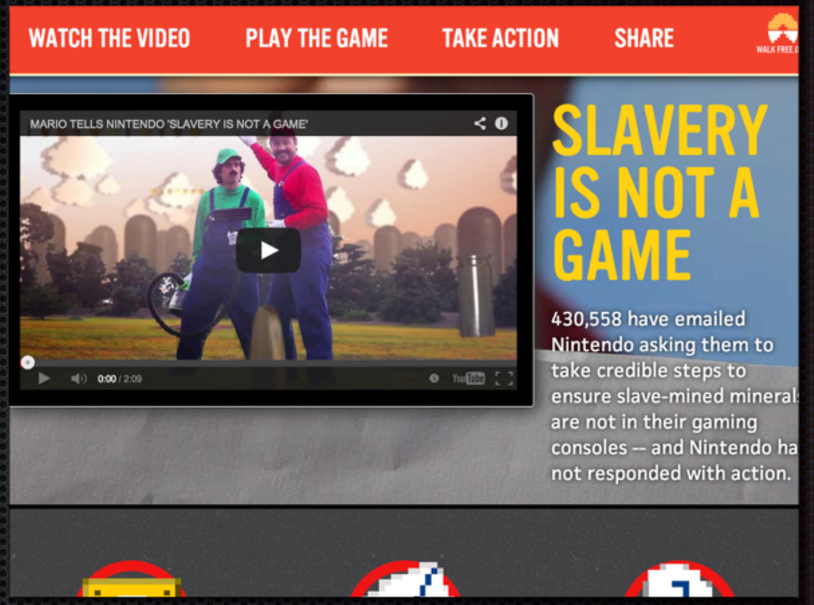
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PLAY THE GAME
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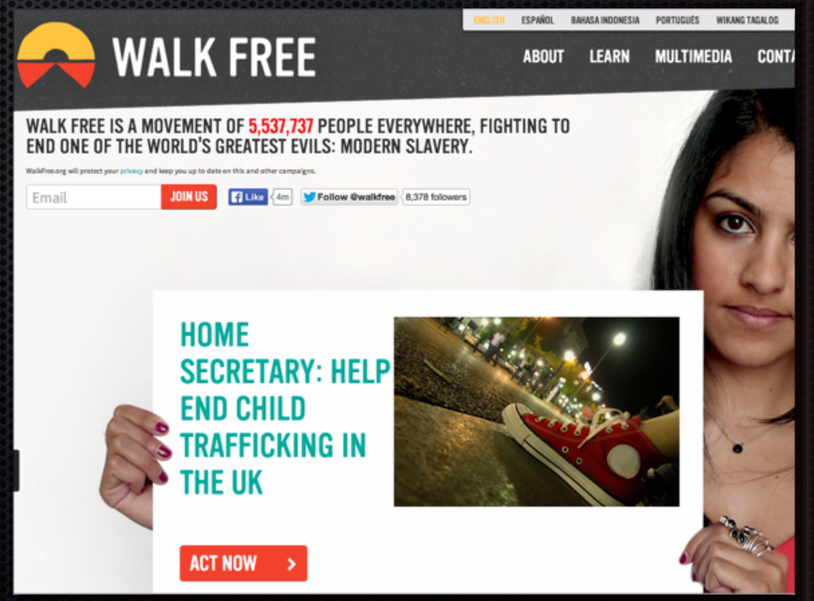
MARIO TELLS NINTENDO 'SLAVERY IS NOT A GAME'
SLAVERY IS NOT A GAME
430,558 have emailed Nintendo asking them to take credible steps to ensure slave-mined mineral
are not in their gaming consoles -- and Nintendo ha
not responded with action.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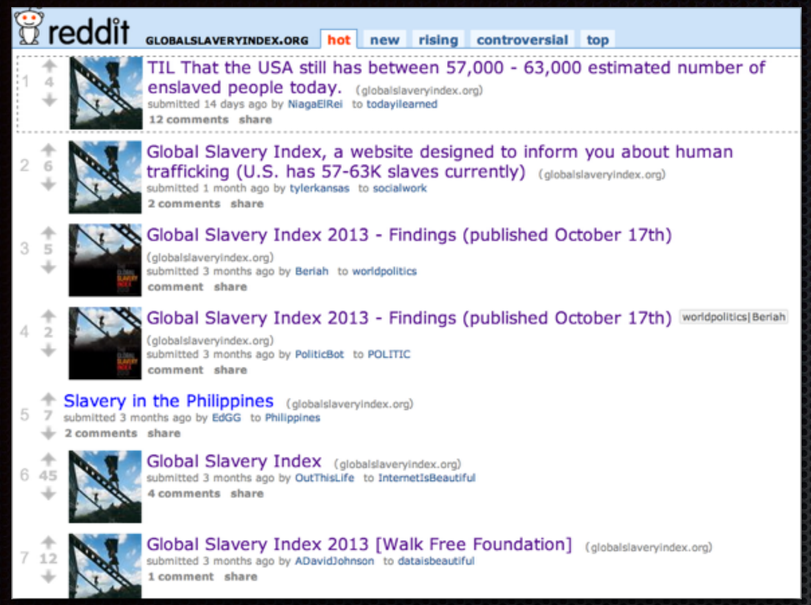
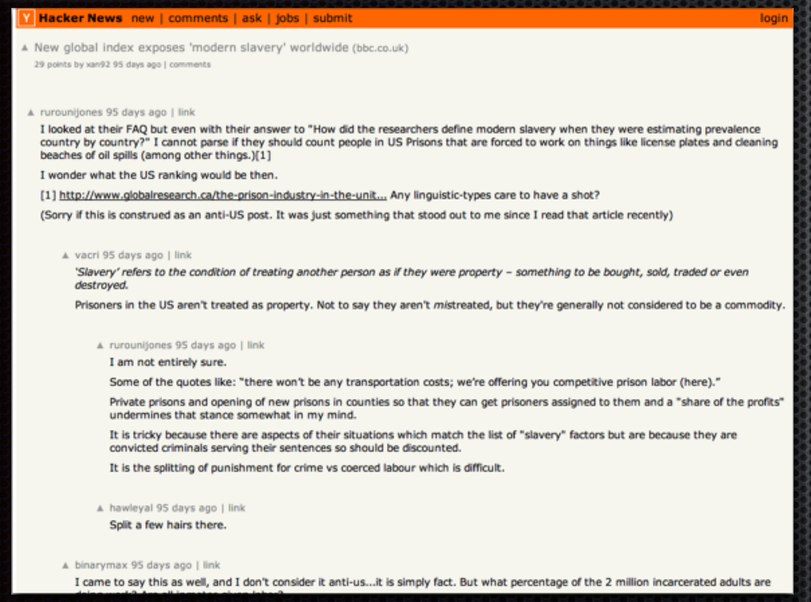
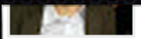
JOIN US
HOME SECRETARY: HELP END CHILD TRAFFICKING IN THE UK
ACT NOW







Oct 17, 2013 - A "**Global Slavery Index**" has been released which shows the number of ... Nick Grono told the French **news** agency Agence France-Presse.

BBC **News** - New **global index** exposes 'modern **slavery**' worldwide
www.bbc.co.uk/**news**/world-24560937
Oct 17, 2013 - Nearly 30 million people around the world are living as **slaves**, according to a new **index** by the Walk Free Foundation, ranking 162 countries.

Thirty million people are **slaves**, half in India: survey - Yahoo **News**
news.yahoo.com/thirty-million-people-**slaves**-half-india-survey-2317108...
Oct 16, 2013 - From Yahoo **News**: By Timothy Large LONDON, Oct 17 (Thomson ... The **Global Slavery Index** 2013 defines slavery as the possession or ...

Map: **Global Slavery Index** finds 29.8M people locked in forced ...
www.cbc.ca/**news**2/interactives/**global-slavery-index**/
Global Slavery Index: 29.8M people locked in forced labour. Haiti, Pakistan have highest prevalence of slavery. CBC **News**. Oct. 18, 2013. Nearly 30 million ...

Millions in modern-day **slavery**, half in India: Survey - The Hindu
www.thehindu.com/**news**/**international**/...**slavery**.../article5243964.ece
Oct 17, 2013 - The **Global Slavery Index** 2013 said India had 14 million people living in conditions of slavery, the highest number ... RELATED **NEWS** ...

Global Slavery Index finds millions caught in modern ... - **News**.com.au

Haiti, Pakistan among countries with highest amount of modern slavery, global index finds

NP | Associated Press | October 17, 2013 | Last Updated: Oct 17 8:54 AM ET

More from Associated Press

A group of rescued workers stand outside a police station after they were saved from a brick kiln in Linfen, northern China's Shanxi province 27 May 2007. Police said 14 June that they had rescued more than 200 people, including 29 children, who were working as "slaves" in brick kilns, in a shocking revelation of labour practices in booming China. STR/AFP/Getty Images)

Global Slavery Index finds millions caught in modern-day slavery

This story was published: 3 MONTHS AGO | OCTOBER 17, 2013 2:46PM

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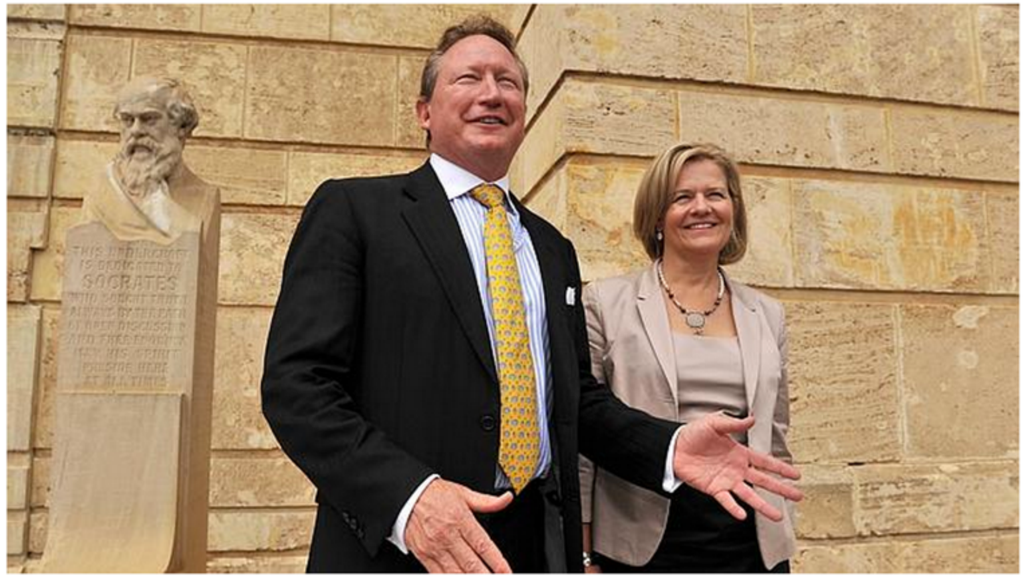
STORY BY

Staff Writers

AFP



Andrew Forrest and his wife Nicola established the Walk Free Foundation last year. *Source:* News Limited

AN estimated 30 million people worldwide are living in modern-day slavery, according to the inaugural Global Slavery Index.

The index was published on Thursday and compiled by the Walk Free Foundation, founded by West Australian mining magnate Andrew Forrest and his wife Nicola.

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ritania tops new global slavery index

Thursday, October 17 2013 at 08:07

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The inaugural Global Slavery Index was published Thursday. AFI

mated 30 million people worldwide are living in modern-day slavery, acc
Slavery Index published Thursday.

dex, compiled by the Walk Free Foundation, said that while India by far ha
d people, the problem was most prevalent in the west African nation of
t of the population was deemed to be held in slavery.

FF hopes the annual index will help governments to monitor and tackle
"A lot of governments won't like hearing what we have to say," chief exe
ire AFP.

governments that want to engage with us, we will be very open to engagi
h we can better measure the issue of modern slavery."

shed in May last year, the WFF is a 20-strong team based in Perth on the
d by philanthropists Andrew Forrest — the chairman of Fortescue Metals

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8.5K Shar

New global index exposes 'modern slavery' worldwide

COMMENTS (444)

The index included victims of human trafficking and forced labour

Nearly 30 million people around the world are living as slaves, according to a new index ranking 162 countries.

The Global Slavery Index 2013 says India has the highest number of people living in conditions of slavery at 14 million.

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Millions in modern-day slavery, half in India: Survey

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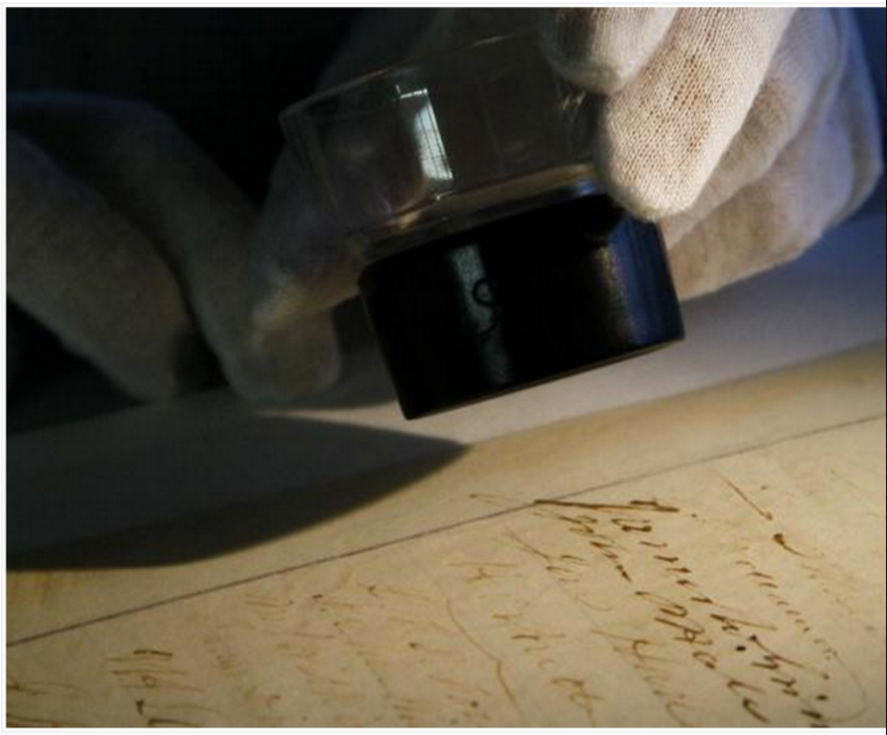


In this Nov. 29, 2011 photo, in Chicago, Sharon Paschke, conservator at Graphic Conservation Co., loo
over a rare, restored copy of the 13th Amendment that ended slavery.

Almost 30 million people around the world live as slaves and nearly
are in India, a global index on modern slavery released on Thursday

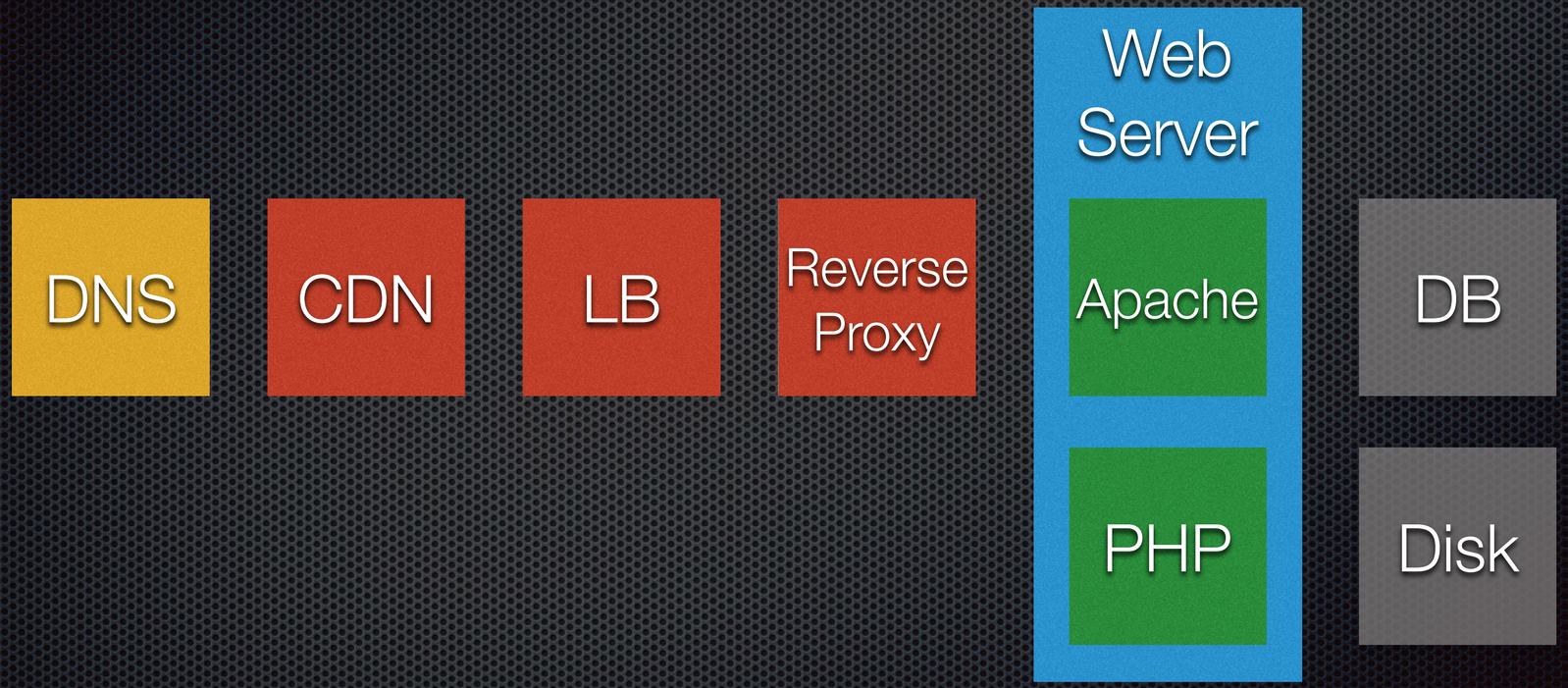
The Global Slavery Index 2013 said India had 14 million people livin
conditions of slavery, the highest number worldwide. West Africa's
had the highest prevalence, with 4.2 per cent of its population enslav

Africa Review BBC The Hindu

What makes a good scalable site?

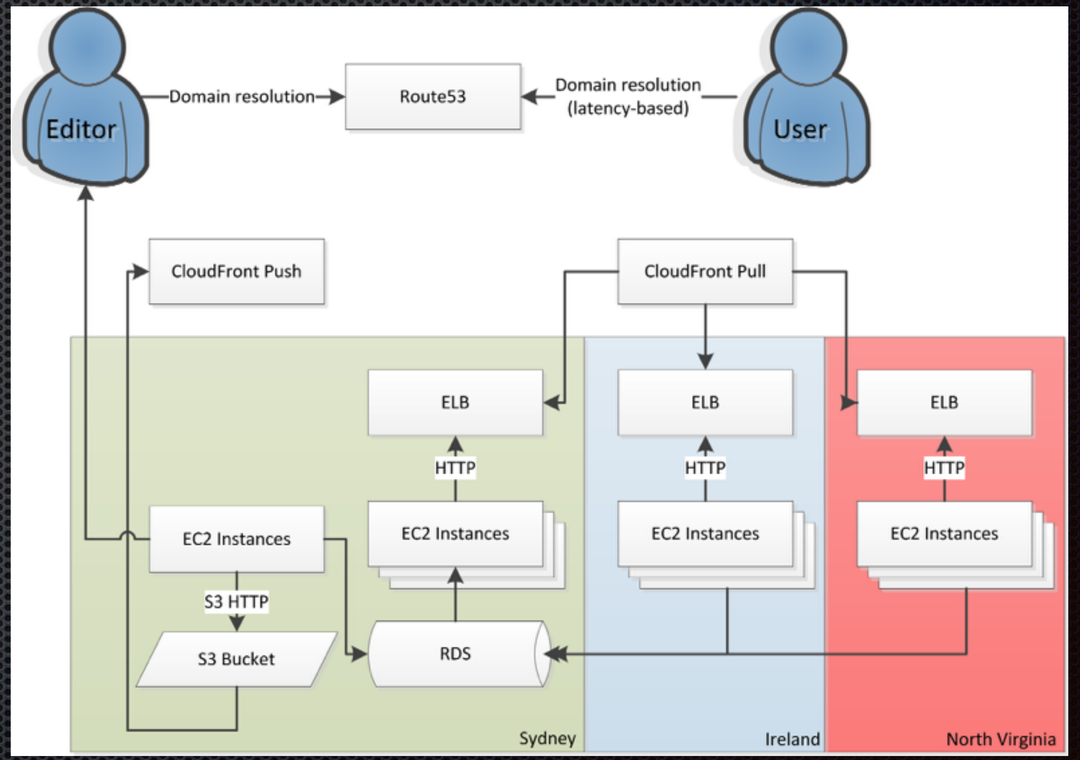
- Eliminate single point of failure
- Elastic site or over-provisioning
- Monitor traffic
- Plan of attack to recover

LAMP Stack Pressure Points



We (had no choice but to) embrace Amazon AWS

- EC2 c2.medium instances (x9) across 3 continents
- High-AZ c2.medium RDS in Sydney
- CloudFront / S3 for WordPress assets
- ELB for load balancing
- Route53 for GLB
- SES for email



Application Stack

- Webserver: Linux (Apache, PHP 5, APC, mysql_nd)
- External services: CartoDB, Scribd
- WordPress:
  - TotalCache (APC page cache, CloudFront JS/CSS rewrite)
  - S3 Upload (Allowed editors to upload media that is accessible globally)
  - HTTPS Plugin (Rewritten host/routing for editors to a dedicated instance)

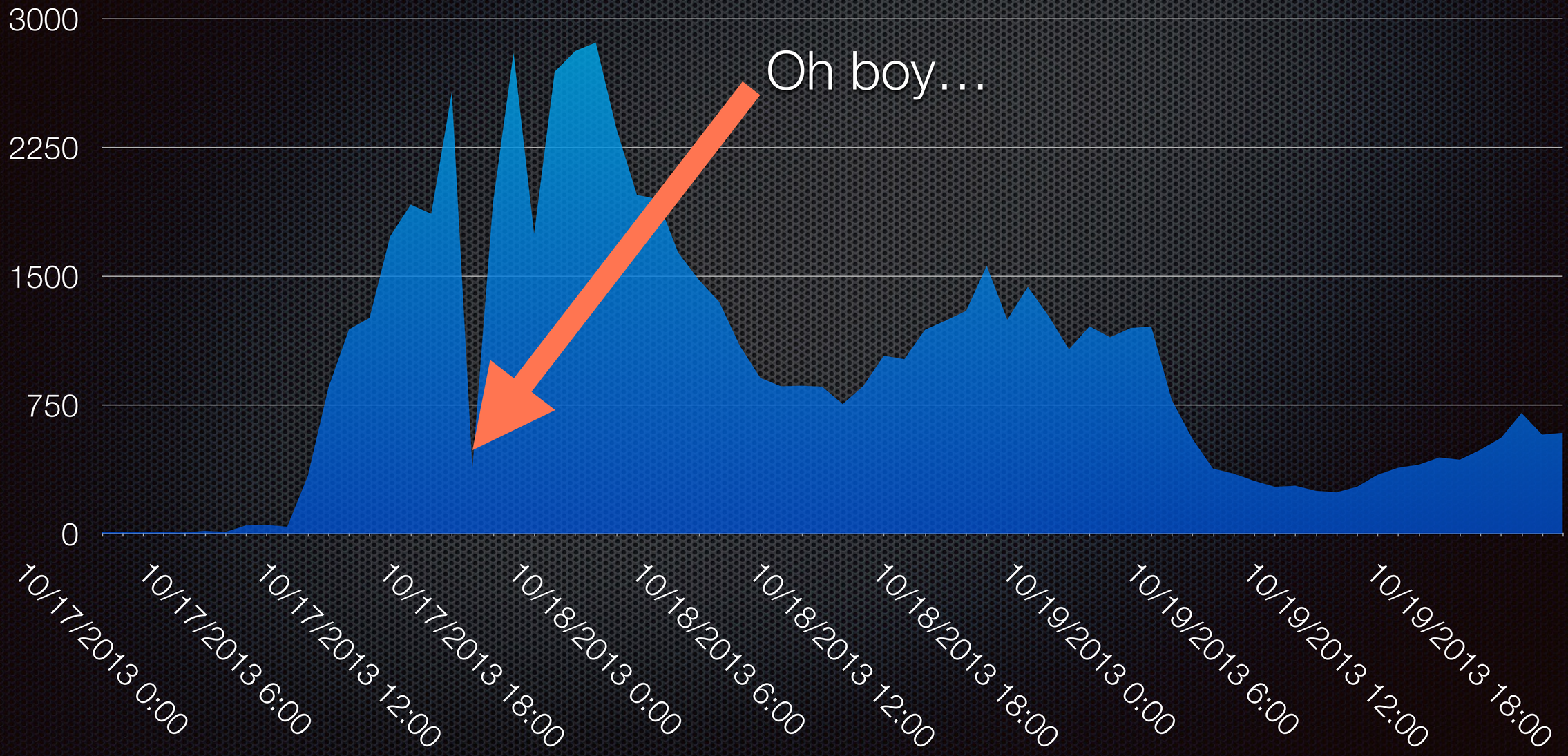
Some sound precautions for scaling WordPress

- Admin and end-user instance separation
- S3 storage for media assets
- CDN and caching (such as CloudFront and Varnish) to protect your website from getting totally hammered

What can go wrong?

Answer: Everything

Our visits by the hour



The oh-crap moment…

- RDS is highly available, but *not* globally available
  - This is by far the most costly mistake - we cannot use HyperDB. Page returned in 5 seconds in Europe and 250ms in Sydney.
- Relied solely on Pingdom for external monitoring
  - Pingdom didn’t tell you enough about what’s wrong, just that something isn’t right
- Went on the cheap and deployed instances too small
  - Sheer HTTP traffic crushed Apache due to no disk swap and CPU-bound

WHAT CAN WE DO BETTER?
MORE POWER!

What we really needed…

- Cross-region replicas with RDS (Dec 2013) or Home-brew MySQL M/S
  - Read slaves to all geographical regions (DB write is NOT a priority)
  - Install HyperDB on WordPress and disable W3TC DB Cache
- Smarter EC2 Instances
- Tune Apache

Smarter EC2 Instances

- Compute power vs memory vs money:
  - Decide between m1.small, c2.medium and m1.medium
- 64-bit instance
  - Ease of moving up to a bigger instance outweighs the wasted RAM
- Provision ephemeral space, even if you may not use it beyond swap

Some tuning tips

- Find the right Apache engine (prefork, worker+fpm, event+fpm)
  - Tune to not exceed free RAM and avoid swapping (if you have a tmpfs…)
- Install and use APC
- Tune down / remove un-needed modules

Prefork - use when in a rush

- Use prefork when you have no chance to test and need reliability (and have money to spend)
  - No threading issues or app isolation problems (each connection = process)
  - Oldest, most tested spawning model
- Configure your prefork settings to avoid swapping
  - assuming 100MB/HTTP instance with 1.5GB RAM free: ServerLimit/MaxClients = 15

Apache 2.4 + php_fpm + event

- If you have time to test your app, or if your WordPress stack is single-tenant, this model is the best
- On Amazon Linux: httpd24, php54 and php54-fpm packages
- Make sure to review /etc/php-fpm.d/www.conf and configure your tmp directory

Apache modules you can omit:

- Authentication: ldap_module, authnz_ldap_module
- Proxy/Cache: proxy_balancer_module, proxy_ftp_module, proxy_ajp_module, proxy_connect_module, cache_module, disk_cache_module
- Others: dav_module, dav_fs_module, speling_module, substitute_module, cgi_module, suexec_module, userdir_module

You can omit as many or as few modules to ensure your site runs!

Simple Apache security measures

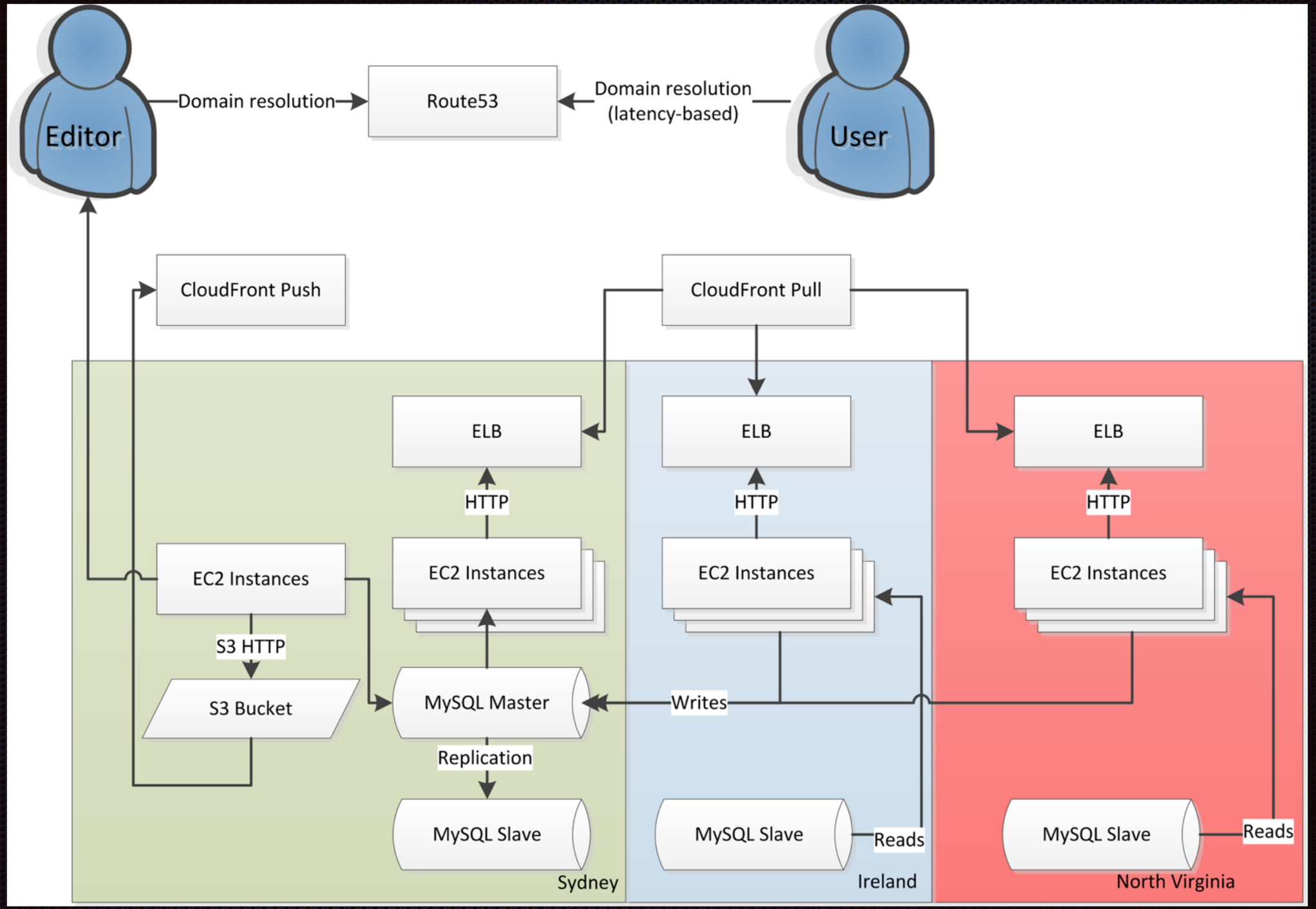
- Remove methods to avoid vectors of attack, and not let people know of your site
- Does **not** replace proper security audit and better code practices!

```
ServerSignature Off
ServerTokens Prod
TraceEnable Off

<Directory />
 <LimitExcept POST GET HEAD>
  Order deny,allow
  Deny from all
 </LimitExcept>
</Directory>
```

Other (silly) things to check

- Run your site against site checkers such as Google PageSpeed and YSlow!
- 404 Errors and PHP - Do you have a WordPress script showing a fancy 404 error? Ensure no assets are 404-ing.
- # Apache or PHP instances in all servers = # max connections in MySQL


Editor
Domain resolution
Route53
Domain resolution
(latency-based)
User
CloudFront Push
CloudFront Pull
ELB
ELB
ELB
HTTP
HTTP
HTTP
EC2 Instances
EC2 Instances
EC2 Instances
EC2 Instances
S3 HTTP
S3 Bucket
MySQL Master
Writes
Replication
MySQL Slave
MySQL Slave
Reads
MySQL Slave
Reads
Sydney
Ireland
North Virginia

Try 2 - WalkFree.org re-launch

- Grassriots converted walkfree.org from Drupal to WordPress, and in December 18, the site was released
- We've improved our software stack and deployment practices
  - Scripted software push
  - Varnish/APC cache
  - m1.small with a decent swap space
  - Optimized DB location
  - fuse-s3fs for shared media uploads
- (almost)* perfect cutover

A new year, a new experiment

- WirelessLinx helped GrassRiots launch another high profile site: gfn2020.org
- Further stack optimization include:
  - Apache 2.4 + event + php_fpm
  - shared memcached for W3TC object cache
- Some takeaways
  - HyperDB, session and cross-region replication

Make a list and check it twice!

- Checklist is really needed with Amazon AWS-based deployment, as there are too many knobs to adjust. The defaults don’t always make sense…
  - S3 and CORS header
  - CloudFront “Forward Query String”
  - ELB instance registration
  - CloudWatch’s inaccurate ELB reporting

Does it have to be AWS?

- Most multi-AZ cloud with Linux can handle this, including Google App Engine, Microsoft Azure or Linode.
- Single vendor in this case make deployment much faster, but multi-vendor deployment can *potentially* decrease failure risks

About the various initiatives

Non-profit group to abolish slavery around the world and educate the public

Network of religious faiths and non-profit groups to abolish modern slavery

Thank you!

Alan Lok • @alan_lok