Optimizing a News Website for Speed and Stability

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- Who has worked for a news website
- Who has configured a CDN – familiar with a CDN?
What’s This Talk About?

- How to build & operate a large media website
  - without spending millions of $
  - without having it go down every 5 minutes

Some technical things, but set the stage with non-technical things
How to build and operate a large media website...  
... without spending millions of dollars
... and without your site going down every 5 minutes.
Who Am I?

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Systems engineer, worked for CBC as digital operations team lead for many years
Now working for alternative markets startup in New York City doing cloud infrastructure &
web operations.
CBC – Canada’s National Public Broadcaster

- Similar to NPR + PBS – combined radio and television station
NHL rejects latest CBA proposal from players' association

The NHL labour talks have hit another roadblock — and this one appears to be massive. After two optimistic days that suggested a deal could be imminent, negotiations between the league and the NHL Players' Association broke off dramatically Thursday, 0:52 PM ET.

- Statements from Ron Burkle, other NHL owners
- Social Media: NHL players react to latest rejected offer
- WATCH: Theo Fleury confident in Sidney Crosby's role in ending lockout
- NHL, NHLPA still need to bridge 'critical open issues' 10:07 AM ET

NEW | F-35 deal not cancelled, Tories insist

The Harper government says it has not made a decision on the F-35 as a replacement for Canada's CF-18 fighter

- Neutrality on Medisave supported by half of Canadians, poll suggests
- ‘End of the world is coming’
- RAW: Winter arrives out West

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cbc.ca

- Most popular news website in Canada - 1 million unique visitors per day
- News, sports, radio & TV streaming (live and on demand), regional news, arts & entertainment, etc. etc.
Very first YouTube video was posted in 2005. Jawed Karim co-founder right here in San Diego at the zoo. (which I highly recommend -- it’s $44 but worth the money. one of the best zoos)
2005 was also the year of a provincial election in British Columbia
We put up this website -- unbelievably it’s still up. I can also talk about data retention issues on a news website but that’s a whole other talk.
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Polls closed at 9 p.m. Pacific Time
Shortly after the site was down for over two hours
50 requests/sec per server!

(300 origin req/sec over 6 servers) WTF, right? Why?
Bad Assumptions
“Make the news stories appear as fast as possible”

Journalists say, “I want the stories to be as fresh as possible” – we’re a news site after all
Developers say, ok that’s great, we’ll put all the stories in an Oracle database
And we'll render them using a J2EE web application.
Architecture was wrong

But this is actually not a great architecture for a news website.

To understand why this is a bad idea, you have to look at news site access patterns.
News of Whitney Houston’s death Feb 11, 2012

From < 1 Gbps to 13 Gbps virtually instantaneously
Story is updated very infrequently, though. Only about 5–6 times per hour even when news is breaking, and over a story’s lifetime perhaps one or two dozen times.
Senseless to use J2EE application to render stories.

Wastes a lot of CPU doing the same thing over and over.

Can even read about this in the outage post-mortem report from BC Votes 2005.

- “Election news stories were not cached on disk.”
- “All stories were generated dynamically which requires more computer processing, hence resulting in more load on the servers.”
Real, Conflicting Requirements

- Stability and reliability
- Content freshness
- System complexity
- Cost
Site Architecture: SSI

- Primitive, but fast/secure
- Audit trail
- Easy to turn off site features
- Details of “wrapper” mechanism in paper

“Cache cache cache” -- we took this to the extreme and made the backend as close to a cache as possible.

- News portion: no dynamic features outside SSI
  - SSI is primitive, but fast/secure
  - Audit trail - nothing gets into production w/o going through CMS
  - Turn off features easily by modifying wrappers to discard site elements
Delivery Parameters
Set Global Site TTL

Originally all kinds of TTL rules for different types of content, path names, etc. Too complicated; journalists constantly calling helpdesk to “purge things from cache”

If you have to “purge things from cache” you’re doing it wrong.

Setting a global site TTL (of 20 seconds) covers most cases and is “fresh enough” (ran some experiments with journalists and they seem not to notice that publishing is not actually instant)
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This is the regular HTTP transaction that we all know and love.
If-Modified-Since:

If IMS is configured properly and the CDN has the object in cache, this is what the interaction looks like. Very small origin response, no need to send content body in most cases.
“Most cases” actually turns out to be a lot... over two thirds of requests can be served out of CDN cache.
Organize filesystem by desired TTL

Allows you to override TTLs by path, e.g. long-lived objects can go in one top-level directory, medium-lived objects go in another, and so on. (examples: /favicon.ico, global site JS and CSS, etc.)
Last mile acceleration, origin compression

origin compression – make sure to talk gzip to the CDN
LMA – enable CDN to pass along the same gzipped content to the end-user
Persistent connections
Appropriate timeouts

* Set pconns with the CDN
* Origin KeepAliveTimeout value synchronized with CDN (CDN, max 300s for pconn, origin KeepAliveTimeout 301s) so that origin doesn’t kill the pconn before the CDN does
General Lessons Learned

• Keep cache rules simple

• Keep tuning knobs at origin if you can

• Organize & categorize content

• Understand meaning of “TTL”

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TTL is not like a DNS TTL. It just means the time after which the CDN will check the origin for object freshness. If still fresh, then it'll keep serving the object out of cache.
Outcomes

• 2003-2010 - no need to grow origin
• 2010-today - 9 origin webservers

• Average 40% CPU utilization

7 years – upgraded from HP/UX to SUSE Linux to RHEL – 3 generations of servers but didn’t change the quantity
2010 – decided to buy ourselves a bit more runway in the event of high traffic situations

Entire origin farm to deliver content costs around $15K to buy, astonishing for a large news website.
Another set of graphs showing that the strategy pays off; CDN serves 80–90% of traffic (both bandwidth & requests)
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My wife’s ICQ # is 1290758 so she brags that she’s cooler than me because her number is lower.