

# Evolving the architecture of *guardian.co.uk*

Mat Wall

Lead software architect

# History





The Manchester Guardian

No. 26841 - Published Daily TUESDAY, DECEMBER 1, 1936 Price 10p

White London and all the HOTEL BUILDERS advertisement

EUSTON HOTEL LONDON advertisement

THE CENTRAL MAIL... advertisement

PERSONAL... advertisement

STEPHENSON'S FOR XMAS GIFTS OF CHINA AND GLASS... advertisement

THE INDIAN PLAY... advertisement

CIVITAS... advertisement

CONCERTS... advertisement

CONCERTS... advertisement

1936 - Scott Trust formed: No proprietor Unique in British newspapers to this day

THE NEW... advertisement

WOLF & COMPANY... advertisement

JOHN MARK & CO. LTD. advertisement

NORDEUTSCHER LLOYD advertisement

ROYAL MAIL... advertisement

SOUTHAMPTON... advertisement

LONDON... advertisement

EDUCATION... advertisement

EDUCATION... advertisement

SALES BY AUCTION... advertisement

INDIA AND CEYLON... advertisement

THE PACIFIC LINE... advertisement

SOUTHAMPTON... advertisement

LONDON... advertisement

**JEMDGFIX PL.**  
 THE BRITISH PRINTING INDUSTRY FEDERATION  
 THE UNION OF PRINTERS  
 1 BROADWAY 2 CO. (LONDON) LTD.

# THE GUARDIAN

**SIMPOLES**  
 OFFER THE LARGEST VARIETY  
 OF STYLISH FURNITURE  
 AND HOME DECORATION  
 100, WHITE CHURCH LANE  
 LONDON W.1

No. 25177 Manchester, Tuesday December 1, 1959 Price 3d

## COMMONS SALUTES ITS G.O.M.

Sir Winston breaks silence with 14 words

### ECHOES OF ECHOES

BY OUR PARLIAMENTARY CORRESPONDENT

THE BRITISH PARLIAMENT has been saluted by the Government for the first time since the Prime Minister's speech at the opening of the House of Commons on 11th November.

The salutes, which are not made to every Government, were given by the House on 26th November, when Sir Winston Churchill, after the announcement of the Government's decision to accept the terms of the Geneva Convention, made a speech in which he said: "After 14 years, the House of Commons has saluted the Government for the first time since the Prime Minister's speech at the opening of the House of Commons on 11th November."

The speech, which did not refer to any Government, was given by the House on 26th November, when Sir Winston Churchill, after the announcement of the Government's decision to accept the terms of the Geneva Convention, made a speech in which he said: "After 14 years, the House of Commons has saluted the Government for the first time since the Prime Minister's speech at the opening of the House of Commons on 11th November."

## British offer to Europe?

SHARING NUCLEAR STRENGTH, IF . . .

**FRANK GARDNER JR.**  
 British offer to Europe to share nuclear strength, if . . .

London's offer to Europe to share nuclear strength, if . . .

## London's Pink Zone plan a "winner"

Timmins shakes Minister's hand: Not a minute lost all day

BY OUR OWN REPORTER

Confidential London plan to build nuclear laboratory . . .

Confidential London plan to build nuclear laboratory . . .

## Refugees "sent back to death"

BRITISH ACCUSED IN CAMEROONS

By our own reporter

According to an official African Committee member from the French Committee . . .

According to an official African Committee member from the French Committee . . .

## POWER "IN FULL"

Board's strike claim

By our Labour Correspondent

The idea of a general strike . . .

The idea of a general strike . . .

Section in gale  
300 ON BOARD



Ship in gale  
in London for the arrival of . . .

Section in gale  
300 ON BOARD

Section in gale  
300 ON BOARD

Liner aground in gale  
300 ON BOARD

Liner aground in gale  
300 ON BOARD

Liner aground in gale  
300 ON BOARD

Accidents up by 17 p.c.  
OCTOBER FIGURES

Accidents up by 17 p.c.  
OCTOBER FIGURES

Twelve nations to sign Antarctic treaty to-day

Twelve nations to sign Antarctic treaty to-day

Central Office announced

Central Office announced

Lord Lovelock's £100 walking challenge

Lord Lovelock's £100 walking challenge

1959 - The Guardian goes national



**Simon Schama:**  
America will never  
be the same again

Page 8



**Lady Thatcher:**  
New letter reveals  
work and learning  
from Colin Blenkinsop,  
but search for her prime  
Q&A, page 11

**Chris Patten:**  
How the Tories  
lost the plot

This Section Page 11



**Amy Jenkins:**  
The me generation  
is now in charge

Page 2

60p  
Monday 10 May 04  
Published  
in London and  
Manchester  
guardian.co.uk

# the guardian

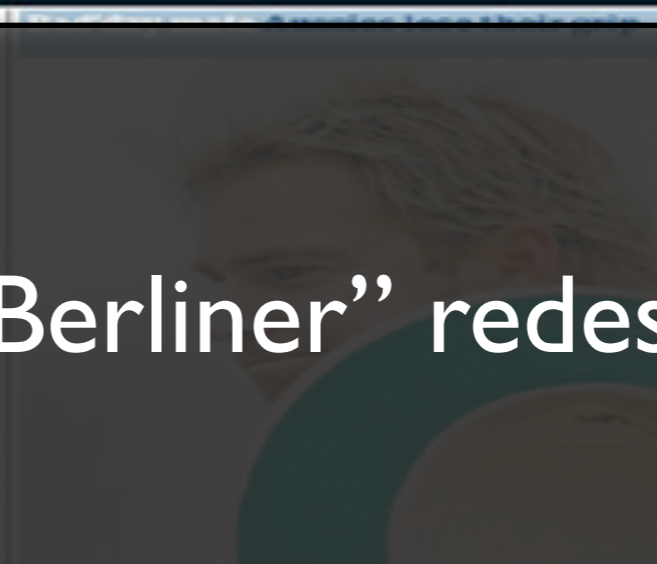
## Backlash over Blair's school revolution

City academy plans condemned by ex-education ministers

As education ministers in the City of London, ex-education ministers have condemned the plans to create a new type of school, the City Academy, which will be run by a private company. The academy is part of a wider programme of school reforms in London, which includes the creation of new academies and the expansion of existing ones. The plans have been met with criticism from educationists and the public, who are concerned about the impact on the state school system.

## UK link to terror snatches

The United Nations is investigating the claims of British intelligence about the involvement of British citizens in the 9/11 attacks. The UN report, led by Maria Steiner, a special rapporteur from the UN Commission on Human Rights, comes as an investigation by the Commission reveals the failure of the British intelligence apparatus, which used to be secret operations from the US, at least, can trace back the September 11 terror attacks. Foreign Office officials have denied all knowledge of the



Sharon Warner at the Oval yesterday. April 9 Photograph: Simon Doherty/Reuters

### National

#### Police chief blames Orangemen for riots

More than 2,000 police officers and soldiers clashed with thousands in Belfast in the worst riot for more than a decade. The violence erupted after a parade of Orange Order parades was escorted by British troops. The rioters, many of whom were members of the Orange Order, a Protestant fraternal organisation, were protesting against the presence of British troops in the city. The rioting was the most serious since the 1990s.

### Law

#### Judges may block deportations

The government faces a confrontation with judges over its attempts to deport foreign terrorists. The Home Office has sought to deport several individuals, but the courts have ruled that the government's actions are unlawful. The judges have argued that the government's actions are in breach of the European Convention on Human Rights. The government has vowed to appeal the decisions.

### International

#### Israeli troops leave Gaza after 38 years

As set intended to begin the process of the last time withdrawal as the government declared an end to its years of occupation and troops withdrew from the Gaza Strip. The Israeli troops were expected to leave overnight, but the withdrawal was delayed by a "technical" problem. The Israeli army has been in control of Gaza since 1967. The withdrawal is a significant step towards a two-state solution.

### Financial

#### Sky's Premiership rights under threat

With the game industry and the Government of Premier League football games in under intense fire from the Football Commission, which is set to be replaced by the Football Commission. It should have been clear that the Premier League's rights to sell a number of games to the broadcasters, a separate regulatory plan under consideration in the Football Commission, would have been limited to just a few games put up for sale. The League, meanwhile, is working all attempts to remove its "secondary" provisions, arguing that the current situation is unfair.

**Bigger isn't always better...**

2004 - "Berliner" redesign

# DIGITAL HISTORY

# Guardian Unlimited

[News](#) | [Football](#) | [Cricket](#) | [Film](#) | [Work](#) | [Jobs](#)

**News**  
Albanian  
civilians  
murdered  
in Kosovo



**News**  
Bramleys  
return from  
Irish exile

1995 - web site launch  
Simple portal  
Experimental project

Please note that you have to register for our sites once you go past the homepage. This should only take a couple of minutes and will allow you permanent, free access to all our sites.

#### Network sites

[News](#) | [Football](#) | [Cricket](#) | [Film](#) | [Work](#) | [Jobs](#)

#### Useful stuff

[About the network](#) | [Get the Net](#) | [Network guide](#) | [Events & offers](#)

Last updated Sunday January 17 1999 6.30am   
Guardian Media Group 1999



**Guardian  
Unlimited**

The UK's most popular  
newspaper website

Go to: Guardian Unlimited home

Login

2006 - Europe's largest online newspaper site.  
Reach of web far greater than national paper.  
18M unique users, many international

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**Today's news**

[Popup headlines](#)

[UK latest](#)



**[Bush leads prayers for dead](#)**

- FBI names hijack suspects
- Congress grants \$40bn war chest
- Taliban 'will avenge any US strikes'

[Storms hinder rescue efforts](#)

[Contact numbers and helplines](#)

[Advice for travellers and relatives](#)

[Special report: terrorism in the US](#)

[Guardian Unlimited on Wap, PDA and TV](#)

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**Find a job**

“The international audience for *guardian.co.uk* has brought a new goal within reach:

for *The Guardian* to become the world’s leading liberal voice”

GMG Scott Trust website

“*The Guardian* to become the world’s leading liberal voice”

Outgrown our web platform

New platform required

Breaking news: Government facing torture row calls - PA

## Two killed as terror returns to Northern Ireland

Last updated 15 minutes ago

Gerry Adams calls first major terror attack in more than a decade 'wrothful and productive'

● Peter Preston: Is the peace process derailed?

● Reaction: Brown condemns attack

● Q&A: Northern Ireland attack

● Timeline: Northern Ireland

### UK faces Mohamed torture claims

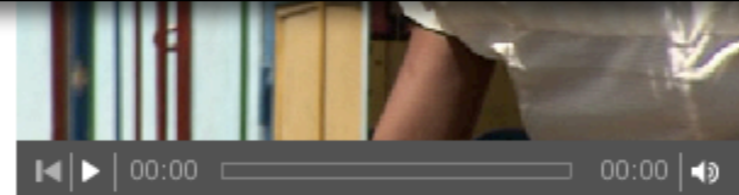
New revelations by Guantánamo Bay detainee must be answered by government, David Davis says

### Suicide bomber kills Iraqi police

Dozens killed and many more injured in latest attack on Baghdad's police academy

### Obama floats idea of Taliban talks

US president says reconciliation process similar to Iraq



### Haiti's Lost Girls

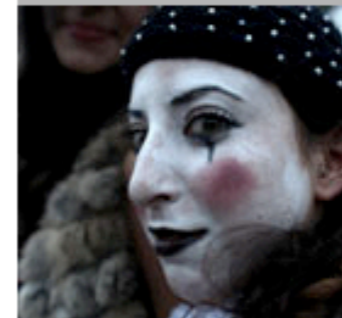
GuardianFilms goes inside Haiti's foetid slums, where criminal gangs use rape as a weapon

### Recession victims to get free therapy

Sufferers will be referred for counselling via Jobcentres, doctors and NHS Direct hotline

 22 comments

### World view 24 hours



### Live cricket

### guardianjobs

Search all jobs

Upload your CV

Get jobs by email

Join our career forums

### Online dating

Find your Soulmate with the Guardian's dating site

Join Guardian Soulmates

### Cranberry pearl necklace

 The perfect Mothers Day gift for only £29.95

18 month build time  
30M unique users  
250M page impressions per month

# Beginning the R2 project

What are we getting into?

Intense 18 month agile build

4 development teams to manage

>2M pages to migrate

Lots of new functionality to develop

# R2 project approach

Develop new system in parallel

Zero downtime

Migrate section by section to new system

Architect system as we go along

Apache layer

user requests

community

Custom apache module allows per-URL backend selection

Provides manageable migration

business

money  
sport

environment  
science  
technology etc

travel

migration

?

R1

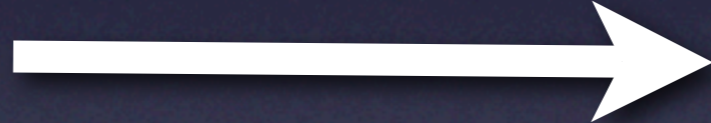
R2

Apache layer

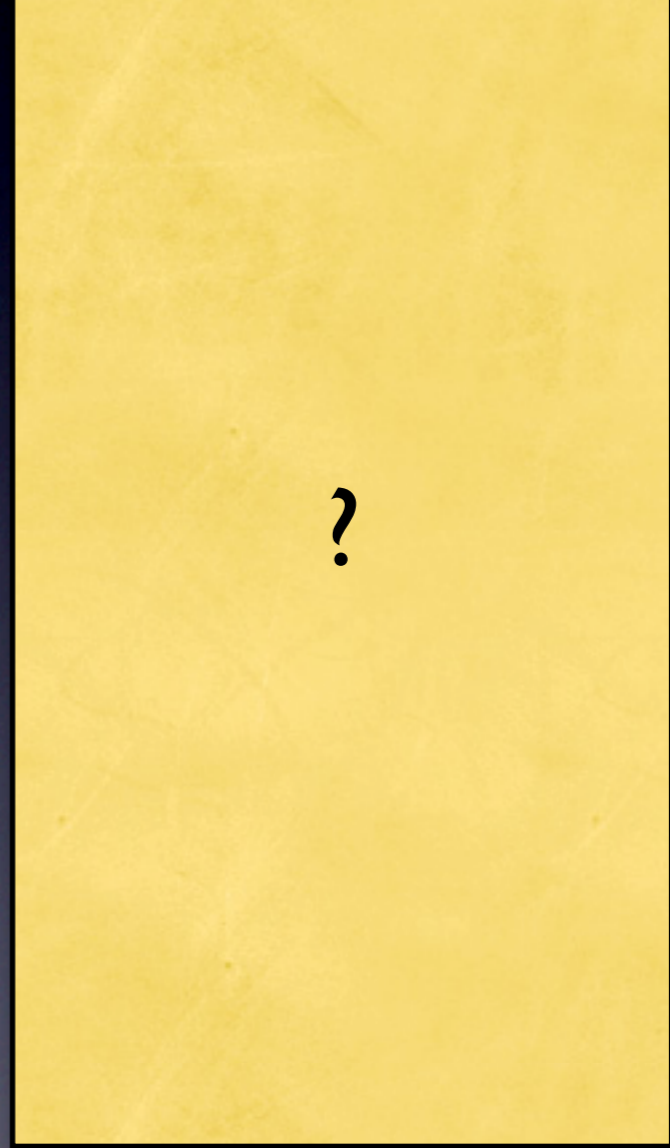


RI

community
news
business money sport
environment science technology etc
travel

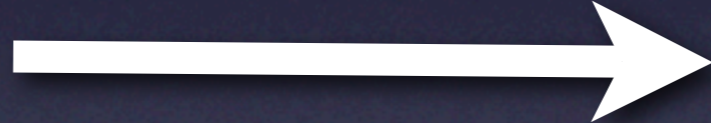
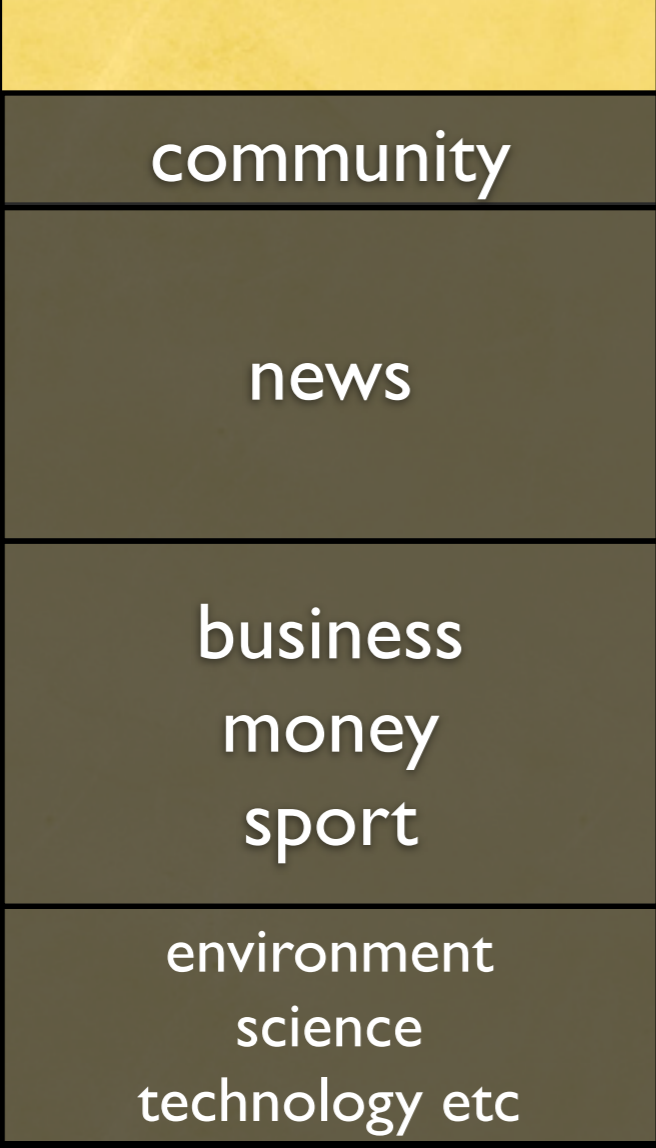


migration





Apache layer



migration



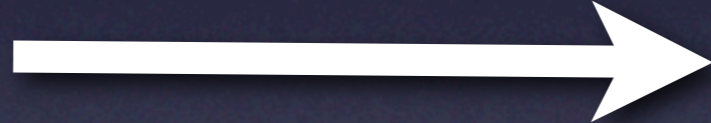
Apache layer



R1



R2



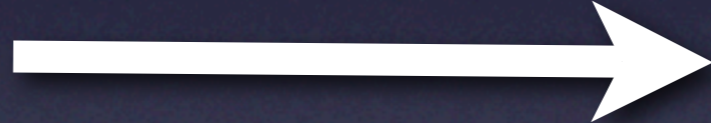
migration



Apache layer



R1



migration

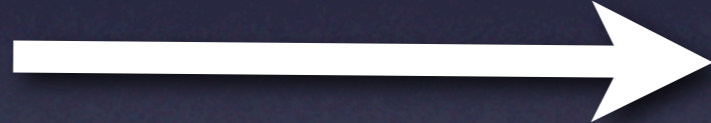
R2



Apache layer



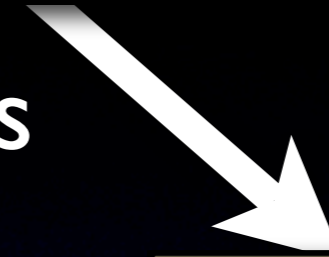
R1



R2

Apache layer

user requests



community

news

business  
money  
sport

environment  
science  
technology etc

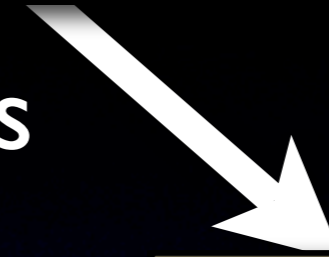
travel

R1

R2

Apache layer

user requests



R1

R2

community

news

business  
money  
sport

environment  
science  
technology etc

travel

# R2 architecture

Start simple

Impossible to predict final architecture

Take an agile “Just in time” approach

Learn from each release

# Travel site build

Apache layer

Why Travel?

Only 14K articles to migrate

Relatively low traffic

Manageable performance

Test our information architecture

money  
sport

environment  
science  
technology etc

migration

travel



# Application architecture

Caucho resin

Spring

Controller (Spring MVC)

Velocity 1.5

Domain model

Repositories

EHCache

Hibernate

Java 6 build

Simple stateless app

EHCache

Only needs to scale  
to 14K articles

# System architecture

Apache

Apache

Apache

R2 frontend

Search

R2 feeds

Oracle

R2 CMS

# Co-location

Apache

R2 frontend

Apache

R2 frontend

standby

standby

standby

CMS

feeds

Oracle

MANCHESTER

LONDON

# Co-location

Apache

Apache

R2 frontend

Search

Search

R2 frontend

Unreliable database

But: Only 14K articles. Cache fits in RAM!

standby

feeds

standby

Oracle

MANCHESTER

LONDON

Keyword

Contributor

Series

Publication

Tone

Tags



Content

Article

Video

Audio

Gallery

Cartoon

# travel



## Editors' picks



### Taiwan's flavours of the month

**Gallery (18 pictures):** Taipei has made its mark on the culinary map with its penchant for bizarrely themed restaurants. Photographs by Dan Chung



### Ten affordable restaurants with rooms

With food this tempting, you'll be glad you only have to stagger upstairs at the end of the night

### Ryanair to scrap check-in desks by October

The low-cost airline announces plans to introduce an online-only service by the autumn

### Take five native New Yorkers ...

Locals' haunts, from East Village thrift shops to the best steakhouse in Brooklyn  
● Live music bars in New York



### Skye's the limit for designer pads

A Scottish architecture practice is making its mark on the island with stunning holiday homes  
● Find a hotel

## On this site

- Find a place
- A - Z all places
- Types of trip
- News
- Blog
- Currency converter
- Offset your carbon emissions
- Readers' tips & photos
- Hotel reviews
- Restaurant reviews
- Short break ideas
- Guardian holiday offers
- Late offers
- Find flight deals
- Find hotel deals
- Free travel brochures
- Audio guides
- Galleries
- Interactives
- Editor's weekly email
- Join our talkboards
- Guardian home exchange
- Airport parking and hotels
- Weekly paper sections
- The Guardian: Saturday's Travel section

## Been there: readers share top travel tips



### Rural retreating

**Perth**  
**The Old Swan Barracks**  
The Swan Barracks were built in 1896, and this imposing stone structure is one of the oldest buildings in Northbridge. But you won't find soldiers in the cavernous drill-hall – the historic building has been converted into a bright and breezy hostel...  
Posted by Sissi

**Perth**  
**Cottlesloe Beach**  
Posted by Sissi  
10 Mar 2009

**Gubbio**  
**Luigi's House on the Pratale farm**  
Posted by milamila  
10 Mar 2009

**Perth**  
**Art Gallery of Western Australia**



Guest Artistic Director:  
Anish Kapoor  
2 - 24 May 2009

# Weekend breaks + Helsinki



## Weekend breaks – places

United Kingdom (85 articles)

France (32)

Italy (28)

Spain (19)

Belgium (10)

Ireland (10)

Germany (8)

Switzerland (8)

Morocco (7)

Netherlands (7)

Poland (7)

Sweden (7)

Portugal (6)

United States (6)

Austria (5)

Show 15 more...

## Most recent



## North star

24 Nov 2007: Drink some hot glogi in Helsinki's fairy-lit Senate Square

## The A-Z of alternative breaks

17 Feb 2007: Done Paris, Rome, Madrid? Try bar-hopping in Belgrade, chilling in Catania or raving in Rimini, says Jeroen Bergmans of Wallpaper.

## Readers' top tips

Helsinki  
GLO Hotel

I stayed at the GLO in July 2007. I went to Helsinki with my husband for a wedding and most of our friends stayed at the Palace Kamp but we decided to stay at its sister hotel, the GLO. It's next door to the Palace Kamp so probably the best location

Read full tip...  
Posted by yabez  
30 Dec 2008

Helsinki  
MadelnEarnest CityGuide  
Posted by SidFord  
25 Feb 2008

Helsinki  
Booking hostels in Helsinki during the summer  
Posted by Cgig  
4 Sep 2007

Helsinki

## Prize includes:

Return flights

Central accommodation

Free entry to top attractions

Free travel

## Most viewed on guardian.co.uk

24 hours

7 days

Most talked about

1. Chimp who threw stones at zoo visitors showed human trait, says scientist
2. Jonathan Myerson on the furore over his wife Julie's decision to write about their estranged son's drug use
3. Stand-off with US ship shows Chinese navy's secret tactics
4. New British search engine 'could be as important as Google'
5. Cricket - West Indies v England - live over-by-over report!

More top stories

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[Travel](#) > [Berlin](#) | [Hotels](#) | [Nightlife](#) | [Culture](#) | [On a budget](#)

## Berlin + Hotels

 [Webfeed](#)

### Suggestions for Berlin

[Restaurants \(3 articles\)](#)

[Short breaks \(20\)](#)

[Cultural trips \(13\)](#)

[Bars and clubs \(11\)](#)

[City breaks \(9\)](#)

[Budget travel \(7\)](#)

[Rail travel \(5\)](#)

[Food and drink \(3\)](#)

[Family holidays \(2\)](#)

[Green travel \(2\)](#)

[Insider guides \(2\)](#)

[Rest and relaxation \(2\)](#)

[Winter sports \(2\)](#)

[Beach holidays \(1\)](#)

[Camping \(1\)](#)

### Most recent



### The hot 10 for 2009

**4 Jan 2009:** From a solar eclipse in China to walking with dinosaurs, by way of Peter Pan and Robbie Burns, **Annabelle Thorpe** lists the year's must-dos

### After serving time, hotel staff to serve guests

**5 Dec 2008:** Neudeck jail in Munich to be turned into four-star hotel with former inmates among staff

### Winter wunderland

### Readers' top tips

Berlin

#### [The Shy Chef](#)

This is a secret restaurant operated from someone's home in central Berlin - a sort of underground restaurant. Brilliant food and a really cool idea!

[Read full tip...](#)

Posted by ACampbell  
3 Mar 2009

Berlin

#### [GoArt! Berlin](#)

Posted by ACampbell  
3 Mar 2009

Berlin

#### [Berlin for free](#)

Posted by moses6  
27 Feb 2009

Berlin

#### [Public Transportation](#)

Posted by mitzyli  
19 Nov 2008



# “Simple sites”

Apache layer

What are “simple sites”?

Sites with similar functionality to travel site

Content migration: 100K+ articles

Front page of site

migration

business  
money  
sport

environment  
science  
technology etc  
travel

# “Simple sites”

Apache layer

user requests

Performance tests indicate we should scale out application layer

community

2 x app servers

news

business  
money  
sport

migration

environment  
science  
technology etc  
travel

# “Simple sites”

Apache layer

user requests

Cache will longer fit in RAM: Site stability at risk

We are in a WAN! ££££ to fix.

Site front page included in this release

**I want to sleep at night**

migration

business  
money  
sport

environment  
science  
technology etc  
travel

# Emergency mode

Apache

Apache

Apache

Apache

NFS

Gracefully degrade in the event of an outage

Handle clean releases

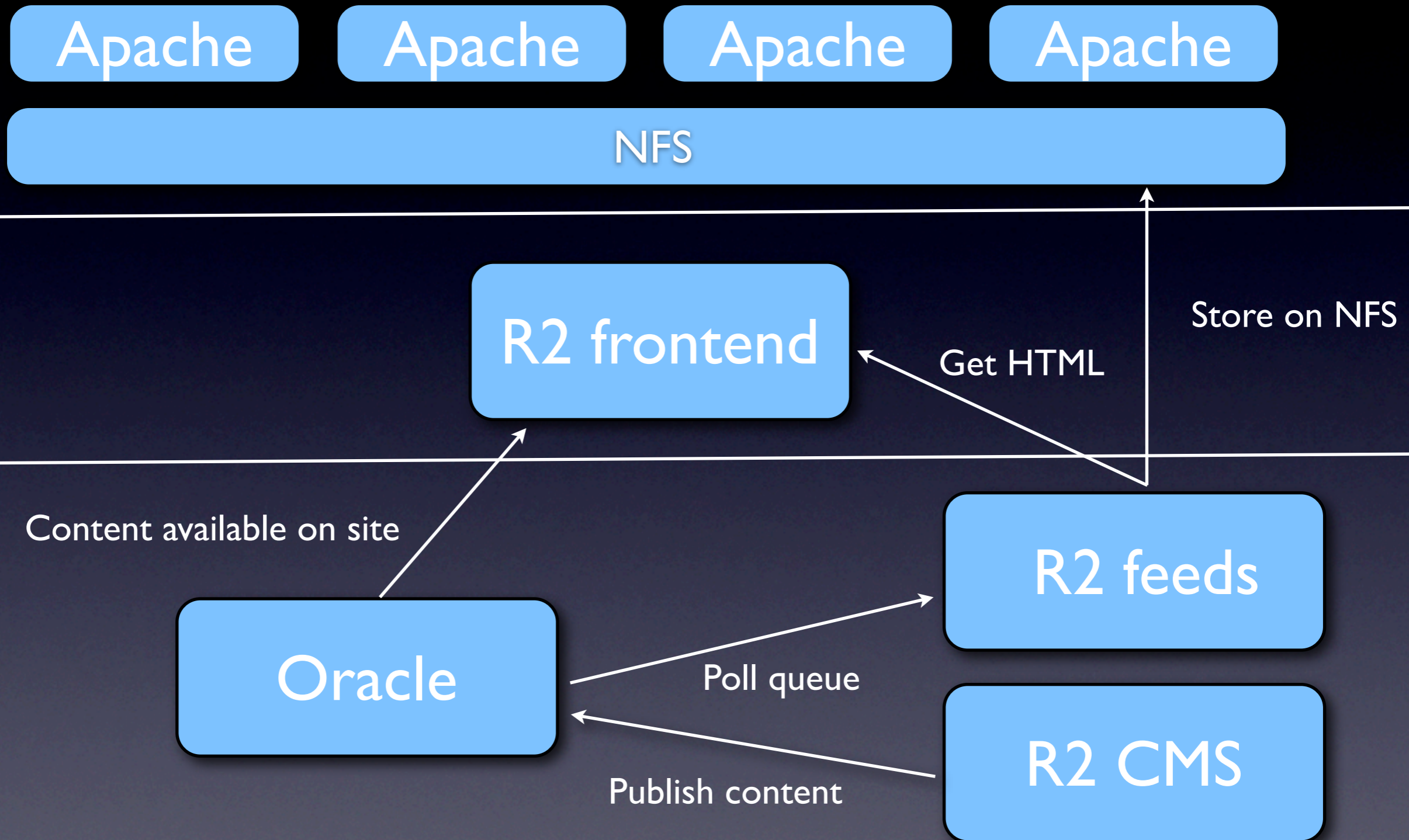
Fall back to flat files for a short time

Graceful (and cheap)

Oracle

R2 CMS

# Emergency mode



# Emergency mode

Apache

Apache

Apache

Apache

NFS

Store HTML on NFS disc

Schedule refresh in queue:

Modified pages pressed in <2 minutes

Unedited pages should be no more that 2 weeks old

Content available on site

When database down serve from NFS

Graceful degredation in user experience

Fixed issue "Just in time" ie: before seen in production

Store on NFS

Get HTML

R2 feeds

Poll queue

R2 CMS

Publish content

# “Complex sites”

Apache layer

What are “Complex Sites”?

Sites with third party interactions.  
Complex feeds.  
More traffic.

200K+ articles to migrate.

migration

community

news

sport

environment  
science  
technology etc

travel

# “Complex sites”

Apache layer

user requests

200K + articles

Performance tests indicate platform will be able to cope

Some Oracle queries need optimising

No scale increase required on app server

community

news

migration

sport

environment  
science  
technology etc

travel



# “Complex sites”

Apache layer

user requests

R1



R2



migration

# External information

**Market data**

<b>FTSE 100</b> 3693.81 Closed	<b>-21.42</b>	<b>DAX</b> 3914.1 Closed	<b>+27.12</b>	<b>Dow Jones</b> 6893.6	<b>-32.89</b>	<b>Nikkei</b> 7376.12 Closed	<b>+321.14</b>
--------------------------------------	---------------	--------------------------------	---------------	----------------------------	---------------	------------------------------------	----------------

Moving up FTSE 100		Price	Change
LEGAL & GENERAL	▲	28.61p	+8.24%
AVIVA	▲	214.15p	+8.21%
MAN GROUP	▲	178.94p	+8.02%
WOLSELEY	▲	172.80p	+7.33%
XSTRATA	▲	348.02p	+7.12%

Moving down FTSE 100		Price	Change
LLOYDS BNK GRP	▼	48.31p	-12.40%
TULLOW OIL	▼	758.00p	-6.71%
HSBC HOLDINGS	▼	374.25p	-6.27%
CENTRICA	▼	241.00p	-6.00%
BRIT AM TOBACCO	▼	1,709.77p	-5.95%

**FTSE 100**  
.FTSE GBP Europe/London 2009-03-11 16:30

More markets data

Search latest share prices from Thomson Reuters  
Enter company name or share code

Search by name  Search by code

[Browse all stocks in the FTSE 100](#)

Financial data from THOMSON REUTERS Share prices are updated with a 15-minute delay. Data is not

# External information

Web server

Stop using database as integration point

Simple change: REST integration with third party server side

App server

Proxy

net

External system

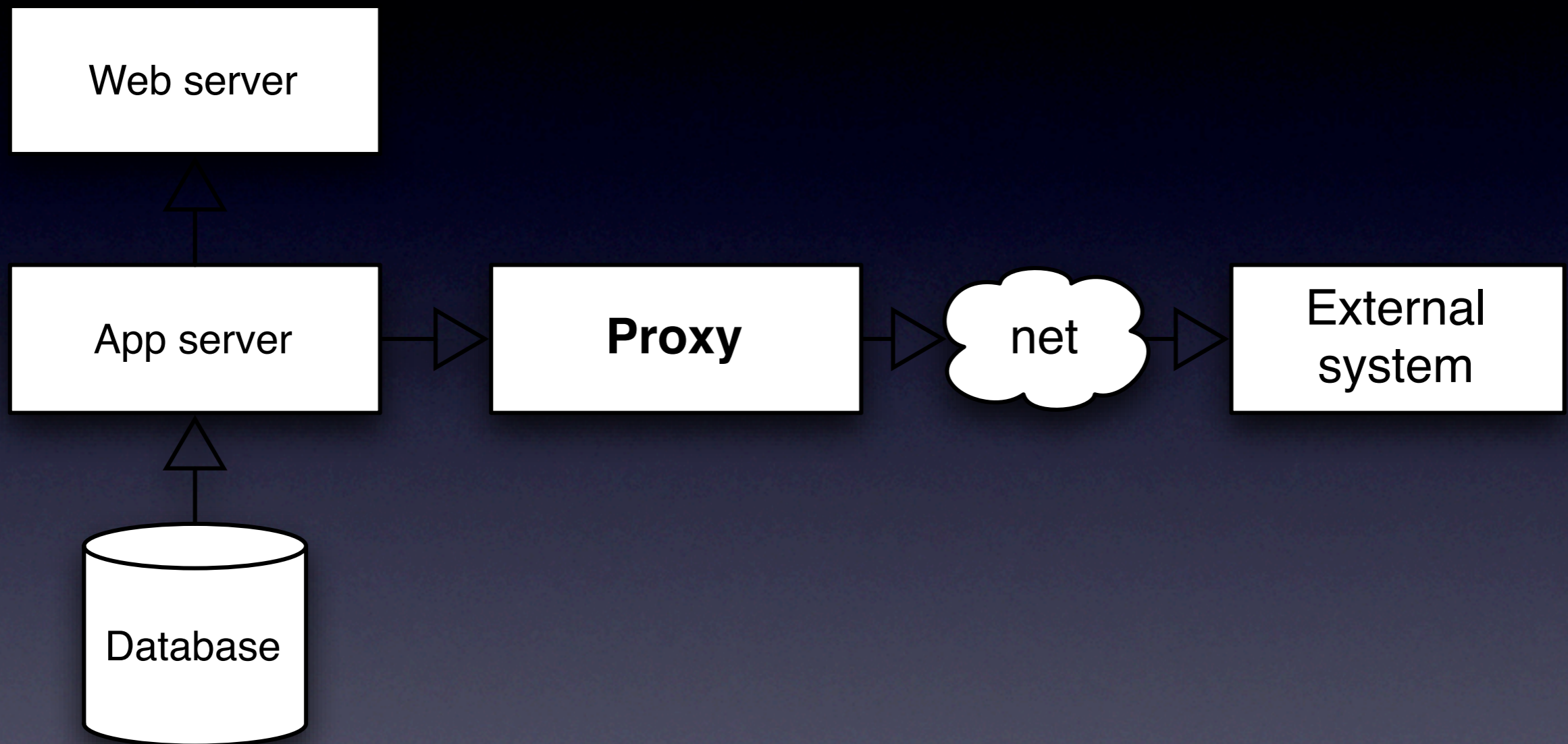
Use proxy server to ensure performance / stability

Third party control caching. Domain model.

Database

Used on our Sport site for football / cricket scores.

# External information








# Liverpool v Real Madrid

## Match facts

Guardian report   Min-by-min   Match facts

Champions Lge KO Rnd 1, Leg 2  
Tuesday 10 March 2009 19.45

Football  
Liverpool -  
Real Madrid

<b>Final score</b>	<b>Liverpool</b> 4 - 0 <b>Real Madrid</b> (HT 2 - 0)						
	Torres 16 Gerrard (pen) 28 Gerrard 47 Dossena 88						
	Liverpool win 5-0 on aggregate						
<b>Aggregate</b>	Liverpool 5 - 0 Real Madrid						
<b>Bookings</b>	<table border="0"> <tr> <td>Gerrard 26</td> <td>Pepe 19</td> </tr> <tr> <td>Mascherano 43</td> <td>Heinze 28</td> </tr> <tr> <td>Dossena 85</td> <td>Marcelo 62</td> </tr> </table>	Gerrard 26	Pepe 19	Mascherano 43	Heinze 28	Dossena 85	Marcelo 62
Gerrard 26	Pepe 19						
Mascherano 43	Heinze 28						
Dossena 85	Marcelo 62						
<b>Corners</b>	8  6						
<b>Goal attempts</b>	15  15						
<b>On target</b>	12  3						
<b>Fouls</b>	26  15						
<b>Offside</b>	5  2						
<b>Liverpool</b>	Jose Manuel Reina, Alvaro Arbeloa, Fabio Aurelio, Martin Skrtel, Jamie Carragher, Javier Mascherano, Xabi Alonso (Lucas Leiva, 60), Steven Gerrard (Jay Spearing, 73), Dirk Kuyt, Ryan Babel, Fernando Torres (Andrea Dossena, 84)						
<b>Real Madrid</b>	Iker Casillas, Sergio Ramos, Gabriel Heinze, Kepler Pepe, Fabio Cannavaro (Rafael van der Vaart, 64), Lassana Diarra, L. Wesley Sneijder, Fernando Ruben Gago (Jose Maria Gutí, 77), Gonzalo Higuain, Gonzalez Raul, Arjen Robben (Junior Marcelo, 46)						
<b>Referee</b>	De Bleeckere, F						
<b>Venue</b>	Anfield						
<b>Attendance</b>	42,550						

## Wednesday 20 August 2008

### Fixtures and results

#### Baseball

Baseball : Baseball Preliminary Round - Game 25  
20 August 2008 - 10:30

Country	Score	Country
Cuba	17-1	China

Baseball : Baseball Preliminary Round - Game 26  
20 August 2008 - 11:30

Country	Score	Country
Netherlands	0-10	South Korea

Baseball : Baseball Preliminary Round - Game 27  
20 August 2008 - 18:00

Country	Score	Country
Canada	5-6	Chinese Taipei

Baseball : Baseball Preliminary Round - Game 28  
20 August 2008 - 19:00

Country	Score	Country
Japan	2-4	United States

#### Full timetable

Aug 08

M	T	W	T	F	S	S
28	29	30	31	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

#### Results by discipline

[Olympics 2008: Aquatics](#)

[Olympics 2008: Archery](#)

[Olympics 2008: Athletics](#)

[Olympics 2008: Badminton](#)

[Olympics 2008: Baseball](#)

[Olympics 2008: Basketball](#)

[Olympics 2008: Boxing](#)

[Olympics 2008: Canoeing and kayaking](#)

[Olympics 2008: Cycling](#)

## Guardian University Guide 2009

### University ranking : Extract of the table

Institution	Average teaching score
Aston	67.30
<b>Nottingham</b>	<b>67.20</b>
Glasgow	67.00

- 
- [Full profile for Nottingham university](#)
  - [Full university table](#)

# Apache layer

user requests

News site launch

The big one!

Will end up with nearly 1M content pages!

Much traffic

migration

news

business

money

sport

environment

science

technology etc

travel

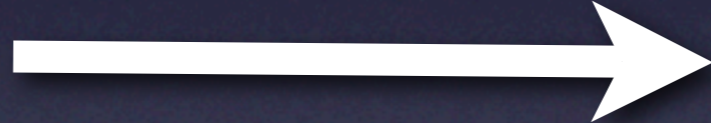
community



Apache layer



R1



R2

# Scalability predictions

Platform team formed.  
They predict problems with:

related content  
tag pages

Both will max out our database

How radical will we have to be?

# Related content

40% of Oracle load


**Related information**

---

**World news**  
United States · Barack Obama · Democrats

---

**Observer**



**Election day across the US**

**5 Nov 2008:**  
A selection of the best images from across the US on election day 2008


[More galleries](#)

16 Oct 2008  
Ballots already cast overwhelmingly favour Democrats, exit surveys suggest

29 Aug 2008  
Jonathan Freedland at the Democratic convention

29 Aug 2008  
Lola Adesioye: Dr King would have been proud to see Barack Obama's nomination

27 Aug 2008  
Jay Stevens: Montana up for grabs for the Democrats



**'Barack Obama showed he has some steel'**

**29 Aug 2008:** Jonathan Freedland analyses the rousing Denver address of the presidential nominee as he tackles race, Iraq and the Republicans

[More video](#)

# Related content

## Difficult to decache


**Related information**

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**World news**  
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**Observer**



**Election day across the US**

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A selection of the best images from across the US on election day 2008


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16 Oct 2008  
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**'Barack Obama showed he has some steel'**

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[More video](#)

# Related content

High editorial value component


**Related information**

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**World news**  
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**'Barack Obama showed he has some steel'**

**29 Aug 2008:** Jonathan Freedland analyses the rousing Denver address of the presidential nominee as he tackles race, Iraq and the Republicans

[More video](#)

# Related content

Get it off the database!!


**Related information**

---

**World news**  
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---

**Observer**



**Election day across the US**

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[More galleries](#)

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**'Barack Obama showed he has some steel'**

**29 Aug 2008:** Jonathan Freedland analyses the rousing Denver address of the presidential nominee as he tackles race, Iraq and the Republicans

[More video](#)

## Solution

Use Endeca search engine

Index page ID > [tag IDs]

Group tag IDs into buckets. Bucket size determined by content volume for tag.

# Solution

Page ID	B1	B2	B3	B4	B5	B6	B7	B8
I23		34,575		632			45	645
I24	15				551	389		
I25		45	4,676		34			

Tags with most content

Tags with least content



## Solution

When user requests page:

Free text search for tag IDs.

Search engine relevance ranks results. Tags with least content get higher relevance. Returns page IDs.

# Problem 2: Tag queries

guardian.co.uk Search:


[News](#) | [Sport](#) | [Comment](#) | [Culture](#) | [Business](#) | [Money](#) | [Life & style](#) | [Travel](#) | [Environment](#)

[News](#) > [World news](#) > [Tibet](#) | [Video](#) | [Audio](#) | [In pictures](#) | [Comment](#) | [China](#) | [India](#)

## Tibet Webfeed

---

### March 2008 unrest



Video: Seven days not in Tibet

Q&A: Tibet and China

Interactive guide

---

### Useful links

[Free Tibet Campaign](#)

[Students for a Free Tibet](#)

[China Tibet Information Centre \(Chinese government website\)](#)

---

### Related subjects

[World news](#)

[China](#)

[Dalai Lama](#)

### Most recent

#### The real Dalai Lama

10 Mar 2009: **Barbara O'Brien:** Tenzin Gyatso has been both vilified and worshipped. But who is he and what does he represent?  
[15 comments](#)


---

#### Dalai Lama warns of Tibetan culture's 'extinction'

10 Mar 2009: On 50th anniversary of failed uprising against Chinese rule, spiritual leader says martial law devastated Himalayan region

---


#### Uprising day protests in Nepal



**Gallery (12 pictures), 10 Mar 2009: 10 March 2009:** Exiled Tibetans protested in the streets as they marked the 50th anniversary of the failed uprising against China, which led to the Dalai Lama fleeing the country in exile

---

#### The Tibetan uprising: 50 years of protest



**Gallery (20 pictures), 10 Mar 2009:** Marking the 50th anniversary of the failed Tibet uprising against

### More Blogs

[Are Tibet's newspapers really flourishing?](#)  
Roy Greenslade, 26 Sep 2008, 6.53am

---

[Tibet tops agenda in India-China talks](#)  
Randeep Ramesh, 18 Sep 2008, 9.39am  
[18 comments](#)

---

[Anger mounts over Everest torch plans](#)  
Roy Greenslade, 24 Apr 2008, 8.24am

---

[What now for the Olympic torch?](#)  
Allegra Stratton, 17 Apr 2008, 8.25am  
[52 comments](#)

---

[China's tortured torch syntax](#)  
Peter Walker, 8 Apr 2008, 1.09pm  
[84 comments](#)

# Tag queries

guardian.co.uk Search:

News | Sport | Comment | Culture | Business | Money | Life & style | Travel | Environment

News > World news > Tibet > Video | Audio | In pictures | Comment | China | India

## Tibet

Webfeed

March 2008 unrest | Most recent | More Blogs

**The real Dalai Lama**  
10 Mar 2008: Barbara O'Brien: Ted... what does he represent?  
15 comments

**Dalai Lama warns of Tibetan culture's**  
10 Mar 2009: On 50th anniversary of failed uprising against Chinese rule, spiritual leader says martial law devastated Himalayan region

**Uprising day protests in Nepal**  
Gallery (12 pictures), 10 Mar 2009: 10 March 2009: Exiled Tibetans protested in the streets as they marked the 50th anniversary of the failed uprising against China, which led to the Dalai Lama fleeing the country in exile

**The Tibetan uprising: 50 years of protest**  
Gallery (20 pictures), 10 Mar 2009: Marking the 50th anniversary of the failed Tibet uprising against

**Are Tibet's newspapers really flourishing?**  
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84 comments

**Useful links**  
Free Tibet Campaign  
Students for a Free Tibet  
China Tibet Information Centre (Chinese government website)

**Related subjects**  
World news  
China  
Dalai Lama

Platform team predict problems

Queries becoming more expensive as content volume increases.

Not scalable.

# Tag queries

Team have 2 ideas:

- 1: Cache page fragments on disc. Use Apache SSI.
- 2: SQL Queries can be sufficiently optimised

I am tempted to just pick option 1.

but....

Developers are better than architects

Developers have greater understanding of the  
real detail of the system innards

Don't dictate to developers

Let them innovate

Allow them to try both options.

(Privately I bet on Option 1, cache page fragments on disc)

# Actual solution

Independent Oracle consultant (with beard) optimised problem queries in 1 day.

Performance tests say we're good to go for News.

Not what I expected!



# Beyond News

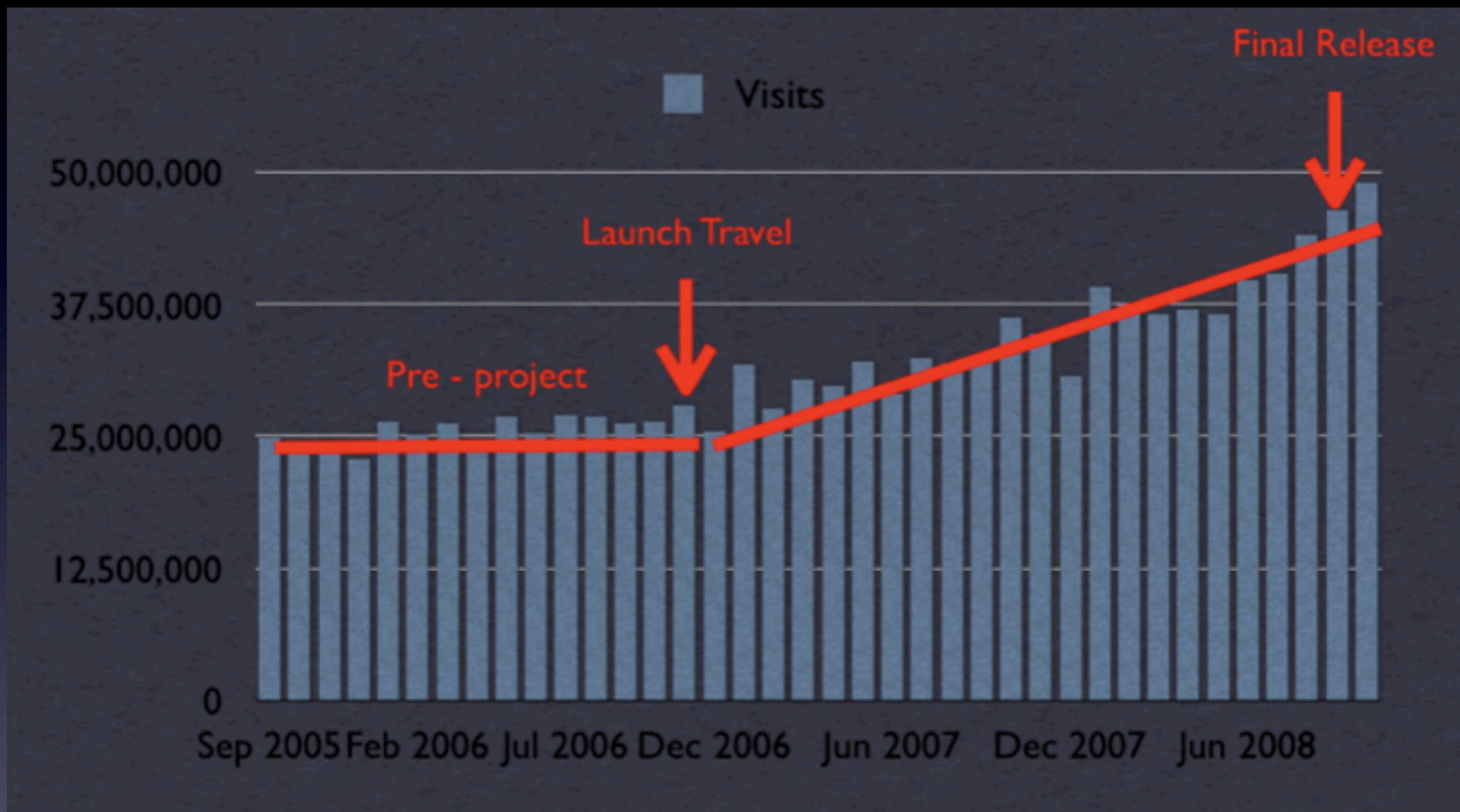
Platform team predicting scalability horizon ahead

Caches overflowing

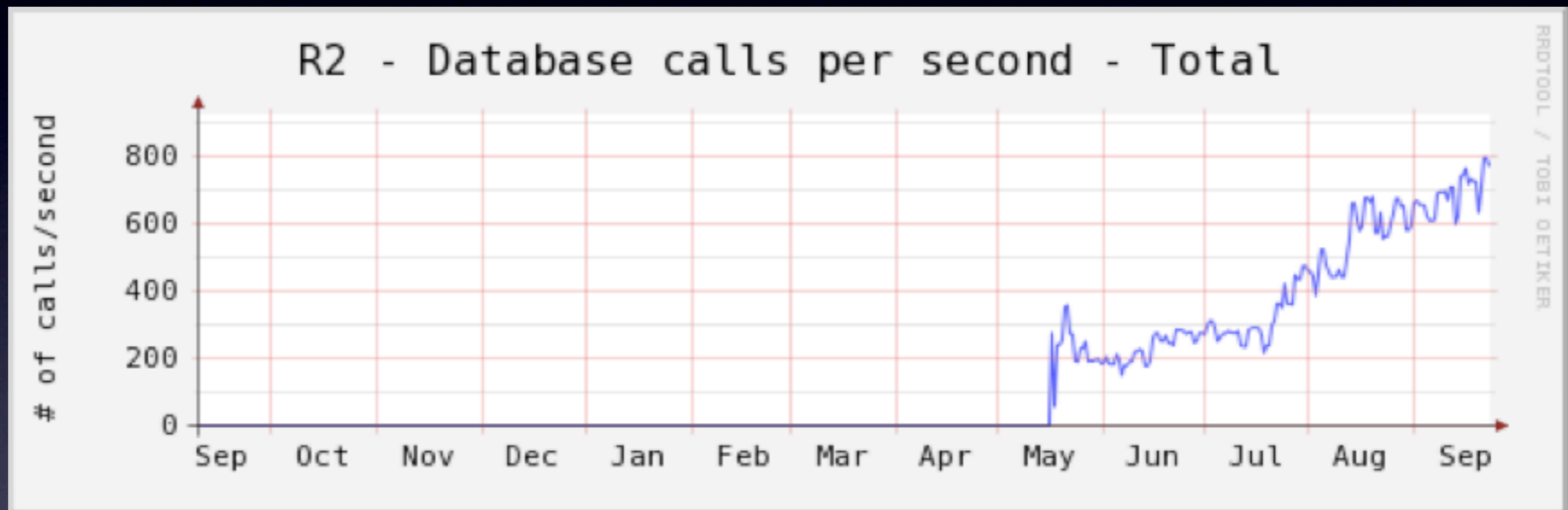
Database load increasing

Can no longer add app tier servers to scale

# Beyond News



# Beyond News



Reduce database load by 50%

Keep it there

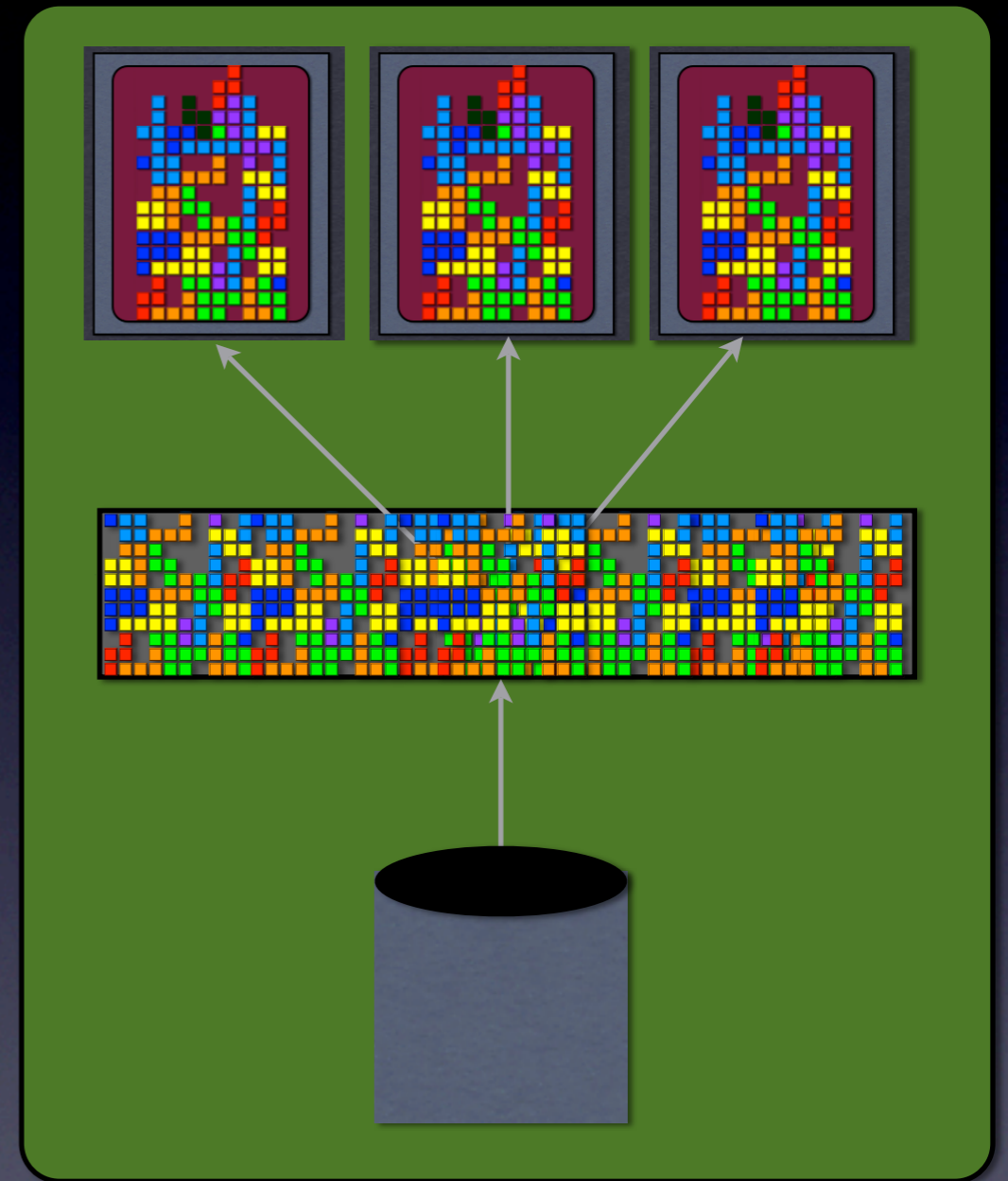
# JBOSS cache & memcached

6Gb distributed cache in development now

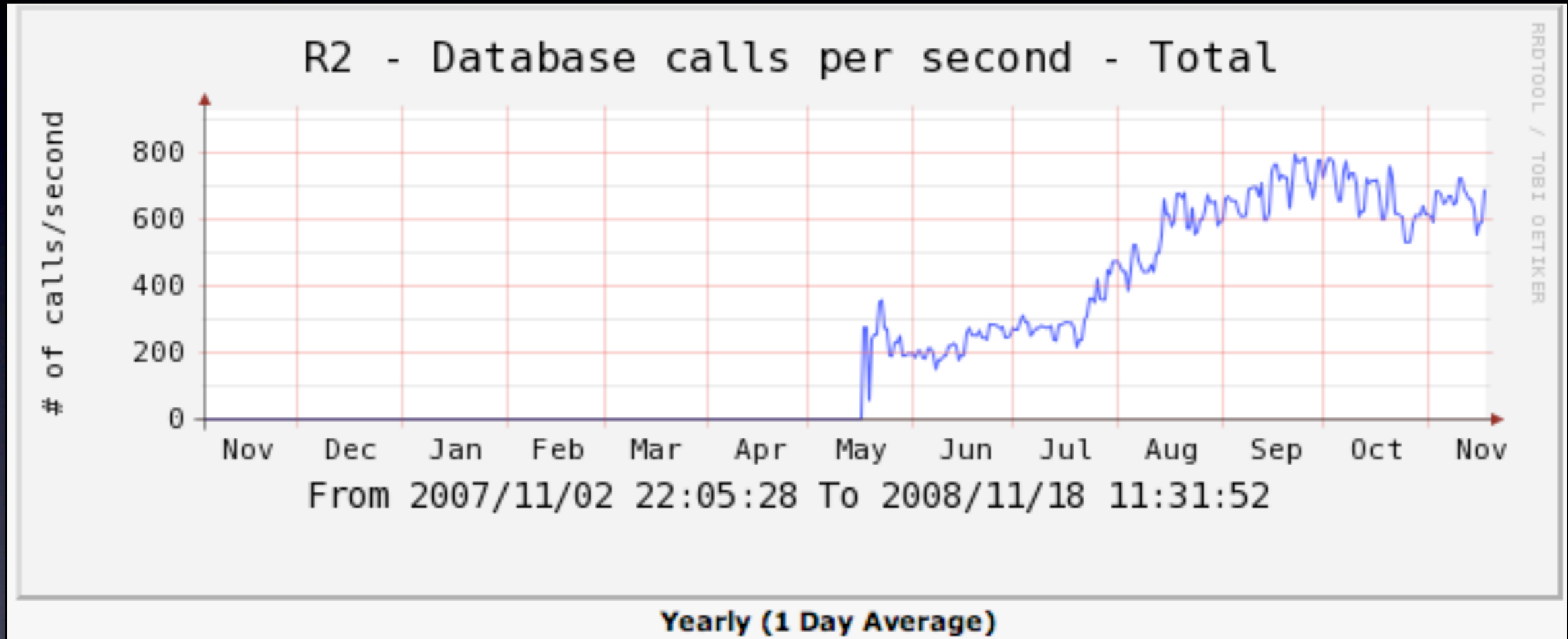
Can scale app tier without killing database

Akami reverse proxy to reduce frontend load

Required much later than I thought!



# Beyond News



Agile architecture is possible

Evolutions often smaller than expected

Reserve technical time in project budget

Try things out.

Make small mistakes.

Let developers innovate

One more thing...



# OPEN PLATFORM

Build applications with the Guardian

# DATA STORE

Facts you can use



## Content API

Backed of our search engine

Provides full access to all guardian content

Supports XML, JSON, ATOM

Free for apps that don't publish full content

Advertising network for those that do

Currently in limited private beta

Go

[Forget my API key](#)

XML

JSON

Raw output

```

<search count="30021" start-index="0">
  <results>
    <content id="4080614" type="article" web-
url="http://www.guardian.co.uk/uk/2000/oct/24/labour.politics" api-
url="http://api.guardianapis.com/content/item/4080614">
      <publication>The Guardian</publication>
      <headline>Blair accused of failing the environment</headline>
      <standfirst>The prime minister is preparing to deliver his first
speech on green issues in nearly four years. But he is deeply at odds
with campaigners Special report: New Labour in power</standfirst>
      <byline>John Vidal</byline>
      <section-name>UK news</section-name>
      <trail-text>Green groups waiting for Tony Blair's first speech on the
environment in almost four years yesterday challenged the prime
minister to admit that Labour had failed to advance many
environmental issues since coming to power. </trail-text>
      <link-text>Blair accused of failing the environment</link-text>
      <publication-date>2000-10-24T00:00:00</publication-date>
      <tagged-with>
        <tag name="Article" type="content-type" filter="/global/article"
api-url="http://api.guardianapis.com/content/search?
filter=/global/article" web-url=""></tag>
        <tag name="John Vidal" type="contributor"
filter="/global/johnvidal" api-
url="http://api.guardianapis.com/content/search?
filter=/global/johnvidal" web-
url="http://www.guardian.co.uk/profile/johnvidal"></tag>
        <tag name="Labour government 1997 - 1999" type="keyword"
filter="/politics/labour1997to99" api-
url="http://api.guardianapis.com/content/search?
filter=/politics/labour1997to99" web-
url="http://www.guardian.co.uk/politics/labour1997to99"></tag>
        <tag name="Labour" type="keyword" filter="/politics/labour" api-
url="http://api.guardianapis.com/content/search?
filter=/politics/labour" web-
url="http://www.guardian.co.uk/politics/labour"></tag>
        <tag name="Politics" type="keyword" filter="/politics" api-
url="http://api.guardianapis.com/content/search?filter=/politics"
web-url="http://www.guardian.co.uk/politics"></tag>
        <tag name="UK news" type="keyword" filter="/uk" api-
url="http://api.guardianapis.com/content/search?filter=/uk" web-
url="http://www.guardian.co.uk/uk"></tag>
      </tagged-with>
    </content>
  </results>
</search>

```

## Filters

- [Article](#) - 29909
- [UK news](#) - 10229
- [Politics](#) - 5799
- [Environment](#) - 5647
- [World news](#) - 5492
- [Business](#) - 4665
- [Society](#) - 3950
- [Comment](#) - 3448
- [Observer](#) - 3347
- [Education](#) - 2724
- [Culture](#) - 2466
- [News](#) - 2203
- [Media](#) - 2063
- [Life and style](#) - 2023
- [News](#) - 1888
- [Money](#) - 1831
- [Technology](#) - 1561
- [Comment is free](#) - 1549
- [Sport](#) - 1547
- [Science](#) - 1531
- [Higher education](#) - 1473
- [United States](#) - 1089
- [Travel](#) - 1031
- [The Guardian](#) - 786
- [Work & careers](#) - 663

Go

[Forget my API key](#)

XML

JSON

Raw output

```

<search count="30021" start-index="0">
  <results>
    <content id="4080614" type="article" web-
url="http://www.guardian.co.uk/uk/2000/oct/24/labour.politics" api-
url="http://api.guardianapis.com/content/item/4080614">
      <publication>The Guardian</publication>
      <headline>Blair accused of failing the environment</headline>
      <standfirst>The prime minister is preparing to deliver his first
speech on green issues in nearly four years. But he is deeply at odds
with campaigners Special report: New Labour in power</standfirst>
      <byline>John Vidal</byline>
      <section-name>UK news</section-name>
      <trail-text>Green groups waiting for Tony Blair's first speech on the
environment in almost four years yesterday challenged the prime
minister to admit that Labour had failed to advance many
environmental issues since coming to power. </trail-text>
      <link-text>Blair accused of failing the environment</link-text>
      <publication-date>2000-10-24T00:00:00</publication-date>
      <tagged-with>
        <tag name="Article" type="content-type" filter="/global/article"
api-url="http://api.guardianapis.com/content/search?
filter=/global/article" web-url=""></tag>
        <tag name="John Vidal" type="contributor"
filter="/global/johnvidal" api-
url="http://api.guardianapis.com/content/search?
filter=/global/johnvidal" web-
url="http://www.guardian.co.uk/profile/johnvidal"></tag>
        <tag name="Labour government 1997 - 1999" type="keyword"
filter="/politics/labour1997to99" api-
url="http://api.guardianapis.com/content/search?
filter=/politics/labour1997to99" web-
url="http://www.guardian.co.uk/politics/labour1997to99"></tag>
        <tag name="Labour" type="keyword" filter="/politics/labour" api-
url="http://api.guardianapis.com/content/search?
filter=/politics/labour" web-
url="http://www.guardian.co.uk/politics/labour"></tag>
        <tag name="Politics" type="keyword" filter="/politics" api-
url="http://api.guardianapis.com/content/search?filter=/politics"
web-url="http://www.guardian.co.uk/politics"></tag>
        <tag name="UK news" type="keyword" filter="/uk" api-
url="http://api.guardianapis.com/content/search?filter=/uk" web-
url="http://www.guardian.co.uk/uk"></tag>
      </tagged-with>
    </content>
  </results>
</search>

```

## Filters

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- [Higher education](#) - 1473
- [United States](#) - 1089
- [Travel](#) - 1031
- [The Guardian](#) - 786
- [Work & careers](#) - 663

## API Console (close)

/content/tags?q=environment

Go

XML

JSON

Raw output

```
<tags count="5" start-index="0">
  <tag name="Geography and environment studies" type="keyword"
    filter="/education/geographyandenvironmentstudies" api-
    url="http://api.guardianapis.com/content/search?
    filter=/education/geographyandenvironmentstudies" web-
    url="http://www.guardian.co.uk/education/geographyandenvironmentstudies">
  </tag>
  <tag name="Environment Q&As" type="keyword" filter="/environment/qa" api-
    url="http://api.guardianapis.com/content/search?filter=/environment/qa" web-
    url="http://www.guardian.co.uk/environment/qa"></tag>
  <tag name="environment" type="keyword" filter="/guardian-films/environment"
    api-url="http://api.guardianapis.com/content/search?filter=/guardian-
    films/environment" web-url="http://www.guardian.co.uk/guardian-
    films/environment"></tag>
  <tag name="Environment" type="keyword" filter="/environment" api-
    url="http://api.guardianapis.com/content/search?filter=/environment" web-
    url="http://www.guardian.co.uk/environment"></tag>
  <tag name="Guardian Environment Network" type="keyword"
    filter="/environment/network" api-
    url="http://api.guardianapis.com/content/search?filter=/environment/network"
    web-url="http://www.guardian.co.uk/environment/network"></tag>
</tags>
```

API Console (close)

/content/search?filter=/environment&filter=/world/barack-obama&before=20081101&q=congress+voting+

Go

XML

JSON

Raw output

```
<search count="1" start-index="0">
  <results>
    <content id="338787109" type="article" web-
      url="http://www.guardian.co.uk/environment/2008/oct/20/network-
      uselections2008" api-
      url="http://api.guardianapis.com/content/item/338787109">
      <publication>guardian.co.uk</publication>
      <headline>Obama or McCain: environmental voting records in
      Congress</headline>
      <standfirst>Analysis of the voting records of the two presidential
      hopefuls, with help from our friends at Environment
      America</standfirst>
      <byline>Duncan Clark</byline>
      <section-name>Environment</section-name>
      <trail-text> Analysis of the voting records of the two presidential
      hopefuls, with help from our friends at Environment America </trail-
      text>
      <link-text>Obama or McCain: environmental voting records in
      Congress</link-text>
      <publication-date>2008-10-20T00:00:00</publication-date>
      <tagged-with>
        <tag name="Biofuels" type="keyword" filter="/environment/biofuels"
          api-url="http://api.guardianapis.com/content/search?
          filter=/environment/biofuels" web-
          url="http://www.guardian.co.uk/environment/biofuels"></tag>
        <tag name="Climate change" type="keyword"
          filter="/environment/climate-change" api-
          url="http://api.guardianapis.com/content/search?
          filter=/environment/climate-change" web-
          url="http://www.guardian.co.uk/environment/climate-change"></tag>
        <tag name="Energy" type="keyword" filter="/environment/energy"
          api-url="http://api.guardianapis.com/content/search?
```

- Alan Rusbridger on why data matters

---

## Guardian data

### Get our full university data

The Guardian university rankings

🗨️ 3 comments

- University research departments ranked

---

### See the data underlying our tax database

Find out how much tax the FTSE100 pay

👉 Interactive guide to the data

- Special report: the tax gap

---

## Population

### England's population, by sex and race

Experimental stats showing the population of England, by sex and ethnic mix

🗨️ Post your comment

- Britain's population since 1946
- European population change
- World populations
- Population and income around the world

---

### Gender equality: The sex war numbers

How many women get paid equally to men?

🗨️ 1 comment

---

## Military

### Costs of British operations in Iraq and Afghanistan

The price of Britain's military adventures

🗨️ 1 comment

- British deaths in Iraq and Afghanistan
- British troop numbers in Iraq
- British soldiers cause of death
- British overseas deployments
- British forces ethnic breakdown
- British forces by sex
- British military intelligence spending

---

## Migration

### Foreign-born people living in the UK

People resident and foreign-born workers

🗨️ Post your comment

- Asylum seekers to the UK

---

## Education

### Get our full university data

The Guardian university rankings

🗨️ 3 comments

- University research departments ranked

---

## Health, UK

### How much do we exercise?

For most of us sport is something we'd rather not be bothered with

🗨️ 1 comment

- What do we eat?
- Obesity among British adults and children
- Drug use by young people across the UK

---

## Health, world

### World health spending

Around 19% of US government expenditure goes on health

🗨️ Post your comment

- Medical personnel by country
- Immunisation rates around the world
- The world in births
- Life expectancy by country
- Condom use around the world

---

### Lebanon: the world capital for teen smokers

Smoking figures for every country

🗨️ 2 comments

- Suicide rates in different countries
- Fundamental fat facts
- Boozers of the world

**DATA  
STORE**  
Facts you can use



<http://www.guardian.co.uk/open-platform>

<http://blogs.guardian.co.uk/inside>

Thank you