

Unibet.com Architecture

Open Source at Unibet.com:
10x scalability at half the cost

stefan.norberg@unibet.com

@stnor

Unibet Open Source strategy

- Open source software and open standards should always be our first choice
- Avoid vendor lock-in - software we use should have a right-to-use license without any cost attached

- Commercial, proprietary software need to show *exceptional business value* (over Free solutions) in order to be considered
- Contribute to the community by buying support from companies backing FOSS solutions or paying for product improvements

Customers

Partners &
Affiliates

Banners

Browser

Flash/Flex

Content Deliver Networks

Fan-out Push Servers

DDos Protection

Single-sign-on

Payment

Web CMS

REST API:s

Async Betting API

Poker

Casino

Bingo

Messaging

Customer
System

Wallet
System

Bonus
System

Betting
Engine

Customers

Partners & Affiliates

Banners

Browser

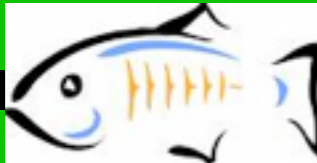
Flash/Flex



Content Deliver Networks

Fan-out Push Servers

DDos Protection



Single-sign-on



Payment

Web CMS

REST API:s

Async Betting API



Messaging



Customer System

Wallet System



Bonus System



Betting Engine



Unibet in numbers

- 100% online - www.unibet.com
- 30+ web sites in 27 languages
- Gross win: 250 million dollars / year
- “Technical” growth is $> 100\%$ / year

NFL: WEEK ONE LINES

The NFL season does not kick off until September 11, but we have the betting for the Week One action, including defending Super Bowl champions Pittsburgh hosting the Tennessee Titans. Check out the handicap markets and division odds!

[NFL Markets](#)

My Account

3.6 M CUSTOMERS WORLDWIDE

Username Password

[Lost your password?](#)

[Log In](#)

[Not a customer yet?](#)

SPORTSBOOK

- Pre-season friendlies
- Premier League
- Burnley - Everton

CASINO

- Mega Fortune
- Texas Hold'em
- Casino tournaments

POKER

- Get started with Poker
- Play In browser
- Unibet Open

Winning right now

	Gonieszczu	€2.40
	thetsaxpins	€1.70
	Servette	€1.60
	jakestan	€1.60
	pelon99	€1.60

[Play skill games!](#)

LIVE

Tokushima Vortis - Ventforet Kofu	0 - 0
Kashima Antlers - FC Tokyo	1 - 0

[To Live Betting](#)

LIVE CASINO

- Blackjack
- Baccarat
- Roulette

GAMES

- Games
- Scratch Card
- Skill

EGAMING AWARDS

Unibet has won the Egaming Awards for the best sport betting operator of the year 2006 and 2008.

[Try our Sports betting](#)

Bet Types

Betting Groups

- Match (4)
- Goal Scorer (4)
- Player Goals (21)
- Other Specials (16)
- Double Chance (4)
- Half Time (4)
- Corners (8)
- HT/FT (4)
- O/U Goals (32)
- Bookings (40)
- Correct Score (8)
- Team to Score (20)
- Hcp Bets (8)

All bets Clear

All Timeframes

Update

Match

23-Aug-2009 1 X 2

All Football > England > Premier League

13:30	West Ham United - Tottenham <i>LIVE</i>	3.45	3.25	2.10	+50
15:00	Burnley - Everton <i>LIVE</i>	3.10	3.25	2.25	+27
16:00	Fulham - Chelsea <i>LIVE</i>	6.50	3.75	1.53	+49

24-Aug-2009 1 X 2

All Football > England > Premier League

20:00	Liverpool - Aston Villa <i>LIVE</i>	1.42	4.00	8.25	+46
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Double Chance

23-Aug-2009 1X 12 X2

All Football > England > Premier League

13:30	West Ham United - Tottenham <i>LIVE</i>	1.68	1.33	1.28	+50
15:00	Burnley - Everton <i>LIVE</i>	1.60	1.33	1.33	+27
16:00	Fulham - Chelsea <i>LIVE</i>	2.40	1.25	1.10	+49

24-Aug-2009 1X 12 X2

All Football > England > Premier League

20:00	Liverpool - Aston Villa <i>LIVE</i>	1.07	1.22	2.70	+46
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UNIBET

Événements en cours: **Calendrier**

Sport Time

All open events

Football Aujourd'hui, 18:15

Viktoria Žilkov - Caslav
Czechia, 2.Liga
HT: 0-0 1-4

Football Aujourd'hui, 11:00

Shonan Bellmare - Vegalta Sendai
Japan, J2 League
0-0

Hockey Aujourd'hui, 11:30

Allemagne - Espagne Femme
European Championship Women
1-1

Football Aujourd'hui, 11:30

Kashima Antlers - FC Tokyo
Japan, J2 League
1-0

Football Aujourd'hui, 11:30

Tokushima Vortis - Kofu
Japan, J2 League
0-0

Football Aujourd'hui, 12:00

Kawasaki Frontale - Montedio Ya...
Japan, J League
0-0

Messages

Aktuelle evenement: Kalender

Sport Time

Fotboll

Fotboll Idag, 13:00

Djurgården - Treleborgs FF
Sweden, Allsvenskan
HT: 0-0 0-0

Fotboll Idag, 13:00

Greuter Fürth - Fortuna Düsseldorf
Germany, 2.Bundesliga
HT: 0-1 1-1

Fotboll Idag, 13:00

SC Paderborn 07 - Augsburg
Germany, 2.Bundeslig
HT: 2-1 2-2

Fotboll Idag, 13:30

Coventry City - Leicester City
English Championship
HT: 1-0 1-0

Fotboll Idag, 13:45

Preston North End - West Bromwich
England Championship
0-0

Asian Championship

Kazakhstan vs Iran

1 2 3 4 5

KAZ 26 21 21 17

IRA 24 25 25 19



▼ Match (1)

Vilket lag vinner?

20.00 1.01

▼ Set (2)

Vilket lag vinner set 4?

9.50 1.05

Total poäng - Set 4

Over 45.5 1.45

Under 2.60

▼ Races (2)

13:00	Football	Frem - Lyngby	20:45	Football	Juventus Turin - Chievo	4.00	8.25	+46
13:30	Football	Cottbus - Greuter Fürth	20:45	Football	Lazio - Atalanta			

Double Chance

23-Aug-2009

	1X	12	X2		
All Football > England > Premier League					
13:30	West Ham United - Tottenham	1.68	1.33	1.28	+50
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24-Aug-2009					
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Casino Play for fun real

MEGA FORTUNE

Mega Fortune has it all: free spins, a bonus round and three progressive jackpots with payouts that can change your life!

[Play](#)



[Most Popular](#)
[Table Games](#)
[Video Poker](#)
[Video Slots](#)
[Slots](#)
[Jackpots](#)
[Other](#)

- | | | | | | | | |
|--|--|---|---|---|--|--|--|
| 
Super Luck... | 
Crusade of... | 
Pacific Att... | 
Voodoo Vi... | 
Mystery at... | 
Tales of Kr... | 
Arabian Ni... | 
Vikings Tr... |
| 
Spellcast | 
Fishy Fort... | 
Tiki Wonders | 
Icy Wonders | 
Geisha W... | 
Excalibur | 
Relic Raiders | 
Devils Del... |
| 
Reel Steal | 
Champion o... | 
Hot City | 
Mega Fort... | 
Bloodsuck... | 
Dead or Alive | 
Groovy Six... | 
Funky Se... |
| 
Super Eigh... | 
Secrets of... | 
Pandoras... | 
Trolls | 
Fortune Tel... | | | |

Start

Sportsbook

Casino

Live Casino

Poker

Bingo

Games

Skill

Scratch Card

↑ Home

🕒 Promotions

Live Casino

Replay movie

LIVE CASINO

▶ Roulette

▶ Blackjack

▶ Baccarat



ROULETTE



BLACKJACK



BACCARAT



SIT N GO CHALLENGE!

Back by popular demand, we offer some cool prizes this month in our newest Sit & Go tournament challenge!

[Sit & Go Challenge!](#)

PLAY POKER

[Play without download](#)
[Download game](#)

Upcoming Poker Tournaments

0.01 - 50 51 + Free

Tournaments	Start time	Buy-in	Fee
Desperado €500 guaranteed	2009-08-23 11:15	1.00	0.10
€2.50 Omaha (6 Seat)	2009-08-23 11:30	2.50	0.25
SURVIVOR €1 Freezeout	2009-08-23 11:30	1.00	0.10
€2,000 GUARANTEED	2009-08-23 12:00	10.00	1.00
€100K Rebuy Qualifier	2009-08-23 12:15	6.00	0.60

[Go to Tournaments](#)



EARN VIP POINTS AND WIN YOUR WAY TO PRAGUE!

Back by popular demand! The next Unibet Open event will take place in one of the most beautiful cities in the world: Prague! During August, we're once again giving away package trips to Unibet Open Prague in weekly points races!

[Read more](#)

SIT 'N GO CHALLENGE!

We're offering more cool prizes this month in our newest Sit 'n Go tournament challenge! Play our Sit 'n Go tournaments during August and you can win one of 2 package trips, worth €2,750 each, to Unibet Open Prague!

[Read more](#)

NEXT EVENT
PRAGUE
17-20/09/09
 by **UNIBET**

Unibet Poker | Contact Us | English

LIVE POKER TOURNAMENTS



IN EUROPE'S HOT SPOTS

COUNTDOWN TO PRAGUE
25D 02H 53M 11

NEXT SATELLITE
08H 53M 11

Qualify now! See Satellites for Prague 09

[HOME](#) [HOW TO QUALIFY](#) [TOURNAMENT INFO](#) [THE HOTEL](#) [UNIBET TV](#) [UNIBET OPEN](#)



UNIBET OPEN PRAGUE '09

A centuries-old jewel of art and architecture situated snugly at the heart of Europe, and once the home to emperors and kings, this beautiful city has worked its magic on generations of visitors. Unibet Open welcomes you to one of Europe's most popular tourist destinations - Prague!

The tournament will be hosted at the Hilton Prague Hotel which is located minutes from the city centre. Unibet Open players and guests will also be accommodated at this magnificent 5-star hotel, which overlooks the River Vlatva.

WHAT PLAYERS SAY ABOUT UNIBET OPEN



André Dias (Portugal) Winner Algarve 09: It was a beautiful dream. It would have been fantastic to win abroad but winning the biggest tournament ever organized in Portugal was something unforgettable.
[Interview](#)

MOVIES



[PLAY POKER](#) [DOWNLOAD BROWSER](#)



NEXT EVENT: 17-20 SEP



PRAGUE 09

Qualify now! See Satellites

UNIBET OPEN SCHEDULE '09

Location	Date
Budapest	4 - 8 March
Algarve	14 - 17 May
London	16 - 19 July

Why is this hard?

Because users are
growing impatient

2006:
4 seconds

2009:
2 seconds

Two main challenges

- Latency - data too far away from where it's needed
- Bottlenecks - resource contention

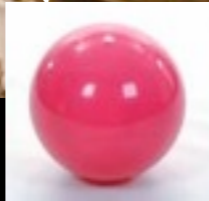
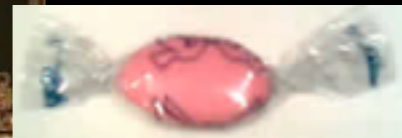
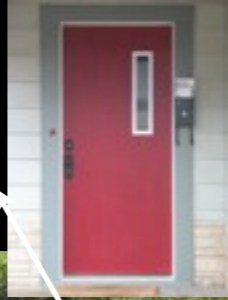


←→
Avg 40 ms RTT



Meet Kevin

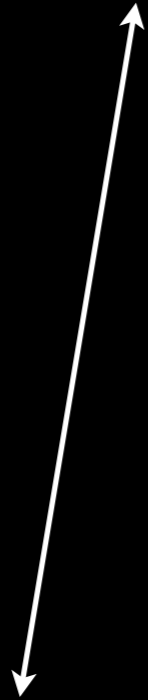
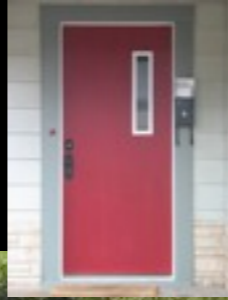
- Kevin is a customer to the candy store
- Kevin wants to buy 40 pcs for his allowance
- Kevin has extremely small pockets (they only fit one piece of candy)
- He also wants to buy two chocolate bars and one bubble gum
- The candy store is far far away from Kevin's house



Idea #1

Sell bags of candy

(Caveat: no bars or bubblegums in bags!)





The bag is a big JS file



The bag is a big CSS file



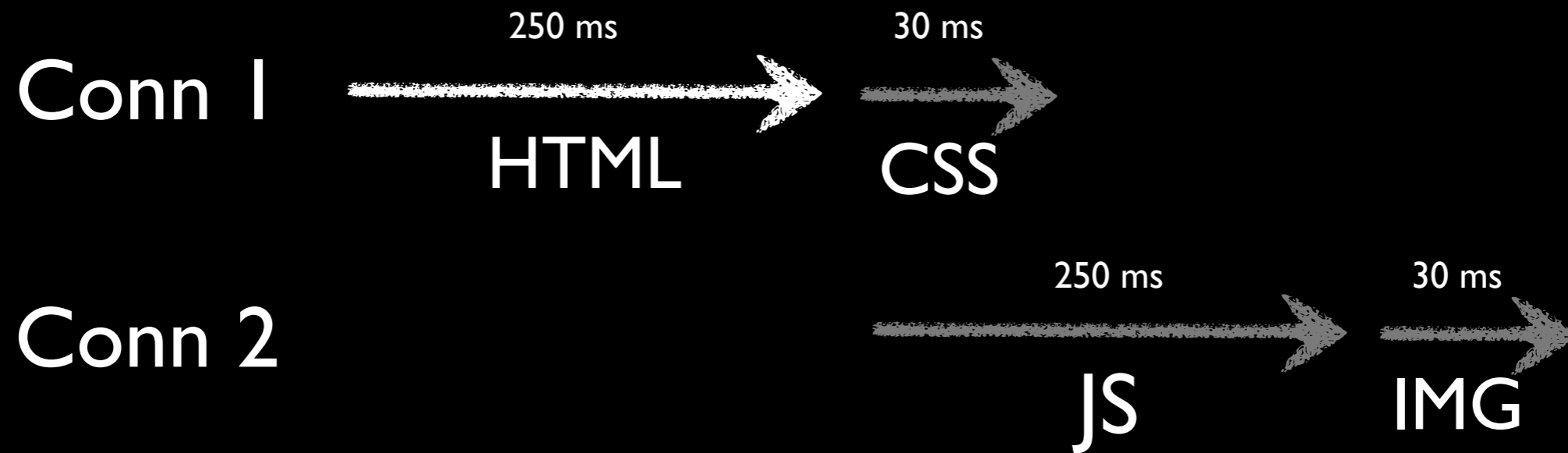
The bag is a CSS image
sprite*

[/4.9.3/images/uskin1/uspritesheadertabs.png](#)



blackTab

The 100% optimized e-commerce web page: 4 requests



Total time: 530 ms

Some real world data

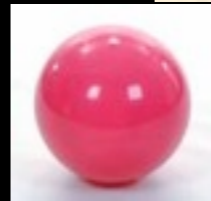
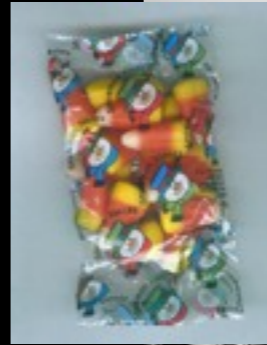
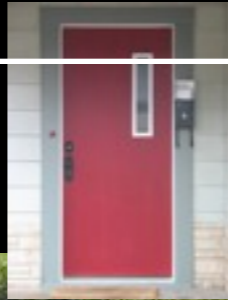
- amazon.com: 57 requests (6)
- ebay.com: 41 requests (4)
- unibet.com: 41 requests (1)

Ouch.

Idea #2

Sell bags on street corners

(Caveat: no bars or bubblegums in bags!)





There are many street
corners



Street corners are very near
all customers

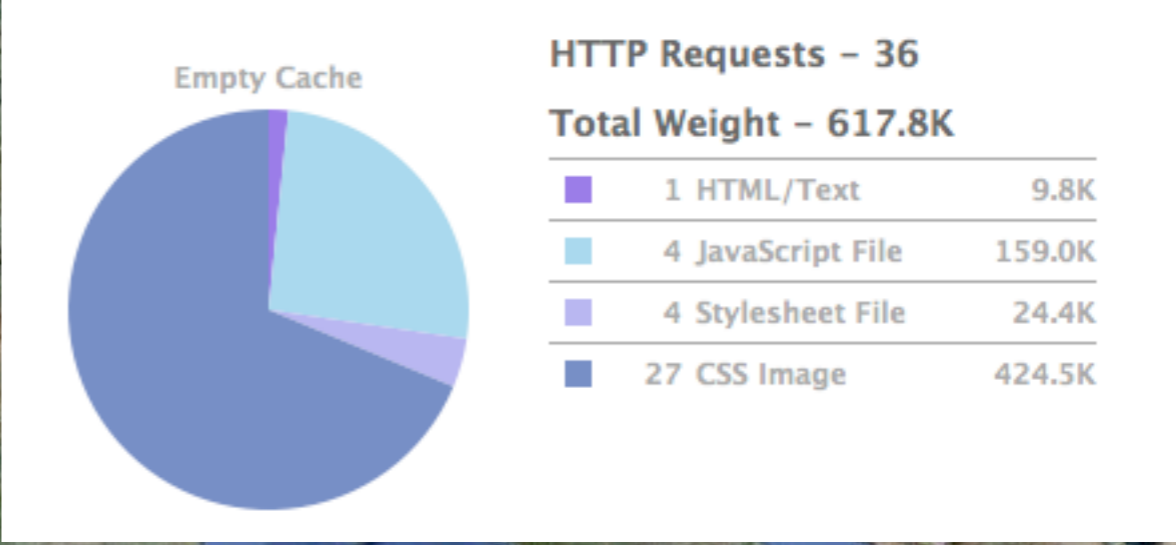


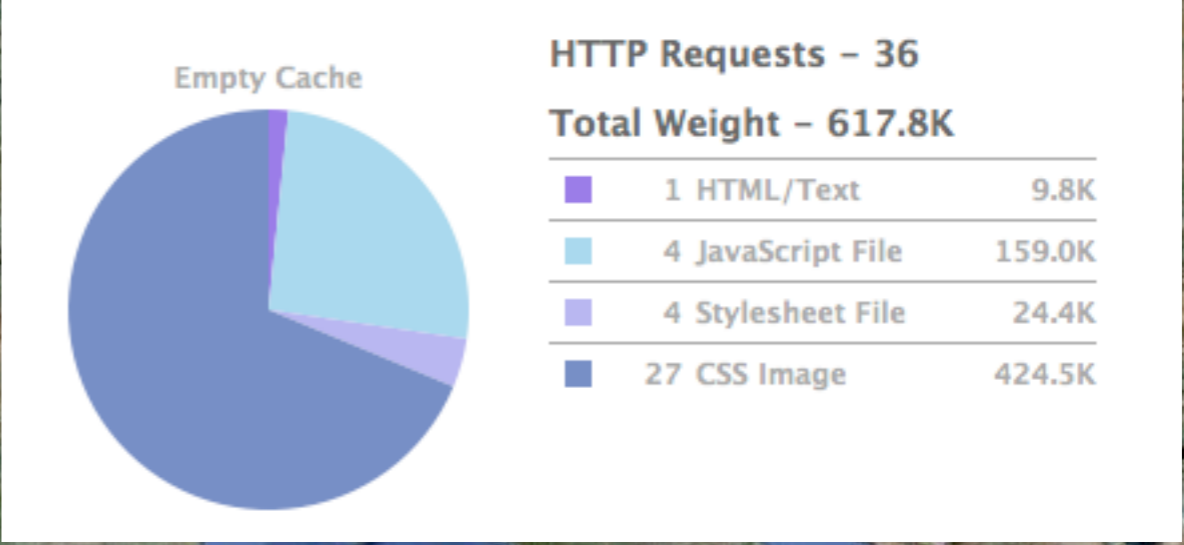
The street corner is a
Content Delivery Network
node



GOOD SPOT

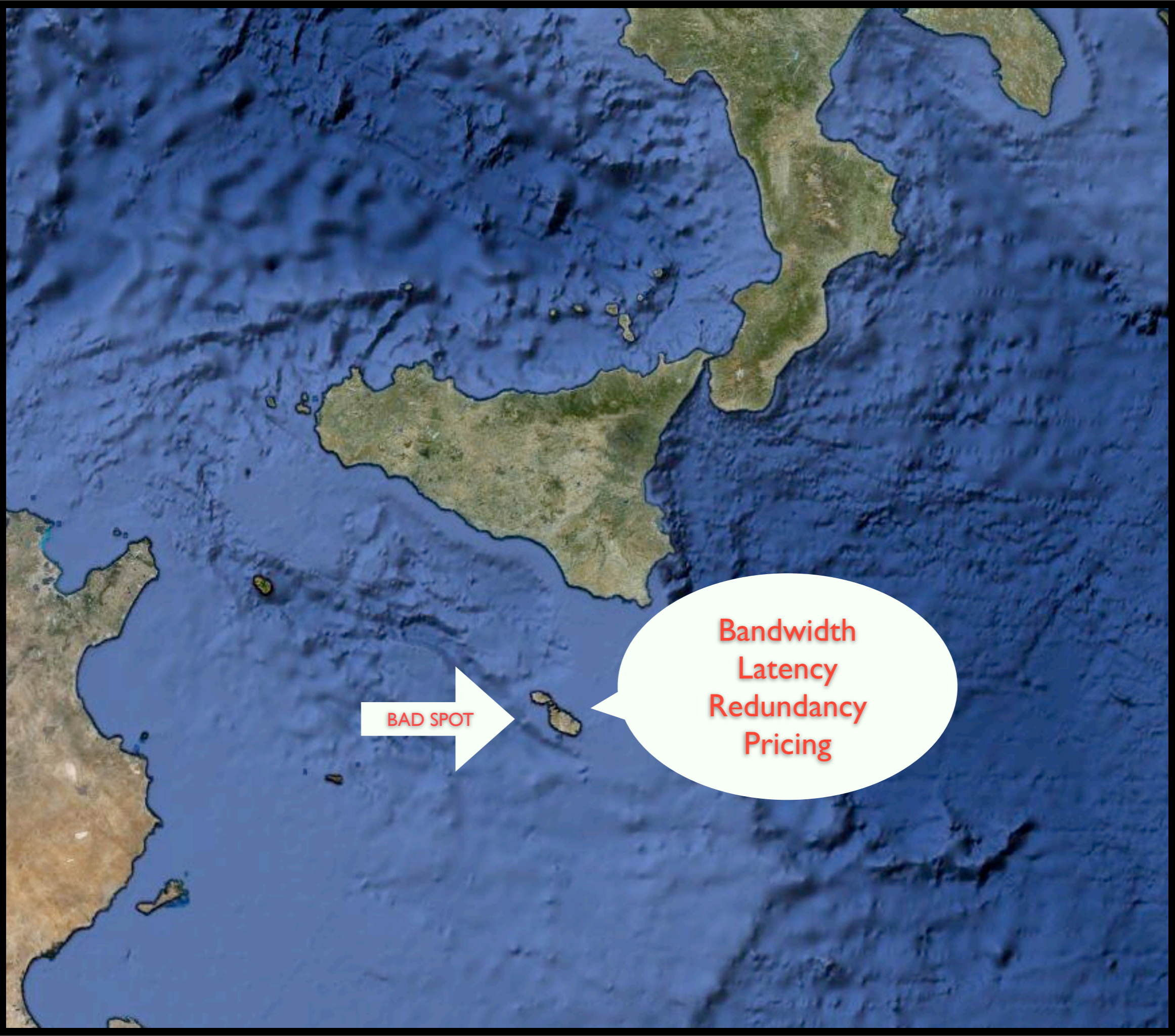
35 ms
avg latency





**70 ms
avg latency**

BAD SPOT



BAD SPOT

**Bandwidth
Latency
Redundancy
Pricing**

Tune tune tune the front-end!

- 80-90% of the end-user response time is spent downloading and processing all the components in the page
- Rewrote and optimized all our front-end code (XHTML, CSS, JS)
- Implemented image spriting and fixed other issues with cache headers etc

Tune tune tune the front-end!

- Use best practice to optimize your front-end (YSlow, Page Speed etc)
- Progressive rendering is key
- Improve performance by having objects served close to the user

<http://www.webpagetest.org/>

How we do it

- Follow YSlow and Pagespeed guidelines
- Be close to your users - use a Content Delivery Network (CDN)
- Prepend CDN proxy name to all static files: /foo/bar -> http://cdn.com/foo/bar
- Set a one year cache-time (no 304:s)
- Version your static content
- Stripe objects over several CNAMEs

15 ms
avg latency

10 ms
avg latency

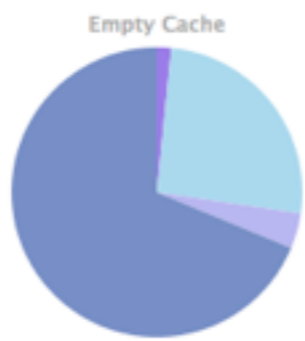
10 ms
avg latency

NOT SO BAD SPOT

Statistics

The page has a total of 36 HTTP requests and a total weight of 617.8K bytes with empty cache

WEIGHT GRAPHS



HTTP Requests - 36

Total Weight - 617.8K

1 HTML/Text	9.8K
4 JavaScript File	159.0K
4 Stylesheet File	24.4K
27 CSS Image	424.5K

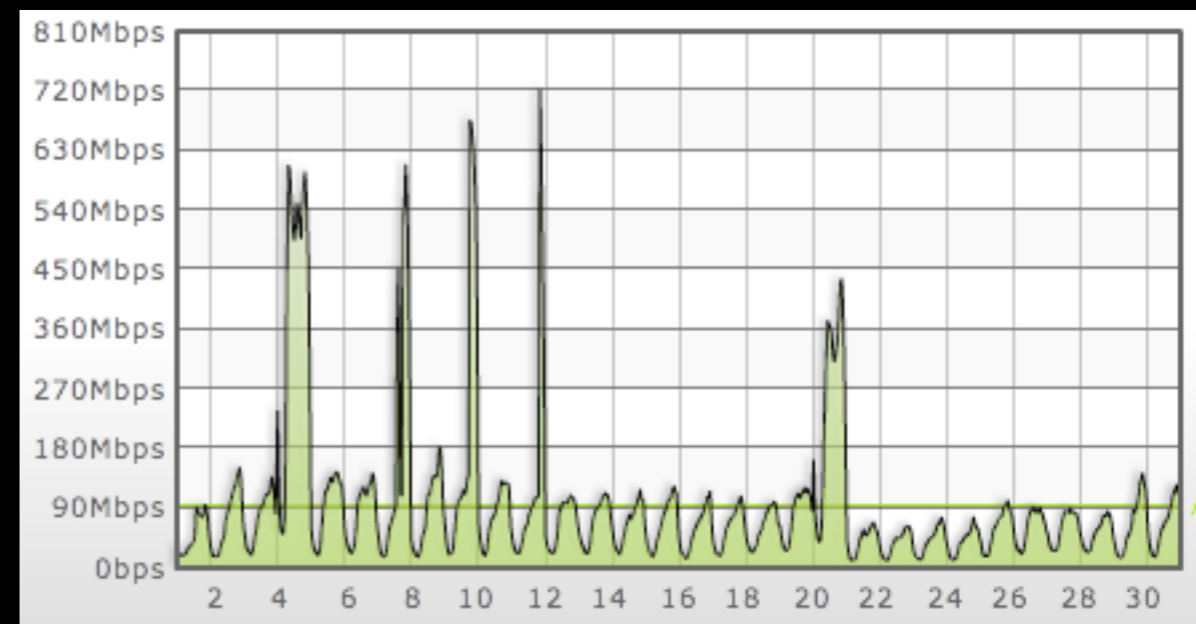
Primed Cache

HTTP Requests - 1

Total Weight - 9.8K

1 HTML/Text	9.8K
-------------	------

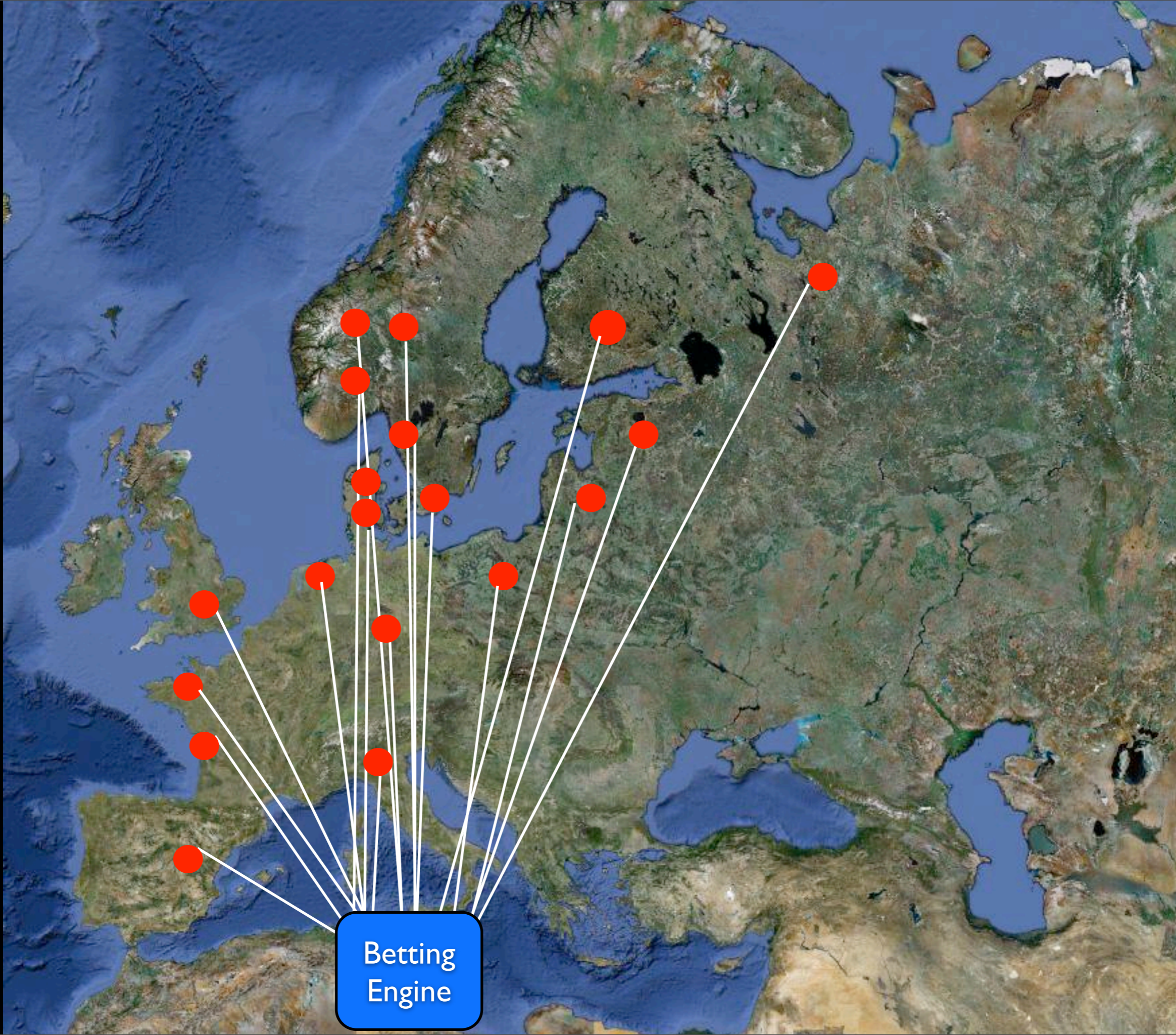
- By using a CDN we serve our users quickly from anywhere in the world
- Capacity is not an issue
- We have cut our delivery costs to 25%
- Use several CDN vendors for load balancing / redundancy



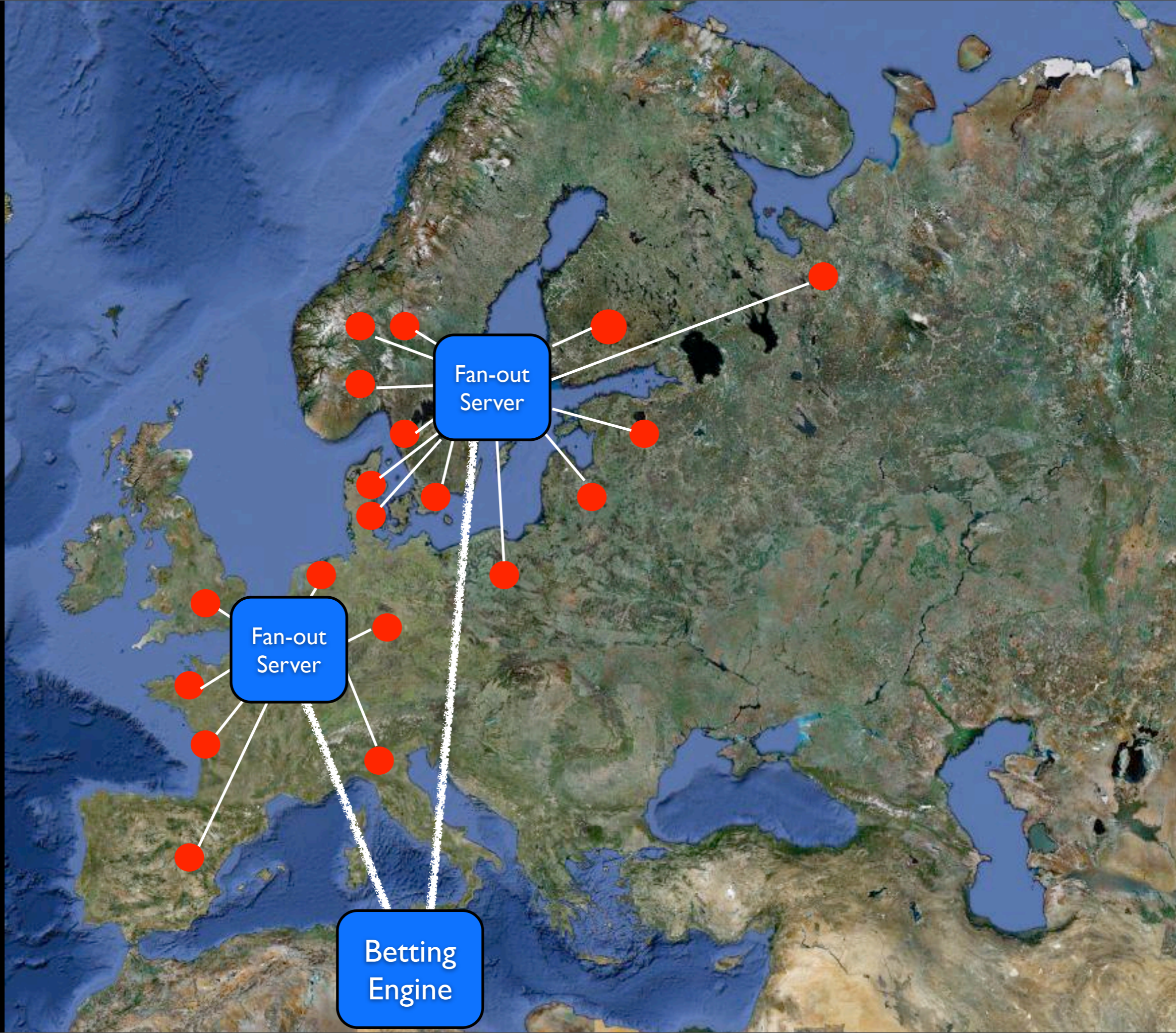
Next steps...

Live Betting data distribution

- Bet while the game is on
 - “Who gets the next corner”, “who scores the next goal” etc
- 10000:s of real-time clients need price updates almost every second
- 20 concurrent games
- 10+ offers within one game
- Product growth 60-80% per year



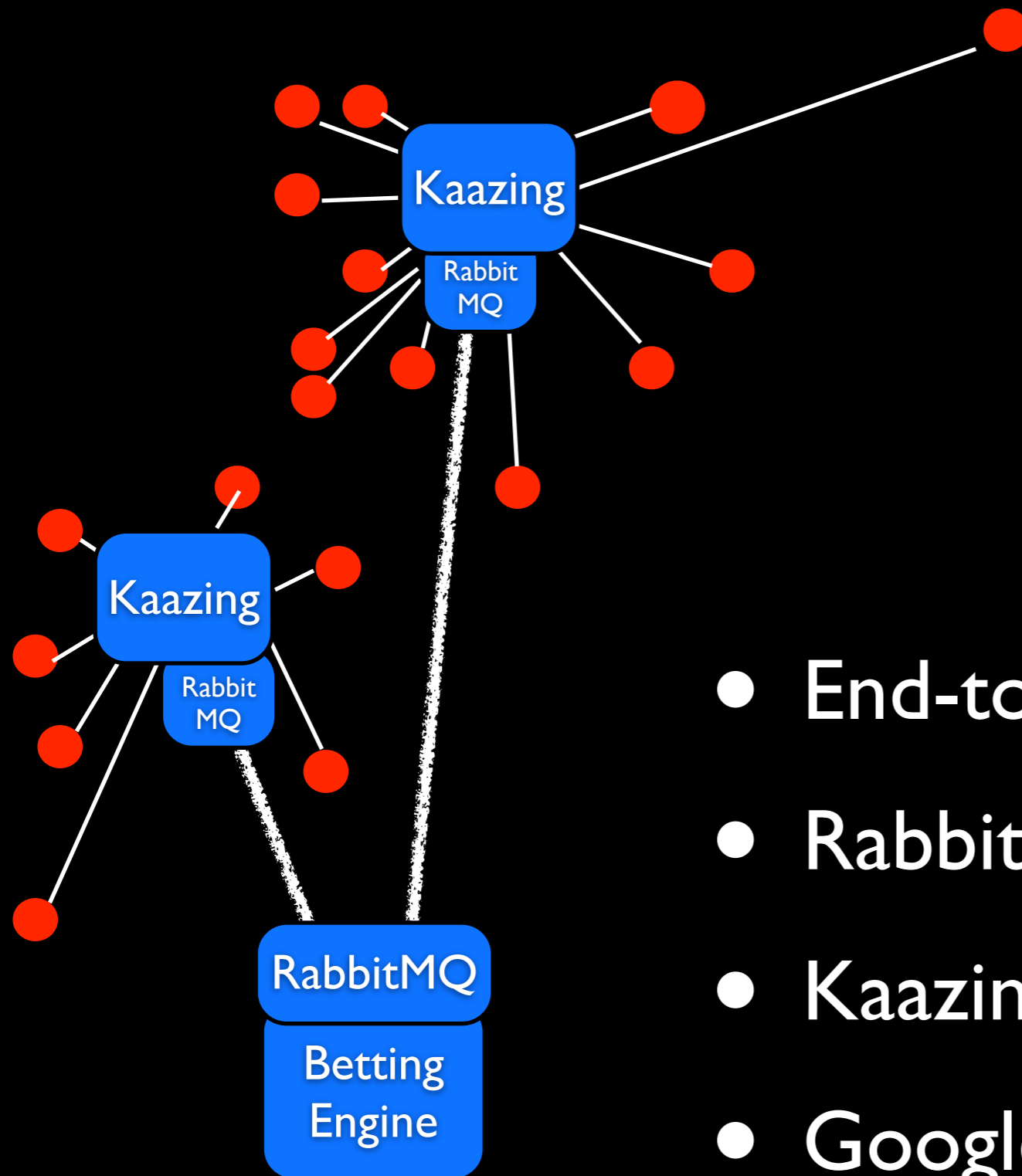
Betting Engine



Fan-out Server

Fan-out Server

Betting Engine



- End-to-end messaging
- RabbitMQ
- Kaazing Enterprise Gateway
- Google Protocol Buffers

RabbitMQ

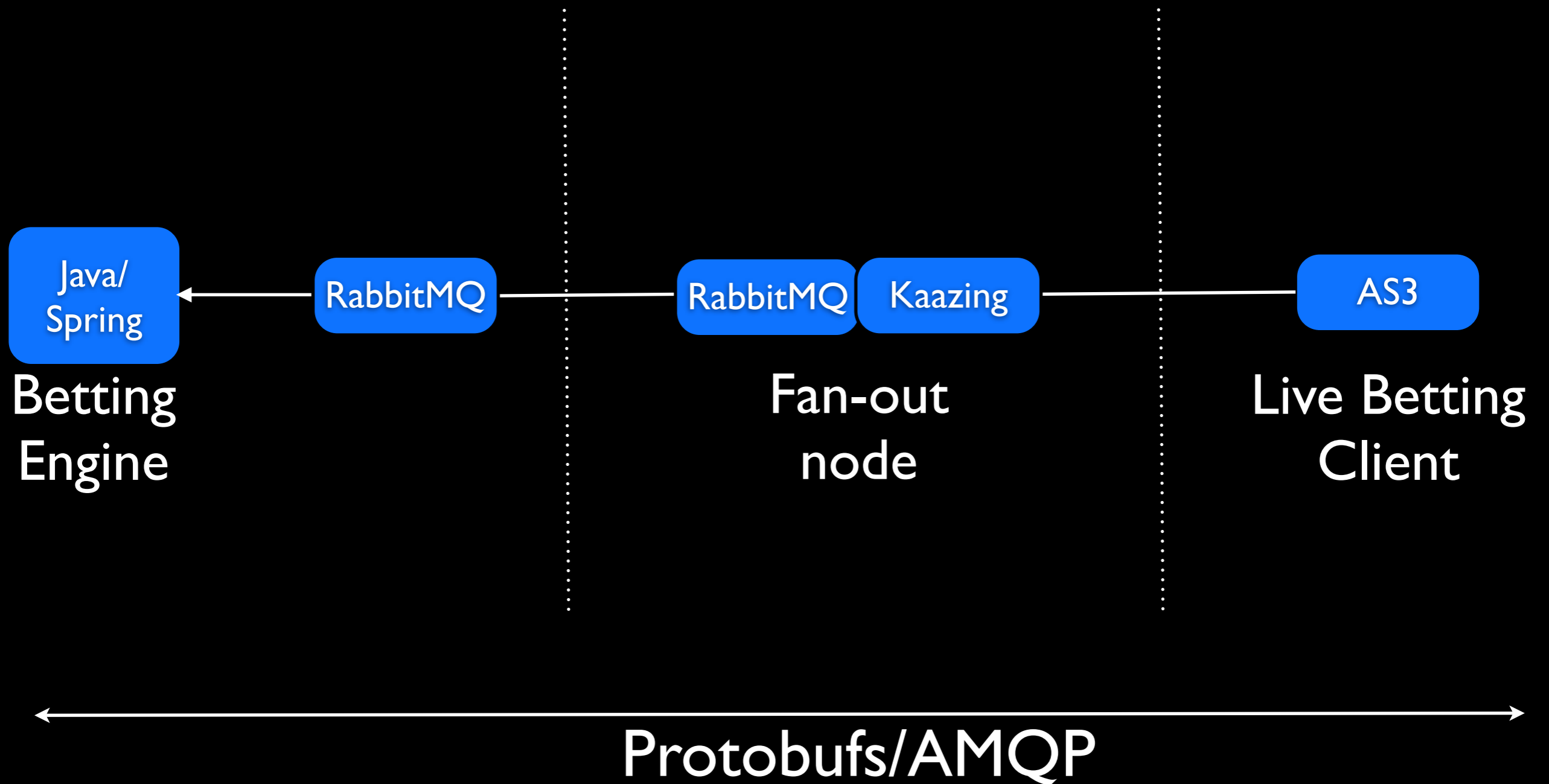
- Free Open Source and Open Standards protocol (AMQP)
- Highly available, highly scalable (Erlang/OTP)
- Excellent & friendly support available

Kaazing

- Open Source and Open Standards protocol (HTML5 WebSockets)
- Supported AMQP clients for Flex, browsers
- Connection offloading
- Great at overcoming last mile hurdles (firewalls, proxies, browsers)
- Excellent & friendly support available

Protocol Buffers

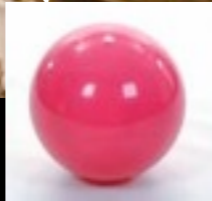
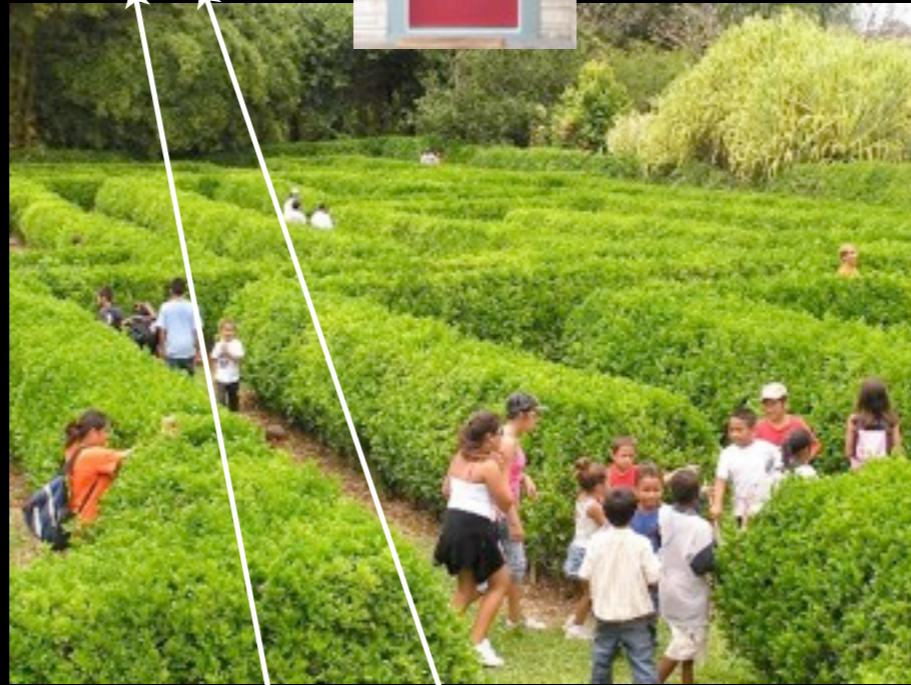
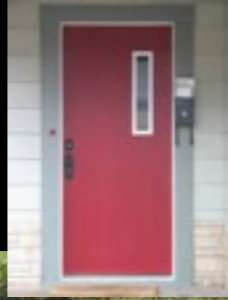
- Flexible, efficient, automated mechanism for serializing (binary)
- Schema support (.proto files)
- Language neutral (we use Java to Actionscript)
- Invented and used by Google
- Open Sourced in July 2008



Let's get back to the
Candy store...

Datacenter

- Ok, the candy delivery problem is solved!
- However, we cannot serve the customers chocolate and bubble gum quickly enough
- Queues are building up due to our bottlenecks





The chocolate bar is a
cacheable read



The bubble gum is a
non-cacheable read or
a write



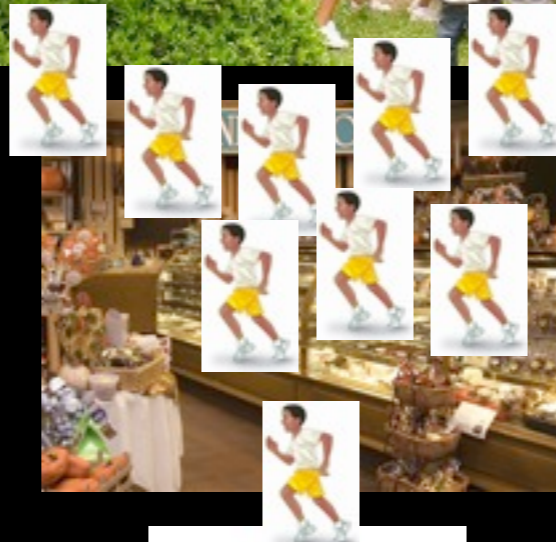
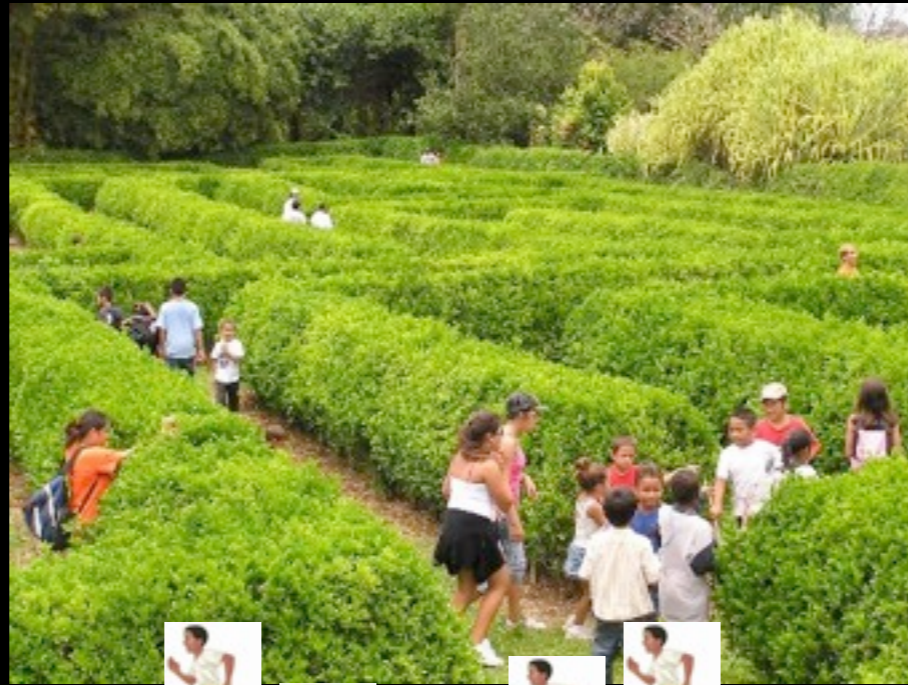
The candy store checkout
is an app server

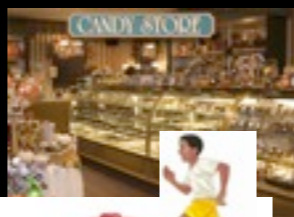
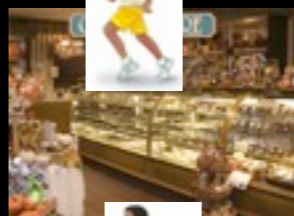
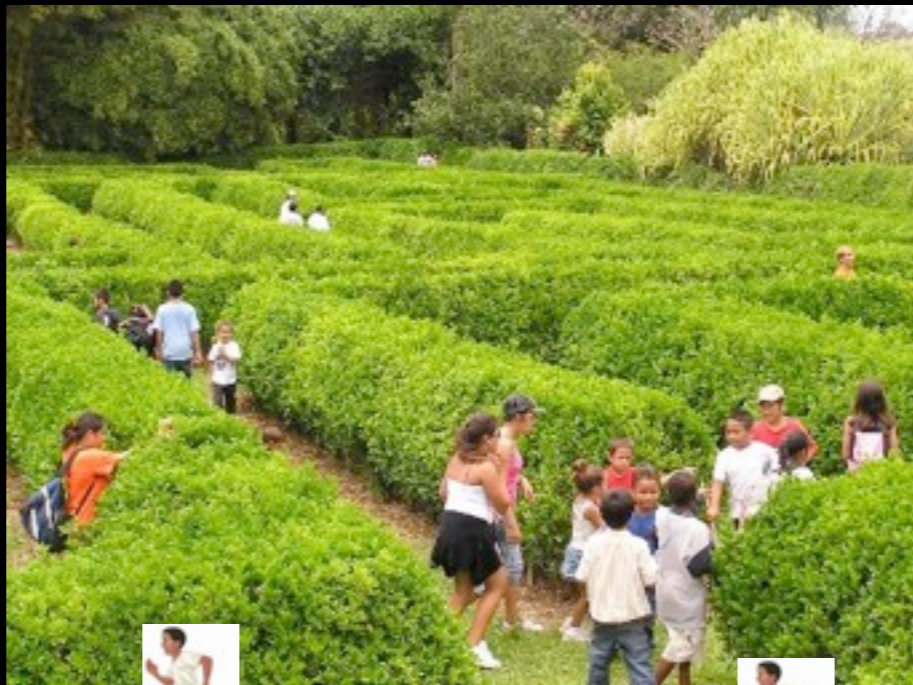


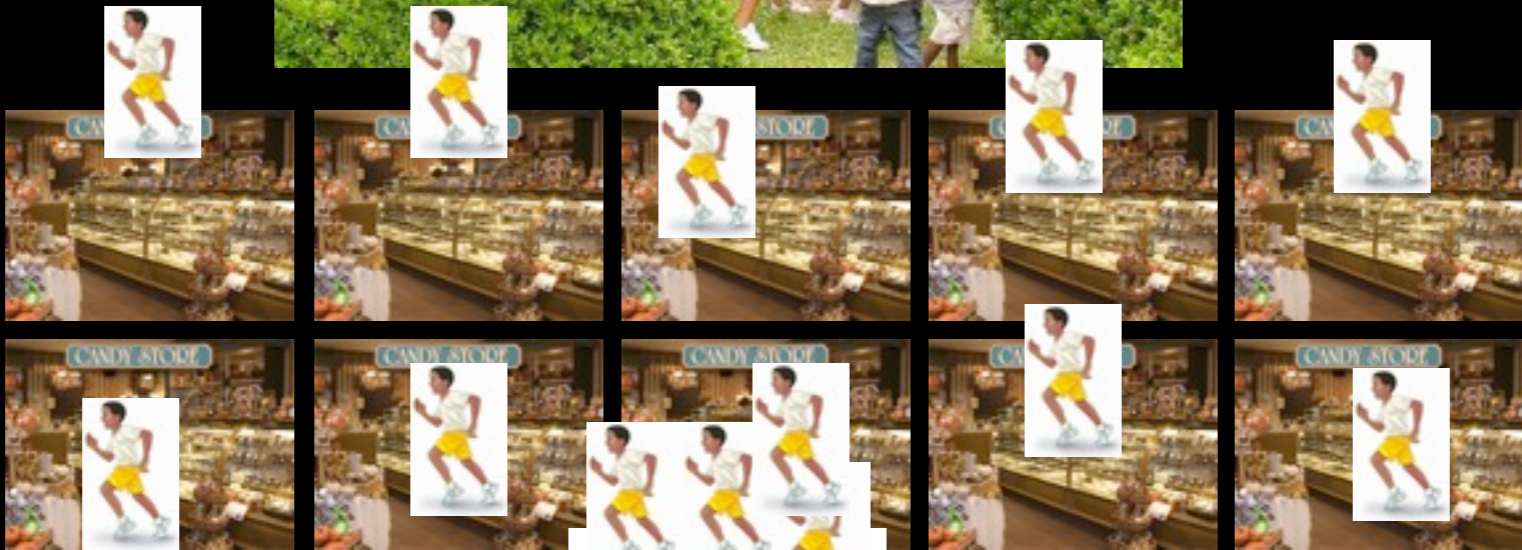
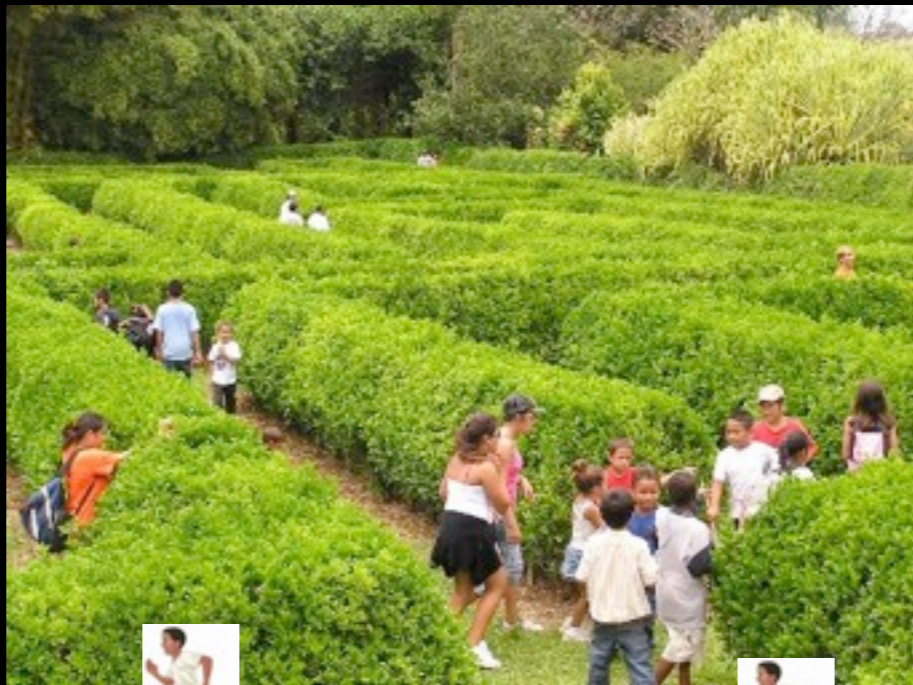
The bubble gum machine
is a database system

Example #1
More hardware!
(and sw licenses)

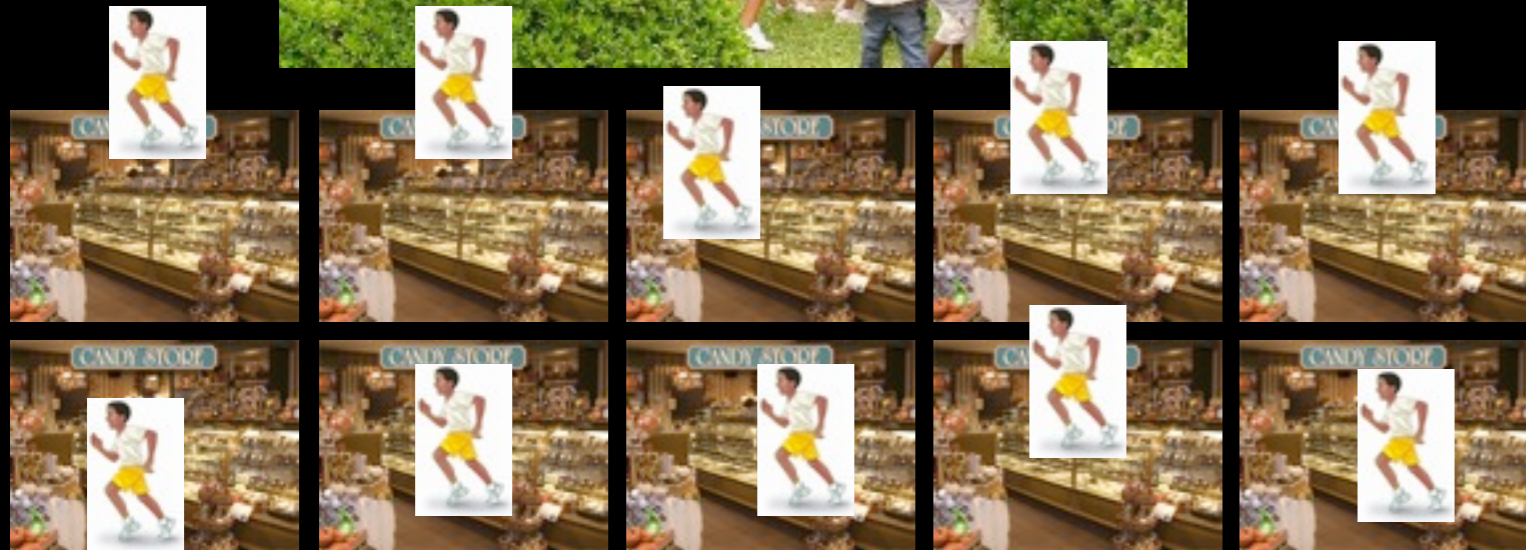
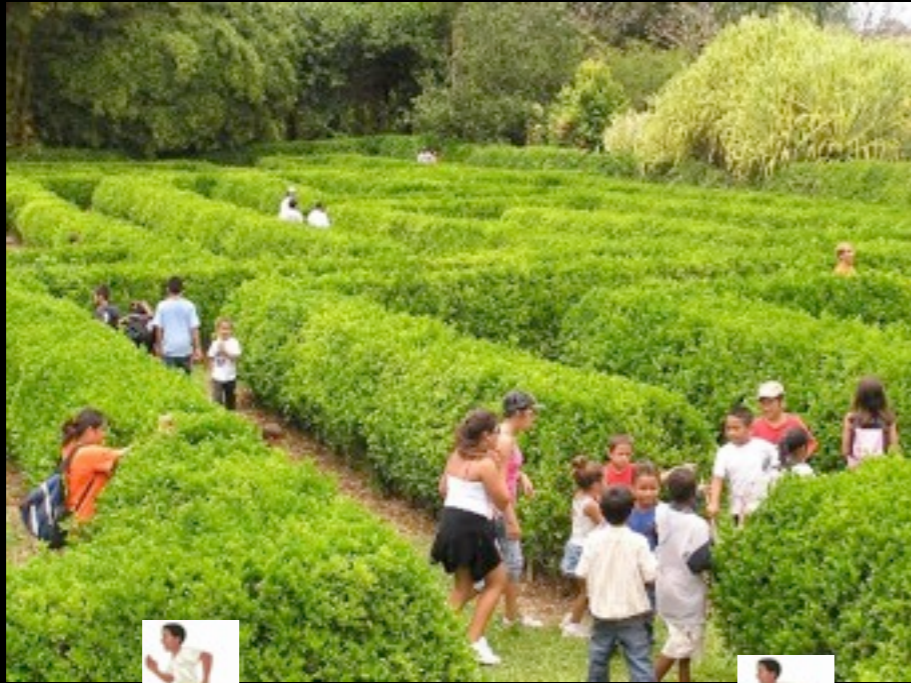
Kids are invading our store...





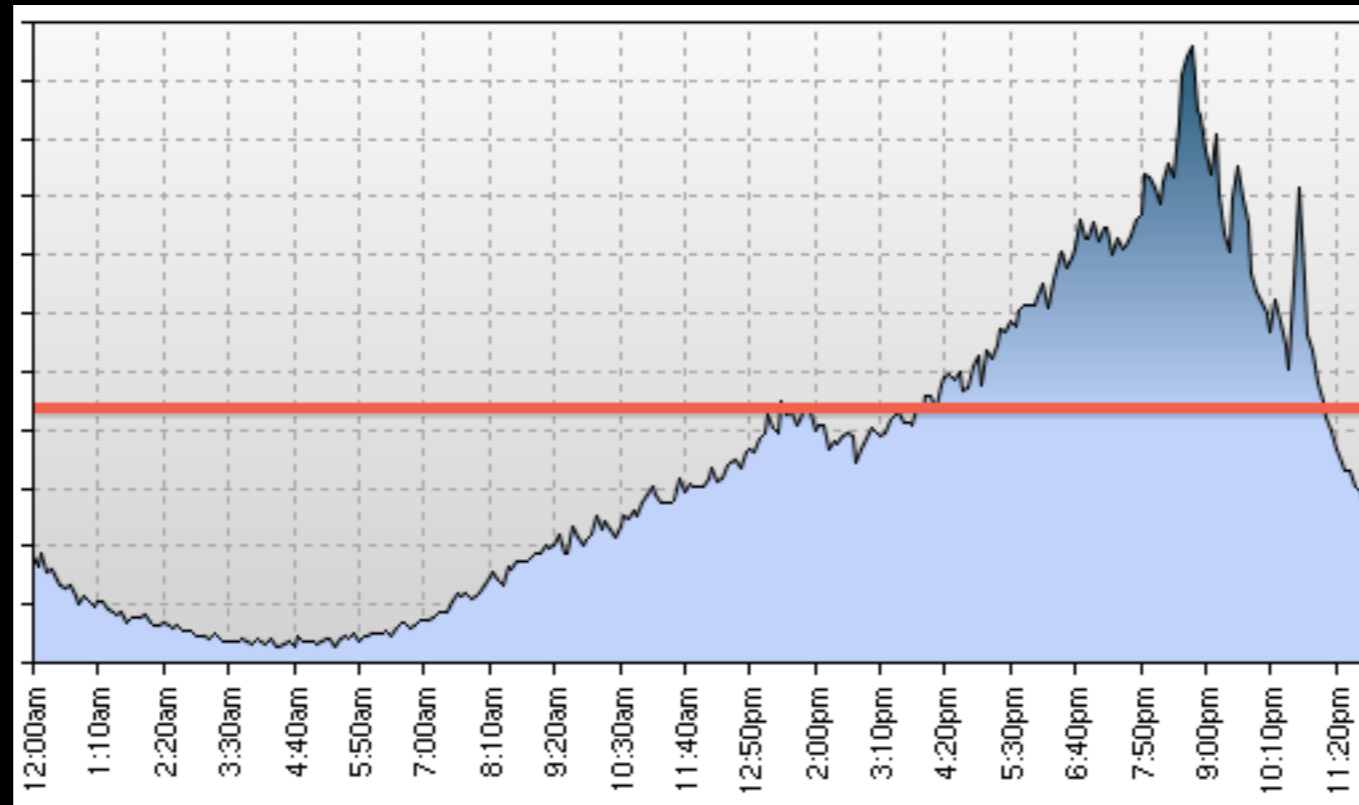








Food for thought



paying per core is paying for peaks...
...is not acceptable?

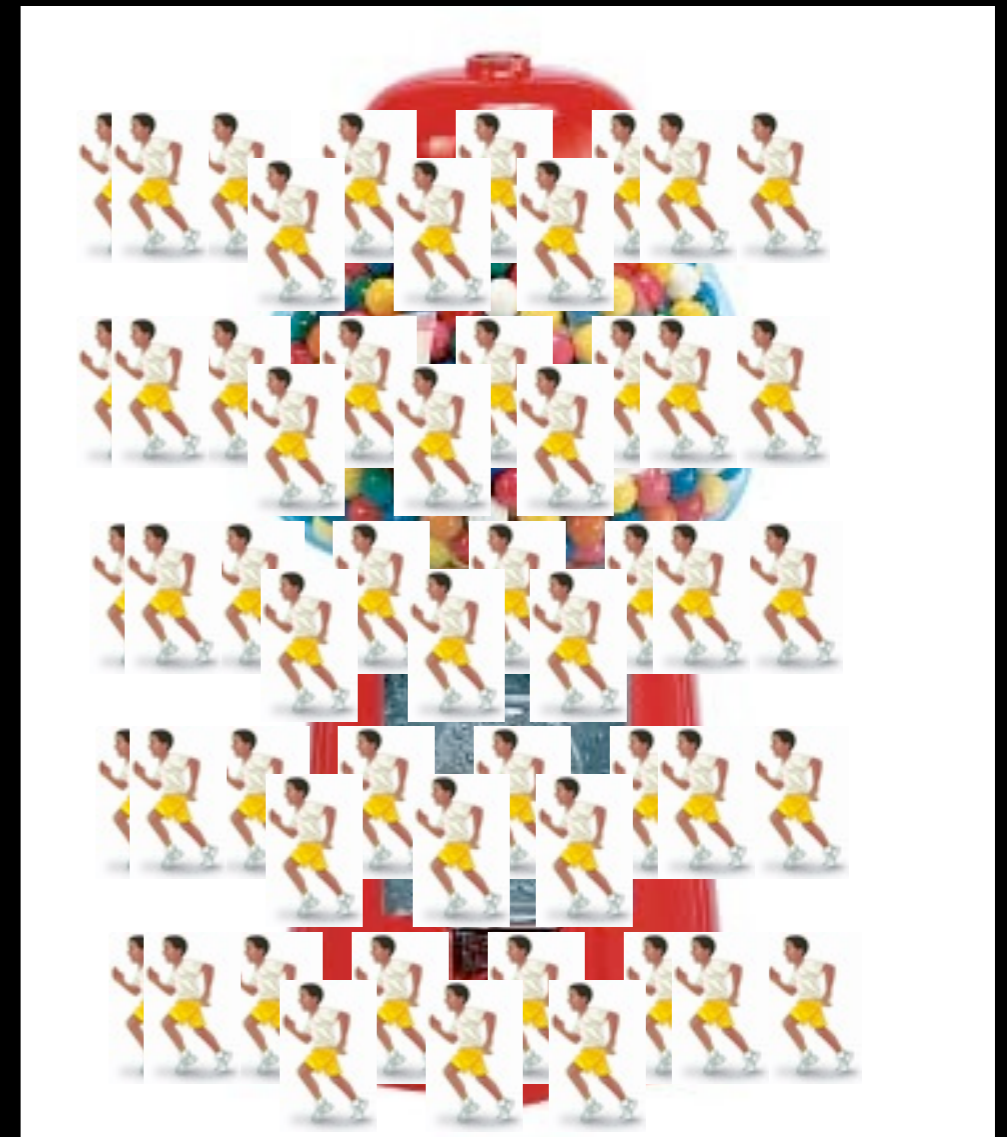
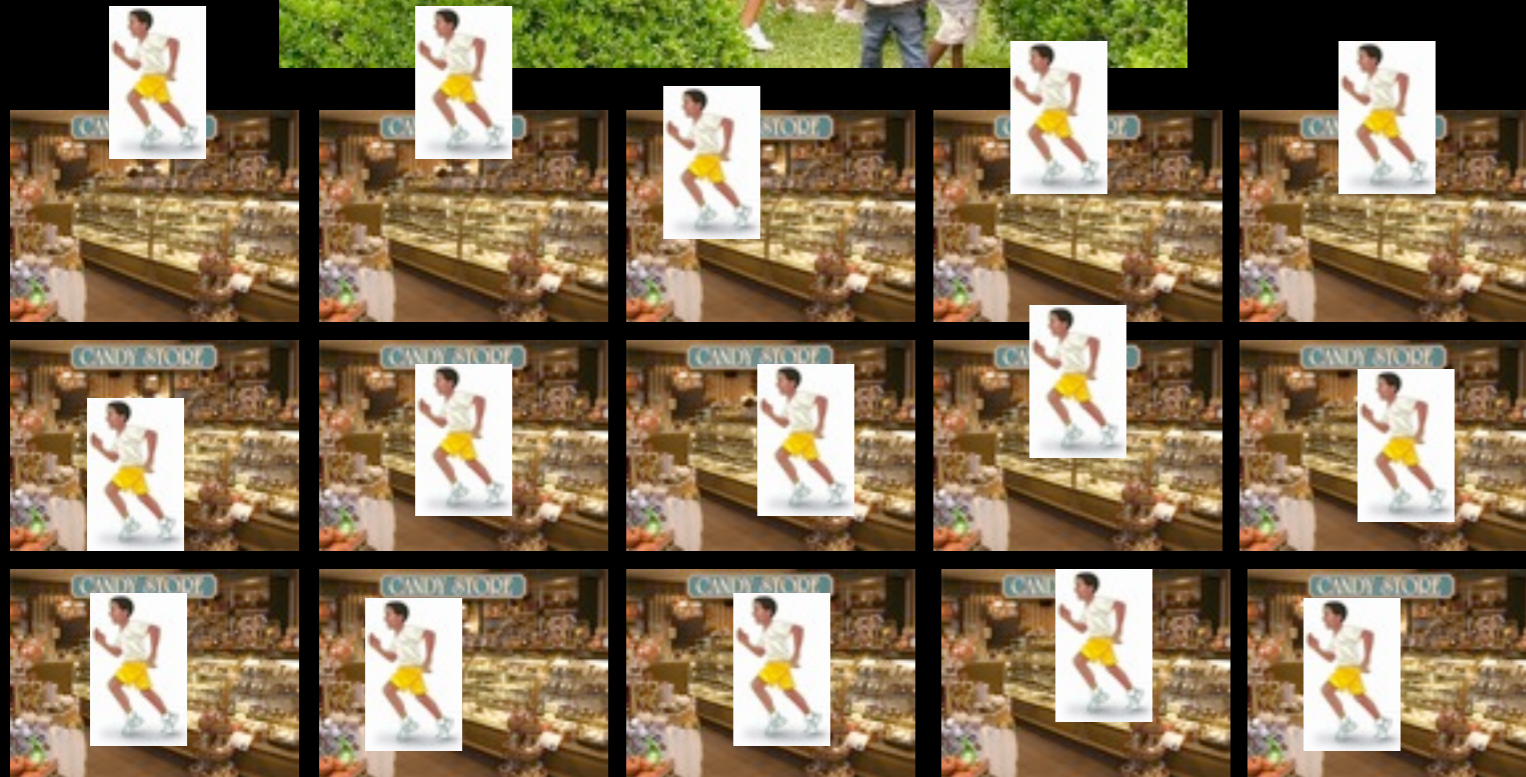
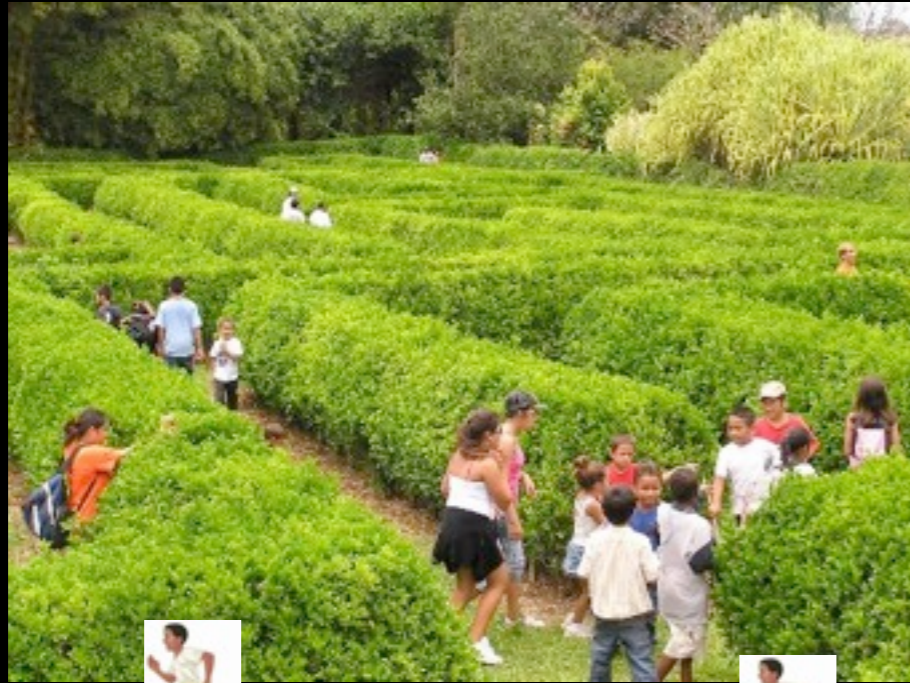




PHOTO: PAUL SAKUMA/AB

You cannot buy a
product to solve this
problem

Need to rearchitect!

Example #2

Near-cache

Terracotta

- Network Attached Memory
- Extends the Java threading model across JVM:s
- In-memory speed access to data
- Fully coherent, with stored to disk guarantees
- Writes are sent as deltas across nodes

Keep data stored/cached
where it's needed for processing

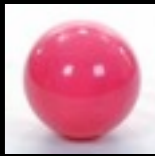
JVM
Heap
"L1"

Betting
Engine

Betting
Engine

...

Betting
Engine



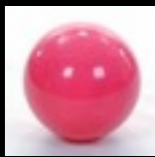
SoR

Event
Repository

Bet Offer
Repository

Live Bets

Terracotta L2



Eventually
consistent
Reporting/
Legacy



write-behind

Oracle (MySQL)



Keep data stored/cached
where it's needed for processing

JVM
Heap
"LI"

update

Betting
Engine

Betting
Engine

...

Betting
Engine

SoR

Event
Repository

Bet Offer
Repository

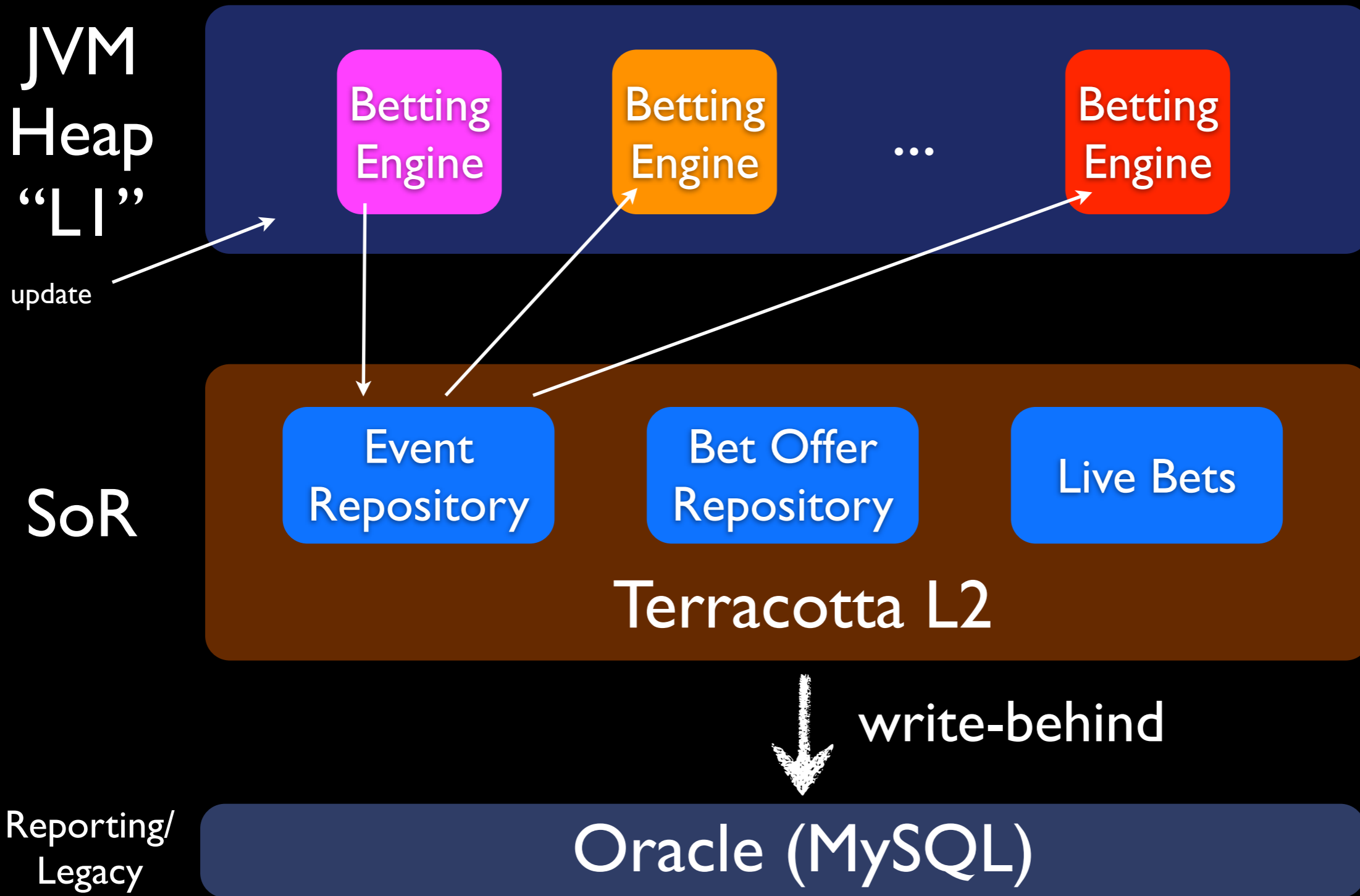
Live Bets

Terracotta L2

write-behind

Reporting/
Legacy

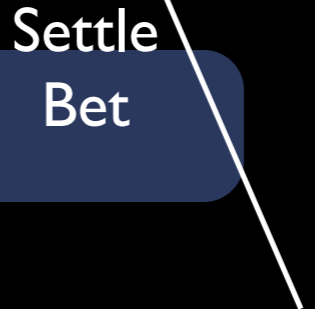
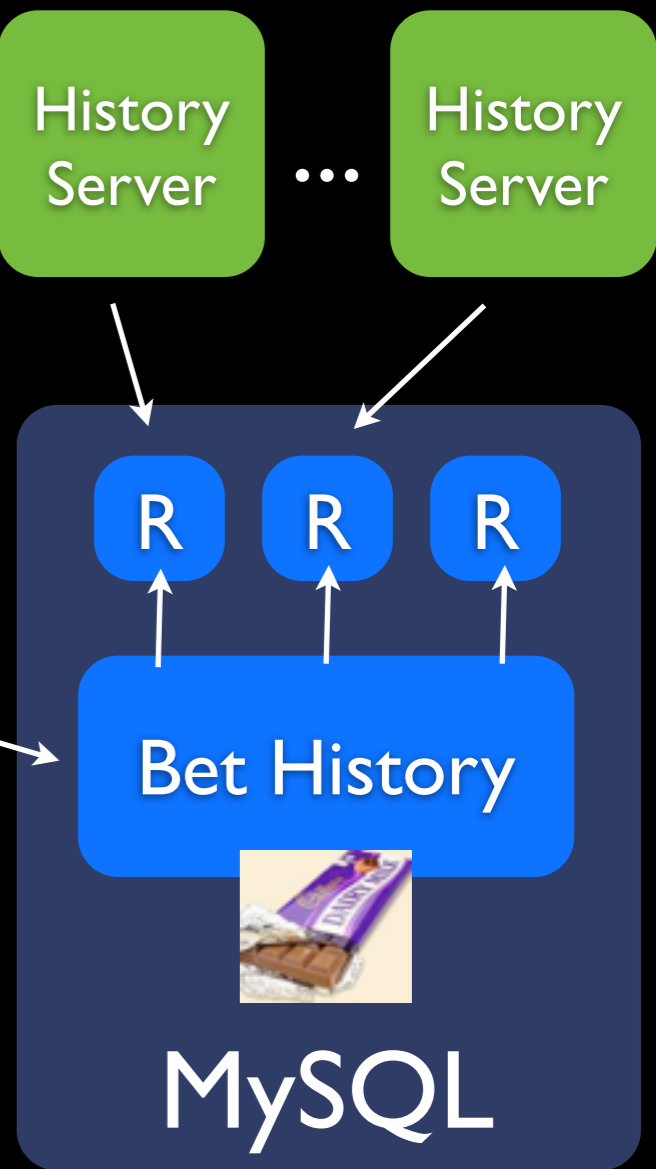
Oracle (MySQL)



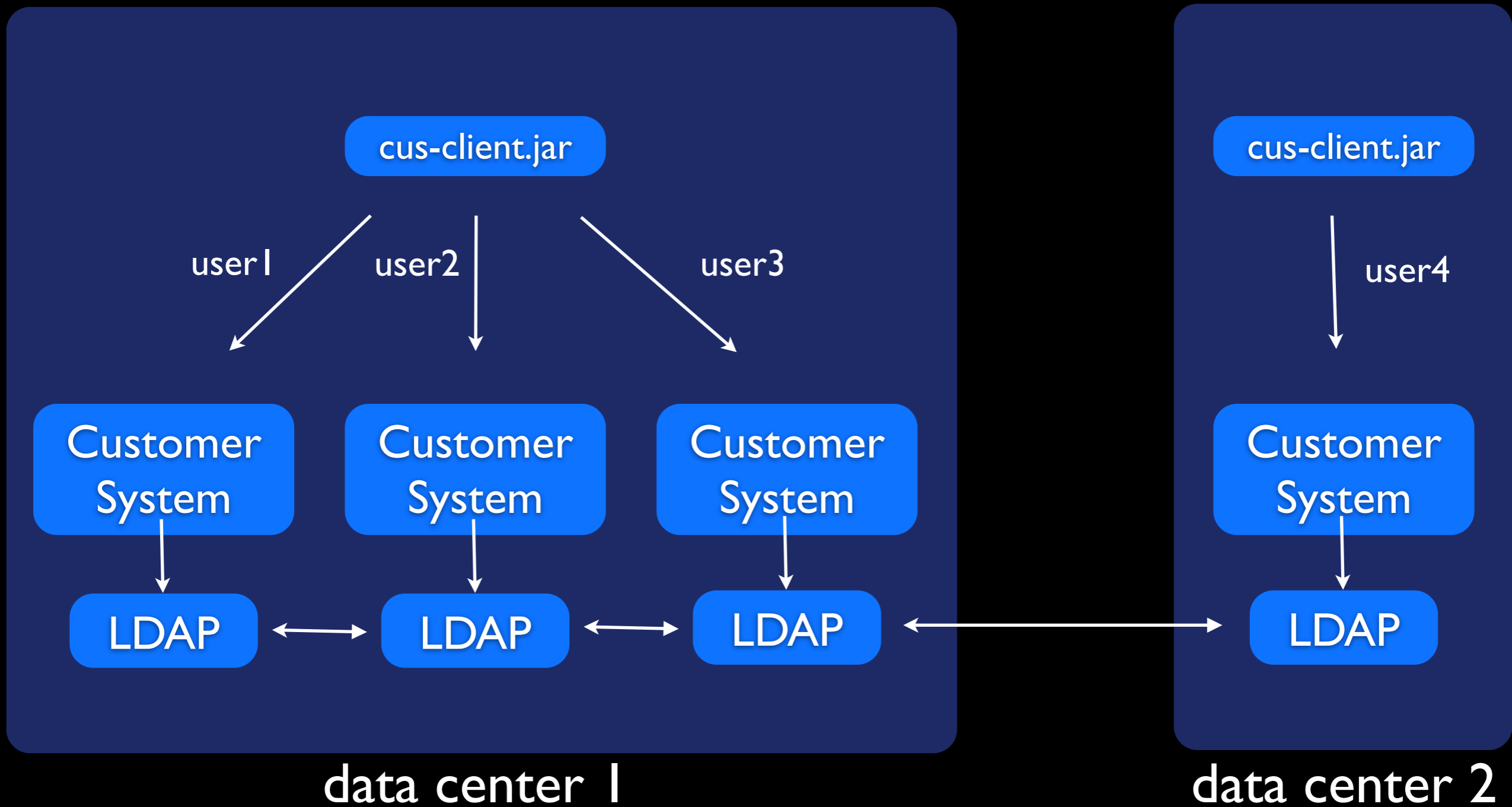
Terracotta

- L2 server can become bottleneck
- Shard (free) or stripe (\$\$\$)

Example #3
Offload reads to
separate systems

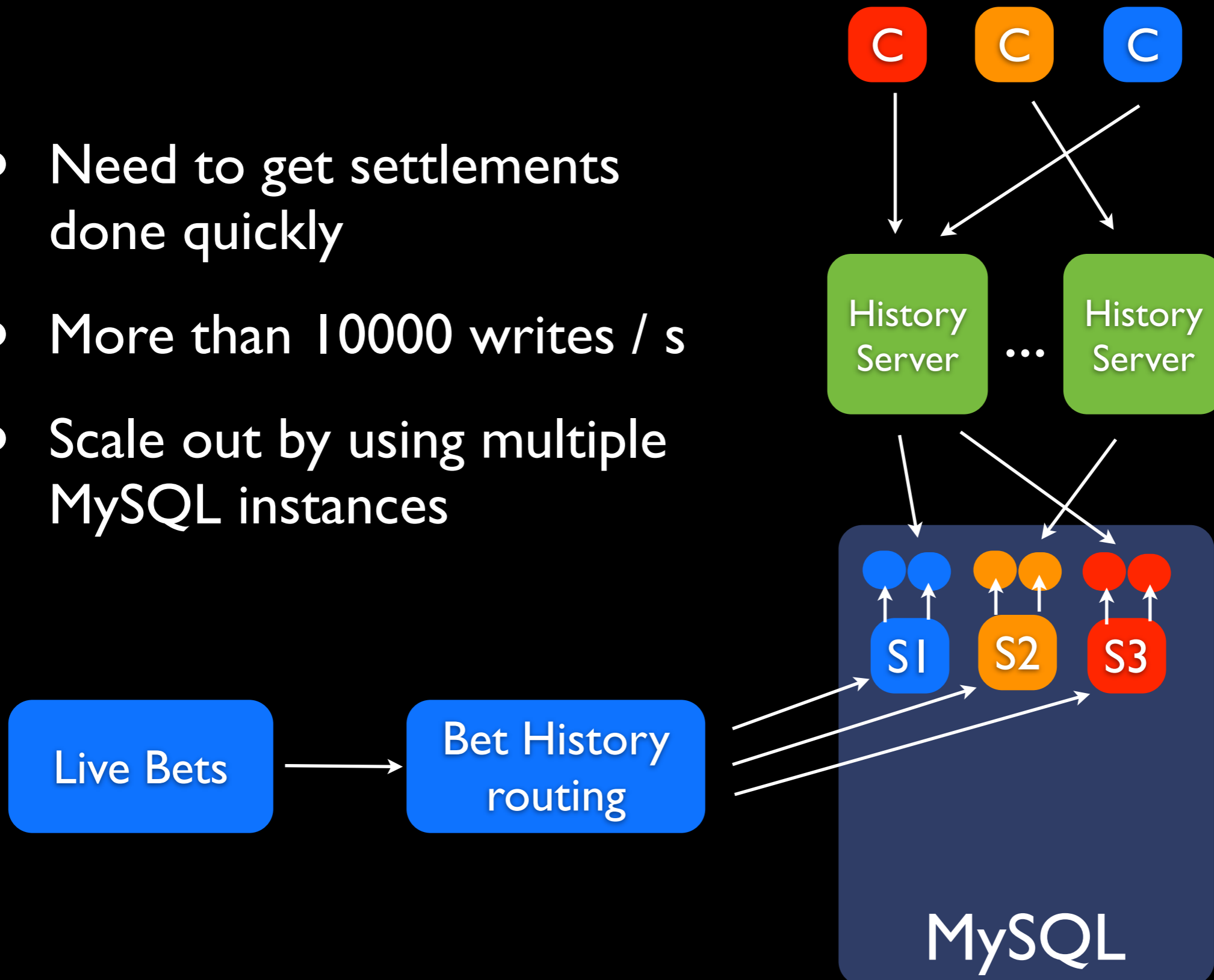


Example #4
Affinity +
multi master replication



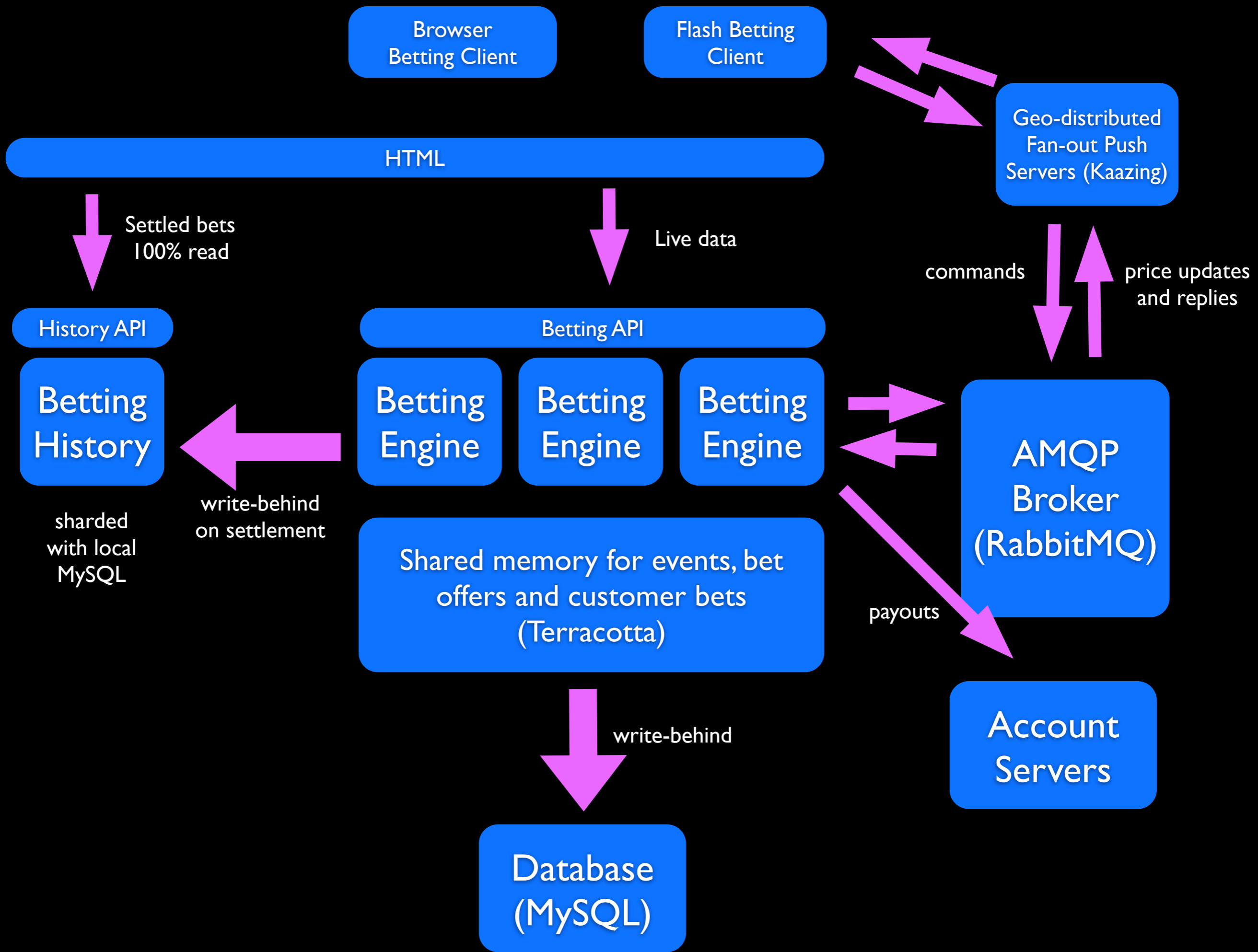
Example #5
Partition the data to
scale writes

- Need to get settlements done quickly
- More than 10000 writes / s
- Scale out by using multiple MySQL instances





Combining the pieces



Recap:

Two main challenges

- Latency - data too far away from where it's needed
- Bottlenecks - resource contention

Recipes used at Unibet

information delivery

- Optimize your web apps!
- Get rid of static object traffic
- Move web data closer to customers (CDN)
- Last-mile fan-out messaging

Recipes used at Unibet

in the data center

- Move data to business logic
- Read-only farms
- Multi-master replication for read-mostly data
- Sharding to scale writes

Open Source Software and Services is used by Unibet extensively in mission critical applications because...

...we are convinced it's better and
more cost effective!

Thanks!
(we're hiring)

@stnor

stefan.norberg@unibet.com

stnor.wordpress.com

www.linkedin.com/in/stnor

Backup slides

DDoS resilience

- Outsourced DNS
- DDoS protection service

