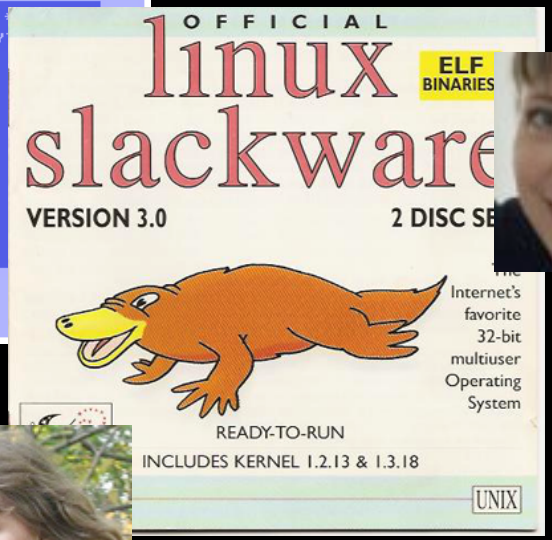
Unibet.com Architecture

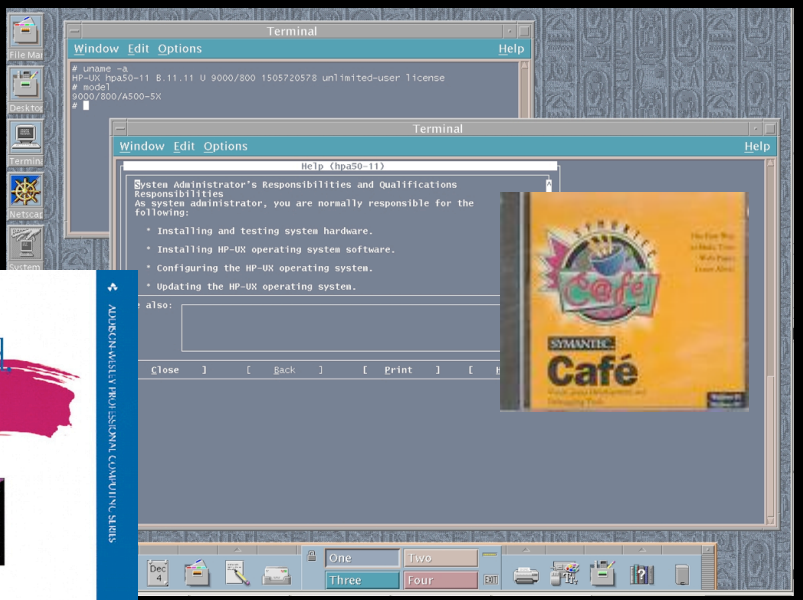
Open Source at Unibet.com:
10x scalability at half the cost

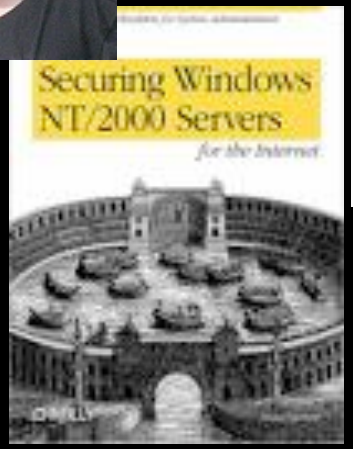
stefan.norberg@unibet.com

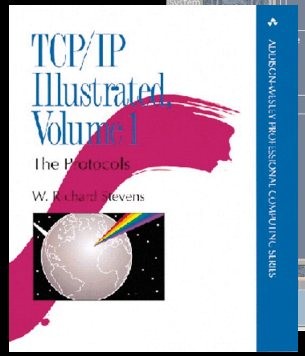
@stnor

About the speaker





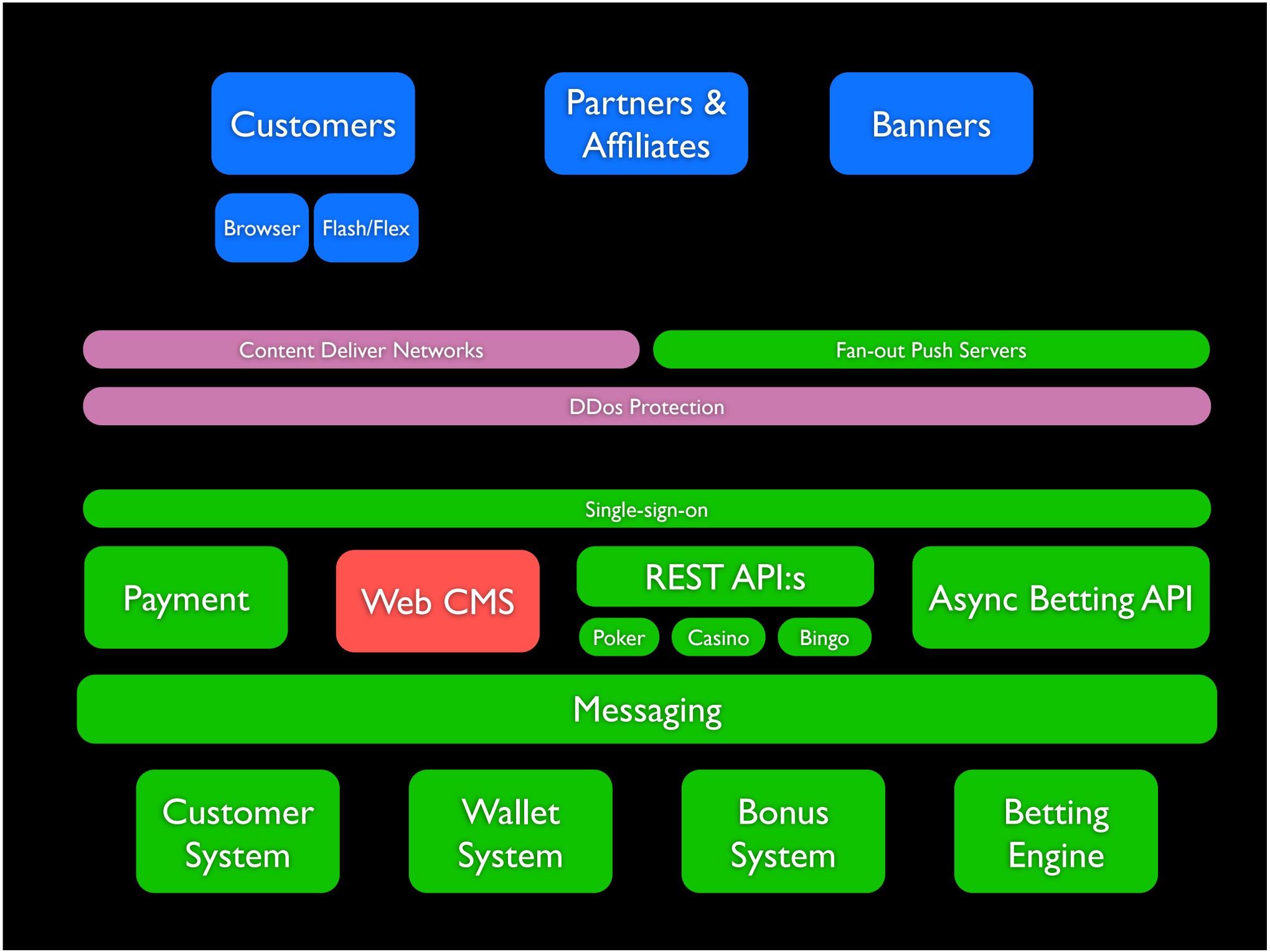


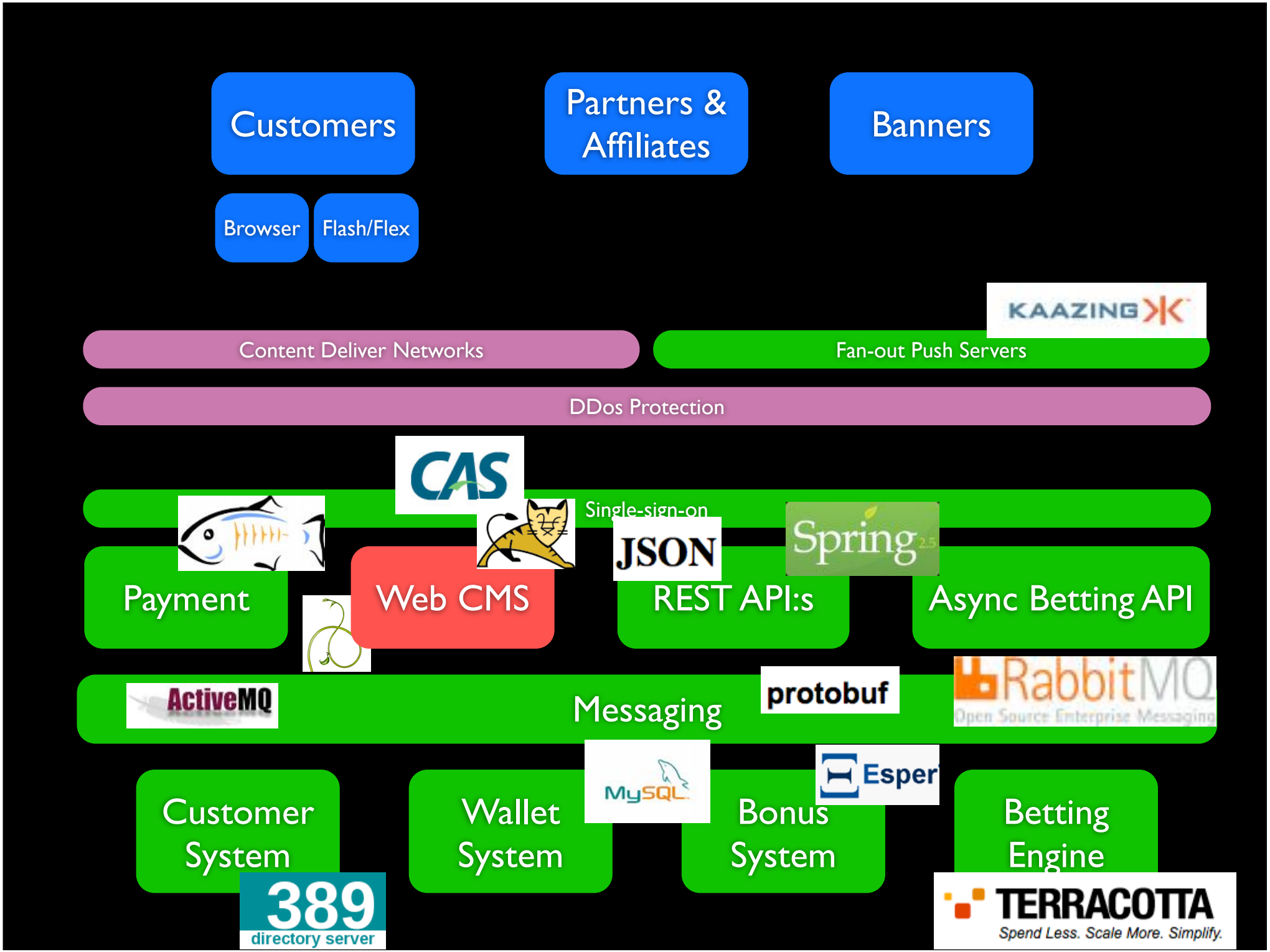


Unibet Open Source strategy

- 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
Poker
Casino
Bingo
Async Betting API
Messaging
Customer System
Wallet System
Bonus System
Betting Engine


Customers
Partners & Affiliates
Banners
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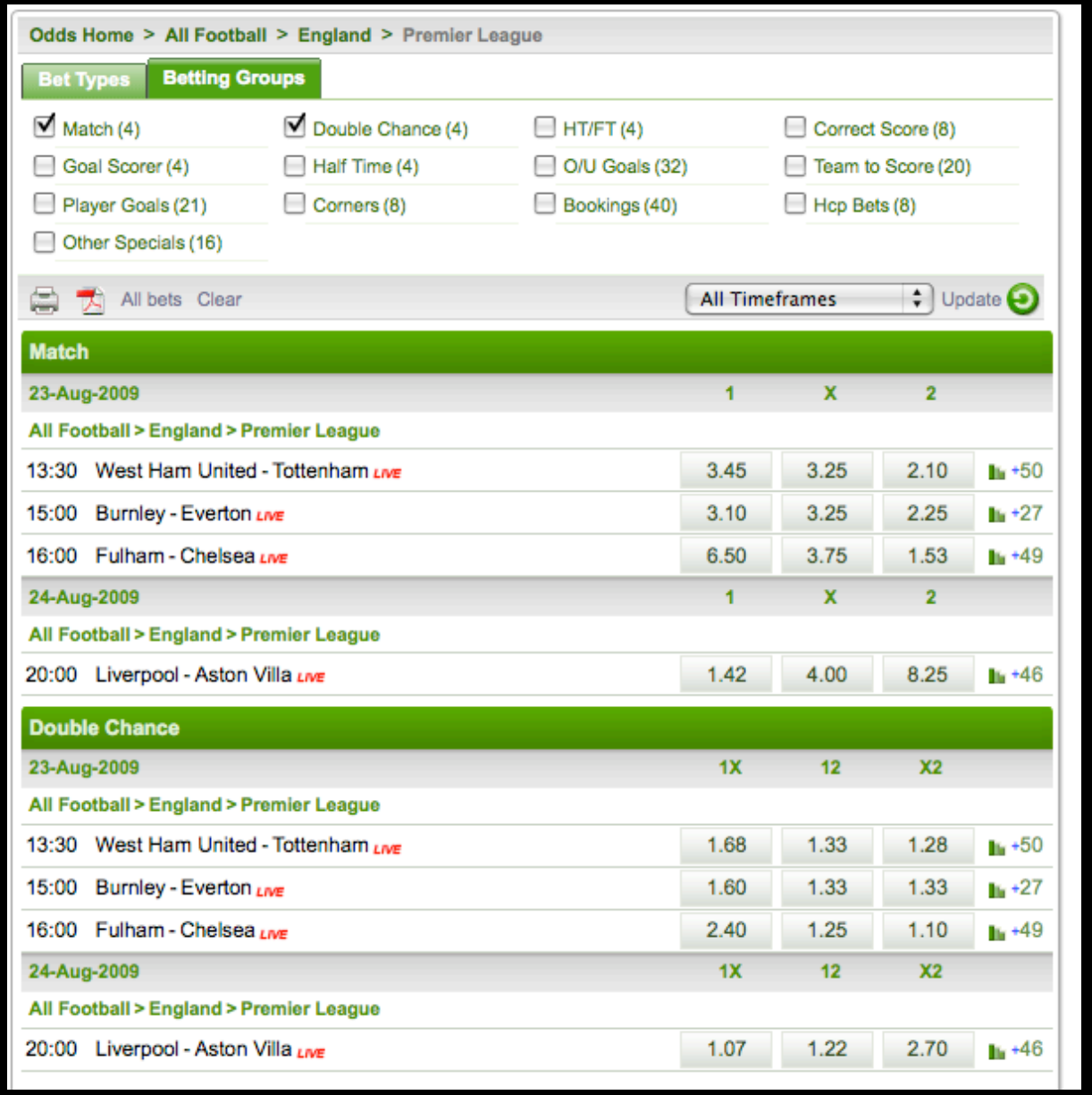
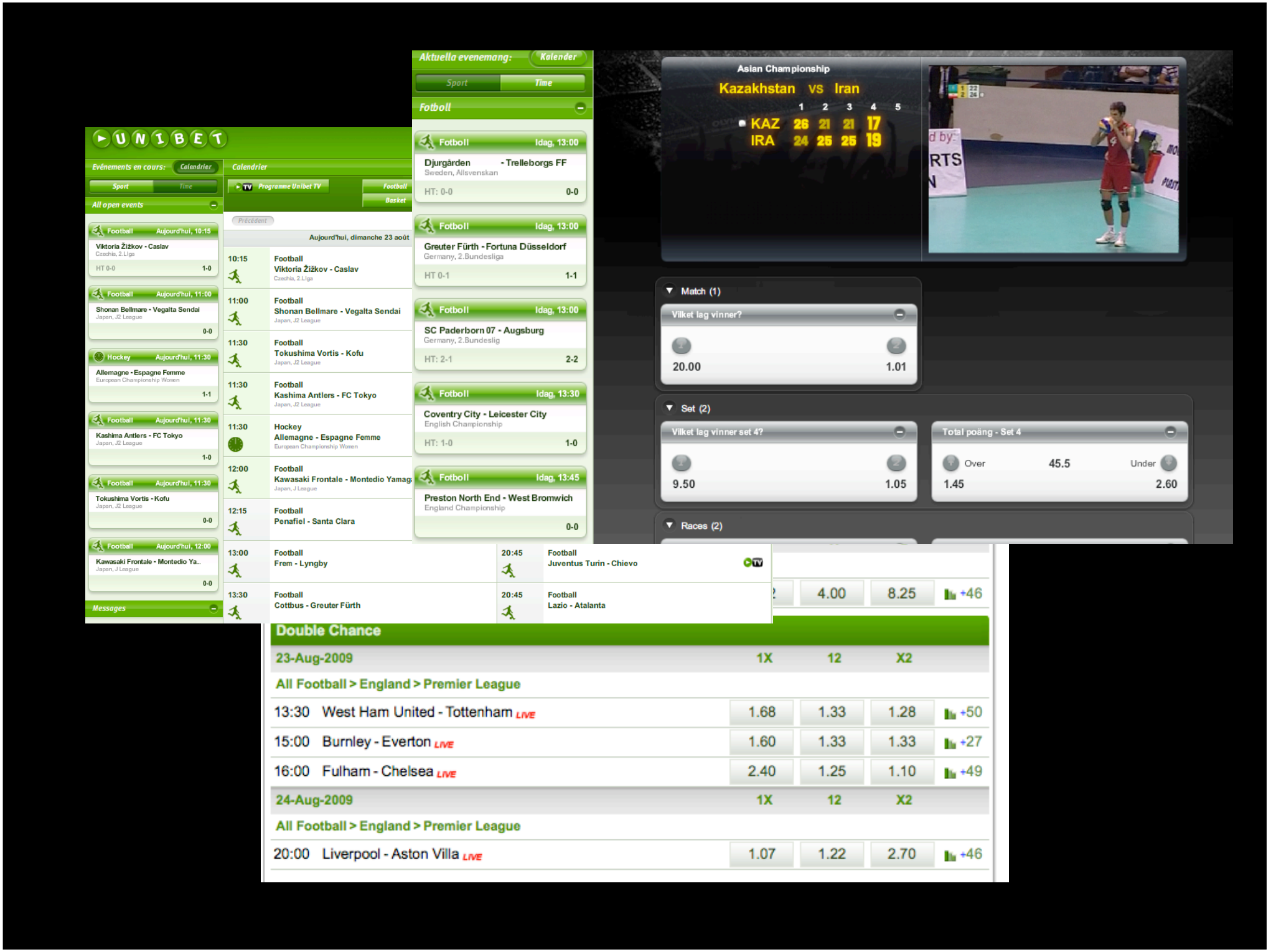
Flash/Flex
KAAZING
Content Deliver Networks
Fan-out Push Servers
DDos Protection
CAS
Single-sign-on
JSON
Spring 2.5
Payment
Web CMS
REST API:s
Async Betting API
ActiveMQ
Messaging
protobuf
RabbitMQ
Open Source Enterprise Messaging
MySQL
Esper
Customer System
Wallet System
Bonus System
Betting Engine
389
directory server
TERRACOTTA
Spend Less. Scale More. Simplify.

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

UNIBET
Sportsbook, Casino and Poker games online
About Unibet
Responsible gaming
Select your
English
Start
Sportsbook
Casino
Live Casino
Poker
Bingo
Games
Skill
Scratch Card
Home
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?
Winning right now
Gonleszczu €2.40
thetsaxpins €1.70
Servette €1.60
jakestan €1.60
pelon99 €1.60
Play skill games!
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
EGAMING AWARDS
Unibet has won the Egaming Awards for the best sport betting operator of the year 2006 and 2008.
Try our Sports betting
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
Security and Trust
Our partners
VeriSign Secured
18+
EGBA
ESSA
RGA


Odds Home > All Football > England > Premier League
Bet Types
Betting Groups
Match (4)
Double Chance (4)
HT/FT (4)
Correct Score (8)
Goal Scorer (4)
Half Time (4)
O/U Goals (32)
Team to Score (20)
Player Goals (21)
Corners (8)
Bookings (40)
Hcp Bets (8)
Other Specials (16)
All bets
Clear
All Timeframes
Update
Match
23-Aug-2009
1
X
2
All Football > England > Premier League
13:30 West Ham United - Tottenham LIVE
3.45
3.25
2.10
+50
15:00 Burnley - Everton LIVE
3.10
3.25
2.25
+27
16:00 Fulham - Chelsea LIVE
6.50
3.75
1.53
+49
24-Aug-2009
1
X
2
All Football > England > Premier League
20:00 Liverpool - Aston Villa LIVE
1.42
4.00
8.25
+46
Double Chance
23-Aug-2009
1X
12
X2
All Football > England > Premier League
13:30 West Ham United - Tottenham LIVE
1.68
1.33
1.28
+50
15:00 Burnley - Everton LIVE
1.60
1.33
1.33
+27
16:00 Fulham - Chelsea LIVE
2.40
1.25
1.10
+49
24-Aug-2009
1X
12
X2
All Football > England > Premier League
20:00 Liverpool - Aston Villa LIVE
1.07
1.22
2.70
+46


UNIBET
Evénements en cours:
Calendrier
Sport
Time
All open events
Football Aujourd'hui, 10:15
Viktoria Žižkov - Caslav
Czechia, 2.Liga
HT 0-0
1-0
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
Calendrier
Programme Unibet TV
Football
Basket
Précédent
Aujourd'hui, dimanche 23 août
10:15 Football Viktoria Žižkov - Caslav Czechia, 2.Liga
11:00 Football Shonan Bellmare - Vegalta Sendai Japan, J2 League
11:30 Football Tokushima Vortis - Kofu Japan, J2 League
11:30 Football Kashima Antlers - FC Tokyo Japan, J2 League
11:30 Hockey Allemagne - Espagne Femme European Championship Women
12:00 Football Kawasaki Frontale - Montedio Yamag Japan, J League
12:15 Football Penafiel - Santa Clara
13:00 Football Frem - Lyngby
13:30 Football Cottbus - Greuter Fürth
20:45 Football Juventus Turin - Chievo
20:45 Football Lazio - Atalanta
Aktuella evenemang:
Kalender
Sport
Time
Fotboll
Fotboll Idag, 13:00
Djurgården - Trelleborgs 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?
1 20.00
2 1.01
Set (2)
Vilket lag vinner set 4?
1 9.50
2 1.05
Total poäng - Set 4
Over 45.5 Under
1.45 2.60
Races (2)
4.00 8.25 +46
Double Chance
23-Aug-2009 1X 12 X2
All Football > England > Premier League
13:30 West Ham United - Tottenham LIVE 1.68 1.33 1.28 +50
15:00 Burnley - Everton LIVE 1.60 1.33 1.33 +27
16:00 Fulham - Chelsea LIVE 2.40 1.25 1.10 +49
24-Aug-2009 1X 12 X2
All Football > England > Premier League
20:00 Liverpool - Aston Villa LIVE 1.07 1.22 2.70 +46

Start | Sportsbook | Casino | Live Casino | Poker | Bingo | Games | Skill | Scratch Card

Home | News | Promotions | Casino tournaments

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!

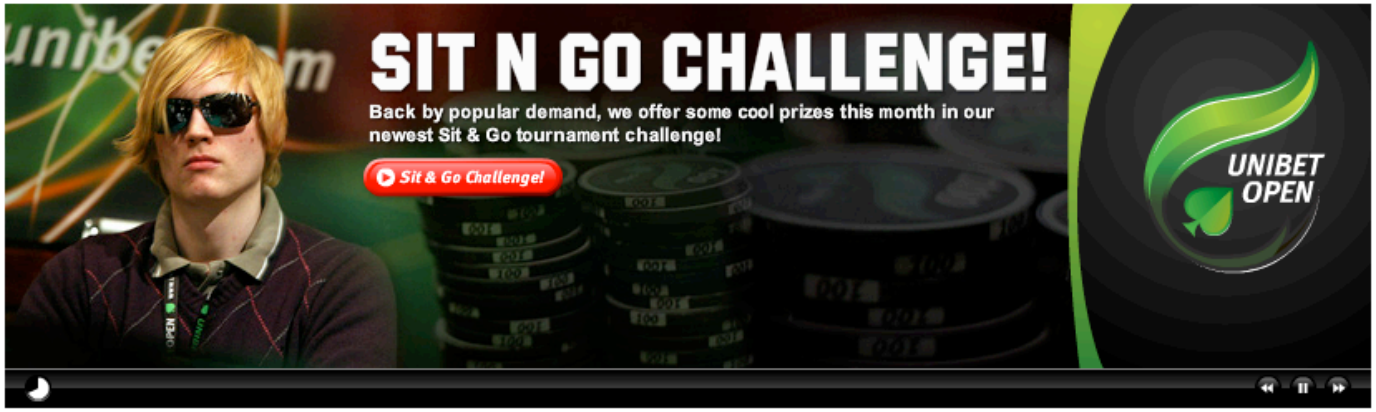
Play

Most Popular | Table Games | Video Poker | Video Slots | Slots | Jackpots | Other

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

Start | Sportsbook | Casino | Live Casino | Poker | Bingo | Games | Skill | Scratch Car

Home | Promotions | Leaderboards | Tournaments | Poker school | Club Shop | Rules & Info



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

LIVE POKER TOURNAMENTS UNIBET OPEN IN EUROPE'S HOT SPOTS

Unibet Poker | Contact Us | English

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

POKER SCHOOL

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

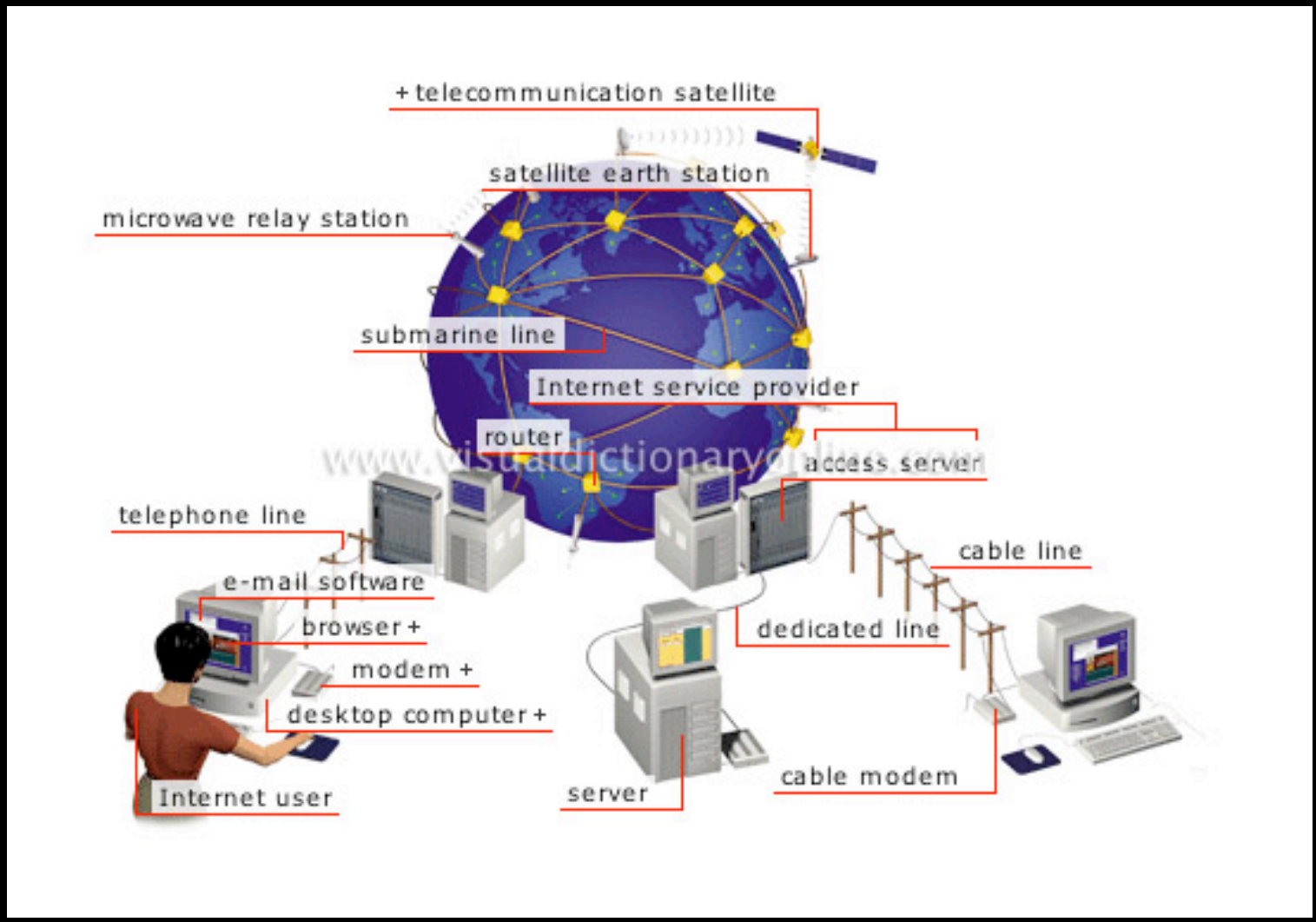
Source: Juniper Research

2009:
2 seconds

Source: Forrester Research

Two main challenges

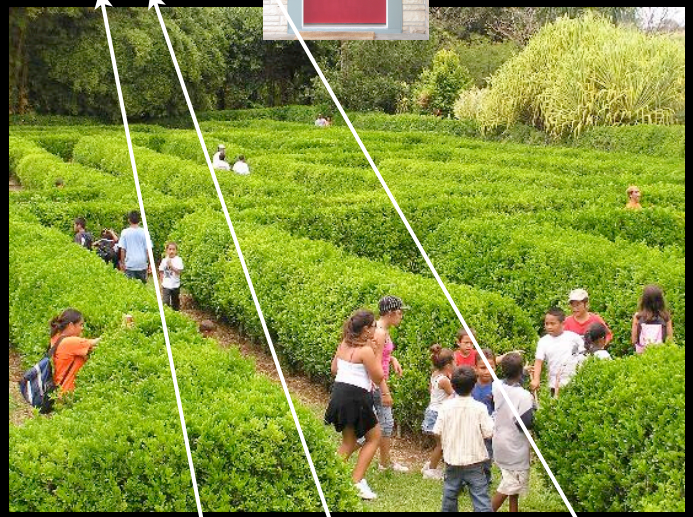
- Latency - data too far away from where it's needed
- Bottlenecks - resource contention


+ telecommunication satellite
satellite earth station
microwave relay station
submarine line
Internet service provider
router
access server
telephone line
cable line
e-mail software
browser +
dedicated line
modem +
desktop computer +
Internet user
server
cable modem

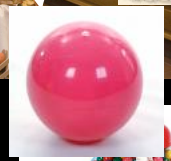
Avg 40 ms RTT

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

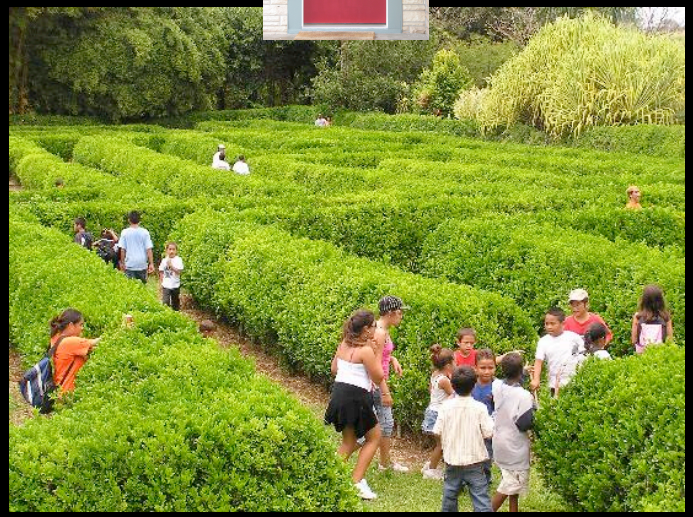


CANDY STORE



Idea #1
Sell bags of candy

(Caveat: no bars or bubblegums in bags!)



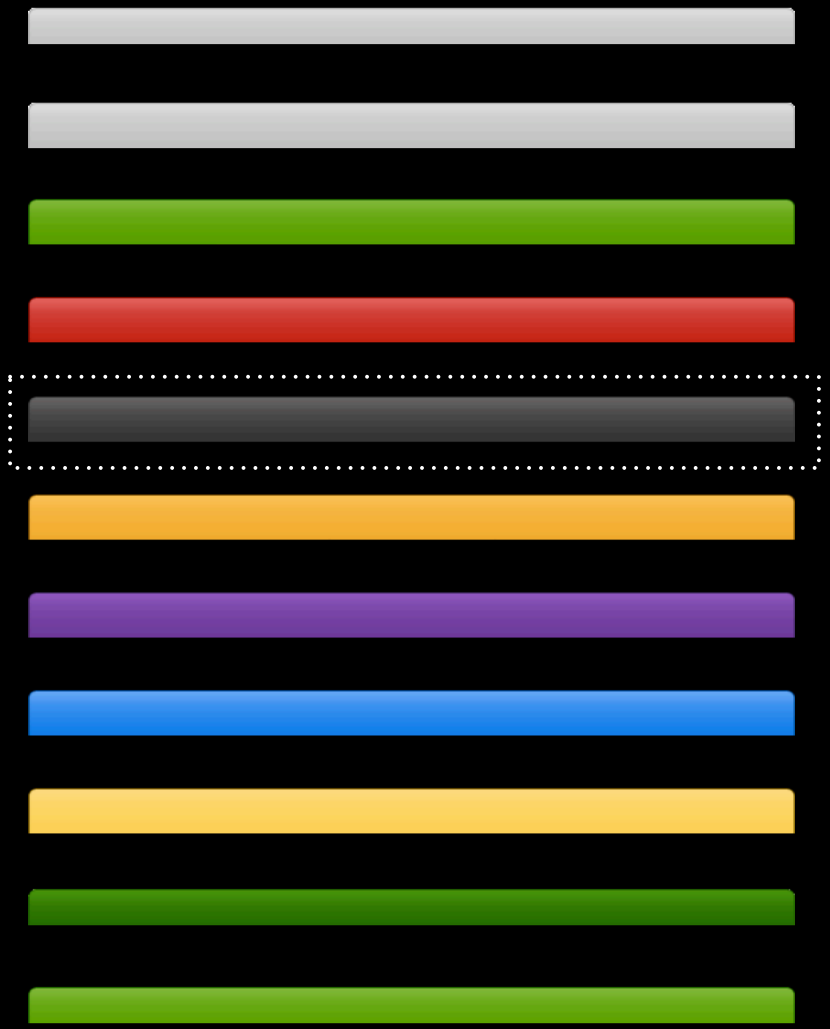
CANDY STORE

The bag is a big JS file

The bag is a big CSS file

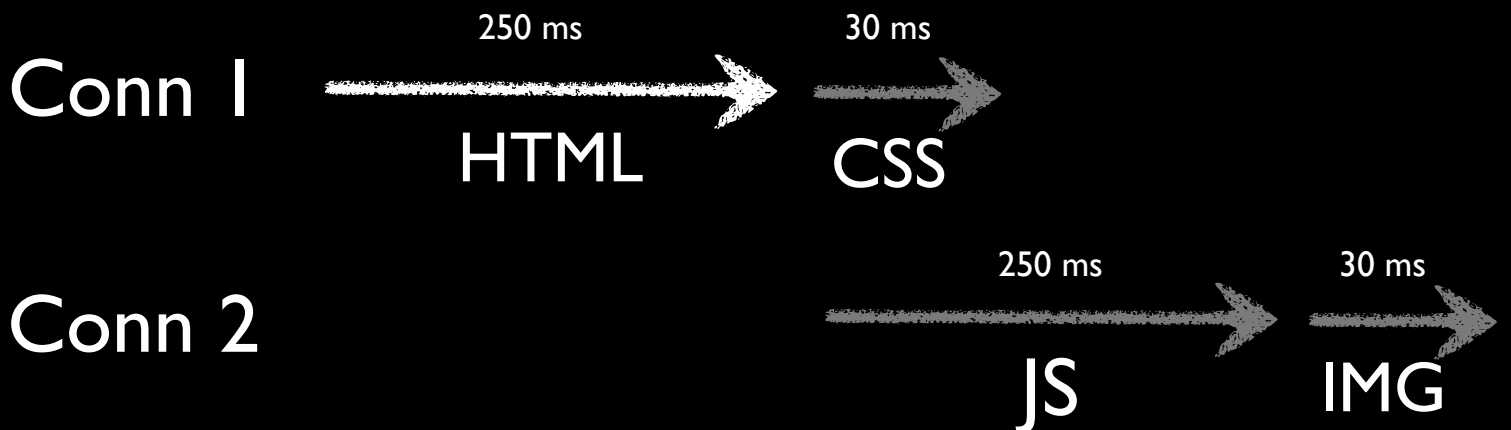
The bag is a CSS image sprite*

/4.9.3/images/uskin I /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!)

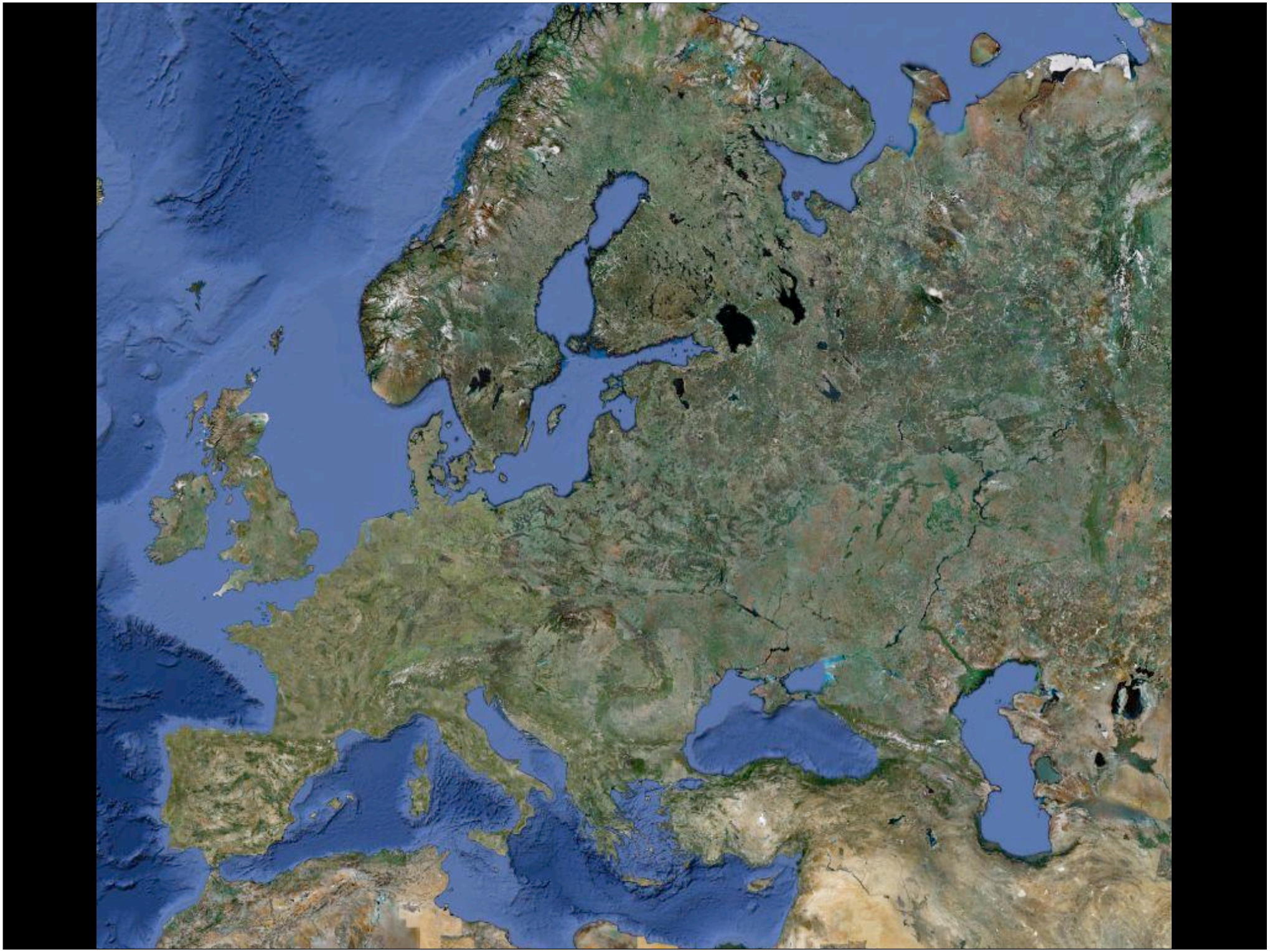
CANDY STORE

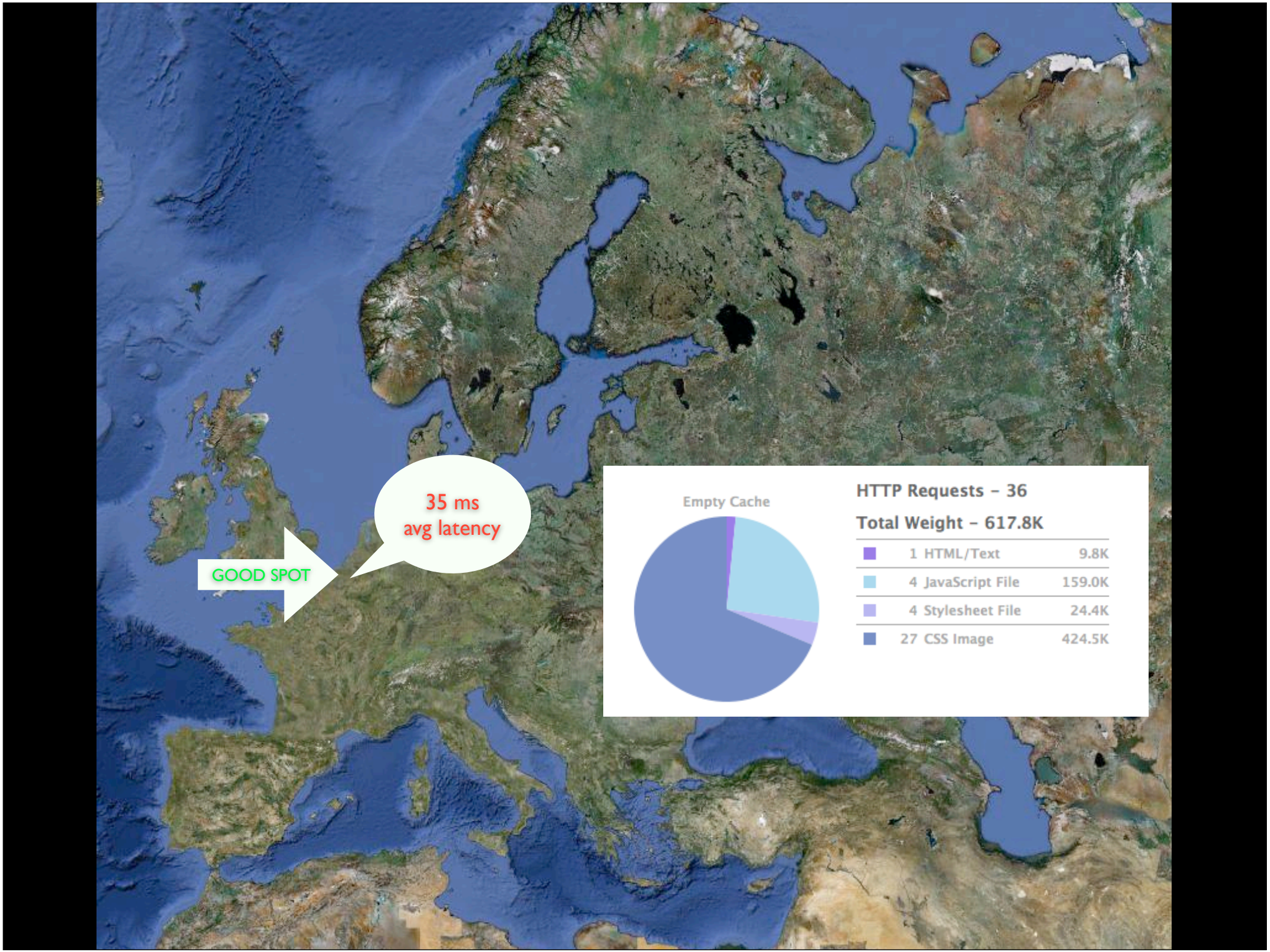
DAIRY MILK

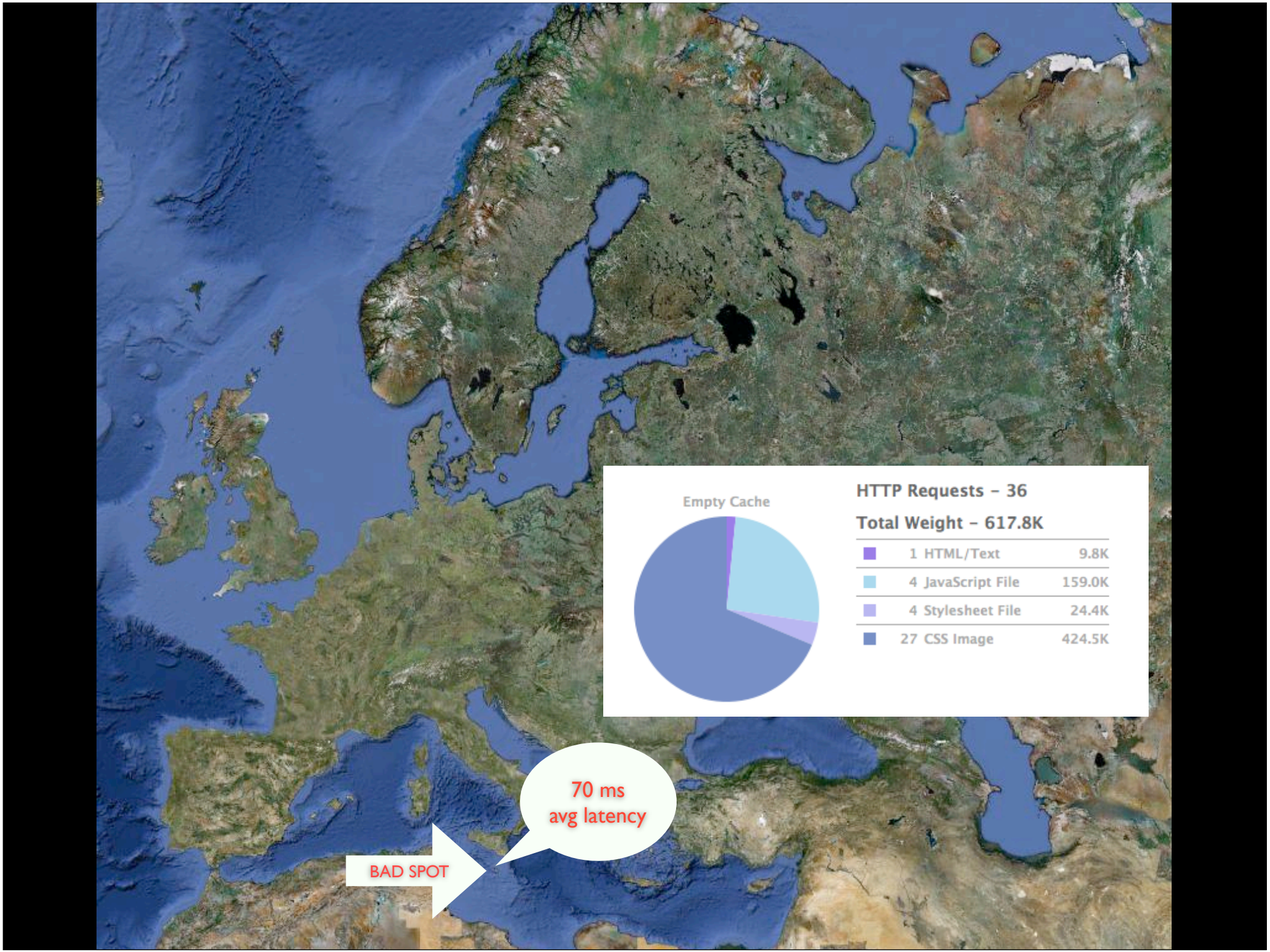
There are many street corners

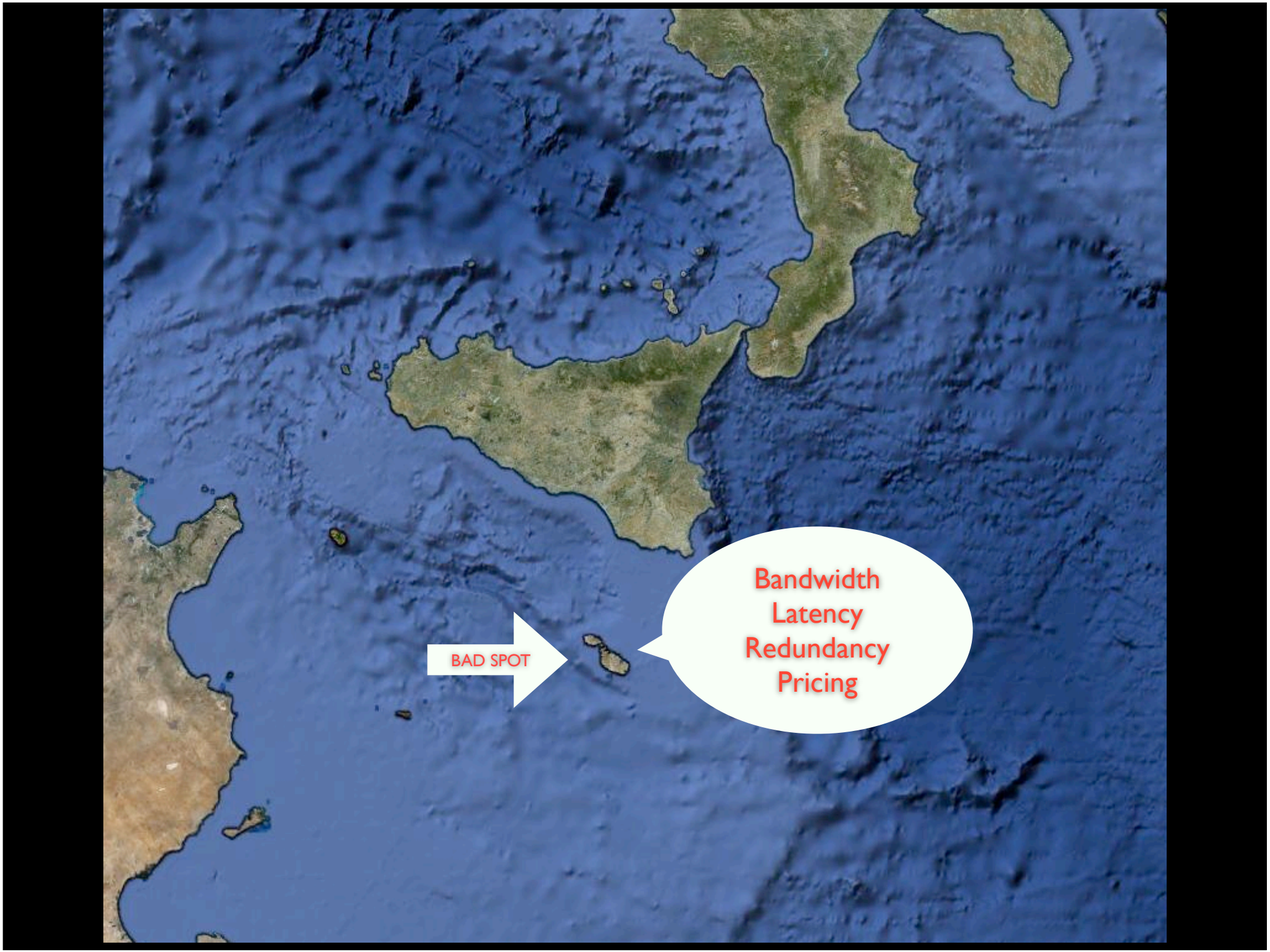
Street corners are very near all customers

The street corner is a Content Delivery Network node




35 ms
avg latency
GOOD SPOT
Empty Cache
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


Empty Cache
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
70 ms
avg latency
BAD SPOT

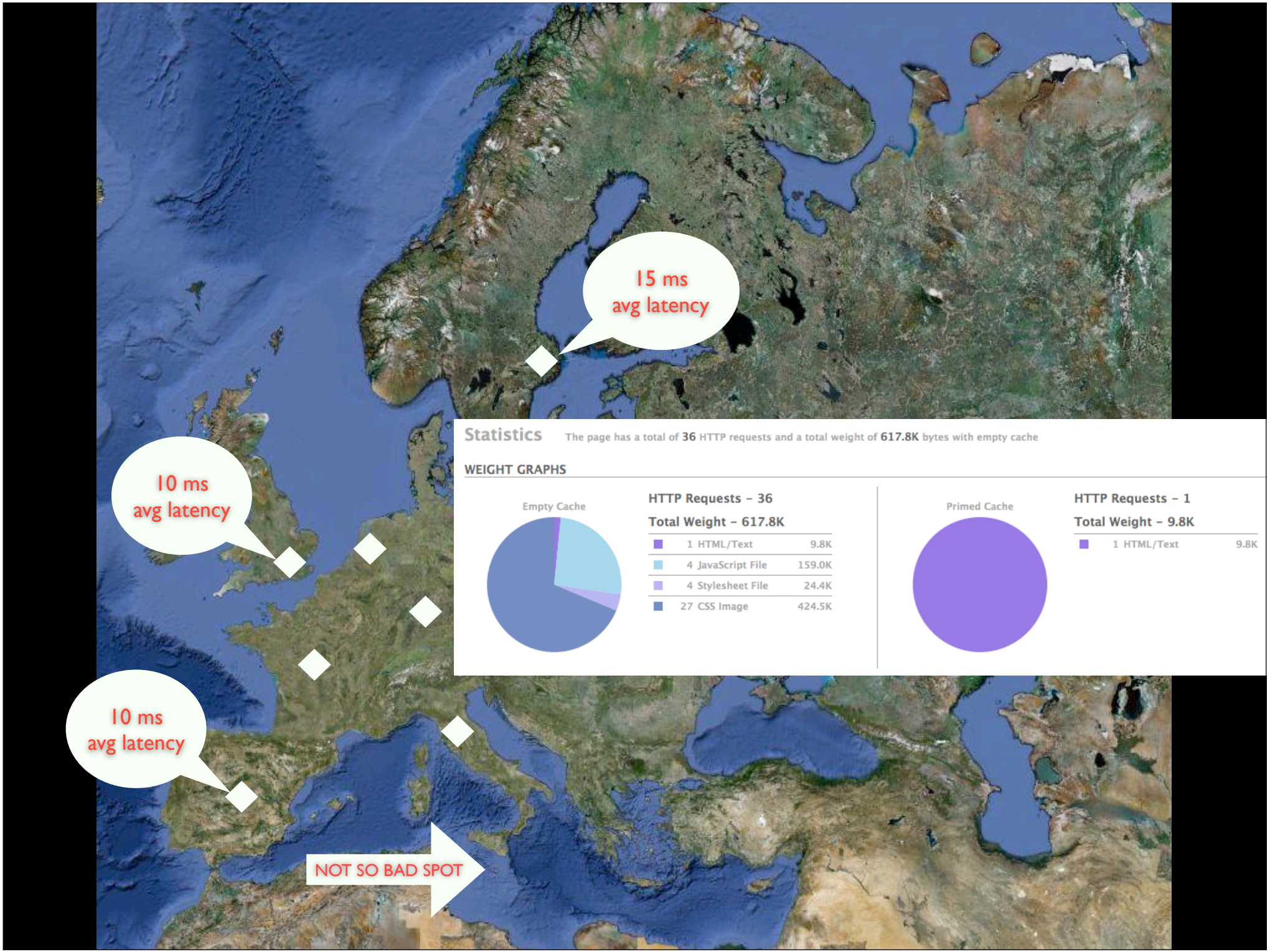

BAD SPOT
Bandwidth
Latency
Redundancy
Pricing

Tune tune tune the front-end!

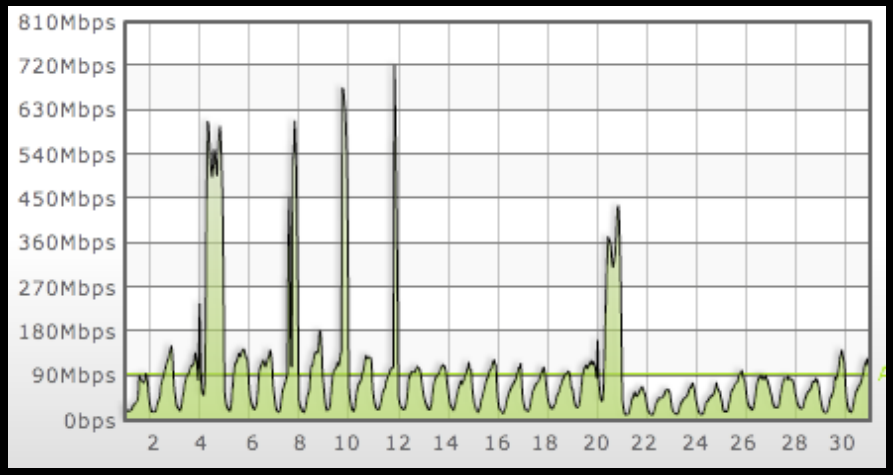
- 80-90% of the end-user response time is spent downloading and processing all the components in the page
- Use best practice to optimize your front-end (YSlow, Page Speed etc)
- Next step to improve performance is to tweak delivery

How we do it

- 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
Empty Cache
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



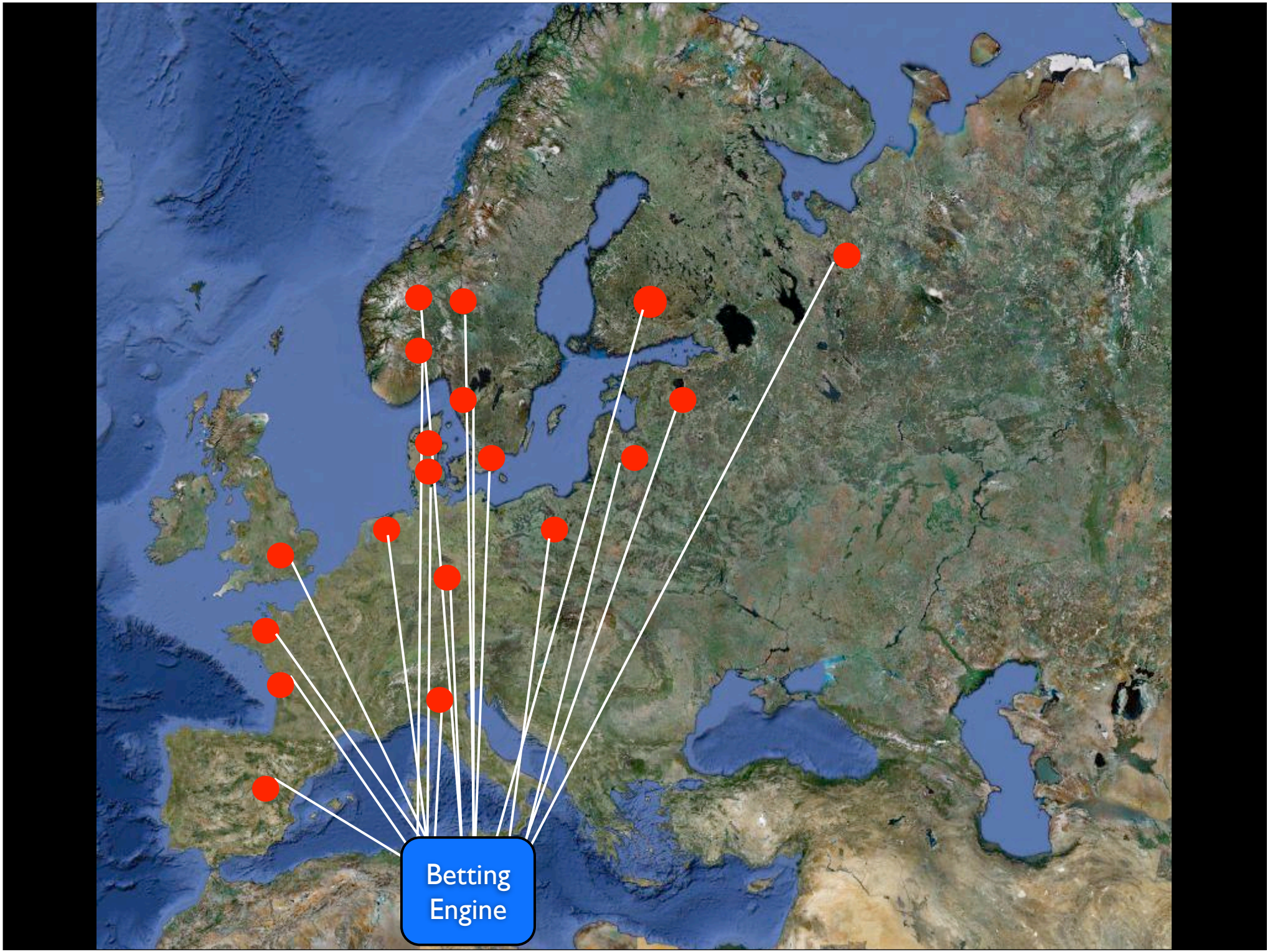
Next steps...

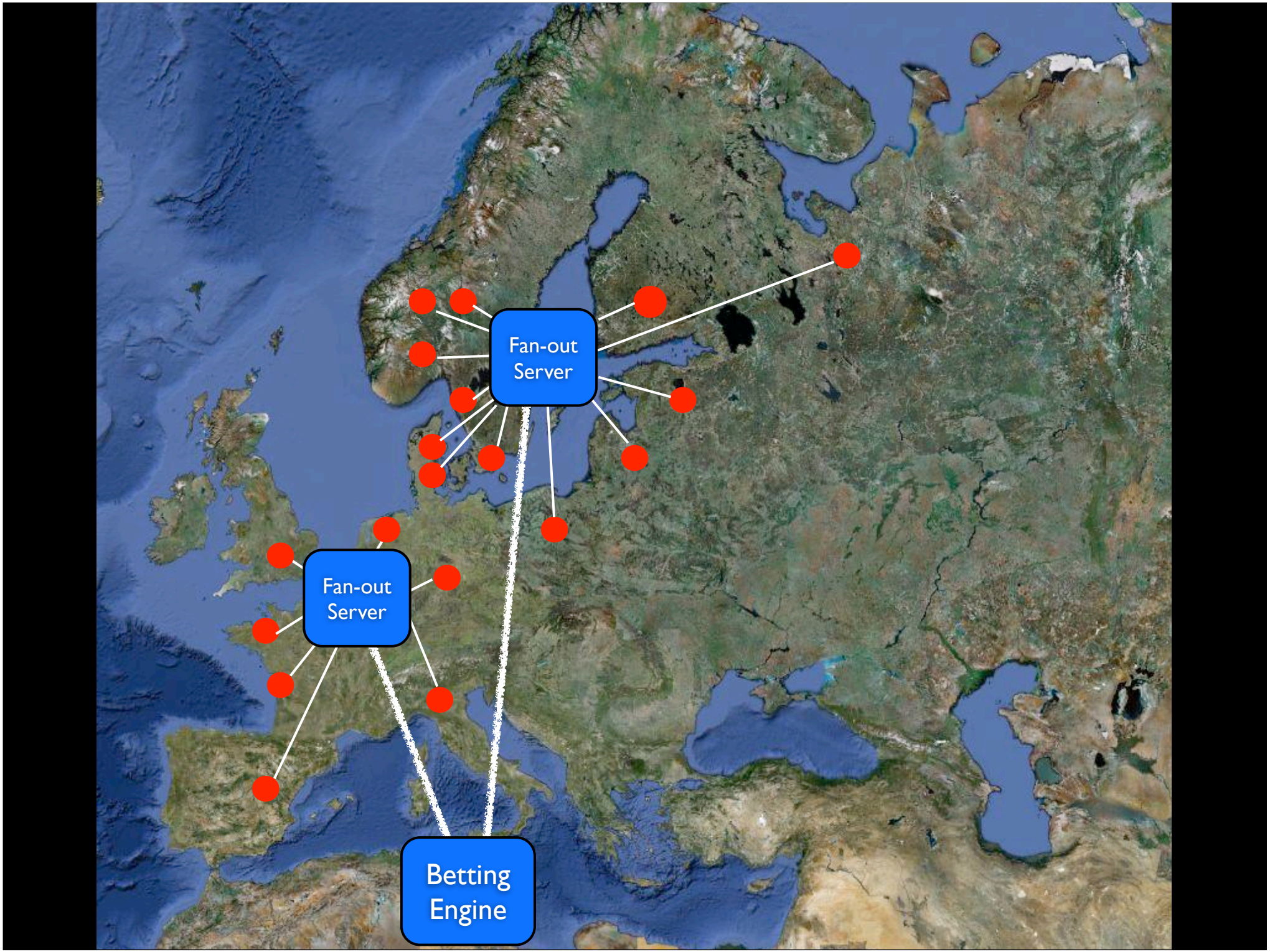
Live Betting data distribution

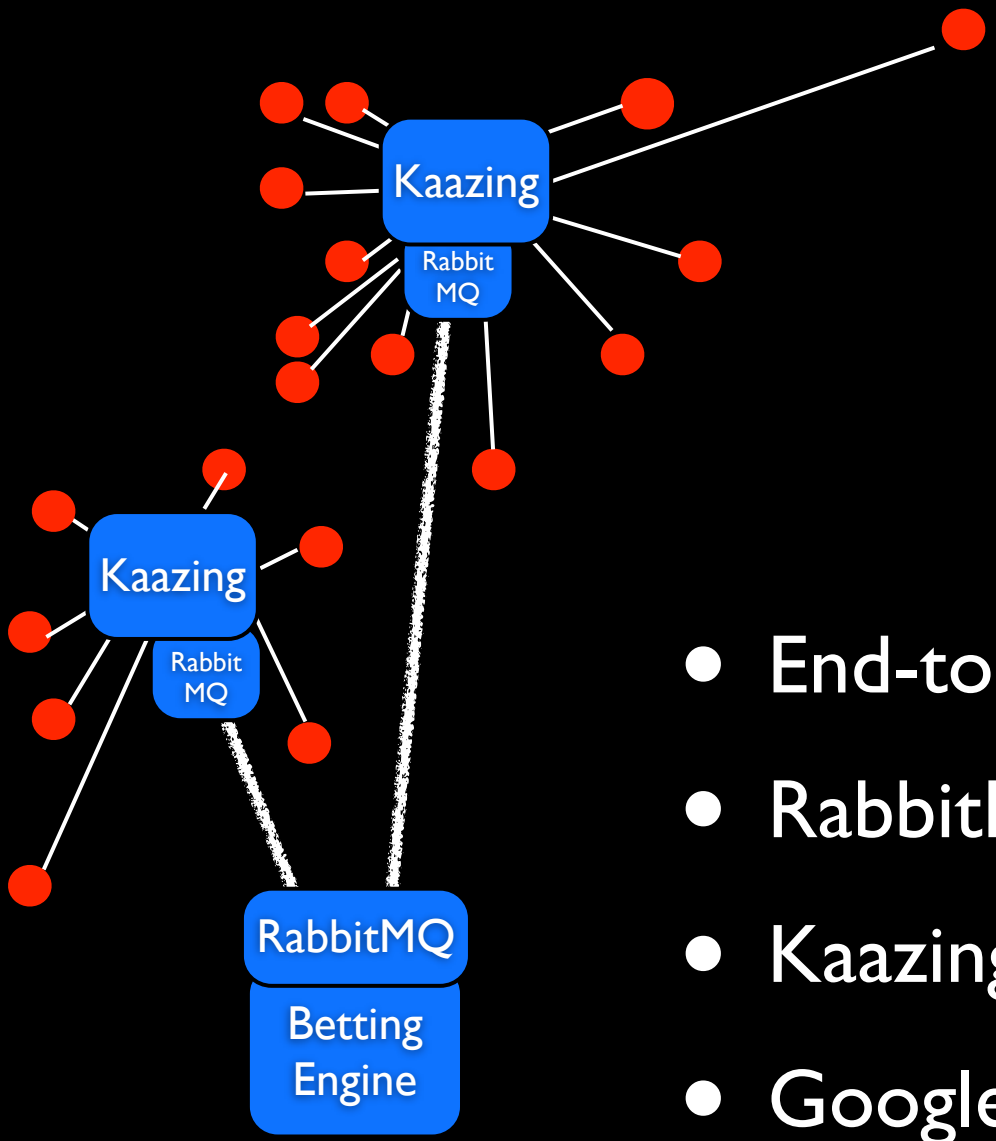
- Bet while the game is on

  "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

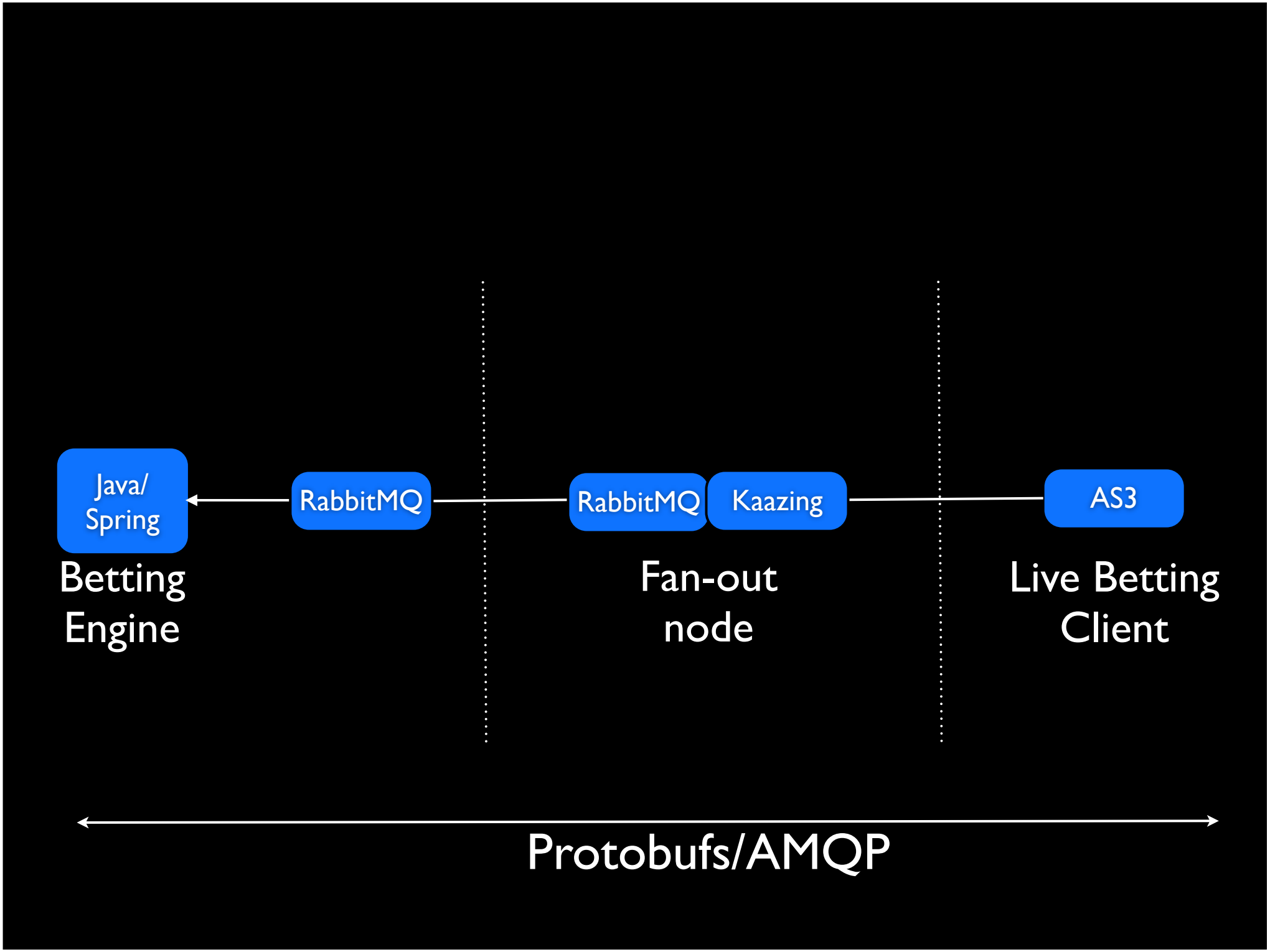
- Free Open Source and Open Standards protocol (AMQP)
- Highly available, highly scalable (Erlang/OTP)
- Excellent & friendly support available

Kaazing

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

Protocol Buffers

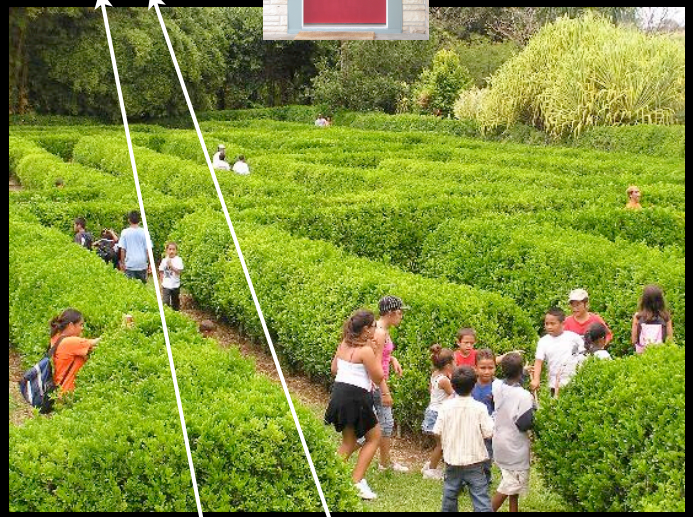
- Flexible, efficient, automated mechanism for serializing (binary)
- Schema support (.proto files)
- Language neutral (we use Java to Actionscript)
- Invented and used by Google
- Open Sourced in July 2008


Java/
Spring
RabbitMQ
RabbitMQ
Kaazing
AS3
Betting
Engine
Fan-out
node
Live Betting
Client
Protobufs/AMQP

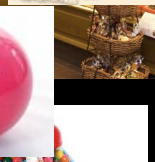
Let’s get back to the Candy store...

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



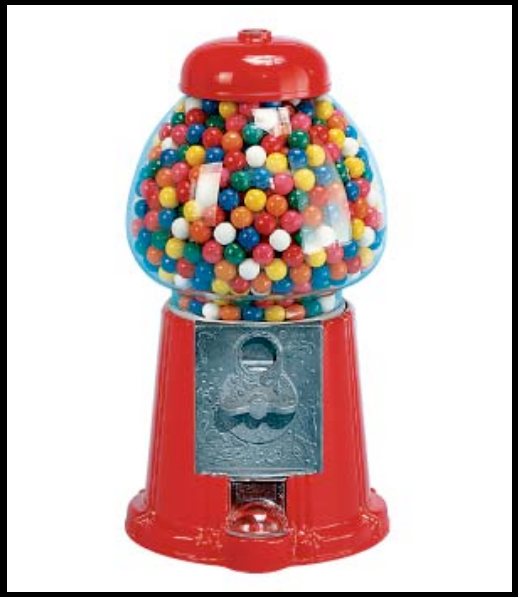
CANDY STORE



The chocolate bar is a cacheable read

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

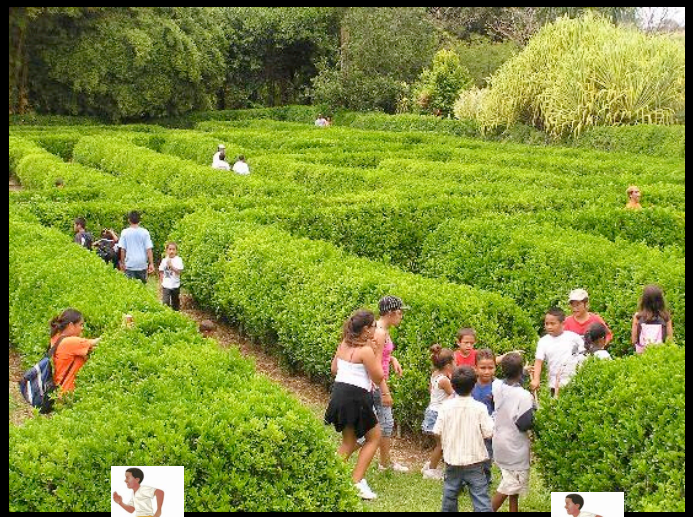
The candy store checkout
is an app server



The bubble gum machine
is a database system

Example #1
More hardware!
(and sw licenses)

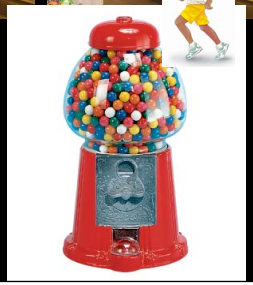
Kids are invading our store...

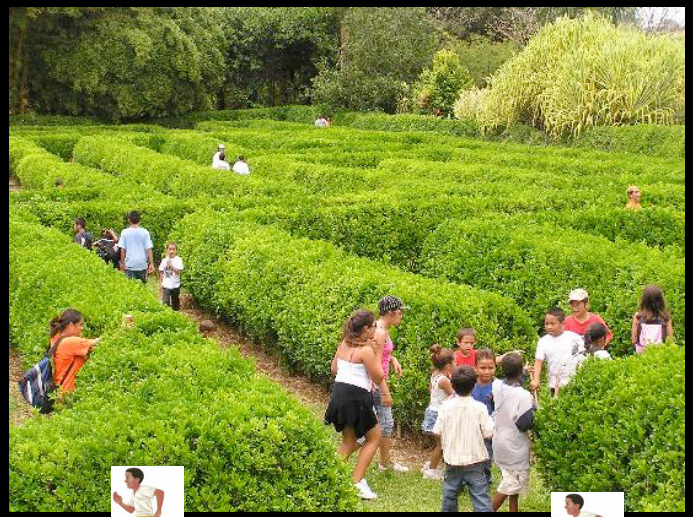


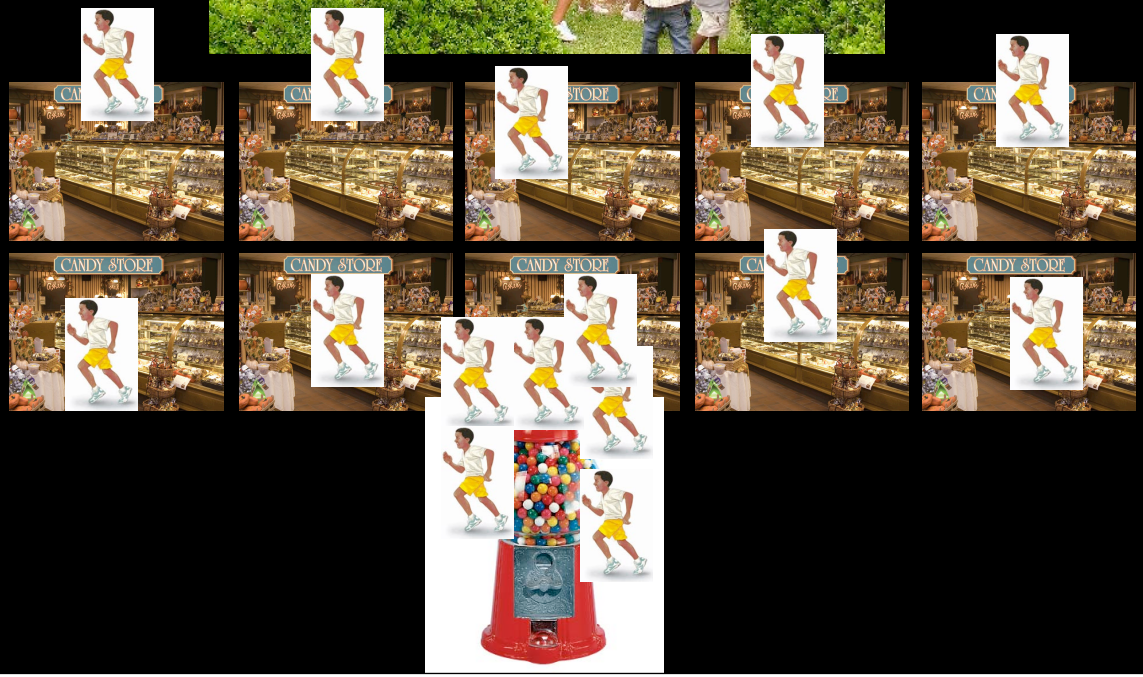
Cadbury
DAIRY MILK

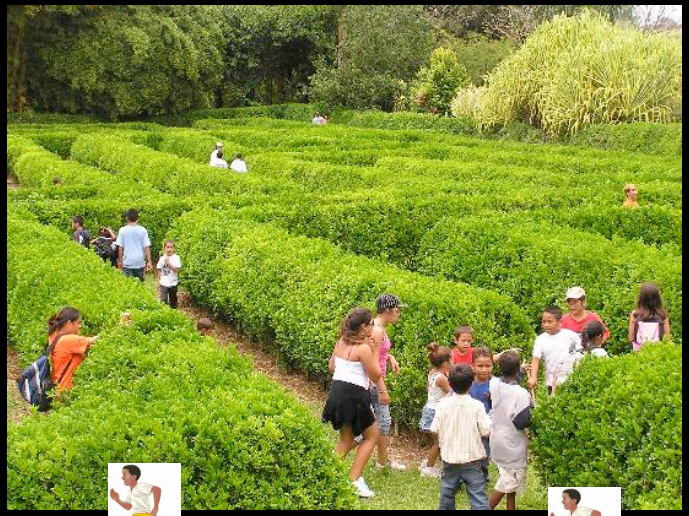
Cadbury
DAIRY MILK

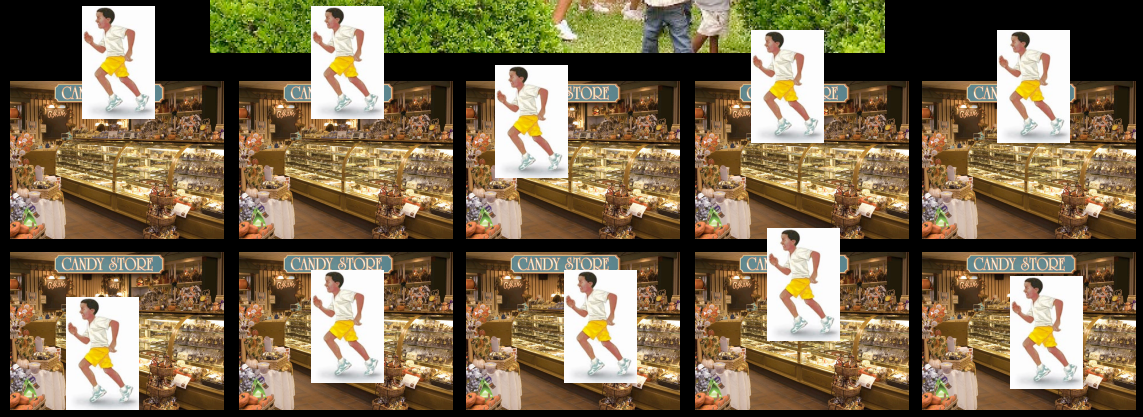
CANDY STORE

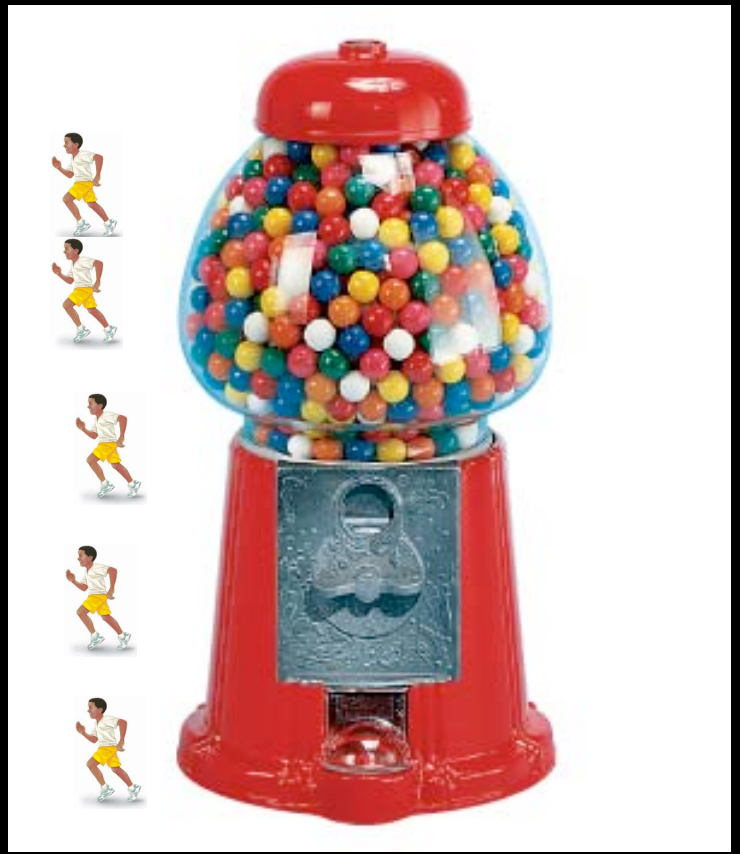




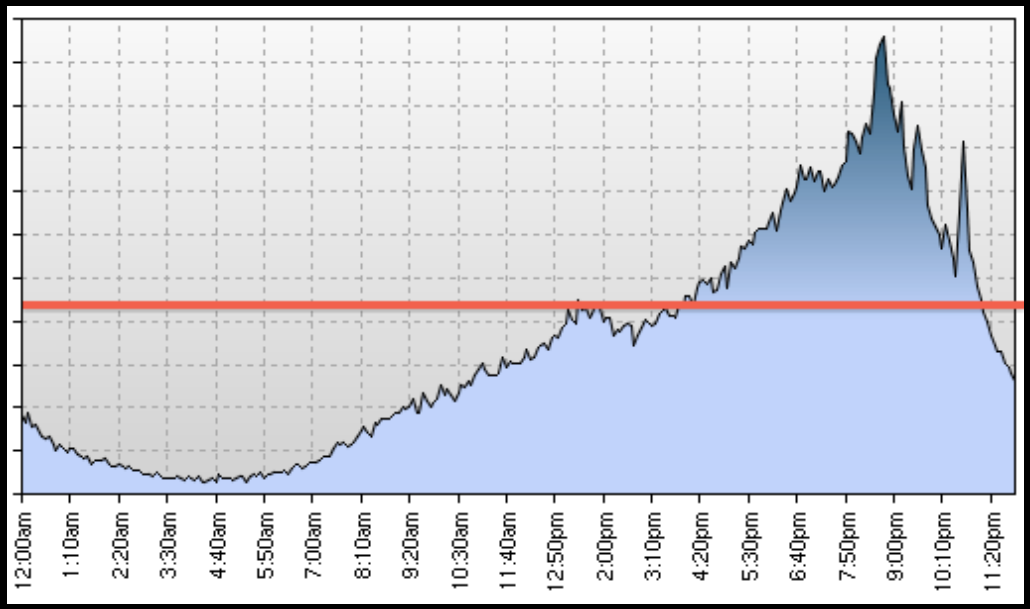

CANDY STORE



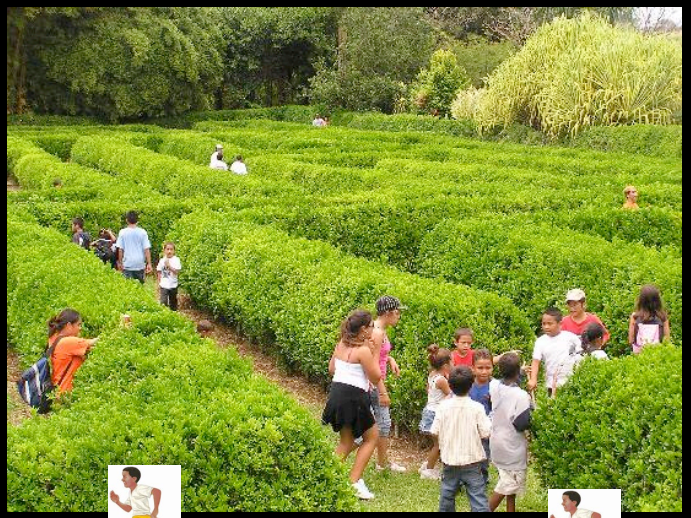

CANDY STORE

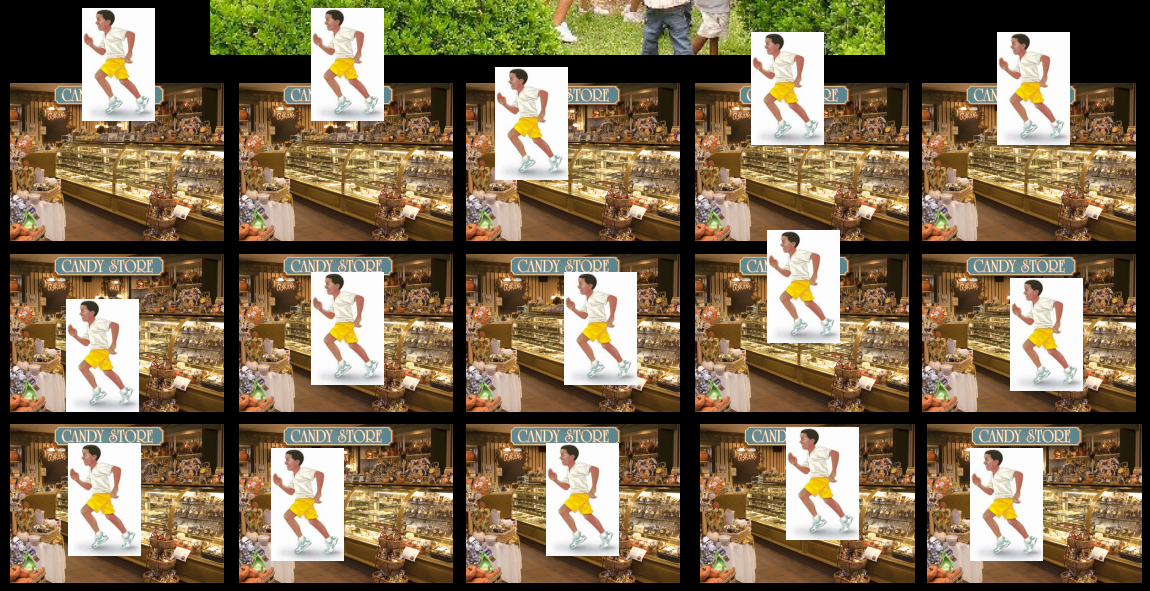


Food for thought



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




CANDY STORE

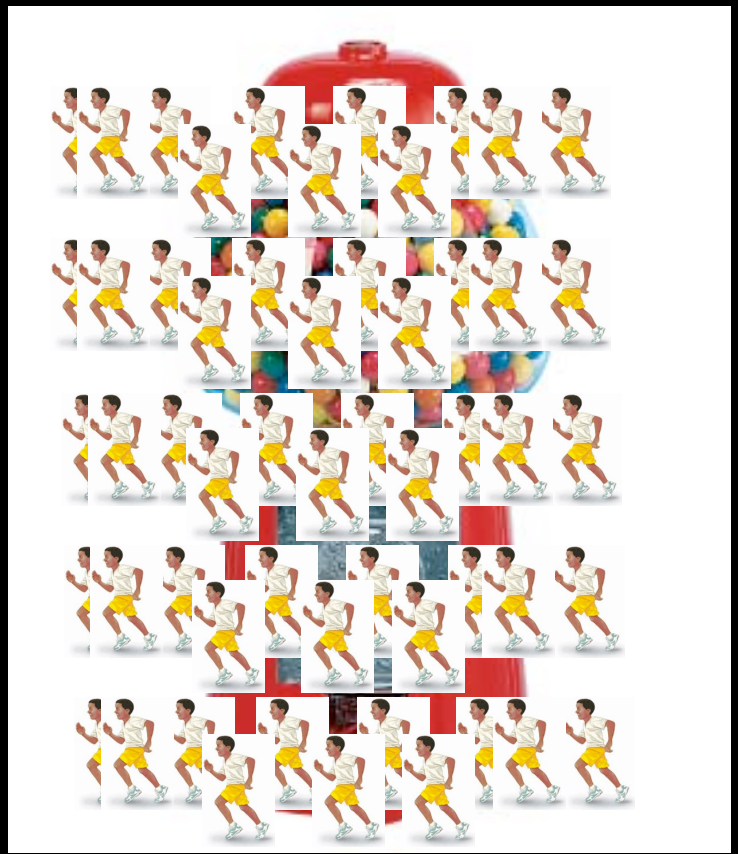


PHOTO: PAUL SAKUMA/AP

You cannot buy a product to solve this problem

Need to rearchitecture!

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

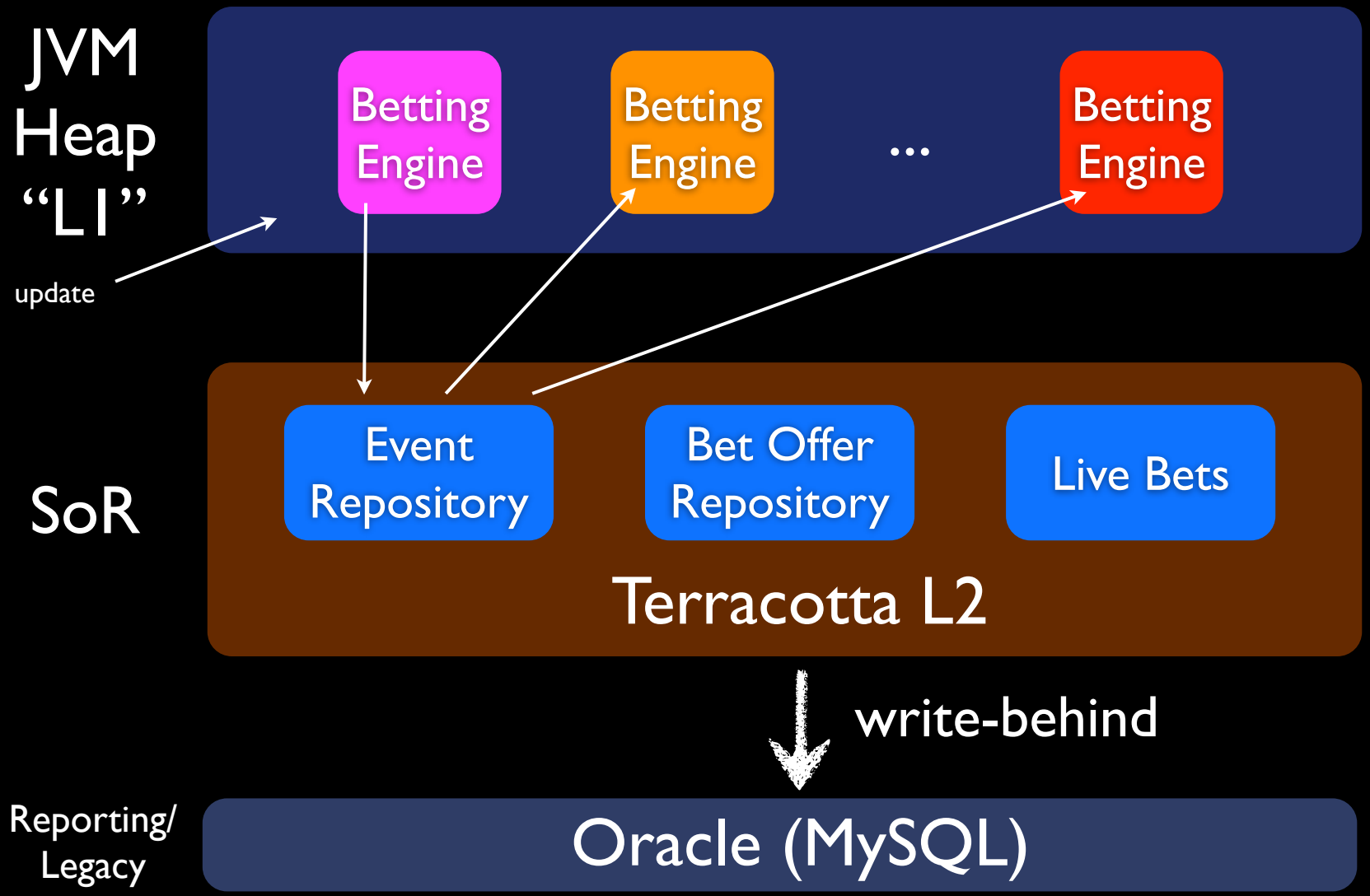
Terracotta L2

write-behind

Eventually consistent Reporting/ Legacy

Oracle (MySQL)

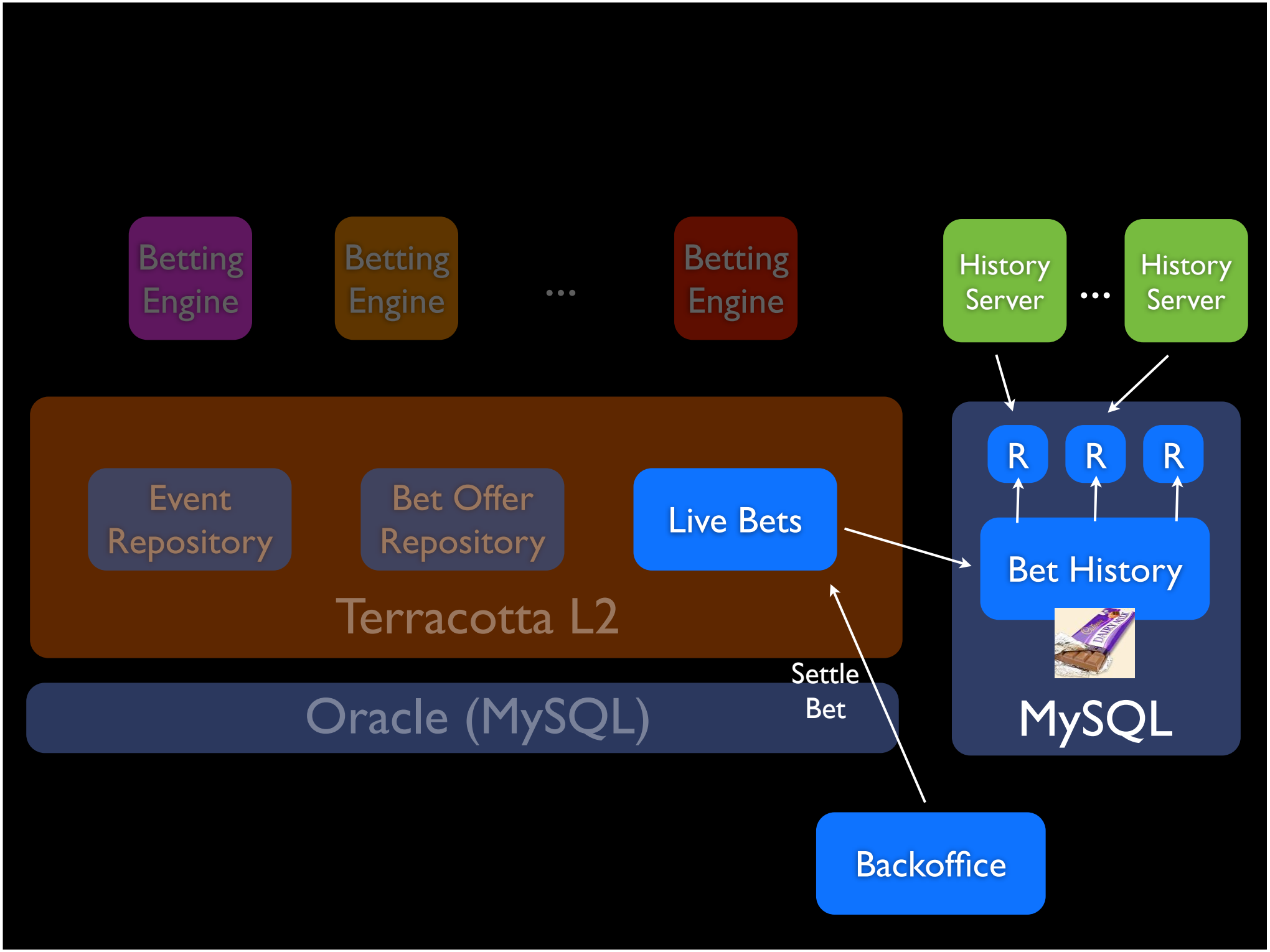
Keep data stored/cached where it's needed for processing



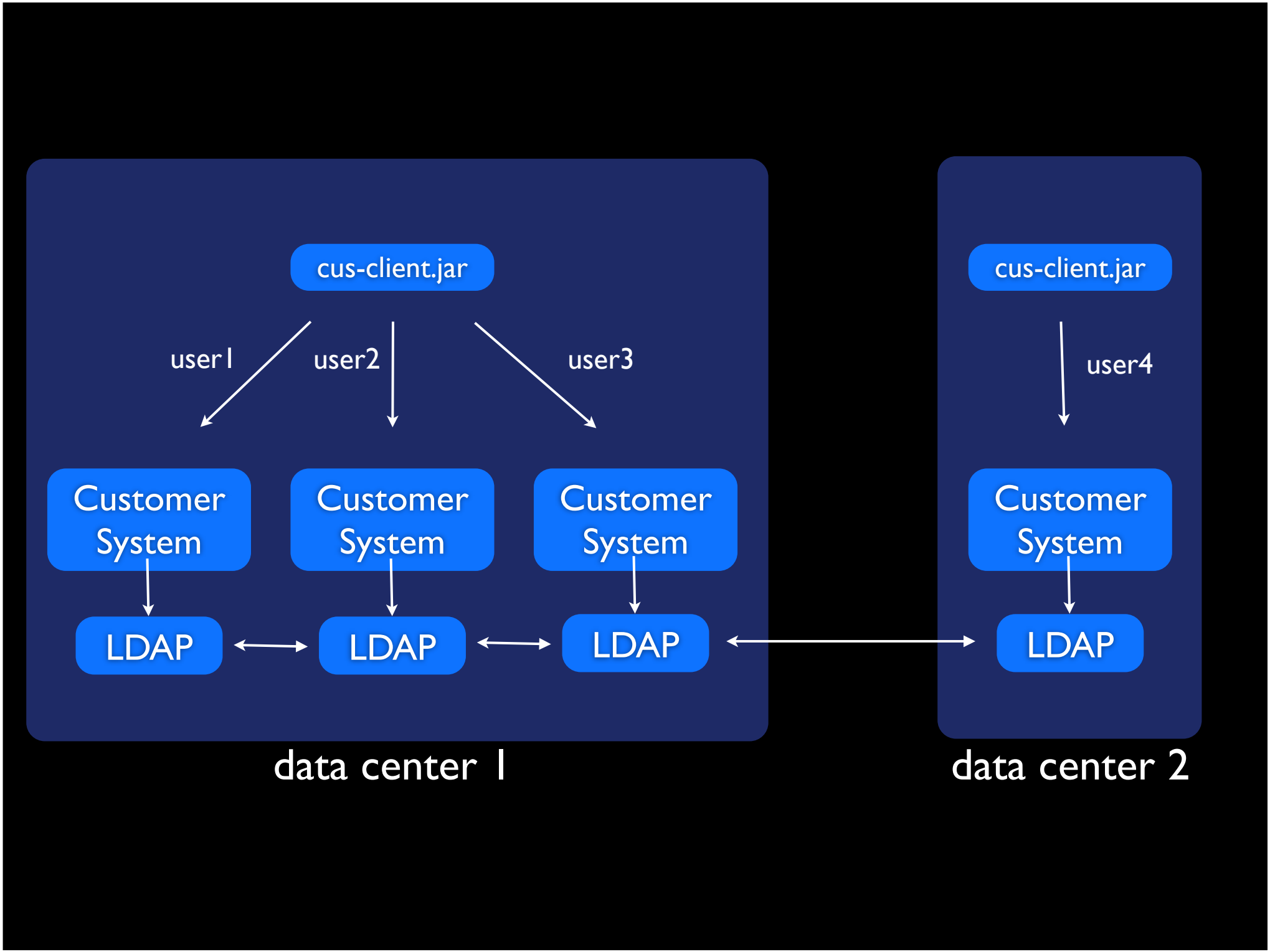
Terracotta

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

Example #3
Offload reads to separate systems

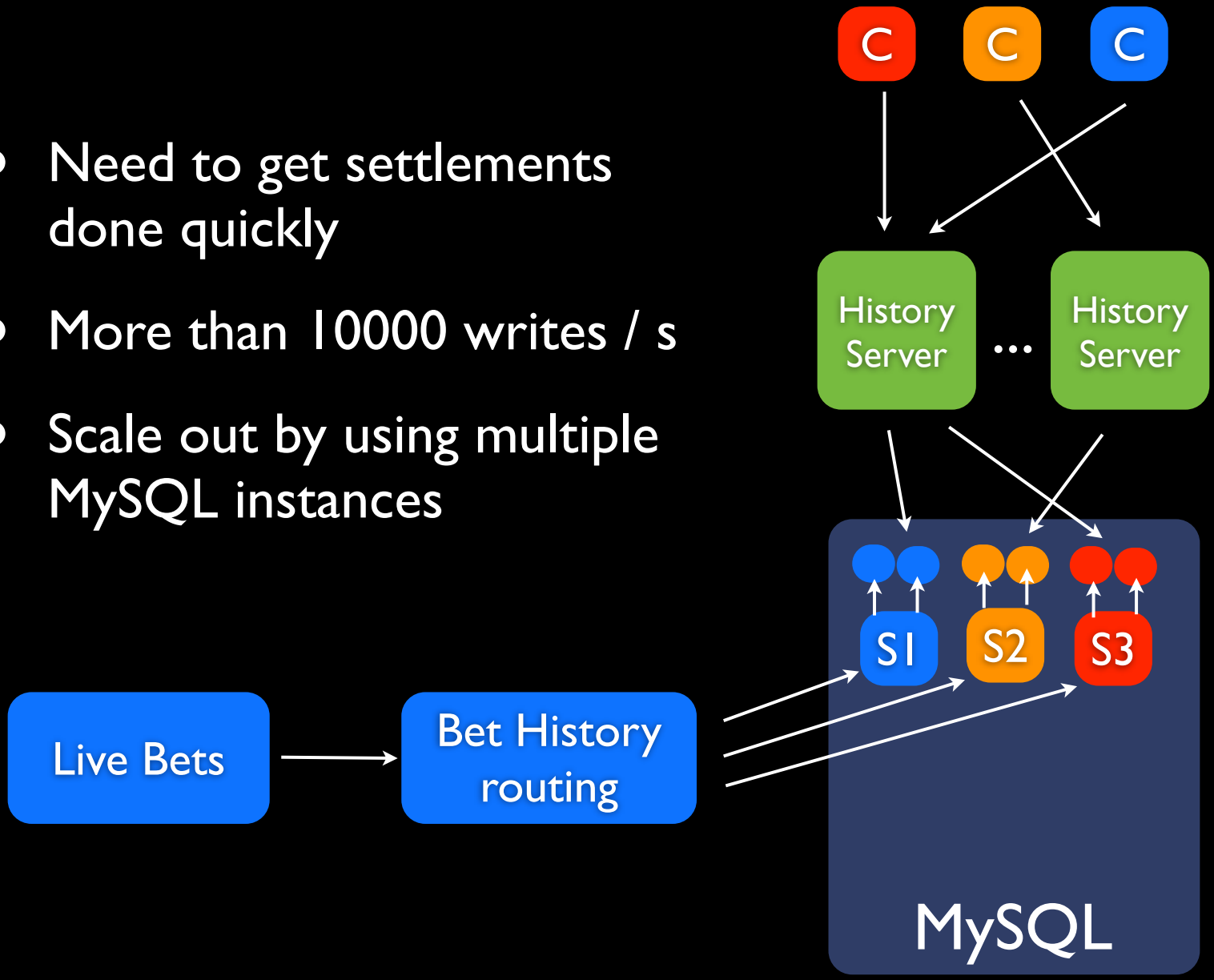

Betting Engine
Betting Engine
...
Betting Engine
History Server
...
History Server
R
R
R
Event Repository
Bet Offer Repository
Live Bets
Bet History
Terracotta L2
Settle Bet
Oracle (MySQL)
MySQL
Backoffice

Example #4
Affinity +
multi master replication


cus-client.jar
user1
user2
user3
Customer System
Customer System
Customer System
LDAP
LDAP
LDAP
data center 1
cus-client.jar
user4
Customer System
LDAP
data center 2

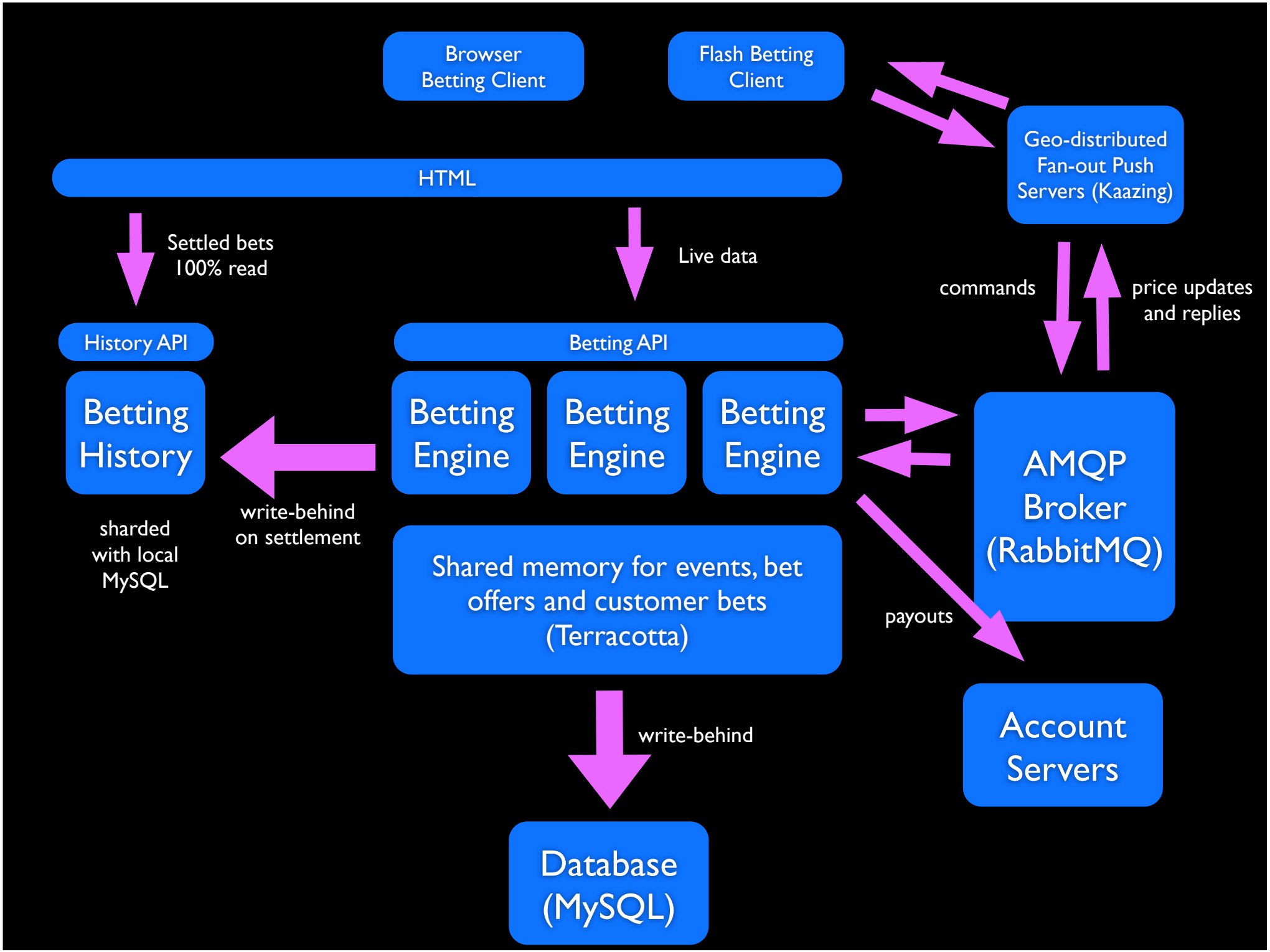
Example #5
Partition the data to scale writes

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



STRAWBERRY
DAIQUIRI JELLY
BELLY

Combining the pieces


Browser Betting Client
Flash Betting Client
Geo-distributed Fan-out Push Servers (Kaazing)
HTML
Settled bets 100% read
Live data
commands
price updates and replies
History API
Betting API
Betting History
Betting Engine
Betting Engine
Betting Engine
AMQP Broker (RabbitMQ)
write-behind on settlement
sharded with local MySQL
Shared memory for events, bet offers and customer bets (Terracotta)
payouts
Account Servers
write-behind
Database (MySQL)

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)

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stefan.norberg@unibet.com
stnor.wordpress.com
www.linkedin.com/in/stnor