
BOTTLENECK ANALYSIS

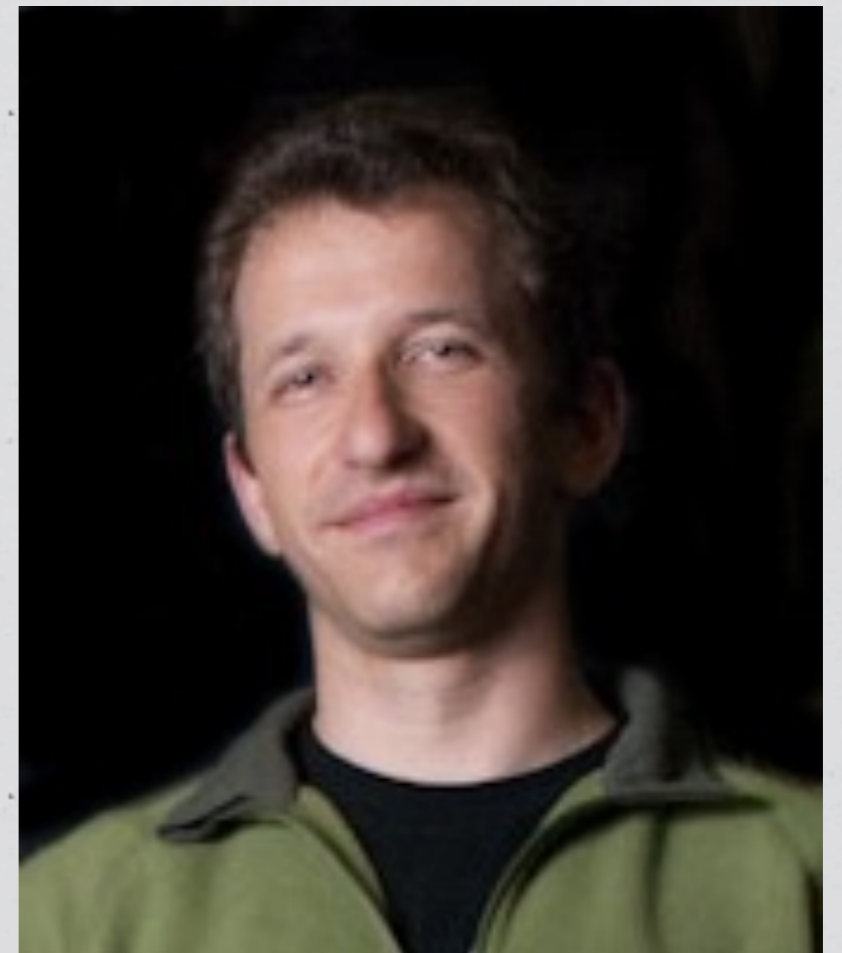
Ilia Alshanetsky - @iliaa



Me, Myself and I

PHP Core Developer

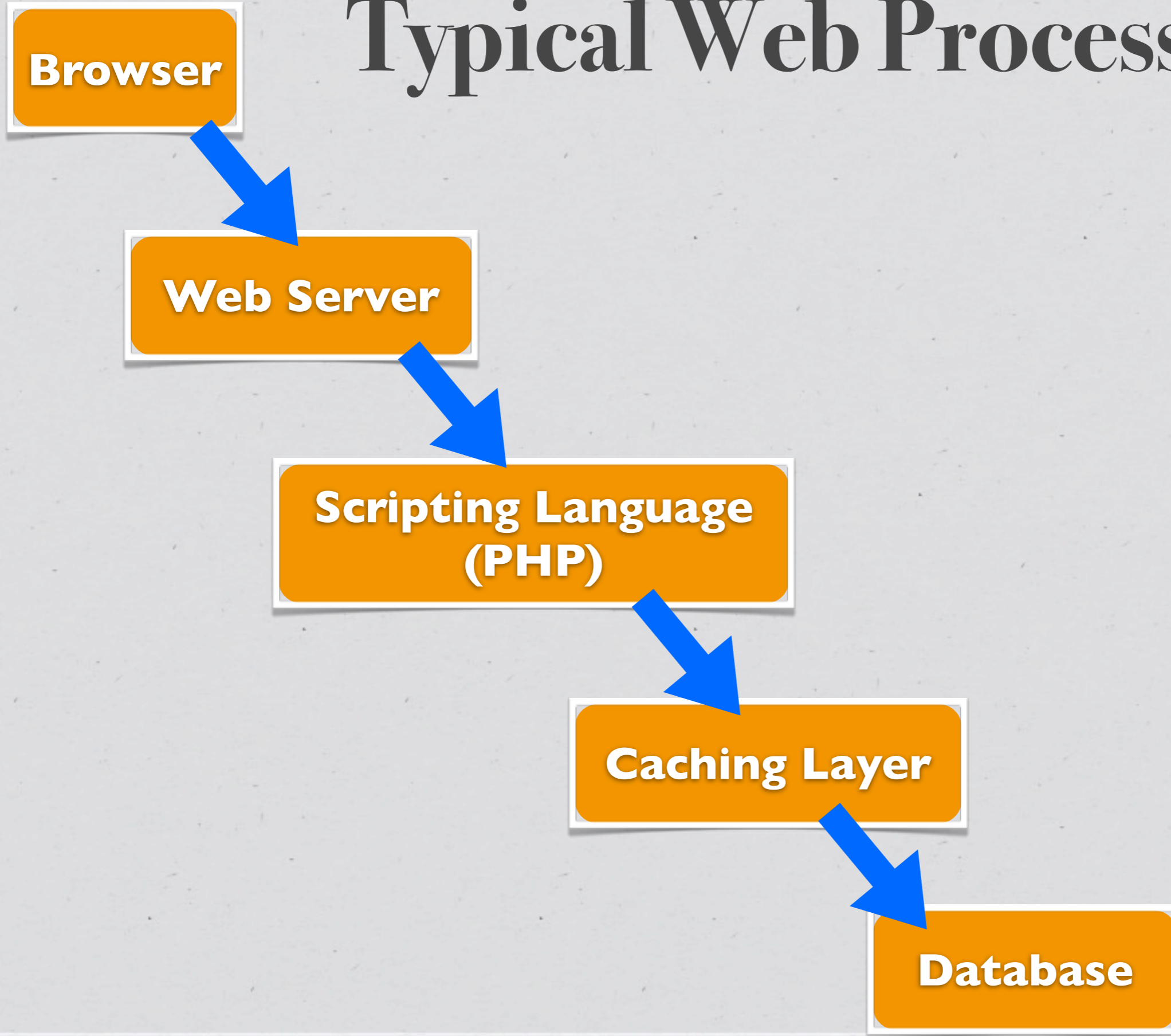
CIO at Centah Inc.



What Causes Bottlenecks?



Typical Web Process



Browser

Web Server

**Scripting Language
(PHP)**

Caching Layer

Database

DNS
Latency
Page Size
of Page Components
"JavaScript Complexity"
"CSS Complexity"



Browser

Web Server

**Scripting Language
(PHP)**

Caching Layer

Database

DNS
Latency
Page Size
of Page Components
"JavaScript Complexity"
"CSS Complexity"

SSL Negotiation
Page Cache
Compression
Overhead
Request pre-processing



Browser

Web Server

**Scripting Language
(PHP)**

Caching Layer

Database

DNS
Latency
Page Size
of Page Components
"JavaScript Complexity"
"CSS Complexity"

SSL Negotiation
Page Cache
Compression
Overhead
Request pre-processing

Slow Code
Lock Contention
Non-Critical Errors

Browser

Web Server

**Scripting Language
(PHP)**

Caching Layer

Database

DNS
Latency
Page Size
of Page Components
"JavaScript Complexity"
"CSS Complexity"

SSL Negotiation
Page Cache
Compression
Overhead
Request pre-processing

Slow Queries
Lock Contention
Frequent Cache Misses
Lack of Indexes

Slow Code
Lock Contention
Non-Critical Errors

A LOT OF POSSIBLE BOTTLENECKS

User Perception = Reality

- * If the end result “appears” slow to the user, it will be deemed *SLOW* even if dynamic page generation is super fast...

```
$ ab -vv -n1000 http://localhost/index.php
```

```
Server Software:      Apache/2.2.22
Server Hostname:     localhost
Server Port:         80

Document Length:     10259 bytes

Complete requests:   1000
Failed requests:     0
Broken pipe errors:  0
Requests per second: 2087.68 [#/sec] (mean)
Time per request:    0.48 [ms] (mean)
```

User Perception = Reality

- * If the end result “appears” slow to the user, it will be deemed *SLOW* even if dynamic page generation is super fast...

```
$ ab -vv -n1000 http://localhost/index.php
```

```
Server Software:      Apache/2.2.22
Server Hostname:     localhost
Server Port:         80

Document Length:     10259 bytes

Complete requests:   1000
Failed requests:     0
Broken pipe errors:  0
Requests per second: 2087.68 [#/sec] (mean)
Time per request:    0.48 [ms] (mean)
```



PROFILING THE USER EXPERIENCE

BROWSER TEST

Using Chrome



Name Path	Method	Type	Initiator	Size Content	Time Latency	Timeline	624ms	936ms	1.25s	1.56s	1.87s
http://php.net/	GET	text/html	Other	49.28KB 48.95KB	1.61s 406ms						
site.css static.php.net/www.php.net/st	GET	text/css	http://php.net/:1 Parser	19.85KB 19.64KB	939ms 183ms						
phpnet.css static.php.net/www.php.net/st	GET	text/css	http://php.net/:1 Parser	1.19KB 1000B	381ms 198ms						
print.css static.php.net/www.php.net/st	GET	text/css	http://php.net/:1 Parser	710B 496B	541ms 370ms						
userprefs.js static.php.net/www.php.net	GET	text/jav...	http://php.net/:2 Parser	2.76KB 2.54KB	380ms 378ms						
php.gif static.php.net/www.php.net/irr	GET	image/gif	http://php.net/:3 Parser	2.67KB 2.46KB	184ms 170ms						
small_submit_white.gif static.php.net/www.php.net/irr	GET	image/gif	http://php.net/:7 Parser	280B 67B	401ms 203ms						
leftbar.png static.php.net/www.php.net/irr	GET	image/...	http://php.net/:7 Parser	422B 207B	412ms 203ms						
rightbar.png static.php.net/www.php.net/irr	GET	image/...	http://php.net/:7 Parser	392B 178B	362ms 184ms						

BROWSER TEST

Using Chrome



Name Path	Method	Type	Initiator	Size Content	Time Latency	Timeline	624ms	936ms	1.25s	1.56s	1.87s
http://php.net/	GET	text/html	Other	49.28KB 48.95KB	1.61s 406ms	406ms					1.20s
site.css static.php.net/www.php.net/st	GET	text/css	http://php.net/:1 Parser	19.85KB 19.64KB	939 183	DNS Lookup 0					
phpnet.css static.php.net/www.php.net/st	GET	text/css	http://php.net/:1 Parser	1.19KB 1000B	381 198	Connecting 206ms					
print.css static.php.net/www.php.net/st	GET	text/css	http://php.net/:1 Parser	710B 496B	541 370	Sending 0 Waiting 199ms Receiving 1.20s					
userprefs.js static.php.net/www.php.net	GET	text/jav...	http://php.net/:2 Parser	2.76KB 2.54KB	380ms 378ms						
php.gif static.php.net/www.php.net/irr	GET	image/gif	http://php.net/:3 Parser	2.67KB 2.46KB	184ms 170ms						
small_submit_white.gif static.php.net/www.php.net/irr	GET	image/gif	http://php.net/:7 Parser	280B 67B	401ms 203ms						
leftbar.png static.php.net/www.php.net/irr	GET	image/...	http://php.net/:7 Parser	422B 207B	412ms 203ms						
rightbar.png static.php.net/www.php.net/irr	GET	image/...	http://php.net/:7 Parser	392B 178B	362ms 184ms						184ms

BROWSER TEST

Using Chrome



Eeek! 1/5 of a second just to connect!

Name Path	Method	Content Type	Size	Time Latency	Timeline	624ms	936ms	1.25s	1.56s	1.87s
http://php.net/			49.28KB	1.61s	406ms					
site.css	GET	text/css	19.85KB	939ms	DNS Lookup 0					
static.php.net/www.php.net/st			19.64KB	184ms	Connecting 206ms					
phpnet.css	GET	text/css	1.19KB	381ms	Sending 0					
static.php.net/www.php.net/st			1000B	198ms	Waiting 199ms					
print.css	GET	text/css	710B	541ms	Receiving 1.20s					
static.php.net/www.php.net/st			496B	370ms						
userprefs.js	GET	text/jav...	2.76KB	380ms						
static.php.net/www.php.net			2.54KB	378ms						
php.gif	GET	image/gif	2.67KB	184ms						
static.php.net/www.php.net/irr			2.46KB	170ms						
small_submit_white.gif	GET	image/gif	280B	401ms						
static.php.net/www.php.net/irr			67B	203ms						
leftbar.png	GET	image/...	422B	412ms						
static.php.net/www.php.net/irr			207B	203ms						
rightbar.png	GET	image/...	392B	362ms						
static.php.net/www.php.net/irr			178B	184ms						

BROWSER TEST

Using Chrome



Eeek! 1/5 of a second just to connect!

Page speed is more or less ok

Name Path	Method	Content Type	Size	Time Latency	Timeline	624ms	936ms	1.25s	1.56s	1.87s
http://php.net/			49.28KB	1.61s	406ms					
site.css	GET	text/css	19.85KB	939ms	DNS Lookup 0					
static.php.net/www.php.net/...			19.64KB	184ms	Connecting 206ms					
phpnet.css			1.19KB	381ms	Sending 0					
static.php.net/www.php.net/...			1000B	198ms	Waiting 199ms					
print.css			710B	511ms	Receiving 1.20s					
static.php.net/www.php.net/...			496B	370ms						
userprefs.js			2.76KB	380ms						
static.php.net/www.php.net/...			2.54KB	378ms						
php.gif	GET	image/gif	2.67KB	184ms						
static.php.net/www.php.net/irr			2.46KB	170ms						
small_submit_white.gif	GET	image/gif	280B	401ms						
static.php.net/www.php.net/irr			67B	203ms						
leftbar.png	GET	image/...	422B	412ms						
static.php.net/www.php.net/irr			207B	203ms						
rightbar.png	GET	image/...	392B	362ms						
static.php.net/www.php.net/irr			178B	184ms						

BROWSER TEST

Using Chrome



Eeek! 1/5 of a second just to connect!

Page speed is more or less ok

Yikes!, over one second to receive the page

Name Path	Method	Content Type	Size	Time Latency	Timeline	624ms	936ms	1.25s	1.56s	1.87s
http://php.net/			49.28KB	1.61s	406ms					
site.css	GET	text/css	19.85KB	939ms	DNS Lookup 0					
static.php.net/www.php.net/...			19.64KB	184ms	Connecting 206ms					
phpnet.css			1.19KB	381ms	Sending 0					
static.php.net/www.php.net/...			1000B	198ms	Waiting 199ms					
print.css			710B	511ms	Receiving 1.20s					
static.php.net/www.php.net/...			496B	370ms						
userprefs.js			2.76KB	380ms						
static.php.net/www.php.net/...			2.54KB	378ms						
php.gif	GET	image/gif	2.67KB	184ms						
static.php.net/www.php.net/ir...			2.46KB	170ms						
small_submit_white.gif			280B	401ms						
static.php.net/www.php.net/...			67B	203ms						
leftbar.png			422B	412ms						
static.php.net/www.php.net/...			207B	203ms						
rightbar.png			392B	362ms						
static.php.net/www.php.net/ir...			178B	184ms						

BROWSER TEST

Using Chrome



Name Path	Method	Type	Initiator	Size Content	Time Latency	Timeline	624ms	936ms	1.25s	1.56s	1.87s
http://php.net/	GET	text/html	Other	49.28KB 48.95KB	1.61s 406ms						
site.css static.php.net/www.php.net/st	GET	text/css	http://php.net/:1 Parser	19.85KB 19.64KB	939ms 183ms						
phpnet.css static.php.net/www.php.net/st	GET	text/css	http://php.net/:1 Parser	1.19KB 1000B	381ms 198ms						
print.css static.php.net/www.php.net/st	GET	text/css	http://php.net/:1 Parser	710B 496B	541ms 370ms						
userprefs.js static.php.net/www.php.net	GET	text/jav...	http://php.net/:2 Parser	2.76KB 2.54KB	380ms 378ms						
php.gif static.php.net/www.php.net/irr	GET	image/gif	http://php.net/:3 Parser	2.67KB 2.46KB	184ms 170ms						
small_submit_white.gif static.php.net/www.php.net/irr	GET	image/gif	http://php.net/:7 Parser	280B 67B	401ms 203ms						
leftbar.png static.php.net/www.php.net/irr	GET	image/...	http://php.net/:7 Parser	422B 207B	412ms 203ms						
rightbar.png static.php.net/www.php.net/irr	GET	image/...	http://php.net/:7 Parser	392B 178B	362ms 184ms						

170ms → 14ms

Blocking	0
Sending	1ms
Waiting	167ms
Receiving	14ms

184ms

BROWSER TEST

Using Chrome



Name Path	Method	Type	Initiator	Size Content	Time Latency	Timeline	624ms	936ms	1.25s	1.56s	1.87s
http://php.net/	GET	text/html	Other	49.28KB 48.95KB	1.61s 406ms						
site.css static.php.net/www.php.net/s				19.85KB 1.64KB	939ms 183ms						
phpnet.css static.php.net/www.php.net/s				1.19KB 1.000B	381ms 198ms						
print.css static.php.net/www.php.net/s				710B 1.96B	541ms 370ms						
userprefs.js static.php.net/www.php.net	GET	text/jav...	http://php.net/:2 Parser	2.76KB 2.54KB	380ms 378ms						
php.gif static.php.net/www.php.net/irr	GET	image/gif	http://php.net/:3: Parser	2.67KB 2.46KB	184ms 170ms					170ms	14ms
small_submit_white.gif static.php.net/www.php.net/irr	GET	image/gif	http://php.net/:7: Parser	280B 67B	401ms 203ms						
leftbar.png static.php.net/www.php.net/irr	GET	image/...	http://php.net/:7: Parser	422B 207B	412ms 203ms						
rightbar.png static.php.net/www.php.net/irr	GET	image/...	http://php.net/:7: Parser	392B 178B	362ms 184ms					184ms	

**162ms to send
process static
request!**

Blocking	0
Sending	1ms
Waiting	167ms
Receiving	14ms

BROWSER TEST


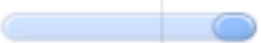























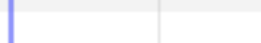

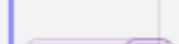

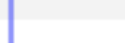
Using Chrome



Name Path	Method	Type	Initiator	Size Content	Time Latency	Timeline	624ms	936ms	1.25s	1.56s	1.87s
http://php.net/	GET	text/html	Other	49.28KB 48.95KB	1.61s 406ms	406ms					1.20s
site.css static.php.net/www.php.net/s				19.85KB 1.64KB	939ms 183ms	DNS Lookup 0					
phpnet.css static.php.net/www.php.net/s				1.19KB 1.000B	381ms 198ms	Connecting 206ms					
print.css static.php.net/www.php.net/s				710B 1.96B	541ms 370ms	Sending 0					
userprefs.js static.php.net/www.php.net	GET	text/jav...	http://php.net/:2 Parser	2.76KB 2.54KB	380ms 378ms	Waiting 199ms					
php.gif static.php.net/www.php.net/irr	GET	image/gif	http://php.net/:3: Parser	2.67KB 2.46KB	184ms 170ms	Receiving 1.20s					
small_submit_white.gif static.php.net/www.php.net/irr	GET	image/gif	http://php.net/:7: Parser	280B 67B	401ms 203ms						170ms 14ms
leftbar.png static.php.net/www.php.net/irr	GET	image/...	http://php.net/:7: Parser	422B 207B	412ms 203ms						
rightbar.png static.php.net/www.php.net/irr	GET	image/...	http://php.net/:7: Parser	392B 178B	362ms 184ms						184ms

**162ms to send
process static
request!**

Blocking 0
Sending 1ms
Waiting 167ms
Receiving 14ms

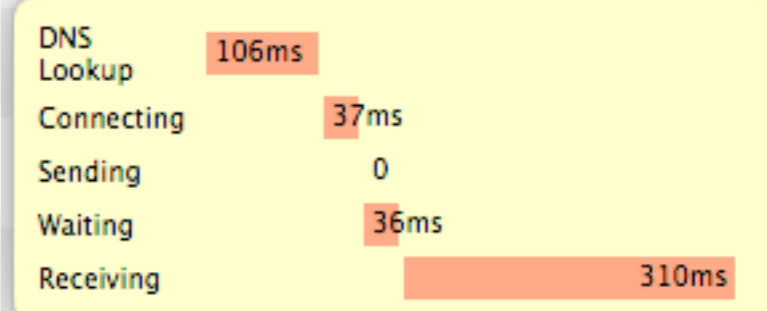
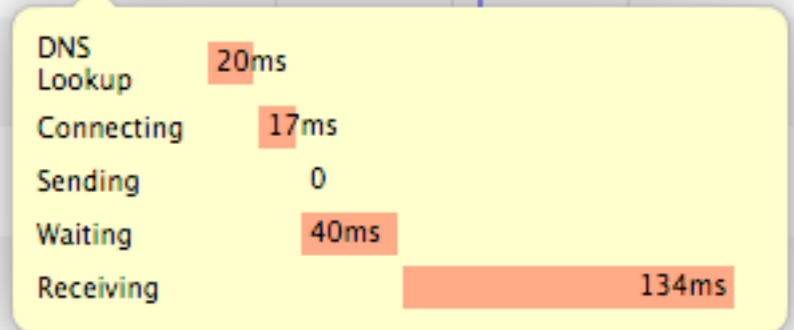
Name Path	Method	Status Text	Type	Initiator	Size Content	Time Latency	Start Time	413ms	619ms	825ms	1.03s	1.24s
 http://www.facebook.com/	GET	200 OK	text/html	Other	12.40KB 37.19KB	275ms 261ms						
 7MO6Ggjtntfq.css static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	text/css	http://www.faceb Parser	8.01KB 32.38KB	109ms 75ms						
 4sv5xh30U-4.css static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	text/css	http://www.faceb Parser	43.44KB 267.40KB	212ms 78ms						
 yOXsARv5tTT.css static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	text/css	http://www.faceb Parser	37.09KB 93.44KB	198ms 79ms						
 u8iA3kXb8Y1.css static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	text/css	http://www.faceb Parser	579B 103B	80ms 80ms						
 HxfnMiPVR11.js static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	applica...	http://www.faceb Parser	17.49KB 50.88KB	161ms 78ms						
 427933800596648_142098 dragon.ak.fbcdn.net/cfs-ak-a	GET	200 OK	image/...	http://www.faceb Parser	98.73KB 98.40KB	490ms 180ms						
 LrYC68IJN6a.js static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	48.77KB 188.33KB	354ms 57ms						
 PO4Yiug--P3.js static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	10.34KB 30.11KB	123ms 62ms						
 -eoXHEHd51l.js static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	5.21KB 13.10KB	118ms 46ms						
 zrd-GRF4xel.js static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	34.95KB 106.94KB	120ms 49ms						
 NgnOOGez7u1.js static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	35.70KB 114.09KB	108ms 21ms						
 GsNjNwul-UM.gif static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	image/...	http://www.faceb Parser	917B 522B	248ms 230ms						
 427933800596648_194983 dragon.ak.fbcdn.net/cfs-ak-s	GET	200 OK	image/...	http://www.faceb Parser	6.25KB 5.92KB	151ms 123ms						
 2-E5vtt9MKh.png static.ak.fbcdn.net/rsrc.php/v	GET	200 OK	image/...	http://www.faceb Parser	19.71KB 19.33KB	78ms 38ms						

**Backend is done in < 400ms,
but loads only after 800ms
and takes 1.2 seconds to
fully appear for the user**

Name Path	Method	Status Text	Type	Initiator	Size Content	Time Latency	Start Time
					12.40KB	275ms	413ms
					37.19KB	261ms	619ms
					8.01KB	109ms	825ms
					32.38KB	75ms	1.03s
					43.44KB	212ms	1.24s
					267.40KB	78ms	
					37.09KB	198ms	
					93.44KB	79ms	
					579B	80ms	
					103B	80ms	
					17.49KB	161ms	
static.ak.fbcdn.net/rsrc.php/v	GET	OK	applica...	Parser	50.88KB	78ms	
427933800596648_142098dragon.ak.fbcdn.net/cfs-ak-a	GET	200 OK	image/...	http://www.faceb Parser	98.73KB 98.40KB	490ms 180ms	
LrYC68IJN6a.js	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	48.77KB 188.33KB	354ms 57ms	
PO4Yiug--P3.js	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	10.34KB 30.11KB	123ms 62ms	
-eoXHEHd51l.js	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	5.21KB 13.10KB	118ms 46ms	
zrd-GRF4xel.js	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	34.95KB 106.94KB	120ms 49ms	
NgnOOGEz7u1.js	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	35.70KB 114.09KB	108ms 21ms	
GsNjNwul-UM.gif	GET	200 OK	image/...	http://www.faceb Parser	917B 522B	248ms 230ms	
427933800596648_194983dragon.ak.fbcdn.net/cfs-ak-s	GET	200 OK	image/...	http://www.faceb Parser	6.25KB 5.92KB	151ms 123ms	
2-E5vtt9MKh.png	GET	200 OK	image/...	http://www.faceb Parser	19.71KB 19.33KB	78ms 38ms	

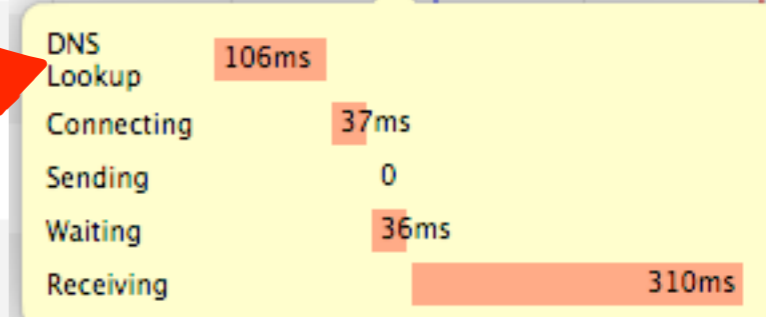
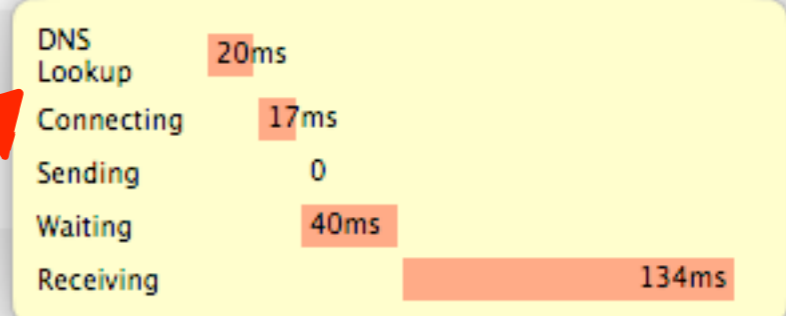
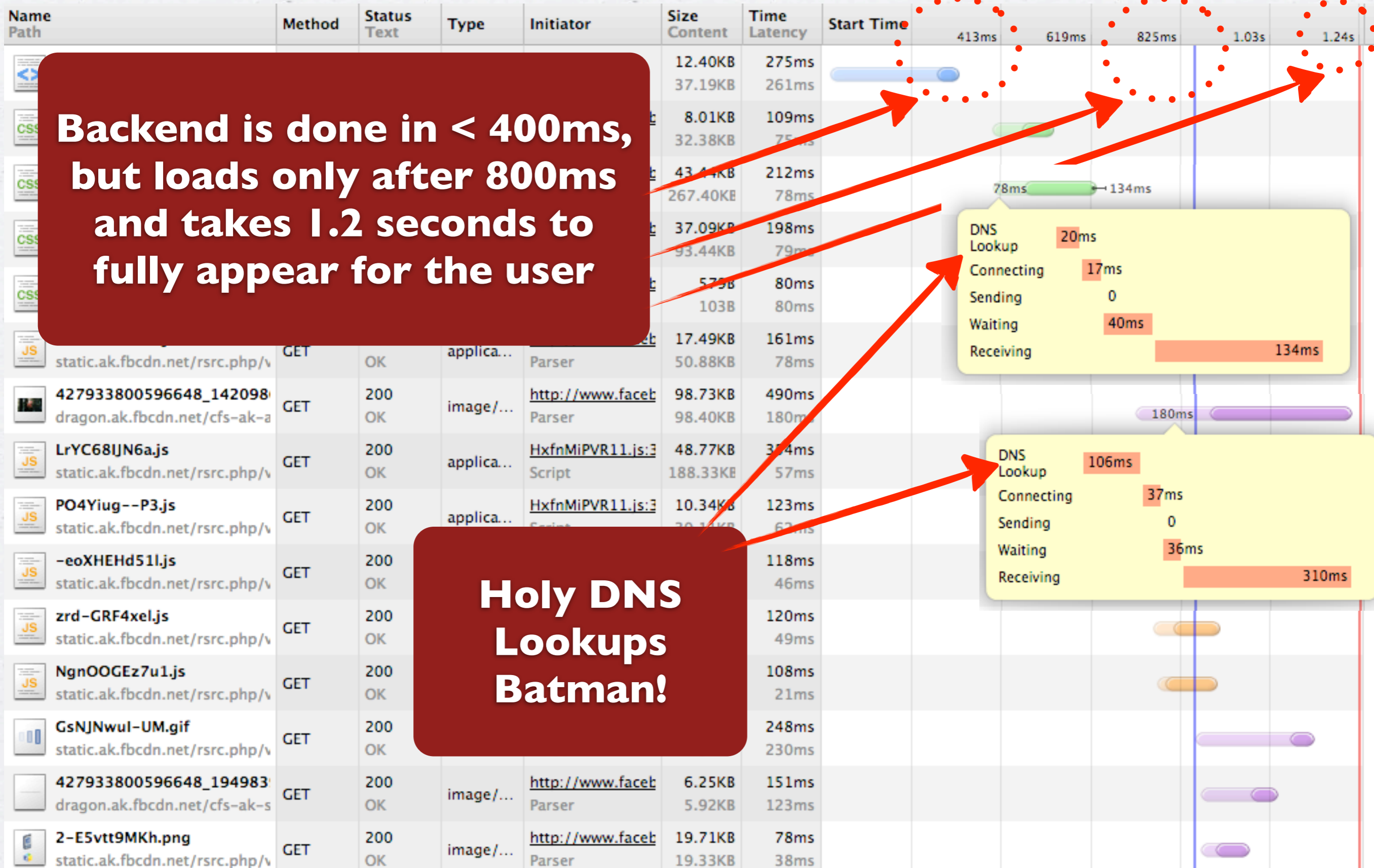
**Backend is done in < 400ms,
but loads only after 800ms
and takes 1.2 seconds to
fully appear for the user**

Name Path	Method	Status Text	Type	Initiator	Size Content	Time Latency	Start Time
					12.40KB	275ms	413ms
					37.19KB	261ms	619ms
					8.01KB	109ms	825ms
					32.38KB	75ms	1.03s
					43.44KB	212ms	1.24s
					267.40KB	78ms	
					37.09KB	198ms	
					93.44KB	79ms	
					579B	80ms	
					103B	80ms	
					17.49KB	161ms	
static.ak.fbcdn.net/rsrc.php/v	GET	OK	applica...	Parser	50.88KB	78ms	
427933800596648_142098dragon.ak.fbcdn.net/cfs-ak-a	GET	200 OK	image/...	http://www.faceb Parser	98.73KB 98.40KB	490ms 180ms	
LrYC68IJN6a.js	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	48.77KB 188.33KB	354ms 57ms	
PO4Yiug--P3.js	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	10.34KB 30.11KB	123ms 62ms	
-eoXHEHd51l.js	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	5.21KB 13.10KB	118ms 46ms	
zrd-GRF4xel.js	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	34.95KB 106.94KB	120ms 49ms	
NgnOOGEz7u1.js	GET	200 OK	applica...	HxfnMiPVR11.js:3 Script	35.70KB 114.09KB	108ms 21ms	
GsNjNwul-UM.gif	GET	200 OK	image/...	http://www.faceb Parser	917B 522B	248ms 230ms	
427933800596648_194983dragon.ak.fbcdn.net/cfs-ak-s	GET	200 OK	image/...	http://www.faceb Parser	6.25KB 5.92KB	151ms 123ms	
2-E5vtt9MKh.png	GET	200 OK	image/...	http://www.faceb Parser	19.71KB 19.33KB	78ms 38ms	



**Backend is done in < 400ms,
but loads only after 800ms
and takes 1.2 seconds to
fully appear for the user**

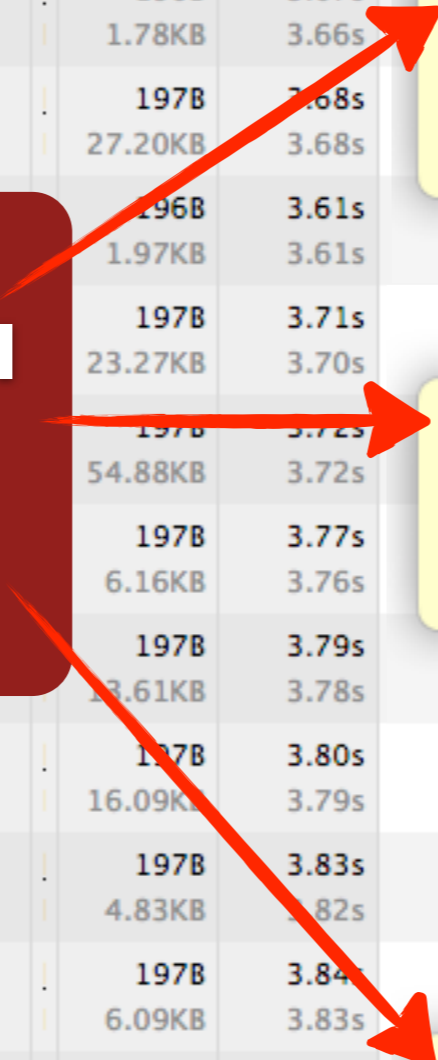
**Holy DNS
Lookups
Batman!**



Method	Type	Size Content	Time Latency	Timeline
GET	application/x-javascript	197B 4.50KB	3.65s 3.65s	3.65s → 5ms
GET	application/x-javascript	196B 1.78KB	3.67s 3.66s	Blocking 3.40s Sending 1ms Waiting 117ms Receiving 5ms
GET	application/x-javascript	197B 27.20KB	3.68s 3.68s	
GET	application/x-javascript	196B 1.97KB	3.61s 3.61s	
GET	application/x-javascript	197B 23.27KB	3.71s 3.70s	
GET	application/x-javascript	197B 54.88KB	3.72s 3.72s	Blocking 3.54s Sending 1ms Waiting 116ms Receiving 6ms
GET	application/x-javascript	197B 6.16KB	3.77s 3.76s	
GET	application/x-javascript	197B 13.61KB	3.79s 3.78s	3.78s → 6ms
GET	application/x-javascript	197B 16.09KB	3.80s 3.79s	
GET	application/x-javascript	197B 4.83KB	3.83s 3.82s	
GET	application/x-javascript	197B 6.09KB	3.84s 3.83s	
GET	application/x-javascript	197B 4.40KB	3.84s 3.84s	Blocking 3.63s Sending 0 Waiting 117ms Receiving 6ms
GET	application/x-javascript	197B 24.71KB	3.73s 3.72s	
GET	application/x-javascript	197B 7.44KB	3.88s 3.88s	3.88s → 6ms

Method	Type	Size Content	Time Latency	Timeline
GET	application/x-javascript	197B 4.50KB	3.65s 3.65s	3.65s → 5ms
GET	application/x-javascript	196B 1.78KB	3.67s 3.66s	Blocking 3.40s Sending 1ms Waiting 117ms Receiving 5ms
GET	application/x-javascript	197B 27.20KB	3.68s 3.68s	
GET	application/x-javascript	196B 1.97KB	3.61s 3.61s	
GET	application/x-javascript	197B 23.27KB	3.71s 3.70s	
GET	application/x-javascript	197B 54.88KB	3.72s 3.72s	Blocking 3.54s Sending 1ms Waiting 116ms Receiving 6ms
GET	application/x-javascript	197B 6.16KB	3.77s 3.76s	
GET	application/x-javascript	197B 13.61KB	3.79s 3.78s	3.78s → 6ms
GET	application/x-javascript	197B 16.09KB	3.80s 3.79s	
GET	application/x-javascript	197B 4.83KB	3.83s 3.82s	
GET	application/x-javascript	197B 6.09KB	3.84s 3.83s	
GET	application/x-javascript	197B 4.40KB	3.84s 3.84s	Blocking 3.63s Sending 0 Waiting 117ms Receiving 6ms
GET	application/x-javascript	197B 24.71KB	3.73s 3.72s	
GET	application/x-javascript	197B 7.44KB	3.88s 3.88s	3.88s → 6ms

**Non-parallel
JavaScript
Execution**



Blocking 3.40s
Sending 1ms
Waiting 117ms
Receiving 5ms

Blocking 3.54s
Sending 1ms
Waiting 116ms
Receiving 6ms

Blocking 3.63s
Sending 0
Waiting 117ms
Receiving 6ms

Name Path	Method	Status Text	Type	Initiator	Size Content	Time Latency	Timeline	1.56s	2.34s	3.12s	3.90s
paypal.com paypal.com	GET	301 Moved Per	Pending	Other	154B 0B	491ms 490ms					
www.paypal.com	GET	200 OK	text/h...	https://paypal.c Redirect	8.67KB 29.44KB	2.07s 1.06s					
807f2587596b01fc7fff23 www.paypalobjects.com/et	GET	200 OK	text/css	https://www.pa Parser	13.72KB 83.26KB	273ms 269ms					
40db0c074183048f12bf5 www.paypalobjects.com/et	GET	200 OK	applic...	https://www.pa Parser	6.21KB 11.61KB	216ms 215ms					
9e652a410df73ec249943 www.paypalobjects.com/et	GET	200 OK	applic...	https://www.pa Parser	12.91KB 36.35KB	231ms 230ms					
4abadeffed5ad75c4e261f www.paypalobjects.com/et	GET	200 OK	applic...	https://www.pa Parser	82.97KB 208.01KB	382ms 264ms					
pp_jscode_080706.js www.paypalobjects.com/js	GET	200 OK	applic...	https://www.pa Parser	26.49KB 56.15KB	317ms 265ms					
pa.js www.paypalobjects.com/pa	GET	200 OK	applic...	https://www.pa Parser	12.20KB 35.82KB	317ms 268ms					
adscout.php amch.questionmarket.com,	GET	(pendi...	Pending	https://www.pa Parser	13B 0B	72ms 0.0 days					
data:image/png;base64...	GET	Success	image...	http://amch.qui Redirect	0B 67B	4ms 0					
homepage-sell.png www.paypalobjects.com/w	GET	200 OK	image...	https://www.pa Parser	16.19KB 15.85KB	464ms 396ms					

Name Path	Method	Status Text	Type	Initiator	Size Content	Time Latency	Timeline	1.56s	2.34s	3.12s	3.90s
paypal.com paypal.com	GET	301 Moved	Pending	Other	154B 0B	491ms 490ms	490ms → 1ms				
www.paypal.com	GET	200 OK	text/h...	https://paypal.c Redirect	8.67KB 29.44KB	2.0 1.0	Connecting 306ms SSL 379ms				
807f2587596b01fc7fff23 www.paypalobjects.com/et	GET	200 OK	text/css	https://www.pa Parser	13.72KB 83.26KB	273 269	Sending 0 Waiting 183ms				
40db0c074183048f12bf5 www.paypalobjects.com/et	GET	200 OK	applic...	https://www.pa Parser	6.21KB 11.61KB	216 215ms	Receiving 1ms				
9e652a410df73ec249943 www.paypalobjects.com/et	GET	200 OK	applic...	https://www.pa Parser	12.91KB 36.35KB	231ms 230ms				<input checked="" type="checkbox"/>	
4abadeffed5ad75c4e261f www.paypalobjects.com/et	GET	200 OK	applic...	https://www.pa Parser	82.97KB 208.01KB	382ms 264ms				<input checked="" type="checkbox"/>	
pp_jscode_080706.js www.paypalobjects.com/js	GET	200 OK	applic...	https://www.pa Parser	26.49KB 56.15KB	317ms 265ms				<input checked="" type="checkbox"/>	
pa.js www.paypalobjects.com/pa	GET	200 OK	applic...	https://www.pa Parser	12.20KB 35.82KB	317ms 268ms				<input checked="" type="checkbox"/>	
adscout.php amch.questionmarket.com	GET	(pendi...	Pending	https://www.pa Parser	13B 0B	72ms 0.0 days				<input type="checkbox"/>	
data:image/png;base...	GET	Success	image...	http://amch.qui Redirect	0B 67B	4ms 0				<input type="checkbox"/>	
homepage-sell.png www.paypalobjects.com/w	GET	200 OK	image...	https://www.pa Parser	16.19KB 15.85KB	464ms 396ms				<input checked="" type="checkbox"/>	

Timeline details for www.paypal.com:

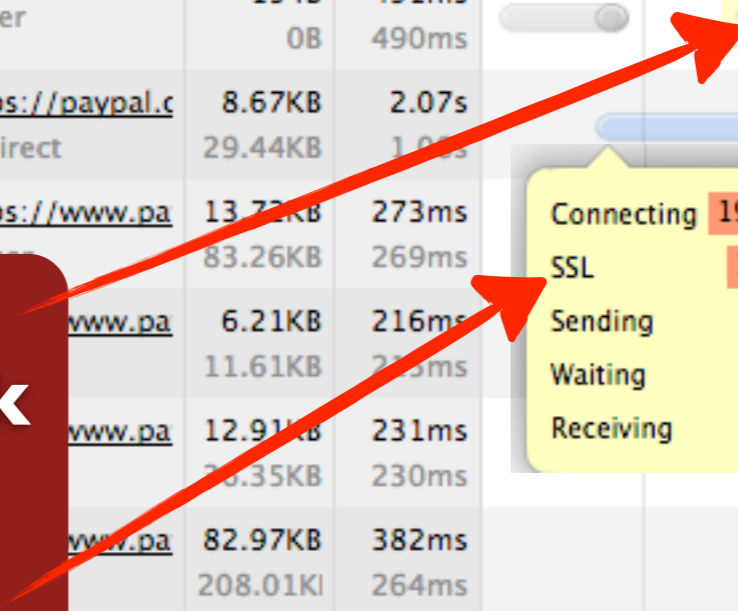
- Connecting: 306ms
- SSL: 379ms
- Sending: 0ms
- Waiting: 183ms
- Receiving: 1ms

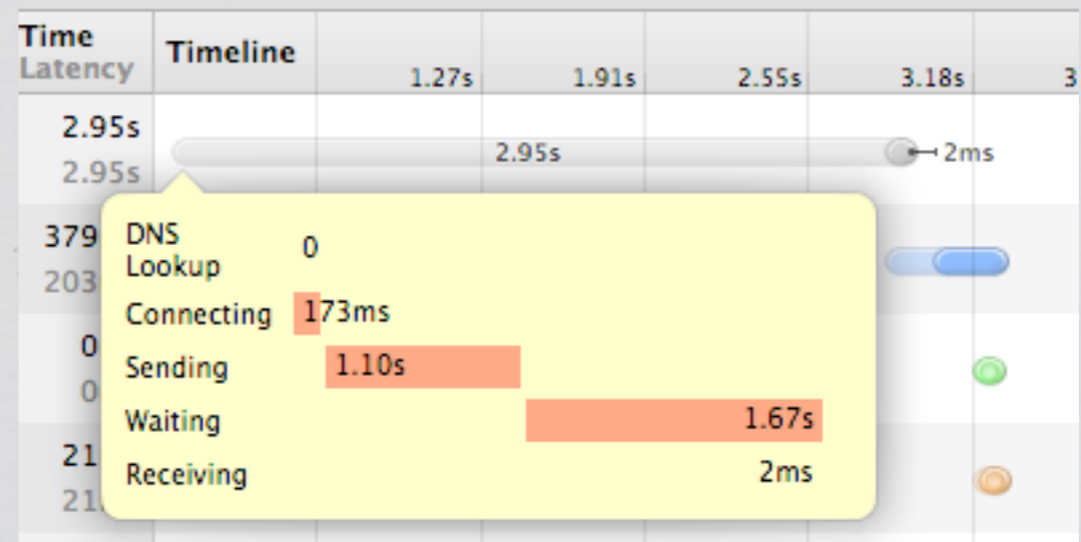
Name Path	Method	Status Text	Type	Initiator	Size Content	Time Latency	Timeline	1.56s	2.34s	3.12s	3.90s
paypal.com paypal.com	GET	301 Moved	Pending	Other	154B 0B	491ms 490ms					
www.paypal.com	GET	200 OK	text/h...	https://paypal.c Redirect	8.67KB 29.44KB	2.07s 1.07s					
807f2587596b01fc7fff23 www.paypalobjects.com/...	GET	200 OK	text/css	https://www.pa Parser	13.72KB 83.26KB	273ms 269ms					
40db0c074183048 www.paypalobjects.com/...	GET	200 OK	text/css	https://www.pa Parser	6.21KB 11.61KB	216ms 215ms					
9e652a410df73ec2 www.paypalobjects.com/...	GET	200 OK	text/css	https://www.pa Parser	12.91KB 28.35KB	231ms 230ms					
4abadeffed5ad75c www.paypalobjects.com/...	GET	200 OK	text/css	https://www.pa Parser	82.97KB 208.01KB	382ms 264ms					
pp_jscode_080706 www.paypalobjects.com/...	GET	200 OK	text/css	https://www.pa Parser	26.49KB 56.15KB	317ms 265ms					
pa.js www.paypalobjects.com/pa...	GET	200 OK	applic...	https://www.pa Parser	12.20KB 35.82KB	317ms 268ms					
adscout.php amch.questionmarket.com/...	GET	(pendi...	Pending	https://www.pa Parser	13B 0B	72ms 0.0 days					
data:image/png;base...	GET	Success	image...	http://amch.qui Redirect	0B 67B	4ms 0					
homepage-sell.png www.paypalobjects.com/w...	GET	200 OK	image...	https://www.pa Parser	16.19KB 15.85KB	464ms 396ms					

SSL Bottleneck worth 1/2 a second!

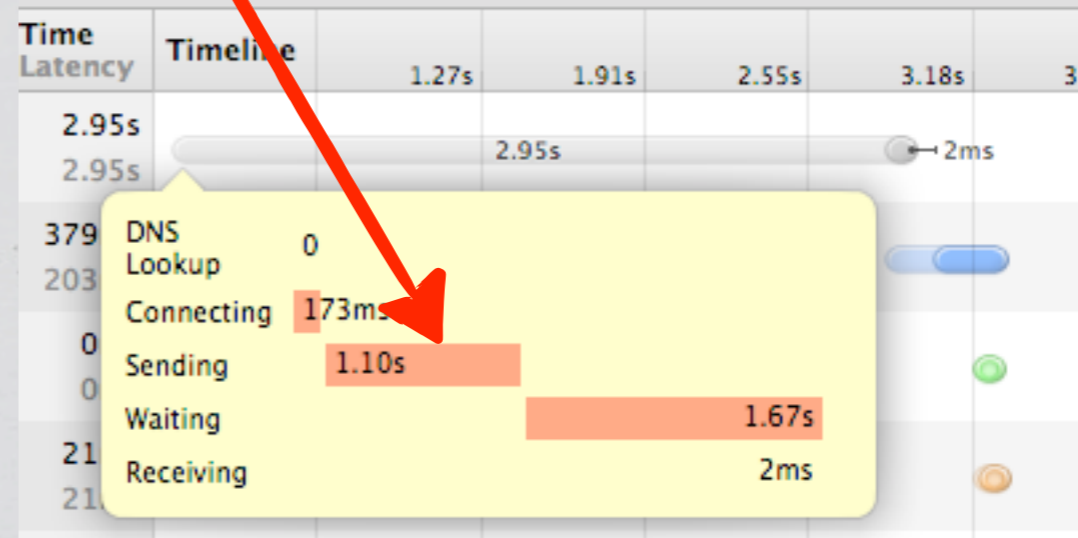
Timeline breakdown for the SSL connection:

- Connecting: 190ms
- SSL: 119ms
- Sending: 1ms
- Waiting: 870ms
- Receiving: 1.00s





**Many users
have upstream speeds
that are just a tad faster
than dial-up, watch
your cookies!**



Firebug in Firefox

The screenshot shows the Firefox Firebug interface with the Net panel active. The panel displays a list of network requests with columns for URL, Status, Domain, Size, Remote IP, and Timeline. A tooltip is overlaid on the 'GET webscr?' request, showing a detailed breakdown of the request phases and event timing.

URL	Status	Domain	Size	Remote IP	Timeline
▶ GET paypal.c	301 Moved Permanently	paypal.com	0	66.211.169.66:443	180ms
▶ GET www.pa	301 Moved Permanently	paypal.com	26 B	23.35.114.234:443	689ms
▶ GET webscr?	200 OK	paypal.com	5.9 KB	23.35.114.234:443	1.54s
▶ GET core.css	200 OK	paypalobjects.com	4.5 KB		
▶ GET marketi	200 OK	paypalobjects.com	2.5 KB		
▶ GET country.	200 OK	paypalobjects.com	294 B		
▶ GET global.js	200 OK	paypalobjects.com	23.8 KB		
▶ GET PPLite.js	200 OK	paypalobjects.com	2.4 KB		
▶ GET pmoDE_	200 OK	securepics.ebaystatic.com	48.9 KB		
▶ GET pmoDE_	200 OK	securepics.ebaystatic.com	5.6 KB		
▶ GET oo_engi	200 OK	paypalobjects.com	1.5 KB		
▶ GET widgets	200 OK	paypalobjects.com	45.4 KB		
▶ GET pp_jsco	200 OK	paypalobjects.com	26.1 KB		
▶ GET paypal_l	200 OK	paypal.com	1005 B		
▶ GET flag_DE_	200 OK	paypalobjects.com	377 B		
▶ GET icon_drc	200 OK	paypalobjects.com	46 B		
▶ GET btn_priv	200 OK	paypalobjects.com	3.9 KB	23.38.98.85:443	25ms
▶ GET btn_ges	200 OK	paypalobjects.com	2.1 KB	23.38.98.85:443	28ms

Request Phases:

- +890ms Request start time since the beginning
- 0 DNS Lookup
- 42ms Connecting
- +42ms Sending
- +42ms 1.49s Waiting
- +1.54s Receiving

Event timing relative to the request start:

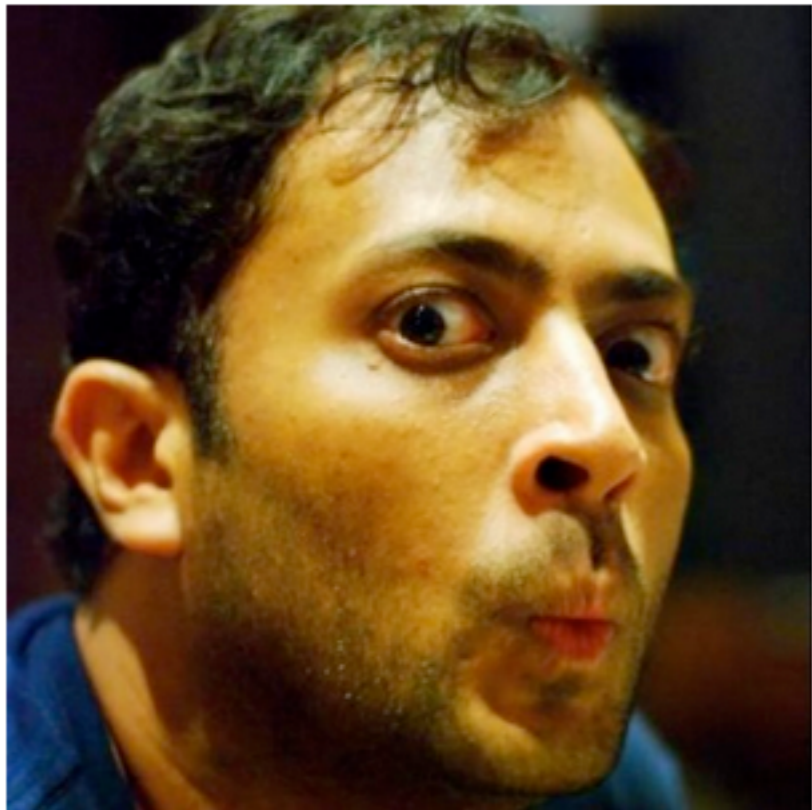
- +2.23s DOMContentLoaded
- +2.27s load

**LOCAL TESTS ARE OFTEN
NOT ENOUGH**

Boomerang

- * Strangely enough, not designed by an Australian
- * A JavaScript library designed to measure speed of a website as experienced by the user
- * Gives you back **data** to **analyze!**
- * Yeah, you can **use** it **in production!**

Boomerang



Philip Tellis

- * Strangely enough, not designed by an Australian
- * A JavaScript library designed to measure speed of a website as experienced by the user
- * Gives you back **data** to **analyze**!
- * Yeah, you can **use** it **in production**!

<https://github.com/lognormal/boomerang>

Initializing Boomerang

```
<script src="/boomerang.js" type="text/javascript">
</script>
<script type="text/javascript">
BOOMR.init({
    beacon_url: "http://yoursite.com/pixel.gif"
});
</script>
```

Initializing Boomerang

```
<script src="/boomerang.js" type="text/javascript">
</script>
<script type="text/javascript">
BOOMR.init({
    beacon_url: "http://yoursite.com/pixel.gif"
});
</script>
```

**Tiny gif file, which will be requested along with
logged data, passed via GET**

Output *(from Apache access log)*

Boomerang Version

pixel.gif?v=0.9

&t_done=316

&u=http://test.com/sample.php

**User Perceived Page
load time in
Milliseconds
(1/1000 of a second)**

**Requested URL
(in url-encoded form)**

W3C Navigation Timing API

Access to web browsers' internal timing data,
available for:

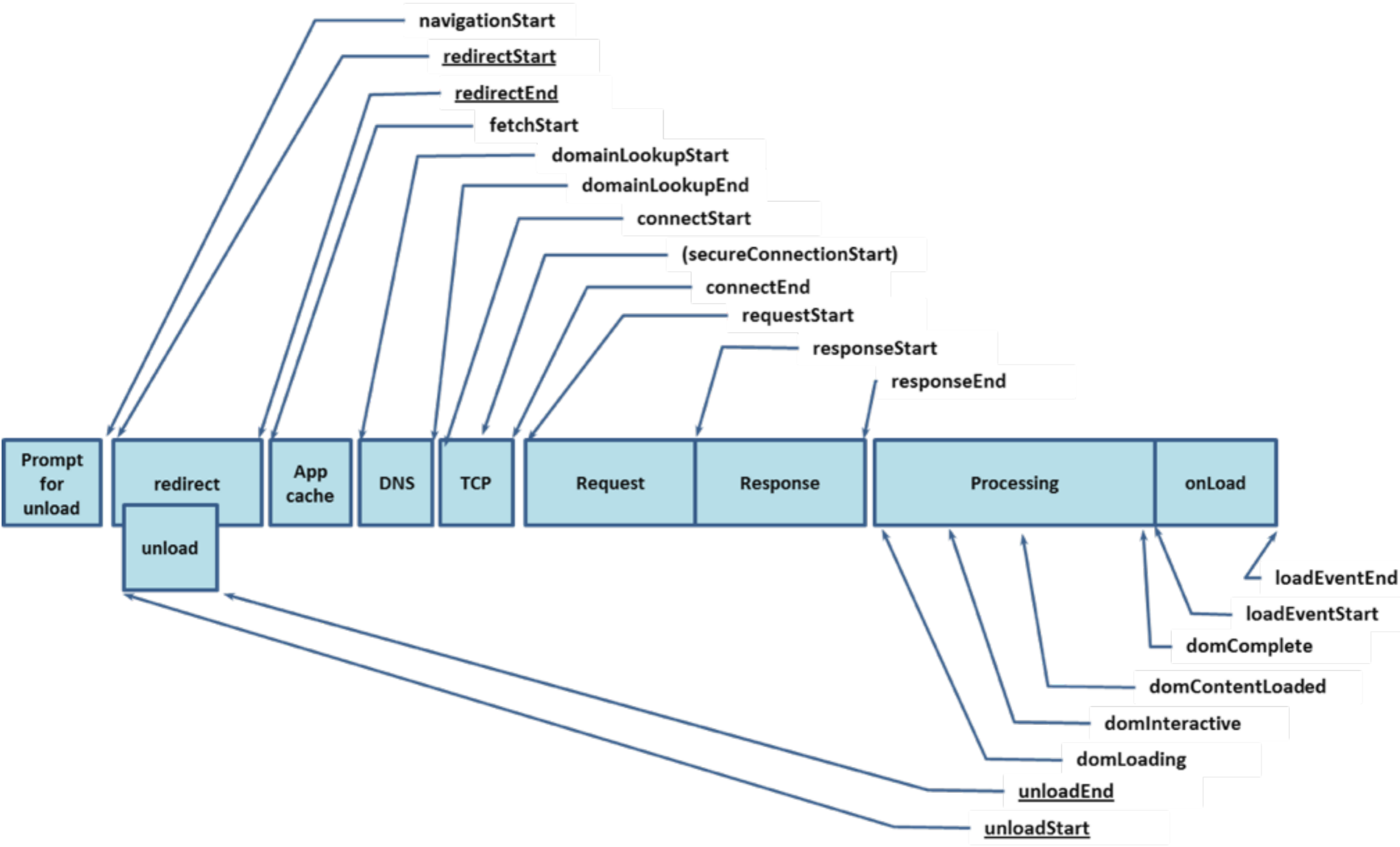
Chrome 6.0+ , IE 9.0+ , Firefox 7+ **

```
$ git clone https://github.com/lognormal/boomerang.git
```

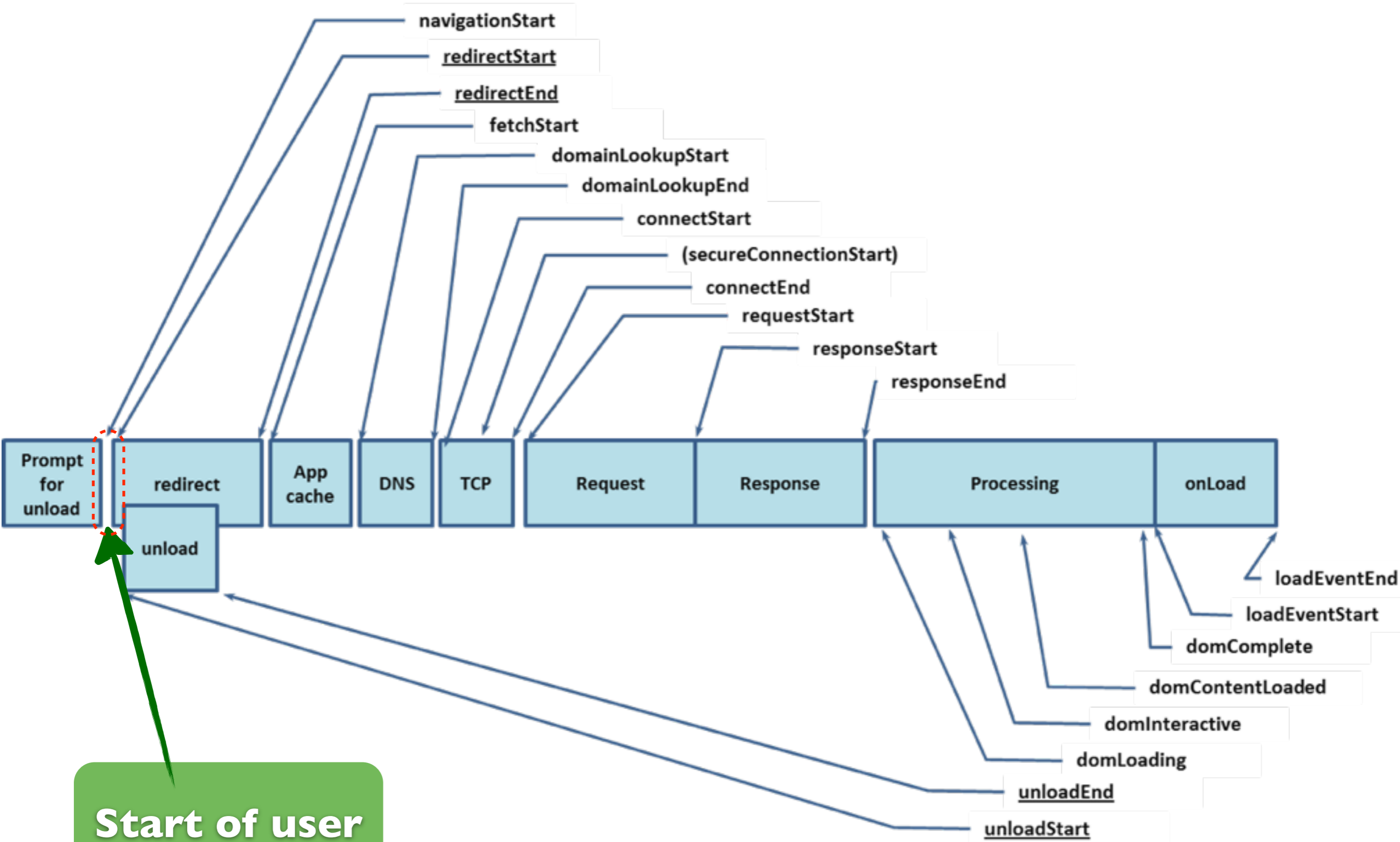
```
$ cd boomerang
```

```
$ make PLUGINS=navtiming.js
```

```
$ scp boomerang.js you@server:webdir/
```

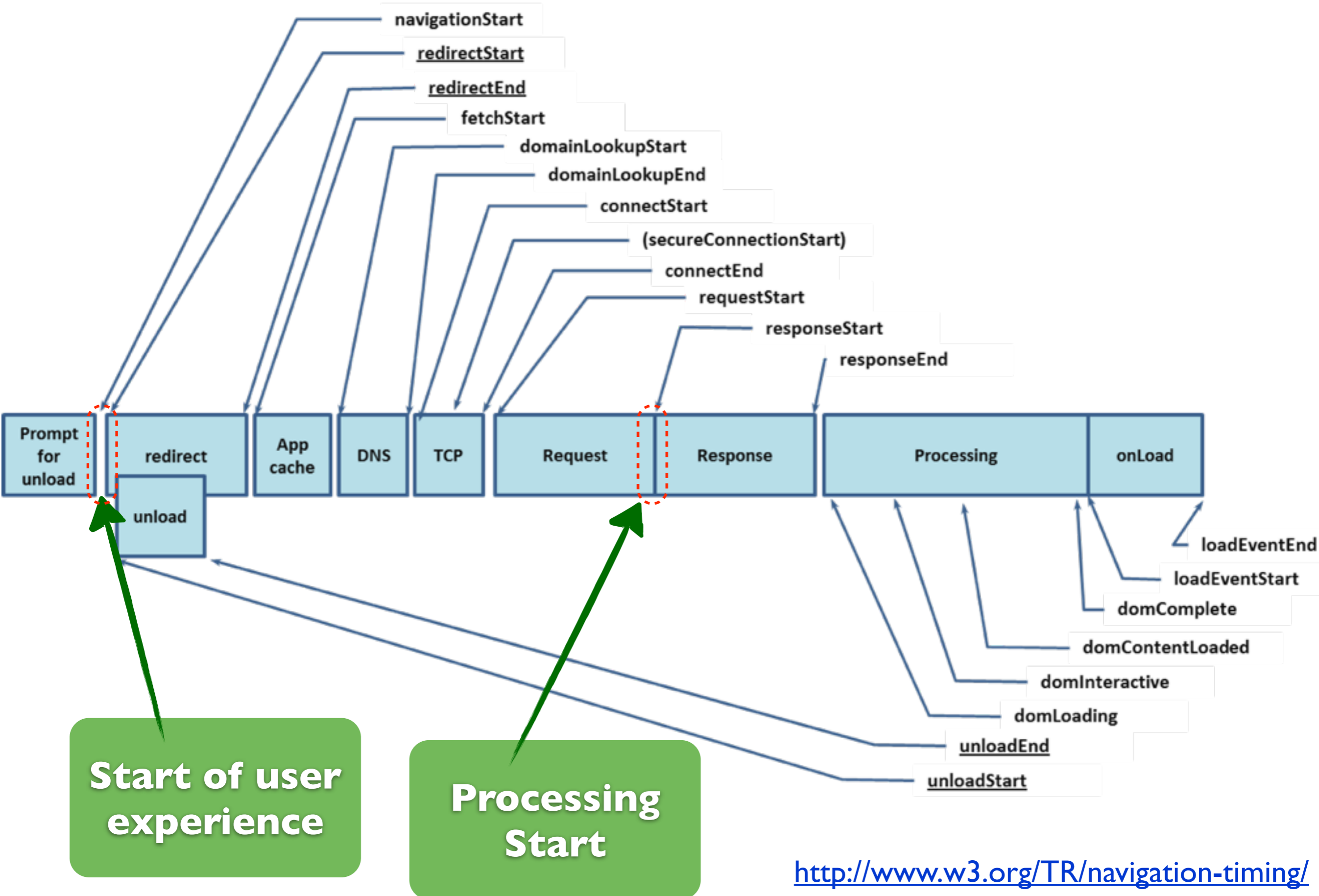


<http://www.w3.org/TR/navigation-timing/>



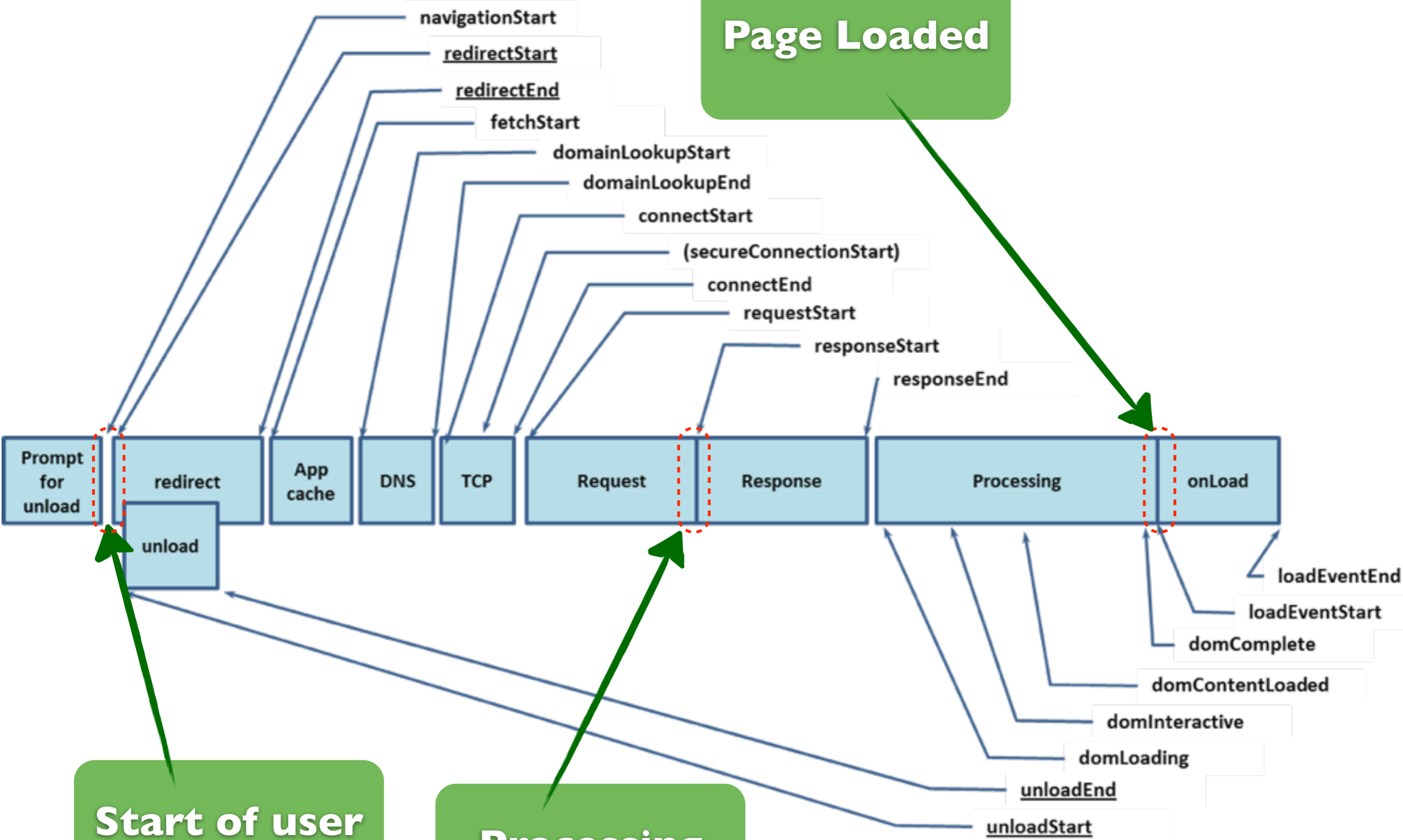
Start of user experience

<http://www.w3.org/TR/navigation-timing/>



<http://www.w3.org/TR/navigation-timing/>

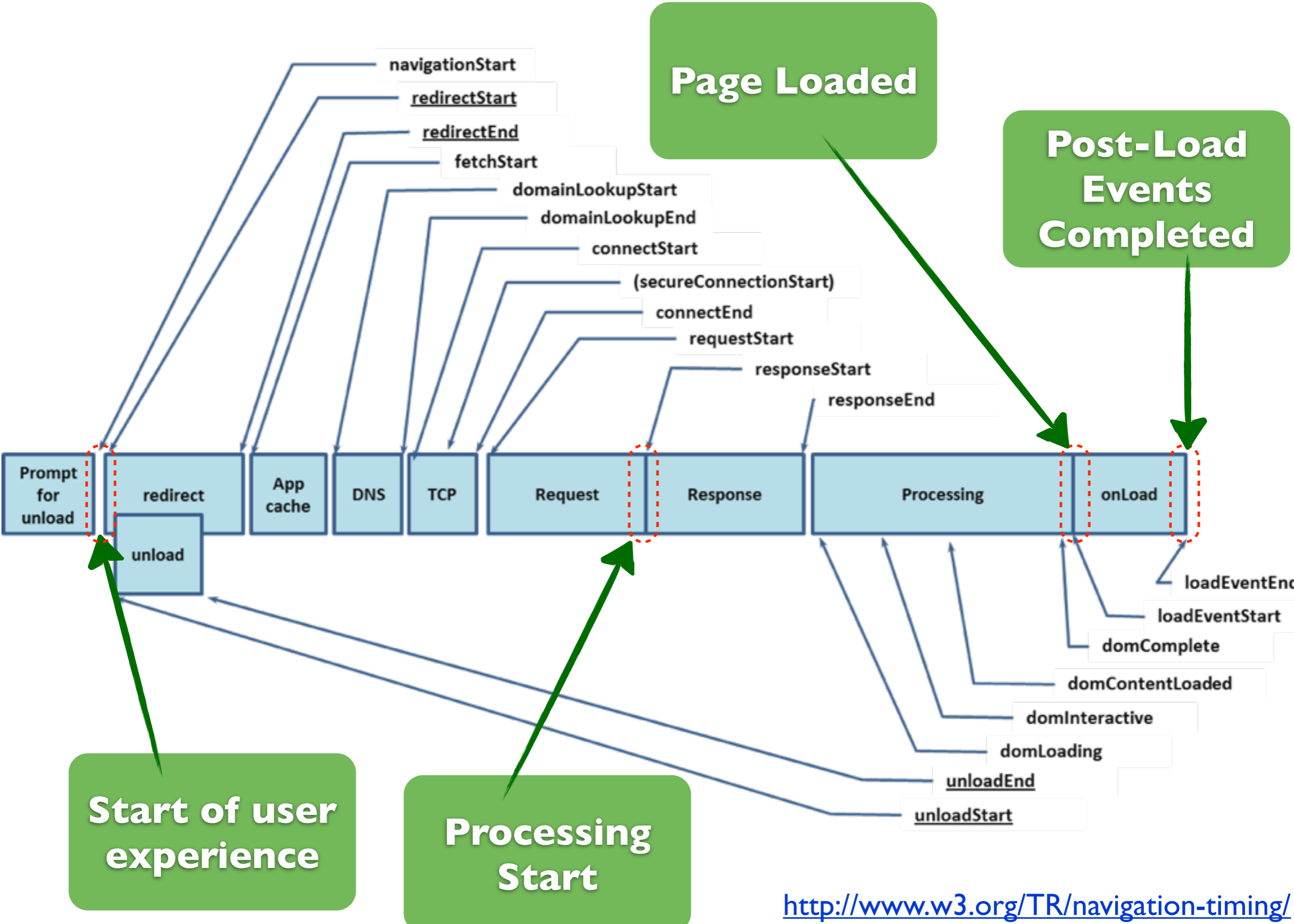
Page Loaded



Start of user experience

Processing Start

<http://www.w3.org/TR/navigation-timing/>



<http://www.w3.org/TR/navigation-timing/>

Output

Key	Data Source	Sample Value (in Msec)
nt_red_cnt	window.performance.navigation.redirectCount	0 (<i>counter, not a timer!</i>)
nt_nav_type	window.performance.navigation.type	1 (<i>counter, not a timer!</i>)
nt_nav_st	window.performance.timing.navigationStart	1350247373629
nt_red_st	window.performance.timing.redirectStart	0
nt_red_end	window.performance.timing.redirectEnd	0
nt_fet_st	window.performance.timing.fetchStart	1350247373629
nt_dns_st	window.performance.timing.domainLookupStart	1350247373629
nt_dns_end	window.performance.timing.domainLookupEnd	1350247373629
nt_con_st	window.performance.timing.connectStart	1350247373633
nt_con_end	window.performance.timing.connectEnd	1350247373734
nt_req_st	window.performance.timing.requestStart	1350247373734
nt_res_st	window.performance.timing.responseStart	1350247373854
nt_res_end	window.performance.timing.responseEnd	1350247373854
nt_domloading	window.performance.timing.domLoading	1350247373860
nt_domint	window.performance.timing.domInteractive	1350247374082
nt_domcontloaded_st	window.performance.timing.domContentLoadedStart	1350247374082
nt_domcontloaded_end	window.performance.timing.domContentLoadedEnd	1350247374083
nt_domcomp	window.performance.timing.domComplete	1350247374083
nt_load_st	window.performance.timing.loadEventStart	1350247374083
nt_load_end	window.performance.timing.loadEventEnd	1350247374084
nt_unload_st	window.performance.timing.unloadEventStart	1350247373855
nt_unload_end	window.performance.timing.unloadEventEnd	1350247373855

Can I do this myself?

```
<html>
<head>
<script type="text/javascript">
var PageTimerStart = new Date().getTime();
window.onload = function() {
    new Image().src = '/pixel.gif?page_load=' +
        (new Date().getTime() - PageTimerStart) +
        '&url=' + escape(window.location.href);
};
</script>
/* rest of your code ... */
```

Output Processing

```
awk -F = '  
BEGIN { sum=0; total=0; }  
/page_load=/ { total++; sum += sprintf("%f\n",$2); }  
END { print strftime("%Y-%m-%d"),": ",total,sum/total; }  
' /var/log/apache2/access_log
```

Will return # of requests made
and their average speed

SEARCHING FOR WEB SERVER BOTTLENECKS

Using Apache Bench

Usage: `/usr/sbin/ab [options] url`

Options are:

- n** Number of requests to perform
- c** Number of multiple requests to make
- C** Add cookie, eg. 'Apache=1234. (repeatable)
- t** Seconds to max. wait for responses
- A** Add Basic WWW Authentication, the attributes are a colon separated username and password
- i** Use HEAD instead of GET

Understanding Output

Concurrency Level:	10
Time taken for tests:	18.054 seconds
Complete requests:	1000
Failed requests:	0
Write errors:	0
Total transferred:	494000 bytes
HTML transferred:	0 bytes
Requests per second:	55.39 [# /sec] (mean)
Time per request:	180.543 [ms] (mean)
Time per request:	18.054 [ms]
(mean, across all concurrent requests)	
Transfer rate:	26.72 [Kbytes/sec]

Understanding Output

Connection Times (Msec)

	min	mean[+/-sd]		median	max
Connect	5	7	0.9	6	12
Processing	76	174	38.0	173	320
Waiting	76	173	38.0	173	320
Total	82	180	38.1	179	327

Understanding the Output

Percentage of the requests served
within a certain time (Msec)

50%	179	
66%	194	
75%	202	
80%	208	
90%	224	
95%	244	
98%	271	
99%	291	
100%	327	(longest request)

TESTING WEB SERVER FOR BOTTLENECKS

Static Tests

Request a static 10kb JavaScript, HTML and CSS files

Static Tests

Request a static 10kb JavaScript, HTML and CSS files

- ✓ Is the response size the same as file size? (*compression is missing*)

Static Tests

Request a static 10kb JavaScript, HTML and CSS files

- ✓ Is the response size the same as file size? (*compression is missing*)
- ✓ Do req/sec max out before the network does?
(*if not, likely server overhead*)

Static Tests

Request a static 10kb JavaScript, HTML and CSS files

- ✓ Is the response size the same as file size? (*compression is missing*)
- ✓ Do req/sec max out before the network does?
(*if not, likely server overhead*)
- ✓ Are there fluctuations in Connection Times?
(*concurrency issues, time to check for pre-processing directives*)

Static Tests

Request a static 10kb JavaScript, HTML and CSS files

- ✓ Is the response size the same as file size? (*compression is missing*)
- ✓ Do req/sec max out before the network does?
(*if not, likely server overhead*)
- ✓ Are there fluctuations in Connection Times?
(*concurrency issues, time to check for pre-processing directives*)
- ✓ Does disk IO spike during test execution?
(*enable in memory caching of frequently requested static files*)

Network IO

Request a static page that is roughly equivalent in size to your average output

Network IO

Request a static page that is roughly equivalent in size to your average output

- ✓ Does the network max-out before anticipated # of req/sec?
(consider getting bigger network pipe or enabling compression)

Network IO

Request a static page that is roughly equivalent in size to your average output

- ✓ Does the network max-out before anticipated # of req/sec?
(consider getting bigger network pipe or enabling compression)
- ✓ Do req/sec max out before anticipated # of req/sec?
(check your web-server & TCP/IP kernel buffer sizes)

Scripting Language Overhead

Add a `.php` extension to your static page from the previous test and the test

Scripting Language Overhead

Add a `.php` extension to your static page from the previous test and the test

- ✓ Is there more than 2x speed difference?
(you may need an op-code cache)

Scripting Language Overhead

Add a `.php` extension to your static page from the previous test and the test

- ✓ Is there more than 2x speed difference?
(you may need an op-code cache)
- ✓ What if op-code cache is already enabled?
(consider different SAPI)

SSL Overhead

Request a static SSL page

✓ Is there $> 100\text{ms}$ difference in loading speed between SSL and non-SSL Speed?

➔ *SSL SessionCache*

➔ *TCP/IP Congestion control settings in kernel*

➔ *GEO-Aware request routing*

Compression Overhead

Request a dynamically compressed page

- ✓ Is there more than 10-20ms speed difference? (*consider using reverse proxy to cache compressed output*)

SEARCHING FOR PHP BOTTLENECKS

XHPprof

Light weight PHP profiler designed for use in production environment.

- ➔ Aggregates historical data runs
- ➔ Web UI
- ➔ Can be configured for In-Production sampling

<http://pecl.php.net/xhprof>

<http://github.com/preinheimer/xhprof>

Starting to Profile

;; Pre-pended to every PHP script (init)

```
auto_prepend_file = /xhprof/external/header.php
```

```
include_once __DIR__ . '/xhprof_lib/config.php');
```

```
include_once __DIR__ . '/xhprof_lib/utils/xhprof_lib.php';
```

```
include_once __DIR__ . '/xhprof_lib/utils/xhprof_runs.php';
```

```
xhprof_enable(XHPROF_FLAGS_CPU + XHPROF_FLAGS_MEMORY);
```

;; Appended to every PHP script (store)

```
auto_append_file = /xhprof/external/footer.php
```

```
$xhprof_data = xhprof_disable();
```

```
$xhprof_runs = new XHProfRuns_Default();
```

```
$xhprof_runs->save_run($xhprof_data, 'YourAppName', null, $_xhprof);
```

Starting to Profile

;; Pre-pended to every PHP script (init)

```
auto_prepend_file = /xhprof/external/header.php
```

```
include_once __DIR__ . '/xhprof_lib/config.php');
```

```
include_once __DIR__ . '/xhprof_lib/utils/xhprof_lib.php';
```

```
include_once __DIR__ . '/xhprof_lib/utils/xhprof_runs.php';
```

```
xhprof_enable(XHPROF_FLAGS_CPU + XHPROF_FLAGS_MEMORY);
```

;; Appended to every PHP script (store)

```
auto_append_file = /xhprof/external/footer.php
```

```
$xhprof_data = xhprof_disable();
```

```
$xhprof_runs = new XHProfRuns_Default();
```

```
$xhprof_runs->save_run($xhprof_data, 'YourAppName', null, $_xhprof);
```

**Configuration
for MySQL
DB where to
log data**

OUTPUT

[View Callgraph](#)

Stat	Exact URL	Similar URLs
Count	38740	38740
Min Wall Time	21.1150 ms	21.1150 ms
Max Wall Time	44.0095 s	44.0095 s
Avg Wall Time	1.3765 s	1.3765 s
95% Wall Time	3.1266 s	3.1266 s
Display run Incl. Wall Time (microsec)	584,869 microsecs	
Min CPU Ticks	9.9980 ms	9.9980 ms
Max CPU Ticks	16.7735 s	16.7735 s
Avg CPU Ticks	614.3510 ms	614.3510 ms
95% CPU Ticks	893.8640 ms	893.8640 ms
Display run Incl. CPU (microsecs)	553,917 microsecs	
Min Peak Memory Usage	5,594,576 bytes	5,594,576 bytes
Max Peak Memory Usage	220,900,512 bytes	220,900,512 bytes
Avg Peak Memory Usage	172,595,582 bytes	172,595,582 bytes
95% Peak Memory Usage	217,540,480 bytes	217,540,480 bytes
Display run Incl. PeakMemUse (bytes)	195,438,544 bytes	
Number of Function Calls:	999	
Perform Delta:	<input type="text"/>	<input type="button" value="Delta"/>

of Historical Runs



Stat	Exact URL	Similar URLs
Count	<u>38740</u>	<u>38740</u>
Min Wall Time	21.1150 ms	21.1150 ms
Max Wall Time	44.0095 s	44.0095 s
Avg Wall Time	1.3765 s	1.3765 s
95% Wall Time	3.1266 s	3.1266 s
Display run Incl. Wall Time (microsec)	584,869 microsecs	
Min CPU Ticks	9.9980 ms	9.9980 ms
Max CPU Ticks	16.7735 s	16.7735 s
Avg CPU Ticks	614.3510 ms	614.3510 ms
95% CPU Ticks	893.8640 ms	893.8640 ms
Display run Incl. CPU (microsecs)	553,917 microsecs	
Min Peak Memory Usage	5,594,576 bytes	5,594,576 bytes
Max Peak Memory Usage	220,900,512 bytes	220,900,512 bytes
Avg Peak Memory Usage	172,595,582 bytes	172,595,582 bytes
95% Peak Memory Usage	217,540,480 bytes	217,540,480 bytes
Display run Incl. PeakMemUse (bytes)	195,438,544 bytes	
Number of Function Calls:	999	
Perform Delta:	<input type="text"/>	<input type="button" value="Delta"/>

of Historical Runs

Stat	Exact URL	Similar URLs
Count	<u>38740</u>	<u>38740</u>
Min Wall Time	21.1150 ms	21.1150 ms
Max Wall Time	44.0095 s	44.0095 s
Avg Wall Time	1.3765 s	1.3765 s
95% Wall Time	3.1266 s	3.1266 s
Display run Incl. Wall Time (microsec)	584,869 microsecs	
Min CPU Ticks	9.9980 ms	9.9980 ms
Max CPU Ticks	16.7735 s	16.7735 s
Avg CPU Ticks	614.3510 ms	614.3510 ms
95% CPU Ticks	893.8640 ms	893.8640 ms
Display run Incl. CPU (microsecs)	553,917 microsecs	
Min Peak Memory Usage	5,594,576 bytes	5,594,576 bytes
Max Peak Memory Usage	220,900,512 bytes	220,900,512 bytes
Avg Peak Memory Usage	172,595,582 bytes	172,595,582 bytes
95% Peak Memory Usage	217,540,480 bytes	217,540,480 bytes
Display run Incl. PeakMemUse (bytes)	195,438,544 bytes	
Number of Function Calls:	999	
Perform Delta:	<input type="text"/>	<input type="button" value="Delta"/>

**Memory Usage
(Max, Min, Avg, 95%)**

Stat	Exact URL	Similar URLs
Count	<u>38740</u>	<u>38740</u>
Min Wall Time	21.1150 ms	
Max Wall Time	44.0095 s	
Avg Wall Time	1.3765 s	
95% Wall Time	3.1266 s	
Display run Incl. Wall Time (microsec)	584,869 microsecs	
Min CPU Ticks	9.9980 ms	9.9980 ms
Max CPU Ticks	16.7735 s	16.7735 s
Avg CPU Ticks	614.3510 ms	614.3510 ms
95% CPU Ticks	893.8640 ms	893.8640 ms
Display run Incl. CPU (microsecs)	553,917 microsecs	
Min Peak Memory Usage	5,594,576 bytes	5,594,576 bytes
Max Peak Memory Usage	220,900,512 bytes	220,900,512 bytes
Avg Peak Memory Usage	172,595,582 bytes	172,595,582 bytes
95% Peak Memory Usage	217,540,480 bytes	217,540,480 bytes
Display run Incl. PeakMemUse (bytes)	195,438,544 bytes	
Number of Function Calls:	999	
Perform Delta:	<input type="text"/>	<input type="button" value="Delta"/>

of Historical Runs

**Execution Time
(Max, Min, Avg, 95%)**

**Memory Usage
(Max, Min, Avg, 95%)**

Stat	Exact URL	Similar URLs
Count	38740	38740
Min Wall Time	21.1150 ms	
Max Wall Time	44.0095 s	
Avg Wall Time	1.3765 s	
95% Wall Time	3.1266 s	
Display run Incl. Wall Time (microsec)	584,869 microsecs	
Min CPU Ticks	9.9980 ms	9.9980 ms
Max CPU Ticks	16.7735 s	16.7735 s
Avg CPU Ticks	614.3510 ms	614.3510 ms
95% CPU Ticks	893.8640 ms	893.8640 ms
Display run Incl. CPU (microsecs)	553,917 microsecs	
Min Peak Memory Usage	5,594,576 bytes	5,594,576 bytes
Max Peak Memory Usage	220,900,512 bytes	220,900,512 bytes
Avg Peak Memory Usage	172,595,582 bytes	172,595,582 bytes
95% Peak Memory Usage	217,540,480 bytes	217,540,480 bytes
Display run Incl. PeakMemUse (bytes)	195,438,544 bytes	
Number of Function Calls:	999	
Perform Delta:	<input type="text"/>	<input type="button" value="Delta"/>

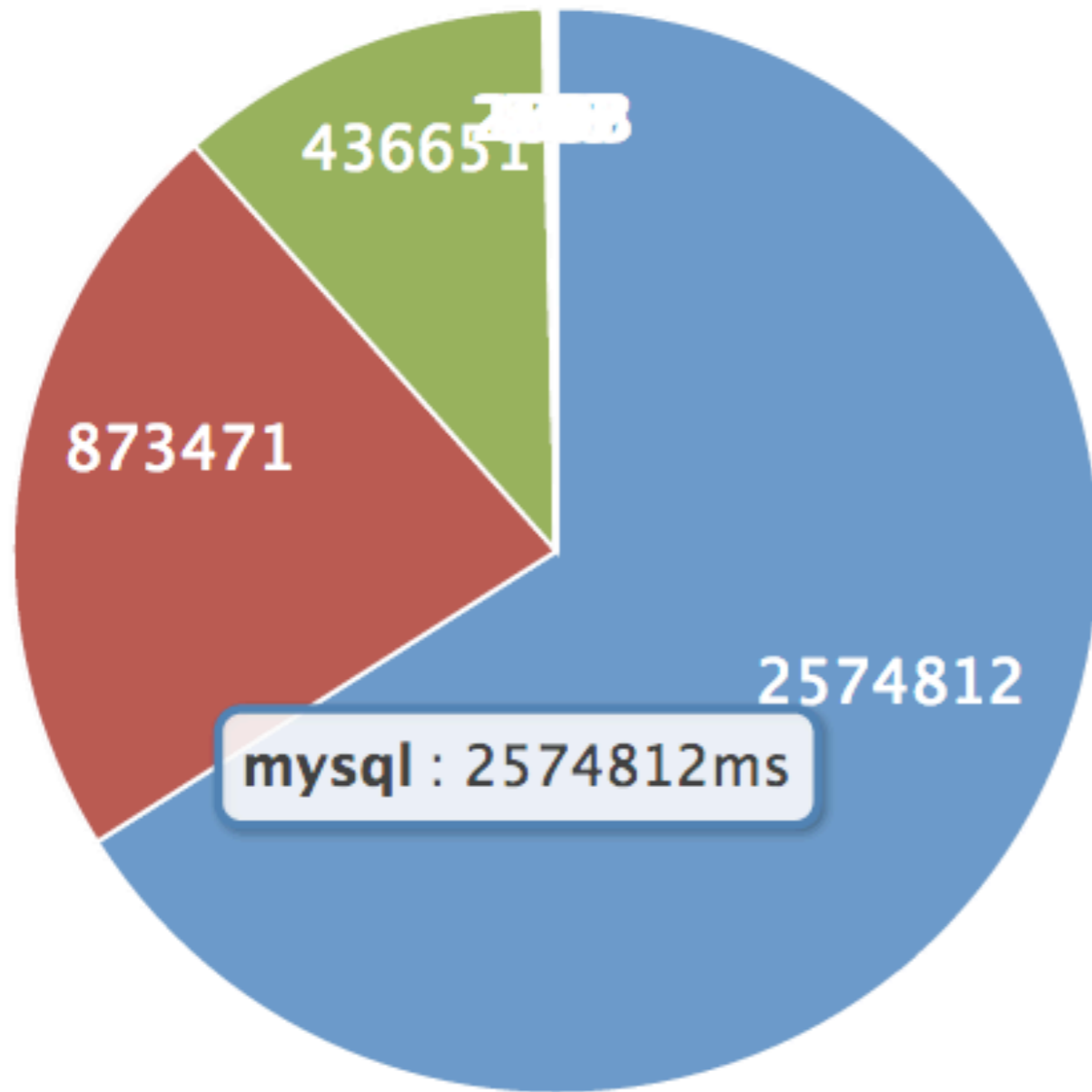
of Historical Runs

**Execution Time
(Max, Min, Avg, 95%)**

**Memory Usage
(Max, Min, Avg, 95%)**

**CPU Time
(Max, Min, Avg, 95%)**

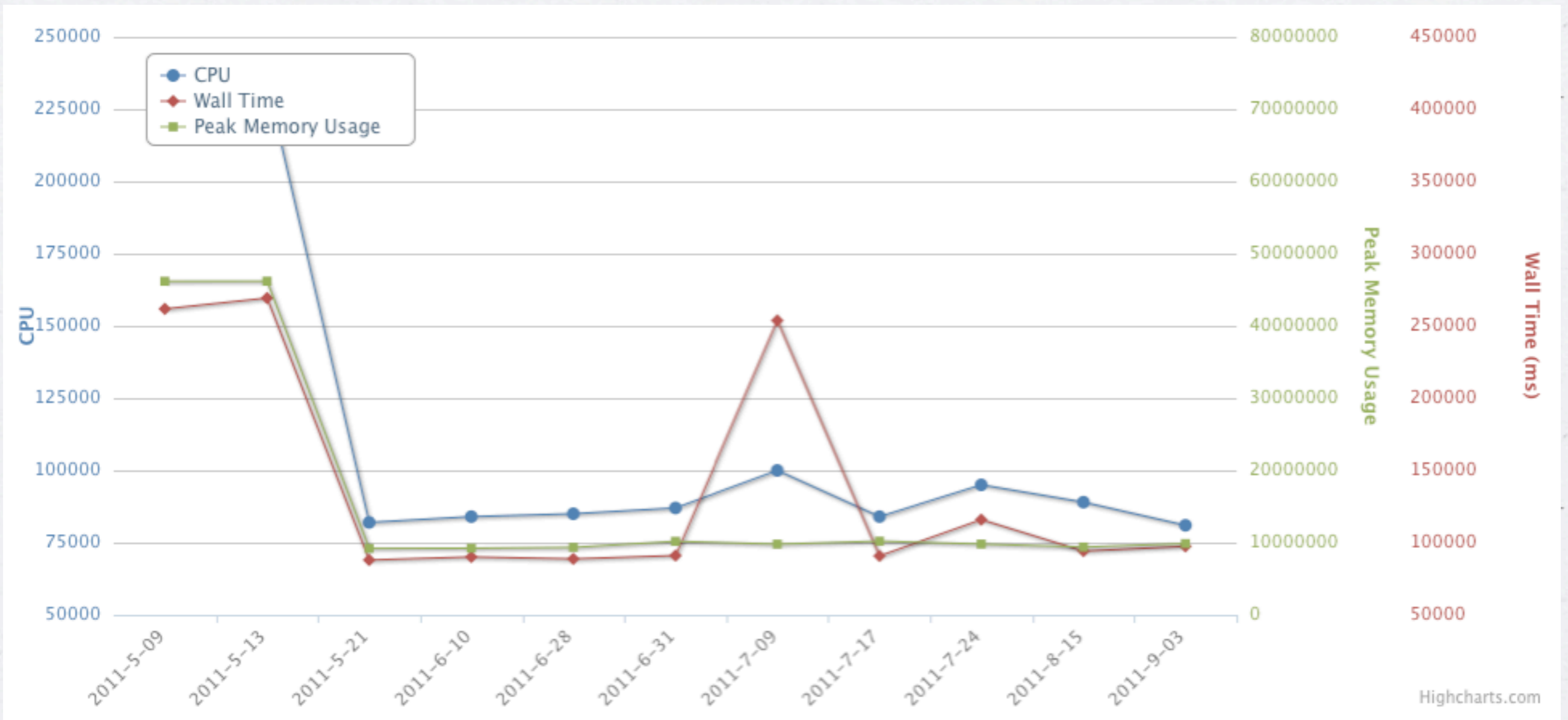
Expensive Calls by Exclusive Wall Time



- mysql
- xhprof_render_image
- stream_get_contents
- xhprof_generate_dot...
- xhprof_parse_parent...
- xhprof_compute_flat...
- xhprof_compute_inclu...
- proc_open
- unserialize
- xhprof_get_children...
- explode
- gzuncompress
- xhprof_get_content_b...
- XHProfRuns_Default:....
- Other

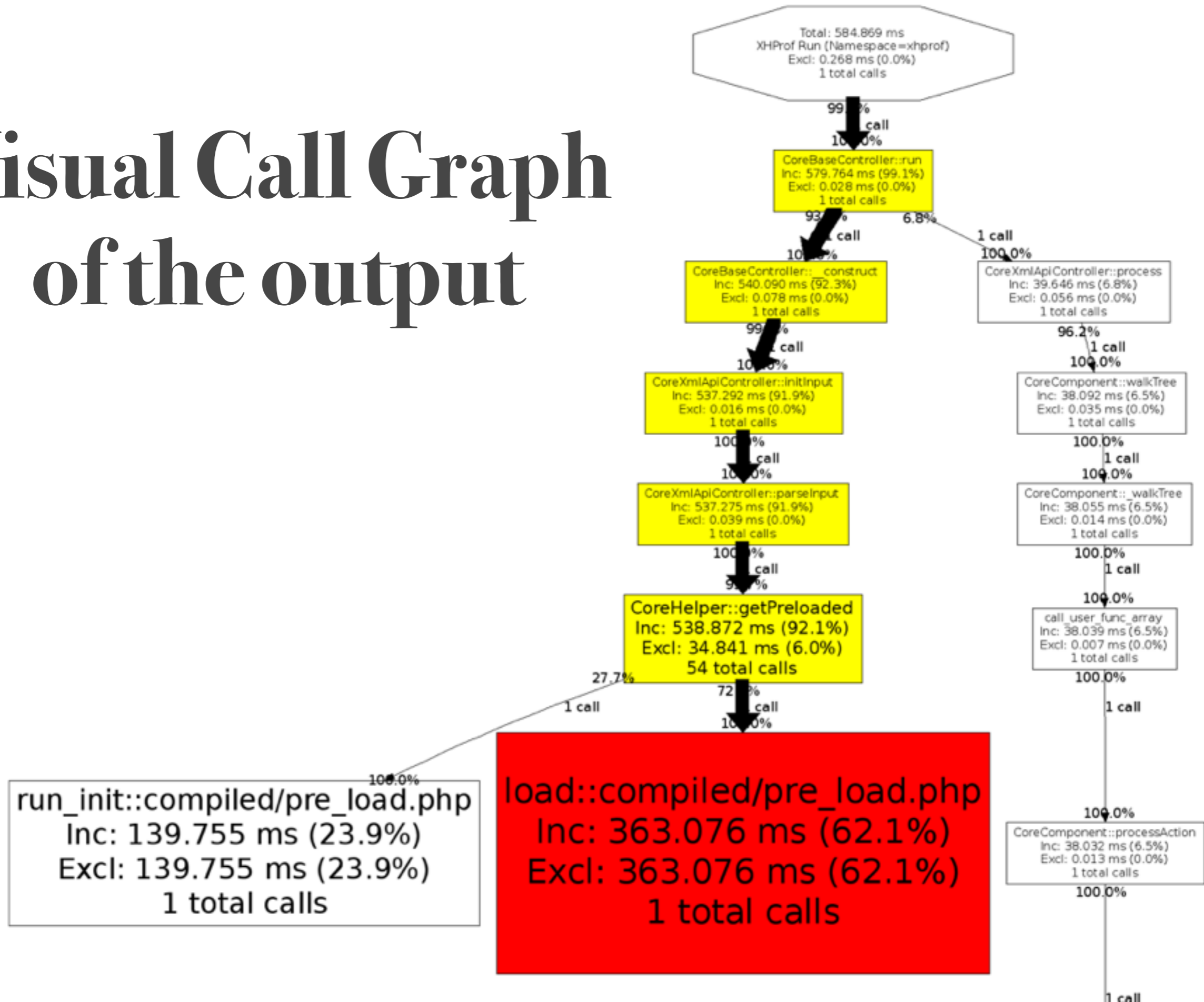
Boring per-call stats

↕ Function	↕ Call Count	↕ Wall Time	↕ CPU	↕ Memory Usage	↕ Peak Memory Usage	↕ Exclusive Wall Time	↕ Exclusive CPU	↕ Exclusive Memory Usage	↕ Exclusive Peak Memory Usage
main()	1	584869	553917	98249760	195438544	268	0	4672	5072
CoreBaseController::run	1	579764	548917	93411472	190604032	28	0	4224	2880
CoreBaseController::__construct	1	540090	540918	92969872	190601152	78	0	4208	1944
CoreHelper::getPreloaded	54	538872	538918	92610840	190135488	34841	35995	-112592632	1936
CoreXmlApiController::initInput	1	537292	538918	92262488	189667824	16	0	352	0
CoreXmlApiController::parseInput	1	537275	538918	92260544	189667824	39	0	2304	0
load::compiled/pre_load.php	1	363076	363944	112610688	189667824	363076	363944	112610688	189667824
run_init::compiled/pre_load.php	1	139755	138979	92251736	0	139755	138979	92251736	0

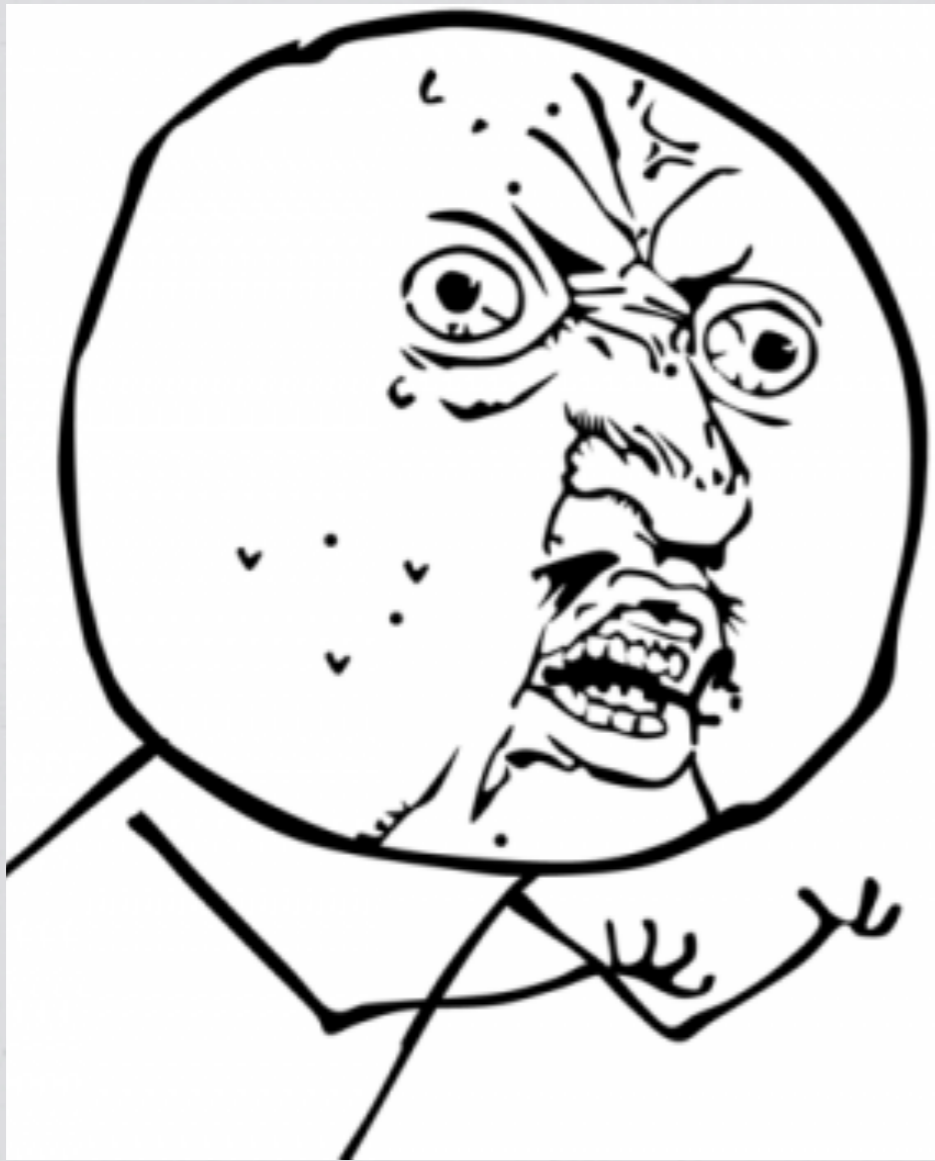




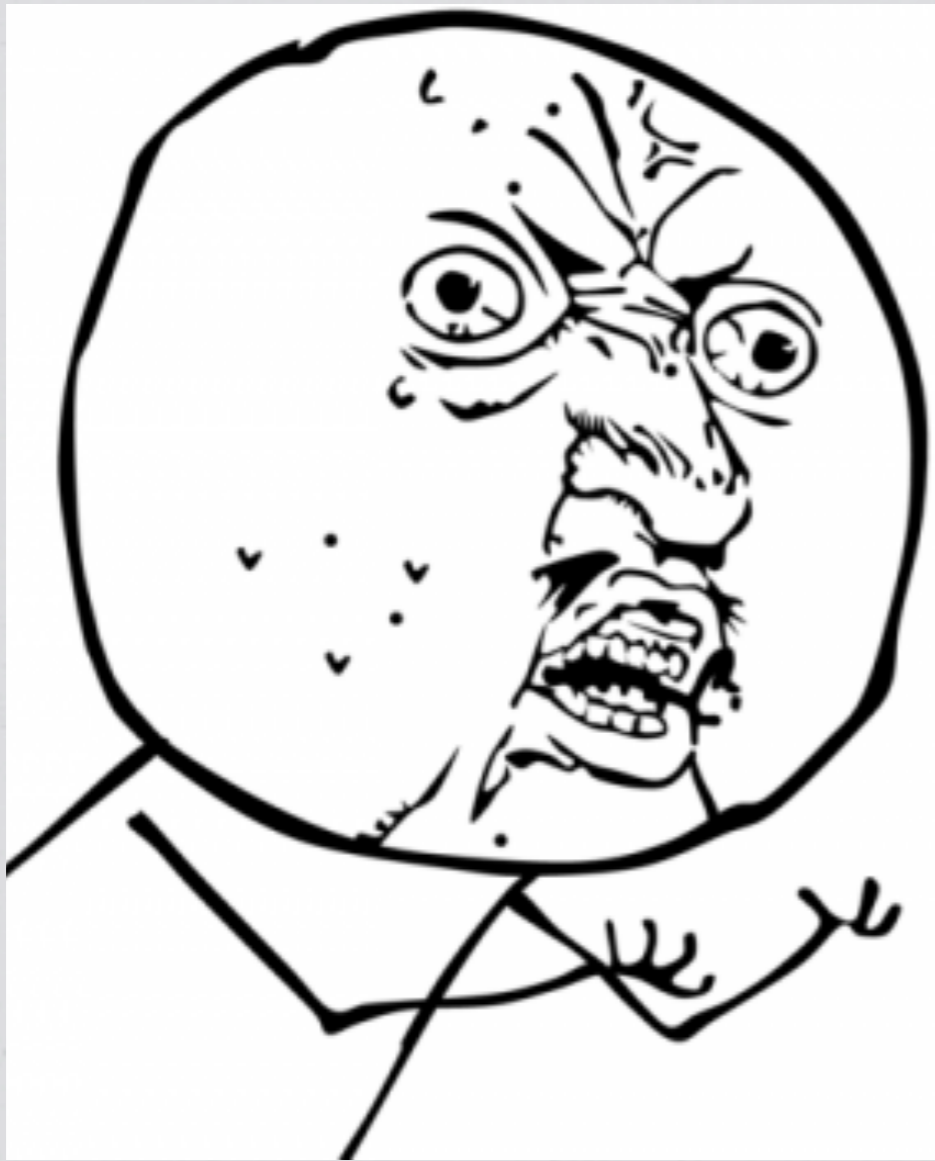
Visual Call Graph of the output



Profiling can cause a Bottleneck



Profiling can cause a Bottleneck



SOLUTION:

Targeted profiling of production environment:

- ➔ Statistical Sampling
- ➔ Pre-Identify Targets
- ➔ Replay-Log profiling

PRE-IDENTIFYING PROFILING TARGET

Apache:

LogFormat "{your usual stuff} %D %I %O" common

PRE-IDENTIFYING PROFILING TARGET

Apache:

LogFormat "{your usual stuff} %D %I %O" common

Processing Time in Msec



PRE-IDENTIFYING PROFILING TARGET

Apache:

Bytes Received

LogFormat "{your usual stuff} %D %I %O" common

Processing Time in Msec

PRE-IDENTIFYING PROFILING TARGET

Apache:

Bytes Received

LogFormat "{your usual stuff} %D %I %O" common

Processing Time in Msec

Bytes Sent

PRE-IDENTIFYING PROFILING TARGET

Apache:

Bytes Received

LogFormat "{your usual stuff} %D %I %O" common

Processing Time in Msec

Bytes Sent

PRE-IDENTIFYING PROFILING TARGET

Nginx:

```
log_format combined '{your usual stuff}'  
    '$bytes_sent'  
    '$request_length'  
    '$request_time'  
;
```

Apache:

Bytes Received

LogFormat "{your usual stuff} %D %I %O" common

Processing Time in Msec

Bytes Sent

PRE-IDENTIFYING PROFILING TARGET

Nginx:

log_format combined '{your usual stuff}'

'\$bytes_sent'

'\$request_length'

'\$request_time'

;

Processing
Time in Msec
(Nginx 0.5.9+)

Apache:

Bytes Received

LogFormat "{your usual stuff} %D %I %O" common

Processing Time in Msec

Bytes Sent

PRE-IDENTIFYING PROFILING TARGET

Nginx:

log_format combined '{your usual stuff}'

'\$bytes_sent'

'\$request_length'

'\$request_time'

Bytes Received

Processing
Time in Msec
(Nginx 0.5.9+)

;

Apache:

Bytes Received

LogFormat "{your usual stuff} %D %I %O" common

Processing Time in Msec

Bytes Sent

PRE-IDENTIFYING PROFILING TARGET

Nginx:

log_format combined '{your usual stuff}'

Bytes Sent

'\$bytes_sent'

'\$request_length'

Bytes Received

'\$request_time'

Processing
Time in Msec
(Nginx 0.5.9+)

;

There are no 'Harmless' Errors

```
function a() { if ($a) {} }  
function b() { if (empty($a)) {} }
```

```
error_reporting(E_ERROR);
```

```
$s = microtime(1);  
for ($i = 0; $i < 100000; $i++) a();  
echo "Time Taken: " . (microtime(1) - $s) . "\n";  
// Time Taken: 0.0585
```

```
$s = microtime(1);  
for ($i = 0; $i < 100000; $i++) b();  
echo "Time Taken: " . (microtime(1) - $s) . "\n";  
// Time Taken: 0.0125
```

```
function a() { if ($a) {} }  
function b() { if (empty($a)) {} }
```

```
error_reporting(E_ALL|E_NOTICE);  
ini_set("display_errors", 0);  
ini_set("log_errors", 1);  
ini_set("error_log", "/tmp/test");
```

```
$s = microtime(1);  
for ($i = 0; $i < 1000; $i++) a();  
echo "Time Taken: " . (microtime(1) - $s) . "\n";  
// Time Taken: 0.1503
```

```
$s = microtime(1);  
for ($i = 0; $i < 1000; $i++) b();  
echo "Time Taken: " . (microtime(1) - $s) . "\n";  
// Time Taken: 0.0002
```


```
function a() { if ($a) {} }  
function b() { if (empty($a)) {} }
```

```
error_reporting(E_ALL|E_NOTICE);  
ini_set("display_errors", 0);  
ini_set("log_errors", 1);  
ini_set("error_log", "/tmp/test");
```

```
$s = microtime(1);  
for ($i = 0; $i < 1000; $i++) a();  
echo "Time Taken: " . (microtime(1) - $s) . "\n";  
// Time Taken: 0.1503
```

```
$s = microtime(1);  
for ($i = 0; $i < 1000; $i++) b();  
echo "Time Taken: " . (microtime(1) - $s) . "\n";  
// Time Taken: 0.0002
```

**Mere 1,000 executions
causes 1/6 of a second
overhead!**



FIX YOUR ERRORS!

AS AN EXTRA INCENTIVE,

Windows

Windows crashed again. I am the Blue Screen of Death. No one hears your screams.

- * Press any key to terminate the application.
- * Press CTRL+ALT+DEL again to restart your computer. You will lose any unsaved data in all applications.

Press any key to continue _

MAKE ALL ERRORS FATAL

* The BSOD is a trademark of the Microsoft Corporation.

CACHING BOTTLENECKS

Memcached Stats

STAT uptime 929318

...

STAT rusage_user_seconds 27

STAT rusage_user_microseconds 135874

STAT rusage_system_seconds 68

STAT rusage_system_microseconds 513584

...

STAT bytes_read 494845674

STAT bytes_written 2751269102

Memcached Stats

STAT uptime 929318

...

STAT rusage_user_seconds 27

STAT rusage_user_microseconds

STAT rusage_system_seconds

STAT rusage_system_microseconds 513584

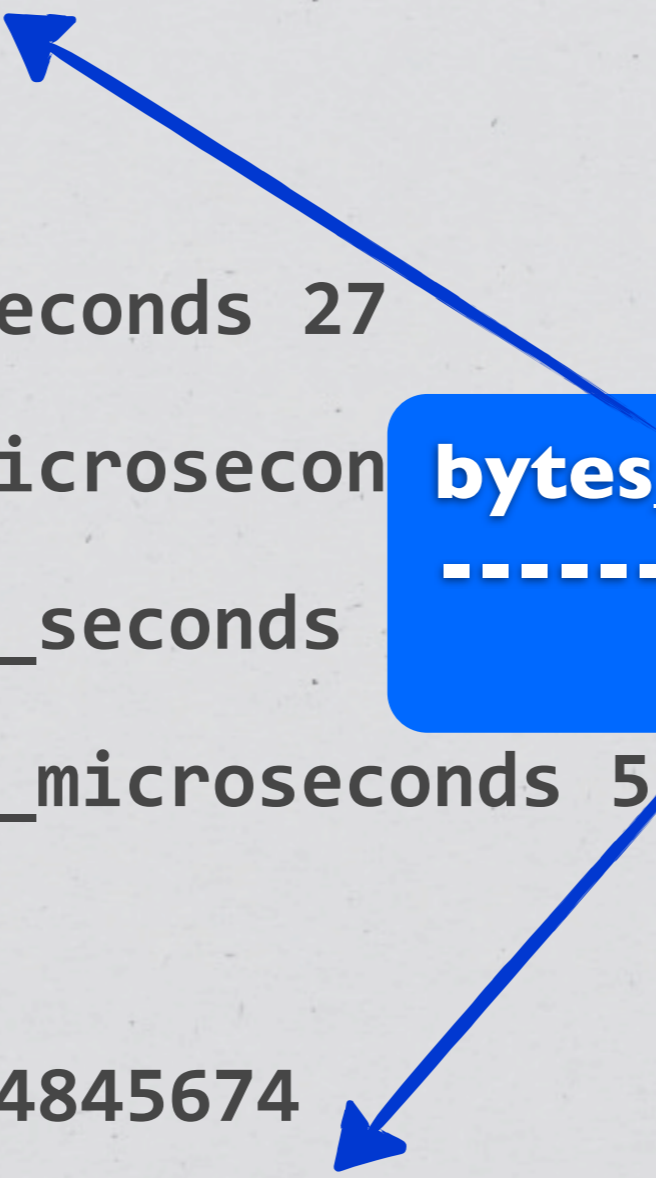
...

STAT bytes_read 494845674

STAT bytes_written 2751269102

bytes_read + bytes_written

uptime



Memcached Stats

STAT uptime 929318

...

STAT rusage_user_seconds 27

STAT rusage_user_microseconds

STAT rusage_system_seconds

STAT rusage_system_microseconds 513584

...

STAT bytes_read 494845674

STAT bytes_written 2751269102

bytes_read + bytes_written

uptime

~= Bandwidth?

Memcached Stats

STAT uptime 929318

...

STAT rusage_user_seconds 27

STAT rusage_user_microseconds 135874

STAT rusage_system_seconds 68

STAT rusage_system_microseconds 513584

...

STAT bytes_read 494845674

STAT bytes_written 2751269102

Memcached Stats

STAT uptime 929318

...

STAT rusage_user_seconds 27

STAT rusage_user_microseconds 135874

STAT rusage_system_seconds 68

STAT rusage_system_microseconds 513584

...

STAT bytes_read 494845674

STAT bytes_written 2751269102

**rusage_system / uptime
> 0.01 ?**



Memcached Stats

STAT uptime 929318

...

STAT rusage_user_seconds 27

STAT rusage_user_microseconds 135874

STAT rusage_system_seconds 68

STAT rusage_system_microseconds 513584

...

STAT bytes_read 494845674

STAT bytes_written 2751269102

**rusage_system / uptime
> 0.01 ?**

**WTF are
you doing?**

Memcached Stats

STAT uptime 929318

...

STAT rusage_user_seconds 27

STAT rusage_user_microseconds 135874

STAT rusage_system_seconds 68

STAT rusage_system_microseconds 513584

...

STAT bytes_read 494845674

STAT bytes_written 2751269102

Memcached Stats

STAT uptime 929318

...

STAT rusage_user_seconds 27

STAT rusage_user_microseconds 135874

STAT rusage_system_seconds 68

STAT rusage_system_microseconds 513584

...

STAT bytes_read 494845674

STAT bytes_written 2751269102

**rusage_user / rusage_system
> 0.5 ?**



Memcached Stats

STAT uptime 929318

...

STAT rusage_user_seconds 27

STAT rusage_user_microseconds 135874

STAT rusage_system_seconds 68

STAT rusage_system_microseconds 513584

...

STAT bytes_read 494845674

STAT bytes_written 2751269102

**rusage_user / rusage_system
> 0.5 ?**

**Lock
Contention?**

Memcached Stats

STAT uptime 929318

...

STAT rusage_user_seconds 27

STAT rusage_user_microseconds 135874

STAT rusage_system_seconds 68

STAT rusage_system_microseconds 513584

...

STAT bytes_read 494845674

STAT bytes_written 2751269102

**rusage_user / rusage_system
> 0.5 ?**

**Lock
Contention?**

**Network
overhead?**

Memcached Stats

STAT total_connections 111098

...

STAT cmd_set 156043

STAT get_hits 1356088

STAT get_misses 128824

STAT evictions 0

Memcached Stats

**Have you heard of
Persistent
Connections?**



```
STAT total_connections 111098
```

```
...
```

```
STAT cmd_set 156043
```

```
STAT get_hits 1356088
```

```
STAT get_misses 128824
```

```
STAT evictions 0
```

Memcached Stats

**Have you heard of
Persistent
Connections?**

**get_misses / get_hits
> 0.1 ?**

STAT total_connections 111098

...

STAT cmd_set 156043

STAT get_hits 1356088

STAT get_misses 128824

STAT evictions 0

Memcached Stats

**Have you heard of
Persistent
Connections?**

**get_misses / get_hits
> 0.1 ?**

STAT total_connections 111098

...

STAT cmd_set 156043

STAT get_hits 1356088

STAT get_misses 128824

STAT evictions 0

**Evaluate your cache
usage...**

Memcached Stats

Have you heard of Persistent Connections?

get_misses / get_hits > 0.1 ?

STAT total_connections 111098

...

STAT cmd_set 156043

STAT get_hits 1356088

STAT get_misses 128824

STAT evictions 0

Evaluate your cache usage...

evictions / cmd_set > 0.1 ?

Memcached Stats

Have you heard of Persistent Connections?

get_misses / get_hits > 0.1 ?

STAT total_connections 111098

...

STAT cmd_set 156043

STAT get_hits 1356088

STAT get_misses 128824

STAT evictions 0

Evaluate your cache usage...

evictions / cmd_set > 0.1 ?

Give cache more RAM

DATABASE BOTTLENECKS

AVOID ACCIDENTS

We have gone

1

days since last

'drop database `production`'

KEEP YOUR COWORKERS SAFE

Continuous Monitoring for MySQL

Make a point to log & analyze “bad” things!

```
--log-slow-queries=/var/log/TheBadBda.log  
long_query_time = 1
```

Continuous Monitoring for MySQL

Make a point to log & analyze “bad” things!

```
--log-slow-queries=/var/log/TheBadBda.log
```

```
long_query_time = 1
```



Because 10 second default is insane!

Continuous Monitoring for MySQL

Make a point to log & analyze “bad” things!

```
--log-slow-queries=/var/log/TheBadBda.log
```

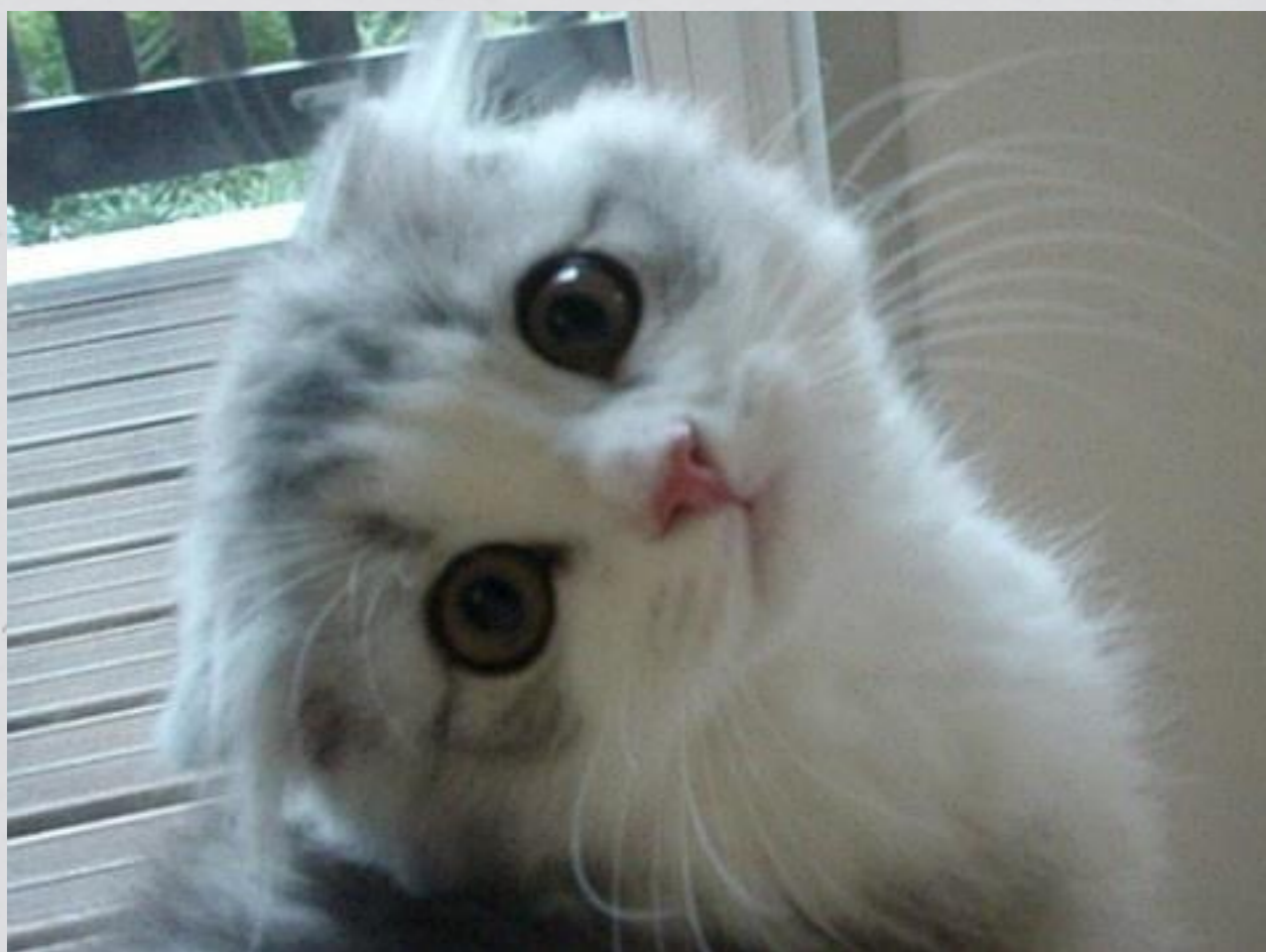
```
long_query_time = 1
```



Because 10 second default is insane!

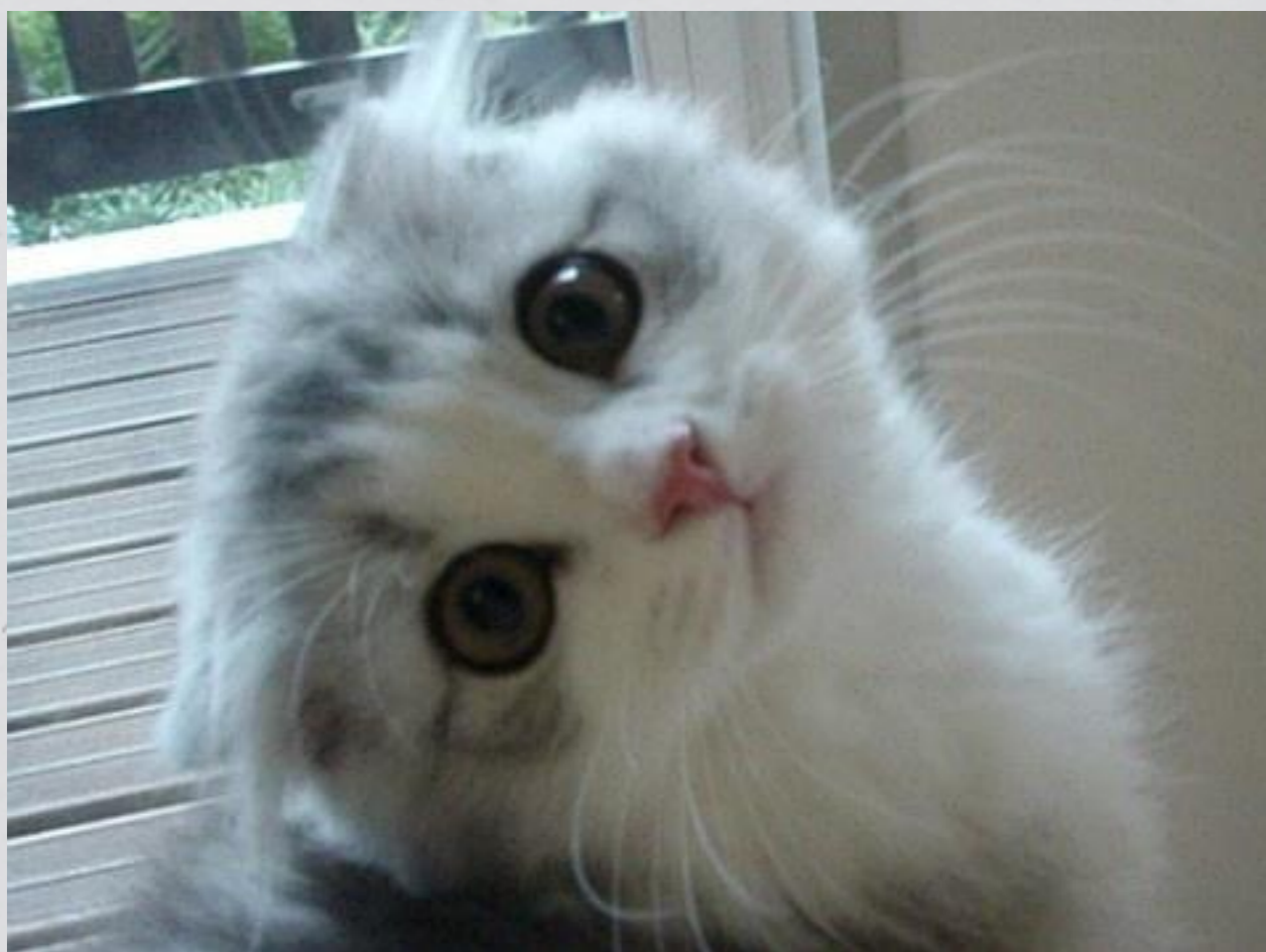
```
--log-queries-not-using-indexes
```

SHOW STATUS;



Variable_name	Value
Bytes_received	183
Bytes_sent	15693
Connections	83875
Created_tmp_files	7
Created_tmp_tables	1
Flush_commands	1
Handler_read_rnd_next	275
Handler_write	274
Innodb_buffer_pool_pages_data	44
Innodb_buffer_pool_pages_free	980
Innodb_buffer_pool_pages_total	1024
Innodb_buffer_pool_read_ahead_rnd	1
Innodb_buffer_pool_read_requests	269
Innodb_buffer_pool_reads	21
Innodb_data_fsyncs	3
Innodb_data_read	2904064
Innodb_data_reads	36
Innodb_data_writes	3
Innodb_data_written	1536
Innodb_log_writes	1
Innodb_os_log_fsyncs	3
Innodb_os_log_written	512
Innodb_page_size	16384
Innodb_pages_read	44
Key_blocks_unused	106733
Key_blocks_used	2615
Key_read_requests	638215
Key_reads	287
Key_write_requests	232608
Key_writes	3146
Qcache_free_blocks	16
Qcache_free_memory	66960032
Qcache_hits	753
Qcache_inserts	188
Qcache_not_cached	5584
Qcache_queries_in_cache	94
Qcache_total_blocks	219
Queries	145454
Questions	6
Select_scan	1
Table_locks_immediate	460

SHOW STATUS;

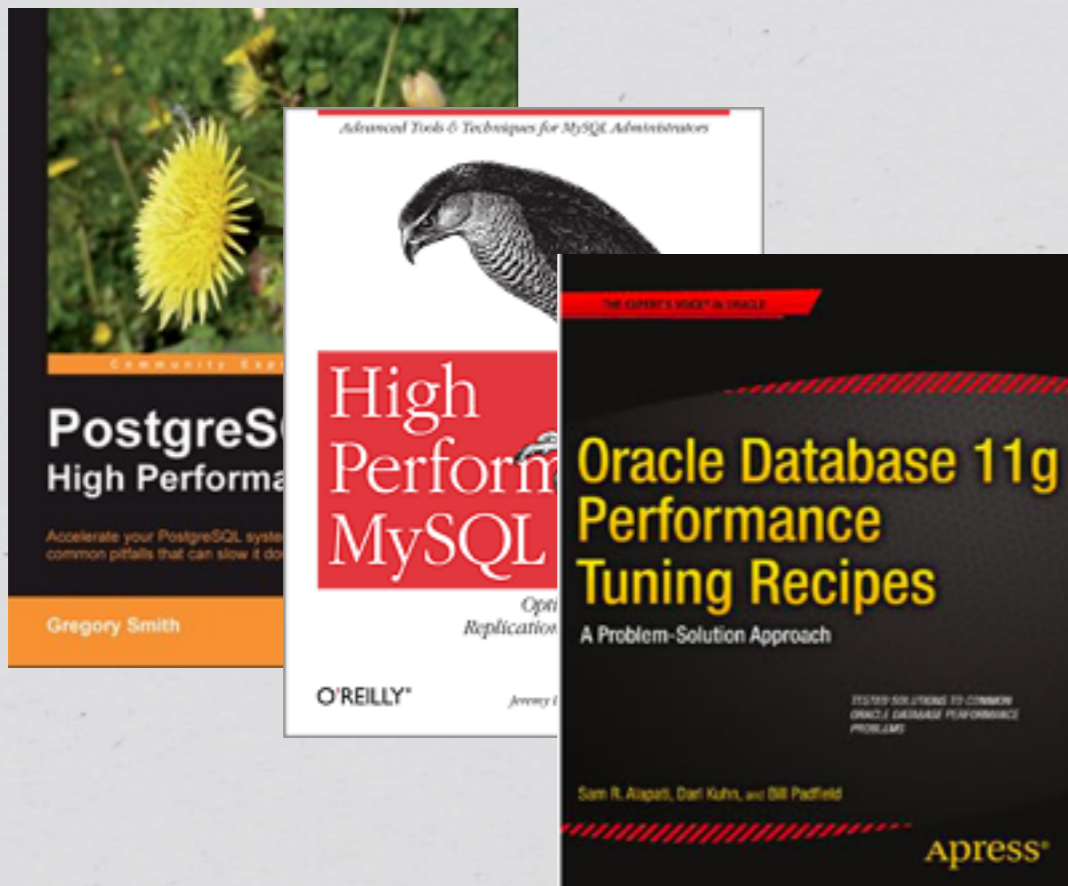


Variable_name	Value
Bytes_received	183
Bytes_sent	15693
Connections	83875
Created_tmp_files	7
Created_tmp_tables	1
Flush_commands	1
Handler_read_rnd_next	275
Handler_write	274
Innodb_buffer_pool_pages_data	44
Innodb_buffer_pool_pages_free	980
Innodb_buffer_pool_pages_total	1024
Innodb_buffer_pool_read_ahead_rnd	1
Innodb_buffer_pool_read_requests	269
Innodb_buffer_pool_reads	21
Innodb_data_fsyncs	3
Innodb_data_read	2904064

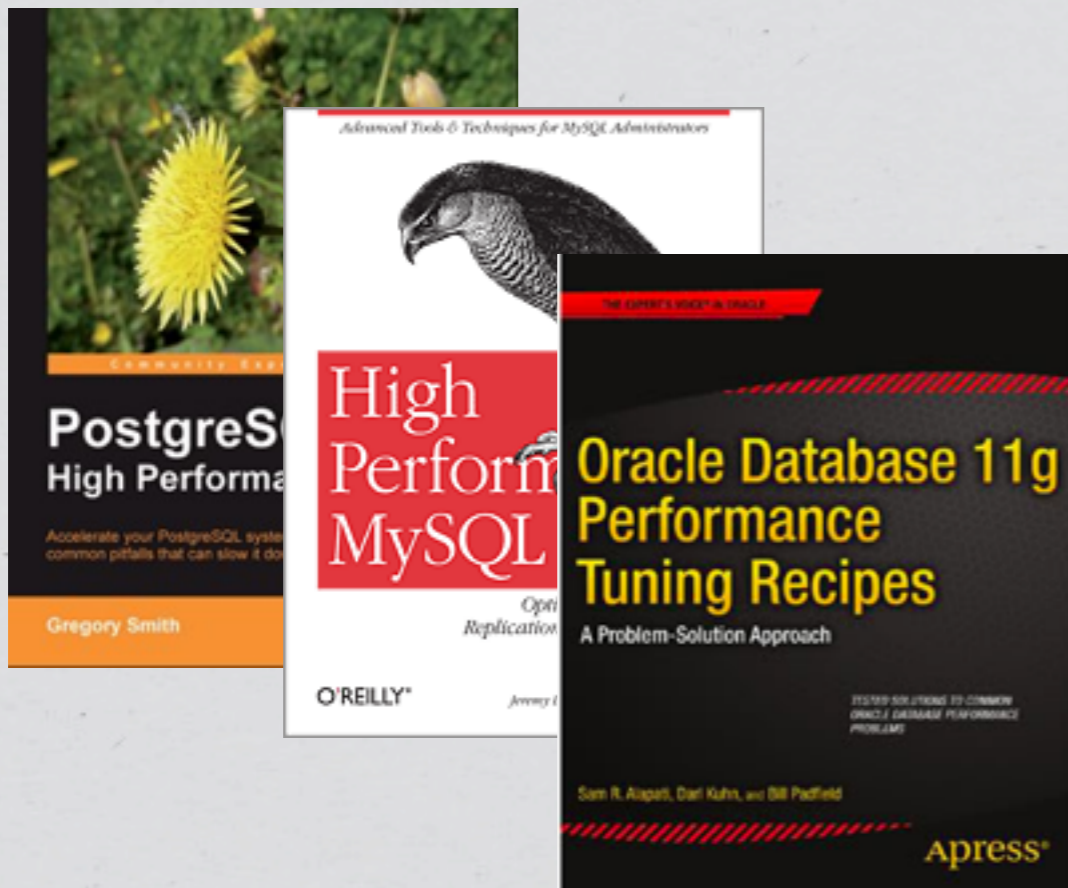
> 300 data points

Innodb_pages_read	44
Key_blocks_unused	106733
Key_blocks_used	2615
Key_read_requests	638215
Key_reads	287
Key_write_requests	232608
Key_writes	3146
Qcache_free_blocks	16
Qcache_free_memory	66960032
Qcache_hits	753
Qcache_inserts	188
Qcache_not_cached	5584
Qcache_queries_in_cache	94
Qcache_total_blocks	219
Queries	145454
Questions	6
Select_scan	1
Table_locks_immediate	460

You'll need some help...

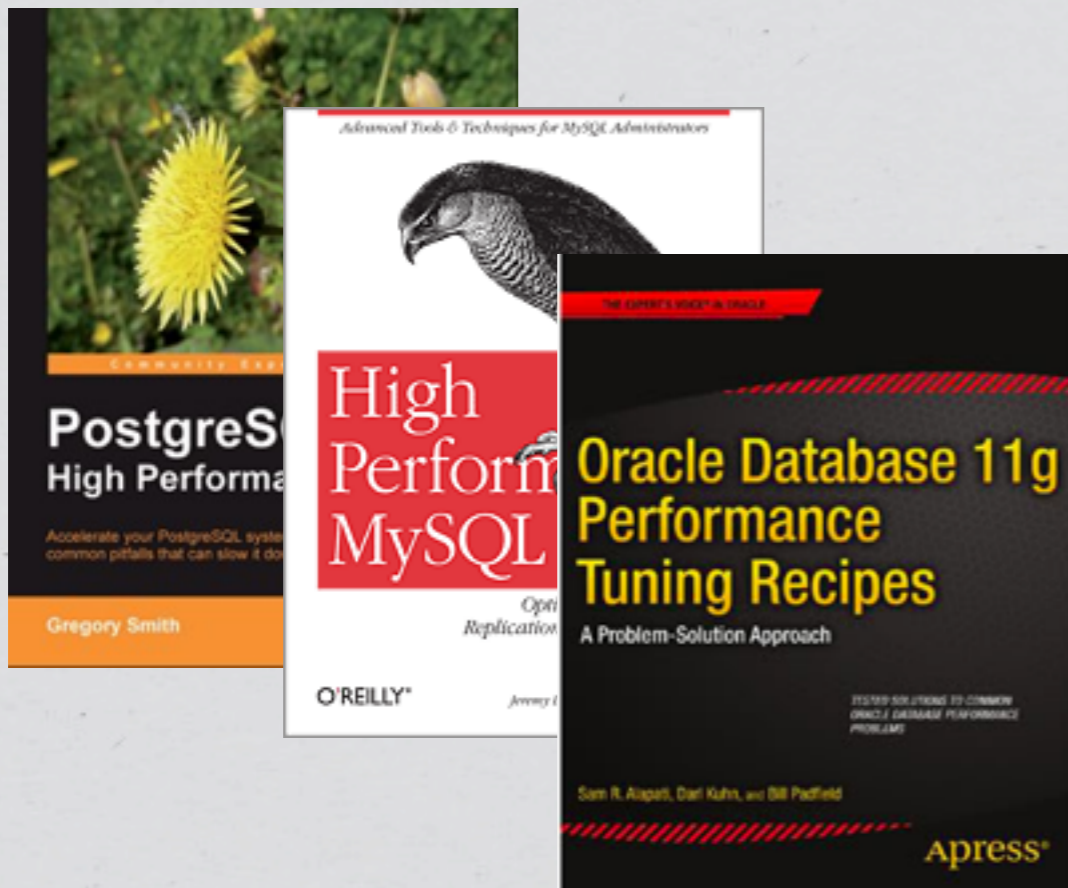


You'll need some help...



**Read some
books**

You'll need some help...



Read some books

Subscribe to a few blogs

<http://www.mysqlperformanceblog.com/>

<http://planet.postgresql.org/>

<http://planet.mysql.com/>

You'll need some help...



And most of all,
good luck! 

Read some
books

Subscribe to
a few blogs

<http://www.mysqlperformanceblog.com/>

<http://planet.postgresql.org/>

<http://planet.mysql.com/>

Watch Your IO

vmstat - Standard Linux IO monitoring tool,

```
$ vmstat
```

```
procs -----memory----- ---swap-- -----io----- -system-- -----cpu-----
r  b   swpd   free   buff  cache   si   so    bi    bo   in   cs  us  sy  id  wa
1  0 162256 583868 2336676 26893784    0    0     6   192    0    0  0  0  99  0
```

Machine readable ;-)

Watch Your IO

Saidar - <http://www.i-scream.org/libstatgrab/>

```
Hostname   : s3                Uptime   : 375d 20:35:19      Date    : 2012-10-15 08:56:44

Load 1    : 0.24      CPU Idle  : 68.06%  Running  : 1      Zombie   : 0
Load 5    : 0.35      CPU System: 12.04%  Sleeping: 124   Total    : 125
Load 15   : 0.33      CPU User  : 19.90%  Stopped  : 0      No. Users: 1

Mem Total : 5028M  Swap Total: 2000M  Mem Used  : 91.26%  Paging in  : 6
Mem Used  : 4588M  Swap Used  : 90152K  Swap Used  : 4.40%  Paging out: 590
Mem Free  : 439M   Swap Free  : 1912M  Total Used: 66.54%

Disk Name  Read      Write      Network Interface  rx      tx
sda        6144B    590K      lo                 0B      0B
           6144B    590K      eth0                0B      0B
Total      6144B    590K      eth1                35056B  59118B

Mount Point  Free      Used
/             51373M   62.85%
```

For the rest of us...

Slides: <http://ilia.ws>

@iliaa

THANK YOU FOR LISTENING

Please leave feedback *@*

<https://joind.in/8047>