Pragmatic Django Performance: The 20% that matters

- Performance matters
- Mistakes to avoid
- Smallest changes, largest impact

hello

- Wes Winham @weswinham, gplus.to/weswinham
- Responsible for product development at PolicyStat
- ~6 year old Django app, ~1 million monthly page views
- Lots of lessons learned the hard way

Performance Matters

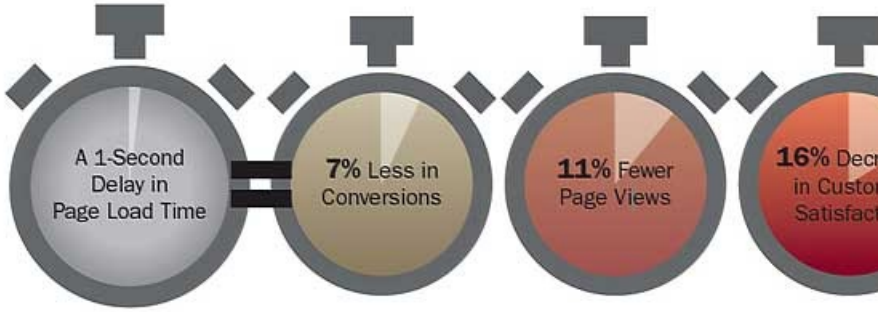


photo: cloudreviews.com

The magic number now is now somewhere between 300 to 250ms

- Harry Schum, Speed specialist for MS

Study Results

- Bing- 2s == 4.3% less revenue
- Yahoo- 400ms == 5-9% less traffic
- Google- 400ms == ~1% less searching

But we're busy!

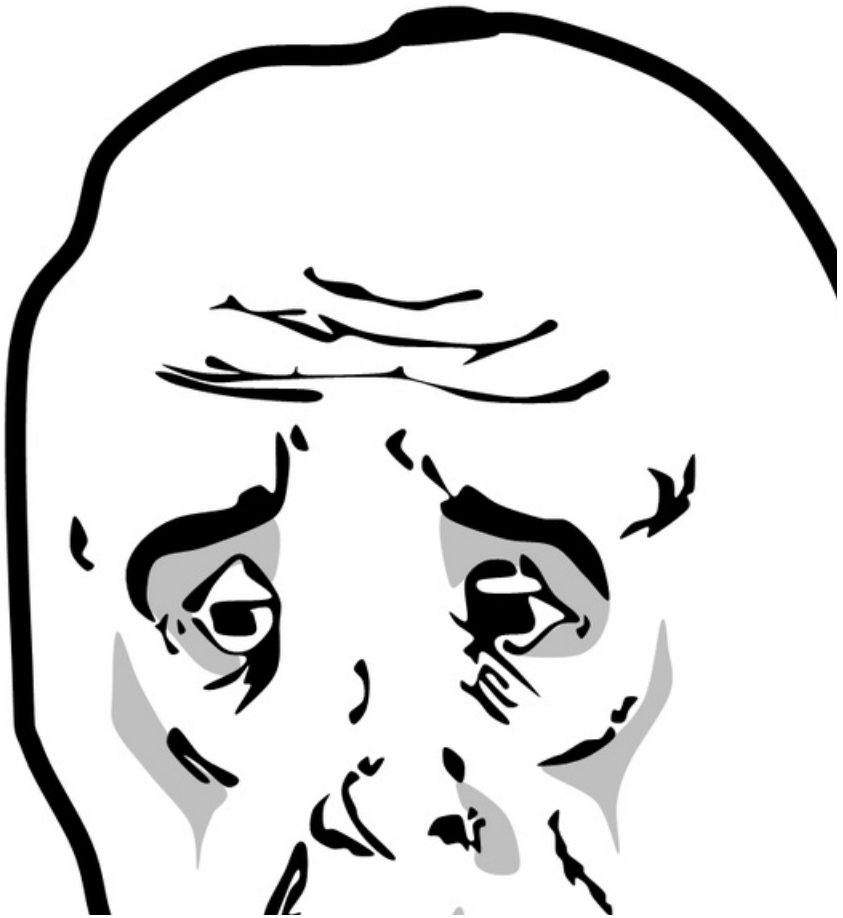
Not that busy

- Many cheap/easy "optimizations"
- Easy once you notice them
- One-time improvements with big payoffs

First rule of optimization:

No premature optimization

It affects to lots of developers

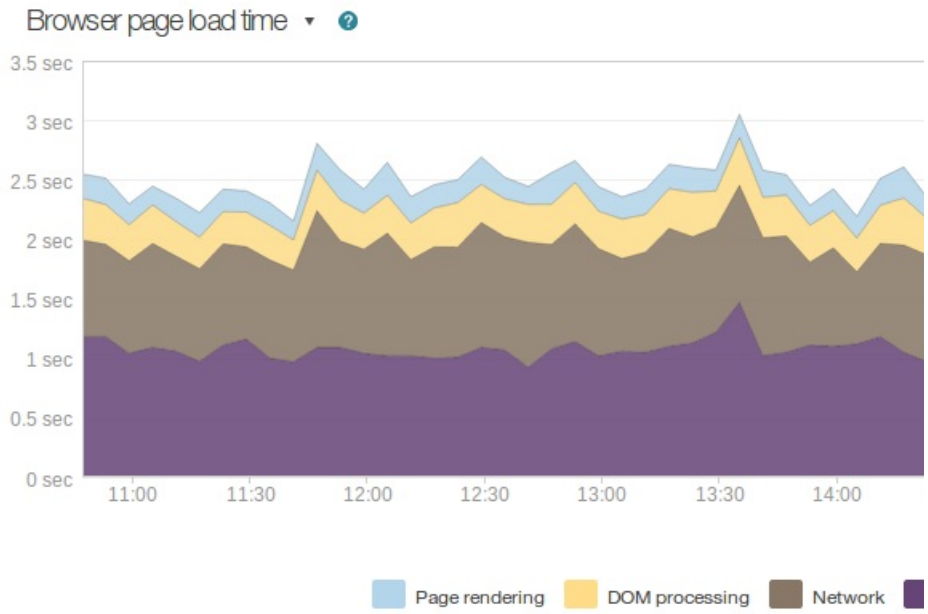


Choose obvious wins!

- Don't add code complexity
- Don't make things fragile
- But you should be monitoring (New Relic)

Advice by (bad) example

Anti-pattern 1: Ignore the front end


Browser page load time
3.5 sec
3 sec
2.5 sec
2 sec
1.5 sec
1 sec
0.5 sec
0 sec
11:00
11:30
12:00
12:30
13:00
13:30
14:00
Page rendering
DOM processing
Network

Our easiest wins are on the front end!

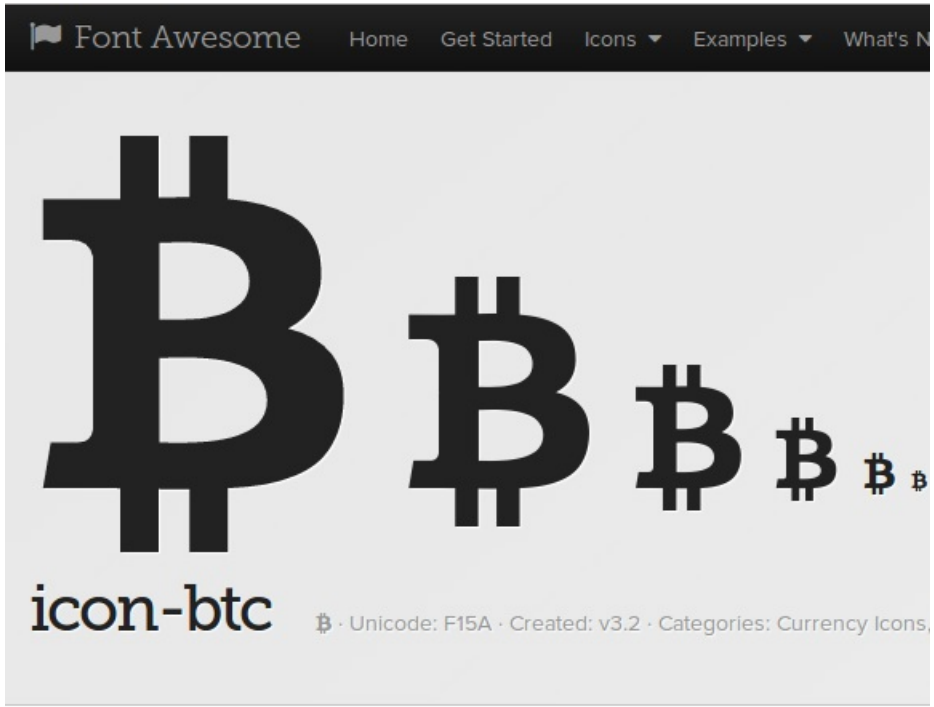
- Server side <50% of time
- Usually <25%

Front end 20%: Reverse Proxy

- Lives in front of uwsgi/mod_wsgi
- Protects you from slow clients
- Serves your media crazy-fast

Front end 20%: GZIP

- Tell nginx to GZIP everything
- Remove django gzip middleware
- Cut network transfer in half, for free



After you get up and running, you can place Font Awesome icons just about anywhere with

icon-btc

Front end 20%: Use a font icon

- HTTP requests for single icons slow you down
- FontAwesome etc look better, anyway

Front end 20%: Merged media

- Use django-compressor (etc)
- CSS at the top, JS at the bottom
- Fewer HTTP requests win!

```
<!-- my_template.html -->

{% load compress %}

{% compress css %}
<link rel="stylesheet"
    href="/static/css/one.css" type="text/css">
<link rel="stylesheet"
    href="/static/css/two.css" type="text/css">
{% endcompress %}
```

Status Text	Type	Initiator	Size Content	Time Latency
200 OK	text/html	Other	6.4 KB 20.0 KB	1.14 s 1.14 s
200 OK	text/css	pstatdev.policystat.com/:29 Parser	17.8 KB 77.2 KB	380 ms 378 ms
200 OK	text/css	pstatdev.policystat.com/:35 Parser	5.4 KB 21.6 KB	99 ms 98 ms
200 OK	text/javascript	pstatdev.policystat.com/:62 Parser	0 B 91.7 KB	36 ms 30 ms
200 OK	text/javascript	pstatdev.policystat.com/:63 Parser	0 B 197 KB	62 ms 35 ms
200 OK	image/jpeg	pstatdev.policystat.com/:139 Parser	9.4 KB 9.0 KB	419 ms 419 ms
200 OK	application/x-javas…	pstatdev.policystat.com/:476 Parser	2.3 KB 5.3 KB	29 ms 28 ms
200 OK	image/gif	pstatdev.policystat.com/:143 Parser	4.1 KB 3.8 KB	30 ms 30 ms
200 OK	image/gif	pstatdev.policystat.com/:193 Parser	1.4 KB 1.0 KB	63 ms 62 ms
200 OK	image/gif	pstatdev.policystat.com/:260 Parser	901 B 563 B	86 ms 85 ms
200 OK	application/x-javas…	(index):485 Script	8.1 KB 20.5 KB	160 ms 159 ms
200 OK	application/x-woff	pstatdev.policystat.com/:1 Parser	43.2 KB 42.6 KB	20 ms 18 ms
200 OK	application/json	mixpanel.2.js:33 Script	469 B 1 B	34 ms 34 ms
200		(index):616	3.9 KB	19 ms

Anti-pattern 2: Database black box

Ways to kill your database

- Don't use a cache or read slave
- What's an index?
- Who needs SQL?

Database 20%: Memcached + Johnny-Cache

- Dead-simple caching
- Stale reads never hit your DB
- Just works

```
# settings.py

MIDDLEWARE_CLASSES = (
    'johnny.middleware.LocalStoreClearMiddlew
    'johnny.middleware.QueryCacheMiddleware
    # ...
)
```

Database 20%: Slow Query Log

- Tells you when you're bad
- Can still mostly use the ORM

Enable the Slow Query Log

```
# /etc/mysql/conf.d/slow_query.cnf

slow_query_log = 1
long_query_time = .1
log_queries_not_using_indexes = 1
```

Read the Slow Query Log

```
# Time: 130823 13:45:48
# User@Host: live0[live0] @ URL[IP]
# Query_time: 10.454075  Lock_time: 0.00008
# Rows_sent: 20  Rows_examined: 149654
use policystat;
SET timestamp=1377265548;
```

How bad was it?

```
# Query_time: 10.454075  Lock_time: 0.00008
# Rows_sent: 20  Rows_examined: 149654
```

When was it?

```
SET timestamp=1377265548;
```

```
SELECT `auth_user`.`id`, ...snip...
FROM `auth_user` LEFT OUTER JOIN `pstat_
  ON (`auth_user`.`id` = `pstat_profile`.`user_id
  INNER JOIN `pstat_tenant`
    ON (`pstat_profile`.`tenant_id` = `pstat_tena
```

```
WHERE (`pstat_profile`.`is_guest` = 0
  AND `pstat_profile`.`tenant_id` IN (
    301, ...snip... 356)
  AND `auth_user`.`is_superuser` = 0
  AND `auth_user`.`is_active` = 1
)
```

Where clause across tables

- Can't index across tables with MySQL
- Your DB chooses *one* index per table
- A JOIN key counts as *one*
- Easy to filter superuser and inactive in python

```
ORDER BY `auth_user`.`last_name` ASC,
`auth_user`.`first_name` ASC,
`auth_user`.`username` ASC
LIMIT 20;
```

Complex ORDER BY

- No index there
- Creates a temporary table!
- Beware of default order_by

Database fixes

- Add an index tenant_id, is_guest
- Python-side filtering is_superuser, is_active
- Sort on indexes last_name, first_name, username

Anti-pattern 3: Default Django Settings

Django Settings 20%: Cache Templates

- Template evaluation is fast
- Disk I/O can be slow
- Cache templates in memory!

```
# settings.py

TEMPLATE_LOADERS = (
(
  'django.template.loaders.cached.Loader',
  (
    'django.template.loaders.filesystem.Loader'
    'django.template.loaders.app_directories.Lo
  )
),
)
```

Anti-pattern 4: Query all the things!

Query 20%: Batch queries

- Don't do queries when iterating in templates
- Get things in one big query, where possible
- select_related() is usually your friend

```
# views.py
context = {
    'my_things': MyThing.objects.filter(foo=bar)
}
```

```
<!-- my_template.html -->
<table>
{% for my_thing in my_things %}
    <tr>
        <td>{{ my_thing.name }}</td>
        <td>{{ my_thing.other_thing.name }}</td>
    <tr>
{% endfor %}
```

See the fail?

select_related() to the rescue!

```
# views.py

context = {
    'my_things': MyThing.objects.filter(
        foo=bar
    ).select_related('other_thing__name')
}
```

Automate catching this fail!

```
# views.py

def test_query_growth(self):
    expected_queries = FuzzyInteger(10, 13)

    # Make 5 MyThing objects

    with self.assertNumQueries(expected_queri
        # Load the view

    # Make 5 more MyThing objects

    with self.assertNumQueries(expected_queri
        # Load the view again
```

Focus on the easy wins

- No extra complexity
- Make them a habit
- The other 20% is much harder