

# Django at Scale

Adam Johnson - [me@adamj.eu](mailto:me@adamj.eu)

12th August 2014

## History

- Worked at Memrise.com as lead developer - 1.3 million users, 20k uniques/day
- Now at YPlan - over 1 million downloads, N uniques/day
- Both powered by Django with API and Web parts

# Scaling Django

- What can you do with your code, caching, and database?



FIG. 2.  
PONY "MAGIC"

# Wrap Django's classes

- Wrap around django where sensible, to implement scalability changes at the highest level.
- Views, admin, models, querysets, fields, ...

```
# project/admin.py
class ModelAdmin(admin.ModelAdmin):
    pass
```

```
# blog/admin.py
from project.admin import ModelAdmin

class BlogPostAdmin(ModelAdmin):
    # bla bla bla ...
```

- e.g. to make all Admin pages use new queryset class (see my [blog post](#) on approximate counts)

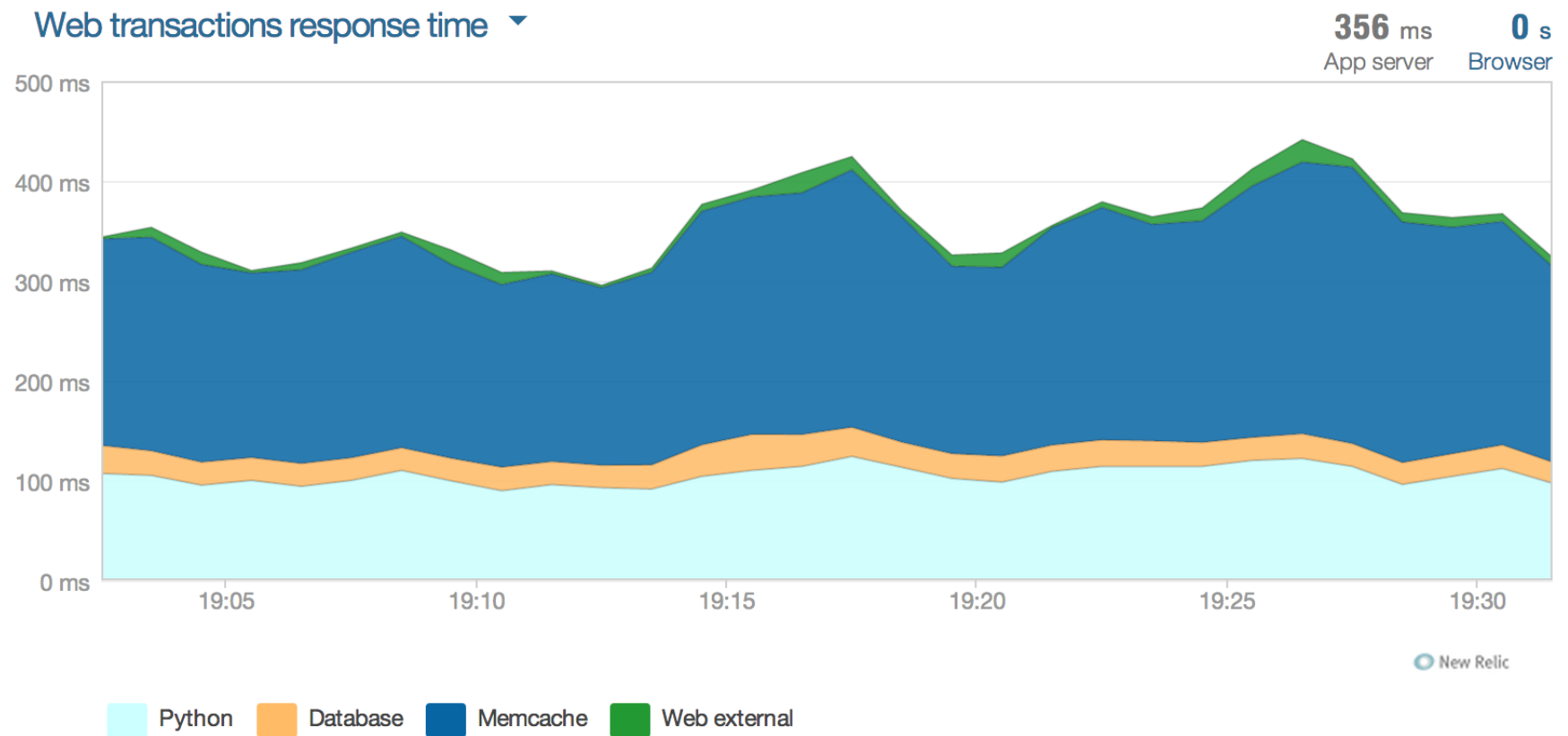
```
# project/admin.py
class ModelAdmin(admin.ModelAdmin):
    def queryset(self, request):
        qs = super(ModelAdmin, self).queryset(request)
        qs = qs._clone(klass=ApproxCountQuerySet)
        return qs
```

# Caching

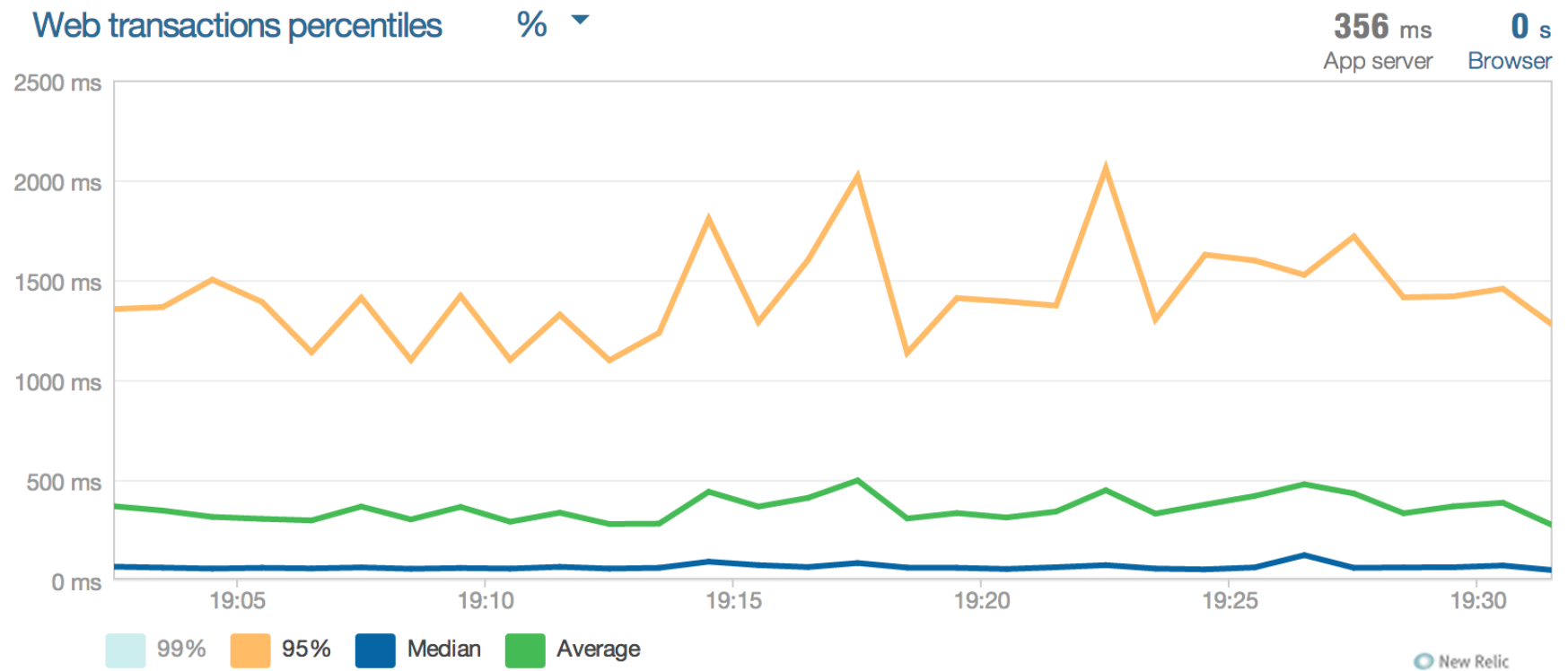


- Caches make things faster.
- But don't be overzealous - keep your caching/invalidation model simple, and don't use it to sticky tape over more fundamental problems (slow DB, code execution time, ...).

- Monitor all the things (New Relic):



- At scale, percentile view is much more useful:





## Background fill your cache

- Typical cache code puts the refill in the request path:

```
def some_func(user_id):  
    cache_key = 'key:' + str(user_id)  
    val = cache.get(cache_key)  
    if val is None:  
        val = slow_func()  
        cache.set(cache_key, val)  
    return val
```

- For the 99th percentile power user, a reasonable but slightly slow function call could become way too slow (>100ms).

- Instead, use an always-there cache value with a timestamp:

```
def some_func():  
    cache_key = 'key:' + str(user_id)  
    last_update, val = cache.get(cache_key)  
    if last_update < now() - timedelta(minutes=15):  
        # celery task to refill cache_key  
        slow_func.apply_async([user_id])  
    return val
```

- In-request code path now just one cache fetch for even the 99th percentile user on a bad day.
- (Code simplified - you want to put task in queue just once, and maybe use a persistent cache backend.)

# Database

- Don't be hasty to get away from the ORM or relational databases.
- Instead, learn them better.
- Understand how Querysets become SQL, how the DB will handle SQL, and find easy wins on this path.

## Use `prefetch_related`

- **`select_related`** on many models will generate a query with a lot of JOIN clauses.
- **`prefetch_related`** will generate many smaller simpler queries - one for each table.
- It may be counterintuitive, but using **`prefetch_related`** to do app-level JOINS can be faster and is much more scalable.
- Django is really friendly here - it's so easy to switch 'select' to 'prefetch' !

# Learn the way of the index

- Indexing is an art that takes time to perfect. Some trial and error.
- Number one problem in Django - bunging 'index=True' on several fields and expecting all queries to magically speed up.



# Run a query killer/sniper



- Web request timed out != query cancelled
- Every 10 seconds, kill any query lasting longer than 30 seconds, and email you about it



## Use replicas smartly



- Replicas are amazing, use them.

- You can use a **DBRouter** in your Django settings to add logic for which DB is used.
- Or, you can manually direct certain queries that you know can handle slightly stale data, e.g.:

```
# project/admin.py
class ModelAdmin(admin.ModelAdmin):
    def queryset(self, request):
        qs = super(ModelAdmin, self).queryset(request)
        if request.method == 'GET':
            qs = qs.using('replica')
        return qs
```

- Routing admin to replica is actually a really big win - stop the big nasty admin queries from affecting the performance of the main app.



# Thank you

- [me@adamj.eu](mailto:me@adamj.eu)