

Оптимизация запросов к базе данных.

На странице <http://151.248.113.248/products/category/9/> (без залогиненного пользователя) мы получаем два дубля в sql-запросах.

SQL queries from 1 connection

default 6,30 ms (7 запросов including 2 similar and 2 duplicates)

Запрос	Временная диаграмма	Время (мс)	Действие
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_product" INNER JOIN "mainapp_productcategory" ON ("mainapp_product"."category_id" = "mainapp_productcategory"."id") WHERE ("mainapp_productcategory"."is_active" AND "mainapp_product"."is_active")</div></div></div>		2,57	<div>Sel</div> <div>Expl</div>
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_productcategory" WHERE "mainapp_productcategory"."id" = 9 LIMIT 21</div></div></div> <div>2 similar queries. Дублей: 2.</div>		0,76	<div>Sel</div> <div>Expl</div>
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_productcategory" WHERE "mainapp_productcategory"."id" = 9 LIMIT 21</div></div></div> <div>2 similar queries. Дублей: 2.</div>		0,40	<div>Sel</div> <div>Expl</div>
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_product" INNER JOIN "mainapp_productcategory" ON ("mainapp_product"."category_id" = "mainapp_productcategory"."id") WHERE ("mainapp_productcategory"."is_active" AND "mainapp_product"."category_id" = 9 AND "mainapp_product"."is_active")</div></div></div>		0,71	<div>Sel</div> <div>Expl</div>
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_productcategory" WHERE "mainapp_productcategory"."is_active"</div></div></div>		0,48	<div>Sel</div> <div>Expl</div>
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_product" INNER JOIN "mainapp_productcategory" ON ("mainapp_product"."category_id" = "mainapp_productcategory"."id") WHERE ("mainapp_productcategory"."is_active" AND "mainapp_product"."category_id" = 9 AND "mainapp_product"."is_active") ORDER BY "mainapp_product"."price" ASC LIMIT 2</div></div></div>		0,87	<div>Sel</div> <div>Expl</div>
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_product" INNER JOIN "mainapp_productcategory" ON ("mainapp_product"."category_id" = "mainapp_productcategory"."id") WHERE ("mainapp_product"."category_id" = 9 AND "mainapp_productcategory"."is_active" AND "mainapp_product"."is_active" AND NOT ("mainapp_product"."id" = 15)) LIMIT 3</div></div></div>		0,52	<div>Sel</div> <div>Expl</div>

Для оптимизации нужно изменить строку 21 файла mainapp/views.py с

```
related_products = Product.objects\
    .filter(is_active=True, category__is_active=True, category=product.category)\
    .exclude(pk=product.pk)[:3]
```

на:

```
related_products = Product.objects\
    .filter(is_active=True, category__is_active=True)\
    .select_related('category')\
    .exclude(pk=product.pk)[:3]
```

В результате получим отсутствие дублирующих обращений к базе данных:

SQL queries from 1 connection

default 4,87 ms (6 запросов)

Запрос	Временная диаграмма	Время (мс)	Действие
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_product" INNER JOIN "mainapp_productcategory" ON ("mainapp_product"."category_id" = "mainapp_productcategory"."id") WHERE ("mainapp_productcategory"."is_active" AND "mainapp_product"."is_active")</div></div></div>		1,63	<div>Sel</div> <div>Expl</div>
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_productcategory" WHERE "mainapp_productcategory"."id" = 9 LIMIT 21</div></div></div>		0,67	<div>Sel</div> <div>Expl</div>
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_product" INNER JOIN "mainapp_productcategory" ON ("mainapp_product"."category_id" = "mainapp_productcategory"."id") WHERE ("mainapp_productcategory"."is_active" AND "mainapp_product"."category_id" = 9 AND "mainapp_product"."is_active")</div></div></div>		0,59	<div>Sel</div> <div>Expl</div>
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_productcategory" WHERE "mainapp_productcategory"."is_active"</div></div></div>		0,46	<div>Sel</div> <div>Expl</div>
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_product" INNER JOIN "mainapp_productcategory" ON ("mainapp_product"."category_id" = "mainapp_productcategory"."id") WHERE ("mainapp_productcategory"."is_active" AND "mainapp_product"."category_id" = 9 AND "mainapp_product"."is_active") ORDER BY "mainapp_product"."price" ASC LIMIT 2</div></div></div>		0,85	<div>Sel</div> <div>Expl</div>
<div><div></div><div><div>+</div><div>SELECT *** FROM "mainapp_product" INNER JOIN "mainapp_productcategory" ON ("mainapp_product"."category_id" = "mainapp_productcategory"."id") WHERE ("mainapp_productcategory"."is_active" AND "mainapp_product"."is_active" AND NOT ("mainapp_product"."id" = 14)) LIMIT 3</div></div></div>		0,67	<div>Sel</div> <div>Expl</div>

Залогиним администратора, создадим для него корзину с товарами и перейдем на главную страницу (<http://151.248.113.248/>). Имеем следующие запросы к базе данных.

SQL queries from 1 connection

default 5,41 ms (6 запросов including 4 similar and 4 duplicates)

Запрос	Временная диаграмма	Время (мс)	Действие
<input type="checkbox"/> SELECT ... FROM "django_session" WHERE ("django_session"."expire_date" > '2021-09-04T11:43:13.090542':timestamp AND "django_session"."session_key" = 'wz64tbl1ys3fw17wxi44hc7oq1isxyp4') LIMIT 21		1,71	<input type="button" value="Sel"/> <input type="button" value="Expl"/>
<input type="checkbox"/> SELECT ... FROM "authapp_shopuser" WHERE "authapp_shopuser"."id" = 1 LIMIT 21 2 similar queries. Дублей: 2.		1,08	<input type="button" value="Sel"/> <input type="button" value="Expl"/>
<input type="checkbox"/> SELECT ... FROM "social_auth_usersocialauth" WHERE "social_auth_usersocialauth"."user_id" = 1		0,84	<input type="button" value="Sel"/> <input type="button" value="Expl"/>
<input type="checkbox"/> SELECT ... FROM "basketapp_basket" WHERE "basketapp_basket"."user_id" = 1 2 similar queries. Дублей: 2.		0,77	<input type="button" value="Sel"/> <input type="button" value="Expl"/>
<input type="checkbox"/> SELECT ... FROM "authapp_shopuser" WHERE "authapp_shopuser"."id" = 1 LIMIT 21 2 similar queries. Дублей: 2.		0,54	<input type="button" value="Sel"/> <input type="button" value="Expl"/>
<input type="checkbox"/> SELECT ... FROM "basketapp_basket" WHERE "basketapp_basket"."user_id" = 1 2 similar queries. Дублей: 2.		0,47	<input type="button" value="Sel"/> <input type="button" value="Expl"/>

Опять у нас много дублей. Оптимизируем запросы basketapp/models.py – Basket.total_quantity

SQL queries from 1 connection

default 4,49 ms (5 запросов)

Запрос	Временная диаграмма	Время (мс)	Действие
<input type="checkbox"/> SELECT ... FROM "django_session" WHERE ("django_session"."expire_date" > '2021-09-04T11:54:21.895047':timestamp AND "django_session"."session_key" = 'wz64tbl1ys3fw17wxi44hc7oq1isxyp4') LIMIT 21		1,57	<input type="button" value="Sel"/> <input type="button" value="Expl"/>
<input type="checkbox"/> SELECT ... FROM "authapp_shopuser" WHERE "authapp_shopuser"."id" = 1 LIMIT 21		0,94	<input type="button" value="Sel"/> <input type="button" value="Expl"/>
<input type="checkbox"/> SELECT ... FROM "social_auth_usersocialauth" WHERE "social_auth_usersocialauth"."user_id" = 1		0,66	<input type="button" value="Sel"/> <input type="button" value="Expl"/>
<input type="checkbox"/> SELECT ... FROM "basketapp_basket" WHERE "basketapp_basket"."user_id" = 1		0,58	<input type="button" value="Sel"/> <input type="button" value="Expl"/>
<input type="checkbox"/> SELECT ... FROM "basketapp_basket" INNER JOIN "authapp_shopuser" ON ("basketapp_basket"."user_id" = "authapp_shopuser"."id")		0,74	<input type="button" value="Sel"/> <input type="button" value="Expl"/>

количество запросов уменьшилось, хотя выигрыш во времени небольшой.

Загрузка сайта на PageSpeed Insights (для desktop):



http://151.248.113.248/products/category/9/



Field Data — The Chrome User Experience Report [does not have sufficient real-world speed data](#) for this page.

Origin Summary — The Chrome User Experience Report [does not have sufficient real-world speed data](#) for this origin.



Lab Data — Metrics are based on [lab data](#) collected and analyzed by [Lighthouse](#).



● First Contentful Paint	0.8 s	● Time to Interactive	0.8 s
● Speed Index	0.8 s	● Total Blocking Time	0 ms
● Largest Contentful Paint	0.9 s	● Cumulative Layout Shift	0

Values are estimated and may vary. The [performance score](#) is calculated directly from these metrics. [See calculator](#).

[VIEW TREEMAP](#)

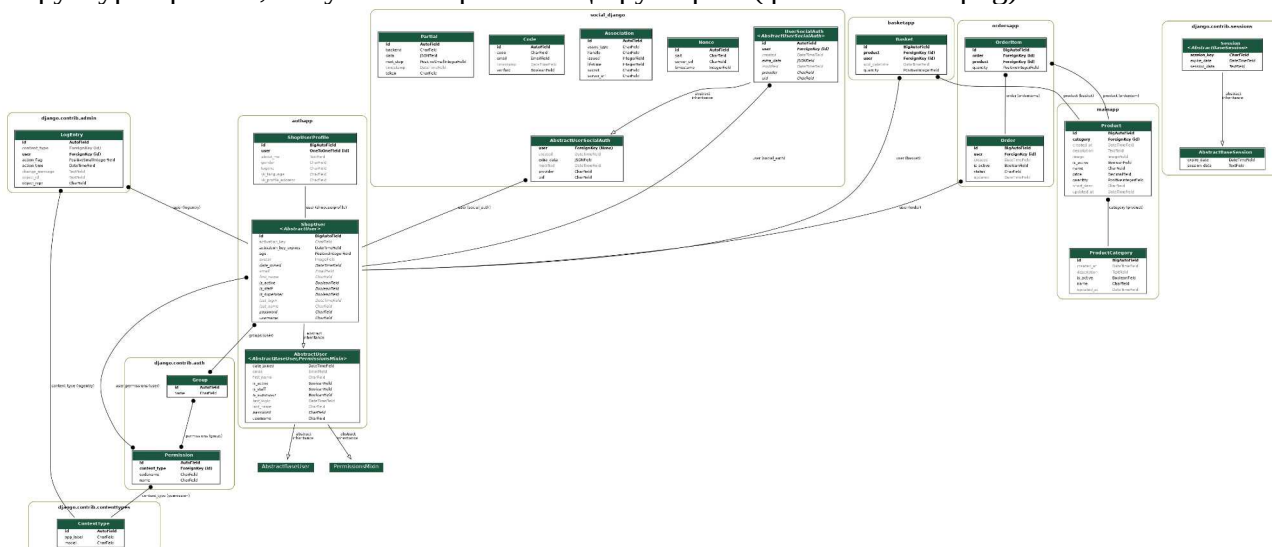


Show audits relevant to: [All](#) [FCP](#) [LCP](#) [TBT](#) [CLS](#)

Opportunities — These suggestions can help your page load faster. They don't [directly affect](#) the Performance score.

Opportunity	Estimated Savings
■ Eliminate render-blocking resources	0.64 s

Структура проекта, полученная при помощи pydotplus (файл structure.png):



Так же получен файл всех url: `geekshop-urls.txt`

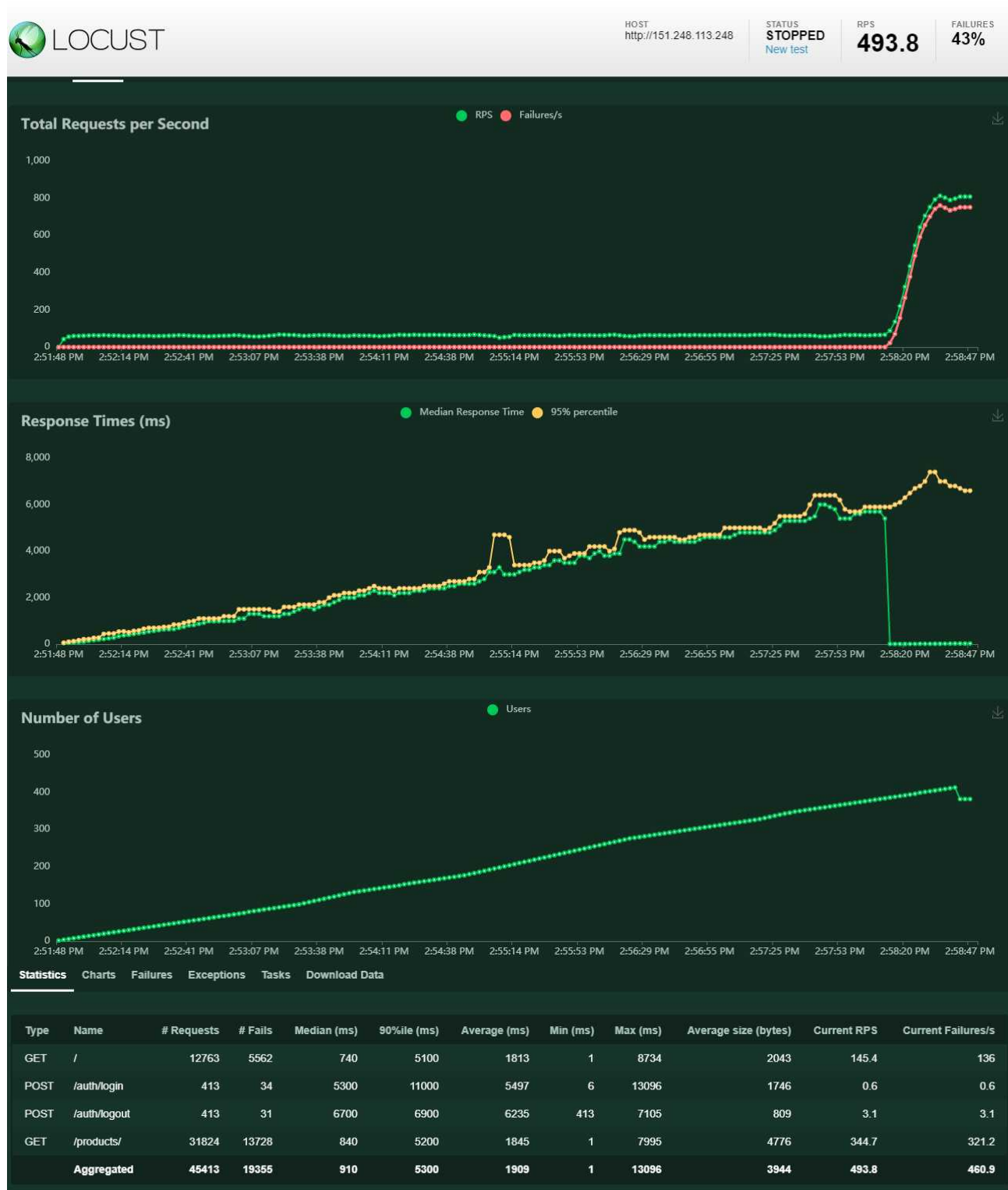
Испытание работы сервера утилитой siege. Для этого отключил обязательный логин на страницах чтения информации о заказе.

```
kris@151-248-113-248:~/Django-2021-1
$ cat login_url.txt
http://151.248.113.248/order/read/1
http://151.248.113.248/order/read/2
http://151.248.113.248/order/read/3
http://151.248.113.248/order/read/4
http://151.248.113.248/order/read/5
http://151.248.113.248/order/read/6
http://151.248.113.248/order/read/7
http://151.248.113.248/order/read/8
http://151.248.113.248/order/read/9
http://151.248.113.248/order/read/10
kris@151-248-113-248:~/Django-2021-1
$ siege -f login_url.txt -d1 -r10 -c100
** SIEGE 4.0.4
** Preparing 100 concurrent users for battle.
The server is now under siege...
Transactions:                13800 hits
Availability:                100.00 %
Elapsed time:                 48.34 secs
Data transferred:            155.83 MB
Response time:                0.29 secs
Transaction rate:            285.48 trans/sec
Throughput:                   3.22 MB/sec
Concurrency:                 82.96
Successful transactions:     12800
Failed transactions:         0
Longest transaction:         4.76
Shortest transaction:        0.00

kris@151-248-113-248:~/Django-2021-1
$
```

При сценарии ста пользователей делающих один запрос в секунду по страницам заранее созданных десяти заказов сервер обработал правильно все запросы.

Теперь атакуем сайт при помощи саранчи (locust):



Сервер выдержал 380 пользователей. При этом, конечно среднее время ответа превысило 5.5 секунд.