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M. Yakovliev, K. Filonenko

National Technical University "Kharkiv Polytechnic Institute", Kharkiv, Ukraine

EFFECTS OF LOADING SPEED ON THE SITE TRAFFIC CONVERSION

The **subject** of this article is the impact of site loading speed to increase user conversions. The **goal** is to determine what is the optimal site loading speed for users and further site optimization. Tasks: identify and optimize the components that take the longest load time. The **methods** used are: optimization of the server part of the site; Configuring Apache and Ngix Server Using server side gzip compression Using CDNs to download popular JavaScript libraries server-side caching settings; database optimization; optimization of TCP, TLS, HTTP / 2; client side optimization. The following **results** are obtained. Using the methods described above, on the example of a working draft, it was possible to optimize the site loading speed by 40%. Taking statistics for the period of 7 days, with the same amount of traffic, the conversion of users to customers increased from 7% to 15%. The number of failures on the first visit to the site decreased by 30%. **Conclusions**. In the course of work, the correlation between the speed of loading the site and the conversion of users to customers was confirmed. By optimizing the speed of loading the site, it was possible to increase the conversion of users by 2 times and reduce the percentage of failure on the first visit to the site.

Keywords: **user conversion, failure percentage, optimization, server part, client part.**

Introduction

Download speed is one of the key parameters that influence the failure rate and the conversion of users. An example of this is typical behavior when visiting the site. If a user navigates to a page and is forced to wait a long time to obtain the necessary information, it is likely to leave the page and go to a site that immediately provide him with the necessary information.

The most relevant download speed for commercial sites. Particularly acute this option if the site is promoted with the help of contextual advertising in search engines. Based on research and personal experience, identifies the following user behavior: 1) the user enters a query into the Google search box; 2) the user receives the search results; first 3-5 results of issue advertising and appropriately marked marker; 3) user opens new tabs in the first few sites from search results; 4) the user starts alternately studying the open pages.

In this context, if your site will be a long time to boot, the user can quickly move to the next site, rather than expect your download. Of particular relevance is the download speed on mobile devices. Mobile Internet is not stable fast download speeds, as well as the context and the user environment is not conducive to a measured information search. If you want to get information on the go, in a hurry with low internet speed, the speed of page loading is important.

Research results

1. Site speed for business. It's no secret that the current business to a greater extent now depends on the promotion of their services on the Internet. Site as one of the tools to promote their brand and services must comply with many criteria to meet the user's expectations. These criteria include: UX, information architecture, offers relevant, marketing content and other component. The first with a user faces - how quickly he can get to the information on your site. The average conversion into the desired a ction is 1/10. In other words, 10 out of 100 people visiting your site likely to make a purchase or other desired effect. Due to low download speed you risk losing users at an early stage - they visit your site. Suppose due to the long download speed instead of 100 users you passed 60. The average conversion of 60 people will have 6 members who have committed targeted action. If we translate this into the plane of money and income, we assume that each user brings you 50 USD. We get the following: 100 users - 10 to make a purchase - 10 * 50 = 500 USD; 60 members - 6 to make a purchase - 6 * 50 = 300 USD. Just because you download speeds as an entrepreneur may lose 40% of the income in this case.

2. Exceptions. The exception to this rule are the large and popular resources such as Facebook, OLX, Rozetka and so on. This phenomenon is due to the fact that the user's motivation and desire to get content higher than the irritation of waiting time. The benefits of waiting only works if your service is quite well known, and helps the user to solve his problem. The user knows in advance what to expect from life and what he'll get. Instead, he is willing to expectations.

3. Research. Large companies, including Google, conducted numerous studies on the impact of download speed. The following describes the results of these studies [1–6].

3.1. Google: "If the site is loaded for more than three seconds, 53% of users leave it" [1]. Download speed - an important parameter. To check the speed of the download, you can use the service from Google - Test My Site [2].

3.2. SOASTA: "Every second mobile page conversion delay reduces by 20%". According to the results of a joint study of the analytical agency SOASTA conversion depends on how fast the user is the target site. So, those pages that often led to conversion, were on average 26% faster than the others.

3.3. Google: "The mobile page, which has decreased the rate of 1 to 10 seconds, the failure rate increased by 123%". The largest gap in conversion is observed in the range of 2-5 seconds. According to studies, the conversion drops to 9 times.

3.4. Google: "Slow download speed - a negative ranking factor in Google». One of the principles of ranking in Google SERP - Mobile First Index. This principle works as follows: if the site is slow and not optimized mobile version, the desktop and in issuing it, too, will pessimizirovan (i.e. goes down).

3.5. Google: "Slow download speed is the most irritating factor for mobile users". According to a survey conducted by Google in 2015, the year she went around advertising unplayable video and redirects to the main page. It is important to note that this refers exclusively to mobile users - but they are the most active internet audience in the last few years.

3.6. Search Engine Land: "The most popular websites with heavy traffic does not meet Google's criteria". Analytical site Search Engine Land conducted its own study, which analyzed the 1000 most popular websites with high traffic. He tested each through service Page Speed Insight and got some interesting results. It was found that only 2% of mobile sites received 100 out of 100 points. On the desktop the percentage has not changed much: only 4% exceed level of 90 points. The average stayed near 55 points, and the average speed of the page - 11 seconds. This casts doubt on the idea that 53% of users leave a site that loads more than three seconds.

3.7. Google: "Index loading speed affects the issue of less than 1% Google search results". Google acknowledges in its official blog. It also confirms that the chase too high download speed does not make sense.

3.8. User Interface Engineering: "If users complain about download speed, then in fact the problem lies elsewhere". It is to this paradoxical conclusion reached by researchers from the User Interface Engineering website. They found that there was no correlation between the actual speed of the download site and how it is perceived by users. As it turned out, if the site does not meet their needs if they can not find in it what they are looking for, they will perceive the session as a waste of time. A download speed will seem to them more slowly than it actually is.

3.9. WP Faster: "The download speed is not one of the eight main indicators of the effectiveness of the site". Many web developers are engaged in site optimization, do not focus on speed, and comfortable user experience.

3.10. Total. Based on the above studies, we can draw the following conclusions:

- Google engineers found that the user notices even the trifling delay loading - 0.4 seconds;
- Users are more likely to leave the page, if that is loaded 3+ seconds;
- Mobile users are willing to wait a little longer - 6-10 seconds;
- 79% of users of online stores do not re-buy if the first time the site was loaded for a long time.

What download speed performance necessary to be guided?

- 1 second - great but elusive results.
- 2-3 seconds - the standard response time most successful resources.
- 3-5 seconds - a small, but for some tolerant rate of projects;
- 6-10 seconds - so low rate of negative impact on the promotion;
- 11 seconds - a lamentable result that urgently needs to speed up the site.

4. From what download speeds depend on? Download speed can be divided into server and client side. It is these two components subsequently fall under optimization. Full load cycle on the first visit as follows:

- DNS-query on the name of the resource.
- Connecting to the server by IP-address.
- Installation secure connection when using HTTPS.
- Query HTML-pages on the url and wait response from the server.
- Loading HTML.
- Parsing file on the browser side, the creation of the request queue.
- Download and analysis of CSS-styles.
- Download and run JS-code.
- Top of the page rendering, execution of JavaScript (JS).
- Download web-fonts.
- Uploading images and other media.
- End drawing, work deferred JS-code.

The individual steps may be reversed or performed in parallel, but the essence remains unchanged.

Items from the first to the fourth refer to the server optimization, the rest - to the client.

5. Tools for monitoring the speed of loading [6].

5.1.Google PageSpeed Insights. Convenient analyzer from Google for a quick assessment of client optimization. PageSpeed lets you know the speed and level of optimization for computers and mobile devices. Site speed is determined by two metrics: FCP and DCL.

5.2. Pingdom. Service to calculate the average load time and the number of calls to the server. Service details displays important information about the speed of images, styles, JavaScript, scripts and other page elements - allows you to immediately detect problem areas that hinder your site, and get tips on how to improve them.

5.3. Google Analytics Report. Reports Google analytics allow us to get a full range of data on your resource. Including performance reports until each page and the session. The result is a general summary of the average speed of response from the server, domain lookup, forwarding, and page load.

5.4. GTmetrix. Service testing resource productivity by providing a lot of useful information. Thanks to the preservation of the history of this service makes it possible to compare how deteriorated or improved speed after making edits..

5.4. PR-CY. The service allows the project to evaluate the performance of your phone and computer. In addition, the service provides detailed information to help in optimization.

6. Accelerating the speed of loading site [5–9].

6.1. The server part.

6.2. Improving hosting.

6.3. Configure Nginx server.

6.4. Removing unused nginx-modules.
6.5. Working with the Server section.
6.6. Data compression.
6.7. Caching static files.
6.8. Apache server configuration.
6.9. Gzip - compress on the server side.
6.10. CDN to load popular JavaScript libraries.
6.12. Configuring server-side caching.
6.13. Database optimization.
6.14. Optimization of TCP, TLS, HTTP/2. I
6.15. Number of HTTP-requests.
6.16. Decrease redirects.
6.17. The client part.
6.18. Setting up an asynchronous download.
6.19. Remove extra plugins.
6.20. Optimize the page size.
6.21. Physical compression graphics.
6.22. Refusal to scale images.
6.23. Optimization of JavaScript and CSS.
6.24. Optimization of web fonts.
6.25. Setting up caching on the browser side.

Conclusion

Taken together, the measures described above make it possible to get the most optimal download speed, thereby directly affecting the conversion and the number of users of your site. All the above measures have been imposed on the company website Geometrya.com.ua - online store mirrors. conversion growth figures do not take long to wait. Taking the statistics for the period - 7 days, for the same amount of traffic, conversion to purchase the site has grown from 7% to 15%. A number of failures at the first visit decreased by 30%. As a result of impact on the number of purchases and share profits.

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Рецензент: д-р техн. наук, проф. К. С. Козелкова,
Державний університет телекомунікацій, Київ
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Вплив швидкості завантаження сайтів на конверсію трафіку

М. В. Яковлєв, К. Д. Філоненко

Предметом вивчення є вплив швидкості завантаження сайтів для збільшення конверсії користувачів. **Метою** є визначення оптимальної швидкості завантаження сайту для користувачів і подальша оптимізація сайту. **Завдання:** визначити та оптимізувати компоненти, які займають найбільше часу завантаження. Використовуваними **методами** є: оптимізація серверної частини сайту; налаштування сервера Apache і Ngix; використання Gzip стиснення на стороні сервера; використання CDN для завантаження популярних JavaScript бібліотек; настройка кешування на стороні сервера; оптимізація бази даних; оптимізація TCP, TLS, HTTP / 2; оптимізація клієнтської частини. Отримані такі **результати.** На прикладі робочого проекту, вдалося оптимізувати швидкість завантаження сайту на 40%. Взявши статистику за період - 7 днів, при тій же кількості трафіку, конверсія користувачів в покупців зросла з 7% до 15%. Кількість відмов при першому відвідуванні сайту знизилася на 30%. **Висновки.** В ході роботи, підтверджена кореляція між швидкістю завантаження сайту і конверсією користувачів в покупців. Оптимізувавши швидкість завантаження сайту, вдалося в 2 рази збільшити конверсію користувачів і зменшити відсоток відмови при першому відвідуванні сайту.

Ключові слова: конверсія користувачів, відсоток відмови, оптимізація, серверна частина, клієнтська частина.

Влияние скорости загрузки сайтов на конверсию трафика

М. В. Яковлев, К. Д. Филоненко

Предмет изучения – влияние скорости загрузки сайтов для увеличения конверсии пользователей. **Целью** является определение оптимальной скорости загрузки сайта для пользователей и дальнейшая оптимизация сайта. **Задачи:** определить и оптимизировать компоненты, которые занимают наибольшее время загрузки. Используемыми **методами** являются**:** оптимизация серверной части сайта; настройка сервера Apache и Ngix; использование Gzip сжатия на стороне сервера; использование CDN для загрузки популярных JavaScript библиотек; настройка кэширования на стороне сервера; оптимизация базы данных; оптимизация TCP, TLS, HTTP/2; оптимизация клиентской части. Получены следующие **результаты.** На примере рабочего проекта, удалось оптимизировать скорость загрузки сайта на 40%. Взяв

статистику за период – 7 дней, при том же количестве трафика, конверсия пользователей в покупателей выросла с 7% до 15%. Количество отказов при первом посещении сайта снизилась на 30%. **Выводы.** В ходе работы , подтверждена корреляция между скоростью загрузки сайта и конверсией пользователей в покупателей. Оптимизировав скорость загрузки сайта, удалось в 2 раза увеличить конверсию пользователей и уменьшить процент отказа при первом посещении сайта.

Ключевые слова: конверсия пользователей, процент отказа, оптимизация, серверная часть, клиентская часть.