Web Content Management Systems used by Search Engine Optimization Experts for Top Rankings in Search Engine Results Pages

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Abstract: There are several Web Content Management Systems (WCMS) available that are used by web developers in order to develop and manage a website. In addition, over the last years, companies have invested in Search Engine Optimization (SEO) techniques by applying the factors used by search engines, such as Google, in order to rank amongst the first results in Search Engine Results Pages (SERPs). On-page factors such as the implementation of keywords in the title tags and the website loading time are amongst the criteria that are taken into consideration and are directly affected by the website's technology and WCMS. Following a relevant literature review, the authors conducted research amongst 6682 websites in order to identify whether and which WCMS is used by SEO experts' websites that appear in the top search results. Findings indicated that custom made websites that do not rely on widely used WCMSs appear more frequently at the top of search results, while the Drupal CMS appears quite high, despite it being used by a small number of websites across the web.

Keywords: Search Engine Optimization, SEO, WCMS, Google, Search Engine, Ranking factor, Digital Marketing

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1 Introduction

SEO is a highly critical process which impacts the rankings of a website in search engines, such as Google [1]. Given that buyers use the internet and search engines in their everyday life in order to search for products and services, showing up at the top organic results ensures a plethora of potential clients for a company and contributes to the development and improvement of its profitability [2,3]. It has been proven that the successful implementation of a SEO strategy contributes towards improving product marketing and allows companies to enhance their visibility, to increase user engagement and sales revenue [4,5]. On the other hand, if a company does not manage to efficiently apply SEO techniques and to appear at the top rankings in organic search results, it then has to spend large amounts on paid campaigns for specific keywords; however, a SEO strategy is more cost effective than a paid campaign [6].

Furthermore, research shows that the Google search engine is used by 92,26% of internet users and many of these have it set as the default option while using Google Chrome [7]. It has been suggested that the factors which affect website rankings in terms of search results are classed as either on-page or off-page factors [8]. SSL certificate use, keywords use in landing pages, responsive design for mobile devices and website loading speed are all considered on-page factors, as a website with a fast-loading speed creates a positive user experience [9].

As discussed further on in the research, the aforementioned indicative factors are affected by the technology of the website. Website development can be accomplished through the use of closed-source or open-source WCMS, which are quite popular [10].

In the present article the authors aimed to study which WCMs are used by SEO experts as well as to examine whether the use of a specific CMS positively affects ranking in SERPs. The current research was conducted based upon reviewing relevant research and literature.

To be more specific, at the first stage the researchers selected 6882 SEO experts' websites which appeared in Google search results for specific keywords, based on their ranking. Initially

180 keywords were used and the top 40 results for each of these were recorded. At the next stage, an automated search was conducted regarding the use of any of the most popular WCMS. Later on the authors presented and analyzed these findings by associating the use of the aforementioned WCMS with the impact on Google ranking.

2 Web Content Management Systems and Search Engine Optimization

2.1 Web content management systems

Web developers are currently able to use WCMSs which allow them to create a website within a short timeframe as well as to effectively manage it [11,12]. These systems provide publishing and digital content management tools without having to know a web programming language such as HTML or PHP [13]. Most of these are open source and provide fast and affordable development of web applications [14]. Thanks to the available WCMS, businesses are able to easily create complex online applications, websites and e-shops. Different WCMSs such as WordPress, Drupal and Joomla perform differently in terms of their functionality [15]; thus there are several issues to take into account when selecting a CMS during the website development process [16,17].

The main advantage provided by WCMSs is that they offer users with poor IT background the possibility to create a website [18]. They provide a series of tools and libraries, known as plugins and modules, that enable the user to easily and quickly develop a web application [19]. However, issues around security often encountered by users is one of the disadvantages that stem from using open source WCMSs [20–22]. Annual research conducted by Sucuri indicates that 94% of hacked websites use WordPress CMS [23]. Several of the security issues are related to the use of not updated plugins [24].

In terms of their popularity, research around a sample of the top 10 million websites available on the Alexa list, indicated that 61% of websites use some CMS [25]. To be more specific, according to the aforementioned research, 39% out of the website total does not use a CMS or use a custom one, 38% relies on WordPress, 2,2% relies on Joomla and 1,5% relies on Drupal. Figure 1 also displays the option for Other CMS & e-business platforms which include electronic commerce systems, such as Shopify (3,1%), Magento (0,7%), Opencart (0,6%), Prestashop (0,5%); these, however, are outside the scope of the present research and are therefore not presented extensively.

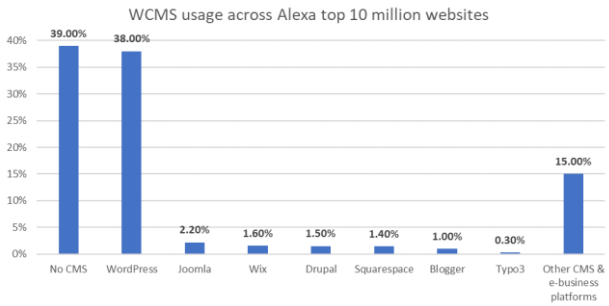

Figure 1. WCMS usage across Alexa top 10 million websites [25]

2.2 Search Engine Optimization

There are, therefore, numerous CMSs which enable programmers, digital marketeers, webmasters and others to publish a website online. However, just having a website is not sufficient for business advancement, as its presence amongst search results top rankings is a significant factor in terms of its success. Users utilise search engines on a daily basis in order to search for information around products and services and they mostly select websites that appear at the top five search results of their search [26].

More specifically, industry studies indicate that the top ranking result gets 31,7% of clicks, the second one gets 24,7%, the third gets 18,7%, the 4th gets 13,6% and the 5th gets 9,5% [27]. Similarly, according to research findings by Sistrix [28] and Moz [29], 71,33% of searches lead to a website that appears at the top page of organic search results, while the second and third page get 5,59% of overall clicks. For the first page in particular, the 5 first results get 67,6% of clicks while results displayed from the 6th until the 10th ranking only get 3,73%. These statistics highlight the great significance of optimizing websites in terms of search engines, which class websites based on certain criteria. Research suggests that the ranking of a website in SERPs is affected by several factors including on-page factors, off-page factors as well as the key words analysis process [9,30–32].

One of the on-page factors that have proven to affect ranking in search results is Page Size and Website Loading Time [33,34]. Website Loading Time is primarily determined by website technology and CMS as well as the webserver where it is hosted, and its optimization is a big challenge for web developers [35]. Responsive design that is related to the website theme and its technology, and therefore to its CMS, is another factor that search engines take into consideration when ranking websites in their SERPs [36]. Furthermore, consistent use of key phrases in

HTML tags and URLs in landing pages as well as the existence of HTML structured data is also important [37,38]. Other research highlights that the use of meta tags is the most significant SEO factor, followed by keywords and website design [39]. Overall it is highlighted that the structure of the website plays an important role for SEO [40].
Applying and optimizing these features during the development or operating process of the website is determined by the ease of use of the WCMS; the average user can easily and quickly make the necessary adaptations to HTML, for instance, when publishing a new article on a website. The same is true for the alternative description (Alt attribute) in the images that are published on a website [41]. CMSs, such as WordPress, Joomla and Drupal have plugins which enable administrators to easily implement SEO techniques, such as the Yoast SEO plugin for WordPress [42]. Facilitating implementation of some characteristics that determine certain on-page factors is directly affected by the website technology and therefore by the WCMS that it uses [43]. These functions appear to be more effective in the case of WordPress due to it being easily manageable, compared to Drupal for example that is more complexly constructed [44].
In a recent commercial study among 10.000 keywords within the automotive sector, websites that do not use any WCMS most frequently appear at the top ranking Google search results, while websites that rely on WordPress follow [45].
Of course, these are just a few of the factors that search engines take into account in order to rank web pages in the SERPs. Further on-page factors, such as the origin and stability of the webserver that hosts the website and the use of caching methods play an important role in SEO. The same applies to off-page factors, such as the quality of backlinks and therefore it is not possible to ascertain which is the friendliest search engine CMS.

3 Methodology

In order to record the WCMSs used by experts in the field, SEO experts around the world as well as to investigate the research question of an existing relationship between the top-ranking search results and the utilized WCMS, the authors conducted the following research in two stages within the time period from the 5th until the 20th October 2020.
It ought to be noted that this research focused on presenting the CMSs used by SEO experts' websites that appear at the top-ranking results. The current analysis documented how well websites are ranked, regardless of whether this is attributed to the used CMS itself or to the successful off-page and on-page factors implementation by the web developers.
The authors selected SEO experts' websites, as they considered that the latter incorporate the majority of other technical SEO factors in their corporate websites, without this being examined in the current research.
During the first stage, the researchers recorded the 40 top-ranking results presented by Google for 180 different search queries. The key phrases that were selected in order to be checked were around user searches for SEO experts in the 90 largest cities in Europe and similarly the 90 largest in the USA ("SEO in Berlin", "SEO in London", "SEO in Paris", "SEO in Athens", "SEO in New York City", "SEO in Chicago", etc.).
Moreover, the regional definition of each city was added in the search queries in order not to activate the Google location algorithm which presents results that are in close proximity to the geographical position of the user that is conducting the search. A relevant table with a full list of key phrases is displayed in the Appendix. Therefore, the research tool REST API provided by apify.com and makes use of Google Search API was used in order to scrape the search results from the 180 different search queries. The Google Search API parameters that were utilized throughout the searches in this tool are the following:

Search query device: Desktop; Search query type: Search; Search query domain: google.com; Country code: AU (Australia), Language: English, Results per page: 20, Pages per query: 2

The results contained the top 40 ranking search results for each of the 180 key phrases used. By omitting the double entries, results came up to a total of 6682 unique website URLs.
In the second stage the authors checked whether these webpages used any of the known WCMSs, such as WordPress, Joomla, Drupal etc. In order to achieve this, the API of whatcms.org was used, through searching for indicators like HTML tags, directory structures, asset files and javascript code in the html markup and headers. Every CMS generates tags or variables in the HTML code which are representative for each of those. The researchers used the CMS detection tool to check the websites for almost 863 different WCMS. The WCMS list for which the websites were checked can be found here https://whatcms.org/Technologies/CMS. It is noted that since these are normal websites and not e-commerce platforms or e-shops, no online applications developed by e-commerce systems

such as OpenCart, Magento etc. were identified in the sample.

4 Findings

In the total of 6682 websites that appeared in the top 40 rankings of search results for the 180 search queries that were analyzed, 32,81% (2185) did not use any known CMS or used a custom developed CMS. The vast majority 53,56% (3567) of websites relied on the WordPress system, while 4,08% (272) relied on Drupal. Just 1,23% (82) used Joomla, while 8,65% (576) incorporated other WCMSs on a smaller scale.
The figure displayed below presents the types of WCMS used in websites categorized according to search result rankings (ranks 1-5; ranks 6-10; ranks 11-20; ranks 21-30; ranks 31-40).

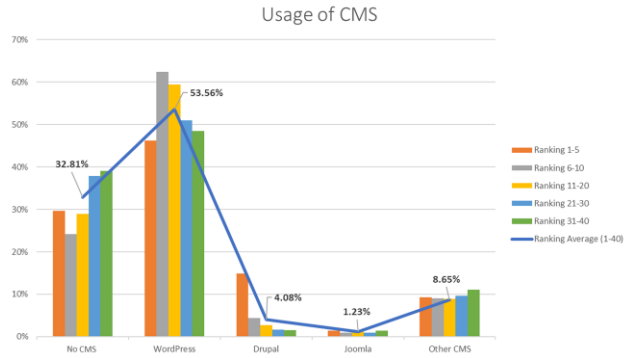

Figure 2. Type of web technology used in websites ranked 1-40 in SERPs for 180 unique search queries

The findings regarding the top 3 search results rankings are particularly interesting as shown in Figure 3, as websites which did not use any well-known CMS appeared in these rankings more frequently. Websites that used WordPress appeared after these, followed by those that used Drupal. From the 4th ranking onwards the number of websites using WordPress increased and it reached the mean score of the overall sample.

Figure 3. Website technology distribution in 20 top rankings

More specifically, websites that did not use any of the available CMS (42,23%) appeared more frequently at the top ranking for search results; 5,56% of websites that did not use any CMS but have been developed using the Laravel (1,66%) and Django framework (0,64%) were included within this percentage. The second most frequently used CMS ranking at the first search result was WordPress (28,33%). WordPress success rates were almost half compared to the overall sample where WordPress was used by 53,56% of websites. Websites that used Drupal appeared at the top ranking with great success (27,22%), even though Drupal was overall used by just 4,08% of websites. This was a clear indication that websites which appear at the top rankings for search results predominantly did not use any CMS and secondly, they were created with Drupal to a much greater extent compared to those which were created with WordPress. Similar findings regarding Drupal effectiveness also emerged from presenting the search results ranked second. Moreover, Google Sites appeared at the top rankings at 0,56% despite the overall Google Sites percentage in the sample being 0,47%. With regards to Joomla, it appeared at the top rankings at 0,56% while its overall percentage in the sample is 1,23%.

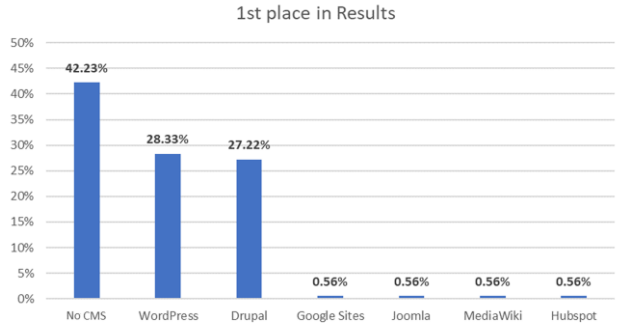

Figure 4. Technology used in 1st ranking websites

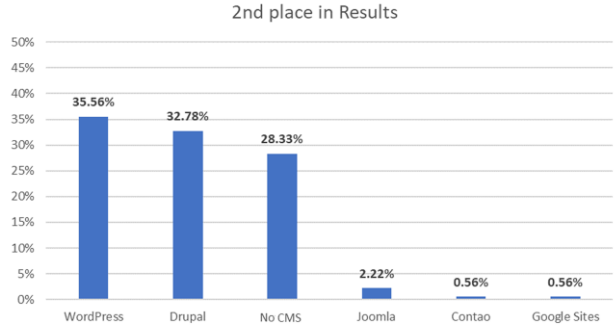

Figure 5. Technology used in 2nd ranking websites

With regards to search results for the third ranking, the vast majority of websites belonged to the following categories: WordPress at 51,11%, 'No CMS' at 32,33% and Drupal at 12,22%.

Regarding search results for the fourth ranking in SEPRs, statistical findings started to follow along the mean scores of the overall sample: WordPress occupied the top ranking at 55,56%, followed by the website percentage that did not use any WCMS (33,34%) and the next ranking was occupied by Drupal at 6,67%. It is worth noting that websites that have been developed through using Google Sites appeared to maintain their percentages at the top 4 rankings for search results.

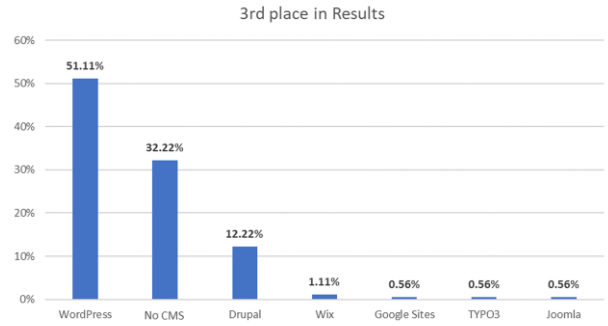

Figure 6. Technology used in 3rd ranking websites

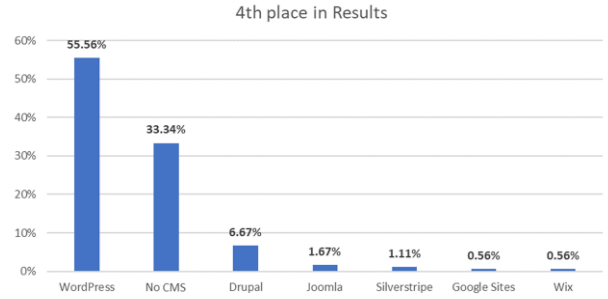

Figure 7. Technology used in 4th ranking websites

The following figures present a comparison between WordPress and websites that did not use any well-known CMS (Figure 8) and WordPress and Drupal (Figure 9). It is evident that websites that did not use any WCMS maintained a better percentage in terms of appearing at the top 3 rankings for search results, while Drupal was ranked quite positively at the top 3 rankings for search results which are the most significant ones as they gather 31,7%, 24,7% and 18,7% of clicks for organic search results respectively [27].

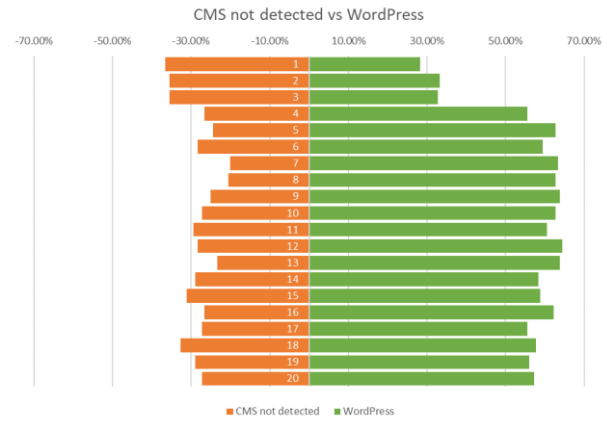

Figure 8. Pyramid diagram No CMS vs WordPress

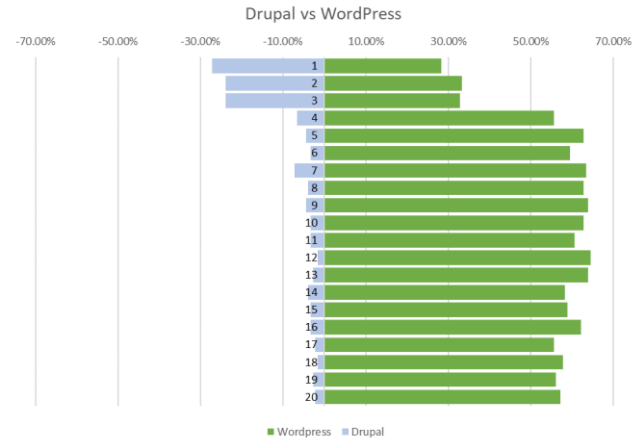

Figure 9. Pyramid diagram Drupal vs WordPress

5 Discussion

The present research highlighted that SEO experts showed a higher preference in terms of using WordPress and Drupal as they used these at 53,56% and 4,08% respectively, when the mean score in terms of their use based on the research conducted by w3techs.com is 38,8% and 1,5% (*CMS Technologies Web Usage Distribution*, 2020) and by whatcms.org 30,28% and 1,45% [46] respectively. Furthermore, the current research conducted amongst 6682 search results indicated that websites which have not been developed by using any of the available WCMSs appeared more frequently at top rankings of search results. Gotch's research which was conducted amongst 10.000 keywords within the automotive sector also reached the same conclusions regarding websites that did not use any WCMS and appeared at the top ranking in SERPs [45]. This could be interpreted by the fact that websites that are constructed in custom ways use significantly less coding and have faster loading speed compared to a website which relies on a WCMS and is not SEO optimized.

At the same time, Drupal was evaluated positively, maintaining significantly high percentages at the

top 3 rankings for the search results in the present research. Increased Drupal use by SEO experts could also be interpreted by the fact that Drupal requires more specialized knowledge that the average user may not possess. After all Drupal use percentages appeared to be much lower within the automotive sector, as highlighted by Gotch's research.

Furthermore, WordPress, which according to this research, was used by the majority of SEO experts' websites (53,56%) did not respectively maintain the same high percentages at the top two rankings for search results, as Drupal does. The fact that WordPress was not highly frequently encountered at the top rankings for search results could also be explained by the fact that many plugins from third party creators were not optimized and may cause problems in terms of website loading times and user experience perspective [47]. Apart from WordPress, Drupal and Joomla, other CMS which appeared at the top 4 rankings for search results in the current research were Contao, Google Sites, MediaWiki, HubSpot, TYPO3 and Wix; however, their percentages in the overall sample were too low in order to reach any conclusions.

6 Conclusions

The initial aim was to study which WCMSs are utilized by SEO experts as well as to examine whether the use of a specific CMS positively affects ranking for Google search results.

Research was conducted amongst 6882 websites that appeared at the top 40 rankings for search results by searching for SEO experts' websites worldwide. The authors observed that websites which do not use any WCMS appeared more frequently at the top ranking which is the most significant one since it gets the highest number of users' clicks. Websites that used WordPress appeared next, while the Drupal percentage was unexpectedly high, despite Drupal being used by a very low online percentage overall. From the fifth ranking downwards, a regularity was noted in terms of results with WordPress occupying the top ranking and maintaining steady percentages up until the 40th ranking for search results.

This lack of homogeneity for the top 5 rankings was indicative of an association between the top rankings for search results and the WCMS that was used. Confirmation for this observation should be reached through further research that would take additional SEO criteria into account, since the range of relevant research is still limited.

However, the main finding which highlighted that the top-ranking websites did not use any WCMS, does not necessarily mean that WCMSs such as WordPress or Joomla are not search engine friendly. In line with this, WMCS are tools used by web developers in order to create a website, while SEO also depends on a plethora of other factors and actions that are implemented at a later stage. Therefore, this constituted a significant limitation for the present research.

Further research regarding loading times for the examined websites as well as the use of an updated CMS would be able to highlight the ways in which the website's loading time factor and any potential security issues can affect the rankings in SERPs. Moreover, a pilot study could also be used in e-commerce sites in order to investigate any potential differentiations that may arise or to conduct the same research by replicating it through using other search engines, such as Bing and Yandex. Finally, the study could also be conducted in other fields besides SEO experts in order to identify any differences. This is a field that has not been extensively researched; it appears to be quite interesting both in terms of developers and in terms of website owners, as they aim to optimize their websites in the search results as well as to gain significant advantages over their competitors.

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Contribution of individual authors

Conceptualization and formal analysis: C.Z.; investigation and methodology: C.Z. and M.V.; writing - original draft preparation: C.Z.; review and editing: M.V. The authors have read and agreed to the published version of the manuscript.

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Appendix

Table 1. List of search queries used

1. SEO in Berlin
2. SEO in Madrid
3. SEO in Rome
4. SEO in Bucharest
5. SEO in Paris
6. SEO in Vienna
7. SEO in Hamburg
8. SEO in Warsaw
9. SEO in Budapest
10. SEO in Barcelona
11. SEO in Munich
12. SEO in Milan
13. SEO in Prague
14. SEO in Sofia
15. SEO in Cologne
16. SEO in Stockholm
17. SEO in Naples
18. SEO in Turin
19. SEO in Amsterdam
20. SEO in Marseille
21. SEO in Zagreb
22. SEO in Copenhagen
23. SEO in Valencia
24. SEO in Krakow
25. SEO in Frankfurt
26. SEO in Seville
27. SEO in Lodz
28. SEO in Zaragoza
29. SEO in Athens
30. SEO in Palermo
31. SEO in Rotterdam
32. SEO in Helsinki
33. SEO in Wroclaw
34. SEO in Stuttgart
35. SEO in Riga
36. SEO in Düsseldorf
37. SEO in Leipzig
38. SEO in Dortmund
39. SEO in Essen
40. SEO in Gothenburg
41. SEO in Genoa
42. SEO in Malaga
43. SEO in Bremen
44. SEO in Vilnius
45. SEO in Dresden
46. SEO in Dublin
47. SEO in Hague
48. SEO in Hanover
49. SEO in Poznan
50. SEO in Antwerp
51. SEO in Nuremberg
52. SEO in Lyon
53. SEO in Lisbon
54. SEO in Duisburg
55. SEO in Toulouse
56. SEO in Gdansk
57. SEO in Murcia
58. SEO in Tallinn
59. SEO in Bratislava
60. SEO in Palma de Mallorca
61. SEO in Szczecin
62. SEO in Bologna
63. SEO in Brno
64. SEO in Iasi
65. SEO in Florence
66. SEO in Las Palmas
67. SEO in Bochum
68. SEO in Utrecht
69. SEO in Wuppertal
70. SEO in Aarhus
71. SEO in Bydgoszcz
72. SEO in Plovdiv
73. SEO in Bilbao
74. SEO in Malmo
75. SEO in Nice
76. SEO in Lublin
77. SEO in Varna
78. SEO in Bielefeld
79. SEO in Alicante
80. SEO in Timisoara
81. SEO in Bonn
82. SEO in Cordoba
83. SEO in Thessaloniki
84. SEO in Cluj-Napoca
85. SEO in Bari
86. SEO in Constanta
87. SEO in Munster
88. SEO in Karlsruhe
89. SEO in Catania
90. SEO in Mannheim
91. SEO in New York City
92. SEO in Los Angeles
93. SEO in Chicago
94. SEO in Houston
95. SEO in Phoenix
96. SEO in Philadelphia
97. SEO in San Antonio
98. SEO in San Diego
99. SEO in Dallas
100. SEO in San Jose
101. SEO in Austin
102. SEO in Jacksonville
103. SEO in Fort Worth
104. SEO in Columbus
105. SEO in Charlotte
106. SEO in San Francisco
107. SEO in Indianapolis
108. SEO in Seattle
109. SEO in Denver
110. SEO in Washington
111. SEO in Boston
112. SEO in El Paso
113. SEO in Nashville
114. SEO in Detroit
115. SEO in Oklahoma City
116. SEO in Portland
117. SEO in Las Vegas
118. SEO in Memphis
119. SEO in Louisville
120. SEO in Baltimore
121. SEO in Milwaukee
122. SEO in Albuquerque
123. SEO in Tucson
124. SEO in Fresno
125. SEO in Mesa
126. SEO in Sacramento
127. SEO in Atlanta
128. SEO in Kansas City
129. SEO in Colorado Springs
130. SEO in Omaha
131. SEO in Raleigh
132. SEO in Miami
133. SEO in Long Beach
134. SEO in Virginia Beach
135. SEO in Oakland
136. SEO in Minneapolis
137. SEO in Tulsa
138. SEO in Tampa
139. SEO in Arlington
140. SEO in New Orleans
141. SEO in Wichita
142. SEO in Bakersfield
143. SEO in Cleveland
144. SEO in Aurora
145. SEO in Anaheim
146. SEO in Honolulu
147. SEO in Santa Ana
148. SEO in Riverside
149. SEO in Corpus Christi
150. SEO in Lexington
151. SEO in Henderson
152. SEO in Stockton
153. SEO in Saint Paul
154. SEO in Cincinnati
155. SEO in St. Louis
156. SEO in Pittsburgh
157. SEO in Greensboro
158. SEO in Lincoln
159. SEO in Anchorage
160. SEO in Plano
161. SEO in Orlando
162. SEO in Irvine
163. SEO in Newark
164. SEO in Durham
165. SEO in Chula Vista
166. SEO in Toledo
167. SEO in Fort Wayne
168. SEO in St. Petersburg
169. SEO in Laredo
170. SEO in Jersey City
171. SEO in Chandler
172. SEO in Madison
173. SEO in Lubbock
174. SEO in Scottsdale
175. SEO in Reno
176. SEO in Buffalo
177. SEO in Gilbert
178. SEO in Glendale
179. SEO in North Las Vegas
180. SEO in Winston–Salem