Case Study: Department of Pre-University

10-12-2024

Introduction

The Department of Pre-University's website is one which plays a crucial role in various stakeholders' functioning, from students all the way to management and administration departments. Thus, the proper functioning and optimal design of it is also necessary in order to reach and serve as many stakeholders as possible. The present case study is a small step in that direction, by studying various aspects of the site and how they may be improved.

Analysis

HTTPS Protocol Issues

Repeating issues with the implementation of HTTPS protocol (TLS/SSL certificates) have made it challenging to access the subdomains/linked sites.
Eg: dpue-pragathi.karnataka.gov.in does not have an SSL/TLS certificate as of 09-12-2024, leading to many users being unable to access the site. It was, however, fixed in the later hours of 10-12-2024.

Performance

1. Network Utilization

Breakdown Of Network Requests

site: pue.karnataka.gov.in | Data collected using Firefox Dev Tools

File type	Bandwidth used	No. of Requests	CDN Requests
CSS	461 kB	16	5
HTML	175.62 kB	1	0
JS	733.95 kB	18	0
Fonts	421 kB	9	4
IMG	2.3 MB	102	1

Total Network Usage: 4.38 MB (146 requests)

The website is rather network intensive as can be seen in the above table given that it needs to be easily accessible by anyone in the state, even in the most remote areas.
CDN requests:

1. fonts.gstatic.com (1)
2. fonts.googleapis.com (3)
3. maxcdn.bootstrapcdn.com (2)
4. google.com (3)
5. atoall (1)

2. Page load time

   Taking on average 2.5-4 seconds to load (variation caused due to cached files, network speed, and other external factors), it is workable.

UI/UX

The structure of the website has allowed for each stakeholder's/intended user's required links to be listed on the site. However, certain stakeholders/intended users may not be able to discover the link they require due to the numerous sections. The issue is further aggravated as the links under the collapsible menu such as "Students' Corner" may not be discovered on mobile, since they aren't shown by default.

On mobile, the site looks much cluttered, with some sections being smaller than they should and others being bigger. This further repels users.

Key Findings

1. Many users (students) did not attempt to discover links on the site due to it not being user-friendly and clean. Hence, they did not have access to certain resources such as blueprints and model question papers unless another user shared it with them.
2. Due to the site being network intensive, it is difficult for users to access the site when they do not have ideal network connection.
3. If any of the CDNs mentioned above fail or take long to respond, or if the user's network bandwidth is not good, the site may not appear as intended or take too long to load.

Recommendations

1. Subdomain Organization

The links & services required by the staff and principals could be provided at another subdomain such as staff.pue.karnataka.gov.in and students.pue.karnataka.gov.in or could be further segmented into staff.pue.karnataka.gov.in and principals.pue.karnataka.gov.in. This would remove the hassle of finding links and services for all the stakeholders.

2. Network Optimization

2.1. Segmentation

If the proposal for the subdomain organization is implemented, it would also enable faster site loading as each stakeholder would only receive content pertaining to their services.

Figure 1. Structure of the site before subdomain segregation

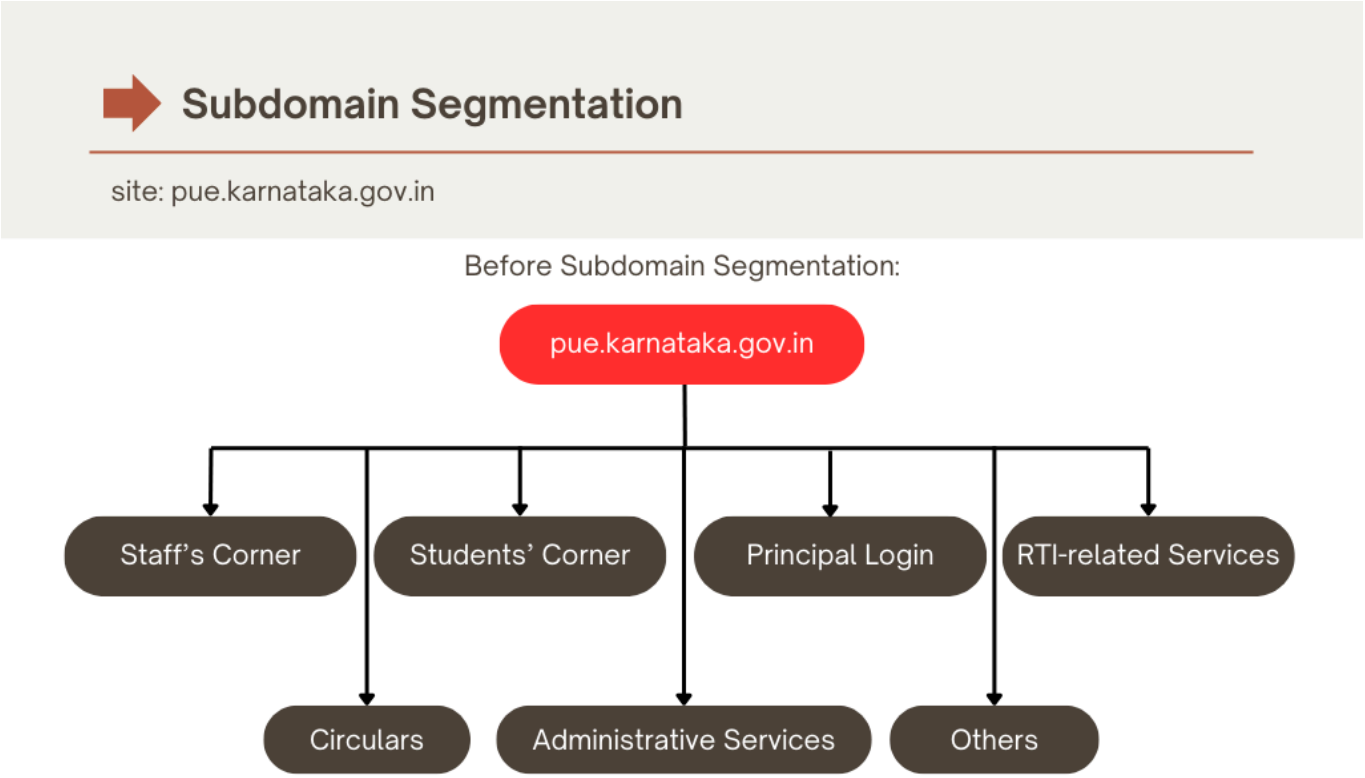

Figure 2. Structure of the site after subdomain segregation

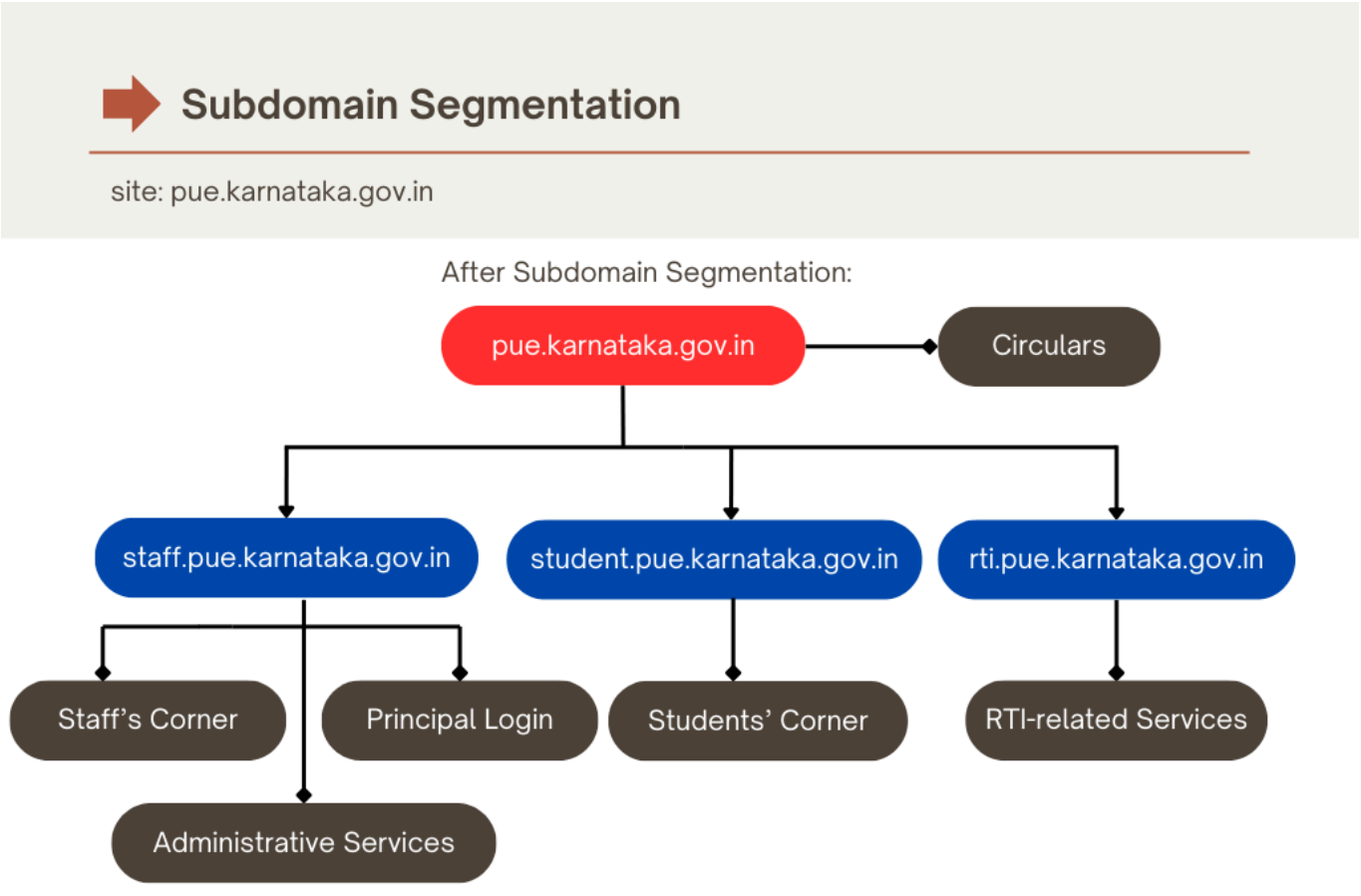

Figure 1, shows the current structure of the site, where services pertaining to all stakeholders are provided under the same site, giving way for the cluttered UI and heavy network consumption.

Figure 2, shows the structure of the site after the proposed subdomain segmentation, wherein all the services pertaining to students, staff, and RTI are provided at student.pue.karnataka.gov.in, staff.pue.karnataka.gov.in, rti.pue.karnataka.gov.in respectively. This would reduce the network utilization since each subdomain would only fetch files pertaining to those services, while also providing a cleaner user interface, since the amount of information to be provided is also distributed over the three subdomains. The root domain, pue.karnataka.gov.in, could serve as the hub for all government orders, circulars and other notifications.

2.2. Compression

Compression of static files such as images displayed on the homepage would significantly reduce the network utilization. A conservative estimate for lossless image compression would come out at 50% reduction in file sizes, giving us the new network bandwidth required for fetching images at 1.315 MB and an optimistic estimate 0.841MB. This would significantly reduce the loading time of the site.

2.3. Self-hosting assets

Instead of using external CDNs for assets such as google fonts and images, these assets could be hosted locally on the server where pue.karnataka.gov.in resides. This would reduce the number of HTTP requests initiated, thus reducing the number of SSL handshakes and DNS lookups, resulting in a reduced loading time. It also allows for more control over the assets in terms of compression, caching, and preloading.

3. User-friendly Design

Making the user interface cleaner by prioritising the most-used links and segmenting the links in accordance with the stakeholder would surely enable users to make the best use of the site and its services. Additionally, revisions on the responsive design and layout of the site would help significantly for those who don’t have access to bigger screen systems.

Potential Issues With Implementation of The Above Recommendations:

1. Subdomain Organization

   Stakeholders must be intimated of the new organization of the website. This could be solved in many ways.

   1.1. Using alerts and forms

   An alert on the webpage could be set to inform the users about the new structure. Although this comes with its own limitations and may not be a pleasant experience for the stakeholders.

   1.2. Using pop-up forms

   A form control can be used to identify whether the visitor is a principal, staff member, student, or belongs to some other stakeholder category. Accordingly, they could be redirected to the site that concerns them. An example of this can be seen at the National Digital Library, Govt. of India's site.

   1.3. Retention of links

   Some links could be retained on the homepage to allow users to familiarize themselves with the changes in the structure of the site. This would be accomplished using 301 redirects such that when they click on the links that are retained, they are taken to the new site. After a certain period of time, say a month, these links could be removed if it is believed that the stakeholders have familiarized themselves with the new changes.

   1.4. Dialog/Banner on the new sites

   A dialog box/banner could be shown to the visitor when they visit it for the first time, informing that the services concerning them are now moved to this site. This could be implemented using cookies.

2. UI Design

   Subdomain Organization will require a user interface to be designed for each of the stakeholders. This may be time-consuming, tedious, and/or difficult to achieve.

Conclusion

The reachability of the site is affected by its network intensive nature, complicated/cluttered user navigation, broken links, and TLS/SSL certificate issues. However, the inclusion of responsive design has most definitely enabled the site to reach more users. The availability of the pages in both Kannada and English language is also noteworthy and so is its compliance with W3C Web Content Accessibility Guidelines. However, from this study, it appears that there is some room for improvement when it comes to the UI/UX and network usage.

Follow-up regarding the HTTPS Protocol Issues

It was observed that the problems with the question bank site have emerged once again as of 16-12-24. On visiting the site on desktop, it was found that the SSL certificate had expired as of 20-12-24.

Although most browsers allow the users to bypass it, it still raises questions about the legitimacy of the site for those who are more cyber-conscious or unaware of the site. Furthermore, some android devices or browsers may not provide an option to trust expired SSL certificates, thus blocking the user from accessing the site. The problem seems to be in the renewal of certificates before they expire.