

Bug Trace Service for IBM Cloud: Usability Improvement Features and Web Search Optimization

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Abstract—A cloud-based web service of questions and answers is proposed. After first start of service beta version, which includes basic functions, it is needed to include additional possibilities. Main areas of improvement are site usability, user account functionality and web optimization. This will raise Bug Trace web search results and make them more attractive and informative for the user [1]. Adding microdata and special tags to the web pages will allow to customize user experience and make web performance faster.

I. INTRODUCTION

Nowadays, with development of the Internet, there are a lot of different information services. By using any search engine, it can be found that almost every subject has been discussed in the Web at least once. Developers try to use the newest technology solutions and make their sites more efficiently and friendly. Some of approaches concern usability improvements, usage of main business processes and structured data. Modern websites should have not only good performance, but canonical optimization [2]. In [3] the authors recommend to use structured data and microdata. Structured data is used as a main part of the site, and microdata is used as a main unit of the information space. In [4] it is shown that structured data can help to answer user from the search page. Schema markup was developed by community with help of corporates, such as Google and Facebook. The main idea is to give additional information about the page or the most important information about resource for the people. For example, searching for question and answers services, the main information would be answer. Microdata takes it exactly in search result page, as it seen on Fig. 1. Thus, web pages still earn weight statistic, as it explained by Google in [5].

This solution allows search engines to store relevant page information and display your pages as a result of different types of search, including: images, videos, news, books, maps, common web search, etc.

Next interesting solutions are shown in [6]. It is based on Open Graph and contains special meta-data, which is rapidly collected after browser or program recognizes the link.

Accordance to recommendations of [7], additional efficient solutions are registration and authorization processes. In personal account user will have an opportunity to access all his questions, see it's rating and comments and change personal information. To maximize web-service secure it is important to have HTTPS protocol installed, which will encrypt user

interactions with data [8]. It is also important to have all fields secure from XSS attacks. The authors in [9] underline that this can be achieved as a result of correct database tables restrictions and additional data verification on the server side. Furthermore, to increase efficiency of security properties the OAuth 2.0 protocol [10], and base64 [11] solutions can be used too.

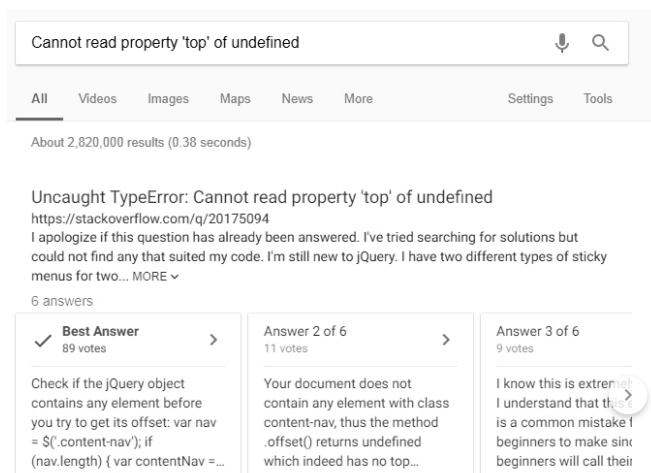


Fig. 1. Microdata answers in Google search result

Managing database structure it is highly recommended [12] to use field restrictions and secondary keys to reduce capacity load. According to the next recommendation by [13] only needed fields are loaded in the requested web page. These make the loading process faster.

This article describes some questions on advanced development of the Bug Trace service that is presented in previous paper [14].

The goal of the improvements is to raise the quality of service to the analogues level in other areas and popularize Bug Trace in the CIS region through web optimization and design simplification, using previous investigation [15].

II. MAIN PART

A. Authorization and personal account features

Adding registration and authorization processes means not only database restructuring, but changing user roles. "User" role was divided on "Authorized user" and "Unauthorized".

Furthermore, functionality and possibilities for these roles will differ, as it can be seen on Fig. 2.

Improving of usability means facilitate work with the site for the end user. Since asking questions is the main business process on Bug Trace, primary attention should be given to this action. First step is the main one – authorization. To make this process more secure, Oauth protocol was used. In a nutshell this means that user data transfers are encrypted and can be read only in two points: server side and user device. To simplify work with the service it is needed to track every single user actions. All such solutions are now implemented.

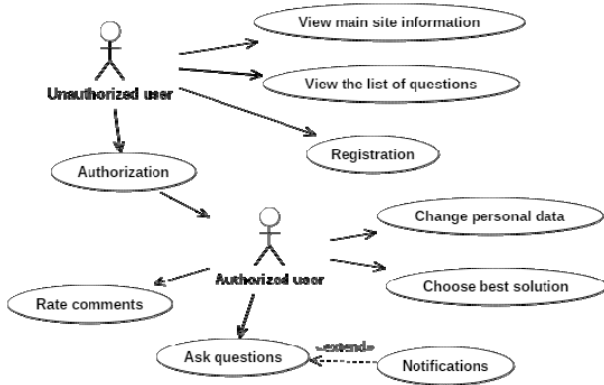


Fig. 2. Use case diagram after adding authorization

Second step is adding features, that available after user has been authorized on the site:

- Comment rating. Allow users to add scores on the comment of other user.
- Best answer. Allow user, who had added question, to pick the solution of his issue from all comments.
- Emails and notifications. Send emails to the user, if some actions with his account were performed.
- Account settings. Allow user to change personal data and watch previously asked questions.

After user passes the registration, he will get email notification with confirmation link. By clicking this link account becomes active and user can start working with web-service. That additional step is needed to secure from bots and machines, to avoid spam and increase user experience on the site. The same procedure is available for password recovering. To complete this step, database was updated with new table “Users” as it shown in the Table I. To add new features, some of existing tables were updated with minor improvements, such as new fields and data types.

All fields from Table I must be present according to functionality reasons, except last four fields. They are expected to increase usability, using Bug Trace. All fields have data restrictions. Additional restrictions are implemented to the field “password”, using javascript on user side. Email is planned to be used in recovering purposes only. Since login is unique field, it is validated before submitting registration form to let user

choose different one if login is already exists. Registration date is collected for future statistics reports and researches.

TABLE I. TABLE FOR USERS IN THE DATABASE

Field	Type
id	mediumint(9)
name	varchar(180)
login	varchar(180)
email	varchar(180)
password	varchar(255)
image	varchar(180)
rating	mediumint(9)
reg_date	date
profile_views	mediumint(9)

Rating comments will be useful feature as an answers sorting parameter. Rating is presented as a counter in information line under every answer. When user opens one of question pages – the first solution he will see is the “best solution”, no matter what rating it has. Best solution marked with green check icon at the left side of the answer. Comment likes are performed as hearts. These icons were chosen because of their high entropy and readability, as it was shown in the previous study. For one question only one best solution is accepted. If question author picks current answer as a solution of his problem, it will be shown in the first place. If comments have the same rating, they will be shown as they were added. Template of modernized answer item is shown on Fig. 3.

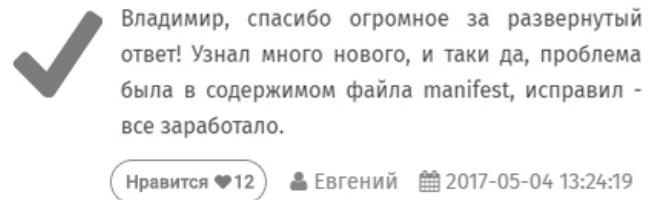


Fig. 3. Template of updated answer field

For making service more flexible it was decided to add new system role – administrator. He has full control on the system. IBM Cloud allows to fully control the system using Dashboard Panel. But, it also offers all server settings and performance. To demarcate user rights it was decided to add this role. For now his possibilities are: questions editing, closing or deleting, users ban, site information editing, adding new educational materials or even new sections. Moreover, it is possible to change web pages meta-data in case of adding new sections or editing present ones. It is possible to add more auxiliary tables that will store statistics data and logs. Minor supplement to make it all possible was changing the inputs on the site in order to make them more functional. It will allow to write in comments or questions not only text, but insert images, code or links and then edit it with text styles. In database it will be stored using base64 encoding. The main problem of this method is mobile adaptivity. When text is encoded in base64 it is also saving CSS styles, what means the same text size on all devices. Since August 2017, Google is going to mobile-first indexing, which makes this issue important. As a solution, different editor can be used. Result was reached by adding additional CSS rules to the web pages to make them responsive with saving all the content. It is possible by using standard classes, but another important thing is users’ behavior.

B. Web optimization and microdata markup

Every year the number of raw data in the web is increasing enormously fast. Despite the fact that search engines have special algorithm for data mining, it is more difficult to find relevant answer for users' queries. It was the main reason to create structured data, or data about data. These are special web page selectors that show search engine, what main information is present on the page. For the end user these selectors are invisible and not important. Also it is no need to load the page, user can easily find a solution directly from search, what is additional advantage when using restrict Internet connection.

Markup also allows showing rating, important page sections, pictures and custom description. Another markup, developed by Facebook, allows changing site link appearance. It is called Open Graph. This markup is suitable for any place user can share a link, like messenger, social network, web site or other place. Usually, it contains image, title and description of the page content, source name, sizes of the image and locale.

Other types of web optimization include code editing, image compression and correcting server settings. All these parameters influence on page load speed and, consequently, on user experience. IBM Cloud has special instruments among additional services that help to organize content. Also, it draws people attention while using search engines, which leads to increasing of web service popularity.

Since main functional components are present in the service, community is deciding what should be added or changed. Gather the community of specific users is not simple nowadays, because of high amount of different services offered. Pages with structured data will be more welcomed by search bots and web page rating will rise. As a result, if user types question in search engine, he could get Bug trace microdata answers as a result.

C. Analyzing the results

Despite the apparent complexity of the system, it is still simple in use. Present development includes special algorithms to involve user in answering process. We have added possibly interesting questions for every user, picked according to his interests. Every answer will give its author some points. Users will get virtual rewards for the points, as if they were playing a game. It increases site interaction. Users wish to write as relevant answer, as they can, to get more points, because of competition manner. In research purposes and facilitation of the registration process, it is recommended to add authorization using social network accounts. If it is known, users' age, gender and country, it is more possible to choose the right variant of future improvements. Furthermore, it allows to collect some public data for social experiments. It makes possible to mark "email" field as not required, because social authorization is usually performed by Oauth 2.0 protocol, which means safe connection. All data processing is performed on the server side to avoid leaks of personal data. Another innovation is notifications inside the accounts. If there is any interaction with the user, like answer or like, user would know about it from special menu bar. But it requires thorough database and account template editing. With IBM Cloud services it is no need to change code many times. Changing database configuration and one template file is enough. Internal notifications create additional load on system capacity. That is connected with

constantly working listener, that checks user actions and load specific functions. It is especially evident when many users are online at the service. One of approaches of load reducing is database setting. Adding triggers and methods, connected to specific database actions can reduce the load of a listener. Nevertheless, it is needed to monitor database changes as well, thus completely reducing server load is impossible.

III. CONCLUSION

In this work, functionality changes and optimization process as an instrument of system restructuring, were considered. Main advantages of restructuring are improving system and data transfer security, user experience and site appearance while using Bug Trace. New roles were added to the system that changed logic of existing service. This led to changes in main business process, because now only authorized users can ask questions. This approach will decrease spam in questions, users' bad behavior and non-relevant answers, which is also have positive influence in database load. Other functional improvements are focused on time savings. Updated sorting of comments list may allow users not to scroll whole web page in search of solution. Using that type of markup will help in attraction of new users and community building. And strong community means faster answers, useful tips, sharing personal professional tricks, etc.

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