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DEVELOPMENT OF A WEB RESOURCE FOR SAFE JOB SEARCH IN A COVID-19 PANDEMIC ANDRII BOICHUK, TARAS STYSLO, SERHII VASHCHYSHAK, PETRO OSTAFIICHUK

Andrii Boichuk; Taras Styslo; Serhii Vashchyshak; Petro Ostafiichuk

King Danylo University, Ivano-Frankivsk, Ukraine

Summary. *The work describes the main steps, the structure, and the result of web resource for job search, which is relevant in the context of a pandemic and employment loss of a large number of citizens. The focus is on the development of a platform with enhanced protection from the point of view of a job seeker, who can analyze data about the employer, and leave a real feedback both at the job search stage and after employment. For this purpose different user profiles and a real opportunity to leave feedback are provided. A platform is developed using PHP with PDO extension for database connection. MySQL relational database is used as a database. All phases of resource development, from architectural and database planning to the development of layouts and interfaces, are described in details. Special attention to the protection of information transmitted by both employers and job seekers is paid. The functionality of the developed system is analyzed. The received resource has been tested and it has been established that it can be used effectively for both employers and job seekers with the appropriate functionality, the ability to post, edit, delete vacancies and comments about the company. This, in turn, makes it possible to avoid fraud and cybercrime by checking the veracity of the information provided by the employer and forming an employer's rating based on real feedback from persons who work or have worked there.*

Key words*: job search, cybersecurity, web resource, User Story, PHP, MySQL.*

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Problem Setting. The relevance of the topic is the fact that job search is currently one of the main social and economic problems, one of the shortcomings of which is the increase in fraudulent schemes in that area. As the labour market operates according to the law of supply and demand, it is necessary to control the balance between these two indicators in order to provide job seekers with quality jobs, and employers with qualified employees. As of September 2020, the number of registered unemployed increased by 67% compared to September 2019. This is confirmed by data from the website of the State Employment Service. In the context of a pandemic, this means that online job-seeking services are coming to the fore. This situation has both positive and negative consequences, as it increases the number of unscrupulous people posing as employers and deceiving applicants in different ways. Therefore, it is important to be able not only to have feedback and wishes from the employer but a secure automated system that allows the job seeker to get up-to-date information about the employer with feedback and full verification of the information provided in the vacancy announcement.

Analysis of notable research results. According to surveys, average users identified the following resources used for job search:

a. Work.ua – 42,1%;
b. Robota.ua – 36,1%;
c. State Employment Service – 15,8%;
d. Jobs.ua – 5,3%;
e. Olx.ua – 5,3%;

The problems and disadvantages faced by users of these sites are the sites often contain unreliable data, there is no possibility to leave and view comments, as well as the fact that the

Corresponding author: Andrii Boichuk; e-mail: andrii.m.boichuk@ukd.edu.ua

sites have paid options. The creation of our online resource in the form of a site called «K-Work» is aimed at eliminating them.

The purpose of the work is to develop a web resource for job search with the opportunity to publish vacancies, resumes and leave feedback about the company, so that job seekers can form their impression of a company based on the experience of other job seekers who are already employed in this company or have had a negative experience with it.

Thus, the task is to create a product with the following parameters:

f. taking into account all possible scenarios of user interaction with the system;

g. the designed essence and connections of the database containing data of job seekers and employers;

h. personal account for the employer with the possibility of creating vacancies and performing manipulations on them;

i. personal account for the job seeker with the ability to create resumes and perform manipulations on them;

j. system of distribution of comments (feedback) on the company;

k. administrative panel for editing content and checking comments.

For the information in the finished product to meet the requests of the target audience, reflect their goals, needs, views, motivation, the so-called Empathy Map is used. This tool allows developers to put themselves in the place of a potential user of the product, to feel his/her problems, goals, feelings, resulting in the formation of the so-called Portrait of the User. The User Story was used to describe the requirements for the developed system and to describe the scenarios of interaction between the user and the system. We use a MySQL database to develop the database. According to the task, the database consists of the following entities: role, users, profile, company, vacancy, resume, job experience, education experience, type of education, work experience, type of employment, number of employees, cities, type of properties, comments, the status of the person who leaves a comment (status). In general, the structure of the database is as follows (Fig 1):

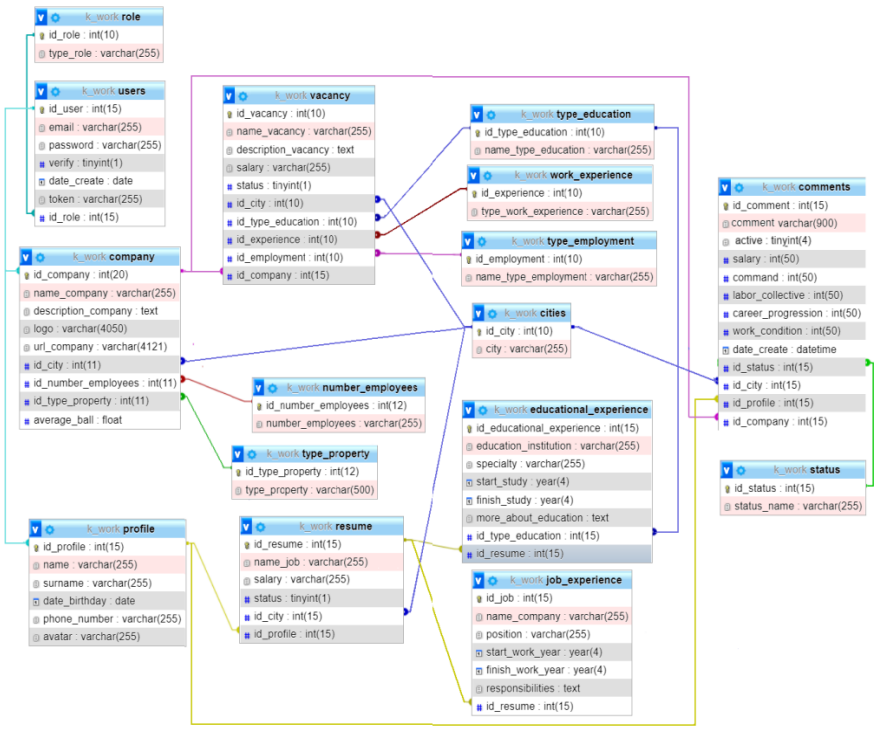

Figure 1. Database structure

In this case, the structure of the site is as follows (Fig. 2):

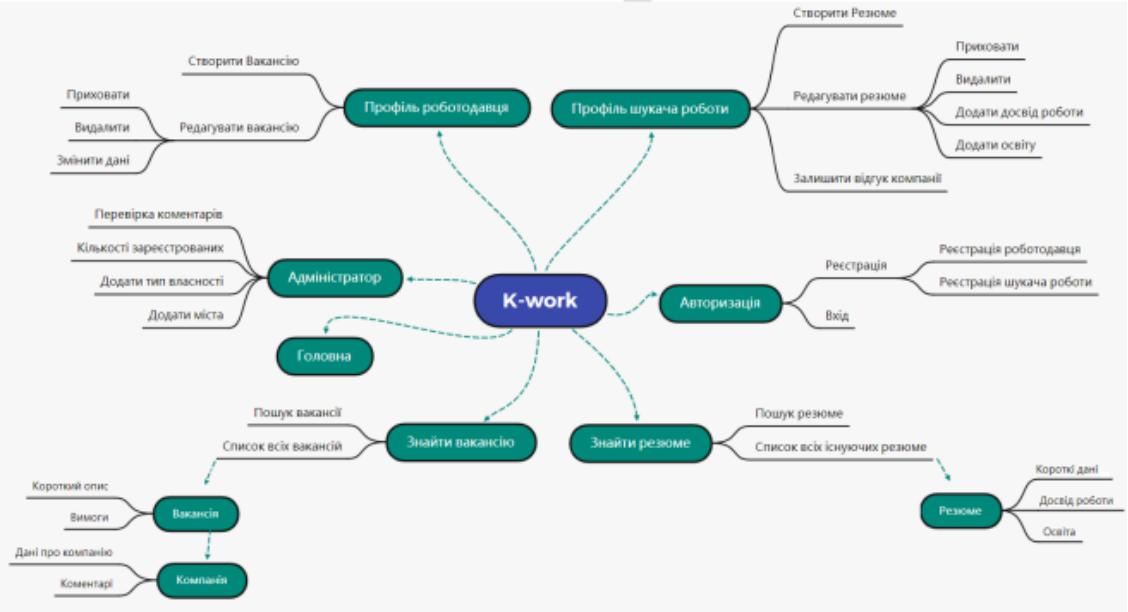

Figure 2. Job search site structure

We used the PHP web development language with the PDO extension as a development language.

The connection to the database is as follows:

```
<?php
  $user = "root";
  $password = "";
  $options = array(
  PDO::MYSQL_ATTR_INIT_COMMAND => 'SET NAMES utf8',
);
  try {
     $database = new PDO("mysql:host=localhost; dbname=k_work", $user, $password
, $options);
   } catch (Exception $e) {
     echo "Підключити базу даних не вдалось: ".$e -> getMessage();
   }
?>
```

In the above-mentioned code, we can see that to connect to the database you need to create a PDO object and pass the connection parameters to it:

l. Host – it is local in this case;
m. Name of the database;
n. User name;
o. Password;
p. Coding;

The try catch construct is used to intercept the connection error. After a successful connection, you can start working with the database.

In the finished product, there are different registration options as user-employer and user-job seeker. In particular, the employer is registered for the first time with the possibility

of creating a secure office with a password. Password hashing using the hash function SHA512 is used for security. Furthermore, two processes are carried out sequentially to log in to the profile:

q. a request is made to the database to provide us with all users with the e-mail address and password that we enter;

r. checking our users and redirecting them to their pages.

The program code at this stage uses the function «htmlspecialchars», which allows protecting our resource from XSS-attacks. Among the functions that belong to the employer are the posting the vacancy, hiding the vacancy, and deleting the vacancy. For example, to perform a job creation operation, a function is set that inserts data into the database. This is done using the SQL query INSERT. In the case of hiding a vacancy, the system determines in what state the vacancy is by querying the database and, as a result, displays on the main page only those vacancies that have the status of active. The vacancy is deleted as follows: according to the vacancy identifier, we find it in the database. After finding we substitute the identifier of the necessary vacancy and we delete it from a database:

```
function DeleteVacancy($database, $id_vacancy){
$sql = "DELETE FROM vacancy WHERE id_vacancy = :id_vacancy";
$statement = $database->prepare($sql);
$statement->bindParam(":id_vacancy", $id_vacancy, PDO::PARAM_INT);
$statement->execute();
}
```

In the case of a job seeker, there is a slightly broader functionality for employers, although the initial stage of registration is identical and involves filling in two tables with the simultaneous transfer of ID. As well as at the employer, password hashing is performed, which ensures data security.

Adding comments is only available to job seekers. This function was designed to improve confidence in companies, as many users pay attention to the reviews. To make it possible, it was necessary to implement the function of adding comments. Data on comments comes from a form that is necessary to fill in. All data on the form is mandatory to prevent unauthorized users. The users who have once left comments for a particular company cannot resubmit them, for this purpose the check is carried out:

```
<?php
if (empty($_SESSION['user'])||$_SESSION['user']['id_role']!=2) { ?>
<a class="editor" href="singin.php">Залишити відгук</a>
<?php }elseif($isadd['COUNT(id_comment)']<1) {?>
<a class="editor" href="seeker/comment.php?id_company=<?php echo $company['id_
company'];?>">Залишити відгук</a>
<?php }else{?>
<a class="editor" href="" onclick='return confirm("Ви вже залишили відгук?")'>Зали
шити відгук</a>
<?php } ?>
```

In the finished product, the panel for comments and assessments of the employer is as follows:

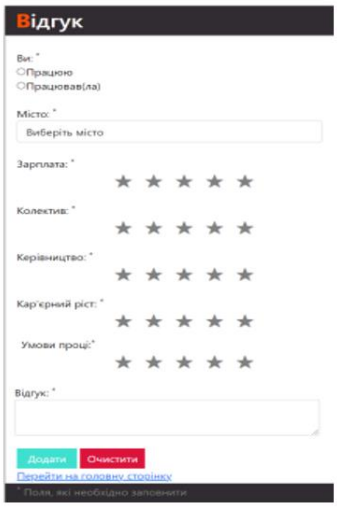

Figure 3. A panel for comments and assessments

After the feedback is sent, the system sends it to the administrator, who checks it. The results of the administrator check are either posting or deleting a comment. If the comment is constructive, it is published. If it uses profanity, and its main task is to provoke aggression, it is removed.

Conclusions. A web resource called «K-Work» has been developed and tested. It differs from existing job search platforms in providing opportunities for the real assessment of employers based on feedback from registered job seekers. An extensive structure of the platform has been created and built for the convenience of its use by both employers and job seekers. All software prerequisites have been created for the impossibility of attacks on the server and maximum protection of the information provided in the questionnaires.

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СТВОРЕННЯ ВЕБ-РЕСУРСУ ДЛЯ БЕЗПЕЧНОГО ПОШУКУ РОБОТИ В УМОВАХ ПАНДЕМІЇ COVID-19

Андрій Бойчук; Тарас Стисло; Сергій Ващишак; Петро Остафійчук

Університет Короля Данила, Івано-Франківськ, Україна

Резюме. *Описано основні етапи, особливості структури та результат створення web-ресурсу для пошуку роботи, що є актуальним в умовах пандемії та втрати працевлаштування великої кількості громадян. Основна увага зосереджена на створенні платформи з підвищеним захистом саме з точки зору пошукача роботи, який може аналізувати дані про роботодавця та залишати реальний відгук як на етапі пошуку роботи, так і після працевлаштування. Для цього передбачені різні профілі користувачів та реальна можливість залишити відгук. Платформа розроблена з використанням мови PHP з розширенням PDO для з'єднання з базою даних, що буде містити інформацію про користувачів, їх захищені особисті дані та іншу персональну інформацію. В якості бази даних використано реляційну базу MySQL. Детально описано усі етапи розроблення сайту – від планування архітектури й бази даних до розроблення макетів та інтерфейсів. Особлива увага зосереджена на спрощенні інтерфейсу, що дозволяє навіть недосвідченим користувачам зареєструватися та безперешкодно використовувати сервіс. З точки зору безпеки даних використано шифрування, яке дозволяє уникнути можливості несанкціонованого доступу як до персональних сторінок користувачів, так і даних, що в них містяться. Здійснено огляд функціональних можливостей розробленої системи. Отриманий ресурс перевірено і встановлено, що його можна ефективно використовувати як роботодавцям, так і шукачам роботи з відповідним функціоналом, можливістю розміщувати, редагувати, видаляти вакансії та коментарі про компанію. Це, в свою чергу, дає змогу уникнути шахрайства та кіберзлочинності, перевіряючи достовірність наданої роботодавцем інформації та формуючи рейтинг роботодавця на основі реальних відгуків осіб, які там працюють чи працювали. Апробовано роботу такого сервісу та здійснено тестове порівняння з аналогами, присутніми на ринку послуг з надання роботи.*

Ключові слова: *пошук роботи, кібербезпека, web-ресурс, User Story, PHP, MySQL.*

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