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Graduate Students and Companies Web Based E-Recruitment System

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Abstract

Computer systems help to improve human life in all sectors. One of the most important sectors that the recent systems support is the recruitment sector. Recruiters used to waste their valuable time, effort and money to reach the best candidates. The traditional recruitment process fulfills neither the recruiter needs nor the job seeker ambitions. Nowadays, companies use their website or social media to announce job vacancy whereas job seekers usually use job portal to market their abilities and skills. All these can be put on one recruitment website to improve the process for both parties. The proposed system will build an online E-recruitment system for recruiters (companies) and job seekers that will help them to interact with each other and to match their expectations. This system will be developed using Hyper Text pre-processor (PHP), Hyper Text Markup Language (HTML), Cascading Style Sheet (CSS), JQ, MySQL, and XMMAP. Moreover, the recent human computer interaction (HCI) concepts will apply to provide good user experience through simple, clear, and modern interfaces. Our E-recruitment system is directed to all graduated students from university in all programs. The system allows the recruiters (companies) to post announcement for job vacancy and to search for job seeker or about another company, and to view the applied job. For the job seeker it allows graduate student to search for job, apply for the available opportunities, upload CV, and setup his own profile. Finally, this study will help to improve the experience and break the difficulties that present in the recruitment process as well as support the human resource (HR) department in companies and other sectors. Finally, the results show the average score of 4.72 out of 5, indicating that the users are feeling enjoyable while using the application features and the system is easy to use.

Keywords

PHP, HR, E-Recruitment System, HCI, Graduate Student, Companies

1. Introduction

The revolution that technology has brought in the recent era cannot be ignored or not exploited in various fields. Computer systems become the right hand and the first assistant for human in all different sectors. Nowadays, computer systems carry out all works that previously required time, effort, human resources and expertise with high efficiency and low cost. One of the most notable sectors that relied on computer system in its development is human resources management sector. The term may seem insufficient, but it denotes a management function. In fact, it manages employees, or in other words, it is responsible for the management of everything related to hiring, training, motivation, communication and other things [1]. The process of searching for a job and filling out the application from the job applicant's side is not easy not only for the job seeker but also for the job posters (recruiter). The same difficulty is there for the job posters, as there is an uneasy process starting from the job announcement, and deciding the best way to reach the desired candidate, then evaluating the requests and then hiring the desired one! It is no secret to anyone that this process in its traditional form is costly for both parties. For example, many companies pay a lot of money for advertisements in magazines, newspapers and so on. At the same time many job seekers pay sums to employment offices and many of them fall as victims of fraud. So, based on the unreliable results of the recruitment process in its traditional form the computer systems stood up and made it clear that once again it could provide the best reliable solution for both parties. This is where online recruitment systems appeared. It allows the job seekers and the job posters to announce or search for jobs at a minimal cost and with a guarantee to reach a huge number of candidates only in seconds [2] [3]. Recruitment system mostly is an online web application in which job seekers can search and apply by themselves for a job matching their ambitions and qualifications. Such system appears to be hero for different users around the world. Quality and Development Authority (QDA) whether in universities or other institutions must rely on these systems to provide opportunities for a large segment of talented people and to guarantee the quality of the hiring process. For example, many recent graduates from university do not know where they should go after graduation and how to arrange the best CV so; they can apply for a job or obtain training opportunity. The online recruitment systems solve many of these problems, increase quality and development, and raise the work in many sectors.

The aims of this paper are to develop a web based online recruitment system that transforms the manual recruitment task from its traditional form to the automatic form. This system is intended to help the jobs providers (recruiters/companies) and the applicants (job seekers) to replace the traditional way of job finding, applying and hiring process. The contribution of the paper is as follows:

- To study the field of web development from the aspects that we need to complete this proposed paper.

- To identify the best structure and design concepts that needed to fill full our requirements and needs.
- To develop a working web based recruitment system that allows applicant to personalize their information and apply with their CVs, and on the other side, allows the companies or any job provider to announce or search for desired candidate.
- Millions of resumes are posted to famous E-recruitment websites, becoming a true market; uncontrolled and unconstrained by geography.

This paper is organized as follows: Section 2 provides the reader with an overview of the literature review. Section 3 provides the system analysis and requirements. Section 4 shows the architectural models to demonstrate overall structure view of the system design. Section 5 shows experimental results and evaluations. Section 6 gives the conclusion and the proposed future work.

2. Literature Review & Related Work

2.1. Literature Review

The process of applying for a job in its traditional way which includes looking for it in newspaper, phone books and across family, colleagues, and so on appears to be ineffective. Also, the task of posting a job vacancy and the task of reaching the best candidates in its manual form is not sufficient [4] [5]. The manual recruitment for both parties was expensive in all respects. Starting from the tools that the job seekers use to search for a job and from the point of view of the job providers that they need to pay often to announce for a job vacancy. However, these ads cannot reach all the experienced candidates that the institution or company needs. This process needs to be repeated until they find the suitable candidate. However, applying to companies in the paper form is not very effective. For example, suppose we have a person X who applied for a job in 2019 and left his CV where he did not get that job, but in the year 2020 a new job was announced and he in return during a year achieved a new skill. The question: Does the company realize among the many employment requests that it has received that the CV of that person X appears to be beneficial for them and how possible this person can add or amend his CV to the company and apply easily? "The Internet has drastically changed the face of recruitment. Job providers now can actively announce their job vacancy by using a well-implemented E-recruitment program to find better quality candidates and to improve their hiring decisions, in less time and at a lower cost." [2]. The answer to this is always in the hands of the modern technology that has imposed itself. Yes, technology has changed the world and taken traditional methods to a better situation. Now, the job seekers can advertise themselves, show off their skills and abilities, compete with others and search for opportunities in their desired field. Companies can also advertise their opportunities at minimal costs. This new way is known as online recruitment system or E-recruitment. The following section will define such system and will talk more about its advantages.

The online recruiting is the act of using the internet to locate the job seekers or whom currently in their position and the job providers effectively in the same place and bring them much closer. From the previous definition there was a new direction to make an online recruitment system (E-Recruitment) that should be able to handle all or some of the most aspects in the job process such as attracting, searching, evaluating, and interviewing candidates and so on [6] [7]. E-recruitment system, opens the door for companies to use technology especially the web-based systems to make awareness of positions in the minimal cost, also it gives the unemployed people the chance to market themselves and to show their experiences and so on. This system assists both the applicant and the job provider for tracking the recruitment process.

The main aim of E-recruitment system is to reach a larger pool of potential job seekers and to facilitate the selection of candidates for the job providers.

2.2. Related Work

Computer Jobs was founded in 1995 in the US [8]. It's a dynamic web application that allows recruiters to advertise the vacancy jobs in computer field. The website advertises the job on the vacancy page and send emails to the subscribed candidates. Also it gives the employer the chance to search in the website database to look for possible candidates. They provide a search tab and it shows the vacancy or the available jobs based on your residence country. Also, it provides a service for the job seekers such as "Get job alter" to notify them of available job by email also it allows the website visitor to upload his CV without registration just he needs to put his email if they find a good chance for him then they can reach him and inform him by email. The website provides services for job providers to advertise but for some fees about $10. This website gives the chance to the website visitors to create an account for that website either as job seeker or provider as shown in Figure 1.

According to Galanaki [9] online recruitment (e-recruitment) process is started by posting vacancies on the corporate website or on an online recruitment vendor's website, and allowing applicants to send their resumes electronically through the e-form or email.

Mary Grace G. Ventura and Rex P [5] [10], have made a study by building a prototype of an E-recruitment system for the university of the East to study the effectiveness of such systems in the recruitment process. They evaluate the system by six groups of respondents to determine the effectiveness of the system in terms of performance, reliability, security, and cost-effectiveness. They didn't present the way of building their system clearly but they show some results to prove their final conclusion that such systems are effective. Actually, this study is related to their work in the field only and will build on their conclusion that these systems are effective, but our study will not going to build our system to evaluate its performance etc. to improve this field as in Figure 2, but rather than will build a recruitment system to help job seekers especially from university in the first place.
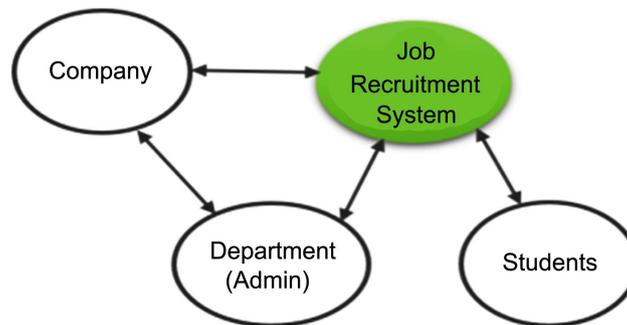
Figure 1. Computer jobs homepage.

Figure 2. E-recruitment of university of the east.

Manual [11] is a global online employment website for job seekers and the employers who need great people. The website also supports Arabic and English but some features in it will disappear once it will change to Arabic as in [12].

This website provides different job search options so the job seeker can search for a job by location, skills, company, function, industry, or, woman jobs, part time job or diploma jobs. Also, they provide resume services to help people to write CVs but it's not for it costs $149. Also, the website has a tab for career tips and job alters. On other hand, the website provides some services for the employer to announce their needs. Also, the website allows visitor to register and create account to get news from the website to their emails as in **Figure 3**.

The E-recruitment systems are not a new branch in research. As mentioned above, there are many such online systems that provide services for both job seekers and job providers. Each system has its own features but most of them share the main functionalities. But let us highlights how our work will be similar or different from other works.
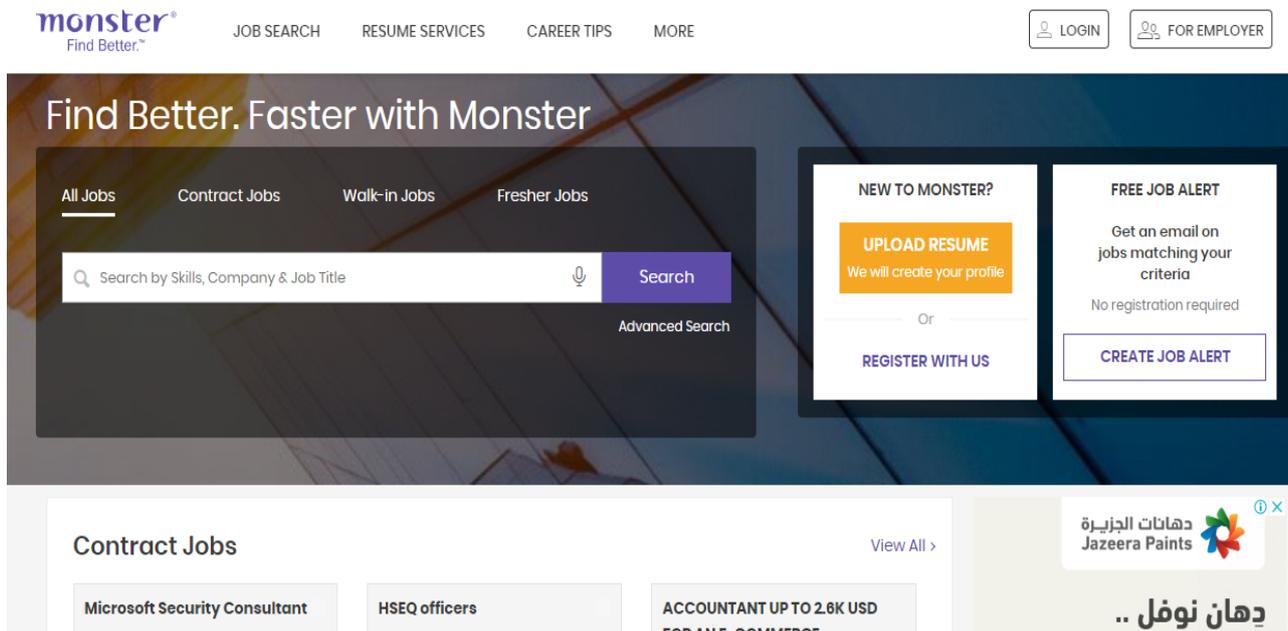
Figure 3. Monster [13] homepage.

Let us first identify the similarities, the first noticeable similarity is that the new study will support both jobseeker as well as job provider to reach each other. Second, new study will give both the opportunity to register in the website to get alter and search in the website with advanced search options based on their interest. Finally, new study will allow visitors to sign up and get accounts in the website.

On the other hand, the difference between new study and the previous study are summarized in the following points:

1) New study will support all job providers to post about jobs available for free to encourage them.

2) New study will allow job seekers and job providers to make their own profile and give them the chance to make it public for all or only for the registered people in the website.

3) New study will support direct chat between job provider and seekers.

4) New study will allow seekers to contact with each other.

5) For the job seeker new study only targets the graduated students from University in all departments not only for one program.

3. System Analysis

This section will try to start the first step of collecting the functional and non-functional requirements of the system carefully by analyzing real existing related system. This will take us to the final constriction of our proposed system. Any working system represents a multiple relationship between its inner components that build to reach one goal. It's so necessary to build an effective system to understand all the components and organize them correctly.

3.1. Analysis of Existing Systems

Dice [14] is an online recruitment system. Similar to the previous sites this site also provides opportunities for job seekers and those who provide jobs to express their needs. It helps the job seekers to find the perfect job match only in computer branches such as web developer, full stack developer mobile developer etc. Job seeker can search for jobs by tittle, by skill or by category. Figure 4 and Figure 5 show the sign up for job seekers and for the employees. The sign up is free for the job seekers but it requires some fees from the job provider to register in the website. Figure 6 shows the webpage of the Dice Company.

Figure 4. Dice employer sign in page.

Figure 5. Dice employee register in the website.
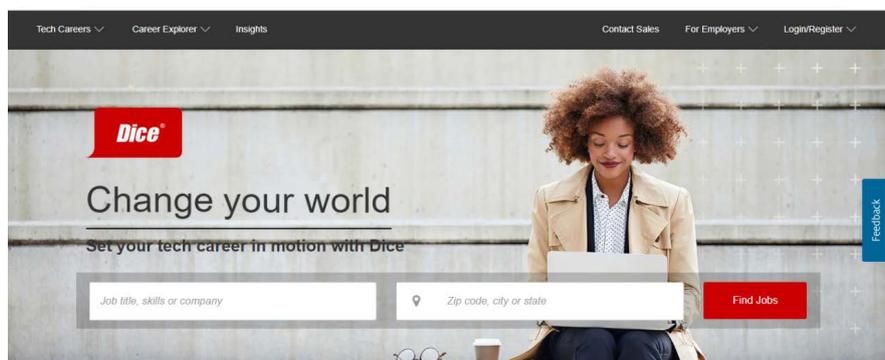
Figure 6. Dice homepage.

3.2. System Requirements

The system serves and provides its functions only for authorized users whether they are job seekers or job providers.

Hardware and Software Requirements

Table 1 shows the needed hardware.

Table 2 shows the needed software.

4. System Design

4.1. Architectural Design

Figure 7 shows the architectural design documents the general organization of the overall structure of system. Hence, it improves the understanding of system and helps to identify the major components of the system and their relations with each other.
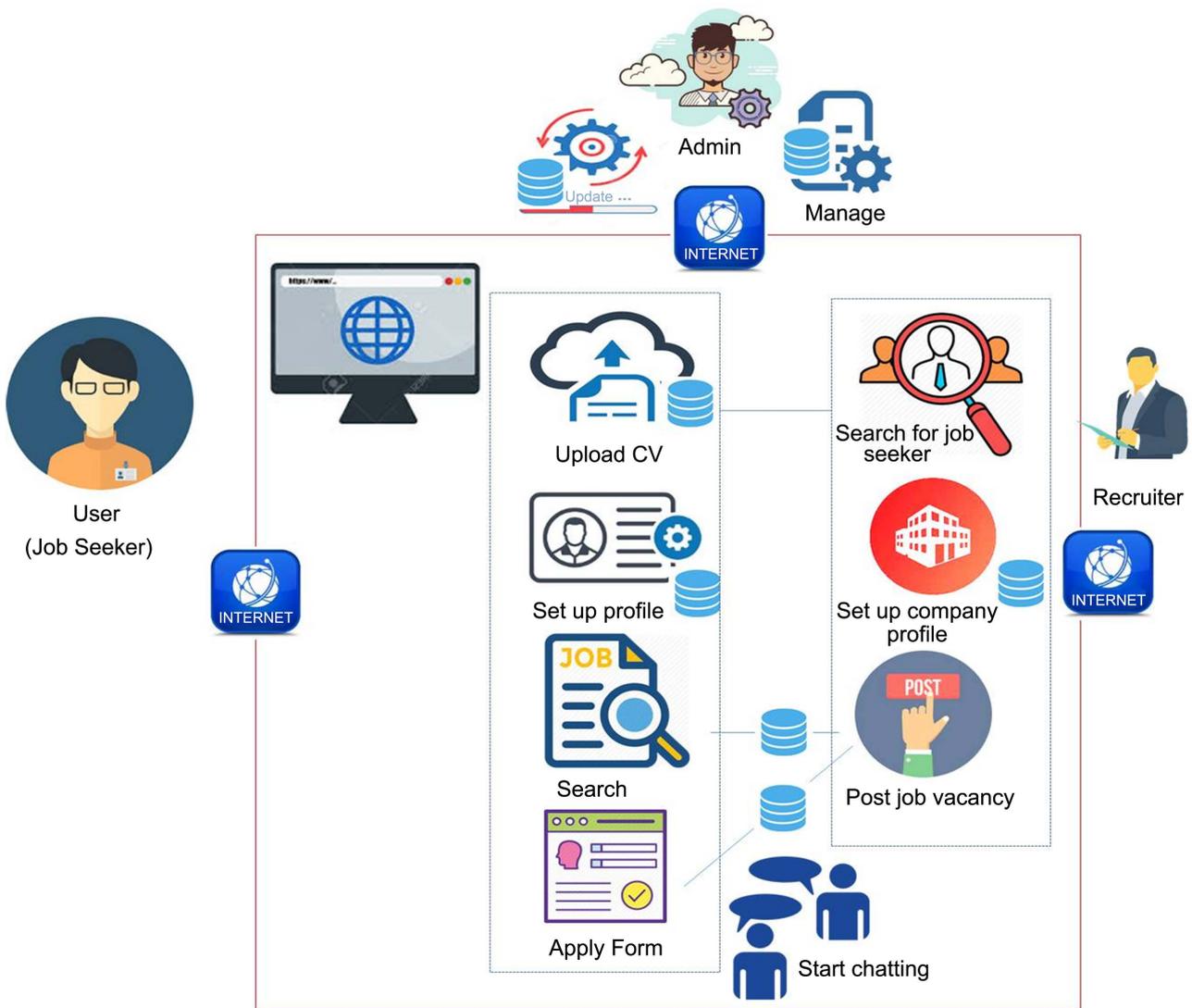

Figure 7. Online recruitment system architectural design.

Table 1. The hardware general requirements.

	Recommended hardware
Processor	Intel 2 GHz or higher
Hard desk	1 GB or higher
Internet connection	DSL
Resolution	Minimum 1024 * 768

Table 2. The software general requirements.

	Recommended software
Windows	Windows 10
Web browser	Google chrome
Web Server	Xmmap local host
Scripting language	PHP
Database	MySql

Using the internet the admin and user (job seeker) and the recruiter all can access the web site but each one of them has his own functions as shown in **Figure 7**. The admin is able to manage and update all services on the website. On the other hand, the user (job seeker) after login to the website he will be able to upload his CV and set up his profile this is how we allow him to market himself to others. Then he can search for a job if any recruiter has posted a job vacancy then he can fill in the form then both of them can chat together and get direct response from each other.

4.2. Object Oriented Design

Object oriented design is concerned about the system general layout and how every layer in the system interacts with other layers. Hence, it helps to separate the system into objects and connect them together with relationships. In the section below, we present the static class diagram (data flow-class) and dynamic sequence diagram [15].

4.2.1. Structural Static Models
In the coming section we will show the flow of data in the system by providing the data flow in our system. Then, we will identify the system components and their relations by presenting the class diagram. Then, the sequence diagram demonstrates the interaction between the users of the system and the system components in period of time.

4.2.2. Dataflow Diagram
A data-flow diagram (DFD) is a method of addressing a progression of an information of an interaction or a framework (generally a data framework). The DFD additionally gives data about the yields and contributions of every substance and the actual interaction. An information stream graph has no informa-

tion stream charts that can be isolated into intelligent and physical. The legitimate information stream outline depicts stream of information through a framework to play out certain usefulness of a business. The actual information stream chart portrays the execution of the logical data flow.

The system data flow is shown in [11] and **Figure 8**.

5. Experimental Evaluation

5.1. User Data Collection

A survey was spread to test and evaluate the system technique, since it is the fundamental limit that depends on the accomplishment of the structure. The model size was 200 respondents their ages in the scope of 20 and 30 related with the market study. As uncovered in **Figure 9**, there are various times of different sexual direction playing out the Web based E-Recruitment System.

Figure 9 is depending on the huge worth it is distinguished that there is a critical contrast with the different age bunches respondents as far as Online
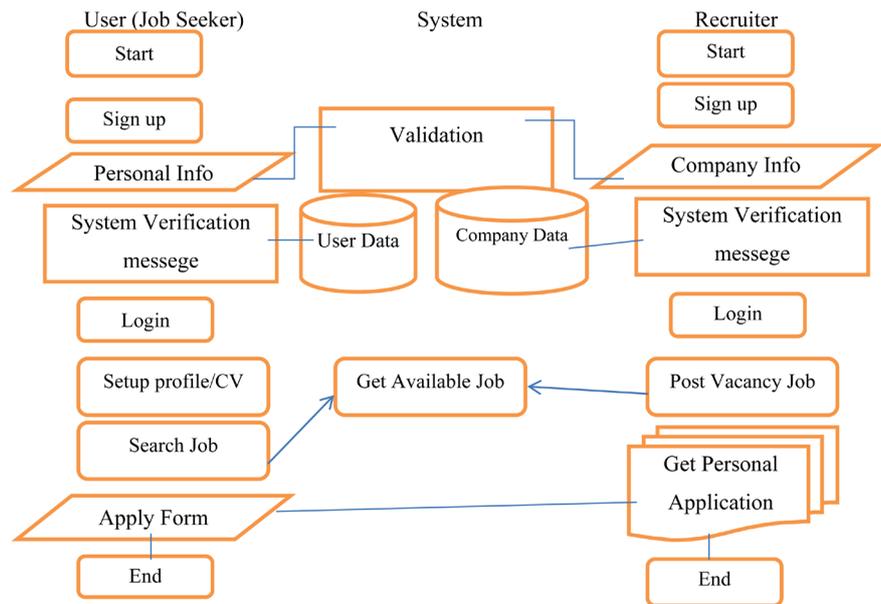
Figure 8. Recruitment data flow.
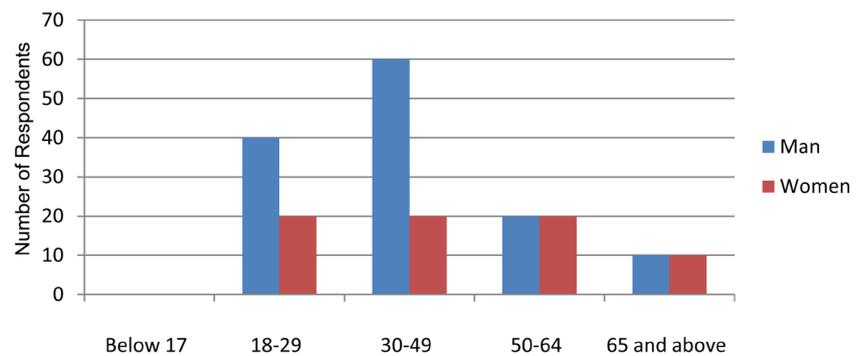
Figure 9. Performed web based E-recruitment system by gender and age.

enlistment (e-enrollment) entrance reception (utilization). It very well may be presumed that online enrollment (e-enlistment) entry reception (use) varies with age.

5.2. Questioners Design

Data assessment was being coordinated using Excel. In this review, scale had been set as seeks after: 1 = Strongly Refuse 2 = Refuse 3 = Neutral 4 = Agree 5 = Strongly Agree, the going with tables present the Mean for all estimations. Also, The Web based E-Recruitment System contains three fundamental classifications, in particular, commitment, style and usefulness, for evaluating the nature of use. Rating the application as indicated by these classifications will furnish better application assessment contrasted and the client appraisals in the application store as displayed in Table 3.

5.2.1. User Interface Questionnaire (Engagement)
The Mean for phrasing used in the system estimation is 4.76 for customers, exhibiting that customers yield to the expressing used in application, and the phrasings used in the structure are clear and simple as shown in Table 4.

5.2.2. Usefulness Perceived (PUEU) (Aesthetics)
The Mean for apparent value measurement is 4.75 for clients, demonstrating that the Web based E-Recruitment System concede to the framework use and the framework empower to achieve the procedure all the more rapidly particularly in using the E-Recruitment System as shown in Table 5.

Table 3. Items categories.

Category	Items
Engagement	Interesting
	Interactive
	Useful
Aesthetics	Layout
	Visual appeal: How good does the app look?
Functionality	Performance
	Ease of use
	Gestural design

Table 4. Terminology used in web based E-recruitment system "descriptive statistics" (Engagement).

Questions	Mean
Web based E-Recruitment System is steady.	4.90
The Application's notices are useful and interesting.	4.80
Average	4.76

5.2.3. Ease of Use (PUEU) (Functionality)

The mean for clear effortlessness use estimation is 4.86 for customers; Customers find the system easy to use and the undertakings in the structure simple to utilize and easy to investigate as shown in Table 6.

5.3. Experimental Analysis and Discussion

5.3.1. New Approach Average Scores

We averaged the scores of the collected application surveys according to the Web based E-Recruitment System. Each Web based E-Recruitment System item uses a three-point scale, a score for each category is calculated as the mean of all belonging items, and the overall score is calculated as an average across the categories. The overall satisfaction measures are, as shown in Table 7. The overall mean for all Dimensions is 4.72.

From Table 7, the outcomes show that the normal score of 4.72 out of 5, demonstrating that the clients are feeling charming while at the same time utilizing the application highlights and the framework is not difficult to utilize. At long last, the frameworks would help with accomplishing the most significant level of administrations security on using Web based E-Recruitment System.

Table 5. Perceived usefulness "descriptive statistics" (Aesthetics).

Questions	Mean
E-Recruitment System will be helped after using the application	5
Using the E-Recruitment System would improve loss in job opportunity	4.30
Using the application will make it easy to request a job Guide service from one application	4.70
I would find the Application useful in urgent cases	5
Average	4.75

Table 6. Perceived ease use "descriptive statistics" (Functionality).

Questions	Mean
Figuring out how to utilize the application was simple for students	5
My association with application is clear	4.70
Web based E-Recruitment System for company and students easy to use.	4.90
Average	4.86

Table 7. Overall satisfaction.

Dimensions	users	mean
Web based E-Recruitment System Screen	10	4.75
Terminology Used in Web based E-Recruitment System	10	4.76
Web based E-Recruitment System Capabilities	10	4.5
Perceived Usefulness	10	4.75
Perceived ease of use	10	4.86
Overall average		4.72

5.3.2. Discussion

We conducted extensive and rigorous testing to test the system as seen in the above sections.

It seems clear that we have delivered all the functions that we have committed to develop in the system. Also, we have also tested all the nonfunctional aspects and we fulfill all of them.

Based on this we can say that we achieve all the functions of nonfunctional goals of our web recruitment system.

6. Conclusions

This paper is trying to build solutions using modern computer systems to build an online recruitment website that helps all of the process parties to reach each other and to meet their needs freely. Our paper aims to build a website that specifically targets graduates of university or who are expected to graduate from all programs and departments. This proposed website will help them to market themselves and their skills by preparing their profiles and uploading their CVs. Also, it helps them to search for companies or institutions that provide jobs with the possibility of filling an employment application and provide a medium of communication between the job applicant and its provider. In this paper some relevant previous works have been studied and have benefited from these experiences. The website supports only Arabic language and it supports three types of users. First, the website administrator is responsible for managing and updating the website. Based on his authority he can see reports of all the registered users on the website. Also, we are able to add/delete/update new job seekers or new job providers. Moreover, we can add new categories (Department) such as computer science or art etc. Then the users and the job provider can belong to categories based on their specialization. Second, job provider (recruiters) is able to set up his own profile and post a vacancy job or search for job seekers throughout the website and communicate with them. The third users are the job seekers (users), who are able to set up their own profiles and search for vacancy jobs and then fill in job applications. Also, we can search for other job seekers throughout the website and communicate with them. Accordingly, we analyzed our system and designed its various functions.

Future work can further improve our system to be more efficient. Some of these improvements include machine learning algorithms to improve the search process. Make the website support English language as well. Improve the security and study the possible vulnerabilities and overcome them. Provide sort algorithm to allow job providers to sort the coming application. Finally, build mobile application for this new system.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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