



Applicant Tracking System for Nigeria Federal Road Safety Corps

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Authors' contributions

This work was carried out in collaboration between all authors. Author IA designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript and managed literature searches. Authors OF managed the analyses of the study and proof read the manuscript. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/BJAST/2015/12910

Editor(s):

(1) Xu Jianhua, Department of Geography, East China Normal University, China.

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(3) Anonymous, Pakistan.

Complete Peer review History: <http://www.sciencedomain.org/review-history.php?iid=766&id=5&aid=7340>

Original Research Article

Received 23rd July, 2014
Accepted 21st November 2014
Published 16th December 2014

ABSTRACT

This paper presents a solution designed and developed to solve the problem of recruitment experienced by the Federal Road Safety Corps (FRSC) of Nigeria. Since the establishment of the Corps in February 1988, the recruitment process has been manually conducted. This has resulted in enormous and completely avoidable financial and human costs. In addition to cost of travel and man-hours expended, FRSC personnel lives have been lost in accidents as they travel around the country to conduct recruitment exercises. In order to alleviate these problems, an Applicant Tracking System (ATS) is proposed to handle the FRSC recruitment exercise, keep track of various processes and make reports easily available. In this paper the approach taken to develop the ATS is discussed, technologies utilized to build the system are described, as well as how the system is used to improve the overall FRSC recruitment process. Furthermore, the system is qualitatively evaluated to measure its potential utility and effectiveness. The ATS is shown to not only have contributed to the enhancement of FRSC's overall recruitment process, but also reduced the risks of sending FRSC staff on long distance trips around the country to manually conduct personnel recruitment exercises.

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Keywords: Applicant tracking system; recruitment; federal road safety corps; cloud computing.

1. INTRODUCTION

The traditional hiring process for a large, medium sized or small-but-expanding companies tend to be a real drag. With increased advertisement in the classifieds section of various media outlets companies end up with hundreds or thousands of applications and resumes, packed so tightly into filing cabinets that end up are literally bursting at the seams. Due to high unemployment rate in Nigeria, HR departments and recruitment personnel are likely to continue to contend with thousands of applications and resumes for some time to come.

In fact, the rate of unemployment in Nigeria is believed to be at its highest ever recorded in recent times [1]. Recruiters and recruitment firms face several challenges during recruitment exercises. The process is so tedious that recruiters are unsurprisingly overwhelmed because of the manual steps involved. No one is comfortable with the manual way of recruiting; both applicants and recruiter encounter many difficulties during recruitment exercises.

This research work focused mainly on developing an Applicant Tracking System for Federal Road Safety Corps. This is motivated by the numerous challenges faced by the agency in previous recruitment exercises. The research work is aimed at designing a functional system that will bring efficiency, transparency, and accountability to the system. The application, when fully operational, will be integrated to the existing FRSC corporate website.

ATS automates the hiring process from end to end. It begins with how candidates view openings and complete online applications to scheduling interviews and securely storing resumes. Central to the process is ensuring that this workflow is easily accessible to everyone from the HR specialist to the CEO [2].

Nearly all major corporations use some form of Applicant Tracking System to handle job applications and to manage resume data. A dedicated ATS is common for recruitment specific needs. At the enterprise level it may be offered as a module or functional addition to a human resources suite or Human Resource Information System (HRIS). The ATS is expanding into small and medium enterprises

through open source or Software-as-a-Service (SaaS) offerings.

Applicant Tracking System works by allowing employers to enter key words or phrases from the job description into the system ATS. The ATS will then search the database and return resumes with the key words to the employer for review. The search of the ATS database can be repeated as many times as desired by the employer to narrow down the best candidates to further pursue. According to Marino [3], the understanding of the workings of the applicant tracking system will help you better prepare your resume for the job description, and help you get the job interview you have been waiting for.

The Internet is a relief to mankind as distance is no longer a barrier to users of a system. Applicants can assess job openings from any part of the globe and offering firms can collect, collate and process applications without physically meeting the applicants.

The newly developed Applicant Tracking System (ATS) upon completion was able to manage job recruitment exercise from the point of online application submission, through short listing, scheduling for interview to selection. The solution does not only minimize human intervention, but it is fraud free, saves time and cost effective when compared with the existing manual technique. The new approach to recruitment and selection exercise has brought relief to the employees who are saddled with the responsibility of processing job applications through manual method.

It is pertinent to mention that the new ATS has brought some innovations into the Applicant Tracking System when compared with other solutions that are available. The new ATS introduced the generation of Personal Identification Number (PIN) which is prepared in the form of scratch cards that are sold to the applicants for the purpose of registration and application tracking.

In this paper, the design and development of an ATS for FRSC recruitment is presented. The approach taken to develop the system is discussed, technologies utilized to build the system are described and a quantitative analysis of the improvement to the overall FRSC recruitment process is given. The paper is organized as follows: Section 2 is a review of

related literature on the research topic; Section 3 presents the design and development methodology and also describes and illustrates the functionality of the system developed for FRSC. Section 4 focuses on results and discussion of quantitative analysis of the system and finally, Section 5 concludes the paper and highlights the possible future work to be undertaken.

2. REVIEW OF RELATED LITERATURE

Talent Management Systems (TMS) a system that gives an organization a high standard, checking any loop hole especially in sensitive area, via program implementation and maintenance in order to get attraction, acquisition, development, promotion and retention of quality talent [4].

The concept of Talent Management began in the late 1980s when larger organizations were able to make applicant tracking possible and important as result of client/server technology, optical server recognition software and level field playing ground. It started in the mid 1990s due to emergence of internet, database technologies and web browsers. It became popular in late 90's with the advent of online job boards, electronic recruitment and corporate employment web sites.

We have some examples of ATS such as iApplicants, SuccessFactors, Icims, Talent Plaform, COMPAS for Staffing, Kronos Workforce Central and the the Applicant Manage.

The iApplicants is an ATS designed to assist average sized firms thus creating a recruiting process that is simpler, faster and highly efficient. The objective is to ensure you do not engage in paper application and sending resume to your email spam. iApplicants was designed to cater for 20 to 2000 employee and charged accordingly. It was made to give a simple but effective recruiting system, easy to maintain and it comes with those features and tools that smaller enterprises need.

The iApplicants works in such a way that firm gives you your unique Uniform Resource Locator (URL) that is made to fit a client brand. The application of client is customized to fit the present enquiries. The website of the client is filled with their information such as the present available jobs, departments, source of recruitment and it is set to work with the

company's structure. The paper processes of the organisation are completely replaced as they launch the website and this happens usually within 3 working days. This is achieved within 2 hours of duration spent by your Human Resource manager. Free 30 day trial service is provided and if a customer is satisfied and decides to buy this product, no set up fee will be required. The customer will only be paying small amount which can be monthly or annually.

Some of the features found in iApplicants are 24/7 Careers information to applicants, web pages that are customized thus project the Organization to Job seekers; automation of posting to Online Job Boards.

Other features are Applicants' information tracking, automation of hiring process assessments, tracking of the flow of the application process and permitting simple email blasting to collection of application. Multiple connections with control is equally possible [5].

SuccessFactors recruiting supports a client's recruiting team resulting in a better cooperation.

It enables hiring firms to be highly effective during the recruiting process thus giving them the opportunity to obtain a well secured job very fast, simply with a lower cost.

It is developed for business purposes and has a good reporting feature. The data is presented in a form that is easier to maneuver, meaningful and actionable information via the customized dashboard. You can evaluate the happenings in your organization from a micro and macro point of view. Everyone has a right in SuccessFactors. It has a page design that involves web 2.0 technologies having an experience as a consumer, easy to use for everyone involved in the recruitment process-hence, the team work in the hiring process. SuccessFactors recruiting provides social and collaborative solution. With SuccessFactors, recruiters are able to reach millions of good applicants, build relationships and allow access to passive applicants and employee referrals spending a fraction of the actual price. This is as a result of deep connection with leading social media sites.

SuccessFactors recruiting can be accessed on the mobile device from which you can review the applicant's resume from the Job Offer To-Do concise and approve or reject job offers for applicants in the To-Do list from anywhere.

Many applicants as possible are gathered through the use of websites and job search engines by declaring a vacant position over a large span of area.

Although, a department manager or human resource department do overtime reading and screening resumes with the mind set of saving cost. Reading, screening of resumes, discussing with potential applicants and delivering a selective group can easily be done by a professional recruiter in a timely manner.

According to Braddy [6], the features of on-line recruitment make it difficult to maintain the personal aspect, however, a carefully designed web page, attention to detail and user-friendly style might help to in achieving these benefits. The recruitment branding should be honest and truthful in order to avoid future financial burdens that might arise from higher turnover, lower performance or reputation damage.

Headhunters for executive and professional positions are firms that are either retained or contingency. Even though, the flow of candidates is kept with the aid of advertisement. They rely on networking as their main source of candidates.

According to a review by Cappelli [7], a detailed description of the recruitment process is often presented on career web pages and might be seen as a commitment to standardised recruitment practices as well as equal opportunities. By publicly showing the practices and processes, organisations might not only be perceived as a 'fair employer' but also allow the applicant to adjust their expectations and to improve their preparation for the selection process. Recruitment is a two-way process, where both the organisation and the applicant take the decision to accept or reject an offer. By providing extensive and coherent information on their web page, organisations might be able to attract the best candidates. Career sites should be designed to show the advantages of working in a particular organisation, including workplace awards, employee benefits, work-life balance or commitments to the community. Additionally, the programs permit Human Resource to put together many reports.

Such report in Abra, include "EEO applicant summary" and "applicants by rejection reason.

With advent of Internet and the present limited number of candidates, software providers are including more capabilities to applicant tracking. In Abra for instance, a self-service capability that permits employees to check which openings are available without visiting the Human Resources is present.

According to product manager Sokol Mark, e-mails are automatically generated to candidates in response to resumes obtained from the internet, an alert in Abra system.

iVantage, from Spectrum Human Resources in Denver, provides reports on "time to hire" and "cost of recruitment for each hire," says president Jim Spoor. The program also creates reports to help companies analyze the needed future workforce skills [8].

A major advantage of an HMS is that it permits your company to integrate its corporate web site with job boards. That is a weakness of some traditional applicant systems, which "do not do a lot on the Web hiring side," based on Spoor's view.

3. METHODOLOGY

The FRCS Applicant Tracking System was implemented using a web-based technology, where the major processes of recruitment of applicants are handled online to reduce the cumbersome nature of recruitment. The background research involved interview and review of published materials. The materials were sourced from various libraries such as University of Abuja, National Library, Abuja and the internet. Interviews were conducted on senior staff in the Corps. The standard quantitative analysis technique of using survey questionnaires which is widely used in research, were used to measure the performance of the system. A standard set of questionnaires designed to measure the metrics shown in the graph were distributed to staff involved in the manual system who then evaluated the new ATS prototype system. The numbers shown in the graph were calculated from the answers given in the questionnaires and averaged over the total number of respondents. 213 staff participated in the survey. A scoring system was developed to translate the qualitative answers to overall quantitative measures depicted in Table 1 and Fig. 11.

The recruitment method of form collecting, filling, submitting, short listing and interview are handled with web technology and language capable of eliminating the manual process. This in effect creates a wide scope of reaching a wide audience or candidates who are interested. Both users and administrators log on to the website to access the recruitment site. Candidates are expected to validate their scratch cards on the site bought from designated banks before they proceed to perform other activities like: Registration, form filling and printing their generated output information. The administrator logs in with his/her username and password to be able to perform the following actions: generate scratch cards, shortlist candidates for interview or aptitude test, view registered persons, view 'contact us' forms records and view records in the database.

For the purpose of this work, four instruments were used for data collection. The instruments are questionnaires, direct interview of FRSC staff, operational manual and recruitment form procedure.

1. Questionnaires were distributed to 213 senior staff.
2. Direct interview (oral) of selected FRSC staff: Oral interview of some selected FRSC staff was conducted. The Corps' Secretary and head of Administration and Human Resources Department were interviewed for clarifications on areas with vague information as primary source of data for the development of the dynamic web pages.
3. FRSC operational manual. This document contains all FRSC modes of operations including recruitment policy.
4. FRSC recruitment form. The recruitment form is the form given to applicants to fill and submit to the Corps. This is eventually used in short listing Candidates base on recruitment guidelines.

The proposed system is purely automated using web-based technology. Data capture of applicant information is done on the WebPages of the system where information captured is entered into a database for use, verification, validation and retrieval. An applicant is expected to log on to the web portal to access the system. The architecture of the Applicant Tracking System for FRSC is based on the following procedural steps.

1. Applicant goes to the bank to buy scratch card.

2. Applicant logs into the portal and registers using access information on his card.
3. Application identity (ID) is generated for the applicant.
4. Applicant completes the recruitment form online.
5. He agrees with the terms and conditions and submits the completed recruitment form.
6. Applicant information is stored in the database.
7. The system administrator logs on to the portal, views the application received, analyses the information and shortlists applicants based on criteria set by FRSC on the recruitment.

3.1 The Graphical User Interface Visualization

The system interface has the Login and Admin, Register, Scratch Card, Resume, Contact us and Shortlist. The validate scratch card which is index page of the website captures scratch card numbers and pin for validation before candidates are allowed to register their details, login and submit their resume. Wrong data entered by candidates or users will return an error page. Fig. 1 shows the interface for validate card.

The graphical user interface visualization for Scratch card records viewing is shown in Fig. 2. Scratch card numbers and Pin number are generated by the administrator from the generate page. The records are displayed on the view scratch cards option.

The graphical user interface visualization for recruitment form (resume) is shown in Fig. 3. The page is displayed after a successful login and it captures data of applicant indicated in the fields on the form. Applicants are expected to submit the form after filling it.

The graphical user interface visualization for Confirmation submission page for printing is shown in Fig. 4. This is obtained after a successful submission of the filled recruitment form.

The graphical user interface visualization for resume records view is shown in Fig. 5. The data captured from the recruitment form page are selectively displayed with the following fields; application ID, name, gender, date of birth, phone number, qualification and specialization. The administrator is the only one that has the right to view this page. When the administrator

clicks details of any record, the detail of the applicant displays.

The graphical user interface visualization for shortlisted candidate record view is shown in Fig. 6. The administrator is the one who shortlists candidates for interview or aptitude test. The view shortlisted candidates have the following fields: ID, application ID, date, session and type. The Fig. 7 is a Use case model that shows the interaction between the components and users of the Applicant Tracking System. It illustrates the connection that the Admin has with the system and also the connection that the Applicant has with the system.

Fig. 8 is a flowchart of Applicant Tracking System that illustrates the processes that are involved between the users (Admin and Applicant) and the system. For the Admin user, the first process is that he has to launch a web browser, since the system is a web-based system. After launching the browser, the Admin can enter the login credentials (username and password) created to him with all the privileges at the database. On clicking on login, the system checks the database to see if the supplied details matches with what is in the database, if "Yes" a pass is granted where the Admin can go ahead to generate scratch card details for applicants, he can view records of applicants and shortlist successful candidates that have been recruited by FRSC.

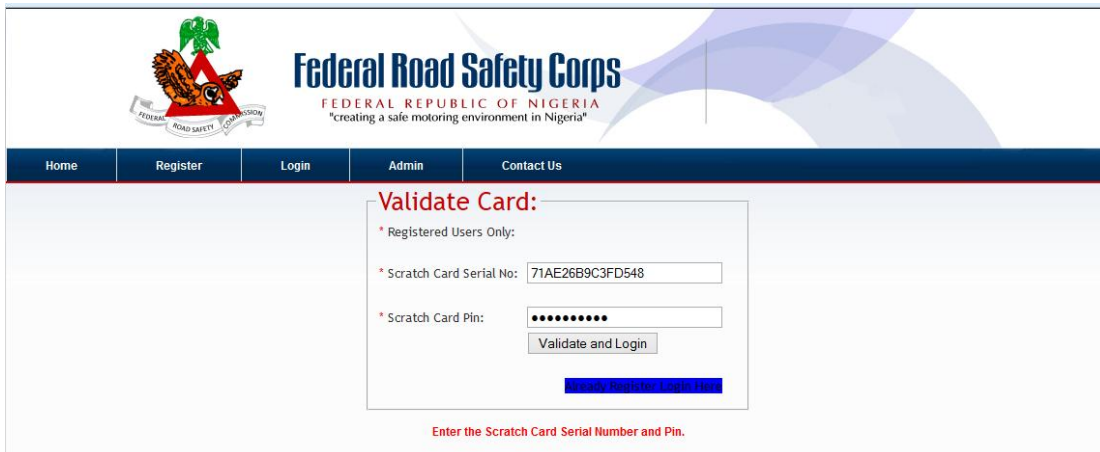


Fig. 1. Validate scratch card

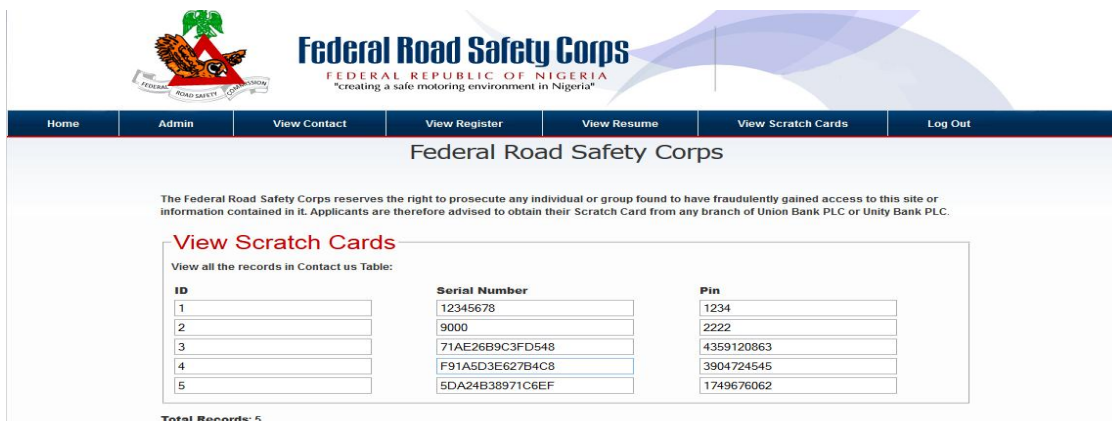


Fig. 2. Interface visualization for view scratch card

* Marked fields are mandatory

Post Resume

Future Login Information

Personal and Contact Details

2

*Application ID: _____

*Surname _____

*Other Names _____

*LGA of Origin _____

*State of Origin _____

*Nationality _____

*Date of Birth: -Month- | -Date- | -Year- |

*Gender: Select |

*Height: _____ Meters

*Current Address: _____

*Phone Number(s): _____

Present Education Details

*Qualifications: Select | If others: _____

*Specialization: _____

*Grade: Select |

*Institution: _____

*Year of Graduation: Select |

Present Education Details 2

Qualifications: Select | If others: _____

Specialization: _____

Grade: Select |

Institution: _____

Year of Graduation: Select |

Professional Experience

Total Experience: 0 |

Industry: _____

Functional Area: _____

Job Role: _____

*Additional Skills: _____
(Eg: Java, C, C++,PHP....etc)

*Upload resume: _____ Please make sure your document is an image to avoid any errors. - (.jpg / .png) file format. - Maximum size 125kb

*Terms and Condition: I have read and accept the Terms and Conditions

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Fig. 3. Interface visualization for recruitment form

For the Applicants, the user also has to launch a browser, thereafter he has to enter his login credentials that was generated by the Admin. The system then authenticates and validates him (that is if it matches with the database), the applicant then provides his email and password then clicks on resume validate. A form is then

presented to the applicant by the system which he has to fill to apply for available job vacancies in FRSC. After correctly supplying the information and uploading necessary documents. The user can submit form and his records will be automatically updated in the database.



Fig. 4. Interface visualization for confirmation page

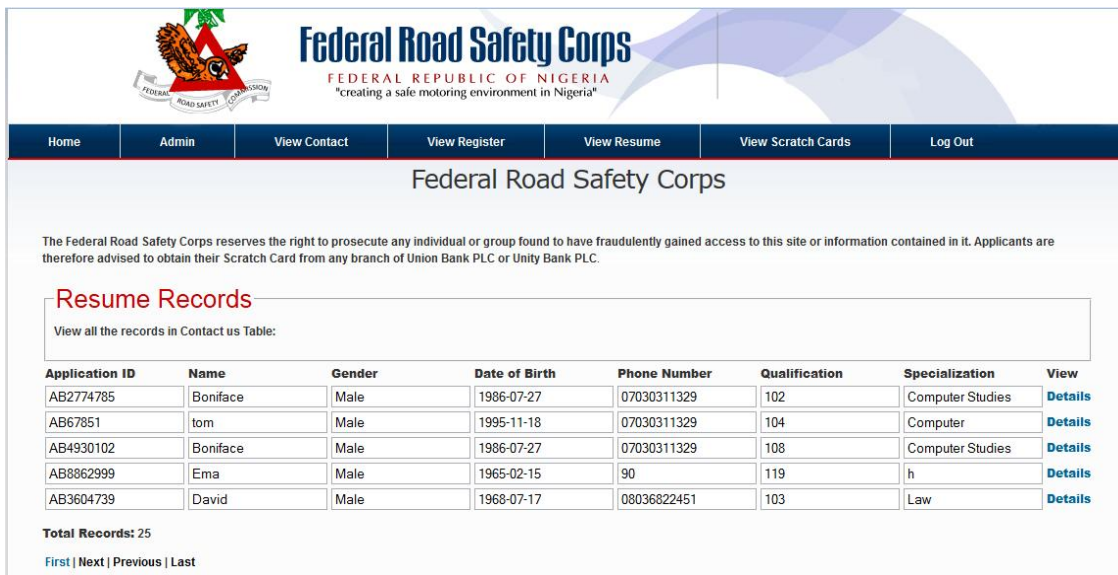


Fig. 5. Interface visualization for resume records



Fig. 6. Interface visualization for view shortlisted candidates

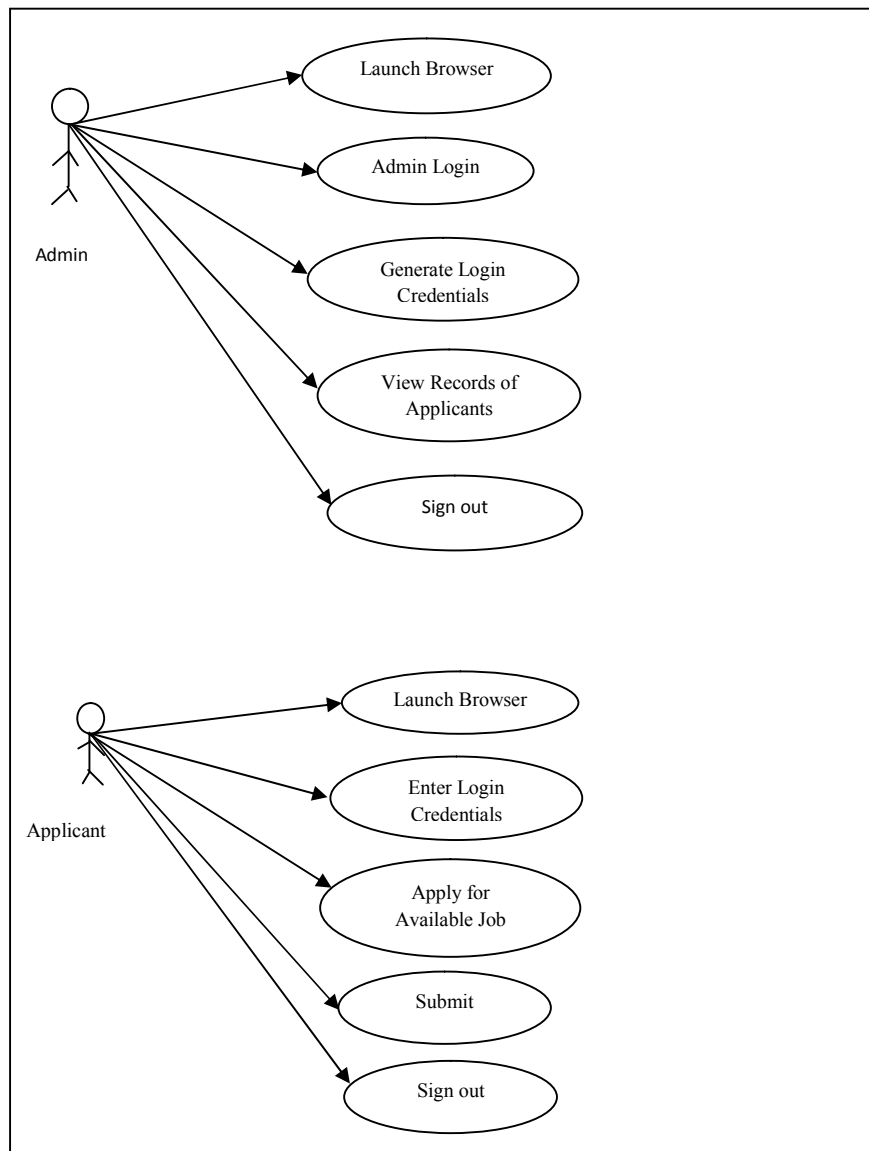


Fig. 7. Applicant tracking system using use case model

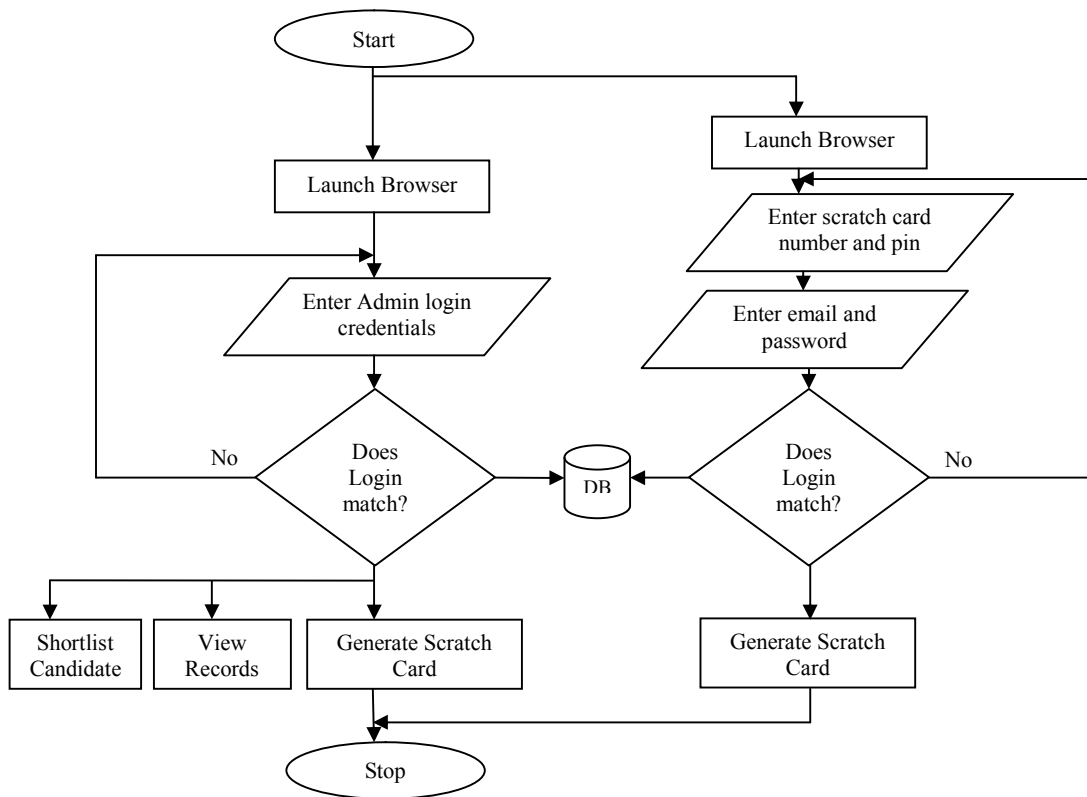


Fig. 8. Flowchart of applicant tracking system

This whole process is shown in the flowchart in Fig. 8.

Fig. 9 shows the proposed system architecture while the 3-tier Architecture of the IT based system is shown in Fig. 10. This system is web based application, designed with web technology languages such as PHP/MySQL, HTML, JavaScript and CSS. It is hosted on a server called XAMPP server where the database records are stored. HTML, JavaScript and CSS was used to develop the web pages while MySQL was used to write the query. PHP was used to code the instructions that work with MySQL database in other to manipulate the database. The Database Management System (DBMS) was implemented by XAMPP server.

An applicant who applies to work in Federal Road Safety Corps (FRSC) has to approach the whole process from the online system when it is fully hosted and implemented from the local host server. The user accesses the system through a browser by typing the uniform resource locator (URL) on the address bar. The user is able to access the functionalities in the applicant tracking system through the browser. The web

browser sends server request from the browser functions through the application's database management system, where the records are stored. The WebPages are displayed based on the user's request, reports and database dynamic functions that are accessed and displayed on the WebPages from the database management system on the local host.

4. RESULTS AND DISCUSSION

After carefully analyzing the existing system which is the manual recruiting system, where applicants queue up to get forms and submit forms. It is important to implement the proposed system which is the "Applicant Tracking system". This system on deployment will totally eradicate the paper trail system of job applicant and recruitment. ATS is a web-based system that will be hosted on the web server (IIS or Apache) and can be accessed by any web browser. ATS is a system that is built using (HTML, CSS, JavaScript) and connected to the SQL database. This system will automate both the processes performed by the applicant and also influenced the human resource processes.

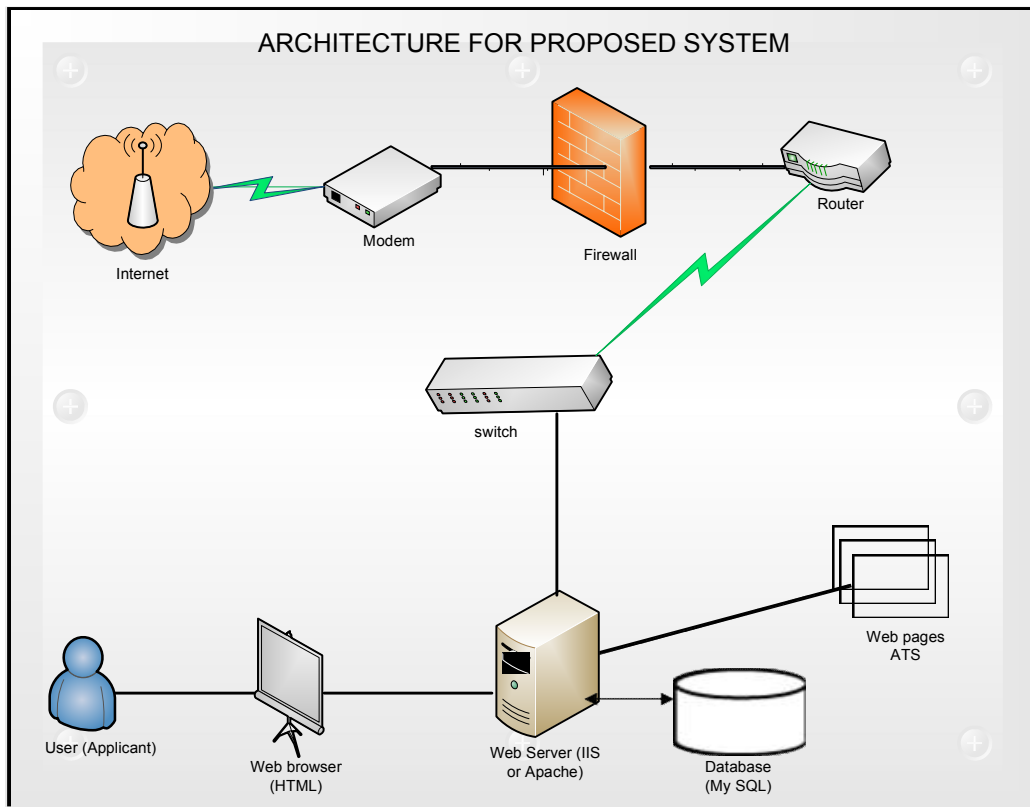


Fig. 9. Architecture of proposed system

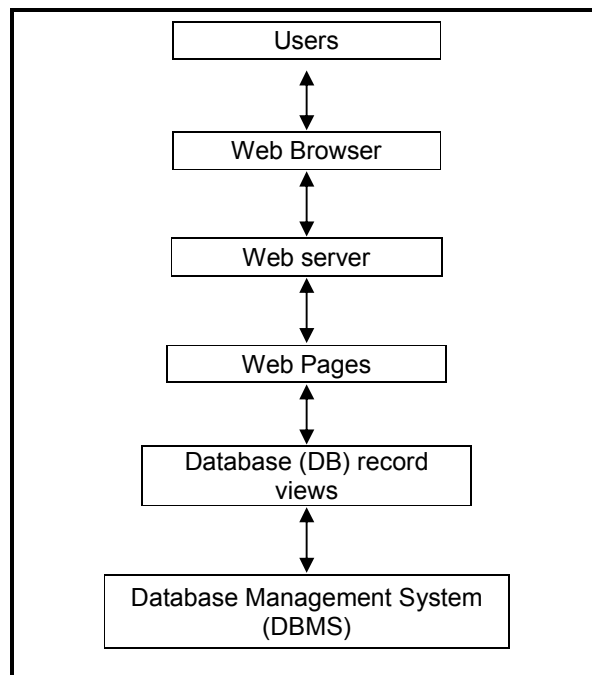


Fig. 10. 3-tier architecture of the IT based system applicant tracking system

For the applicant, all they need to do is to launch the browser and type in the URL (Uniform Resource Locator). The next thing the applicant does is to create an account with the system by creating a username and password which will be stored in the database of the system. Thereafter he can apply for any available job and then submit the application. The applicant does not need to come in contact with anybody and this will to a large extent reduce fraud that comes with job recruitment.

From the Human Resource point of view, sorting of Applicant forms is much easier because he can easily search through the entire database using inputs like name, Application number. This makes it easier and faster to manage enormous data and retrieval. Also, access to applicants' information is based on privilege given to each Human Resource personnel or system administrator, thereby creating access control and accountability because not everybody can have access to applicants' forms like in the manual system where forms are kept in cabinets. The access control attribute of this system will lead to selection based on merit since limited staff have access to the backend of the system.

The ATS can be viewed at two levels (front-end and back-end). The frontend of the system gives both the applicant and the admin an interface that allows them to interact with the system. The front-end is a Graphical User Interface (GUI) that was built with Hypertext Markup Language (HTML), Cascade Styling Sheet (CSS) and Java script. The backend of the system is the database that stores all the data in the system (both login credentials and applicant uploaded data) and was designed using MySQL. The Java script links the frontend with the backend and was designed using the Hypertext Preprocessor.

This system was implemented in the Federal Road Safety Corps and has totally automated the job recruitment process of the establishment. Before implementation, the facilities that would support the successful implementation of this system were put in place (as shown in the architecture).

Testing this system was firstly done at the subsystem level where all the subsystems were tested individually before integrating them then testing the system as a whole. The test data was mainly the Admin and the Applicant; the Admin logged into the system and create login

credentials for the applicants, could view records of applicants and could upload shortlisted applicants. The applicants successfully logged into the system using his login credentials that was generated and could upload and submit application.

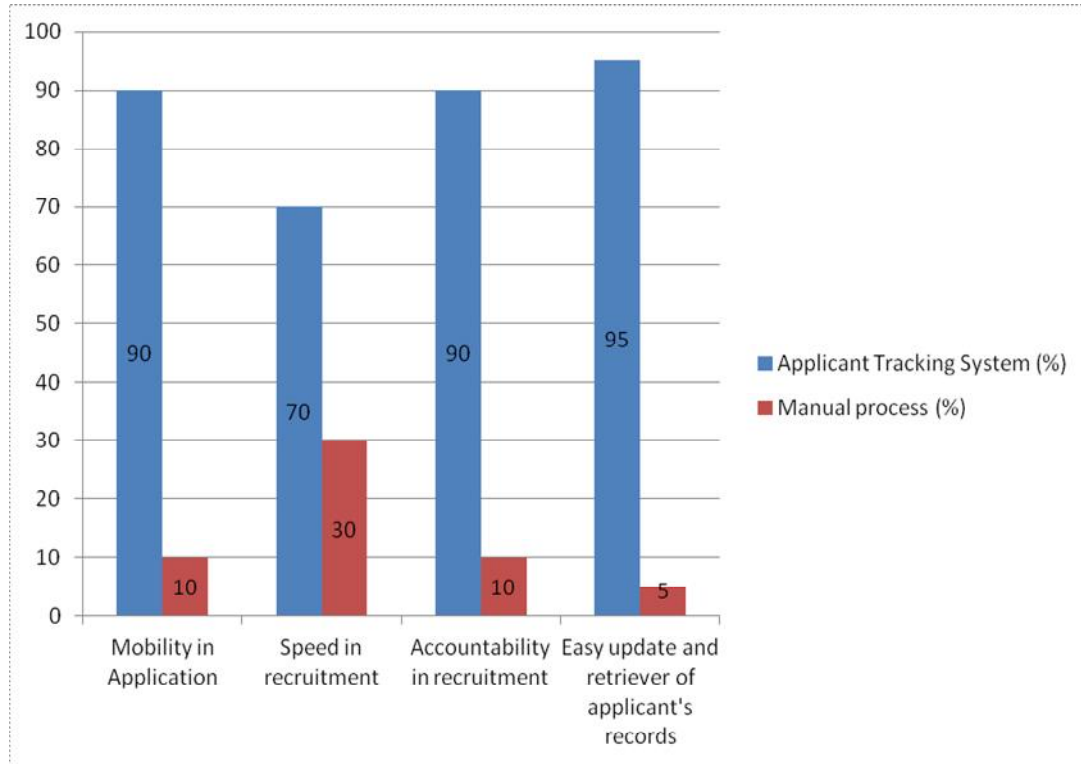
The performance of ATS can be evaluated when compared with the existing system which is the manual means of applying for jobs as shown in Fig. 11. The following criteria were used to evaluate the new system (Applicant Tracking System):

- ❖ **Mobility in application:** The existing system which is also the manual approach of application and recruitment does not allow applicants to apply for jobs from anywhere. This new system (ATS) allows applicants to log onto the system from different locations and apply for jobs in FRSC. This reduces the risk and stress of having to come down to submit forms and also check if their names have been shortlisted. This performance feature brings about convenience in application and getting updates from applied jobs in FRSC.
- ❖ **Speed in Recruitment:** Since records of applicants can be readily made available electronically, it is easier to process application forms and shortlist successful candidates compared to the manual approach.
- ❖ **Accountability in Recruitment Process:** This new system's performance is very relevant in the aspect of who has access to applicant's records and the shortlisted list. With the system only certain persons can have the privilege and access to the database where records of applicants are stored. The Admin password is shared to only individuals that are trusted and this will to a large extent allow for recruitment of qualified and credible candidates.
- ❖ **Easy Update and Retrieval of Applicant's Records:** ATS allows data to be collated electronically. This simplifies sorting because the database can be queried at any time to retrieve records about an applicant. At the same time, records of certain applicants can be updated in the shortest possible time and correctly too.

These criteria justify the high performance of this system especially when compared with the existing manual system.

Table 1. Performance evaluation of ATS table

	ATS (%)	Manual process (%)
Mobility in application	90	10
Speed in recruitment	70	30
Accountability in recruitment	90	10
Easy update and retriever of applicant records	95	5

**Fig. 11. Bar chart of the performance evaluation of ATS**

5. CONCLUSION

The design and development of ATS for the Federal Road Safety Corps offered the opportunity to provide a viable solution to existing recruitment challenges which the Corps faced. The Applicant Tracking System is a web based computer solution designed to ease the stress involved in the manual process of recruitment in Nigeria Federal Road Safety Corps. This justifies the need to develop an Applicant Tracking System developed using available software packages (PHP/MySQL, HTML, XAMP server 1.8, Adobe Dreamweaver CS 5.5). The system helped to overcome previous hitches experienced during recruitment process and introduced mobility, faster recruitment, accountability as well as ease of update and retrieval of records. Applicants can now apply for positions from anywhere in the world without physically queuing for form collection and

submission. Moreover, the ATS system is browser compatible and user friendly. The choice to eliminate the cumbersome nature of the manual process in the recruitment department motivated the development of the applicant tracking system. The ATS system prototype has been shown by the analysis to improve performance. However, the system can be improved further by including local language module and incorporation of biometric features.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:

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