UNIT STANDARD TITLE					SAQA US ID	
Use computer technology to research a computer topic					114076	
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A RESEARCH PROPOSAL BY:

Group 3 – Team Infinity

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1) Introduction

1.1) The Research Problem

Job seekers of today find it challenging to receive employment and the process of connecting job-seekers to jobs has been a persistent issue. Our proposed employment system aims to cater towards the employees within JumpCO to help the human resource department in selecting any suitable candidates within the company foremost. Providing opportunities and advantages to the internal aspect of the company will increase productivity as internal candidates have a track record within the company. The job market has displayed numerous challenges. As a result, there is a need for a user-friendly employment system that caters to both the needs of employers and job seekers. Existing and current employment platforms although valuable still face many issues and shortcomings such as, limited functionality and outdated user interfaces. Recognizing these defects, our research and application aims to develop and create an advanced employment system that not only addresses these issues but, moreover improves the overall recruitment process experience by creating more innovative features.

1.2) Rationale or Purpose of the Study

The primary purpose of this study and proposed application is to conceptualize, implement, design and create an innovative employment system that addresses the shortcomings of these existing issues. By doing so, we aim to bridge the gap. The proposed system aims to assist in the recruitment process, by creating a seamless and smooth platform in which companies can post job openings and in turn, job-seekers can flaunt their qualifications which would help assist in the unemployment rates. This research envisions a future where the job market operates more efficiently, fostering increased collaboration and mutual benefit for both employers and job-seekers.

1.3) Objective of the Study

This application and study aims to:

- **System Development:** Design and implement a robust employment system with an emphasis on user-friendliness, functionality, and adaptability to diverse user needs.
- **Enhanced Efficiency:** Improve the efficiency of the hiring process for employers by introducing features that simplify job posting, candidate evaluation, and communication.
- **Empowering Job Seekers:** Provide job seekers with a comprehensive platform to showcase their qualifications, skills, and experiences, thereby increasing their chances of finding suitable employment.
- **Evaluation:** Conduct a thorough evaluation of the developed employment system to assess its effectiveness, usability, and impact on the job market.

1.4) Research Question(s)

This application and study will look and address the following research questions:

- In what ways can the employment system aid job seekers to present their qualifications in a much more effective manner?
- What features may assist to the usability of the employment system?
- How will the proposed system help improve the hiring process of companies?

Literature Review

In the rapid era of technology, the need for robust application development is crucial. This literature review looks at existing research and technologies related to Java based CRUD application development with a focus on its development in the employment sector.

Java Development in Data Mining and Analytics

Research by, Petri Ihantola, Arto Vihavainen, Alireza Ahad, Matthew Butler, Jürgen Börstler, Stephen H. Edwards, Essi Isohanni, Ari Korhonen, Andrew Petersen, Kelly Rivers (2015), focuses on learning programming and how it relates to users actions. This study gives insight into the behavioral aspect behind the necessity and creation of certain applications. This directly relates to our proposed employment system. Java has been the preferred programming language for developing complex and enterprise applications. This makes it the ideal choice for systems that make use of data management. The use of Springboot will further improve the development process and help assist and provide our development team with the necessary tools for efficient data handling and processing.

Implementation of Advanced SQL Using Java Server Pages as Frontend

In the realm of web-based applications, establishing effective communication between the frontend and backend databases is of crucial importance. This connection serves not only for the storage and retrieval of data but also for executing various processes, be it at the frontend or backend. It is imperative to address potential data leakage vulnerabilities resulting from weak security measures during frontend processes. To mitigate this risk, this paper proposes a systematic approach—shifting the storage of all processes, including prepared statements for Create, Retrieve, Update, and Delete (CRUD) operations and calculations, into the database using the SQL programming language. The frontend is constructed using Java Server Pages (JSP), as well as HTML, CSS and alike, with the Model-View-Controller (MVC) framework guiding the web development process.

Furthermore, this incorporates advanced SQL elements such as stored procedures, functions, and trigger events. These components play a pivotal role in executing CRUD operations securely. All CRUD operations, calculations, and error handling (exception handlers) are exclusively processed at the backend, ensuring a secure transactional data exchange between the web and the database. Consequently, the frontend's primary role is relegated to data display and user input submission. In summary, by centralizing all operations within the database, this approach enhances the security of transactional data exchange, providing a comprehensive and robust solution.

This literature review provides insights into the key aspects of developing Java CRUD applications, with a

specific focus on their application in employment systems. Leveraging the strengths of Java programming, database management, user interface design, and web integration, developers can create robust and scalable applications to meet the evolving needs of HR management in organizations.

3) Proposed Methodology

3.1) Research Design

The research design for this study will contain a mixed-methods approach, combining both quantitative and qualitative research methods to provide a comprehensive evaluation of the employment system. The qualitative aspect will focus on user feedback, user experience, and the overall usability of the application. Usability testing and surveys will be conducted to gain insight into user satisfaction as well as the applications user interface and functionality. Additionally, the quantitative method will involve assessing the performance of the application through metrics such as response time, and scalability, which will measure the applications efficiency.

We decided on a mixed-method approach for its ability to measure both quantitative and qualitative approaches. This mixed-method aims to provide a holistic approach in creating an application that is well rounded.

3.2) Data Sources

There are two data sources primary and secondary. The primary data for this research will be collected through the implementation and testing of the employment system application. This involves the active development and deployment of the application in a controlled environment, where its performance can be systematically measured. Secondary data will be collected from existing literature, research papers, and documentation related to Java development, and CRUD applications. By gathering information from prior research this will be beneficial in understanding best practices, challenges, and innovations in the field.

With both the use of primary and secondary data sources this will contribute to more effective research, ensuring that findings are grounded in real-world application while also being informed by established knowledge. This enhances the credibility of the research, allowing for a more comprehensive exploration.

3.3) Data Collection techniques

Qualitative Data: User feedback will be collected through surveys and usability testing from potential users. Surveys will be distributed to collect feedback and user testing will provide a more in depth understanding of the users and their experience.
Quantitative Data: This data collection involves the performance metrics of the application which

will be gathered through profiling track tools, to measure the metric performance of the response time.

The combination of quantitative and qualitative data collection techniques ensures a enhances the validity and reliability of the research findings from the different sources, ultimately contributing to a more nuanced understanding of the application's strengths and areas for improvement.

3.4) Issues of reliability and validity

To ensure security multiple quantitative testing will be conducted. The validation of data will be done with error handling and try, catch blocks to secure data and with the use of SQL injection as well as validation done on the front end. This will ensure minimum attacks. The reliability of the application will also be done through user feedback metrics to ensure that the application is producing the intended results and performance. In the context of quantitative data, the reliability of performance metrics will be addressed through repeated tests under consistent conditions. By conducting multiple trials, any variability in results can be identified and accounted for, enhancing the dependability of the quantitative findings. Validity will be ensured through triangulation, comparing performance metrics with user feedback to validate the accuracy and relevance of the collected data.

For the qualitative component, the reliability of user feedback will be addressed by employing consistent data collection instruments across multiple participants. The credibility and transferability of qualitative findings will be strengthened through detailed documentation of the research process.

3.5) Sampling techniques

The sampling technique for this research paper is the purposive sampling technique. This will be conducted through a selection of a few participants for qualitative data collection. These participants will be various individuals with some having expertise in Java development and human resource management as well as job seekers, this will help aid in the creation of the application. The research aims to capture diverse perspectives from individuals with relevant knowledge and experience.

The purposive sampling approach aligns with the research's focus on obtaining insights from individuals with specific expertise relevant to the study's objectives. By selecting participants deliberately, the research aims to gather in-depth and meaningful data that reflects the perspectives of experienced individuals, providing valuable insights into the application's usability and functionality.

3.6) Definitions of key terms, concepts and variables

Employment System: This is a system that manages HR processes, employee records (qualifications, work experience etc.), and related data.

Performance Metrics: Quantitative measures, such as response time used to assess the efficiency of the Java CRUD application.

3.7) Data analysis and interpretation

As mentioned above, quantitative data will be analyzed using statistical tools to identify patterns and trends in performance metrics during the testing phase. The Chrome dev tools will also be a crucial tool in the development of this system. Qualitative data will be analyzed thematically, categorizing user feedback into common themes to derive insights into usability and user experiences. This theatrical analysis will display the recurring patterns and insights directly related to the functionality and user satisfaction of the application.

By using both quantitative and qualitative analyses, the research aims to derive a comprehensive understanding of the application's strengths and weaknesses, providing actionable insights for further development and improvement.

3.8) Pretest or pilot study

This will be measured by the completion of each of the modules instructed, as well as with the use of surveys and user-feedback. Each iteration of the application will be tested and the agile methodology will be implemented as the employment system progresses. Each task will be broken down into smaller components to each assigned team member and this will ensure efficient team management, improvement and collaboration.

During the pretest phase, participants from the survey will be asked to provide feedback on the application's usability, and their responses will be used to iteratively improve the research and application. This iterative process will enhance the reliability and validity of the research as well as improve the application.

4) Group 3 PERSONAL WORK PLAN (subject to change)

STEPS IN THE RESEARCH PLAN	DEADLINE FOR COMPLETION
Submission of the proposal	17/01/24
Design of a research plan	17/01/24
Gaining access/getting permission to work in a particular area/have access to data, etc.	Team agreed to create the documentation this week and to collect data and any permissions end of next week (26/01/23)
Literature review	17/01/24
Defining of a universe, a sample frame, sampling OR setting up of selection criteria, etc.	17/01/24
Design and testing of questionnaire, if appropriate	26/01/24
Design of a final questionnaire/schedules, etc.	26/01/24
Interviews/posting of questionnaires, etc.	22/01/24
Editing of completed questionnaires, grouping and coding of data, entering data into a computer	22/01/24
Design and testing of a computer program	7/02/24
Raw tabulations/draft analysis of qualitative data	28/01/24
Analysis of data	29/01/24
Report up of findings	05/02/24
Presentation of final research product(s)	25/03/24

5) Research Findings

(Can only be obtained once the application is complete)

6) Proposed Solutions

(Can only be obtained once the application is complete)

7) Future Research

This will be updated once the first iteration of the application has been complete.

8) List of Sources

References

Petri Ihantola, Arto Vihavainen, Alireza Ahad, Matthew Butler, Jürgen Börstler,
Stephen H. Edwards, Essi Isohanni, Ari Korhonen, Andrew Petersen, Kelly Rivers., 2015. Educational Data Mining and Learning Analytics in Programming: Literature Review and Case Studies. *Digital Library*, pp. 41-63.

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