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An Automated Pool Service Management Framework for Efficient Maintenance and Monitoring

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Abstract- ***The increased demand for skilled consultants in various organizations has created a need for efficient consultant management systems. The traditional methods of managing consultant information, such as maintaining manual records or using spreadsheets, are not efficient and are prone to errors. The objective of this project is to design and implement a "Consultant Management System," a web application that enables efficient management of consultants in various organizations, starting from the onboarding process up to the project placement phase. The system offers various functionalities such as resume analysis, training management, attendance tracking, and opportunity management. Consultants can upload their resumes, get course recommendations based on their skills, and track their training. Additionally, they can apply for opportunities. The system offers administrators the opportunity to keep track of consultants, manage their training, and keep track of job opportunities. The system has been developed using modern web development technologies such as Node.js, Express, MongoDB, and JavaScript***

Index Terms- ***Consultant Management System, Resume Analyzer, Training Management, Digital Consultant Platform.***

I. INTRODUCTION

In today's organizations, consultants are an essential part of the delivery of specialized knowledge and technical expertise. Organizations may be dealing with several consultants at the same time, and it is necessary to monitor the consultants' skills, training, attendance, and opportunities. However, it may be an inefficient and time-consuming process to manage these activities through spreadsheets or manual methods.

The traditional way of managing consultants is not automated, nor is there storage. This makes it hard to keep track of all the information. Besides, monitoring Consultants' skills and finding appropriate job opportunities is not easy.

As web technology is advancing at a rapid pace, an organization can use technology to automate the management of the consultant management process. A web-based system for consultant management enables an administrator to effectively manage the details of the consultants and also allows the consultants to track their training and career opportunities.

The proposed Consultant Management System offers a digital platform that enables an organization to manage the process of consultant onboarding, skill analysis, training, and opportunity management. This system improves efficiency and eliminates manual work, enabling better communication between consultants and management.

II. LITERATURE REVIEW

Research studies highlight the importance of digital systems in workforce management and employee skill development. With the rapid growth of information technology, organizations are increasingly adopting web-based systems to manage employee data, monitor performance, and reduce administrative workload.

Sharma and Gupta (2019) reported that traditional workforce management methods such as paper records and spreadsheets often cause data duplication and difficulty in retrieving information. They suggested that web-based systems can improve efficiency through centralized data storage.

Patel and Mehta (2020) proposed a digital training management system that helps monitor employee

skill development through online training programs and improves productivity.

Kumar and Singh (2021) developed a skill-based job recommendation system that matches employee skills with suitable job opportunities, improving the recruitment and placement process.

Reddy and Rao (2022) emphasized that modern technologies such as cloud computing and REST APIs help in developing efficient workforce management systems with secure and centralized data access.

Verma and Patel (2023) highlighted the importance of integrating employee training systems with performance monitoring to improve management efficiency.

III. PROBLEM STATEMENT

Many organizations still use traditional manual methods such as paper records and notebooks to manage consultant information. These methods are time-consuming and may lead to data entry errors, making it difficult for organizations to maintain accurate consultant records.

Another major issue is the lack of a centralized system for storing consultant information. Details related to consultant skills, training progress, attendance, and opportunities are often stored in separate files or systems, making it difficult for administrators to access and manage the data efficiently.

There are also challenges in identifying suitable job opportunities for consultants because manual systems cannot automatically analyze consultant skills. As a result, consultants may not be assigned to appropriate roles.

Tracking training activities and attendance manually increases administrative workload and may reduce data accuracy. It also becomes difficult to monitor consultant progress and evaluate them for project assignments.

Therefore, there is a need for a centralized digital platform that can automate consultant management processes, including resume analysis, training management, attendance tracking, and opportunity management.

IV. OBJECTIVE

The main objective of this project is to develop a Consultant Management System that enables efficient management of consultants within an organization. The system provides a digital platform for administrators to manage consultant information, training activities, and job opportunities.

Another objective is to store consultant details such as personal information, skills, training progress, attendance records, and opportunities in a centralized system, making the data easily accessible and eliminating the limitations of manual record keeping.

The system also automates resume analysis, where consultants can upload their resumes and the system extracts skills and recommends suitable training courses to improve their knowledge and project opportunities.

Additionally, the system helps administrators monitor training progress and attendance, ensuring that consultants complete required training before being assigned to projects.

It also supports opportunity management by tracking job applications, interviews, and final placements, helping organizations manage consultant assignments efficiently.

Overall, the proposed system improves efficiency, transparency, and productivity by replacing traditional manual processes with a modern digital solution.

V. SYSTEM ARCHITECTURE

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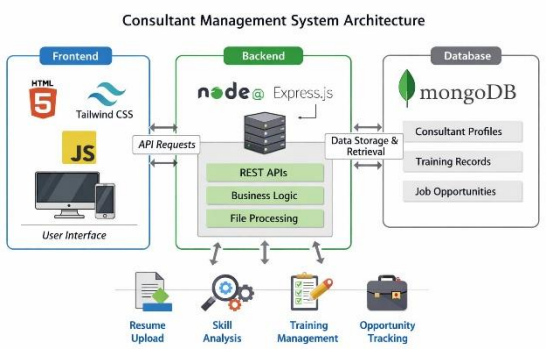

The pool consultant Platform that has been proposed has a three-tier architecture that comprises the presentation layer, the application layer, and the database layer. This helps in the organization of the system components in an efficient manner.

1. Presentation Layer (User Interface)
The presentation layer is equivalent to the user interface of the system, through which users can interact with the application using web pages. The user interface is used to display information to users and obtain input from users. Through this interface, users can perform various tasks, such as logging into the system, uploading resumes, viewing training courses, monitoring their progress, and managing job opportunities.
The system has two main users:

- Administrator
- Consultant.

Both users log into the system with their respective user IDs and passwords. The users are redirected to their respective dashboards after logging in.

2.Application Layer (Business Logic)
The application layer is the one that is responsible for the overall functionality of the system, i.e., the business logic of the system. The requests sent by the user, i.e., the presentation layer, are processed by this layer before the actual operation is performed, which then connects with the database.

The backend of the system is built using Node.js and Express.js, which is a powerful environment for developing web applications and RESTful APIs.

- The main responsibilities of this layer include:
- User authentication and authorization
- Resume upload and skill analysis
- Training course management and progress tracking
- Attendance monitoring for training sessions
- Opportunity management and job tracking

This layer ensures that all user requests are processed efficiently and securely before the data is stored or retrieved from the database.

3. Database Layer
The database layer holds all the data in the system, which includes user data, consultant data, training sessions, and opportunities.

The system uses MongoDB. MongoDB is a NoSQL database that allows for flexible data storage.

5.1 EXISTING SYSTEM
In the existing system, information related to consultants is being handled through traditional methods such as using paper records, note-taking, or using spreadsheets. However, these traditional methods of handling information related to consultants are not more efficient and have resulted in several disadvantages. For example, handling information related to consultants through traditional methods has resulted in problems such as duplication of information, errors during recording, and difficulties in updating information regularly.

The second disadvantage of the existing system is that there is no proper platform for handling information related to consultants. For example, information related to consultant profiles, consultant skills, and consultant activities may be recorded using several documents or files. This has resulted in difficulties for administrators in retrieving information related to consultants.

The traditional methods of handling information related to consultants have also resulted in difficulties in tracking information related to consultant training and consultant attendance. For example, administrators need to record information related to consultant training and consultant attendance manually. This has resulted in difficulties for administrators and problems such as inconsistencies during recording. In addition, it is difficult for administrators to track consultant performance.

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Moreover, finding proper job opportunities for these consultants becomes another complicated issue. The administrators have to manually look at the skills of each consultant and match these skills with available job opportunities. This becomes an inefficient process.
It is also clear that there is no automation, centralization of data, and proper tracking of these activities. This further emphasizes the need for an advanced digital platform for managing these consultants.

5.2 METHODOLOGY

The Consultant Management System is developed utilizing a structured and systematic software development methodology to effectively manage the information of the consultant, the training process, the attendance of the consultant, and the job opportunity. The proposed system will help to avoid the limitations of the conventional methods of consultant management. The conventional methods of consultant management include the documentation of the consultant's information and the use of a spreadsheet to keep the records. These methods may cause redundancy and may make it difficult to track the progress of the consultant. It may also make the management of the consultant's activities inefficient.

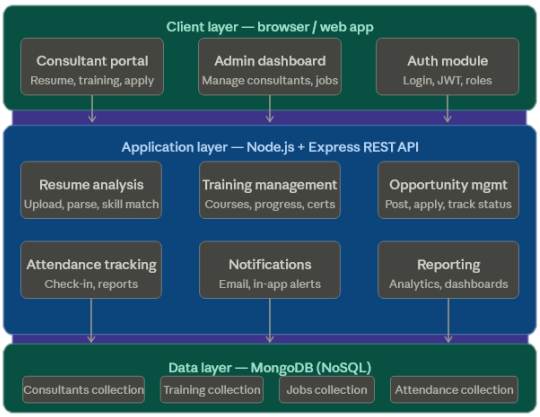

Fig. 5.1. Methodology

In order to avoid the limitations of the conventional methods of consultant management, the proposed Consultant Management System will be developed utilizing a well-structured and systematic methodology. This methodology will help to effectively design, implement, and evaluate the proposed Consultant Management System. The proposed methodology will help to develop a centralized platform to manage the consultant's information, the training process, the attendance of the consultant, and the job opportunity.

5.3 PROPOSED SYSTEM

The proposed Consultant Management System provides a centralized web-based platform to automate consultant management processes within an organization. The system stores, manages, and retrieves consultant information efficiently, replacing traditional manual methods.

Consultants can upload their resumes through the system, where automated processing extracts their skills and recommends suitable training courses to improve their knowledge and abilities.

The system also allows administrators to monitor consultant training progress, attendance, and overall development, ensuring that consultants complete required training before being assigned to job opportunities.

Additionally, the system includes an opportunity management feature that helps administrators track recruitment stages such as applications, interviews, and placements in an organized manner.

Overall, the system improves data accessibility, reduces administrative workload, and enhances consultant productivity through a centralized digital platform.

5.4. SYSTEM DESIGN

The system design focuses on organizing the modules of the Consultant Management System to ensure efficient operation.
The main modules of the system include:

- Authentication Module
- Resume Analyzer Module
- Training Management Module
- Attendance Tracking Module
- Opportunity Management Module

Each module interacts with the centralized database to store and retrieve relevant information.

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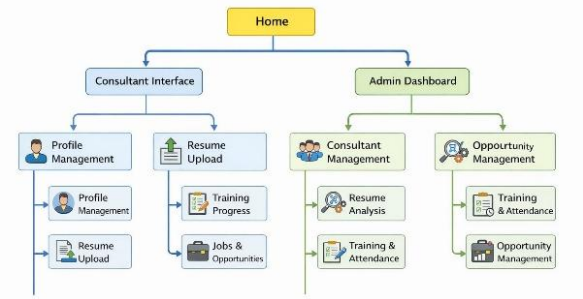

Fig 5.2 System Design

VI. API IMPLEMENTATION

The Consultant Management System makes use of RESTful API to facilitate communication between the frontend interface and the backend server. The RESTful API facilitates communication between different modules of the system. The frontend interface sends HTTP requests to the backend server, and the backend server processes the requests, interacts with the database, and responds to the requests.

The Consultant Management System makes use of several RESTful API to facilitate communication between different modules of the system.

Authentication API
The Authentication API deals with the registration and login of users. The Authentication API validates the user registration and login process.

POST /api/register – This API allows a user to register in the system. The API stores user credentials such as name, email, and password in the database.

POST /api/login – This API allows registered users to access the system by providing the correct credentials to the system.

Consultant Profile API
The Consultant Profile APIs handle operations related to consultant information and resume management.

GET /api/dashboard/:email – This API retrieves dashboard data for a specific consultant using their email address. It returns details such as profile information, training progress, and opportunities.

POST /api/resume – This API allows consultants to upload their resumes. The uploaded resume is processed by the system to extract skills and other relevant information.

Training API
The Training APIs manage consultant learning activities and training progress.

POST /api/training/progress – This API updates the training progress of a consultant when they complete learning modules.

POST /api/training/quiz – This API records quiz results after a consultant completes an assessment related to a training course.

POST /api/training/certificate/generate – This API generates a training completion certificate once the consultant successfully completes a course.

Opportunity API
The Opportunity APIs are used to manage job opportunities and recommendations for consultants.

POST /api/opportunity/add – This API allows administrators to add new job opportunities into the system.

GET/api/opportunity/recommendations/:email – This API retrieves recommended job opportunities for a consultant based on their skills and profile information.

Attendance API
The Attendance API is responsible for managing attendance data related to consultant training sessions.

POST /api/attendance/sync – This API synchronizes attendance data from external sources or training platforms and stores it in the system database.

Overall, these APIs, enabling the system to perform various operations efficiently and maintain accurate consultant management records.

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VII. IMPLEMENTATION & RESULT

7.1. Implementation

The Consultant Management System was implemented as a web-based application using modern web technologies. The frontend of the system was developed using HTML, Tailwind CSS, and JavaScript, which provide an interactive and responsive user interface for users to access different system features.

The backend was implemented using Node.js and Express.js, which handle the application logic and manage communication between the frontend and the database. REST APIs were used to process user requests such as login, resume upload, training updates, and opportunity management.

The system uses MongoDB as the database to store consultant profiles, resumes, training progress, attendance data, and job opportunities. The backend communicates with the database to store and retrieve information efficiently, ensuring that all consultant management activities are handled in a centralized and organized manner.

7.2. Result

The developed Consultant Management System successfully provides a centralized platform for managing consultant information, training activities, and job opportunities. Consultants can upload their resumes, view recommended courses, track their training progress, and explore available opportunities through an easy-to-use dashboard.

The system also helps administrators efficiently manage consultant data, monitor attendance, and track the progress of opportunities in the recruitment pipeline. By automating these processes, the system reduces manual workload, improves data organization, and enhances overall productivity in consultant management.

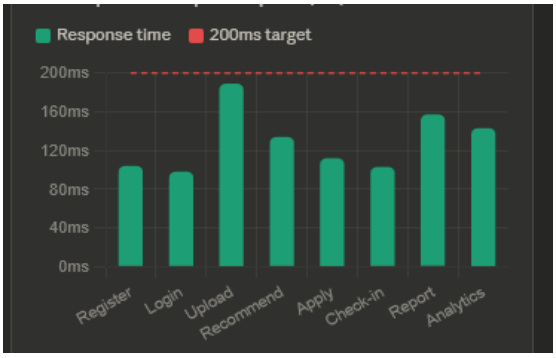

Fig 7.1 Response time

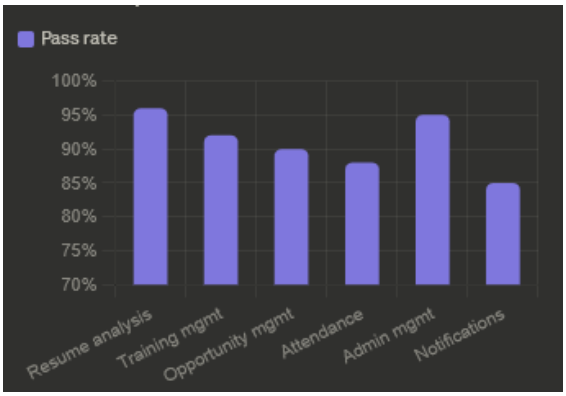

Fig 7.2 Consultant Analysis

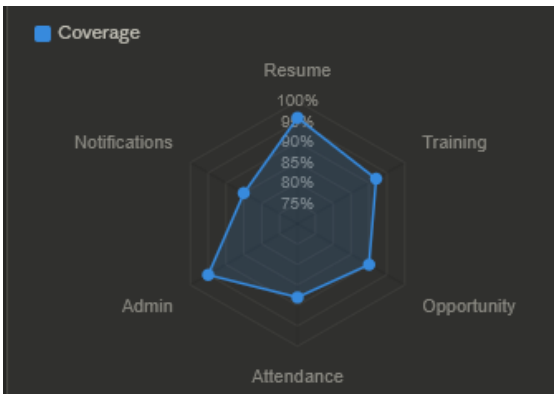

Fig 7.3 Feature Analyzer

VIII. CONCLUSION

The Consultant Management System was developed to simplify and automate the process of managing consultant information, training activities, and job opportunities within an organization. The system provides a centralized platform where consultants and administrators can efficiently access and manage relevant data.

By using modern web technologies such as HTML, Tailwind CSS, JavaScript, Node.js, Express.js, and MongoDB, the system improves data organization and reduces manual administrative work. Overall, the application enhances efficiency, transparency, and productivity in consultant management.

IX. FUTURE ENHANCEMENT

The Consultant Management System can be further improved by adding advanced features to enhance system functionality and user experience. One possible enhancement is the integration of Artificial Intelligence for advanced resume analysis, which can provide more accurate skill extraction and better job opportunity recommendations for consultants.

Another future improvement could be the development of a mobile application to allow consultants and administrators to access the system from smartphones. Additional features such as real-time notifications, integration with external job portals, and advanced analytics dashboards can also be implemented to provide better insights into consultant performance and opportunity tracking.

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