A PROJECT-C REPORT
On

MYAPTITUDE: ONLINE EXAM GENERATION SYSTEM USING WEB SCRAPING

Submitted in partial fulfillment of the requirement of
University of Mumbai for the Degree of

Bachelor of Technology
In
Computer Engineering

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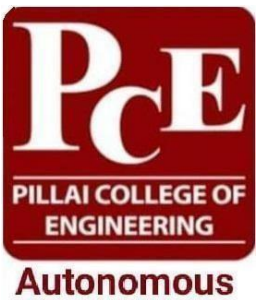
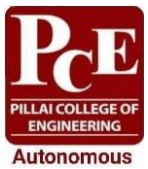


Department of Computer Engineering
Pillai College of Engineering, New Panvel – 410 206

UNIVERSITY OF MUMBAI
Academic Year 2023– 24



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CERTIFICATE

This is to certify that the requirements for the B.Tech Project-C Report entitled '**MyAptitude: Online Exam Generation System Using Web Scraping'** have been successfully completed by the following students:

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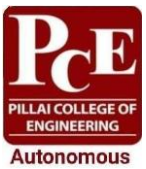

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PROJECT-C APPROVAL FOR B.Tech

This project entitled "**MyAptitude: Online Exam Generation System Using Web Scraping**" by Shreyas Varadkar, Nisha Sagar, Rohan Kadam, and Atharva Bhingarde are approved for the degree of Bachelor of Technology in Computer Engineering.

Examiners:

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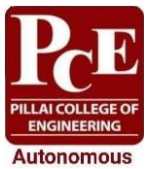
1. _____

Date:

Place:



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DECLARATION

We declare that this written submission for the B.Tech Project entitled "**MyAptitude: Online Exam Generation System Using Web Scraping**" represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any ideas / data / fact / source in our submission. We understand that any violation of the above will cause for disciplinary action by institute and also evoke penal action from the sources which have not been properly cited or from whom prior permission have not been taken when needed.

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Shreyas Varadkar: _____

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Date:

Place:

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Abstract

People prefer shortcuts in today's fast-paced world—the quickest, fastest, easiest, least effort path paradigm. As a result, companies may find it challenging to come up with different sets of aptitude questions when testing candidates for different job profiles. Additionally, most students and fresh graduates struggle to pass aptitude exams these days. One of the most crucial components of all competitive tests, entrance exams, and campus interviews for government and IT employment is the online aptitude test. Thus, for new students joining the engineering field, practicing consistently and improving their aptitude skills becomes crucial. Tests of aptitude rate a person's cognitive ability and are used to measure general intelligence. This test consists of multiple subtests that assess a person's ability to reason, solve problems mathematically, and pay attention to details. Standardized aptitude tests have been incorporated into the hiring process over time and have proved essential in upholding meritocracy in the technical sector. In today's competitive job market, aptitude tests have become vital for job seekers, and it is therefore crucial to consider them carefully when preparing for and applying for positions. Therefore, we developed an Online Aptitude Exam Generation System in which question papers would be generated in real-time and students could practice aptitude questions to gain an idea of what is needed in the modern era to gain success in aptitude rounds of various companies. This would reduce the headache of various companies having to arrange or set different sets of question papers and also give students a platform where they can brush up on their aptitude skills.

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Chapter 1

INTRODUCTION

1.1 Fundamentals

An aptitude test is a kind of test designed to determine a person's aptitude for a specific activity or skill set. The main idea of aptitude assessment is that people not only have physical abilities and limitations but also have an innate tendency to succeed or fail at certain subjects based on their characteristics. Aptitude tests evaluate personal abilities by determining how well a person can cope in an environment that lacks education or knowledge. Aptitude assessments can be divided into several categories, such as quantitative, verbal, and logical.

1.2 Objectives

MyAptitude strives to be a comprehensive and reliable application for both companies and students to help them excel in their respective outcomes. The primary objective of this web application is to facilitate an environment that is user-friendly for all users and minimize manual work of the companies in a go. The project's objective is to create an effective test and aptitude learning application that would be able to curate the needs of both the service-based companies and students or candidates appearing for the examination.

1.3 Scope

The project's scope encompasses a broad spectrum of knowledge acquisition and information exchange, with several key points: Accessibility: Being a web-based application, it ensures round-the-clock access from any location, offering users convenience and flexibility in utilization. Diverse User Base: The application serves both corporate entities and educational institutions, addressing the needs of employers conducting aptitude tests and students preparing for examinations. Personality Insights: Users can gain valuable insights into their personality traits and characteristics, fostering self-awareness and self-discovery through the platform. Instant Results Access: The platform provides users with prompt access to examination results as soon as they are made available, enabling timely feedback and performance assessment.

1.4 Organization of the Report

The organization of the report is written in not more than 10 lines. The report is organized as follows: The introduction is given in Chapter 1. It describes the fundamental terms used in this project. It motivates to study and understand the different techniques used in this work. This chapter also presents the outline of the objective of the report. The Chapter 2 describes the review of the relevant various techniques in the literature systems. It describes the pros and cons of each technique. The Chapter 3 presents the Theory and proposed work. It describes the major approaches used in this work. The societal and technical applications are mentioned in Chapter 4. The summary of the report is presented in Chapter 5.

Chapter 2

Literature Survey

In this chapter the relevant literature is reviewed. It describes various techniques used in the work. The summary of the literature presented at the end of this Chapter.

2.1 Introduction

This literature review explores the evolution and impact of online exam generation platforms, investigating their methodologies and functionalities. Examining a range of studies, the review emphasizes the growing popularity of web-based systems in educational and corporate settings. It highlights the benefits of automation, accuracy, and efficiency offered by these platforms, along with their potential to revolutionize assessment practices. From enhancing student performance to addressing governance considerations, the review provides insights into the multifaceted role of online exam systems in modern education.

2.2 Literature Review

1. Hameed et al. “discuss the functionality and benefits of online examination systems (OES), which provide a web-based approach to efficiently conducting exams.” These systems use PHP, web applications, and database management technologies to automate processes and deliver accurate results. OES simplifies exam administration for administrators and students, saves time and ensures precision in evaluations. Its adaptability through open-source languages makes it easy to implement in all educational institutions. The system's modular design improves user experience, security and maintenance. Overall, OES represents a promising solution for modernizing examination practices and offers educational institutions flexibility, efficiency and reliability.[1]

2. Choubey et al. “Explore the importance of online examination systems in modern education. They highlight the accuracy, speed and efficiency of the systems, making them indispensable assessment tools. These systems eliminate the need for paper-based assessments, reduce manual work and provide students with instant feedback. Additionally, they offer scalability, robust security, and flexibility for remote audits and audits. The literature emphasizes the

use of web-based applications, database management and programming languages such as PHP and JavaScript. The system architecture typically includes modules for administrators, teachers, etc. Students, each of which fulfils specific functions. Overall, online exam systems are changing assessment practices in education, providing efficiency, convenience and valuable insights into student performance.[2]

3. Butler-Henderson et al. “Conducted a systematic review of online assessments, focusing on implementation assessments and their impact on students and staff. The review found that online learning environments generally promote student well-being and performance, while staff prefer online exams for workload and cost-saving reasons. However, discussions of pedagogical and governance considerations have been lacking in the literature. Techniques used included data incorporation, coding and theme search. Future research should examine accreditation and authenticity in online examinations and assess their validity and reliability. Overall, the review highlights the need for comprehensive discussions about pedagogy and governance in online examinations to support evidence-based practices. [3]

4. Kathirisetty et al. “Conducted a study on an IQ-based student assessment model using machine learning. They examined the influence of emotional intelligence and IQ on academic performance and emphasized the need for cognitive and emotional development. Various machine learning techniques have been used, including ensemble methods, decision trees, k-nearest neighbor and support vector machines. The decision tree model proved to be the most effective as improved strategies increased accuracy and recall rates. Future efforts aim to implement advanced machine learning techniques for better prediction accuracy. The research highlights the importance of IQ-based assessment models in education and highlights the potential of machine learning in predicting student performance. Emphasis is placed on integrating cognitive and emotional development strategies to improve academic outcomes. [4]

5. Kavyashree et al. “Introducing an innovative online exam portal to modernize assessment practices in education. The platform highlights its efficiency and resource-saving benefits and addresses challenges faced by both exam authorities and students. Security features such

as webcam and audio recording during exams ensure transparency and integrity. In addition, the portal includes an intelligent tutoring system to evaluate descriptive answers and assess students' cognitive abilities. The platform provides a robust technological framework by leveraging a client/server architecture, the PHP programming language, and the MySQL database management system. Future research directions include improving security features, refining system flexibility, and exploring automated question-generation techniques. Overall, the online exam portal promises to revolutionize the assessment experience, providing efficiency, security and adaptability to meet the evolving needs of modern education. [5]

6. Singrodia et al. “propose a comprehensive overview of web scraping and highlight its importance for data extraction and analysis. They discuss challenges with limited API access in desktop solutions and advocate for automated methods such as syntactic, semantic and computer vision approaches. The study examines applications in data mining, research and marketing, and testing techniques such as syntactic, semantic and computer vision web scraping. Tools like Rvest and visual interface services are used for automation. Future directions include advanced techniques, efficiency improvements, and consideration of legal and ethical concerns. Overall, web scraping is considered crucial to data processing, with constant advances and legal considerations determining its future.[6]

7. M. Khder “This paper provides an overview of web scraping and highlights its effectiveness in collecting large data sets from the web. The author emphasizes the need for specific hypotheses based on data source theory and addresses legal, practical and ethical considerations. Techniques.” Topics covered include hypothesis testing, case studies using Python code and tools like OX Path, and challenges like captcha and rate limiting. Methods used range from manual parsing to HTTP requests using libraries such as Curl and Wget, with data extraction via regular expressions and HTML parsing. The author suggests the future integration of AI and machine learning and emphasizes the importance of continuous development of scraping techniques to keep pace with legal and technological developments.[7]

8. Sonia Thakur et al. “The research introduced a question generator and monitoring system to

enable faculties to automate the process of creating tests or test forms with various options to choose from. The system retrieves questions from its internal databases, which include questions collected from websites. Scanning PDFs and images uses Optical Character Recognition (OCR) an electronic service that converts an image into text and predicts questions based on specific paragraphs or multimedia files using Questgen AI, an open-source NLP -Library that helps develop easy-to-build question generation algorithms. The exams taken on the system are taken in proctored mode. In the future, they are trying to improve the face monitoring module and other processes to make the system faster. [8]

9. Yağci et al. “Present an adaptive online exam system with comprehensive exam management tools. Built with PHP, MySQL and Apache, it emphasizes a user-friendly interface and data security by leveraging adaptive testing and security measures such as IPSec, SSL and encryption. It dynamically adjusts the difficulty level of the questions based on the competency of the test takers. Also suggest refining question selection and assessing the validity and reliability of the system. The system aims to improve user convenience and data security. Future work should focus on improving challenge selection and evaluating system effectiveness through statistical analysis. [9]

10. Erlewad et al. “This paper examines web scraping and its applications in various industries and research areas. They highlight its role in driving data-driven decision-making and innovation in areas such as healthcare, social media, finance and marketing. By comparing different web crawlers, the authors provide insights into selecting appropriate tools for specific needs. They emphasize the ethical and legal aspects of web scraping, which are crucial in disciplines such as e-commerce, finance and science. The discussion covers various scraping tools such as Scraper API, FMiner and Scrapy. along with machine learning integration for advanced capabilities. Future research should address ethical issues and advances in scraping technologies and aim for more efficient data extraction methods. In summary, web scraping represents a transformative technology with extensive applications that place ethical considerations at the forefront and have the potential to revolutionize decision-making processes. [10]

2.3 Summary / Inference of Literature Survey

The summary of related work on automatic number plate detection and recognition techniques is presented in Table 2.1.

Table 2.1 Literature survey summary

Literature	Online Exam Generation System Techniques		
	Web-based Platform	**Software Application**	**Machine Learning Algorithm Used**
Hameed et al. 2017 [1]	Yes		
Choubey et al. 2020 [2]	Yes	Yes	
N. Kathirisetty et al. 2022 [4]	Yes		Yes
Kavyashree et al. 2022 [5]	Yes		
S. Thakur et al. 2020 [8]		Yes	
Yağci et al. 2014 [9]	Yes		

2.4 Research Gap Identified

In the landscape of aptitude examination systems, a noticeable discrepancy emerges between conventional manual methods and the potential for automated solutions. Presently, prevailing systems heavily lean on manual processes for tasks like question selection and paper generation. However, this reliance on manual intervention presents evident inefficiencies and scalability challenges. In contrast, our proposed approach heralds a departure from these traditional practices by leveraging web scraping technology. This departure underscores a significant void in current methodologies, accentuating the imperative for automation in aptitude assessments. By automating the processes of question sourcing and paper creation, our innovative solution endeavors to mitigate these limitations and elevate the examination experience. This research illuminates a critical need for technological advancement in aptitude assessment practices and offers a compelling solution to bridge this divide effectively.

Chapter 3

Implemented System/ Proposed system

3.1 Overview

Aptitude tests serve as crucial tools for evaluating candidates' competencies and suitability across various job roles. However, traditional methods of conducting these assessments, often reliant on paper-based systems, present notable inefficiencies and challenges. To address these shortcomings and enhance the examination process, we propose an innovative approach leveraging web scraping technology for the seamless facilitation of online aptitude examinations.

3.1.1 Existing System Architecture

The current reliance on paper-based systems for storing examination information poses several inherent limitations. Issues such as spatial constraints, cumbersome filing procedures, difficulty in filtering pertinent documents, and time-intensive manual review processes hamper the efficiency and effectiveness of aptitude assessments. Moreover, the manual entry of questions into the system demands significant time and effort from administrators or educators, hindering the scalability and agility of the examination process.

3.1.2 Proposed System Architecture

In response to the shortcomings of existing methodologies, our proposed system introduces a sophisticated online aptitude examination platform empowered by web scraping capabilities. This advanced architecture automates the question selection and paper generation processes by dynamically sourcing questions in real time from a diverse array of online repositories. Comprising modular components for paper creation, examination administration, and result processing, our system minimizes human intervention while maximizing efficiency and accuracy. The proposed system offers examination authorities the flexibility to tailor question papers to specific requirements, including the number of questions and minimum passing thresholds. Furthermore, organizations have the option to upload custom question datasets, fostering adaptability and customization. Students stand to benefit significantly from the system's comprehensive features, gaining access to a wealth of practice materials to hone their aptitude skills and excel in examinations. By embracing cutting-edge technology and automation, our proposed system not only

streamlines the examination process but also enhances accessibility, scalability, and fairness. It represents a paradigm shift in the realm of aptitude assessments, promising a more seamless and equitable experience for both candidates and administrators.

3.2 Implementation Details

Systems implementing a content-based recommendation approach analyze a set of documents and/or descriptions of items previously rated by a user, and build a model or profile of user interests based on the features of the objects rated by that user. The profile is a structured representation of user interests, adopted to recommend new interesting items. The recommendation process basically consists in matching up the attributes of the user profile against the attributes of a content object. The result is a relevance judgment that represents the user's level of interest in that object. If a profile accurately reflects user preferences, it is of tremendous advantage for the effectiveness of an information access process. For instance, it could be used to filter search results by deciding whether a user is interested in a specific Web page or not and, in the negative case, preventing it from being displayed.

3.2.1 Methodology and Algorithm

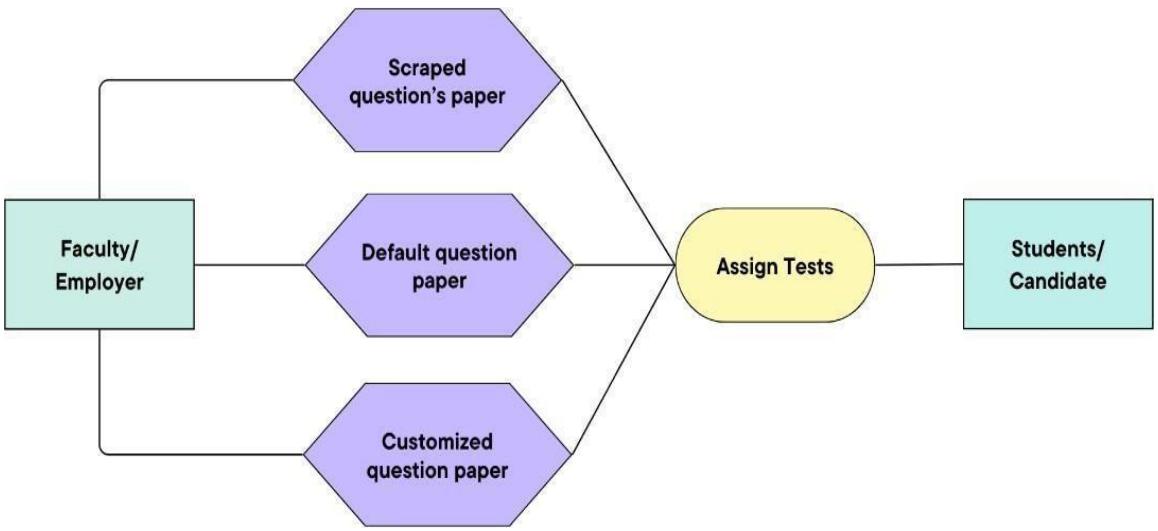

Figure 3.1 Architecture of MyAptitude System

The methodology for developing the Online Aptitude Exam Generation System follows a systematic approach, incorporating various stages from data collection to system implementation. It ensures the seamless integration of web scraping techniques for data collection, along with provisions for client- provided data in CSV format.

The algorithms for the Online Aptitude Exam Generation System are meticulously crafted to handle diverse website structures for efficient data extraction and question selection. The web scraping algorithm, tailored for each website, ensures adaptability to varying layouts and structures, facilitating comprehensive data collection.

BeautifulSoup: A Python library designed for web scraping tasks, particularly for parsing HTML and XML documents. It provides convenient methods and structures for navigating, searching, and manipulating the parsed data.

3.2.2 Use Case Diagram / Activity Diagram / DFD

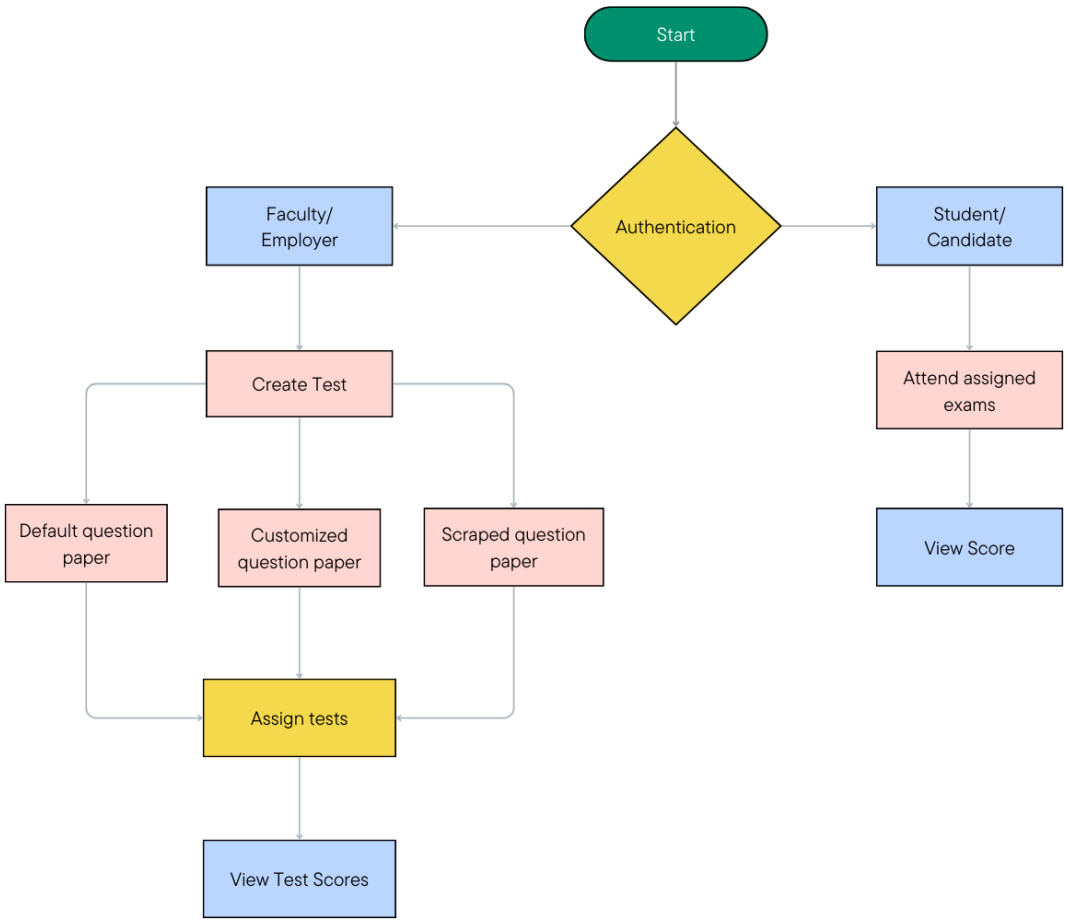

Figure 3.2 Data Flow Diagram

3.2.3 Hardware and Software Specification

Hardware Requirements

- Intel i3 or higher processor
- 4 GB RAM
- 1 Gb hard free drive space

Software Requirements

- HTML (front end)
- CSS
- JavaScript
- Flask (back end)
- Python
- MS Word 97 or later
- Web Browser: Microsoft Internet Explorer, Mozilla, Google Chrome or later
- MongoDB database Server
- Operating System: Windows XP / Windows7/ Windows 10

Chapter 4

Result and Discussion

4.1 Sample of Inputs, Outputs and GUI Screenshots

The MyAptitude interface, depicted in Figures 1-14, showcases its intuitive design and seamless navigation. Figures highlights authentication, admin dashboard, test creation, student dashboard, and performance tracking, underscoring the interface's efficiency in supporting academic activities.

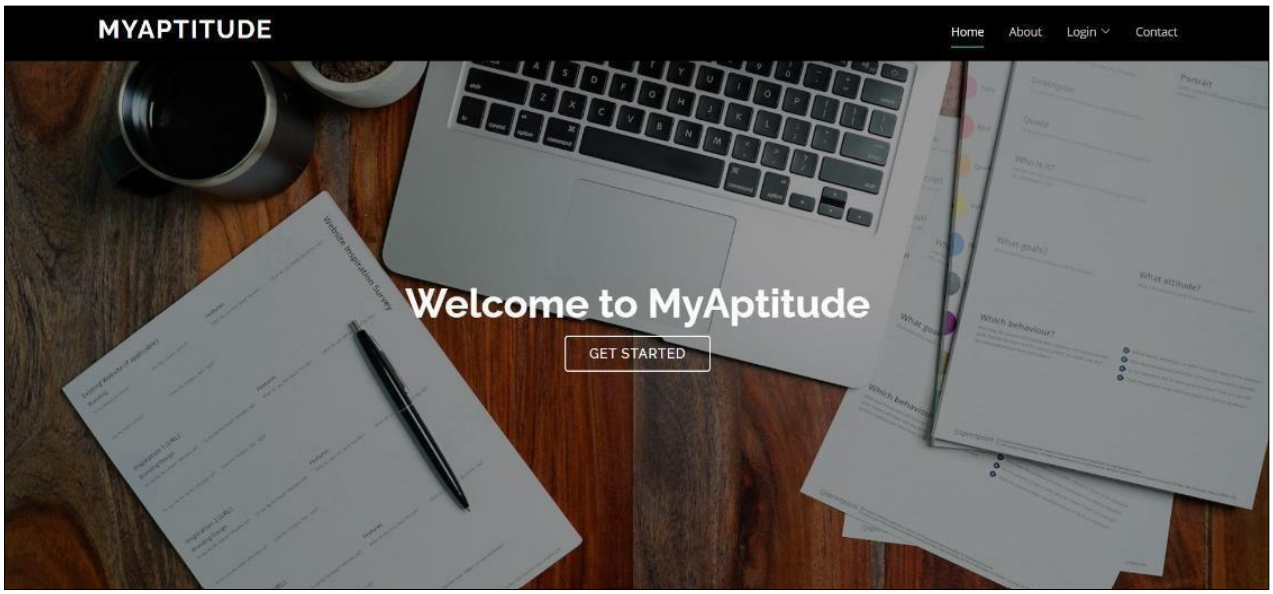

Fig. 4.1 MyAptitude Homepage

Fig. 4.1 demonstrates the Home Page of MyAptitude. It has a Login option as well as a Sign-Up option for new registration of both admin and student separately. It displays a basic walkthrough of how this web application works.

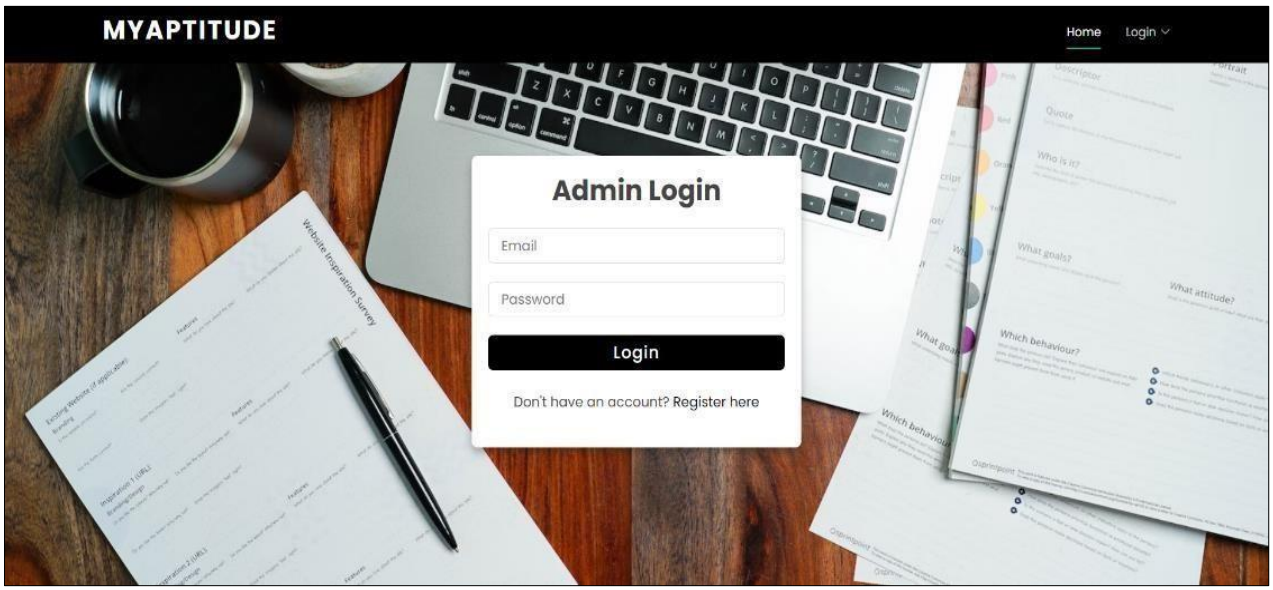

Fig. 4.2 Admin Login

Fig. 4.2 is the Login Page of Admin where the admin can login using the registered details.

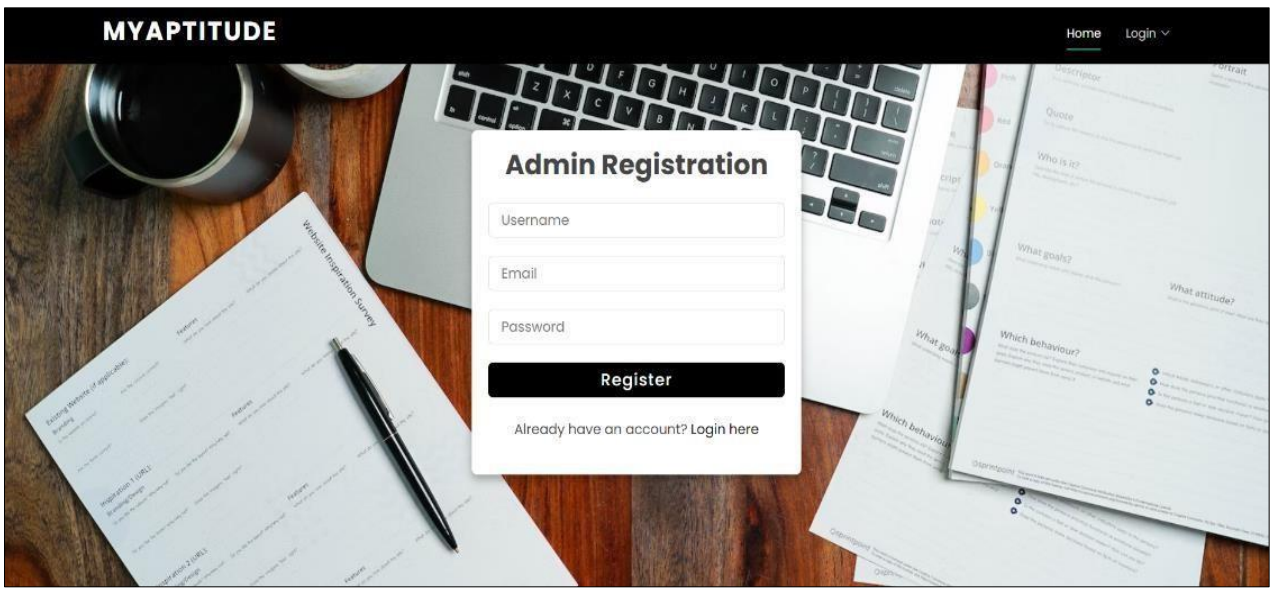

Fig. 4.3 Admin Registration

Fig. 4.3 is the Registration Page where new Admin can create an account themselves before creating a Test.

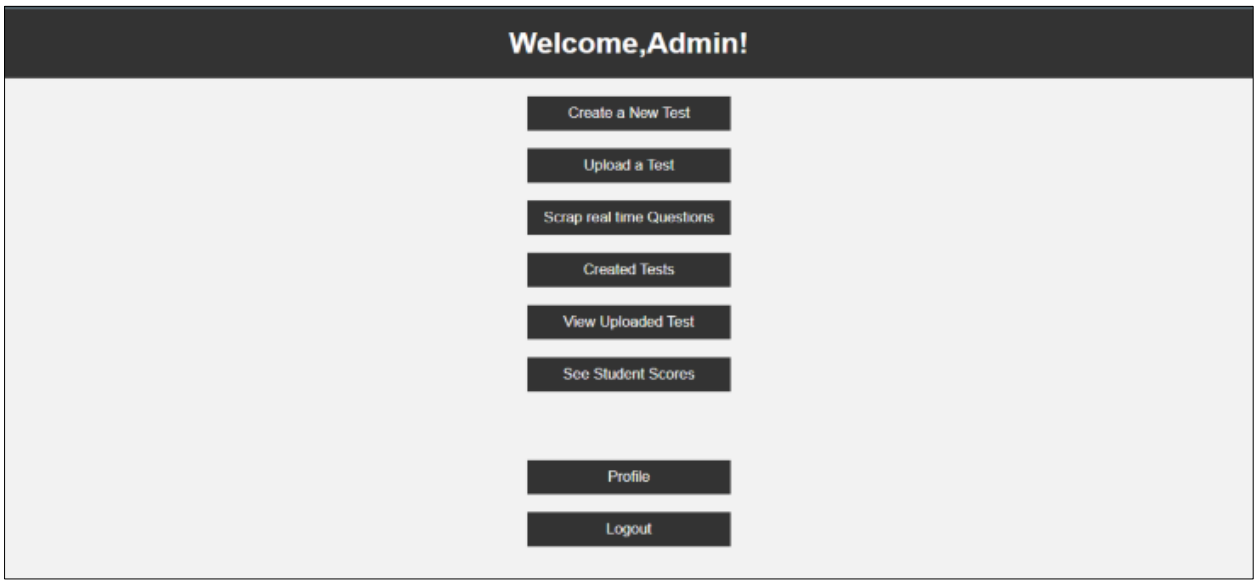

Fig. 4.4 Admin Dashboard

Fig 4.4 displays the Admin Dashboard where different options are available for the Admin such as Create a New Test, Upload a Test, Scrap real-time Questions, Created Tests, View Uploaded Test, See Student Scores, Profile, and Logout. Each option is explained in the coming figures.

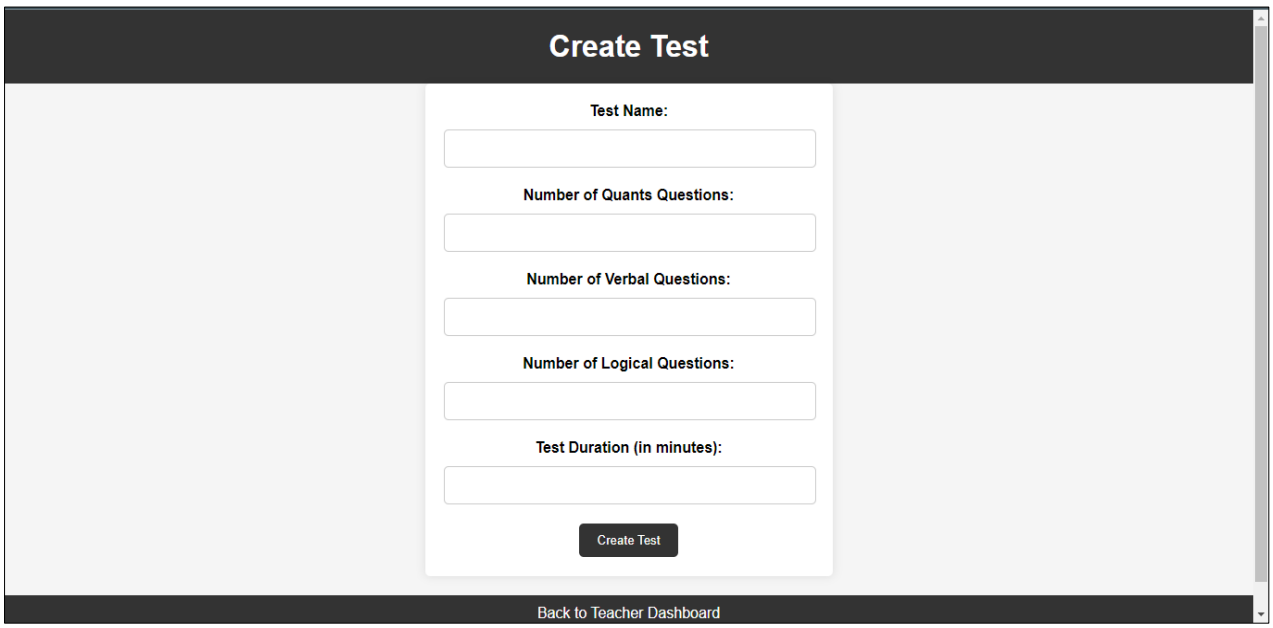

Fig. 4.5 Test Generation using Create test

Fig. 4.5 displays the Test Generation Page when the admin clicks on the ‘Create a New Test’ option as shown in above figure where the Admin has to enter details about the Test Name, Number of Quants/Verbal/Logical Questions and the total duration of the test.

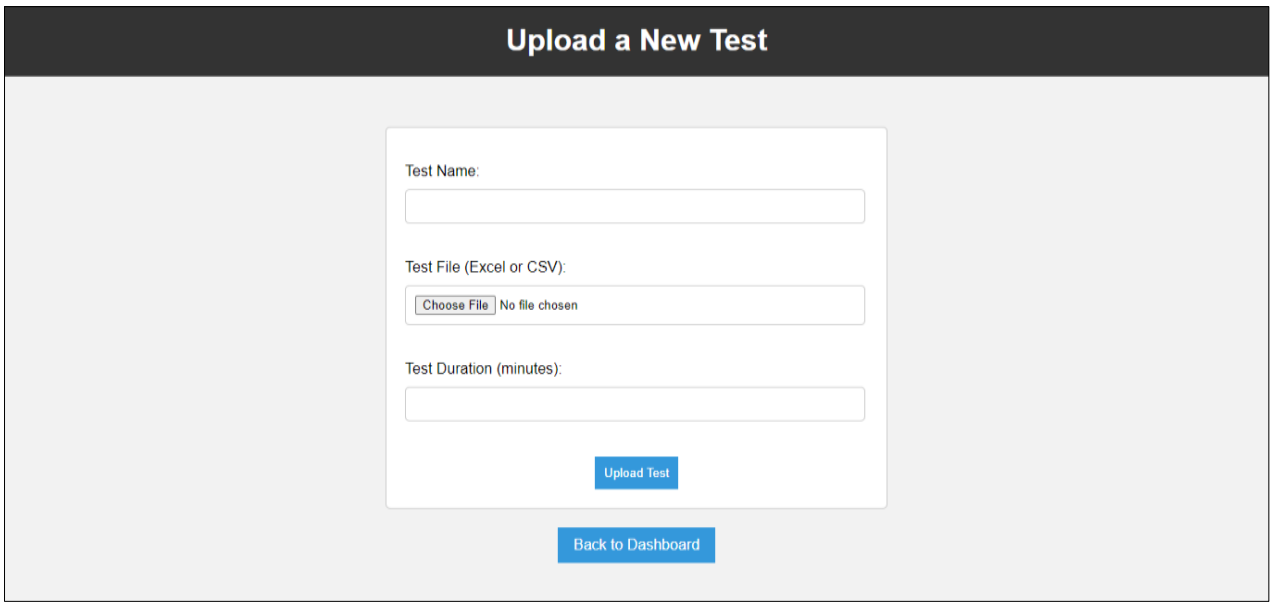

Fig. 4.6 Test Generation by uploading New Test

Fig. 4.6 demonstrates the Test Generation Page when the admin clicks on the 'Upload a Test' option as shown in above figure where Admin can create his own new Test based on his dataset. Admin has to enter details about the Test Name, Test File i.e. the Questions, Its Options, and its answer in an Excel/CSV format, and the total duration of the test. The Test File Details further would be stored in our Database and from that Question Papers would be generated for Students to Attempt.

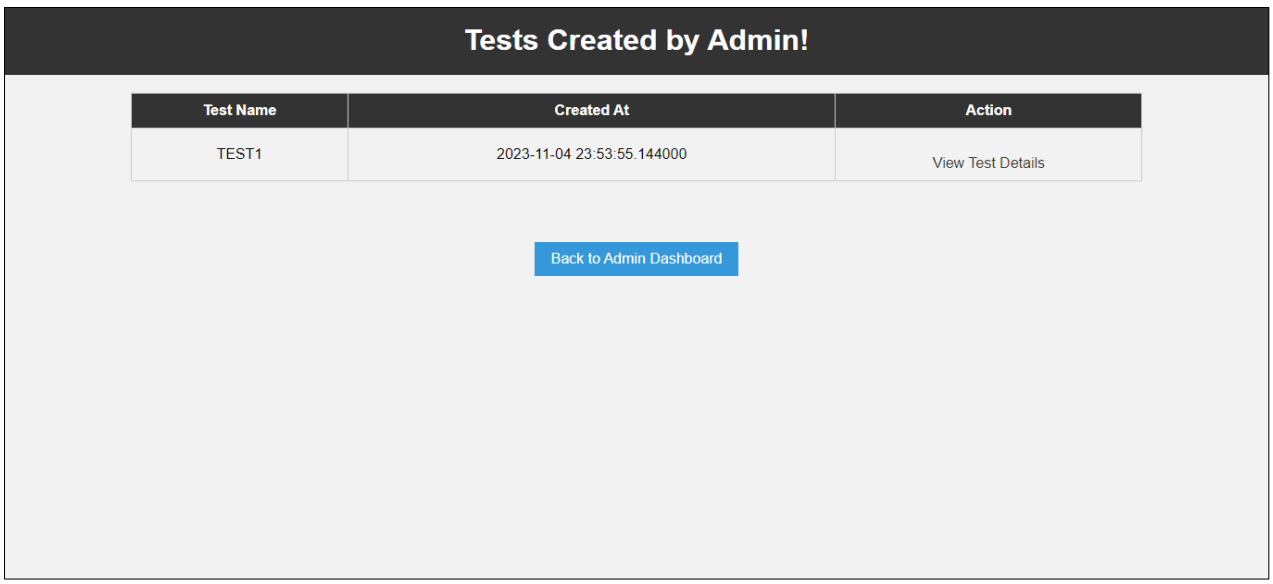

Fig. 4.7 Test created by admin

Fig. 4.7 displays the list of Tests Created by Admin using the 'Create Test' and 'Upload a New Test' options. Admins can view test details and generated question papers using desired datasets.

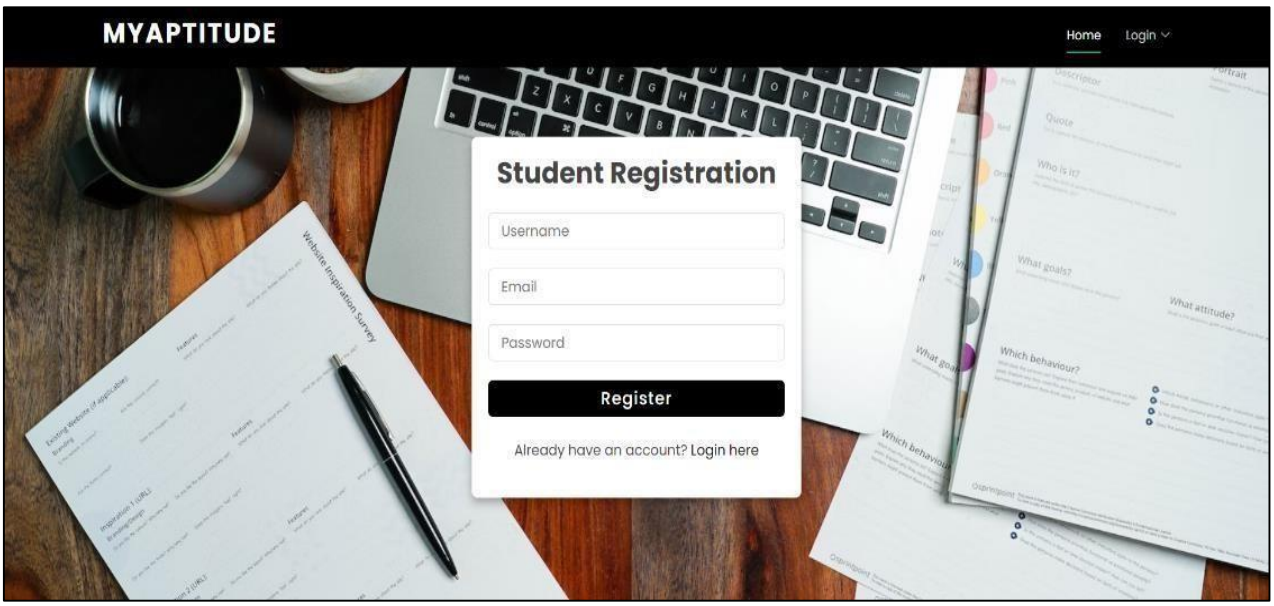

Fig. 4.8 Student Registration

Fig.4.8 is the Registration Page where new Student can create an account themselves before attempting a Test.

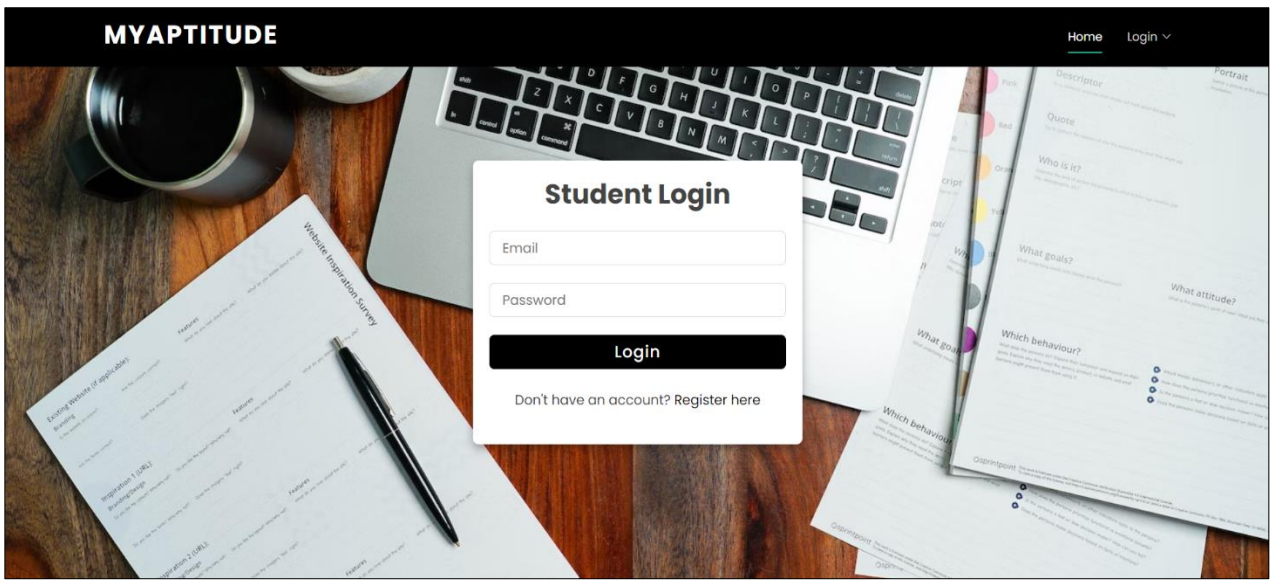

Fig 4.9 Student Login

Fig 4.9 Demonstrates the login page where student's can login into their account using their credentials.

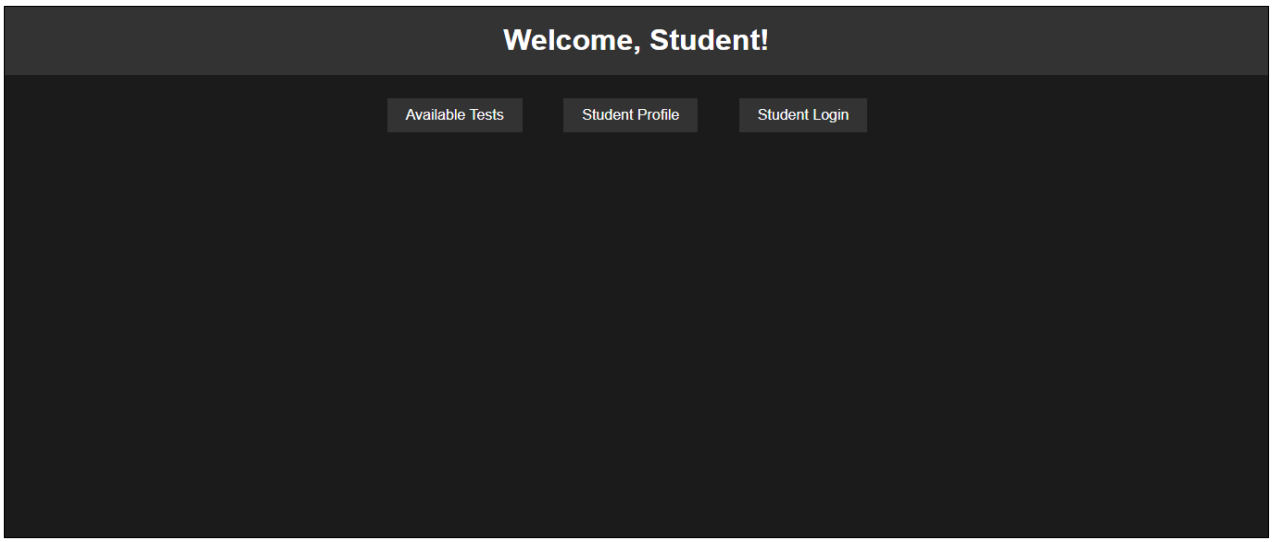

Fig. 4.10 Student Dashboard

Fig. 4.10 displays the Student Dashboard after logging in where the Student's Individual Profile is created after registering and is available to be viewed after clicking on Student Profile. The student has to navigate through the Available Tests to attempt the assigned test.

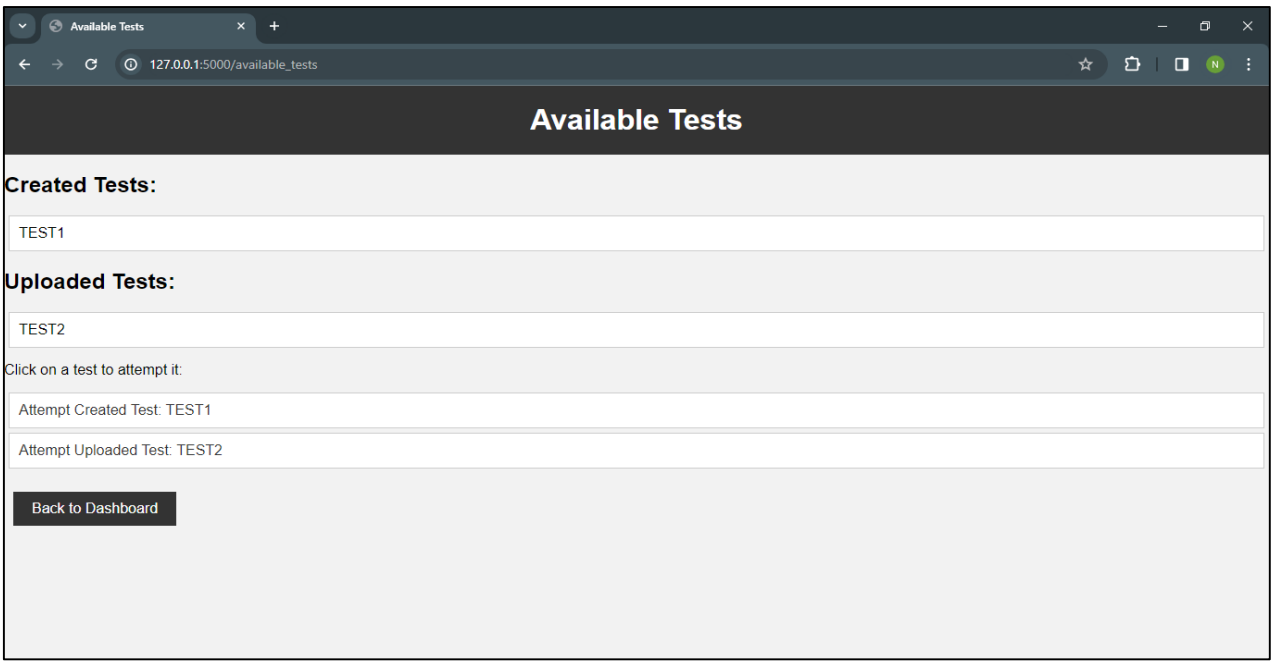

Fig. 4.11 Assigned tests

Fig. 4.11 demonstrates the Available Tests for the Student to Attempt.

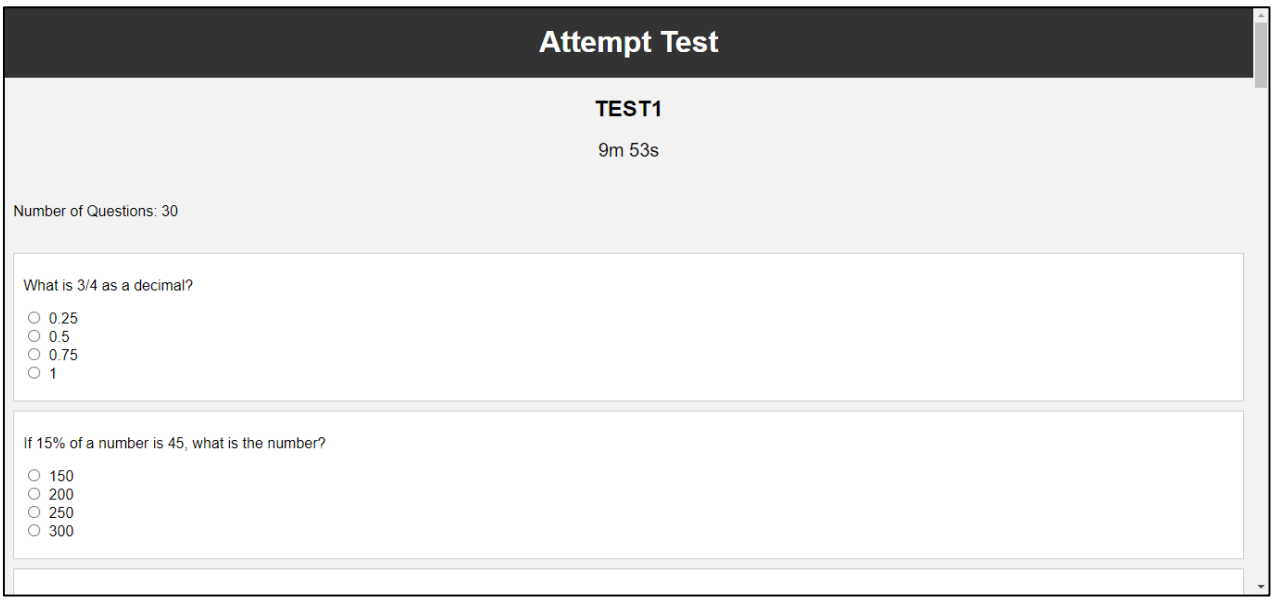

Fig. 4.12 Attempt Test Page

Fig. 4.12 displays the Test Page Student Dashboard after logging in where the Student's Individual Profile is created after registering and is available to be viewed after clicking on Student Profile. The student has to navigate through the Available Tests to attempt the assigned test.

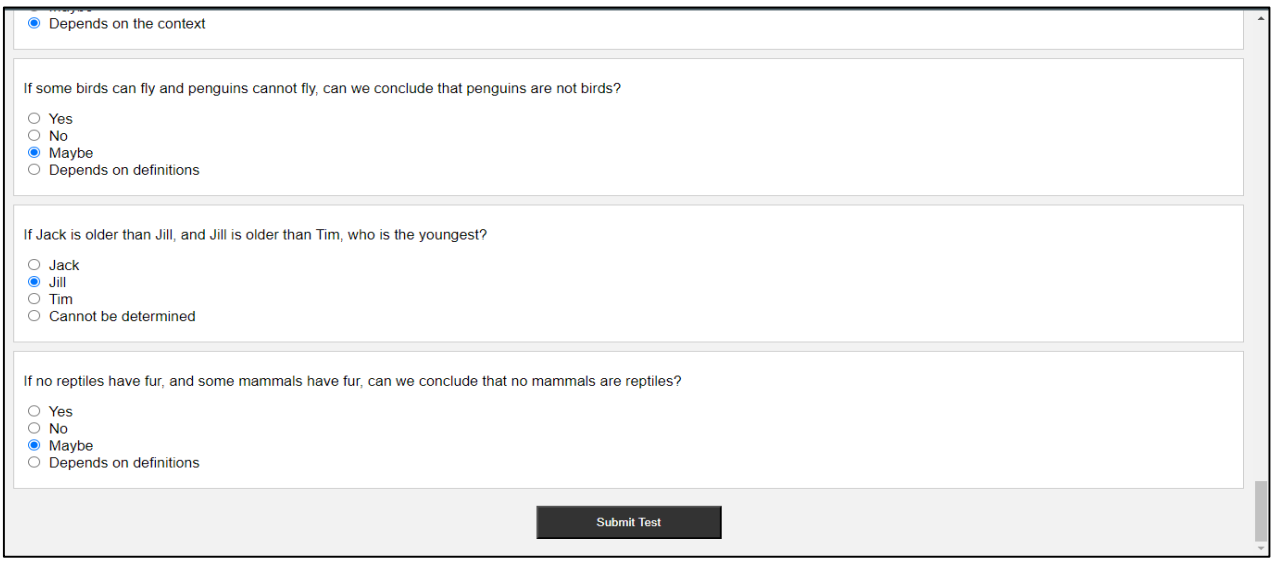

Fig. 4.13 Test submission

Fig. 4.13 displays the Test Page Submission button where after finishing the paper the student has to Submit the Test. The student has to navigate through the Available Tests to attempt the assigned test.

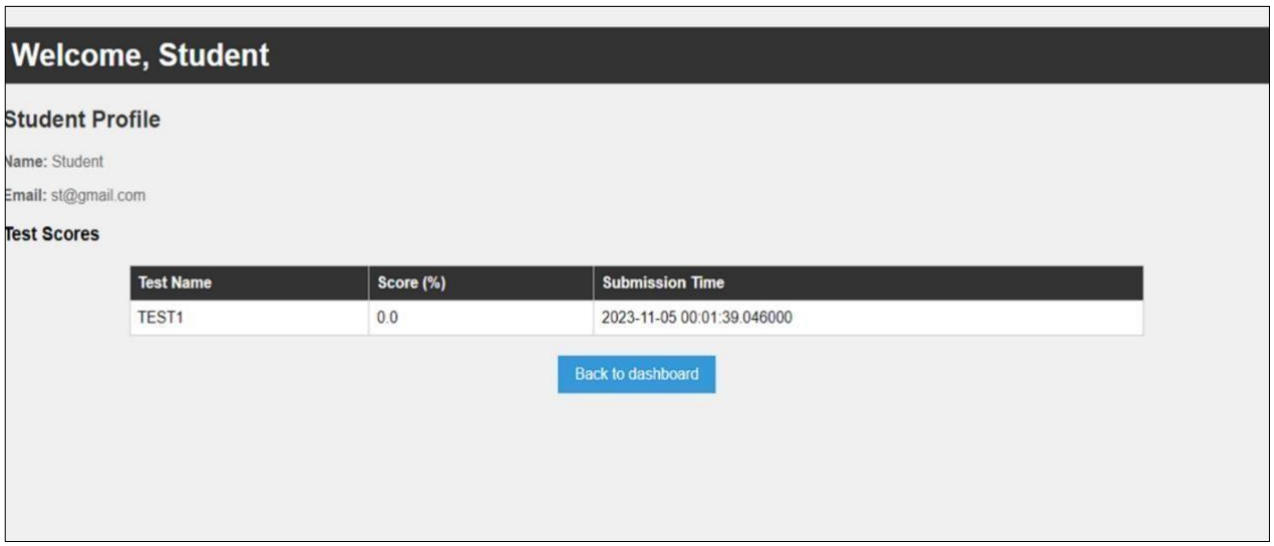

Fig. 4.13 Student Profile

Fig. 4.13 displays the Student's Score in the Attempted exam in Student Login.

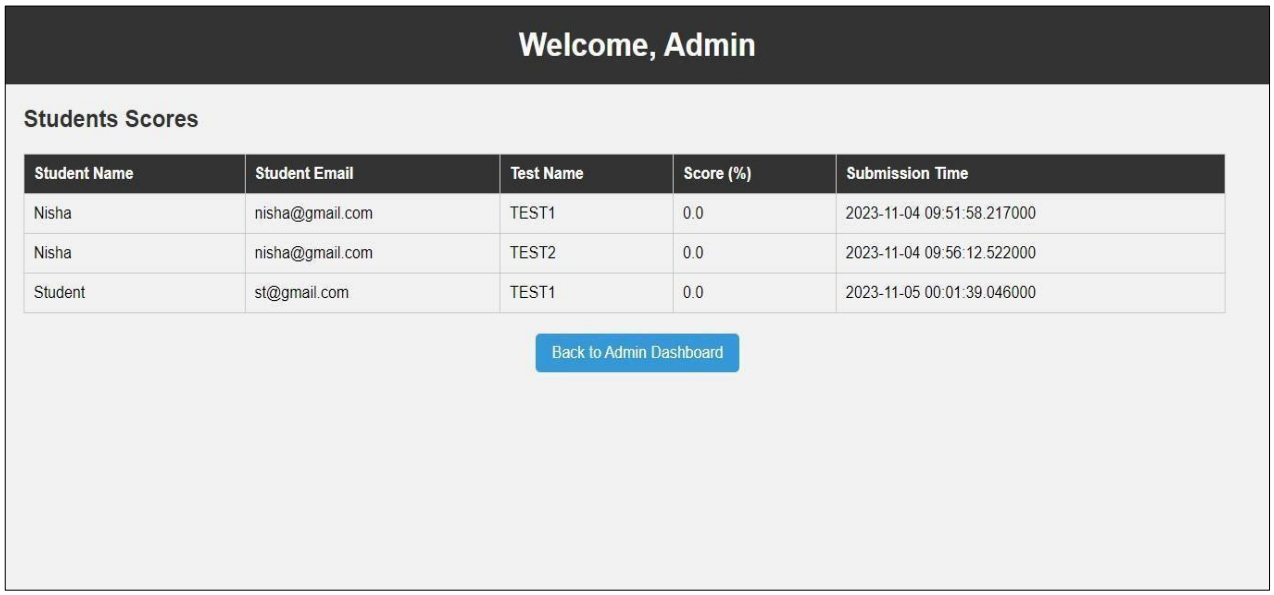

Fig. 4.14 Student's Score – Admin module

Figure 4.14 demonstrates the Student's Score in the assigned exam and it will be available to be viewed in the Admin module.

Chapter 5

Conclusion and Future Scope

5.1 Conclusion

The Online Aptitude Exam Generation System is a pivotal advancement in talent assessment and educational technology, offering efficient question generation, user-centric design, and dynamic adaptability. Its web scraping capabilities enable real-time customization of question papers, while an intuitive interface ensures accessibility for all users. With detailed analytics and feedback mechanisms, the system facilitates continuous improvement, promising a brighter future in education and employment. Moving forward, the system's impact extends to educational preparation and corporate recruitment processes. Future research may explore integrating advanced machine learning algorithms and addressing ethical considerations such as data privacy and algorithmic fairness. The Online Aptitude Exam Generation System paves the way for enhanced success in competitive landscapes by embracing innovation and fostering equitable practices.

5.2 Future Scope

In the future, “MyAptitude: Online Exam Generation System Using Web Scraping” has the potential to undergo significant advancements across various fronts. One key avenue for development involves enhancing the system's question selection algorithms through the integration of advanced machine learning techniques, such as natural language processing and deep learning. These algorithms can enable the system to better understand the semantic meaning of questions and tailor them more precisely to the desired competencies and difficulty levels, thus ensuring a more accurate assessment of candidates' abilities. Additionally, the system could expand its capabilities to encompass adaptive testing methodologies, dynamically adjusting the difficulty level of questions based on individual candidate performance. This personalized approach would lead to fairer evaluations and provide a more accurate reflection of candidates' skills. Furthermore, expanding the system's database to include a comprehensive list of Questions, options and answers would broaden its utility. Also moving ahead, the platform could extend its reach beyond aptitude tests to include assessments in various domains, such as technical skills and personality traits, catering to diverse

assessment needs across education and employment sectors. In addition to algorithmic enhancements and the integration of adaptive testing methodologies, collaboration with educational institutions and corporations represent another vital aspect of the Online Aptitude Exam Generation System's future development. By forging partnerships with these stakeholders, the system can gain valuable insights into real-world assessment needs and refine its functionalities accordingly. Collaborative efforts can lead to the refinement of the platform based on user feedback and practical use cases. Furthermore, partnerships with educational institutions and corporations can facilitate the integration of the system into existing talent assessment and recruitment processes, ensuring seamless adoption and alignment with industry standards. Through continuous collaboration and iterative development, the system can evolve into a comprehensive and adaptive assessment platform that meets the diverse needs of candidates and organizations alike. By focusing on mobile compatibility, data privacy, and continuous improvement through collaboration with stakeholders, the system can evolve into a comprehensive and adaptive assessment platform, empowering candidates and organizations with efficient, fair, and insightful talent evaluation solutions.

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MyAptitude: Online Exam Generation System Using Web Scraping.

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Abstract : People prefer shortcuts in today's fast-paced world—the quickest, fastest, easiest, least effort path paradigm. As a result, companies may find it challenging to come up with different sets of aptitude questions when testing candidates for different job profiles. Additionally, most students and fresh graduates struggle to pass aptitude exams these days. One of the most crucial components of all competitive tests, entrance exams, and campus interviews for government and IT employment is the online aptitude test. Thus, for new students joining the engineering field, practicing consistently and improving their aptitude skills becomes crucial. Tests of aptitude rate a person's cognitive ability and are used to measure general intelligence. This test consists of multiple subtests that assess a person's ability to reason, solve problems mathematically, and pay attention to details. Standardized aptitude tests have been incorporated into the hiring process over time and have proved essential in upholding meritocracy in the technical sector. In today's competitive job market, aptitude tests have become vital for job seekers, and it is therefore crucial to consider them carefully when preparing for and applying for positions. Therefore, we developed an Online Aptitude Exam Generation System in which question papers would be generated in real-time and students could practice aptitude questions to gain an idea of what is needed in the modern era to gain success in aptitude rounds of various companies. This would reduce the headache of various companies having to arrange or set different sets of question papers and also give students a platform where they can brush up on their aptitude skills**.**

IndexTerms **-** Web Scraping, Aptitude Test, Automated Assessment, Scraped question, MyAptitude.

I. INTRODUCTION

MyAptitude is a comprehensive, all-in-one solution designed to reduce the headache of companies to generate unique question sets for conducting Aptitude exams. This platform serves as a one-stop solution, meticulously curated to generate unique question sets on which various companies could conduct exams, eliminating the risk of paper leaks. Likewise, students and job seekers recognize the significance of excelling in aptitude tests to secure coveted positions in competitive exams, entrance tests, and interviews. This system aims to revolutionize the conventional approach to aptitude testing by leveraging technology to streamline the question-generation process. The use of web scraping has been achieved to incorporate this application. Through web scraping, we can scrap a unique and large number of questions within a few seconds, allowing companies to conduct such exams without any hassle. MyAptitude is designed to cater to a diverse user base, including companies, employment candidates and students. MyAptitude aims to make a company's job easier so that they can reduce the stress of generating new question papers from time to time.

A. Fundamentals:

An aptitude test is a kind of test designed to determine a person's aptitude for a specific activity or skill set. The main idea of aptitude assessment is that people not only have physical abilities and limitations but also

have an innate tendency to succeed or fail at certain subjects based on their characteristics. Aptitude tests evaluate personal abilities by determining how well a person can cope in an environment that lacks education or knowledge. Aptitude assessments can be divided into several categories, such as quantitative, verbal, and logical.

B.Objectives:

MyAptitude strives to be a comprehensive and reliable application for both companies and students to help them excel in their respective outcomes. The primary objective of this web application is to facilitate an environment that is user-friendly for all users and minimize manual work of the companies in a go. The project's objective is to create an effective test and aptitude learning application that would be able to curate the needs of both the service-based companies and students or candidates appearing for the examination.

C. Scope:

The project's scope encompasses a broad spectrum of knowledge acquisition and information exchange, with several key points: Accessibility: Being a web-based application, it ensures round-the-clock access from any location, offering users convenience and flexibility in utilization. Diverse User Base: The application serves both corporate entities and educational institutions, addressing the needs of employers conducting aptitude tests and students preparing for examinations. Personality Insights: Users can gain valuable insights into their personality traits and characteristics, fostering self-awareness and self-discovery through the platform. Instant Results Access: The platform provides users with prompt access to examination results as soon as they are made available, enabling timely feedback and performance assessment.

II. Literature Survey

This literature review focuses on the development of exam generation platforms, investigating various methodologies and functions. Existing research demonstrates the growing popularity of web-based platforms that generate complete question papers by manually creating tests. The Online Aptitude Exam Generation System saves time by automating the process of creating assessments for candidates. In recent years, online exams have been employed in a variety of educational and corporate settings due to their improved accuracy, ease of manipulation, and multi-functionality. Though the interface for online tests is deemed to be good, in some conditions, such as the number of students, method of attempting the answer, timing, and so on, the measurement results still require more intelligent results for analyzing students' knowledge.

1. Hameed et al. “discuss the functionality and benefits of online examination systems (OES), which provide a web-based approach to efficiently conducting exams.” These systems use PHP, web applications, and database management technologies to automate processes and deliver accurate results. OES simplifies exam administration for administrators and students, saves time and ensures precision in evaluations. Its adaptability through open-source languages makes it easy to implement in all educational institutions. The system's modular design improves user experience, security and maintenance. Overall, OES represents a promising solution for modernizing examination practices and offers educational institutions flexibility, efficiency and reliability.[1]
2. A. Choubey et al. “Explore the importance of online examination systems in modern education. They highlight the accuracy, speed and efficiency of the systems, making them indispensable assessment tools. These systems eliminate the need for paper-based assessments, reduce manual work and provide students with instant feedback. Additionally, they offer scalability, robust security, and flexibility for remote audits and audits. The literature emphasizes the use of web-based applications, database management and programming languages such as PHP and JavaScript. The system architecture typically includes modules for administrators, teachers, etc. Students, each of which fulfils specific functions. Overall, online exam systems are changing assessment practices in education, providing efficiency, convenience and valuable insights into student performance.[2]
3. Butler-Henderson et al. “Conducted a systematic review of online assessments, focusing on implementation assessments and their impact on students and staff. The review found that online learning environments generally promote student well-being and performance, while staff prefer online exams for workload and cost-saving reasons. However, discussions of pedagogical and governance considerations have been lacking in the literature. Techniques used included data incorporation, coding and theme search. Future research should examine accreditation and authenticity in online examinations and assess their validity and reliability. Overall, the review highlights the need for comprehensive

discussions about pedagogy and governance in online examinations to support evidence-based practices. [3]

4. Kathirisetty et al. "Conducted a study on an IQ-based student assessment model using machine learning. They examined the influence of emotional intelligence and IQ on academic performance and emphasized the need for cognitive and emotional development. Various machine learning techniques have been used, including ensemble methods, decision trees, k-nearest neighbor and support vector machines. The decision tree model proved to be the most effective as improved strategies increased accuracy and recall rates. Future efforts aim to implement advanced machine learning techniques for better prediction accuracy. The research highlights the importance of IQ-based assessment models in education and highlights the potential of machine learning in predicting student performance. Emphasis is placed on integrating cognitive and emotional development strategies to improve academic outcomes. [4]
5. Kavyashree et al. "Introducing an innovative online exam portal to modernize assessment practices in education. The platform highlights its efficiency and resource-saving benefits and addresses challenges faced by both exam authorities and students. Security features such as webcam and audio recording during exams ensure transparency and integrity. In addition, the portal includes an intelligent tutoring system to evaluate descriptive answers and assess students' cognitive abilities. The platform provides a robust technological framework by leveraging a client/server architecture, the PHP programming language, and the MySQL database management system. Future research directions include improving security features, refining system flexibility, and exploring automated question-generation techniques. Overall, the online exam portal promises to revolutionize the assessment experience, providing efficiency, security and adaptability to meet the evolving needs of modern education. [5]
6. Singrodia et al. "propose a comprehensive overview of web scraping and highlight its importance for data extraction and analysis. They discuss challenges with limited API access in desktop solutions and advocate for automated methods such as syntactic, semantic and computer vision approaches. The study examines applications in data mining, research and marketing, and testing techniques such as syntactic, semantic and computer vision web scraping. Tools like Rvest and visual interface services are used for automation. Future directions include advanced techniques, efficiency improvements, and consideration of legal and ethical concerns. Overall, web scraping is considered crucial to data processing, with constant advances and legal considerations determining its future.[6]
7. M. Khder "This paper provides an overview of web scraping and highlights its effectiveness in collecting large data sets from the web. The author emphasizes the need for specific hypotheses based on data source theory and addresses legal, practical and ethical considerations. Techniques." Topics covered include hypothesis testing, case studies using Python code and tools like OX Path, and challenges like captcha and rate limiting. Methods used range from manual parsing to HTTP requests using libraries such as Curl and Wget, with data extraction via regular expressions and HTML parsing. The author suggests the future integration of AI and machine learning and emphasizes the importance of continuous development of scraping techniques to keep pace with legal and technological developments.[7]
8. Sonia Thakur et al. "The research introduced a question generator and monitoring system to enable faculties to automate the process of creating tests or test forms with various options to choose from. The system retrieves questions from its internal databases, which include questions collected from websites. Scanning PDFs and images uses Optical Character Recognition (OCR) an electronic service that converts an image into text and predicts questions based on specific paragraphs or multimedia files using Questgen AI, an open-source NLP -Library that helps develop easy-to-build question generation algorithms. The exams taken on the system are taken in proctored mode. In the future, they are trying to improve the face monitoring module and other processes to make the system faster. [8]
9. Yağci et al. "Present an adaptive online exam system with comprehensive exam management tools. Built with PHP, MySQL and Apache, it emphasizes a user-friendly interface and data security by leveraging adaptive testing and security measures such as IPSec, SSL and encryption. It dynamically adjusts the difficulty level of the questions based on the competency of the test takers. Also suggest refining question selection and assessing the validity and reliability of the system. The system aims to improve user convenience and data security. Future work should focus on improving challenge selection and evaluating system effectiveness through statistical analysis. [9]
10. Erlewad et al. "This paper examines web scraping and its applications in various industries and research areas. They highlight its role in driving data-driven decision-making and innovation in areas such as healthcare, social media, finance and marketing. By comparing different web crawlers, the authors

provide insights into selecting appropriate tools for specific needs. They emphasize the ethical and legal aspects of web scraping, which are crucial in disciplines such as e-commerce, finance and science. The discussion covers various scraping tools such as Scraper API, FMiner and Scrapy. along with machine learning integration for advanced capabilities. Future research should address ethical issues and advances in scraping technologies and aim for more efficient data extraction methods. In summary, web scraping represents a transformative technology with extensive applications that place ethical considerations at the forefront and have the potential to revolutionize decision-making processes. [10]

III. MYAPTITUDE: ONLINE APTITUDE EXAM GENERATION SYSTEM USING WEB SCRAPING

A. Overview

Aptitude tests serve as crucial tools for evaluating candidates' competencies and suitability across various job roles. However, traditional methods of conducting these assessments, often reliant on paper-based systems, present notable inefficiencies and challenges. To address these shortcomings and enhance the examination process, we propose an innovative approach leveraging web scraping technology for the seamless facilitation of online aptitude examinations.

1) Existing System Architecture:

The current reliance on paper-based systems for storing examination information poses several inherent limitations. Issues such as spatial constraints, cumbersome filing procedures, difficulty in filtering pertinent documents, and time-intensive manual review processes hamper the efficiency and effectiveness of aptitude assessments. Moreover, the manual entry of questions into the system demands significant time and effort from administrators or educators, hindering the scalability and agility of the examination process.

2) Proposed System Architecture:

In response to the shortcomings of existing methodologies, our proposed system introduces a sophisticated online aptitude examination platform empowered by web scraping capabilities. This advanced architecture automates the question selection and paper generation processes by dynamically sourcing questions in real time from a diverse array of online repositories. Comprising modular components for paper creation, examination administration, and result processing, our system minimizes human intervention while maximizing efficiency and accuracy. The proposed system offers examination authorities the flexibility to tailor question papers to specific requirements, including the number of questions and minimum passing thresholds. Furthermore, organizations have the option to upload custom question datasets, fostering adaptability and customization. Students stand to benefit significantly from the system's comprehensive features, gaining access to a wealth of practice materials to hone their aptitude skills and excel in examinations. By embracing cutting-edge technology and automation, our proposed system not only streamlines the examination process but also enhances accessibility, scalability, and fairness. It represents a paradigm shift in the realm of aptitude assessments, promising a more seamless and equitable experience for both candidates and administrators.

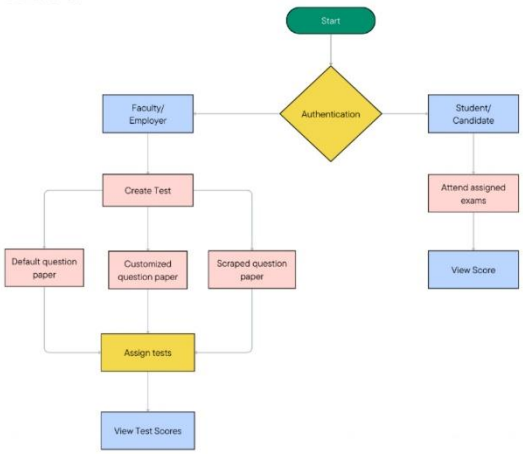

Fig 3.1. Flowchart of Proposed System Architecture

B.Implementation Details:

1. **Methodology and Algorithms:**

The methodology for developing the Online Aptitude Exam Generation System follows a systematic approach, incorporating various stages from data collection to system implementation. It ensures the seamless integration of web scraping techniques for data collection, along with provisions for client-provided data in CSV format.

2. **Data Collection:**

Data collection is a crucial phase in building the system's question bank and informing the question generation algorithm. It involves:

- Web Scraping: Utilizing web scraping techniques to extract aptitude questions from online resources, educational websites, and question banks. This automated process involves parsing HTML pages, extracting relevant text and metadata, and storing the data in a structured format.
- Client-Provided Data: Providing clients with the option to upload their question data in CSV format. This allows for customization and integration of proprietary question banks or specific question sets tailored to the client's requirements.

3. **Algorithm Design:**

The algorithms for the Online Aptitude Exam Generation System are meticulously crafted to handle diverse website structures for efficient data extraction and question selection. The web scraping algorithm, tailored for each website, ensures adaptability to varying layouts and structures, facilitating comprehensive data collection.

- BeautifulSoup: A Python library designed for web scraping tasks, particularly for parsing HTML and XML documents. It provides convenient methods and structures for navigating, searching, and manipulating the parsed data.

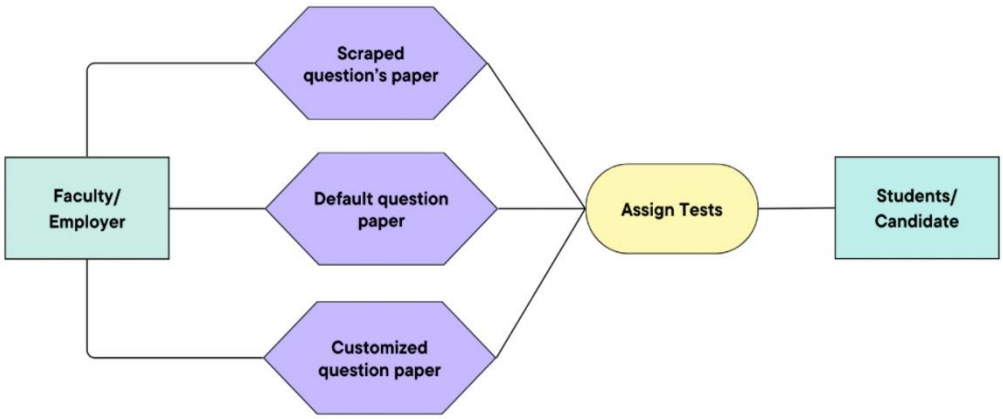

Fig 3.2. Concept Diagram

4. **Hardware and Software Specifications**

For our project the required specifications are given in Table I and Table II respectively.

Table I. Hardware Details

Processor	Intel i3
HDD	512GB
RAM	8GB

Table II. Software Details

Operating System	Windows 10
Programming Language	Python, Flask, HTML, CSS, Javascript
Database	MongoDB

IV. Results and Discussion

A. Output Results:

The MyAptitude interface offers intuitive design and navigation, showcased in Figures 1-14. Figure 1 highlights system advantages, while Figures 2 and 3 depict authentication. Figure 4 reveals the admin dashboard, and Figure 5 allows for test creation with parameters. Alternatively, Figure 6 enables custom test uploads. Figure 7 displays the test repository, and Figure 8 illustrates the student authentication. The student dashboard is shown in Figure 9, and available tests are listed in Figure 10. Test pages are explored in Figures 11 and 12. Figure 13 catalogues student profiles and scores, while Figure 14 provides an admin view of student performance. These visuals collectively underscore the interface's efficiency and support for academic endeavours.

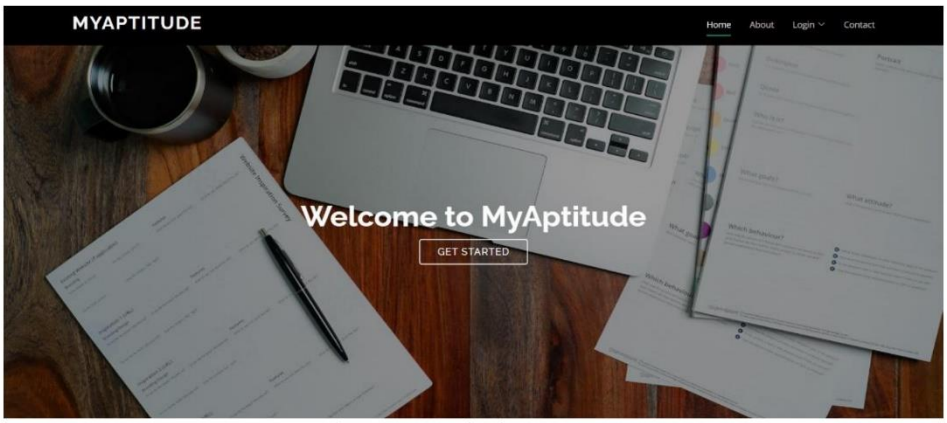

Fig 4.1 MyAptitude Homepage

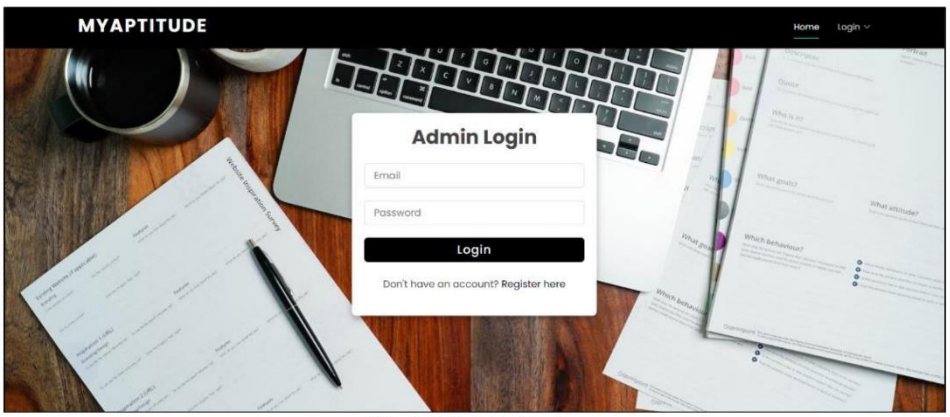

Fig 4.2 Admin Login

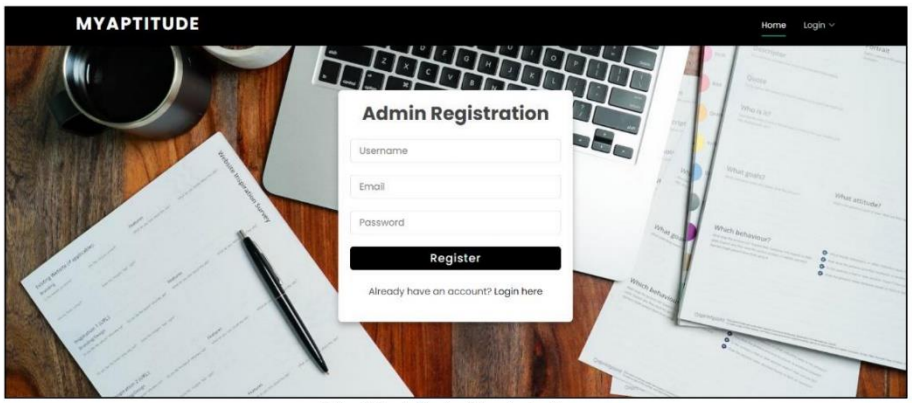

Fig 4.3 Admin Registration

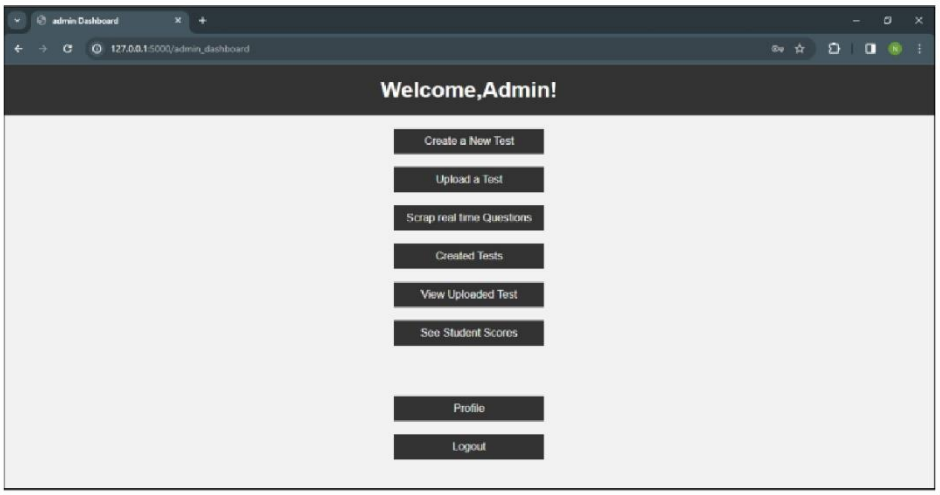

Fig 4.4 Admin Dashboard

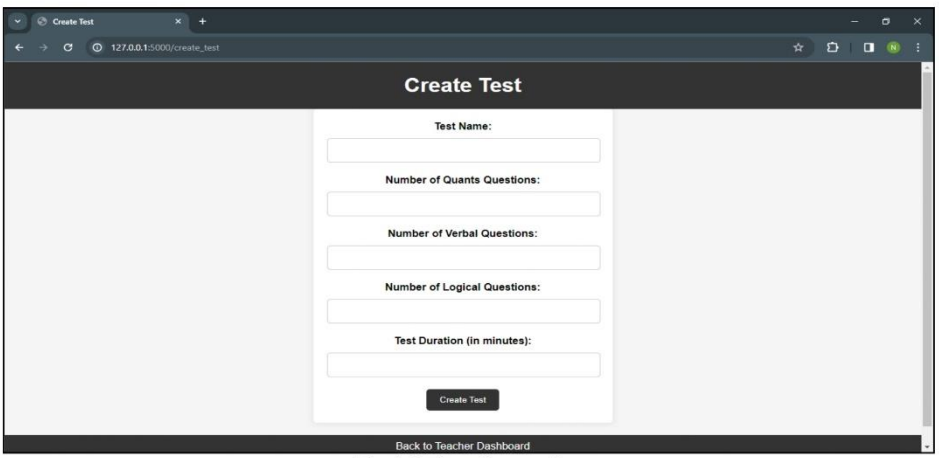

Fig 4.5 Test Generation

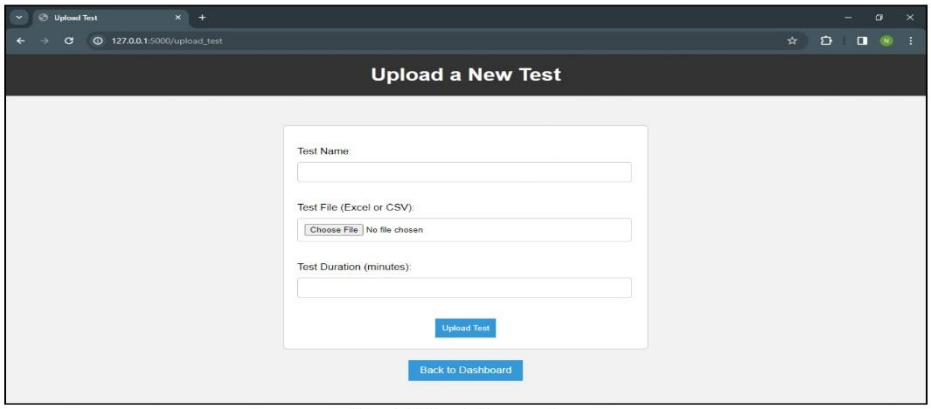

Fig 4.6 Test Generation

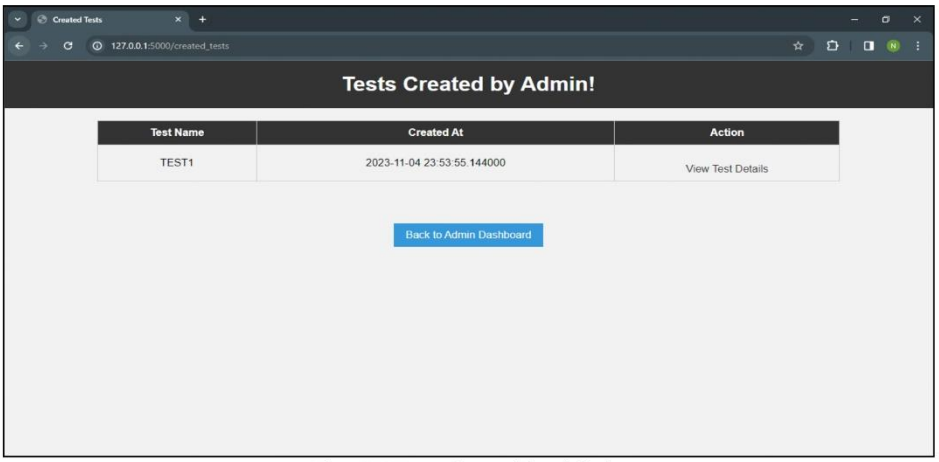

Fig 4.7 Tests Created by Admin

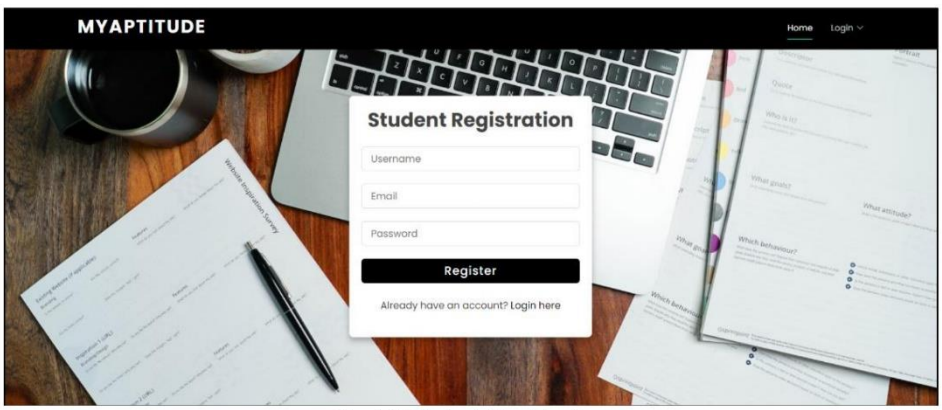

Fig 4.8 Student Registration

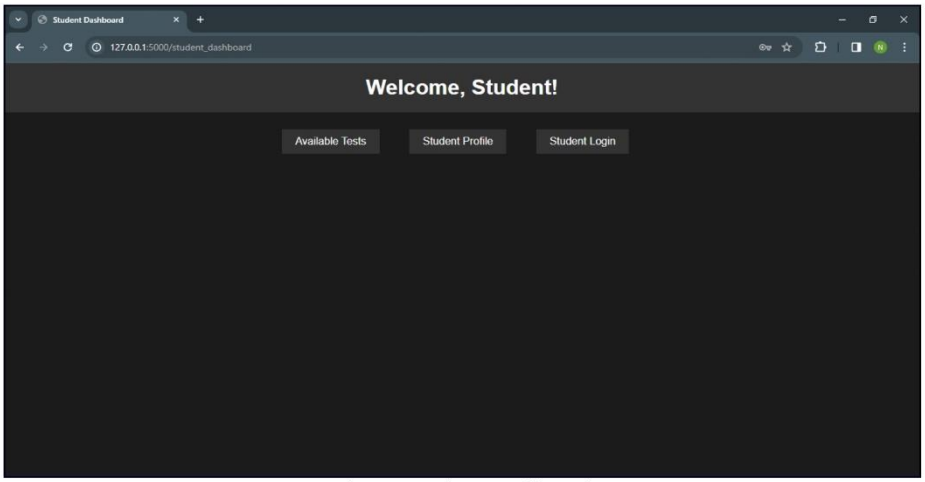

Fig 4.9 Student Dashboard

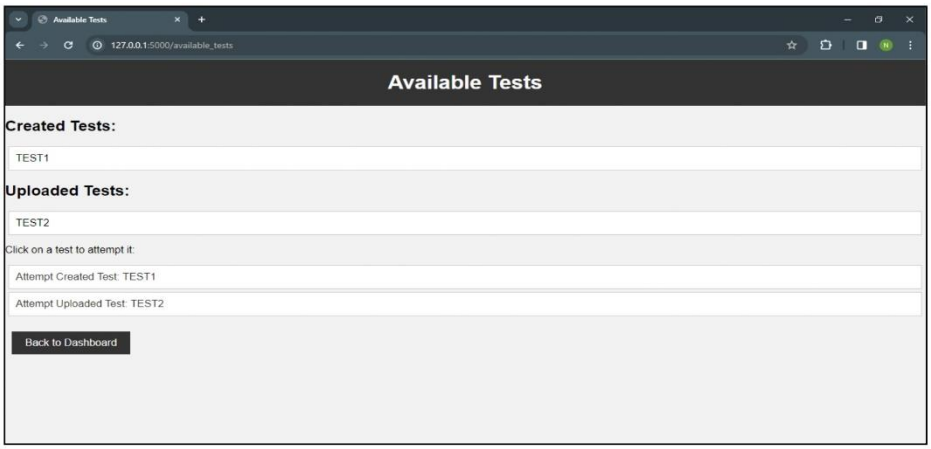

Fig 4.10 Available Tests

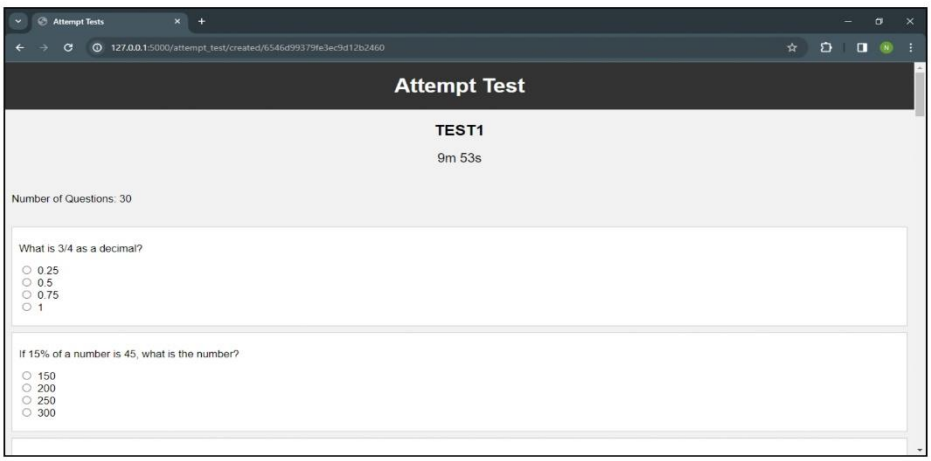

Fig 4.11 Test Page

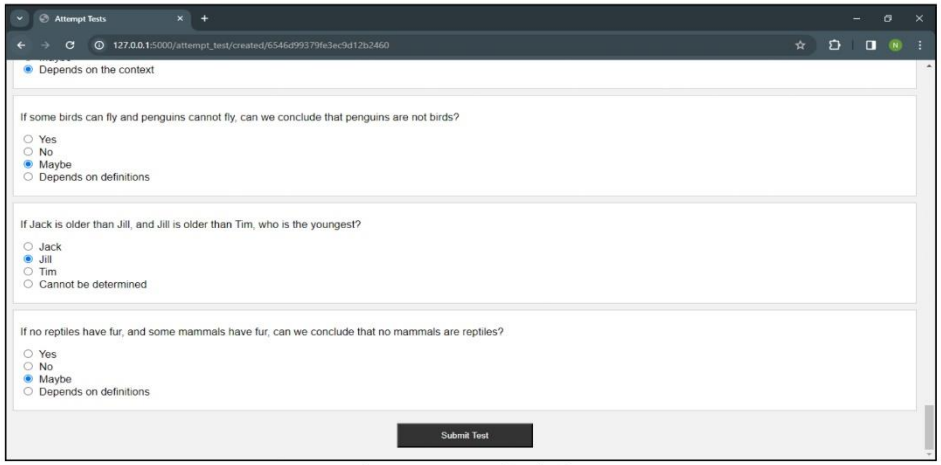

Fig 4.12 Test submission

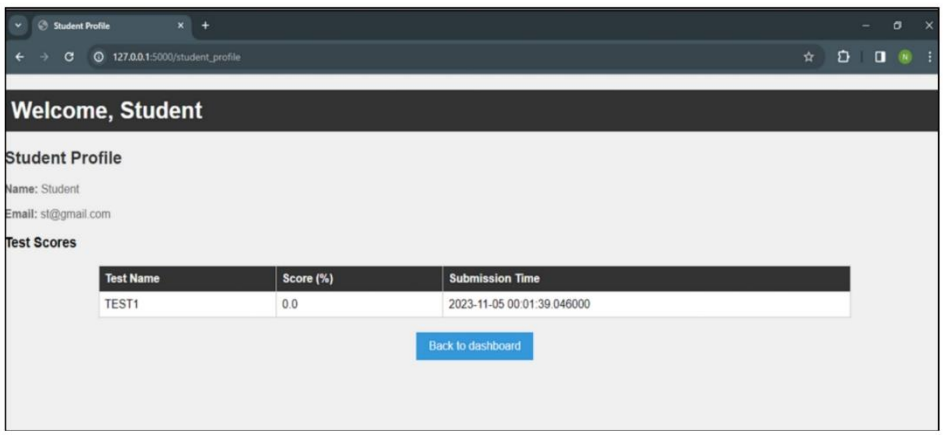

Fig 4.13 Student Profile

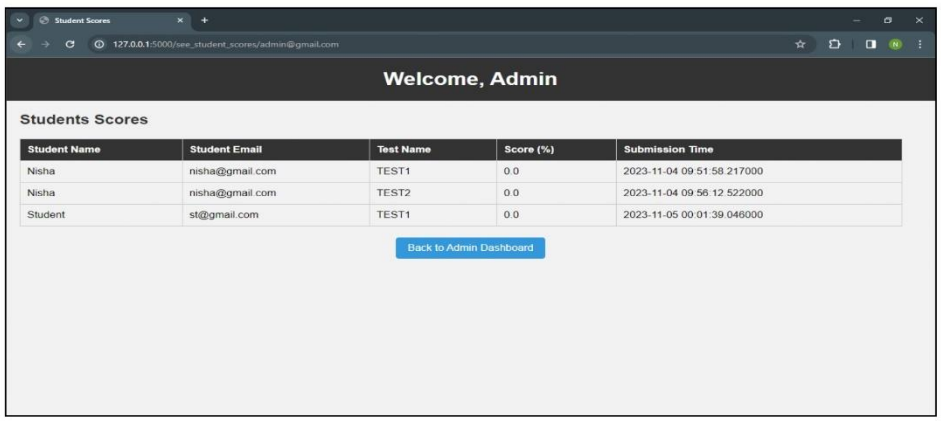

Fig 4.14 Student's Score – Admin module

V. CONCLUSION

The Online Aptitude Exam Generation System is a pivotal advancement in talent assessment and educational technology, offering efficient question generation, user-centric design, and dynamic adaptability. Its web scraping capabilities enable real-time customization of question papers, while an intuitive interface ensures accessibility for all users. With detailed analytics and feedback mechanisms, the system facilitates continuous improvement, promising a brighter future in education and employment.

Moving forward, the system's impact extends to educational preparation and corporate recruitment processes. Future research may explore integrating advanced machine learning algorithms and addressing ethical considerations such as data privacy and algorithmic fairness. The Online Aptitude Exam Generation System paves the way for enhanced success in competitive landscapes by embracing innovation and fostering equitable practices.

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