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Placement Readiness Software System

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A B S T R A C T

This paper presents the Smart Student Placement Readiness & Career Management System, a web-based application that helps engineering students prepare for campus placements in an organized and measurable manner. Many students prepare without knowing which skills are strong and which need more practice. The system addresses this by providing time-based tests in three categories: Aptitude, Programming and Technical Subjects. A student registers, maintains a personal and academic profile, and attempts timed multiple-choice tests. Answers are evaluated on the server using Java Servlets and the results are stored in a MySQL database through JDBC. From the stored results the system produces performance analysis, skill gap analysis, a placement readiness score and personalized recommendations, so that students can understand their current preparation level and improve weak areas step by step.

Keywords: Placement Readiness, Aptitude Test, Time-Based Test, Performance Analysis, Skill Gap Analysis, Personalized Recommendations, Java Servlets, JDBC, MySQL.

1. Introduction

Placement preparation is an important part of an engineering student's career. Most students use many different websites and books for practice, but they have no way to measure their overall readiness or to know which topic needs more attention. Teachers and placement cells also find it difficult to evaluate every student manually. The Smart Student Placement Readiness & Career Management System brings testing, analysis and guidance into one place and can be used on a computer, tablet or smart phone.

The system allows a student to take a test with a fixed time limit, see the result immediately, track improvement over multiple attempts and receive suggestions on what to practice next. The test is evaluated by the server, so the marks cannot be changed by the student. The raw marks are then converted into useful information such as category-wise scores, weak topics, a readiness score and practice recommendations.

1.1 Objectives

The main objective is to provide a single platform where a student can practice, get evaluated, analyse the performance and receive guidance for placement preparation without depending on separate tools or manual evaluation. The system provides the following features:

Student registration and login with session management;

Student profile management;

Placement preparation with Aptitude, Programming and Technical Subjects tests;

Time-based tests with automatic submission and server-side evaluation;

Performance analysis, skill gap analysis and placement readiness score based on stored test results; and

Personalized recommendations for each student.

All results are calculated from the actual test performance of the student and stored in the database, so every student gets an individual analysis.

2. System overview

2.1 Purpose and scope

The application provides time-based tests in Aptitude, Programming and Technical Subjects. Students can judge their knowledge and skill and improve them at the same time, by attempting the tests repeatedly and observing their own improvement. The system is developed as one integrated website with a separate module for each feature. The test categories and topics are listed in Table 1.

Table 1 - Test categories and topics.

Category	Topics covered
Aptitude	Quantitative Aptitude, Logical Reasoning and Verbal Ability
Programming	Java, Programming Logic and Problem Solving
Technical Subjects	DBMS, Operating Systems and other Computer Science subjects

2.2 Non-functional requirements

Usability. The interface is simple, so that a student can register, log in, attend a test and understand the result easily. The website uses a clean purple theme with a dashboard layout and works on desktop, laptop, tablet and mobile screens.

Performance. The system gives a response within 2 seconds after login or when any page is opened. It is hosted on one Apache Tomcat server and can be used by many students at the same time through a web browser, with no installation on the student's computer.

Reliability. Evaluation is done on the server using the correct answers stored in the database, and each test attempt can be submitted only once, so the results are accurate and consistent.

Security. Passwords are stored in hashed form, database access uses prepared statements, and every request is checked against the server session so one student cannot view the profile or results of another. Correct answers are never sent to the browser.

3. System architecture and design

3.1 Three-tier architecture

The system is a three-tier web application. The browser pages are written in HTML, CSS and JavaScript. The business logic is written in Java Servlets, and the data is stored in a MySQL database accessed through JDBC using the MySQL Connector/J driver. The application runs on the Apache Tomcat server. The only user of the system is the student, who needs only basic knowledge of a web browser.

3.2 Functional modules

The functional requirements are grouped into three modules: the student module (registration, login, logout and profile management), the test module (placement preparation, time-based tests, submission and result display), and the analysis and recommendation module. They are described below.

Registration and login. Registers a student after validating name, email, password, college, department and year. The email format is checked and the password must have at least eight characters with letters and digits. A session is created after login and destroyed on logout.

Profile management. The student can view and update personal and academic details, which are saved in the database.

Placement preparation. Displays the Aptitude, Programming and Technical Subjects categories, each with a description and a Start Test button.

Time-based test. Shows the title, instructions, number of questions and time limit, runs a countdown timer, allows answers to be changed before submission, tracks unanswered questions, submits automatically when time ends, prevents duplicate submission and stores the result.

Performance analysis. Shows test-wise and category-wise scores, correct and incorrect answers, accuracy, time taken and improvement over multiple attempts using charts.

Skill gap analysis. Identifies strong skills, weak skills, topics requiring improvement and suggested practice areas from the stored results.

Placement readiness score. Calculates the score using a defined formula and shows the preparation level, strengths and areas requiring improvement.

Personalized recommendations. Recommends topics to practice, tests to attempt again and skills to improve, based on the individual performance of the student.

3.3 Database design

The MySQL database contains the tables students, student_profiles, tests, questions, test_attempts, student_answers and test_results. Primary keys and foreign keys are used to support multiple students, multiple tests and multiple attempts.

System configuration

The hardware and software requirements for developing and running the system are given in Table 2 and Table 3.

Table 2 - Hardware requirements.

Component	Specification
Processor	Intel Core i3 or above, 2.0 GHz
RAM	4 GB
Hard disk	500 GB
Monitor	15 inch LCD/LED colour
Input devices	Optical mouse, standard keyboard

Table 3 - Software requirements.

Component	Specification
Operating system	Windows 10 / Windows 11
Front end	HTML, CSS, JavaScript
Back end	Java, Java Servlets, JDBC
Database	MySQL 8
Web server	Apache Tomcat 9
IDE	Eclipse IDE for Enterprise Java Developers
Java version	JDK 11 or above
Browser	Google Chrome / Microsoft Edge

4. Implementation

The system is implemented as a Java web application organised into packages for utilities, controllers, data access and models. DBConnection loads the MySQL JDBC driver and provides database connections. RegisterServlet and LoginServlet handle registration and login, validating all inputs on the server, hashing passwords and managing the session. StudentDAO and the model classes Student and Test carry data between the servlets and the database.

PerformanceServlet, SkillGapServlet, ReadinessScoreServlet and RecommendationServlet read the stored test results and return the analysis to the browser as JSON, which the front-end pages display as charts and tables. Skill levels are classified as Strong, Average or Needs Improvement using fixed percentage thresholds, and the same levels drive the readiness score and the recommendations.

5. Results and discussion

The system was tested through its complete flow, from registration to recommendations. Figs. 1–8 show the main screens. After login the student reaches the dashboard (Fig. 1) and chooses a category on the placement preparation page (Fig. 2). The test runs with a countdown timer (Fig. 3) and the result is shown immediately after submission (Fig. 4).

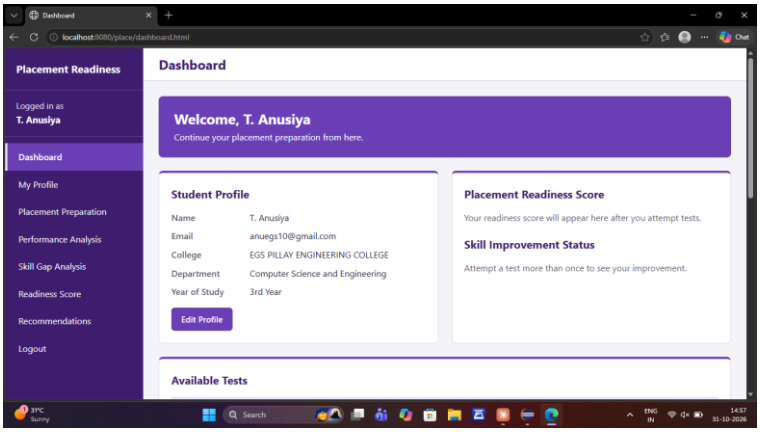


Fig. 1 - Student dashboard.

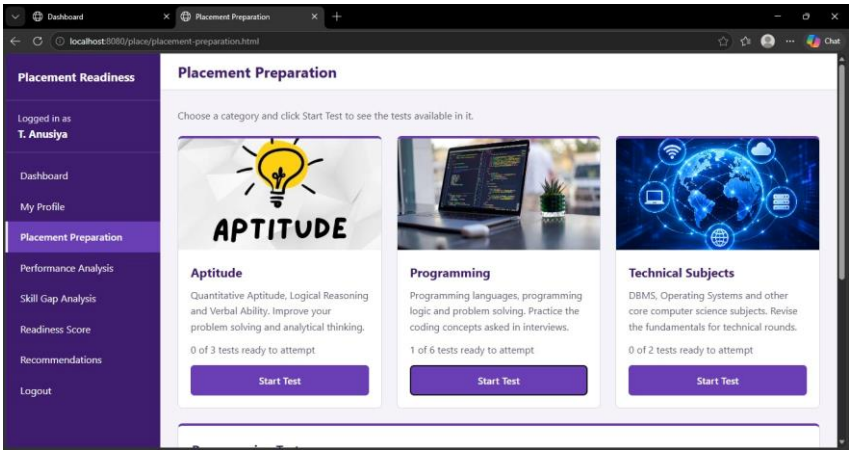


Fig. 2 - Placement preparation page.

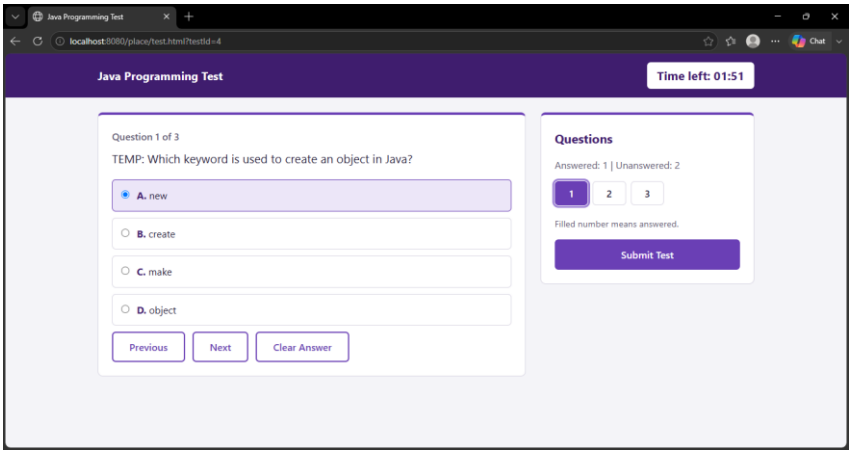


Fig. 3 - Time-based test page with countdown timer.

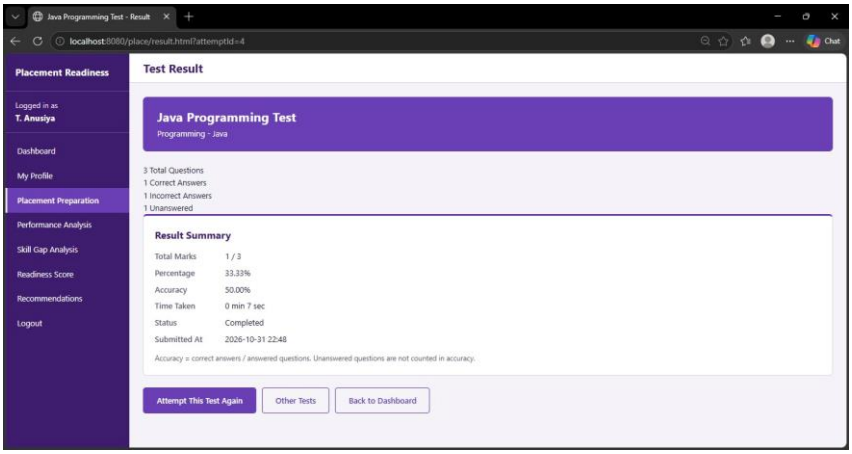


Fig. 4 - Test result page.

The performance analysis (Fig. 5) presents category-wise scores, accuracy and the improvement over multiple attempts. The skill gap analysis (Fig. 6) separates strong skills from weak topics, the placement readiness score (Fig. 7) summarises the overall preparation level, and the personalized recommendations (Fig. 8) tell the student exactly what to practice next. Every student receives an individual analysis based on his or her own results.

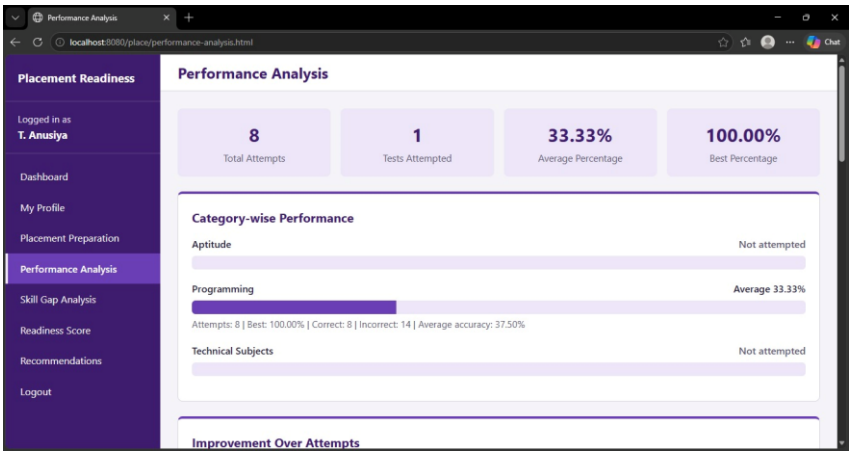


Fig. 5 - Performance analysis.

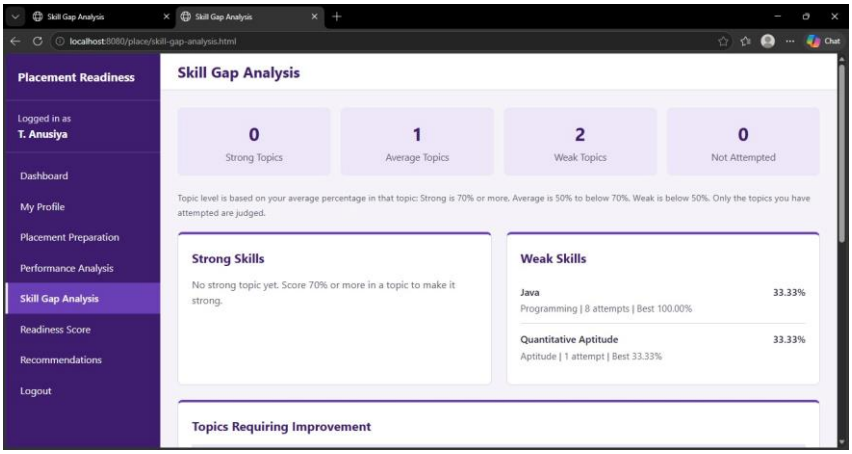


Fig. 6 - Skill gap analysis.

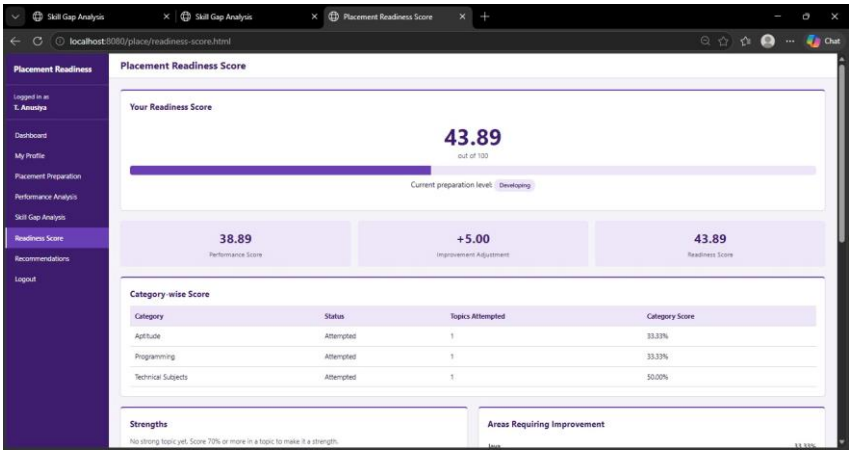


Fig. 7 - Placement readiness score.

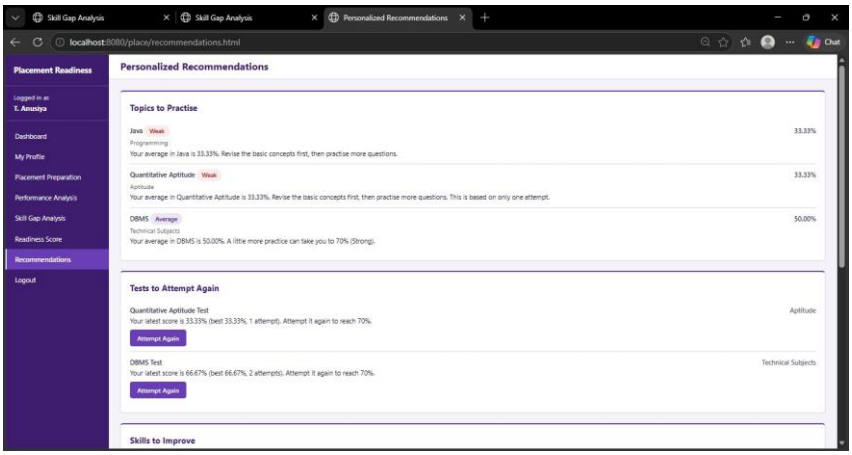


Fig. 8 - Personalized recommendations.

7. Conclusion

The Smart Student Placement Readiness & Career Management System provides a single platform for placement preparation. Students can register, maintain a profile, attempt time-based tests in Aptitude, Programming and Technical Subjects, and see the result immediately. Since the marks are calculated on the server using Java Servlets and JDBC, the evaluation is accurate and cannot be changed from the browser. The performance analysis, skill gap analysis, placement readiness score and personalized recommendations turn raw marks into useful guidance. The system was developed using Java Servlets, JDBC, MySQL and Apache Tomcat with HTML, CSS and JavaScript on the front end, and works as one integrated website.

7.1 Future enhancements

An administrator module to add, edit and delete test questions from the website.

A placement officer view to see the readiness of a whole department or batch.

Company-wise mock tests and coding practice with automatic code evaluation.

Email notifications and downloadable performance reports for students.

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