

PROJECT FINAL REPORT

The University of Azad Jammu and Kashmir, Muzaffarabad.



OBJECT ORIENTED PROGRAMMING

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Instructor:	Engr. Awais Rathore
Project Title:	Smart Campus Management System
Report:	Final Report

SMART CAMPUS MANAGEMENT SYSTEM

Final Project Report

Submitted to: Engr. Awais Rathore
Course: Object Oriented Programming
Department of Software Engineering
The University of Azad Jammu and Kashmir, Muzaffarabad

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Date: September 27, 2025

Abstract / Executive Summary

The Smart Campus Management System is a completed C++ console-based application that streamlines core academic and administrative processes. Unlike traditional manual methods, the implemented system provides secure, role-based access to students, faculty, and administrators. It enables efficient management of courses, attendance, fees, and digital identification. This final report details the design, implementation, testing, and evaluation of the system, highlighting its use of Object-Oriented Programming (OOP) concepts, modular architecture, and file handling for persistent data storage.

Project Objectives

- Develop an integrated digital platform for campus management
- Provide role-based access and authentication
- Automate attendance, financial, and enrollment operations
- Maintain secure, persistent data storage
- Apply OOP principles to solve real-world problems

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Implemented Features

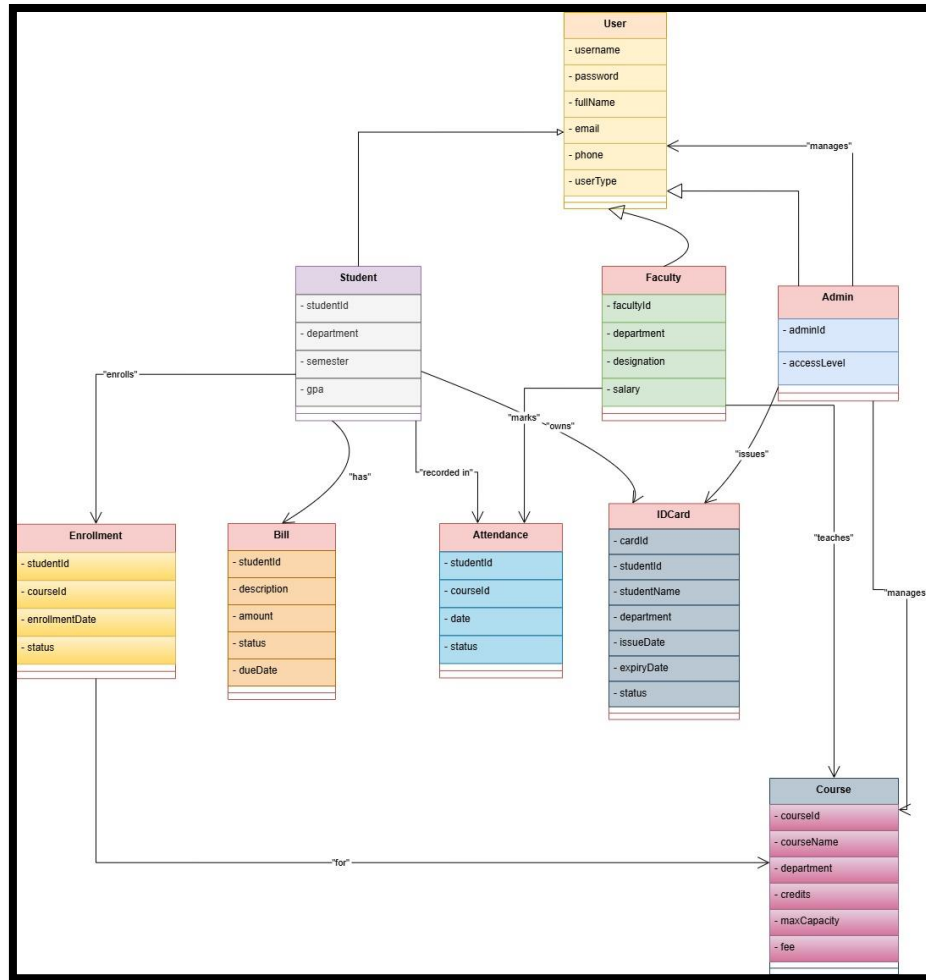
The following features were successfully implemented in the system:

- Role-based login system for students, faculty, and administrators
- Course management: add, enroll, search, and view courses
- Attendance marking and reporting by faculty
- Fee calculation, payment, and reporting for students
- Digital ID card generation with validity tracking
- File handling for persistent storage of all records

System Design & UML Diagram

The Smart Campus Management System was modeled using UML diagram. This diagram represent the object relationships, user interactions, and overall workflow.

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Implementation

The system was implemented in C++ using Dev-C++ IDE. Object-oriented programming concepts such as encapsulation, inheritance, and polymorphism were applied to design classes for users, courses, billing, and attendance. File handling was used for persistent storage of users, courses, enrollments, and reports. The console interface was enhanced with ASCII formatting and simple colors for usability.

Testing & Results

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The application was tested through the following scenarios:

- Student login, enrollment in courses, and fee payment
- Faculty login, marking attendance, and generating reports
- Administrator login, managing users and courses

All test cases executed successfully, and the system consistently produced correct outputs. Console outputs confirmed accurate data storage, retrieval, and reporting.

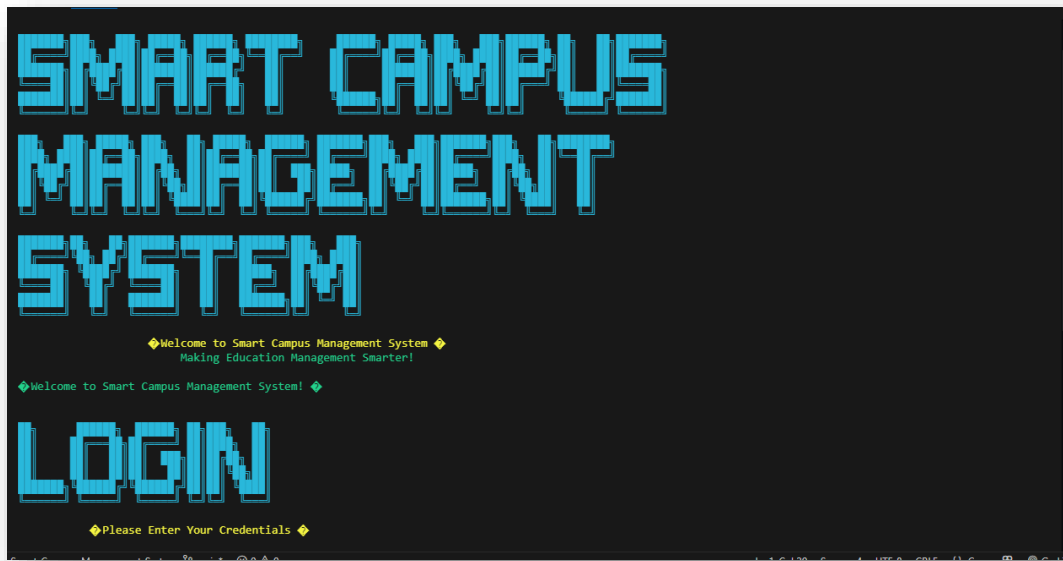


Figure 1: Login Portal

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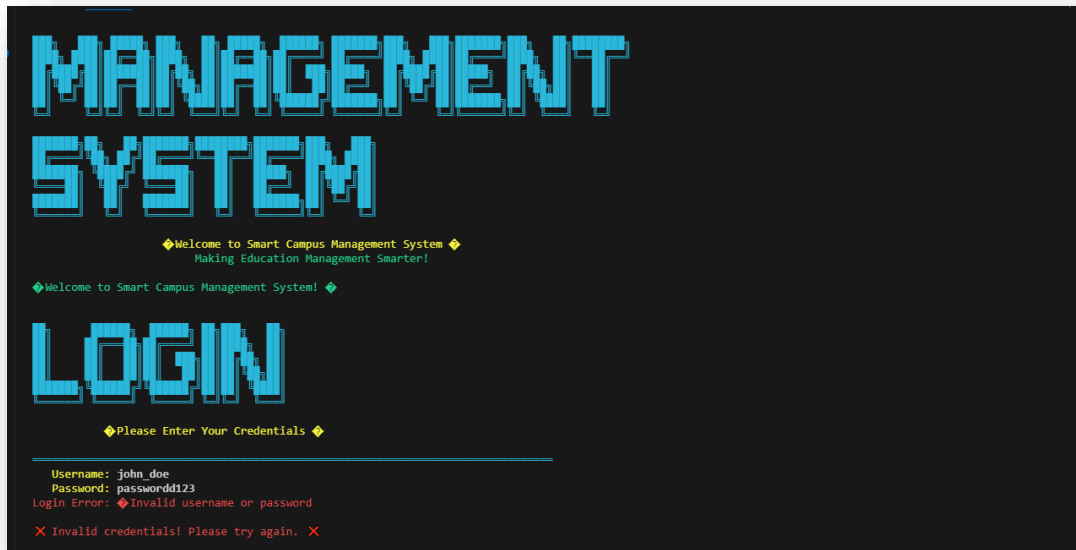


Figure 2: Handling Invalidity

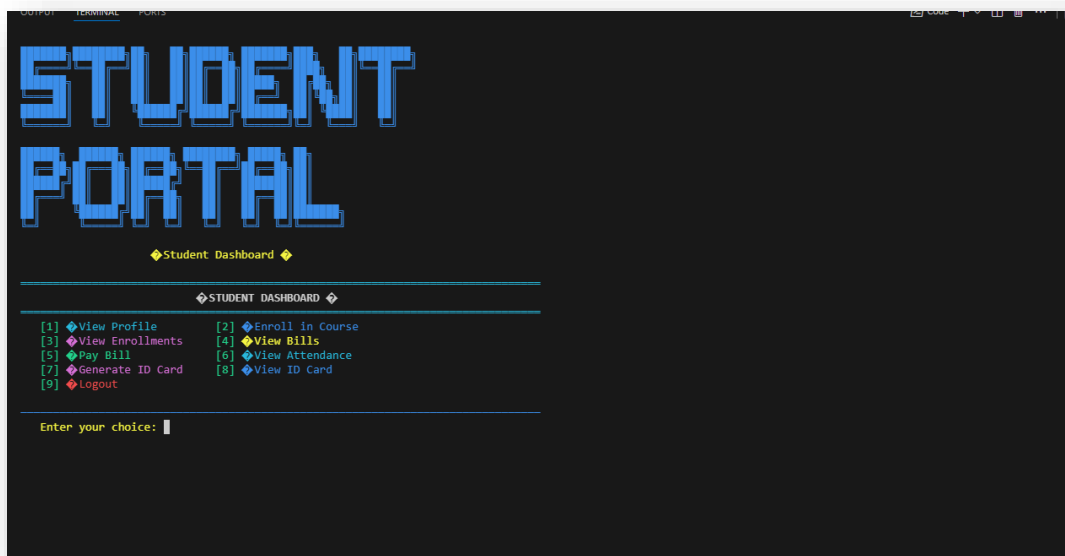


Figure 3: Student Dashboard

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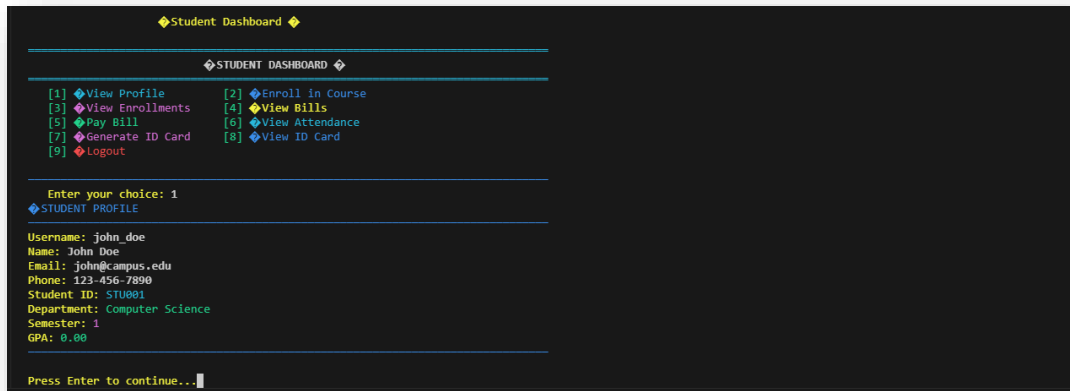


Figure 4: Student Profile Generation

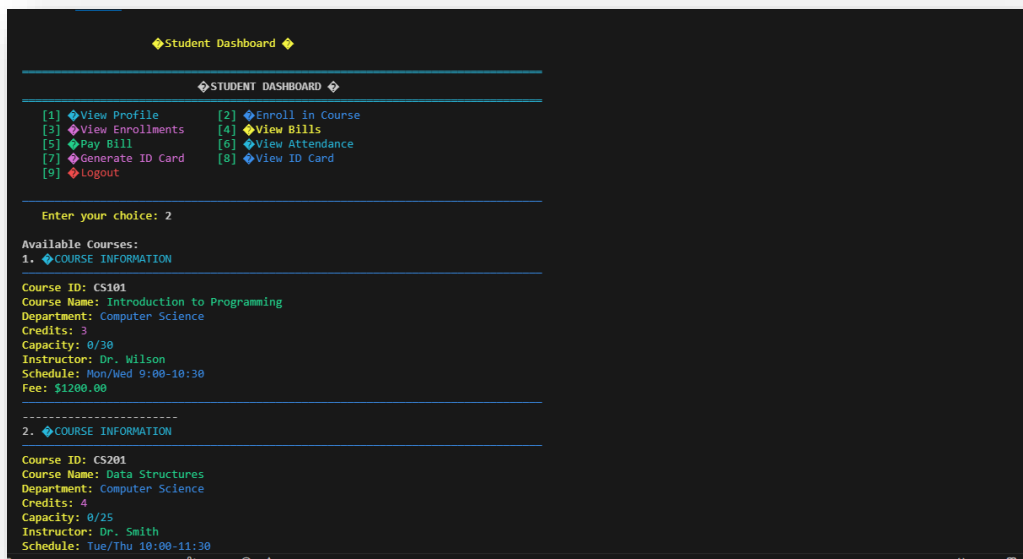


Figure 5: Showing Available Courses

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```
Course Name: 42
Department: tgfh
Credits: 53
Capacity: 0/532
Instructor: edrgsdx
Schedule: 34
Fee: $3525.00

-----
32. ♦ COURSE INFORMATION
-----
Course ID: gerjg
Course Name: 234r
Department: r423f
Credits: 324
Capacity: 0/2343
Instructor: frdgerrt
Schedule: 34
Fee: $234.00

-----
33. ♦ COURSE INFORMATION
-----
Course ID: 123SE
Course Name: PF
Department: SE
Credits: 34
Capacity: 0/35
Instructor: Engr.Muhammad Awaiz
Schedule: 4:00
Fee: $4000.00

-----
Enter course number to enroll: 32
✔ Successfully enrolled in 234r! ✔

Press Enter to continue...
```

Figure 6:Enroll In Course

```
♦ Student Dashboard ♦

♦ STUDENT DASHBOARD ♦

[1] ♦ View Profile      [2] ♦ Enroll in Course
[3] ♦ View Enrollments [4] ♦ View Bills
[5] ♦ Pay Bill         [6] ♦ View Attendance
[7] ♦ Generate ID Card [8] ♦ View ID Card
[9] ♦ Logout

Enter your choice: 3

Your Enrollments:
Course: Data Structures
Status: ACTIVE
Enrolled: Sun Aug 31 05:18:00 2025
-----
Course: Database Management Systems
Status: ACTIVE
Enrolled: Sun Aug 31 05:22:57 2025
-----
Course: Introduction to Programming
Status: ACTIVE
Enrolled: Sun Sep 21 03:50:53 2025
-----
Course: 234r
Status: ACTIVE
Enrolled: Sat Sep 27 04:55:08 2025
-----

Press Enter to continue...
```

Figure 7: Showing Student Enrollment

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```
Your Bills:
◆BILL INFORMATION
-----
Student ID: STU001
Description: Course Fee - Introduction to Programming
Amount: $1200.00
Status: PENDING
Due Date: 2024-02-15
-----
◆BILL INFORMATION
-----
Student ID: STU001
Description: Library Fee
Amount: $50.00
Status: PAID
Due Date: 2024-02-10
-----
◆BILL INFORMATION
-----
Student ID: STU001
Description: Lab Fee
Amount: $200.00
Status: PAID
Due Date: 2024-01-20
-----
◆BILL INFORMATION
-----
Student ID: STU001
Description: Course Fee - Introduction to Programming
Amount: $1200.00
Status: PAID
Due Date: 2024-02-15
-----
```

Figure 8: View Bills

```
Description: Library Fee
Amount: $50.00
Status: PENDING
Due Date: 2024-02-10
-----
17. ◆BILL INFORMATION
-----
Student ID: STU001
Description: Course Fee - Introduction to Programming
Amount: $1200.00
Status: PENDING
Due Date: 2024-02-15
-----
18. ◆BILL INFORMATION
-----
Student ID: STU001
Description: Library Fee
Amount: $50.00
Status: PENDING
Due Date: 2024-02-10
-----
19. ◆BILL INFORMATION
-----
Student ID: STU001
Description: Course Fee - 234r
Amount: $234.00
Status: PENDING
Due Date: Sat Sep 27 04:55:08 2025
-----
Enter bill number to pay: 17
Payment successful!
Press Enter to continue...|
```

Figure 9: Pay Bills

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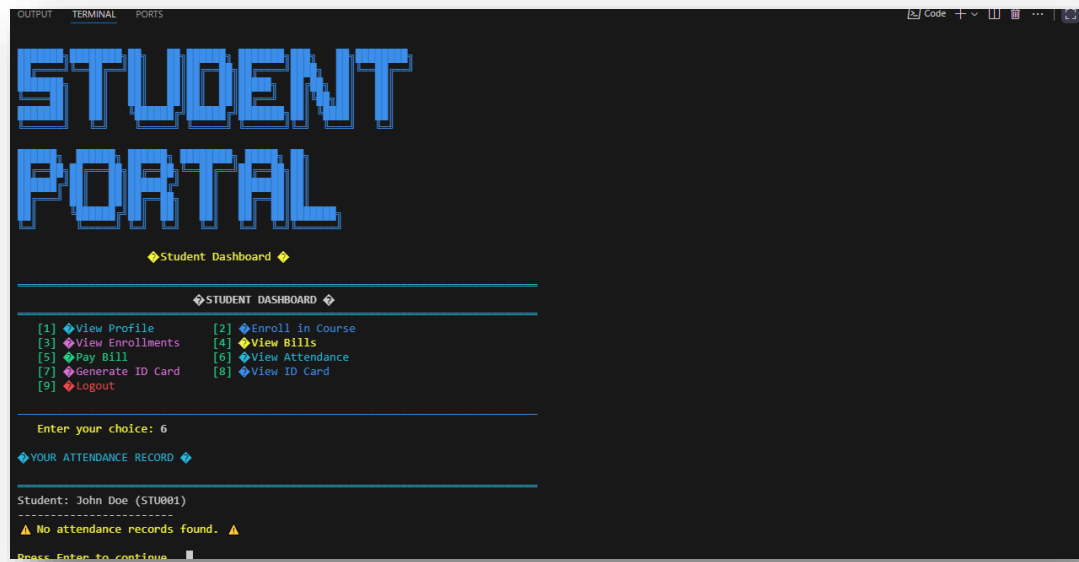
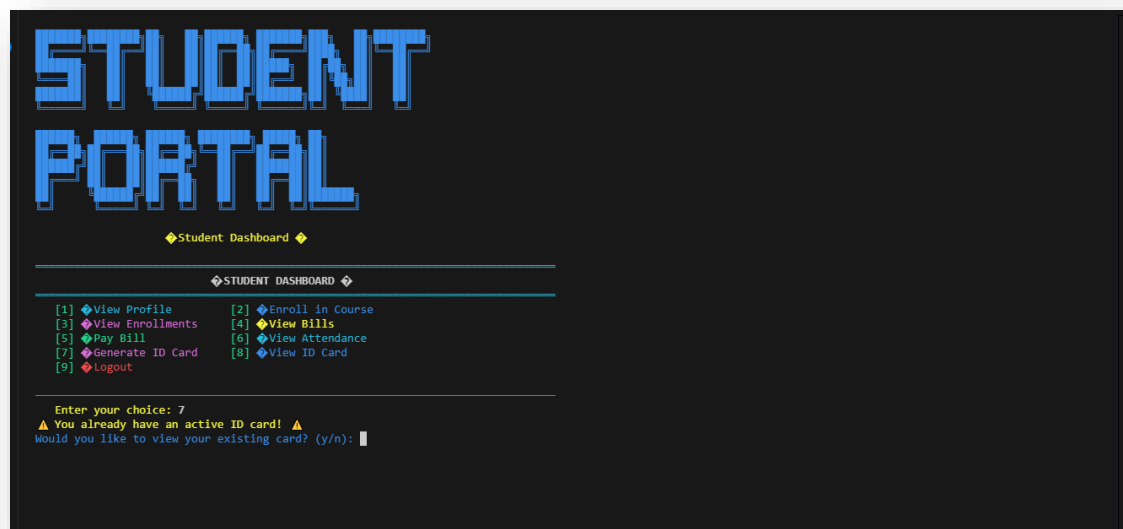


Figure 10:View Attendance



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Figure 11: Generate ID Card

```
SMART CAMPUS UNIVERSITY
STUDENT ID CARD

STUDENT PHOTO

Name: John Doe
ID: STU001
Department: Computer Science
Email: john@campus.edu
Phone: 123-456-7890

Card ID: SC20250011041
Issue Date: Sat Aug 16 14:04:37 2025
Expiry Date: 2029-08-15
AUTHORIZED ID Status: ACTIVE

◆ This card is property of Smart Campus University
◆ Contact: +1-800-CAMPUS | ◆ www.smartcampus.edu

◆ ID CARD INFORMATION

Card ID: SC20250011041
Student ID: STU001
Name: John Doe
Department: Computer Science
Email: john@campus.edu
Phone: 123-456-7890
Issue Date: Sat Aug 16 14:04:37 2025
Expiry Date: 2029-08-15
Status: ACTIVE

Press Enter to continue...
```

Figure 12: View ID Card

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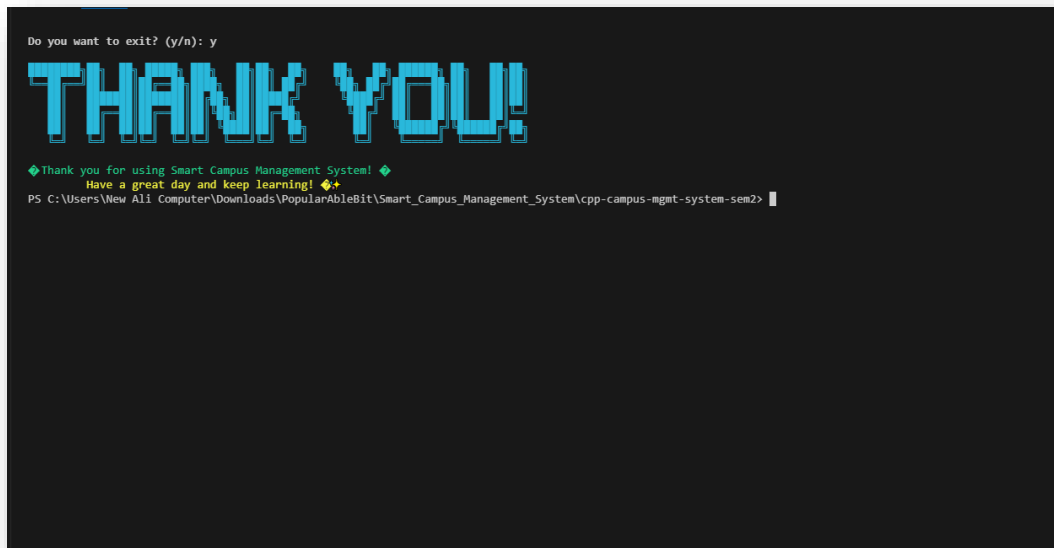


Figure 13: Student Portal Close

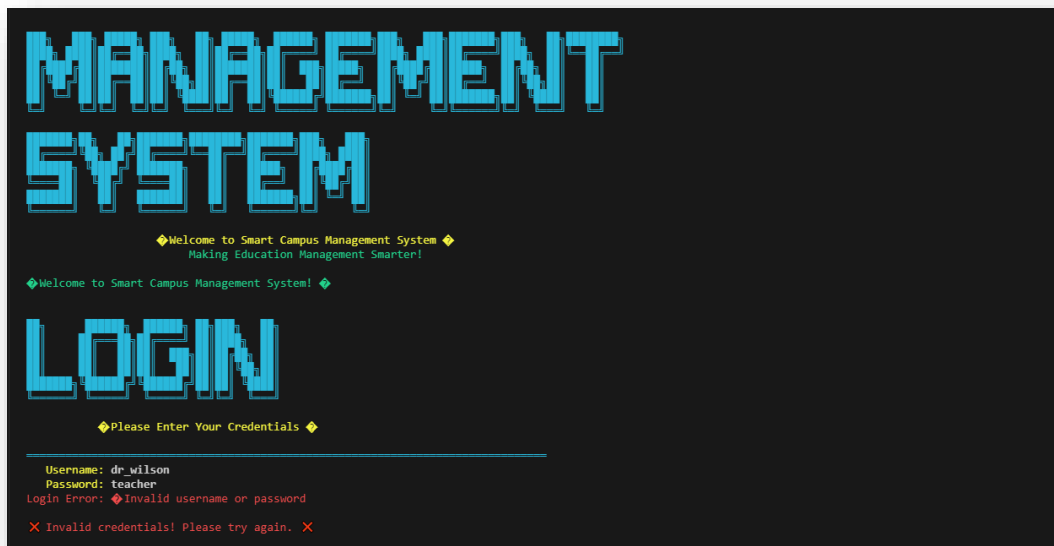


Figure 14: Handling Invalid Teacher Credentials

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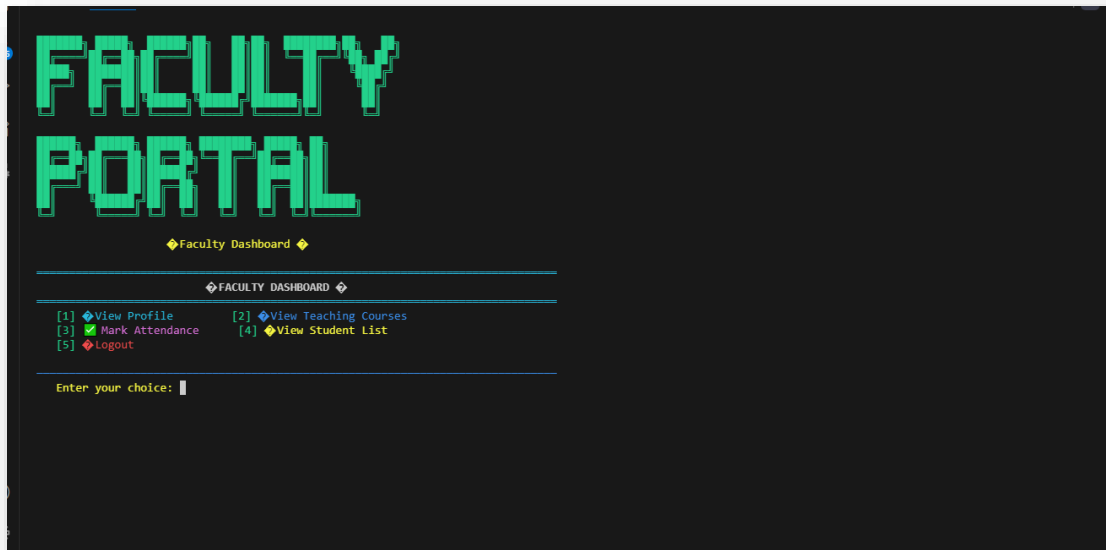


Figure 15: Faculty Portal open on Correct Credentials

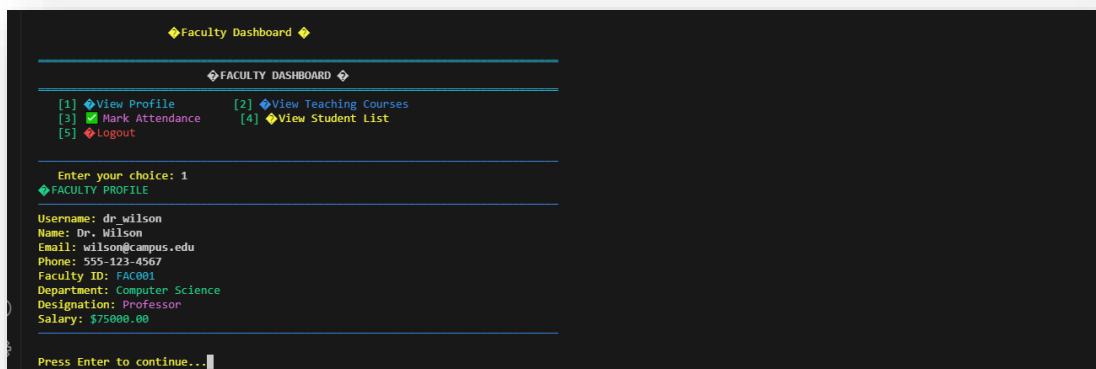


Figure 16:View Faculty Profile

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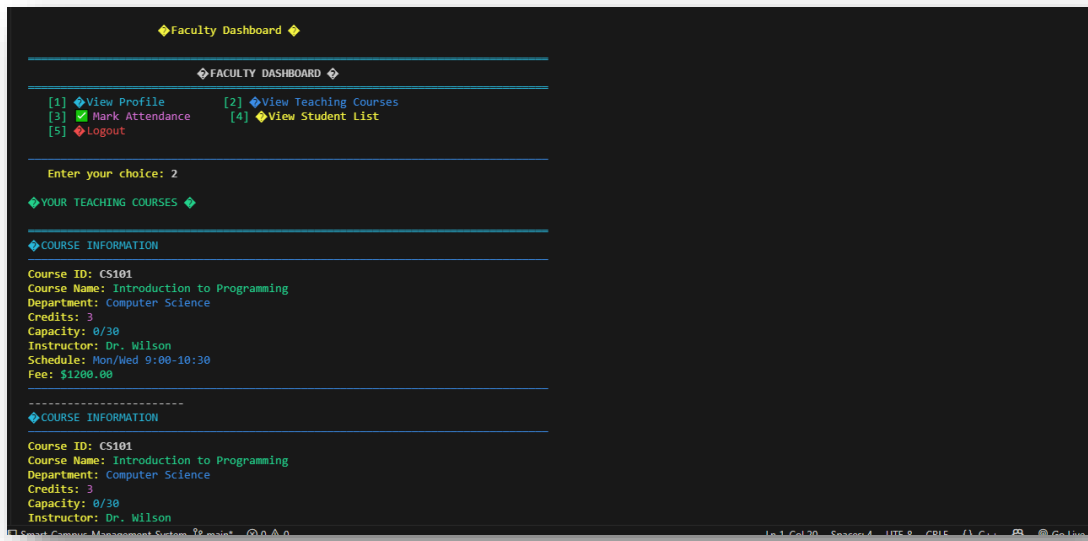


Figure 17: View Teaching Courses

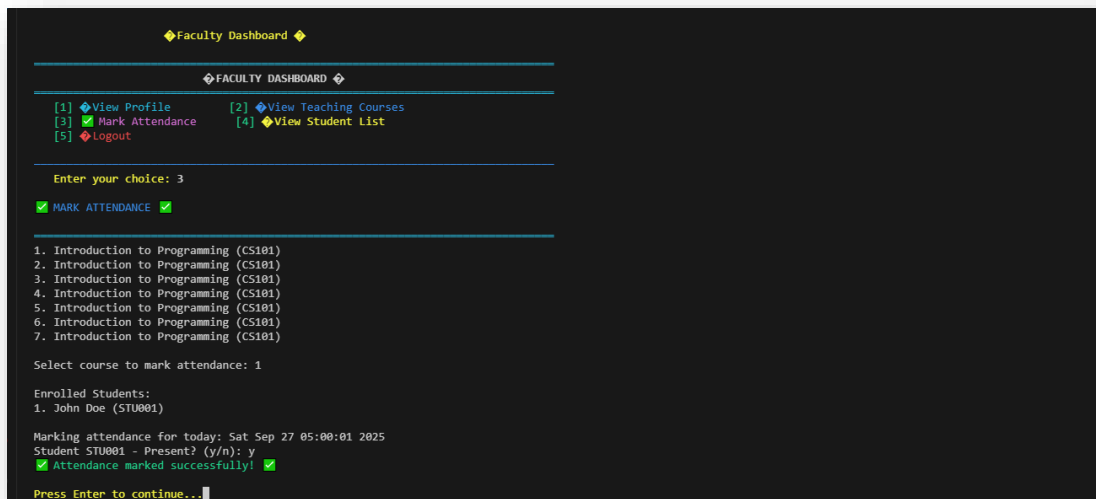


Figure 18: Mark Attendance

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```
Enter your choice: 4
◆STUDENT LIST◆

Course: Introduction to Programming (CS101)
Enrolled Students:
- John Doe (STU001, john@campus.edu)
-----
Course: Introduction to Programming (CS101)
Enrolled Students:
- John Doe (STU001, john@campus.edu)
-----
Course: Introduction to Programming (CS101)
Enrolled Students:
- John Doe (STU001, john@campus.edu)
-----
Course: Introduction to Programming (CS101)
Enrolled Students:
- John Doe (STU001, john@campus.edu)
-----
Course: Introduction to Programming (CS101)
Enrolled Students:
- John Doe (STU001, john@campus.edu)
-----
Course: Introduction to Programming (CS101)
Enrolled Students:
- John Doe (STU001, john@campus.edu)
-----
Course: Introduction to Programming (CS101)
Enrolled Students:
- John Doe (STU001, john@campus.edu)
-----
Press Enter to continue...
```

Figure 19: View Student List

```
MANAGEMENT
SYSTEM

◆Welcome to Smart Campus Management System◆
  Making Education Management Smarter!

◆Welcome to Smart Campus Management System!◆

LOGIN

◆Please Enter Your Credentials◆

Username: admin
Password: admin123
```

Figure 20: Opening Admin Portal

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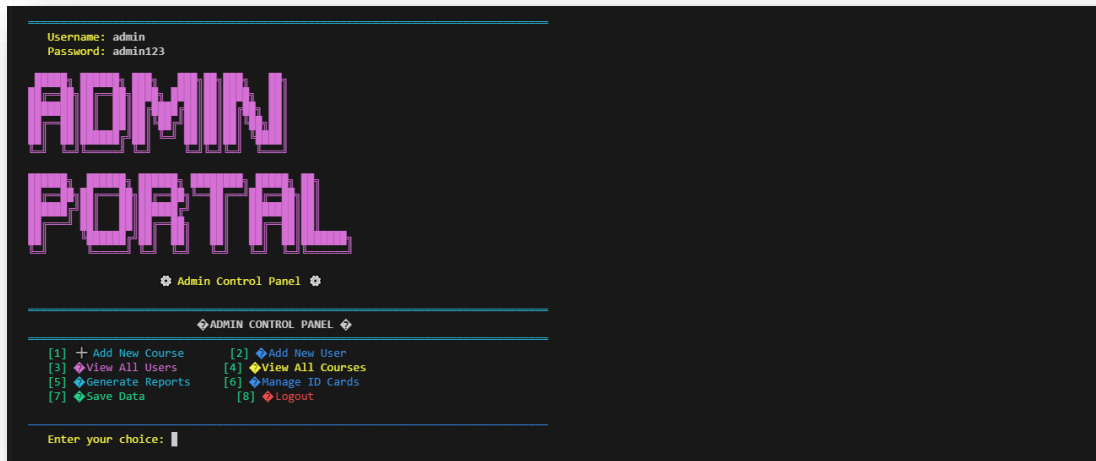


Figure 21: Admin Portal Opened

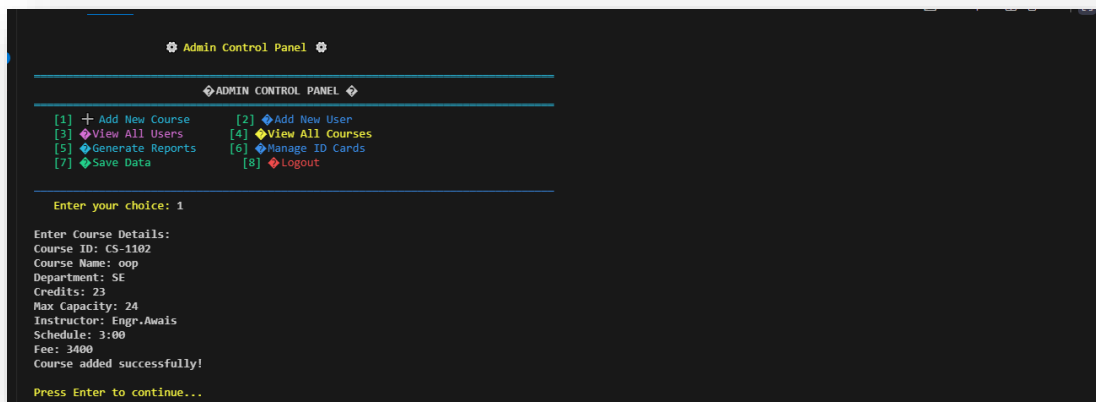


Figure 21: Admin Adding New Course

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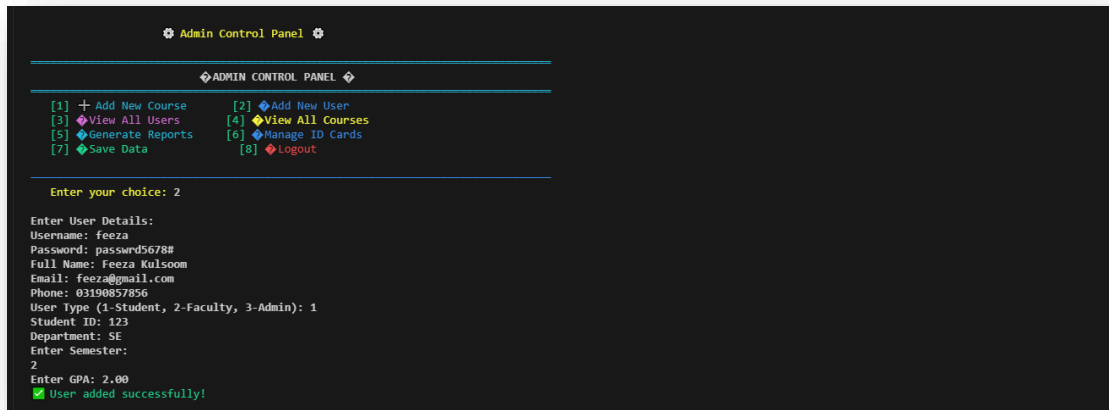


Figure 22: Admin Add New User

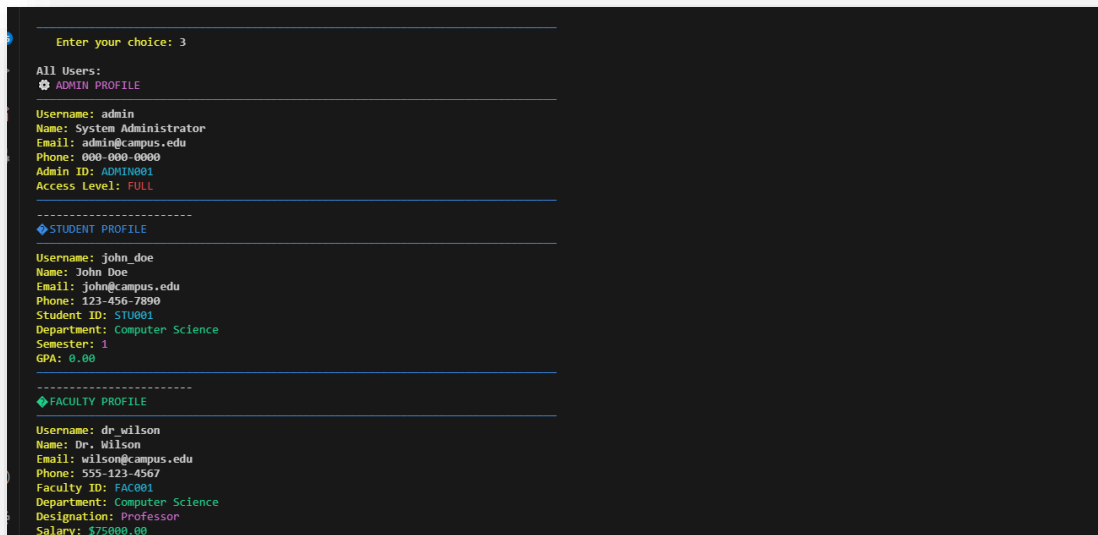


Figure 23: Admin View All Users

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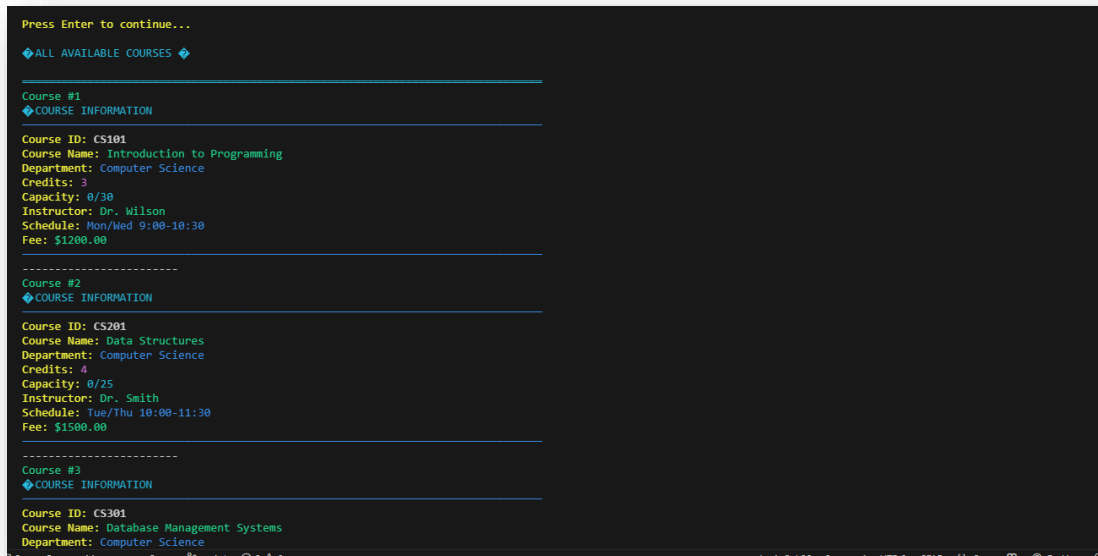


Figure 24: Admin View All Available Courses

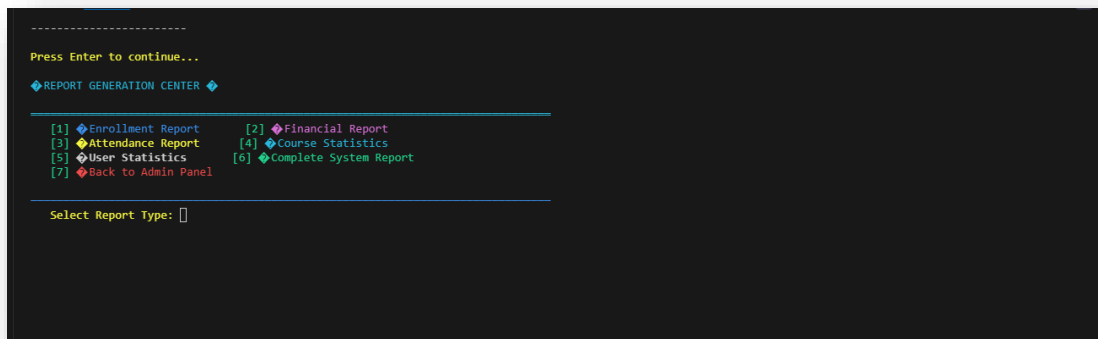


Figure 25: Admin Generating Any Type Of Report

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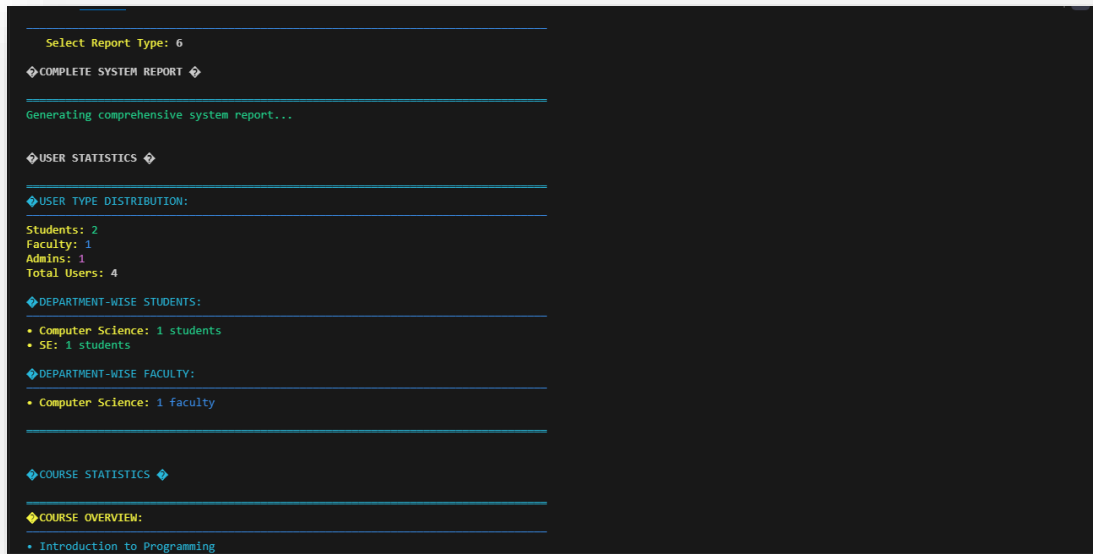


Figure 26: Generating System & User Statistical Report

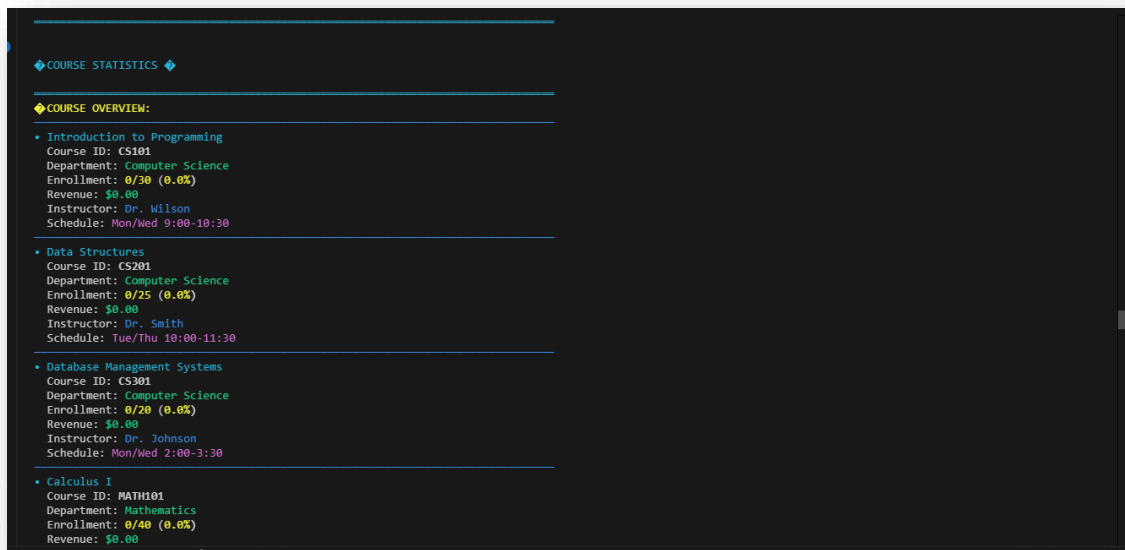


Figure 27: Generating Course Statistic Report

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```
◆OVERALL STATISTICS:
Total Courses: 44
Total Capacity: 4134
Total Enrolled: 3
Utilization Rate: 0.1%
Course Revenue: $2634.00

◆ENROLLMENT REPORT ◆

◆COURSE-WISE ENROLLMENTS:
• 234r: 1 students
• Data Structures: 1 students
• Database Management Systems: 1 students
• Introduction to Programming: 1 students

◆DEPARTMENT-WISE ENROLLMENTS:
• Computer Science: 3 enrollments
• r423f: 1 enrollments

✅ Total Active Enrollments: 4

◆FINANCIAL REPORT ◆

◆REVENUE SUMMARY:
Total Revenue Collected: $547729798.00
```

Figure 28: Generating Financial and Enrollment Report

```
◆ATTENDANCE REPORT ◆

◆COURSE-WISE ATTENDANCE:

◆STUDENT ATTENDANCE SUMMARY:

◆Total Attendance Records: 0

✅ Complete System Report Generated Successfully! ✅

Press Enter to continue...
```

Figure 29: Generating Attendance Report

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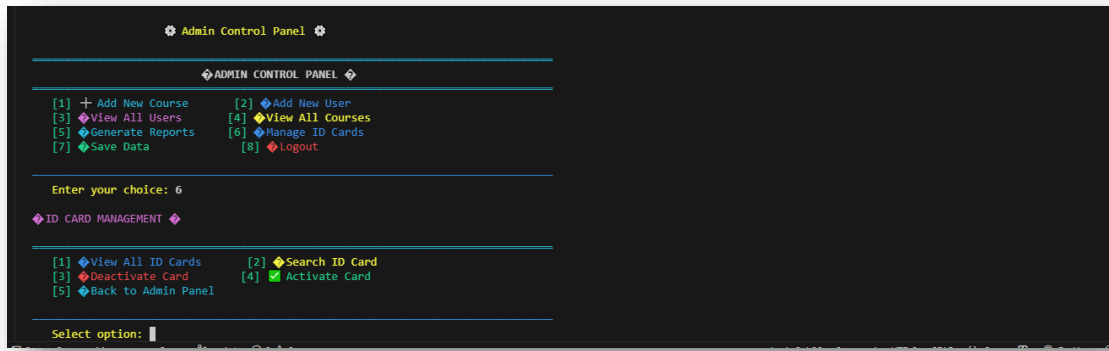


Figure 30: ID Card Management By Admin (Can Select any option)

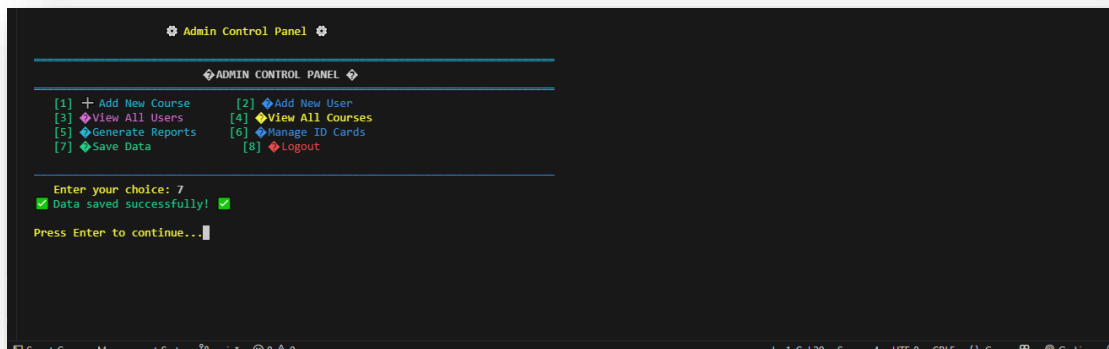


Figure 31: Admin Saving All Data At The End

Discussion

The development process demonstrated the importance of OOP concepts in structuring software. Encapsulation ensured modularity, inheritance allowed reusability, and polymorphism enabled flexibility. The major challenge was ensuring data consistency across multiple files, which was addressed by careful file handling design. The system effectively balances functionality with simplicity.

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Future Work

While the current version of the system fulfills its objectives, several future improvements are possible:

- Transition from file handling to a relational database system
- Development of a graphical user interface (GUI)
- Web or mobile-based versions for remote access
- Enhanced analytics and dashboards for administrators

Conclusion

The Smart Campus Management System successfully achieved its objectives by automating critical campus operations and demonstrating practical applications of OOP principles. The implementation provided hands-on experience in designing, coding, and testing a real-world project. The project not only improved technical skills but also showcased how OOP and file handling can be applied to solve real institutional challenges.