A Major Project Mid-term Report on

College Automation

Submitted in Partial Fulfillment of the Requirements for the Degree of **Bachelors of Engineering in Software Engineering** under Pokhara University

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ABSTRACT

College automation seeks to improve efficiency and communication among administrators, instructors, students, and general secretaries by optimizing academic administration using cutting-edge electronic solutions. Our solution provides an all-inclusive framework to optimize several administrative processes, which boosts overall efficiency.

The management of student information, keeping current records of academic standings, attendance, and student information are important elements. Because of this automation, handling of information is accurate and timely while reducing administrative responsibilities and errors.

Academic scheduling modules optimize faculty allocation and resource use by automating the construction and management of class schedules, creating a more efficient and well-organized learning environment. Faculty management tools optimize performance evaluation, teaching assignment scheduling, and feedback gathering while offering practical insights to improve instruction and foster a positive learning environment.

Furthermore, the incorporation of online payment options guarantees safe, effective, and convenient financial transactions by optimizing the procedure. Teachers, parents, and students all benefit from an improved user experience and a reduction in administrative workload.

Our project's goal is to create a reliable, effective, and user-friendly college administration system that optimizes administrative processes and improves learning for all parties involved. We believe that this automation will have a major positive impact on resource management, overall satisfaction in the academic community, and operational efficiency.

Keywords: College Automation, Academic Administration, Student Information Management, Academic Scheduling, Faculty Management, Online Payment Integration, Operational Efficiency, Resource Optimization, Administrative Procedures, Educational Technology.

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LIST OF ABBREVIATIONS

SDLC: Software Development Life Cycle

VCS: Version Control System

REST: Representational state transfer

API: Application Program Interface

JSON: JavaScript Object Notation

UML: Unified Modeling Language

LMS: Learning Management System

1. INTRODUCTION

In the domain of higher education, the implementation of the college automation system is reshaping the roles and responsibilities of key stakeholders. These systems enhance efficiency and transparency, benefiting college administrators, faculty members, students, and general secretaries.

College administrators use automation systems to manage student information, coordinate faculty, and monitor performance. These systems optimize administrative duties, reducing manual effort and minimizing errors. Administrators can manage student records, track performance metrics, and ensure compliance with academic standards. Automated systems also improve scheduling by considering faculty availability, classroom resources, and student needs, thereby reducing conflicts and ensuring smooth operations.

Automation supports informed decision-making by providing comprehensive, up-to-date. This enables administrators to identify trends, assess policy impacts, and make strategic decisions that drive institutional growth and development. Data-driven approaches enhance overall management, ensuring efficient and effective operations.

Automation systems significantly improve the student experience by optimizing administrative processes such as class registration, assignment submission, and accessing academic updates. Automated registration systems eliminate the need for lengthy lines and paperwork, allowing students to enroll in classes easily. Real-time information helps students make informed decisions about their course selections.

Students receive regular evaluations of their academic achievements, helping them stay on track and adjust their study routines as needed. Access to real-time academic updates and timetables allows students to manage their schedules, track assignment deadlines, and receive important notifications, enhancing their academic experience and reducing stress. This level of transparency and accessibility fosters a supportive and responsive academic environment.

Faculty members benefit from reduced administrative burdens as automation handles tasks like grade management, attendance tracking, and class scheduling. Grade management systems optimize the recording, calculating, and reporting of grades, ensuring accuracy and consistency. Attendance tracking systems automate the collection and analysis of attendance data, supporting student retention and achievement.

Automation also enhances the communication and collaboration between faculty members and other departments. With centralized data and optimized workflows, faculty can easily access and share information, coordinate on interdisciplinary projects, and participate in institutional decision-making processes. This collaborative environment not only improves the educational experience for students but also promotes a culture of continuous improvement and innovation within the institution.

By minimizing administrative workload, automation allows faculty to focus more on teaching, research, and professional development, ultimately enhancing the quality of education provided.

General secretaries use automation to improve operational efficiency and communication within departments. Automated systems support event planning, data management, and resource allocation, ensuring smooth and successful execution. Efficient resource allocation, including facilities, tools, and personnel, is also enhanced through automation.

In conclusion, the implementation of college automation systems is revolutionizing higher education by changing the way institutions operate. The academic experience and operational efficiency can be improved with these systems. For administrators, students and faculty automation offers tools that facilitate informed decision-making, stoptimize processes, and promote a culture of collaboration and transparency. As educational institutions continue to embrace automation, they are well-positioned to guide in a new era of efficiency and productivity, ultimately advancing their mission of providing high-quality education. The adoption of automation technologies in higher education is not just a trend but a necessity in an increasingly digital world, covering the way for more innovative, responsive, and efficient academic environments.

1.1. PROBLEM STATEMENT

Issues with resource allocation, communication bottlenecks, and inefficient administrative procedures provide obstacles for educational institutions. These issues make it difficult to plan lessons, handle student records, organize faculty assignments, and facilitate good stakeholder communication. Students also have challenges when registering for classes, and gaining access to academic resources, all of which negatively affect their overall experience. Academic staff members are overburdened with administrative duties that take time away from their primary duties of teaching and research.

General secretaries tasked with communication, event planning, and data management lack efficient tools to optimize their responsibilities, affecting institutional coordination and support. To address these challenges, there is a need for comprehensive college automation systems that integrate student information management, academic scheduling and communication tools. Such systems will enhance efficiency, transparency, and collaboration within educational institutions, optimizing resources and improving stakeholder experiences.

1.2. OBJECTIVES

A new, easier method to better connect the teachers and students is needed to solve the drawbacks mentioned in the problem statement. Following are the objectives of this project:

- 1. To develop web apps for asking and answering the questions related to various feedback of the college and upgrade.
- 2. To upload and download necessary assignments and notes.
- 3. To develop an interactive web application with a user-friendly search interface.
- 4. To allow students to see their performance and assignment.

1.3. PROJECT SCOPE AND LIMITATIONS

The scope of this project is to provide users with all the services through a web-based networking service. In this project, a web app is developed where users of the college are able to ask and answer questions, as well as upload and download notes and many more.

1.3.1. SCOPE:

- 1. The targeted audience are the administration, faculty, student, and General secretaries of the college.
- 2. This web app can be modified and used for various colleges/schools or even universities.

1.3.2. LIMITATIONS:

- 1. This is only a web app, not an android app.
- 2. Payment is limited to ID card replacement fees, excluding other college fees.

1.4. SIGNIFICANCE OF STUDY

Researching college automation has important consequences for academic institutions looking to improve productivity and update administrative procedures. Colleges that implement automation systems stand to gain a great deal from it, including increased operational efficiency from the simplification of manual processes like scheduling, attendance monitoring, and registration. College staff may devote more time and resources to value-added activities by automating these processes, which will ultimately improve the overall efficiency of academic operations. Additionally, automation improves the student experience by optimizing processes like grading and course registration, which increases student satisfaction and retention rates.

Furthermore, automation guarantees efficient administration and accuracy of data, minimizing errors related to human data entry and enabling trustworthy reporting for college administrators to make well-informed decisions. Another benefit of automation is cost savings, as it reduces operating costs by eliminating the need for paperwork and physical labor. Automation also makes it easier to obtain information in real time, giving administrators, teachers, and students access to rapid updates on schedules, events, and academic progress. This enhances communication and transparency among the college community. In addition, studying automation in college gives students the necessary technological knowledge and gets them ready for the needs of the digital age, which improves their workforce readiness.

Finally, because automated systems are flexible and scalable, universities can effectively handle expanding student bodies and changing curriculum. In conclusion, research into college automation is important because it may optimize administrative procedures, enhance student services, and get educational institutions ready for a world driven by technology.

2. LITERATURE REVIEW

In today's ever-changing digital landscape, online platforms have revolutionized the way we do everything from managing administrative tasks to delivering content to engaging with students and hearing their feedback. In this literature review, we'll look at how online platforms have changed college administration and how they're changing learning management. We'll explore theories, practices and success stories from popular platforms like Ellucian Banner, Blackboard, Oracle PeopleSoft Campus Solutions and Moodle.

2.1. Existing Platforms

Ellucian Banner, which is extensively adopted by higher education institutions for its comprehensive suite of integrated solutions. Student info management, financial operations, and human resources are all covered. Administrators can efficiently manage student records, including registration, grades, transcripts, and degree audits, with the Student Information System (SIS) component of Ellucian Banner. The financial module helps with budgeting, accounting, financial reporting, and procurement, ensuring optimized and transparent financial operations. Human resources manages employee records, payroll, benefits, recruitment, and professional development. Additionally, Ellucian Banner has a financial aid module that automates the financial aid application, evaluation, and distribution processes. The comprehensive integration and scalability of Ellucian Banner make it suitable for large institutions despite its high implementation and maintenance costs. [1]

Blackboard, which is primarily recognized as a learning management system (LMS), also offers significant administrative automation features. The goal is to enhance the student learning experience while supporting administrative tasks. The course management feature allows for the creation, delivery, and management of online and hybrid courses, including content management and assessment tools. Forums, messaging, announcements and virtual classrooms are communication tools that facilitate interaction

between students and faculty. The student performance tracking tools provided by Blackboard help educators monitor and analyze student performance. The focus on enhancing the learning experience and robust support for various learning modalities make Blackboard a versatile choice. However, its primary focus on academic functions rather than comprehensive administrative automation can be a challenge for smaller institutions. Potential costs can also be a challenge. [2]

Oracle PeopleSoft Campus Solutions is a robust ERP(Enterprise Resource Planning) system known for its flexibility and extensive customization capabilities, making it ideal for large and complex institutions. It handles a wide range of administrative and academic functions. Academic guidance and student records are handled by the student administration tools. Academic advising tools support degree planning and student progress tracking. Communication and interactions with students, teachers, staff, and former students are handled by the campus community module, boosting community involvement. Various administrative tasks like registration, financial aid applications, and personal information updates can be facilitated by PeopleSoft's self-service portals for students and staff. Data flow and operational efficiency can be ensured by strong integration with other Oracle products. The high cost of implementation and upkeep, as well as the substantial IT resources required for customization and support, are significant concerns, but PeopleSoft's extensive capabilities make it a intimidating choice for large organizations. [3]

Moodle stands out as an open-source learning management system that also supports administrative automation. It's a hit because of its adaptability, value, and solid community backing. Course management in Moodle lets you create and manage online courses, with multimedia integration, assessments, and discussion boards. Tools for role assignments and permissions are provided for tracking student, faculty, and staff data. Tools for managing grades, tracking progress, and generating reports can be found in the

gradebook module. The extensive library of plugins for Moodle allows customization and integration with other administrative systems. Users can access course materials and administrative functions on the go with the platform's mobile app, which ensures that they can access course materials and administrative functions on the go. The open-source nature and community support of Moodle make it a powerful tool for both learning and administrative automation. [4]

Modern educational institutions need college automation systems to improve administrative efficiency, academic experience, and overall operational effectiveness. There are distinct advantages for each system, including Ellucian Banner, Blackboard, Oracle PeopleSoft Campus Solutions, and Moodle. These systems are instrumental in driving forward a new era of academic and administrative excellence, from comprehensive and scalable solutions like Ellucian Banner and Oracle PeopleSoft to user-friendly and cost-effective options like Blackboard and Moodle.

2.2 Comparison Between The Existing System And Our System

While LMS platforms offer effective online learning solutions, they come with limitations such as cost, complexity in setup and operation, limited customization, and integration challenges. Whereas, Our college automation platform offers an effortless experience by integrating all essential functions into one user-friendly system. With automated processes, advanced communication tools, and robust security measures, it enhances efficiency, transparency, and collaboration across the institution. Scalable, customizable, and continuously updated, it ensures a tailored solution that meets evolving needs while prioritizing data security and compliance.

3. METHODOLOGY

In this section we have described the method that we are using to meet the requirement of the project.

3.1. SOFTWARE DEVELOPMENT LIFE CYCLE

The model used for development of the project is the Iterative model of SDLC. Iterative model is simple and emphasizes on initial and simple implementation and with progress in the project it gains more features. It is advantageous since it has a unique feature of repetitive nature i.e. during development phase one can go back to check out the previous works without any complications and flaws can be improved if any. Further explanation about the model has been described below.

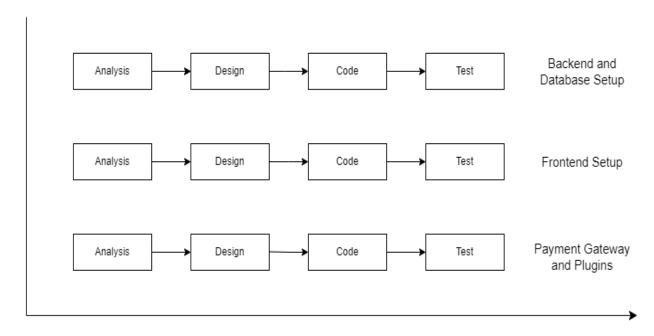


Figure 1: Iterative and Incremental model of software development life cycle

3.1.1. REQUIREMENT ANALYSIS PHASE

In this phase, all the essential requirements are analyzed. By this stage, the necessary requirement for further analysis of the project is gathered from the end-user, the internet and teachers. As a result, final specification of the project is established.

3.1.2. DESIGN PHASE

In this phase, the specifications gathered are designed as per the requirement. Further the database models, technical requirements and the logic are implemented in the project.

3.1.3. IMPLEMENTATION

After the analysis and design, coding is done according to the specifications. Coding in progress, leading to a working system in this phase.

3.1.4. TESTING

Once the system is developed, a series of tests will be performed in order to identify and eliminate bugs and errors. As of now, some functionalities have been developed and tested. In this phase, any necessary changes are applied to ensure a complete and successful system.

3.2.TOOLS USED

TOOLS	PURPOSE	
Visual Studio Code	Text Editor	
Github	To manage Source Code (VCS)	
Node js	For Backend	
Angular	For Frontend	
MongoDb	Database	

Table 1: Tools to be Used

3.3. TECHNOLOGIES

- Rest API used as a functioning backend.
- Node js for backend and Angular for frontend development in VS Code.
- JSON, to transmit data objects consisting of key-value pairs.

4. SYSTEM DESIGN AND UML MODELS

4.1. USE CASE DIAGRAM

A use case diagram summarizes the relationship and use cases between user and the system. There are altogether three actors: user, system and admin. The below figure depicts the relationship between these actors.

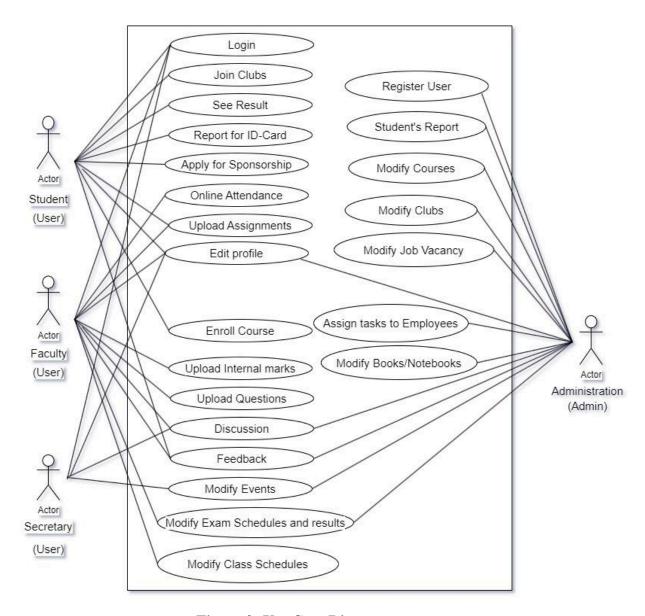


Figure 2: Use Case Diagram

4.2. DATA FLOW DIAGRAM

The 1-Level provides a more detailed view of the system by breaking down the major processes identified in the level 0 Data Flow Diagram (DFD) into sub-processes that are depicted as separate processes on the level 1 Data Flow Diagram (DFD). The data flows and data stores associated with each sub-processes are also shown. The diagrammatic representation is as below:

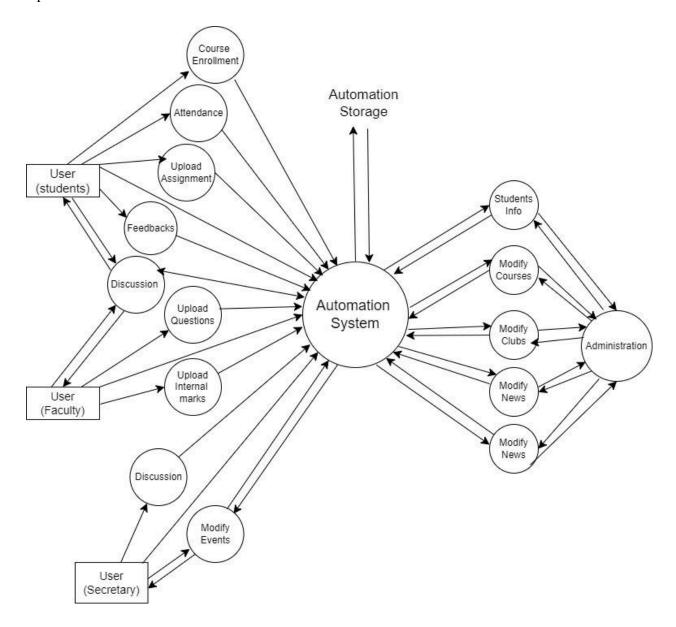


Figure 3: Data flow diagram Level 1

4.3.SEQUENCE DIAGRAM

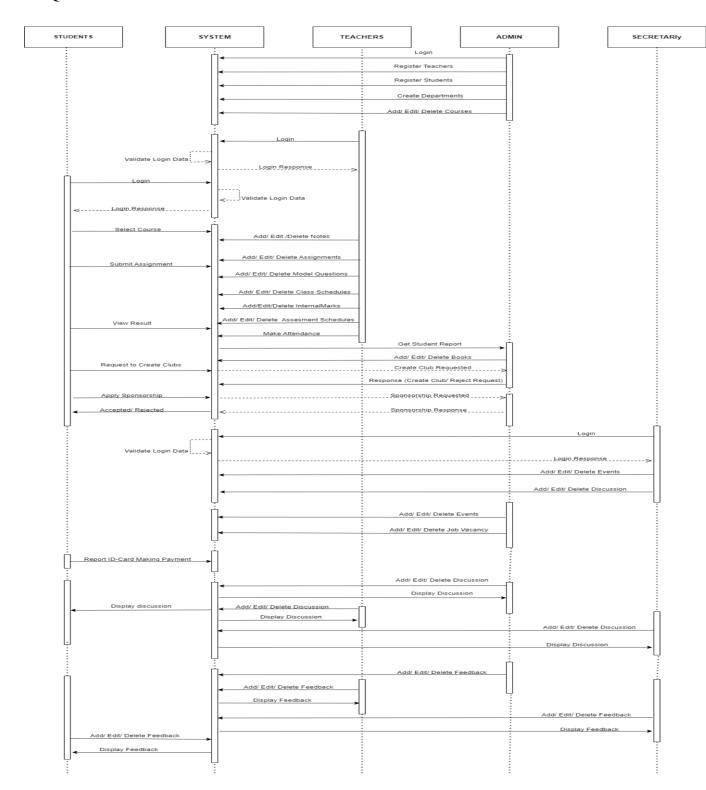


Figure 4: Sequence Diagram

5. TASK DONE SO FAR

- 1. Discussion
- 2. Feedback
- 3. Assignments
- 4. Sponsorship
- 5. ID Card View
- 6. Join Clubs
- 7. Event Add
- 8. Model Questions

6. RESULTS AND DISCUSSION

6.1. RESULTS:

- **1. Enhanced Communication:** Clear announcements via a centralized platform.
- **2. Organized Course Management:** Centralized resources and streamlined assignment handling through an LMS.
- **3. Increased Accessibility:** Real-time updates and on-the-go access via a web app.
- 4. Efficient Scheduling: Conflict-free scheduling.
- **5. Improved Feedback**: Regular and private feedback, only visible to the admin and the feedback provider, providing valuable insights.
- **6. Feature Implementation:** Successfully implemented and tested the course registration module and the automated attendance tracking feature.

6.2. DISCUSSIONS:

- **1. Communication:** Improved coordination among students, club secretaries administration and staff.
- **2.** Course Management: Easier access to materials and transparent assignment processes.
- **3.** Accessibility: Increased convenience and timely information access.
- **4. Scheduling:** Better time management.
- **5. Feedback:** Constructive input guiding ongoing improvements.

7. PERFORMANCE ANALYSIS METHODOLOGY AND VALIDATION SCHEME

7.1. Performance Analysis:

- **1. Define Performance Metrics:** Establish key indicators to measure system performance, like response time, throughput, and error rates.
- **2. Conduct Load Testing:** Simulate different user loads to assess system capacity and scalability.
- **3. Implement Stress Testing:** Test the system's limits to identify potential weak points under high stress.
- **4. Monitor Resources:** Track critical resources such as CPU, memory, and network usage to detect performance issues early.
- **5.** Collect Feedback: Obtain user feedback to understand their experience and pinpoint areas for improvement.

7.2. Validation Scheme:

- **1. Validation Objectives:** Establish clear goals focusing on security, data protection, and LMS functionality.
- **2. Security and Data Protection**: Conduct vulnerability scanning, penetration testing, and ensure compliance with privacy laws.
- **3. Create Test Cases:** Cover user authentication, data integrity, and user permissions.
- **4.User Acceptance Testing (UAT):** Engage end-users (students, faculty, administrators) to validate usability and functionality.
- **5. Documentation and Reporting:** Produce a report detailing test outcomes, issues, and recommendations for improvements.

8. TASK REMAINING

- 1. Attendance
- 2. Academic Record
- 3. Settings
- 4. Report ID-Card
- 5. Validation

9. DELIVERABLES

- 1. User-Friendly Web Application
- 2. Attendance Tracking
- 3. Customized User Roles
- 4. Course Registration and Management
- 5. Analytics and Reporting on user Performance
- 6. Event Management

10. TASK DIVISION

Members	Roles	Tasks
Anish Pokharel	Full Stack Developer	Manage UI/UX, Database, APIs and Integration
Menuka Lamsal	Backend Developer	Manage APIs and Database
Pragya Kanth	Designer and Tester	UI/UX and Testing
Ishan Subedi	Frontend Developer	Manage UI/UX and Integration
Rudra Nahawang Pandey	Backend Developer	Manage APIs and Database

Table 2: Task Division

11. GANTT CHART

The project schedule has been designed as per the requirements, listing various tasks with their approximate durations, ensuring debugging and testing are completed prior to project completion.

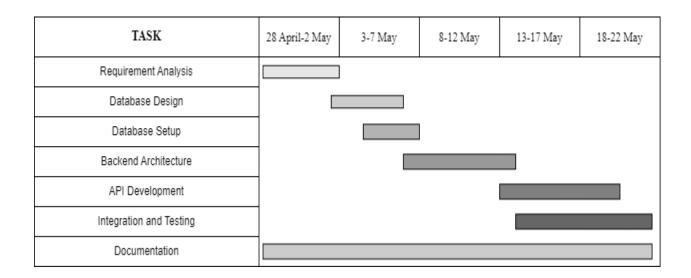


Table 4: INCREMENT 1: Backend and Database Setup

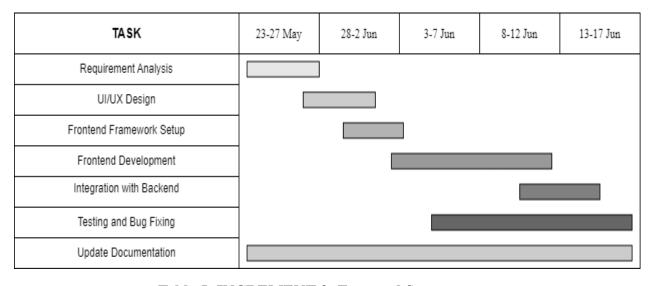


Table 5: INCREMENT 2: Frontend Setup

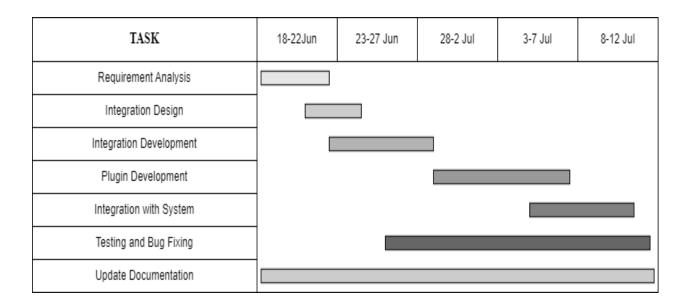


Table 6: INCREMENT 3: Payment Gateway and Plugins

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APPENDIX

