

**AVIATION INDEX
PROJECT PROPOSAL**

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ABSTRACT

Aviation Index is a full-stack, web-based study platform created for pilots who need a fast, structured way to master aviation knowledge. The project aimed to turn a sprawling collection of scattered notes and flashcards into a simple, organized, and concise application. The application organizes aviation information into Topics and Questions and tracks each user's progress as they study the material. From a user's perspective, it feels like an adaptive question bank.

The application is built using the Spring Boot framework with session-based authentication. Data is persisted using a MySQL database. Client web pages are generated using the Thymleaf Templating engine. Key features include secure password management with BCrypt, a user-friendly library of aviation-specific information, enum-driven study-status tracking, and tailored filters for managing session content.

The entire software development process included phases for design, implementation, testing, and deployment. Design plans included user stories, a complete requirements list, a comprehensive data dictionary, a low-level architecture design, and detailed implementation and testing plans. Implementation was carried out according to the design plans and guided by the requirements list with testability in mind. To track project success, a traceability matrix was used to map requirements to final project artifacts and tests.

Background

The role of a pilot is inherently safety-critical, requiring extensive knowledge across multiple aviation domains. Pilots must thoroughly understand principles of flight, aircraft-specific performance metrics, meteorology, navigation, airspace regulations, and emergency procedures. A firm grasp of these concepts is essential for making informed decisions in dynamic and often high-pressure environments.

The sheer volume of information that pilots must learn and retain can be overwhelming. While numerous resources exist, they are often scattered across textbooks, FAA publications, online forums, and training materials. Few platforms effectively aggregate this information into a structured and comprehensive format, making it challenging for pilots to efficiently review and reinforce their knowledge.

Christian Worldview

From a Christian worldview perspective, this project aligns with the ethical principles of service and integrity.

By providing a free resource to fellow pilots, I am serving my community and elevating the safety and quality of my industry. By making the study question bank freely accessible to pilots, the project provides a valuable resource that benefits the aviation community without financial barriers. Ethically, open-source software and freely available knowledge promote fairness and accessibility, ensuring that all pilots, regardless of background or financial means, have access to the tools they need for learning and safety. The Bible tells us, "Whatever you do, work at it with all your heart, as working for the Lord, not for human masters" (Colossians 3:23 King James Bible, 2017). By prioritizing my duty to God, I benefit my fellow man in turn.

I also recognize my responsibility to uphold integrity by providing correct information. Because the application will be used as an educational tool, the information must be accurate and clear, ensuring that pilots are acquiring the most current, applicable, and correct information. As Christians, we understand the importance of honesty, hard work, and proper understanding. "To do justice and judgment is more acceptable to the LORD than sacrifice" (Proverbs 21:3 King James Bible, 2017). As with all worthy endeavors, it is ethical and in line with Jesus' teachings to provide our best work for the benefit of others.

This project embodies the Christian responsibility to serve others by providing a tool that enhances learning, promotes safety, and fosters a culture of knowledge sharing within the aviation community.

Project Objectives

The Aviation Index Application aims to fulfill the following objectives:

1. Centralized Knowledge Base – Provide a structured and comprehensive database of aviation study questions covering key topics such as aerodynamics, aircraft systems, regulations, weather, navigation, and emergency procedures.
2. Efficient Study Tool – Offer a streamlined, web-based, user-friendly platform where pilots can efficiently review and reinforce their knowledge through categorized questions and structured study sessions.
3. Customizable Learning Experience – Provide a set of filters that allow pilots to tailor their study sessions based on specific topics, difficulty levels, and question types. Additionally, incorporate progress tracking and performance reports to help users focus on areas needing improvement and measure their knowledge growth over time.
4. Accuracy and Reliability – Ensure that all study material is accurate, up-to-date, and aligned with aviation industry standards, FAA regulations, and best practices.

Challenges

Challenges that will be used to measure project success:

- Does the application content cover the topics and material that pilots need to know?
- Do pilots feel comfortable using the application (Does it feel intuitive)?
- Does the application provide an effective way to consistently learn and retain information?

Project Scope

The application will be a web-based study application designed to provide pilots with a structured and comprehensive bank of aviation-related study questions. The platform will include categorized question sets covering topics such as aerodynamics, aircraft systems, regulations, weather, and emergency procedures. Users will have the ability to filter questions, track their progress, and customize study sessions.

Out of Scope

- The application will be in English only
- The application will be web-based only (no mobile clients)
- The application is not supported by or endorsed by a recognized aviation industry
- The application does not provide pilot certification

Stakeholder Name	Role(s)	Responsibilities
Jesse Dalton	Owner	Project Management and Development

Work Breakdown Structure								
#	Task	Dependencies	Status	Effort Hours	Start Date	Planned Completion	Estimate to Completion	Actual Completion
1	Project Planning	0	S	5	3/10	3/16		
2	Define Requirements	1	N	3	3/17	3/18		
3	Design System Architecture	1,2	N	4	3/19	3/20		
4	Develop Backend	3	N	12	3/24	4/7		
5	Develop Frontend	3	N	12	3/31	4/7		
6	Finalize Development and Test	4,5	N	4	4/7	4/9		

Project Success Measures

Project Completion Criteria	
1 - Completion of Core Features – The platform successfully includes a structured question bank, filtering options, progress tracking, and customization for aircraft-specific parameters.	
2 - User Engagement & Accessibility – The application is accessible online and used by pilots or aviation students, with a certain number of registered users or study sessions completed within a given timeframe.	
3 - Accuracy & Reliability of Information – All study material is verified for correctness, aligning with FAA regulations and aviation best practices, ensuring trustworthiness.	
4 - System Performance & Usability – The application functions smoothly with minimal bugs, loads efficiently, and provides a user-friendly interface that enhances the study experience.	

Assumptions and Constraints			
ID	Description	Comments	Date Entered
1	Users Have Basic Aviation Knowledge	Users already have some foundational aviation knowledge	3/16
2	Study Material is Static	The initial question bank will remain relatively unchanged	3/16
3	Internet Access	Pilots use digital devices with internet connectivity for flying	3/16

Project High-Level Solution

Introduction

The aviation industry demands that pilots possess a vast amount of knowledge across multiple disciplines. Pilots must not only learn but also retain this information to ensure safe and effective decision-making in real-world flight operations. However, traditional study methods—such as textbooks, FAA handbooks, and scattered online resources—can be overwhelming and inefficient.

This project addresses the challenge of consolidating aviation study materials into a single, structured, and interactive web-based study tool. By providing a comprehensive question bank with customizable filtering options and progress tracking, the application allows pilots to study efficiently and focus on areas for improvement.

System Architecture

The Aviation Index Application is designed to help pilots retain aviation knowledge effectively by presenting a structured bank of questions, allowing filtered study sessions, and tracking progress. The solution follows a web-based client-server architecture, with a Spring Boot backend that serves Thymleaf pages, persisted by a MySQL database.

Front End Client

The Front End Client will include a Header with a Navigation Bar. The links will include Home, Login, Register, Reports, Topics, Questions, Study, and Profile.

Users begin by registering a new account or logging in to an existing one. Once authenticated, they will have access to the Topics, Questions, Study, Reports, and Profile pages.

From the Topics page, users can view and traverse the topics tree and select topics for study. Selecting a lowest-level topic from the tree will take them to a questions page and provide a filtered set of questions that belong to that topic.

From the Questions page, users are provided a set of filters that can be used to filter a set of study questions. They will also be able to view each question from the filtered set in succession,

provide an answer, verify their answer against the provided content, and then update their current comprehension of the question.

Users will be provided options to view their profile, edit their profile, and log out.

Database

Database tables will include:

Users - user information and login credentials

Topics - topic titles and parent topic to maintain hierarchy

Questions - study questions and corresponding answers, other metadata for filtering

User Questions - relationship between individual users and individual questions, tracks user progress

Security

Public pages will include the landing page (home), login page, and register page.

Certain pages that are used for curating the aviation knowledge information will only be accessible by users with a role of "ADMIN".

All other pages will require authenticated user access. All user sessions will be authenticated and managed using Spring Security.

Project Controls

Risk Management				
Event Risk	Risk Probability	Risk Impact	Risk Mitigation	Contingency Plan
	(high, medium, low)			
What is the risk?	What is the probability?	What is the impact if the risk occurs?	What can be done to minimize the risk?	What can be done to minimize the impact of the risk?
Server Down Time	Low	Users will be unable to study	Backup Servers	Backup Servers
User Progress Data is Lost	Low	Users will have to start over	Backup Data	Backup Data

Roles and Responsibilities		
Name	Project Role	Responsibility
Jacob Brown	End User	Provide Feedback
Hunter Bolles	End User	Provide Feedback

Near the end of the development phase, meetings will be scheduled with the above listed volunteer End Users (who are pilots) to use the application and provide feedback.

Project Cost and Schedule

This project is designed to incur no costs unless deployed on a live server with a custom domain. Currently, there are no plans for live hosting or domain purchase.

Appendix A – References

King James Bible. (2017). King James Bible Online. <https://www.kingjamesbibleonline.org/>
(Original work published 1769)