STAKT - PRJ GROUP 2

Summer 2025

SOFTWARE REQUIREMENTS SPECIFICATION

GitHub Link: https://github.com/tommy-chabiras/skytrackr

Project Name:

SkyTrackR

Seung, Truong, Arky, Khanh, Tommy

Executive Summary

Background

Description

Company Value Add

End-user Value Add

Scope

What is Included

- Price trends
-

What is Not Included

Justification

This project is justified by the growing demand for smarter airfare tracking solutions. Current platforms lack real-time notifications and transparent cost breakdowns, leaving travelers uncertain about the best time to book flights. By providing predictive insights, personalized dashboards, and detailed pricing transparency, SkyTrackR addresses a real-world problem while offering academic value by applying data-driven methods, system design, and user-centered development practices.

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Section 1

1.1 Document Authors

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1.2 Document Revision History

WEEK	DATE	Revisions
1	Sept. 17, 2025	• Initial document formatting • Edited Sections 1 - 2.1
2	Sept. 18, 2025	• Edited Section 2.1 • Added Executive Summary - Justification
3	Sept. 24, 2025	• Initialize sections 2.2, 2.3, 2.5 •
4	Sept. 25, 2025	• Edited Sections 2.2-2.5 • Added References to Section 2.1
5	Oct. 01, 2025	• Edited Sections 2.6-2.7
6		•
7		•
8		•
9		•
11		•
12		•
13		•
14		•

1.3 Document Purpose

The purpose of this document is to define the foundation of the **SkyTrackR Project**. It establishes the project background, objectives, scope, and intended deliverables, while also serving as a formal agreement between the project team, stakeholders, and faculty advisor. This document provides clarity on expectations, responsibilities, and success criteria for all parties involved.

1.4 Audience

This document is intended for:

Faculty Advisors/Clients: To assess the feasibility, quality, and alignment of the project with academic and business requirements.

Team Members: To maintain a shared understanding of goals, scope, and deliverables.

End-Users/Stakeholders: To confirm that the product vision and scope address their needs.

Project Evaluators: To evaluate progress, adherence to methodology, and overall outcomes.

1.5 Group Agreement

Team #: 2

Project Title: SkyTrackR

Project Time Frame: September 17, 2025 - April 17, 2026

Team Members:

Arky Lun, Khanh Anh Kiet Nguyen, Tommy Chabiras, Truong Ma, Seung Hoon Han

Team Leadership: Khanh Anh Kiet Nguyen

Team Functions/Roles:

Arky Lun (Business Analyst),
Khanh Anh Kiet Nguyen (Project Manager),
Tommy Chabiras (Backend Developer),
Truong Ma (UI/UX Designer),
Seung Hoon Han (Frontend Developer)

Team Meetings

- Weekly In-Person Meeting: Every **Wednesday** on campus to review progress, resolve issues, and plan next steps.
- Weekly Online Meeting: Every **Thursday** through Teams for status updates and coordination.
- Ad-hoc Sessions: Additional meetings as needed for sprint planning, backlog refinement, or urgent reviews, held on **Discord**.

Team Problems

- Keep communication open and clear
- Respect and listen to all member's ideas
- Focus on the problem not the individuals

Team Commitment

The undersigned members agree to work together on the project until the end of the PRJ666 next Semester. They recognize that as a team and individually they are equally responsible for the quality of all deliverables.

Name	Date	Signature
Arky Lun	Sept. 17 2025	Arky Lun
Khanh Anh Kiet Nguyen	Sept. 17 2025	Khanh Anh Kiet Nguyen
Tommy Chabiras	Sept. 17 2025	Tommy Chabiras
Truong Ma	Sept. 17 2025	Truong Ma
Seung Hoon Han	Sept. 17 2025	Seung Hoon Han

Section 2

2.1 Project Proposal

2.1.1 Project Background

Features	Google Flights	Skyscanner	Expedia	Flight Deals	SkyTrackR
Flight Search and Comparison	✔	✔	✔	✔	✔
Price Tracking and Alert	✔	✔	✔		✔
Personalized Watchlist		✔	✔		✔
User Reviews		✔			✔
Price Trend	✔	✔	✔		✔
AI Price Prediction					✔
Airline Info (e.g. pet policy)			✔		✔
Offer deals/discounts	✔	✔	✔		

Google Flights [1]

Google Flights is an online flight search engine that is designed to help travellers quickly find and compare airfare across a wide range of airlines and booking platforms.

This tool offers travellers a fast and reliable way to search for flights across numerous airlines worldwide. One of the strongest advantages of Google Flights is its ability to help travelers visualize price trends. The platform provides interactive charts and calendars that display how fares fluctuate over time, making it easier for users to identify the cheapest travel dates. These visualizations allow travelers to quickly spot patterns, such as seasonal increases or weekend price spikes.

Although Google Flights provides helpful visualizations and price trend charts, these tools remain largely descriptive rather than predictive. Users can only see how fares have fluctuated in the past or compare options across flexible dates. Additionally, they can sometimes oversimplify the data leaving out critical details such as hidden fees, baggage charges or seat selection costs.

Skyscanner [2]

Skyscanner is an aggregation platform that brings together different travel agency information and prices. This includes specific flight prices, 1 to 5 star user reviews, and a page dedicated to decreased ticket prices. This may count as a simple form of price trend analysis. However, with the frequency of ticket prices changing, prices shown on Skyscanner sometimes change after redirecting to the Travel Agency/Airline site. Hidden fees such as baggage costs and taxes are also not included in the prices shown, leading to confusion. Additionally, Skyscanner does not handle the booking, instead requiring users to click through to the OTA/airline sites to book which may cause feelings of redundancy.

Expedia [3]

Expedia is a platform allowing travelers to book and reserve many different traveling services including flights, hotels, rental cars, and vacation packages. They also include the specific details and price tracking of each of these services, but Expedia doesn't really have one main service or feature they excel at, their price prediction feature is very undetailed and leaves a lot to be desired from the user.

Flight Deals [4]

Flight deal platforms save time by scanning multiple routes and sending quick alerts, which can be useful for flexible travelers. These services are not personalized, often focusing on broad routes rather than user-specific needs. Alerts may not be real-time, deals can expire quickly, and there is little transparency about taxes, baggage fees, or policies.

SkyTrackR levers AI to provide accurate price predictions, detailed insights, and clear all-in-one cost breakdowns. By showing the true cost upfront including baggage, seat selections(economy, business, first class), and taxes, SkyTrackR aids travelers in planning trips with confidence and clarity.

Our AI solution goes beyond static searches by offering real-time notifications with full price breakdown, personalized watchlists/dashboards, and predictive insights into future price changes from OTAs and airlines. This allows travelers to simplify their trip-planning experience with clear, data-driven information our solution seeks to provide.

2.1.2 Problem Statement

The idea for SkyTrackR came from a problem almost every traveller has faced, hunting for cheap flights and never being sure if they're booking at the right moment. One day the ticket looks affordable but becomes expensive the next day. Airline prices are unpredictable and constantly changing because of demand, competition or even the day of the week itself.

The ticket prices for airlines constantly fluctuate, making it difficult for customers to decide on when to purchase a flight ticket. Customers will often book a flight and later discover a price lower than what they purchased it for, creating uncertainty and buyer's remorse when they want to book a flight in the future.

Existing solutions such as Google Flights, Skyscanner, and others attempt to address this issue, but their limited alerts, lack of real-time tracking, and insufficient cost transparency leave travelers without the guidance they truly need.

2.1.3 Product Vision

The goal is to develop an application that provides real-time updates on ticket prices and transparency on overall cost of the ticket and price trends to travellers as well as building confidence in their purchase. The platform should support user integration, enabling the creation of personalized profiles and a user dashboard where all tracked flights are conveniently saved. It should also offer a comparison between airlines to help users find the best deals. Additionally, travellers should be able to save their preferences for destinations, airlines, and specific travel dates for a more tailored experience. A subscription service can provide access to premium features, including advanced tracking options such as AI-powered pricing predictions and exclusive discounts on hotels and amenities.

2.2 Stakeholders and Users

Internal:

- **Project Manager** - Oversees the project timeline, ensures milestones are met, coordinates communication between team members, and aligns deliverables with client and academic requirements.
- **Developers Team** - Responsible for building the backend services, integrating airline APIs, implementing real-time tracking, and ensuring the application functions smoothly and securely.
- **UI/UX Designers Team** - Designs an intuitive and user-friendly interface, focusing on clear visualization of price trends, cost breakdowns, and seamless navigation for end-users.

External:

- **Travellers** - Individuals searching for flights who want transparent pricing, real-time notifications, and AI-driven recommendations to make informed booking decisions.
- **Travelling Agencies** - Third-party platforms that can integrate SkyTrackR's features into their systems or benefit from data insights to improve their offerings.
- **Airlines** - Provide real-time flight data, pricing, and policy information through APIs, enabling SKyTrackR to deliver accurate and up-to-date information to users.
- **Third-Party API Providers** - Offer additional travel-related services that can be integrated into SkyTrackR in future iterations to improve user experience.
- **Investors/Sponsors** - Provide the financial resources and strategic support necessary for the development and long-term sustainability of SkyTrackR. Their involvement helps fund essential components such as API integrations, AI model training, and infrastructure scaling. In return, they gain opportunities to participate in the platform's growth, future commercializations, and potential partnerships with travel agencies and airlines.

2.3 Project Scope

Included Project Features:

- **User Authentication:** Login/Register interfaces
- **Basic Dashboard:** Flight search and results display
- **Real-Time Data Updates:** Integration with airline APIs
- **Database Integration:** Data storage
- **UI/UX Design:** Clean, easy-to-use front-end
- **(Stretch Goal):** Simplified AI model for basic price trend prediction

Excluded Project Features:

- **B2B Web & Mobile App API**
- **Full AI Integration:** Advanced predictive modeling, data training, and testing
- **Additional Visual Enhancements:** UI polish and dynamic animations
- **B2B Offers, Deals, and Discounts:** Future collaboration after main features are done

2.4 System Risks

- **AI failures to predict prices**: The model may give wrong price forecasts causing users to miss better deals
- **Failure to get the API from the travelling agencies:** APIs from airline or travel agency may be unavailable, change, or block access, breaking daily checks
- **Inaccurate or missing historical pricing data:** Historical flight data may be incomplete or inaccurate, reading prediction quality
- **Data Drift:** Seasonal changes or sudden events make past data less reliable
- **Legal and Compliance Issues**: Scraping or storing user travel data without consent could break laws
- **Web scraping of ticket pricing data**: Causes increased API calls and greatly increases the server load
- **Excessive API calls**: Large amount of API calls leading to increased fees and hitting API rate limits.
- **Notification Failures:** Too many alerts for small price drops also missed or delayed alerts lead to lost trust if users discover cheaper prices elsewhere.

2.5 Operating Environment

Users can use SkyTrackR on the web browser. The web platform will be created with JavaScript, specifically using the React library. For user authentication when signing up or logging in, we will use Next.js which is a subset of React, to protect user's credentials. We will also use Next.js for integrating API for flights to save time from creating the API from scratch.

2.6 Functional Requirements

SkyTrackR must provide the following core functionalities to ensure travelers can search, track, and make informed booking decisions confidently.

2.6.1 User Story Interviews

User Interview

- **Name:** John Smith
- **Age:** 20
- **Occupation:** Student
- **Status:** Returning to university for a career, studying in Canada while still based in Europe
- **Financial situation:** Limited income, juggling part-time work and studies always **cost-conscious**
- **Travel frequency:** Must fly 2-3 times a year to Canada and back to his home country to visit his family

When you search for flights online, what information do you look for first and how do you sort your options to make a final decision (price, airline, etc.)?

"I want to see the **cheapest options** first, but I also want to **check the airline's reputation** and whether it's an economy or business seat. I don't think the lowest price is worth it if baggage isn't included or if there are flight transitions. This is why I usually **sort by price first**, then **filter by airline, class, and baggage option** in order to make my final choice."

How would you like to be notified when flight prices change? Do you prefer email or text messages? Would too many alerts annoy you?

“I would like to be **emailed** whenever the **price goes below a certain threshold**. I would also like to **control how often I get notified** and maybe only for big changes, not just ever small fluctuations like 2 dollars difference. That’s annoying.”

Have you ever searched for a flight and not been able to find details about baggage allowance or seat selection? How did that affect your book decision? Would you prefer to see baggage and seat fees included in the ticket price, or listed separately?

“Yes, that has happened to me a few times. When I couldn’t find clear information about baggage allowance or seat selection, I felt really uncertain and almost didn’t book the ticket. For me, baggage is important because I usually travel with books, a laptop, and study materials. If I don’t know whether it’s included, I have to assume I’ll be paying extra — which can make the flight much more expensive than it first looks. I’d much rather **see baggage and seat fees included in the ticket price upfront**. That way I can compare flights properly and avoid any surprises at the checkout.”

Would you like to create an account or log in to save your flight searches, watchlists, or preferences, or do you prefer using the system without an account?

“I want to save my favorite flights and preferences so I don’t have to search the same options every time, but I also want login and registrations to be super quick. So I want it to **remember my notification settings and preferred airlines** across sessions. I also want to **log in on multiple devices**.”

If you were willing to pay for extra features, what kind of features would that be?

"Since I'm travelling for studying, flexibility is the most important extra. I'd pay a bit more if I could **change dates without big penalties**. And if the price is reasonable, I'd pay for **extra baggage** because I need to bring a lot of things."

Would you need to see how confident the AI is or would a simple recommendation be enough?

"I would definitely want to see the confidence level. A simple "buy now" or "wait" isn't enough for me, because I need to understand the risk of it. If the AI says its "**80% price will drop**", I might be willing to wait. But if it's only 50-60%, I'd probably book right away. Since my budget is tight, I can't afford to gamble too much, the confidence number helps me make safer decisions."

Business Owner Interview

- **Name:** Tracy Lang
- **Age:** 47
- **Occupation:** Business owner
- **Status:** Primary decision-maker for project scope and funding
- **Financial situation:**

How do you plan to monetize this project?

"**Partnerships** with various **airlines and travel agencies, advertisements, referrals, and royalty.** For example, every successful sale of a flight ticket gives you a fixed percentage of commissions that we can negotiate. A big one is our **user subscription service** for the extra features, especially the AI price prediction."

Who are the competitors for this system and how would you like to differentiate from those systems?

"As of now, we have Expedia, Skyscanner, Google Flight and many other companies or services that perform the same purpose. One key difference is the use of AI to **predict the price of future tickets including the total cost** which other competitors do not have.**"**

With AI becoming increasingly prevalent, how would you want to incorporate AI into this project?

"I'd like to implement AI by utilizing its decision making capabilities using it to **smartly predict and track prices**, maybe also providing the users with a chatbot or AI enabled search which can easily provide users with potential trip destinations."

If flight alerts failed or prices were misleading, how would you rebuild user trust?

"If flight alerts failed or the prices turned out to be misleading, the first priority would be honesty and transparency. I'd notify users immediately, explain what went wrong and **apologize**. More importantly, I'd **show users that we're improving the system**, for example by sharing updates on how accuracy is being increased."

What kinds of reports or dashboards should the system provide so you can monitor active users, alerts sent, and premium conversions?

"I want an administrative dashboard that tracks **active users, number of alerts sent, user retention,** and number of **subscription accounts**. I also want to monitor platform performance like **how long each page loads for the user**."

2.6.2 Core Functionalities

User Accounts and Authentication

- Register, log in, and manage personal profiles securely.
- Maintain user sessions and allow preference updates.

Flight Search and Comparison

- Search flights by route, travel dates, and passenger details.
- Filter and sort results by price, airline, duration, or class.
- Display full cost breakdowns, including baggage fees, seat selection, and taxes.

Price Tracking and Alerts

- Add flights or routes to a personal watchlist
- Continuously update flight prices through airline API integration.
- Notify users of significant price drops or changes in real-time.

AI Price Prediction

- Analyze historical pricing data to estimate future trends.
- Provide confidence levels and “buy now” or “wait” recommendations.

User Dashboard

- Display all tracked flights with updated prices in one place
- Visualize price trends with simple interactive charts.
- Personalize future search results based on user preferences

Notifications

- Send email and in-app alerts for price changes and recommendations.
- Allow users to customize notification types and frequency.

Data Integration and Storage

- Retrieve real-time flight and pricing data through third-party APIs.
- Securely store user profiles, searches, watchlists, and price history.
- Refresh flight data periodically or on-demand.

Administrative Functions

- Provide an admin panel for monitoring system status and managing users.
- Log errors and track API performance for troubleshooting.
- Dashboard for administrations to track the revenue, active users and number of alerts sent

2.7 Nonfunctional Requirements

Usability (API, UI)

- Minimal layout
- Less buttons to navigate
- Reduced bugs and crashes

Privacy

- Only necessary personal information is stored such as their name, email, and personalized site data.
- No Third-Party sharing without consent
- Provide full functional requirements for the users.

Security

- Only store essential information and avoid requesting sensitive data from users.
- All data transfers encrypted by using HTTPS
- User accounts are always protected by 2 factor authentication

Performance

- Ensures loading page satisfy SEO Ranking and ensure URLs are SEO-friendly, clean and descriptive
- Speed of data that is gathered from APIs
- Flight search results must load in few seconds
- System must handle 10k users at the same time without noticeable slowdowns

Maintainability

- Codebase will follow modular design principles to support future feature expansion

2.8 UI/UX Interface Mock-ups

Section 3

3.1 Data Flow Diagrams

3.2 User Stories and related Use Case Scenarios

3.3 Activity Diagrams

3.4 Business Rules

Business Rule #	Description	Activity Diagram	Related UCS	UI Mock-up
BR1		AD1	UC1	UI 2.7.2
BR2		AD2	UC2	UI 2.7.3
BR3		AD3	UC3	UI 2.7.4
BR4		AD3	UC3	UI 2.7.4
BR5		AD5	UC4	UI 2.7.6
BR6		AD6	UC5	UI 2.7.6
BR7		AD7	UC6	UI 2.7.7
BR8		AD8	UC7	UI 2.7.8
BR9		AD8	UC7	UI 2.7.8
BR10		AD8	UC7	UI 2.7.8
BR11		AD8	UC7	UI 2.7.8
BR12		AD8	UC7	UI 2.7.8
BR13		AD9	UC8	UI 2.7.9
BR14		AD9	UC8	UI 2.7.9
BR15		AD9	UC8	UI 2.7.9
BR16		AD9	UC8	UI 2.7.9
BR17		AD10	AD9	UI 2.7.9
BR18		AD10	AD9	UI 2.7.9
BR19		AD10	AD9	UI 2.7.9
BR20		AD11	UC10	UI 2.7.10
BR21		AD11	UC10	UI 2.7.11
BR22		AD11	UC10	UI 2.7.11
BR23		AD12	UC11	UI 2.7.10
BR24		AD13	UC12	UI 2.7.12

Section 4 – Domain Class

Section 5 – Database

Section 6 – Project Management

6.1 Work Breakdown Structure

6.2 Milestones & Acceptance Criteria

Section 7 – Product Backlog & Implementation Schedule

Section 8 – Client/Faculty Sign-off

Section 9 – References

References

[1] Google, “Google Flights,” *Google Travel*, accessed Sep. 25, 2025. [Online]. Available: https://www.google.com/travel/flights/

[2] Skyscanner, “Skyscanner,” Skyscanner.ca, accessed Sep. 25, 2025. [Online]. Available: https://www.skyscanner.ca/

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