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| Creative Layout. Top View of White Model Plane, Airplane Toy on Pink Pastel  Background. Flat Lay Wi' Photographic Print - jchizhe | AllPosters.com  **FareTide**  CST-451 Capstone Project Proposal | Caroline Macauley  Grand Canyon University  Instructor: Professor Amr Elchouemi  Revision: 2  Date: March 16th, 2025 |

**ABSTRACT**

Many travelers face challenges when determining the optimal time to purchase airline tickets, often resulting in uncertainty about whether to buy now or wait for better prices. Existing tools on the web can provide flight information and basic fare comparisons, but they frequently lack advanced predictive capabilities and integrated insights into fare trends. This can leave users guessing if they are getting the best deal or if waiting might offer a better price, leading to potentially missed opportunities or unnecessary expenses.

FareTide is designed to address these issues by offering a comprehensive platform that consolidates flight information from various airlines and uses historical data to predict the best times to purchase tickets. By leveraging advanced machine learning algorithms and real-time data integration, FareTide provides users with detailed fare trend insights, helping them make well-informed decisions. The website’s features will include easy search and filtering features, allowing even less seasoned travelers to access all possible flights that fit their needs. Detailed flight listings will populate a clean, simple search results page that enables users to make comparisons. When users finds a flight that interests them, they can click to view more specific details such as plane models or seat classes. The standout feature, fare price predictions, will be provided on the selected flight’s purchasing options page. The goal of FareTide is to ensure that every click on the website guides users smoothly towards a confident airline ticket purchase.

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| **History and Signoff Sheet** |

**Change Record**

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| --- | --- | --- |
| **Date** | **Author** | **Revision Notes** |
| September 14, 2024 |  | Initial draft for review/discussion |
| March 16, 2025 |  | Revision for final subission |
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| **Overall Instructor Feedback/Comments** |

**Integrated Instructor Feedback into Project Documentation**

Yes  No

**Project Approval**

Professor Amr Elchouemi

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# Project Overview and Project Objectives

This section contains details regarding the inspiration for the project and how this project will offer benefits and solutions to that problem. Challenges the team will face are also listed below.

**Problem and Background**

Travelers face challenges in determining the optimal time to purchase airline tickets, often resulting in uncertainty about whether to buy now or wait for better prices. Existing tools on the web can provide flight information and basic fare comparisons, but they frequently lack advanced predictive capabilities and integrated insights into fare trends. This can leave users guessing if they are getting the best deal or if waiting might offer a better price, leading to potentially missed opportunities or unnecessary expenses.

**Project Objectives**

FareTide is a website designed to instill purchasing confidence in the user by providing a comprehensive platform that consolidates flight information from various airlines and uses historical data to predict the best times to purchase tickets.

**Challenges**

* Gaining knowledge about necessary technologies
* Collecting and gaining access to necessary data
* Overcoming unexpected issues in a timely manner
* Maintaining an adaptable project schedule to address unexpected life events

**Benefits and Opportunities**

* Save Money on flight fare
* Give user the confidence that they are purchasing at the right time
* Make buying flight fare easier and more approachable
* Provide users with a reactive, attractive and user-friendly platform

# Project Scope

This section contains details regarding the project’s scope, contacts and work breakdown structure (WBS). The scope is defined as the features and capabilities the project should have. If ‘in scope’ these features and capabilities are expected. If ‘out of scope’ these features and capabilities are not expected. The WBS lays out a view of what the timeline for the project looks like.

**In Scope**

* Responsive web application with a landing page and all pages laid out in web frame diagram
* Simple attractive design and theme
* Functioning search and filter feature
* Fare prediction feature
* Sharing feature

**Out of Scope**

* Evolve into a Chrome extension
* Employee portal integrating FareTide tool
* Compliant to ADA standards (Accessible)
* Tested for security
* Base fare prediction on additional factors

**Stakeholders and Contacts**

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| **Stakeholder Name** | **Role(s)** | **Responsibilities** |
| Caroline Macauley | Visionary, Project Owner, Scrum Master, Developer, User | Create idea, implement project and test project |

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| **Work Breakdown Structure** | | | | | | | | | | |
| **ID** | **Task** | **Dependencies** | **Status (x = complete)** | **Effort Hours** | **Cost** | **Start Date** | **Planned Completion** | **Estimate to Completion** | **Actual Completion** | **Resource** |
| 1 | Prep (Planning Phase) |  | **X** | 8 | $0 | 09-03-24 | 09-22-24 |  | expected |  |
| 2 | Requirements (Analysis Phase) |  |  | 10 | $0 | 09-23-24 | 10-13-24 |  | expected |  |
| 3 | Checkpoint for assessing Python/ML capabilities |  |  | 20 | $0 | 09-23-24 | 11-01-24 |  | expected |  |
| 4 | Final Architectural Plan (Design Phase) |  |  | 10 | $0 | 10-14-24 | 11-17-24 |  | expected |  |
| 5 | Development (Coding Phase) |  |  | 20 | $0 | 11-18-24 | 12-15-24 |  | expected |  |
| 6 | Checkpoint for determining Dataset resource (API) and ensure hardware is dependable and capable |  |  | 2 | $0 | 01-06-25 | 01-15-25 |  | early |  |
| 7 | Code Development, Testing, and Implementation 1 |  |  | 20 | $0 | 12-16-24 | 02-16-25 |  | early |  |
| 8 | Code Development, Testing, and Implementation 2 |  |  | 20 | $0 | 02-17-25 | 03-30-25 |  | early |  |
| 9 | Benchmark Final Project |  |  | 10 | $0 | 03-31-25 | 04-27-25 |  | early |  |
| 10 | Final Project Presentation |  |  | 5 | $0 | 03-31-25 | 04-27-25 |  | early |  |

# Project Success Measures

This section contains details regarding the definition of a complete and successful project. Criteria, assumptions and constraints are all found in the tables below. An assumption is a hurdle the team foresees arising but may not necessarily occur. Constraints are boundaries that limit the team.

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| **Assumptions and Constraints** | | | | | |
| **ID** | **Description** | **Comments** | **Type** | **Status** | **Date Entered** |
| 1 | Energy and focus afforded to this project | Variable affected by team’s environment | Constraint | Potential | 09/20/24 |
| 2 | Amount of time available in schedule before due date | Variable affected by team’s environment | Constraint | Potential | 09/20/24 |
| 3 | Knowledge on relevant topics | Variable affected by first and second constraints | Constraint | Potential | 09/20/24 |
| 4 | Knowledge on relevant technologies | Variable affected by first and second constraints | Constraint | Potential | 09/20/24 |
| 5 | There will be tasks that will be tedious to understand |  | Assumption | Potential | 09/20/24 |
| 6 | There will be bugs/issues that add to estimated time allotted |  | Assumption | Potential | 09/20/24 |
| 7 | Team will have unexpected life events that affect the time and focus available for this project |  | Assumption | Potential | 09/20/24 |
| 8 | Learning Python will be less extensive than learning Java or C |  | Assumption | Potential | 09/20/24 |
| 9 | Budget will increase as the project progresses |  | Assumption | Potential | 09/20/24 |

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| **Project Completion Criteria** |
| 1. Web application provides user with flight fare prediction for any selected flight |
| 1. Web application includes all fully functioning features as outlined in scope section |
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# Project High-Level Solution

*This section contains a more in-depth introduction to the web application and further detail how it will serve as a solution. Diagrams are provided below for a visual representation of project details.*

**Introduction**

Travelers often face uncertainty when deciding the best time to purchase airline tickets due to fluctuating prices. Current online tools provide flight searches and fare comparisons but lack predictive capabilities, leaving users unsure if they should buy now or wait for better prices. This challenge can result in unnecessary expenses for the patrons. FareTide aims to solve this problem by offering a platform that predicts the best times to buy tickets based on historical fare data and real-time information. By using machine learning algorithms and integrating data from multiple airlines, FareTide provides users with accurate fare predictions, detailed flight information, and a seamless search experience, helping travelers make more informed decisions confidently.

**Solution**

FareTide combines real-time flight data with historical fare analysis to offer a platform for airfare predictions. Built using Python, the backend employs machine learning models trained on past data to predict fare trends. The system integrates with external APIs to provide real-time flight listings from various airlines. The front end is designed for ease of use, allowing users to search and filter flights based on criteria like destination and travel dates. Detailed flight information, including fare predictions, helps users decide whether to book or wait for better prices. By combining machine learning and real-time data, FareTide offers a solution that simplifies and improves the flight booking process.

# Project Controls

This section contains details about the team, associated risks and issues, and a log for adjustments/changes made. Issues are defined as current problems the team is facing. Risks are defined as potential issues.

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| **Risk Management** | | | | |
| **Event Risk** | **Risk Probability (high, medium, low)** | **Risk Impact** | **Risk Mitigation** | **Contingency Plan** |
| No suitable resources for learning Python | low | Require using a different language/framework | Research resources and speak with mentor | Use Java as alternative if not resolved by set date |
| No suitable resources for learning ML | low | Project fails to have key feature | List as highest priority, research resources and speak with mentor | Change Project topic if not resolved by set date |
| Lacking enough understanding of Python to build website | high | Web app is incomplete | Research resources and speak with mentor | Use Java as alternative if not resolved by set date |
| Lacking enough understanding of Python as it relates to machine learning | high | Project fails to have key feature | Research resources and speak with mentor | Change Project topic if not resolved by set date |
| Inadequate hardware for project | medium | Project stops | Speak with hardware experts and mentor | Acquire necessary material OR adjust project to meet current hardware specs. |
| Cost for access to necessary materials is not within budget | medium | Project stops | Speak with mentor and investigate options | Adjust budget OR adjust project sources |
| Inability to obtain access to data/API to train AI | medium | Project will have no data | Research resources and speak with mentor | Adjust project data sources |

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| **Change Control Log** | | | | | | | | | |
| **ID** | **Change Description** | **Priority** | **Originator** | **Date Entered** | **Date Assigned** | **Evaluator** | **Status** | **Date of Decision** | **Included in Rev. #** |
| 1 | Change language/framework | High | CM | 09-18-2024 | 09-18-2024 | CM | pending | 11-01-2024 |  |
| 2 | Change key features of project | High | CM | 09-18-2024 | 09-18-2024 | CM | pending | 11-01-2024 |  |

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| **Roles and Responsibilities** | | | |
| **Name** | **Team** | **Project Role** | **Responsibility** |
| Caroline Macauley | Client | Visionary/Client | Present idea for project with list of desired features |
| Caroline Macauley | Client Facing | Project Owner | Translate idea into organized planning document and present it to Scrum Master. Advocate for Client’s needs throughout process. |
| Caroline Macauley | Development | Scrum Master | Determine best technologies and technical approach based on planning documents. Present technical checklist that can be completed by developer team. |
| Caroline Macauley | Development | Developer | Write code to create project. Adress bugs and implement necessary updates. |
| Caroline Macauley | Development | User/Tester | Use and test finished project when presented. Report issues and experience |

# Project Cost and Schedule

This section contains details regarding the cost and schedule for this project.

**Cost Estimation**

**$0.00** No costs are expected currently.

**Project Schedule**

*Pending…* The official project schedule is subject to change in the early stages of this project.

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| **Project Schedule** | | | |
| **ID** | **Task** | **Start Date** | **Planned Completion** |
| 1 | Prep (Planning Phase) | 09-03-24 | 09-22-24 |
| 2 | Requirements (Analysis Phase) | 09-23-24 | 10-13-24 |
| 3 | Checkpoint for assessing Python/ML capabilities | 09-23-24 | 11-01-24 |
| 4 | Final Architectural Plan (Design Phase) | 10-14-24 | 11-17-24 |
| 5 | Development (Coding Phase) | 11-18-24 | 12-15-24 |
| 6 | Checkpoint for determining Dataset resource (API) and ensure hardware is dependable and capable | 01-06-25 | 01-15-25 |
| 7 | Code Development, Testing, and Implementation 1 | 12-16-24 | 02-16-25 |
| 8 | Code Development, Testing, and Implementation 2 | 02-17-25 | 03-30-25 |
| 9 | Benchmark Final Project | 03-31-25 | 04-27-25 |
| 10 | Final Project Presentation | 03-31-25 | 04-27-25 |

**Programming Schedule**

*Pending…* The official project programming schedule is subject to change in the early stages of this project.

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| --- | --- | --- | --- |
| **Programming Schedule** | | | |
| **ID** | **Task** | **Start Date** | **Planned Completion** |
| 1 | Development (First Coding Phase) | 11-18-24 | 12-15-24 |
| 2 | Checkpoint for determining Dataset resource (API) and ensure hardware is dependable and capable | 01-06-25 | 01-15-25 |
| 3 | Code Development, Testing, and Implementation 1 | 12-16-24 | 02-16-25 |
| 4 | Code Development, Testing, and Implementation 2 | 02-17-25 | 03-30-25 |
| 5 | Benchmark Final Project – Final code adjustments made and submitted | 03-31-25 | 04-27-25 |

# Appendix A – References

The work on this document is mine in my own words

CST-451 Topic 1 slides found in Mark Reha’s Padlet

Mark Reha’s CST-451 in class notes and lecture

Asif, I. H. (2023, November 1). *Complete Machine Learning Project Flowchart explained!*. Medium. <https://ihsanulpro.medium.com/complete-machine-learning-project-flowchart-explained-0f55e52b9381>

*Color palette: #EEEBDD #CE1212 #810000 #1B1717 - color hunt*. Color Palette: #EEEBDD #CE1212 #810000 #1B1717 - Color Hunt. (n.d.). <https://colorhunt.co/palette/eeebddce12128100001b1717>

*Draw.io - free flowchart maker and diagrams online*. Flowchart Maker & Online Diagram Software. (n.d.). <https://app.diagrams.net/>

GeeksforGeeks. (2020, September 5). *Flowchart for basic machine learning models*. <https://www.geeksforgeeks.org/flowchart-for-basic-machine-learning-models/>

# Appendix B – Copyright Compliance

*Pending…* Project technical resources have not been determined