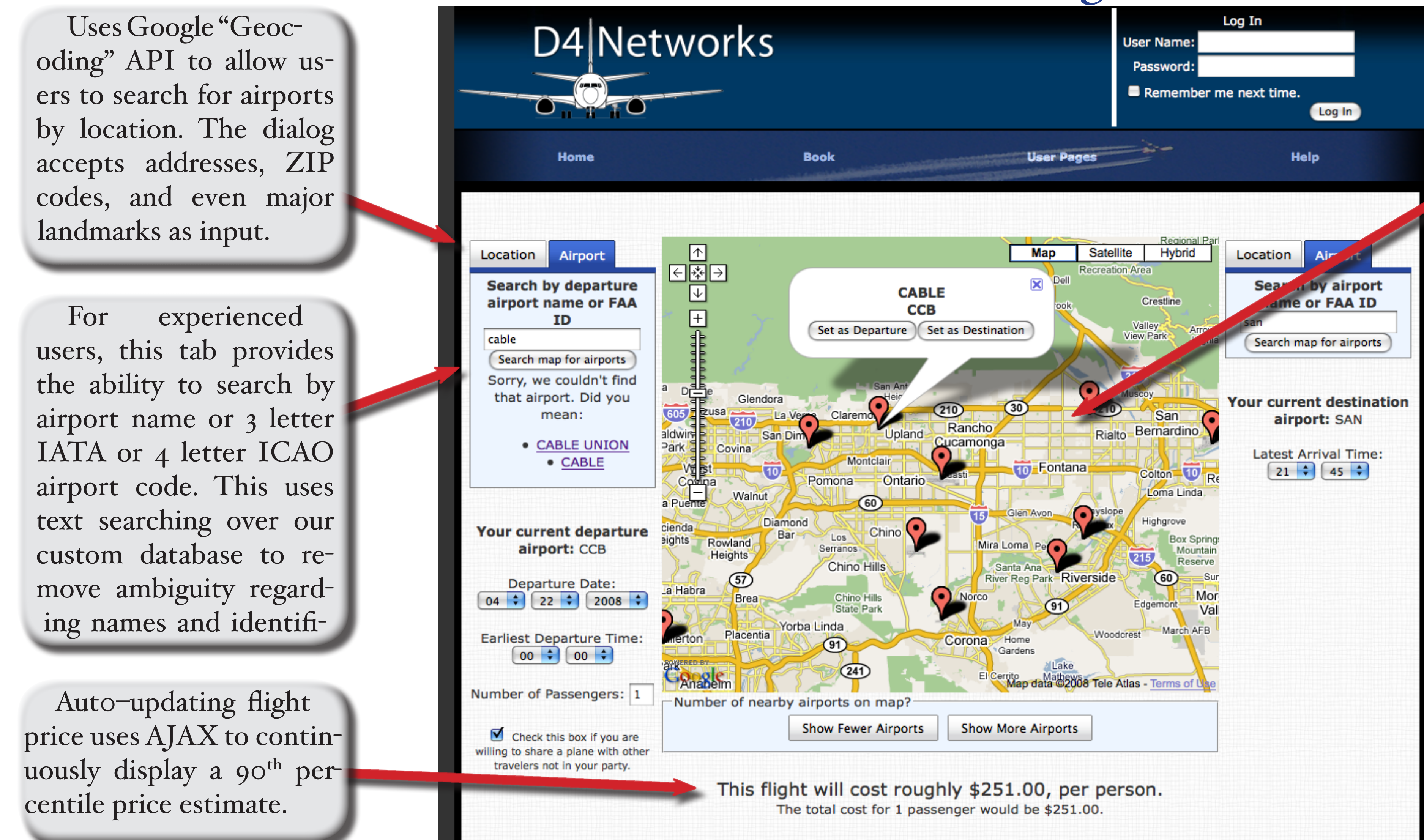


Front Page



Reservations Page



Uses Google “Geocoding” API to allow users to search for airports by location. The dialog accepts addresses, ZIP codes, and even major landmarks as input.

For experienced users, this tab provides the ability to search by airport name or 3 letter IATA or 4 letter ICAO airport code. This uses text searching over our custom database to remove ambiguity regarding names and identifiers.

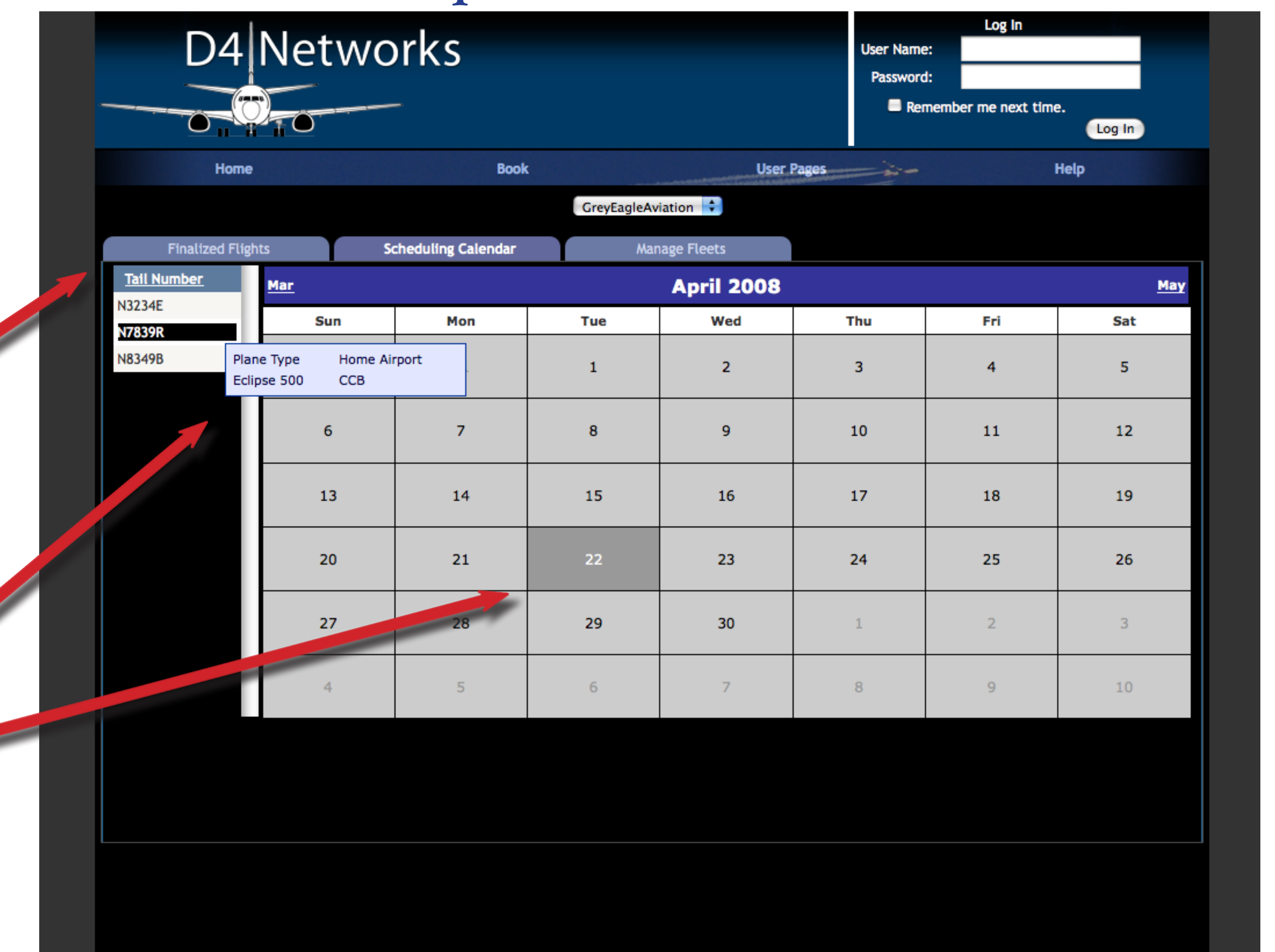
Auto-updating flight price uses AJAX to continuously display a 90th percentile price estimate.

Google Maps interface shows all of the airports in the local departure and destination area, many of which new users will not be aware of.

Operators can see a detailed listing of their upcoming flights by selecting this tab.

Operators tell us that a particular plane is available on a given day by dragging that plane from a list onto the AJAX calendar.

Operator Interface



Charter operators use this interface to manage their fleet by providing information about when their planes and pilots are available and to find out when the U Fly system has scheduled them to fly customers. They may also manage their fleet by modifying the data the system stores about their planes and their pilots. To keep the interface simple and clutter-free, a tabbed interface.

Studies have shown that users’ decisions about whether to use a given web service are often made seconds after navigating to a website, and thus the clinic team needed to make the main page of the website were to make it as look as professional and trustworthy as possible, while making the next step the user should take (in this case either “[Trying] Now” or “[Learning] More”) as obvious as possible. The boilerplate text at the bottom is intended to be replaced by the liason.

Charter aircraft have the ability to fly to many, many more airports than commercial planes can (in fact, between the HMC campus and Los Angeles International, there are more than 50 airports, but only 2 are commonly serviced by commercial airlines). Users may be unaware of the number of airports available to them, so our map-based interface guides them through the process of locating the most convenient airport — sometimes right outside their door — in a relaxed and convenient manner.

Problem Statement

D4 Networks (now U Fly) hired an HMC Math Clinic to create an optimization algorithm for charter air flight scheduling that reduced costs and increased efficiency for charter flight business operators. Their solution accomplished this by combining flights and allowing charter operators to pool resources in order to reduce flight prices and make those prices competitive with those of commercial air.

The 2007–2008 HMC Comptuer Science Clinic team used this existing optimization algorithm in a fully functional Internet application that is easily accessible to both charter operators and customers. The team accomplished this through carefully developing user interfaces and integrating a bespoke database backend and the math clinic’s optimization engine.

Technology and Design

The clinic team made heavy use of a variety of technologies during the creation of the application. These include ASP.NET, C#, SQL, AJAX, JSON, the Yahoo User Interface Library, and several Google APIs, including Google’s Maps API and Geocoding API.

After initial requirements-gathering, the team employed a multi-phase, iterative design process detailed in the next panels to the right and below.

Test-Driven Development

The team used a test-driven development model to design and implement the web application. The steps roughly consisted of:

1. **Design:** carefully develop a UML model
2. **Implement:** For each class, the team
 - (a) first provided stub functionality
 - (b) created tests from system use cases
 - (c) implemented functionality and tested iteratively.

Final Product

We have successfully deployed

1. the internet application, ready to be transferred to D4’s servers. This includes the customer and charter operator user interfaces discussed extensively elsewhere.
2. an interface for the 2006–2007 HMC Math Clinic’s linear-program solver
3. a robust, custom-tailored database backend, storing user, flight, charter operator, and airport information.

Acknowledgements

The 2007–2008 D4 Networks clinic team, Chris Alvino, Corey Hebert, Andrew La Motte-Mitchell, *Project Manager*, and Steven Sloss would like to express their sincere gratitude to Mr. Chuck McKnett, *D4 Networks Liason*, and Professor Zachary Dodds, *HMC Advisor*

User Interface Design

A crucial element of the team’s design process was iteration, as demonstrated by this series of design prototypes for the front page.

To the left are several sketches and mockups generated during the design process as retrieved from the source code repository. After each one of these designs was created, a variety of likely users were asked to view the designs and suggest improvements, which were incorporated in the next design revision. This happened several times per page.

