Introduction:

Boston-based flight school East Coast Aero Club's current site is purely static, informational content. As it currently exists, there are pieces of information relevant to a newcomer such as rates, FAQ, directions, etc. Though is might contain enough information to answer any question a perspective customer would have, there is little content to aid instructors, students or others involved in the school.

The system we plan to build will completely change this by adding several new tools to help both the customers and employees of ECAC. Additions include a scheduling tool, which will allow users to make reservations for specific aircrafts and instructors without calling the office, a forum will allow users to find other members to share flights or serve as co-pilot as well as discuss topics relevant to ECAC, and user ability to post articles and trip reports they have written for other users to see. All of these abilities will be moderated by administrators and dispatchers. The system will also be able to send out reminders for appointments and special information about equipment being used.

Tools:

The system is being developed in Ruby on Rails and uses PostgreSQL. We chose Ruby on Rails for its well-structured framework that reduces repetition in web programming, and ease of development. The nature of Ruby on Rails should also make any future necessary changes to code a much easier task. PostgreSQL was chosen because it is an advanced, feature-rich, open-source RDBMS which does not require a license to use, even for commercial endeavors, reducing the cost to our clients.

Use Cases:

-User Classes

Students

The main target user class for this application are the students of the Aero Club. They will mainly use the scheduler for making their reservations as well as the forum. They may also submit or read articles.

Instructors

Instructors will also likely be using the application heavily. They may also use the scheduling app and the forum, though they may in addition make comments on user progress, check the appoints that have been made with them and block out periods in time during which they cannot teach.
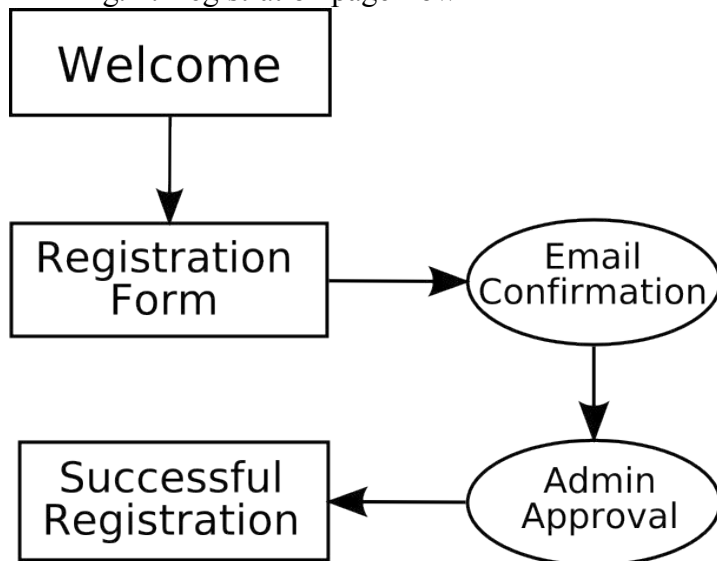
<u>Administrators</u>

The administrators, likely the office employees of ECAC, will uses the application to add new users to the system, moderate user profiles, articles, and the forum, and any other necessary editing on the site.

<u>Dispatchers</u>

The dispatchers class, which may overlap with the administrator class, will use the system to keep track of user reservations, giver permission for special cases in which a user would not make a certain reservation, and give special notices about specific aircraft.

-Page Flows

Fig. 1: Registration page flow

<u>Registration</u>

The page flow for registration, as shown in Figure 1, requires a user email confirmation as well as an admin approval after registration. The email confirmation of course confirms that the user is using a valid email and the admin approval prevents non-members from scheduling, posting in the forum, etc. Note that the users can modify their profile before acquiring admin approval.

Figure 2. Administrator page flow

<u>Administration tools</u>

The administration tools in Figure 2 are also straight forward. Note that besides new users, administrators will also approve some changes to user information. Any changes administrators want to make to user profiles will utilize the same suite of tools as the users themselves, except they will able to edit all profiles.
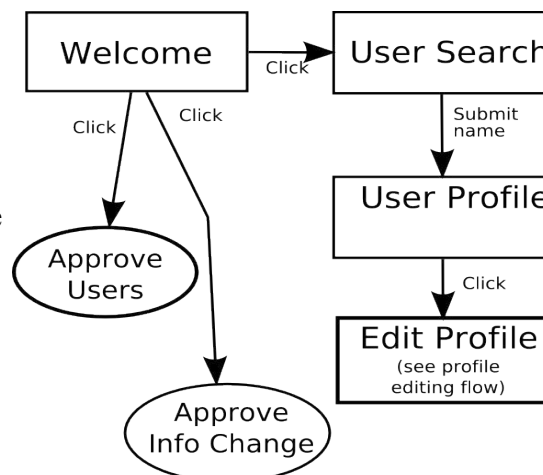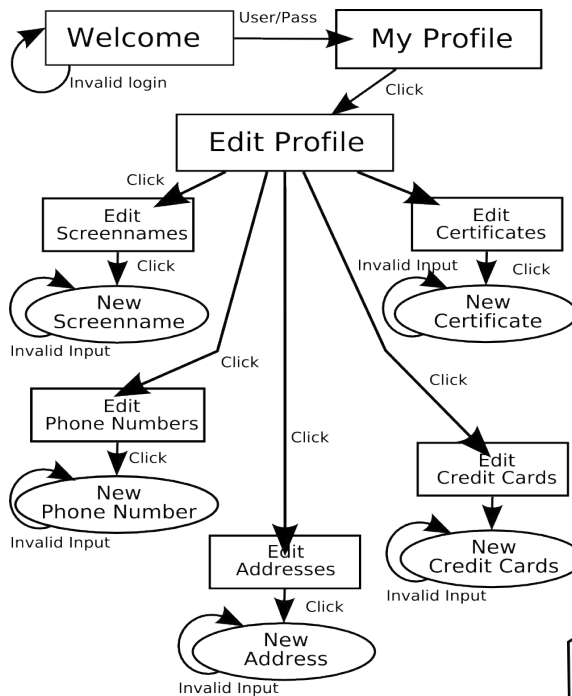
Figure 2. Profile editing flow

```
Welcome ──User/Pass──▶ My Profile
  ↺ Invalid login          │ Click
                           ▼
                    Edit Profile
        ┌────────┬─────────┼──────────┬──────────┐
     Click    Click     Click      Click      Click
        ▼                                         ▼
    Edit                                        Edit
  Screennames                                Certificates
     │ Click                     Invalid Input  │ Click
     ▼                                          ▼
   New                                        New
 Screenname                                Certificate
 Invalid Input
        ▼ Click
    Edit
  Phone Numbers
     │ Click
     ▼
   New
 Phone Number
 Invalid Input
                Click              Click
                  ▼                  ▼
               Edit              Edit
             Addresses         Credit Cards
                │ Click            │
                ▼                  ▼
              New                New
            Address          Credit Cards
          Invalid Input      Invalid Input
```

Profile Editing

The flow users will utilize to edit their own profile is displayed in Figure 2. The editing process is fairly straight forward. The separate pages for some elements (screennames, certificates, etc) are to allow for multiple entries per user for those attributes.

Scheduling

Scheduling will be possible from the opening page or from a fuller separate scheduler as shown in Figure 4. The schedule on the opening page will contain aircraft and instructors the student has used before for convenience's sake. Some reservation requests will be beyond a student's skill level and will require special approval of dispatchers.
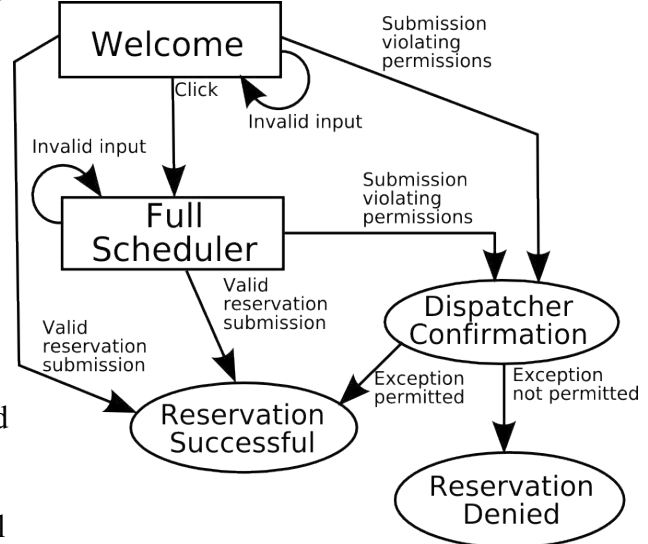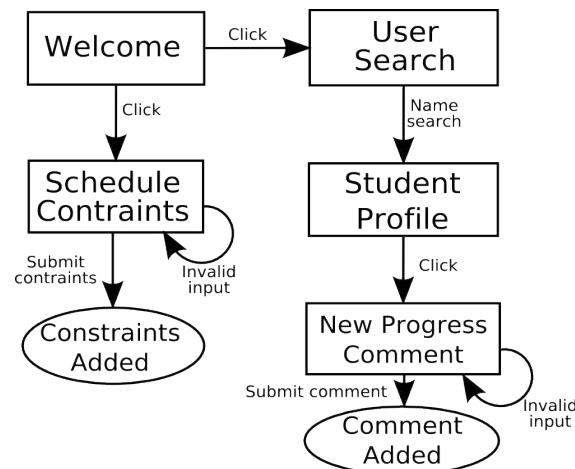
Figure 4. Scheduling page flow

```
        Welcome ──Submission violating permissions──┐
          │ Click  ↺ Invalid input                  │
          ▼                                          │
   Invalid input                      Submission     │
      ↺  Full ──violating permissions──▶ Dispatcher  │
       Scheduler                        Confirmation ◀┘
          │ Valid reservation                │
   Valid  │ submission           Exception   │ Exception
reservation▼                     permitted   │ not permitted
submission                          ▼         ▼
       Reservation                        Reservation
       Successful                          Denied
```

Figure 5. Instructor Page Flow

```
   Welcome ──Click──▶ User Search
     │ Click              │ Name search
     ▼                    ▼
  Schedule             Student
 Contraints ↺         Profile
     │ Submit   Invalid   │ Click
     │ contraints input   ▼
     ▼                 New Progress
 Constraints           Comment ↺
   Added                  │ Invalid input
              Submit comment ▼
                        Comment
                         Added
```

Instructors

In addition to the all the abilities of students, instructors will have the capabilities demonstrated in Figure 5. Progress comments are added only when viewing a student's profile.

Data Model:

Our data model is design to support two levels of community registration - a basic one, that simply allows registering user's name and email, and can be used for forum participation or reading the user-submitted articles, and a full one, that provides information enough for tasks like renting an aircraft. To facilitate this, two tables with 1-to-1 mapping are present users and extra_user_info. The data model is flexible enough to support arbitrary number of phone numbers, possibly international addresses, and credit cards.

Users are organized into groups through a groups_users mapping table. Of interest is the 'approved' column in that table - which allows for user group memebrship be pending admin approval. This would be a common case in a user registering as a student on the website and waiting for administrator approval before he or she can rent an aircraft. Groups are not just for representing role information - they can also be used for membership of mail lists (like newsletter), and special user statuses like being deactivated by administrator.