
Florida Institute of Technology

# Software Testing Plan

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# Florida Tech Carpool and Park

A mobile application for students to use to find and create carpooling groups based on the students location and class schedule.

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# 1. Introduction

The purpose of this document is to outline the methods which will be used to test the software requirements. The testing will ensure not only that all functions of the software work, but also that they do so efficiently and under varying circumstances. Special attention will be paid to security, as to make sure the app doesn't harm any users. The only users of this app should be Florida Tech students, and they are expected to use the app on either an Apple or Android smartphone.

# 2. Testing Plan

The testing plan contains a list of detailed scenarios in which the Florida Tech Carpool and Parking app will need to be tested. There will be two different types of tests which need to be performed before the app launches: Functional Tests and User Tests.

Functional Tests are meant to ensure that each of the Functional Requirements exhibits the correct behavior for many different scenarios. Since the results of these tests are mostly objective, they can simply be performed by the development team themselves.

User Tests are meant to ensure that the application as a whole works well enough for the users. User Tests handle the subjective aspects of the application, such as the usability of a UI design, or the quality of a ranking algorithm.

# 3. Functional Tests

## 3.1 User Profile

1. **Register:** Users can register for an account by using a valid Florida Tech email address and a password.
    - **Test A:** Single Correct Registration: A single account must be successfully registered from start to finish. The registration must succeed.
    - **Test B:** Multiple Correct Registration: Multiple accounts will be registered at once. Confirmation emails will be tested to make sure they apply to the correct account. The registrations must succeed.
    - **Test C:** Incorrect Email: A single account will be registered with an invalid email address. The registration process must halt.
    - **Test D:** Outside Email: A single account will be registered with a non-Florida Tech email address. The registration must halt.
    - **Test E:** Email In Use: A single account will be registered with an email already associated with an account. The registration must halt.
    - **Test F:** Passwords Don't Match:  A single account will be registered with passwords that don't match. The registration must halt.

2. **Setup Profile:** Upon registration, users must fully complete their profile information by providing their basic information, location and vehicle information, and their carpooling schedule.
    a. **Basic Info:** General information about the user and their role in a carpooling group
        - **Test A:** Correct Information: The Basic Info will be entered correctly for a single account. The setup must succeed.
        - **Test B:** Incomplete Information: Sections of the Basic Info will be left blank. The setup must halt.
        - **Test C:** File Extension: Files with invalid formats will be uploaded in the Profile Picture section. The setup must halt.
    b. **Location Info:** Information about where the user would be picked up/dropped off from and the distance a driver will travel
        - **Test A:** Correct Locations: A valid location near the Florida Tech Campus will be entered for all fields. The setup must succeed.
        - **Test B:** Empty Fields: Location fields will be left empty during the test. If the Address field is left empty the setup must halt. If the Pick-up/Drop-off fields are empty, the setup must succeed.
        - **Test C:** Incorrect Address: An invalid address will be provided for one or more fields. The registration must halt.
        - **Test D:** Far Away Address: An address deemed too far from the Florida Tech Campus will be provided for one or more fields. The registration must halt.
        - **Test E:** Correct Driving Distance: A distance above zero will be provided. The setup must succeed. This field should only be visible by Drivers.
        - **Test F:** Incorrect Driving Distance: A distance equal to or below zero will be provided. The setup must halt.
    c. **Vehicle Info (Driver Only):** Information about a Driver's vehicle used to determine the number of users in a group and used by Riders to identify their Driver's vehicle.
        - **Test A:** Rider Access: This page must not be accessible to users who set up their profiles as Riders.
        - **Test B:** Correct Vehicle Info: Valid info will be provided for all fields. The setup must succeed.
        - **Test C:** Invalid Model/Manufacturer: An invalid Model or Manufacturer will be inputted. The setup must halt.
        - **Test D:** License Plate: An invalid License Plate will be provided. The setup must halt.

- **Test E:** Default Preferences: Some/all driver preferences will be left empty/untouched. They must convert to a default value, and the setup must succeed.

d. **Carpooling Schedule:** Users set their carpooling schedule and how often it reoccurs
    i. **Daily Schedule**: User sets their pick-up/drop-off time for each day of the school week (Monday through Friday)
        - **Test A:** Correct Schedule: Valid information is provided for every field, every day. The setup must succeed.
        - **Test B:** Incomplete Schedule: One or more days of the schedule will be left empty. The setup must halt.
        - **Test C:** Impossible Earliest Arrival: The Desired Arrival Time and Earliest Arrival fields will be set to make the earliest arrival time occur on the previous day. The setup must halt.
        - **Test D:** Impossible Latest Departure: The Desired Departure Time and Latest Departure fields will be set to make the latest departure time occur on the next day. The setup must halt.
        - **Test E:** Impossible Timing: The Desired Arrival Time will be set to occur after the Desired Departure Time. The setup must halt.
    ii. **Recurring Schedule:** User sets how often their carpooling schedule reoccurs
        - **Test A:** Correct Information: A valid input is provided for either the Weekly or Until Specific Date option. The setup must succeed.
        - **Test B:** Incorrect Weekly: A number less than or equal to zero is provided for the Weekly recurrence. The setup must halt.
        - **Test C:** Incorrect Date: A date before the current date is selected for the Until Specific Date option. The setup must halt.
    iii. **Find Friends:** Upon registration and profile set-up, users may search for their friends that also have an account to add them to their friends list
        - **Test A:** Basic Search: A first or last name will be entered into the search bar. The program must display all users with a name matching either.
        - **Test B:** No Results: A name is entered which matches zero registered users. The program must display that no matches have been found.

- **Test C:** Friends List: The user's Friends List is selected. The program must display all users on the Friends List, and only users on the Friends List, in some correct order.
- **Test D:** Add Friend: A user discovered through the Search function is added to the user's Friend List. The program must succeed.
- **Test E:** Remove Friend: A user on the user's Friends List is selected to be removed. The program must succeed.

3. **Provide Carpooling Preferences:** Upon registration and entering profile information, users must then select their preferences regarding safety, cleanliness, and comfort during the ride. All user preferences default to "No Preference" if the user chooses to enter no information during profile set-up.
    - **Test A:** All Inputs: All preferences have received a valid input. The setup must succeed.
    - **Test B:** Empty Fields: One or more preferences haven't been manually assigned a value. The preferences must revert to their default values and the setup must succeed.

4. **Login**: Users can login in to the application using their student email and password used during registration.
    - **Test A:** Correct Login: A previously registered account will attempt to login with correct credentials. The login must succeed.
    - **Test B:** Unregistered Email: A Florida Tech email unassociated with an account will attempt to login. The login must halt.
    - **Test C:** Incorrect Password: A previously registered account will attempt to login with an incorrect password. The login must halt.
    - **Test D:** Multiple Incorrect Passwords: Test C will be attempted multiple times. After a set number of failed attempts, the user must be temporarily restricted from logging in.
5. **Update Profile:** At any point after registration, users can update/modify their profile information and preferences.
    - **Test X:** Test Repetition: Previous Profile Tests will be repeated, but from within the update profile interface. They must function the same as they did in the previous tests.

6. **Delete Account:** Users can delete their account at any point, removing them from any current and future carpooling recommendations and groups.
    - **Test A:** Login: The correct information to a deleted account will be provided. The login must fail.
    - **Test B:** Register: An email used in a deleted account is provided to register for a new account. The registration must succeed.

7. **View Profile:** View a user's full profile
    - **Test A:** User Bio: An account is selected. All Bio information for that account must be displayed and formatted properly.

- **Test B:** User Rating: Ratings for an account are manually created. The correct average rating for that account must be displayed. The number must update after a new rating.
- **Test C:** User Statistics: Correct statistics for a user must be displayed. The numbers must update after a ride.

## 3.2 Creating Group Recommendations

1. **Considerations:** The group recommendation algorithm attempts to match users based on their similarity in the following considerations…
    - **Test A:** Group Recommendation Algorithm: The Group Recommendation Algorithm will rank a list of groups in order from best to worst for a particular user. The list must be correctly ordered.
2. **Determining the Driver of a Trip:** When a group is recommended, the Driver role of the ride will be appointed based on the following…
    - **Test A:** Automatic Selection: The driver with the lowest net driving miles must be selected as the group's default driver.
    - **Test B:** Manual Override: A driver attempts to manually change their group's driver. The new driver must be able to see all relevant driver information, and the old driver must no longer be able to see it.
    - **Test C:** Rider Override: A rider attempts to manually change their group's driver. The override must fail.

## 3.3 Group Formation

1. **Form a Group via System Recommendations**
    a. **View Group Recommendations:** Users can view automatically-generated group recommendations that are suggested based on their profile information.
        - **Test A:** View Members: The user will attempt to view basic info of the members of a group. All information must be present, and formatted correctly.
        - **Test B:** Expanded Profile: The user is already viewing members of a group. They must be able to select individual members, and view an expanded version of their profile. All information must be present, and formatted correctly.
        - **Test C:** Viewing Blocked Group: A user in a carpool group will block another user. When the blocked user searches for groups to join, that user's group must not appear in the recommendations.
    b. **Accept/Deny Recommendations:** Users can either accept or deny suggested groups from the system
        - **Test A:** Accept: A user accepts a recommendation. They must end up in the correct group, and be unable to join other groups.
        - **Test B:** Other Group: A user denies a group. They must be given a recommendation for another group.

- **Test C:** Manual Group: A user denies a group. They must be given the option to create their own group out of users on the Friends List, or users with similar profiles. After forming the group they must be unable to join other groups.

2. **Form a Group manually**
    a. **View List of Similar Users:** User can view a list of all other users with similar profile information and preferences.
        - **Test A:** Similar Users: The user will attempt to view a list of similar users. The users listed must all be within a certain degree of similarity, and more similar users shouldn't be passed up for less similar users. All information must be present, and formatted correctly.
    b. **Send Request to Join a Group:** User can send a request to join a pre-existing group
        - **Test A:** Accept: A user sends a request to join a group and the group accepts. The user must have access to all group features the other members have access to.
        - **Test B:** Deny: A user sends a request to join a group and the group denies. The user must not have access to any group features the other members have access to.
    c. **Request User Join your Group:** Users already in a group can request other users to join their carpooling group.
        - **Test A:** Accept: A group sends a request to join a group and the user accepts. The user must have access to all group features the other members have access to.
        - **Test B:** Deny: A group sends a request to join a group and the user denies. The user must not have access to any group features the other members have access to.
3. **Manage group**
    i. **Switch which user is the driver:** Groups can switch who is the group's driver at any point
        - **Test A:** Switch Driver: A group attempts to switch one driver in the group to another driver within the group. The switch must succeed. The new driver must be able to see all relevant driver information, and the old driver must no longer be able to see it.
        - **Test B:** Switch Failure: A group attempts to switch one driver in the group to a rider in the group, or a user in another group. The switch must fail.
    ii. **Organize pick up/drop off spots:** If users do not want to provide their personal address to be picked up at, a public pick up/drop off spot can be set.
        - **Test C:** Creating Valid Public Spots: A group member creates a public meeting spot, within an acceptable distance of the campus. The creator of the spot must have their address removed from the driver's route.

- **Test D:** Creating Far Public Spots: A group member creates a public meeting spot, outside of an acceptable distance of the campus. The spot creation must halt.

## 3.4 Communication

1. **Messaging**
    a. **Message Group:** When a group is formed, members can message one another as a group to discuss their next ride
        - **Test A:** Send/Receive Message: A user has joined a carpool group. They will send a message in the group messaging feature. All other members of the group must receive that message.
        - **Test B:** Message Order: Users have joined a carpool group. They will take turns sending different messages. When other users view the messages later, they must all be listed in chronological order.
    b. **Message Individual Group Members:** Members of a group may also reach out and message other group members individually
        - **Test A:** Send/Receive Message: A user has joined a carpool group. They will send a message to a single group member using the individual messaging feature. Only that member should receive the message.
        - **Test B:** Message Order: Users have joined a carpool group. Two users will take turns sending different messages to each other. When they view the messages later, they must all be listed in chronological order.
2. **Notifications:** Users may receive multiple types of push-notifications on their device related to their carpooling trip. These notifications include…
    - **Test A:** Group Request: A user will request to join a group. The members inside the group must all receive a notification.
    - **Test B:** Message Request: A user will send a message to a group/member. Everyone who receives the message must receive a notification.
    - **Test C:** Upcoming Carpool: A user will have joined a group with an upcoming carpool, as either a rider or driver. The user must receive a notification for the carpool the day before the driver is expected to arrive.
    - **Test D:** Upcoming Carpool: A user will have joined a group with an upcoming carpool, as a rider. The user must receive a notification for the carpool 15 minutes before the driver starts driving. The notification must allow the user to either confirm or deny that they're riding in the carpool.
    - **Test E:** Time To Leave: A user will have joined a group with an upcoming carpool, as a driver. The app will calculate how long the driver's route will take, and send a notification 15 minutes before when they should leave to arrive on campus on time. The time must be accurate.
    - **Test F:** Driver is Arriving: A user will have joined a group with an upcoming carpool, as a rider. Once the driver begins their route, users in

the carpool must receive a notification 10 minutes before the driver is expected to arrive at their location. The time must be accurate.
- **Test G:** Driver is Arriving: A user will have joined a group with an upcoming carpool, as either a driver or a rider. After arriving at campus, every user on the trip must receive a notification asking them to provide feedback on the trip. Clicking on the notification must take users to a page where they can rate every other user in the ride, and also file a report if necessary.
- **Test H:** Incorrect Notifications: The notifications in tests D, and F must only appear to riders. The notification in test E must only appear to drivers.

## 3.5 Before the Trip

1. **Ride Confirmation**
    - **Test A:** Rider Cancel: A rider is a member of a group with an upcoming carpool session. When the rider cancels their ride, their location must be removed from the driver's route.
    - **Test B:** Driver Cancel: A driver is a member of a group with an upcoming carpool session. The driver cancels their ride. The app must assign the driver role to another member of the group, who is eligible to drive. If no eligible drivers are present in the group, all members of the group must be notified that the ride is canceled for that day.
2. **Know the Driver**
    - **Test A:** View Info: Before a ride, riders must be able to view information on their driver. All information must be present and formatted correctly.

## 3.6 During the Trip

1. **Driver Communication**
    - **Test A:** Driver Route: When a carpool session starts, the driver will receive an ordered list of locations to pick up riders from. After picking up a user from a location, that location must be removed from the list, and directions to the next location must be given. The list must also be ordered in such a way to reduce the total travel time of the route.
2. **Rider Communication**
    - **Test A:** Driver Location: During a carpool session, while the driver is en-route the user must be able to view the driver's location in real time. The location information must be accurate.
    - **Test B:** Pickup Confirm: After being picked up by a driver, a rider confirms that they were picked up. The rider must then have access to all During-Ride features, and also all After-Ride features once the ride is complete.
    - **Test C:** Pickup Unconfirmed: After being picked up by a driver, a rider does not confirm that they were picked up. They must not have access to any During-Ride or After-Ride features until they do so.

3. **Florida Tech Safe:** Drivers and Riders are given a link to the Florida Tech Safe app which provides access to all Florida Tech safety resources.
    - **Test A:** Open FLSafe: After a rider confirms being picked up by a driver, or after a driver starts their route, a user clicks on a button which opens the Florida Tech Safe app. The app must open.

## 3.7 After the Trip

1. **Provide feedback**
    - **Test A:** Give Rating: After a Ride is completed, the user must be able to input a rating out of five stars for their group members. This rating must be reflected in the rated users' rating (eg. on their profiles).
    - **Test B:** Complete Report: After a Ride is completed, a user reports another user in the ride. All report information is filled out. The report must succeed, and an administrator must be able to view the report.
    - **Test C:** Incomplete Report: After a Ride is completed, a user reports another user in the ride. Fields in the report have been left blank. The report must halt.

# 4. User Tests

- **Test A:** Group Recommendation Algorithm: The Group Recommendation Algorithm will be tested to make sure it accurately assesses user preferences. Testers will be asked to mark their preferences, then rank a list of groups from best to last. This will be compared to the ranking the Group Recommendation Algorithm outputs. The algorithm must deviate from user preference as little as possible.
- **Test B:** User UI: A tester will be handed a smartphone with the app downloaded, and asked to perform a variety of tasks with no assistance. These tasks will include, but are not necessarily limited to:
    - Registering an Account
    - Logging In to an Account
    - Setting up the Profile
    - Updating the Profile
    - Friending a User
    - Blocking a User
    - Joining a Group though Recommendation
    - Joining a Group through User Search
    - Creating a Group
    - Leaving a Group
    - Setting up a Public Meeting Spot
- **Test C:** Field Test: Testers will be placed inside a group with an upcoming carpooling session. The driver will need to travel to every pickup spot and pick up every rider in the group. Once the ride is over, every tester will need to submit a rating of the others in their group.