

User Interface Design Project Report

Development Document

Trip Planner

Meng-yi Hsu

Using the Foursquare APIs(v2), our team has developed an application that helps users to make schedules for trips. The Foursquare application provides access to a wide variety of information about venues, however, it does not provide the function for users to plan trips to these venues. Our application allows users to search for and select venues by certain criteria, and create and arrange itineraries with these venues.

1. Overall Process

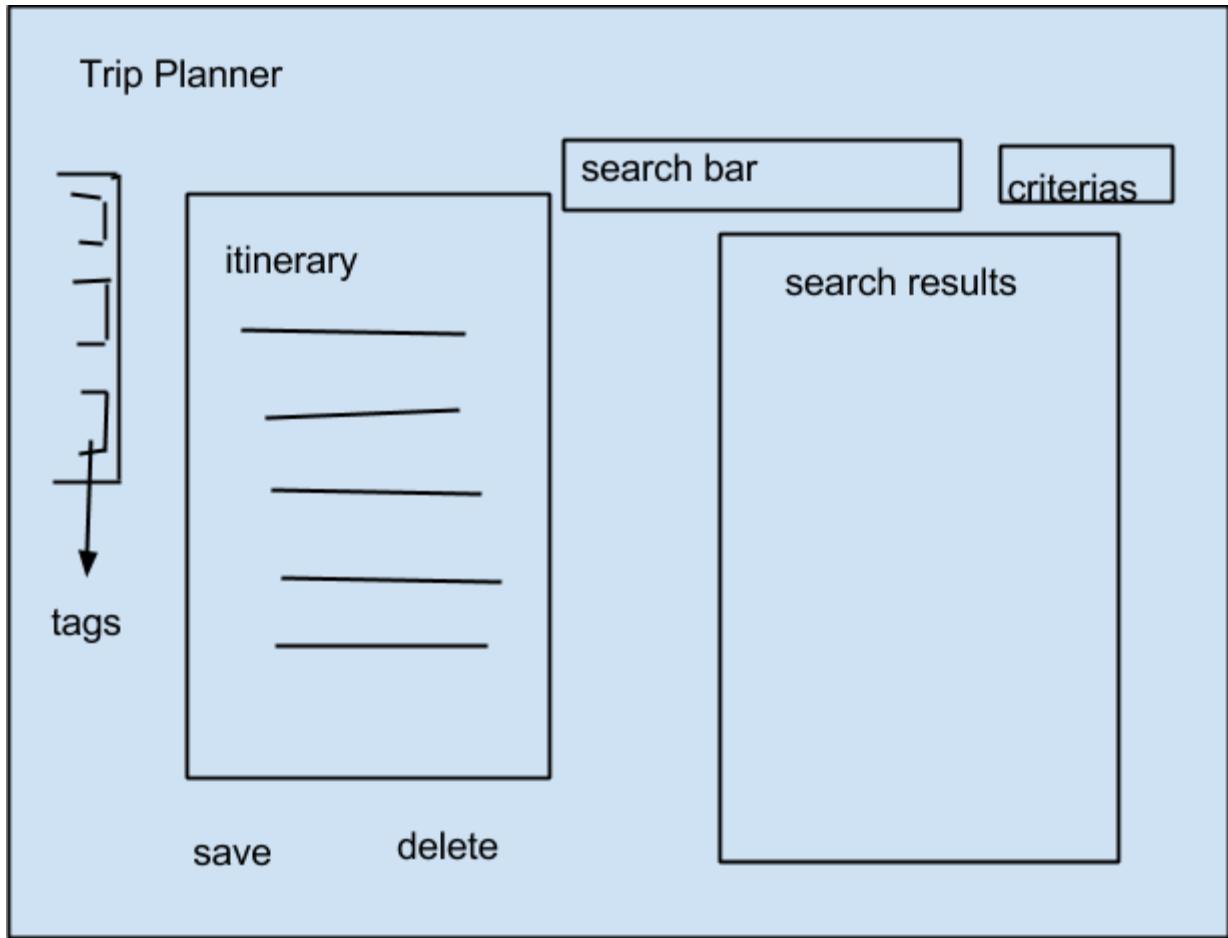
Our team developed the application by the following steps:

1) Determine Target Users, Personas and Use Scenarios

In our team's first meeting, we determined our target users, and designed two personas as well as two use scenarios. After going through the requirement for this project, we got a basic idea of the application's functionality and decided that the target user group should be one that we are familiar with, so that it will be easier for us to cater to their tastes and needs when designing the user interface. This is described in detail in the second part of this document.

2) Making an Initial Sketch

Having had an basic idea of the functionality and target users, we went on drawing an initial sketch of the overall layout of our application (as shown below).



The Initial Sketch

In this sketch, we already included the function of searching venues, adding venues to itinerary, saving and deleting venues and itineraries and maintaining multiple itineraries. However, we had not gone in details about how the creating and editing were to be done. Obviously, this sketch was subject to any later design decisions and changes.

3) Lo-fi Prototyping, Testing and Analyzing

After drawing the initial sketch and some further discussions, we developed the lo-fi prototype that captured our early design decisions on the overall layout and the way the system interacted with users. Then we tested the prototype within our group, made records and analyzed the test results. And some changes are made during after that. This process is illustrated in detail in the third part of this document.

4) Hi-fi Prototyping, Testing and Analyzing

With the refinement made from lo-fi prototyping, we used my Balsamiq to build our hi-fi

prototype. This time we had two fellow students who are not enrolled in UI design class to serve as users and conducted usability test in the process of which they are invited to think aloud while we recorded their behavior and facial expressions. By analyzing the test results at this stage, we decided on some further refinement of our prototype. This process is illustrated in detail in the fourth part of this document.

5) Building the Application with Final Design Decisions

After the lo-fi and hi-fi prototyping, we reached our final decisions of the design of the layout and the implementation details. At this stage, we got down on building the application using HTML5, Javascript, and the Foursquare APIs(v2). While testing the functionality and implementation of the application through building process, trivial modifications might have been made due to technical issues, which would not influence the overall design. The final result is shown in the demo video.

6) Writing Development Document, User Manual and Making Demo Video

As the last step of our development process, we write up the documents recording the whole process, reasoning our development method and justifying our design decisions. Also the user manual and demo videos are made showing how our application are used to perform specific tasks.

2. Target Users

We have made changes to this part according to the advice the TAs gave after the submission of the initial design concept. And the use scenarios were subject to little modifications as the development process went on.

1) Description of users

Our target user class includes people are within the range of 18 to 30 years old. They are mostly college students and people who just started working. Our users are the kind of people who loves using technologies and enjoys traveling. For college students, they have relatively more time to spend, but more tight on their budget. Almost opposite of that, people who just start working have less time, but they have more money to spend

compared with college students. Differences on financial status and available time will be the major factors that affect their choices on searching criteria and venues.

2) Tasks the users are interested

1. To make a schedule of their trip with our application, the users create new itineraries which are in the form of timetables, name it with a title, and set the date. They add venues into the itinerary to their desired time range and save the venue.
2. To add venues to itineraries, the users search for venues with key words and criteria for location. They pick up the venues in the search results and add them to one of the itineraries that they keep. While adding the venue, they set the event's time range and write some comment if needed.
3. To further arrange their trips, the users edit their itineraries, rearrange the events' time range, change the content of comments, delete certain venues.
4. To make plans for trips that are more than one day, the users maintain multiple itineraries. They also keep more than one itineraries for one day as alternative plans. After they have decided or the itinerary is no longer needed for other reasons, they can delete the itineraries.

3) Personas

1. Joyce, 20 years old, a college student studying computer science at Columbia University. She enjoys traveling with her friends and exploring new places. She and her friends enjoys hiking and all kinds of out door activities.
2. Tom, 28 years old, a software engineer works at a big IT company. He enjoys fancy restaurant, going to bars and shopping for technology products. He's also interested in art, so he sometimes goes to museum on weekends. He always enjoys his relaxing time on his own.

4) Use scenarios

Scenario 1

a.Joyce is planning the trip to California for her and her friends for spring recession(2 days trip). She opens the trip planning website and she sees itineraries she saved from last time on the right side of the screen. The first tag is her itinerary for the first day and the second and third are the two alternative plans for the second day.

b.She clicks on the second tag and the itinerary shows up.

c. She thought for a while and decides to take a look at the other plan. So she clicks the third tag in the itinerary tag list, and the timetable on the right side now shows the schedule for this plan.

d. Joyce decides that she should go for the second plan except she needs to change the events in the morning to the afternoon. She clicks on the event between 10 am to 12 pm.

e. A window pop out asking the new time for the change. She inputs the time and clicks on the “OK” button.

f. Now the event is in the afternoon, and she clicks on the “save” button to finish editing.

g. She goes on deleting the first plan. She clicks on the second tag and drags it to the delete button on the right button of the timetable. A box pops out asking “Are you sure to delete this itinerary?” and Joyce click on “yes”.

Scenarios 2

a. Tom has just finished a big project and he wants to take some day off to have a vacation by only himself. He decides to go to California. He wants to make a elaborate plan to truly relax himself. His friend recommended him to use a website called “TripPlaner”, so he decides to use it to make the plan this time. First, he goes to the main page and a box is popped asking whether he wants to create a new itinerary. He wants to do it later so he clicked cancel.

b. The box disappears and he sees the main page, with a search bar on the left and a blank box on the right. He types in San francisco, CA and searches for restaurants. However no search result comes out, and a line appears above the search bar suggesting that he check his typo. And he found out that he mistakenly typed “San transfisco” instead of “San francisco”.

c. He corrected the type and searched again. A list of restaurants comes out under the search bar.

d. He then clicks on the create button under the box on the right side of the screen. A window pops out asking him to set the title and date for the itinerary. He input the information and hit OK.

e. He chooses a certain item in the search results, and drags it to the calendar. A box pops out asking him to set the time range for the event. He input the time and hit “add”.

f. He clicks on the save button. A box pops up asking him to confirm the information of the itinerary, and he clicks "yes". So the new itinerary is saved.

3. Lo-fi Prototyping and Testing

1) What is Lo-fi Prototype and Why Lo-fi Prototype

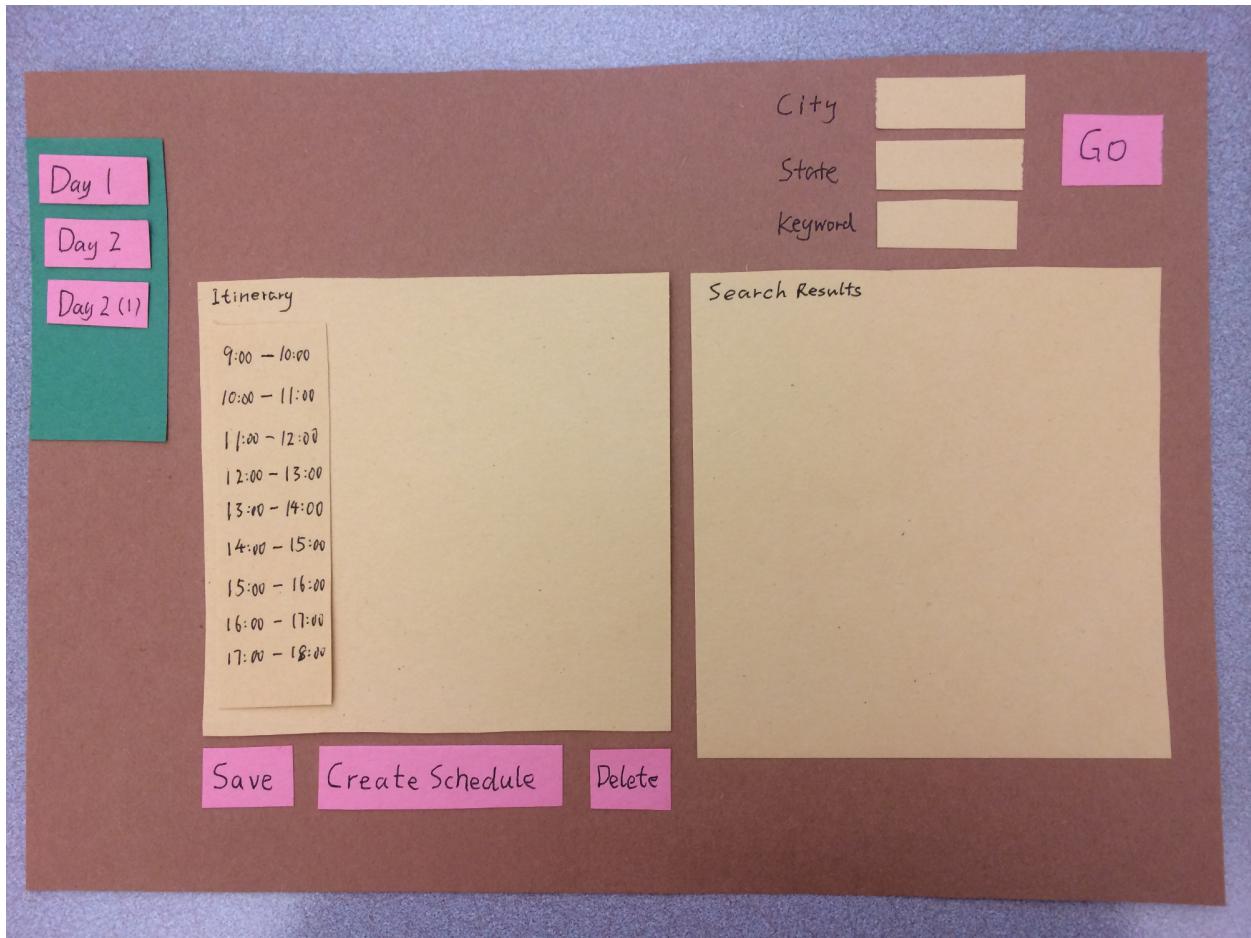
Lo-fidelity prototype is a method used in user-centered design process, using paper or other low-tech material to provide rough sketches as approximation of the system. For interactivity, separate pieces of paper are used to mock up everything that moves and changes. In the early stage of development, the lo-fi prototype has the following advantages:

- a. In lo-fi prototype, no programming is needed, so that the creation process can be relatively easy and lessens the workload.
- b. The "paper programming" costs less and allows more iterations. Also, the human computer can never crash, saving a lot of trouble with nasty implementation details. Changes are easily made.
- c. With lo-fi prototype, all the team members can gather together and work on the sketches at the same time. This would be better for itinerary exchanging ideas and modifications on the prototype are easily made with paper.
- d. With paper prototype, we can emphasize more on the content and functionality of the application instead of its appearance, thus avoiding low-level visual detail. As a result, both developers and test users are better focused on the high-level design.

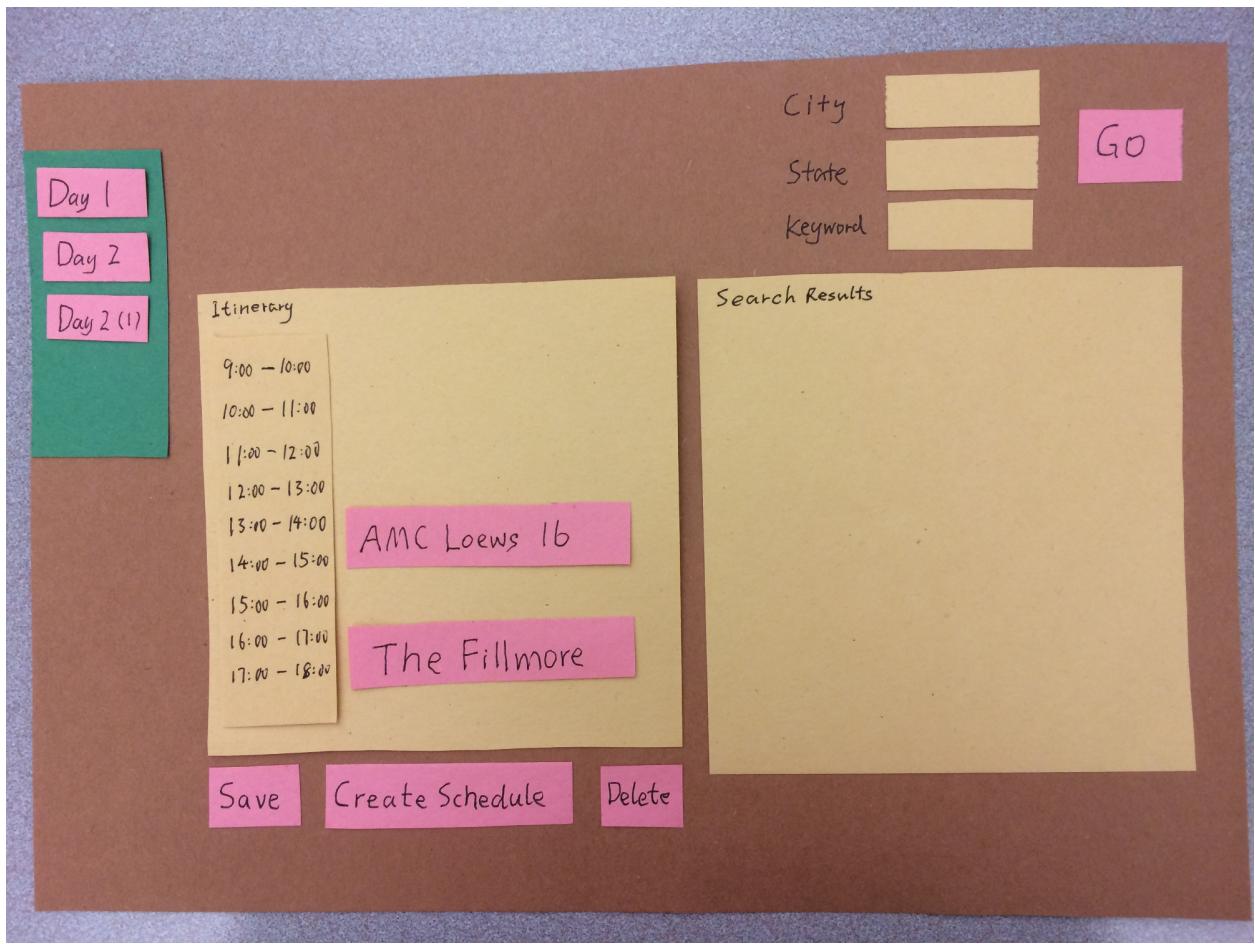
2) Prototyping Using Story Board

Story Board 1

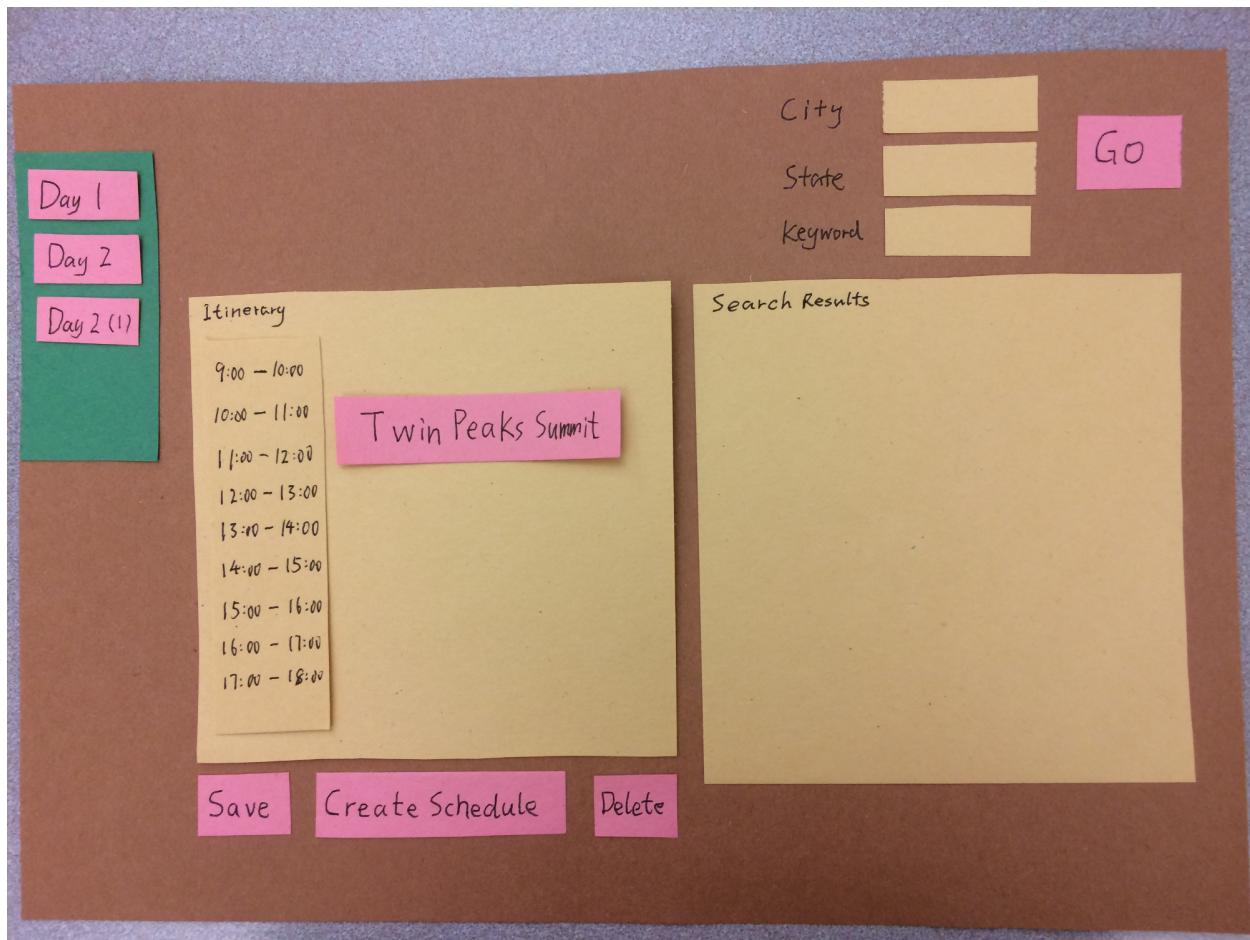
a. Joyce is planning the trip to California for her and her friends for spring recess (2 days trip). She opens the trip planning website and sees itineraries she saved from last time on the left side of the screen. The first tag is her itinerary for the first day and the second and third are the two alternative plans for the second day.



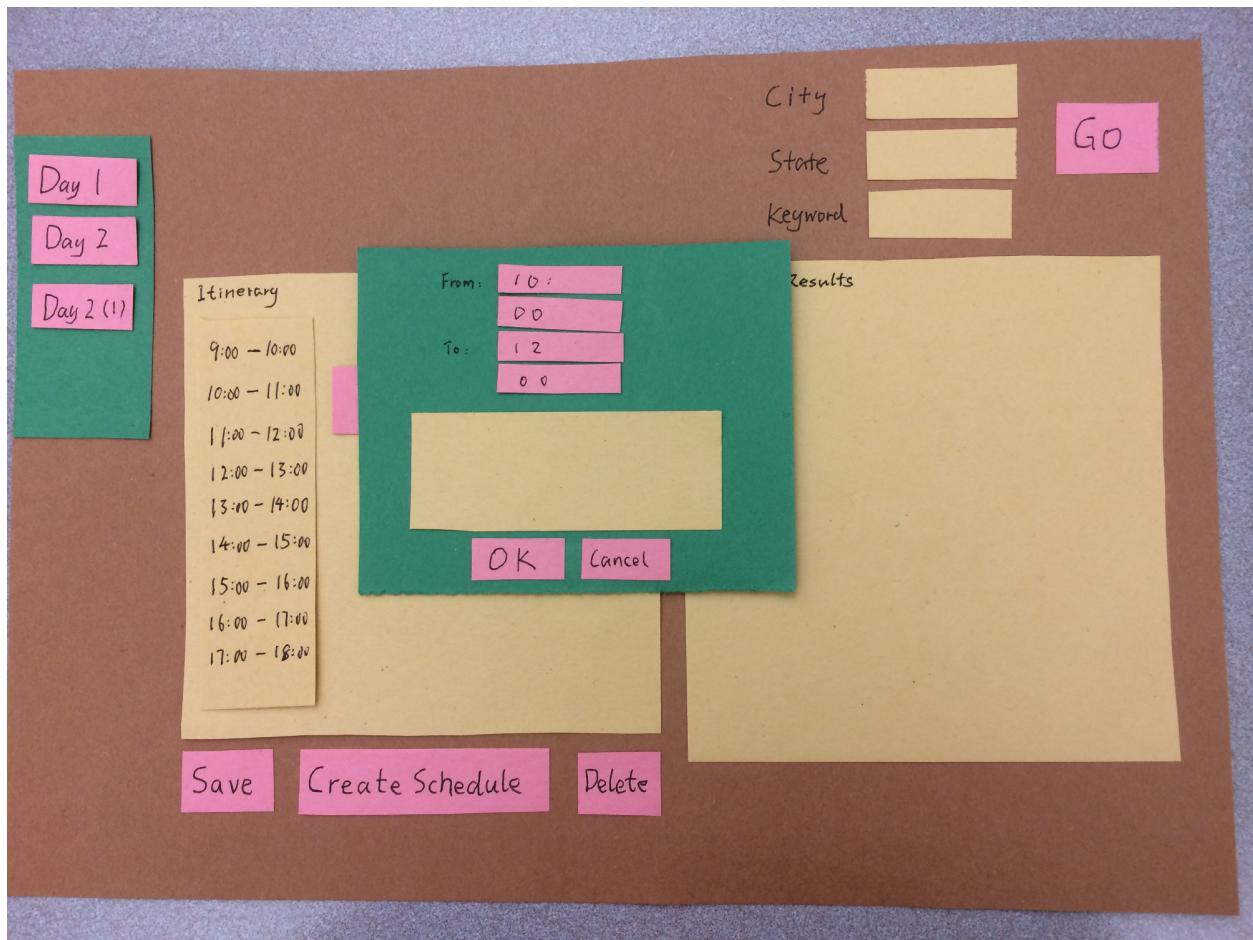
b. She clicks on the second tag and the itinerary shows up.



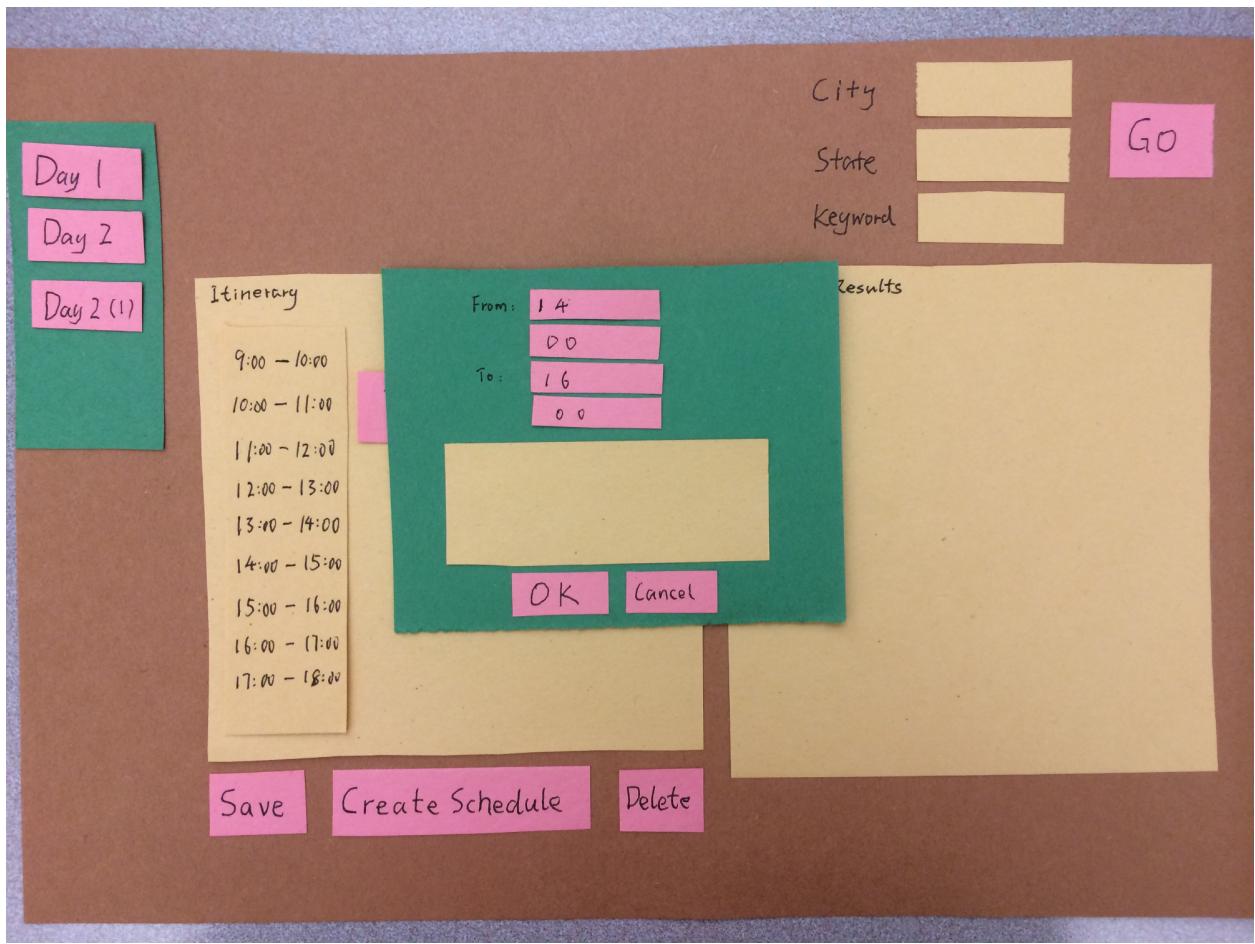
c. She thought for a while and decides to take a look at the other plan. So she clicks the third tag in the itinerary tag list, and the timetable on the right side now shows the schedule for this plan.



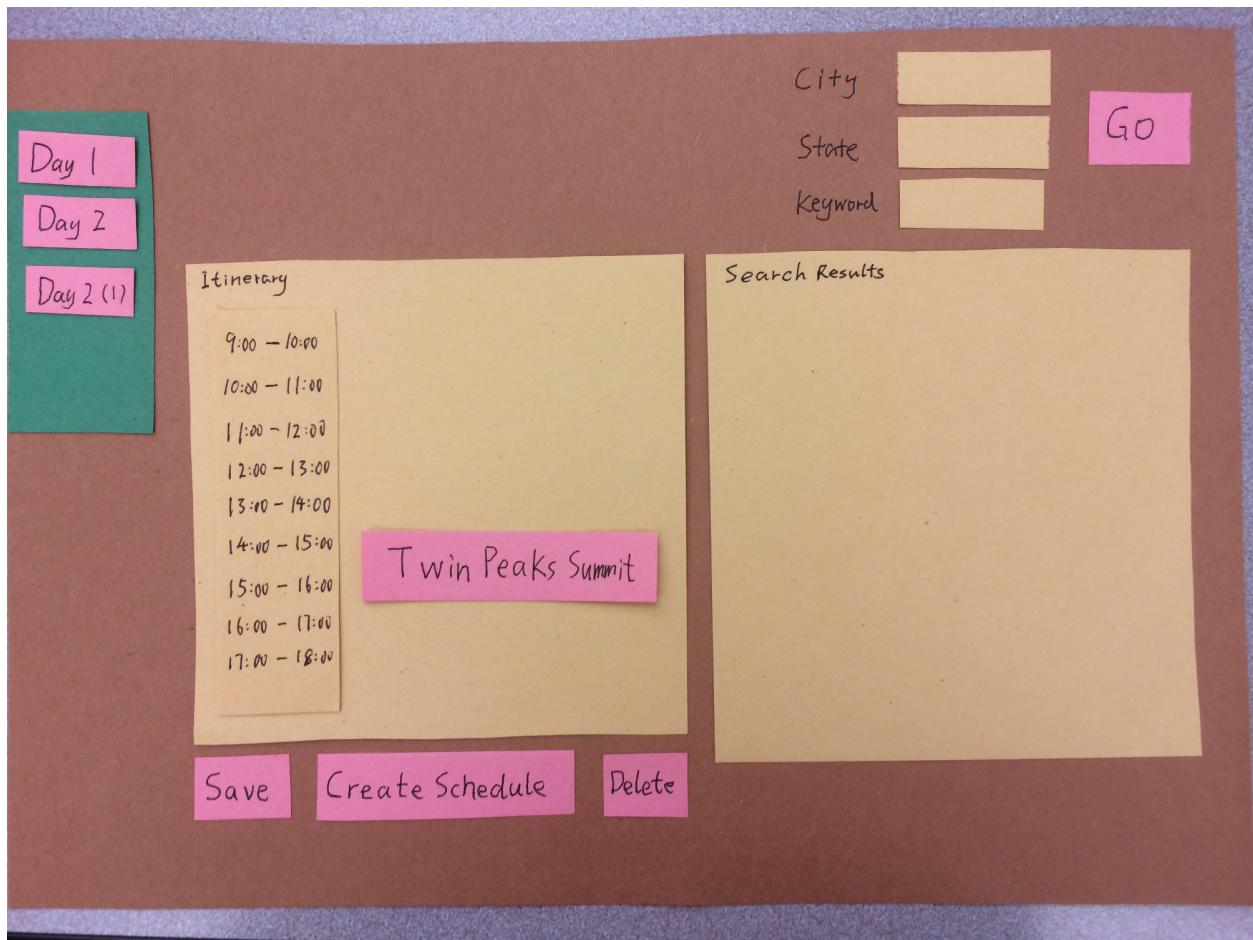
d.Joyce decides that she should go for the second plan except she needs to change the events in the morning to the afternoon. She clicks on the event between 10 am to 12 pm and a box pops out letting her to set the new time..



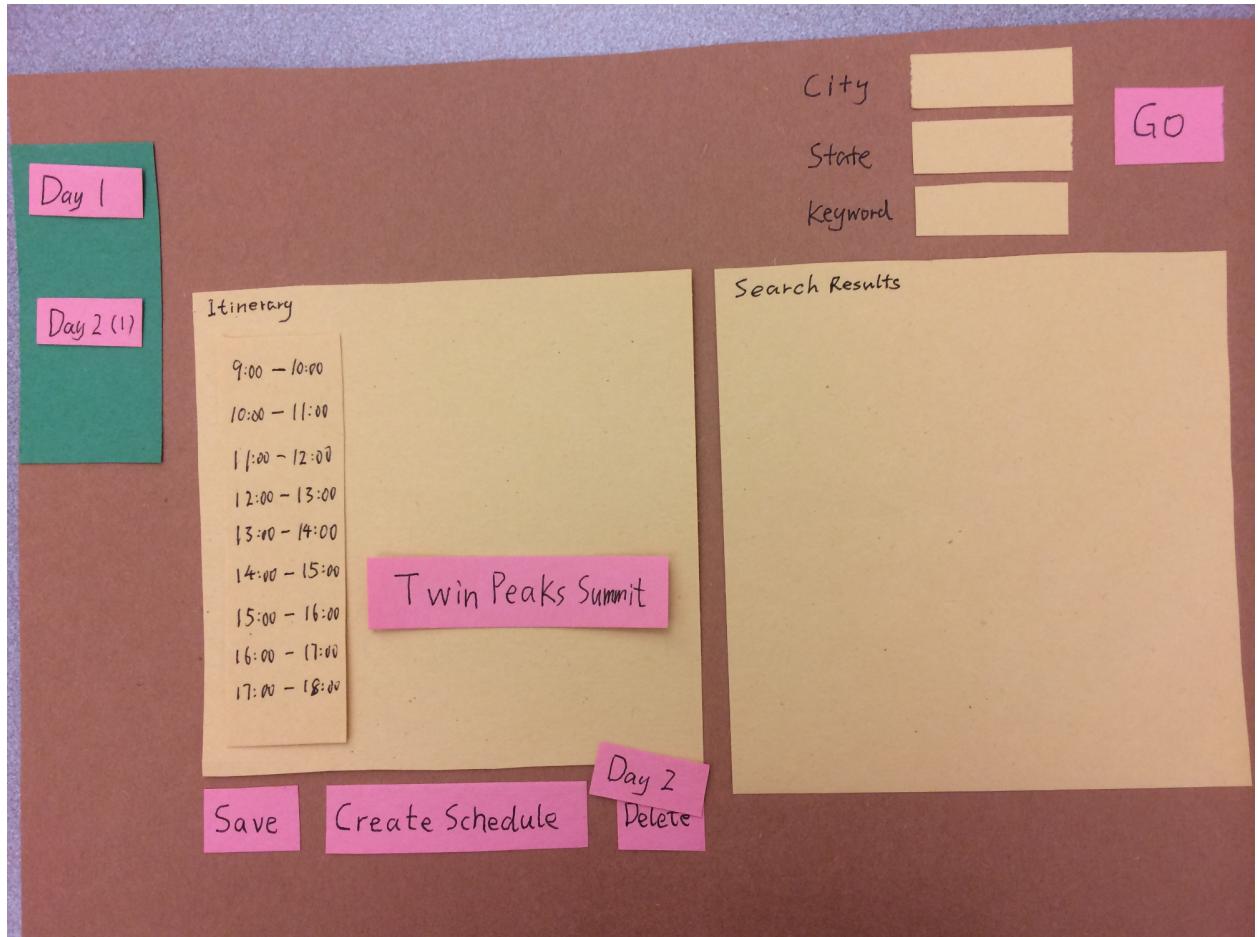
e. She inputs time and hit “OK”, and the event is moved to the afternoon.



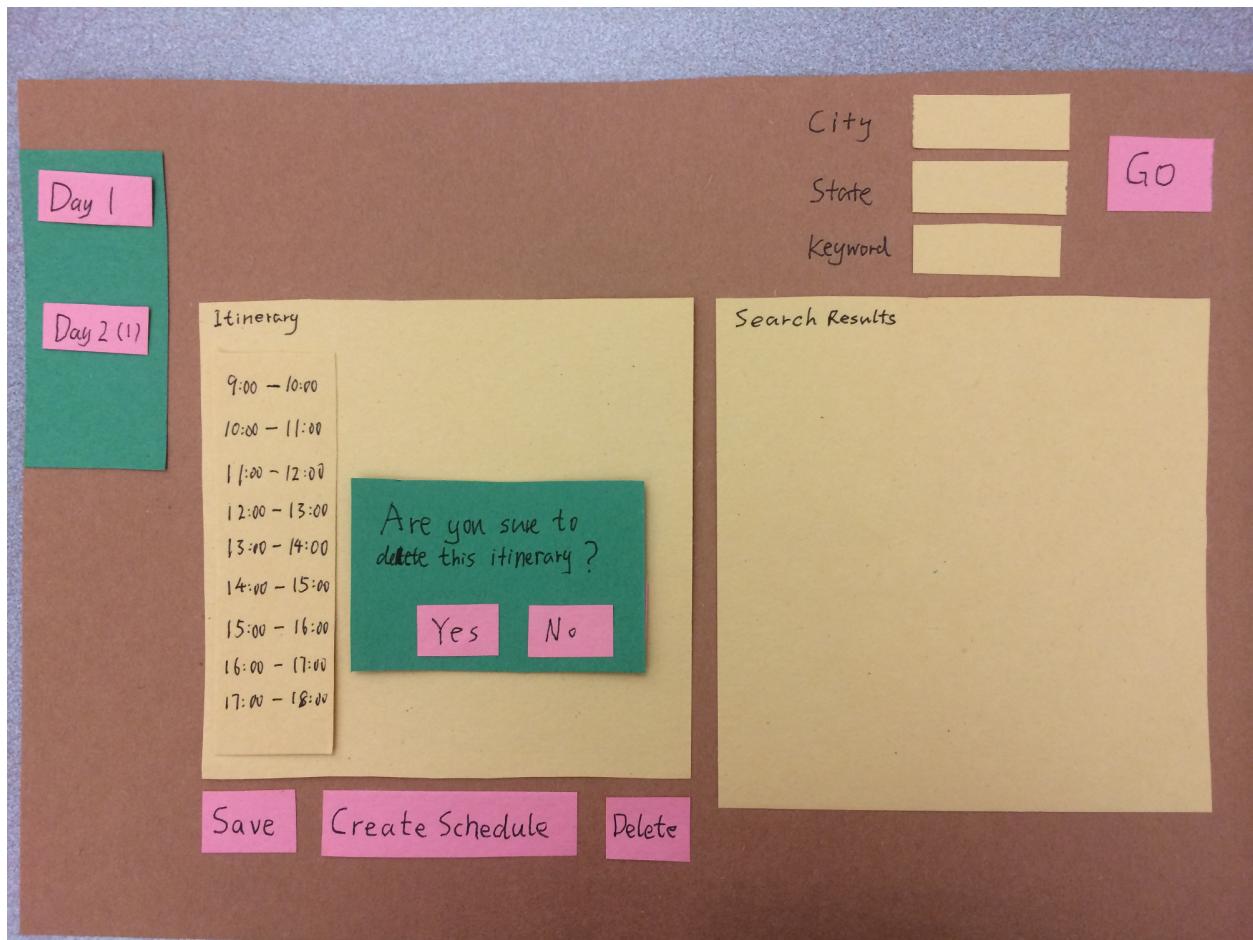
f. Now the event is in the afternoon, and she clicks on the "save" button to finish editing.



g. She goes on deleting the first plan. She clicks on the second tag and drags it to the delete button on the right button of the timetable.



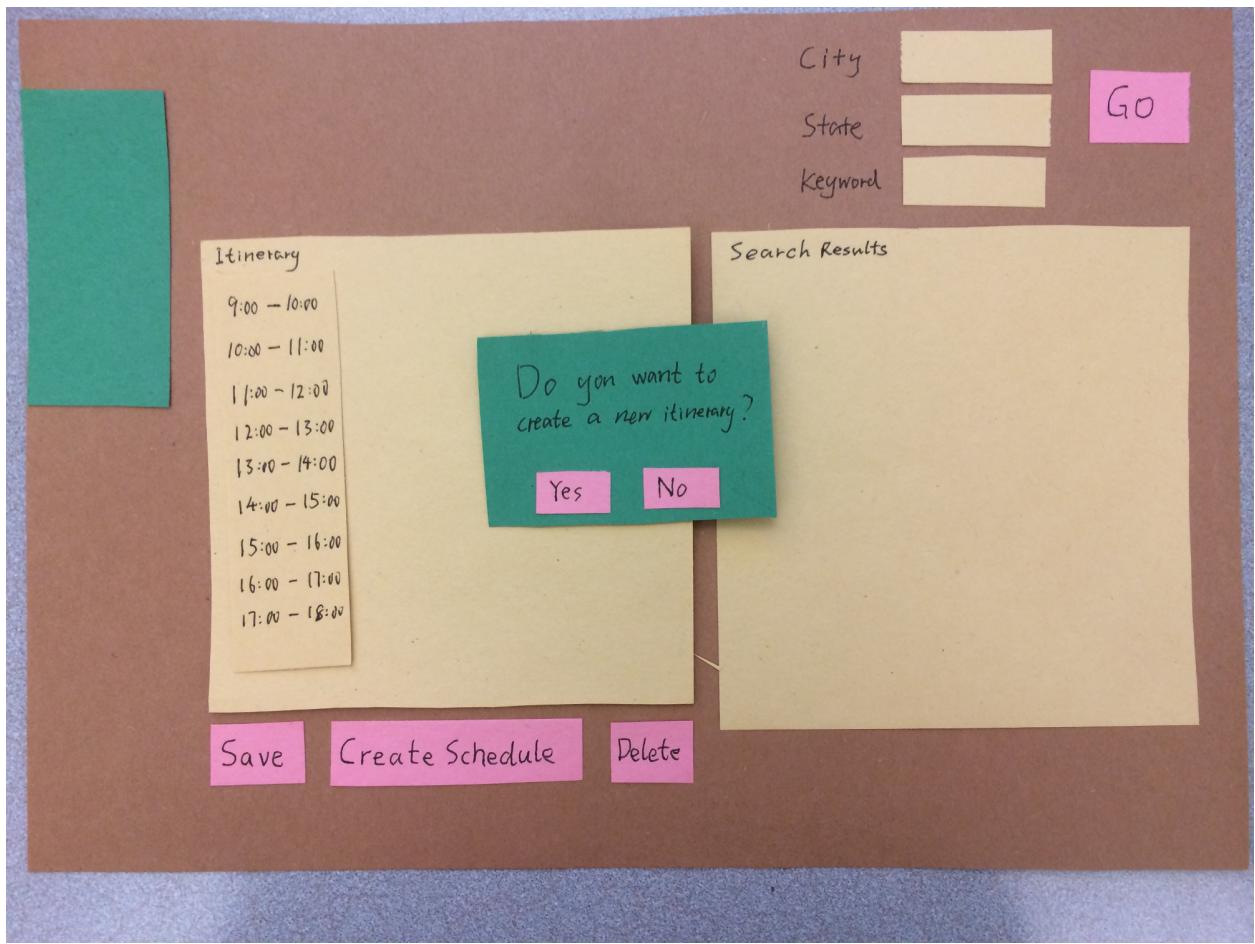
h. A box pops out asking “Are you sure to delete this itinerary?”



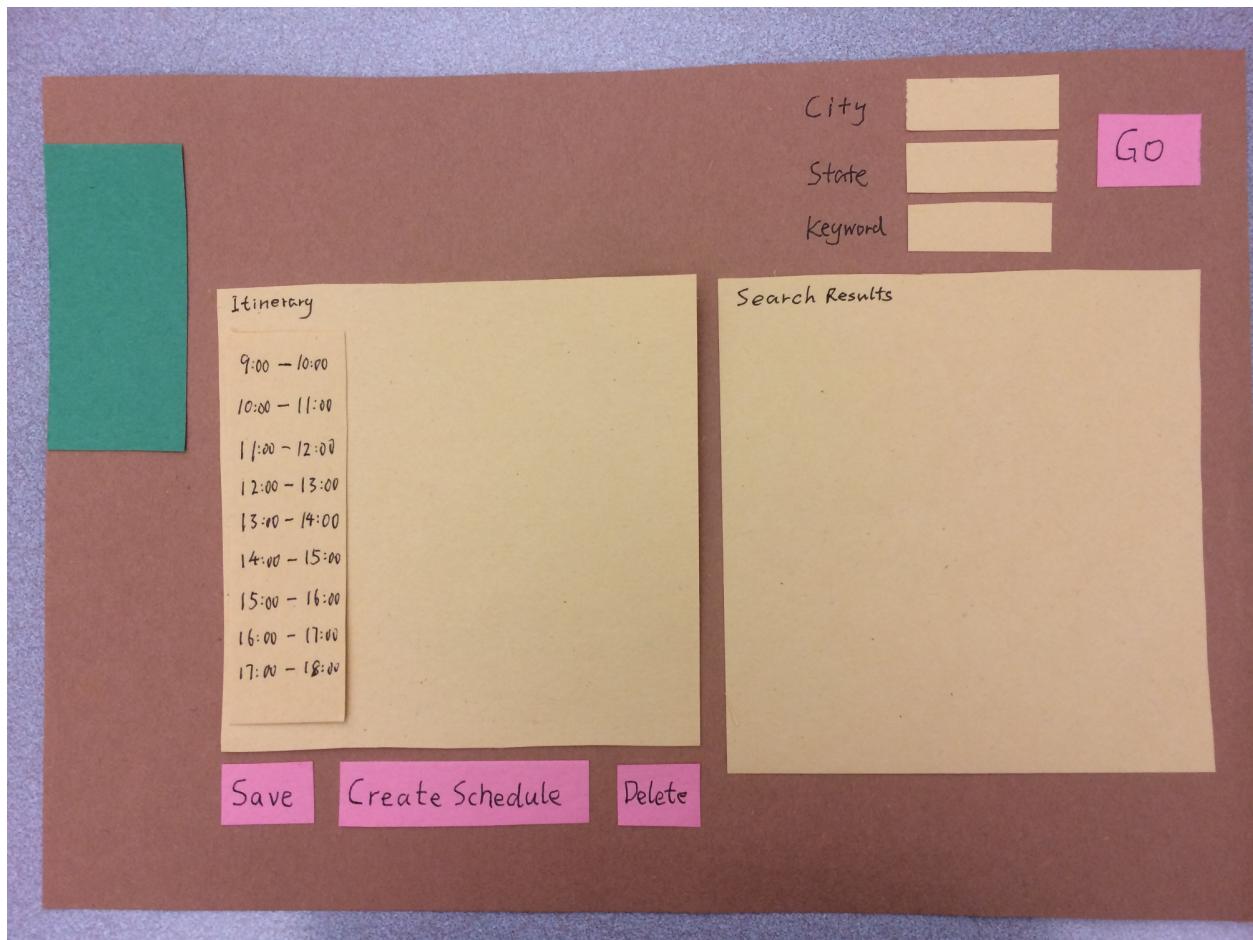
i. Joyce click on “yes”.

Story Board 2

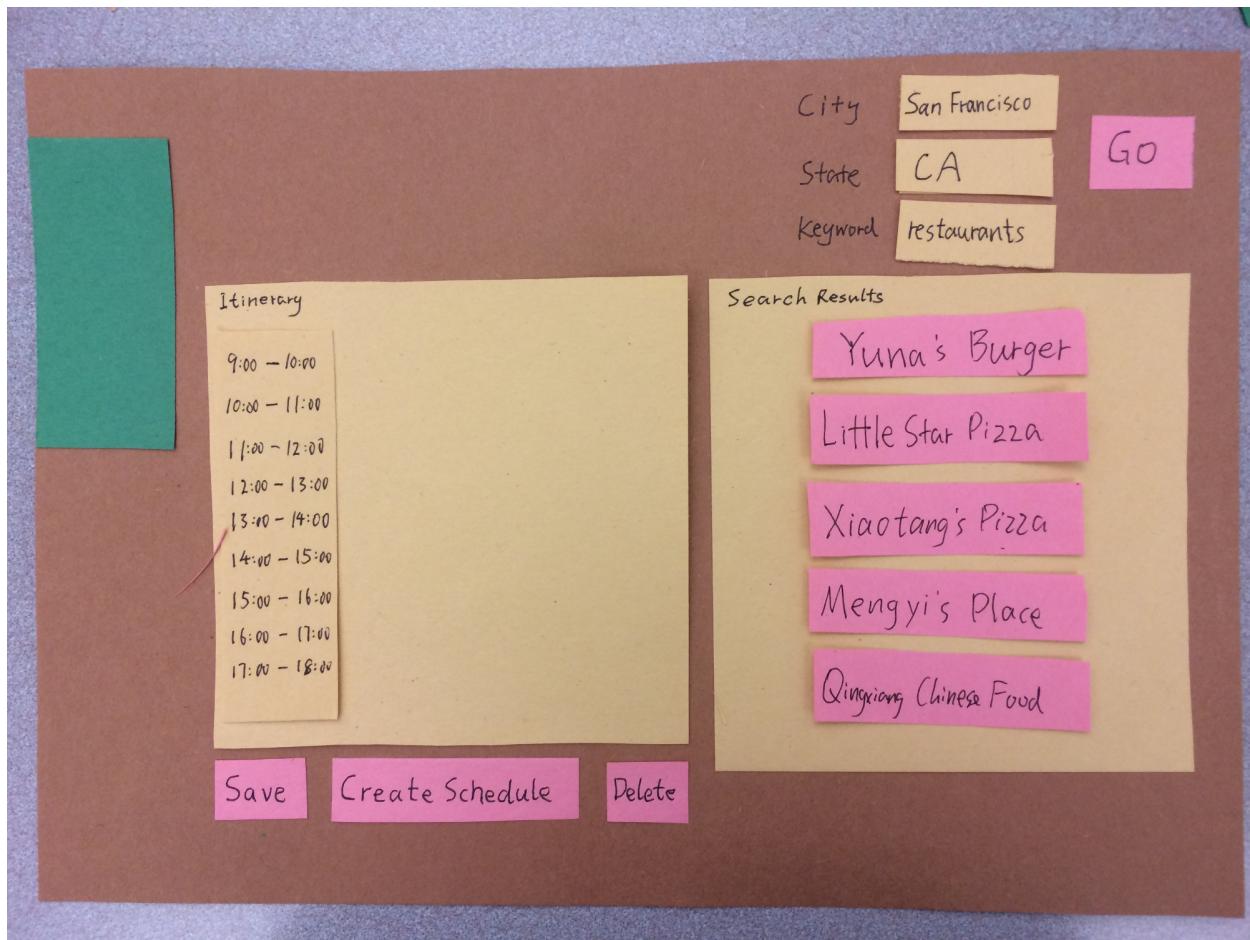
a. First, Tom goes to the main page and a box is popped asking whether he wants to create a new itinerary.



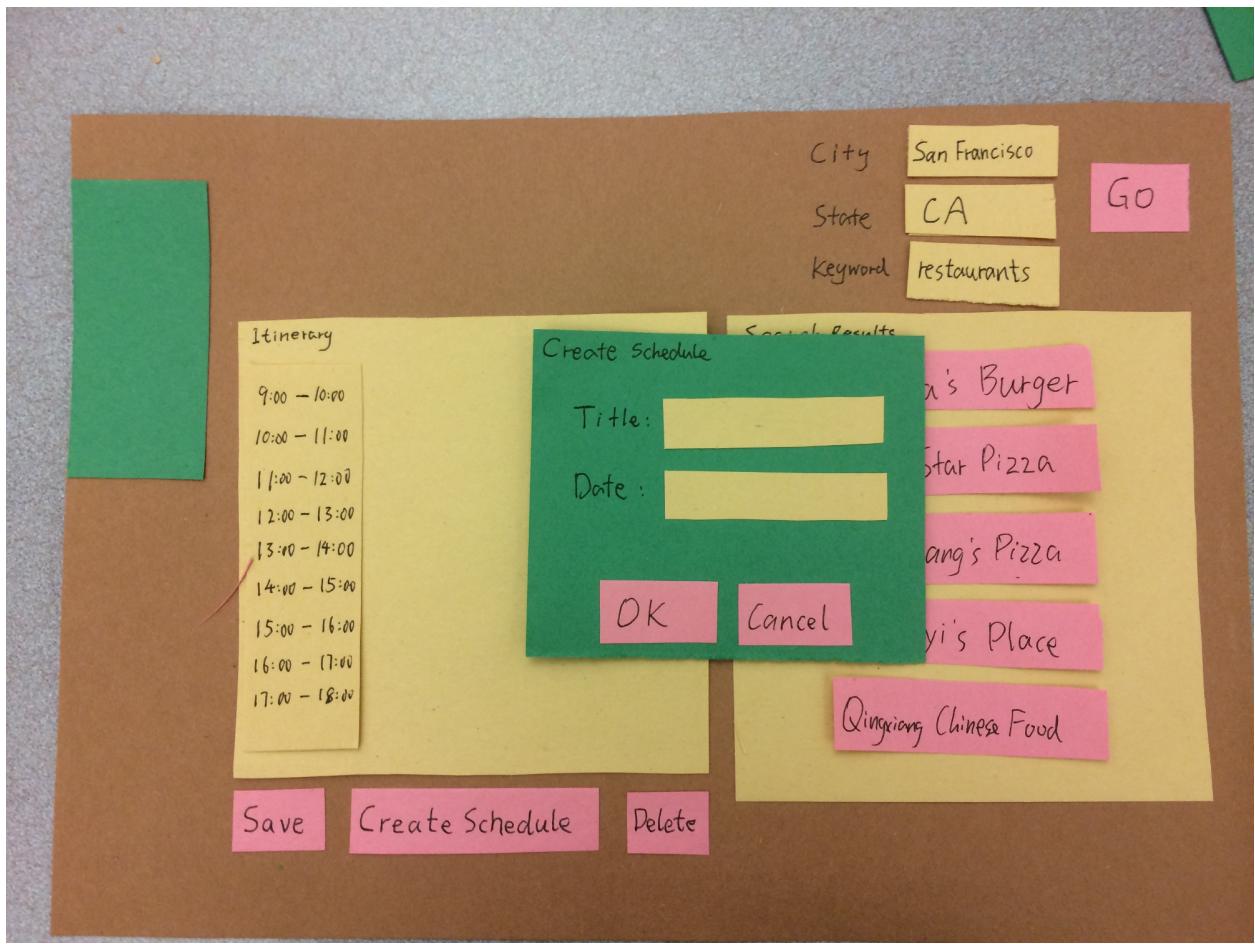
- b. He wants to do it later so he clicks “No”. The box disappears and he sees the main page, with a search bar on the right and a blank box on the left.



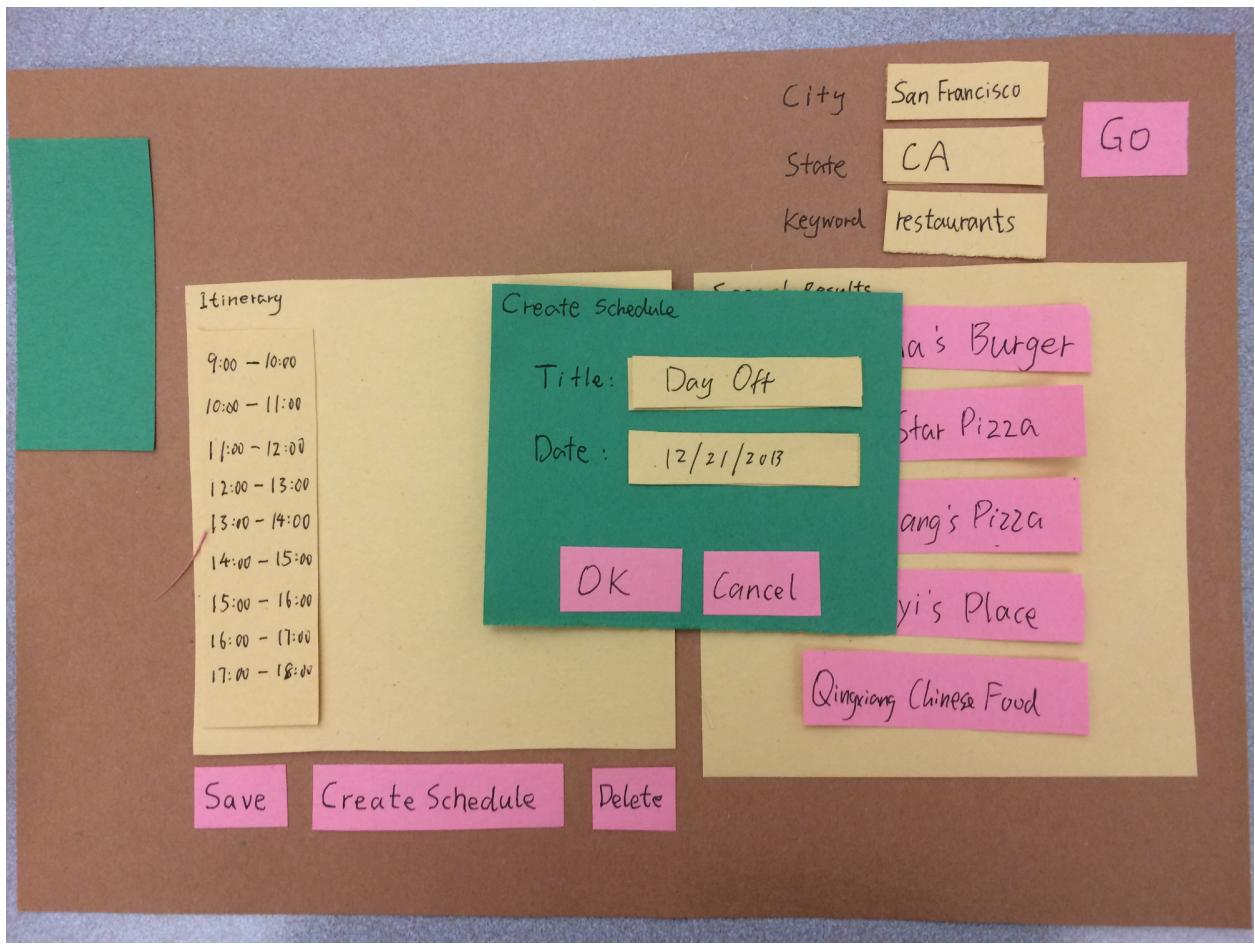
- c. He types in San francisco,CA and searches for restaurants. A list of restaurants comes out under the search bar.



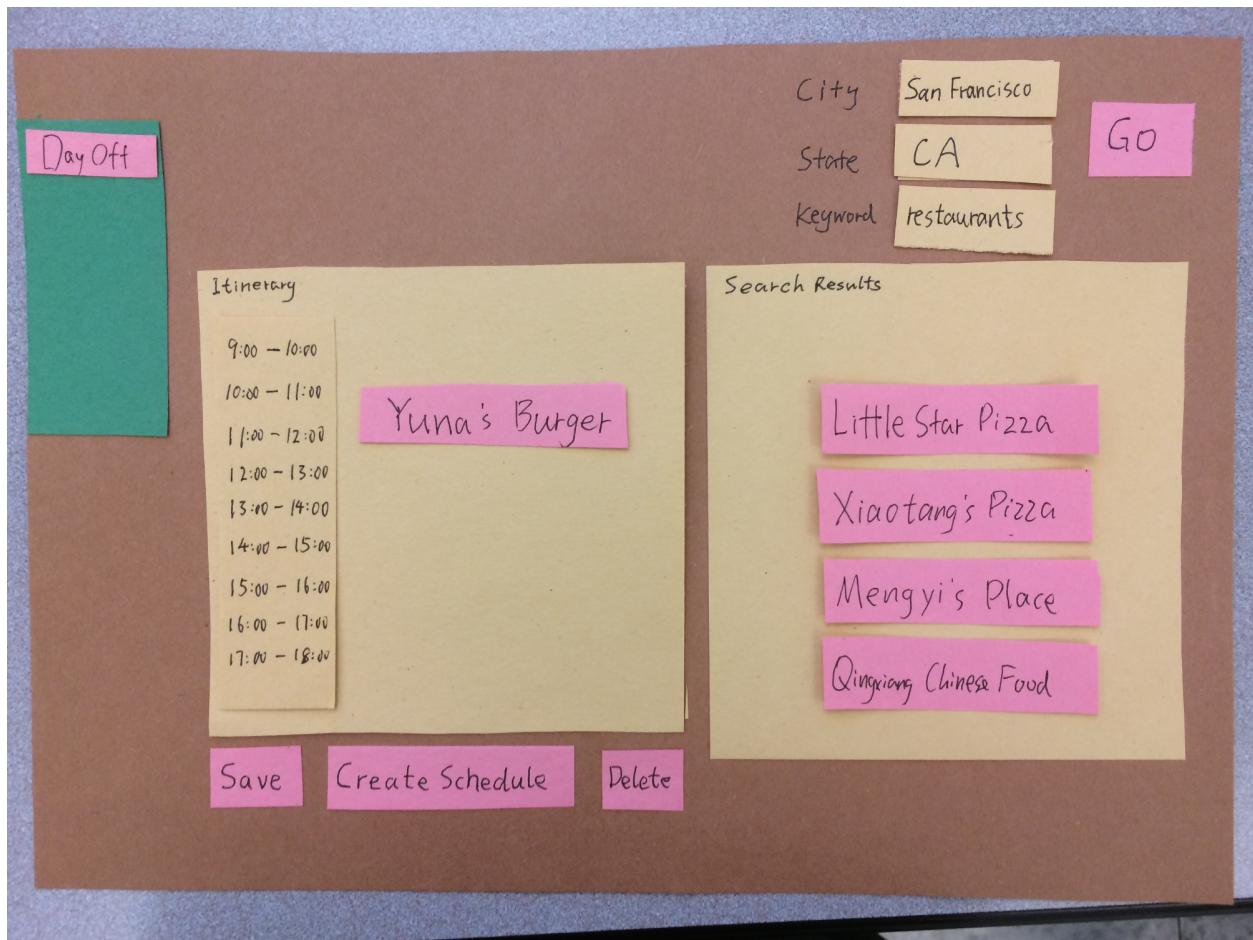
d. He then clicks on the create button under the box on the right side of the screen. A window pops out asking him to set the title and date for the itinerary.



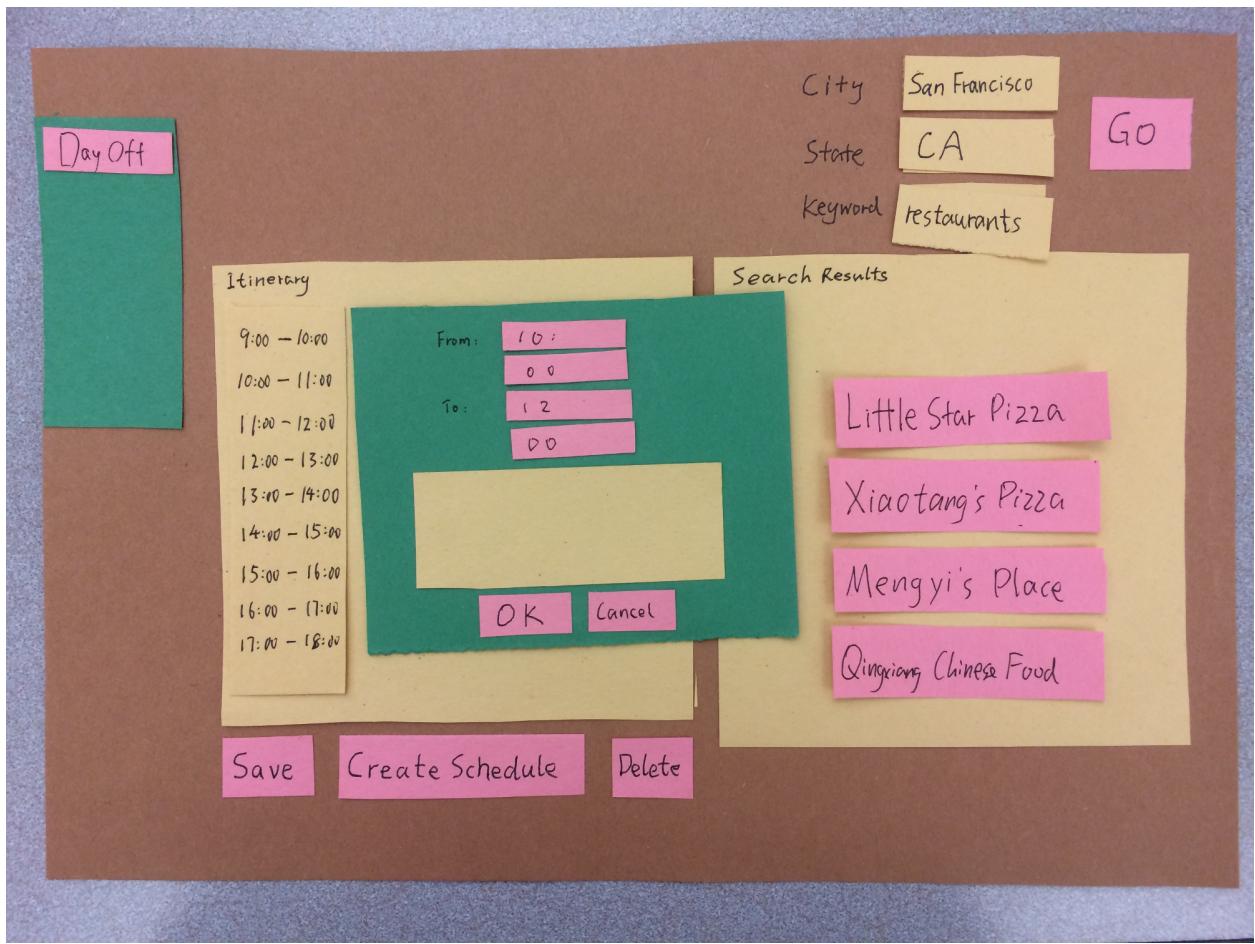
e. He input the information and hit OK.



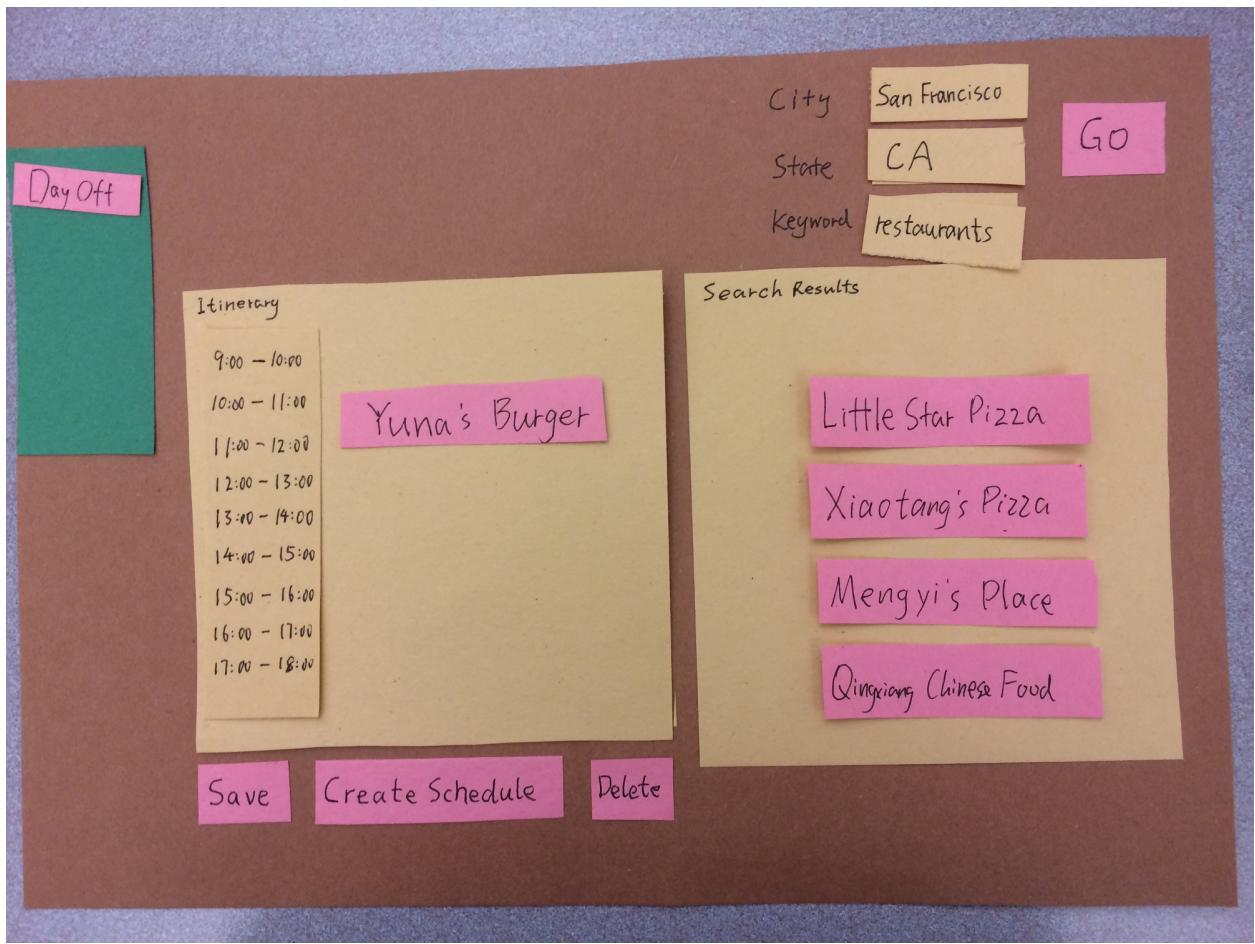
f. He chooses a certain item in the search results, and drags it to the calendar.



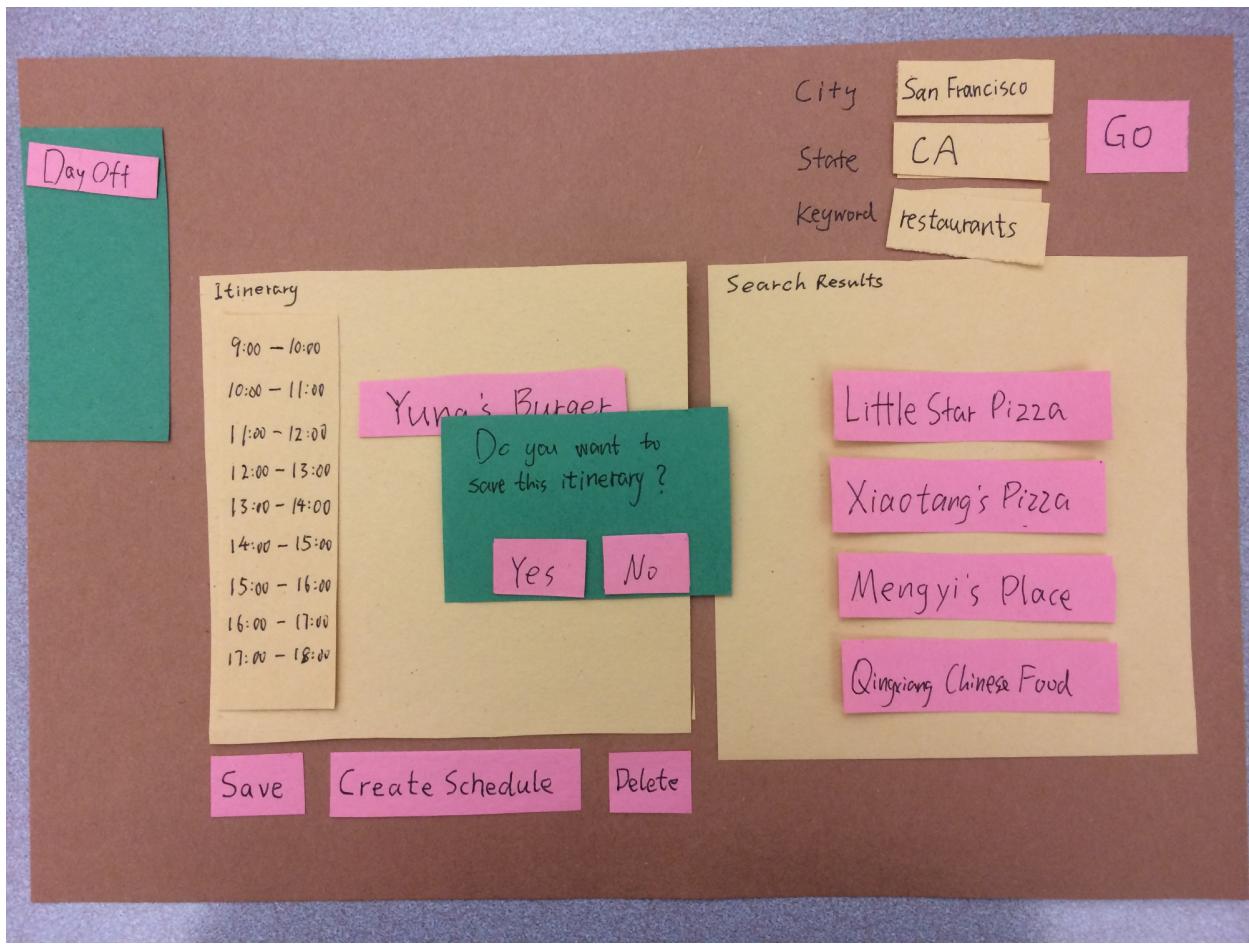
g. A box pops out asking him to set the time range for the event. He input the title and date.



h. Then he clicks "OK."



- i. He clicks on the save button. A box pops and asking him to confirm the information of the itinerary.



j. He clicks “yes”. So the new itinerary is saved.

3) Testing

We conducted three tests within our team, each time one team member played as the human computer, one acted as the observer and note taker and one acted as the tester. And here are the role assignment for the three tests:

- In the first test, Qingxiang Jia acted as human computer, Yuna Jing acted as the greeter, observer and note taker, and Meng-yi Hsu acted as the user.
- In the second test, Qingxiang Jia acted as human computer, Yuna Jing acted as the greeter, observer and note taker, and Xiaotang Wang acted as the user.
- In the third test, Qingxiang Jia acted as human computer, Xiaotang Wang acted as the greeter, observer and note taker, and Yuna Jing acted as the user.

After the three tests, the notes were collected and analyzed.

4) Analysis and Modifications

Here we analyzed notes taken during each test, and made some modifications.

a.

Notes from test 1

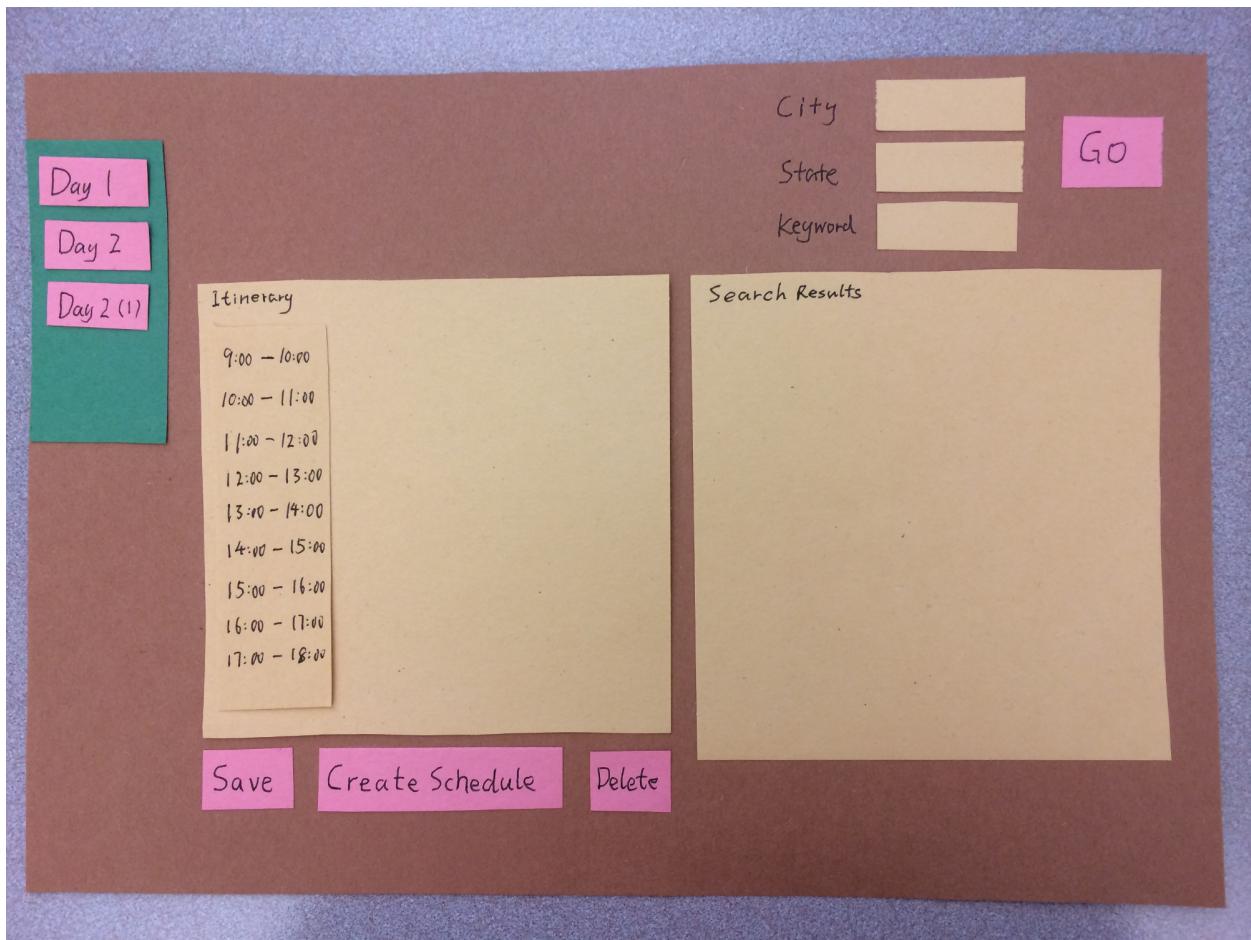
- The user thinks the overall layout is simple and fulfills basic functionality.
- The user points out that the way putting schedule on the left and search result on the right is not as convenient for right handy users to drag the items, and suggests they be arranged the other way round.

The first user suggests that the placement of schedule and search list be exchanged to meet the convention of right handy users in dragging the items from left to right but not the other way round. As we thought about it, we noticed that in major search engines like Google and Yahoo, the search list are almost always on the left side of the screen.

As a result of this observation, we decided to rearrange the placement so that the design better fits the heuristics of “matching between the system and the real world” as it better meets the users’ convention and “Consistency and Standard” as it keeps major platform standard.

The modification is shown as below:

lo-fi:



hi-fi:

Trip Planner

b.

Note from Test 2

- The user thinks everything basically works.
- The user challenges the computer what happens when there are typos in city and states and pointed out that typos can easily happen when typing in city and state names.

This addresses the issue with a potential problem that can happen with searching, which was not initially considered in our design. But it was a thoughtful advice. Besides, this should meet the heuristic of “help users recognize, diagnose, and recover from errors” of the Jacob Nielson’s ten heuristics for user interface design.

As a revision from this analysis, we added this certain function into the hi-fi prototype and modified the use scenario to include it. The change is shown as follows.

“The box disappears and he sees the main page, with a search bar on the left and a blank box on the right. He types in San francisco, CA and searches for restaurants. However no search result comes out, and a line appears above the search bar suggesting that he check his typo. And he found out that he mistakenly typed “San fransisco” instead of “San

francisco”.”

Trip Planner

city

state

key word

There are no result according to
your input
Please enter another one

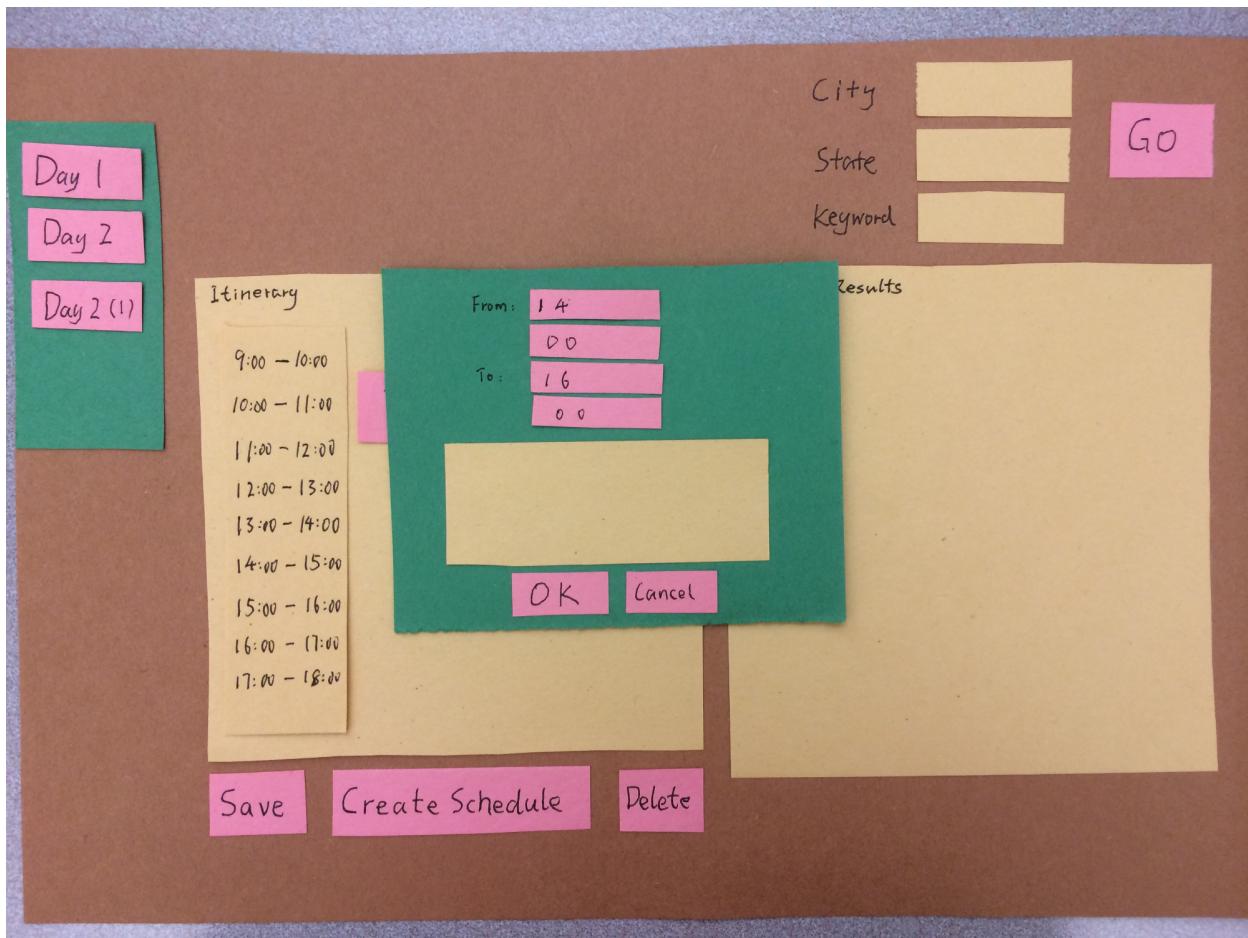
C.

Notes from test 3

- The user thinks the way of inputting date when creating itineraries and the way of inputting time when editing venues are inconvenient and a little nasty.
- The user agrees that the layout would be easier to use if the placement of search results and schedules are exchanged.

The third user finds the blanks for inputting time and date should be better organized and set in a way that users are more used to. And this modification should meet the heuristics of both “Consistency and standards” and “Error prevention”.

lo-fi:



hi-fi:

Trip Planner

city

state

key word

Schedule Change

All form fields are required.

From : :

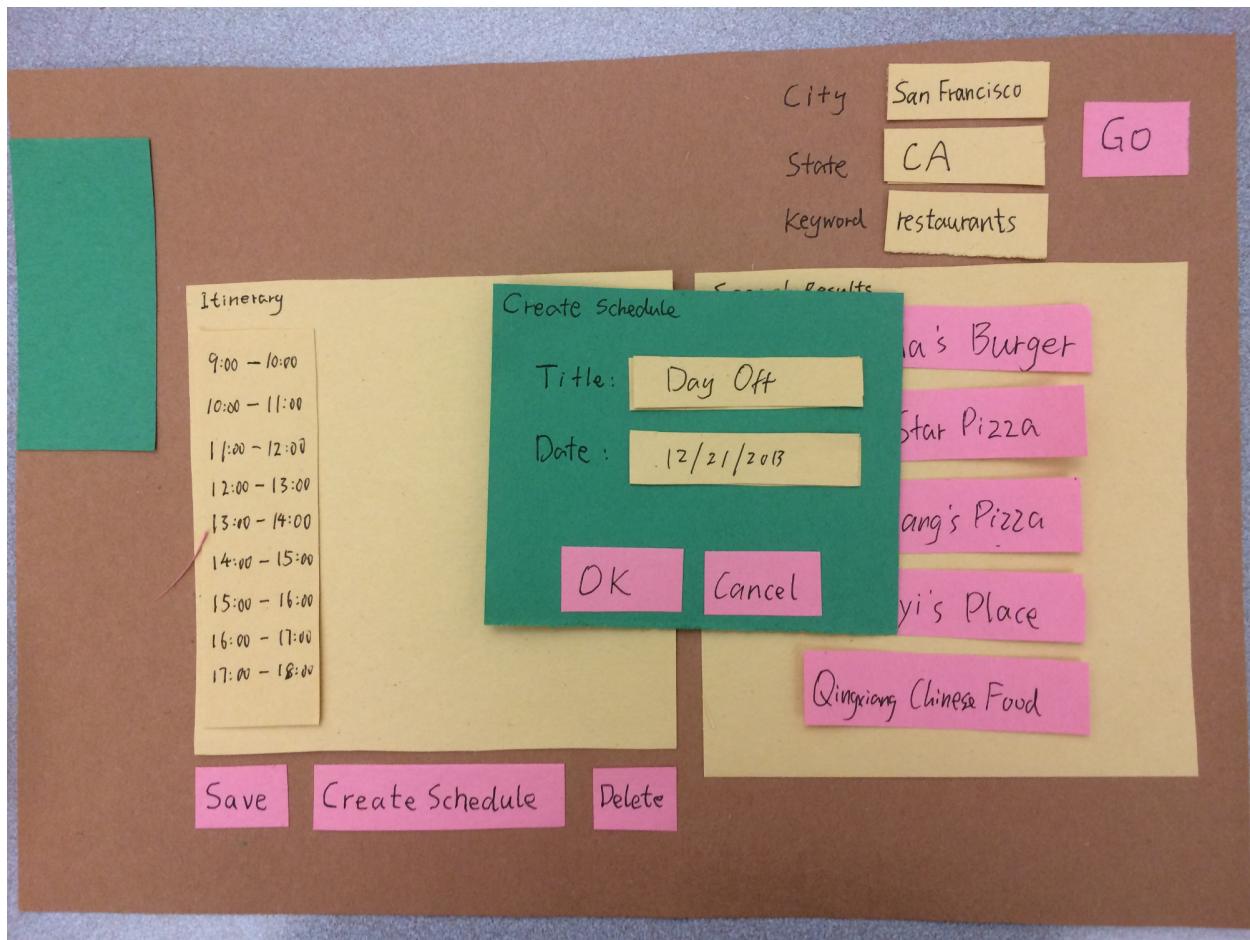
To : :

Comment :

"Add"

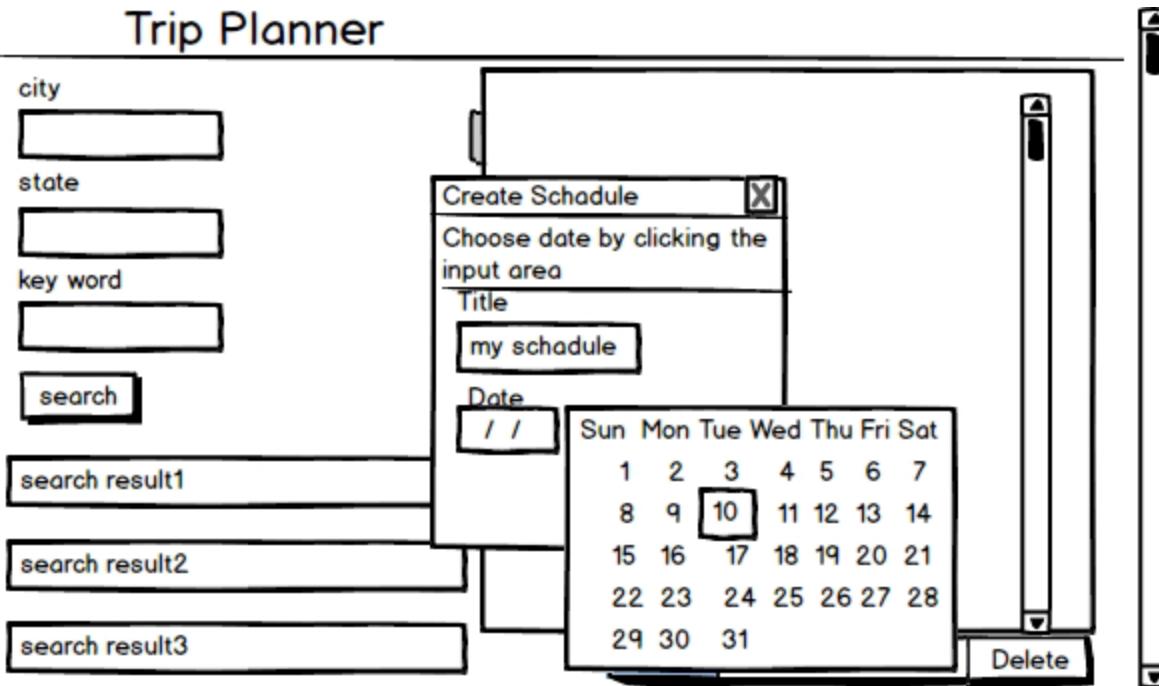
0 to 9:00
0 to 10:00
0 to 11:00
0 to 12:00
0 to 13:00
0 to 14:00
0 to 15:00
15:00 to 16:00

lo-fi:



hi-fi:

Trip Planner



4. Hi-Fi Prototyping with My Balsamiq and Testing

1) What is Hi-fi Prototype and Why Hi-fi Prototype

Hi-fidelity prototyping is a method that uses computer-base tools to mock up the core functionality of the user interface and provide the look and feel of the real system. As an important method, it has the following advantages:

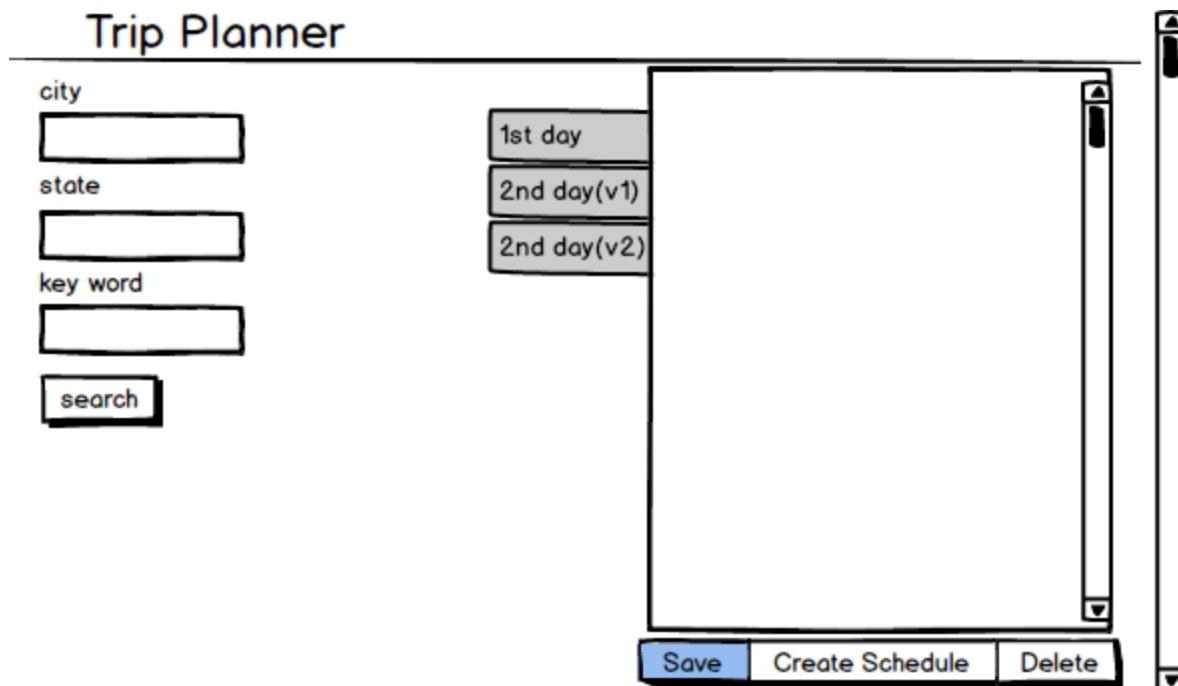
- a. The hi-fi prototype provides with the feel of the real system, and respond in time, which enables the users to fluently interact with the prototype.
- b. The process of developing hi-fi prototype helps us developers better think through the product than paper prototype.
- c. Hi-fi prototype provides the information on engineering cost and prevention of significant problems that may be way more costly when occurring in the actual building process.

In this stage, we built and tested the hi-fi prototype using my Balsamiq.

2) Prototyping Using Story Board

Story Board 1

a.Joyce is planning the trip to California for her and her friends for spring recession(2 days trip). She opens the trip planning website and she sees itineraries she saved from last time on the right side of the screen. The first tag is her itinerary for the first day and the second and third are the two alternative plans for the second day.



b. She clicks on the second tag and the itinerary shows up.

Trip Planner

The screenshot shows a user interface for a trip planner. On the left, there are input fields for 'city' (empty), 'state' (empty), and 'key word' (empty), followed by a 'search' button. To the right, a list of itinerary tags is shown: '1st day', '2nd day(v1)', and '2nd day(v2)'. The '2nd day(v2)' tag is selected. Below this is a vertical timeline from 4:00 to 13:00, divided into one-hour intervals. Each hour slot contains a 'search result' box: 'search result2' for 5:00 to 6:00, 'search result3' for 9:00 to 10:00, and 'search result1' for 12:00 to 13:00. At the bottom of the timeline is a horizontal bar with three buttons: 'Save' (highlighted in blue), 'Create Schedule', and 'Delete'.

c. She thought for a while and decides to take a look at the other plan. So she clicks the third tag in the itinerary tag list, and the timetable on the right side now shows the schedule for this plan.

Trip Planner

This screenshot is similar to the previous one, but the '2nd day(v2)' tag is now selected in the list on the right. The timeline on the right shows the same search results as before: 'search result2' for 5:00 to 6:00, 'search result3' for 9:00 to 10:00, and 'search result1' for 12:00 to 13:00. The 'Save' button at the bottom is highlighted in blue.

d. Joyce decides that she should go for the second plan except she needs to change the

events in the morning to the afternoon. She clicks on the event between 10 am to 12 pm and a box pops out asking her to fill in the new time.

Trip Planner

city

 state

 key word

 search

Schedule Change X

All form fields are required.

From : :

To : :

Comment :

"Add" Cancel

0 to 9:00	search result3
0 to 10:00	
0 to 11:00	search result1
0 to 12:00	
0 to 13:00	
0 to 14:00	
0 to 15:00	
15:00 to 16:00	

Save Create Schedule Delete

e. She fills in the time and hit "ADD", now the event is in the afternoon. And she clicks on "save" button to save the change.

Trip Planner

city

 state

 key word

 search

1st day

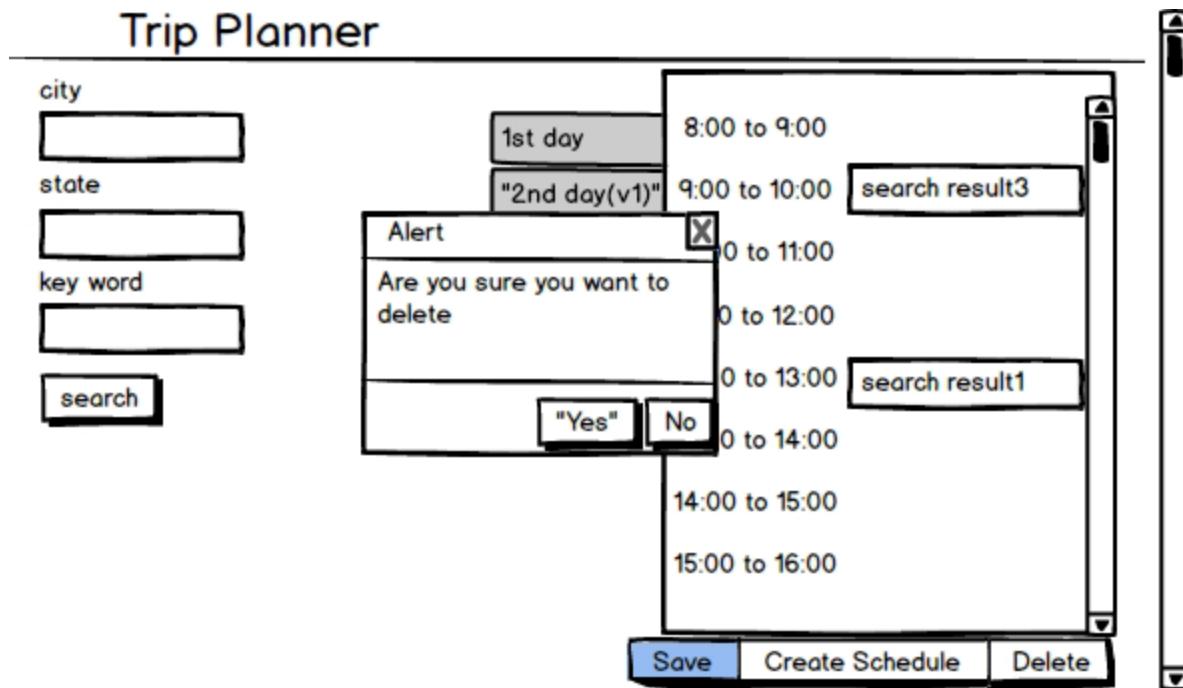
2nd day(v1)

"2nd day(v2)"

8:00 to 9:00	search result3
9:00 to 10:00	
10:00 to 11:00	
11:00 to 12:00	
12:00 to 13:00	
13:00 to 14:00	
14:00 to 15:00	search result1
15:00 to 16:00	

"Save" Create Schedule Delete

f. She goes on deleting the first plan. She clicks on the second tag and drags it to the delete button on the right button of the timetable. A box pops out asking “Are you sure to delete this itinerary?” and Joyce click on “yes”.



Story Board 2

a. Tom has just finished a big project and he wants to take some day off to have a vacation by himself. He decides to go to California. He wants to make an elaborate plan to truly relax himself. His friend recommended him to use a website called "TripPlaner", so he decides to use it to make the plan this time. First, he goes to the main page and a box is popped asking whether he wants to create a new itinerary. He wants to do it later so he clicked cancel.

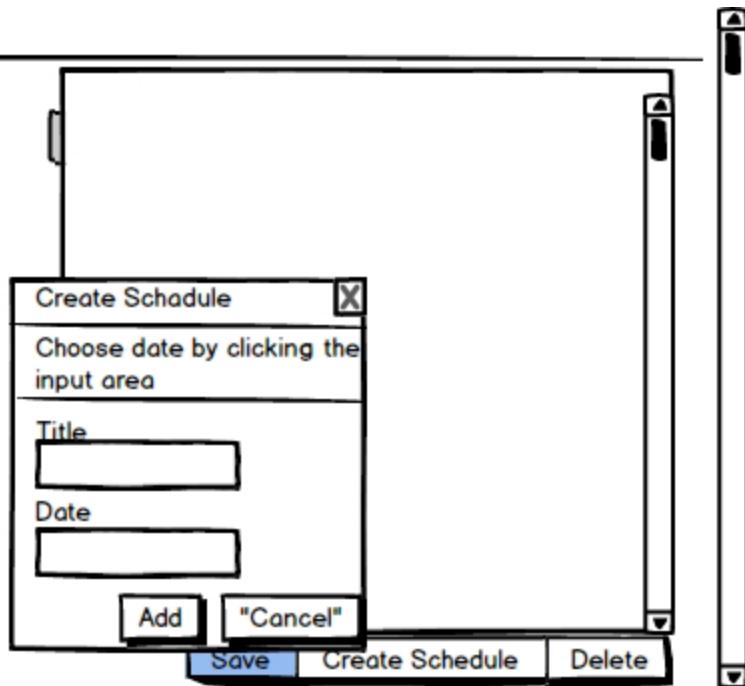
Trip Planner

city

state

key word

search



- b. The box disappears and he sees the main page, with a search bar on the left and a blank box on the right. He types in San francisco,CA and searches for restaurants.However no search result comes out, and a line appears above the search bar suggesting that he check his typo. And he found out that he mistakenly typed “San fransisco” instead of “San francisco”.

Trip Planner

city

San fransisco

state

CA

key word

restaurant

search

There are no result according to
your input

Please enter another one

Save

Create Schedule

Delete

c. He corrected the type and searched again. A list of restaurants comes out under the search bar.

Trip Planner

city

San francisco

state

CA

key word

restaurant

search

search result1

search result2

search result3

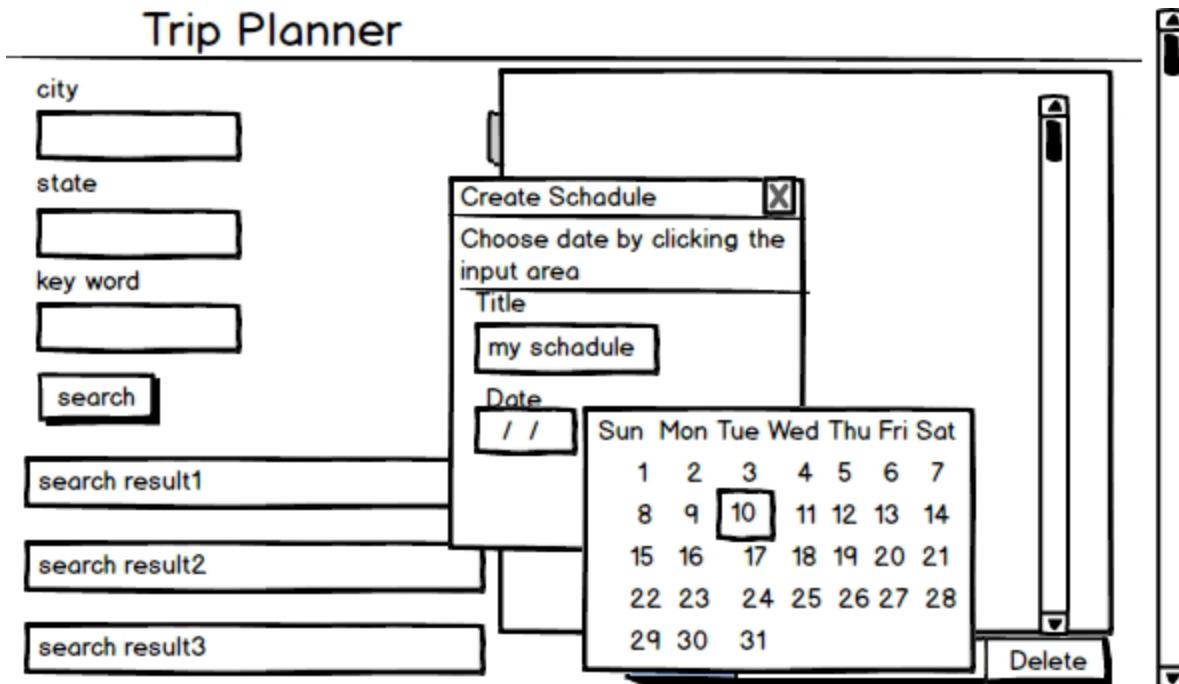
Save

Create Schedule

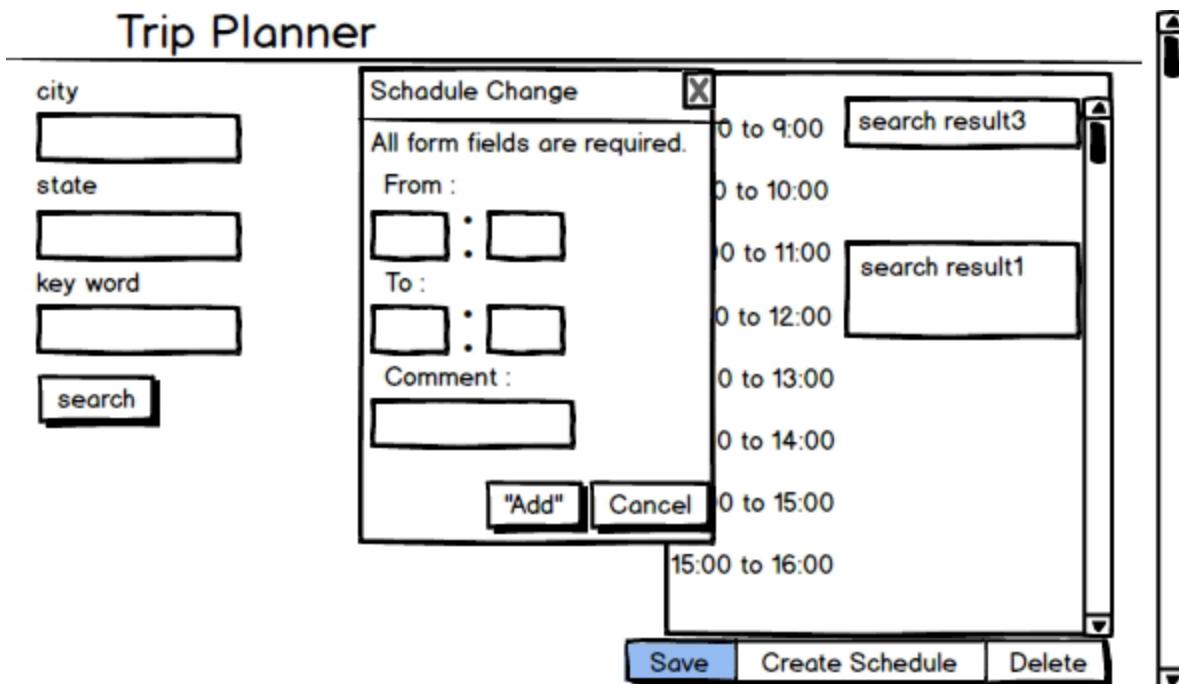
Delete

d. He then clicks on the create button under the box on the right side of the screen. A

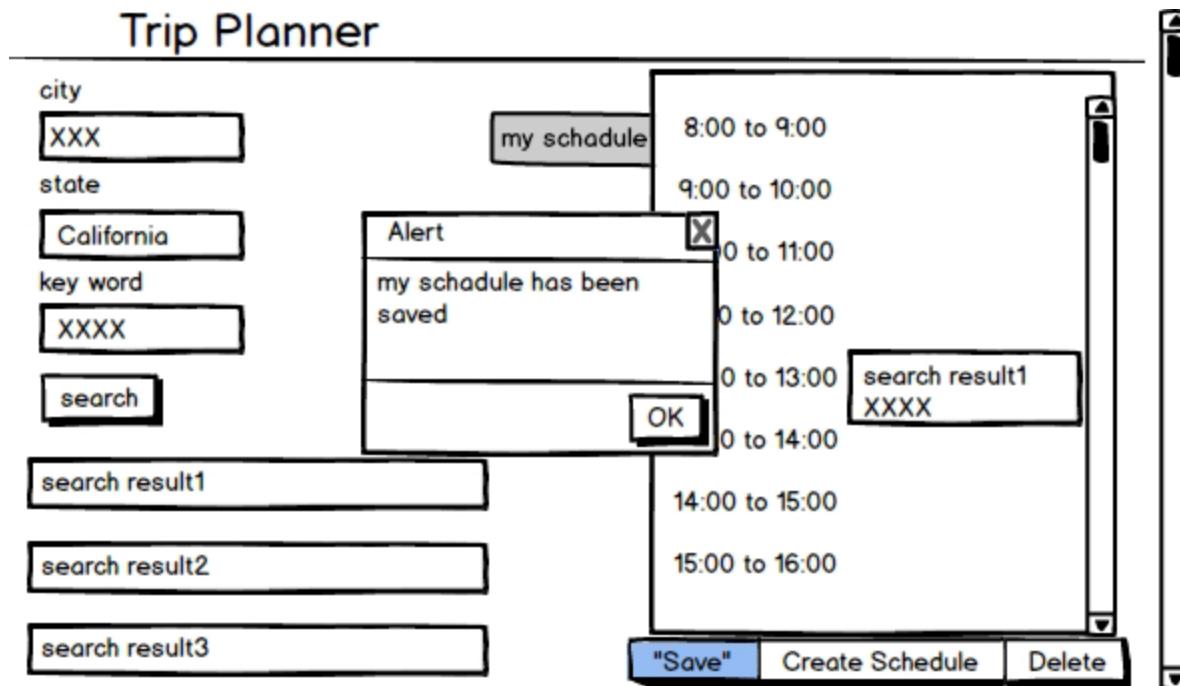
window pops out asking him to set the title and date for the itinerary. He input the information and hit OK.



e. He chooses a certain item in the search results, and drags it to the calendar. A box pops out asking him to set the time range for the event. He input the time and hit "add".



f. He clicks on the save button. A box pops up asking him to confirm the information of the itinerary and he clicks "yes". So the new itinerary is saved.



3) Testing Process

At this stage, as all our members have participated in the development and got familiar with the application, we wanted to get some outsider's view of our product. So we invited two fellow students who are not enrolled in this class to be our testers of this integrated version of user interface.

Different from the previous lo-fi test where users simply played around the prototype, this time we conducted usability test, in which we ask users to complete **certain tasks**. And during the test, the users are invited to **think aloud**. This kind of test has the following advantages:

- With certain tasks to perform, the users can better focus on the key functionality of the system.
- While the users think aloud when interacting with the system, problems they meet in the progress are easily revealed.

c. When thinking aloud, the users show not only their state in the progress of performing the tasks, but also their opinion on other parts of the design aside from the main functionality.

During each test, Yuna Jing acted as the greeter and explained to the users what this system does and what tasks they are to perform. And Xiaotang Wang acted as the note taker.

During each test, the user was asked to

- a. Create two itineraries.
- b. Search for whatever venues they want and fill each itinerary with three venues and save.
- c. Delete one of the itineraries.
- d. Rearrange the order and time range of the venues in the other itinerary.
- e. Edit one of the venues and then delete it.

Since the prototype on my Balsamiq does not provide the action of drag and drop, nor the pop out calendar for date setting, we actually conducted these tests on an early version of the real application, which was exactly the same as the hi-fi prototype.

4) Test Records

Test 1

Tester Name; Danfei Hu Gender: Female Age; 21

Time Used to Accomplish the Tasks: 5 minutes

Observation Index Card;

- Open main page, greeted by calendar creation window, input title and date successfully, click yes.
- Go on to create another one, click “create new schedule”, input another title and date, click yes.
- Try input nothing and search with default location and keyword, and there come out the results.
- How do I put the result into the calendar? No “add” button. Try dragging. It works.
- Choose the first calendar, pull “Columbia University” and drop. It’s got the time, click “add”.

- Try put “Columbia University” three times in the same calendar. Time is different. It works.
- Try search for “New York, NY, pizza”. What if I want to choose the price or popularity?
- Choose the other calendar, pull three items in. Click “save”. Saved?
- Delete an itinerary. I should click delete. Doesn’t work? Why doesn’t delete button work? (Greeter suggested drag and drop.) Are you sure? Yes delete.
- Rearrange order. I’m thinking drag again. I can just click? Set time.
- Edit venue again? Suppose I can add comment? Click and write comment, add.
- Delete it. So should I drag. There it goes.

Test 2

Tester Name; Xiaoli Li Gender: Female Age; 22

Time Used to Accomplish the Tasks: 6 minutes

Observation Index Card;

- Create. Yes create. Title xiaoli and time. Add.
- Here’s my first calendar. I need another one. “Create new schedule”, same thing, done.
- Search for venues. It’s set to New York? I want to check out Seattle. So you should input the state your own? What if you get it wrong? I may get it wrong.
- Add three to each calendar. There’s no “add”. I try click on the calendar, no “add” pop out. How do I add? Do I drag? Yes.
- Three for each, done. Click “save”. Not sure, is it saved like that?
- Now delete one of the itineraries. This one and delete. Nothing? “Delete” button doesn’t work. (The tester got stuck and the greeter helped with delete)
- Rearrange order. I guess it’s drag again. So I drag it down and I can set a different time. I am glad that it can tell the time range according to the place I drop it. I want to set it longer. Now I see the blue thing becomes longer and I can scroll in it. Seems nice.
- Edit venue again? What do you mean? Maybe I can reset the time again, and comment. Do I drag it? I see I can click it. And reset it. By the way, since I can edit the venues, can I also edit the calendar title

- or change date? Click on the calendar's name. Seems I can't.
- Delete the venue. Like before, drag and drop. And it's deleted.

5) Analysis and Modifications

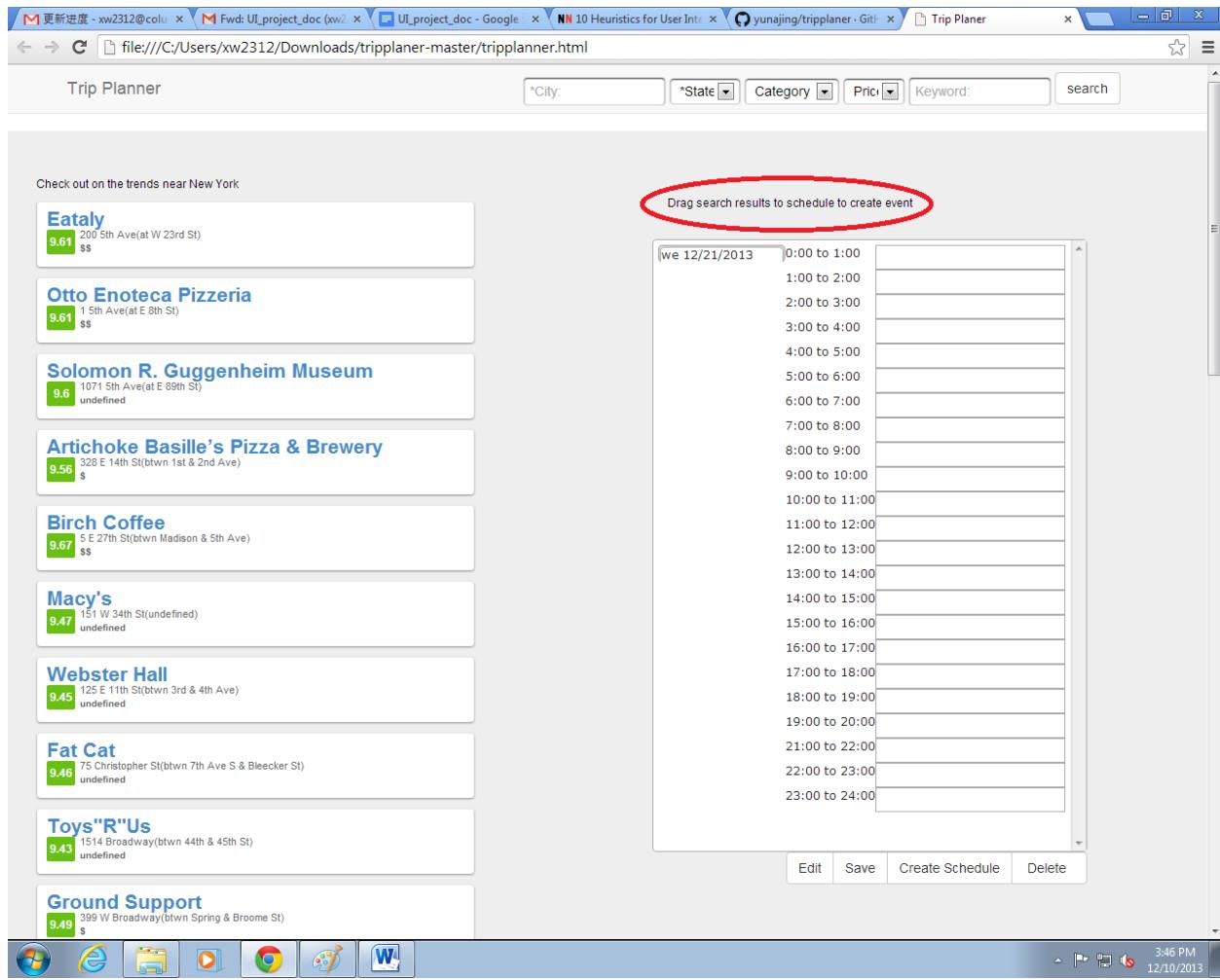
In the two usability tests, both users finished the task list in around 5 minutes, which was close to our expectation and proved that our application worked well with the functions that we focused on.

However, the process revealed some problem that we did not think of in the stage of hi-fi prototyping. After summarizing the test notes, we found out many ways that the application needed improvement in to meet the user's need, intuition and the ten heuristics. And the following are the modifications we made in this stage:

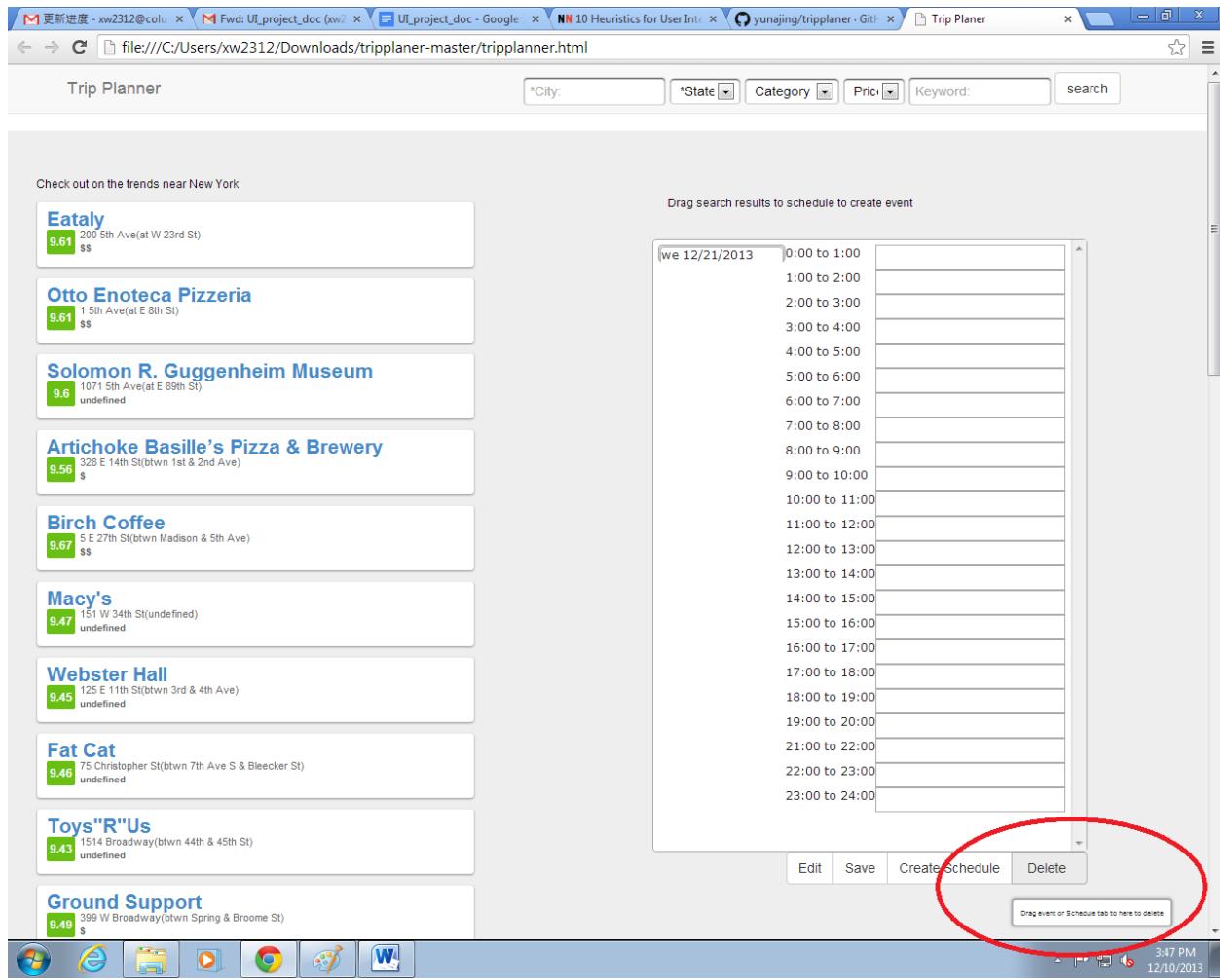
a.

During the test, both users encountered the problem of missing instructions when add venues and deleting calendars and venues. Especially with the delete, both users needed to get help from the greeter to figure out the way to conduct deletion. This got us reflecting on our lack of help and documentation which was against one of the ten heuristics.

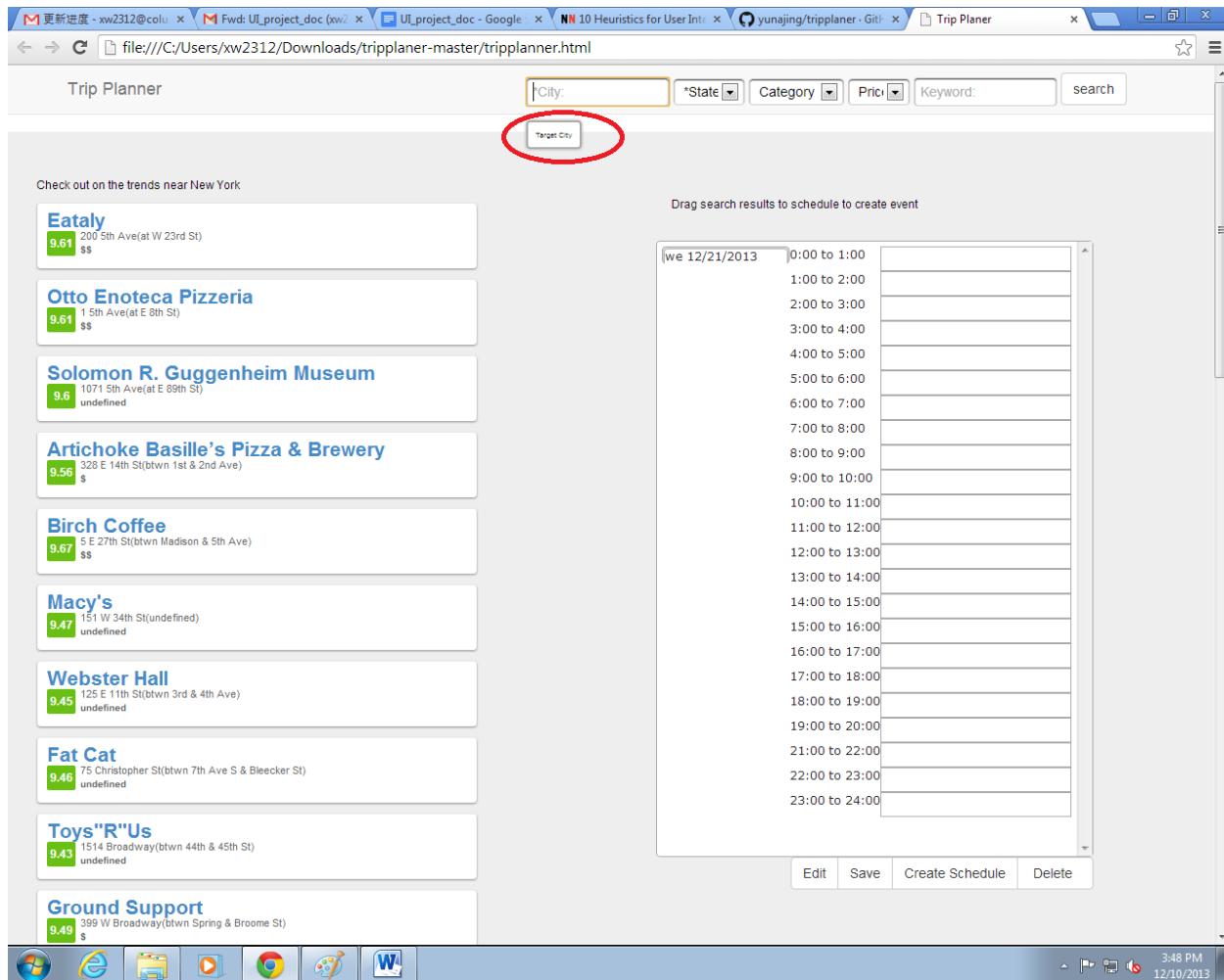
To solve this problem, we added instructions for adding venues:



Also, when we put the mouse in the area of the delete button, a piece of instruction floats and inform the user how to delete.



In addition to add and delete, we also added instructions for other actions like edit, save and input. For example when inputting keywords and city.



There are more about this design illustrated in detail in the final decision part of this document.

b.

While inputting state name when searching for venues, the second user pointed out that if the users are not familiar with the state abbreviations or for other reasons, the input can be not standard thus cause unnecessary trouble.

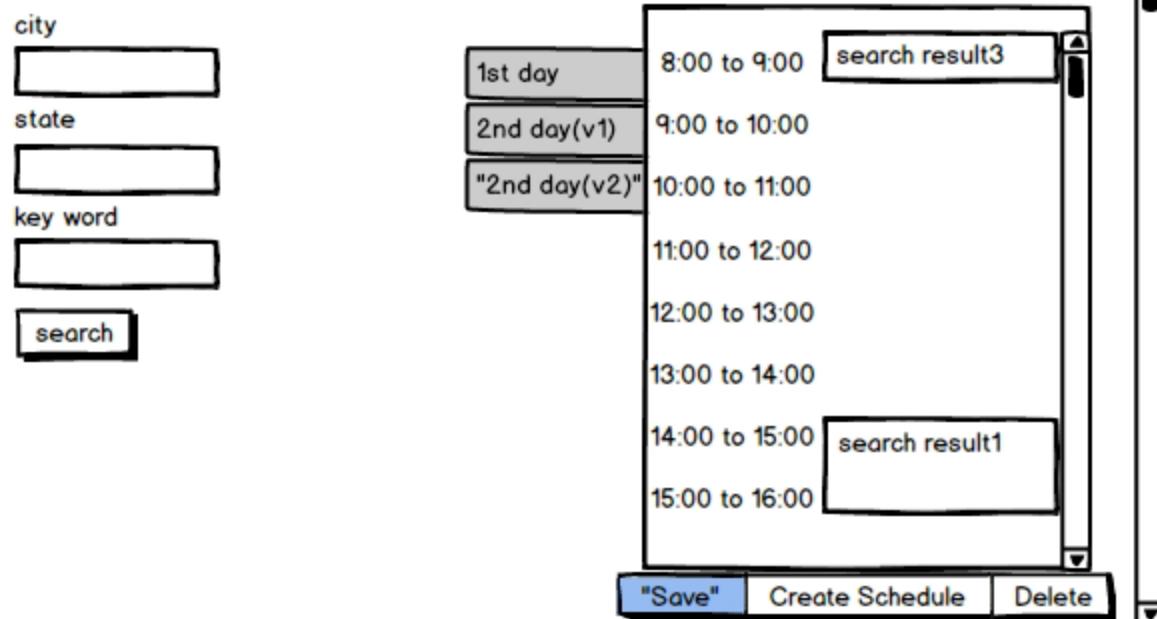
This got us reflect on our design with input style. And in order to solve this problem and meet the heuristic of “Error prevention”, we changed the way of inputting state name into a pull down menu, shown as below.

hi-fi:

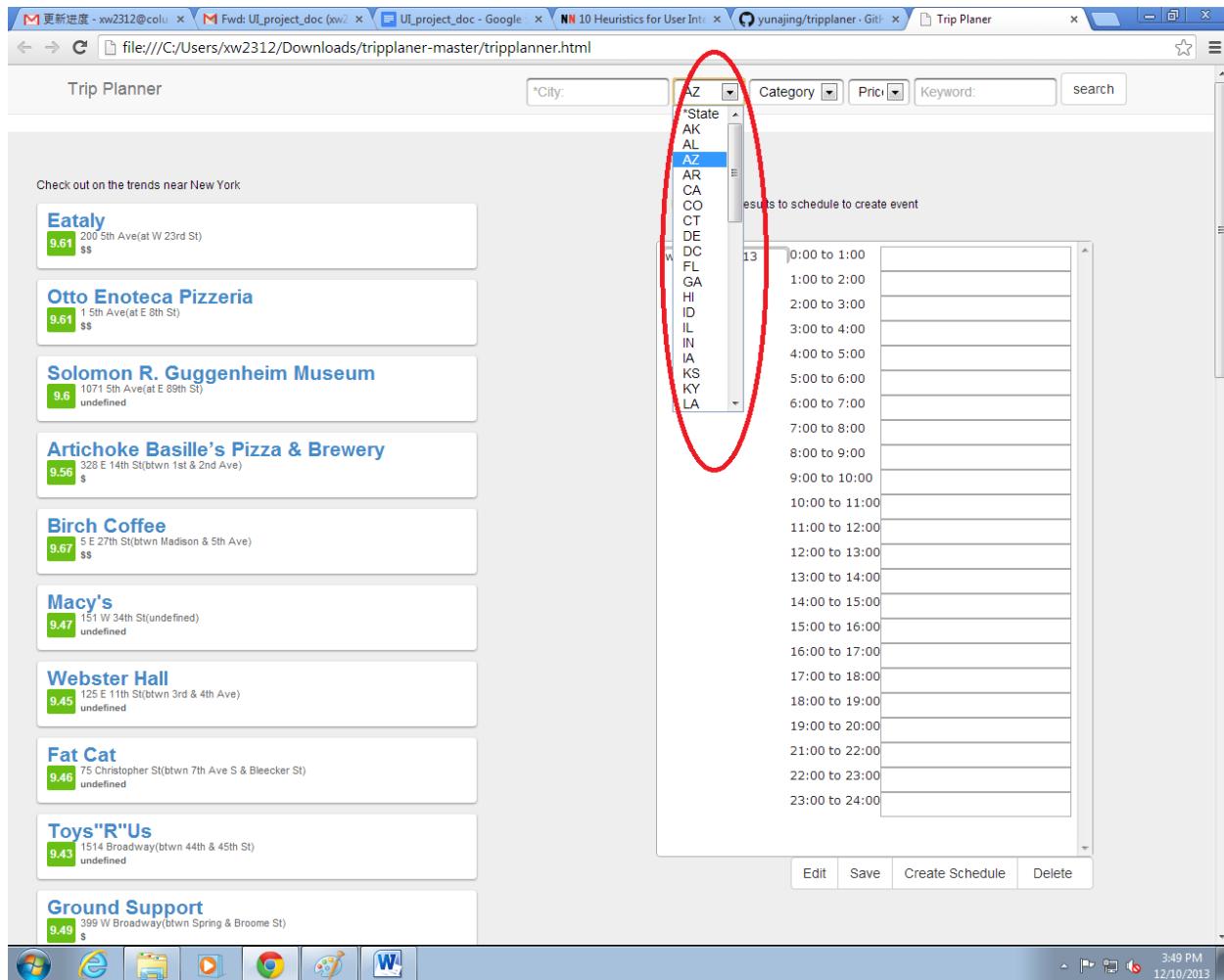
Trip Planner

city <input type="text"/>	1st day <input type="text"/>	8:00 to 9:00 <input type="text"/> search result3
state <input type="text"/>	2nd day(v1) <input type="text"/>	9:00 to 10:00
key word <input type="text"/>	"2nd day(v2)" <input type="text"/>	10:00 to 11:00
		11:00 to 12:00
		12:00 to 13:00
		13:00 to 14:00
		14:00 to 15:00 <input type="text"/> search result1
		15:00 to 16:00 <input type="text"/>

"Save" **Create Schedule** **Delete**



Modification:



C.

In the first test, when the user was searching for venues, she wondered why there was not more filters for more criteria rather than just the location and key word.

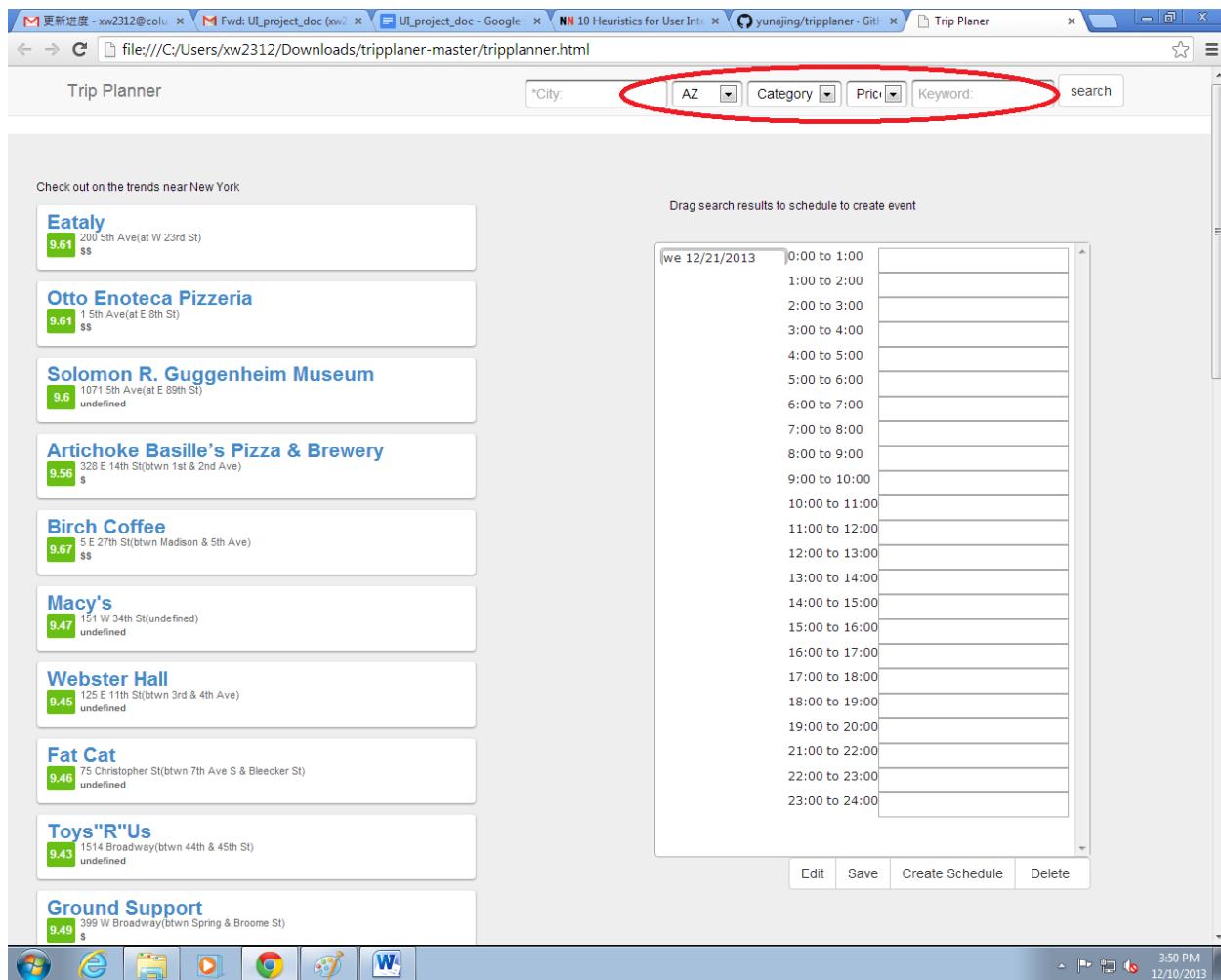
We considered it a good advice that gives the user a better match of the system and the real world, and more flexibility. The change is shown below.

hi-fi:

Trip Planner

city <input type="text"/>	1st day <input type="text"/> 2nd day(v1) <input type="text"/> "2nd day(v2)" <input type="text"/>	8:00 to 9:00 <input type="text"/> search result3 9:00 to 10:00 10:00 to 11:00 11:00 to 12:00 12:00 to 13:00 13:00 to 14:00 14:00 to 15:00 <input type="text"/> search result1 15:00 to 16:00 <input type="text"/>	"Save" Create Schedule Delete
------------------------------	---	---	-------------------------------------

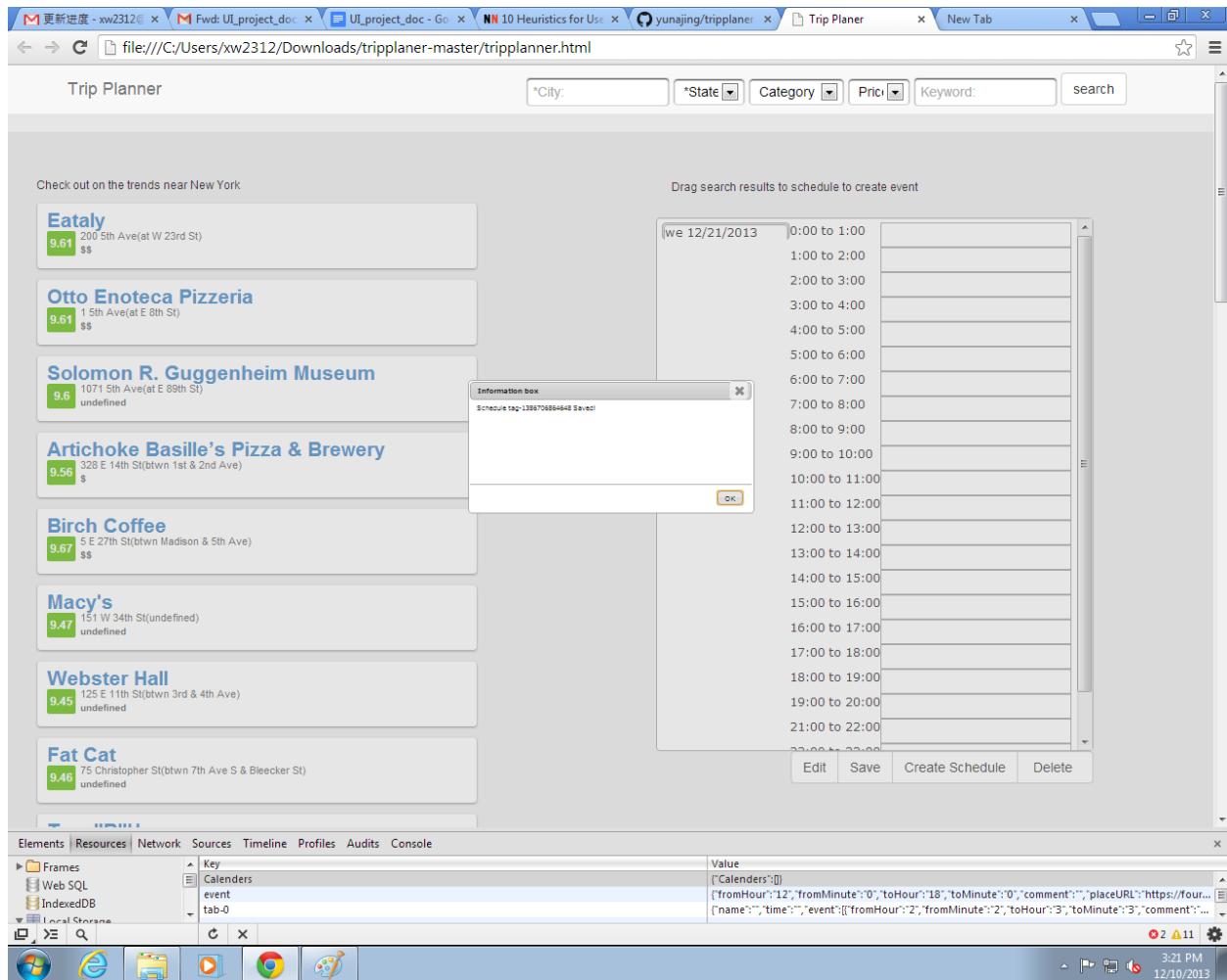
Modification:



d.

In both tests, the users wondered a little whether the “save” is done after clicking the “save” button. We analyzed the problem and found out that it was because after the saving is done, no instructions were given, notifying the users what has happened with the system.

Lacking such instructions obeys the heuristic of “Visibility of system status”. To strengthen this heuristic, we added feedback on the save action.



In addition to the notification after “save”, we also added more feedback on searching, which shall be explained in detail in the final decision part of this document.

e.

When performing the task of editing the venues, the second user asked about the capability of editing the itinerary rather than just the events.

We did not initially design such a function, but according to the user’s advice, we figured that this would allow the users with more flexibility, so we added this function in later design.

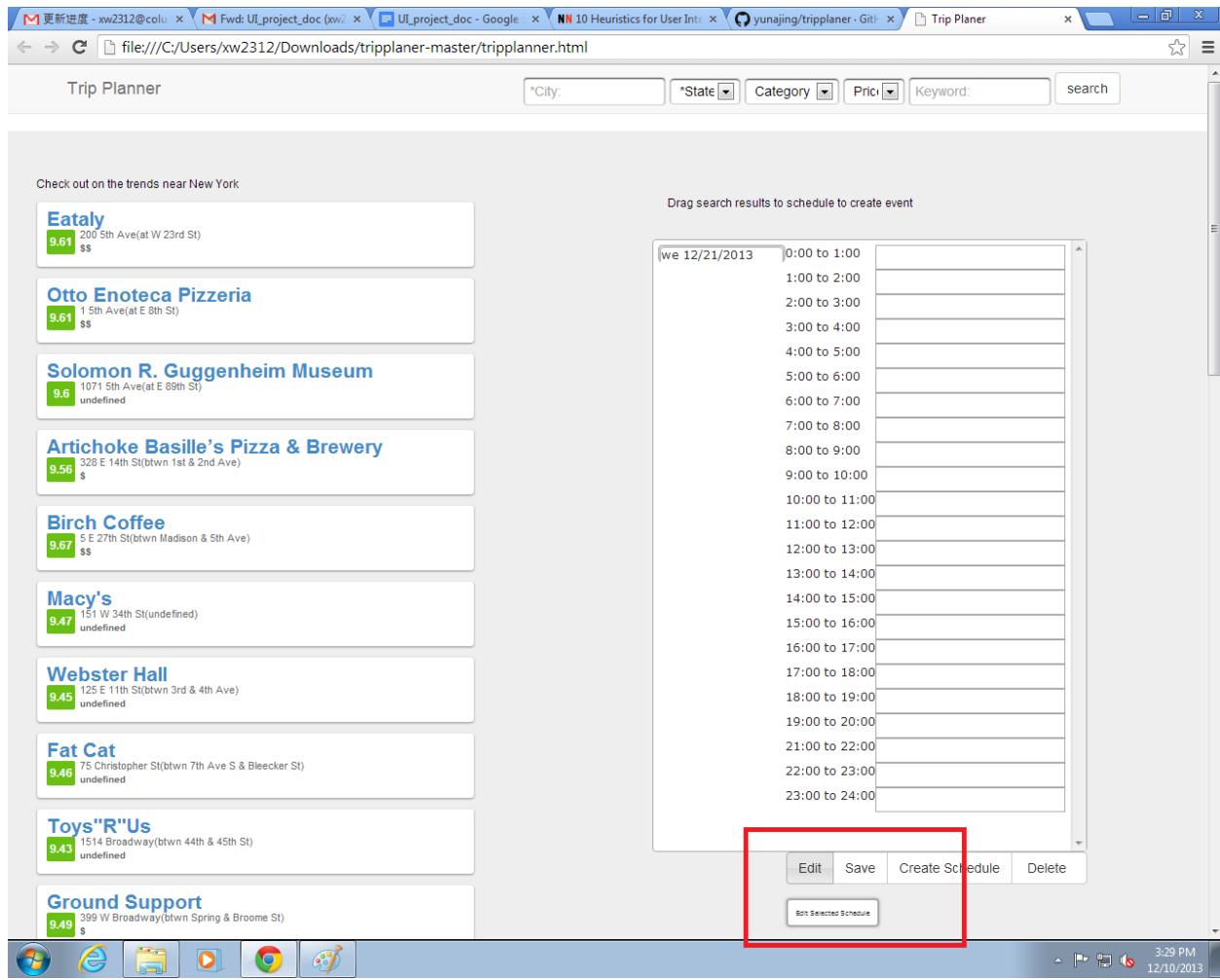
The modification is shown below:

hi-fi;

Trip Planner

city <input type="text"/>	1st day <input type="text"/>	8:00 to 9:00 search result3
state <input type="text"/>	2nd day(v1) <input type="text"/>	9:00 to 10:00
key word <input type="text"/>	"2nd day(v2)" <input type="text"/>	10:00 to 11:00
		11:00 to 12:00
		12:00 to 13:00
		13:00 to 14:00
		14:00 to 15:00 search result1
		15:00 to 16:00 <input type="text"/>
		<input type="button" value="Save"/> <input type="button" value="Create Schedule"/> <input type="button" value="Delete"/>

Modification:



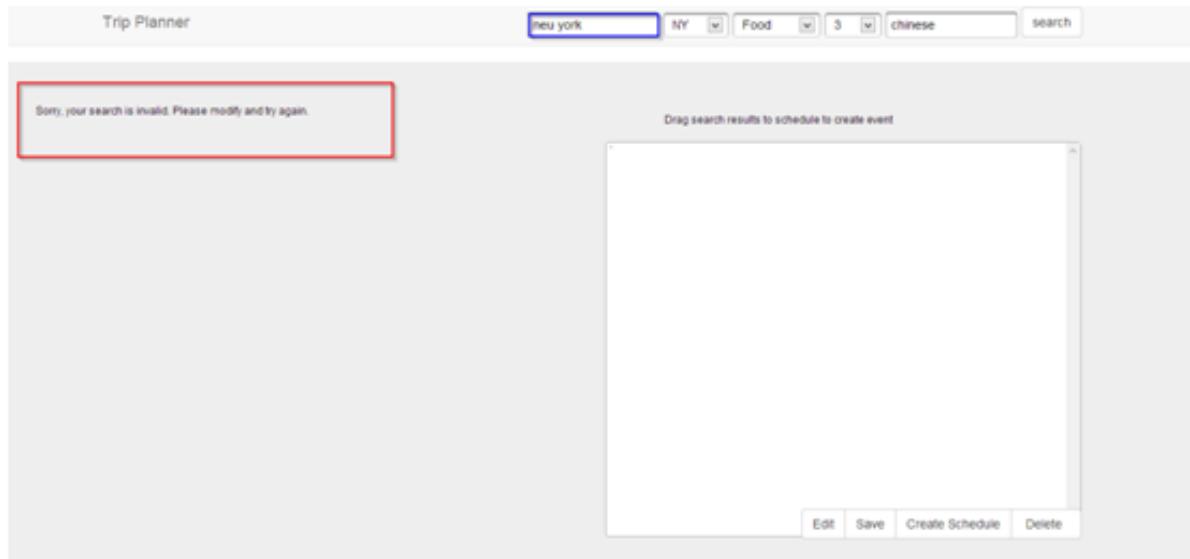
5. Design Decisions and Justification

After Hi-fi prototyping, we have reached our final design decisions and implemented the final version of our application. Following are the justification of our final decisions against the ten heuristics by Jacob Nielson.

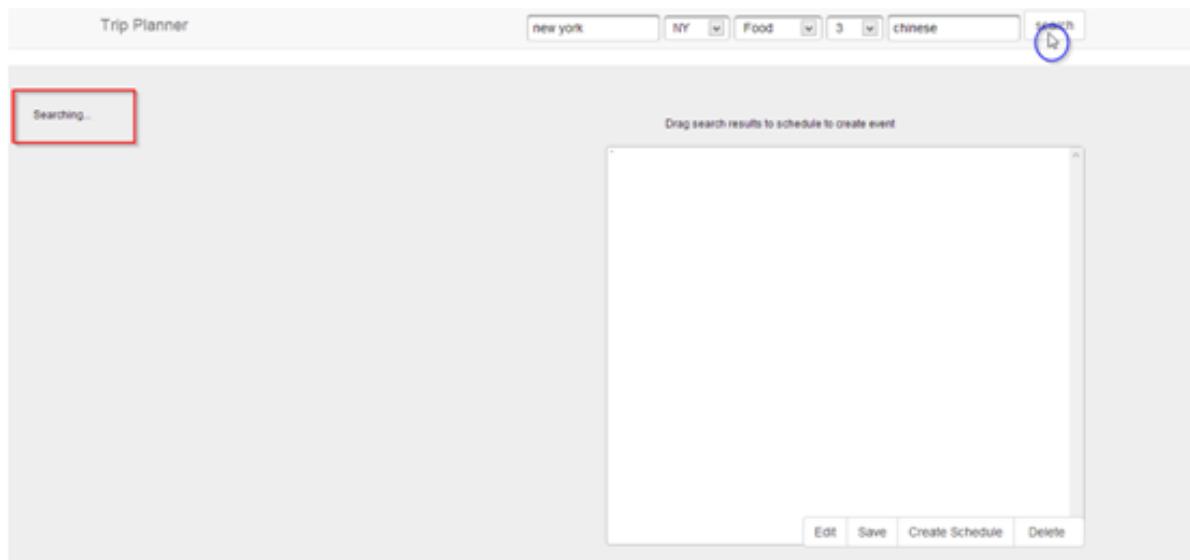
a. Visibility of system status

When performing searching, there is always some status information to let users know what's going on. For example, when performing searching invalid city(ne'u' york) input, it

will show “Sorry, your search is invalid. Please modify and try again.” as shown as below.



Also, when searching for a certain criteria system will show “Searching...” on the left side of the main container so the user knows what’s happening in the system, which is shown as below.



When the results are loaded, we will notify the user by updating “Searching” to “Results loaded!”, so the user will know when their search is completed.

Trip Planner

new York NY Category Price Keyword search

Results loaded! Target Place: New York, Key word: undefined

Drag search results to schedule to create event

Eataly 200 5th Ave(at W 23rd St) 9.61 \$\$	
Otto Enoteca Pizzeria 1 5th Ave(at E 8th St) 9.61 \$\$	
Solomon R. Guggenheim Museum 1071 5th Ave(at E 89th St) 9.6 undefined	
Artichoke Basille's Pizza & Brewery 328 E 14th St(btwn 1st & 2nd Ave) 9.56 \$	
Birch Coffee 5 E 27th St(btwn Madison & 5th Ave) 9.67 \$\$	
Macy's 151 W 34th St(undefined) 9.47 undefined	
Webster Hall 125 E 11th St(btwn 3rd & 4th Ave) 9.45 undefined	

Edit Save Create Schedule Delete

For save and delete function, system will show a notification dialog box telling the user if the action is successful or not. They are shown individually as below.

Trip Planner

*City: *State: Category: Price: Keyword: search

Check out on the trends near New York

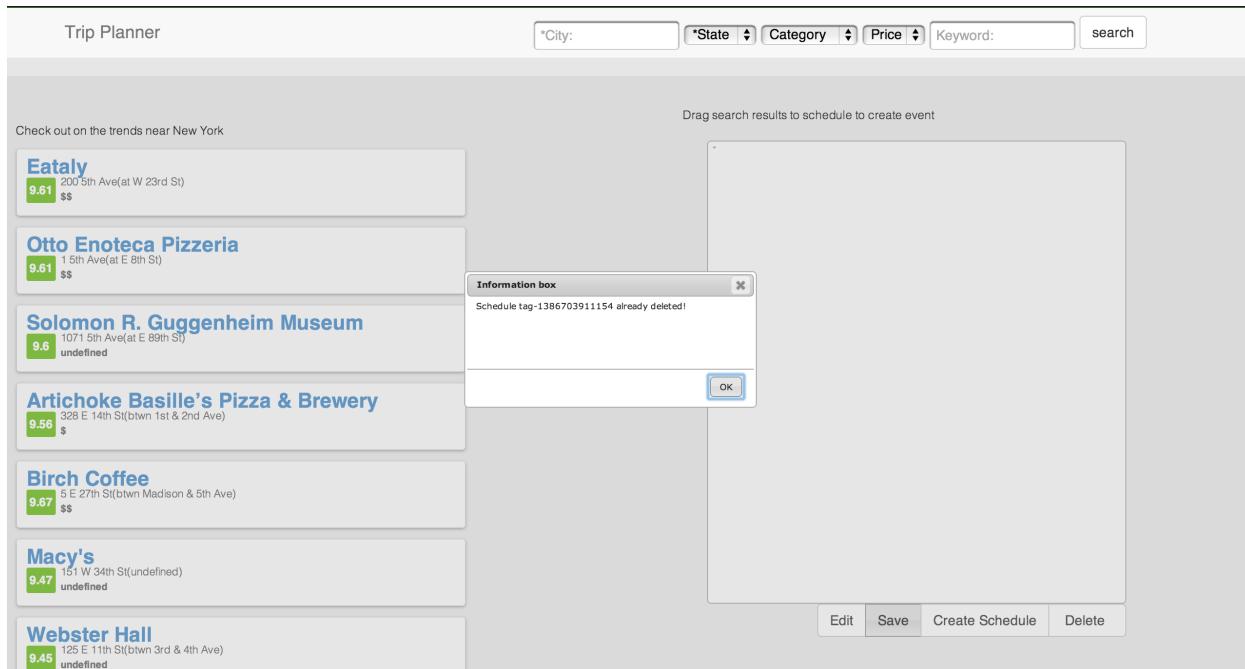
Drag search results to schedule to create event

Eataly 200 5th Ave(at W 23rd St) 9.61 \$\$	
Otto Enoteca Pizzeria 1 5th Ave(at E 8th St) 9.61 \$\$	
Solomon R. Guggenheim Museum 1071 5th Ave(at E 89th St) 9.6 undefined	
Artichoke Basille's Pizza & Brewery 328 E 14th St(btwn 1st & 2nd Ave) 9.56 \$	
Birch Coffee 5 E 27th St(btwn Madison & 5th Ave) 9.67 \$\$	
Macy's 151 W 34th St(undefined) 9.47 undefined	
Webster Hall 125 E 11th St(btwn 3rd & 4th Ave) 9.45 undefined	

OK

asedfred 12/05/2013 0:00 to 1:00
1:00 to 2:00
2:00 to 3:00
3:00 to 4:00
4:00 to 5:00
5:00 to 6:00
6:00 to 7:00
7:00 to 8:00
8:00 to 9:00
9:00 to 10:00
10:00 to 11:00
11:00 to 12:00
12:00 to 13:00
13:00 to 14:00
14:00 to 15:00
15:00 to 16:00
16:00 to 17:00
17:00 to 18:00

Edit Save Create Schedule Delete



b.Match between system and the real world

There are no machine language, and all our functions in our design are straight forward enough for users to understand. The display of the itineraries is in a temporal way which everyone can relate to. So, we believe our application perfectly matches the real world conventions, and information appear in a natural and logic order.

c.User control and freedom

When choosing some elements by mistake, we introduce 'delete' button, which is used to delete any elements including deleting schedules or events.

The screenshot shows a Trip Planner interface. At the top, there is a search bar with fields for 'new york', 'NY', 'Food', '3', 'chinese', and a 'search' button. Below the search bar, a message says 'Results loaded! Target Place: New York, Keyword: chinese'. To the left, a list of Chinese restaurants in New York is displayed:

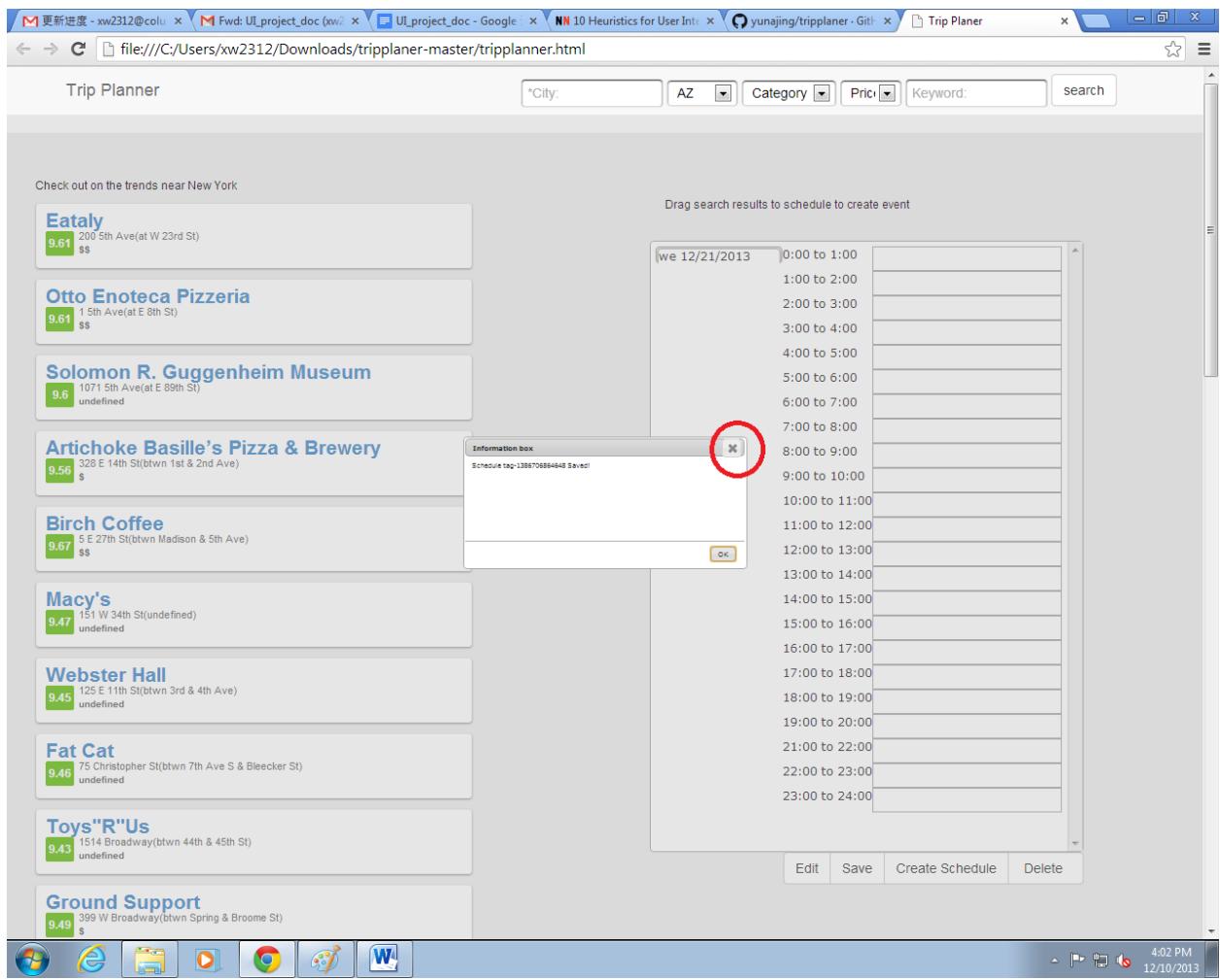
- Wo Hop Restaurant** (Rating: 9.29, Address: 17 Mott St(b/w Worth & Mosco St) \$5)
- Café China** (Rating: 9.39, Address: 13 E 37th St(b/w Fifth Ave & Madison) \$5)
- Hop Kee** (Rating: 9.26, Address: 21 Mott St(at Mosco St.) \$5)
- Yunnan Kitchen** (Rating: 9.23, Address: 78 Clinton St(b/w Remington & Delancey) \$5)
- Hot Kitchen** (Rating: 9.13, Address: 104 2nd Ave(at 6th St.) \$5)
- Grand Sichuan International** (Rating: 9.08, Address: 229 9th Ave(at 24th) \$5)

To the right, a calendar interface is shown for December 11, 2013. It displays a grid of time slots from 0:00 to 16:00. Events are listed in the grid cells:

Time Slot	Event
0:00 to 1:00	
1:00 to 2:00	
2:00 to 3:00	
3:00 to 4:00	
4:00 to 5:00	
5:00 to 6:00	
6:00 to 7:00	
7:00 to 8:00	
8:00 to 9:00	
9:00 to 10:00	
10:00 to 11:00	Cafe China
11:00 to 12:00	
12:00 to 13:00	
13:00 to 14:00	
14:00 to 15:00	
15:00 to 16:00	Hot Kitchen

Below the calendar, there are buttons for 'Edit', 'Save', 'Create Schedule', and a red-bordered 'Delete' button. A blue arrow points from the 'Delete' button back to the search results area.

Also, when the user accidentally hit save, edit or delete, they can undo by hitting the cross button.



d.Consistency and standards

We think the main function of our design is to let users search and fit into their schedule. Therefore, we keep follow this standard to expand our design.

Since we use dragging to create an event, we want to keep that operation consistent for every function. We made it possible for the user to drag to create and delete schedule and event.

e.Error prevention

If the user input any thing wrong, or not satisfying our input regulation, we will notice the user in the following ways.

For the search part, if user tries to input not-letter characters for city or leaving one or two of

the city and state blank, the system will catch that error and throws the following notification: “Input invalid. Check if you filled in both city and state, and the input is correct.”

The screenshot shows a user interface for a "Trip Planner". At the top, there is a header bar with the title "Trip Planner" and several search filters: "City:" (with an asterisk indicating it's required), "State" (a dropdown menu), "Category" (a dropdown menu), "Price" (a dropdown menu), and "Keyword". To the right of these filters is a "search" button. Below the header is a large central area with a light gray background. In the upper left corner of this area, there is an error message: "Input invalid. Check if You filled in both city and state, and the input is correct." In the upper right corner, there is a small instruction: "Drag search results to schedule to create event". Below the error message is a large, empty rectangular box with a thin black border. At the bottom of the page, there is a horizontal row of four buttons: "Edit", "Save", "Create Schedule", and "Delete".

If the user input a wrong city name or the city name doesn't match with the state name, the system will do the search and catch the error and throws the following message: “Sorry, your search is invalid. Please modify and try again.”

The screenshot shows a user interface for a "Trip Planner". At the top, there is a header bar with the title "Trip Planner" and several search filters: "ne" (in the City field), "AL" (in the State dropdown menu), "Category" (a dropdown menu), "Price" (a dropdown menu), and "Keyword". To the right of these filters is a "search" button. Below the header is a large central area with a light gray background. In the upper left corner, there is an error message: "Sorry, your search is invalid. Please modify and try again." In the upper right corner, there is a small instruction: "Drag search results to schedule to create event". Below the error message is a large, empty rectangular box with a thin black border. At the bottom of the page, there is a horizontal row of four buttons: "Edit", "Save", "Create Schedule", and "Delete".

Apart from that, user may mistype the keyword, like “happ” for “happy”, our system will still do the search, and notify the user that the keyword he/she input might be wrong:

The screenshot shows a 'Trip Planner' interface with a search bar containing 'new york', dropdown menus for 'NY', 'Category', 'Price', and 'columb univ', and a 'search' button. Below the search bar, a message says: 'There aren't a lot of results for "columb univ." Try something more general, reset your filters, or expand the search area.' A search result for 'Le Columb' is shown, with a note '(undefined)(undefined)' and a price of '\$'. To the right, there's a large empty area labeled 'Drag search results to schedule to create event' with buttons for 'Edit', 'Save', 'Create Schedule', and 'Delete' at the bottom.

When creating/editing the schedule, we restrict input to be a phrase/word consist of letters, numbers and underscores, begins with a letter and between 1 to 8 characters long. If the regulation is not complied, system will throws the following message:

The screenshot shows a 'Trip Planner' interface with a search bar containing 'City:', dropdown menus for 'State', 'Category', 'Price', and 'Keyword', and a 'search' button. Below the search bar, a message says: 'Check out on the trends near New York'. A list of search results is shown, including 'Eataly', 'Otto Enoteca Pizzeria', 'Solomon R. Guggenheim Museum', 'Artichoke Basille's Pizza & Brewery', 'Birch Coffee', 'Macy's', and 'Webster Hall'. To the right, a modal dialog titled 'Creating New Schedule' is open. It contains instructions: 'Chalender title may consist of letters, numbers and underscores. Must begin with letter.', 'Choose date by clicking the input area', 'Title' (with the value '123' highlighted in red), and 'Date' (with the value '12/11/2013'). At the bottom of the dialog are 'Add' and 'Cancel' buttons. Below the dialog is a large empty area labeled 'Drag search results to schedule to create event' with buttons for 'Edit', 'Save', 'Create Schedule', and 'Delete' at the bottom.

For creating/editing the event, users are only allowed to input numbers for starting and ending time, and the ending time must come after the starting time. If these regulations are not complied, system will throw the following message:

If ending time is before starting time:

The screenshot shows a trip planner interface with a search bar at the top. Below it, a list of New York City restaurants and museums is displayed. A modal window titled "Adding new event" is open, showing an error message: "Ending Time is prior to Starting Time". The "From:" field contains "7" and the "To:" field contains "6". To the right of the modal is a timeline grid from 0:00 to 18:00. At the bottom right of the main screen are buttons for Edit, Save, Create Schedule, and Delete.

If the inputs are not numbers:

This screenshot is similar to the previous one, showing the same trip planner interface and list of locations. The "Adding new event" modal now displays the error "Only Numeric input is allowed for Time". The "From:" field contains "a" and the "To:" field contains "b". The rest of the interface is identical to the first screenshot.

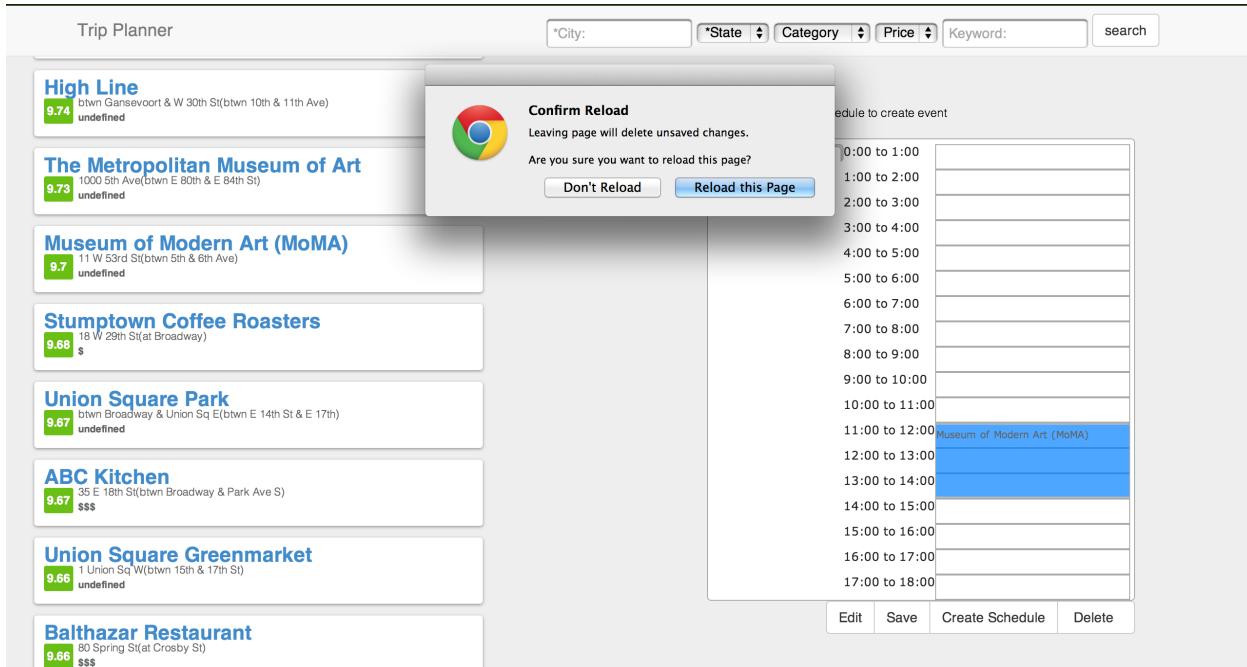
If the input number is larger than 24:

The screenshot shows the Trip Planner interface. On the left, there is a list of local businesses: Eataly, Otto Enoteca Pizzeria, Solomon R. Guggenheim Museum, Artichoke Basille's Pizza & Brewery, Birch Coffee, Macy's, and Webster Hall. On the right, a calendar grid displays time slots from 0:00 to 18:00. A modal dialog box titled "Adding new event" is open, showing the message "Input Time exceeds 24 hours". It has fields for "From" (15) and "To" (27), both set to 0. There is also a "Comments:" field and buttons for "Add to Calendar" and "Cancel". Below the calendar grid are buttons for "Edit", "Save", "Create Schedule", and "Delete".

As for deleting an event or an entire schedule, since the action is final and can not be undone, we want to user to double check if they want to do that so they will not make mistakes. We ask the user to confirm their deletion and tells the users that their behaviour can't be recovered:

The screenshot shows the Trip Planner interface with the same list of businesses on the left. A modal dialog box titled "Delete This Item for ever?" is open, containing the message "⚠ These items will be permanently deleted and cannot be recovered. Are you sure?". It has "Delete all items" and "Cancel" buttons. To the right of the dialog is a large empty calendar grid. Below the grid are buttons for "Edit", "Save", "Create Schedule", and "Delete".

Since our system does not automatically save changes of the schedule and event, we don't want the user to leave the page without saving their changes and when coming back find out that all the changes are gone. We ask the user if they want to leave the page or not every time they try to close or refresh the page:



f. Recognition rather than recall

When performing searching, the results will show in the same page as the schedule. Therefore, users don't need to memorize anything to arrange their schedule as shown as below.

The screenshot shows a 'Trip Planner' interface. On the left, there is a vertical list of venue cards, each with a name, a green star rating, and a small description. The venues listed are: High Line, The Metropolitan Museum of Art, Museum of Modern Art (MoMA), Stumptown Coffee Roasters, Union Square Park, ABC Kitchen, Union Square Greenmarket, and Balthazar Restaurant. A red box highlights this list. On the right, there is a calendar interface titled 'Drag search results to schedule to create event'. It shows a grid of time slots from 0:00 to 18:00 on a specific date. Below the grid are buttons for 'Edit', 'Save', 'Create Schedule', and 'Delete'. Another red box highlights this calendar area.

We always tell the users which calendar they are trying to add events to so they don't need to remember.

For the events in the calendar, we offer a link to the venues in that event, so users can always click on it to see the details about that venue rather than remembering what that is.

This screenshot is similar to the one above, showing the 'Trip Planner' interface. The left side displays the same list of venues with their details and ratings. The right side shows the calendar interface. In this version, a specific time slot in the calendar for the 'Museum of Modern Art (MoMA)' is highlighted with a red box. This indicates that when a user tries to add an event to that specific slot, they will be directed to the MoMA venue details page. The bottom of the calendar interface includes buttons for 'Edit', 'Save', 'Create Schedule', and 'Delete'.

Museum of Modern Art (MoMA)
Art Museum, Art Gallery, and Museum
11 W 53rd St (btwn 5th & 6th Ave), New York, NY 10019 →
[Suggest an Edit](#)

Hours: Open until 5:30pm (Show more)
Reservations: Yes
Credit Cards: Yes (incl. American Express)
Wi-Fi: Yes
Outdoor Seating: Yes

The Museum of Modern Art is a place that fuels creativity, ignites minds, and provides inspiration. Follow us on Foursquare to get tips on what's cool and new at MoMA—and leave some yourself. Share tips on your visit to MoMA, whether it's checking out great art in our exhibits... ([See all](#))

More Like Museum of Modern Art (MoMA)

- The Metropolitan Museum of Art** 9.7 1000 5th Ave (btwn E 80th & E 84th St)
- Solomon R. Guggenheim Museum** 9.6 1071 5th Ave (at E 89th St)
- Whitney Museum of American Art** 9.6 945 Madison Ave (at E 75th St)

Besides, when editing an event, we will show the current starting and ending time of the event in the form so the user don't have to remember which event at which time they are editing.

Trip Planner

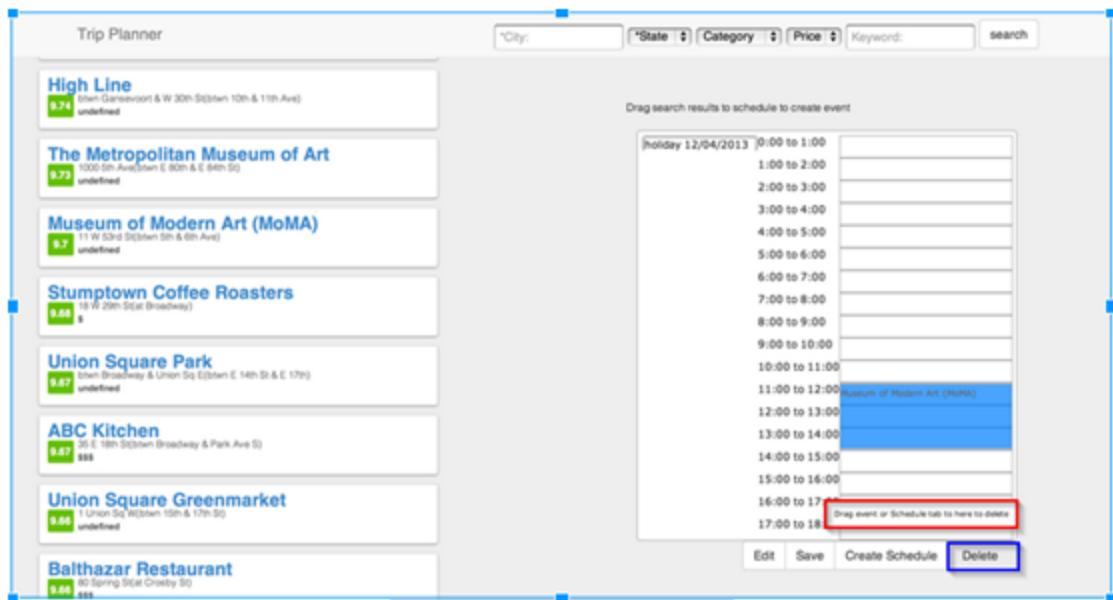
*City: *State: Category: Price: Keyword: search

High Line 9.74 btwn Gansevoort & W 30th St(btwn 10th & 11th Ave)	Drag search results to schedule to create event
The Metropolitan Museum of Art 9.73 1000 5th Ave(btwn E 80th & E 84th St)	(holiday 12/04/2013) 0:00 to 1:00 1:00 to 2:00 2:00 to 3:00 3:00 to 4:00 4:00 to 5:00 5:00 to 6:00 6:00 to 7:00 7:00 to 8:00 8:00 to 9:00 9:00 to 10:00 10:00 to 11:00 11:00 to 12:00 12:00 to 13:00 13:00 to 14:00 14:00 to 15:00 15:00 to 16:00 16:00 to 17:00 17:00 to 18:00
Museum of Modern Art (MoMA) 9.7 undefined 11 W 53rd St(btwn 5th & 6th Ave)	Modify event From: 11:00:00 To: 14:00:00 Comments: <input type="button" value="Modify"/> <input type="button" value="Cancel"/>
Stumptown Coffee Roasters 9.68 18 W 29th St(at Broadway)	
Union Square Park 9.67 btwn Broadway & Union Sq E(btwn E 14th St & E 17th)	
ABC Kitchen 9.67 35 E 18th St(btwn Broadway & Park Ave S) \$\$\$	
Union Square Greenmarket 9.68 1 Union Sq W(btwn 15th & 17th St) undefined	
Balthazar Restaurant 9.66 80 Spring St(at Crosby St) \$\$\$	<input type="button" value="Edit"/> <input type="button" value="Save"/> <input type="button" value="Create Schedule"/> <input type="button" value="Delete"/>

recognize what this button does and how to do it rather than remembering it. Apart from this, for the buttons, input text field, we offers a floating notification which will appear when

user move their mouse on it. These little notification helps the user to

Taking the delete button as an example:



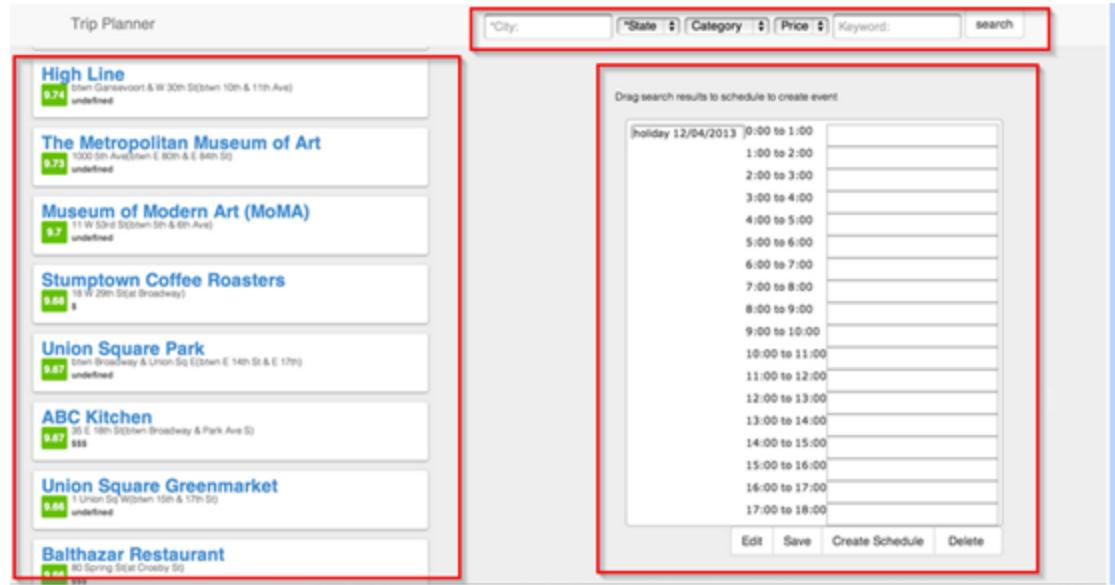
g.Flexibility and efficiency of use

We don't think the accelerators is needed because our implement is very simple and just need little time to perform. Hence, if accelerators is added, there are no significant improved for the speed of interaction.

However, we did put some thought into the design of aiding new users while not influencing the experience with expert users. For new users, they have the mouse stay above the buttons to reveal the floating user instructions, while expert users wouldn't have to do so and can directly hit the button that they need to use.

h.Aesthetic and minimalist design

Out main goal is to reach minimalist design, which can be easy-understood by first-time users. So, we expand our design only by adding only some functions that can let users play with this website smoothly instead of adding some fancy and complex functions. Moreover, we stick to our original plan that our website mainly for user to search event and arrange those event they are interested in the schedule, which is clearly shown as below.



i. Help users recognize, diagnose, and recover from errors

Generally, we have done our best to prevent errors when playing with this website. Moreover, when choosing system functions by mistake, there will show a information box in the center of the page to let users to undo the system functions in order to prevent mistaken operation.

Users might make mistakes when searching for certain criteria, they may enter the wrong name for a city or mismatching state or a misspelling keyword. Our way to help user diagnose and recover from these errors is to tell the user that there is something wrong with what they are searching and ask them to check their input.

Trip Planner

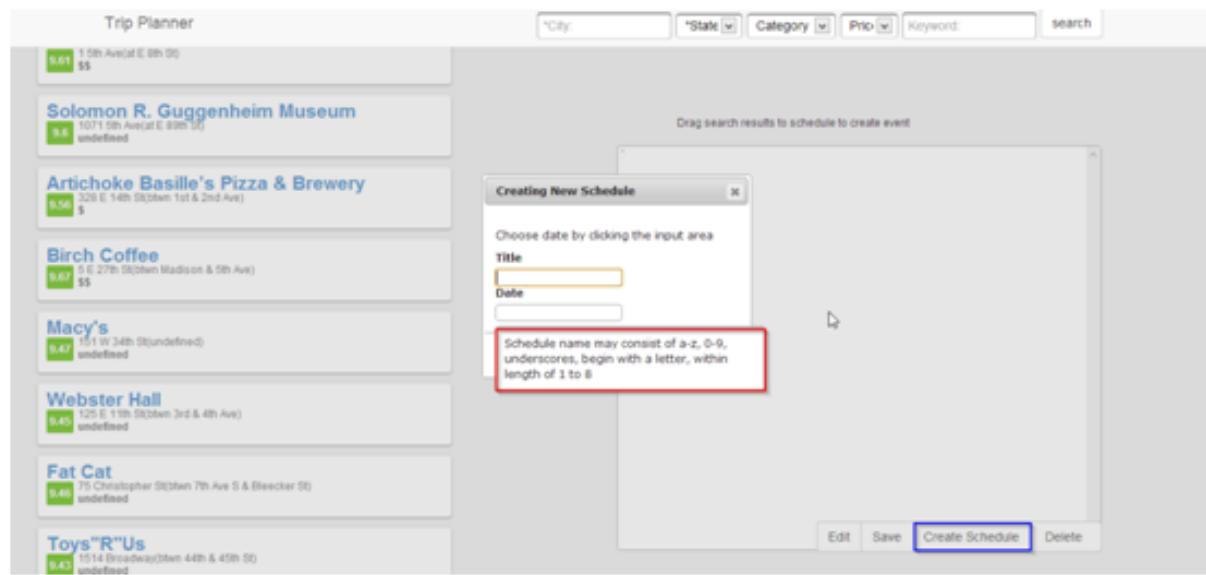
*City: *State Category Price Keyword:

Drag search results to schedule to create event

Input invalid. Check if You filled in both city and state, and the input is correct.

j.Help and documentation

The needed instruction will automatically shows when performing any task user want. For example, when users want to create a new schedule and after clicking “create schedule”, the instruction shows “Schedule name may consist of a-z, 0-9, underscores, begin with a letter, within length of 1 to 8”, which is shown as below.



Another example is that users might want to learn how to use any buttons or blanks on the website. When users move the cursor to buttons or blanks, it will automatically show the instruction which is very straight enough for users to understand their usage, which is shown as below.



Therefore, we don't think we need to put extra documentation online because we need to minimalist our design.

6. Software Engineering

The main tool we have used are Sublime Text2. Using this software, we write html, javascripts and css. We also references the following materials: FourSquare API, Bootstrap, Stackoverflow, jQUery UI and jQuery. Detailed links are listed as below.

- 1) **While designing the survey, we got a lot of inspiration from Ben Shneiderman and Catherine Plaisant. Designing the User Interface: Strategies for Effective Human-Computer Interaction, Fifth Edition.—Chapter 4: Evaluating Interface Designs**
- 2) **FourSquare API**
(<http://www.yelp.com/developers/documentation/v2/overview>).
- 3) **Stackoverflow** (<http://stackoverflow.com/>)
- 4) **jQuery** (<http://jquery.com/>).
- 5) **jQuery UI** (<http://jqueryui.com/>)
- 6) **Bootstrap** (<http://getbootstrap.com/>)