**Calendar Event and   
To-Do List Manager:**

**A Mobile Application**



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# Summary

On April 23, 2015, Team Thundercats presented the prototype of our calendar appointment and to-do list manager mobile application. We had previously done a calendar and to-do list application for our web application, and we felt very valuable experience could be gained as we worked through the process of translating a web application to a mobile device while still ensuring a rich user experience.

This document provides a brief description of our application including its key features, a source code overview, our presentation methodology, and examples of five design patterns we used.

# Application Overview[[1]](#footnote-1)

It is common for a person to have multiple daily calendars stored on different, disconnected platforms. Managing and visualizing these disparate calendars can be cumbersome and difficult. Our application simplifies this otherwise burdensome task by integrating all of a user’s different calendars into a unified calendar where a user can visualize and modify all of his/her calendars through a single, cohesive interface.

In addition to scheduled meetings and appointments, an individual usually must also complete a set of tasks, chores, errands, etc. Our application also integrates the ability to create and manage a user’s tasks in the form of an advanced “to-do list”.

By juxtaposing in a single interface an individual’s calendar with the tasks s/he must perform, a user is able to easily visualize and prioritize all of his/her daily activities. Therefore, this application’s integrated approach helps prevent the inefficiencies and issues (e.g. belated completion of tasks) associated with what for most is an unstructured system to daily activity management.

# Application Files and Source Code

Our tool was written in Objective-C and incorporated multiple open source utilities including:

* **JTCalendar**
  + **Description:** Skeleton calendar application
  + **Location:** <https://github.com/jonathantribouharet/JTCalendar>
* **UITextField+Shake**
  + **Description:** Tool that can shake a text field either horizontally or vertically on demand.
  + **Location:** <https://github.com/andreamazz/UITextField-Shake>
* **RateView**
  + **Description:** Interface for rating based on a scale of 0 to 5 stars.
  + **Location:** <https://github.com/taruntyagi697/RateView>
* **UIView+Toast**
  + **Description:** Interface for rating based on a scale of 0 to 5 stars.
  + **Location:** <https://github.com/taruntyagi697/RateView>

When running this application, we recommend the following configuration:

* **Operating System:** Apple OSX Yosemite ver. 10.10.1
* **Runtime Environment:** Apple Xcode ver. 6.3

To run the application, the source code included with our submission in the file “Assignment #4 – iOS Prototype.” should be unzipped; for this walkthrough, we will assume the folder name used the default naming of “Assignment #4 – iOS Prototype.” Next, open XCode and import the project by clicking on the “Open another project…” button in the bottom right corner as shown in figure 1.



Figure – Importing the Project into Xcode

A viewer will then open that allows you to browse to the Xcode project. Navigate to the folder containing the source code. Next select the folder name “iOSPrototype.” In there, you will find an Xcode project name “iOSPrototype.xcodeproj.” Select that and click “Open” as shown in figure 2.

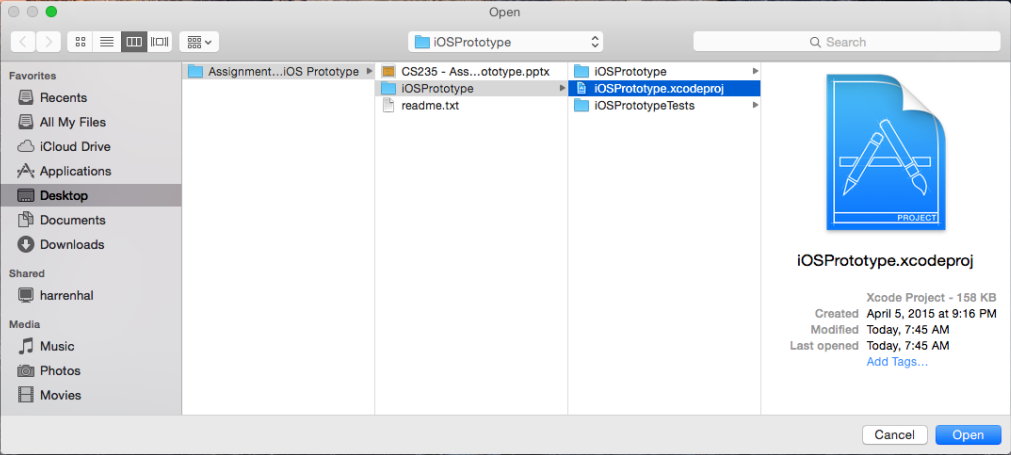


Figure – Selecting the Project in the Xcode File Browser

After clicking “Open”, the project will automatically open in Xcode. Verify that the iPhone 6 runtime environment is selected and click the run button as shown in figure 3. A modal dialog box stating “Build Successful” should appear at which point the iOS Simulator will open showing our iOS application.

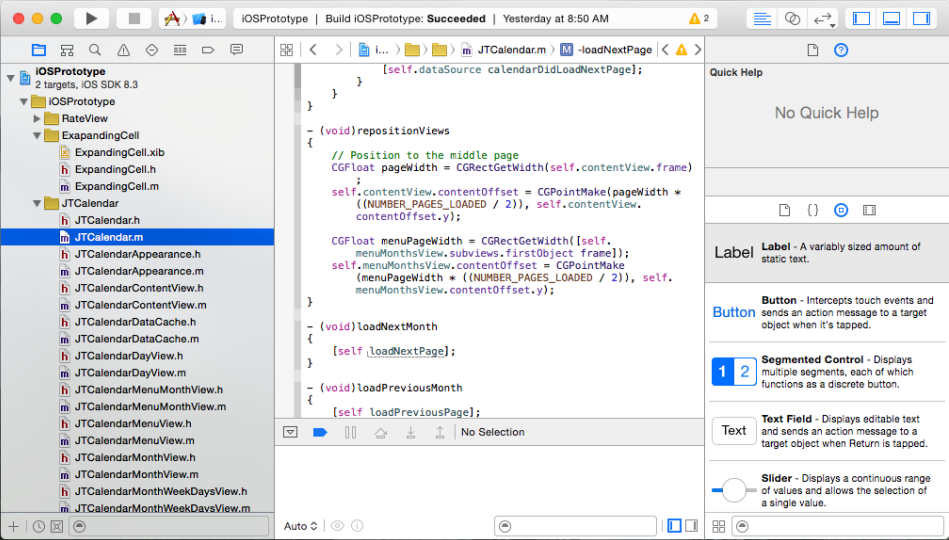


Figure – Running the Project in Xcode

# Prototype Presentation

Similar to the approach we used in our web application presentation, our mobile application presentation only had a very small number of slides. A slide-focused presentation can quickly cause the audience to lose interest and/or become distracted. It was our position that a very short presentation followed by a longer demonstration would be more engaging and informative to the audience. Given the very positive feedback we received from both Professor Mak and the class after our web application presentation, we saw no need to change our application in this presentation. Overall, we felt the presentation was a success and was engaging to the audience. Our PowerPoint presentation, named “CS235 - Assignment #4 - Mobile Prototype.pptx”, is included with this submission.

# Design Patterns

Design patterns provide solutions to often encountered software challenges; they serve as best practices that have been refined through proven design experience. In this section, we describe five of the design patterns that were incorporated into our mobile application. Note that this list is not intended to be exhaustive; rather, when selecting which design patterns to describe in the subsequent sections, we considered the following criteria:

Criticality of the pattern to the overall design.

Potentially interesting contrast between our implementation for a mobile application versus the implementation in a web application.

Conduciveness of the pattern to be shown and described in a text report

## Inlay List Design Pattern

An inlay list displays a list of items (usually text based) as a single column; when a user selects/clicks on an item in the list, that item’s details are displayed below it. This pattern allows for a significant amount of content to be displayed in a relatively compact space.

In our original web application, we used the Inlay List Pattern to display the user’s to do list. We had decided on this methodology because a user could have dozens of items or more in their to-do list. What is more, each to-do list item will have several pieces of information associated with it including: a title, description, priority, completion due date, etc. To display all of this information at once for each to-do list item would be a large visual cognitive load and would greatly reduce the scanability of the list. In contrast, the inlay list allowed us to display the minimum amount of information possible while at the same time giving the user the flexibility to display additional details as required by that user’s specific goals. When transitioning to a web application, all of the previously enumerated benefits applied; what is more, the smaller screen size of a smartphone made it even more necessary to be efficient when displaying the items in the to-do list.

Figure 4 shows our mobile application’s to-do inlay list in its unexpanded form. Note that for the four items in the list, only the title for each task is displayed. When the user clicks on an item in the list, the item expands to display all of its associated information. Figure 5 shows the expanded information associated with the “Mow the Lawn” to-do list item. Note that the description, due date, priority, and completion check box are now displayed below the item’s title.

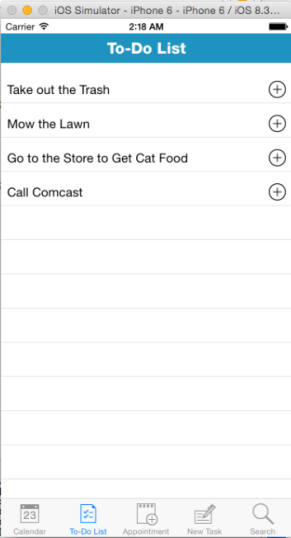


Figure – Mobile Application’s Unexpanded Inlay To-Do List

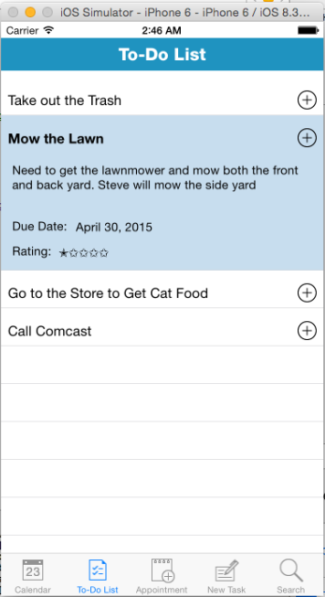


Figure – Mobile Application’s Expanded Inlay To-Do List

During our in class presentation, we spoke multiple times about the importance of brand cohesion between the mobile and web applications. When developing the mobile application, we strived to keep the interface as close as possible to the web application. Figures 6 and 7 show the inlay lists from our web application. Similarity between the two application allows for a user to share their frequency of practice between the two applications. Below are examples where we tried to ensure similarity between the two to-do list implementations:

Title bar with the text “To-Do List”

Color scheme for the title board and text color as well as the unexpanded (white) and expanded (light blue) to-do list items.

Organization of the text in the expanded to-do list description.

The plus (“+”) sign to indicate that a to-do list can be expanded.



Figure – Web Application’s Unexpanded Inlay To-Do List



Figure – Web Application’s Expanded Inlay To-Do List

## Alternate Views Design Pattern

When using a software program or tool, often a single, “one-size-fits-all” view is insufficient to allow a user to extract all of the requisite information from a set of data. For example in any calendar application including ours, a user may want to know the meetings s/he has on a specific day; if his/her calendar is particularly full on that day, s/he may want the application to exclusively display that day’s schedule. In contrast, if the same user wants to know what days in the next month s/he can schedule an all day trip, s/he may want to view the whole month’s calendar at once. We used the Alternate Views Pattern in our application to addresses these types of varying user needs by allowing a user to select the calendar view that best suits his/her current goals. In our application, a user can select between three primary calendar views:

* Day View – View an hour by hour breakdown of a user’s appointments for a specific day.
* Week View – View an hour by hour breakdown of a user’s appointments for a specific week.
* Month View – A higher level view of a user’s appointments for an entire month.

These three alternate views are shown in figures 8, 9, and 10 respectively. Note that the view is selectable by clicking on the name of the view (e.g. “day”, “week”, and “month”) in the upper right corner of the calendar as shown in each of these figures.

## Prompting Text Field Design Pattern

A web page is more likely to make traction with users if it is intuitive and easy to use. One of the ways to increase the intuitiveness of a page is to reduce the amount users must think when using it. The Prompting Text Field Pattern includes prefilled information inside a text field to inform the user regarding the nature of the input field.

The Prompting Text Field design pattern reduces the amount a user must think when using any application; it also reduces the likelihood of user error. Our original web application failed to take full advantage of the benefits provided by prompting text fields. Figures 11 and 12 show the web application’s forms to create new calendar appointment and to-do list tasks respectively. Note that for the “Name”, “Description”, and “Due Date” fields, the text box is blank with no guidance to the user.

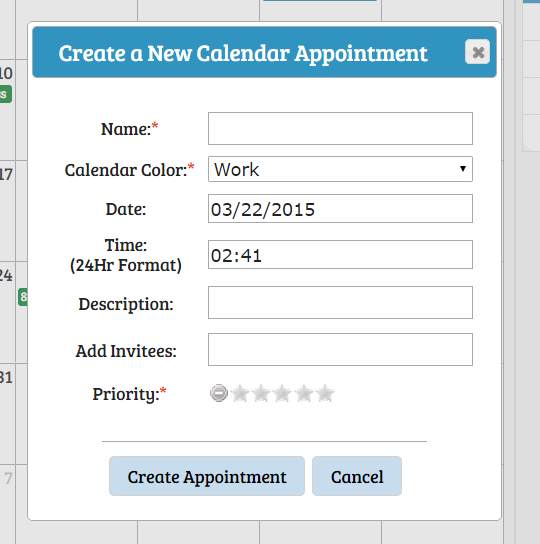


Figure – Web Application’s Create Calendar Appointment Modal Dialog

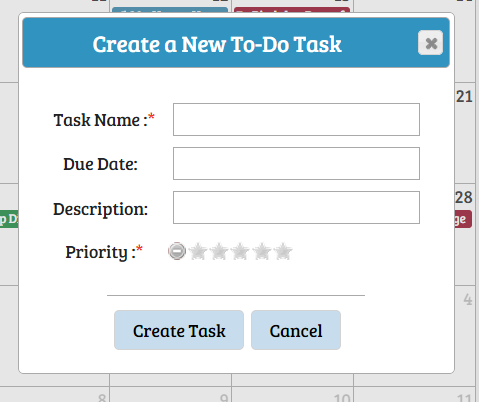


Figure – Web Application’s Create To-Do Task Modal Dialog

The second place we used the Prompting Text Field Pattern was in our page’s search box as shown in figure 12. Since the search field was placed above the to-do list (as shown in figure 13), there were concerns that some users may think that the search feature applied only to the to-do list and not the whole application. As such, we placed inside the search field the prompting text “Search Calendar & To-Do List” to inform the user of the search feature’s full functionality. In addition to the intuitiveness improvements associated with the prompting text field for the search box, this approach also reduces the burden on a user’s long term memory to remember the types of queries the search feature supports.

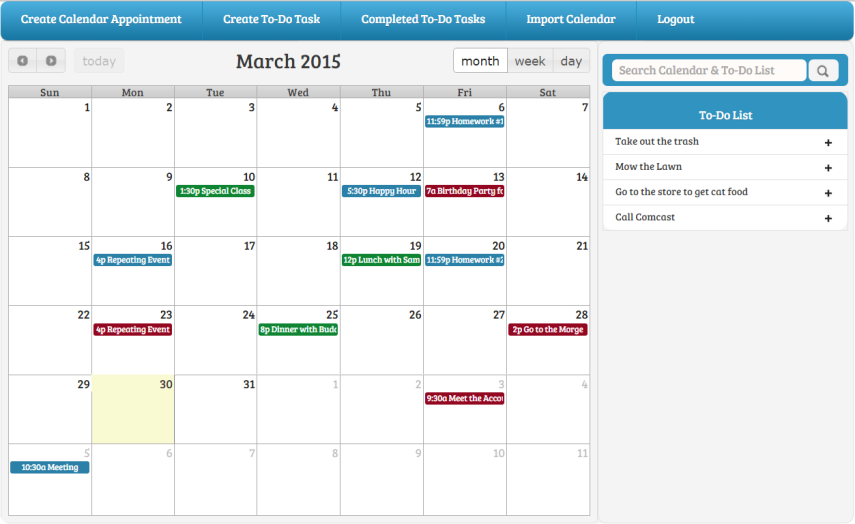


Figure – Location of the Search Box Above the Inlay List

## “Toast” Semi-Modal Dialog Messages

For the web version of this application, we relied heavily on modal dialog boxes to streamline navigation and create a “hub and spoke” style navigation modal. In contrast, modal dialogs generally do not translate well to a smartphone because of the smaller screen and less precise control for a finger versus a mouse. Despite these limitations, modal dialogs can still have a place in a mobile environment when done correctly.

Starting with Jelly Bean (version 4.1), Android provided an API for creating simple “Toast” semi-modal dialogs scheme[[2]](#footnote-2). They are intended as “simple feedback about an operation in a small pop-up”. The two locations we used semi-modal “Toast” messages were after calendar appointment and to-do task created (shown in figures 14 and 15 respectively). Some may consider near blasphemous to use an Android feature in iOS. However, we felt that since this scheme is used in other applications (e.g. the now defunct Windows messenger was the originator of the idea), it was not a case of forcing something where it did not belong.

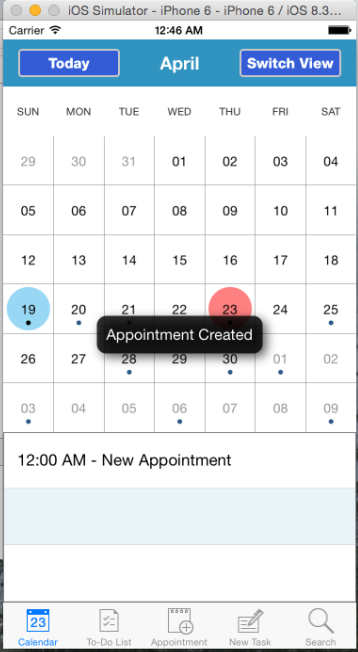


Figure – “Toast” Semi-Modal Dialog after Calendar Appointment Creation

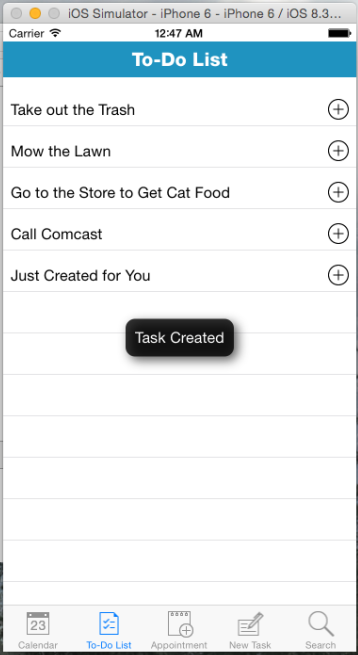


Figure – “Toast” Semi-Modal Dialog after To-Do Task Creation

The advantages of the “Toast” messaging scheme are:

**Size** – On a smartphone screen, size is often paramount leading to everything being miniaturized. This model is specifically designed for short (2-3 words) messages.

**Instant Feedback** – For users to feel comfortable with an application, they should receive obvious feedback that a specific control’s action has taken place. This interface provides that feedback.

**Semi-modality** – The “Toast” message appears in front of all text so the user will not be able to accidentally hide it behind other menus. At the same time though, it is non-blocking so users can continue to perform other actions as needed.

**Ephemerality** – Modal dialogs, in a particular on a mobile device, can be annoying if dismissing them requires a user action. Toast dialogs are minimally intrusive as they are only displayed for a preprogrammed length of time (ideally the display time would be determined based off user feedback in a usability test).

## Dropdown Chooser Design Pattern

When a web page or mobile application is not well-designed, users often become confused when trying to enter information into a form as they may be unsure of how to correctly format the input as well as the set of possible values the field accepts. In addition, when users are forced to manually type such information, they are more likely to make a mistake. To address these types of issues with user input, we used multiple dropdown choosers in both our web and mobile applications.

Our web application used two types of dropdown choosers. The first was to select a specific date from a calendar (shown in figure 16), and the second was a time chooser (shown in figure 17).



Figure – Web Application’s “Point-and-Click” Style Date Dropdown Chooser



Figure – Web Application’s “Point-and-Click” Style Time Dropdown Chooser

While these dropdown choosers worked well for a web application, they were wholly insufficient for a mobile application as both required high precision when selecting the date/time. Figures 18 and 19 show the dropdown choosers we used in our mobile application; the date chooser was used in both the “Create New Calendar Appointment” and “Create New To-Do Task” forms while the time chooser was only used in the “Create New Calendar Appointment” form. It is important to note that the choosers were changed to a “rolodex” style in the mobile application as to the opposed to a “point and click” style used in the web application. The benefits of the rolodex style for mobile applications include:

**Reduction in the Requisite Precision** – Precisely controlled selections on a mobile device are very difficult, especially for specific types of users (e.g. elderly). Requiring users to click on specific dates or times in a small window may be next to impossible for some users. In contrast, the rolodex only requires users to move their finger up and down to move through the list of choices, which many users will find significantly more manageable.

**Error Forgiveness** – In a rolodex dropdown chooser, the user is able to do fine scrolling back and forth as they try to hone in on their target date and time. This is contrasted with a web drop down chooser which usually closes as soon as the user selects an item.

While the change in dropdown chooser represents a difference between our two applications, we felt the previously enumerated benefits greatly outweighed the associated costs (e.g. requiring users to learn two data entry models).

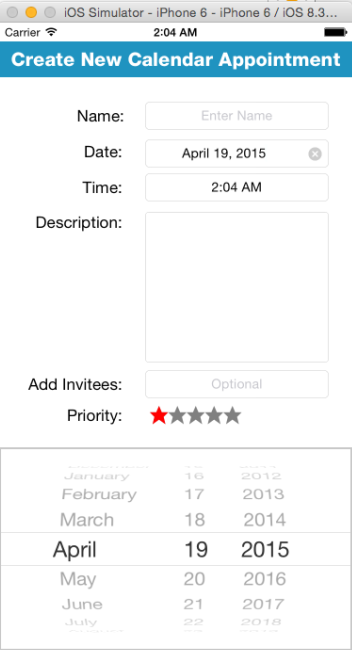


Figure – Mobile Application’s “Rolodex” Style Date Dropdown Chooser

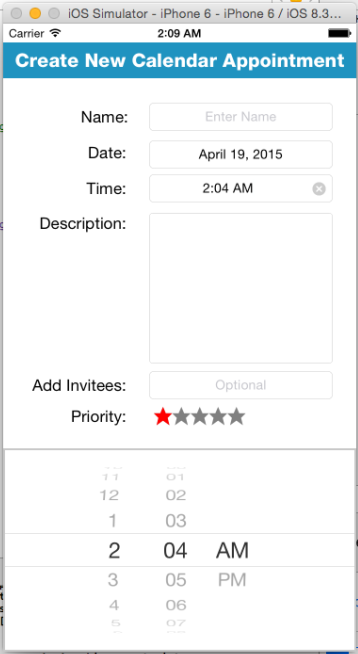


Figure – Mobile Application’s “Rolodex” Style Time Dropdown Chooser

1. The “Application Overview” section is the same as in our web application final report. Since the two applications are intended to have been developed theoretically by the same company going after a single market, we did not see it made logical sense to have two different descriptions. [↑](#footnote-ref-1)
2. For more information on Android’s toast, please see here: <http://developer.android.com/guide/topics/ui/notifiers/toasts.html>. [↑](#footnote-ref-2)