

Good Morning

Conceptual Design Document



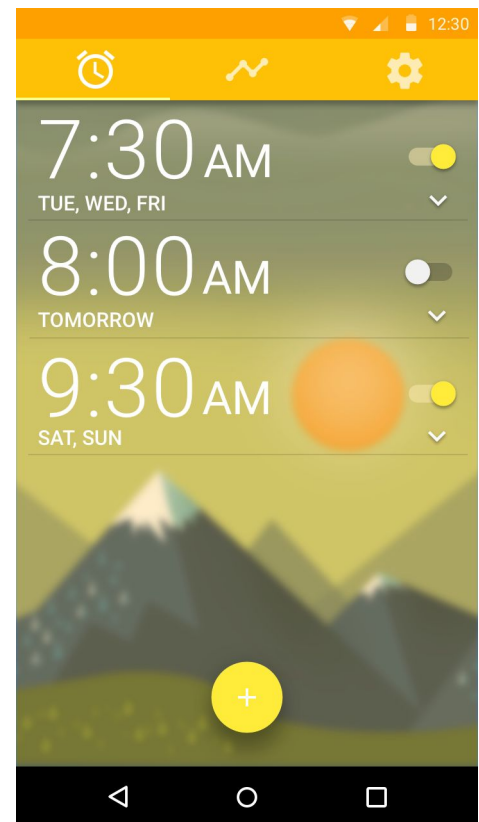
LARGE Software Inc.

Adam Kroon, Rahat Mahbub, Graeme Bates, Luke McLaren

Executive Summary

LARGE Software developers have been given the task of developing a mobile application that intends to assist users in waking up efficiently and gracefully in the morning. This application is called Good Morning. The SoftStart development group has provided LARGE Software with a Detailed Request for Proposal for this application. In this document, SoftStart outlines objectives, constraints and known interactions that they are looking to see in a successful prototype demonstration before the end of March 2016.

This Detailed Request for Proposal has served LARGE developers as a guideline to begin development of the Good Morning application. Given the timeline, and known objectives as well as constraints provided for the application, LARGE developers have been able to identify and research topics that are relevant to developing a minimum application system before the end of March. These topics would include a core alarm, smart assistant, machine learning, and smart technology integration. From this research, developers have been able to begin mock-ups on user interface design and interaction. LARGE developers have also created a Management Plan for the Good Morning application. In this plan, a finalized minimal system has been identified, which will meet SoftStart's specific needs. This plan discusses all known relationships between the application and APIs that will be used during development. Finally this Management Plan outlines which developers will be completing specific tasks in order to deploy a working application before the deadline at the end of March 2016.



Project Summary

The Good Morning application project was proposed by the SoftStart project team. The main functionality of this application is assisting users (a targeted group of young adults or professionals between the ages of 18 and 32) in the process of waking up in the Morning. To do so, this application aims to utilize the following technologies (as outlined by SoftStart in their Detailed RFP):

- **Core Alarm** - a system through which the user's mobile device will reliably and gracefully assist the user in waking up.
- **Smart Assistant** - a summarization of additional information that the user utilizes on their mobile device. Such information would be comprised of missed or unseen instant messages, emails and phone calls as well as notifications on upcoming daily calendar events or weather information for the upcoming day.
- **Machine Learning** – the application should be able to learn from user habits, such as sleep patterns, to be able to adapt or better assist the user throughout the process of waking up through the morning.
- **Smart Technology Integration** – ideally the Good Morning application will allow users to setup and control smart devices such as the *LIFX* wakeup light to assist the process of gracefully waking up in the morning. Integration of smart watches in the application will allow for use of accelerometers on additional devices to detect waking time during REM sleep cycles.

Along with the aforementioned utilized technologies, the Good Morning application will meet the following development constraints in order to meet the prototype demonstration at the end of March:

- The application will be available for users to test for mobile devices that use Android operating systems
- Prototype will be made available in English as a primary language with capability to expand to multiple languages
- The ability to interact with various types of smart technology (Prototype will specifically interact with the *LIFX* wakeup light)

In order to accomplish these tasks the Good Morning application will have to accurately, efficiently and securely utilize APIs of existing applications or technologies. *LARGE* Software developers have completed background research in these fields to provide a framework for the development of the Good Morning application.

Core Alarm

- Market currently saturated with alarm applications available publicly on Github
- Most applications not compatible with Android V4.4 and above
- Researching code base of current highly used applications will allow LARGE developers to focus on refining the UI experience of the alarm
- Developers are looking to potentially integrate the SensorManager API to allow devices to anticipate when to implement an alarm at an appropriate point during a REM sleep cycle

Speech Synthesis

- Voice Notify will be a primary example of how to construct an application that properly synthesizes speech
- Main developer goal is to create an application that requires little to no interaction from the user at first, utilizing speech synthesis to read off displayed information
- Speech synthesis will be synchronized with alarms to ensure that information is given in a slow, steady stream. This will allow for maximum comprehension on the user's end.

LIFX Smart Lights

- LIFX application sets limits to the user by limiting the control of a light's color or brightness, as well as whether or not it is on.
- Good Morning aims to tap into this technology to allow the user to control when and how the light is turned on
- *SoftStart* has stated that a graceful transition to waking up is preferred. This would mean not abruptly turning on lights, but a smooth and slow transition.
- LIFX API is made public, which will allow LARGE developers to apply the aforementioned effects to smart lights used by clients

Google Calendar API

- Google is the standard application base for all Android operating system phones
- LARGE developers main goal is to be able to hook into Google Calendar API to summarize upcoming events in the user's day
- Codebase for Google Calendar is widely used through many applications whose code is made available publicly online

With the provided RFP for the Good Morning application from *SoftStart*, the Software Developers at LARGE Software Inc. have created a plan to effectively engaged the user throughout their morning, delivering relevant information at a suitable pace. This engagement will be done through a well-planned and thoroughly testing User Interface, ensuring it meets the client's needs through product demonstrations. This document will also thoroughly outline the management process that LARGE Software developers plan to follow. This will ensure that the client understands what the developers understand to be a minimal product for demonstration by the end of term, and a complete breakdown of all major features that the developers intend to have working by the time.

User Interaction

Application Installation

In order to use the Good Morning application it must first be installed on the user's device. Since the application is solely an application for Android devices users must download it from the Google Play Store. Once installed the user can navigate to the application through their application menu and begin using it.

Installation Interaction

The user must access the Google Play Store from their phone, this requires that their phone use the Android Os. From the Google Play Store the user can search for "Good Morning" to find the application developed by LARGE Software Inc. Once the application has been located, the user can select it to be brought to it's application page. From the application page select "INSTALL", this will begin the installation process which may take a few moments to download and install. Once the user has been notified that the application has been installed on their phone they may access it from their application menu.

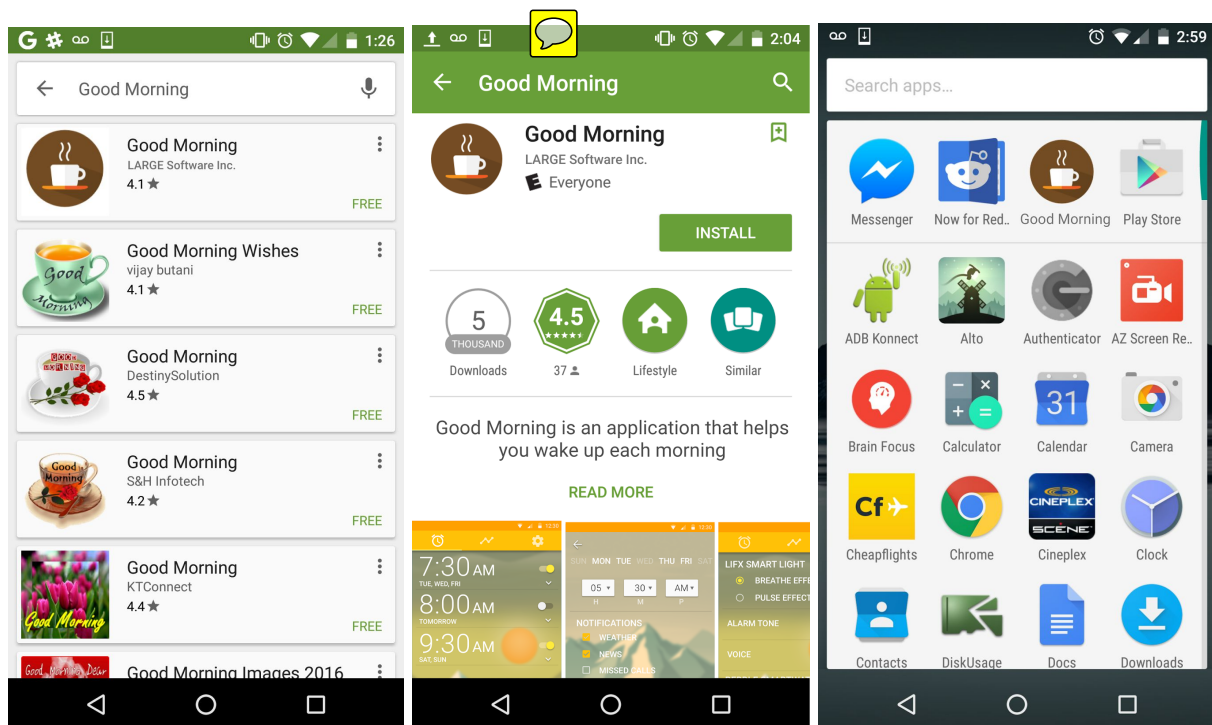


Figure 1: Installation flow, Google Play Store search, application Page, application available in the user's application menu

Installation Interaction

Description	User interaction which culminates in the creation of a new alarm
Actors	<ul style="list-style-type: none">• User• Device• Google Play Store• Application
Preconditions	<ul style="list-style-type: none">• Device must be using the Android operating system
Basic Steps	<ol style="list-style-type: none">1. Access the device2. Navigate to the Google Play Store3. Search for “Good Morning”4. Select the “Good Morning” application developed by LARGE Software Inc.5. From the application page press “INSTALL”6. Wait a moment until download and installation has completed7. Access the Good Morning application from application menu
Rules	<ul style="list-style-type: none">• User must have a Google account in order to install Play Store applications

Alarm Creation

Create alarms using the Good Morning application to wake you up in the morning. The created alarm will wake the user up at their specified time or within a window of time if smart integrations are used.

At the time the alarm has begun it will present the user with two options, either “snooze” the application for a specified time (usually 10 minutes) or dismiss it. The snoozing input will delay the alarm for a specified time, while the dismiss input will close the alarm. After dismissal of the alarm, notifications which have been specified will be vocally read using the builtin virtual assistant. Once the virtual assistant has finished it will ask the user to verbally confirm that they have received the notifications. If the user gives a negative response the virtual assistant will repeat them, otherwise interactions with the application will be complete.

Creation Interaction

Open the Good Morning application. The home screen which shows the user's current alarms and provides access to the configuration screen will be displayed. Press the addition symbol to begin creating the new alarm. The configuration screen allows characteristics of the alarm to be specified such as, time, notifications, vocals used, and smart integrations will be displayed. Specify the time for the alarm to wake the user up, leaving the default configurations in the additional fields. After confirming that the alarm is configured as the user wants, press the "OK" button at the bottom of the configuration screen finalizing the creation process. You will be presented with an Android Toast which informs the user how long till the created alarm will go off, as well as being returned to the home screen which will now display the user's newly created alarm.

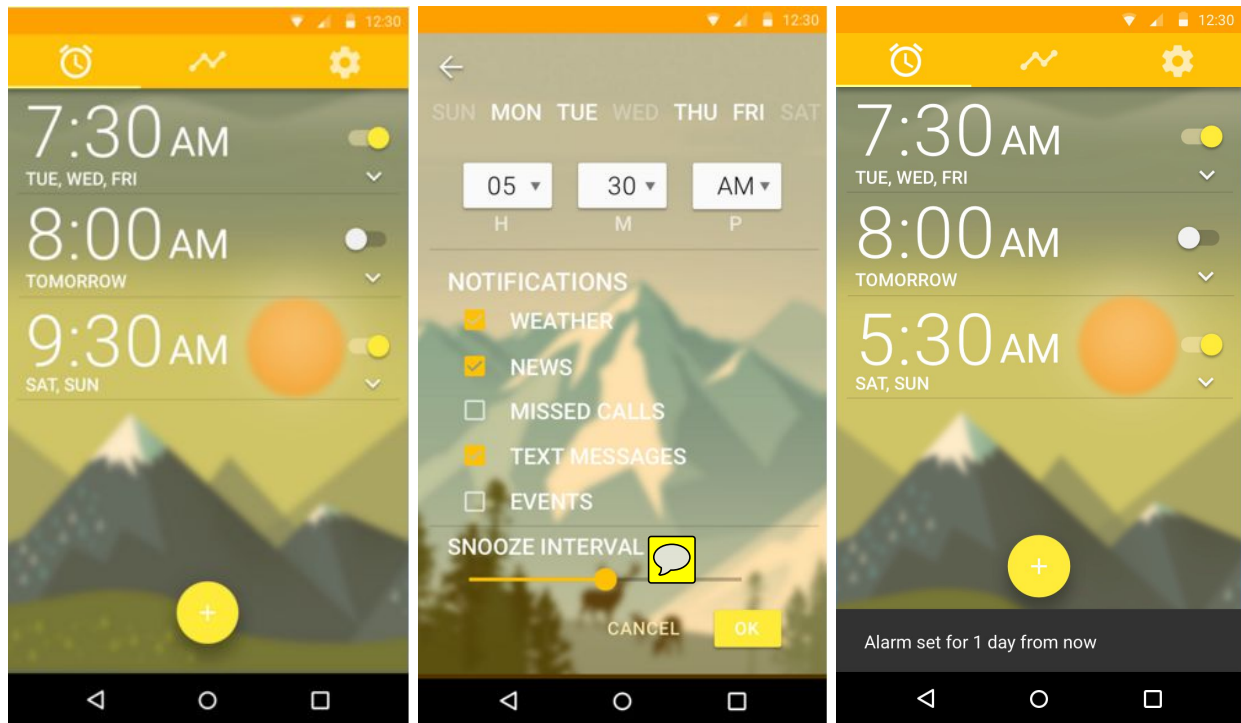


Figure 2: Creation flow, displaying the home page pre-alarm-creation, alarm creation page, and the home page post-alarm-creation.

Creation Use Case Description

Description	User interaction which culminates in the creation of a new alarm
Actors	<ul style="list-style-type: none">• User• Application
Preconditions	<ul style="list-style-type: none">• The application must have the permissions to access all notification streams
Basic Steps	<ol style="list-style-type: none">1. Open the application2. Press the addition symbol3. Configure the alarm's settings4. Assign a time to the alarm5. Confirm alarm configuration6. Select "OK" to finalize alarm creation
Rules	<ul style="list-style-type: none">• If no notifications are selected the application produces a common alarm.• The alarm will default to being enabled on creation, this can be changed from the home screen.

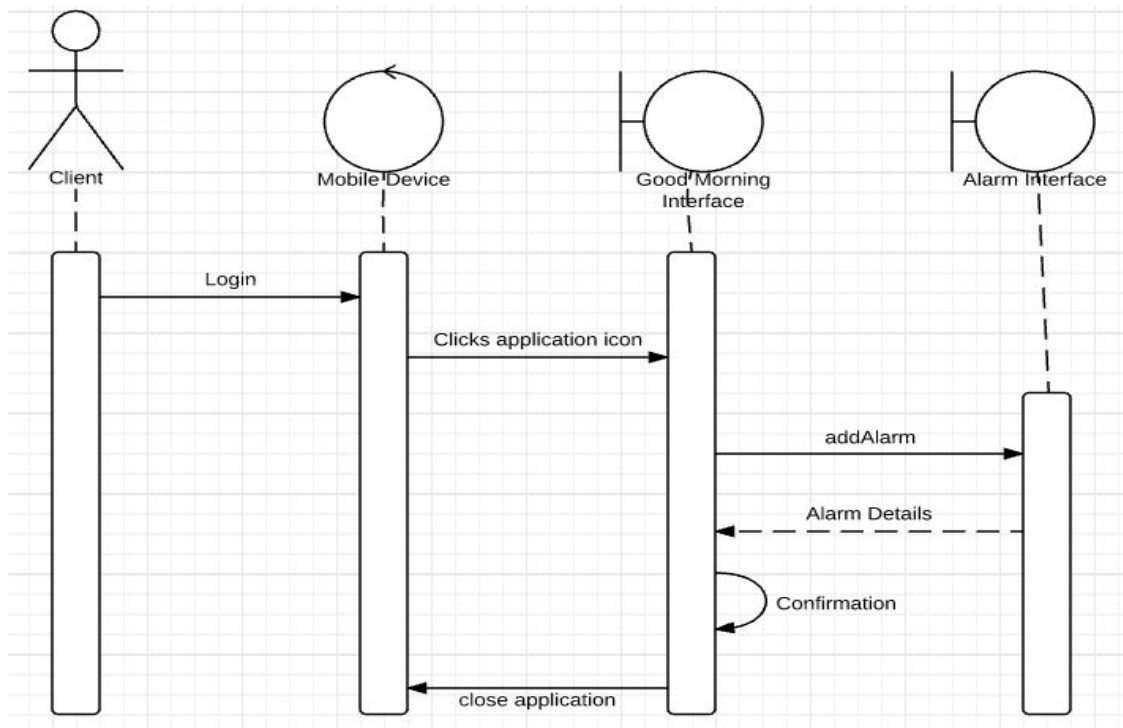


Figure 3: Alarm Creation Sequence Diagram

Alarm Deletion

The user may want to delete their configured alarms once they are no longer needed or for any other reason. Please keep in mind that alarms can be reconfigured which may be more appropriate compared to deleting an alarm which is an irreversible action.

Deletion Interaction

Open the Good Morning application. The home screen will be displayed along with all of the user's current alarms. Select the alarm to be deleted. The Alarm will expand to reveal additional operations, "Configure" and "Delete". Selecting Configure will allow the user to reconfigure the alarms current configuration. **Selecting "Delete" will permanently and irreversibly remove the alarm.** Select the "Delete" option, and a confirmation dialog will appear giving the user two options "Cancel" and "Confirm", selecting the former will return the user to the home screen with the alarm intact while selecting the later will finalize the deletion of the alarm. Select the "Delete" option. The home screen will be displayed and the alarm will be removed from the user's current alarms. The home screen will then display an option to undo the deletion, reverting the previous deletion and displaying the alarm again.

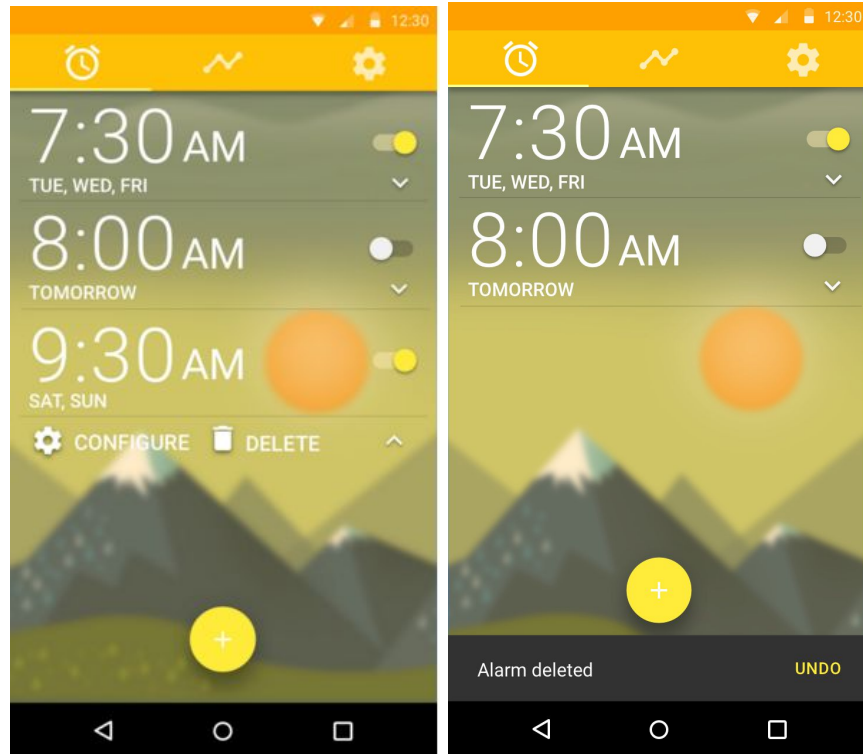


Figure 4: Deletion Flow, displaying the home page pre-alarm-deletion, and the home page post-alarm-deletion

Deletion Use Case Description

Description	User interaction to delete the alarm from their list of preconfigured alarms displayed on the home page.
Actors	<ul style="list-style-type: none"> • User • Application
Preconditions	<ul style="list-style-type: none"> • The user must have at least one alarm to delete
Basic Steps	<ol style="list-style-type: none"> 1. Open the application 2. From the home screen select the alarm to be deleted 3. Press the displayed “Delete” option 4. (Optional) Select undo to revert alarm deletion
Rules	<ul style="list-style-type: none"> • Once an alarm has been deleted and the undo option has disappeared the alarm is permanently deleted

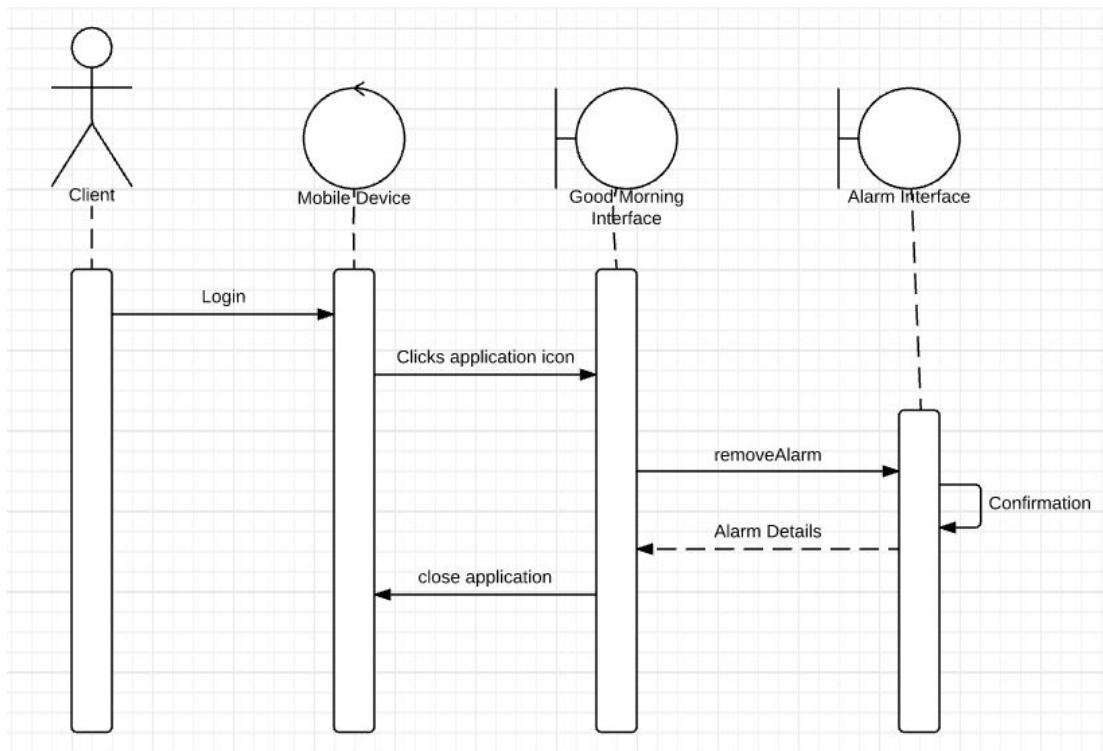


Figure 5: Alarm Deletion Sequence Diagram

Alarm Snooze/Dismissal

When the user's alarm goes off they will be presented with two choices, either to “Snooze” or “Dismiss”.

Snoozing the alarm will silence the alarm and delay it for a configured period of time until it goes off again, this is set within the configure alarm screen. Snoozing the alarm is good for getting an extra bit of sleep before having to wake up.

Dismissing an alarm will silence it and begin the virtual assistant which vocally reads the user their configured notifications. Dismissal of the alarm is the trigger which begins the key component of the Good Morning application.

Snoozing Interaction

Open the Good Morning application, and the home screen will be displayed along with all of the user's current alarms. To set the snooze interval, either create a new alarm or configure an old one. Once on the configuration screen of said alarm, select the “Snooze Interval” field and input an integer value ranging between 1-59, this value will represent the snoozing interval in

minutes. Confirm the configuration of the alarm and select “Done”. Now when the alarm begins selecting the “Snooze” option will delay the alarm for the specified interval.

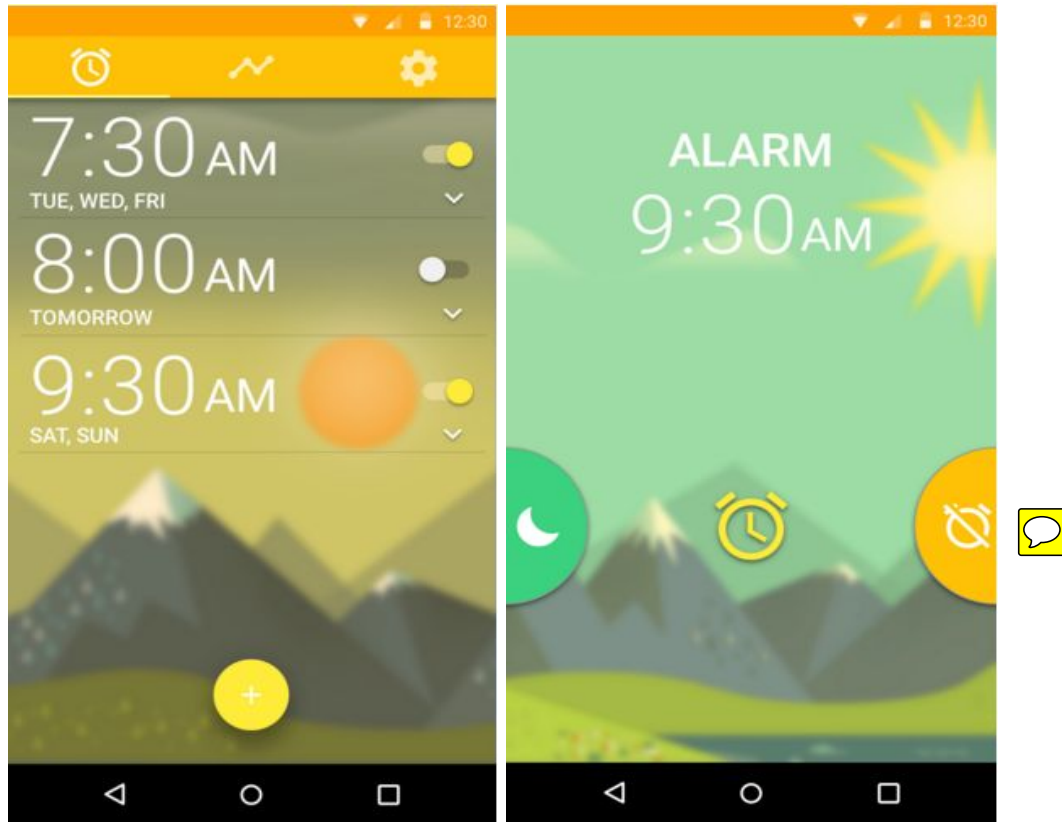


Figure 6: Alarm Snoozing/Dismissal flow; showing the set alarm, and the alarm once it has begun

Snoozing Use Case Description

Description	User interaction to delay the current alarm by a preset time amount. This action also silences the alarm.
Actors	<ul style="list-style-type: none"> • User • Application
Preconditions	<ul style="list-style-type: none"> • An alarm must be configured • An alarm must be currently sounding
Basic Steps	<ol style="list-style-type: none"> 1. The alarm sounds 2. Swipe right on the snooze button
Rules	<ul style="list-style-type: none"> • The alarm will snooze for the preset time configured

Dismissing Interaction

Once the Alarm begins select the dismiss option. The alarm will silence and the vocal notifications will begin. The vocal notifications will alert the user with the configured information.

Dismissing Use Case Description

Description	User interaction to dismiss the current alarm.. This action also silences the alarm.
Actors	<ul style="list-style-type: none">• User• Application
Preconditions	<ul style="list-style-type: none">• An alarm must be configured• An alarm must be currently sounding
Basic Steps	<ol style="list-style-type: none">1. The alarm sounds2. Swipe left on the dismiss button
Alternate Steps	<ol style="list-style-type: none">1. Open the application2. Open the alarm that is going to sound3. Turn off the alarm
Rules	<ul style="list-style-type: none">• Alarms may only be dismissed once
Postconditions	<ol style="list-style-type: none">1. The alarm is dismissed until the next time it sounds2. The user's notifications will be read aloud if applicable

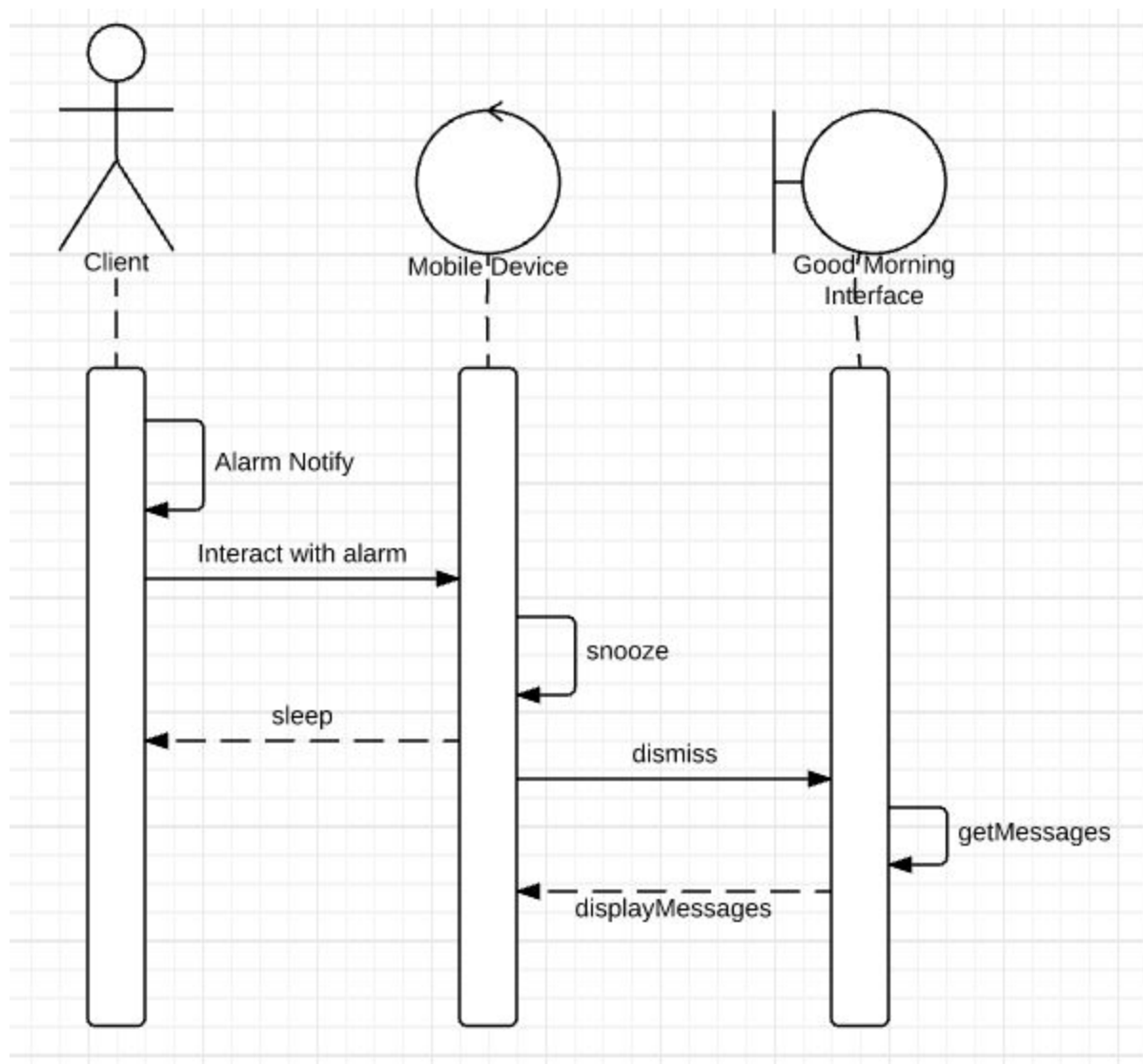


Figure 7: Alarm Snooze and Dismissal Sequence Diagram

Alarm Notifications

Once the alarm has been dismissed it will vocally read the notifications which the user has configured using Google's built in speech capabilities. This will allow the user to receive a concise summary of valuable information of the user's day.

Notification Configuration Interaction

Open the Good Morning application. The home screen will be displayed along with all of the user's current alarms. To set the notifications, either create a new alarm or configure an old one. Once on the configuration screen of said alarm, under the "Notifications" header select the

notifications which the user would like to receive (calendar events, missed notifications and calls, weather information, news, etc). Confirm the configuration of the alarm and select “Done”.

Notification Configuration Interaction

Description	User interaction when receiving the notifications associated with an alarm.
Actors	<ul style="list-style-type: none">• User• Application
Preconditions	<ul style="list-style-type: none">• User must have an alarm configured with notifications
Basic Steps	<ol style="list-style-type: none">1. Dismiss an Alarm2. Configured notifications will be read aloud
Rules	<ul style="list-style-type: none">• If the alarm does not have any associated notifications nothing will be read

Alarm Settings

The Alarm Settings screen will allow the user to configure various core alarm features and smart Internet of Things integrations. It can be accessed by tapping the “Gear” icon or by swiping to the right.

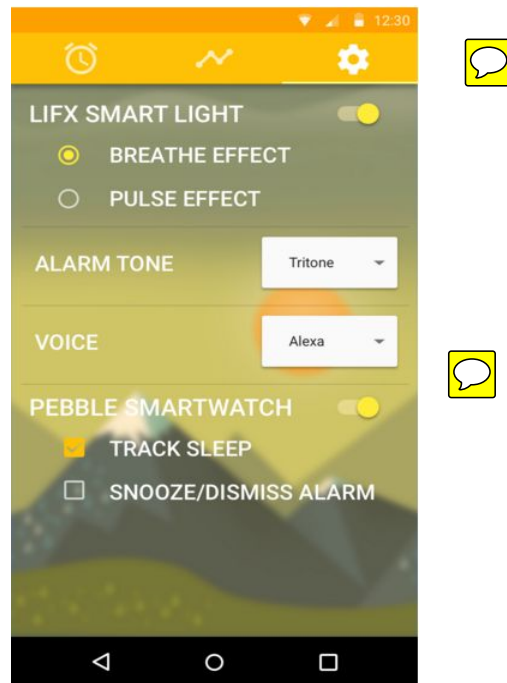


Figure 8: Alarm settings menu with integration, tone, and voice configurations

LIFX Light Bulb

The LIFX Light Bulb is a smart lightbulb that can be configured to gently wake up the user with a breathe effect where lights are turned on slowly or with a pulse effect for the heavy sleepers. Turning on the LIFX Light Bulb by pushing the slider automatically discovers and connects to any light bulb that are connected in the same network.

LIFX Configuration Interaction

Description	User interaction when enabling LIFX smart light capability.
Actors	<ul style="list-style-type: none">• User• Application• LIFX Smart Light
Preconditions	<ul style="list-style-type: none">• User must have a LIFX smart light installed and configured to their home wireless network• User must be connected to their home wireless network on their phone
Basic Steps	<ol style="list-style-type: none">1. Open the application2. Select the setting tab3. Configure the light options4. Press or swipe on the toggle switch next to the LIFX name
Postconditions	The light will now perform its configured operation upon an alarm sounding

Alarm Clock Sound

Selecting the drop-down menu beside Alarm Tone allows the user to play and select one of the available thirty different alarm clock sounds to wake the user. The tones include nature sounds to gently wake up light sleepers and loud tones for heavy sleepers.

Alarm Tone Configuration Interaction

Description	User interaction to configure the tone used when the alarm sounds
Actors	<ul style="list-style-type: none">• User• Application
Preconditions	<ul style="list-style-type: none">• The user may use custom tones which they must download themselves
Basic Steps	<ol style="list-style-type: none">1. Open the application2. Select the setting tab3. Press the “Alarm Tone” drop down4. Select an alarm tone
Rules	<ul style="list-style-type: none">• This alarm tone is universal for all alarms

Configure Voice

The user can select any one of five available voices to read them notifications when they wake up by pressing the drop-down menu beside Voice.

Voice Configuration Interaction

Description	User interaction to configure the voice used to read notifications post alarm dismissal
Actors	<ul style="list-style-type: none">• User• Application
Preconditions	<ul style="list-style-type: none">• The user may use custom voices which they must download themselves
Basic Steps	<ol style="list-style-type: none">1. Open the application2. Select the setting tab3. Press the “Voice” drop down4. Select an alarm tone
Rules	<ul style="list-style-type: none">• The user must have at least one voice file downloaded

Pebble Smartwatch

The Pebble Smartwatch is a smartwatch that can connect via bluetooth to a smart phone, track motion during sleep and perform simple actions against notifications. Tapping the switch beside Pebble Smartwatch, opens up a Bluetooth pair window that allows the Good Morning app to pair up with the user's Pebble Smartwatch. Enabling the "Track Sleep" option gathers accelerometer data from the Pebble Smartwatch while the user is sleeping and stores it in the Good Morning app so that Sleep Motion Graphs can be generated. Enabling the "Snooze/Dismiss Alarm" option allows the user to dismiss or snooze an alarm from their smartwatch.

Description	User interaction to configure Pebble smartwatch to track sleep and snooze/dismiss alarm from the watch.
Actors	<ul style="list-style-type: none">• User• Application• Pebble Smartwatch
Preconditions	<ul style="list-style-type: none">• User must have a Pebble smartwatch.• User must have the Pebble Android app.• User must be connected to their smartwatch via Bluetooth.
Basic Steps	<ol style="list-style-type: none">1. Open the application2. Select the setting tab3. Tap the "Pebble Smartwatch" integration button5. Select "Track Sleep" and/or
Postconditions	



Management Plan

Following the provided schedule, a final product demonstration is planned for the end of March 2016. Currently, developers are working on finding the best combination of implementations for the core features to ensure the best experience for all users. For this final demonstration, LARGE developers plan to have the following features available as a minimal system of Good Morning:

- Core Alarm

- Google Calendar
- Core Interactions/Settings Page
- Speech Synthesis

This section of the Management Plan document will discuss in detail, said implementations of core application features. Expanded system features that developers hope to implement on top of the planned minimal Good Morning system given appropriate time and resources are also described.

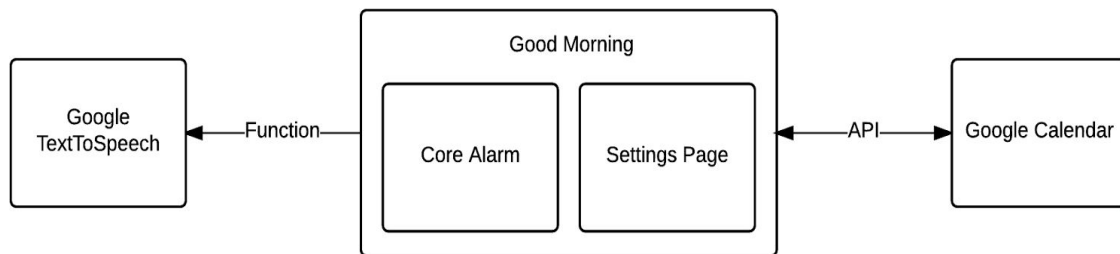


Figure 9: Minimal System Relationship Diagram

Core Alarm

The core alarm may be implemented in a few ways. The first implementation involves creating a proprietary alarm application. This version will integrate the settings page and alarm application together in a single application.

Proprietary Core Alarm

- Utilizes an aesthetically-pleasing user-interface
- When the alarm goes off, the user may choose to dismiss or snooze the alarm
- Displays user-editable clocks for set alarm times

The second implementation uses Android APIs to create, modify, and delete alarms.

Core Alarm using Google Clock

- Settings are separated from the clock functionality
- Alarms are set in settings, but use Google Clock as the UI

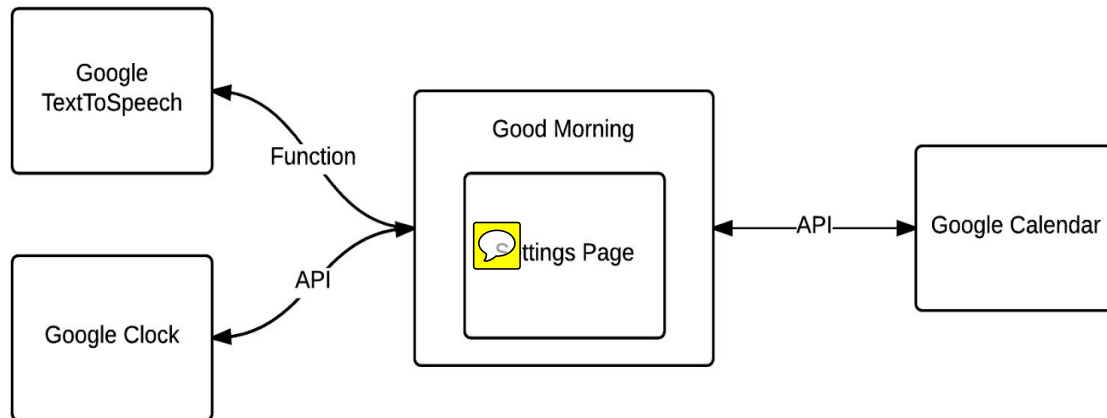


Figure 10: Minimal System Relationship Diagram Utilizing Google Clock

Google Calendar

The Good Morning application is planned to be initially released on the Android platform. The application will access the Google Calendar API, ensuring that users are notified of any events throughout the day. The Good Morning application will do this in the following ways:

- Access upcoming events from Google Calendar and display via Good Morning User Interface
- Ensure that daily events (holidays, birthdays etc.) are interpreted correctly and separately from appointments or scheduled events
- Summarize events in chronological order
- Ensure to notify user of importance of impending events approaching (ex. User wakes up at 7:30am, and has a scheduled event happening within an hour of wake up)
- If implemented with expanded feature speech synthesis, Good Morning should be able to accurately and efficiently convey upcoming events to users without having to be read

Speech Synthesis

The Good Morning application will synthesize the notifications specified by the user to speech output. This output will be read to the user once their alarm has been dismissed, updating them with information useful to their day.

LARGE Software inc. will leverage the following to complete the speech synthesis requirement:

- Use Google TextToSpeech functionality
- Use Core Alarm and Settings to know when to activate
- Read configured notifications and information using phone speakers or connected device

Expanded System

The expanded system includes features that enhance the user experience. These features may potentially be included, but are not guaranteed to be finished for the release product.

LIFX Smart Lights

- Uses LIFX Developer API
- Uses Core Alarm and Settings to know when to activate
- Sends commands to the lights to dim, brighten, change color, or turn on and off

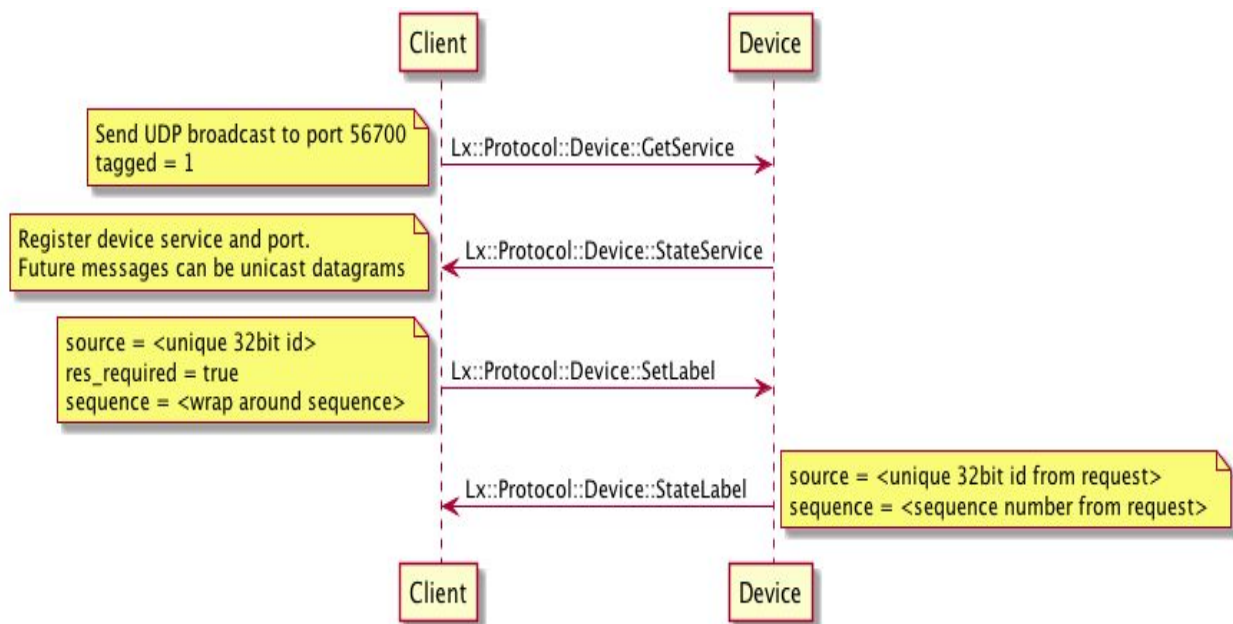


Figure 11: Interaction of connection between client and LIFX device [1]

Music Wakeup

- Extension of Core Alarm app
- Uses phone speakers or connected device to play sound
- User may specify what music will wake them up instead of a typical alarm
- User may choose to have the music gradually increase in volume

Machine Learning

- Uses custom algorithms
- Learns when the user wakes up, and their typical daily schedule
- Uses knowledge of the user to set dynamic alarms
- Reminds them of things that they may have forgotten that they
- Use of additional devices such as smart watches (accelerometers specifically) to track wake ups during REM sleep patterns

Relationship Between Features

The diagram below demonstrates how the extended functionality would be incorporated with the minimal functionality. In this case, Good Morning may be considered as either the proprietary core alarm, or the core alarm using Google Clock.

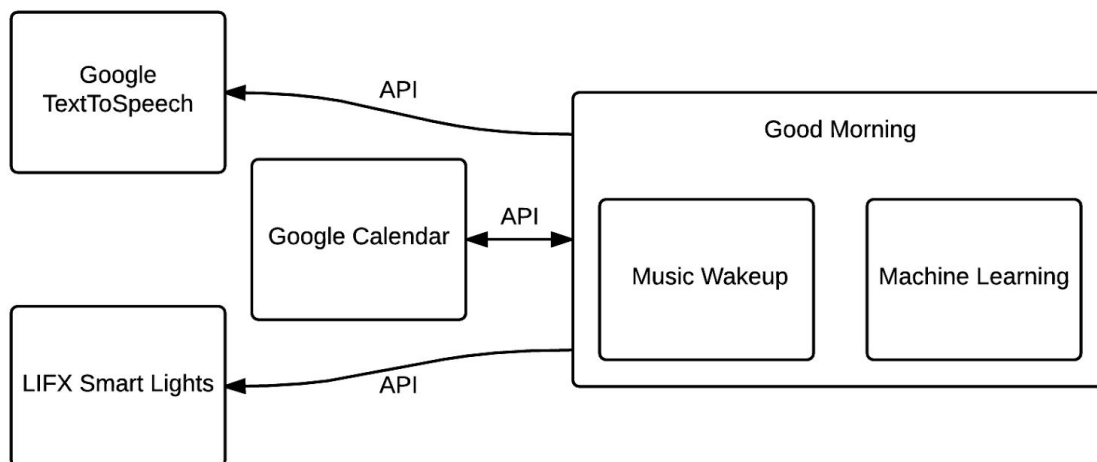


Figure 12: Expanded System Relationship with Core Alarm

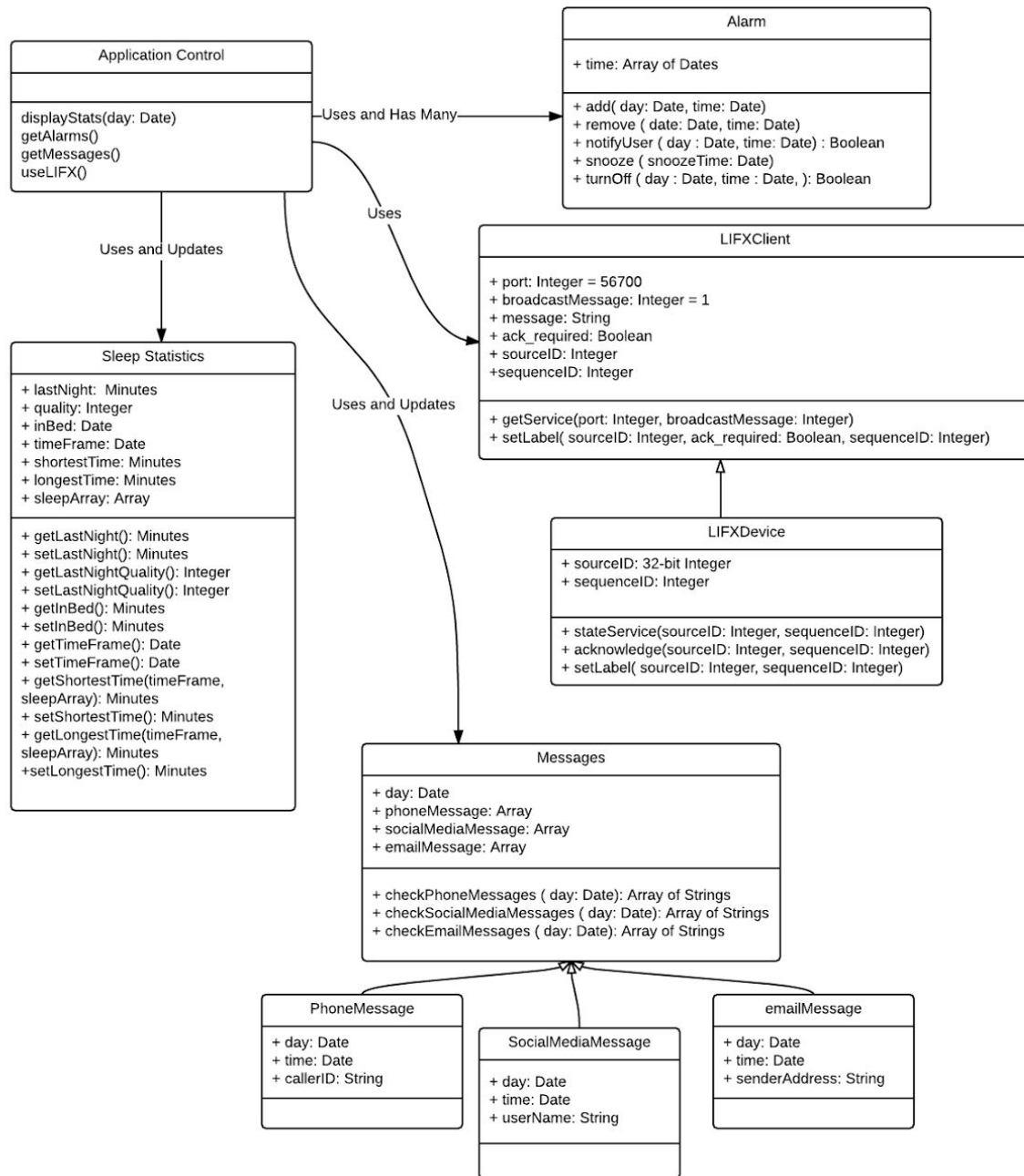


Figure 12: Class Diagram of the Good Morning application

Team Planning

Team Member	Team Role	Development Responsibilities
Luke McLaren	Web Master	System Architect
Adam Kroon	Project Lead	Integrations
Rahat Mahbub	Toolsmith	User Interface
Graeme Bates	Documentation Expert	Integrations

References

[1] "LIFX/lifx-protocol-docs", *GitHub*, 2015. [Online]. Available: <https://github.com/LIFX/lifx-protocol-docs/tree/master/workflows>. [Accessed: 04- Mar- 2016].



C2 Validation Requirements

Google Calendar Integration

1. Create valid API key.

Inputs	User signs up with google account
Outputs	User receives API key Calendar functionality is unlocked
Exceptions	If password or username are incorrect they do not receive a key

2. Get events from current day.

Inputs	You have connected with the google API
Outputs	Events are updated within the app, and the app now reads you your upcoming events.
Exceptions	User does not have any events on current day

3. Chronologically order the events.

Inputs	Application requests events
Outputs	Events are ordered in app and read to the user in chronological order
Exceptions	User does not have any events on current day

4. Validate how many times we can request data from the calendar API.

Inputs	Many events exist for current day Application requests events
Outputs	Events are added to applications event database
Exceptions	Too many requests are made and API stops giving responses

Alarm Interface

1. Create an alarm, the alarm should now be enabled.

Inputs	User creates alarm from home screen
Outputs	Alarm is created, and enabled
Exceptions	If alarm is already created on this day, error is displayed.

2. Select different notification settings and times.

Inputs	User opens dropdown on an alarm User selects configuration for an alarm User changes settings
Outputs	New settings should be active immediately
Exceptions	If no notifications are selected, then the alarm should simply be the sound and nothing else (similar to the stock android alarm clock, with the added snooze functionality).

3. Deleting an Alarm

Inputs	User opens dropdown on an alarm User selects delete
Outputs	Prompt is displayed that gives users the option of "Confirm" or "Cancel"
Exceptions	None

4. Undoing Deletion

Inputs	User follows path for test 3 User selects undo after deleting the alarm
Outputs	Alarm returns back to original state, before being deleted
Exceptions	None

5. Snooze

Inputs	Alarm is going off User selects snooze
Outputs	Alarm is snoozed for specified time for given alarm
Exceptions	None

Integration with LIFX Smart Light

1. Configure LIFX light with app.

Inputs	LIFX Smart Light is not Configured Phone and Smart Light are on the same LAN Phone is connected to internet
Outputs	Phone is connected to smart light Smart light is configured
Exceptions	Invalid username or password does not allow configuration

2. LIFX light should not be triggered if user is not connected to local network (ie. at friends house).

Inputs	Phone is not connected to same LAN as Smart Light Smart light is configured Phone is connected to internet
Outputs	Alarm should not trigger light
Exceptions	None

3. Toggle integration on/off

Inputs	LIFX Smart Light is Configured Phone is on same LAN and Smart Light Phone is connected to internet User Toggles smart light integration
Outputs	Integration is toggled correctly Smart light is still configured but not connected

Exceptions	Invalid username or password will not allow configuration
------------	---

4. Select breathe/pulse effects.

Inputs	LIFX Smart Light is Configured Phone is on same LAN and Smart Light Phone is connected to internet User Toggles Breathe or Pulse
Outputs	Breathe or Pulse is correctly selected
Exceptions	None