

Developing Mobile Applications

KTH

Diary Native Application Report

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Software engineering of the distributed systems

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Individual programming assignment

Design

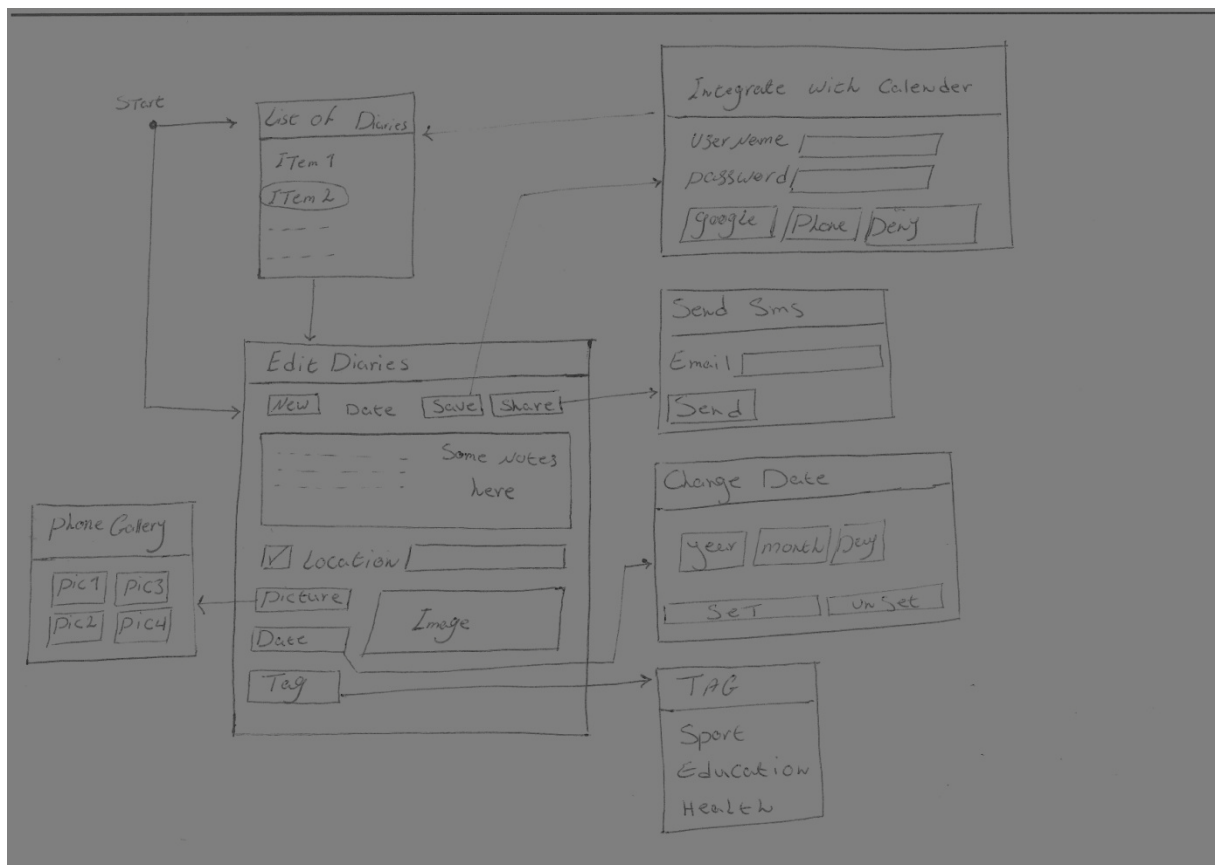
Introduction

I have designed a mobile diary application that allows a user to:

- Write notes in two different media (Text and photo)
- Tag the notes and also adds the location of the user when creating the notes
- Specifies date and the time of creating the notes
- browse through the notes and edit the notes
- Share the notes by sending them via Sms
- Import the notes to the phone calendar and also the Google calendar (**Optional Part**)
- Keep the notes in a permanent storage on the phone (Database)

In this part, I am going to present the steps which I went through, before starting the implementation process. At first I made a brain storming to find out the users need from this application, what are the requirements for this application to satisfy the users need? I also tested some other previously developed similar Diary applications on the android market and got some idea. The results lead to Conceptual design and prototype.

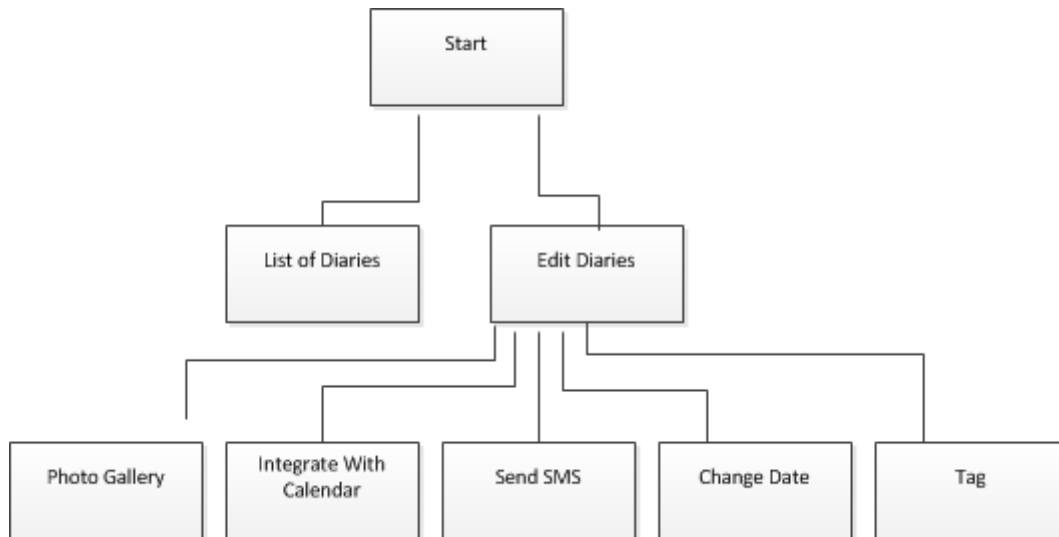
Paper prototype



Here I started with paper prototype. This is a kind of the prototype which is cheap and easy to modify. It gives a nice idea to start and how users will use this application. So the initial idea of my application regarding the users' requirements and goals would be like this. It worth to say that I have changed this prototype about 5 times after each brainstorming with the reason of applying improvements to the application and make it more near to the users need. The final version of the prototype which was an important base for the rest of my application is presented above.

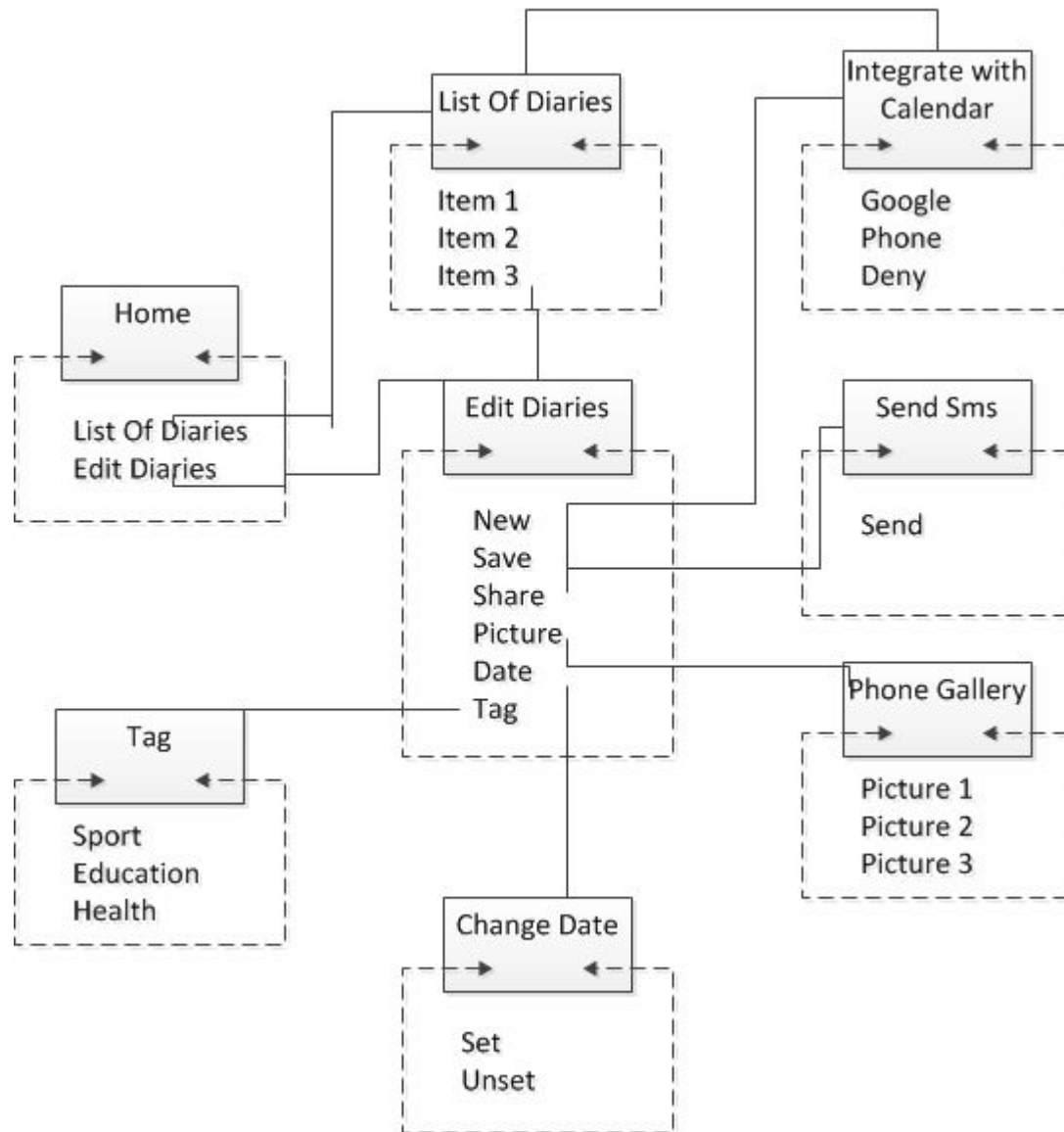
Site Map

Site map helps us to list the view of the application in a hierarchical fashion and so their relationships.



Click Stream

Show how the content can be organized in our informational space and how the user can travel between mobile's information architecture. Here it shows the complete navigation between pages of the application.



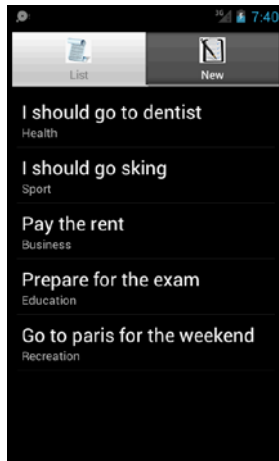
Wire Frame

Are used for the informational design and helps in understanding how user will directly interact with the content of the application. In this wireframe all the possible views of the application are presented. Navigation between the pages and the reason of the navigation is presented by buttons and the arrows.



Functional Prototype

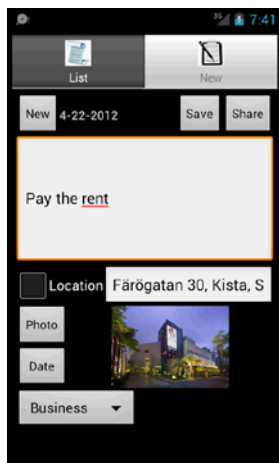
This is a kind of prototype so near to the final product since we can upload it to the mobile phone, and gives the opportunity to have the same experience as with the real product. I have put the final screen shot of the application here. Some explanation about the possible pages presented here.



This is the first page of the application. List of all events and also their tag is presented here. If the user wants to edit an event, can simply click on the item and so the application will navigate to the new tab.

Improvements:

- It could be better to provide some more information about an event to the user. So user could better select the preferred event.
- Recently the program does not sort the events in the chronological order. It would be so helpful to the users to do so.
- Deleting the finished events according to their date.

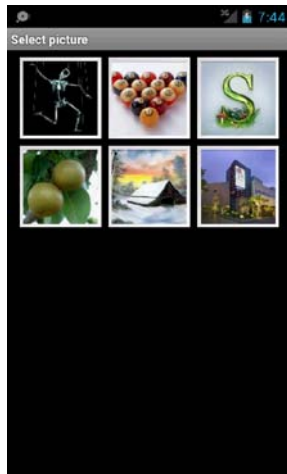


Functionalities:

- ✓ If the user wants to edit a selected event or also create a new event should use this page.
- ✓ By pressing the NEW button all the fields will be cleared and user can create a new event.
- ✓ There is a place for inserting the notes.
- ✓ If the check box is selected the application retrieve the address of the user where he or she is creating the notes.
- ✓ By pressing the Photo button the user will be navigated to the phone picture gallery and select an image for the event.
- ✓ There is the possibility for the user to change the date.
- ✓ User can tag the note by selecting a tag among the previously specified tags.
- ✓ Finally user can save the event in the phone database by pressing the SAVE button. In this case user will be navigated to a new page which also gives the facility for the user to save the event to the Google calendar or phone calendar.
- ✓ User has the facility to share the event via SMS or EMAIL which is possible by pressing the SHARE button and providing the required information.

Improvements:

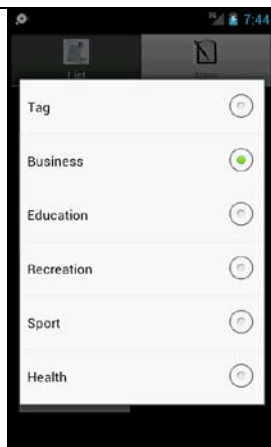
- I think it could be some how better to put some of the facilities and settings in the menu and making the application a bit more user friendlier.



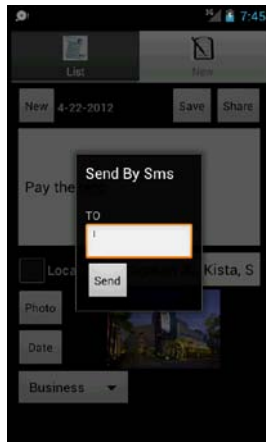
User can simply select a photo from the phone photo gallery. The result will be sent back to the page which described previously.



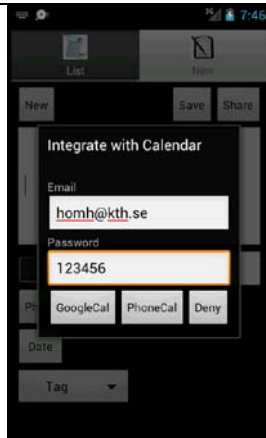
User can set the date of the event.



User can tag the note



User can share the event via SMS, by assigning a phone number and pressing the send button.



After inserting the required information for creating a new event, data would be saved in permanent storage and there would be two other facilities for the user.

- Providing a Gmail account and password so the application will import this event to the specified **Google calendar**
- User can just import the event to the **phone calendar**.
- User can refuse to do so, and just redirect to the list of the events to see all the available events.

Implementation

After the design process, it's the time to implement the application. The real screen shots of the application were provided in the functional prototype part above. There are some points which I faced during implementation.

- At first I decided to use a file for storing the data, but after careful consideration I decided to use SQLITE as the data base of the application. The database has only one table with these fields. Id, Note, Image Link, Tag, Address, Start Date, End Date.
- Saving images was a challenging task. There were two different options. First inserting the image Uri to the database which was retrieved from the phone gallery and the other one is to inserting the image itself to the database as binary. There are advantages and disadvantages, by the first step we will get rid of the redundancy of having the file in two places, but if the user deletes the file from gallery then what will happen? The second solution seems good but is memory consuming. I selected the first approach.
- Android SDK does not provide enough facility for creating the user interface and this makes the development process a bit challenging. Using the relative layouts is a good choice for creating the pages.
- The other problem was with the emulator, it's too slow and most of the times crash. It consumes nearly the most of the CPU capacity and it's too hard to up two emulators for testing the SMS and the other functionalities which need two emulators.
- I have used a class which extends the Application and is added as the application name attribute in the manifest file. It is used for passing the required data between the activities. It makes the work simple but I think it would be better to use Intent for sending data between activities and also retrieving the result.
- There is no calendar application on the emulator and for adding the events to the phone calendar I had to test on the real device. The location of the calendar database is different between platforms below 8 and the platforms more than 9 and also there is not a standard calendar API for connecting the app to phone calendar.

The source code of the application and the instructions for running the application will be provided with this report.

Tools

- Operating System, Microsoft windows 7
- Eclipse IDE Version 3.7.1
- Android SDK version 16
- Android platform 4, 2.3, 1.6
- SQLITE as Database
- ADT plug-in for the Eclipse
- JDK version 6

Device Testing

I have tested the application on tree different android enabled devices (Smart phones). For installing the application on the old android phones, I set the min SDK version to 4, in manifest file.

- HTC Phone with Android platform 1.6 and API 4. This phone has a small screen which made some trouble for the user interface of my application. I have made some part of the user interface

dynamic in order to act flexible on different devices' screens. But the other aspects worked fine, specifically adding an event to the phone calendar.

- HTC Pone with Android platform 2.3 and API 7. Different aspects of the application worked fine on this device. Also the screen size was proper for the application. Just the problem is that when programming in this version, it's not possible to install the application on SD card and this makes the phone memory some times overloaded.
- Samsung galaxy with android platform 4 and API level 14. The application was great in this phone, and everything worked correctly.
- Samsung tablet with android platform 2.3.3 and API 10. There was problem with big screen of this device which put my user interface in trouble. Other things like retrieving the location and address from Google and sending SMS worked fine.

Analysis

Problems and Improvements

There were some pros and cons and improvements to my application which should be discussed

- Regarding the design and the user interface of the application, there were some points for improvements which I discussed during functional prototype and explanation about the activities.
- Regarding using a file as permanent storage, I had to read all the data to the memory at the application start and every interaction was with this temporary variable on the memory. It could improve the speed because of no IO operations, but when the number of the records increases, it's hard to manage the data and not structural. SQLITE is an embedded SQL database engine. Unlike most other SQL databases, SQLITE does not have a separate server process. SQLITE reads and writes directly to ordinary disk files. A complete SQL database with multiple tables, indices, triggers, and views, is contained in a single disk file.
- The application retrieves the address of the user from his or her location. There are three different approaches, Using the mobile network and Cell ID and BTS, using the Wi-Fi and internet network which cannot be so accurate and the last approach is the GPS which gets the location from satellite, but the last approach although is so accurate but too battery consuming. In this application I try to find the best available location provider.
- I preferred Native mobile application rather than Web application, since I needed to save the people's location which is not possible with web applications. I wanted the data to be stored on the phone itself because of the security and privacy issues and finally users can use the application offline.
- Deciding whether to use view or activity based Tab Host. Activity based tabs are great because they can be separated into their own XML file. Activities can also be organized into their own Java file instead of being cluttered into one. That being said some of the things you would think would be easy become complicated with activity based tabs. It's hard to pass information between tabs without creating overhead. Activity based tabs also use more memory/CPU time as they have the overhead of the activity around each of them.

Instructions on running the Application:

- Emulator or real device should have an SD card.
- Needs some photo to be uploaded to the emulator via DDMS and then run Dev Tools-Media provider from emulator itself for the memory card to be recognized.
- Check to see if phone calendar works correctly and it's possible to add an event to the calendar.
- Check to see if the phone is able to send SMS messages.
- Check to see if the location service works fine on the phone and if the Google maps are able to show the location, so the diary application will. On the emulator we should use DDMS to provide virtual location for the emulator.
- Check the internet connection of the phone, it should be active.

If the above requirements are fulfilled, simply you can install the APK file on the phone with preferably Google API 14 or an emulator.

This application is developed in eclipse so import the project in to the eclipse and run it as an android application with an emulator with Google API 14 (Preferably).

Acknowledgement

Thanks to prof. Konrad Tollmar for your efforts to make this course an enjoyable and well-organized experience in developing mobile applications.

Conclusion

Going through these steps we realized how handy they are. One might think having the wireframes, he can start coding, and that there is no need to have any paper prototype, or any functional prototype. But completing this project, we understood how considering each step helps us save time and energy. This way, once you start coding, you much better know what you want.

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