

Institiúid Teicneolaíochta Cheatharlach



At the Heart of South Leinster

Project Report

For

iPhone Application

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1. Introduction

The final product I have is a prototype of commercial iPhone application for the Red Oak Tax Refunds Irish Company of their Tax Refund Calculator currently online on the internet.¹ This Tax Refund Calculator as an iPhone app will play significant role to direct the customers to Red Oak in order to get a full Tax Refund Assessment to see how much more they are due. This Refund Calculator has been built for PAYE (Pay as you earn) income tax payers and covers most scenarios. This includes rent relief, medical expenses tax, PAYE tax credits, Ireland resident personal tax credits, service charges, trade union subscriptions tax credits and calculates refund amounts due for employment expenses.

This tax back calculator application calculates and displays how much the tax refund estimation of a user, after he/she has entered the required information. Then for a full refund check, the application presents the contact form in order to establish communication channel between the user and the Red Oak Tax Refunds Company. The application also contains the links that direct to users to the Red Oak Tax Refunds official site in order to provide them further information.

2. Original Specification Updates

The Report provides updates from the original detailed specification document containing both old and updated screen shots of an iPhone app to illustrate the fact that the GUI underwent some changes that changed both the look and feel of the screens as well as their functionality after the regular meetings with the company. Architectural design, modular design and procedural design of the project remain pretty much the same that updated with the few changes on the name of the classes.

2.1. Removed GUI Screen Shots

“Details” View Screen Shot

Carrier 3:26 PM

Reset Calculator Next Step →

Details Home Expenses

Tax Year 2007

Marital Status Single ?

Date of Birth 14.05.1972 ?

Dependent Children 0 ?

Annual Salary Before Tax 50,000 ?

Tax on Pay 2,000 ?

Profession Lawyer ?

Member of a Trade Union? ON ?

Other Income in the Year? OFF ?

Calculator Contact Update

This screen shot is the start-up and the first step of the Tax Refund Calculator iPhone app called “Details” that allows the user enters his/her personal income tax information. The user can proceed next step “Home” either by touching the “Next Step” button above at the navigation bar or the user is able to immediate access to any step (“Details”, “Home”, or “Expenses”) he/she wants by using the segmented control. “Reset” button is also provided on the navigation bar, if the user wishes to reload the calculator and clear all the fields contained by the “Details”, “Home”, “Expenses” and “Your Tax Refund” views.

“Home” View Screen Shot

Carrier 3:28 PM

Reset Calculator Next Step →

Details Home Expenses

Rent or Mortgage Rent ?

Bin charges for prev year 600 ?

Want More Info? VISIT OUR SITE

Red Oak Tax Refund Calculator

Calculator Contact Update

This screen shot is the second step of the Tax Refund Calculator iPhone app called “Home” that allows the user enters the information about his/her principle residence. The user can proceed next step “Expenses” either by touching the “Next Step” button above at the navigation bar or by using the segmented control. Reset button also exists on the navigation bar to reload the calculator.

“Expenses” View Screen Shot



This screen shot is the third and the last step of the Tax Refund Calculator iPhone app called “Expenses” that allows the user enters the information about allowable expenses before presenting the result of the estimated tax refund. The user gets his/her tax refund estimation whenever he/she touches the “Next Step”, the calculator will switch and display the view “Your Tax Refund”. Reset button also exists on the navigation bar to reload the calculator.



“Your Tax Refund” View Screen Shot

This screen shot displays the estimated tax refunds of the user. If the user doesn't satisfy with the result and wants to make changes, he/she is allowed to come back to the calculator (“Details” view) by touching the “Back” button on the navigation bar. The calculator dynamically calculates and fills the user refund estimation as long as the user fills the information without requiring further button for the calculation.

“Contact us” View Screen Shot



This screen shot allows the user to contact with the Red Oak Tax Refunds Company. The user enters the required fields and touches the “Submit” button in order to establish communication channel with the company. “Contact us” is last but not least view since this iPhone app’s aim is to attract the users with the result of the calculation and makes them to apply Red Oak Tax Refunds Company to get back their tax refunds.

2.2. Renewed GUI Screen Shots

“Details” View Screen Shot



This screen shot is the start-up and the first step of the Tax Refund Calculator iPhone app called “Details” that allows the user enters his/her general details. The user can proceed one of the step (“My Tax”, “Expenses” or “Spouse”) that he/she wants by tapping the required segmented control element. The user can also see his/her tax refund estimation at any time by tapping the “Calculator” button on the navigation bar. “Reset” button is provided on the navigation bar, if the user wishes to reload the calculator and clear all the fields contained by the “Details”, “My Tax”, “Expenses”, “Spouse” and “Your Tax Refund” views.

“MyTax” View Screen Shot



This screen shot is the second step of the Tax Refund Calculator iPhone app called “My Tax” that allows the user enters his/her personal income tax information. The user can proceed or come back one of the steps (“Details”, “Expenses” or “Spouse”) that he/she wants by tapping the required segmented control element. The user can also see his/her tax refund estimation at any time by tapping the “Calculator” button on the navigation bar. Reset button also exists on the navigation bar to reload the calculator.



“Expenses” View Screen Shot

This screen shot is the third step of the Tax Refund Calculator iPhone app called “Expenses” that allows the user enters the information about his/her allowable expenses and principle residence. The user can proceed or come back one of the steps (“Details”, “My Tax” or “Spouse”) that he/she wants by tapping the required segmented control element. The user can also see his/her tax refund estimation at any time by tapping the “Calculator” button on the navigation bar. Reset button also exists on the navigation bar to reload the calculator.



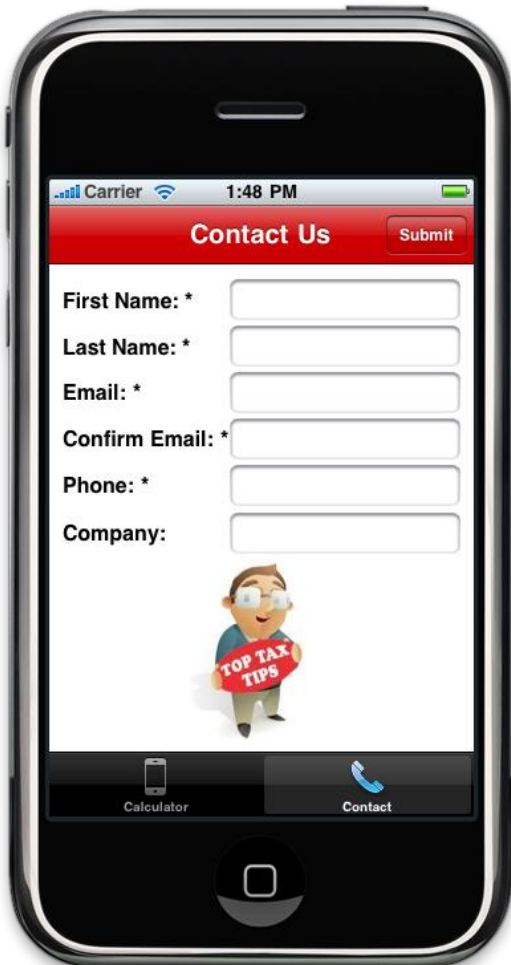
“Spouse” View Screen Shot

This screen shot is the fourth and the last step of the Tax Refund Calculator iPhone app called “Spouse” that allows the user enters his/her spouses income tax information. This segment (“Spouse”) is only visible unless the user is single. The user can come back one of the steps (“Details”, “My Tax” or “Expenses”) that he/she wants by tapping the required segmented control element or the user can get his/her tax refund estimation by tapping the “Calculate” button on the navigation bar.



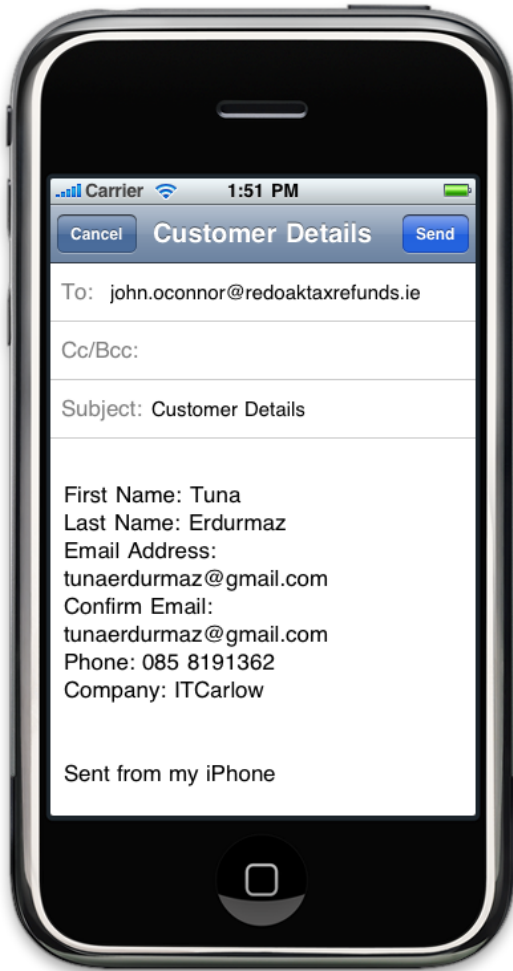
“Your Tax Refund” View Screen Shot

This screen shot displays the estimated tax refunds of the user. If the user doesn't satisfy with the result and wants to make changes, the calculator allows coming back to the last view that the user was in the calculator by touching the “Back” button on the navigation bar. This view contains the “Apply Today!” button that directs the user to the contact form (Screenshot below).



“Contact us” View Screen Shot

This screen is the initial step in order to contact with the Red Oak Tax Refunds Company. The user enters the required fields and taps the “Submit” button. When the user taps the “Submit” button, the application will present an email page to the user without shutting down itself. “Contact us” is last but not least view since this iPhone app's aim is to attract the users with the result of the calculation and makes them to apply Red Oak Tax Refunds Company to get back their tax refunds.



“Customer Details” View Screen Shot

This screen shot is the last step in order to contact with the Red Oak Tax Refunds Company. The user can alter his/her details and/or taps the “Send” button to send an email to the company which contains the user details.

3. Problems Encountered and Resolved

Tax Refund Calculations

The company gave me the Excel spreadsheets which contain all the details of the calculations that I have to implement in the project. Spreadsheets was too complicated for me in order to figure out the refund calculations since they are extensive, complicated, and I have never read the spreadsheets that interpret very comprehensive information like this before.

However, I cope with the problem by consulting the Company's Leader when there appears something that I do not understand that helps me also to understand the company's business flow. When I got the idea behind the calculations, I tackled with the most of the calculations by actually calculating onto the paper and testing on their official tax refund calculator which is online on the internet that helps me to get through the precise figures of the calculator.

Switching between the segments ("Details", "My Tax", "Expenses" e.g.)

Switching between the calculator segments was one of the challenges in this project. This functionality did require many researches and modifications on the application to reach the best design approach (since the maestro of the calculator) in order to switch between the segments without causing any lose of data that was previously entered into the element of leaved segmented controller view. (User's input such as annual salary, tax on salary etc.)

I dealt with this problem through much reasearch into the View Controllers and by watching the several videos on the internet. After many trials and modifications, I reached the segmented control that switches as I expected.

Sending the user's details via email

In order to establish communication channel between the customer and the company, the application allows the user to send his/her details to the company via email. There was a problem that if the user wants to send an email and taps the "Submit" button on the "Contact Form" after he/she entered the relevant details, the application has

shutdown itself and then jumped to the email page that did cause the lose of all the user data previously entered on the calculator for a refund estimation.

I fixed this problem by creating an email picker view by using MFMailComposeViewController class that provides the email functionality to the application which works inside of the application.

Presenting the “Spouse” view unless the user is single

The calculator contains the “Spouse” view that appears on the calculator segment if the user is married. Marital status field in the “Details” view is controlled by the DetailsViewController class while the entire views (“Details”, “My Tax”, “Spouse” e.g.) of the calculator are controlled by the SwithViewController class. Due to this interaction between the modules caused this problem.

I overcame this problem using the Objective-C protocol which declares methods that can be implemented by any class. A Protocol in Objective-C is identical in functionality to an interface in Java or C#.

Fast tapping between the Picker Views and/or the Data Pickers

Picker View and Data Picker is a component of the Xcode interface builder that is similar to the Combo box in Java. For instance, data picker contains the list of dates that allows to user make a selection from the list. The problem appears when I tried to fast switch between the marital status picker view and the date of birth date picker which are elements of “Details” view. For example, if the user tapped to the date of birth date picker when the marital status picker view was also active, marital status picker view was resigned by sliding downwards from the screen and date of birth date picker has became an active by sliding upwards at the same time. This causes problems on the scroll of the screen and each picker lost its tool bar which contains the “Done” button to stop the Picker View and the Date Picker.

I managed this problem by removing whichever the active picker is from being the superview and adding a subview which makes the user tapped picker visible and the active picker invisible without sliding them upwards or downwards on the screen.

Testing on the device

The problem appeared, when I tried to install my application into the iPod Touch in order to test on real device. iPod Touch contains the iPhone OS 3.1.1 that was not compatible with the Xcode. So, I read through the instruction that provided by the Apple to install my app into device and there were saying that I need to downgrade my device OS into the earlier version in order to download my application from Xcode. However, the only way to downgrading to the OS of your device was the illegal way called Jailbreaking.

I resolved this problem by downloading the latest iPhone SDK rather than Jailbreaking. So, I successfully downloaded my iPhone app from the latest version of the Xcode into my device.

4. What I achieved

- I completed my first iPhone application as a Tax Refund Calculator by cooperation with the Red Oak Personal Financial Ltd that fully meets the demands of the company.
- This tax back calculator includes rent relief, medical expenses tax, PAYE tax credits, Ireland resident personal tax credits, service charges, trade union subscriptions tax credits and calculates refund amounts due for employment expenses.
- An Accurate and user friendly iPhone app GUI for use as well as this iPhone application as a calculator is more advanced in comparison with the most of the calculator iPhone apps available on the App Store.
- Fast access between the steps required (Details, My Tax, Expenses, Spouse) by the calculator without lose of any data that the user entered into one of the steps for a refund estimation.

- Contact form is provided for the user which establishes the communication channel with the Red Oak Tax Refunds Company's refund experts for a detailed refund check via email.
- The user is allowed to see his/her tax refund estimation at any time he/she taps "Calculate" button even if they have not complete all the steps yet.
- Reset functionality is provided to bring an application to its initial state.
- Explicit helps provided, they are associated with each field in order to clear any ambiguity that the user may encounter while filling the informations.

5. What I did not achieved

The iPhone app that I developed doesn't provide the update functionality and a profession picker view in this version due to the fact that the company didn't demand these functionality and picker view after the discussions upon to them. Update functionality doesn't needed since the calculator was developed for a specific year 2009 and the tax figures usually constant for the year. Implementation of a profession picker requires several picker views in order to get the info from the user. So, the company's leader decided that the several picker view interactions will not be user friendly and seems good as in the iPhone app. Hence, I have removed this field from the calculator. Besides these exceptions above, mainly all of the target tasks (from my point of view as well as the company's) was achieved while developing the Tax Refund Calculator as an iPhone app.

6. What I learned

Technological Aspect

This iPhone application project gives me to the great experience since I worked with the outstanding technologies such as iMac with the latest Mac OS X Snow Leopard. I was very unfamiliar with the Mac OS X and the project related language Objective-C and the

tools (XCode IDE, Interface Builder, Instruments, Shark e.g.) at the beginning; however, I quickly understood these technologies and started to use efficiently during the life-time of my project. I learned a new programming language called Objective-C. This is another object-oriented language which is an extension to the C language. I found the Objective-C really powerful and well-defined language that enables to coding easier by using object-oriented approach.

Software Aspect

This project gave me more experience on the software development process. I learned a very crucial point that developing a software project does not only mean the coding, lots of different aspects are needed for developing good software such as definition, development and maintenance. I saw again that the coding is very straight-forward after extensive design phases. I also learned that all of the project modules have to have a high level of cohesion and low coupling so I tried to do this as much as possible.

Coding Aspect

I gained more experience about the code has to be well organised and appropriately commented. That's very important for the maintenance aspect of the program. When I want to make changes to code, I saw that appropriate commenting made this easier to do.

Personal Aspect

This project gave me a chance to work with the company that provided me a great experience. After a very successful job made with the real time company, I gain more self-confidence and I believe that I will not have any problem to work in any company. I got also my first job offer from the Red Oak Financial Ltd that indicates how well I did while developing an iPhone app for them. I also gained advantage from this project experience that I became able to develop any application for the Mac OS X, iPhone as well as for the iPad since from now on I had sufficient knowledge about the language Objective-C and Apple tools such as Xcode.

7. What I would do differently if starting the project again

I do not think I would change my strategy different then how I did initially. I got through very effective and long preparation period before starting the project while I was waiting iMac to come. I finished the book called “Head First iPhone Development” that provided me by my supervisor Paul Barry. I quickly learned to use iPhone SDK tools, including Interface Builder and Xcode, and master Objective-C programming principles that make my app stand out thanks to this book. I also watched a set of videos of the iPhone Development course on Stanford University and the other videos related with iPhone development available on the web. I also reviewed plenty of iPhone apps from iTunes when I had free time.

As soon as I got the iMac, I flew through the app development in order to present an iPhone app to the company on time.

8. My advice for anyone else attempting a similar project

My advice for anyone else attempting a similar project in a subsequent year, they have to make sure that they have enough knowledge about one of the object-oriented programming languages and object-oriented approaches as well as they have to be the type of person who enjoys building GUI. Since, they will use Objective-C language while developing their app, they should learn the general concept of the language related with iPhone programming rather than attempting to learn the language from scratch. There is one crucial point that I would like to mention in here, memory management is the most important thing while coding with Objective-C due to the fact that Objective-C has not got automatic garbage collection mechanism. Therefore, if they do not want their app to be terminated by the iPhone OS due to memory leak, they have to keep an eye on memory. I also advise the book “Head First iPhone Development” to help the user quickly learn about the iPhone SDK tools, including Interface Builder and Xcode and master Objective-C programming principles that will make their app stand out.

9. Conclusion

To sum up, I thoroughly enjoyed my work on this iPhone app project. Mainly due to correct planning and design I managed to complete successfully any tasks I began. Thanks to my supervisor I got a chance to work with the real time financial company and I got my first job offer from them as well. After the very successful cooperation with the company, I gain more self-confidence and I believe that I will not have any problem to work in any software related company where I can demonstrate my skills and knowledge to be a valuable member and an asset.

ⁱ Tax Refund Calculator, Red Oak Tax Refunds,
<http://www.redoaktaxrefunds.ie/tax-refund-calculator-ireland?PHPSESSID=eb8a18c646e0e7a47557abe0ffcc4b2c>
[Accessed Feb 5th, 2010]