A Facebook Application : 'iThink'

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Abstract

Having over 750 million active users Facebook has clearly surpassed all its contender social networking websites in the competition.The popularity of this 7 year old website comes from it's unique features and its ability to keep up its user experience to emerge with the changing trends. In 2007 Facebook launched the platform for third party developers to be able to contribute to the user experience by creating their own applications for Facebook. The objective of this project is to develop a web application that integrates into the core functionality of Facebook to create an innovative app.The application integrates with Google Services such as Google Maps , Embedded Book Search and Image search features to make the reviews more interesting and informative.

Ever wondered what book to read on that lazy Sunday afternoon or if the latest epic movie is really worth all that hype, if the iPhone or Blackberry better suits your lifestyle or if it's worth going to the newly opened fast-food joint in your neighborhood. While having the world at our fingertips does provide a lot of options, all that information also leads to confusion. (Information that is excessive,conflicting and often redundant) Under such circumstances whose reviews would you really count on. Well! your friends, of course!! iThink is a simple Facebook application that gives you reliable reviews of your favorite books , movies, gadgets and more. And most importantly from people you can rely on.

Keywords : Facebook Application,Google Book Search API, Google Maps , FB API

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Chapter 1

Introduction

While having the world at our fingertips does provide a lot of options, all that information also leads to confusion sometimes,the fundamental idea behind this app is that even though there are many online sources from which reviews may be found, these are from unknown people and may not always be trustworthy.'iThink' is a live Facebook application that allows users to review books, movies , restaurants and technology related things and share them with friends.The application has been integrated with Google Search features to make the reviews more informative and interesting.

The idea is to leverage the social networking functionality of Facebook to create an App that allows a user to actively involve and engage their friends in communicating ideas and expressing their opinions.At present the application has about 100 monthly active users.And it has had about 200 visits in the last 10 days . In the following sections of this document the project is further analyzed and explained.

1.1 Objective

The main objective of the project is to develop a web application that integrates into the core functionality of Facebook to provide an interesting and fun user experience to Facebook users.In this preliminary stage the following objectives have been set in order to ensure that the proposed system is developed in a methodical manner and without any delay.

1. To research existing Facebook Applications to identify innovative ideas for the application to be developed and to avoid recreating already existing apps.

2. To speak to Facebook users to understand what is of core importance to the user experience and to understand their requirements. To get their views on the ideas proposed.

3. To research how Facebook Applications are developed by reading the Facebook API.

4. Study the available technologies Java, PHP , Javascript, AJAX , HTML/CSS and run sample codes to make the best choice of technology for developing the proposed application.

5. To study the PHP SDK and the Javascript SDK that provides official support for developing applications on Facebook.

6. To develop an interface that is intuitive and user friendly, as this is of critical importance for the success of a project of this type.

7. To give the completed system to test to a small group of Facebook users to identify bugs and errors and correct them.

8. To have a fully working system a week prior to demonstration and to set it up for use by Facebook users to test for performance and to check for any issues related to different browsers or Operating Systems being used.

9. To set up Google Analytics to understand how users interact with the system and to create an online survey to gauge user satisfaction.

1.2 Motivation

The idea is to leverage the social networking functionality of Facebook to create an App that allows a user to actively involve and engage their friends in communicating ideas and expressing their opinions about places/technology/books more effectively.Some interesting statistics from the Facebook site[16]:

- More than 750 million active users
- People spend over 700 billion minutes per month on Facebook
- People on Facebook install 20 million applications every day

These statistics give an indication of the potential reach that an application developed for Facebook is bound to have. These applications have all the features of a standalone application but what sets them apart is the Facebook functionality which adds to the user experience. The aim would be to try and make an application that is truly social, and not just a widget embedded within Facebook.

1.3 Organization of the Report

This section outlines the remainder of the report , briefly explaining what comes in each section.

Chapter2 gives an in-depth explanation of the basic principles underlying Facebook Applications.It compares the various available technologies and aims to highlight which one is best suited to the nature of this project.

Chapter3 will outline the requirements that were laid out in the initial stages of the project. It identifies the Functional and the Non-Functional requirements both.

Chapter4 presents the design for the application. It includes the database design and the interface design. UML modeling technique has been used to explain some of the typical use cases.

Chapter5 will briefly explain how some of the main features of the Application were implemented. This is illustrated using screenshots and code snippets.

Chapter6 is one of the most important chapters as it documents the testing efforts undertaken to ensure that the developed application is bug-free and secure.

Chapter7 will explain the project scheduling and the risk analysis that was done prior to starting the project.

Chapter8 will evaluate the project to analyze if the application meets the objectives outlined in the preliminary stages. It also includes responses from the survey

Chapter9 will sum up the project objectives , results and how the project has helped build on the knowledge gained through the course.

Chapter 2

Background Research

To have a complete understanding of the project to be developed it is necessary to carry out a thorough research in a number of areas.This chapter describes what background research was carried out before undertaking this project.This chapter will form the basis for formulating the functional and non-functional requirements for the application in the chapter on Problem Analysis.

2.1 Overview

The first two sections will provide a basic understanding of Social Networking Sites like Facebook and how an application can be integrated with Facebook.This is followed by three sections each dedicated to one of the three main areas in which the research needs to be carried out.

Firstly an analysis of existing applications on Facebook is carried out with the basic aim of establishing whether there are any applications on Facebook that offer the functionality that this application aims to offer.If there are any , then these are analyzed to identify if there is any scope for further improvement in the area.

Secondly , research in the technologies that may be feasible to use for developing the application needs to be carried out.This includes details on the planned use of development techniques,SDK's and technologies.This is an important area as it will highlight which technology best suits the nature of the project in order to ensure that it meets all the outlined objectives.A wrong choice can lead to catastrophic consequences.

Lastly, the final area of research will be carried out to identify the Google API features that can be integrated with the application functionality to make it more useful and interesting.

2.2 Social Networking and Facebook

“Social networking is the art of connecting with those who share common interests.”[20]Over the past few years, social networking websites such as Facebook and MySpace have gained vast popularity among the masses.This increase in social networking trend is no longer just restricted to teenagers and college students but is gaining ground among professionals too.

Founded in February 2004 by former-Harvard student Mark Zuckerberg (while at Harvard) who ran it as one of his hobby projects with some financial help from Eduardo Saverin, Facebook is a social utility that helps people to stay connected with their friends, family and coworkers.It is a free service and anybody can sign up for a Facebook profile and interact with the people they know in a trusted environment. As of July 2011, Facebook has more than 750 million active users.[7] Facebook, the product, is made up of core site functions and applications. Some of the key features to the user experience on Facebook are:

- **The Home page** which includes the News Feed; this is a personalized feed consisting of live updates from a user's friends activity.
- **The User Profile** which displays information specific to a person which he/she may have chosen to reveal to his/her friends , this could include their education and work details ,contact information,interests, relationship status etc.
- In addition to this Facebook also includes core applications – **Photos, Events, Videos, Groups, and Pages** – these let people connect and share in even more rich and engaging ways.

- Some other typical features of Facebook inlcude - **Chat, personal messages, Wall posts, Pokes, or Status Updates.**

Facebook is largely written in PHP, however in order to gain performance benefits the PHP source code has been pro grammatically transformed into C++ code.It relies heavily on open source software and releases large pieces of its own software infrastructure as open source.

2.3 Applications on Facebook

Facebook opened its platform for third party applications in August 2006 and since then has made several modification to the Developers API also called Facebook Developers. This essentially gives anyone access to Facebook's internals and lets programmers create widgets, mashups, tools and projects based around Facebook.

This is an important feature for Facebook since it makes it the first major social network to give access to its API.Using Facebook applications, developers can add custom features to one of the most popular websites in the world.The app can integrate with many aspects of Facebook.com, including the News Feed and Notifications. All of the core Facebook Platform technologies, such as Social Plugins, the Graph API and Platform Dialogs are available to Apps on Facebook.[9]The purpose of a third party Facebook application is to add new ways for users to interact with each other using Facebook. These applications can be written using any language or tool chain that supports web programming, such as PHP,Python,Java,C# etc. and are required to be hosted on the application developer's own server. They interface with Facebook, so that they appear to users to be part of Facebook itself.[10]

2.3.1 Facebook versus Standard Web Application Model

The figure 2.1 illustrates how a standard web application model differs from a Facebook Application Model.In a standard model, the users directly access the applications by using web browsers to make requests to the web server where the application and related data resides whereas in the case of a Facebook model , FB acts as a proxy between the app and the users.

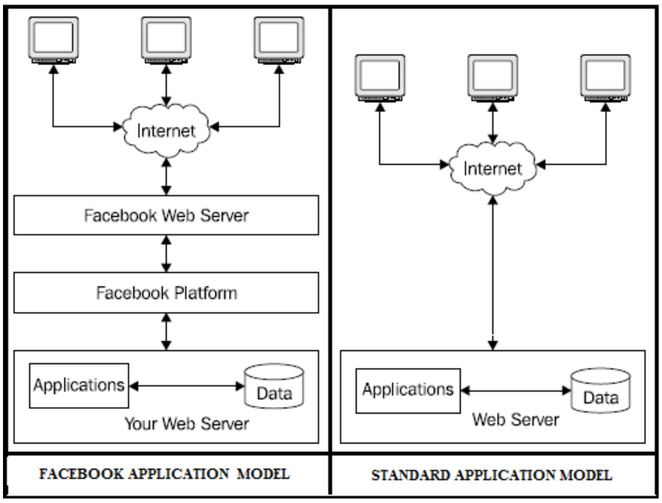


Figure 2.1: Facebook Web Application vs Standard Application Model

The following steps briefly summarize how the application is loaded within Facebook when a user makes a request.

1. Users go to http://apps.facebook.com/AppName
2. FB makes a call to the third party web server where the App resides(eg. Using an iFrame)
3. The server will format data accordingly . It may also make calls back to FB's API to retrieve additional information (such as friends , profile information etc.) before returning the data to the user.

4. The server returns the formatted data to Facebook.com in an iFrame(or a redirect message to authenticate or authorize the App).
5. Facebook.com parses the data and formats it further by adding the Facebook Header.
6. Facebook returns the entire formatted page to the user.

2.4 Core Concepts

All of the core Facebook Platform technologies, such as Social Plugins, the Graph API and Platform Dialogs are available to Apps on Facebook.These technologies have been further explained in the following section.

2.4.1 Authentication

Facebook Platform uses the OAuth 2.0 protocol[16] for authentication and authorization. It supports two different OAuth 2.0 flows for user login:

- **server-side** (known as the authentication code flow in the specification) flow is used whenever the application needs to make a call to the the Graph API from the developers web server.
- **client-side** (known as the implicit flow) flow is used when you need to make calls to the Graph API from a client, such as JavaScript running in a Web browser or from a native mobile or desktop app.

The implementation of the OAuth 2.0 involves three different steps: [16]

1. User authentication to ensure that the user is who they say they are.
2. App authorization to ensure that the user knows exactly what data and capabilities they are providing to the app.
3. App authentication to ensure that the user is giving their information to the app and not someone else.

The diagram[16] below illustrates the HTTP calls made through the server-side flow:

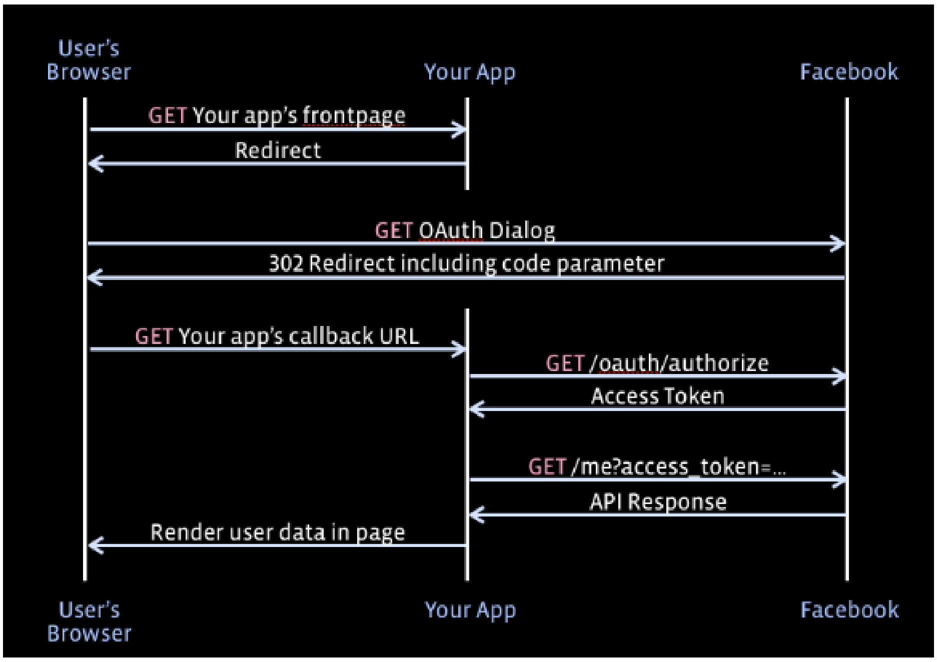
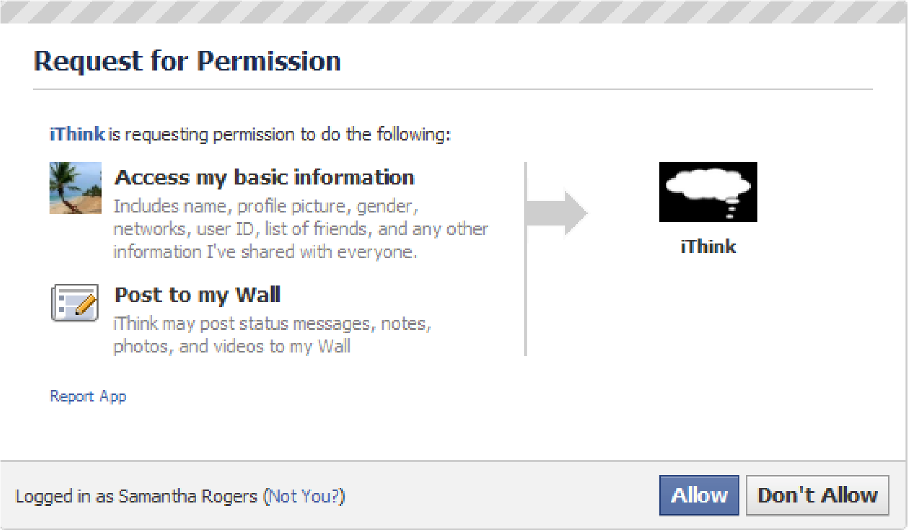


Figure 2.2: OAuth 2.0 Server-side flow

User authentication and app authorization are handled at the same time by redirecting the user to the OAuth Dialog. When invoking this dialog, the app id (the client_id parameter) and the URL that the user's browser will be redirected back to once app authorization is completed (the redirect_uri parameter) needs to be passed. If the user is already logged in, Facebook will validate the login cookie that they have stored on the user's browser, authenticating the user. If the user is not logged in, they are prompted to enter their credentials.Once the user is successfully authenticated, the OAuth Dialog will prompt the user to authorize the app:



Request for Permission

iThink is requesting permission to do the following:

Access my basic information

Includes name, profile picture, gender, networks, user ID, list of friends, and any other information I've shared with everyone.

Post to my Wall

iThink may post status messages, notes, photos, and videos to my Wall

Logged in as Samantha Rogers (Not You?)

Figure 2.3: Request for permission

By default, the user is asked to authorize the app to access basic information that is available publicly or by default on Facebook. If the app needs more than this basic information to function, then these must be requested explicitly.This is accomplished by adding a scope parameter to the OAuth Dialog request followed by comma separated list of the required permissions.

If the user presses Allow, the app is authorized. The OAuth Dialog will redirect (via HTTP 302) the user's browser to the URL passed in the redirect_uri parameter with an authorization code:

```
http://YOUR_URL?code=A_CODE_GENERATED_BY_SERVER
```

In order to authenticate the app, this authorization code and the app secret needs to be passed to the Graph API to get the access token.

```
https://graph.facebook.com/oauth/access_token?client_id=YOUR_APP_ID
&redirect_uri=YOUR_URL&client_secret=YOUR_APP_SECRET
&code=THE_CODE_FROM_ABOVE
```

If the app is successfully authenticated and the authorization code from the user is valid, the authorization server will return the access token.The application can then access data on behalf of the user through the Facebook Graph API.

2.4.2 Graph API

At Facebook's core is the social graph; people and the connections they have to everything they care about. The Graph API[16] presents a simple, consistent view of the Facebook social graph, uniformly representing objects in the graph (e.g., people, photos, events, and pages) and the connections between them (e.g., friend relationships, shared content, and photo tags).

Every object in the social graph has a unique ID. This ID can be used to access the properties of an object by requesting **https://graph.facebook.com/ID**. For example, to fetch the basic information of a user, the following GET request needs to be made

https://graph.facebook.com/544980051:[24]

The results returned by Facebook is a JSON object of the form

```
{
    "id":  "544980051",
    "name":  "Mugdha Kanhere",
     "first_name":  "Mugdha",
     "last_name":  "Kanhere",
     "username":  "mugdha.kanhere",
     "gender":  "female",
     "locale":  "en_US"
}
```

All of the objects in the Facebook social graph are connected to each other via relationships.For example User A is a fan of the Coca-Cola page, and User B are friends. These are known as relationship connections.To examine the connections between objects the following URL structure can be used : **https://graph.facebook.com/ID/CONNECTION_TYPE.**

2.4.3 Social Channels

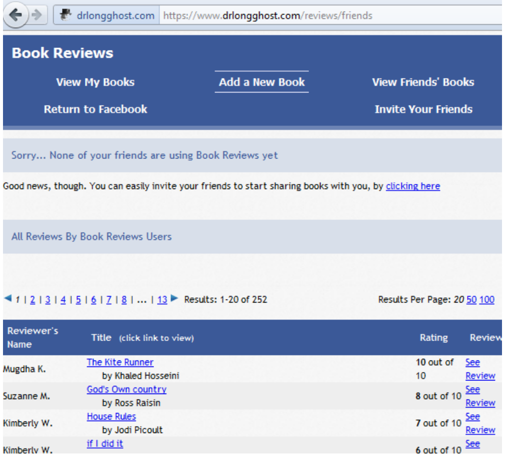
One benefit of using Facebook Platform is the potential reach the developer has when Facebook users share content from the app or website with their friends. These channels can be leveraged by apps on Facebook to gain popularity among the users. Because of the strength of a friend's endorsement, communication through Facebook Platform can help Application users grow tremendously. The most common available social channels are:News Feed , Feed Dialog etc.

2.5 Analysis of current applications

The following section describes some of the existing Facebook applications and how 'iThink' can be compared with these applications.

2.5.1 BookReviews

This application allows the user to share book reviews with friends and see what they're reading.The app automatically adds a link to Amazon.com to the review based on the Book Title. [11]



Sorry... None of your friends are using Book Reviews yet

Good news, though. You can easily invite your friends to start sharing books with you, by clicking here

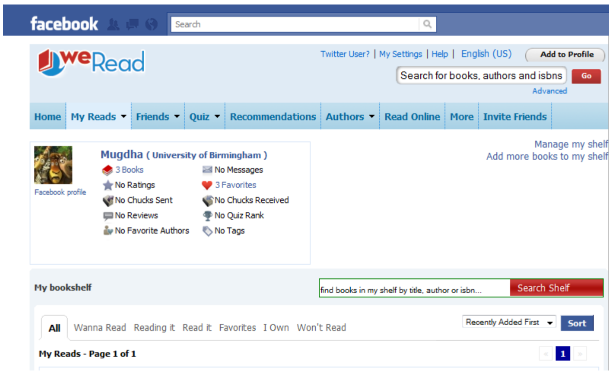
All Reviews By Book Reviews Users

1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | ... | 13 Results: 1-20 of 252 Results Per Page: 20 50 100

Reviewer's Name	Title (click link to view)	Rating	Review
Mugdha K.	The Kite Runner by Khaled Hosseini	10 out of 10	See Review
Suzanne M.	God's Own country by Ross Raisin	8 out of 10	See Review
Kimberly W.	House Rules by Jodi Picoult	7 out of 10	See Review
Kimberly W.	if I did it	6 out of 10	See

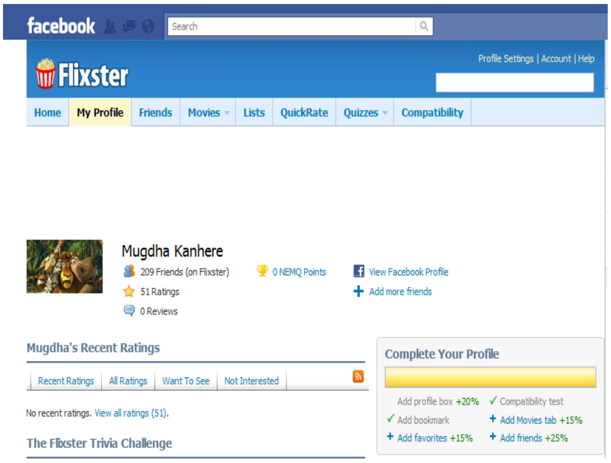
2.5.2 weRead

This is an online virtual bookshelf to help users find others who share the same reading tastes and discover new books. [13]



2.5.3 Flixster

This is an application to rate movies and share what users saw or want to see with friends. It allows users to compare their movie taste with their friends and take some movie trivia quizzes. [3]



After performing an extensive search of Facebook Applications, the following conclusions have been drawn:

- Currently there are no applications on Facebook that are related to technology related reviews from friends.
- Applications such as Flixster,weRead etc. although very sophisticated have too many features, some of which are hardly used , this tends to make them a bit confusing to use.
- iThink is an innovative application that combines some of the features of the above apps included with some new features to make this an interesting and useful application, but at the same time easy to use, making it one of its kind.

A short survey was also conducted by speaking to a group of Facebook users regarding what kind of an application would be of interest to them.They were asked if they used these above existing applications and whether they would like to see any new features added or any changes in the current features.Keeping in mind the responses , iThink has been designed to overcome this gap in the market.

2.6 Technology Research

The technologies listed below have been chosen to be used for developing the project. Each one is discussed briefly with its core concepts indicating why it is the best choice for the project.

1. **PHP vs Java**

There are several languages and frameworks available for developing Web Applications. Most commonly used programming languages are Java, PHP, C#,Python etc. It cannot be said that one is better than the other as the context of the application determines which language would be the most apt to use. One of the most important choices that needed to be made in the initial stages of planning was the programming language to be used for the implementation.An extensive research was conducted to identify the most common languages used in programming Facebook Applications and the available documentation for developing apps was reviewed, the following points briefly summarize the findings of the research.

- Facebook discontinued it's official Java Library support for users in 2008, encouraging users to switch to other programming languages.To quote one of the statements from the Facebook Development Blog[18]

  > "We encourage all developers who are interested in continuing to develop in Java to consider some of the open source alternative client libraries listed on the Wiki here. While the official Java library should have no immediate problems with continued use, we nevertheless recommend that you use a client library that is kept up to date, in order to best take advantage of any new functionality that is added in the future."

  The libraries that Facebook provides official support for are the JavaScript SDK and the PHP SDK, these are kept up to date and give developers an opportunity to build applications on the Facebook Platform.

- Facebook itself is largely written in PHP though the engineering team has now developed a way to programmatically transform PHP source code into C++ to gain performance benefits.

- It was found that since Facebook had discontinued support of their official Java client library in 2008 , even the user supported Java Facebook API[21] has turned obsolete and is based on some of the primitive functionality which Facebook plans to deprecate in the near future.

- One of the greatest problems working with a live platform like Facebook is the constant updates that are likely be made to the system. Keeping this in mind it was considered that using a library that Facebook provides official support for would be the best way to make the application more robust and maintainable.

  As part of the curriculum Spring , Wicket , Hibernate were the key technologies that were taught during the course, however taking into consideration the nature of the project and the above factors , the decision to use PHP as the main programming language was made. This also meant that an extra amount of time would have to be spent in learning a new language, but this seemed as a wise investment in time as the effort spent in learning the language would be well paid off eventually in terms of implementation and maintainability.Although the learning process of any language is an ongoing effort , an extra one week was spent in learning PHP in initial stages in order to get familiar with the basics and be able to start coding, and from there on the learning and developing was done hand in hand.

  Some of the key benefits of using PHP are:

- It is a popular server side scripting language developed with a focus on web programming.

- It is used for creating dynamic webpages and offers many advantages; it is fast, stable, secure, easy to use and open source .

- It's coding style is easy to understand it is very efficient on multi-platforms like Windows, Linux, and UNIX etc

- PHP does not put strain on servers. It uses its own inbuilt memory space that decreases the workload from the servers and the processing speed automatically enhances. Its script is optimized to make the server's job easier

2. **AJAX**(Asynchronous JavaScript and XML)

This is not a new programming language but a new way to use existing standards.Ajax's primary contribution to web pages is user-experience improvement.Some of the Application functionality was implemented using AJAX.The main features of AJAX are:

- It can update parts of a web page - without reloading the whole page.[key-3]

- It makes a website more professional and enticing to visitors.

- It is possible to process and refresh only the content that needs refreshing thus building a faster website.

- Again, because pages do not have to completely reload, it results in using less server bandwidth

3. Javascript

This was chosen to add some of the client side functionality to the application. The main reasons for opting for this are:

- It provides interactivity for web pages without relying on server side programming.
- JavaScript effects are much faster to download than some other front-end technologies like Flash and Java applets.
- It helps in designing pages with Dynamic effects like image swapping , Rollover, which is not available in HTML or CSS.
- It is also very fast as any code functions can be run immediately instead of having to contact the server and wait for an answer thereby reducing the demand on the website server.
- Users do not need need any extra software to download or install as it's supported by all browsers.[5]
- Lastly, it's simple and easy to test and modify, and there's a knowledgeable online support user community for it as well.

4. PostgreSQL vs MySQL

PostgreSQL was chosen as the DBMS for the project.It is an open source database management system which relies on a large community of software developers and companies.The reasons for choosing this over MySQL are:

- It is cross-platform compatible.
- It requires a low level of maintenance and tuning.
- There are many open source programs written for PostgreSQL administration and GUI Database Design.
- It is considerably faster than its main competitor MySQL.
- It supports a lot of complex routine and sub-queries
- It is easy to develop and integrate postgreSQL using development tools like : C/C++, PHP, Java, Python etc.

5. School Server space

A Facebook application needs to reside on the developer's own server.The School Server http://wwwteach.cs.bham.ac.ul is available for student projects and was chosen as the web hosting provider for iThink.It offers the following features:

- The server runs Apache with PHP enabled.
- External Web Hosting services are usually quite expensive, the School Server provided the option of a free hosting service.
- Available 24*7 so the application could be up and running at all times.
- Reliable to use.

6. CSS/HTML

Cascading Style Sheets(CSS) is a style language that defines layout of HTML documents.HTML is used to structure content whereas CSS is used for formatting the structured content.A CSS style sheet compliments well with HTML which is insufficient when used independently in website development, but when combined with CSS they can result in technically stronger web pages.The main features of these are:

- It helps keep the information content of a document separate from the details of how it is displayed.
- It avoids duplication and makes maintenance easier.
- Its possible to use the same content with different styles for different purposes [22]

- CSS is compatible with all web browsers
- CSS allows the web pages to have absolute consistency
- Dreamweaver and GIMP software was used for designing the pages.

The following SDK's were also used.
PHP SDK

- This SDK provides Facebook Platform support to PHP-based web apps. This library helps add Facebook Login and Graph API support to applications.

  Javascript SDK
- The JavaScript SDK enables an application to access features of the Graph API and Dialogs via JavaScript. It provides rich client-side functionality for authentication and rendering Social Plugins.

2.7 Google API Research

This project relies heavily on some of the Google services made available through the Google Data APIs which allow programmers to create applications that read and write data from Google services. Currently, these include APIs for Google Apps, Google Analytics, Blogger, Google Base, Google Book Search, Google Calendar, Google Code Search, Google Earth, Google Spreadsheets, Google Notebook, and Picasa Web Albums.[11]In order to make use of the Google Services , an application needs to sign up for an API key.There are two types of keys:

- keys for web applications running on a specific domain and
- keys for installed applications.

This application uses the former type of key. The key has been setup for the domain

```
http://studentweb.cs.bham.ac.uk/
```

The following subsections will briefly explain the features that have been planned to be included in the application.

2.7.1 Google Maps

The Google Maps Javascript API lets developers embed Google Maps in their own web pages. This project will be using the Version 3 of the API which has been especially designed to be faster.The API provides a number of utilities for manipulating maps(just like on the http://maps.google.com web page) and adding content to the map through a variety of services, allowing developers to create robust maps applications on their website.[12]

2.7.2 Google Book Search API

Google Books[14] allows developers to easily and reliably integrate with the Google Books repository from their own site, in a number of ways:

- Integrate search results and social features into the application.
- Perform full-text searches and retrieve book information, viewability and eBook availability.
- Manage personal bookshelves.
- The Embedded Viewer API lets developers embed Google Books previews on their own website and programmatically control these previews using JavaScript.

2.7.3 Google Image Search API

The Google Image Search API JSON interface can be used to write image query applications in any language that can handle a JSON-encoded result set with embedded status codes. [13]

2.7.4 Google Analytics

Collect visitor data for a website using the Google Analytics[15] tracking code. The tracking code works by the inclusion of a block of JavaScript code on the website pages. When visitors to the website view a page, this JavaScript code executes the tracking operation for Analytics. Data about the page visit is collected and sent to the Analytics server through a list of parameters attached to a single-pixel image request.The tracking code snippet supplies the Analytics reports with a wide variety of data about the website pages, visitors' loyalty, AdWords traffic sources etc.

Chapter 3

Requirements Analysis and Specification

The following sections describe the requirements of the application.As the application is integrated into Facebook, the users are restricted to all authorized users of Facebook. Any user registered with Facebook can find the application listed in the Facebook Application Directory and add the app to their profile by authorizing it using OAuth2.0 protocol in order to start using it.

3.1 User Requirements

These are the high level user requirements that the application is expected to include.

1. Post a new review.
2. Delete a review.
3. View friends reviews.
4. Invite friends to use the application
5. Bookmark application to homepage to go back to it easily later.
6. Preview a book review on Google Book .
7. View a restaurant location on Google Maps
8. Publish a review to news feed.
9. Search for a review.

3.2 System Requirements

3.2.1 Functional Requirements

1. System shall allow users to post a new review.
2. The system shall redirect the user to the Login page if a user tries to use the application when they are not logged into their Facebook account.
3. System shall allow users to bookmark the application to their Facebook profile.
4. System shall allow users to search for a keyword in any category.
5. System shall allow users to browse through friends reviews.
6. **System shall allow users to post a new book review.**
   (a) System shall allow users to enter title.

   (b) System shall allow user to search for the book details based on the book title.
   (c) User can choose a book from the given search results to add the book details to his/her review.
   (d) User can click on submit to post the review to his profile.
   (e) The system shall allow the user to pick a rating on a scale of 1-5.
   (f) The review will be added to the user's profile when he clicks on SUBMIT.
   (g) The user will be redirected to the page containing all his reviews.

7. **System shall allow users to post a new movie review.**

   (a) System shall allow users to enter the movie title.
   (b) System shall allow users to search for a movie poster based on the title.
   (c) System shall allow users to choose a movie image from the given search results to add to his/her review.
   (d) System shall allow users to enter the movie review.
   (e) The system shall allow the user to pick a rating on a scale of 1-5.
   (f) The review will be added to the user's profile when he clicks on SUBMIT.
   (g) The user will be redirected to the page containing all his reviews.

8. **System shall allow users to post a review for a restaurant.**

   (a) The user can enter the name of the restaurant and the address.
   (b) The system shall locate the restaurant on Google Maps when the user clicks on LOCATE.
   (c) The system shall allow the user to add a review for the restaurant.
   (d) The system shall allow the user to pick a rating on a scale of 1-5.
   (e) The review will be added to the user's profile when he clicks on SUBMIT.
   (f) The user will be redirected to the page containing all his reviews.

9. **The system shall allow the user to post a review for a technology related item.**

   (a) The user can enter the model and brand of the gadget.
   (b) The system shall find a thumbnail image for the gadget using Google Image Search when the user clicks on SEARCH.
   (c) The system shall allow the user to pick an image that he/she prefers to add to the review.
   (d) The system shall allow the user to enter a review for the electronic gadget.
   (e) The system shall allow the user to pick a rating on a scale of 1-5.
   (f) The review will be added to the user's profile when he clicks SUBMIT.

10. The system will allow users to delete a review.

11. The system shall allow the users to send an invitation to their friends to use the application.

3.2.2 Non-Functional Requirements

1. **Usability**

   (a) The application must be intuitive and must have a user-friendly easily navigable interface.

2. **Performance**

   (a) The system should not suffer from performance problems regardless of how many active users are currently using the application.
   (b) All database operations should be completed in a reasonable amount of time.

3. **Legislative**

(a) The application must abide by the terms and conditions of Facebook Application Development.

4. **Portability**

   (a) The application should be compatible with all the popular browsers available namely: Firefox ,Internet Explorer,Safari, Google Chrome.

   (b) The application should run on Microsoft Windows , Mac OS X and Linux Operating Systems.

5. **Security**

   (a) The users should be able to access the application using their Facebook login credentials only.

   (b) The users data must be kept securely to prevent unauthorized access to it.

   (c) The system must be immune to malicious user input.

6. **Scalability**

   (a) The system should be able to scale to any number of users and an increase in the number of users must have no effect on the functionality of the application

7. **Robustness**

   (a) The application should display proper error messages and guide the user to take appropriate steps instead of terminating abruptly.

8. **Availability**

   (a) The application must be up and running at all times, consequently the server that hosts the application must be available 24*7.

Chapter 4

System Design

4.1 Database Design

In this project many components needed the support of a database. In order to illustrate the overall structure of the database the following diagram has been drawn. As the application has been integrated with Facebook , some of the data is directly accessed from the Facebook Server and hence did not have to be included in the database.The database comprises of six tables.

Table	Purpose
1. bookreview	To store the book reviews posted by users.
2. moviereview	To store the movie reviews posted by users.
3. resreview	To store the restaurant reviews posted by users.
4. techreview	To store the technology related reviews posted by users.
5. users	To keep a track of all the users.Store user details.
6. reviewstats	To store the statistics pertaining to each review(This functionality was slightly modified)

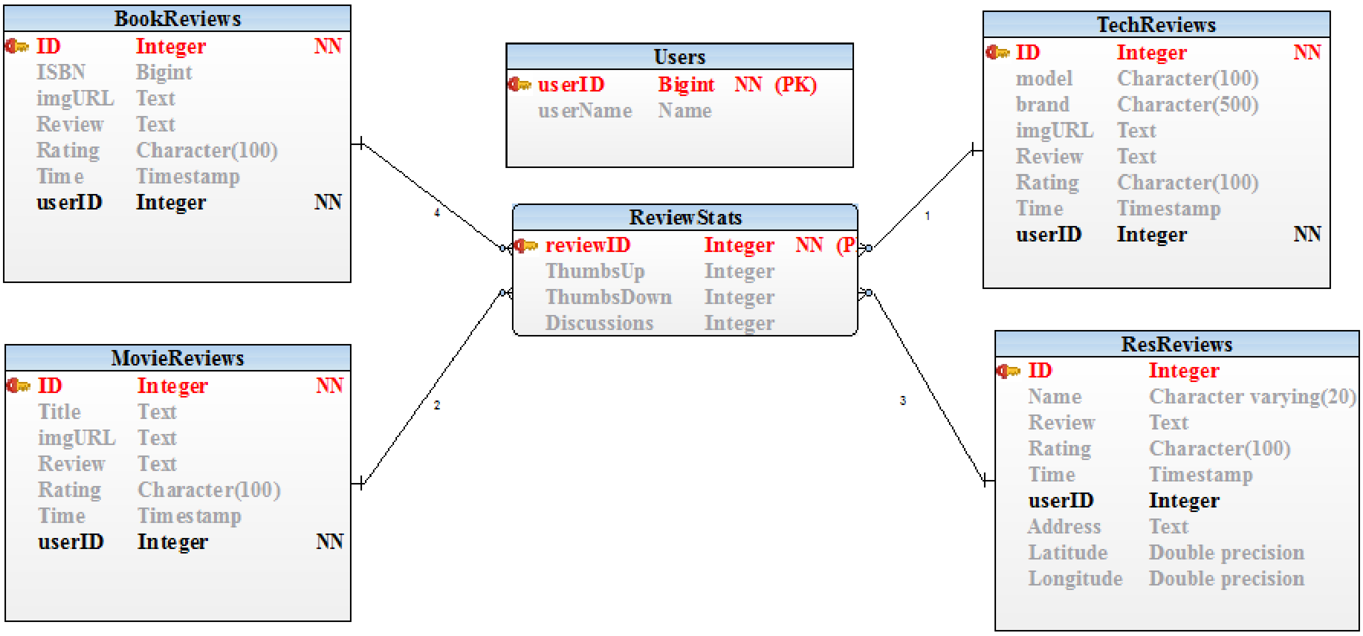


Figure 4.1: Database Design

4.2 Use Cases

A use case is a description of steps or actions between a user and a software system which leads the user towards something useful.It is a modeling technique that helps developers determine which features to implement and how to gracefully resolve errors[24]This section documents the use cases applicable to 'iThink'.

1. Add application to a user's profile

Use Case Name:	**Add app to profile**
Goal in Context:	To authenticate the user and get permissions from user to access their data.Bookmark the app to a user's profile.
Precondition:	The user is logged into their Facebook Account.
Basic Flow:	**1.** User clicks on 'iThink' in the App Directory. **2.** System redirects user to the OAuth Dialog asking for permission to access basic info and publish to wall. **3.** User clicks on 'Allow'. **4.** The user has successfully authorized the app to access data, which will be bookmarked to their profile page. **5.** System redirects user to the main menu page.
Alternative Flow:	**1.** User clicks on 'Don't Allow' **2.** App is not authorized by user. **3.** Redirected to user's profile page. App is not added to their profile

2. Post a Book Review

Use Case Name:	**Post Book Review**
Goal in Context:	To add a new book review to a user's profile
Precondition:	The user is logged into their Facebook Account. The user has authorized the app to access data.
Basic Flow:	**1.** User clicks on 'Post Book Review' **2.** System redirects user to the BookReview Page. **3.** User enters title and clicks on SEARCH. **5.** System displays all the Google books matching the book title. **4.** User selects a book from the search results. **5.** Adds a review and a rating. **6.** Clicks on **'SUBMIT'**. **7.** User redirected to the 'myReviews' page displaying the review just posted
Alternative Flow:	**1.** User does not enter all the fields. **2.** Error message asking user to enter all the fields.

3. Post a Movie Review

Use Case Name:	**Post Movie Review**
Goal in Context:	To add a new movie review to a user's profile
Precondition:	The user is logged into their Facebook Account. The user has authorized the app to access data.
Basic Flow:	**1.** User clicks on 'Post Movie Review' **2.** System redirects to the MovieReview Page. **3.** User enters title and clicks on SEARCH. **3.** System will find all the movie poster's matching the movie title. **4.** User selects a movie poster from the search results. **5.** Adds a review and a rating. **6.** Clicks on **'SUBMIT'**. **7.** User redirected to the 'myReviews' page displaying the review just posted
Alternative Flow:	**1.** User does not enter all the fields. **2.** Error message asking user to enter all the fields.

4. Post Restaurant Review

Use Case Name:	**Post Restaurant Review**
Goal in Context:	To add a new restaurant review to a user's profile
Precondition:	The user is logged into their Facebook Account. The user has authorized the app to access data.
Basic Flow:	**1.** User clicks on 'Post Restaurant Review' **2.** Redirected to the ResReview Page. **3.** Enter name and click on LOCATE ON MAP. **4.** System will locate the address of the restaurant on the map. **5.** User adds a review and a rating. **6.** Clicks on **'SUBMIT'**. **7.** User redirected to the 'myReviews' page displaying the review just posted
Alternative Flow:	**1.** User does not enter all the fields. **2.** Error message asking user to enter all the fields.

5. Post a Technology Review

Use Case Name:	**Post a Technology Review**
Goal in Context:	To add a new tech review to a user's profile
Precondition:	The user is logged into their Facebook Account. The user has authorized the app to access data.
Basic Flow:	**1.** User clicks on 'Post Technology Review' **2.** System redirects user to the TechReview Page. **3.** User enters model no. and brand and clicks on SEARCH. **3.** System will find all the images matching the technology item. **4.** User selects one of the images from the search results. **5.** User adds a review and a rating. **6.** Clicks on **'SUBMIT'**. **7.** User redirected to the 'myReviews' page displaying the review just posted
Alternative Flow:	**1.** User does not enter all the fields. **2.** Error message asking user to enter all the fields.

6. Browse Friends Reviews

Use Case Name:	**Browse Friends Reviews**
Goal in Context:	To browse friends reviews
Precondition:	The user is logged into their Facebook Account. The user has authorized the app to access data.
Basic Flow:	**1.** User clicks on 'Friends Reviews' **2.** System redirects user to the FriendsReviews Page. **3.** User clicks on a friend's name. **4.** System displays the reviews posted by that user.
Alternative Flow:	**1.** User does not have friends who are using iThink **2.** There are no reviews to display.

6. Delete a Review

Use Case Name:	Delete Review
Goal in Context:	To delete a review from a user's profile
Precondition:	The user is logged into their Facebook Account. The user has authorized the app to access data.
Basic Flow:	1. User goes to 'MyReviews' page. 2. Clicks on the the x button for the review to be deleted 3. System displays a confirmation message asking user again if he wants to delete the review. 4. User clicks on yes 5. Review is deleted.
Alternative Flow:	1. User clicks on no when the system displays confirmation message. 2. Review is not deleted

7. Search for a review

Use Case Name:	Search for a Review
Goal in Context:	To search for a review.
Precondition:	The user is logged into their Facebook Account. The user has authorized the app to access data.
Basic Flow:	1. User enters the search phrase. 2. User picks the category. 3. The results matching the search phrase are displayed to the user. 4. The user can choose a review to see it in detail.
Alternative Flow:	1. User does not pick category/ enter any search phrase 2. Error message prompting the user to pick category/enter search phrase

4.3 User Interface Design

The user interface design is a significant step in the System Design phase. An intuitive easy to follow design can cause a good impression on the users who usually tend to evaluate a system based on the interface. Also, without a clear design users are likely to be confused and not willing to use the application owing to its difficulty in understanding. One of the main things that make an application on Facebook stand out from the millions of others is its interface , hence a careful amount of time was spent in designing the interface. A large number of design walkthroughs were sketched and discarded or modified later during the Implementation owing to slight modifications in the functionality and based on the user feedback.In the report the final designs that were accepted have been included to avoid putting extraneous data.There are five main sections in the the user interface design, these are common framework design, homepage design , post review design , view friends reviews design, my reviews design.

4.3.1 Common Framework Design

The common framework is designed as the container into which other pages will be loaded.This layout is used in order to follow a uniform interface design throughout to keep things simple and easy to follow for the user.The figure 4.2 shows the design of the common framework

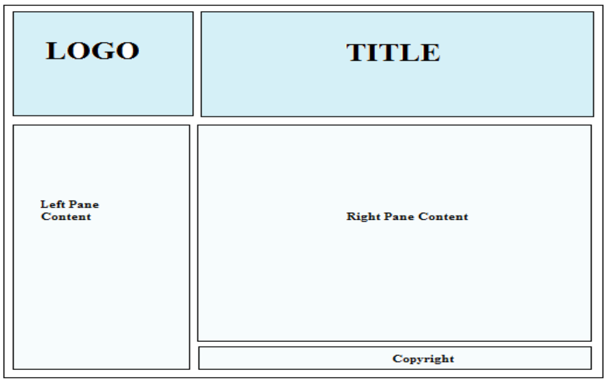


Figure 4.2: Common Framework Design

4.3.2 Homepage Design

The homepage is the main page containing all the menu items. This was designed keeping in mind that it should be simple and uncluttered and as user-friendly as possible.

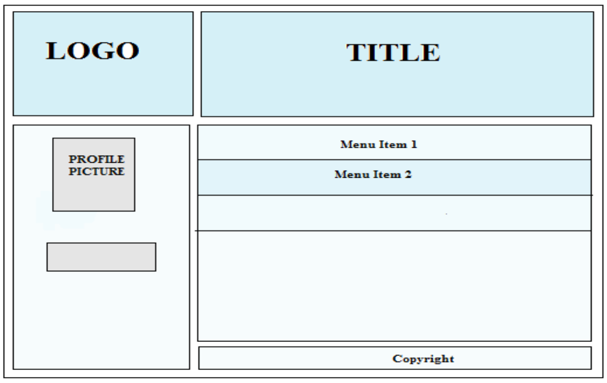


Figure 4.3: Homepage Design

4.3.3 Post Review Design

This page is designed to make posting a review very simple and easy for users.The Google Functionality added to this page adds an interesting aspect to the review. To make sure the user understands how to make use of this functionality the design is simple and clean. The left panel is kept empty to populate with the search results/Google Map Location and the right panel is for the user to enter his review and rating.

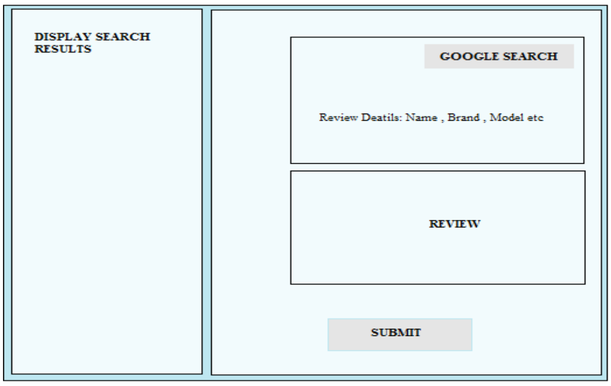


Figure 4.4: Post Review Design

4.3.4 View Friends Reviews

The figure 4.4 is the final design that was chosen for the View Friends Reviews Design.This consists of an iframe in the right panel that loads the reviews for each of the the user's friends when they click on their names, which are listed out in the left panel.

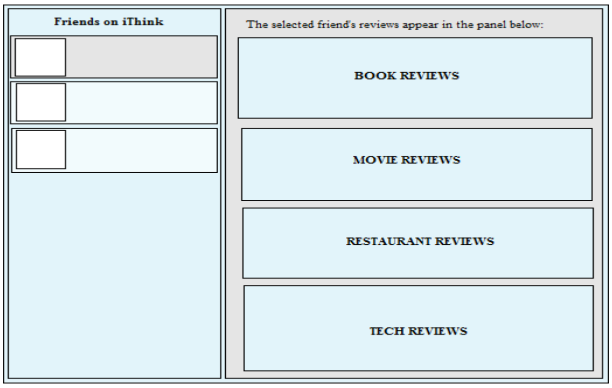


Figure 4.5: View Friends Reviews

4.3.5 My Reviews Design

The design for this was a simple tabbed pane on which the user could hover the mouse over the different tabs to read the respective reviews they had written for them.

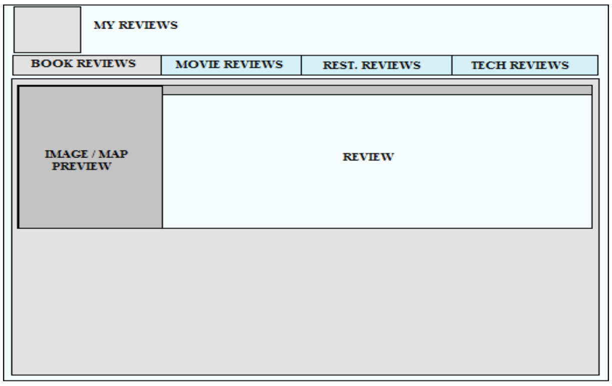


Figure 4.6: My Reviews Design

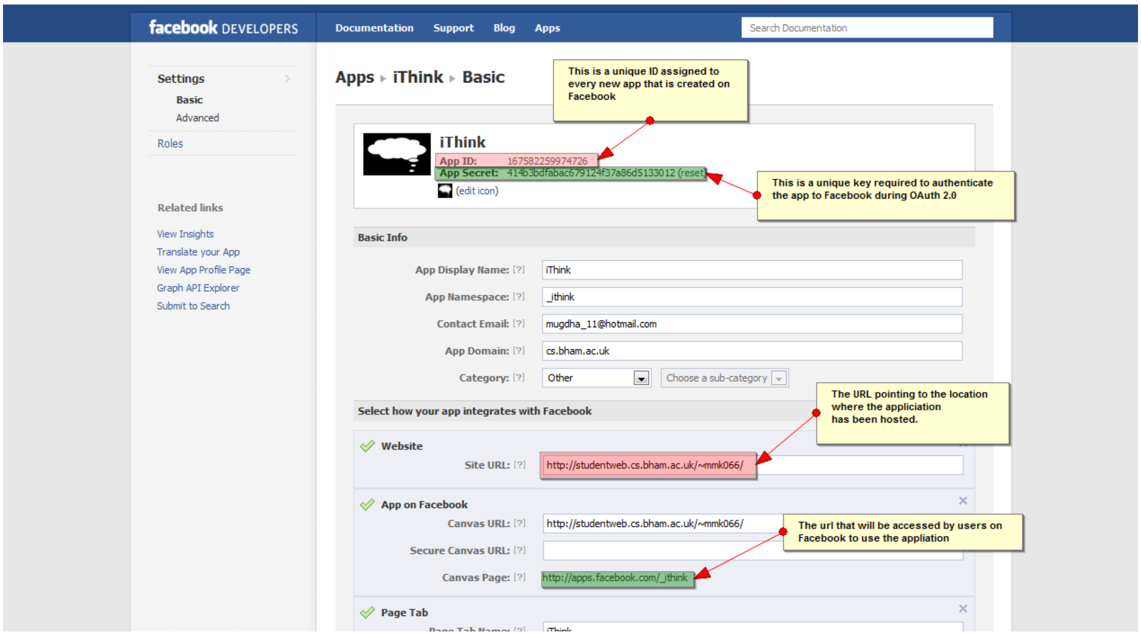
Chapter 5

Implementation

This chapter will give an elaborate explanation of the implementation of some of the key components of the Application.To begin with, it will focus on how the application was setup on Facebook , followed by a brief explanation on how the OAuth 2.0 protocol was implemented. This is followed by a description of the implementation of the main application functionality.

5.1 Integrating the Application with Facebook

To setup an application on Facebook, a developer needs to install the Developers App on their profile. This gives a Facebook user the rights to access the Facebook Platform to be able to make the necessary calls to the API and to be able exchange information.The Application can then be set up by configuring the settings for the application on the Developers App The figure 5.1 gives a screenshot of the Developer's App with the configured settings for 'iThink'.



Apps ▸ iThink ▸ Basic

iThink

App ID: 167582259974726

App Secret: 414b3bdfabac679124f37a86d5133012

Basic Info

App Display Name: [?] iThink

App Namespace: [?] _ithink

Contact Email: [?] mugdha_11@hotmail.com

App Domain: [?] cs.bham.ac.uk

Category: [?] Other | Choose a sub-category

Select how your app integrates with Facebook

✓ Website

Site URL: [?] http://studentweb.cs.bham.ac.uk/~mmk066/

✓ App on Facebook

Canvas URL: [?] http://studentweb.cs.bham.ac.uk/~mmk066/

Secure Canvas URL: [?]

Canvas Page: [?] http://apps.facebook.com/_ithink

✓ Page Tab

Page Tab Name: [?] iThink

This is a unique ID assigned to every new app that is created on Facebook

This is a unique key required to authenticate the app to Facebook during OAuth 2.0

The URL pointing to the location where the appliciation has been hosted.

The url that will be accessed by users on Facebook to use the appliation

Figure 5.1: Facebook Developers App setup preview

When an application is setup, Facbook issues it with a unique App ID and an App Secret. These are the key identifying features for any application on Facebook and are required to authenticate and authorize an application to Facebook during the OAuth 2.0 protocol.As the application resides on the developers own server , the canvas URL must be set correctly to the location where the files for the application are stored.

5.2 Implementing the OAuth 2.0 Protocol

Once an application has been setup on Facebook the next key step in the process is to obtain an access token for any user who wishes to use the Application. This is a permission that the user gives to the app to access data on behalf of them.The protocol works by displaying a simple dialog (refer figure 2.3) that prompts the user to click on 'Allow' if the user consents to the application accessing their data otherwise they may also click on 'Don't Allow' in which case the app is not authorized and the OAuth Dialog will redirect (via HTTP 302) the user's browser to the URL passed in the redirect_uri parameter with an error.

In order to clearly indicate what permissions a user is giving access to, the OAuth Dialog presents a list of all the user data that the app will have access to once the user clicks 'Allow'. The user will click on 'Allow' only if he is assured that the App is a genuine one.There exists a strong inverse correlation between the number of permissions the app requests and the number of users that will allow those permissions. The greater the number of permissions an app asks for, the lower the number of users that will grant them, keeping this in mind, the code was written to ensure that the app requests for only those permissions which are absolutely essential.'iThink' requests for the following data permissions from a user.

1. Access user's basic information: (default permission for every app)Includes name, profile picture , gender , networks , userID , list of friends, and any other information a user has shared with everyone.

2. Post to a user's wall : iThink may post status messages , notes , photos , videos to a user's wall.

The following code snippet illustrates how the OAuth 2.0 protocol was implemented.

```
$app_id = "167582259974726";
$app_secret = "414b3bdfabac679124f37a86d5133012";
$canvas_page = "http://apps.facebook.com/_ithink/index.php";
$_SESSION['state'] = md5(uniqid(rand(), TRUE)); //CSRF protection
$auth_url="https://www.facebook.com/dialog/oauth?client_id=".$app_id."&redirect_uri=" . urlencode
    ($canvas_page) . "&scope=publish_stream";

/* if user clicks allow , the app is authorized.The   oauth dialog will redirect the users
    browser to the redirect uri with  an authorization code. With this code we can proceed to
    the next  step(app authentication)to get the access token inorder to make the  API calls on
     behalf of the user. */

$signed_request = $_REQUEST["signed_request"];

/* authorization code to get the access token for the user.*/

list($encoded_sig, $payload) = explode('.', $signed_request, 2);
$data = json_decode(base64_decode(strtr($payload, '-_', '+/')), true);
$userid = $data["user_id"];
$oauth_token=$data["oauth_token"];
$_SESSION['token'] = $oauth_token;
$_SESSION['userid'] = $userid;
if (empty($data["user_id"]))
{     echo("<script> top.location.href='" . $auth_url . "'</script>"); }
```

In addition to the access token (the access_token parameter), the response contains the number of seconds until the token expires (the expires parameter). Once the token expires,these steps need to be re-run to generate a new code and access_token, although if the user has already authorized the app, they will not be prompted to do so again. If the app needs an access token with an infinite expiry time (to take actions on the user's behalf after they are not using the app), the app will need to request the offline_access permission.(However this has not been used as user's usually prefer not giving a third party application so much control on their data.)

5.3 Setup database on the School Server

The school runs a PostgreSQL database server[24]. This is directly accessible within the school. From outside the school, access to the database is possible by setting up a secure-shell tunnel to dbteach.cs.bham.ac.uk on port 5432. Within the code to access the database the pg_connect was used.

```
$connection = pg_connect("host=dbteach␣port=5432␣dbname=<database-name>␣user=<user␣name>␣
    password=<password>");
```

5.4 Main Functionality Implementation

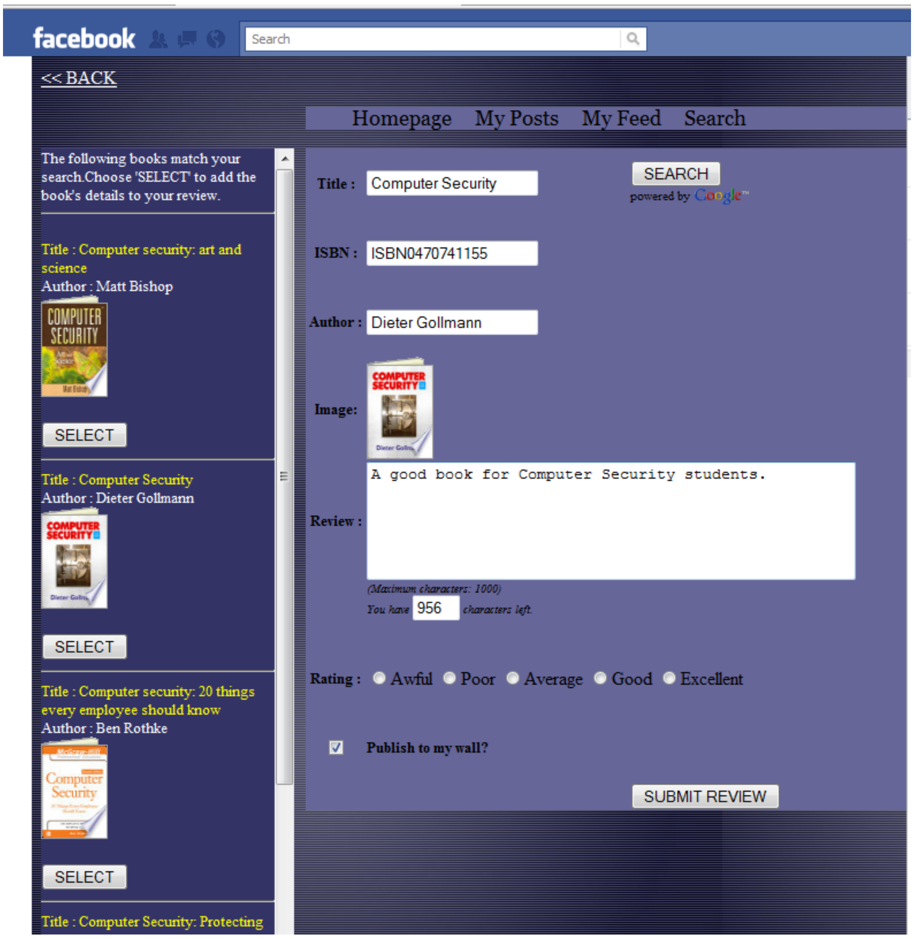
The implementation of the main functionality of the application has been explained in the next few subsections. Code snippets and screenshots have been added to illustrate the process.

5.4.1 Posting Reviews using Google Features

- **Posting a Book Review using the Google Book Search API.**

This functionality allows a user to post a review for a book and share it with Facebook friends. The user enters the title and Google Book search will get the book details.The user then selects the desired book from the search results , this adds additional details such as the ISBN,Author,thumbnail image etc. to the review leaving the user to only enter the review and rating. Figure 5.2 contains a screenshot from the application to illustrate how this feature works.A small snippet of code is included below to show how Google Book Search fetches the results and displays them to the user.

```
/*This code generates a "Raw Searcher" to handle search queries.
  The search results are handled manually */
function searchComplete()
{ if(bookSearch.results && bookSearch.results.length > 0)
 //Populate the left tab with results.Please refer CD for the entire code
}
function onLoad()
{
bookSearch = new google.search.BookSearch();
bookSearch.setSearchCompleteCallback(this, searchComplete, null);
bookSearch.execute(document.getElementById("bookname").value);
google.search.Search.getBranding('branding');
}
```



The following books match your search.Choose 'SELECT' to add the book's details to your review.

Title : Computer security: art and science
Author : Matt Bishop

Title : Computer Security
Author : Dieter Gollmann

Title : Computer security: 20 things every employee should know
Author : Ben Rothke

Title : Computer Security: Protecting

Title : Computer Security

ISBN : ISBN0470741155

Author : Dieter Gollmann

Image:

Review : A good book for Computer Security students.

(Maximum characters: 1000)
You have 956 characters left.

Rating : ○ Awful ○ Poor ○ Average ○ Good ○ Excellent

☑ Publish to my wall?

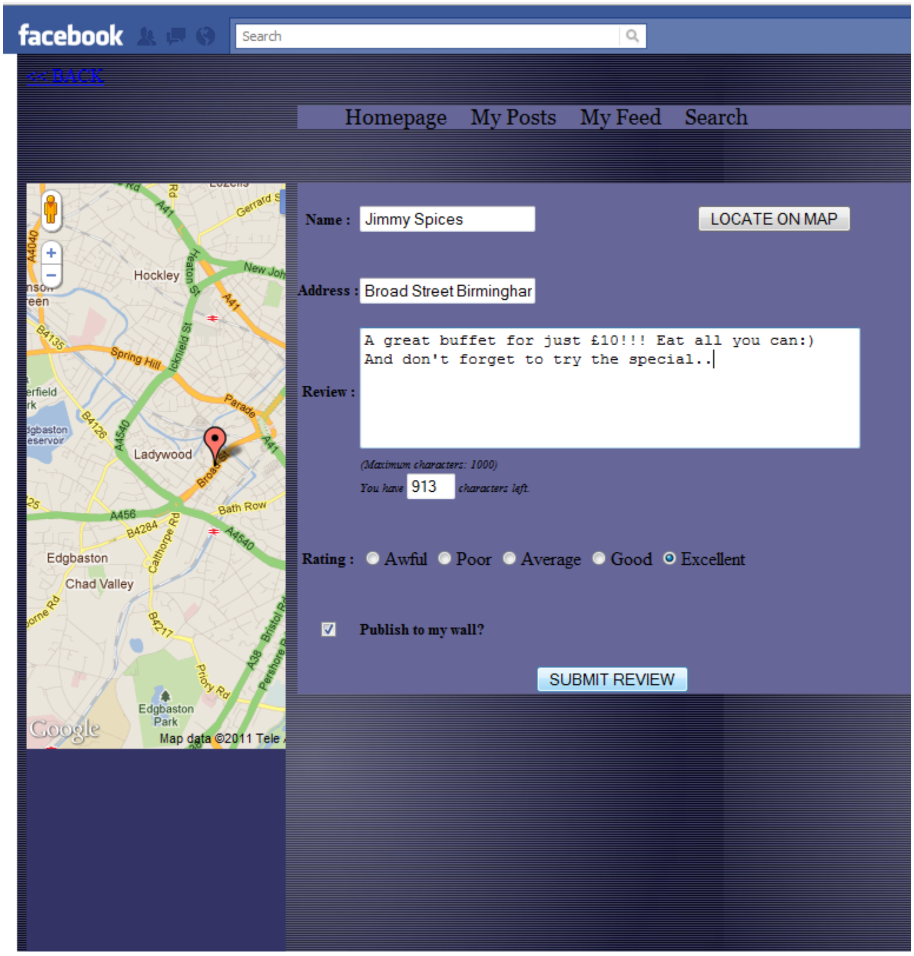
Figure 5.2: Post Book Review

The advantage of this feature is while reading the reviews of friends and other users, if a user is interested in a particular book they can preview the first few chapters using the Google Embedded Preview Functionality.

- **Posting a review for a restaurant using the Google Maps API**

This feature allows a user to enter a review for a restaurant. The code snippet below will illustrate how the feature was implemented.When a user submits a review for a restaurant, they may additionally also include the location using Google Maps so that a person reading the review could be able to view directions to get to the restaurant using the embedded Google Maps functionality.

```
function codeAddress() {
var myOptions = {zoom: 13,mapTypeId: google.maps.MapTypeId.ROADMAP}
var map = new google.maps.Map(document.getElementById("map_canvas"), myOptions);
var address = document.getElementById("addr").value;
geocoder.geocode( { 'address': address}, function(results, status) {
if (status == google.maps.GeocoderStatus.OK)
{map.setCenter(results[0].geometry.location);          document.getElementById('lat').
    value= results[0].geometry.location.lat();
document.getElementById('lng').value= results[0].geometry.location.lng();
var marker = new google.maps.Marker({map: map,position:results[0].geometry.location
});}else
{alert("Geocode was not successful for the following reason: " + status);}});
}
```



Name : Jimmy Spices

Address : Broad Street Birminghar

Review : A great buffet for just £10!!! Eat all you can:)
And don't forget to try the special..

(Maximum characters: 1000)
You have 913 characters left.

Rating : ○ Awful ○ Poor ○ Average ○ Good ● Excellent

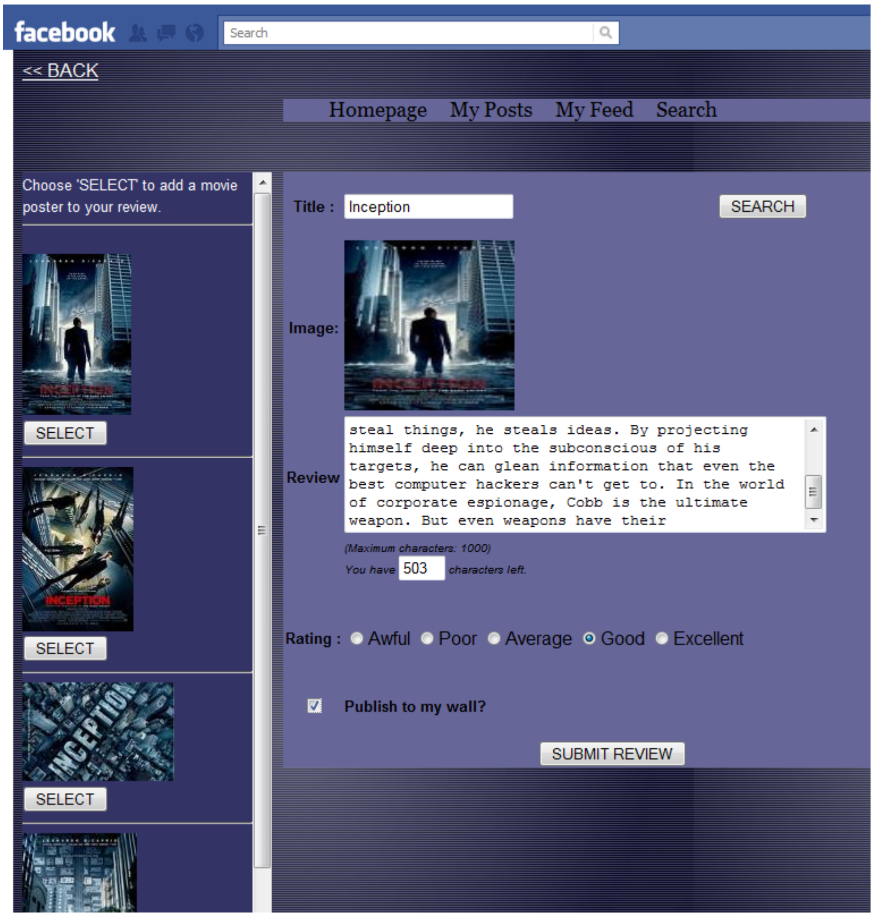
☑ Publish to my wall?

Figure 5.3: Google Maps Implementation

- **Posting a review for a Movie/ Technology item using Image Search**

The Google Image Search functionality has been implemented in the technology review and movie review functions. This gives the user the ability to add a small thumbnail image of a movie poster or an electronic gadget to their reviews.The code snippet shows how the image searcher was implemented. Figure 5.4 shows a screen shot of the functionality.

```
function searchComplete(searcher)
{if (searcher.results && searcher.results.length > 0)
{  //populate the left tab with results.   } }
function OnLoad() {
//ImageSearch instance.
var imageSearch = new google.search.ImageSearch();
/* Set a callback so that anytime a search is executed, it will call
* the searchComplete function and pass it ImageSearch searcher.
* When a search completes, the ImageSearch object is automatically
* populated with the results.
*/
imageSearch.setSearchCompleteCallback(this, searchComplete, [imageSearch]);   imageSearch.
    execute(document.getElementById('title').value+" poster");
}
```



Choose 'SELECT' to add a movie poster to your review.

Title : Inception

Image:

Review: steal things, he steals ideas. By projecting himself deep into the subconscious of his targets, he can glean information that even the best computer hackers can't get to. In the world of corporate espionage, Cobb is the ultimate weapon. But even weapons have their

(Maximum characters: 1000)

You have 503 characters left.

Rating : ○ Awful ○ Poor ○ Average ● Good ○ Excellent

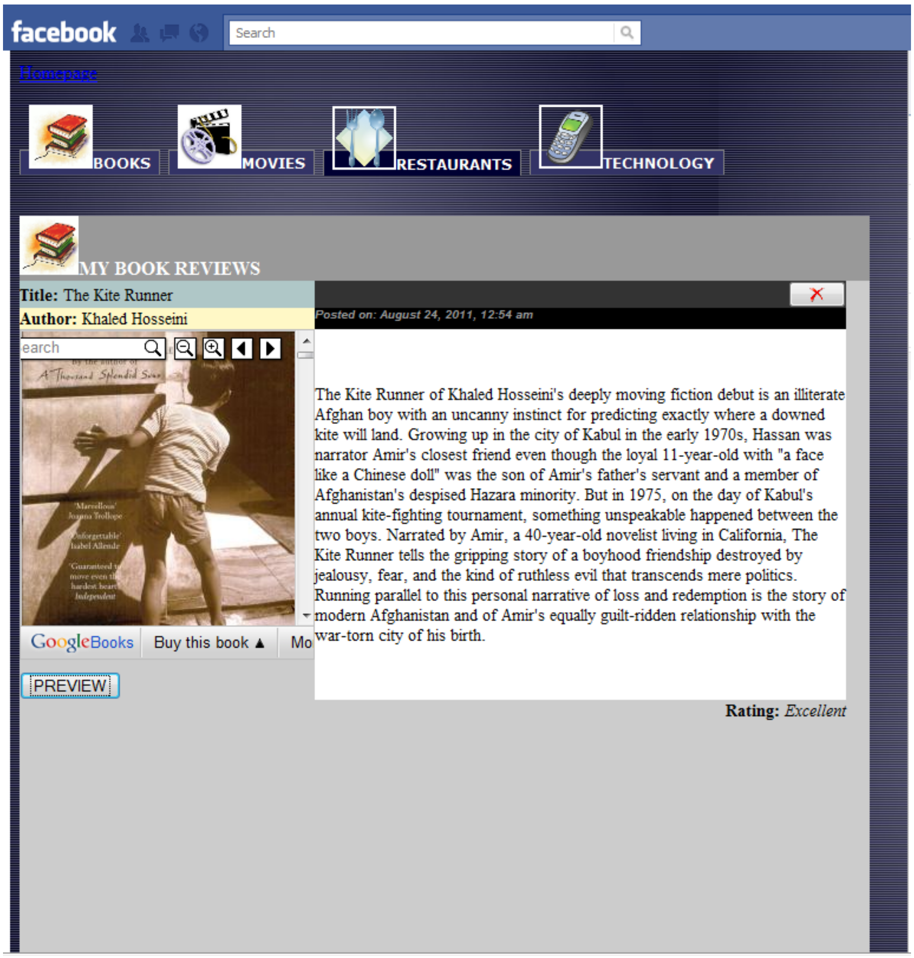
☑ Publish to my wall?

Figure 5.4: Post a movie review

- **AJAX Implementation to delete a reviews.**

A user can delete a review by going to 'myReviews' page and clicking on X in the review panel for the review to be deleted. This functionality is implemented using AJAX so that the whole page does not have to be refreshed each time the user deletes a review.A small snippet of the code is added below to show how AJAX has been implemented.

```
function deleterev(id)
{var answer = confirm("Are␣you␣sure␣you␣want␣to␣delete␣this␣review?");
// if user confirms delete then use AJAX to delete the review in the background
if (answer){
var xmlhttp;
if(window.XMLHttpRequest) {
//code for IE7 , Firefox , Chrome , Opera , Safari
xmlhttp = new XMLHttpRequest();                          }
else{
// code for IE6 , IE5
xmlhttp=new ActiveXObject("Microsoft.XMLHTTP");
}
xmlhttp.onreadystatechange=function(){
if(xmlhttp.readyState==4 && xmlhttp.status==200)
{window.location.reload();
alert("Your␣review␣has␣been␣deleted");}}
var type = document.getElementById(id).value;
xmlhttp.open("POST","deletereview.php?id="+id+"&type="+type,true);
xmlhttp.send();} }
```



Title: The Kite Runner
Author: Khaled Hosseini

Posted on: August 24, 2011, 12:54 am

The Kite Runner of Khaled Hosseini's deeply moving fiction debut is an illiterate Afghan boy with an uncanny instinct for predicting exactly where a downed kite will land. Growing up in the city of Kabul in the early 1970s, Hassan was narrator Amir's closest friend even though the loyal 11-year-old with "a face like a Chinese doll" was the son of Amir's father's servant and a member of Afghanistan's despised Hazara minority. But in 1975, on the day of Kabul's annual kite-fighting tournament, something unspeakable happened between the two boys. Narrated by Amir, a 40-year-old novelist living in California, The Kite Runner tells the gripping story of a boyhood friendship destroyed by jealousy, fear, and the kind of ruthless evil that transcends mere politics. Running parallel to this personal narrative of loss and redemption is the story of modern Afghanistan and of Amir's equally guilt-ridden relationship with the war-torn city of his birth.

Rating: *Excellent*

Figure 5.5: Delete a review

To refer to the complete code and all the screen shots please refer to the accompanying CD. Appendix A explains the code structure on the CD and how the application can be run. Appendix D contains some more screenshots of the application.

Chapter 6

Validation and Testing

Testing plays an important role in the process of Web Application Development.Owing to the nature of the project and the time constraint testing has been done throughout the implementation process.The key testing strategies used were:

- **Code Review :** This involved visual inspection of the code to spot any programming logic errors.
- **System Testing :** This type of testing falls in the scope of Black box testing and requires no knowledge of inner design of the code or logic, the testing is conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements.[17] The system was tested to check for any unusual behavior or unexpected output. The test cases and test results can be found in Appendix B.
- **Regression testing:** This type of testing seeks to uncover new errors, or regressions, in existing functionality after changes have been made to a system.The intent of regression testing is to ensure that a change, such as a bug fix, did not introduce new faults.Whenever any changes were made to the existing functionality , regression testing was performed to check that there was no problem with the older units and they were working as expected. [18]
- **User Acceptance testing** The user acceptance testing is a black box type of testing. It focuses on the functionality and the usability of the application rather than the technical aspects.This type of testing gives the end users the confidence that the application being delivered to them meets their requirements.This testing also helps nail bugs related to usability of the system.The application was given for testing to a small group of Facebook users , having background knowledge on the subject. The feedback received from them was crucial in ensuring that the delivered system is bug free and secure.

6.1 Testing for Attacks against the Application

The battle against hackers is a difficult one. An attacker needs to find only one vulnerability to break in, while the developer needs to find all of them to keep him out. The following checks have been done to ensure that the developed system is secure.

CSRF is an attack in which a trusted (authenticated and authorized) user unknowingly performs an action on website. To prevent this attack, the app passes an identifier in the state parameter, and then validates that the state parameter matches on the response, the code below shows how this is achieved:[16]

```
$_SESSION['state'] = md5(uniqid(rand(), TRUE)); //CSRF protection
if($_REQUEST['state'] == $_SESSION['state'])
{//the user is authenticated}
else
{echo("The state does not match. You may be a victim of CSRF.");}
```

This was tested to ensure that the web application is not vulnerable to CSRF.

SQL Injection is a technique that allows an attacker to retrieve crucial information from a Web server's database. Depending on the application's security measures, the impact of this attack can vary from basic information disclosure to remote code execution and total system compromise.[23] To prevent this all user input is sanitized before processing it and all database operations are done using prepared statements.The application was tested against some of the common SQL injections , none of these were successful.

6.2 User Acceptance Testing

User Testing is an important phase of testing to determine if the developed system meets all the user requirements satisfactorily.In this project as the application was targeted towards Facebook users, a small group of them were selected to assist with the UAT.

6.2.1 Create Test Facebook User Profiles

Facebook provides developers with the functionality to create test users to test their apps without creating fake user profiles that violate Facebook's terms of service, or polluting their own profiles with test posts.

These test users are different than “testers”, humans that a developer has given the ability to test their app in sandbox mode. They can interact normally with apps and each other, but are invisible to and can't interact with normal users.Multiple test users can be created at once, and developers have the option to instantly authorize an app for them or opt to have them go through the permissions dialog later.Once test users have been created, developers can switch to use Facebook as them, edit their names, view their access tokens, make them friends with each other, assign them to additional apps, or remove them from the currently viewed app. This formed an important functionality to be able to test the application during the early implementation stages as the application could only be accessed by registered Facebook users and this gave the opportunity to test how the application would work when run by another user without having to create fake profiles.

6.2.2 Feedback from UAT

The web application was first given for testing to a small group of users(approx. 20) at an early stage, after completing the basic functionality to get feedback and to check for any bugs.The table lists the bugs discovered during this process and the subsequent changes that were made to the system.The table can be found in Appendix E.

Chapter 7

Project Management

7.1 Project Scheduling

Figure 7.1 comprises of a Gantt chart for the project, illustrating the project schedule. It shows the start and finish dates of the terminal elements and summary elements of the project.

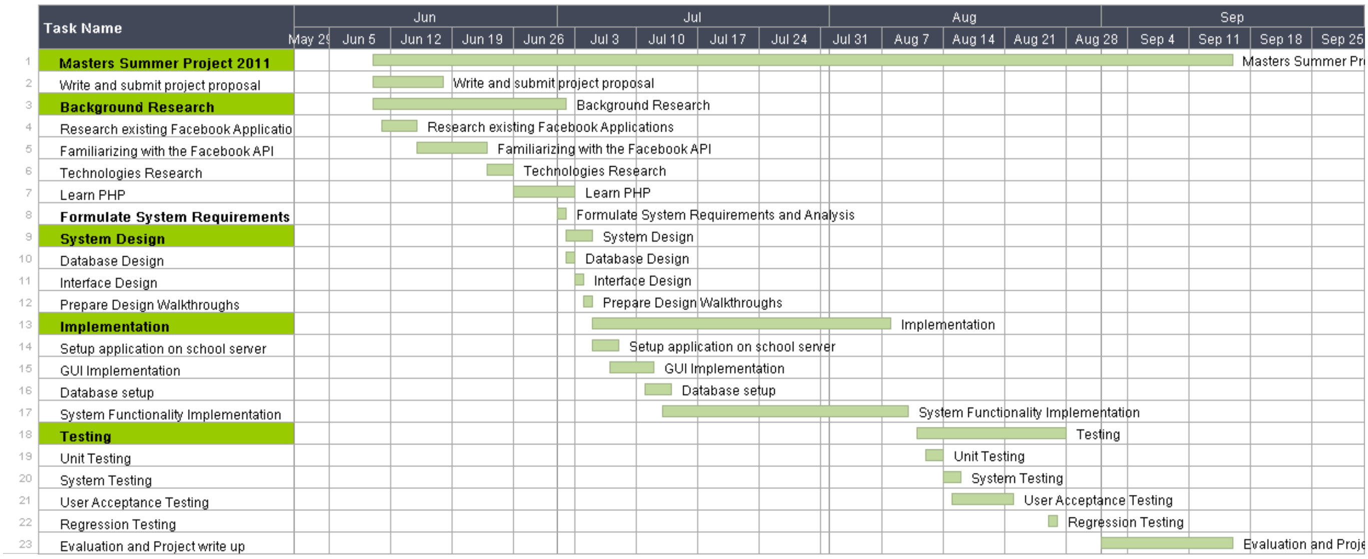


Figure 7.1: Gantt Chart

7.2 Risk Analysis

Prior to undertaking the project a risk analysis was performed to determine problems that were likely to be encountered during the project.Countermeasures have been defined that would help to avoid the risk or reduce its impact.

	Risk	**Countermeasures**	**Likelihood**	**Impact**
1.	Incomplete/Misunderstood user and system requirements	Spend sufficient time on background research. Crosscheck requirements with supervisor	low	high
2.	Unable to complete all the functionality in the specified time frame	Prioritize the requirements and system functionality. Use an incremental approach of development to avoid total failure.	low	moderate
3.	Loss of project files.	Take Proper Backup at regular intervals using subversion	moderate	high
4.	Lack of knowledge of chosen technologies	Choice of technologies that have good documentation and knowledgeable user communities. Project scheduling to allocate sufficient time for background research to get familiar with the technologies. Research alternative technologies Reduce project scope	high	high
5.	Wrong choice of Technologies	Use throwaway prototyping to evaluate all the potential problems and choose the best solution.	low	high
6.	Critical Bug discovered in the final stages	Using clear Testing strategies right from the beginning. Do not implement new features close to deadlines.	low	high

Chapter 8

Evaluation

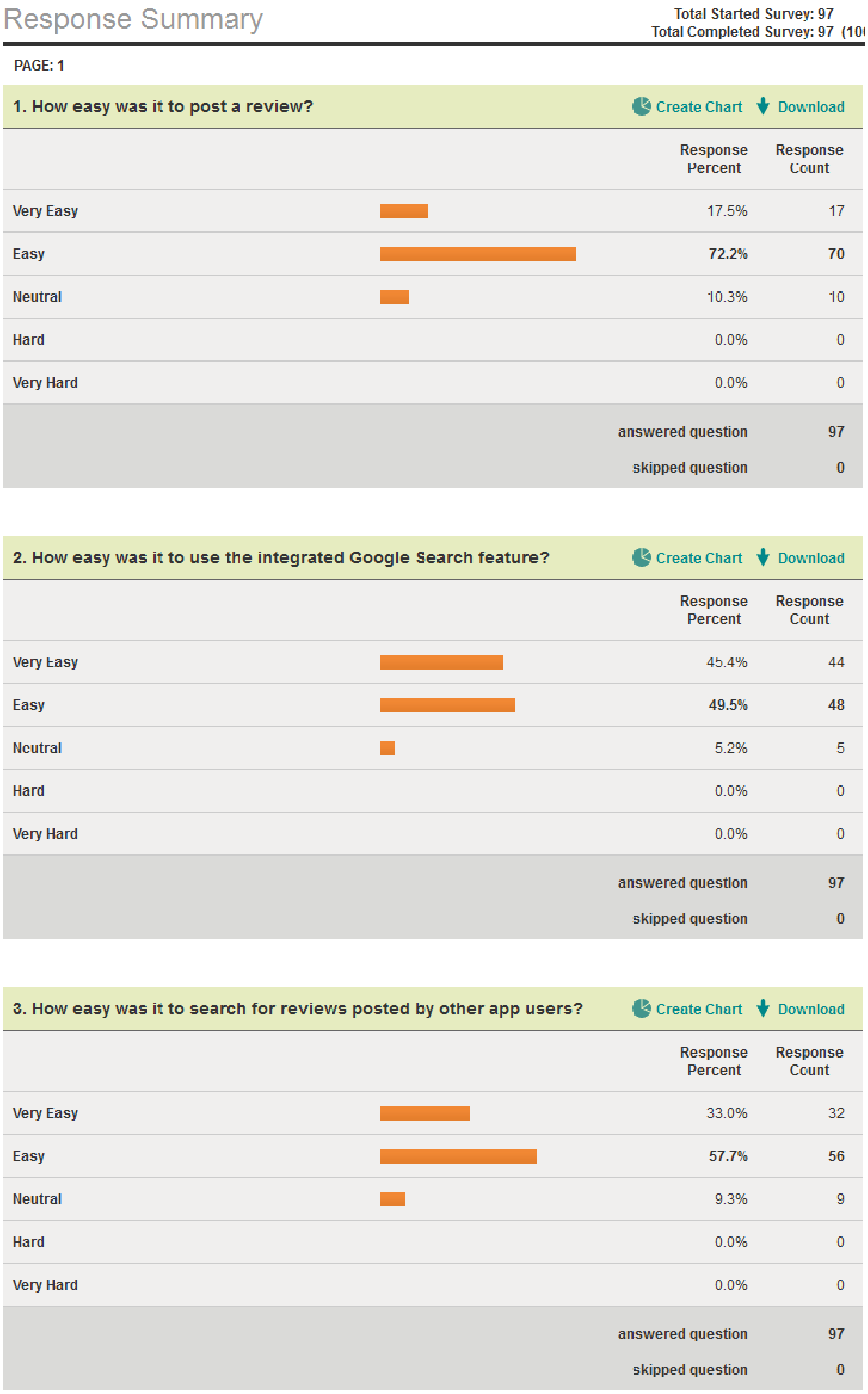
This chapter aims to highlight the successes and weaknesses of the application when compared with the Requirements Specification. It also identifies the limitations of the project and the areas for further improvement and gives an in-depth description of how the system was evaluated and the final outcome of it.

8.1 Author's Comments

One of the fundamental aims of this project was to develop something innovative and unique by building on the knowledge gained through my course over the last few months.The idea of a Facebook Application was chosen as it had a unique element to it yet it is based on the fundamentals of standard web applications.Perhaps the greatest challenge of this project was to try and develop a new idea in such a short span of time.As being a bit different , there were no past projects available for reference so a lot of background research was needed to be done before the actual implementation of the project. There was also a lot of research done regarding the technologies as well and within the short span of time I had to learn the new technologies that best suited the nature of the project. Taking into consideration the time constraint, the project was successfully completed and tested on time and met all the requirements that had initially been specified.However, in order to get an unbiased critical evaluation of the success of the project , it was set up live to be used by Facebook users who were also asked to complete an anonymous questionnaire to describe their experience with the application.

8.2 User Evaluation

The ultimate test of any web application is achieved by gauging the user satisfaction of the targeted users. To test this acceptance the application was set up live to be accessed by Facebook friends and other users. A special effort was made to distribute the application on forums and public groups on Facebook to ensure unbiased feedback from all categories of users.The application has currently got over a 100 monthly active users as per the Facebook Application statistics and about 90% of these users have completed the short questionnaire describing their experience with the application.The results of the survey have been summarized here. The questionnaire can be found in Appendix A.The general consensus of the testers was that they thought the application was a very unique and useful one , given that there are currently no applications on Facebook that offer the same functionality.A large number of users praised the innovative manner in which the Google Services were integrated with the application.Also most users found the interface design easy and intuitive to use.The questionnaire also gave users the option to add comments on whether they thought the application was useful and why they thought so.The analysis of the user's responses and a selection of some of their comments is given below.The figures 8.1 and 8.2 present a screen shot of the questionnaire results analysis.



Response Summary

Total Started Survey: 97
Total Completed Survey: 97 (10

PAGE: 1

1. How easy was it to post a review?

	Response Percent	Response Count
Very Easy	17.5%	17
Easy	72.2%	70
Neutral	10.3%	10
Hard	0.0%	0
Very Hard	0.0%	0
	answered question	97
	skipped question	0

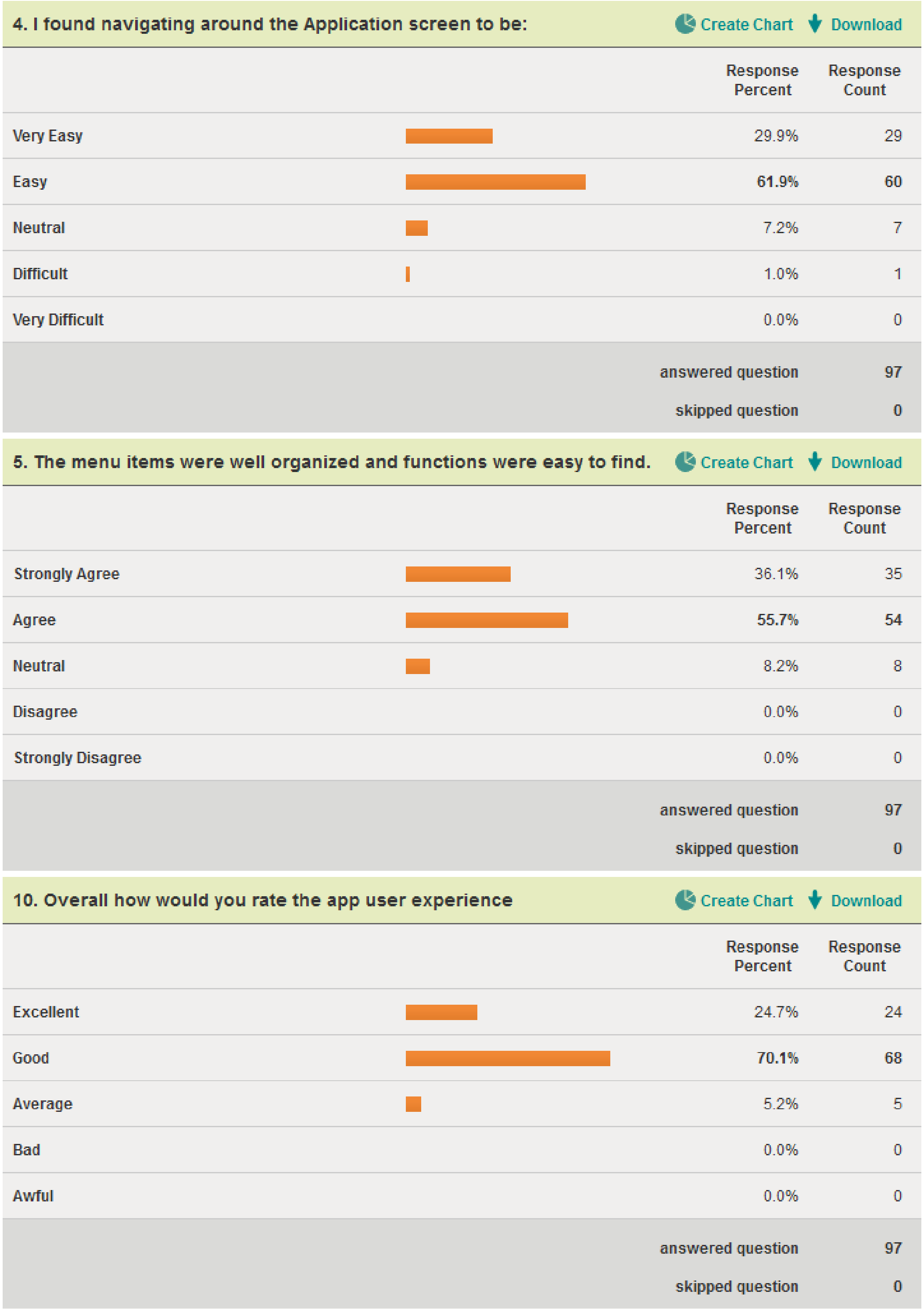
2. How easy was it to use the integrated Google Search feature?

	Response Percent	Response Count
Very Easy	45.4%	44
Easy	49.5%	48
Neutral	5.2%	5
Hard	0.0%	0
Very Hard	0.0%	0
	answered question	97
	skipped question	0

3. How easy was it to search for reviews posted by other app users?

	Response Percent	Response Count
Very Easy	33.0%	32
Easy	57.7%	56
Neutral	9.3%	9
Hard	0.0%	0
Very Hard	0.0%	0
	answered question	97
	skipped question	0

Figure 8.1: Survey Results



4. I found navigating around the Application screen to be:

	Response Percent	Response Count
Very Easy	29.9%	29
Easy	**61.9%**	**60**
Neutral	7.2%	7
Difficult	1.0%	1
Very Difficult	0.0%	0
	answered question	97
	skipped question	0

5. The menu items were well organized and functions were easy to find.

	Response Percent	Response Count
Strongly Agree	36.1%	35
Agree	**55.7%**	**54**
Neutral	8.2%	8
Disagree	0.0%	0
Strongly Disagree	0.0%	0
	answered question	97
	skipped question	0

10. Overall how would you rate the app user experience

	Response Percent	Response Count
Excellent	24.7%	24
Good	**70.1%**	**68**
Average	5.2%	5
Bad	0.0%	0
Awful	0.0%	0
	answered question	97
	skipped question	0

Figure 8.2: Survey Results

"I think it's an excellent way for me to check up on my friend's opinions about books, movies and restaurants. Especially when I am visiting a new city and want to know the best places to hang out." *(User 1 : 9/3/11 12:56AM)*

"Yes, integrating it with facebook makes this a really good application." *(User 2 : 9/2/11 2:58PM)*

"Yes, I think this app is quite useful as instead of searching reviews on different forums I can just search reviews on my Facebook. Moreover, as I know these reviews are from the people whom I know so I have more trust in these reviews." *(User 3 : 8/29/11 10:56PM)*

"It seems a useful application if its design improve,especially reviews are a bit primary,it needs to have more clear view.but the functionality is very good" *(User 4 : 8/27/11 5:41PM)*

"Yes. Surely its very useful I feel its like a blog inside Facebook..." *(User 5 : 8/27/11 5:24PM)*

"Yes, it is a great place to get reviews. It's helpful because everything can be found at one place." *(User 6: 8/27/11 5:20PM)*

"ya great use of google features very handy to post reviews" *(User 7:8/26/11 5:57PM)*

"This is an awesome and useful application. Keeps me updated with the reviews and my friends' thoughts. Loved it.." *(User8 : 8/26/11 4:35PM)*

8.3 Successes and Noteworthy features

The success of the project can be determined by ensuring that all the requirements outlined at the beginning of the project have been met.When comparing the requirements , it can be seen that all the functional requirements that have been specified in chapter 3 have been implemented in the actual system during the project development and some additional features were added to improvise on the earlier requirements.The system can thus be said to meet all the goals that were set out and achieves them well.Furthermore the user feedback received is an indication that the system has been well received by the target audience it was intended for. The response received from the user evaluation process was a major factor in helping the project become a success as a lot of bugs were discovered in the early stages of development and hence were easy to correct.

8.3.1 Scalability and Performance

The non-functional requirements of Scalability, Performance , Usability and Security have been given special attention to. The system has been tested by creating several test user Facebook profiles and by several real Facebook users and there have been no problems reported regarding the the performance ,thus it can be said that the system scales well. The system was also given to be tested by some of the Security students for some malicious attacks and all the reported vulnerabilities have been rectified ensuring that the system is secure.

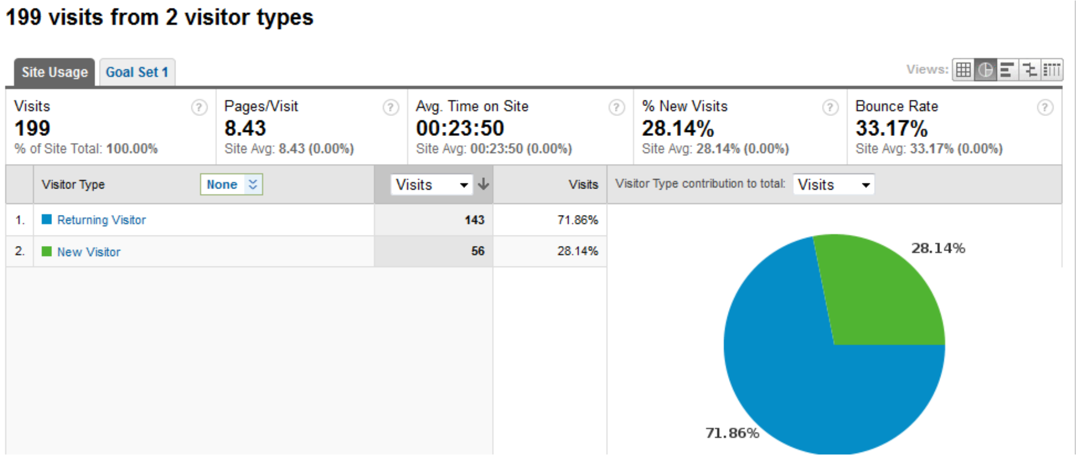
8.3.2 Project Planning Evaluation

The project plan described in the chapter on Project Management highlights the time-frame in which the project was estimated to be completed. The project is found to be almost on schedule with all the stages of SDLC completed within the estimated time.

8.4 Google Analytics Results summarized

The application was set up to be tracked using Google Analytics to get some statistical data on how the user's interacted with the system. The charts on the next page show some of these findings.

This figure shows the new versus the returning visitors.



199 visits from 2 visitor types

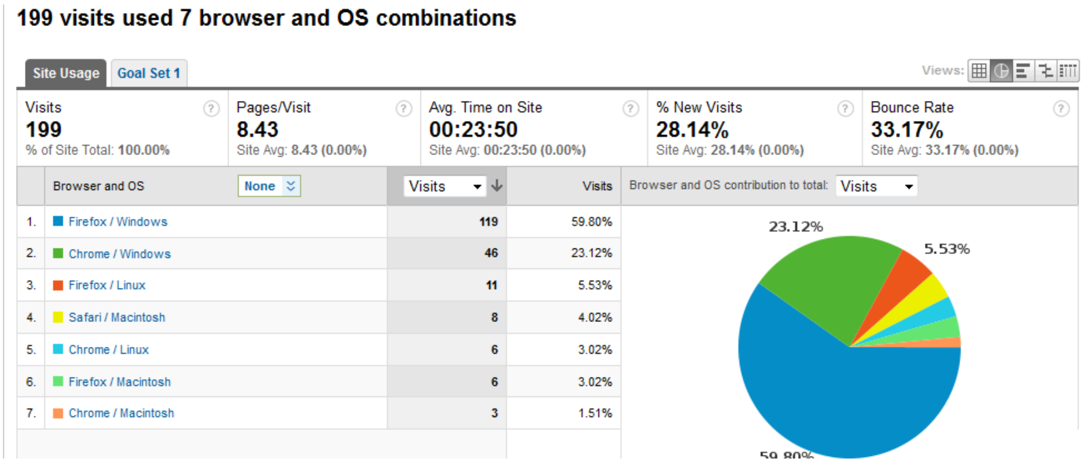
Visits	Pages/Visit	Avg. Time on Site	% New Visits	Bounce Rate
199	8.43	00:23:50	28.14%	33.17%
% of Site Total: 100.00%	Site Avg: 8.43 (0.00%)	Site Avg: 00:23:50 (0.00%)	Site Avg: 28.14% (0.00%)	Site Avg: 33.17% (0.00%)

	Visitor Type None	Visits	Visits
1.	Returning Visitor	143	71.86%
2.	New Visitor	56	28.14%

Visitor Type contribution to total: Visits

Figure 8.3: New vs. Returning

This figure shows the different browsers and OS that the application has been installed on.As there have been no complaints from users in running the application , it can be said that the application meets the non-functional requirement of portability.



199 visits used 7 browser and OS combinations

Visits	Pages/Visit	Avg. Time on Site	% New Visits	Bounce Rate
199	8.43	00:23:50	28.14%	33.17%
% of Site Total: 100.00%	Site Avg: 8.43 (0.00%)	Site Avg: 00:23:50 (0.00%)	Site Avg: 28.14% (0.00%)	Site Avg: 33.17% (0.00%)

	Browser and OS None	Visits	Visits
1.	Firefox / Windows	119	59.80%
2.	Chrome / Windows	46	23.12%
3.	Firefox / Linux	11	5.53%
4.	Safari / Macintosh	8	4.02%
5.	Chrome / Linux	6	3.02%
6.	Firefox / Macintosh	6	3.02%
7.	Chrome / Macintosh	3	1.51%

Browser and OS contribution to total: Visits

Figure 8.4: Portability

The figure below is to illustrate who the target audience was. The intention was to try and distribute the application to all categories of users to get unbiased feedback.

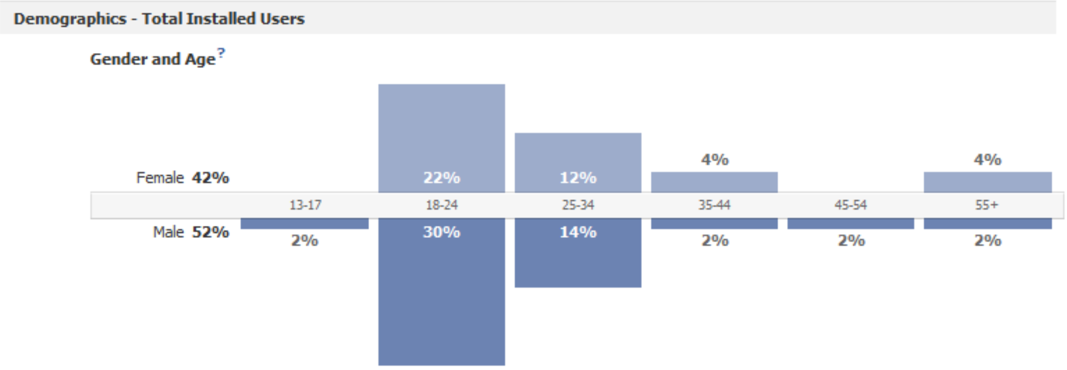
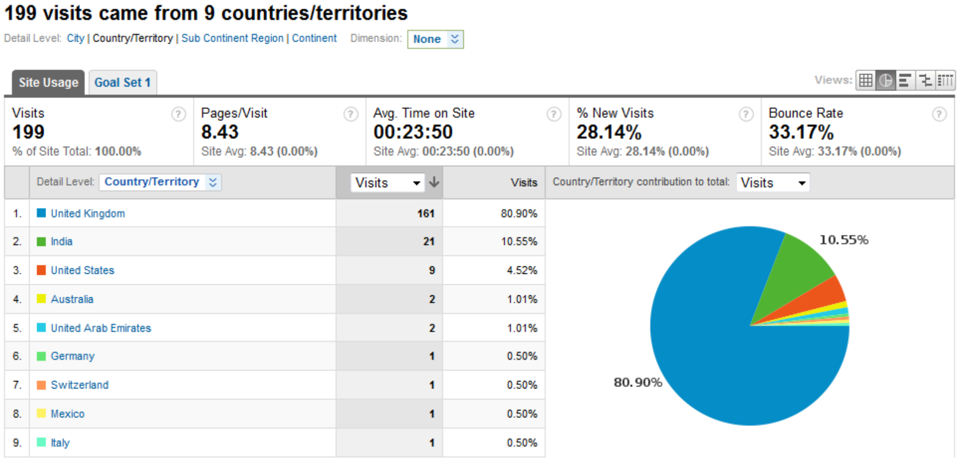


Figure 8.5: Types of users



199 visits came from 9 countries/territories

Detail Level: City | Country/Territory | Sub Continent Region | Continent Dimension: None

Visits	Pages/Visit	Avg. Time on Site	% New Visits	Bounce Rate
199	8.43	00:23:50	28.14%	33.17%
% of Site Total: 100.00%	Site Avg: 8.43 (0.00%)	Site Avg: 00:23:50 (0.00%)	Site Avg: 28.14% (0.00%)	Site Avg: 33.17% (0.00%)

	Detail Level: Country/Territory	Visits	Visits
1.	United Kingdom	161	80.90%
2.	India	21	10.55%
3.	United States	9	4.52%
4.	Australia	2	1.01%
5.	United Arab Emirates	2	1.01%
6.	Germany	1	0.50%
7.	Switzerland	1	0.50%
8.	Mexico	1	0.50%
9.	Italy	1	0.50%

Country/Territory contribution to total: Visits

Figure 8.6: Visits

8.5 Limitations

Every system has some limitations and this is indeed true in the case of iThink as well.The following is a list of some of the shortcomings of the system that could not be implemented owing to various reasons and which could also be considered as any Future work that could be done on the system.

1. The system lacks a real time feed where users could see all the real-time activity going on in the App. This could be, for instance, as soon as a new review is posted , any users currently logged into the Application can see the new review in their feed.The time constraint was a major factor why this was not implemented in the project.

2. The system lacks the ability to be able to like or comment on the reviews in the app.The feature was partially implemented in the earlier stages of development, however owing to the time constraint and as some other features took more time than expected, this functionality had to be done away with. The substitute that was implemented for this is that when a user publishes a review to their profile, their friends who are not users of the app can also see the review and can comment or like it.

3. Not all of the user feedback received could be acted upon as some of the ideas received even though very good were received much later in the development phase when there was no time to incorporate new features. Some of these ideas have been outlined here.

- Integration of app with Foursquare check-in feature. The app can have a feature to add a review about the place that the user checks into.
- A custom category feature. This would enable users to create their own category to post their own reviews.
- Add a rating system. Like, for a particular review, people can rate it so that others can see how many people agree with a particular review.

It should be noted that these limitations do not negate the successes of the project rather they document what is possible and could not be implemented for various reasons. This could be considered as future work that could be undertaken on the Application.

8.6 Summary

Overall the system developed and delivered can be considered to be a success.It has met the objectives that were set out in the preliminary stages quite well , also the response from the target audience has been generally very positive.This being said it is also true that there is a lot more functionality that could be encompassed but the intended system delivers all the functionality it set out to achieve.

Chapter 9

Conclusion

9.1 Scope for Improvement

Facebook keeps adding new features to the Developer's Platform to enhance the capabilities it provides to third party applications.Keeping this in mind , it can be said that there are numerous ways in which the project could be extended in the future.Other enhancements to the application could be in the form of:

- Adding jQuery functionality within the web application for better user interface.
- It could be integrated with Foursquare Checkin feature, so a user could add a review for a place after they check-in through foursquare on their Facebook.
- The system functionality can be extended by adding a real time feed where users could see all the real-time activity going on in the App.
- Adding a feature to rate the reviews , so users can see how many people agree with a particular review.

9.2 Conclusion

The motivation behind the project was to go for a slightly non-conventional topic but to apply all the fundamental concepts taught during the Master's course. I was able to extend the skills I have acquired through my course and apply these to different aspects of the project.. It would be fair to say that the project has been one of the best learning experiences for me as it enabled me to experience the full software product life cycle of a Web Application. From the Analysis phase to the Design phase to the Implementation , each phase required giving attention to the minutest of details in order to develop a successful system. The background research undertaken was very extensive and was well worth the time as it helped in gaining knowledge related to the development of Applications for one of the msot popular social networking sites used today. It helped analyze what were the best ideas for the application and to study some of the available technologies. Learning a new language and implementing it in such a short time was one of the challenges of the project , but it was also imperative for the project in order to make the best of the available SDK's and documentation. One of the primary goals of the project was to to evaluate the end product from a user perspective as this is one of the most critical evaluation of any product. The feedback received was generally positive and there was a lot of constructive criticism. While all the reported bugs were fixed some of the additional features suggested in the feedback could not be implemented and can be considered as Future work that could be done on the Application. Having said all this it is also true that there is still scope for a lot of improvement as far as functionality is concerned. Overall it has been very productive to work on this project and it gives me a lot of satisfaction as a great deal of learning experience has been achieved

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Appendix A

How to run the application:

A.1 Content of the CD :

Folder	Content Description
code/CSS	The style sheets used for the design.
code/images	The images used in the Application
code/Source	The source code of the application consisting of the PHP and HTML files
code/Libraries	PHP Libraries used in the project

Table A.1: CD Content

A.2 How to run the Application

To run the application a user needs to be registered to use Facebook.It is free and hardly takes a minute to sign up.Visit http://facebook.com/ and click on Sign up.

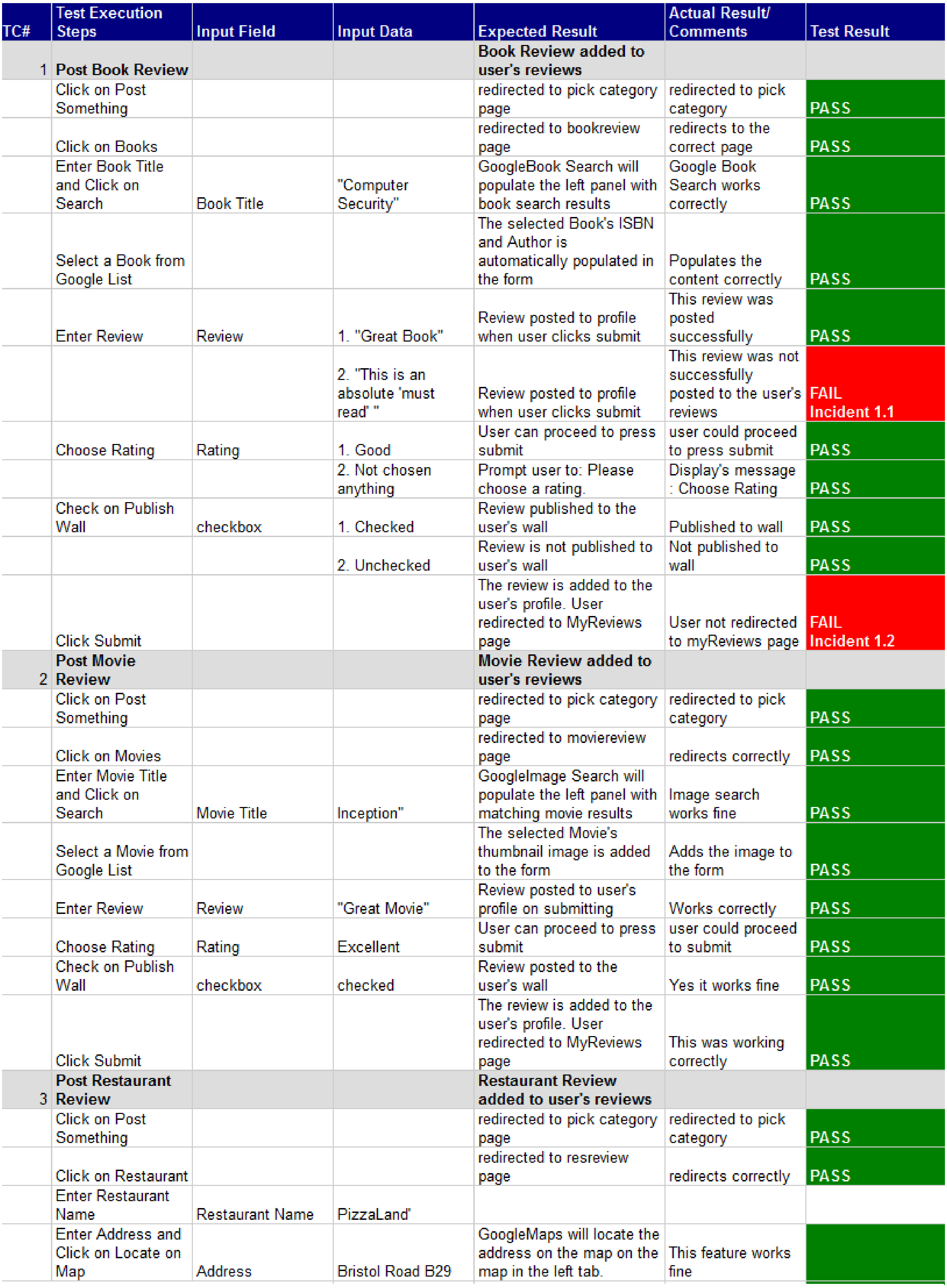
Once logged into Facebook a user can run the application by performing the following steps:

1. In the search field on the homepage enter 'iThink' and select the category Apps. The search results contains iThink.
2. Click on the app. This will redirect the user to the OAuthDialog 2.0
3. To continue using it , user needs to click on Allow , to grant access to some of their data to the app.
4. Once this is done the app will get bookmarked on the user's homepage.
5. Also, the user will be redirected to the Application's home page.
6. The user can now start using the app.

Appendix B

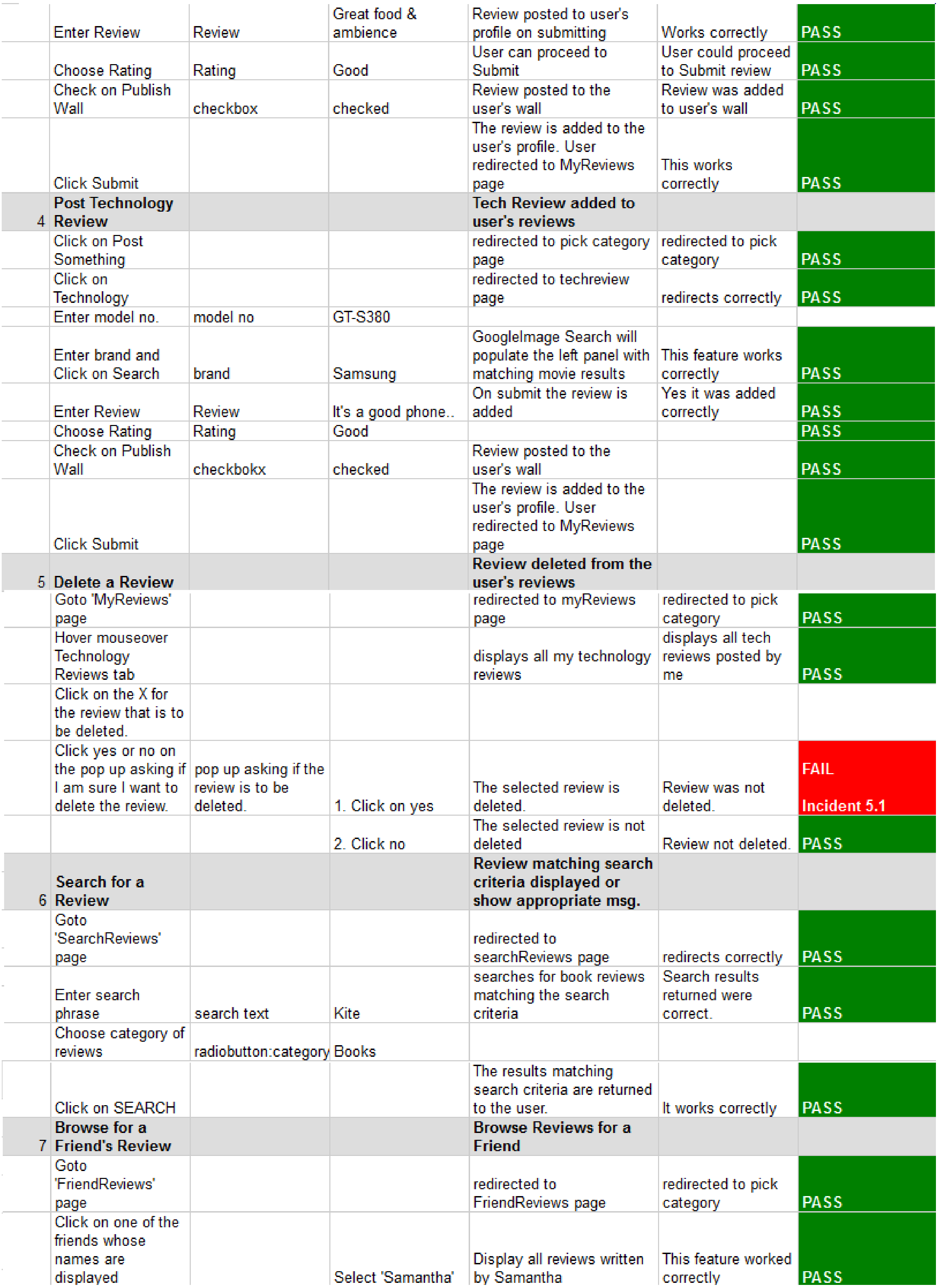
Test Cases

This table presents the test cases that were used to perform System Testing for the Application.In order to avoid having a very long table , the test cases have been written in a format to show all the important tests possible for each scenario.The 'input field' column represents textfields/checkboxes/radiobuttons which may have different values and these values are written in the column 'Input Data'. The tests that did not pass have been logged in the incident table documented on the next page.



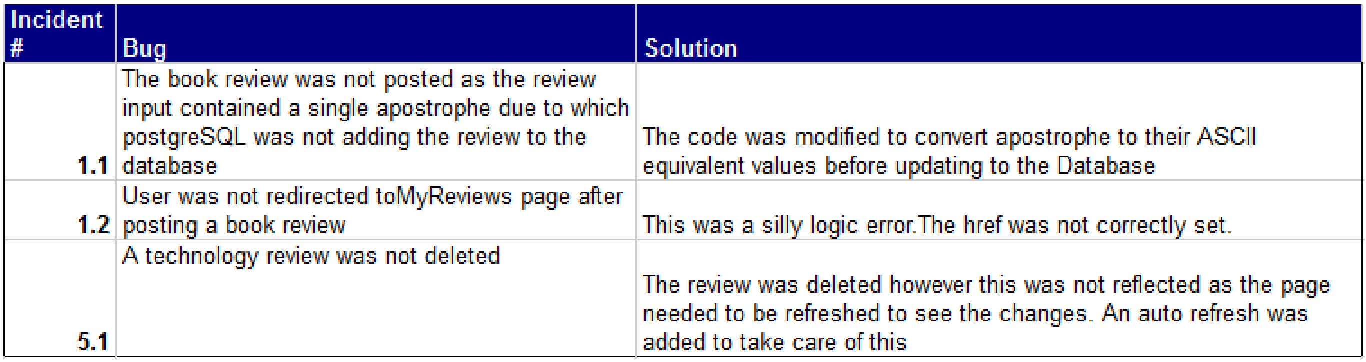
TC#	Test Execution Steps	Input Field	Input Data	Expected Result	Actual Result/ Comments	Test Result
1	**Post Book Review**			**Book Review added to user's reviews**		
	Click on Post Something			redirected to pick category page	redirected to pick category	PASS
	Click on Books			redirected to bookreview page	redirects to the correct page	PASS
	Enter Book Title and Click on Search	Book Title	"Computer Security"	GoogleBook Search will populate the left panel with book search results	Google Book Search works correctly	PASS
	Select a Book from Google List			The selected Book's ISBN and Author is automatically populated in the form	Populates the content correctly	PASS
	Enter Review	Review	1. "Great Book"	Review posted to profile when user clicks submit	This review was posted successfully	PASS
			2. "This is an absolute 'must read' "	Review posted to profile when user clicks submit	This review was not successfully posted to the user's reviews	FAIL Incident 1.1
	Choose Rating	Rating	1. Good	User can proceed to press submit	user could proceed to press submit	PASS
			2. Not chosen anything	Prompt user to: Please choose a rating.	Display's message : Choose Rating	PASS
	Check on Publish Wall	checkbox	1. Checked	Review published to the user's wall	Published to wall	PASS
			2. Unchecked	Review is not published to user's wall	Not published to wall	PASS
	Click Submit			The review is added to the user's profile. User redirected to MyReviews page	User not redirected to myReviews page	FAIL Incident 1.2
2	**Post Movie Review**			**Movie Review added to user's reviews**		
	Click on Post Something			redirected to pick category page	redirected to pick category	PASS
	Click on Movies			redirected to moviereview page	redirects correctly	PASS
	Enter Movie Title and Click on Search	Movie Title	Inception"	GoogleImage Search will populate the left panel with matching movie results	Image search works fine	PASS
	Select a Movie from Google List			The selected Movie's thumbnail image is added to the form	Adds the image to the form	PASS
	Enter Review	Review	"Great Movie"	Review posted to user's profile on submitting	Works correctly	PASS
	Choose Rating	Rating	Excellent	User can proceed to press submit	user could proceed to submit	PASS
	Check on Publish Wall	checkbox	checked	Review posted to the user's wall	Yes it works fine	PASS
	Click Submit			The review is added to the user's profile. User redirected to MyReviews page	This was working correctly	PASS
3	**Post Restaurant Review**			**Restaurant Review added to user's reviews**		
	Click on Post Something			redirected to pick category page	redirected to pick category	PASS
	Click on Restaurant			redirected to resreview page	redirects correctly	PASS
	Enter Restaurant Name	Restaurant Name	PizzaLand'			
	Enter Address and Click on Locate on Map	Address	Bristol Road B29	GoogleMaps will locate the address on the map on the map in the left tab.	This feature works fine	

Table B.1: TestCases



	Enter Review	Review	Great food & ambience	Review posted to user's profile on submitting	Works correctly	PASS
	Choose Rating	Rating	Good	User can proceed to Submit	User could proceed to Submit review	PASS
	Check on Publish Wall	checkbox	checked	Review posted to the user's wall	Review was added to user's wall	PASS
	Click Submit			The review is added to the user's profile. User redirected to MyReviews page	This works correctly	PASS
4	**Post Technology Review**			**Tech Review added to user's reviews**		
	Click on Post Something			redirected to pick category page	redirected to pick category	PASS
	Click on Technology			redirected to techreview page	redirects correctly	PASS
	Enter model no.	model no	GT-S380			
	Enter brand and Click on Search	brand	Samsung	GoogleImage Search will populate the left panel with matching movie results	This feature works correctly	PASS
	Enter Review	Review	It's a good phone..	On submit the review is added	Yes it was added correctly	PASS
	Choose Rating	Rating	Good			PASS
	Check on Publish Wall	checkbokx	checked	Review posted to the user's wall		PASS
	Click Submit			The review is added to the user's profile. User redirected to MyReviews page		PASS
5	**Delete a Review**			**Review deleted from the user's reviews**		
	Goto 'MyReviews' page			redirected to myReviews page	redirected to pick category	PASS
	Hover mouseover Technology Reviews tab			displays all my technology reviews	displays all tech reviews posted by me	PASS
	Click on the X for the review that is to be deleted.					
	Click yes or no on the pop up asking if I am sure I want to delete the review.	pop up asking if the review is to be deleted.	1. Click on yes	The selected review is deleted.	Review was not deleted.	FAIL **Incident 5.1**
			2. Click no	The selected review is not deleted	Review not deleted.	PASS
6	**Search for a Review**			**Review matching search criteria displayed or show appropriate msg.**		
	Goto 'SearchReviews' page			redirected to searchReviews page	redirects correctly	PASS
	Enter search phrase	search text	Kite	searches for book reviews matching the search criteria	Search results returned were correct.	PASS
	Choose category of reviews	radiobutton:category	Books			
	Click on SEARCH			The results matching search criteria are returned to the user.	It works correctly	PASS
7	**Browse for a Friend's Review**			**Browse Reviews for a Friend**		
	Goto 'FriendReviews' page			redirected to FriendReviews page	redirected to pick category	PASS
	Click on one of the friends whose names are displayed		Select 'Samantha'	Display all reviews written by Samantha	This feature worked correctly	PASS

Table B.2: TestCases



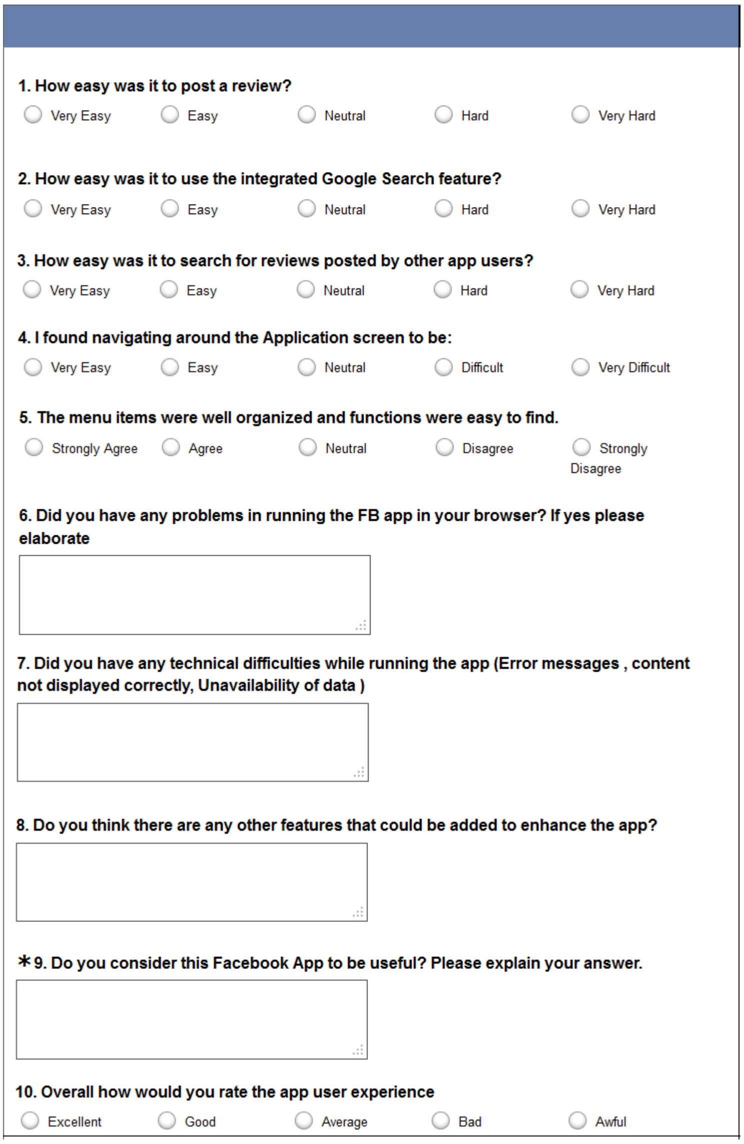
Incident #	Bug	Solution
1.1	The book review was not posted as the review input contained a single apostrophe due to which postgreSQL was not adding the review to the database	The code was modified to convert apostrophe to their ASCII equivalent values before updating to the Database
1.2	User was not redirected toMyReviews page after posting a book review	This was a silly logic error.The href was not correctly set.
5.1	A technology review was not deleted	The review was deleted however this was not reflected as the page needed to be refreshed to see the changes. An auto refresh was added to take care of this

Table B.3: Incident Table

Appendix C

Questionnaire

The questionnaire overleaf was created and provided to the end users to provide some feedback based on their evaluation of he system. The test users were selected from a variety of backgrounds to try and gather information on whether the system suited to the taste of the wider target audience.



1. How easy was it to post a review?

○ Very Easy ○ Easy ○ Neutral ○ Hard ○ Very Hard

2. How easy was it to use the integrated Google Search feature?

○ Very Easy ○ Easy ○ Neutral ○ Hard ○ Very Hard

3. How easy was it to search for reviews posted by other app users?

○ Very Easy ○ Easy ○ Neutral ○ Hard ○ Very Hard

4. I found navigating around the Application screen to be:

○ Very Easy ○ Easy ○ Neutral ○ Difficult ○ Very Difficult

5. The menu items were well organized and functions were easy to find.

○ Strongly Agree ○ Agree ○ Neutral ○ Disagree ○ Strongly Disagree

6. Did you have any problems in running the FB app in your browser? If yes please elaborate

7. Did you have any technical difficulties while running the app (Error messages , content not displayed correctly, Unavailability of data)

8. Do you think there are any other features that could be added to enhance the app?

*9. Do you consider this Facebook App to be useful? Please explain your answer.

10. Overall how would you rate the app user experience

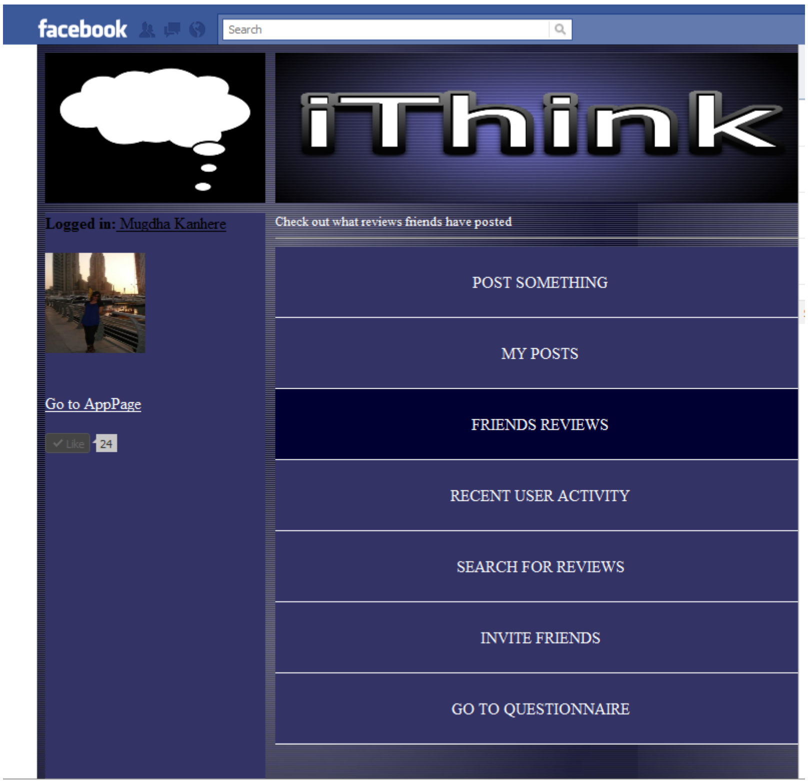
○ Excellent ○ Good ○ Average ○ Bad ○ Awful

Figure C.1: Questionnaire

Appendix D

Screen shots

Screenshot D.1 shows the main menu of the application.

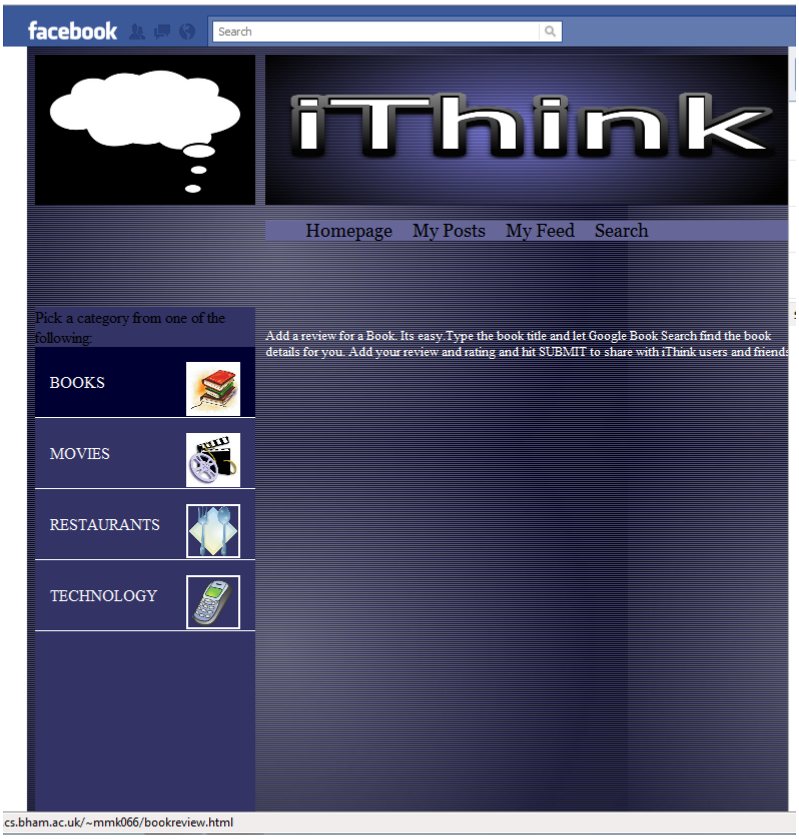


Logged in: Mugdha Kanhere

Check out what reviews friends have posted

Figure D.1: Main Page

Screenshot D.2 shows the page a user is redirected to when he wants to post a new review.The user then clicks on a category to add the respective review

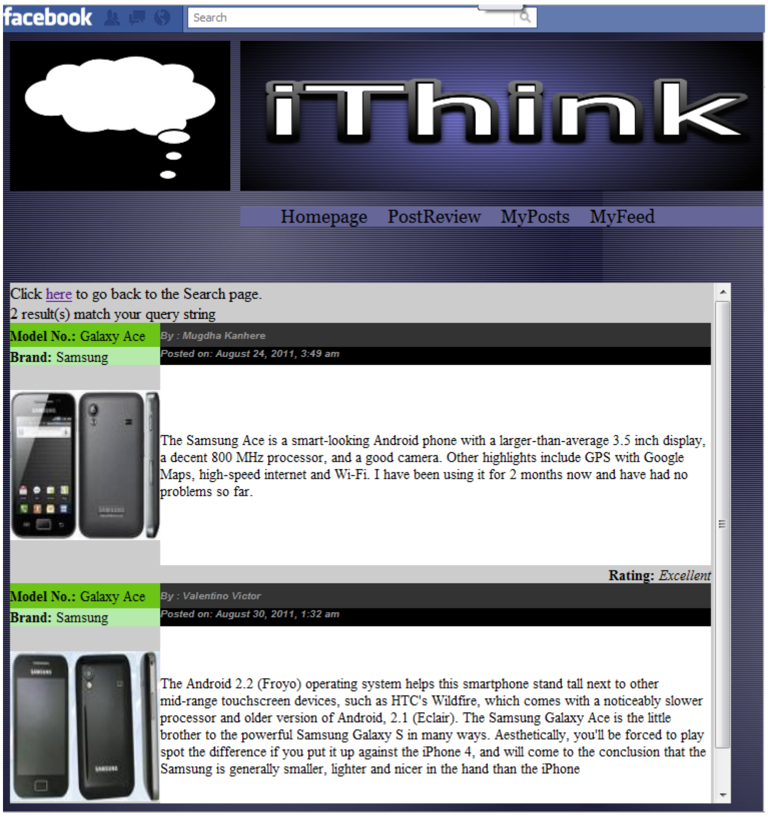


Pick a category from one of the following:

Add a review for a Book. Its easy.Type the book title and let Google Book Search find the book details for you. Add your review and rating and hit SUBMIT to share with iThink users and friends

Figure D.2: Post a Review

Screenshot D.3 shows the search results obtained when I searched for reviews for ’Samsung Galaxy’.



Click here to go back to the Search page.
2 result(s) match your query string

Model No.: Galaxy Ace
Brand: Samsung
By : Mugdha Kanhere
Posted on: August 24, 2011, 3:49 am

The Samsung Ace is a smart-looking Android phone with a larger-than-average 3.5 inch display, a decent 800 MHz processor, and a good camera. Other highlights include GPS with Google Maps, high-speed internet and Wi-Fi. I have been using it for 2 months now and have had no problems so far.

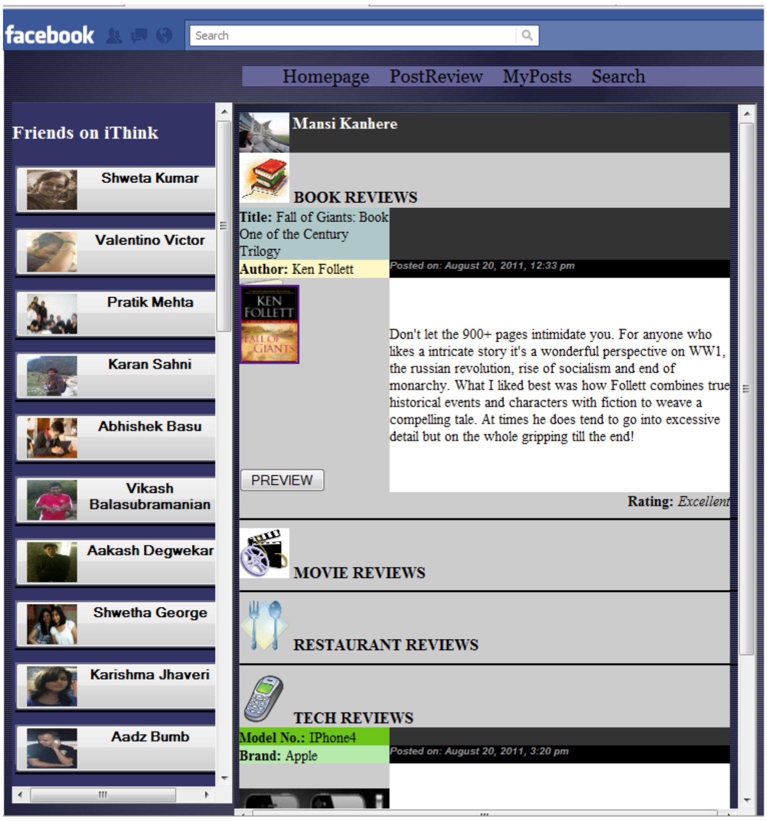
Rating: *Excellent*

Model No.: Galaxy Ace
Brand: Samsung
By : Valentino Victor
Posted on: August 30, 2011, 1:32 am

The Android 2.2 (Froyo) operating system helps this smartphone stand tall next to other mid-range touchscreen devices, such as HTC's Wildfire, which comes with a noticeably slower processor and older version of Android, 2.1 (Eclair). The Samsung Galaxy Ace is the little brother to the powerful Samsung Galaxy S in many ways. Aesthetically, you'll be forced to play spot the difference if you put it up against the iPhone 4, and will come to the conclusion that the Samsung is generally smaller, lighter and nicer in the hand than the iPhone

Figure D.3: Search Results for 'Samsung'

Screenshot D.4 illustrates how a user may be able to view the reviews posted by friends.



Mansi Kanhere

BOOK REVIEWS

Title: Fall of Giants: Book One of the Century Trilogy
Author: Ken Follett
Posted on: August 20, 2011, 12:33 pm

Don't let the 900+ pages intimidate you. For anyone who likes a intricate story it's a wonderful perspective on WW1, the russian revolution, rise of socialism and end of monarchy. What I liked best was how Follett combines true historical events and characters with fiction to weave a compelling tale. At times he does tend to go into excessive detail but on the whole gripping till the end!

Rating: *Excellent*

MOVIE REVIEWS

RESTAURANT REVIEWS

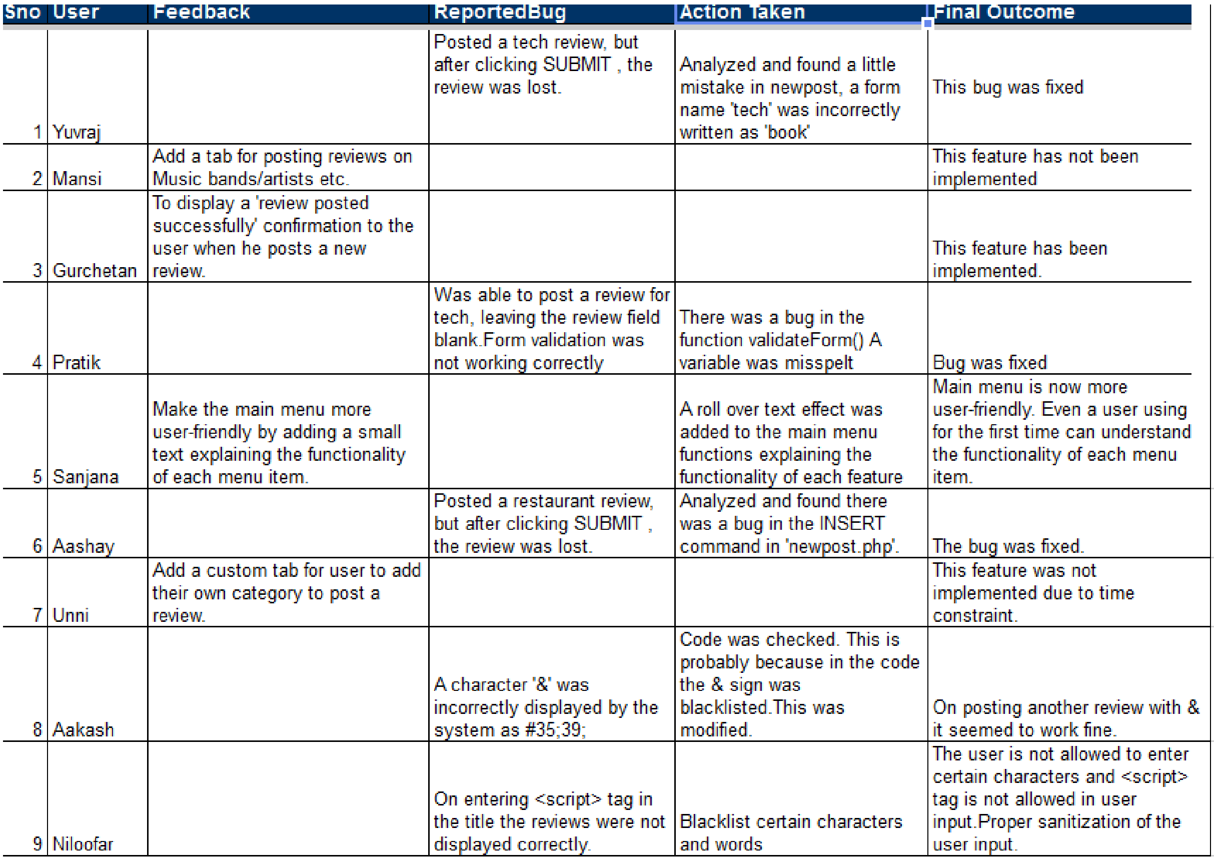
TECH REVIEWS

Model No.: IPhone4
Brand: Apple
Posted on: August 20, 2011, 3:20 pm

Figure D.4: Friend's Reviews

Appendix E

UAT Feedback



Sno	User	Feedback	ReportedBug	Action Taken	Final Outcome
1	Yuvraj		Posted a tech review, but after clicking SUBMIT , the review was lost.	Analyzed and found a little mistake in newpost, a form name 'tech' was incorrectly written as 'book'	This bug was fixed
2	Mansi	Add a tab for posting reviews on Music bands/artists etc.			This feature has not been implemented
3	Gurchetan	To display a 'review posted successfully' confirmation to the user when he posts a new review.			This feature has been implemented.
4	Pratik		Was able to post a review for tech, leaving the review field blank.Form validation was not working correctly	There was a bug in the function validateForm() A variable was misspelt	Bug was fixed
5	Sanjana	Make the main menu more user-friendly by adding a small text explaining the functionality of each menu item.		A roll over text effect was added to the main menu functions explaining the functionality of each feature	Main menu is now more user-friendly. Even a user using for the first time can understand the functionality of each menu item.
6	Aashay		Posted a restaurant review, but after clicking SUBMIT , the review was lost.	Analyzed and found there was a bug in the INSERT command in 'newpost.php'.	The bug was fixed.
7	Unni	Add a custom tab for user to add their own category to post a review.			This feature was not implemented due to time constraint.
8	Aakash		A character '&' was incorrectly displayed by the system as #35;39;	Code was checked. This is probably because in the code the & sign was blacklisted.This was modified.	On posting another review with & it seemed to work fine.
9	Niloofar		On entering <script> tag in the title the reviews were not displayed correctly.	Blacklist certain characters and words	The user is not allowed to enter certain characters and <script> tag is not allowed in user input.Proper sanitization of the user input.

Table E.1: User Reported Bugs and Feedback