iBudget

Software Design Document

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Revision History

Date	Author	Version	Reason
3/26/12	VV, CL, JR, VD, LA, QP	1.0	First Draft Modified architecture design description & diagram Modified design pattern
5/6/12	VV,QP,CL	2.0	Added/modified state diagrams/screenshots

1. Introduction

1.1. Purpose

This document describes the design of the *iBudget* personal finance software. It shows how the software system will be structured to satisfy the requirements identified in the software requirements specification.

1.2. Scope

This design is intended for the initial version of *iBudget*. It is intended as the basis for other versions of the software in the future.

1.3. Definitions, acronyms and abbreviations

API: Application Programming Interface – a way for the programmer to interact with the system hardware

DBMS: Database Management System

GUI: Graphical User Interface

1.4. References

[1] Role-playing video game SDD

[2] *Encounter* video game SDD

[3] IEEE Std 1016-1998 IEEE Recommended Practice for Software Design Descriptions

2. System Architecture

2.1. Architecture design

iBudget is set up in a non-traditional MVC structure. Traditional MVC structure usually has Model as the data container layer, usually database or some file system. View is in the form of a UI, client facing code. And Controller is the middle logic layer where client information gets translation and process and stored to the model layer. Controller is as its name describes, a controller of information flowing to the client from the model and information from the client to the model layer.

iBudget took MVC to a higher level, where there is a Model Validation layer. The model validation layer acts as a logic layer between the Controller and Model. It decouples the two layer further by having this ORM (object relational mapping) layer. So when the database schema changes, the application layer would not be affected by it. The ORM will need to be remapped, but as application development, the process will not be interrupted or even need to care about it. This model works very well in larger, more scalable applications, where you have many different skill sets of contributors. You may have DBA whose main focus it on the database (model layer), while application developer focus on the controller layer. And as each layer changes, as long as the ORM logic gets re-mapped correctly, there will be no time lost in development of both model and controller layer. This advantage iBudget has benefit fully from. Throughout the development cycle, the database schema went through a few minor and major changes, but our application development continues as it is not being affected by it.

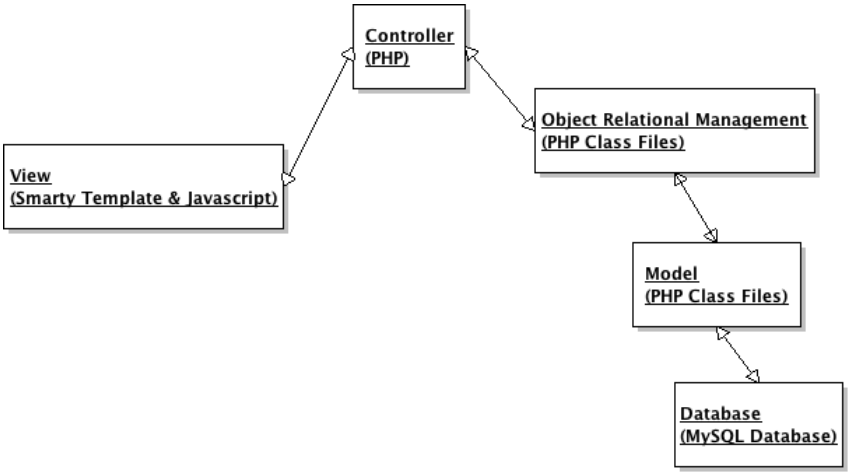


Figure 1 Model–view–controller concept.

2.2. Design pattern

2.2.1. Factory

The factory pattern creates objects without exposing the instantiation logic to the client and refers to the newly created object through a common interface. The factory pattern is being used by using keys to interface with the objects instead of calling them directly.

```
public function __construct (UserKey $key) {
	$this->key = $key;

	parent::__construct ();

	if ($key->isNew()) {
		$this->markNew();
	} else {
		$this->id = $key->getId();
	}

	$this->phones = array();
	$this->activities = array();
	$this->mappings = array();
	$this->budgets = array();
	$this->preferences = array();
}
```

2.2.2. Singleton

The singleton pattern ensures that there is exactly one instance of a given class and that it is accessible from anywhere in the application. The singleton pattern is being used in the *iBudget* application to restrict the number of database connections to only one.

Indeed it is used with all the source objects that are in the source folder. For all these files, the constructor is made private and only called once to create the object the one time. All other attempts to create another instance of the same object will result with getting the instance created before. A static attribute called $instance is created when calling for the first time the getSource() method. Then every time the method is called again, the same instance is returned. Below is an example of how it is implemented in categorysource.inc :

Attribute:

```
private static $instance = null;
```

Method:

```
public static function getSource () {
	if (self::$instance == null) {
		self::$instance = new CategorySource();
	}
}
```

Constructor:

```
private function __construct () {
	/*content */
}
```

And an example of how it is used in category.inc by calling the getSource() method:

```
protected function delete () {
	$source = CategorySource::getSource();
	$source->delete(array('ID' => $this->id));
}
```

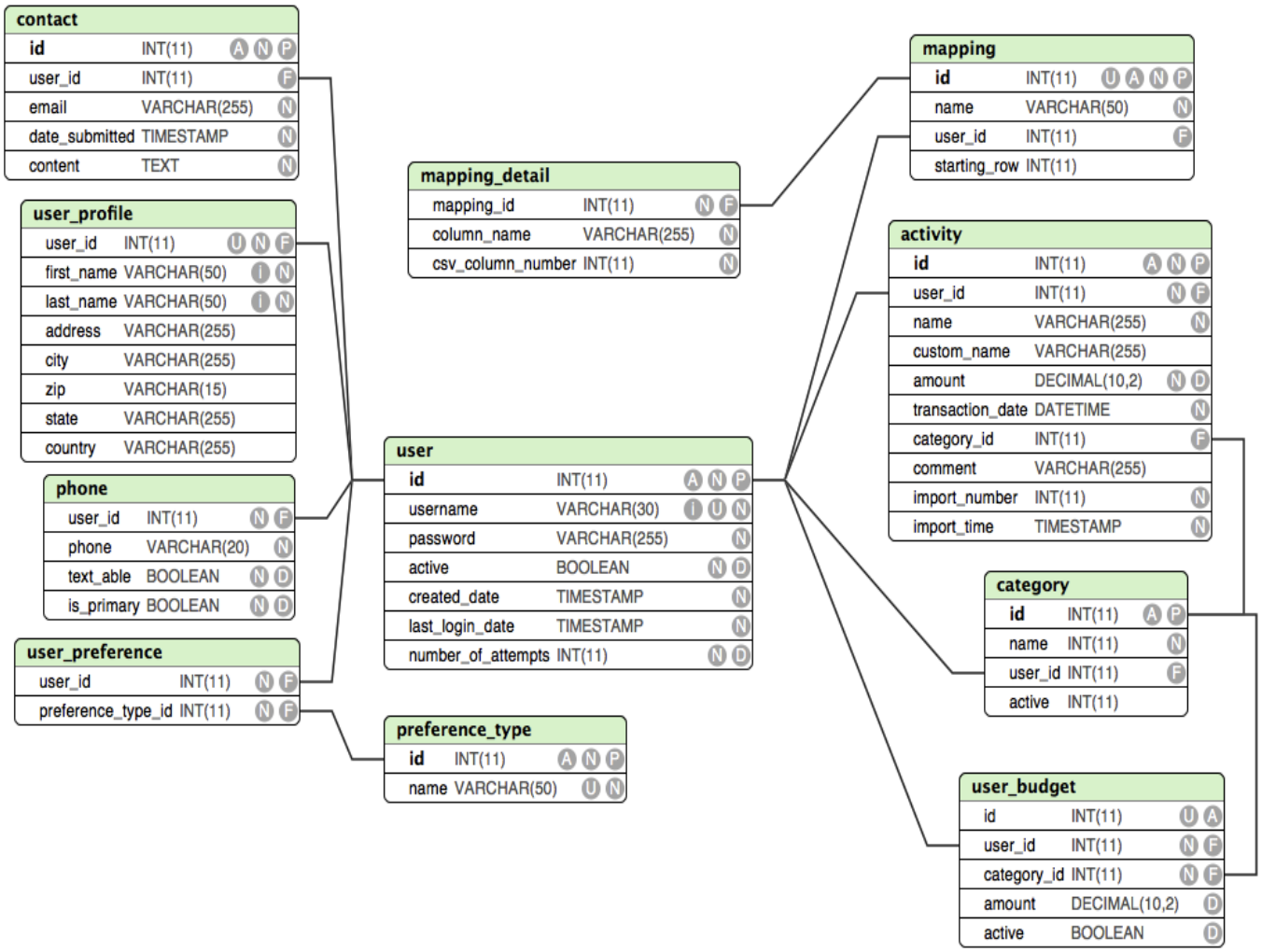
2.2.3. Observer

The observer design pattern defines an object that maintains a list of observers and notifies them automatically when there is a change in state. In this project the model

notifies the view of any change in the database. The view reflects these changes in the front-end. For example, the observer pattern is being use by JavaScript such as on click or on change events which activates an ajax call to perform a specific task.

3. Data diagram

3.1. Data description



Where the following keys are being used:

A = Auto Incremement

N = NOT NULL

P = Primary Key

U = Unique

i = Indexed

D = Has default value assigned

F = Foreign Key

3.2. Data dictionary

3.2.1 Source objects

The Source objects are used to access the database and execute SQL statements to modify or get information from the database. Here are the description of the different source objects used in the project:

- **activitySource**: can access the activity table
- **budgetSource**: can access the user_budget table
- **categorySource**: can access the category table
- **commonSource**: is the class inherited by all the other source classes. It contains methods that can be used by all source objects: deleteFromTableById($table, $id, $id_column) that enables to delete a row based on the id and getLastInsertedId() that returns the id of the last row inserted in the table.
- **ContactSource**: can access the contact table
- **mappingDetailSource**: can access the mapping_detail table
- **mappingSource**: can access the mapping table
- **phoneSource**: can access the phone table
- **preferenceTypeSource**: can access the preference_type table
- **userPreferenceSource**: can access the user_preference table
- **userSource**: can access the user table.

3.2.2 General methods of the source objects

Since all source objects implement the Source interface, they can all define and use the following four methods:

- read(): select elements in the database tables. The fields and tables are different depending on the purpose of the class. Ex: get the user information, the budget information, the category information etc…

The SQL statement is an SELECT statement.

- insert(): insert rows in the database. Each field that can be inserted in the corresponding table is checked to see if it is given a value or not with the following statement:

`array_key_exists('NAME', $params)` with NAME the name of a field in the Category table and $params the entered parameters.

All parameters are put in an array that is then used to complete the INSERT statement.

- update(): updates rows in the database. The original values of the rows are stocked in an array to check if the value will be changed. Each field that can be updated in the corresponding table is checked to see if it is given value or not. Those two steps are illustrated with the following:

`array_key_exists('NAME', $params) && $original['name'] != $params['NAME']` with NAME the name of a field in the Category table, $params the entered parameters, $original the previous values of the row.

The SQL statement is an UPDATE statement.

- delete(): deletes rows in the database. Deleting rows is done by using the id field in most of the tables. If an id is given, then the following function is used to delete the corresponding row:

`$this->deleteFromTableById('category', $params['ID']);` with category the name of the table and $params the entered parameters.

The SQL statement is a DELETE statement.

4. Human interface design

4.1. Registration

4.1.1. Overview

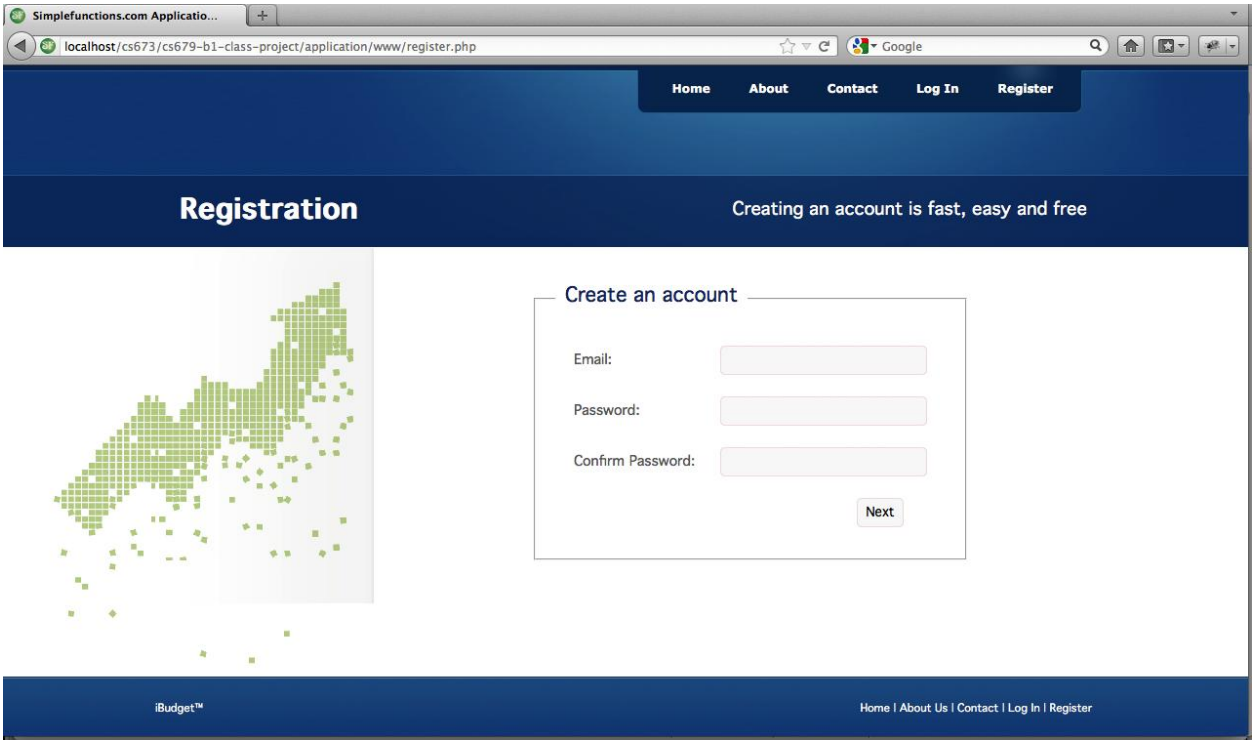
Registration is where a user can create an iBudget account. Users will be prompted to enter their email address (username), a password, their first name, and their last name.

Email and password will be prompted for first and they will be validated dynamically using AJAX to make sure that there is not an account already associated with the email address and that the password meets our requirements.

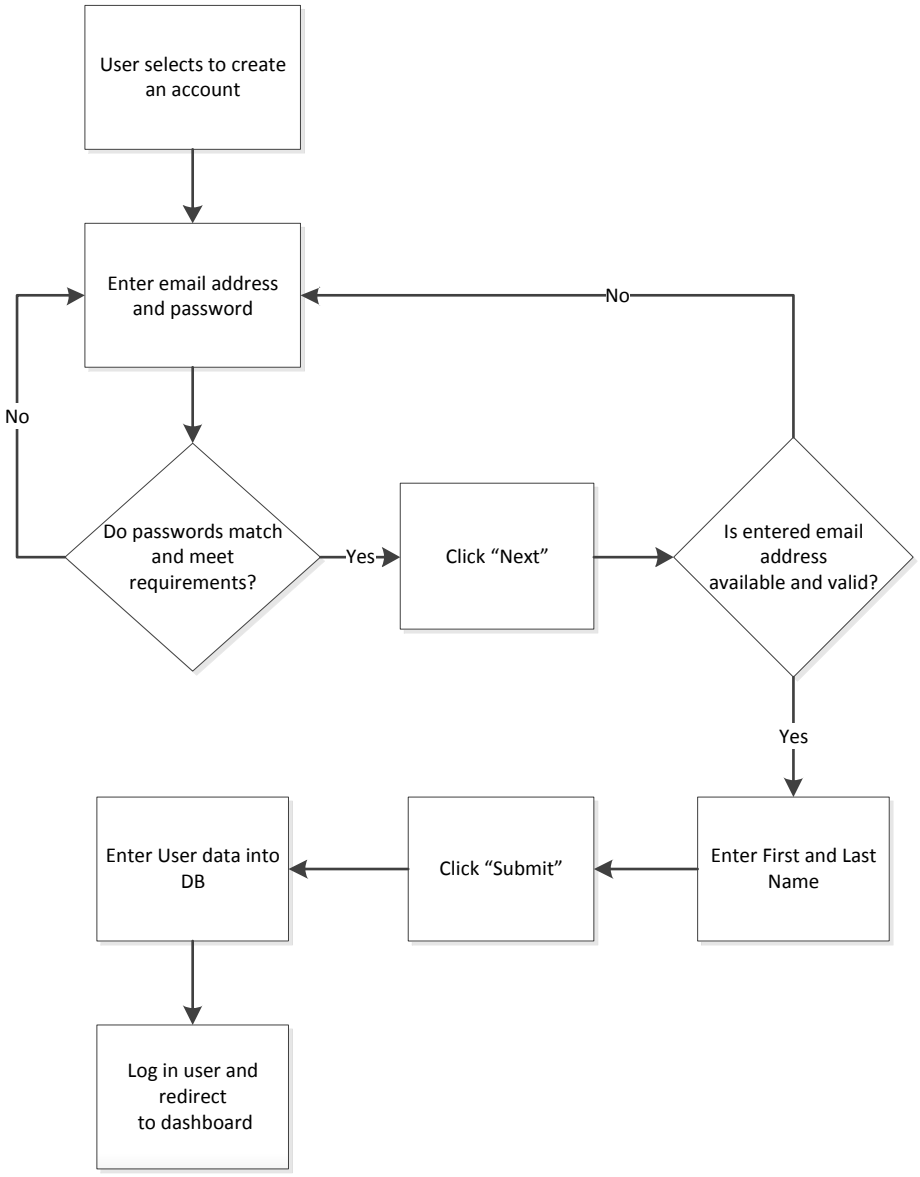
The user will then click “Next”, the two passwords entered will be validated to ensure they match, and then the user will be prompted to enter their first and last names.

Lastly the user will click “Submit”, and the users account will be created, the user will be logged in, and then redirected to the dashboard.

4.1.2. Screenshot



4.1.3. State diagram



4.2. Log In

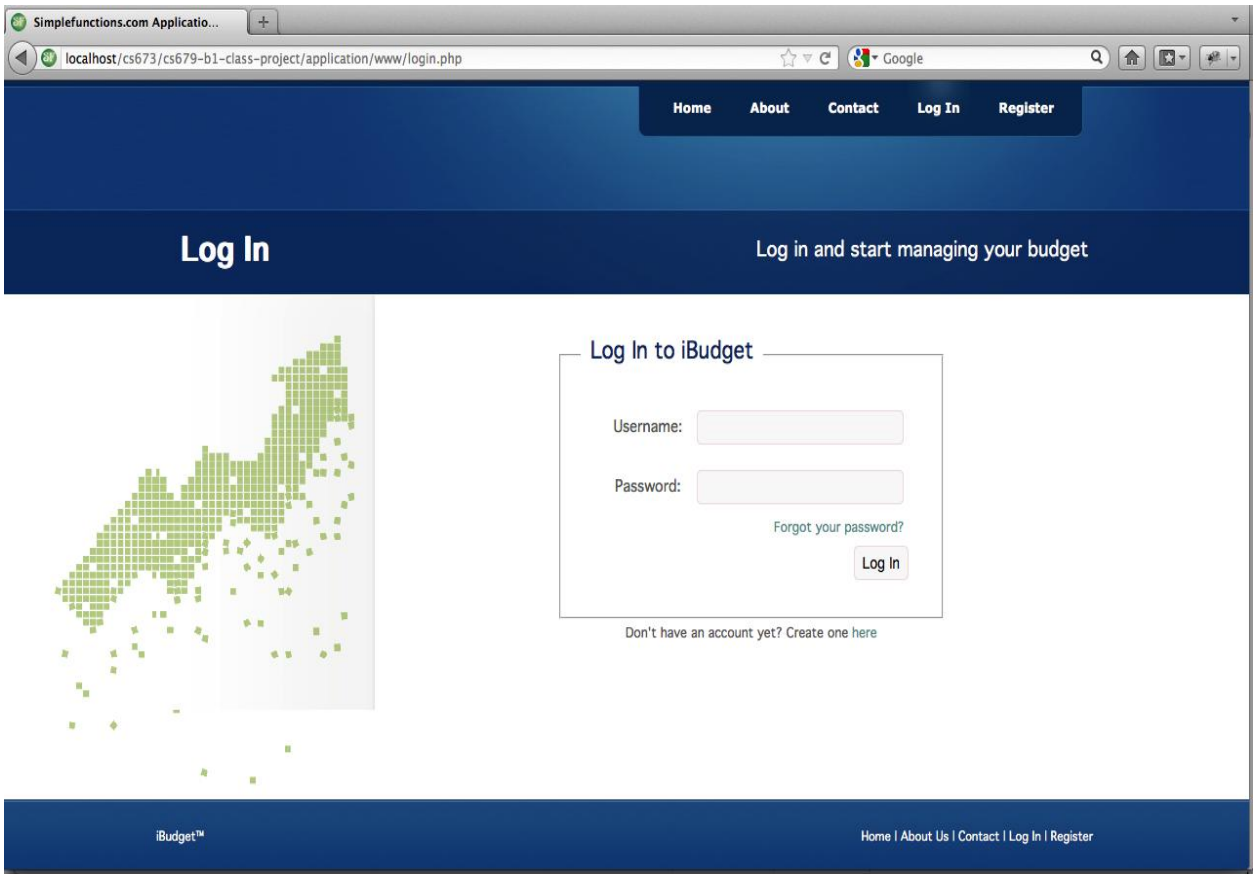
4.2.1. Overview

The log in screen is where the user can log in to a previously registered account.

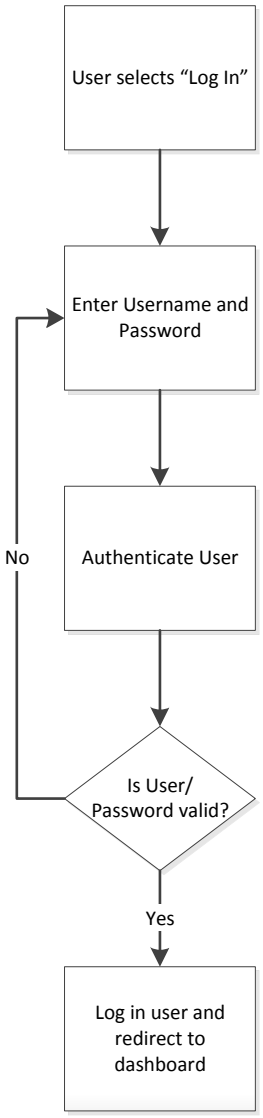
The user will be prompted for their email (username) and password. The username and password will be validated, if they match the user will be logged in and redirected to the

Dashboard. If the username or password are not valid, the user will see an error message and again be prompted to enter an email and password.

4.2.2. Screenshot



4.2.3. State Diagram



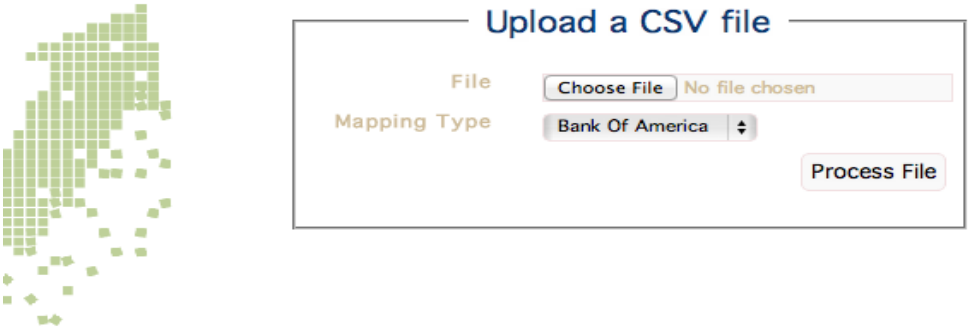
4.3. Process CSV

4.3.1. Overview

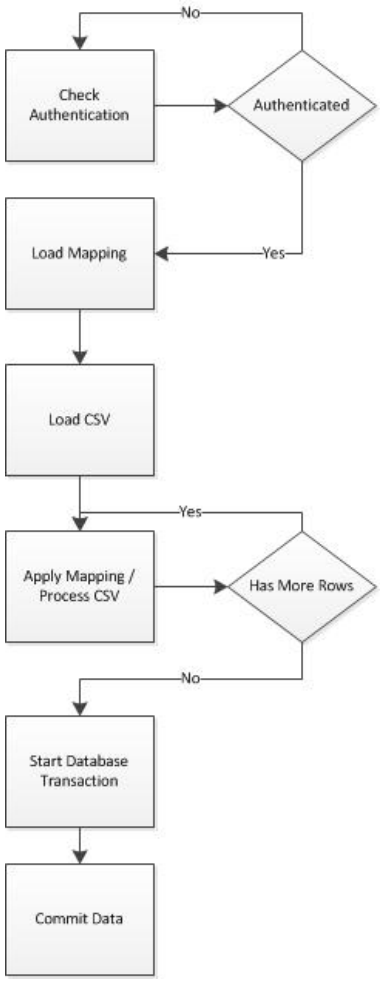
Process CSV is one of the core components of iBudget. Turning provided CSV files into data that we can understand, store, and transform. The process first load the mapping settings which directs how the translate the CSV files. The mapping

will be discussed at a later section. Which the mapping understood, the process reads the file line by line, and applies the mapping settings, The result will create an Activity object and the entire process will create a list of activity objects. If the process complete successfully, a database transaction is created to submit all these data. A randomize number between 10000000000 and 99999999999 is generated and is assigned to the list of activities in conjunction to a date time, this will help identify an import transaction, so when use needed to revert the import, this can be done easily.

4.3.2. Screenshot



4.3.3. State diagram



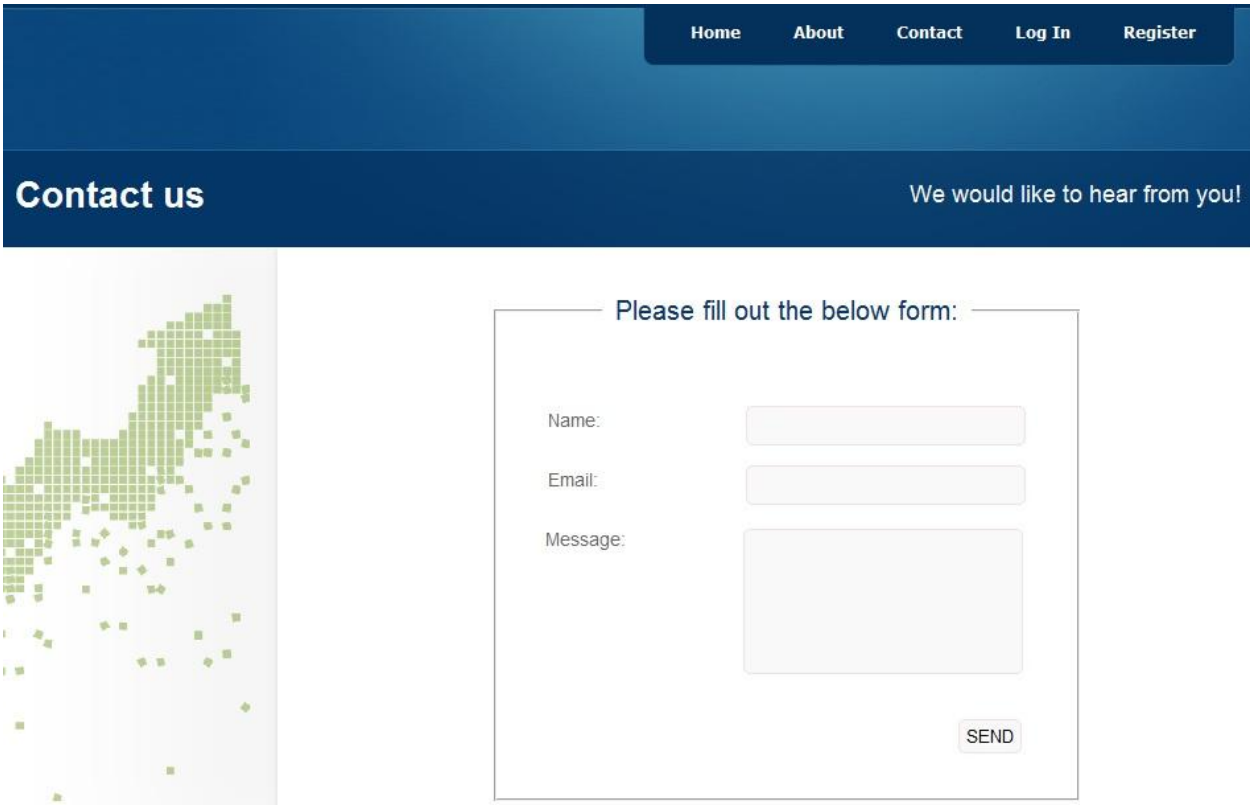
4.4. Contact

4.4.1. Overview

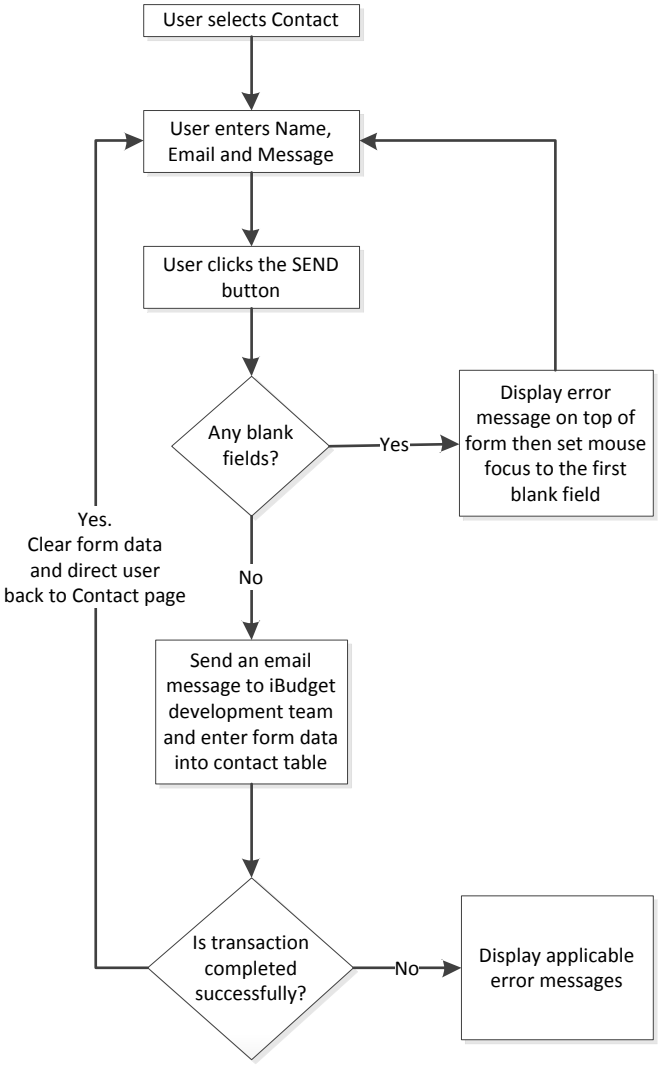
The contact page is where both registered and non-registered users can leave a message for the iBudget development team. Users need to complete all three fields on the form before the form result can be sent. A client side JavaScript will check and display a message on top of the form to remind users if they leave any fields blank. Once submitted, the similar server side check is carried out. If everything is checked out, an email will be sent to the iBudget team email address. Form data will also be stored in the Contact table of the backend database along with a user ID. The system will check to see if the form is filled out by a currently logged on user or a registered

user, who has not logged on, by searching for the provided email in the database or user ID will be anonymous. Error messages will be displayed if anything happens during the submission process. A successful submission will direct the user to the blank Contact page.

4.4.2. Screenshot



4.4.3. State diagram



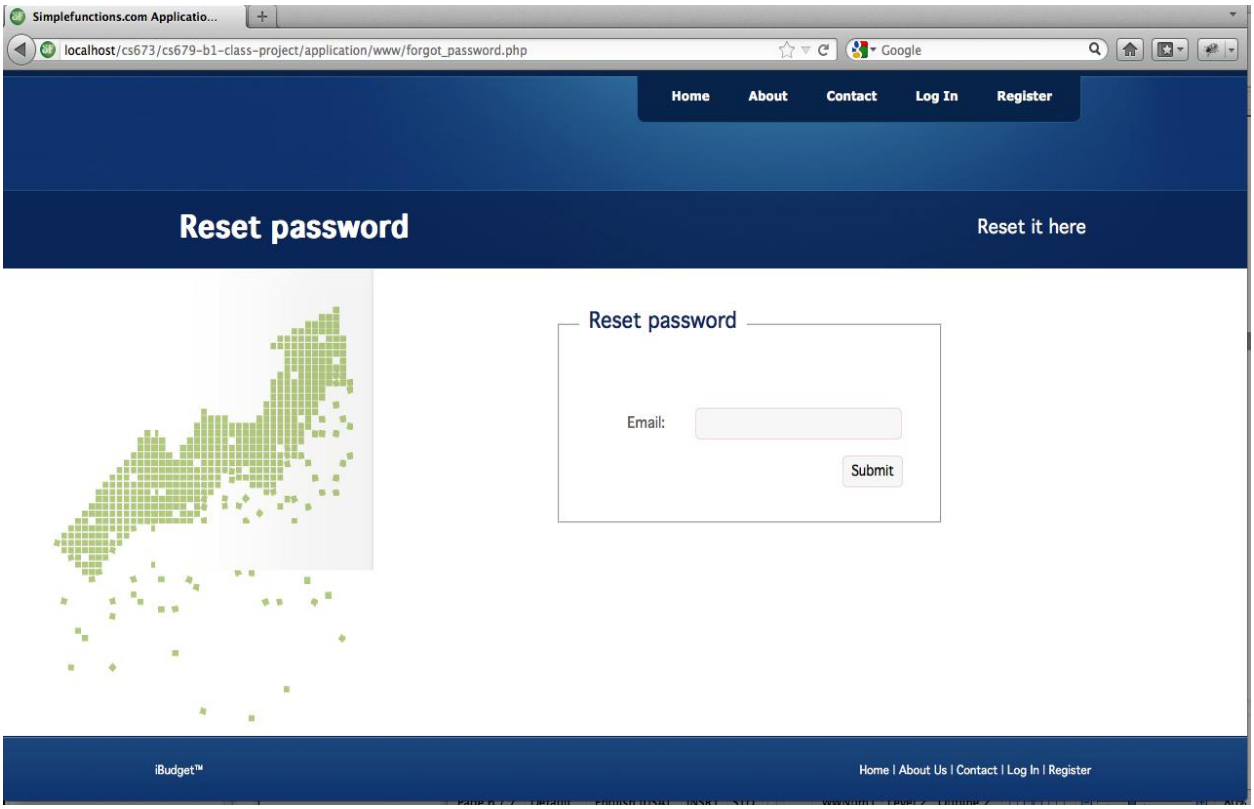
4.5. Forgot password

4.5.1. Overview

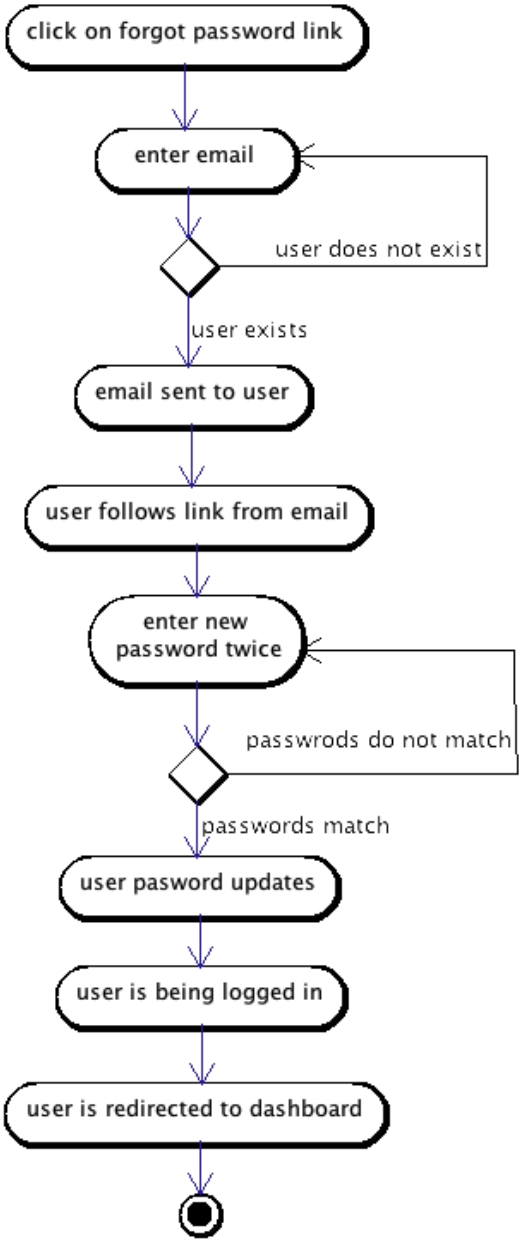
If the user forgets his/her password they can reset it by clicking on the 'Forgot password' link in the login page. They are taken to the reset password page (see screenshot below). They enter the email with which they've registered at the site. In case no account with this email exists, the system displays an error message 'User with

this username was not found'. An email is sent out to the user with a link they have to follow and they are taken to the reset password screen where they can enter a new password that is being checked to meet the following condition: a password must be at least 8 characters long, and have one lowercase, one uppercase, one number, and one special character. In addition, the 'password' and 'repeat password' fields must match. Once they hit the submit button, the password field in the database is updated, they are logged into the site and being taken to the dashboard page.

4.5.2. Screenshot



4.5.3 State diagram



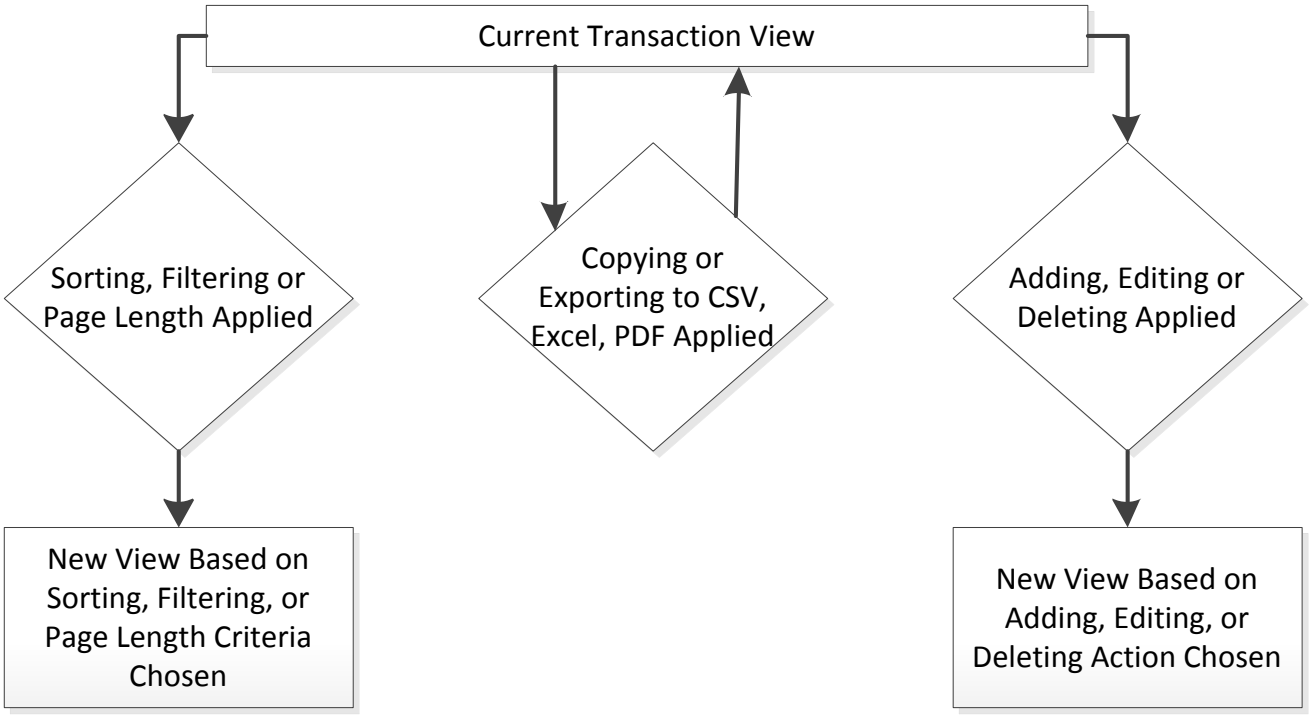
4.6 Transaction View

4.6.1 Overview

This view displays all imported data from various banks. On this page, user can categorize each transaction. User can manually create, edit, or remove a transaction. For further manipulation, user can copy the whole transaction list to clipboard and paste it into any program of their choice or they can export the list to a CSV, Excel or PDF format. On this page, user can sort and search as well as defining the lenfth of the list they want to show on screen at a time.

4.6.2 Screenshot

4.6.3 State diagram

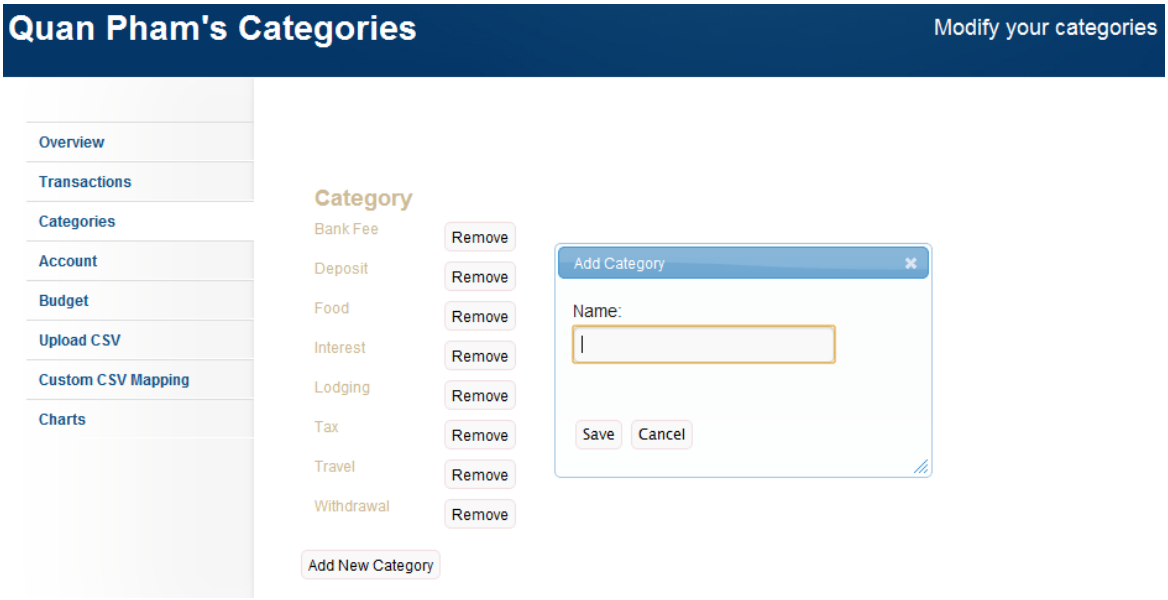


4.7 Category View

4.7.1 Overview

Adding cateogy allow users the flexibility to specify their own categories that make the most sense to them. Users are given complete control on adding or removing categories in their own list.

4.7.2 Screenshot

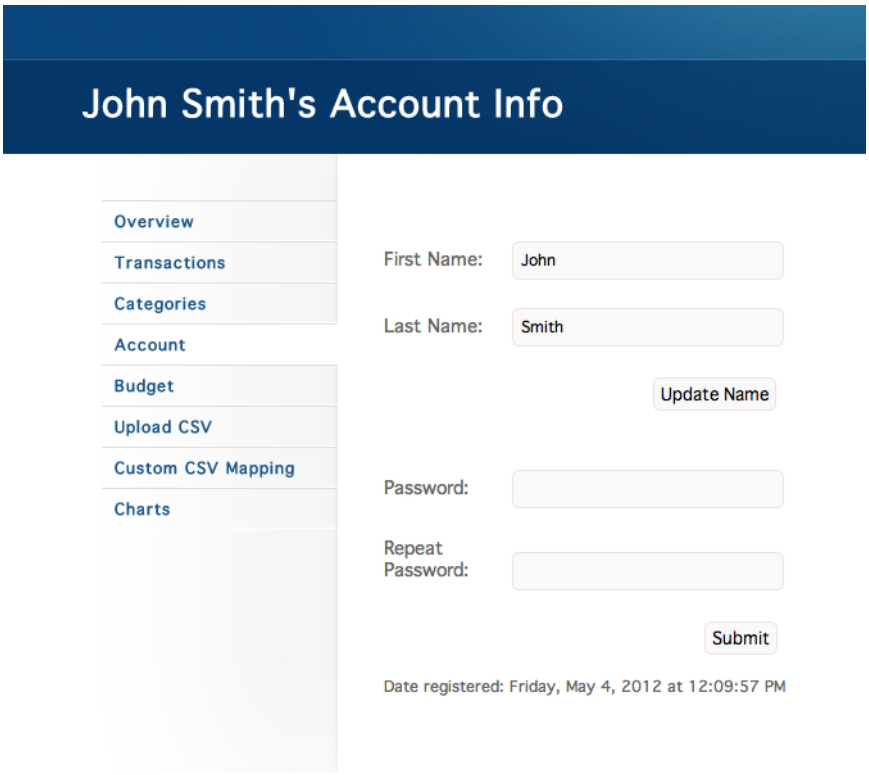


4.8 Account View

4.8.1 Overview

User can change their password or their name anytime they want by visiting the account page.

4.8.2 Screenshot

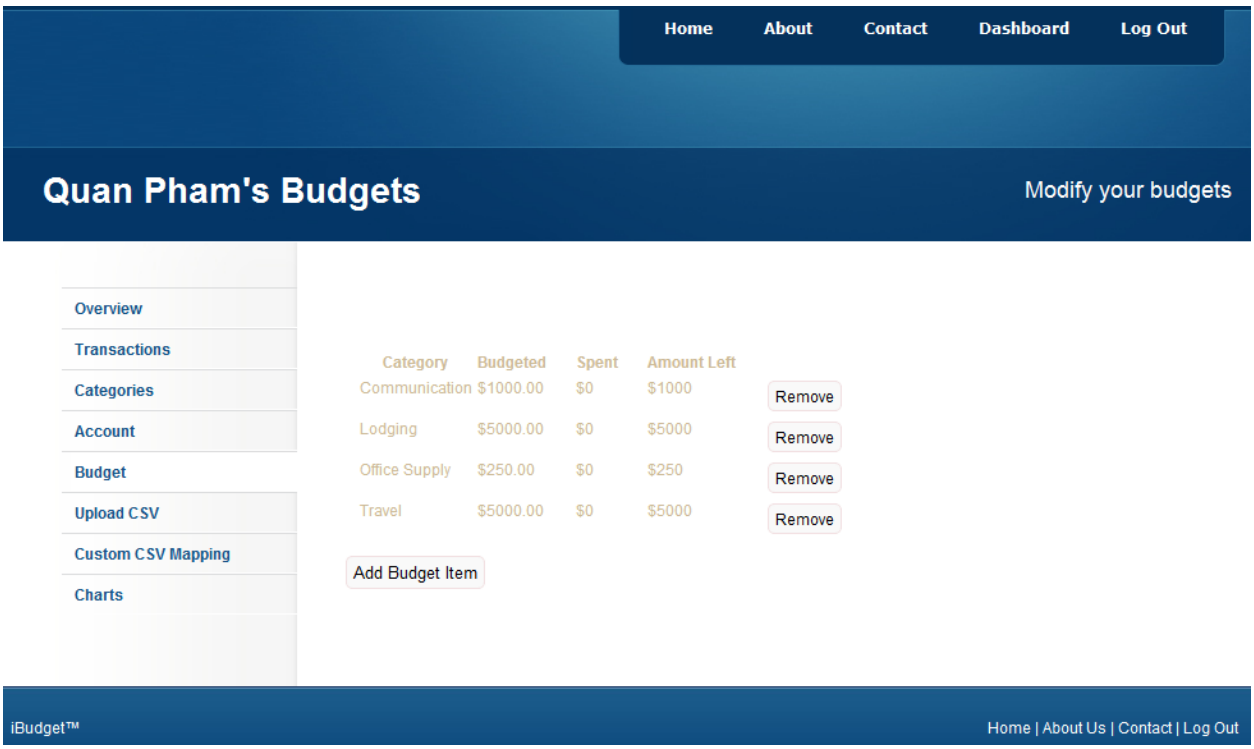


4.9 Budget View

4.9.1 Overview

Users can track their monthly spending on any Category they have created. When users create a budget, they select a category and a monthly allowance, they can then view all the budgets and see how much they have spent in the current month on each budget, versus the amount they have allotted.

4.9.2 Screenshot

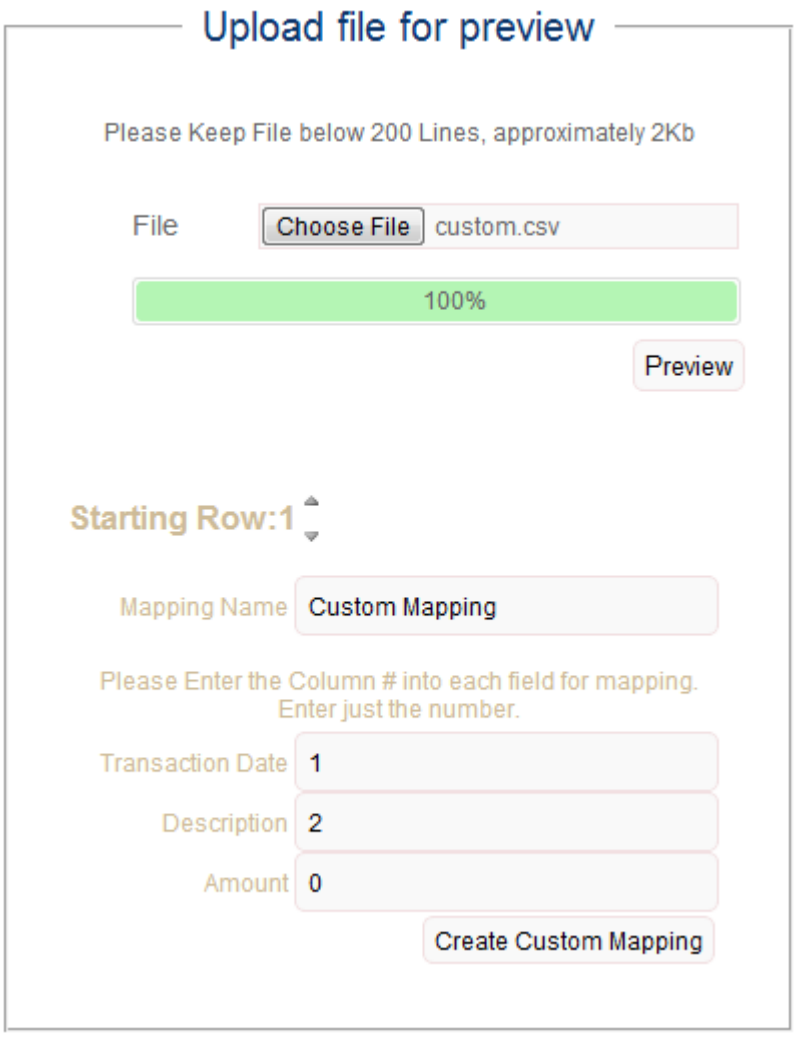


4.10 Custom CSV Mapping

4.11.1 Overview

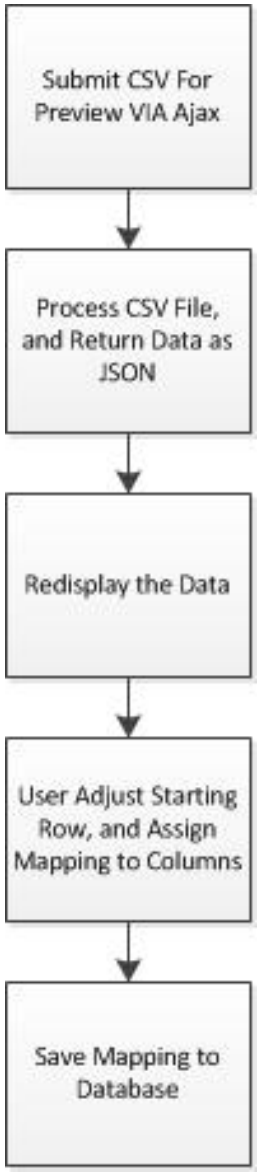
In addition to the built-in mappings from major banks, users can create their own custom mappings from virtually any format that their CSV files happen to be in.

4.11.2 Screenshot




Preview
Column 0
Column 1
Column 2
9.83
2/21/2012 0:00
WWW.LOGMEIN.COM
233.74
2/20/2012 0:00
MICRO CENTER #121
15.99
2/17/2012 0:00
STAMPS.COM
4.92
2/11/2012 0:00
WWW.LOGMEIN.COM
26.99
2/24/2012 0:00
THE HOME DEPOT #6230
14
2/20/2012 0:00
BELLAS GOURMET MARKET
42.33
2/13/2012 0:00
STAPLES 00111336
6
2/12/2012 0:00
FOUR POINTS HOTELS PIA
10.79
2/11/2012 0:00
BURGER KING NJ10892QPS
4.17
2/10/2012 0:00
HESS 21219 Q38
21.57
2/10/2012 0:00
FOUR POINTS HOTEL PIA
26.12
2/27/2012 0:00
H BUD BREWHOUS10140309
19.19
2/27/2012 0:00
CHILI'S MIA - G
42.96
2/26/2012 0:00
THE RIB RANCH
33.4
2/26/2012 0:00
HARTSFIELD BUD BREWHOU
15
2/25/2012 0:00
GAME ON
9.95
2/26/2012 0:00
AIRCELL*GOGO INFLIGHT
-14.95
2/12/2012 0:00
PSSPRT2FUNPLU154100298
14.95
2/16/2012 0:00
PSSPRT2FUNPLU154100298

4.11.3 State diagram



4.11 Chart View

4.12.1 Overview

Instead of looking at numbers, users can visualize their financial health by looking at charts broken down by categories.

4.12.2 Screenshot