MINISTRY OF EDUCATION AND TRAINING

FPT UNIVERSITY

Capstone Project Document

Reasonable Spending Suggestion

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Capstone Project code	RSSuggestion

-Ho Chi Minh City, 05/2014-

E. System Implementation and Test

1. Introduction

1.1 System Overview

This section provides in detail all necessary information about test plans, test cases, test result, test environments, pass/fail criteria and risks estimations as well as a checklist to cover all possible cases of this project.
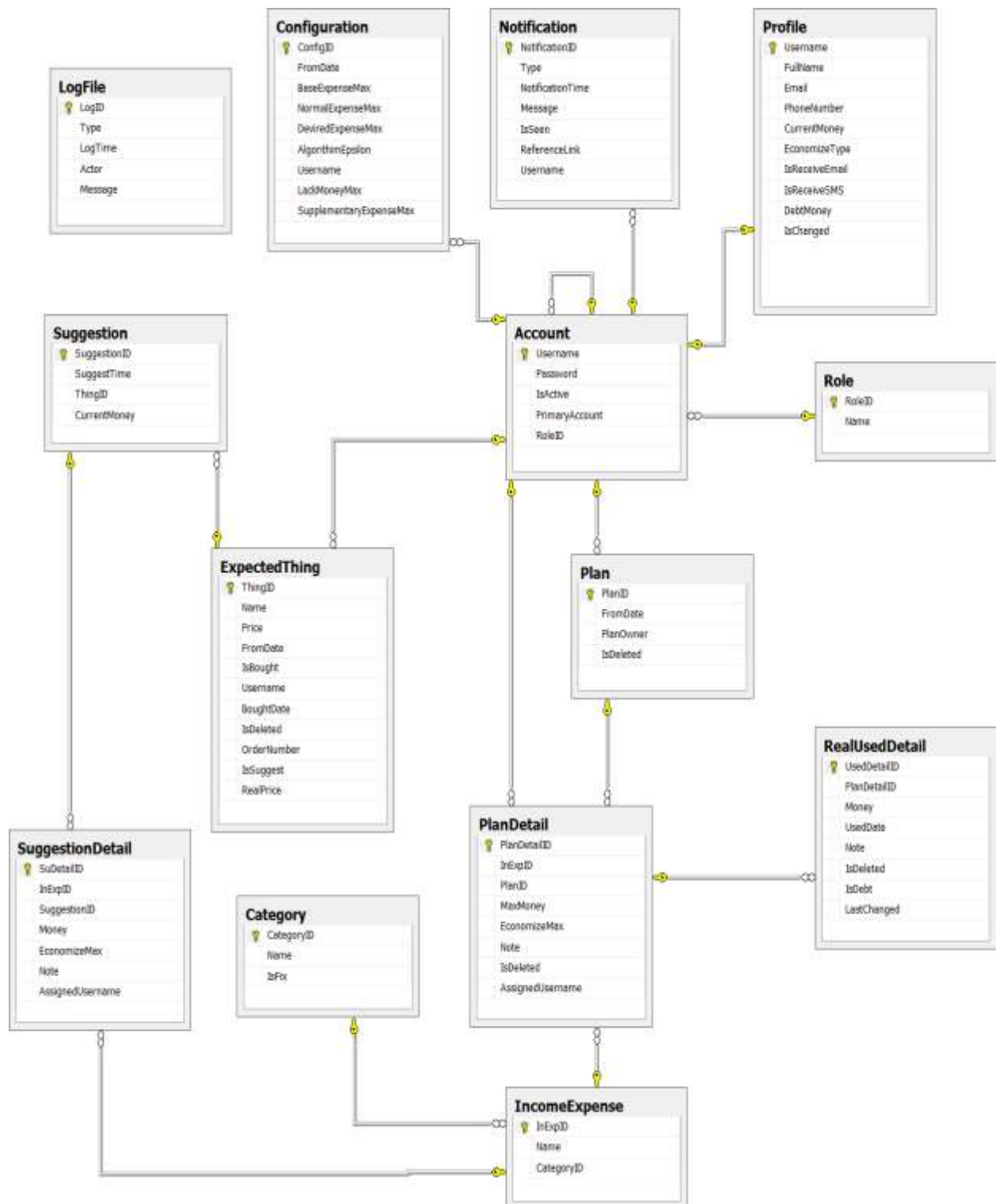
1.2 Test Approach

- Goal: To test the whole system based on the core workflow.
- Method: System Testing, Black – box Testing.

2. Database Relationship Diagram

2.1 Web Application

  2.1.1. Diagram

Figure 1 Database Relationship Diagram

2.1.2. Data Dictionary

Entity Data dictionary: describe content of all entities	
Entity Name	**Description**
Account	Describe all accounts in the system.
Role	Describe all roles in the system.
Profile	Describe all profiles of user in the system. Each user has only one profile.
Notification	Describe all notifications of user in the system.
Configuration	Describe all configuration of user in the system.
LogFile	Describe all logs of user in the system. Log is created when users do each action on the system.
Plan	Describe all plans of user in the system.
PlanDetail	Describe all plan details of each plan in the system.
RealUsedDetail	Describe all incomes or expenses in real life of user.
IncomeExpense	Describe all incomes or expenses in the system.
Category	Describe all categories of income or expense in the system.
ExpectedThing	Describe all expected things of user in the system.
Suggetion	Describe all suggestions of user in the system.
SuggestionDetail	Describe all suggestion details of each suggestion in the system.

Table 1 Data Dictionary

Entity name	Attributes	Description	Domain	Null
Account	Username {PK}	Account username	varchar(50)	No
	Password	Account password	varchar(50)	No
	IsActive	Account status	bit	No
	PrimaryAccount {FK}	Username of primary account	varchar(50)	Yes
	RoleID {FK}	Foreign key, role identifier	int	No
Role	RoleID {PK}	Unique identifier of a role, auto increment.	int	No
	Name	Role name	varchar(50)	No
Profile	Username {PK,FK}	Profile username	varchar(50)	No
	Fullname	Profile full name	nvarchar(100)	No
	Email	User email	varchar(100)	No
	PhoneNumber	User phone number	varchar(20)	Yes
	CurrentMoney	User current money	int	No
	EconomizeType	User economize type	nvarchar(50)	Yes
	IsReceiveEmail	Check user receive email	bit	No

	IsReceiveSMS	Check user receive SMS	bit	No
	DebtMoney	User debt money	int	No
	IsChanged	Check user changed status	bit	No
Notification	NotifyID {PK}	Unique identifier, auto increment.	int	No
	Type	Notification type	nvarchar(50)	No
	NotifyTime	Notification time	datetime	No
	Message	Notification message	nvarchar(1000)	No
	IsSeen	Check user is seen	bit	No
	ReferenceLink	Reference link of notification	varchar(250)	Yes
	Username {FK}	Notification username	varchar(50)	No
Configuration	ConfigID {PK}	Unique identifier, auto increment.	int	No
	FromDate	Configuration applies from date	datetime	No
	BaseExpenseMax	Maximum percent can be decreased of base expense	float	No
	NormalExpenseMax	Maximum percent can be decreased of normal expense	float	No
	DerivedExpenseMax	Maximum percent can be decreased of derived expense	float	no
	AlgorithimEpsilon	Maximum money to compute algorithms again.	int	No
	Username {FK}	Configuration applies for username	varchar(50)	No
	LackMoneyMax	Maximum money which suggestion can be lack.	int	No
	SupplementaryExpenseMax	Maximum percent can be decreased of supplementary expense	float	No
LogFile	LogID {PK}	Unique identifier, auto increment.	int	No
	Type	Log type	nvarchar(50)	No
	LogTime	Log time	datetime	No
	Actor	Who writes log	nvarchar(50)	No
	Message	Log message	nvarchar(300)	No
Plan	PlanID {PK}	Unique identifier, auto increment.	int	No
	FromDate	Plan applies from date	datetime	No

	PlanOwner {FK}	Owner of plan	varchar(50)	No
	IsDeleted	Check is deleted plan	bit	no
PlanDetail	PlanDetailID {PK}	Unique identifier, auto increment.	int	No
	InExpID {FK}	Income Expense ID	int	No
	PlanID {FK}	Plan ID	int	No
	MaxMoney	Maximum money of plan detail	int	No
	EconomizeMax	Maximum percent can be decreased of plan detail	float	Yes
	Note	Plan detail note	nvarchar(300)	Yes
	IsDeleted	Check is deleted plan detail	bit	No
	AssignedUsername {FK}	Plan detail is assigned for username	varchar(50)	No
RealUsed Detail	UsedDetailID {PK}	Unique identifier, auto increment.	int	No
	PlanDetailID{FK}	Plan Detail ID	int	No
	Money	Money of real used detail	int	No
	UsedDate	Used date of real used detail	datetime	Yes
	Note	Note of real used detail	nvarchar(300)	Yes
	IsDeleted	Check is deleted real used detail	bit	No
	IsDebt	Check is debt real used detail	bit	No
	LastChanged	Last time changed this used	datetime	No
IncomeExpense	InExpID {PK }	Unique identifier, auto increment.	int	No
	Name	Income or Expense Name	nvarchar(200)	No
	CategoryID {FK}	Category ID of income or expense	int	No
Category	CategoryID {PK}	Uniquely identifier, auto increment.	int	No
	Name	Category name	nvarchar(200)	No
	IsFix	Check is user can add new income or expense	bit	No
Expected Thing	ThingID {PK}	Unique identifier, auto increment.	int	No
	Name	Expected thing name	nvarchar(200	No

			)	
	Price	Maximum price of expected thing	int	No
	FromDate	User expected thing from date	datetime	No
	IsBought	Check is bought expected thing	bit	No
	Username {FK}	Owner of expected thing	varchar(50)	No
	BoughtDate	Bought date of expected thing	datetime	Yes
	IsDeleted	Check is deleted expected thing	bit	No
	OrderNumber	Order number of expected thing	int	No
	IsSuggest	Check is computing suggestion for this expected thing	bit	No
	RealPrice	Real price of expected thing after bought	int	Yes
Suggestion	SuggestionID {PK }	Unique identifier, auto increment.	int	No
	SuggestionTime	Suggestion time	datetime	No
	ThingID {FK}	Expected Thing ID of suggestion	int	No
	CurrentMoney	Current money at time computing suggestion	int	No
SuggestionDetail	SuDetailID {PK}	Unique identifier, auto increment.	int	No
	InExpID {FK}	Expense ID	int	No
	SuggestionID {FK}	Suggestion ID	int	No
	Money	Suggestion Money	int	No
	EconomizeMax	Percent decreased of expense	float	Yes
	Note	Note of suggestion	nvarchar(300)	Yes
	AssignedUsername	Expense for username	varchar(50)	No

Table 2 Attribute Data Dictionary

2.2 Mobile Application
2.2.1. Diagram
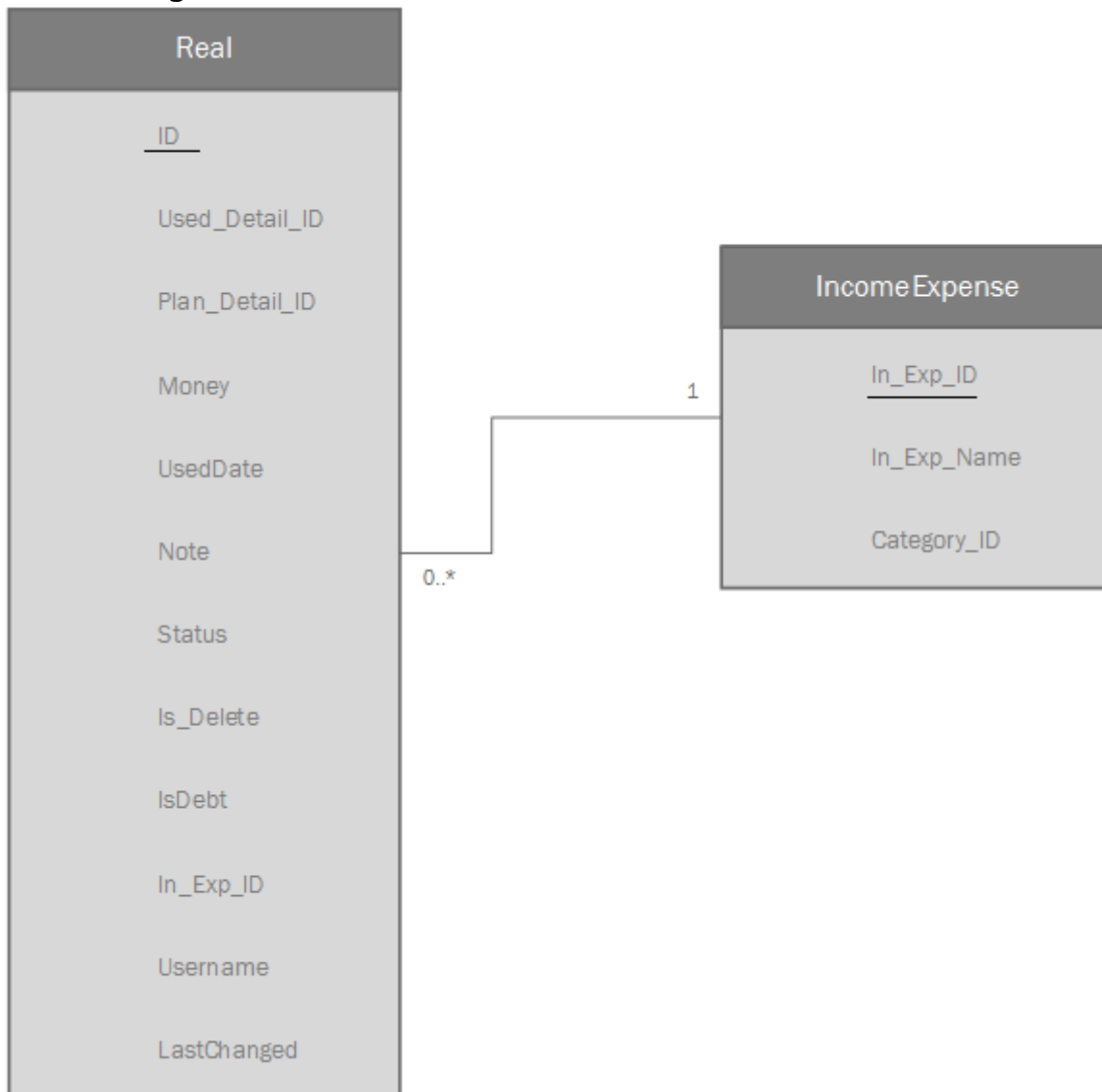
Figure 2 Database Relationship Diagram on Mobile

2.2.2. Data Dictionary

Entity Data dictionary: describe content of all entities	
Entity Name	**Description**
Real	Describe all incomes or expenses in real life of user.
IncomeExpense	Describe all incomes or expenses in the system.

Table 3 Data Dictionary

Entity name	Attributes	Description	Domain	Null
Real	ID {PK}	Unique identifier	int	No
	Used_Detail_ID	ID of real used detail on web	int	No
	Plan_Detail_ID	ID of plan detail of real used	int	No
	Money	Money of real used	int	No
	UsedDate	Date of real used	string	Yes
	Note	Note of real used	string	Yes

	Status	Status of real used	int	No
	Is_Deleted	Check is delete real used	int	No
	IsDebt	Check is debt	int	No
	In_Exp_ID {FK}	ID of income expense	int	No
	Username	Username of real used	string	No
	LastChanged	Last time changed real used	string	No
IncomeExpense	In_Exp_ID {PK }	Unique identifier	int	No
	In_Exp_Name	Income or Expense Name	string	No
	Category_ID	Category ID of income expense	int	No

Table 4 Attributes data dictionary

3. Performance Measures

The speed of suggestion algorithm is less than 2 seconds.

4. Test Plan

The purpose of this section is to verify and ensure that RSSuggestion meets its design specification and other requirements from user. The following part will describe which features to be tested and which will not.

4.1 Features to be tested

We will test the entire system based on the following core workflow (Reference: **Figure 1, 2: Core Workflow**).

Based on the workflow, all following features will be tested, which can include one or more functions. These features will be focused and tested thoroughly during the test phase.

- Primary member: Add income expense in real life, Add income expense in plan, add expected thing, and view suggestion.
- Supplementary member: Add income expense in real life.
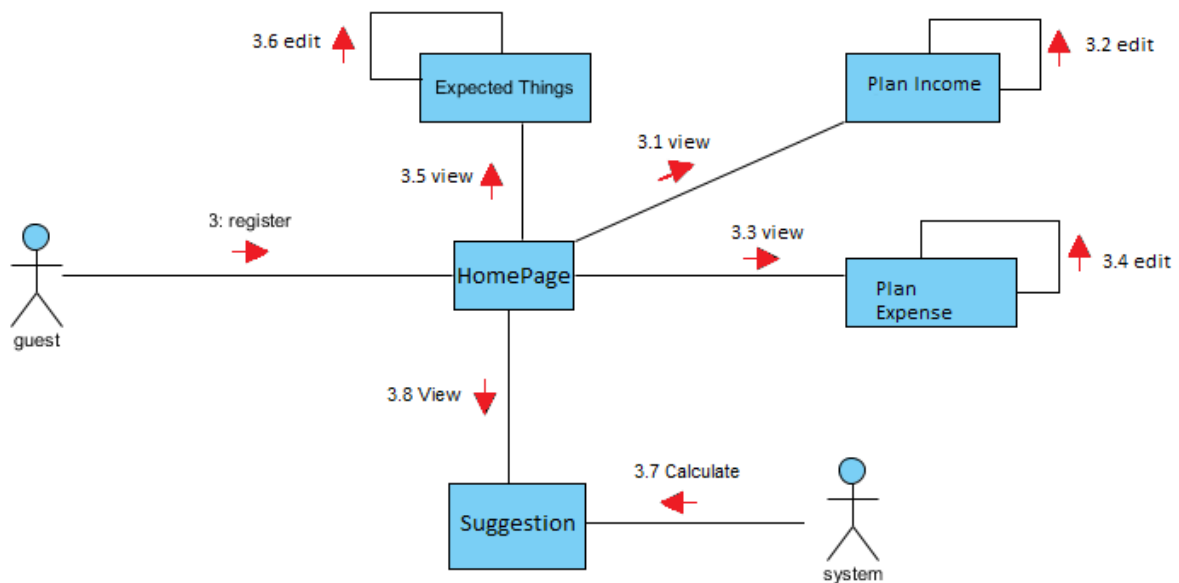- System: Compute suggestion.

4.2 Features not to be tested

- Login, Logout, Change password.
- Admin configuration, account management.
- Supplementary management.
- View Report.
- User custom configuration and change profile.
- Debt management.

5. System Testing Test Case
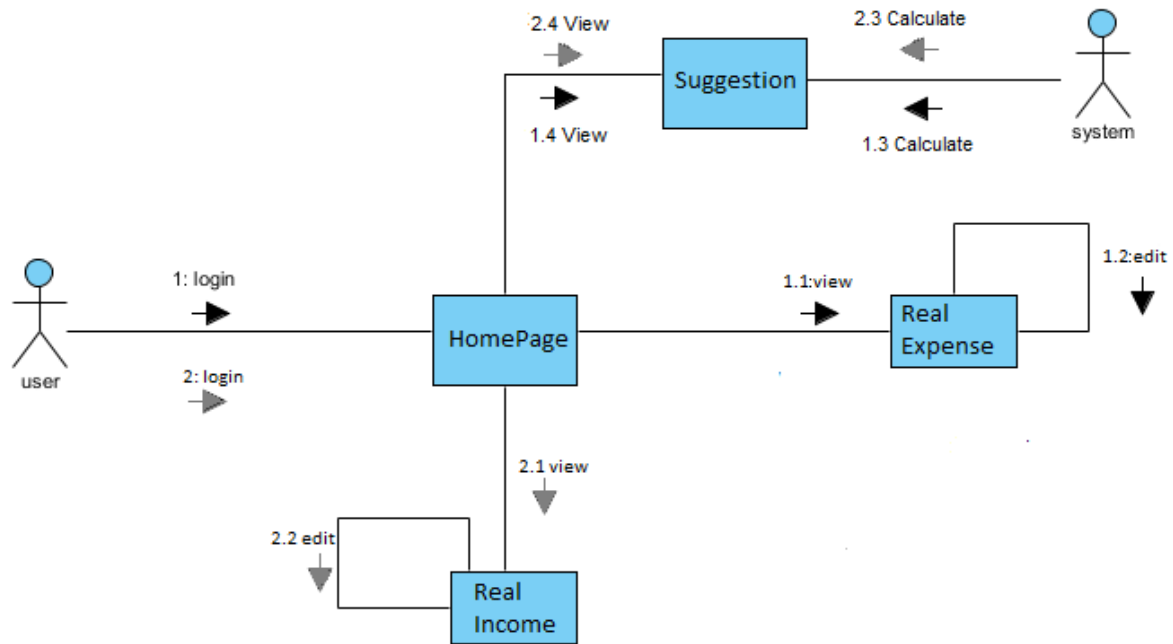
Figure 3 Core Flow 1, 2

Figure 4 Core Flow 3

5.1 Core flow 1

5.1.1 View Real Expense

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
VRE 01	Primary member view real expense	1 – On the home page, click on "Quản lý chi tiêu" on menu bar.	- Show real expense page, includes base expense, normal expense, derived expense, supplementary expense		Passed	14/07/2014	
VRE 02	Supplementary member view real expense	1 – On the home page, click on "Quản lý chi tiêu" on menu bar.	- Show real expense page, includes derived expense		Passed	14/07/2014	

Table 5 View Real Expense Test Case

5.1.2 Edit Real Expense

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
ERE 01	Member add real expense when money is less than or equal current money	1 – On the real expense page, click on "Thêm" button. 2 – Input expense name, money, date, and note. 3 – Click "Đồng ý" button	- After step 1, show the popup add real expense - After step 3, hide the popup and show the new expense in real expense page, current money is decrease.	VRE01	Passed	14/07/2014	

ERE 02	Member add real expense when money is greater than current money	1 – On the real expense page, click on "Thêm" button. 2 – Input expense name, money, date, and note. 3 – Click "Đồng ý" button 4 – On confirm popup, click "Ghi nợ" button	- After step 1, show the popup add real expense - After step 3, hide the popup and show the new popup to confirm is debt expense. - After step 4, hide the popup and the show the new expense in real expense page, debt money is increase	VRE01	Passed	14/07/2014	
ERE 03	Member update real expense which is used by current money	1 – On the real expense page, click on "Sửa" button. 2 – Change expense name, money, date, and note. 3 – Click "Đồng ý" button	- After step 1, show the popup update real expense - After step 3, hide the popup and show the new expense in real expense page, change current money	VRE01	Passed	14/07/2014	
ERE 04	Member update real expense which is used by debt money	1 – On the real expense page, click on "Sửa" button. 2 – Change expense name, money, date, and note. 3 – Click "Đồng ý"	- After step 1, show the popup update real expense - After step 3, hide the popup and show the new expense in real	VRE01	Passed	14/07/2014	

ID	Test case Description	Test case Procedure	Expected output	Inter - test case dependence	Result	Test Date	Note
		button	expense page, change debt money				
ERE 05	Member delete real expense which is used by current money	1 – On the real expense page, click on "Xóa" button. 2 – Click "Đồng ý" button	- After step 1, show the popup delete real expense - After step 2, hide the popup and the expense is removed in real expense page, change current money	VRE01	Passed	14/07/2014	
ERE 06	Member delete real expense which is used by debt money	1 – On the real expense page, click on "Xóa" button. 2 – Click "Đồng ý" button	- After step 1, show the popup delete real expense - After step 2, hide the popup and the expense is removed in real expense page, change debt money	VRE01	Passed	14/07/2014	

Table 6 Edit Real Expense Test Case

5.1.3 Calculate and View Suggestion

ID	Test case Description	Test case Procedure	Expected output	Inter - test case dependence	Result	Test Date	Note
CV S01	Primary member view	1 – On the home page, click on "Gợi	- System calculate the suggestion and show list of expected thing can be		Failed Passed	14/07/2014 15/07/2014	Not auto calculate after edit

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
	suggestion	ý" on menu bar.	bought in next month and summary money of next month.				expected thing
CVS02	Primary member view suggestion detail	1 – On the suggestion page, click on "Chi tiết" button.	- Show suggestion money of each category expense: base expense, normal expense, derived expense, supplementary expense.	CVS01	Failed Passed	14/07/2014 15/07/2014	Not auto calculate after edit plan income expense

Table 7 Calculate and View Suggestion Test Case

5.1.4 View Real Expense on Mobile

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
MVRE01	Primary member view real expense	1 – On the mobile's home screen, click or swipe to second tab.	- Show real expense list of current month, includes base expense, normal expense, derived expense.		Passed	16/07/2014	
MVRE02	Supplementary member view real expense	1 – On the mobile's home screen, click or swipe to second tab.	- Show real expense list of current month, includes derived expense		Passed	16/07/2014	

5.1.5 Edit Real Expense on Mobile

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
MERE01	Member add real expense when money is less than or equal current money	1 – On the first tab of mobile home screen, click on "Nhập khoản chi" button. 2 – Input expense name, money, date, and note. 3 – Click "Thêm chi tiêu" button	- After step 1, show input real expense screen. - After step 3, show home screen with notify success or fail, update the expense list and current money.	MVRE01	Passed	16/07/2014	
MERE02	Member add real expense when money is greater than current money	1 – On the first tab of mobile home screen, click on "Nhập khoản chi" button. 2 – Input expense name, money, date, and note. 3 – Click "Thêm chi tiêu" button 4 – On confirm popup, click "Ghi nợ" button	- After step 1, show input real expense screen. - After step 3, show the popup to confirm is debt expense. - After step 4, show home screen with notify success or fail, update the expense list and debit money.	MVRE01	Passed	16/07/2014	
MERE03	Member update real expense which is used by current	1 – On the second tab of mobile's home screen, click on item in list. 2 – Change expense name, money, date,	- After step 1, show the edit screen - After step 3, show home screen with notify success or fail, update the	MVRE01	Passed	16/07/2014	

	money	and note. 3 – Click "Cập nhật" button	expense list and current money.				
MER E04	Member update real expense which is used by debt money	1 – On the second tab of mobile's home screen, click on item in list. 2 – Change expense name, money, date, and note. 3 – Click "Cập nhật" button	- After step 1, show the edit screen - After step 3, show home screen with notify success or fail, update the expense list and debit money.	MVRE01	Passed	16/07/2014	
MER E05	Member delete real expense which is used by current money	1 – On the second tab of mobile's home screen, click on item in list. 2 – On the edit sreen, click "Xóa" button	- After step 1, show the edit screen - After step 2, show home screen with notify success or fail, update the expense list and current money.	MVRE01	Passed	16/07/2014	
MER E06	Member delete real expense which is used by debt money	1 – On the second tab of mobile's home screen, click on item in list. 2 – On the edit sreen, click "Xóa" button.	- After step 1, show the edit screen - After step 2, show home screen with notify success or fail, update the expense list and debit money	MVRE01	Passed	16/07/2014	

5.2 Core flow 2

5.2.1 View Real Income

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
VRI01	Member view real income	1 – On the home page, click on "Quản lý thu nhập" on menu bar.	- Show real income page, includes main income income		Passed	14/07/2014	

Table 8 View Real Income Test Case

5.2.2 Edit Real Income

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
ERI01	Member add real income	1 – On the real income page, click on "Thêm" button. 2 – Input income name, money, date, and note. 3 – Click "Đồng ý" button	- After step 1, show the popup add real income - After step 3, hide the popup and show the new income in real income page, current money is increase.	VRI01	Passed	14/07/2014	
ERI02	Member update real income	1 – On the real income page, click on "Sửa" button. 2 – Change income name, money, date, and note. 3 – Click "Đồng ý" button	- After step 1, show the popup update real income - After step 3, hide the popup and show the new income in real income page,	VRI01	Passed	14/07/2014	

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
			change current money				
ERI0 3	Member delete real income when income money is less than or equal current money	1 – On the real income page, click on "Xóa" button. 2 – Click "Đồng ý" button	- After step 1, show the popup delete real income - After step 2, hide the popup and the income is removed in real income page, decrease current money	VRI01	Passed	14/07/2014	
ERI0 4	Member delete real income when income money is greater than current money	1 – On the real income page, click on "Xóa" button. 2 – Click "Đồng ý" button	- After step 1, show the popup delete real income - After step 2, hide the popup and show error message: "Số tiền trong tài khoản không đủ".	VRI01	Passed	14/07/2014	

Table 9 Edit Real Income Test Case

5.2.3 Calculate and View Suggestion
Reference to **5.1.3 Calculate and View Suggestion**

5.2.4 View Real Income on Mobile

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
MVR I01	Member view real income	1 – On the mobile's home screen, click or swipe to third tab.	- Show real income list of current month, includes main income.		Passed	16/07/2014	

5.2.5 Edit Real Income on Mobile

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
MERI01	Member add real income	1 – On the first tab of mobile home screen, click on "Nhập khoản thu" button. 2 – Input income name, money, date, and note. 3 – Click "Thêm thu nhập" button	- After step 1, show input real income screen. - After step 3, show home screen with notify success or fail, update the income list and current money.	MVRI01	Passed	21/07/2014	
MERI02	Member update real income	1 – On the third tab of mobile's home screen, click on item in list. 2 – Change expense name, money, date, and note. 3 – Click "Cập nhật" button	- After step 1, show the edit screen - After step 3, show home screen with notify success or fail, update the income list and current money.	MVRI01	Passed	21/07/2014	
MERI03	Member delete real income when income money is less than or equal current money	1 – On the third tab of mobile's home screen, click on item in list. 2 – Click "Xóa" button	- After step 1, show the edit screen - After step 2, show home screen with notify success or fail, update the income list and current money.	MVRI01	Passed	21/07/2014	
MERI04	Member delete real income when income money is greater than current money	1 – On the third tab of mobile's home screen, click on item in list. 2 – Click "Xóa" button	- After step 1, show the edit screen - After step 2, show error message: "Số tiền trong tài khoản không đủ".	MVRI01	Passed	21/07/2014	

5.3 Core flow 3

5.3.1 View Plan Income

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
VPI01	Primary member view plan income	1 – On the home page, click on "Kế hoạch thu nhập" on menu bar.	- Show plan income page, includes main income and supplementary income		Passed	14/07/2014	
VPI02	Primary member view plan income	1 – On the plan income page, select another month year	- Show plan income page in selected month year		Passed	14/07/2014	

Table 10 View Plan Income Test Case

5.3.2 Edit Plan Income

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
EPI01	Primary member add plan income	1 – On the plan income page, click on "Thêm" button. 2 – Input income name, money, month and note. 3 – Click "Đồng ý" button	- After step 1, show the popup add plan income - After step 3, hide the popup and show the new income in plan income page	VPI01	Passed	14/07/2014	
EPI02	Primary member update plan income	1 – On the plan income page, click on "Sửa" button. 2 – Change income name, money, and note. 3 – Click "Đồng ý"	- After step 1, show the popup update plan income - After step 3, hide the popup and show the new income in plan	VPI01	Passed	14/07/2014	

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
		button	income page				
EPI03	Primary member delete plan income	1 – On the plan income page, click on "Xóa" button. 2 – Click "Đồng ý" button	- After step 1, show the popup delete plan income - After step 2, hide the popup and the income is removed in plan income page	VPI01	Passed	14/07/2014	

Table 11 Edit Plan Income Test Case

5.3.3 View Plan Expense

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
VPE 01	Primary member view plan expense	1 – On the home page, click on "Kế hoạch chi tiêu" on menu bar.	- Show plan expense page, includes base expense, normal expense, derived expense and supplementary expense		Passed	14/07/2014	
VPE 02	Primary member view plan expense	1 – On the plan expense page, select another month year	- Show plan expense page in selected month year		Passed	14/07/2014	

Table 12 View Plan Expense Test Case

5.3.4 Edit Plan Expense

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
EPE 01	Primary member add	1 – On the plan expense page, click	- After step 1, show the popup add	VPE01	Passed	14/07/2014	

		on "Thêm" button. 2 – Input expense name, money, month and note. 3 – Click "Đồng ý" button	plan expense - After step 3, hide the popup and show the new expense in plan expense page				
EPE 02	Primary member update plan expense	1 – On the plan expense page, click on "Sửa" button. 2 – Change expense name, money, and note. 3 – Click "Đồng ý" button	- After step 1, show the popup update plan expense - After step 3, hide the popup and show the new expense in plan expense page	VPE01	Passed	14/07/2014	
EPE 03	Primary member delete plan expense	1 – On the plan expense page, click on "Xóa" button. 2 – Click "Đồng ý" button	- After step 1, show the popup delete plan expense - After step 2, hide the popup and the expense is removed in plan expense page	VPE01	Passed	14/07/2014	

Table 13 Edit Plan Expense Test Case

5.3.5 View Expected Thing

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
VET 01	Primary member view expected thing which is not bought	1 – On the home page, click on "Sản phẩm mong đợi" on menu bar.	- Show expected thing page		Passed	14/07/2014	
VET 02	Primary member view expected thing which is bought	1 – On the expected thing page, click on "Sản phẩm đã mua" tab.	- Show list of expected thing which is bought.		Passed	14/07/2014	

Table 14 View Expected Thing Test Case

5.3.6 Edit Expected Thing

ID	Test case Description	Test case Procedure	Expected output	Inter-test case dependence	Result	Test Date	Note
EET 01	Primary member add expected thing	1 – On the expected thing page, click on "Thêm" button. 2 – Input expected thing name and money 3 – Click "Đồng ý" button	- After step 1, show the popup add expected thing - After step 3, hide the popup and show the new thing in expected thing page	VET01	Passed	14/07/2014	
EET 02	Primary member	1 – On the expected thing	- After step 1, show the popup	VET01	Passed	14/07/2014	

	update expected thing	page, click on "Sửa" button. 2 – Change expected thing name and money. 3 – Click "Đồng ý" button	update expected thing - After step 3, hide the popup and show the new thing in expected thing page				
EET 03	Primary member delete expected thing	1 – On the expected thing page, click on "Xóa" button. 2 – Click "Đồng ý" button	- After step 1, show the popup delete expected thing - After step 2, hide the popup and the thing is removed in expected thing page	VET01	Passed	14/07/2014	
EET 04	Primary member change order of expected thing	1 – On the expected thing page, click on up button.	- The order of expected thing is increased	VET01	Passed	14/07/2014	
EET 05	Primary member change order of expected	1 – On the expected thing page, click on down button.	- The order of expected thing is decreased	VET01	Passed	14/07/2014	

	thing						
EET 06	Primary member change order of expected thing	1 – On the expected thing page, click on up down button. 2 - Input order number 3 – Click "Đồng ý" button	- After step 1, show the popup change order thing. - After step 3, order of expected thing is changed	VET01	Passed	14/07/2014	
EET 07	Primary member buy expected thing	1 – On the expected thing page, click on "Mua" button. 2 – Input expected thing name and money 3 – Click "Đồng ý" button	- After step 1, show the popup buy expected thing - After step 3, hide the popup. Expected thing is change status to "Bought", add new real expense about buy expected thing.	VET01	Passed	14/07/2014	

Table 15 Edit Expected Thing Test Case

5.3.7 Calculate and View Suggestion
Reference to **5.1.3 Calculate and View Suggestion**