

# Personal Finance Manager

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# 1 Context

## 1.1 Version

V1.0

## 1.2 Changes

Date	Author	Description
06/11/2016	JM	Creation of the document.

## 1.3 Environment

The application has been tested on Google Chrome on a Windows 10 environment.

## 1.4 Goals

- Registering the expenses on a bank account of a user and report them into a dashboard for analysis.
- Using technologies for learning purpose.

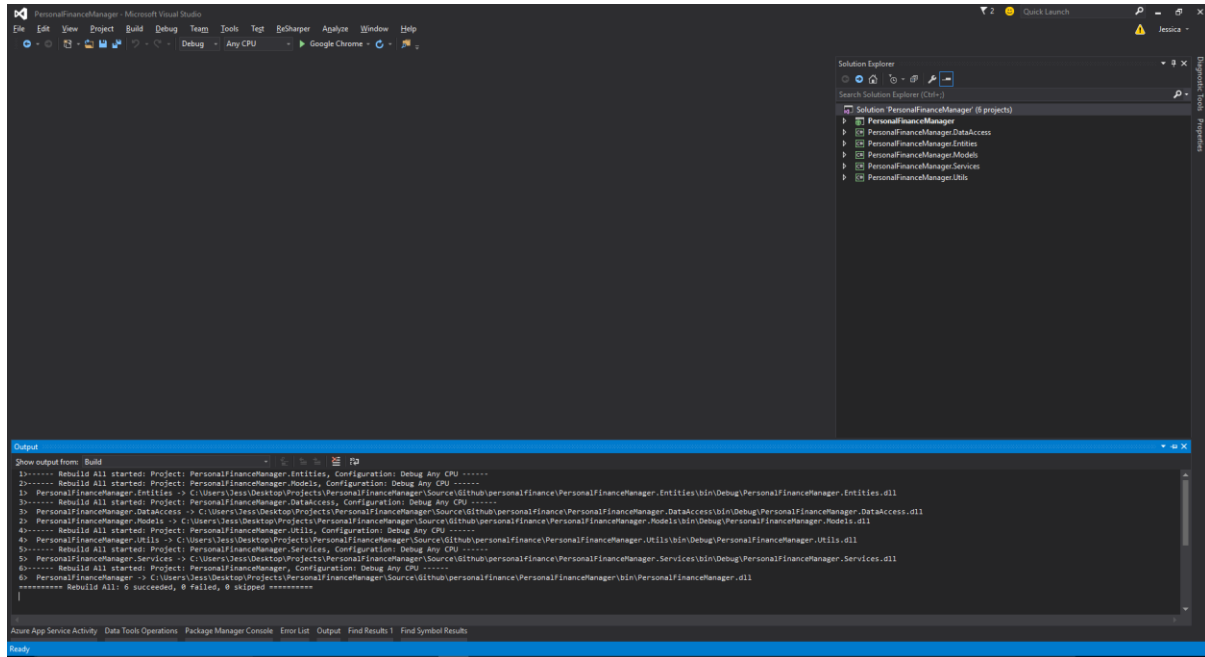
## 1.5 Technologies

USAGE	TECHNOLOGIES
MAIN	.NET Technologies, C# Language
WEB	ASP. NET MVC HTML Razor Syntax JQuery Bootstrap
DATA ACCESS	SQL Server 2014 Entity Framework (Code first approach)
SOURCE CONTROL	GIT GitHub TortoiseGIT
WEB SERVER	IIS

## 2 Getting Started

### 2.1 Start point

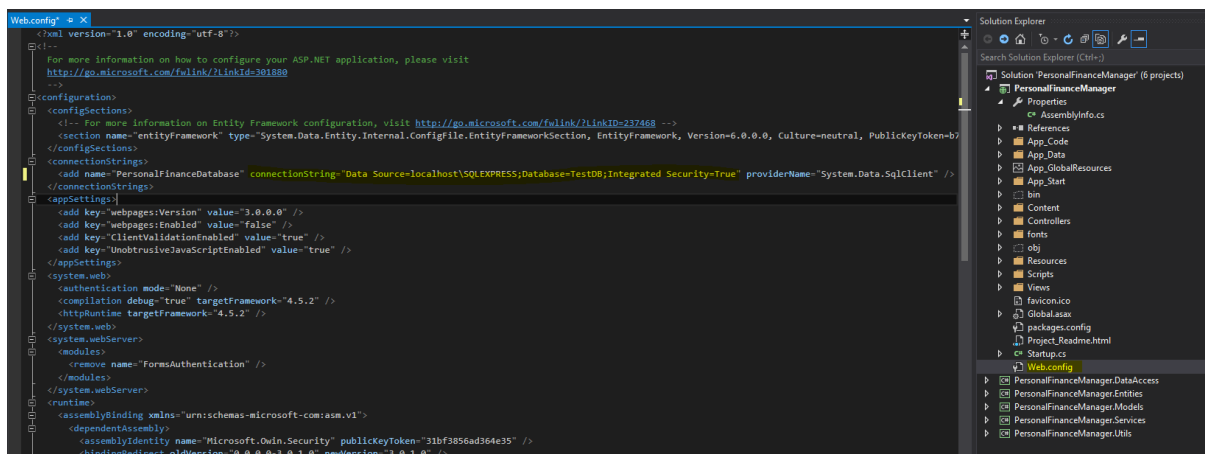
After getting the sources, you should see the following project and be able to build.



### 2.2 Database setup

The database will be built from the project but you need at least a SQL Express instance running on the server.

Change the connection string in the Web.config of the web project so it matches your DB server:



In **Package Manager Console**, make sure the **PersonalFinanceManager.DataAccess** project is selected and enter:

Add-Migration InitialCreate

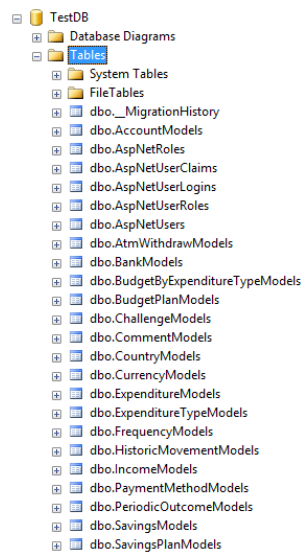
```
PM> Add-Migration InitialCreate
Scaffolding migration 'InitialCreate'.
The Designer Code for this migration file includes a snapshot of your current Code First
migration, then you can re-scaffold it by running 'Add-Migration InitialCreate' again.
```

Then, enter:

Update-Database

```
PM> Update-Database
Specify the '-Verbose' flag to view the SQL statements being applied to the target database.
Applying explicit migrations: [201611050702109_InitialCreate].
Applying explicit migration: 201611050702109_InitialCreate.
Running Seed method.
```

Result in DB:



The only prepopulated table is **dbo.PaymentMethodModels** as this is a static enum type.

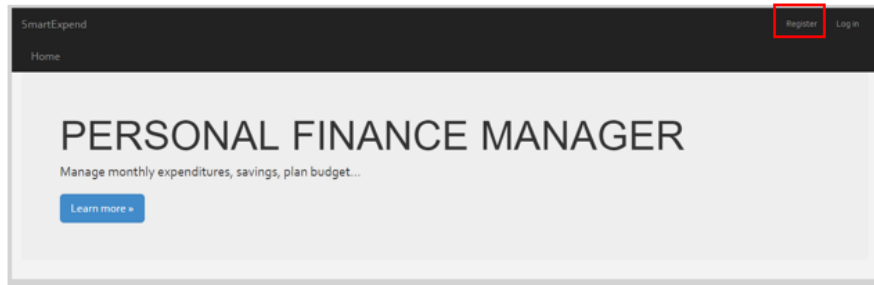
Id	Name
1	CB
2	Cash
3	Direct Debit
4	Transfer
5	Internal Transfer

All other tables are empty at that point.

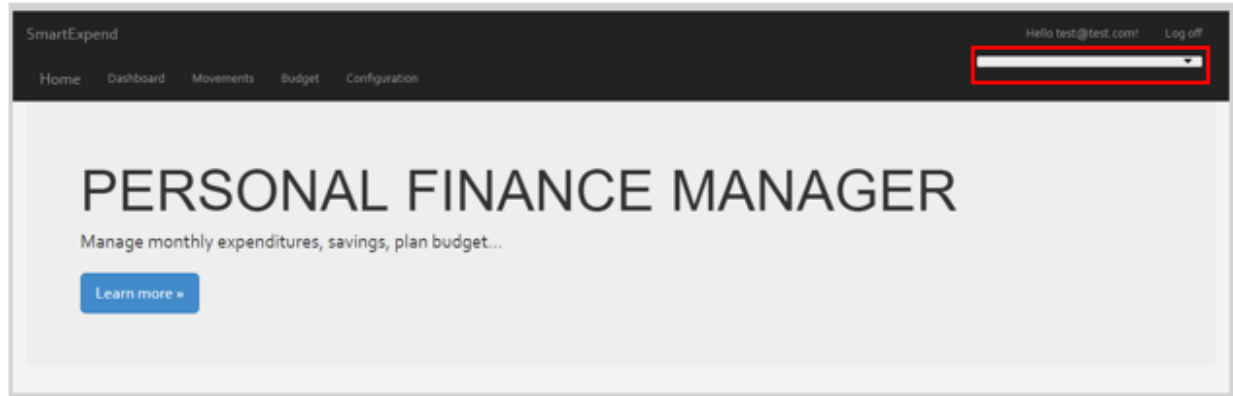
## 2.3 Metadata setup

Run the web project

First you need to register:

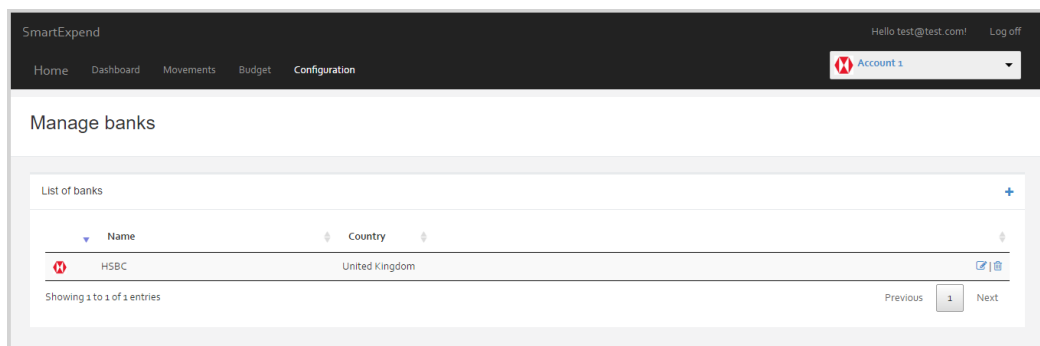


The list of accounts is empty as no data has been created yet for this user.

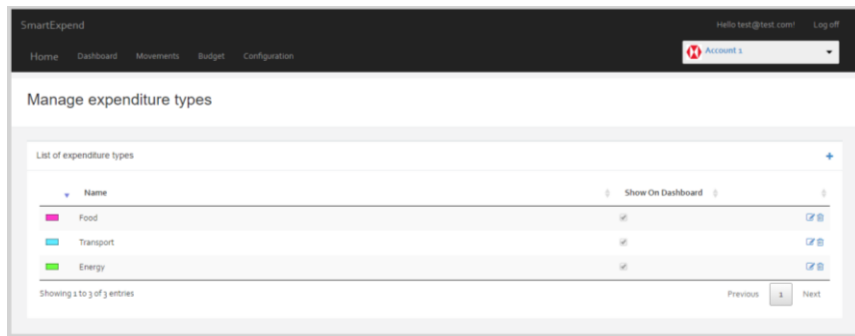


You should populate the settings in this order:

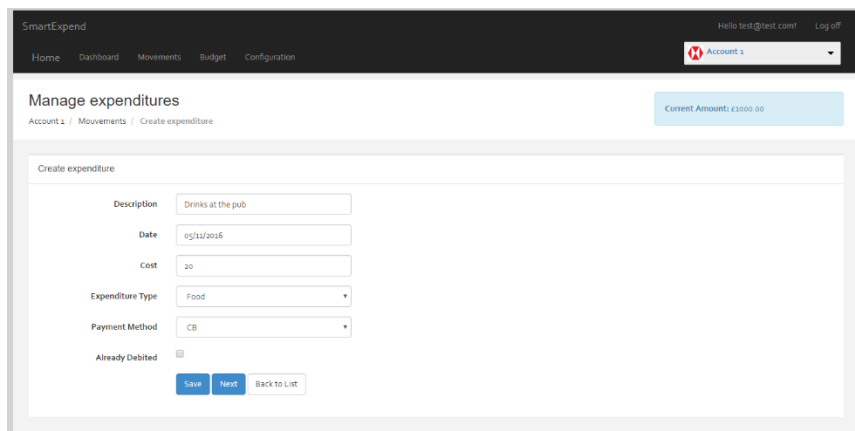
- Create a country
- Create a currency
- Create a bank
- Create an account



Next stage is to define the expenditure types you want to manage:



Then you only need to add some expenditures and have a look at the dashboard!



## 3 Functional Requirements

### 3.1 Requirement Definition

The use cases are described by a code according to the following descriptions:

- **SEC\_XX**: Related to security including authentication and authorization.
- **MET\_XX**: Related to metadata of the system (accounts, currencies, countries...).
- **EI\_XX**: Related to entering expenses and incomes to the system.
- **D\_XX**: Related to visualizing dashboards.
- **AUD\_XX**: Related to auditing, logging.

The use cases are more or less detailed depending of the complexity of the functionality.

### 3.2 Requirement Overview

Use Case	Name	Description
SEC_01	User Registering	Register a new user so he can start to use the application
SEC_02 - User Authenticati onSEC_02	User Authentication	Be able to log in a user so he can start to use the application
MET_01	Account Management	Be able to list, create, update and delete accounts for the authenticated user
MET_02	Bank Management	Be able to list, create, update and delete banks for the authenticated user
MET_03	Country Management	Be able to list, create, update and delete registered countries for the authenticated user
MET_04	Currency Management	Be able to list, create, update and delete registered currencies for the authenticated user
MET_05	Expenditure Type Management	Be able to list, create, update and delete categories of expenditures for the authenticated user
MET_06	Payment Method Listing	Be able to list, create, update and delete categories of expenditures for the authenticated user
EI_01	Incomes Management	Be able to list, create, update and delete incomes for an account
EI_02	ATM Withdraw Management	Be able to list ATM withdraws for an account
EI_03	Expenditure Listing (Common Features)	Be able to list and filter expenditures for an account.
EI_04	Expenditure Management (Common Expenditure Strategy)	Be able to create / update / delete an expenditure, for CB Direct Debit and Transfer expenditures.
EI_05	Expenditure Management (ATM Withdraw Strategy)	Be able to create / update / delete an expenditure, for Cash expenditures.



<b>EI_06</b>	Expenditure Management (Internal Transfer Strategy)	Be able to create / update / delete an expenditure, for Internal Transfer expenditures.
<b>D_01</b>	Expenditure Dashboard	Be able to visualize the expenditures for an account in a dashboard.
<b>AUD_01</b>	Historic Movements Tracking	Be able to check the expenditures, incomes, ATM withdraw applied on an account. Table in DB

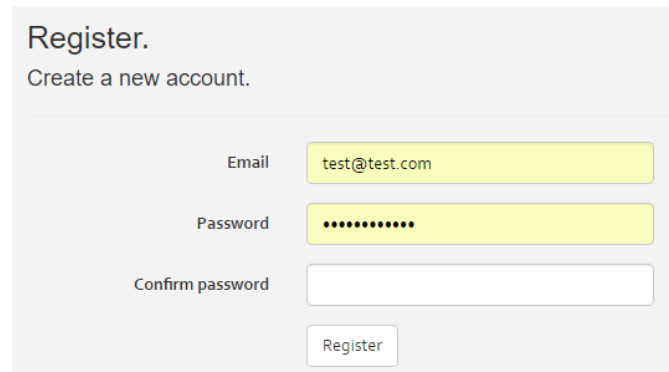
## 3.3 Detailed Requirements

### SEC\_01 - User Registration

#### Description

It uses the integrated authentication mechanism proposed in the ASP.NET MVC template project.

#### Create a new account



The image shows a user registration form with a light gray background. At the top, the text "Register." is displayed in a bold font, followed by "Create a new account." in a smaller font. Below this, there are three input fields: "Email" with the value "test@test.com", "Password" with masked characters "\*\*\*\*\*", and "Confirm password" which is empty. A "Register" button is located at the bottom right of the form.

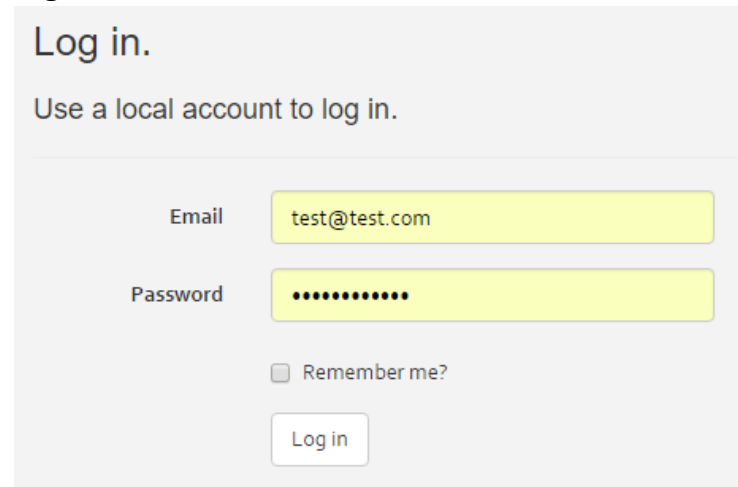
Property	Type	Description	Required	Size	Other constraints
Email	Text	Email	Yes	256	
Password	Text	Password	Yes		At least one character, one number and one special character. At least one uppercase.
Confirm password		Password			

## SEC\_02 - User Authentication

### Description

It uses the integrated authentication mechanism proposed in the ASP.NET MVC template project.

### Login



The image shows a standard ASP.NET MVC login form. It has a light gray background. At the top, it says "Log in." in a large font, followed by "Use a local account to log in." in a smaller font. Below this, there are two input fields: "Email" with the value "test@test.com" and "Password" with masked characters ".....". There is a checkbox labeled "Remember me?" and a "Log in" button at the bottom.

Log in.

Use a local account to log in.

Email test@test.com

Password .....



☐ Remember me?

Log in

## MET\_01 - Account Management

### List

Manage accounts

Name	Bank	Currency	Initial Balance	Current Balance	
Account 1	HSBC	GBP	£1000.00	£760.01	 

Showing 1 to 1 of 1 entries

Previous1Next

Actions available:

- Sort
- Create
- Update
- Delete (with confirmation): disabled if the account is used by at least one expenditure, income or ATM withdraw.

### Create / Edit account

Manage accounts

Create account

Bank

HSBC

Currency

GBP

Name

Initial Balance

0.00

Create

Back to List

Property	Type	Description	Required	Size	Other constraints
Bank	List	List of available banks in the system.	Yes		
Currency	List	List of available currencies in the system.	Yes		
Name	Text	Account name	Yes	50	Unique.
Initial Balance	Decimal	Initial balance	Yes	(10, 2)	Can't be changed in edit mode.

The **Current Balance** is not visible from the creation screen, it is initialized with **Initial Balance** at creation time. It is going to be updated when expenditures, incomes and ATM withdraw are created.

## MET\_02 - Bank Management


### List

Manage banks

List of banks

Name

Country

 HSBC

United Kingdom

Showing 1 to 1 of 1 entries

Previous

1

Next

Actions available:

- Sort
- Create
- Update
- Delete (with confirmation): disabled if the bank is used by at least one account.

### Create / Edit bank

Manage banks

Create a bank

Country

United Kingdom


Name

Natwest

Upload an icon

Upload PNG/JPEG

Preview

 photo

Save

Back to List

Property	Type	Description	Required	Size	Other constraints
Country	List	List of available countries in the system.	Yes		
Name	Text	Bank name	Yes	50	Unique.
Icon	Image Upload	Bank Icon	Yes		

## MET\_03 - Country Management

### List

Manage countries

List of countries +

Name

United Kingdom

[✎](#) [✕](#)

Showing 1 to 1 of 1 entries

Previous 1 Next

Actions available:

- Sort
- Create
- Update
- Delete (with confirmation): disabled if the country is in used by an account.

### Create / Edit country

Manage countries

Create a country

Name

Save

Back to List

Property	Type	Description	Required	Size	Other constraints
Name	Text	Country Name	Yes		

## MET\_04 - Currency Management

### List

Manage currencies

List of currencies

Name

Symbol

GBP

£

Showing 1 to 1 of 1 entries

Previous1Next

Actions available:

- Sort
- Create
- Update
- Delete (with confirmation): disabled if the currency is in used by an account.

### Create / Edit currency

Manage currencies

Create a currency

Name

EUR

Symbol

€

Save

Back to List

Property	Type	Description	Required	Size	Other constraints
Name	Text	Currency Name	Yes		
Symbol	Text	Currency Symbol	Yes		

## MET\_05 - Expenditure Type Management

### List

Manage expenditure types

List of expenditure types

Name

Food

Transport



Energy



Show On Dashboard



☒

☒

☒







Showing 1 to 3 of 3 entries

Previous1Next

Actions available:

- Sort
- Create
- Update
- Delete (with confirmation): disabled if the expenditure type is used by at least one expenditure.

### Create / Edit an expenditure type

Manage expenditure types

Create an expenditure type

Name

Gym / Sport

Graph Color

FF5E99

Show On Dashboard

☒

Save

Back to List

Property	Type	Description	Required	Size	Other constraints
Name	Text	Expenditure name	Yes	50	Unique.
Graph Color	Color Pick	Color which will be displayed in the graph in the dashboard for this expenditure type.	Yes		
Show On Dashboard	Yes/No	Determine if the expenditure types will be in the dashboard	Yes		



## MET\_o6 - Payment Method Listing

### Description

Depending on which payment method has been selected, a different strategy applies on the expenditure computation. As a result, this entity became static. You can still visualize what payment method are available to you.

### List

Manage payment methods	
List of payment methods	
Name	
Transfer	
Internal Transfer	
Direct Debit	
CB	
Cash	
Showing 1 to 5 of 5 entries	
Previous	Next

## El\_01 - Incomes Management

### Description

An income is an external source of amount like salary, gift...

For an income which comes from an account registered in the system, you can use the expenditure functionality with the payment method option “internal transfer”, as it will create both the debit in the source account (expenditure) and credit in the destination account (income). For instance, you have a saving account and you transfer money from your current to your saving account, you won't have to do two actions.

### List

Manage incomes

Account 1 / Mouvements / List of incomes

Current Amount: £2260.01

List of incomes

Search:

Date Income	Cost	Description
31/10/2016	£1500.00	Salary

Showing 1 to 1 of 1 entries

Previous 1 Next

Available actions:

- Sort
- Create
- Update
- Delete (with confirmation).

### Create / Update an income

Manage incomes

Account 1 / Mouvements / Create an income

Current Amount: £760.01

Create an income

Description

Salary

Cost

1500

Date Income

31/10/2016

Save

Back to List

Property	Type	Description	Required	Size	Other constraints
Description	Text	Description	Yes		
Cost	Decimal	Cost	Yes		
Date income	Date	Date income	Yes		

The account will be credited and debited again with the new cost.

**Delete**

The account will be re-credited.

## El\_02 - ATM Withdraw Management

### Description

An ATM withdraw is a special expenditure that won't be shown in the dashboard as it is not split by expenditure type. The cash expenditures attached to it are the ones which needs to be displayed. As the amount can't necessarily be precise for cash expenditures and they might come later after the amount is removed from the account, we define this ATM withdraw object.

### List

Manage ATM withdraws

Account 1 / Mouvements / List of ATM withdraws

Current Amount: £1260.01

List of ATM withdraws

Date Withdraw	Description	Initial Amount	Current Amount	Already Debited
06/11/2016	ATM 06/11/2016 (Left: £100.00)	£100.00	£100.00	<input type="checkbox"/>

Showing 1 to 1 of 1 entries

Previous 1 Next

Available actions:

- Sort
- Create
- Update
- Close ATM withdraw.
- Delete (with confirmation). Disabled if used by at least one cash expenditure.

### Create/Update ATM Withdraw

Manage ATM withdraws

Account 1 / Mouvements / Create an ATM withdraw

Current Amount: £1360.01

Create an ATM withdraw

Date Withdraw

06/11/2016

Initial Amount

100

Already Debited

☒

Save

Back to List

Property	Type	Description	Required	Size	Other constraints
Date Withdraw	Date		Yes		
Initial Amount	Decimal		Yes		
Already Debited	Yes/No				

Business rules:

- When an ATM Withdraw is created, the cost is debited from the account.
- When an ATM Withdraw is updated, the old cost is credited to the account and the new cost is debited from the account.

**Close ATM withdraw**

Closing an ATM withdraw means that we won't be able to take any cash expenditures on it. It might not be zero as the cash expenditures are not precise.

## El\_03 - Expenditure Listing (common features)

### Description

Depending on the payment method, the expenditure management might be different.

We distinguish 3 different expenditure strategies:

- **Common expenditures:** used for CB, Direct Debit and Transfer. Target is an account.
- **ATM withdraw expenditures:** used for Cash payment only. Target is an ATM withdraw.
- **Internal transfer expenditures:** used for Internal Transfer payment only. Source is an account. Target is another account.

In this first user case, only the common features will be described, then the different strategies are described in the following user cases.

### List

Manage expenditures

Account 1 / Movements / List of expenditures

Current Amount: £1150.01

List of expenditures

Search:

Date	Cost	Expenditure Type	Payment Method	Description	Already Debited
06/11/2016	£100.00	Savings	Internal Transfer	Internal Transfer Expenditure	<a href="#">✎</a> <a href="#">🗑</a>
05/11/2016	£50.00	Food	CB	test	<a href="#">✎</a> <a href="#">🗑</a>
05/11/2016	£100.00	Energy	CB	test	<a href="#">✎</a> <a href="#">🗑</a>
18/10/2016	£69.99	Transport	CB	Taxi to go to the airport	<a href="#">✎</a> <a href="#">🗑</a>
10/10/2016	£20.00	Food	CB	Drinks at the pub	<a href="#">✎</a> <a href="#">🗑</a>
20/09/2016	£10.00	Food	Cash	Cash Expenditure	<a href="#">✎</a> <a href="#">🗑</a>
12/09/2016	£10.00	Energy	CB	Common Expenditure	<a href="#">✎</a> <a href="#">🗑</a>

Showing 1 to 7 of 7 entries

Previous1Next

Available actions:

- Sort
- Create
- Update
- Delete (with confirmation).

## El\_04 – Expenditure Management (Common Expenditures Strategy)

### Create

Manage expenditures

Account 1 / Mouvements / Create expenditure

Current Amount: £1260.01

Create expenditure

Description

Common Expenditure

Date

12/09/2016

Cost

10

Expenditure Type

Energy

Payment Method

CB

Already Debited

☐

Save

Next

Back to List

When an expenditure with payment method “CB”, “Direct Debit” or “Transfer” is created, the cost is debited from the account.

### Edit

In edit mode, we can change the payment type and as a consequence, the old target should be refunded before we debit on the new target.

If an expenditure with payment method “CB”, “Direct Debit” or “Transfer” is updated to:

Common (CB, Direct Debit or Transfer)	ATM Withdraw (Cash)	Internal Transfer
<div>Cost Has Changed</div> <div>El_04_R1</div> <div>Current Account is credited by old cost.</div> <div>Current Account is debited by new cost.</div>	<div>El_04_R2</div> <div>Current Account need to be refunded (old cost).</div> <div>ATM Withdraw need to be debited (new cost).</div>	<div>El_04_R3</div> <div>Current Account need to be refunded (old cost).</div> <div>Income created (Transfer) on Target Account.</div> <div>Target Account need to be debited (new cost).</div>

### Delete

Deleting a common expenditure will credit back the current account.

## El\_05 – Expenditure Management (ATM Withdraw Strategy)

### Create

Manage expenditures

Account 1 / Mouvements / Create expenditure

Current Amount: £1150.01

Create expenditure

Description

Cash Expenditure

Date

20/09/2016

Cost

10

Expenditure Type

Food

Payment Method

Cash

ATM Withdraw

ATM 06/11/2016 (Left: £100.00)

Save

Next

Back to List

When an expenditure with payment method "Cash" is created, the cost is debited from the selected ATM withdraw.

When this expenditure is added, the Current Amount is automatically updated for the selected ATM:

Manage ATM withdraws

Account 1 / Mouvements / List of ATM withdraws

Current Amount: £1150.01

List of ATM withdraws

Date Withdraw	Description	Initial Amount	Current Amount	Already Debited
06/11/2016	ATM 06/11/2016 (Left: £90.00)	£100.00	£90.00	

Showing 1 to 1 of 1 entries

Previous 1 Next

### Edit

In edit mode, we can change the payment type and as a consequence, the old target should be refunded before we debit on the new target.

If an expenditure with payment method "Cash" is updated to:



Common (CB, Direct Debit or Transfer)	ATM Withdraw (Cash)		Internal Transfer
EI_05_R1  ATM Withdraw need to be refunded (old cost).  Current Account need to be debited (new cost).	ATM Withdraw Has Changed	Same ATM Withdraw, Cost Has Changed	EI_05_R4  ATM Withdraw need to be refunded (old cost).  Income created (Transfer) on Target Account.  Target Account need to be debited (new cost).
	EI_05_R2  Old ATM Withdraw need to be refunded (old cost).  New ATM Withdraw need to be debited (new cost).	EI_05_R3  ATM Withdraw is credited by old cost.  ATM Withdraw is debited by new cost.	

### Delete

Deleting an ATM withdraw will credit back the ATM withdraw.

## El\_o6 – Expenditure Management (Internal Transfer Strategy)

### Create

Manage expenditures

Account 1 / Mouvements / Create expenditure

Current Amount: £1250.01

Create expenditure

Description: Internal Transfer Expenditure

Date: 06/11/2016

Cost: 100

Expenditure Type: Savings

Payment Method: Internal Transfer

Internal Account: Account 2

Save Next Back to List

When an expenditure with payment method "Internal Transfer" is created, the cost is debited from the account and the cost is credited to the selected internal account.

When this expenditure is added, an income is automatically added to the selected internal account:

PFM

Hello test@test.com! Log off

Home Dashboard Movements Configuration

Account 2

Manage incomes

Account 2 / Mouvements / List of incomes

Current Amount: £3100.00

List of incomes

Search:

Date Income	Cost	Description
06/11/2016	£100.00	Transfer: Internal Transfer Expenditure

Showing 1 to 1 of 1 entries

Previous 1 Next

### Edit

In edit mode, we can change the payment type and as a consequence, the old target should be refunded before we debit on the new target.

If an expenditure with payment method "Internal Transfer" is updated to:

Common (CB, Direct Debit or Transfer)	ATM Withdraw (Cash)	Internal Transfer	
<p>El_06_R1</p> <p>Target Account need to be refunded (old cost).</p> <p>Expenditure created (Transfer Cancel) on Target Account.</p> <p>Current Account need to be debited (new cost).</p>	<p>El_06_R2</p> <p>Target Account need to be refunded (old cost).</p> <p>Expenditure created (Transfer Cancel) on Target Account.</p> <p>ATM Withdraw need to be debited (new cost).</p>	<p>Internal Account Has Changed</p>	<p>Same Internal Account, Cost Has Changed</p>
		<p>El_06_R3</p> <p>Old Target Account need to be refunded (old cost).</p> <p>Income removed on old target account.</p> <p>New Target Account need to be debited (new cost).</p> <p>Income created (Transfer) on new target account.</p>	<p>El_06_R4</p> <p>Target Account is credited by old cost.</p> <p>Target Account is debited by new cost.</p>

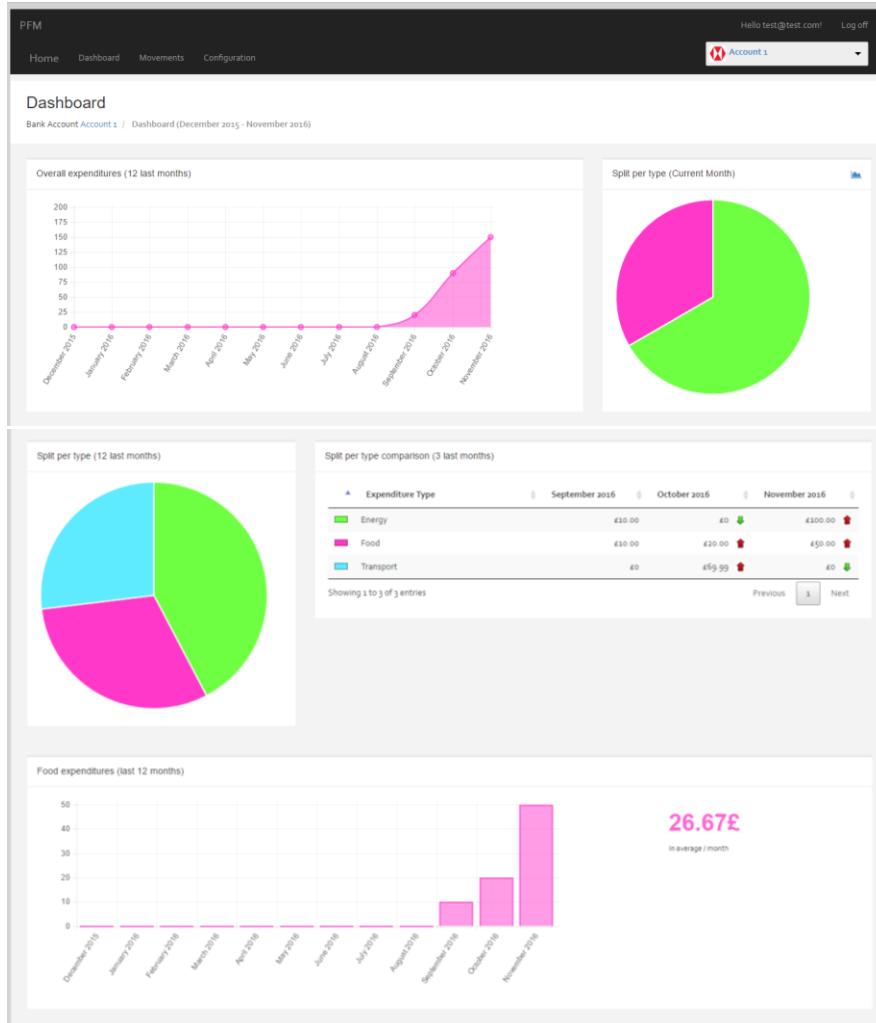
### Delete

Deleting an internal account expenditure should cancel the income to the selected target account and credit back the current account.

## D\_01 - Expenditures Dashboard

Five visualizations are available in this dashboard:

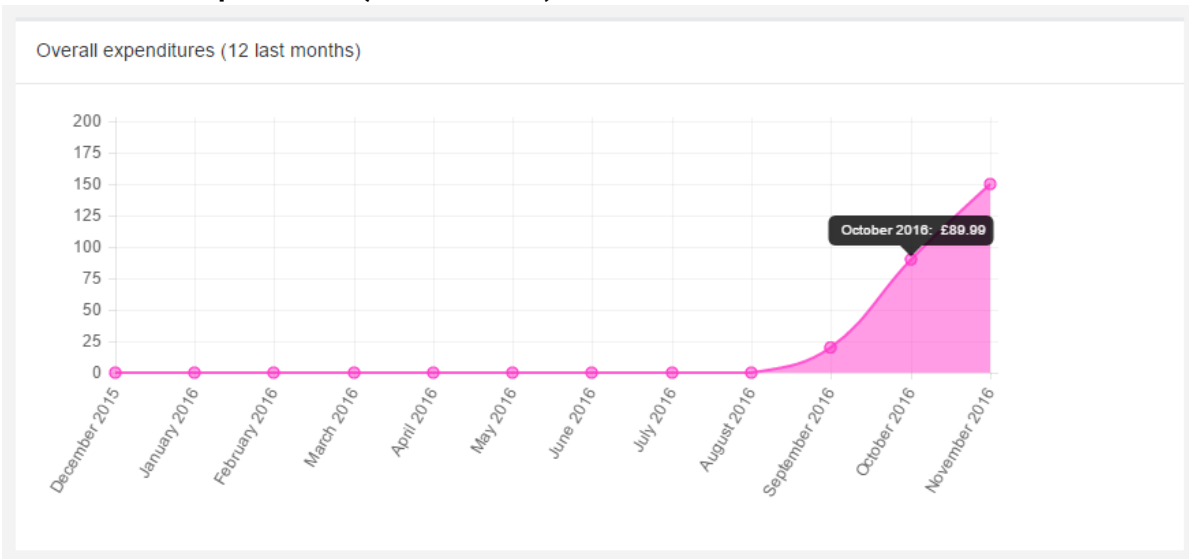
1. Overall expenditures (12 last months)
2. Split per type (Current Month)
3. Split per type (12 last months)
4. “Type” expenditures (12 months)
5. Split per type comparison (3 last months)



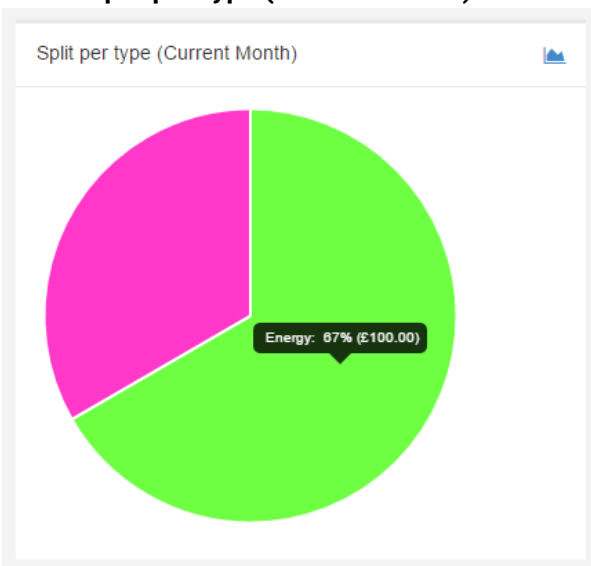
When the data is analysed for over a year, we take 12 months including the current month. For example, in November 2016, we want to see the data from 1<sup>st</sup> of December 2015 to 30<sup>th</sup> of November 2016.

- **Start Date:** first day of the current month – 11 Months
- **End Date:** last day of the current month

### Row 1: Overall expenditures (12 last months)



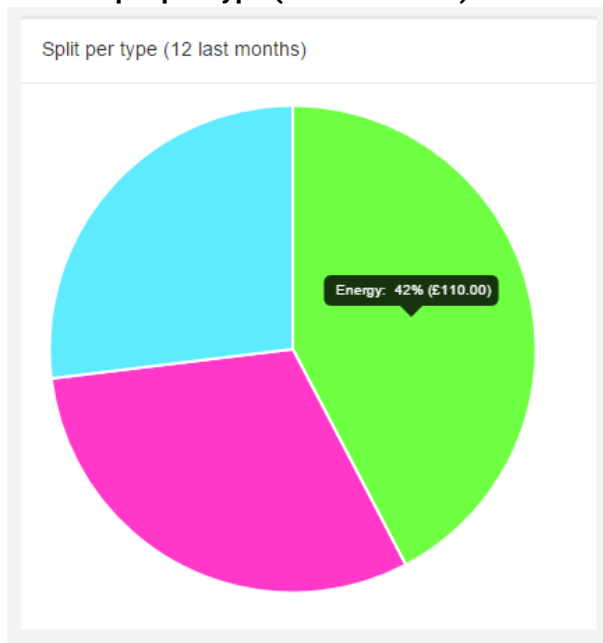
### Row 1: Split per type (Current Month)



Action available:

- Button  will open Row 2

## Row 2: Split per type (12 last months)



Action available:

- Click on pie chart split will open the Row 3

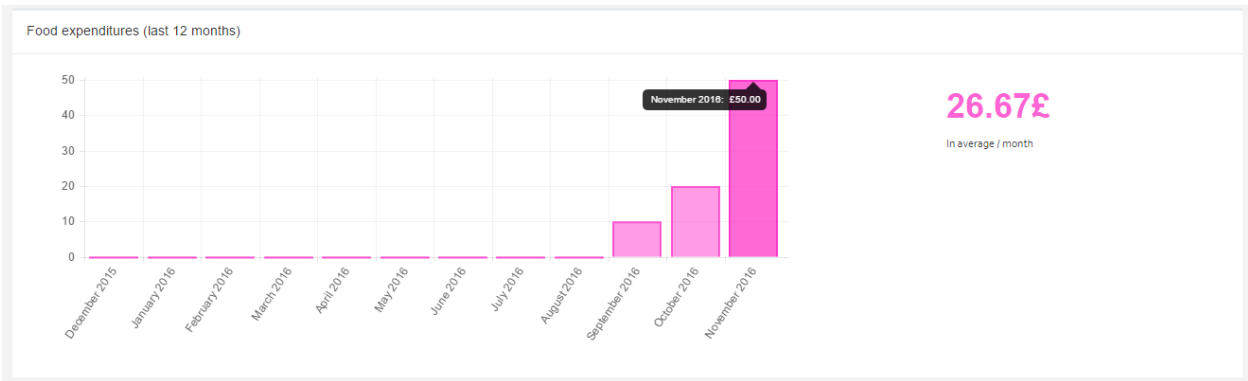
## Row 2: Split per type comparison (3 last months)

Split per type comparison (3 last months)				
Expenditure Type	September 2016	October 2016	November 2016	
Energy	£10.00	£0	£100.00	
Food	£10.00	£20.00	£50.00	
Transport	£0	£69.99	£0	

Showing 1 to 3 of 3 entries

Previous 1 Next

## Row 3: “Type” expenditures (12 months)



The average is computed from the moment we started registered the expenditures, not before. For instance, we show the data from December 2015, but our first expenditures registered in the system was in September 2016. The average is then computed from September 2016 and the zero values are ignored from December 2015 to August 2016 are not considered in the computation.

## AUD\_01: Historic Movements

### Tracking movements

In the table HistoricMovementModels, all movements are registered (even the deleted ones):

Column	Description
<b>Id</b>	ID.
<b>AccountId</b>	Source Account ID.
<b>AtmWithdrawId</b>	Target ATM Withdraw ID. Optional.
<b>Date</b>	Date of the movement (not the expenditure date).
<b>Cost</b>	Negative if debit, Positive if credit.
<b>MovementType</b>	Income = 0 Expenditure = 1 AtmWithdraw = 2