# Paynote

This paper will detail the capabilities of the
Paynote applications

15 oct 2020

# Table of contents

# Introduction

Overall, people currently under 45 years of age have a net worth that is at least 30% lower than what the baby boomers had at their age. If we restrict the analysis to people currently under 25 the situation becomes even worse. An increase in the number of people living alone (something that brings about a large dose of self-reliance) is also a complicating factor to the overall people's financial health.

This state of affairs requires an increased focus on monitoring one's financial status. This is more than just simply tracking revenues and costs very closely. It is also a matter of finding ways to reduce expenditures, or – at least – to spend efficiently.
Technology can help. Paynote is a system that tracks money going in and out of your account(s, monitors your financial transactions, categorizes your expenses, and gives suggestions on how to reduce outlays and overheads.

You can use Paynote to define and manage a budget and to forecast your incomes and expenses, but that is not all it does. It identifies your financial behavior, collecting and analyzing data from bank accounts optimizes your cash flow, categorizes all your transactions, and builds your financial profile.

The anonymized financial profiles became accessible to third parties that can make custom offers to Paynote users, these offers are then filtered by Paynote and only those that are considered advantageous to a specific profile get distributed within that profile. Third parties only access the anonymized common details, which, from their point of view, represent a group of users. Those third parties have no access to the identity of any of the individuals behind a specific profile. The separation is total, third parties that use Paynote to access specific profiles of clients to create ad-hoc offers do not see the activity of any individual user, Paynote users access their data and can only see information related to their financial profile. This dual architecture allows users to remain anonymous and still receives offers that would help them make the most out of their financial situation.

This is not the only way that Paynote manages your transactions. Analysis and categorization allow you to see how much money you spend each month in each category.

Paynote is the application that provides insights into your financial situation. A transparent, honest, and above all clear financial analysis. Through its dual portal, it also helps you make the most out of your money by suggesting offers specifically selected for their level of convenience.

# How it works

## 2.1  How it works for the user.

Paynote will start from the mobile app, it supports all mobile platforms. In time, Web, SmartWatch. and Desktop will follow in this order. The process to connect and synchronize all the devices is shown in Figure 1 below. The QR code is an added level of security to ensure that the other devices are connected by a legitimate user of the app.
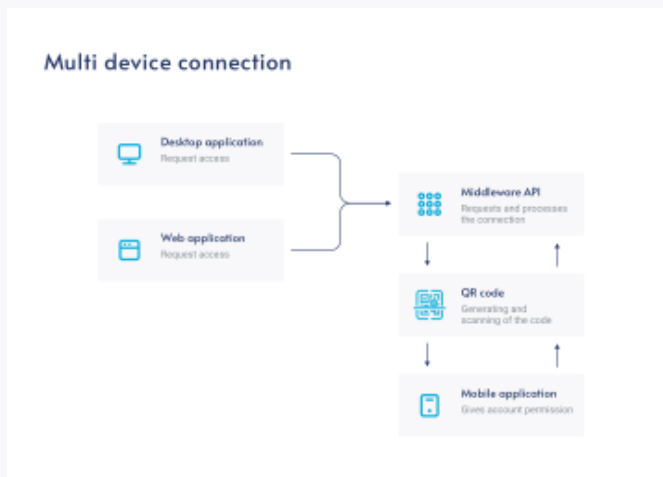


Figure 1 – Connecting multiple devices to the same user account

## 2.1.1 Connecting to your bank account

The app needs to connect to your bank account(s) to capture all the transactions to manage your budget and be able to prepare a forecast. This is achieved through a middleware API (see Figure 2 below) that reads the necessary information and retrieves the relevant ones to include them in the Paynote Data Base in a way that is secure, confidential, and fully compliant with GDPR.



Figure 2 - Connecting to the bank account(s) and retrieve relevant transactions

Paynote analyzes your transactions by recognizing patterns and tagged subscriptions. This information is added to a list of upcoming direct debits retrieved from your bank account(s). All together they are used to forecast your financial situation in the medium to long term (see Figure 3 below).



Figure 3 - Forecasting flow

## 2.1.2　　　User's financial profile

We collect and analyze a user's transactions for the last seven years so we can determine a user's financial behavior; which payments go to whom with a specific description of the recipient, where transactions take place, etc. If there are persons with the same last name and address in this environment, we can suggest to link them together as family members. We collect how much shopping someone does and what is bought based on the price per product of all Dutch stores. A user can also scan receipts and link them to the transaction. The process is shown in Figure 4 below.



Figure 4 - Collecting and analysing transactions

Users activate suggestions to make a better, more efficient use of their money through their financial profile. For instance, under every recurrent transaction within the system, there is a switch button (which is included by default) that enables the user to switch to another supplier. We offer each user the top 5 alternatives the system has selected as the cheapest.

Then there is an option for a monthly (salary period) push message, which users get if they want to actively save. In this push message, we offer a maximum of 5 suppliers users can switch to if they are cheaper than their current subscription. This push message is only activated on request.

## 2.2 Third parties

We never sell personal data. The data sold to third parties is a statistical overview of bundled data created using the transactions of at least 100 different users. The user can select whether their data can be used for such bundles or not. The data supplied to third parties cannot be traced to any specific person, they represent market intelligence information such as:

- Which supermarket sells the most
- Which area within a city can you shop cheaply
- Which age group saves the most
- Which age group is financially healthy
- How much the average household saves
- How many children an average household has
- Which category is richer, somebody who lives alone or somebody who shares accommodations
- Areas within a city or country in which the greatest poverty lies.

Third parties can buy access to bundled information and can also offer their services. We receive their offers and filter them. The user will never see an offer that is not cheaper than what they currently use. We do not go for quantity but for quality, the user is our top priority. The advertiser has a dashboard where they can keep track of how often their offer has been viewed and how many people have switched. Their dashboard however will not show them any information of specific users who viewed their offer or who switched to them from their previous suppliers, only anonymous summaries will be available.

## 2.3 Security

### 2.3.1      Encryption

Paynote features end to end encryption using APIs. All API requests will be POST request with bearer token authorization and a TLS layer which shall make all those requests secure.
The bearer token is a cryptic string, usually generated by the server in response to a login request.

The data is stored encrypted within an MYSQL Enterprise TDE environment. which enables data-at-rest encryption by encrypting the physical files of the database. Data is encrypted automatically, in real-time, before writing to storage and decrypted when read from storage. As a result, hackers and malicious users are unable to read sensitive data from tablespace files, database backups, or disks. MySQL Enterprise TDE uses industry-standard AES algorithms.

We also use Couchbase for the storage of non-relational data, including user personal data and transaction data, which is also referred to as 'big data'. For this purpose, we provide additional security when it comes to storing and managing data.

The structure and the way we store data remains within the environment of Paynote.

### 2.3.2    Nothing is saved on the phone

NO information related to the users' account information or PCI standard will be saved on the phone, including all the cards and bank account details along with the transaction details.

The user's bank details will be stored in an encrypted manner using the Threefish 1024-bit.

Only user back-up will be saved on the phone but encrypted and can be uploaded to the server.

# Conclusion

For a user, Paynote is a personal finance management tool, the ultimate financial data hub that respects your privacy and your decisions. They also make use of anonymous users' profiles based on information provided by the users. Third-party can access those anonymized user profiles to define offers specifically tailored to that profile, they do not see who's behind it.

Paynote provides a secure way to manage your finances. It also provides suggestions on how you can make more efficient use of your money.

A generation that has lost a huge chunk of the purchasing power their parents have, has a tool that helps manage their cash flow against a budget.

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